



**Roscommon
Equipment
Center**

-FINAL REPORT-

METRIC CONVERSION STUDY

PROJECT NO. 21

NORTHEAST FOREST FIRE SUPERVISORS

METRIC CONVERSION STUDY
ROSCOMMON EQUIPMENT CENTER
PROJECT NO. 21

The stated objective of the Metric Conversion Study is "to facilitate simple conversion to the metric system by fire management agencies." The focus of the study thus far has centered on searching for reference material related to metrification, with hopes of uncovering available tables in pocket manual form that can be utilized by fire management agencies. While a plethora of tables and conversion charts are currently available from commercial and governmental sources, none seems to fully meet the requirements of fire management. Either they contain too much or too little information for our purposes. It should not be too difficult to produce a pocket size manual, or chart, that meets the unique requirements of fire management agencies drawing on the wealth of material already in existence.

Even when a suitable conversion table is developed for use by fire managers, the process of metrification will by no means be completed. Fire management personnel are going to have to become accustomed to "thinking in metric terms." Much time and effort will be wasted if our people continue to convert metric units into English units.

Devising a conversion table, or chart, will be relatively easy. Training people to "think in metric terms" will be a time consuming, and no doubt frustrating task. Development of a programmed text dealing with metric requirements as they apply to fire management might serve to minimize this problem.

When a person in the field realizes that a good pump with a 38mm hose will feed a 7mm nozzle and provide a fire quenching stream, and no longer feels the need to calculate that this is an 1-1/2 inch hose with approximately 1/4 inch nozzle, then our ultimate goal of metrification will be accomplished.

By now, most people are aware that complete conversion to the metric system may take a generation, or two, to make the mental adjustments that are needed. Therefore, the REC Committee, is recommending that because of the open-endedness of this subject, that it not be further pursued as a specific project under REC auspices. But that each interested agency use the material contained herein to assist them on their way to conversion, at their own pace and in their own timeframe.

The following pages contain lists of source material and products that will prove helpful in devising a metric conversion table for use in fire management. Also included are a number of articles outlining some of the problems various industries and governmental agencies have encountered when attempting to instruct their personnel to "think" metric.

- This Report Concludes REC Project No. 21 -

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- _____ 1972. Metric system now at our backdoor. *Forest & Timber, Spring*: 16.
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- Dominick, R. 1969. The metric system...is U.S. industry ready for it? *Wood & Wood Prod.* 74(2): 28-30, 68, 70.
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- _____ 1970. Metric top diameter sawlog tables. *Forestry Comm. Bookl.* 31, 23 p.
- _____ 1970. Metric volume ready reckoner for round timber. *Forestry Comm. Bookl.* 26, 80 p.
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- Hanson, A. G. 1970 (?). The likely impact of the metric system on forestry and the timber industry. *Aust. Natl. Univ. Forest Log*, p. 12-13.
- Helgren, F. J. 1967. Metric supplement to mathematics, 28 p. Waukegan, Ill.: Metric Assoc., Inc.
- International Organization for Standardization. 1973. SI units and recommendations for the use of their multiples and of certain other units. *Int. Stand. ISO 1000*, 21 p. New York: Am. Natl. Stand. Inst.
- Jenkins, J. H. 1964. Lumber measurement of the future--inch or metric? *B. C. Lumberman* 48(2): 64, 66, 68.
- Kendig, F. 1972. Coming of the metric system. *Saturday Rev. Sci.* Nov. 25, P. 40-44, illus.
- Legget, R. F. 1973. The metric system. *Forestry Chron.* 49: 122-124.
- Lewis, S. H. 1969. M3 stands for: metrication, measure, and muddle. *South. Lumberman* 219(2728): 154-155.
- Lyle, R. J. 1974. Metric lumber? *Metric News*, May/June 20-21.
- Metric Association, Inc. 1972. Metric units of measure, 10th ed., 11 p. Waukegan, Ill.
- Muncey, R. W. R. 1970. Metric measurements--a golden opportunity. *Aust. Timber J. & Bldg. Prod. Merchandiser* 36(1): 37.
- Prange, G. F. 1971. The impact of current and future metrication trends upon construction uses of forest products. *Wood & Fiber* 3(2): 90-94.
- Richie-Calder, Lord. 1970. Conversion to the metric system. *Sci. Am.* 223(1): 17-25.
- Slinn, R. J. 1970. The metric system in Australian forest research. *Aust. For. Res.* 4(3): 51-53.

