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NOTICE OF APPROVAL
AVIS D'APPROBATION

G-129

Ottawa, May 23, 1980

RANAREX MODEL 410 RECORDING
GAS GRAVITOMETER

Apparatus

Recording Range:	0.5 to 0.8 relative density (specific gravity)
Chart Number: (Graphic Controls)	441-50080
Chart Minor Divisions:	0.005 relative density (specific gravity)
Chart Size (Nominal):	12 inch, nominal
Ambient Operating Temperature Range:	$0^{o}F$ to $120^{o}F$
Power Requirements:	115 V.A.C., 50 or 60 Hz

Chart Movements:

Electrical - Manufactured by:	Hansen Manufacturing Company, Princeton, Indiana, U.S.A.	
Model Number:	1391LK-24-1-24	RPH
Power Requirements:	110 V.A.C.,	60 Hz
Ramarex Part Number:	187-13389	
Rotational Period:	24 hours	

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Chart Movements: (Continued)

Mechanical -	Manufactured by:	Robertshawl Lux Time Division, Waterbury, Connecticut, U.S.A.
	Model Number:	160-035-7JY
	Ranarex Part Number:	187-13387
	Rotational Period:	24 hours or 7 days

Description

This instrument measures and records the relative density (specific gravity) of gas continuously by comparing the torque transmitted by the gas being tested with that of "standard air". This comparison is performed in two separate gas torque converters (impellers) which spin at approximately 4100 R.P.M. and through which the gas under test and air flow separately.

The relative torsional output through these converters is measured and plotted on a circular chart recorder having a scale indexed from 0.5 to 0.8 relative density.

To assure accuracy of measurement, the gas sample and the reference air must be free of suspended particles or entrained mist and they must be measured at ambient temperature, at atmospheric pressure and at equal dryness. These requirements are to be satisfied by the gas and reference air sampling systems in the following manner:

1. Filtering: A filter must be installed to remove from the gas sample particles larger than 25-micron (.001 inch). If unfiltered instrument air or compressed air is used for reference air, a 25-micron air filter must also be installed.

2. Ambient Temperature: No auxiliary heat exchange devices are required. As the gas sample and reference air flow through the metallic sample lines to the location of the RANAREX Instrument, they will cool or heat by natural heat transfer, to the ambient temperature at the instrument.

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3. Atmospheric Pressure: Where the initial pressures of the gas sample and reference air are above atmospheric pressure, suitable pressure reducing regulators and valves must be installed. When the gas or air pressure exceeds 30 PSIG, the first stage of reduction is to 20 PSIG. The second stage of reduction is to atmospheric pressure. To control the second stage reduction would ordinarily suggest a pressure indicating device. However, greater accuracy and operating convenience are achieved by measuring the corresponding sample flow rate which is 16 SCFH. Variable area (rotometer) flow meters are to be installed for the gas sample and reference air. These meters are graduated in relative density units. The correct flow rate and, consequently the correct inlet pressure, exists when the inlet needle valve is adjusted so the float rises in the flow tube to the relative density of the gas sample (1.0 for air).

4. Equal Dryness: Sample gas shall be "dry" and shall be measured against dry reference air. ("Dry" is defined as having dew point below 50^{o}F at atmospheric pressure.) Where dry instrument air is available at the installation site, provision should be made to use it for reference air. If dry instrument air is not available, the RANAREX Instrument has been equipped with an internal air drier for drying ambient air to use it as reference air.

Sealing/Security

The Ranarex gravitometer case is made from heavy sand-cast aluminum having a door with a lock and key arrangement and an 11 inch by 13 inch glass window. The unit can be wall or panel mounted. It is the "user's" responsibility to maintain the security to prevent unauthorized access to the measuring components for this type of device.

