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To: Current Holders of ANSI C12.4-1984
From: NEMA Communications Department
Date: May 21, 2003
Subject: Reaffirmation of ANSI C12.4-1984

The ANSI Board of Standards Review reaffirmed ANSI C12.4-1984, "*Registers, Mechanical Demand*."

The new designator for this standard is: ANSI C12.4-1984 (R2002), "*Registers, Mechanical Demand*."

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ANSI C12.4-1984
(Revision of ANSI C12.4-1978)

American National Standard

for mechanical demand registers

ANSI C12.4-1984



american national standards institute, inc.



ANSI C12.4-1984 (R2002)

American National Standard

**Registers—
Mechanical Demand**

Secretariat:

National Electrical Manufacturers Association

Approved as an
American National Standards Institute, Inc.

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Foreword

(This Foreword is not a part of ANSI C12.4-1984, American National Standard for Mechanical Demand Registers.)

This revised standard provides minimum recommended requirements for mechanical demand registers for use on watthour meters. It supersedes ANSI C12.4-1978 and previous EEI Publication No MSJ-4, NEMA Publication No EI-14-1972.

The changes in the revised standard are mainly editorial; they make the document consistent with other C12 standards and prevent overlap in specifications. Also, data for Class 320 meters have been added.

Suggestions for improvement of this standard will be welcome. They should be sent to the American National Standards Institute, 1430 Broadway, New York, NY 10018.

This standard was revised and approved for submittal to ANSI by the Accredited Standards Committee on Electricity Metering, C12. At the time of approval, the C12 Committee had the following membership:

R. S. Turgel, *Chairman*

Fred Huber, Jr, *Secretary*

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Contents

SECTION	PAGE
1. Scope	7
2. References	7
3. Definitions	7
4. General Requirements	7
4.1 General	7
4.2 Scale Classes	8
4.3 Full-Scale Values	8
4.4 Alternative Designations	8
4.5 Multiplying Constants for Universal Demand Registers	8
4.6 Voltage and Frequency Ratings	8
4.7 Demand Interval	8
4.8 Nameplate Information	8
4.9 Multipliers	8
4.10 Timing Mechanism	8
4.11 Billing-Period Reset Device	10
5. Single-Pointer-Form Demand Registers	10
5.1 Indicating Pointer	10
5.2 Marking of Register Face Plate	10
5.3 Length of Scale	10
5.4 Scale Design	10
6. Cumulative-Form Demand Registers	10
6.1 Demand Dials	10
6.2 Marking of Register Face Plate	10
6.3 Test Dial	10
7. Multiple-Pointer-Form Demand Registers	10
7.1 Demand Dials	10
7.2 Marking of Register Face Plate	12
7.3 Full-Scale Value	12
FIGURES	
Fig 1 Sample Scale Markings	11
Fig 2 Sample Scale Markings for Registers Having Multipliers	12
TABLES	
Table 1 Typical Full-Scale Values for Single-Pointer and Cumulative-Form Demand Registers	9
Table 2 Cumulative-Form Demand Register Dial Markings	10
Table 3 Multiple-Pointer-Form Demand Register Dial Markings	12

American National Standard for Mechanical Demand Registers

1. Scope

This standard covers the voltage and frequency rating, full-scale values, scale classes, demand intervals, multiplying constants, timing mechanism, and other general features of mechanical demand registers required for use on watthour meters. Since mechanical demand registers are designed for use as accessories in watthour meters, items relating to watthour meters are not covered in this standard; these items are dealt with in several other standards.

2. References

When the American National Standards referred to in this standard are superseded by a revision approved by the American National Standards Institute, the revision shall apply.

[1] ANSI C12.1-1982, American National Standard Code for Electricity Metering.

[2] ANSI C12.10-1978, American National Standard for Watthour Meters.

3. Definitions

NOTE: Only definitions not included in ANSI C12.1-1982 [1]¹ are provided here.

block-interval demand register. A demand register that indicates or registers the maximum demand obtained by arithmetically averaging the meter registration over a regularly repeated time interval.

