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DOD METRIC SEMINAR/WORKSHOP (1980) HELD IN WASHINGTON, DC 18-20--ETC(U)
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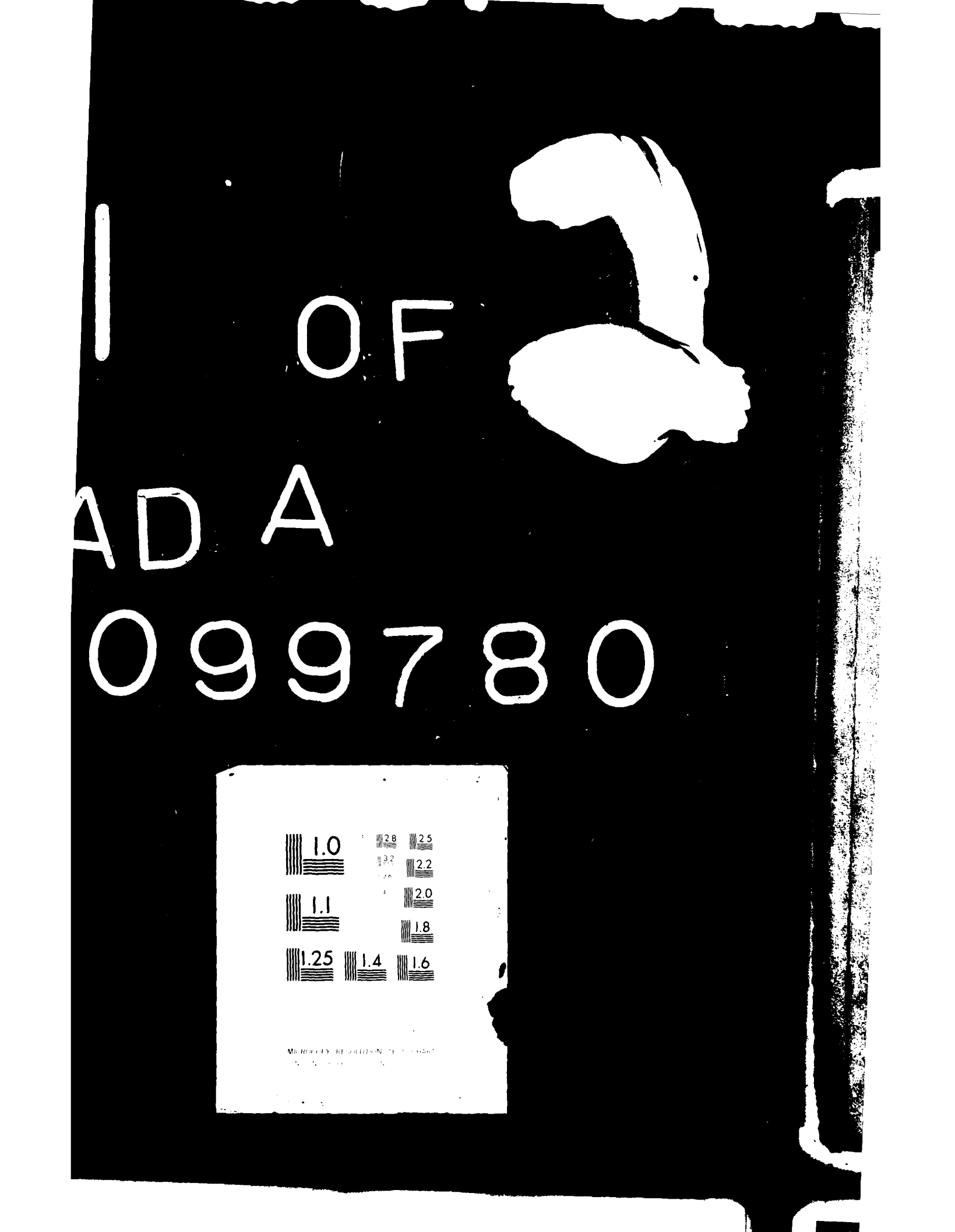
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20. ABSTRACT (Continue on reverse side if necessary and identify by block number)

This is the proceedings of a metrication seminar/workshop held on 18-20 Nov 80 for mid-level DoD Managers. Its purpose was to discuss defense policies, plans, problem areas, and solutions needed to implement the provisions of the U.S. Metric Act (P.L. 94-168) and DoD Directive 4120.18, Metric System of Measurement. The proceedings include speeches and presentations made during the seminar/workshop, minutes, workshop action items, recommendations, and list of attendees.

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OFFICE OF THE UNDER SECRETARY OF DEFENSE

WASHINGTON, D C 20301

RESEARCH AND
ENGINEERING

23 APR 1981

MEMORANDUM FOR CONFERENCE ATTENDEES

As a follow-up to the 12 June 1980 Executive Metric Briefing, a seminar/workshop was held at the Pentagon on 18-20 November 1980. Its purpose was to discuss defense policies, plans, problem areas, and solutions needed to implement the provisions of the U.S. Metric Act (P.L. 94-168) and DoD Directive 4120.18, Metric System of Measurement.

Attached you will find the written proceedings for the seminar, including specific recommendations. Our next task will be to resolve the problems raised and implement the recommendations made. To carry this out, I have directed the DoD Metrication Steering Group (MSG) to assign these action items to the OSD, Military Department and Defense Agency offices who are predominant in the respective policy and program areas. Each action office will be asked to develop an implementation plan, including milestones for its action item(s) and report on these plans to the MSG, DoD's focal point on all metric issues.

I wish to express my thanks to the attendees for contributing their professional knowledge and experience.

R. F. Trimble

ROBERT F. TRIMBLE
Acting Deputy Under Secretary
(Acquisition Policy)

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1980 DOD METRIC SEMINAR/WORKSHOP

Pentagon
Washington, D.C.

Agenda

18-20 November 1980
Room 5A1070

THEME: Voluntary Metric Conversion Mandates Early Planning

Tuesday, 18 November 1980

0830-0930	Registration	
0930-0940	Welcoming Remarks	Mr. Robert F. Trimble Acting Deputy Under Secretary for Acquisition Policy
0940-1000	DOD Metrication Policy and Plans	Mr. John A. Mittino Director of Materiel Acquisition Policy, OUSD(R&E)
1000-1020	U.S. Metric Board Interagency Committee on Metric Policy/Metrication Operating Committee	Mr. Malcolm O'Hagan Executive Director U.S. Metric Board
1020-1030	DOD Metrication Steering Group	Mr. Howard Ellsworth Special Assistant for NATO/ DOD Standardization
1030-1050	Break	
1050-1110	DOD/Private Sector Interface	Lt. Gen Charles E. Buckingham (Ret) President, ANMC
1110-1130	NATO Standardization/Plans and Programs	Col R. de Groot Ministry of Defense Netherlands
1130-1140	Summary Remarks	Mr. Robert F. Trimble
1140-1150	Introduction of Workshop Chairpersons/Review of Workshop Assignments	Mr. Howard Ellsworth
1150-1200	Question and Answer	
1200-1300	Lunch	
1300-1430	Presentations for All Workshop Attendees	
	. Metric Units and Practices	Mr. John Haas Navy Metric Coordinator
	. Specifications and Standards	Mr. Donald R. Mitchell Defense Materiel Specifications and Standards Office

1430-1445	Break
1445-1600	Concurrent Workshops

Wednesday, 19 November 1980

0830-1000	Concurrent Workshops
1000-1015	Break
1015-1200	Concurrent Workshops
1200-1300	Lunch
1300-1430	Concurrent Workshops
1430-1445	Break
1445-1600	Concurrent Workshops

Thursday, 20 November 1980

0830-0930	Concurrent Workshops
0930-1000	Break
1000-1200	Chairman Reports and Open Question and Answer Session
1200	Adjourn

Seminar/Workshop Coordinator: Mr. Howard Ellsworth - OUSD(AP)SS

SPEECH - POINT PAPER

MR. ELLSWORTH, OUSD(R&E)SS

18 NOVEMBER 1980

09:30

WELCOMING REMARKS

. MY PLEASURE TO WELCOME YOU -

. DR'S PERRY AND DINNEEN AGREE IT IS TIMELY TO DISCUSS DEFENSE METRIC POLICY AND USE.

. THIS FOLLOWS A 12 JUNE 1980 METRIC EXECUTIVE BRIEFING GIVEN TO TOP LEVEL DOD OFFICIALS.

. THESE THREE DAYS WILL BE DEVOTED TO:

- BACKGROUND INFO PROVIDED BY GUEST SPEAKERS:

1. MR. MALCOLM O'HAGAN, EXECUTIVE DIRECTOR OF THE USMB, ON THE SUBJECT OF THE U.S. METRIC BOARD.

2. GENERAL CHARLES BUCKINGHAM, PRESIDENT OF THE AMERICAN NATIONAL METRIC COUNCIL'S ROLE, AND

3. COL R. DE GROOT, CHAIRMAN OF NATO'S STANDARDIZATION COMMITTEE ON ITS TASKS AND RESPONSIBILITIES.

. PLUS CLARIFICATION OF DEFENSE POLICY WORKSHOP ACTIVITIES BEGINNING THIS AFTERNOON ON SPECIFIC AREAS REQUIRING ADDED ATTENTION.

. VERY BRIEFLY:

- PASSAGE OF U.S. METRIC ACT (1975) INITIATED

A SERIES OF FAR REACHING ACTIONS AFFECTING:

1. PRIVATE INDUSTRY
2. FEDERAL GOVERNMENT
3. U.S. RELATIONS WITH FOREIGN COUNTRIES

. THE ACT ALSO CREATED U.S. METRIC BOARD WHOS ROLE WILL BE ADDRESSED BY MR O'HAGAN LATER.

. DOD'S THEME IN IMPLEMENTING THE ACT IS TO:

- APPLY METRIC DIMENSIONS TO ALL NEW MATERIEL WHEN IT IS COST EFFECTIVE TO DO SO AND MEETS <u>OPERATIONAL</u>, <u>ECONOMICAL</u>, <u>TECHNICAL</u> AND <u>SAFETY REQUIREMENTS</u>.

- THIS ACTIVITY TO BE EFFECTIVE MANDATES EARLY PLANNING.

- SUCH PLANNING IS NOT VOLUNTARY AND MUST BE TIMELY TO ASSURE LATER METRIC APPLICATIONS DEEMED IN THE BEST INTEREST OF NATIONAL DEFENSE.

. THIS SEMINAR WORKSHOP AND GUIDANCE THAT FOLLOWS ARE A PART OF OUR DEFENSE MANDATORY PLANNING PROCESS.

<u>CONCLUSION</u>

. INFORMATION DEVELOPED DURING THIS SEMINAR/ WORKSHOP IS TO BE APPLIED IN YOUR AREAS OF RESPONSIBILITY.

. IT'S IMPORTANT THAT DODD 4120.18 BE IMPLEMENTED IN ORDER TO:

- MAXIMIZE NATO INTERCHANGEABILITY.

- FULLY UTILIZE INDUSTRY'S CAPABILITY AS IT BECOMES AVAILABLE.

(AND) - IMPROVE DEFENSE STANDARDIZATION.

. YOUR PERSONAL COMMITMENT TO APPLY DOD POLICY IS REQUESTED.

