File 13-5
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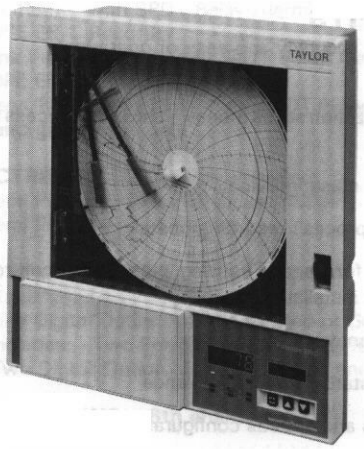
FULSCOPE® ER/C
MICROPROCESSOR-BASED CIRCULAR CHART RECORDER



E-1107-27A

- **Isolated Process Input**
- **± 0.1% Accuracy**
- **Record up to 3 Variables**
- **NEMA 3 Enclosure**
- **Standard Alarm Output**
- **Optional Integration and Totalization**

PRODUCT DESCRIPTION

GENERAL

The FULSCOPE® ER/C Recorder is a microprocessor-based, 10-in. circular chart recorder that can be used to record up to three measured process variables. Process input capability for each pen is user selectable for direct connection of either thermocouple, RTD, mV dc, V dc, or mA dc inputs. Ranging is automatic. Process input is isolated from the rest of the instrument. All thermocouple and RTD linearization is automatically performed. Square-law linearization is user configurable. A 24V dc, nonisolated, transmitter power supply is provided on each pen for use with two-wire mA dc inputs.

Input Fault Detection (Open Inputs, etc.) is provided for each pen (all input types). Upon detection of an input fault, the pen moves to the 0% position on the chart. Error messages are then displayed that identify the specific fault condition.

Record functions, alarm settings, and other parameters are configured via front face mounted keys and easily understood display prompts. All configuration is protected via the instrument's security access system and is contained within nonvolatile memory.

RECORD

The instrument incorporates a 10-in. circular chart for use with up to three pens: red, green, and blue.

Each pen is also user selectable as an event marker. The event pen(s) will record on the outside edge of the chart. Upon an event occurrence, the pen will drive inward to a preset position and record at that point for the duration of the event, and the alarm relay will change state.

A convenient Pen Change/Chart Change switch provides quick and unobstructed access to the instrument chart or pens for easy replacements. A snapdown chart hub allows for convenient chart changes.

DISPLAY

The FULSCOPE ER/C Recorder is provided with two digital displays. The main display indicates the measured process variable of either of the pens specified. Display resolution for thermocouple and RTD inputs is configurable to either 0.1 or 1 degree. For mV dc, V dc, and mA dc inputs, the decimal point is configurable for fixing resolution at either 0001., 000.1, 00.01, or 0.001 engineering units. Configuration of the decimal point position sets the display's minimum and maximum engineering unit limits. Engineering unit identification is user selectable using labels provided with each instrument. The secondary display is used for instrument configuration and error messages.

ALARMS

Two alarm indications (HI and LO) are provided for each pen. Alarm LEDs are provided on the instrument door. Alarm thresholds are configurable over the full instrument range.

An SPDT relay is provided with each pen for use as a single alarm output. Both HI and LO alarms will activate this alarm output. Dual (independent HI and LO) alarm outputs are available for the red and green pens.

Alarm acknowledgement is user configurable. Acknowledging is accomplished by depressing any key on the front face of the instrument. Alarm relays are user configurable for either on/off or latching action. Relays are provided as "fail safe" (instrument power loss results in relay alarm condition).

HOUSING

The instrument housing is a molded, glass fiber filled reinforced polyester that provides excellent corrosion resistance. The instrument is designed to meet NEMA 3 requirements.

Instrument installation is quickly and easily accomplished via use of either the standard panel and surface mounting configurations, or the optional mounting kits specified in Specification Sheet File 16-24 for panel, surface, pipe, and existing installations.

COMMUNICATIONS

An RS-422 serial communications port provides bidirectional communications. This communications port can be quickly and easily added to any FULSCOPE ER/C recorder at any time.

RETRANSMISSION
The red and green pens are provided with a 4 to 20 mA dc process variable output.

INTEGRATOR/TOTALIZER
User configurable 7 digit counter with provisions for: displayed negative sign, reset function, predetermining counter, count direction and preset value.

