

INCINERATOR EXHAUST MONITOR

CLASS "A" DESIGN

ABERDEEN CHEMICAL PLANT

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DTH 000105928

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I. PURPOSE OF DESIGN

The purpose of this design is to provide a VCM detection system specifically for the exhaust of either of the inert vent incinerators. This system will monitor the exhaust stack of the "on stream" incinerator for the presence of VCM.

Presently, the incinerator exhaust is monitored for VCM by the fixed point monitoring system. This stream is analyzed once every ten minutes by the monitoring system which is set at a span of 0-10 ppm VCM. The vinyl chloride standard states that any emissions from the incinerator "which averaged over any hour period (commencing on the hour) are in excess of the emission limits" (10 ppm) must be reported to the EPA. Use of the existing continuous monitoring system with a span of 0-10 ppm VCM presents a problem each time the incinerator exhaust exceeds 10 ppm or registers full scale. The exact concentration of VCM cannot be obtained and it is not positively known whether the vinyl chloride standard is exceeded. Also, with the present system, the possibility of cross contamination between sampling points exists. To correct these problems, this design proposes to install a gas chromatograph specifically for the inert vent incinerator exhaust. The proposed system will have a span of 0-60 ppm VCM and will analyze the exhaust every ten minutes. With this system, if the incinerator exhaust exceeds the maximum span of 60 ppm VCM, the average will be over 10 ppm VCM and the emission will need to be reported. If the exhaust exceeds 10 ppm but is less than 60 ppm, an hourly average can then be calculated for the emission. This system will also eliminate cross contamination problems.

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II. PROCESS DESCRIPTION

A slip stream is taken from an incinerator exhaust stack and is filtered, dried, and pulled to the sample conditioning system. The sample conditioning system filters the sample again and sends it to the analyzer section. (The conditioning system also provides a means of calibrating the gas chromatograph with a gas standard for span and separation.) In the analyzer section sample separation is accomplished with a stripper configuration for the columns. The first column "strips" the "heavies" from the "lights" and the second column separates VCM from the "lights". A Flame Ionization Detector (FID) analyzes the VCM concentration and sends the raw signal to the Control Section. The Control Section sends a processed signal to the bargraph recorder and the Fixed Point Monitor Data Computer, both located in the Vinyl Control Room. As an option, the Control Section may send the processed signal to a second bargraph recorder located in the Old Large Reactor Control Room for the purpose of checking span adjustment and separation.

The fixed point monitor data computer will receive the signal from the gas chromatograph and be reprogrammed to perform the following:

- 1) If the VCM concentration exceeds 10.0 ppm, the existing incinerator alarm will be activated. The concentration, time, and location will be immediately printed on the printer associated with the data computer located in the control room. These readings above 10.0 ppm will also be printed out with the shift summary. (See attached shift report format)
- 2) Hourly concentration averages (commencing on the hour) will be calculated. These hourly averages will be printed at the end of each 12 hour shift. (7 AM and 7PM). (See attached shift report format).
- 3) If any hourly average exceeds 10.0 ppm, the concentration, time (at the beginning of the hour), and location are to be printed immediately along with the message "INCINERATOR EXHAUST HAS EXCEEDED ALLOWABLE LIMITS. CONTACT OPERATIONS SUPERINTENDENT AND CHIEF PROCESS ENGINEER IMMEDIATELY".
- 4) A monthly summary will consist of the actual number of data points grouped into the following ranges:
 - a) 0.0 - 0.5 PPM
 - b) 0.5 - 1.0 PPM
 - c) 1.0 - 5.0 PPM
 - d) Over 5.0 PPM

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The percentages of the data points in each of these ranges will also be calculated. (See attached monthly report format).

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II. PROCESS DESCRIPTION (Continued)

- 5) The data computer will be connected to the incinerator selector switch. This switch will indicate which incinerator is being used. The data computer will print which incinerator is being used on the shift summaries. Also, when the incinerators are switched, the data computer will print immediately the date, time, and indicate which incinerator is now in service. A record of the switches will be printed out on the monthly summary.
- 6) Shift reports will be stored so that any shift can be printed out on demand anytime during the following two weeks.