¹ The numbers in brackets correspond to those of the references in Section 2.

dual-range single-pointer-form demand register. An indicating demand register having an arrangement for changing the full-scale capacity from one value to another, usually by reversing the scale plate. For example, Scale Class 1/2; Scale Class 2/6. An interlock assures proper scale and scale-class relation.

full-scale value. The maximum scale capacity of the register. If a multiplier exists, the full-scale value will be the product of the maximum scale marking and the multiplying constant.

scale class. Denotes, with respect to single-pointer-form, dual-range single-pointer-form, or cumulative-form demand registers, the relationship between the full-scale value of the register and the test kVA rating of the meter with which the register is used.

universal demand register. A demand register of specific ratio used in conjunction with all ratings of any type of integrating electricity meter designed to accommodate it. The register constant of a universal demand register is proportional to the watthour constant K_h of the meter on which it is mounted.

4. General Requirements

4.1 General. Mechanical demand registers shall be substantially constructed of good material in a workmanlike manner with the objective of attaining stability of performance, sustained accuracy, and safe operation over long periods of time and over wide ranges of operating conditions with minimum maintenance. The sections of ANSI C12.10-1978 [2] relating to finishes, protective enclosures, and connections shall be applicable to mechanical demand registers.

4.2 Scale Classes. The scale classes for both single-pointer and cumulative-form mechanical demand registers shall be:

Scale Class	Percent of Test kVA Meter Rating
1	166-2/3
2	333-1/3
6	666-2/3

The test kVA rating of the watthour meter shall be derived as follows:

$$\text{Test kVA rating} = \frac{E \times I \times \text{number of stators}}{1000}$$

where:

E = rated meter voltage

I = test-ampere rating of the meter

NOTE 1: For use in this formula, two-stator, three-phase, four-wire-wye meters are considered to have three stators.

For transformer-rated meters, the kVA rating is related to the test kVA rating as follows:

$$\text{kVA rating} = \text{test kVA rating} \times \text{CT ratio} \times \text{VT ratio}$$

The scale classes are not necessarily indicative of meter capacity.

4.3 Full-Scale Values. Typical full-scale values for single-pointer and cumulative-form demand registers are shown in Table 1. These may be related to current and voltage ratings of meters by scale classes, as defined in 4.2.

4.4 Alternative Designations. The scale class and full-scale value are alternative systems for defining register load capabilities; either may be used to define a specific register.

4.5 Multiplying Constants for Universal Demand Registers. The multiplying constant to be applied to the kWh and kW readings of the register shall be derived as follows:

$$\text{Multiplying constant} = \frac{K_h \text{ of meter}}{K_h \text{ of meter for which universal register is direct reading}}$$

NOTE: The numerator is the primary K_h in the case of a transformer-rated meter.

4.6 Voltage and Frequency Ratings. The voltage and frequency ratings shall be 120, 240, 277, or 480 V, 60 Hz.

4.7 Demand Interval. Demand intervals shall be 15 or 30 min.

4.8 Nameplate Information. The demand register nameplate shall contain the following minimum information:

Type
Serial number
Register ratio
Demand interval
Full-scale value or scale class

NOTE: The symbol "t-15" or "t-30," whichever is applicable, shall be used to designate the demand interval on the nameplate.

The register shall be identified with the manufacturer's name or trademark.

The timing mechanism of the demand register shall be separately identified as to voltage and frequency rating.

4.9 Multipliers

4.9.1 Multiplying Constant. A multiplying constant, applicable to both the demand reading and integrating dial reading, shall be adjacent to either the demand scale or the integrating dials and shall be preceded by the words "Multiply Both (or All) Readings by."

4.9.2 Removable Plates

4.9.2.1 Multiplying constants and their preceding word identification may be on removable plates.

4.9.2.2 When multiplying constants are to be determined by the user, the identifying words as stated in 4.9.1 shall appear on a removable plate that shall also provide a minimum space of $\frac{3}{4} \times \frac{1}{4}$ inch for the insertion of a multiplier.

4.10 Timing Mechanism. The maximum mechanical burden of the register mechanism shall not affect the accuracy of the timing mechanism.