1970. Metrication in Australian forestry. Aust.
Forestry 34(1): 32-38.
1970. Some implications of metrication in forestry.
J. Forestry 68: 218-220.
Vincent, A. B. 1971. Metrication: start learning now. Forestry
Chron. 47: 249.

Products

Metric Conversion Slide Rules

The Billian Company
P. O. Box 8504, T-1R
Greenville, SC 29604

Research Associates
P. O. Box 13237
Gainesville, FL 32604

Jaydee Specialties
P. O. Box 536
Wilmette, IL 60091

National Dealers Service
33 Rockwell Place
Brooklyn, NY 11217

Metric Calculator/Converter

TWS Electronics, Inc.
P. O. Box 113
So. Beloit, IL 61080

Crown Industries
Park Ridge, IL

Perrygraf Div. of Nashua Corp.
Los Angeles, CA

M.C.C. Calculator
Calculator Service and Sales
P. O. Box 151180
Salt Lake City, UT 84115

U.S. METRIC STUDY PUBLICATIONS

Because of the world trend to metric, Congress asked in 1968 for a sweeping investigation of the metric question. This investigation involved public hearings and surveys of almost every activity of our society - from education and the consumer to international trade and national security.

The findings are available in one summary report and 12 detailed special reports:

- A METRIC AMERICA: A DECISION WHOSE TIME HAS COME. D. V. DeSimone, Nat. Bur. Stand. (U.S.) Spec. Publ. 345, 190 pages (July 1971). \$2.50 (SD Catalog No. C13.10:345).
- INTERNATIONAL STANDARDS (An Interim Report of the U.S. Metric Study). R. D. Huntoon et al., Nat. Bur. Stand. (U.S.) Spec. Publ. 345-1, 145 pages (Dec. 1970). \$1.25 (SD Catalog No. C13.10:345-1).
- FEDERAL GOVERNMENT CIVILIAN AGENCIES (An Interim Report of the U.S. Metric Study). R. E. Clark and J. M. Tascher, Nat. Bur. Stand. (U.S.) Spec. Publ. 345-2, 324 pages (July 1971), \$2.25 (SD Catalog No. C13.10:345-2).
- COMMERCIAL WEIGHTS AND MEASURES (An Interim Report of the U. S. Metric Study). S. L. Hatos, Nat. Bur. Stand. (U.S.) Spec. Publ. 345-3, 109 pages (July 1971), \$1.00 (SD Catalog No. C13.10:345-3).
- THE MANUFACTURING INDUSTRY (An Interim Report of the U. S. Metric Study). L. E. Barbrow, Coordinator, Nat. Bur. Stand. (U.S.) Spec. Publ. 345-4, 165 pages (July 1971), \$1.25 (SD Catalog No. C13.10:345.4).
- NONMANUFACTURING BUSINESSES (An Interim Report of the U. S. Metric Study). E. D. Bunten and J. R. Cornog, Nat. Bur. Stand. (U.S.) Spec. Publ. 345-5, 192 pages (Aug. 1971), \$1.50 (SD Catalog No. C13.10:345-5).
- EDUCATION (An Interim Report of the U. S. Metric Study). B. D. Robinson, Nat. Bur. Stand. (U.S.) Spec. Publ. 345-6, 209 pages (July 1971), \$1.25 (SD Catalog No. C13.10:345-6).
- THE CONSUMER (An Interim Report of the U. S. Metric Study). B. D. Rothrock, Nat. Bur. Stand. (U.S.) Spec. Publ. 345-7, 146 pages (July 1971), \$1.25 (SD Catalog No. C13.10:345-7).
- INTERNATIONAL TRADE (An Interim Report of the U. S. Metric Study). G. F. Gordon, Nat. Bur. Stand. (U.S.) Spec. Publ. 345-8, 181 pages (Aug. 1971), \$1.50 (SD Catalog No. C13.10:345-8).