INCINERATOR EXHAUST MONITOR

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INCINERATOR MONITORING SHIFT REPORT

LOCATION: (EAST OR WEST) INCINERATOR

DATE:

TIME	0700	0800	0900	1000	1100	1200	1300	1400	1500	1600	1700	1800
AVG.												

HIGH READINGS (10.0 ppm or over)

TIME CONCENTRATION

- 1.
- 2.
- 3.

INCINERATOR MONITORING MONTHLY SUMMARY

ABERDEEN CHEMICAL PLANT

	Month:	(Month and Year)
Range, PPM	Number Of Readings	% Of Total
0.0 - 0.5	_____	_____
0.5 - 1.0	_____	_____
1.0 - 5.0	_____	_____
Over 5.0	_____	_____

The (East or West) incinerator was on stream on the first of the month.
The (East or West) incinerator was put on stream on (Day, Month) at (time).
(Repeat each time the incinerator is switched).

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ENGINEERING CENTER

PONCA CITY, OKLAHOMA
SPECIFICATION SHEET

A.F.E. NO. _____
DATE 7-15-81 W.O. NO. _____
MADE BY JLS INQ. NO. _____
APP'D BY VEM REQ. NO. _____
B.M. NO. _____ P.O. NO. _____

PLANT ABERDEEN CHEMICAL PROJECT INCINERATOR EXHAUST MONITOR

ITEM NO. PGC-100
SERVICE ANALYZES EXHAUST FOR VCM

MODEL & MFG. (1) DANIEL MODEL H-1000 PROCESS GAS
CHROMATOGRAPH INCLUDING ANALYZER
SECTION, CONTROL SECTION, AND
APPLICATION ENGINEERING.

SPECIFICATIONS OF THE ANALYZER SYSTEM

CARRIER GAS : NITROGEN
ANALYSIS CYCLE : 60 SECONDS OR LESS
DETECTOR : FLAME IONIZATION
COMPONENT MODULES : DUAL WITH CONTINUOUS OUTPUT
FOR MEMORY

MEASUREMENT RANGE, Mol. %

COMPONENTS

VINYL CHLORIDE 0-60 PPM

STREAM COMPOSITION COMPOSITION, Mol. %

COMPONENTS

WATER 19.7

NITROGEN 65.7

OXYGEN 2.9

CARBON DIOXIDE 11.6

CHLORINE 25 PPM

NO_x 200 PPM

VCM 5 PPM

HYDROGEN CHLORIDE 40 PPM DTH 000105935

OPTIONS AND ACCESSORIES

- ONE (1) DANIEL SAMPLE CONDITIONING SYSTEM, PLATE-MOUNTED, COMPLETELY PLUMBED WITH ALL NECESSARY METERING, GAUGING, AND FILTERING DEVICES TO SUPPLY

SHEET 1 OF 2 REV 0



ENGINEERING CENTER

PONCA CITY, OKLAHOMA
SPECIFICATION SHEET

A.F.E. NO. _____
DATE 7-15-81 W.O. NO. _____
MADE BY JLS INQ. NO. _____
APP'D BY VEM REQ. NO. _____
B.M. NO. _____ P.O. NO. _____

PLANT ABERDEEN CHEMICAL PROJECT INCINERATOR EXHAUST MONITOR

ITEM NO. PGC-100
SERVICE ANALYZES EXHAUST FOR VCM

THE ANALYZER WITH A CONTINUOUSLY REPRESENTATIVE AND MEASURABLE SAMPLE. (IN ENCLOSURE)

2. TWO (2) HONEYWELL MODEL III-X, 6" STRIP CHART RECORDERS WITH SPECTRUM AND BARGRAPH READ-OUT FOR ANALYZER DATA.
3. AIR SET CONSISTING OF SPECIAL FILTER/COALESCER, PRESSURE REGULATOR, AND PRESSURE INDICATOR.
P/N 30741240-001.
4. CARRIER GAS DRYER TO REMOVE TRACE MOISTURE AND CONTAMINANTS FROM THE CARRIER GAS, ASSEMBLED AND MOUNTED ON ANALYZER. P/N 30741273-001.
5. EXTENDER BOARD FOR MAINTENANCE CONVENIENCE
P/N 30740228-001.