For block-interval demand registers, means shall be provided for performing the following test functions without removing the demand register from the watthour meter:

- (1) Manually initiating the interval reset and billing-period reset functions
- (2) Determining the instant of interval reset
- (3) Checking the speed of the timing mechanism

Table 1
Typical Full-Scale Values for Single-Pointer and Cumulative-Form Demand Registers (See 4.3)

Nameplate Test Amperes	Meter Load Class*	1 Stator	2 Stator	3 Stator†	Scale Class
Meters Rated 120V					
2.5	10	0.5‡	1.0‡	1.5‡	1
2.5	10	1.0‡	2.0‡	3.0‡	2
2.5	20	1.0‡	2.0‡	3.0‡	2
2.5	20	2.0‡	4.0‡	6.0‡	6
15	100	3.0‡	6.0‡	9.0‡	1
15	100	6.0‡	12.0‡	18.0‡	2
15	100	12.0‡	24.0‡	36.0‡	6
30	200	—	12.0‡	18.0‡	1
30	200	—	24.0‡	36.0‡	2
30	200	—	48.0‡	72.0‡	6
2.5	10-200:5	20.0	40.0	60.0	1
2.5	10-200:5	40.0	80.0	120.0	2
2.5	10-400:5	40.0	80.0	120.0**	1
2.5	10-400:5	80.0	160.0	240.0**	2
2.5	10-600:5	60.0	120.0	180.0**	1
2.5	10-600:5	120.0	240.0	360.0**	2
	Universal	0.5‡,††	1.0‡,††	—	1
	Universal	1.0‡,††	2.0‡,††	—	2
	Universal	2.0‡,††	4.0‡,††	—	6
Meters Rated 240 V and 277 Y/480 V					
2.5	10	1.0‡	2.0‡	3.0‡	1
2.5	10	2.0‡	4.0‡	6.0‡	2
2.5	20	2.0‡	4.0‡	6.0‡	2
2.5	20	4.0‡	8.0‡	12.0‡	6
15	100	6.0‡	12.0‡	18.0‡	1
15	100	12.0‡	24.0‡	36.0‡	2
15	100	24.0‡	48.0‡	72.0‡	6
30	200	12.0‡	24.0‡	36.0‡	1
30	200	24.0‡	48.0‡	72.0‡	2
30	200	48.0‡	96.0‡	144.0‡	6
50	320	72.0‡	—	—	6
2.5	10-200:5	40.0	80.0	120.0**	1
2.5	10-200:5	80.0	160.0	240.0**	2
2.5	10-400:5	80.0	160.0**	240.0**	1
2.5	10-400:5	160.0	320.0**	480.0**	2
2.5	10-600:5	120.0**	240.0**	360.0**	1
2.5	10-600:5	240.0**	480.0**	720.0**	2
	Universal	1.0‡,††	2.0‡,††	—	1
	Universal	2.0‡,††	4.0‡,††	—	2
	Universal	4.0‡,††	8.0‡,††	—	6
Meters Rated 480 V					
2.5	10		4.0‡		1
2.5	10		8.0‡		2
2.5	20		8.0‡		2
2.5	20		16.0‡		6
15	100		24.0‡		1
15	100		48.0‡		2
15	100		96.0‡		6
30	200		48.0‡		1
30	200		96.0‡		2
30	200		192.0‡		6
2.5	10-200:5		160.0**		1
2.5	10-200:5		320.0**		2
2.5	10-400:5		320.0**		1
2.5	10-400:5		640.0**		2
2.5	10-600:5		480.0**		1
2.5	10-600:5		960.0**		2
	Universal		4.0‡,††		1
	Universal		8.0‡,††		2

*For definitions of "Class" of meter, see ANSI C12.1-1982[1].

†Applies also to 2-stator, 3-phase, 4-wire wye meters.

‡4-dial registers, multiplying constant 1, or 5-dial registers, multiplying constant 1.

§4-dial registers, multiplying constant 1 or 10, or 5-dial registers, multiplying constant 1.

||4-dial registers, multiplying constant 10, or 5-dial registers, multiplying constant 10.