DEPARTMENT OF DEFENSE (An Interim Report of the U. S. Metric Study).
L. E. Barbrow, Coordinator, Nat. Bur. Stand. (U.S.) Spec. Publ.
345-9, 125 pages (July 1971), \$1.25 (SD Catalog No. C13.10:345-9).

A HISTORY OF THE METRIC CONTROVERSY IN THE UNITED STATES (An Interim
Report of the U. S. Metric Study). C. F. Treat, Nat. Bur. Stand.
(U.S.) Spec. Publ. 345-10, 306 pages (Aug. 1971), \$2.25 (SD
Catalog No. C13.10:345-10).

ENGINEERING STANDARDS (An Interim Report of the U. S. Metric Study).
R. D. Stiehler, Nat. Bur. Stand. (U.S.) Spec. Publ. 345-11,
257 pages (July 1971), \$2.00 (SD Catalog No. C13.10:345-11).

TESTIMONY OF NATIONALLY REPRESENTATIVE GROUPS (An Interim Report of
the U. S. Metric Study). J. V. Odom, Editor, Nat. Bur. Stand.
(U.S.) Spec. Publ. 345-12, 174 pages (July 1971), \$1.50
(SD Catalog No. C13.10:345-12).

OTHER METRIC PUBLICATIONS BY NBS

WHAT ABOUT METRIC? Louis E. Barbrow, Nat. Bur. Stand. (U.S.)
Con. Infor. Ser. 7 (1973) 80 cents (Stock No. 0303-01191).

BRIEF HISTORY OF MEASUREMENT SYSTEMS WITH A CHART OF THE
MODERNIZED METRIC SYSTEM. Nat. Bur. Stand. (U.S.) Spec. Publ.
304A, 3 pages (1972), 30 cents (SD Catalog No. C13.10:304A).

WALL CHART OF THE MODERNIZED METRIC SYSTEM (Color). Nat. Bur.
Stand. (U.S.) Nat. Bur. Stand. Spec. Publ. 304, 1 page (1952)
55 cents (SD Catalog No. C13.10:304).

UNITS OF WEIGHT AND MEASURE -- INTERNATIONAL (METRIC) AND U.S.
CUSTOMARY: DEFINITIONS AND TABLES OF EQUIVALENTS. Nat. Bur.
Stand. (U.S.) Misc. Publ. 286, 251 pages (1967), \$2.25
(SD Catalog No. C13.10:286).

THE INTERNATIONAL SYSTEM OF UNITS (SI). Nat. Bur. Stand. (U.S.)
Spec. Publ. 330, 42 pages (1972), 30 cents (SD Catalog No.
C13.10:330/2).

METRIC CONVERSION CARD (pocket card). Nat. Bur. Stand. (U.S.)
Spec. Publ. 365 (1972), 20 cents domestic prepaid, or 10 cents
GPO Bookstore (SD Catalog No. C13.10:365/2).

FOR GOOD MEASURE: COMPARE METRIC AND CUSTOMARY UNITS (pocket
ruler). Nat. Bur. Stand. (U.S.) Spec. Publ. 376 (1972),
10 cents (SD Catalog No. C13.10:376).

GENERAL PHYSICAL CONSTANTS (pocket card). Nat. Bur. Stand. (U.S.)
Spec. Publ. 344 (1971), 10 cents each or \$6.25 per 100
(SD Catalog No. C13.10:344).

ELECTRICAL ENGINEERING UNITS AND CONSTANTS (pocket card). Nat.
Bur. Stand. (U.S.) Spec. Publ. 368 (1972), 10 cents each or
\$6.25 per 100 (SD Catalog No. C13.10:368).