FEATURES	BENEFITS
• Microprocessor control of linearization, ranging, chart speed, alarms, and other functions	Improved accuracy and ease of operation
• Universal input capabilities include: thermocouples, RTDs, mV dc, V dc, and mA dc	Standardization saves money – universal process recorder
• Isolation of process inputs	Improves noise immunity
• Record, integrate and totalize up to three variables	Reduces process recording costs
• Glass fiber filled reinforced polyester housing is designed to meet NEMA 3 requirements	No need for special housing outside the control room – increases installation flexibility
• Standard alarm relay output on each pen	Saves money
• Large digital indication of measured variable	Process status at a single glance
• Tactile feedback keys and configuration prompts	Simplifies and speeds configuration; reduces errors
• Nonvolatile memory and security access	Ensures process record integrity
• RS-422 communications port	Improves process monitoring capability

SPECIFICATIONS

FUNCTIONAL CHARACTERISTICS

General

Power Supply 120/240V ac ± 10%, 50/60 Hz

Power Consumption 30W typical

Inputs

Ranging of thermocouple and RTD inputs is automatic.

Thermocouples
Minimum Chart Span 3.0 mV

Type	Measuring Range Limit
Type J	–328 to 2192 °F (–200 to 1200 °C)
Type K	–328 to 2498 °F (–200 to 1370 °C)
Type R	32 to 3002 °F (0 to 1650 °C)
Type S	32 to 3002 °F (0 to 1650 °C)
Type E	–328 to 1832 °F (–200 to 1000 °C)
Type T	–328 to 752 °F (–200 to 400 °C)

***RTD (Resistance Temperature Detector)**
Type 3-wire platinum, 100-ohm
Measuring Range Limits –328 to 1562 °F (–200 to 850 °C)
Minimum Chart Span 20.0 ohms

Voltage	Min.	Max.	†Min. Span
mV dc	0	100	20
V dc	0	10	0.2

Current	Min.	Max.	†Min. Span
mA dc	4	20	1

Input Impedance
Millivolt 10M ohms minimum
Volt 10M ohms minimum
Current 100 ohms nominal

Linearization Automatic for thermocouple and RTD inputs. Configurable for square law.
Thermocouple Per NBS125 and IEC584 standards
RTD Per IEC751 and DIN 43760 standards

Process Input Isolation 10M ohms minimum; 45V dc

Transmitter Power Supply Nonisolated 24V dc supply for 20-mA loop. Loop should not be externally grounded.

Outputs

Standard
Relay
Type SPDT
Contact Rating 5A at 120/240V ac

Retransmission (red and green pens) 4 to 20 mA dc into 750 ohms maximum load

Optional (red and green pens)
Relays
Type SPDT
Contact Rating 5A at 120/240V ac

† Minimum spans shown are in compliance with the maximum error limits as defined under **Performance Characteristics.** Actual resolution may be a smaller value.

Record Display

Chart	10 in. circular chart; 100 charts furnished with each instrument if standard range; 4⅛ in. linear record length
Chart Drive	DC stepper motor
Chart Rotation	User configurable from 1 revolution per hour to 1 revolution per 168 hours (7 days) in increments of 1 hour
Digital Displays	
Main Digital Display	
Type	4-digit, 0.56-in. high red LEDs
Digits	7-segment: –999 to 9999, automatic positioning of (–)
Secondary Digital Display	
Type	4-digit, 0.3-in. high red LEDs
Digits	7-segment: –999 to 9999, automatic positioning of (–)
Status Display	3 LEDs provide identification of main digital display indication for pen 1, 2, or 3; pen numbers and colors are cross-referenced
Alarm Display	Red LEDs for HI and LO process alarm indication
Pens	
Type	Disposable, fiber-tipped
Color	
Pen 1	Red
Pen 2	Green
Pen 3	Blue
Pen Resolution	0.1% steps
Event Marker	Each pen is user selectable as an Event Marker