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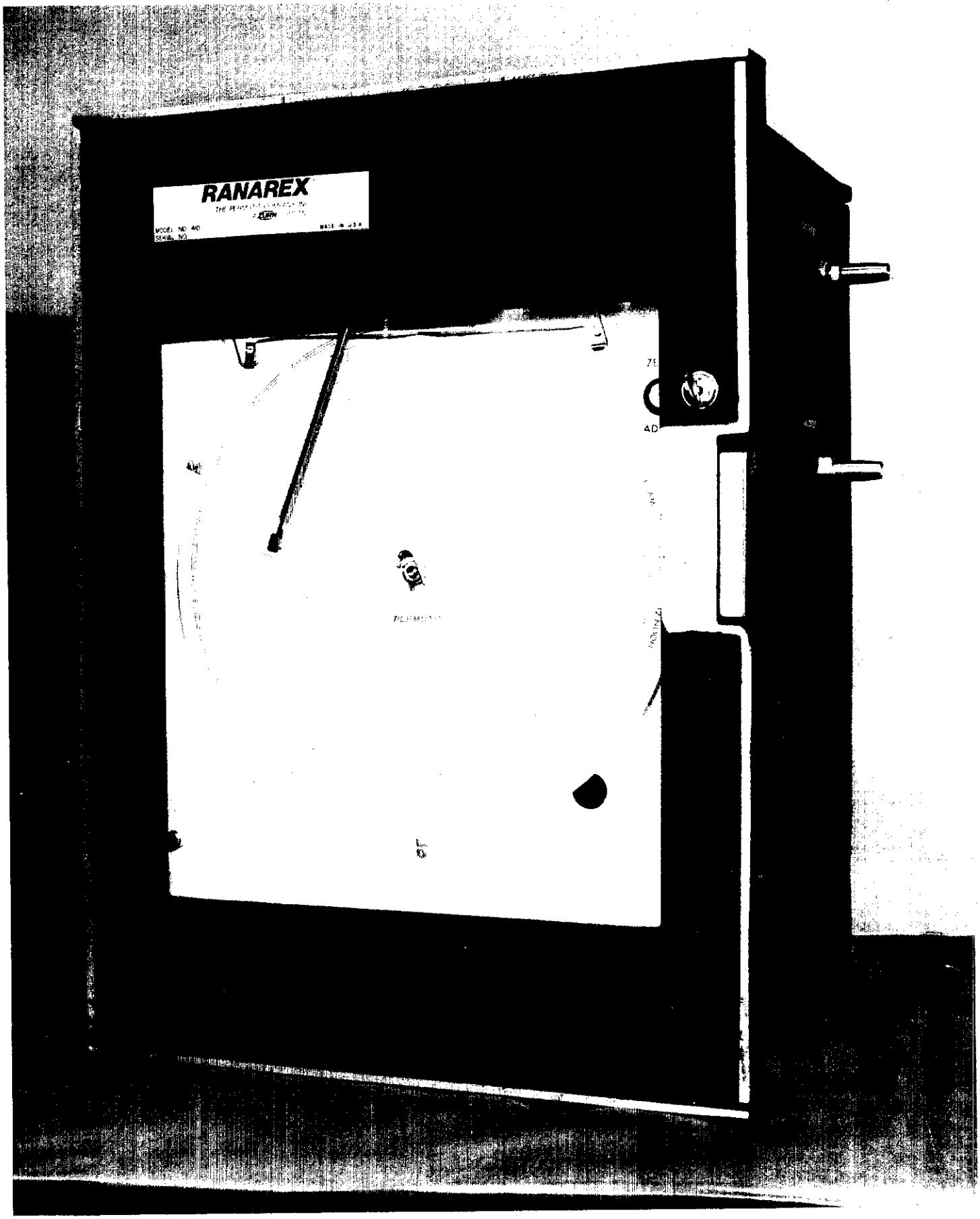

RANAREX MODEL 410 RECORDING GAS GRAVITOMETER

Nameplate Data

Each instrument shall have the following information appearing in a visible location:

Instrument Nameplate(s):

- Manufacturer's name
- Instrument model designation
- Serial number
- Chart identification number
- Chart rotation period
- Relative Density (Specific Gravity) recording range

Chart Drive Nameplate(s):

- Manufacturer's name
- Model number
- Serial number
- Ranarex part number
- Rotational period (output)

For installation and operation, careful adherence must be made to the manufacturer's manual of instruction identified as RI 201.

The device approved herein may be used in conjunction with a Mullins Dial-O-Graph automatic chart changer approved under Circular S-GA: 267, dated February 5, 1964.

Approval granted to: MacDonald Process Equipment Ltd,
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Etobicoke, Ontario. M9C 1C2

BMP Sales and Service Ltd,
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Calgary, Alberta. T2P 2G2

Permutit Company of Canada,
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J. Armstrong, Acting Chief,
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LEGAL METROLOGY BRANCH.

Ref: G-6635-P3