Instructions for Obtaining Material Listed. - Government publica-
tions listed can be purchased from the Superintendent of Documents,
U. S. Government Printing Office, Washington, D. C. 20402; U. S.
Department of Commerce Field Offices, or the National Technical
Information Service, Springfield, Virginia 22151.

Where an SD Catalog Number or Stock Number is listed after a publication, include this number when you order. Unless you have an account with the office from which you are ordering a publication(s), please include your remittance with the order.

The prices quoted are for delivery to addresses in the continental United States and its territories and possessions, and in certain foreign countries that extend the franking privilege.

In the case of all other countries, one-fourth the cost of the publication should be added to cover postage. Remittances should be made either by five-cent coupons (obtainable from the Superintendent of Documents and good until used), or by check or money order payable to the "Superintendent of Documents" and transmitted with the order. Do Not Send Postage Stamps.

AVAILABLE FROM ANSI

Six informative publications dealing with the metric system and/or metric conversion may be ordered individually or as a set from the American National Standards Institute (ANSI), 1430 Broadway, New York, New York 10018. The publications and their individual copy prices are as follows:

ORIENTATION FOR COMPANY METRIC STUDIES (Mechanical Products Industry), 2nd Edition: the nation's first metric guide, revised March 1, 1970, to include standards parts and materials. \$1.00 each.

MEASURING SYSTEMS AND STANDARDS ORGANIZATIONS: a 45-page illustrated booklet on measuring systems past, and present, and the role played in this field by national and international standards organizations. \$1.25 each.

ISO STANDARD 1000, SI UNITS AND RECOMMENDATIONS FOR THE USE OF THEIR MULTIPLES AND OF CERTAIN OTHER UNITS. \$1.50 each.

GUIDE TO IMPACT OF METRIC USE ON STANDARDS DEVELOPMENT IN COMPANIES, TRADE ASSOCIATIONS, TECHNICAL & PROFESSIONAL SOCIETIES: a manual for assessment of priorities and long-range planning for development of standards required for any change in units of measure. \$1.00 each.

AMERICAN NATIONAL STANDARD METRIC PRACTICE GUIDE: Z210.1-1973 (ASTM E380-72)*: this newly-approved American National Standard provides guidance on conversion from U.S. Customary units to SI units of quantities in general use. \$1.50 each.

ANTITRUST IMPLICATIONS OF METRIC CONVERSION: a concise analysis of problems that may be encountered under a number of varying recommendations for national metric conversion. \$2.00 each.

Quantity Discounts on Complete Sets

1-49 sets	\$5.50 each
50-99 sets	\$4.50 each
100 or more	\$4.00 each

*Also available by purchases from the American Society for Testing and materials, 1916 Race Street, Philadelphia, PA 19103, \$1.50 a copy, minimum order \$3.00.

ORGANIZATIONS MARKETING METRIC MATERIALS FOR EDUCATORS

List courtesy of the National Council of Teachers of Mathematics

KEY: (B) Books or pamphlets, (F) Films or filmstrips, (K) Kits,
(P) Posters, (I) Other instructional aids.