**4-dial registers, multiplying constant 100, or 5-dial registers, multiplying constant 100.

††For the multiplying constant for a universal register, see 4.5.

4.11 Billing-Period Reset Device. The billing-period reset device shall be insulated from the register.

Facilities shall be provided for sealing or locking the reset mechanism contained in the meter cover. If a seal is used, the reset device shall accommodate a lead-and-wire seal, a T-type seal, or equivalent seal.

The preferred rotation to reset is counterclockwise.

5. Single-Pointer-Form Demand Registers

5.1 Indicating Pointer. The indicating pointer shall be so designed with relation to the scale that parallax errors are minimized. The width of that part of the pointer over the scale divisions shall not exceed 0.020 in.

5.2 Marking of Register Face Plate. The designation, such as "kilowatts," "kW," "KW," "kW demand," "KW demand," or "demand" shall be located adjacent to the demand scale and preferably at the center. The designation "kilowatt-hours," "kWh," or "KWHR" shall be located directly under the kilowatthour dials.

5.3 Length of Scale. The demand scale shall be at least 6.0 inches long.

5.4 Scale Design. The value of each scale division shall be either 1, 2, or 5 of the units measured, or an integral power of 10 or its reciprocal times these values.

Lines of different lengths of different widths, or both, shall be used for the main, intermediate, and subdivision markings. In addition, the subdivision markings should be bounded by arc lines, and every tenth line shall be numbered.

On a scale that includes decimal fractions, the following shall apply:

(1) All whole numbers shall be followed by 0 after the decimal point; that is, 1.0, 2.0

(2) Decimal fractions shall be preceded by 0 or other whole numbers in front of the decimal point; that is, 0.1, 0.5, 1.5

The scale divisions and numbering shall be as shown in Fig 1; for registers having multipliers, scale divisions and numbering as shown in Fig 2 may be used.

6. Cumulative-Form Demand Registers

6.1 Demand Dials. The demand dials for cumulative-form demand registers shall consist of four circular dials, arranged similarly to those used on a four-dial watthour meter register.

A solid black index line $\frac{1}{8}$ inches wide and equal in height to the demand dials shall be located as designated in Table 2 to denote the decimal point between the units and tenths dials.

Table 2
Cumulative-Form Demand Register
Dial Markings

Full-Scale (kW)	kW-Division, First Dial	Position of Decimal Mark*
0-4.8†	0.01	Between second and third cumulative dials
4.9-48	0.1	Between first and second cumulative dials
Above 48	1.0	None

*Counting from the right.

†Includes universal demand registers listed in Table 1.

6.2 Marking of Register Face Plate. The designation, such as "kilowatthours," "kWh," or "KWHR" shall be located over the kilowatthour dials at the top of the register; and the designation "kilowatts," "kW," "kW demand," "KW," "KW demand," or "demand" shall be located directly under the demand dials at the bottom of the register.

6.3 Test Dial. A pointer-and-dial arrangement shall be provided to indicate the approximate position reached by the maximum demand gearing since the previous cumulative maximum demand reading was taken. The dial shall have a minimum scale length of 1.25 inches. It shall be provided with a scale having suitable main divisions and subdivisions. The upper 20% of this scale shall be bounded by extra-heavy arc lines.

7. Multiple-Pointer-Form Demand Registers

7.1 Demand Dials. The demand dials for multiple-pointer-form demand registers shall consist of two or more circular dials, arranged similarly