NOTES:

1. CONTROL SECTION OF GAS CHROMATOGRAPH TO CONTAIN THE FOLLOWING MODULES: (1) MONITOR, (2) SEQUENCER, (3) AMPLIFIER, (4) DUAL VALVE, AND (5) DUAL COMPONENT W/MEMORY.

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Analyzer Section

The Analyzer Section of the Model 1000 Chromatograph is designed to perform the high-speed analyses required by the technological advances of recent years. Although the need existed for near-continuous analyses of process streams, suitable gas chromatograph equipment was not available prior to the introduction of the Model 1000.

The heart of this high-speed analytical system is the Micro Packed Column, used exclusively in the Model 1000. With efficiencies as high as 115 plates per inch, the length of columns required for most analyses ranges from 2 inches to 24 inches.

The resolution of the Micro Packed Column is complemented by the High-Speed Micro Detectors; both Thermal Conductivity and Flame Ionization types have been designed and are manufactured by Honeywell.

The Honeywell chromatographic valve makes it possible to utilize the complete potential of the high-speed micro gas chromatograph. This diaphragm valve produces sample sizes and profiles demanded by micro gas chromatography techniques. It contains very few moving parts and due to the extremely short movement of the pistons the valve is capable of operating, conservatively, for several million cycles.

These components, the Micro-Packed Column, Micro Detectors and sample and column-switching valves have been packaged in an analyzer designed to provide the ultimate in thermal stability and accessibility. Analyzer oven temperature is controlled by an all solid-state proportional temperature controller. Several modifications to the widely used heated air type of temperature control system have resulted in an analyzer design that permits the full sensitivity of the Micro Detector to be utilized.

The Model 1000 analyzer section is designed for use with modern computer-chromatograph data collection or control systems. Since the Micro Detector bridge assembly and preamplifier are in this section, a computer can be used for the timing, automatic range attenuation, and baseline correction without the need for special interface modules. For further information on Computer Controlled Chromatograph Systems please refer to Honeywell's brochure, GC-16 Computer Chromatograph System.

To simplify maintenance and troubleshooting, the temperature controller, preamplifier and solenoid-switching

cards are plug-in type assemblies. Manual valve control switches are located at the analyzer to further facilitate maintenance.

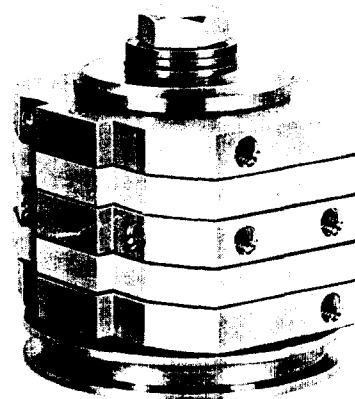
Dual-Pac and Multi-Analyzer Chromatography Systems

The *Dual-Pac* Analyzer design houses two separate analysis applications in a single, standard-size oven.

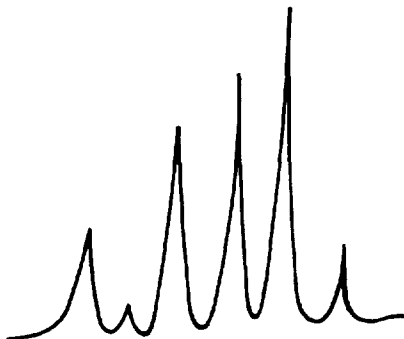
The *Multi-Analyzer* design uses one Control Section for multiple analyzer sections with separate programming controls for each analysis.

Honeywell H-1000 *Dual-Pac* and *Multi-Analyzer* Systems can be custom assembled to meet the requirements of your specific multi-analysis application; from a single control section and a single *Dual-Pac* Analyzer Section, to a single control section and multiple analyzer sections. For any configuration, the H-1000 *Dual-Pac* and *Multi-Analyzer* Systems represent the optimum equipment utilization for reduced system costs and minimum mounting and installation space requirement.