- END -

MR. TRIMBLE

WELCOMING REMARKS

PHASE II DOD METRICATION SEMINAR/WORKSHOP

18 NOVEMBER 1980

IT IS MY PLEASURE TO WELCOME YOU HERE THIS MORNING. DR. BILL PERRY, THE UNDER SECRETARY OF DEFENSE AND GERRY DINNEEN, HIS PRINCIPAL DEPUTY, AND I HAVE AGREED THAT IT IS TIMELY TO HOLD THIS SEMINAR/ WORKSHOP NOW SO THAT A MUTUAL UNDERSTANDING CAN BE REACHED AMONG ALL OF US ON THE USE OF THE METRIC SYSTEM IN OUR WORK. THIS SESSION FOLLOWS A 12 JUNE 1980 SEMINAR WHEREIN TOP LEVEL EXECUTIVES OF THE MILITARY DEPARTMENTS, DEFENSE AGENCIES AND THE OSD STAFF WERE BRIEFED TO ENSURE A MUTUAL UNDERSTANDING OF THE METRIC SYSTEM IN OUR WORK.

WE PLAN TO COVER DURING THIS 3 DAY SEMINAR/WORKSHOP DOD'S POLICY AND PLANNING FOR APPLYING THE METRIC SYSTEM OF MEASUREMENTS TO MATERIAL ACQUISITION PROGRAMS. LATER, IN THE WORKSHOPS, WE WILL HIGHLIGHT POTENTIAL PROBLEMS AND EXPLORE POSSIBLE SOLUTIONS. THE PASSAGE OF THE U.S. METRIC ACT IN LATE 1975 INITIATED A SERIES OF FAR REACHING ACTIONS INVOLVING

PRIVATE INDUSTRY, THE FEDERAL GOVERNMENT, AND U.S. RELATIONS WITH OTHER COUNTRIES. ANTICIPATING A NEED TO COORDINATE THESE SEGMENTS, THE METRIC ACT CREATED THE U.S. METRIC BOARD, WHICH WILL BE DISCUSSED IN GREATER DETAIL LATER ON. THE DOD INTERPRETATION TO THE ACT IS THAT, TO BE EFFECTIVE, VOLUNTARY METRIC CONVERSION AS STATED IN THE ACT MANDATES EARLY PLANNING. SUCH PLANNING IS NOT VOLUNTARY AND MUST BE COMPLETED IN TIME TO EFFECT METRIC CONVERSION WHEN SUCH IS IN THE INTEREST OF NATIONAL DEFENSE. THIS SEMINAR/WORKSHOP AND THE GUIDANCE THAT WILL FOLLOW ARE A PART OF THE MANDATORY PLANNING PROCESS.

WE ARE VERY FORTUNATE TO HAVE WITH US THIS MORNING REPRESENTATIVES FROM THE NATION'S TOP AGENCIES ON METRICATION. THEY WILL TALK ABOUT THEIR RESPECTIVE ROLES UNDER THE ACT. WE ALSO HAVE AN EMINENT SPEAKER TO TELL US ABOUT THE IMPORTANCE OF THE METRIC SYSTEM IN REGARD TO OUR NATO RELATIONSHIPS.

I ASK THAT THE INFORMATION YOU RECEIVE HERE BE APPLIED IN YOUR AREAS OF RESPONSIBILITY. I BELIEVE THAT IT IS ESSENTIAL THAT OUR METRIC POLICY, SPELLED OUT IN DOD DIRECTIVE 4120.18 BE APPLIED IN ORDER

THAT WE CAN MAXIMIZE INTERCHANGEABILITY AND INTER-OPERABILITY OF EQUIPMENT WITH OUR ALLIES AND TO FULLY UTILIZE THE PRODUCTS OF U.S. INDUSTRY AS THEY BECOME AVAILABLE WHEN IT IS COST EFFECTIVE TO DO SO. YOUR PERSONAL COMMITMENT TO APPLY DOD POLICY IS ESSENTIAL AND IS HEREBY REQUESTED.

I AM PLEASED TO WELCOME YOU HERE THIS MORNING. JOHN MITTINO WILL NOW DISCUSS DOD METRIC POLICY AND OUR PLANNING THUS FAR. JOHN -------

JOHN A. MITTINO

Mr. Mittino is currently the Director, Materiel Acquisition Policy, Office of the Deputy Under Secretary of Defense for Research and Engineering (Acquisition Policy). In this capacity, Mr. Mittino is responsible for Department of Defense policy development in several areas, including the Defense Standardization Program, reliability and quality assurance, weapons systems software, metric conversion, and the Defense industrial base and production resources.

For the past four years he was Director of Standardization and Support, and prior to that period conducted management analyses of major weapons systems from a production and logistics aspect.

Other experience included tours with the National Security Agency and the Army Security Agency as general engineer and planner on their science and technology staffs, and a period with McDonnell-Douglas Electronics Company on the program management staff for a large-scale Defense intelligence system.

As an Army officer prior to 1970, Mr. Mittino completed assignments in engineering management in the communications-electronics and ADP disciplines.

He has a Bachelor of Science degree in Electrical Engineering from the School of Mines, University of Missouri and a Master of Business Administration from the University of Arizona.

MR. MITTINO

DOD METRIC POLICY AND PLANS

THE OFFICE OF THE DEPUTY UNDER SECRETARY FOR ACQUISITION POLICY IS THE FOCAL POINT IN DOD FOR METRIC CONVERSION. IT IS DOD'S POLICY TO CONSIDER USE OF THE METRIC SYSTEM IN ALL OF ITS ACTIVITIES, CONSISTENT WITH OPERATIONAL, ECONOMICAL, TECHNICAL AND SAFETY REQUIREMENTS. IN ADDITION, OUR NATO COMMITMENTS NECESSITATE SPECIAL EMPHASIS FOR CONVERSION WHEN CONSIDERING DESIGNS FOR SUCH MATERIALS.

U.S. METRIC BOARD. AS MENTIONED IN MR. CHURCH'S WELCOMING REMARKS, THE U.S. METRIC CONVERSION ACT (P.L. 94-168) SIGNED BY PRESIDENT FORD IN DECEMBER 1975, STATES THAT IT IS THE POLICY OF THE U.S. TO COORDINATE AND PLAN THE INCREASING USE OF THE METRIC SYSTEM IN THE UNITED STATES. THE ACT FURTHER ESTABLISHES A U.S. METRIC BOARD TO COORDINATE THE VOLUNTARY CONVERSION TO THE METRIC SYSTEM. DR. MALCOLM O'HAGAN, EXECUTIVE DIRECTOR OF THE BOARD, IS HERE TODAY AND WILL TELL US MORE ABOUT THE ACT AND THE FUNCTIONS OF THE BOARD.

DOD ROLE. AS A CONSEQUENCE OF THE ACT, IT BECAME NECESSARY FOR DOD AND THE FEDERAL AGENCIES TO DEVELOP PLANS AND POLICIES FOR ITS IMPLEMENTATION. DOD DIRECTIVE 4120.18, TITLED "METRIC SYSTEM OF MEASUREMENT", REFLECTS OUR INTERPRETATION OF THE ACT AND SPELLS OUT THE DEFENSE POLICY AND ASSIGNS RESPONSIBILITIES. EACH OF YOU IS DIRECTLY OR INDIRECTLY REQUIRED BY THE DIRECTIVE TO PERFORM OR RECOGNIZE CERTAIN METRICATION ACTIVITIES. IN ADDITION TO MY OFFICE'S RESPONSIBILITY FOR THE DOD METRICATION PROGRAM,

IT ALSO PROVIDES THE DOD MEMBER ON A FEDERAL INTER-AGENCY COMMITTEE ON METRIC POLICY. THIS COMMITTEE WAS ESTABLISHED TO PROVIDE UNIFORM GUIDANCE AND TO COORDINATE PLANNING EFFORTS WITHIN THE FEDERAL GOVERNMENT IN COMPLIANCE WITH THE METRIC ACT. THE CHAIRMAN OF THE U.S. METRIC BOARD ALSO CHAIRS THE ICMP, THUS EFFECTING A CLOSE WORKING RELATIONSHIP BETWEEN THE BOARD AND THE FEDERAL GOVERNMENT. THIS CHART SHOWS THE RELATIONSHIP OF THE ICMP TO THE BOARD.

- CHART

ICMP/MOC. THE ICMP IS SERVED BY A METRICATION OPERATING COMMITTEE THAT HAS MEMBERSHIP FROM SOME 40 GOVERNMENT AGENCIES. DOD PRESENTLY PROVIDES THE CHAIRMAN. THIS WORKING COMMITTEE DOES THE IMPORTANT GROUND WORK IN DEVELOPING RECOMMENDATIONS TO THE ICMP ON PROJECTS AND ACTIVITIES NECESSARY TO IMPLEMENT A COORDINATED GOVERNMENT POSITION ON METRIC ISSUES. THE MOC IS SUPPORTED BY A NUMBER OF SUBCOMMITTEES THAT ADDRESS SPECIFIC AREAS OF METRIC PLANNING. FURTHER INFORMATION ON THE ICMP/MOC AND ITS SUBCOMMITTEES IS PROVIDED IN YOUR HAND-OUT MATERIAL. DOD HAS A FIRST HAND INTEREST IN THESE MOC SUBCOMMITTEES AND PROVIDES MEMBERSHIP TO ONE OR MORE OF THESE ACTIVITIES. WITHIN DOD, A METRICATION STEERING GROUP HAS BEEN ESTABLISHED TO RECOMMEND POLICIES AND PROVIDE DOD-WIDE PROCEDURES FOR METRICATION OF DEFENSE MATERIAL. THE CHAIRMAN IS PROVIDED FROM WITHIN THE OSD ACQUISITION STAFF. HOWARD ELLSWORTH, THE PRESENT MSG CHAIRMAN, WILL GO INTO FURTHER DETAIL LATER ON.

MSG. THE MANDATORY PLANNING FOR USE OF METRIC MEASUREMENTS IN DEFENSE MATERIAL IS EVERYBODY'S BUSINESS. THE DOD METRICATION STEERING GROUP WAS NOT ESTABLISHED TO SOLVE ALL THE PROBLEMS. EACH AGENCY REPRESENTED HERE TODAY WILL FROM TIME TO TIME BE TASKED TO PROVIDE INPUTS AND OTHERWISE SUPPORT THIS COMMITTEE AS NEEDED.

ANMC. I MENTIONED THAT A COMBINED GOVERNMENT COMMITTEE, THE ICMP, HAS BEEN ESTABLISHED AS A SPIN-OFF FROM THE ACT. THERE IS A SIMILAR IMPACT ON THE PRIVATE SECTOR. THE AMERICAN NATIONAL METRIC COUNCIL (ANMC) WAS ESTABLISHED IN 1973 TO HELP GUIDE METRIC CONVERSION IN THE PRIVATE SECTORS OF OUR ECONOMY. MR. BUCKINGHAM (AF LT. GEN., RETIRED) IS ITS PRESIDENT AND IS HERE TODAY TO TELL YOU ABOUT ANMC'S ACTIVITIES. THE ORGANIZATION HAS A NUMBER OF SECTOR COMMITTEES THAT REPRESENT THE MAJORITY OF U.S. COMMERCE. THIS INCLUDES, FOR EXAMPLE, THE METALS INDUSTRY, PETROLEUM AND LUMBER INTERESTS, AEROSPACE AND CONSTRUCTION MANUFACTURERS, ELECTRONICS, TEXTILES AND OUR FOOD PRODUCERS. BECAUSE OF DOD'S KEEN INTEREST IN AND INFLUENCE ON THESE SECTORS, WE NOW HAVE OVER 50 DEFENSE REPRESENTATIVES WHO SERVE ON MOST OF THEM. IT IS ESSENTIAL THAT YOUR AGENCIES FULLY SUPPORT THE DUTIES AND RESPONSIBILITIES OF THOSE PEOPLE REPRESENTING DOD. ACTIVITY IN THE PRIVATE SECTOR OF THE U.S. ECONOMY WILL PROBABLY INCREASE, THUS DOD MUST KEEP UP-TO-DATE ON THE GROWING NUMBER OF METRIC PLANS AND CAPABILITIES DEVELOPING IN U.S. BUSINESSES THAT REFLECT OUR INTERESTS.