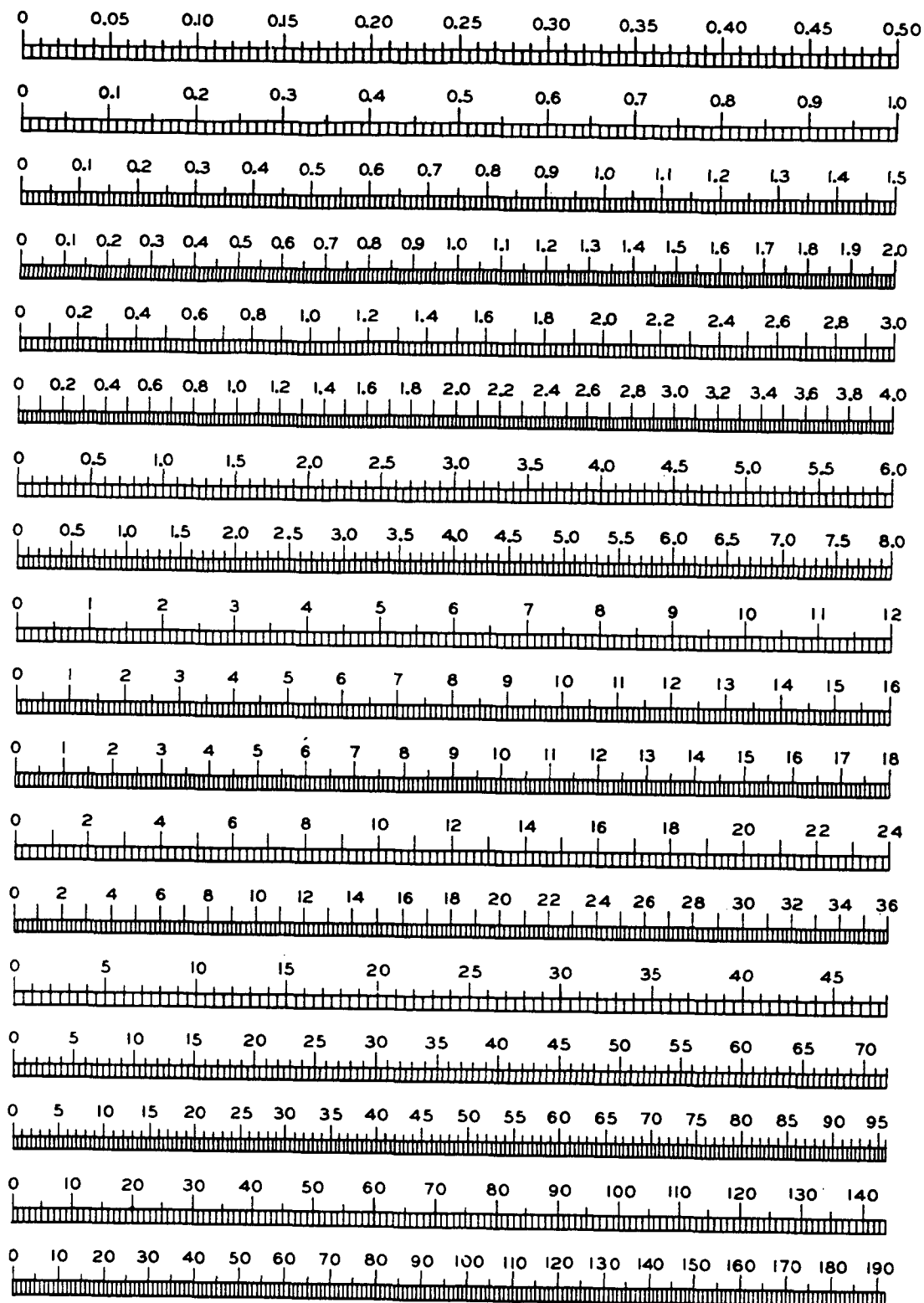


Fig 1
Sample Scale Markings

to those used on a pointer-type watt-hour meter register.

A black index marker shall be located as shown in Table 3 to denote the decimal point between the units for 3-dial registers.

7.2 Marking of Register Face Plate. The designation, such as "kilowatthours," "kWh," or "KWHR" shall be located over the kilowatthour dials at the top of the register; and the designation "kilowatts," "kW," "KW," "kW demand," "KW demand," or "demand" shall be located directly under the demand dials at the bottom of the register.