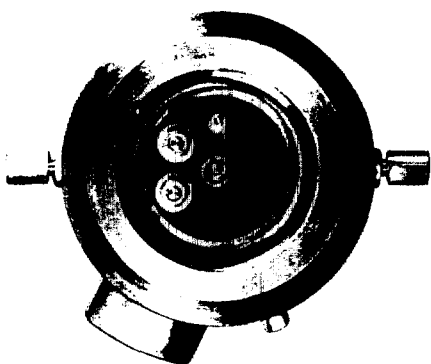
Chromatographic Valve



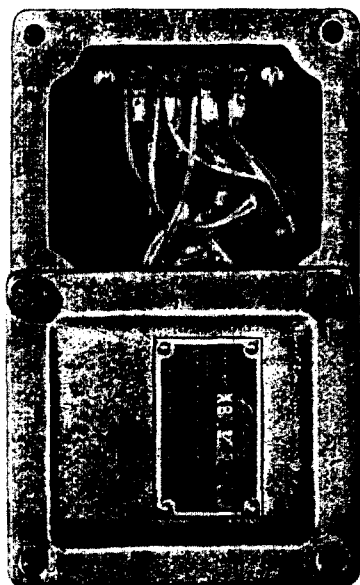
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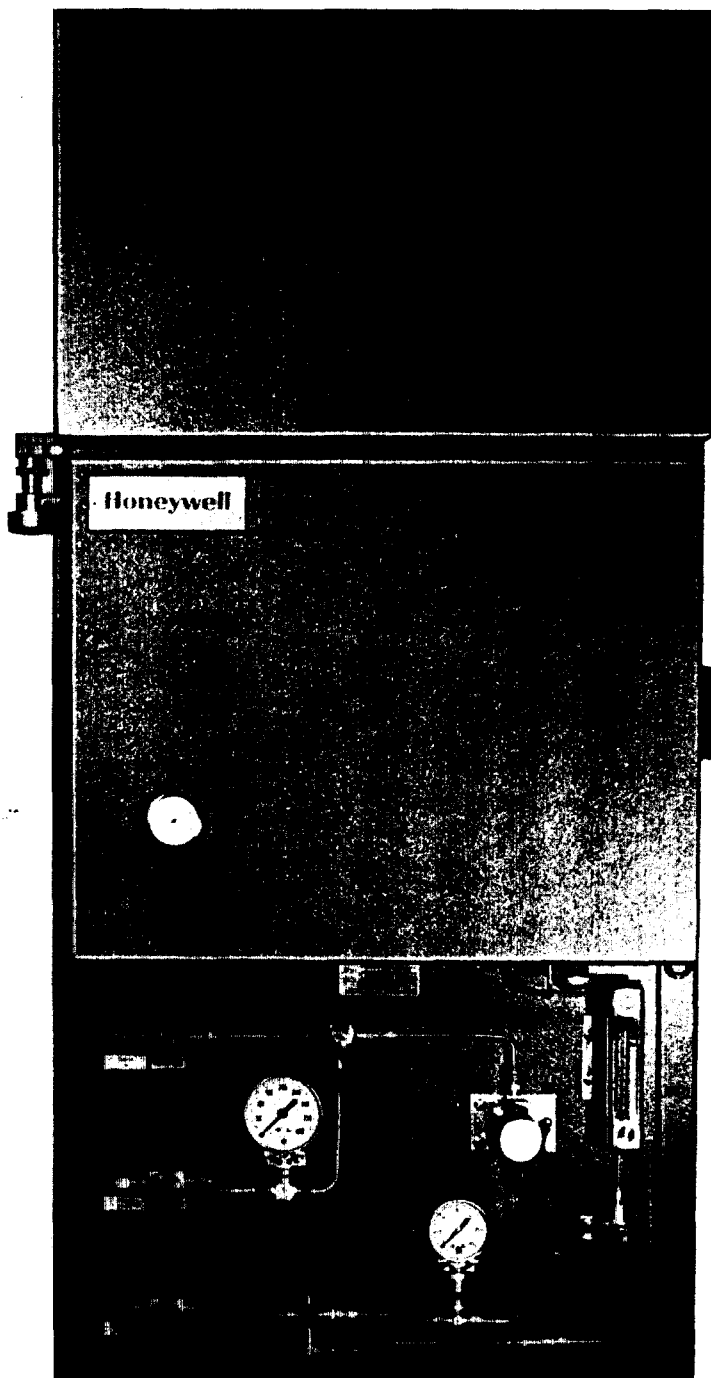
Flame Ionization Detector



Thermal Conductivity Detector



Analyzer Section



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Control Section

The Control Section of the Model 1000 consists of a series of plug-in assemblies, or modules, permitting each chromatograph to be "custom designed" for the intended process application by the selection and installation of appropriate modules.