NATO. THERE ARE OTHER DEFENSE ORGANIZATIONS ON THE INTERNATIONAL SIDE THAT DEAL WITH METRIC ISSUES AND IN WHICH DOD PARTICIPATES. FOR EXAMPLE, WE PARTICIPATE WITH NATO TECHNICAL COMMITTEES DEALING WITH MILITARY MATERIAL AND RELATED STANDARDIZATION EFFORTS. YOU ARE ALL FAMILIAR WITH OUR VAST INDEX OF MILITARY SPECIFICATIONS AND STANDARDS ON JUST ABOUT EVERY CONCEIVABLE ITEM OR SERVICE. THE PROCESS OF REVISING THESE DOCUMENTS TO REFLECT THE METRIC SYSTEM OF MEASUREMENT PRESENTS SOME VERY DIFFICULT PROBLEMS. IN HIS MEMORANDUM OF 7 MARCH 1980 TO THE MILITARY DEPARTMENTS AND DEFENSE AGENCIES, DR. PERRY, THE UNDER SECRETARY FOR RESEARCH AND ENGINEERING, ESTABLISHED A TARGET DATE OF 1990 FOR AVAILABILITY OF A COMPLETE SPECTRUM OF METRIC SPECIFICATIONS AND STANDARDS. THOUGH THE

1990 DATE SEEMS FAR INTO THE FUTURE, THE MAGNITUDE AND COMPLEXITY OF THIS TASK REQUIRES THAT WE GET STARTED NOW. THIS IS ESPECIALLY TRUE WHEN WE CONSIDER THE ROLE THESE DOCUMENTS PLAY IN THE NATO INTEROPERABILITY ENVIRONMENT. THE INTEROPERABILITY PROCESS IS NOT SOLELY DOD'S CONCERN. I MENTION THIS BECAUSE IT IS OUR POLICY TO USE DOD ACCEPTED PRIVATE INDUSTRY STANDARDS WHEREVER POSSIBLE IN LIEU OF CREATING OR MAINTAINING OUR OWN. THUS, WE MUST LOOK TO U.S. INDUSTRY AND NATO FOR ASSISTANCE EACH TIME A DEFENSE DECISION IS CONTEMPLATED TO REVISE OR ISSUE NEW MILITARY SPECIFICATIONS AND STANDARDS CONTAINING THE METRIC SYSTEM. SUCH COORDINATION BETWEEN NATO AND OURSELVES REQUIRES EARLY PLANNING IF WE ARE TO REDUCE THE TOTAL NUMBER OF ITEMS IN THE NATO AND U.S. INVENTORY AND REDUCE EQUIPMENT PRODUCTION AND INVENTORY COSTS. TO TELL YOU MORE ABOUT THE NATO ASPECTS OF METRICATION, WE ARE VERY FORTUNATE INDEED TO HAVE WITH US THE CHAIRMAN OF THE NATO AC-301 GROUP WHICH REPORTS TO THE COUNCIL OF NATO ARMAMENT DIRECTORS AND WHO WILL BE ADDRESSING THIS AREA SHORTLY.

WE HAVE SOME EXCELLENT SPEAKERS AND I KNOW YOU WANT TO HEAR FROM THEM. IT IS MY PLEASURE TO INTRODUCE DR. MALCOLM O'HAGAN, EXECUTIVE DIRECTOR OF THE U.S. METRIC BOARD. DR. O'HAGAN -----

MALCOLM E. O'HAGAN

Dr. Malcolm E. O'Hagan was appointed Executive Director of the U.S. Metric Board on July 1, 1978.

Dr. O'Hagan was the President of the American National Metric Council, a private, nonprofit organization that serves as a planning, coordinating, and information center for metric activities in the United States. This Washington based organization was established in 1973 to assist those companies and organizations that are now facing the decision or are now converting to the metric system.

Dr. O'Hagan served as a special assistant to the Chairman of the National Metric Advisory Panel to the Department of Commerce metric study. From 1968 to 1973, Dr. O'Hagan held a number of staff and executive positions at Bendix Corporation (Dayton, Ohio). He earlier held the position of Senior Scientific Officer at the Institute for Industrial Research and Standards (Dublin).

Dr. O'Hagan, who was born and raised in Ireland, holds a B.S. and M.S. in Mechanical Engineering form the National University of Ireland. He obtained his D.Sc. from George Washington University. During his doctoral studies he held a teaching fellowship at GWU and did his doctoral research at the National Bureau of Standards.

Dr. O'Hagan is a nationally and internationally known expert on the subject of metrication and has addressed numerous conferences throughout the nation and abroad. He has published many articles and has written reports for NBS, SME, ASAE, ASTM, International Organization for Standardization, U.S. Office of Education; just to mention a few. He has been interviewed on several radio and TV programs across the nation.

DOD PRESENTATION -- NOVEMBER 18, 1980

GOOD MORNING LADIES AND GENTLEMEN:

IT IS A PLEASURE TO APPEAR BEFORE YOU TODAY TO BRIEF YOU ON THE ROLE OF THE UNITED STATES METRIC BOARD AND HOW WE ARE WORKING WITH FEDERAL, STATE, AND LOCAL GOVERNMENT, AS WELL AS WITH THE PRIVATE SECTOR IN COORDINATING VOLUNTARY CONVERSION EFFORTS IN THIS COUNTRY.

SINCE THERE HAS BEEN CONSIDERABLE CONFUSION OVER WHAT THIS COUNTRY'S NATIONAL POLICY IS ON THE SUBJECT OF METRICS, LET ME SPELL IT OUT FOR YOU AT THIS TIME.

IN PASSING THE METRIC CONVERSION ACT, WHICH IS ALSO KNOWN AS PUBLIC LAW 94-168, CONGRESS DECLARED THAT THE POLICY OF THE UNITED STATES IS "TO COORDINATE AND PLAN THE INCREASING USE OF THE METRIC SYSTEM IN THE UNITED STATES" AND ESTABLISHED THE UNITED STATES METRIC BOARD TO "COORDINATE THE VOLUNTARY CONVERSION TO THE METRIC SYSTEM."

IT IS IMPORTANT FOR YOU TO KNOW THAT THIS ACT DID NOT SET A DEADLINE; EXPRESS A PREFERENCE; OR, COMMIT THIS COUNTRY TO CONVERT TO METRICS.

HOWEVER CONGRESS VERY WISELY DECIDED THAT A CAREFULLY PLANNED TRANSITION IN WHICH ALL SECTORS OF OUR ECONOMY PARTICIPATE VOLUNTARILY WOULD BE PREFERABLE TO EITHER DRIFTING HAPHAZARDLY TOWARD METRIC OR MANDATING ITS USAGE BY A SPECIFIC DATE.

DOD PRESENTATION

THE METRIC BOARD CONSISTS OF A CHAIRMAN AND 16 MEMBERS APPOINTED BY THE PRESIDENT AND CONFIRMED BY THE SENATE. IT IS A CITIZEN BOARD REPRESENTING CONSUMERS, BUSINESS, INDUSTRY, LABOR, SCIENCE, STATE AND LOCAL GOVERNMENT, EDUCATION, AND ENGINEERING. MORE IMPORTANTLY, THE BOARD IS A MICROCOSM OF THIS COUNTRY'S VIEWS, BOTH FOR AND AGAINST, ON THE WHOLE ISSUE OF METRIC CONVERSION.

THE BOARD HELD ITS FIRST FULL MEETING IN AUGUST, 1978 AND HAS BEEN MEETING SINCE ON A BI-MONTHLY BASIS IN DIFFERENT CITIES AROUND THE COUNTRY. PUBLIC FORUMS ARE HELD IN CONJUNCTION WITH THE MEETINGS SO THAT ORGANIZATIONS AND INDIVIDUALS IN THE AREAS WE VISIT HAVE AN OPPORTUNITY TO PRESENT THEIR VIEWS ON METRIC TO THE BOARD.

AT THIS POINT I WOULD LIKE TO STRESS THE BOARD HAS NO COMPULSORY OR REGULATORY POWERS. ITS ROLE IS TO CONDUCT RESEARCH, COORDINATE VOLUNTARY CONVERSION ACTIVITIES, AND THROUGH A BROAD PROGRAM OF PUBLIC EDUCATION, ASSIST THE PEOPLE OF THIS COUNTRY IN BETTER UNDERSTANDING THE MEANING AND USE OF METRIC TERMS IN EVERYDAY LIFE.

AT THE SAME TIME, LET NO ONE BE MISLED TO BELIEVE THAT THE METRIC BOARD WILL SHIRK ITS RESPONSIBILITY UNDER THE LAW OR FAIL TO SPEAK OUT IF WE BELIEVE THAT THE INTERESTS OF THE CONSUMING PUBLIC, BUSINESS, OR LABOR WILL BE ADVERSELY AFFECTED BY HAPHAZARD AND UNPLANNED METRIC CONVERSION ACTIVITIES.

DOD PRESENTATION

RESPONSIBILITY FOR THE DEVELOPMENT OF METRIC CONVERSION PLANS RESTS WITH THOSE WHO WILL BE RESPONSIBILE FOR THEIR IMPLEMENTATION -- COMPANIES, INDUSTRY GROUPS, EDUCATIONAL INSTITUTIONS, AGENCIES OF THE FEDERAL GOVERNMENT, AND THE STATE AND LOCAL GOVERNMENT. IT IS THE RESPONSIBILITY OF THESE GROUPS TO: ASSESS THE COSTS AND BENEFITS; WEIGH THE TOTAL RANGE OF ADVANTAGES AND DISADVANTAGES: CONSIDER TIMING, DEGREE, AND METHODS OF CONVERSION; AND EVALUATE THE IMPACT OF ANY PLANS ON THEIR OWN ORGANIZATIONS AS WELL AS THE IMPACT ON SUPPLIERS, CUSTOMERS, LABOR, SMALL BUSINESSES, CONSUMERS, AND OTHER PARTIES AFFECTED BY ANY CHANGE.

BY LAW THE BOARD WAS REQUIRED TO DEVELOP PLANNING GUIDELINES TO ALLOW GROUPS TO FORMULATE AND RECOMMEND OR SUGGEST SPECIFIC PROGRAMS FOR COORDINATING CONVERSION. GUIDELINES FOR PRIVATE SECTOR PLANNING WERE APPROVED BY THE BOARD AND PUBLISHED IN THE NOTICE SECTION OF THE FEDERAL REGISTER IN FINAL FORM ON SEPTEMBER 16, 1980.

ADDITIONALLY, THE BOARD HAS IN COOPERATION WITH THE DEPARTMENT OF JUSTICE AND THE FEDERAL TRADE COMMISSION DEVELOPED GUIDELINES FOR COORDINATED INDUSTRY PLANNING IN A MANNER THAT MINIMIZES POTENTIAL ANTI-TRUST PROBLEMS.