- A. Balla & Co., 3494 North Ocean Boulevard, Fort Lauderdale, FL 33308 (I)
- Activity Resources Company, Inc., Box 4875, Hayward, CA 94545 (B)
- Allyn & Bacon, 470 Atlantic Avenue, Boston, MA 02202 (B)
- American Association of School Librarians, 1201 Sixteenth Street, NW,
Washington, DC 20036 (B)
- American National Standards Institute, 1430 Broadway, New York, NY 10018 (B,P)
- Behavior Research Laboratory, P. O. Box 577, Palo Alto, CA 94302 (B)
- BFA Educational Media, 2211 Michigan Avenue, Santa Monica, CA 90404 (F)
- Central Instrument Company, 900 Riverside Drive, New York, NY 10032 (I)
- Channing L. Bete Company, Inc., 45 Federal Street, Greenfield, MA 01301 (B)
- Charles E. Merrill Publishing Company, 1300 Alum Creek Drive, Columbus, OH
43216 (B)
- Compu-Data Services, Inc., 16 Sherman Street, P. O. Box 471, Wayne, NJ 07470 (I)
- Coronet Films, 65 East South Water Street, Chicago, IL 60601 (B,F)
- Creative Publications, P. O. Box 10328, Palo Alto, CA 94303 (I)
- C-Thru Ruler Company, 6 Britton Drive, Bloomfield, CT 06002 (I)
- Cuisenaire Company of America, 12 Church Street, New Rochelle, NY 10805 (I)
- Dick Blick Co., P. O. Box 1267, Galesburg, IL 61401 (I)
- Dominie Pty Ltd., 8 Cross Street, Brookvale, Australia 2100 (B,P)
- Edmund Scientific Co., 380 Edscorp Building, Barrington, NJ 08007 (K)
- Educational Teaching Aids, 159 West Kinzie Street, Chicago, IL 60610 (I)
- Encyclopedia Britannica Educational Corporation, 425 North Michigan Avenue,
Chicago, IL 60611 (K)

Eye Gate House, Inc., 146-01 Archer Avenue, Jamaica, NY 11435 (F)

Grolier Educational Corporation, 845 Third Avenue, New York, NY 10022 (B,I)

Houghton Mifflin Company, 110 Tremont Street, Boston, MA 02107 (B,I)

Ideal School Supply Company, 11000 South Lavergne Avenue, Oak Lawn, IL 60453 (F,I)

Instructor Publications, Inc.(The), Instructor Park, Dansville, NY 14437 (B,P)

International Business Machines Corporation, Old Orchard Road, Armonk, NY 10504 (I)

International Tutors, Department A, 22303 Devonshire, Chatsworth, CA 91311 (K)

JEM Innovations, 4568 East 45th Street, Tulsa, OK 74135 (P)

John Colburn Associates, Inc., P. O. Box 187, Lake Bluff, IL 60044 (I)

John Wiley & Sons, Inc., 605 Third Avenue, New York, NY 10016 (B)

Laidlaw Brothers, Thatcher and Madison, River Forest, IL 60305 (B)

Larry Harkness Company, 115 North Princeton Avenue, Villa Park, IL 60181 (K)

Leicestershire Learning Systems, Box 335, New Gloucester, ME 04260 (I)

Library Filmstrips Center, 3033 Aloma, Wichita, KS 67211 (F)

MacLean-Hunter Learning Materials Co., 481 University Avenue, Toronto 101, Ontario, Canada (Canada only) (I)

McGraw Hill, 1221 Avenue of the Americas, New York, NY 10020 (B,F)

Math Shop, 5 Bridge Street, Watertown, MA 02172 (I)

Metric Aids Limited, 75 Horner Avenue, Toronto 530, Ontario, Canada (I)

Metric Association, Inc., Sugarloaf Star Route, Boulder, CO 80302 (B,I)

Metrix Corporation, P. O. Box 19101, Orlando, FL 32814 (I)

Midwest Publications Co., Inc., P. O. Box 129, Troy, MI 48084 (B)

Mind/Matter Corp., P. O. Box 345, Danbury, CT 06810 (I)

Moyer Vico Limited, 25 Milvan Drive, Weston, Ontario, Canada M9L 1Z1 (I)

National Aeronautics and Space Administration, Projects Office,
S&E - ASTR - B/Building 4487, Marshall Space Flight Center, AL 35812 (B)

National Council of Teachers of Mathematics, 1906 Association Drive,
Reston, VA 22091 (B,I,P)

National Education Association, American Education Week, P. O. Box 327,
Hyattsville, MD 20781 (B)

National Microfilm Association, Suite 1101, 8728 Colesville Road,
Silver Spring, MD 20910 (I,P)

National Science Teachers Association, 1201 Sixteenth Street, NW,
Washington, DC 20036 (B,K)