Modules are easily replaced from the front of the Control Section simplifying troubleshooting or maintenance. All electrical contacts are gold-plated over nickel providing long-term reliability even when the equipment is operated in areas where corrosive atmospheres prevail.

Control Section modules include:

- 1 The MONITOR Module which is essentially a "power control" and maintenance module containing a meter and selector switch for monitoring various parameters of the chromatograph.
- 2 The SEQUENCER Module is the functional center of the Model 1000 Process Gas Chromatograph. The module contains the precision crystal-controlled digital clock on which all system timing is based and the mode selection switch that determines the analysis mode (Auto, Gate, Spectrum, Manual) of the equipment. It also contains the programming switches and control circuitry for selection of sample valve duration and analysis cycle time.
- 3 The AMPLIFIER Module provides final amplification for the preamplifier output from the detector bridge in the Analyzer oven. It also contains the Auto Zero circuitry and an internal calibration circuit. Two types are available for use with the Thermal Conductivity detector, the Flame Ionization detector or the Flame Photometric detector.

- 4 The DUAL VALVE Module contains programming switches and control circuitry for two separate column-switching valves. Toggle switches on the front of the panel permit automatic or manual actuation of either valve.

- 5 The DUAL COMPONENT Module contains programming switches and control circuitry for two separate component gates. Separate front of panel controls for each gate permit operator selection of gate start time and duration, and precise adjustment of amplifier gain during the respective gates.

Two types of Dual Component modules are available:

Without memory circuits, if bargraph readout is desired, or

With two independent memory circuits, each having appropriate Zero and Span adjustments to provide outputs suitable for a trend recorder or a computer.

Either type of module includes a dedicated Auto Zero function which automatically occurs at the gate opening, unless inhibited by a jumper.

- 6 The RATIO Module produces an analog output proportional to the ratio of two selected process components. This module operates in conjunction with, and receives gating information from, a Dual Component Module.

- 7 TEST MOD II is a maintenance module which can be installed in any available component/valve module position in the Control Section without affecting normal system operation. The unit contains indicators and controls that are used to quickly determine the operational status of various system functions that are performed during an analysis.

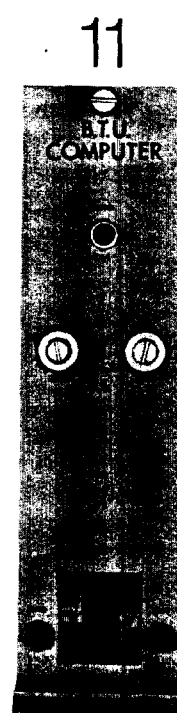
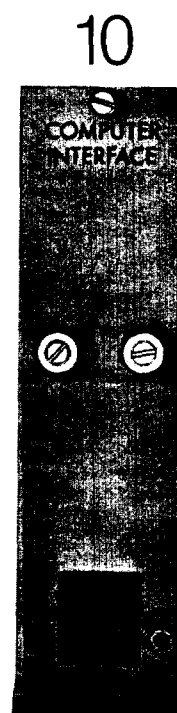
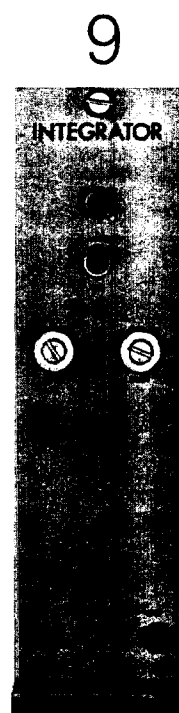
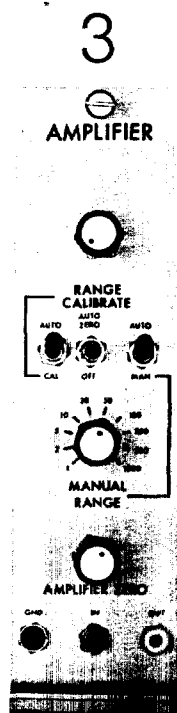
- 8 The STREAM SELECTOR Module contains programming switches and control circuitry for automatic or manual selection of any one of up to ten sample streams for analysis. In automatic mode, streams to be analyzed are selected by front-panel switches and each stream, in sequence, is automatically analyzed. In the manual mode, each successive stream is selected by depressing a STEP pushbutton. In either mode, selected streams can be bypassed by positioning on/off switches to the off position.