THE BOARD WILL SUPPORT THE PRIVATE SECTOR BY PUBLICIZING PROPOSED PROGRAMS, ASSISTING WITH PUBLIC EDUCATION, COORDINATING WITH FEDERAL AND STATE GOVERNMENTS, ADDRESSING LEGAL IMPEDIMENTS TO CHANGE, CONDUCTING HEARINGS, AND UNDERTAKING RESEARCH WHEN SUCH IS DEEMED NECESSARY.

DOD PRESENTATION

THE INCREASED USE OF THE METRIC SYSTEM IN THE UNITED STATES IS THE RESULT FOR THE MOST PART, OF INDEPENDENT, ENGINEERING AND MARKETING DECISIONS IN THE PRIVATE SECTOR. AS THE MAJOR CORPORATIONS ADOPT METRIC MEASURES THEIR SUPPLIERS IN MANY INSTANCES, ARE REQUIRED TO DEAL TO METRIC SPECIFICATIONS. FOR MANY OF THESE SUPPLIER COMPANIES, THERE IS NO OPTION AND THEY ARE OBLIGED TO CONVERT IN ORDER TO STAY IN BUSINESS. THE IMPACT OF CONVERSION ON SMALLER COMPANIES IS A SUBJECT OF PARTICULAR INTEREST TO THE U. S. METRIC BOARD AND RESEARCH IS UNDERWAY TO EVALUATE THE IMPACT AND IMPLICATIONS OF CONVERSION FOR SMALL BUSINESS. LIKEWISE, WORKERS ARE REQUIRED TO OPERATE IN WHATEVER UNITS THEIR EMPLOYERS DICTATE. FOR THEM CONVERSION MAY IMPOSE PROBLEMS WITH RESPECT TO TOOLS AND GAGES, TRAINING, SAFETY AND OTHER MATTERS. THIS ALSO IS AN AREA OF IMPACT UNDER STUDY BY OUR BOARD.

ONE PARTICULAR AREA WHERE THE U. S. METRIC BOARD HAS EXERCISED ITS COORDINATING ROLE HAS BEEN IN THE AREA OF GAS PUMP CONVERSION TO LITER SALE. THE BOARD HELD HEARINGS ON THIS SUBJECT AND PUBLISHED A COMPREHENSIVE REPORT DEALING WITH ALL ASPECTS OF THIS ISSUE. THE BOARD IS PARTICULARLY CONCERNED THAT CONSUMERS BE PROPERLY INFORMED DURING THE TRANSITION AND HAS URGED THE MAJOR OIL COMPANIES AND GASOLINE RETAILERS TO PROVIDE ADEQUATE INFORMATION TO THEIR CUSTOMERS.

TO ASSIST IN THIS EDUCATION PROCESS AND TO ENSURE THE AVAILABILITY OF ACCURATE INFORMATION ON THE ISSUE OF LITER DISPENSING, THE BOARD IS PRODUCING A PACKAGE OF PROTOTYPE MATERIALS WHICH WILL BE MADE AVAILABLE TO RETAILING ORGANIZATIONS AND OTHER INTERESTED GROUPS FOR REPRODUCTION AND WIDE DISTRIBUTION.

I HAVE DETAILED FOR YOU THE BOARD'S PLANNING AND COORDINATING ROLE, AS WELL AS SOME OF ITS ACTIVITIES IN SUPPORT OF THE PRIVATE SECTOR. THERE ARE TWO OTHER AREAS WHERE THE BOARD HAS A MAJOR ROLE. NAMELY, IN THE COORDINATION OF FEDERAL ACTIVITIES AND THE COORDINATION OF STATE ACTIVITIES.

ONE OF THE EARLY ACTIONS OF THE BOARD, WITH THE APPROVAL OF THE OFFICE OF MANAGEMENT AND BUDGET, WAS TO AGREE TO THE ESTABLISHMENT OF AN INTERAGENCY COMMITTEE ON METRIC POLICY. THIS COMMITTEE, COMPRISED OF HIGH RANKING OFFICIALS FROM EVERY MAJOR GOVERNMENT DEPARTMENT AND AGENCY, IS THE PRIMARY MECHANISM THROUGH WHICH POLICIES AND ACTIONS OF THE VARIOUS AGENCIES ARE TO BE COORDINATED. A SUPPORTING AND MORE OPERATIONALLY ORIENTED ARM OF THE ICMP -- THE METRIC OPERATING COMMITTEE -- DEALS WITH DAY TO DAY COORDINATING PROBLEMS. THE MOC, AS IT IS KNOWN, HAS RESPONSIBILITY FOR DEVELOPING RECOMMENDATIONS FOR THE ICMP AND FOR COORDINATING OPERATIONAL METRIC RELATED ACTIVITIES IN THE MEMBER AGENCIES.

AMONG AREAS ADDRESSED BY THE MOC ARE TRAINING, EDUCATION, INFORMATION, CONSUMER AFFAIRS, PROCUREMENT, DATA COLLECTION, LEGISLATIVE AND REGULATORY CHANGES, AND CONSTRUCTION AND TRANSPORTATION. THROUGH THE MOC AND ICMP, A POLICY AND GUIDELINES

ARE PRESENTLY BEING DEVELOPED WHICH WILL PROVIDE FOR CONSISTENCY AND COMPATIBILITY IN VOLUNTARY FEDERAL METRIC CONVERSION ACTIVITIES.

THE ICMP, THE MOC, AND THE MOC SUBCOMMITTEES INVOLVE 44 AGENCIES WHICH TOGETHER ACCOUNT FOR VIRTUALLY ALL GOVERNMENT ACTIVITIES AFFECTED BY METRICATION. IN MANY AREAS, THESE FEDERAL AGENCIES WILL HAVE A DECISIVE INFLUENCE ON THE PROGRESS OF METRICATION -- PROCUREMENT POLICY IS A MAJOR EXAMPLE BECAUSE GOVERNMENT HAS A SIGNIFICANT PROCUREMENT IMPACT ON THE PRIVATE SECTOR.

THE U. S. METRIC BOARD HAS NO SOVEREIGNTY OVER INDIVIDUAL FEDERAL AGENCIES. HOWEVER, THE USMB CAN AND WILL EXECUTE THE COORDINATING ROLE ON THE COLLECTIVE ACTIONS OF FEDERAL AGENCIES, E.G., THE ACTIVITIES OF THE ICMP. THE NEED FOR DEFINITION OF THIS COORDINATION ROLE HAD BEEN EVIDENT FOR QUITE A WHILE. AT ITS FEBRUARY 1980 MEETING, THE USMB DIRECTED THE USMB STAFF TO DEVELOP A FEDERAL PLAN, WHICH AMONG OTHER THINGS, WOULD DEFINE THE ROLE. THAT PLAN WAS TO WORK TO ENSURE FOR THE BOARD THE FEDERAL AGENCIES AND THE BOARD OPERATE HARMONIOUSLY, CONSISTENTLY AND EFFECTIVELY IN ACCORDANCE WITH THE BOARD'S INTERPRETATION OF THE LAW AND ACCORDING TO THE INDIVIDUAL AND COLLECTIVE AGENCIES' INTERPRETATION OF THEIR INDIVIDUAL AND COLLECTIVE RESPONSIBILITIES WITH RESPECT TO THE METRIC CONVERSION. DEVELOPMENT OF THE PLAN IS PROCEEDING WELL.

DOD PRESENTATION

THERE IS SUBSTANTIAL AGREEMENT THAT FEDERAL AGENCIES HAVE A DUAL ROLE TO SERVE WITH THE PRIVATE SECTOR AND METRICATION. I WANT TO EMPHASIZE THIS DUAL ROLE. THAT DUALITY CONSISTS OF FIRST, THE FEDERAL AGENCIES ACCOMMODATION OF THE PRIVATE SECTOR IN METRIC CONVERSION WHEN ECONOMICS OR ANY OTHER REASONS MOTIVATES METRIC CONVERSION WITHIN THE PRIVATE SECTOR.

TO ACCOMMODATE THE PRIVATE SECTOR INITIATIVES IN METRIC CONVERSION MEANS THAT THE FEDERAL AGENCIES AND THE LAWS, REGULATIONS AND PROGRAMS THEY MUST NOT SERVE AS A BARRIER TO METRICATION AND SHOULD NOT DISCRIMINATE BETWEEN METRIC AND CUSTOMARY PRODUCTS. ALSO THE AGENCIES SHOULD PROVIDE ANY REASONABLE INFORMATION REQUESTED BY THE PRIVATE SECTOR IN CONNECTION WITH METRIC CONVERSION.

THE OTHER PORTION OF THAT DUAL ROLE IS FOR FEDERAL AGENCIES TO GIVE DUE AND PROPER CONSIDERATION TO THE IMPACT THAT ANY FEDERAL AGENCY UNILATERAL ACTION MAY HAVE ON THE PRIVATE SECTOR WHEN THE AGENCY MAKES A FINDING THAT BECAUSE OF ITS PARTICULAR MISSION, JURISDICTION OR INTERNAL BUSINESS INTERESTS IT SHOULD UNILATERALLY ESTABLISH A METRIC REQUIREMENT THAT WILL AFFECT THE PRIVATE SECTOR.

WHAT DOES THE FEDERAL PROGRAMS AT THE U. S. METRIC BOARD DO IN RELATION TO THESE ABOVE MENTIONED FEDERAL AGENCY METRICATION ACTIVITIES?

DOD PRESENTATION

THE FEDERAL PROGRAM PERFORMS THREE BASIC FUNCTIONS. THE FIRST FUNCTION IS ONE OF SUPPORT FOR THE ICMP AND THE MOC. IN THIS ROLE THE BOARD PROVIDES ADMINISTRATIVE SUPPORT SO THAT THE COORDINATING ACTIVITIES ARE MADE EASIER FOR ALL PARTICIPANTS. THIS SUPPORTING ROLE RANGES FROM THE VERY SIMPLEST PROCEDURES, SUCH AS MAKING ARRANGEMENTS FOR MEETING ROOMS, PUBLISHING AN AGENDA, TO MORE COMPLEX ACTIVITIES SUCH AS BRINGING TOGETHER MULTI-DICIPLINARY TASK FORCES FROM THE STAFF, OR THE BOARD, TO DEVELOP ISSUE PAPERS OR PROVIDE RECOMMENDATIONS FOR DELIBERATION.

THE SECOND FUNCTION REPRESENTED IN THE BOARD'S FEDERAL PROGRAM IS THAT OF A NONDOMINATING PARTICIPANT. THIS BOARD'S PARTICIPATION ENHANCES COMMUNICATION BETWEEN THE BOARD AND THE ICMP/MOC, BUT IT ALSO IS IMPORTANT IN THE CONSENSUS AND APPROVAL PROCESS INVOLVED IN DEVELOPING FEDERAL POLICIES, OBJECTIVES, AND PLANS. THIS RELATIONSHIP IS MAINTAINED IN TWO DIFFERENT WAYS.

THE CHAIRMAN OF THE U. S. METRIC BOARD SERVES ALSO AS CHAIRMAN OF THE ICMP, AND THE BOARD'S DIRECTOR OF RESEARCH, COORDINATION AND PLANNING SERVES AS THE STAFF REPRESENTATIVE FROM THE METRIC BOARD TO THE MOC. A PRIMARY CONCERN IS TO ENSURE THAT THE METRIC BOARD'S OPINIONS AND INTERPRETATIONS ARE INCORPORATED AS EARLY AS PRACTICAL IN THE DELIBERATIONS OF THE MOC.