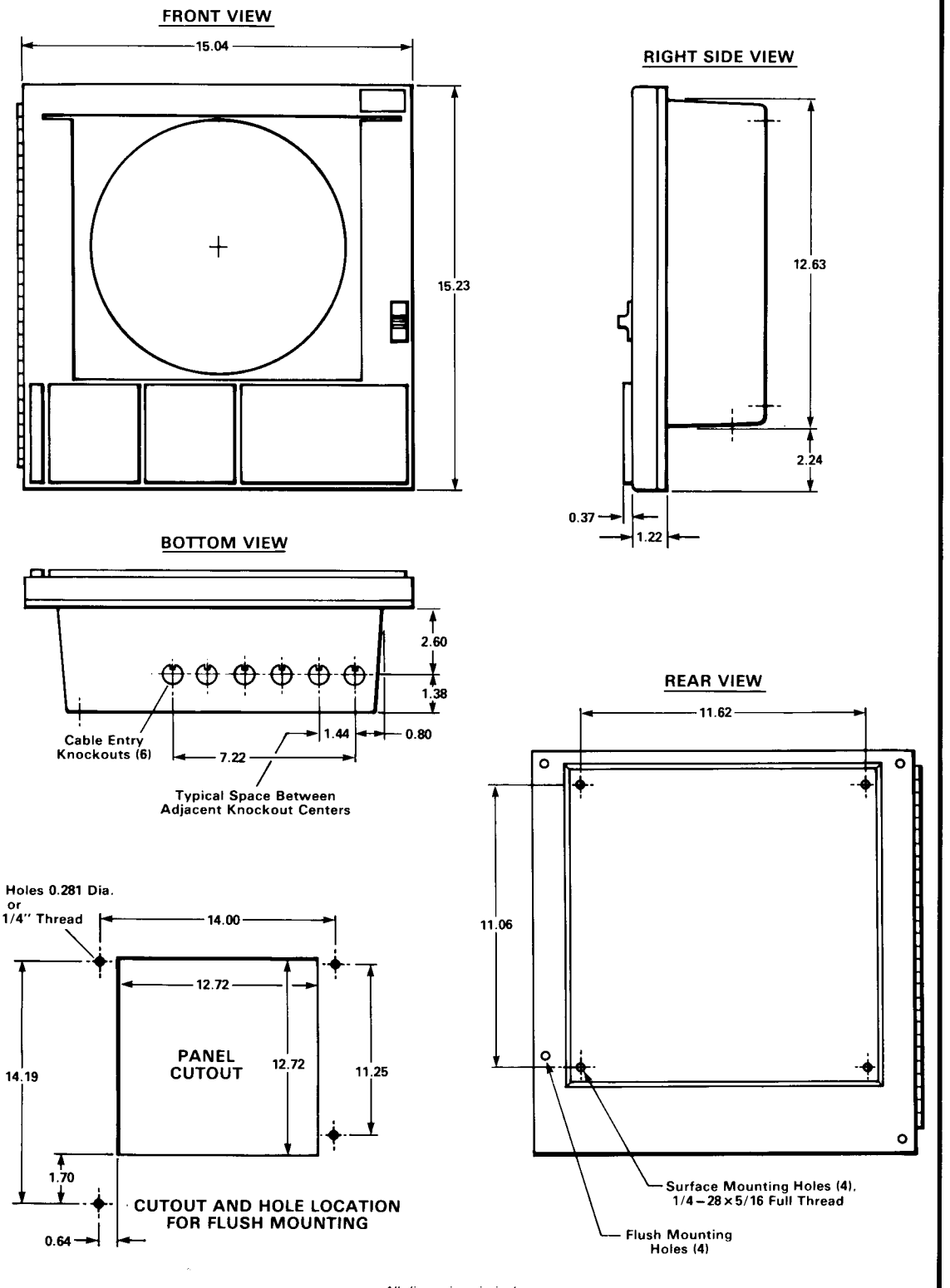
PERFORMANCE CHARACTERISTICS

Maximum Error Limits	
Voltage (V dc)	±0.1% of actual input value or 20 mV, whichever is greater, for zero based input spans from 1.0 to 10V dc
Millivolts	±0.2% of actual input value or 20 μV, whichever is greater, for zero based spans, including volt inputs less than 1.0V dc
Current	±0.2% of actual input value or 20 μA, whichever is greater, for zero based spans
RTD	±0.2% of actual temperature input or 1.0 °C (1.8 °F), whichever is greater, for ranges from –328 to 1112 °F (–200 to 600 °C).
Thermocouple Error Limits Ranges Above 0° (F or C):	**Apply to Zero Based Ranges or**
Type J, K, E, T	±0.2% of actual temperature input or 1.0 °C (1.8 °F), whichever is greater
Type R, S	±0.3% of span as defined under **Functional Characteristics**.
Temperature Calibration	A user-configurable, single-point calibration facility is provided to reduce RTD and Thermocouple measurement error to 0.0° or any user-desired offset; Calibration adjustment is ± 15.0°.
Linearizer Error	±0.1 °C (0.2 °F) typical
Chart Resolution	± ½ division
Display Resolution	Process value rounded to the least significant digit
Retransmission Error (red and green pens)	Nonprecision output
Pen Response Time	9 seconds, typical, for full scale deflection
Operating Conditions	
Temperature	32 to 131 °F (0 to 55 °C)
Humidity	5 to 90% RH (noncondensing)
Thermocouple Resistance	1,000 ohms maximum
RTD Resistance	10 ohms per lead (3-wire connection)
Temperature Stability	±0.02% per °C typical
Supply Voltage Influence	±0.1% for ± 15% variations typical
Sample Time	0.8 second
Agency Approvals	*FDA (pending), CSA certified
Data Retention	10 years typical with instrument unpowered. Data stored in nonvolatile memory. Approximately 10,000 power down cycles permitted.
Electrical Codes	General Purpose, Taylor Standard (on kitted versions only) General Purpose, CSA certified
Input Fault Detection	Upon detection of input fault (thermocouple, RTD, mV dc, V dc, mA dc), pen goes to 0% position; error message is displayed
Common Mode Rejection	120 dB at 50/60 Hz
Normal Mode Rejection	60 dB at 50/60 Hz
Maximum Normal Mode Voltage	15V dc on thermocouple, mV, and volts
Line Interruption	No effect from ½ cycle dropout at nominal line voltage
Line Interference	No effect from 500V for 125 μs