- 9 The INTEGRATOR Module produces an analog output proportional to the area of the component peaks detected during a selected portion of an analysis. On completion of the integrator gate, a value proportional to the total area of the peaks detected during the integrator gate, is stored in an output memory circuit. In Auto operating mode, the stored value is updated during each successive analysis.

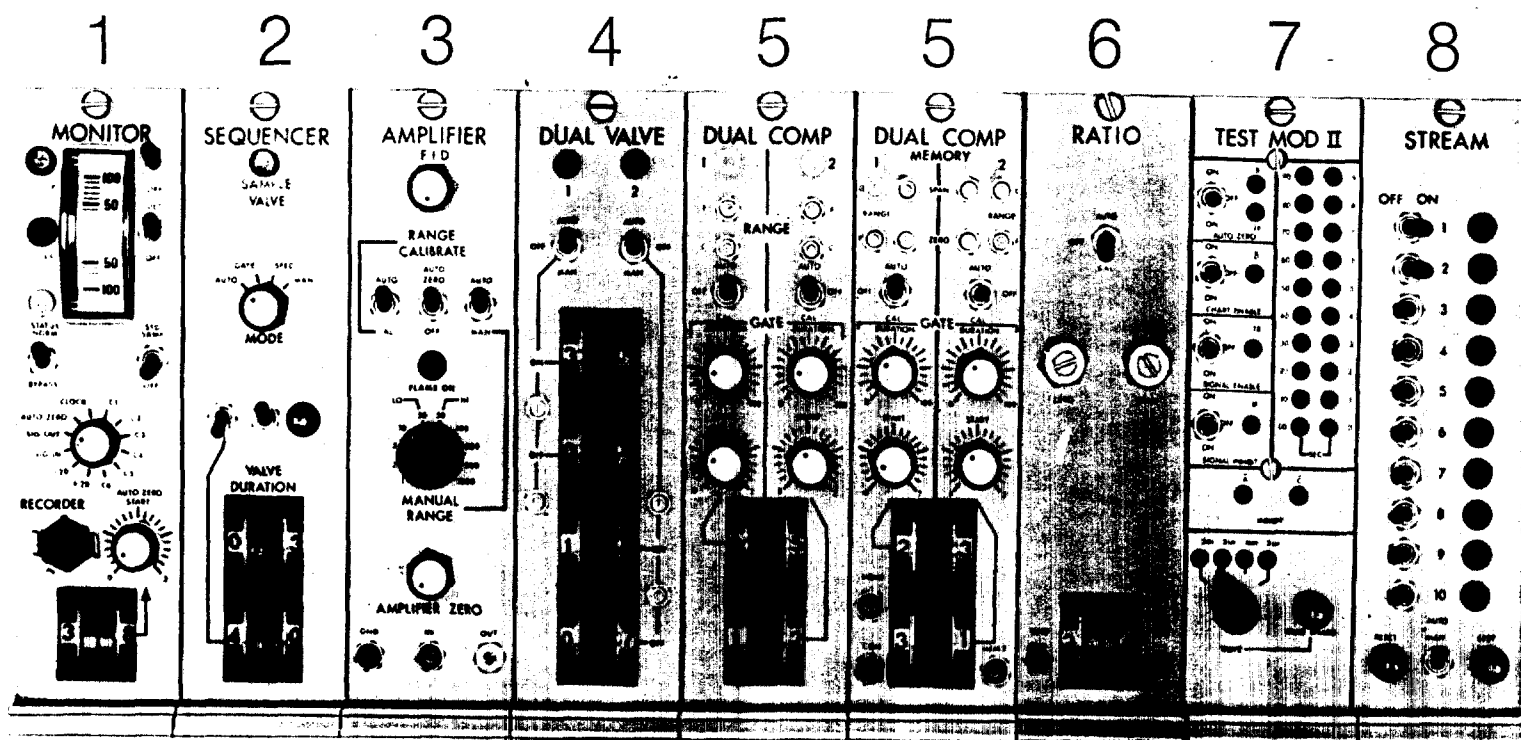
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10 The COMPUTER INTERFACE Module consists of a short-term memory circuit for storage of component peak values and switch closures for computer readout of each successively stored peak. Zero and Span adjustments are provided on the front of the panel.