DOD PRESENTATION

THE THIRD FUNCTION OF THE FEDERAL PROGRAM IS ONE OF INVOLVEMENT WITH THE VOLUNTARY STANDARDS PROCESS. OUR ENABLING LEGISLATION REQUIRES THE BOARD TO: ENCOURAGE THE DEVELOPMENT OR REVISION OF ENGINEERING STANDARDS ON A METRIC MEASUREMENT BASIS; ENCOURAGE RETENTION IN NEW METRIC STANDARDS OF U. S. DESIGNS, PRACTICES AND CONVENTIONS THAT ARE INTERNATIONALLY ACCEPTED OR THAT EMBODY SUPERIOR TECHNOLOGY: AND HELP GAIN INTERNATIONAL RECOGNITION FOR METRIC STANDARDS PROPOSED BY THE U. S.

MANY OF THE KEY DECISIONS RELATING TO METRIC CONVERSION RESIDE AT THE STATE LEVEL -- IN EDUCATION, IN TRANSPORTATION, IN WEIGHTS AND MEASURES REGULATIONS, ETC. RECOGNIZING THIS, THE BOARD HAS ASKED ALL STATE GOVERNORS TO APPOINT A METRIC COORDINATOR WITH WHOM THE BOARD CAN WORK IN ESTABLISHING AN INTERSTATE COORDINATING MECHANISM. SEVERAL REGIONAL MEETINGS HAVE BEEN HELD AS WELL AS A NATIONAL MEETING WHICH REPRESENTATIVES FROM 33 OF THE 50 STATES ATTENDED.

THE NEED FOR APPROPRIATE, TIMELY, AND CONSISTENT ACTION BY THE STATES IS WIDELY RECOGNIZED AND WE HAVE FOUND STATE OFFICIALS ANXIOUS TO WORK WITH THE UNITED STATES METRIC BOARD TO ACHIEVE THESE GOALS.

THE U. S. METRIC BOARD HAS NOW BEEN OPERATIONAL FOR ALMOST TWO YEARS AND OUR EFFORTS TO DATE HAVE BEEN DIRECTED TOWARD ESTABLISHING A SOLID FOUNDATION TO SUPPORT VOLUNTARY CONVERSION ACTIVITIES IN THE PRIVATE AND PUBLIC SECTORS.

DOD PRESENTATION

BASIC CONVERSION DATA IS BEING GATHERED; THE IMPACT OF CONVERSION IN KEY AREAS IS BEING RESEARCHED; PLANNING PROCEDURES HAVE BEEN DEVELOPED; COORDINATING MECHANISMS SET IN PLACE; AND; A PROGRAM OF PUBLIC EDUCATION THAT WILL ENABLE THE AMERICAN PUBLIC TO BECOME FAMILIAR WITH THE MEANING AND APPLICABILITY OF METRIC TERMS AND MEASURES IN DAILY LIFE IS WELL UNDERWAY.

THE RATE AT WHICH METRIC USAGE CONTINUES TO INCREASE IN THIS COUNTRY WILL BE A FUNCTION OF THE SYSTEM'S UTILITY AND PRACTICAL VALUE. BECAUSE CONVERSION IS STRICTLY VOLUNTARY, THE VALUE WILL BE PUT TO THE TEST IN THE CRUCIBLE OF THE AMERICAN MARKETPLACE.

ACCEPTANCE OR NON-ACCEPTANCE OF THE METRIC SYSTEM BY AMERICAN INDUSTRY AND THE AMERICAN PEOPLE WILL BE DICTATED BY HOW WELL IT SERVES THEIR NEEDS AND THE OVERALL NEEDS OF THE NATION.

HOWARD B. ELLSWORTH

Mr. Ellsworth is assigned to the Defense Department for Acquisition Policy (Office, Under Secretary of Defense for Research and Engineering). Prior to joining the OSD staff in 1964, Mr. Ellsworth spent 17 years as a procurement and production management specialist and as a contracting officer for major Army, Navy and Air Force weapon systems. He is currently serving as the OSD Standardization Staff Officer for the Department of Defense. Within the last year, he assumed additional duties as the Department of Defense Metrication Staff Officer and the Vice Chairmanship of the U.S. Government's Metrication Operating Committee. He is a member, Washington Chapter, SOLE (D2 C1). Mr. Ellsworth holds a degree in Aeronautical Engineering.

HOWARD B. ELLSWORTH

18 NOVEMBER 1980
10:20 - 10:30

DOD METRICATION STEERING GROUP

VERY BRIEFLY, LET ME TELL YOU MORE ABOUT THE DOD METRICATION STEERING GROUP WHICH WAS REFERENCED PREVIOUSLY IN MR. MITTINO'S DISCUSSION. DOD DIRECTIVE 4120.18 ESTABLISHED THIS GROUP IN ORDER TO PLAN AND COORDINATE DOD'S CONVERSION TO THE METRIC SYSTEM AND TO ADVISE DOD COMPONENTS ON MATTERS RELATING TO METRICATION. THE CHARTER FOR THIS GROUP, A COPY OF WHICH HAS BEEN PROVIDED IN YOUR HAND-OUTS, REQUIRES THAT THE GROUP REPORT TO THE SECRETARY OF DEFENSE THROUGH THE UNDER SECRETARY FOR RESEARCH AND ENGINEERING. THE R&E DEPUTY UNDER SECRETARY EXERCISES OPERATIONAL CONTROL, ASSIGNS TASKS, AND DESIGNATES OBJECTIVES.

OBJECTIVES. VERY BRIEFLY, THE GROUP'S OBJECTIVES ARE:

A. FACILITATE EFFECTIVE MANAGEMENT OF DOD'S METRIC PLANS AND PROGRAMS,

B. PROMOTE THE DEVELOPMENT AND IMPLEMENTATION OF UNIFORM POLICIES AND CONVERSION INITIATIVES, AND

C. ENSURE COORDINATION.

AS STATED IN OUR METRIC DIRECTIVE, PRIMARY AND ALTERNATE MEMBERS ARE APPOINTED BY THE MILITARY DEPARTMENTS AND DEFENSE AGENCIES. THESE PEOPLE MUST HAVE THE KNOWLEDGE, STATURE AND AUTHORITY TO EFFECTIVELY REPRESENT THEIR COMPONENTS.

ADDITIONALLY, THIS GROUP WORKS CLOSELY WITH THE STAFFS OF BOTH THE U.S. METRIC BOARD AND THE AMERICAN NATIONAL METRIC COUNCIL, WITH SPECIAL EMPHASIS ON DOD'S APPOINTED REPRESENTATIVES WORKING WITH THE 40 SOME ODD ANMC PRIVATE SECTOR COMMITTEES.

REPORTS. THE MSG IS REQUIRED TO SUBMIT AN ANNUAL METRIC STATUS "HOW GOES IT" REPORT TO OUR OFFICE. THE REPORT IS REQUIRED TO DISCUSS PROBLEM AREAS, SOLUTIONS, GIVE RECOMMENDATIONS, AND CITE ACCOMPLISHMENTS.

CURRENTLY, THE GROUP HAS 18 PEOPLE REPRESENTING ALL OF THE MILITARY DEPARTMENTS AND A MAJORITY OF THE DEFENSE AGENCIES. A COMPLETE LISTING IS PROVIDED IN YOUR HAND-OUTS. THEY ARE THERE TO REPRESENT DEFENSE INTEREST AND TO KEEP DOD INFORMED ON THE PRIVATE SECTORS' METRIC CONVERSION PLANNING.

DOD METRIC PLAN. IN CLOSING, I WOULD LIKE TO QUICKLY BRIEF YOU ON THE SALIENT FEATURES OF THE FORTHCOMING DOD METRIC PLANNING DOCUMENT NOW IN ITS REVIEW AND COMMAND PHASE. THIS PLAN WILL SERVE AS A MANAGEMENT TOOL IDENTIFYING BY SPECIFIC TASKS WHAT NEEDS TO BE DONE. IT WILL BE A "LIVING" DOCUMENT WHEREBY THESE TASKS CAN BE ADDED OR DELETED AS DICTATED BY DEFENSE COMPONENTS THROUGH THEIR MSG MEMBERSHIP.

CURRENTLY, TEN (10) TASKS HAVE BEEN IDENTIFIED INITIALLY. THESE ARE:

1. DEVELOP EVALUATION CRITERIA FOR USE IN DETERMINING WHICH SYSTEMS AND EQUIPMENT SHOULD BE DESIGNED USING METRIC UNITS.

2. DEVELOP GUIDELINES FOR MONITORING CONVERSION ACTIVITIES IN THE U.S. AND NATO.

3. DEVELOP PROCEDURES FOR DEFENSE PARTICIPATION IN GOVERNMENT INTER-AGENCY METRIC POLICY COMMITTEE ACTIVITIES.

4. DEVELOP A DOD-WIDE POLICY ON METRIC TRAINING.

5. DETERMINE HOW BEST TO ADDRESS AND RESOLVE SUPPLY AND MAINTENANCE PROBLEMS RESULTING FROM THE INTRODUCTION OF LOOK-ALIKE METRIC ITEMS INTO THE DEFENSE INVENTORY. THE RELATED ISSUE OF FORM-FIT AND FUNCTION SIMILARITIES WITH INCH-POUND COUNTERPARTS ALSO WILL BE EXAMINED.

6. INVESTIGATE THE NEED TO ESTABLISH AN M-DAY AFTER WHICH ALL MILITARY OPERATIONS WILL BE CARRIED OUT IN METRIC UNITS, INCLUDING COMMUNICATIONS.

7. EXAMINE CURRENT MEASUREMENT SENSITIVE DOD REGULATIONS TO DETERMINE IF THERE IS A NEED FOR REVISION IN ORDER TO PROPERLY RECOGNIZE THE USE OF THE METRIC SYSTEM.

8. EXAMINE NEED FOR AND IMPLEMENT, AS NEEDED, DAR GUIDANCE FOR THE SOLICITATION AND ACQUISITION OF METRIC DIMENSIONED MATERIAL.

9. AND 10. ESTABLISH A PROGRAM FOR THE CONVERSION OF EXISTING AND/OR PREPARATION OF NEW SPECIFICATIONS AND STANDARDS THAT REQUIRE MEASUREMENT INFORMATION AND, FINALLY, HOLDING PERIODIC SEMINARS SUCH AS THIS ONE.

THESE INITIAL TASKS ARE INCLUDED IN A NEW DOD INSTRUCTION CURRENTLY UNDER COORDINATION.

CHARLES E. BUCKINGHAM

Charles E. Buckingham has served as President of the American National Metric Council since September 1978.

Prior to joining ANMC, he spent 32 years in the U.S. Air Force culminating his career as Lt. General and Comptroller of the Air Force with responsibility for the formulation, defense and execution of its $33 million (FY 78) annual budget. General Buckingham's military career began as a pilot in the Strategic Air Command, and subsequently involved procurement and production engineering, procurement operations in Europe, research and development programming and logistics acquisition management. General Buckingham received the Air Force Association General Thomas P. Gerrity Memorial Award in 1975 for outstanding achievement in logistics Management. Other decorations and awards include two Distinguished Service Medals, Legion of Merit, two Air Force Commendation Medals and the Army Commendation Medal.

General Buckingham is a graduate of the U.S. Military Academy and a distinguished graduate of the Industrial College of the Armed Forces. He holds an MBA from George Washington University.