National Textbook Company, 8529 Niles Center Road, Skokie, IL 60076 (B)

National Tool, Die & Precision Machining Association, 9300 Livingston Road,
Washington, DC 20022 (B)

NBC Education Enterprises, 30 Rockefeller Plaza, New York, NY 10020 (F)

Pathescope Educational Films, Inc., 71 Weyman Avenue, New Rochelle, NY
10802 (F,I)

Pickett Industries, P. O. Box 1515, Santa Barbara, CA 93102 (I)

Polymetric Services, 4600 Brewster Drive, Tarzana, CA 91356 (I,P)

Random House, The School Division, Westminster, MD 21157 (B)

Realty Facts, P. O. Drawer 449, Warwick, NY 10990 (I)

Robie Sales Company, 2755 Woodshire Drive, Hollywood, CA 90068 (I)

Rowsey Enterprises, P. O. Box 666, Friendswood, TX 77546 (I)

Sargent-Welch Scientific, 7300 North Linder Avenue, Skokie, IL 60076 (I,P)

Science Service, 1719 N Street, NW, Washington, DC 20036 (I,K)

Selective Educational Equipment, Inc., 3 Bridge Street, Newton, MA 02195 (I)

Sigma Scientific, Inc., P. O. Box 1302, Gainesville, FL 32601 (I)

Society for Visual Education, Inc., 1345 Diversey Parkway, Chicago, IL
60614 (P)

Spectrum Educational Ltd., 9 Dohme Avenue, Toronto, Ontario, Canada (I)

Sterling Publishing Company, Inc., 419 Park Avenue, South, New York, NY 10016 (B)

Swanti Publishing Company, Box 248, Roscoe, IL 61073 (B,I,F,K)

Teach'em Inc., 625 North Michigan Avenue, Chicago, IL 60611 (I)

Union Carbide Corp., Public Relations Department, 270 Park Avenue, New York, NY 10017 (I)

Note: This list is based on a compilation (Sept. 1973) by the National Council of Teachers of Mathematics. Recommended changes, deletions, or additions to this list are welcomed by the Council and NBS.

ADDITIONAL SOURCES OF METRIC INFORMATION

Two NBS metric items--the Modernized Metric System (wall chart in color) and the Metric Conversion Card (wallet card)--have been reprinted by the training and recruiting services of the Department of the Army for school distribution. These are available free upon request from your nearest Army school representative.

The following organizations may be contacted for additional material as indicated.

Metric Association, Sugarloaf Star Route, Boulder, Colorado 80302. Distributes some educational material and publishes a quarterly newsletter, available to its members (annual dues are \$3.00).

National Council of Teachers of Mathematics, 1906 Association Drive, Reston, Virginia 22091.

National Science Teachers Association, 1201 Sixteenth Avenue, NW, Washington, DC 20036.

Metrication Task Group, George C. Marshall Space Flight Center, Huntsville, Alabama 35812.

American Society for Testing and Materials, 1916 Race Street, Philadelphia, Pennsylvania 19103. Publishes assorted aids to metrication.

American National Metric Council, 1625 Massachusetts Avenue, NW, Washington, DC 20036. A group newly established under the auspices of the American National Standards Institute to provide guidance to industrial and commercial segments of society.

Construction Industry Training Board, Publication Distribution Section, Radnor House, London Road, Norbury, London SW 16 4EL England. CITB produced a much-seen set of "Think Metric" wall posters.

The several national metric conversion boards can supply general information about conversion in their respective countries and also provide referrals to other organizations therein. Their addresses are listed below.

Metrication Board
22 Kingsway
London WC2B 6LE England

Metric Advisory Board
P. O. Box 10-243
The Terrace
Wellington, New Zealand

Metric Commission
320 Queen Street
Ottawa K1A 0H5 Canada

South African Bureau of Standards
Private Bag X191
Pretoria, South Africa

Metric Conversion Board
18-24 Chandos Street
St. Leonards, N.S.W. 2065 Australia