11 The BTU COMPUTER Module produces an analog output directly proportional to the BTU content of up to eight stream components in a monitored sample. The unit includes six short-term peak memory circuits, input circuits for two additional peak values from external memories, a summing amplifier and a long-term output memory circuit.



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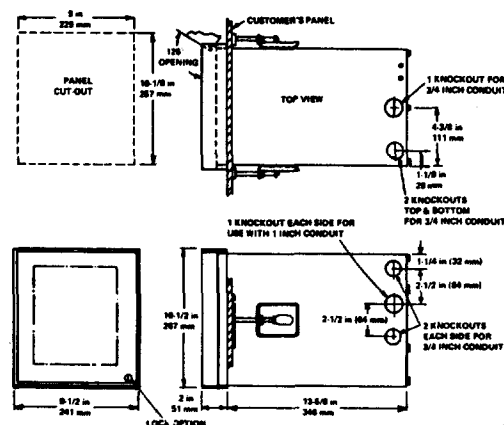
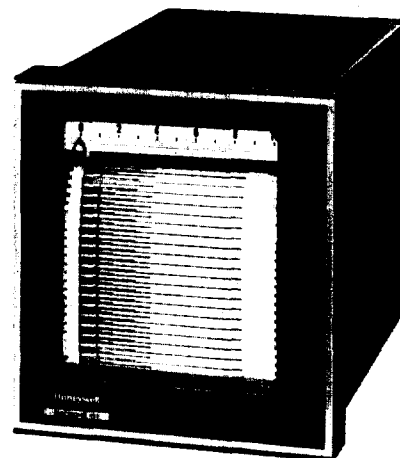


Display and Readout

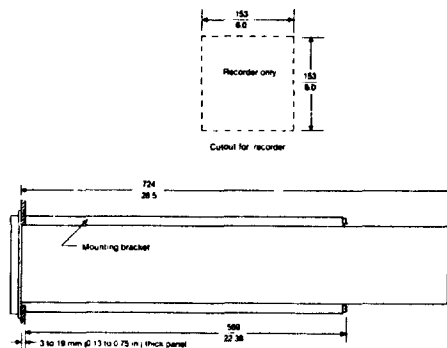
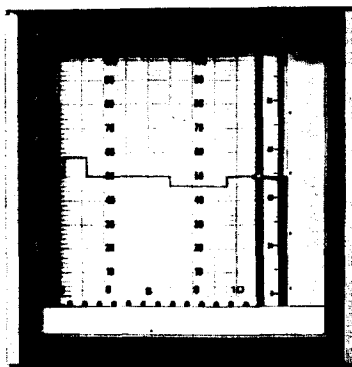
Industry-proved through years of service in rugged process environments, the *ElectroniK 111* Strip Chart Potentiometer is now available with a servo system customized especially to handle the high-speed analysis of the Model 1000 Process Gas Chromatograph.

In addition, the recorder incorporates a unique electric writing system in place of the conventional ink and capillary arrangement. In this system a heated stylus is used which, when heated by the current from a power supply, makes a permanent blue record comparable to a conventional ink record on the heat-sensitive strip chart supplied.

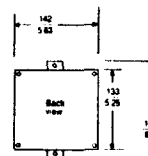
For information concerning additional types of data display and data reduction systems, contact the Honeywell office nearest you.



ElectroniK 111 Recorder



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VutroniK Trend Recorder