STATEMENT

OF

GENERAL BUCKINGHAM, PRESIDENT, ANMC

I am delighted to have this opportunity to get back into an environment in which I feel somewhat more comfortable with than I do in many of the arenas that I find myself in these days.

The American National Metric Council is a private, non-profit corporation, established in 1973. Initially, this was part of the American National Standards Institute.

And it was formed in anticipation of a national policy for metrication, which, as you all know, came about about two years later. The purpose o ANMC as provided for in our by-laws is to provide assistance to sectors of the American economy that wish to voluntarily -- and I stress the word "voluntarily" -- explore the benefits and problems of metric conversion.

And to assist those sector committees in developing industry plans for conversion when the sectors deem it appropriate to do so.

We are neither an advocate nor do we oppose conversion to the metric system for any segment of the U.S. economy. And having spent a good part of my Air Force career in the programs budget area, and working with the Congress, that sort of a position causes us a bit of credibility, because the very nature of our title, American National Metric Council, makes it appear that we are, indeed, a very pro-metric organization.

We feel that the expertise, the knowledge, and the timing of conversion to metric is something that the various segments of our economy know better than anybody else. And we look to them for that advice.

We strongly encourage -- as a matter of fact, we try to insist that they do effective planning. Try to get the groups together in an effort to examine those issues, and to take an objective look at it.

I know I've felt oftentimes in my career that in order to secure the objectives of the organization which I was in I had to get myself involved. The same thing is true of metrication.

You have to get yourself involved. And we encourage tnat. And to that extent we have over 1500 personnel participating in our sector committee activities. We have some 46 sectors at the present time and we are anticipating the addition of a few more here in the near future.

We are having discussions with The Travelers Insurance Company about establishing one in the insurance area, and with tne American Bankers' Association in that area.

I'll cover a little bit of the activities of some of these sectors with you in a few minutes. The sectors report up through an hierarchy of what we now call "coordinating groups."

Now the hand-out that you have is out of date, unfortunately, and we just recently, this past month, had a new organization approved, and I'll make copies of that available to DoD here, so that they can pass those out later.

We changed the name of the coordinating committees to coordinating groups, and we added an additional three. The sectors report through the coordinating groups to the steering committee.

And the steering committee is where the coordination across coordinating groups takes place. It is where we attempt to resolve issues. And we also have a series of advisory groups which were previously called "operations committees" on the charts you have.

The advisory groups are just that. They provide advice, as needed, to tne sector committees. And in some cases, sector committees don't always follow that advice, nor want it.

One of the committees that -- advisory groups we have is the Consumer Advisory Group, and some years ago they put out a publication, "Metrication and the Consumer: Avoiding Deception in the Marketplace."

This has caused me a lot of problems with the food and grocery people, because they say that implies there might be deception. That was not the intent of this document.

It's a very good document, but the title itself did cause some concern for those people. We do have a very active consumer group, and they are, I think, very helpful by and large.

They were recently very active in our endorsement and preparation of a plan to convert retail motor fuel dispensers to dispense gasoline by the liter. Now that came about as a result of the rapid increase of gasoline prices to over $1 a gallon.

And it was found it was much cheaper to convert those pumps to dispense by the liter than it was to dispense it over $1 a gallon.

So the metric board, United States Metric Board held hearings a little over a year ago, in which we participated and agreed to undertake the task of pulling together such a plan.

We do have such a plan. It's a voluntary plan. It did not establish any start and stop dates. I think in the very jaundiced look at a plan one would say is more a planning guideline as opposed to a plan.

It's something that an individual company or large petroleum organizatior can take and by following those guidelines go ahead and implement the changeover.

There are some specific thoughts in there as to how they might make that changeover more compatible and accessible to the consumer. And it's that sort of thing that the Consumer Committee does and does quite well.

We also have a labor group that inputs labor concerns, a Government liaison group in which we interface principally through that organization with the Metrication Operating Committee.

And we just recently established a Small Business. We have some five others that I need not run through at this point that provide assistance to the various sector committees.

The small staff which I had -- and it is reasonably small -- we have 18 people on the staff -- provides the secretarial services for the coordinating groups and advisory groups, and also provides assistance to the sector chairmen and the secretariats of the sectors.

The secretariats for a sector is a trade association, and I give you one example that you're all familiar with, our aerospace sector is serviced by the Aerospace Industries Association.

And our Program Managers work with the secretariats and the chairmen in establishing agendas and in carrying on the planning process.

Other functions that we perform in ANMC, of course, is the dissemination of current and accurate information on metric practice and on metric conversion. We do this principally through the issuance of a bi-weekly document called, "The Metric Reporter."

A couple of them here that I show you, where we report on activities of the Federal Government, activities of our sectors, and activities on a worldwide basis, of metrication.

We also publish a number of other publications useful to both companies and individuals. One of the principal ones is a metric system day to day. It's a very simple little guideline, and it tells the average person just about everything he needs to know about metric conversion.

It's a very handy little document. And, of course, all of our sectors put out other documents from time to time, and just a couple of them -- here's a "Guide to Metrication" for the textile industry.

We have a number of those. We have over -- about -- at the present time about ten different guides published by various organizations. And, principally, the educators. There's a lot of guides on education and on training that's required.

And in addition to those two functions we represent the private sector before the United States Metric Board and other federal agencies.

And I point out at this point that we do have and will continue to have -- and, matter of fact, I'd like to further enhance our relationship with both the Metric Board and the Government agencies, and that's why we encourage participation of Government personnel in our sector activities.

And it's useful for them to get that input, because if they're charging along on a certain planning process or function, only to find when they have completed it, it's completely unacceptable to some Government agency, I think that's just the wrong way to go.

We need to know that at the very beginning of the process. The nature of activity in our sector committees varies quite widely. Some are just getting organized; some are in the process of trying to convince some they should get organized.

And some are down to the point where the plans are completed, they have the drafts out for consensus. I have a couple of draft summaries that we have here that we do send out en masse.

We send -- here's one on metal products. We send out some 12,000 of these, to about every trade association, company, anybody that's involved in the business. And on chemicals we sent out some 17,000 of these.

These are out at the present time for comment and review, and we expect at least chemicals to be ready to present to the United States Metric Board for their approval either later this year or early next year.

The level of activity varies of some of our sectors from inactive -- they've sat down, they've examined the issues, they find that there's no need for them to proceed further at the present time, to wnere it's extremely high, as in the case of the chemical area.

In many cases, the marketplace is going to determine the amount of -- and nature and speed of the activity of those groups. In some instances, of course, we have high technology, and the groups just aren't interested in meeting.

And I'll give you an example: our electronics industry. They feel that throughout tne world that they have the technology edge. The customary system of measurement is satisfactory to them, and they're having no difficulty selling their products.

However, tne recent issuance of tne memorandum by Dr. Perry on DoD standards and specifications has sparked some interest, and I'm glad to see that, because I think they ought to at least get in there and start examining how things stand.

Very briefly, I would summarize some of the activities in our sectors. I think the thing tnat's impressed me the most in the year and a half I've been doing this is the fact tnat the Number 1's in tneir industry groupings are moving.

And this is particularly true of multinational companies. In the construction and agricultural equipment, Caterpillar, John Deere, International Harvester all nave metric products.

It's amazing, however, that in the case of a lot of the farming construction equipment they do not have metric fasteners. That's because when they initiated their metrics design some years ago metric fasteners were not readily available.

We find that fastly changing, and there currently -- our construction and agricultural equipment sector is currently studying and along with the Fastener Institute preferred sizes of metric fasteners.

And we expect the gradual phase-in of metric fasteners in that industry. On the other hand, the automobile industry is using metric fasteners. I think predominantly. It depends upon which one of the manufacturers you talk about.

In the case of General Motors, 27 of their 34 fastener nameplates are predominantly metric. And all 34 will be by 1982. Ford is about 20 percent on the way to average metric today.

They will be over 50 percent in 1985, as will Chrysler and American Motors. The cost need not be prohibitive, as the General Accounting Office and those who do not want to convert to metric have said it will be.

Matter of fact, the General Accounting Office said that it will cost billions of dollars. The experience at General Motors indicates that that's not so.

Their costs to date have been less than one percent of what they originally estimated. Not only they, but other companies, they find that drafting design time is less and that if they really go about their planning process effectively, they are able to, indeed, take advantage of opportunities and to review a lot of old procedures that have grown up over years and reduce expenditures in that respect.

Now you can say, certainly, you don't have to change to metric to do that. That's true. But metric serves as the impetus for that to occur.

We have coming up this fall or actually in December a conference of the construction industries. This is a conference which is co-sponsored by the National Institute of Building Sciences, the National Bureau of Standards' Center for Building Technology, the U.S. Metric Board and our organization.

And at that meeting they will explore and address issues of metrication and determine which direction the industry desires to move in.

Our coordinating group does have a plan for the industry that will serve as the basis for discussions at that meeting in December.

The educational group is moving along quite rapidly. Our employee training people have a guide out. Educational materials are available. Our vocational people have just developed a guide which will be printed here later this year, and the engineering educational people have actually established dates on which engineering education will commence in the various universities.

And I might mention that most of the disciplines that the DoD is interested in are being taught at the university level today.

As one might expect, the consumer product area will lag a little bit behind. And the principal reason for that, of course, is customer acceptance. And that's where the education process will, I think, pay dividends.

In closing I'd like to just highlight for you that leading corporations within each industry, with few exceptions, have a metric conversion program. One of those exceptions is the aerospace industry, quite honestly.

I've been told by a number of my friends in that industry group that their position is one of informed readiness. That, I might say, like the electronic industries, is also rapidly changing.

Second-tier companies are moving along more slowly and cautiously, of course, than the leaders. And they, in many cases, need to be convinced. In many cases they do not ship their goods outside the United States.

And it's going to be difficult to get them to turn their operation over to metric system. But I think it's going to happen; it's a question of time. Our Sector Committee activity is picking up.

However, I point out again as I did before, that the marketplace will determine the speed of conversion. And we strongly stress that planning is essential to a sound conversion program.

I am delighted that the DoD has taken the initiative and, having spent so much of my life in this great organization, I can understand that. And, believe me, you take second fiddle to nobody when it comes to good management.

And I'd like to tell a lot of members of Congress that. Thank you.

COL. REINIER DE GROOT

Military Background

Joined the army (infantry) in 1945 as a war volunteer. Basic military and NCO training in England & officers training in the Netherlands. Commissioned as a reserve officer in 1947. Transferred in 1949 -- on request -- to (POL branch) Quarter Master General and in 1952 -- on a temporary basis -- employed in POL branch R.NL.A.F. In 1954 permanent commission as captain R.NL.A.F. Carried out several staff duties (POL logistics and engineering) in the Air Staff and Directorate Materiel Air till the end of 1959; in that period member of certain NATO (MAS) and civil standardization committees. In 19[illegible]aff course and a temporary posting at Soesterberg Airbase; promoted to major. Posted as senior technical officer in March 1961 and in 1962 as Commanding Officer of the R.NL.A.F. Jet Engine Overhaul Facility at Woensdrecht. End 1966 again employed at the Directorate Materiel Air but this time in the procurement branch; promoted to Lt. Col.

Passed examination for flying military light aircraft in 1968; glider pilot license since 1960 and private pilot license since 1966. After 6 years in procurement posted in an interservice logistics advisory function in the National Armaments Director's personal staff at the MOD; promoted to colonel in 1974.