Security Access	Switch on chart plate with hardware override behind chart plate; provision made for wire seal on chart plate; optional door lock.

PHYSICAL CHARACTERISTICS

Overall Size (approximate)	
Height	15.23 in. (387 mm)
Width	15.04 in. (382 mm)
Depth	5.57 in. (141 mm)
Weight (approximate)	18 lb (8.2 kg)
Housing Protection	Meets NEMA 3 requirements
Housing Materials	
Door and Case	Glass fiber filled reinforced polyester molded for excellent corrosion resistance
Mounting	
Standard	Panel or surface
Optional	Refer to File 16-24 for optional mounting kits.

DIMENSIONS



All dimensions in inches.
Not for construction purposes.

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ORDERING INFORMATION

1. Select one character or set of characters from each category and specify complete catalog number as per sample below.
2. Refer to File 16-24 for Accessories. Specify accessories as separate item(s) on order form.

BASE NUMBER – 1st thru 5th characters

1911J FULSCOPE ER/C Recorder
One Pen (Red) – with SPDT Relay Alarm Output and Process Variable Retransmission

1912J FULSCOPE ER/C Recorder
Two Pens (Red, Green) – with SPDT Relay Alarm Output and Process Variable Retransmission on each pen

1913J FULSCOPE ER/C Recorder
Three Pens (Red, Green, Blue) – with SPDT Relay Alarm Output on each pen and Process Variable Retransmission on red and green pens only

ELECTRICAL CODE – 6th character

A General Purpose, Taylor Standard *(Note 1)* — No Extra
B General Purpose, CSA Certified

OPTION MODULE – 7th character

0 None — No Extra
2 One Digital Option Module for Red or Green Pen
Includes: - Two Form C (SPDT) relays for use as independent HI and LO Alarm Outputs
6 Two Digital Option Modules for Red and Green Pens

OPTIONS – 8th character

0 None — No Extra
1 RS-422 Serial Communications Port
3 Integrator/Totalizer
4 Combination of 1 and 3

DOOR – 9th character

1 Without Door Lock — No Extra
2 With Door Lock

FIRMWARE VERSION – 10th and 11th characters

04 Version 4 — No Extra

MODEL (Design Level) – 12th character

A Model A

1911J B 0 0 1 04 A SAMPLE CATALOG NUMBER

NOTE

1. General Purpose available on kitted versions only.

RELATED INFORMATION

Circular Charts	File 9-13
Instruction Book	IB-13D300
Sales Brochure	98287
Quick Reference Guide	98319

Specifications subject to change without notice.

ABB Kent-Taylor

P.O. Box 110
Rochester, NY 14692

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