7.3 Full-Scale Value. The full-scale value of a

Table 3
Multiple-Pointer-Form Demand Register
Dial Markings

Full-Scale (kW)*	kW-Division, First Dial	Position of Decimal Mark†
8.30/9.60	0.01	Between second and third dials
83.0/96.0	0.10	Between first and second dials
830/960	1.00	None

*Lower full-scale values may be used as required by meter rating or meter application circumstances.

†Counting from the right.

multiple-pointer-form demand register may be indicated by markings on the left dial. This value is not necessarily indicative of meter capacity.

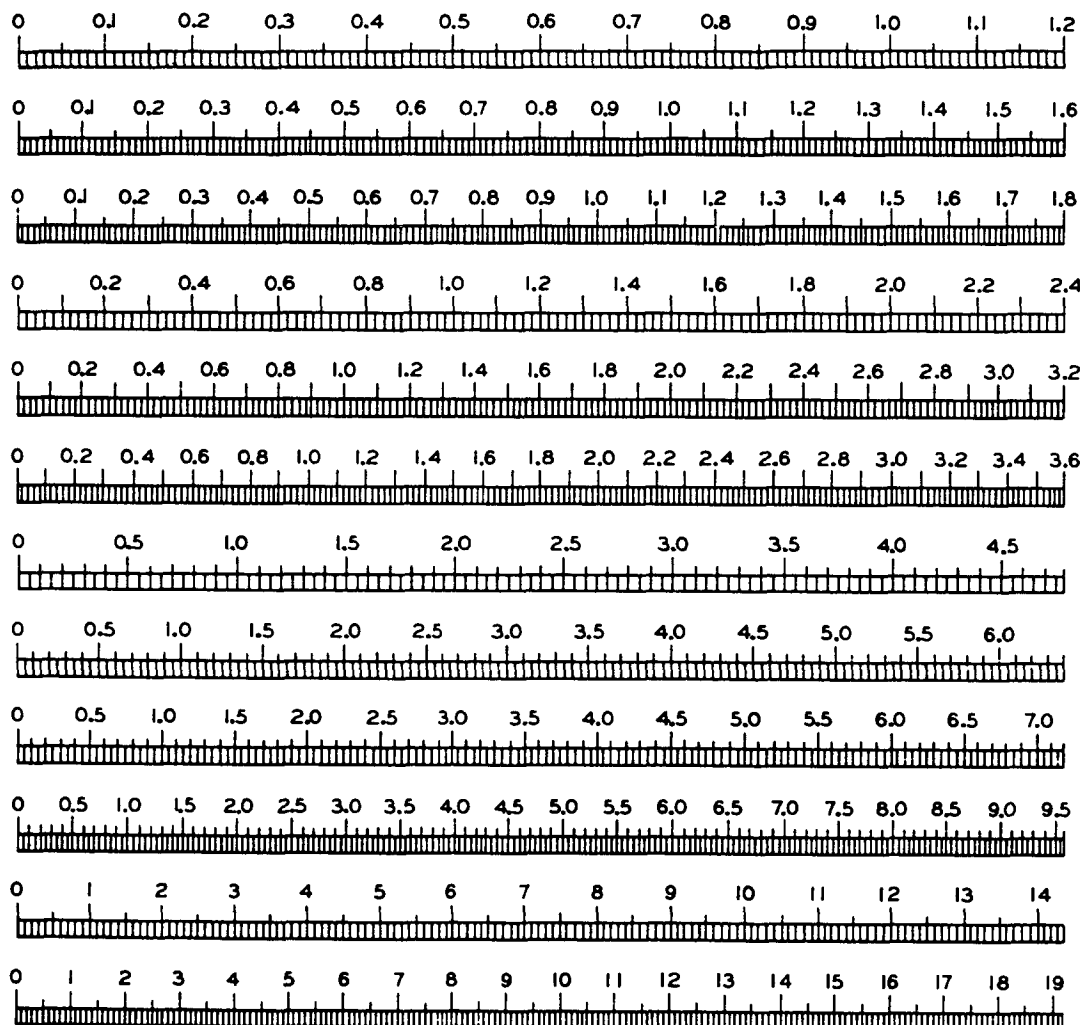


Fig 2
Sample Scale Markings for Registers Having
Multipliers