After DoD reorganization in 1976 appointed as Head Standardization and Quality Assurance Office-Directorate-General Materiel. Netherlands/DoD representative in a number of NATO-,civil- and intergovernmental committees; a.o. Chairman NATO Group on Materiel (ACSM) Standardization (AC/301), member NATO Group on Rationalization and Standardization (AC/308), member Executive Board Netherlands Standards Institute.

Royal decoration in 1965: Knight in the Order of Oranje Nassau (military division)

"METRICATION FROM A NATO PERSPECTIVE"

NATO STANDARDIZATION PLANS AND PROGRAMS

DOD METRICATION SEMINAR

18 NOVEMBER 1980

WASHINGTON, D.C.

BY COLONEL RNLAF REINIER DE GROOT

CHAIRMAN, NATO GROUP ON MATERIEL (ACSM) STANDARDIZATION (AC 301)

HEAD, STANDARDIZATION AND QUALITY ASSURANCE OFFICE

DIRECTORATE GENERAL MATERIEL

MINISTRY OF DEFENCE

NETHERLANDS

THE HAGUE

INTRODUCTION

I AM PRIVELEGED, AS CHAIRMAN OF THE NATO GROUP ON MATERIEL (ACSM) STANDARDIZATION (AC/301) TO TALK TO YOU TODAY ON AN EXTREMELY IMPORTANT SUBJECT AND TO PRESENT A PERSPECTIVE RELATED TO METRICATION WITHIN NATO. I WANT TO THANK THE DEPARTMENT OF DEFENSE FOR THE INVITATION. FRANKLY I WAS SOMEWHAT HESITANT ABOUT ACCEPTING THIS INVITATION, SINCE I WONDERED WHAT I COULD TELL THIS AUDIENCE ABOUT METRICATION THAT THEY DIDN'T ALREADY KNOW. DESPITE THIS CONDITION I DECIDED TO ACCEPT MAINLY BECAUSE I CONSIDER THE SUBJECT OF METRICATION VITAL TO EFFECTIVE AND EFFICIENT COOPERATION WITHIN NATO.

METRICATION TO ME MEANS THE TRANSITION FROM THE U.S. CUSTOMARY SYSTEM OF WEIGHTS AND MEASURES TO THE METRIC SCHEME OF THE INTERNATIONAL SYSTEM OF UNITS (SI). I INTENTIONALLY USE THE WORD TRANSITION BECAUSE IN MY JUDGEMENT IT INCORPORATES AN EVOLUTIONARY MOVEMENT LEADING TO A REAL CHANGE. NOT JUST A SIMPLE CONVERSION OF FIGURES (THE SO-CALLED SOFT CONVERSION).

TO ILLUSTRATE THIS POINT, LET ME QUOTE FROM A DRAFT NATO STANDARDIZATION DOCUMENT. IN THAT DOCUMENT THE FOLLOWING DEFINITIONS ARE GIVEN FOR CONVERSION:

> SOFT CONVERSION - THE PROCESS OF CHANGING ONE MEASUREMENT IN ONE SYSTEM OF UNITS TO ANOTHER MEASUREMENT IN A DIFFERENT SYSTEM OF UNITS, WITHIN ACCEPTABLE MEASUREMENT TOLERANCES, WITHOUT CHANGING THE PHYSICAL CONFIGURATION OF THE ITEM.
>
> IN OTHER WORDS IT IS THE SAME ITEM BOTH BEFORE AND AFTER CONVERSION.

HARD CONVERSION - THE PROCESS OF CHANGING ONE MEASUREMENT IN ONE SYSTEM OF UNITS TO ANOTHER NONEQUIVALENT MEASUREMENT IN A DIFFERENT SYSTEM OF UNITS WHICH NECESSITATES PHYSICAL CONFIGURATION CHANGES OUTSIDE THOSE PERMITTED BY ESTABLISHED MEASUREMENT TOLERANCES.

ALTHOUGH THE TERM "HARD CONVERSION" IS IN COMMON USE, IT IS TECHNICALLY INCORRECT WHEN APPLIED TO SPECIFIC ITEMS BECAUSE NO "CONVERSION" TAKES PLACE; RATHER A "NEW" ITEM, REQUIRING NEW IDENTIFICATION, IS CREATED TO REPLACE THE "ORIGINAL" ITEM.

IT IS NOTEWORTHY THAT AS EARLY AS 1893 THE INTERNATIONAL METER AND KILOGRAM BECAME FUNDAMENTAL STANDARD UNITS OF LENGTH AND MASS IN THE U.S.A. BOTH FOR METRIC AND CUSTOMARY WEIGHTS AND MEASURE. BECAUSE OF THIS THE INCH AND POUND ARE CALCULATED AGAINST METRIC STANDARDS WITH ALL OF ITS CONSEQUENCES. DESPITE THIS I AM IMPRESSED WITH THE FACT THAT THE U.S.A. HAS BEEN METRIC FOR NEARLY A CENTURY.

THE METRIC SYSTEM HAS BEEN PROMULGATED THROUGH INTERNATIONAL AND NATIONAL STANDARDS, WHICH FORM THE BASE FOR ALL METRIC DIMENSIONING AND THEIR CORRESPONDING DOCUMENTS. THEREFORE, WHEN WE TALK OF METRICATION WE ARE IN FACT DEALING WITH A FUNDAMENTAL STANDARDIZATION TOPIC. METRICATION IS A FIRST COUSIN OF STANDARDIZATION AND WITHIN NATO MUST GO HAND-IN-HAND IF WE ARE TO REDUCE INTEROPERABILITY PROBLEMS RESULTING FROM DIFFERENT SYSTEMS, PARTS, ENGINEERING DISCIPLINES AND METHODS OF MEASUREMENT.

NATO STANDARDIZATION

BECAUSE OF THE INCREASED EMPHASIS ON STANDARDIZATION MOST RECENTLY A NEW

NATO STANDARDIZATION POLICY WAS DRAFTED. THE NEW POLICY DOCUMENT CONTAINS THE FOLLOWING PROPOSED DEFINITION FOR STANDARDIZATION: NATO STANDARDIZATION IS THE PROCESS OF FORMULATING, AGREEING, IMPLEMENTING AND KEEPING UP-TO-DATE NATO STANDARDS. NATO STANDARDIZATION IS ONE MEANS BY WHICH ALLIANCE NATIONS MAY DEVELOP THEIR COLLECTIVE CAPABILITY TO RESIST ARMED ATTACK AS REQUIRED BY ARTICLE 3 OF THE NORTH ATLANTIC TREATY. IT CARRIES ADDITIONAL POLITICAL VALUE AS AN OUTWARD DEMONSTRATION OF CO-OPERATION AND SOLIDARITY. NATO STANDARDIZATION IS VOLUNTARY AND IS NOT AN END IN ITSELF.

AIMS

THE OVERALL AIM OF NATO STANDARDIZATION IS TO INCREASE THE EFFECTIVENESS OF THE MILITARY FORCES OF ALLIANCE NATIONS. THIS OVERALL AIM HAS INTERACTING MILITARY AND ECONOMIC (INCLUDING INDUSTRIAL) COMPONENTS, AND ITS ATTAINMENT DEPENDS ON POLITICAL WILL:

THE MILITARY AIM OF NATO STANDARDIZATION IS TO INCREASE THE COMBINED OPERATIONAL EFFECTIVENESS, IN MULTI-NATIONAL WARFARE, OF THE NATIONAL MILITARY FORCES OF THE ALLIANCE NATIONS: AN EFFECTIVE COOPERATION AMONG ALLIANCE FORCES.

THE ECONOMIC AIM OF NATO STANDARDIZATION IS TO INCREASE OVERALL EFFICIENCY IN THE USE OF AVAILABLE ALLIANCE DEFENCE RESOURCES. THIS INCLUDES, AMONG OTHER THINGS, INCREASING CO-OPERATION AND ELIMINATING UNNECESSARY DUPLICATION AMONG ALLIANCE NATIONS IN RESEARCH, DEVELOPMENT, PRODUCTION, PROCUREMENT AND SUPPORT OF DEFENCE SYSTEMS AND EQUIPMENT: AN EFFICIENT USE OF THE LIMITED ALLIANCE DEFENCE RESOURCES.

NATO STANDARDIZATION PROBLEMS

MUCH HAS ALREADY BEEN SAID AND WRITTEN ABOUT NATO STANDARDIZATION PROBLEMS.

BUT TODAY A VERY IMPORTANT AND FUNDAMENTAL ONE IS UNDER DISCUSSION, WHICH MOST PEOPLE TEND TO TREAT LIGHTLY OR ARE NOT EVEN AWARE OF. IN MY JUDGEMENT NATO AIMS CAN ONLY BE ACHIEVED IF ALL ALLIANCE NATIONS USE THE SAME BASIC STANDARDS SUCH AS THOSE COVERING MEASUREMENT UNITS. PARTICULARLY MEASUREMENT UNITS--COVERING PRODUCTS AND ENGINEERING DISCIPLINES--BECAUSE PRODUCT STANDARDS AND SPECIFICATIONS ARE BASED ON JUST THAT: MEASUREMENTS.

INITIALLY AND DURING THE EARLY YEARS OF NATO'S EXISTENCE VERY FEW--IF ANY--STANDARDIZATION PROBLEMS WERE ENCOUNTERED. THIS WAS DUE TO THE FACT THAT ALL NATO PARTNERS WERE MAINLY USING U.S. MATERIEL GRANTED UNDER THE MUTUAL DEFENCE ASSISTANCE PROGRAM. THE MARSHALL PLAN BROUGHT NEW LIFE TO THE EUROPEAN INDUSTRY BY FURNISHING U.S. MACHINERY AND TOOLS. THEREFORE, FOR NATO MATERIEL WE WERE ALL USING THE SAME LANGUAGE OF MEASUREMENT: NAMELY THE U.S. CUSTOMARY SYSTEM. THIS INCLUDED THE INDUSTRIAL AS WELL AS THE MILITARY COMMUNITY. HOWEVER, WITH THE REBUILDING OF EUROPEAN INDUSTRY AND THEIR ABILITY TO NOW DEVELOP AND PRODUCE DEFENCE MATERIEL, YOUR NATO PARTNERS HAVE MOVED--VOLUNTARILY OR BY LAW--TO THE METRIC SYSTEM; AND METRIC DIMENSIONING, IN GENERAL, IS NOW PREVALENT IN BOTH THE DEVELOPMENT AND PRODUCTION OF MATERIEL.

PROBLEMS IN ACHIEVING THE NATO STANDARDIZATION AIMS WILL MANIFEST THEMSELVES EVER INCREASINGLY, IF ALL NATO NATIONS DO NOT DEVELOP COMMON STANDARDS. WE ARE NOW CONFRONTED WITH SERIOUS PROBLEMS IN ACHIEVING THESE AIMS, BECAUSE A STANDARD NATO MEASUREMENT LANGUAGE IS LACKING. LET ME GIVE YOU A BIRD'S EYE VIEW OF WHAT I MEAN.

WHAT IS THE SITUATION

TO ACHIEVE INTEROPERABILITY, A CERTAIN DEGREE OF STANDARDIZATION IS

NECESSARY. YET AT THIS MOMENT STANDARDIZATION PROGRESS IS HAMPERED BY THE INCOMPATIBILITY OF THE METRIC AND INCH/POUND SYSTEM. THIS IS NOT ONLY COMPLICATED, BUT IT IS COSTLY AND SOLUTIONS MUST BE DEVELOPED IN ORDER TO ENHANCE THE INTEROPERABILITY OF SYSTEMS AND EQUIPMENT SO VITAL TO A STRONG MILITARY POSTURE AMONG THE NATO NATIONS.

IN DEALING WITH MUTUAL LOGISTIC SUPPORT, THE PROBLEM IS EVEN MORE SEVERE DUE TO THE FACT THAT IN NATO, ITEMS IN BOTH CUSTOMARY AND METRIC MEASUREMENT MUST BE SUPPLIED. DIFFERING MEASUREMENT SYSTEMS ALSO HAMPER CROSS-SERVICING OF EQUIPMENT. CAN YOU IMAGINE REPLACING A ½" BOLT WITH A 6MM ONE AND THEN TORQUING IT WITH A ½" WRENCH? THIS IS ONLY A SIMPLE EXAMPLE OF WHAT NATO MILITARY FORCES ARE FACED WITH. WITH THE EXTENSION OF THIS PROBLEM TO OTHER TECHNOLOGY AREAS YOU CAN WELL UNDERSTAND WHY EFFECTIVE OPERATION IS HAMPERED.

IN READING A METRIC ASSOCIATION NEWSLETTER I CAME ACROSS THE FOLLOWING: QUOTE "WHEN METRIC ORIENTED SCIENTISTS GET INFORMATION FROM PRODUCTION ENGINEERS--WHO ARE MAINLY ORIENTED TO THE INCH/POUND SYSTEM--MANY HOURS OF PROFESSIONAL TIME IS WASTED IN CONVERTING DATA FROM ONE SYSTEM TO THE OTHER. IN THE AEROSPACE INDUSTRY ALONE - FOR EXAMPLE - SEVERAL HUNDRED THOUSAND HOURS PER YEAR ARE LOST IN PERFORMING SUCH CONVERSIONS. SOME AEROSPACE FIRMS LOSE AS MUCH AS 5% NET EARNINGS PER YEAR IN EXTRANEOUS METRIC CONVERSION AND CALCULATIONS" UNQUOTE.

FROM THAT STATEMENT YOU CAN SEE THAT WHEN WE ENTER INTO THE FIELD OF MULTINATIONAL PRODUCTION OF DEFENCE EQUIPMENT, THE PROBLEMS ARE FURTHER COMPOUNDED. AMERICANIZING OR EUROPEANIZING THE EQUIPMENT IS NOT A SOLUTION

AND RATHER THAN SOLVING THE STANDARDS PROBLEM INVALIDATES THE PROFOUND GOAL OF MUTUAL COOPERATION. IT MIGHT BE ATTRACTIVE FROM A NATIONAL POINT OF VIEW BUT CERTAINLY NOT FROM A NATO POINT OF VIEW.

MODERN DEFENCE SYSTEMS TEND TO BE MORE AND MORE COMPLEX AND HUGE DEVELOPMENT AND TOOLING COSTS ARE INCURRED IN BRINGING THEM FROM DESIGN TO DEVELOPMENT TO PRODUCTION. THAT IS WHY IN A GROWING NUMBER OF CASES TWO OR MORE COUNTRIES COMBINE THEIR RESOURCES TO BRING A PROJECT TO FRUITION. SUCH POOLING OF RESOURCES WILL IN GENERAL ONLY BE EFFICIENT IF THE STANDARDS OF THE COUNTRIES INVOLVED ARE COMPATIBLE.

VARIOUS DISCIPLINES IN SCIENCE AND ENGINEERING BECOME MORE AND MORE INTEGRATED IN THE PROCESS OF DESIGNING HARDWARE AND SOFTWARE; DIFFERING MEASUREMENT STANDARDS HAMPER OR EVEN BLOCK THIS INTEGRATION. MORE AND MORE ITEMS (PARTS, COMPONENTS, ETC.) ARE ELEMENTS OF A "SYSTEM" AND THUS BASIC STANDARDS ARE REQUIRED FOR DIMENSIONING, INTERFACING, INTERCHANGEABILITY, ETC.; THIS ALSO APPLIES TO "MODULAR DESIGN."

IT IS CLEAR THAT ONE MEASUREMENT/ENGINEERING LANGUAGE IS ESSENTIAL TO REALIZE EFFICIENTLY THE GOALS ENVISONED BY "DUAL PRODUCTION" AND, "THE FAMILY OF WEAPONS" CONCEPT. MUCH MORE COULD BE SAID ABOUT THE PROBLEMS CAUSED BY THE USE OF TWO DIFFERENT LANGUAGES OF MEASUREMENT. I HOPE I HAVE MADE THE POINT THROUGH THE EXAMPLES MENTIONED. ONE IMPORTANT ASPECT OF DIFFERENT SYSTEMS I MUST MENTION, HOWEVER, IS SAFETY. I COULD SPEND THE REST OF THE TIME ALLOTTED TO ME FOR THIS TALK ON THE SUBJECT OF SAFETY. SINCE THIS IS NOT POSSIBLE, LET ME JUST SAY THAT INCOMPATIBLE MEASUREMENT SYSTEMS ARE NOT CONDUCIVE TO SAFETY AND - AS IN THE EXAMPLE I HAVE ABOUT THE ½" AND 6MM BOLT - CAN LEAD

TO A FALSE SECURITY ON THE PART OF MILITARY TECHNICIANS.

WHAT TO DO ABOUT IT?

I AM CONVINCED THAT METRICATION IS THE KEY TO EFFECTIVENESS AND EFFICIENCY. THE IMPORTANT QUESTION HOWEVER IS: HOW TO PROCEED? I AM NOT IN A POSITION TO INDICATE HOW DOD SHOULD PROCEED IN SOLVING ITS PROBLEMS. BUT PERMIT ME TO MAKE SOME REMARKS WITH RESPECT TO THE SUBJECT.

THE INDUSTRIAL COMMUNITY RECOGNIZES THE INTERNATIONAL ORGANIZATION FOR STANDARDIZATION (ISO) AND THE INTERNATIONAL ELECTRO TECHNICAL COMMISSION (IEC) AS BEING THE PRIME INTERNATIONAL STANDARDS INSTITUTES. AT PRESENT ISO COMPRISES THE NATIONAL STANDARDS INSTITUTES OF 87 COUNTRIES. IT IS THE LARGEST INTERNATIONAL ORGANIZATION FOR INDUSTRIAL AND TECHNICAL COLLABORATION, BRINGING TOGETHER THE INTERESTS OF PRODUCERS, USERS, CONSUMERS' BODIES, GOVERNMENTS AND THE SCIENTIFIC COMMUNITY.

THE RESULTS OF ISO ACTIVITIES ARE PROMULGATED IN THE FORM OF STANDARDS AND "CODES OF PRACTICE." ROUGHLY 2000 COMMITTEES AND WORKING GROUPS WITHIN ISO ARE CARRYING OUT THE DEVELOPMENT WORK. THE EQUIVALENT OF A FULL STAFF OF 500 PEOPLE ARE ADMINISTERING THE OPERATIONS. EACH YEAR ABOUT 20,000 EXPERTS FROM ALL OVER THE WORLD TAKE PART IN ISO MEETINGS, AVERAGING 9 PER DAY.

IT IS ONLY REASONABLE AND LOGICAL FOR THE MILITARY COMMUNITY TO TAKE ADVANTAGE OF THIS ALREADY COMPLETED AND CONTINUING EFFORT. THEREFORE, I BELIEVE THAT A FIRST STEP SHOULD BE TAKEN TO INCLUDE AN EVALUATION OF EXISTING DOCUMENTATION WITH A VIEW TOWARDS ADOPTION OF EXISTING INTERNATIONAL INDUSTRIAL METRIC STANDARDS. AT TIMES IT MIGHT BE NECESSARY TO TAILOR SUCH STANDARDS,

BUT IT CERTAINLY IS BETTER TO ADOPT THEM TO TAKE THE RISK OF DEVIATING FROM WORLD-WIDE RECOGNIZED STANDARDS. AT TIMES IT MIGHT BE NECESSARY TO TAILOR SUCH STANDARDS, BUT IT CERTAINLY IS BETTER TO ADOPT THEM THAN TO TAKE THE RISK OF DEVIATING FROM WORLD-WIDE RECOGNIZED STANDARDS. THE NATO GROUP AC/301 IS PLANNING TO DO JUST THAT AND HAS ALREADY INCORPORATED THE RECOGNITION AND ADOPTION OF INTERNATIONAL INDUSTRIAL STANDARDS IN ITS POLICY FOR NATO USE.

I WANT TO SAY AT THIS POINT, THAT IF I HAVE LEFT THE IMPRESSION THAT ONLY THE USA IS EXPERIENCING METRIC PROBLEMS, LET ME DISPEL THAT IMPRESSION. AT PRESENT NO NATION IN THE WORLD IS 100% METRIC; THE SO-CALLED METRIC COUNTRIES ARE STILL REWRITING EXISTING STANDARDS AND DRAFTING NEW METRIC ONES. MANY EXISTING STANDARDS ARE NOT IDEAL AND CAN OR MUST BE IMPROVED AND THIS PROVIDES THE OPPORTUNITY FOR COOPERATIVE ACTION THAT CAN RESULT IN COMPATIBLE STANDARDS LEADING TO A REDUCTION OF EXISTING PROBLEMS.

THROUGH ACTIVE PARTICIPATION BY DOD REPRESENTATIVES IN THE NATIONAL STANDARDIZATION ACTIVITIES IT IS POSSIBLE TO CONTRIBUTE TO THE FORMULATION OF INTERNATIONAL STANDARDS AND THE INCLUSION OF MILITARY REQUIREMENTS INTO THOSE STANDARDS. THIS KIND OF ACTION WILL FACILITATE THE ADOPTION OF AGREED-TO INTERNATIONAL INDUSTRIAL STANDARDS AS MILITARY STANDARDS AND MINIMIZE THE NEED FOR NEW MILITARY STANDARDS.

A U.S. METRIC STUDY SUGGESTED THAT SOME 20,000 ENGINEERING STANDARDS ARE NEEDED TO FILL THE NEEDS OF AN INDUSTRIALIZED SOCIETY LIKE THE U.S.A. OF THESE STANDARDS PERHAPS ONE-FOURTH ARE MEASUREMENT SENSITIVE: INVOLVE SIZE OR DIMENSIONAL SPECIFICATIONS. THEREFORE FOR AN EFFECTIVE TRANSITION SOME 5,000 METRIC STANDARDS ARE REQUIRED FOR PRODUCTS, COMPONENTS, MATERIALS AND EQUIPMENT.

THE IDEAL WAY TO PRODUCE THESE NEW STANDARDS IS AT THE INTERNATIONAL LEVEL IN COOPERATION WITH STANDARDS WRITING BODIES OF OTHER COUNTRIES.

FORTUNATELY THERE IS STILL SOME TIME TO DO SO. SO FAR ONLY A LIMITED NUMBER OF METRIC STANDARDS HAVE BEEN ACCEPTED AS INTERNATIONAL STANDARDS WITHIN THE ISO AND IEC AND METRIC STANDARDS DRAFTING WORK IS ONLY IN ITS FIRST PHASE IN ISO. FURTHERMORE THERE IS NO NEED TO START FROM SCRATCH. THERE ARE THOUSANDS OF METRIC STANDARDS THROUGHOUT THE WORLD THAT COULD BE ADOPTED, ADAPTED OR AT LEAST USED AS A STARTING POINT IN WRITING METRIC STANDARDS.

DOD ACTIVE PARTICIPATION IN NATO ACTIVITIES - AS IN THE GROUP ON MATERIEL (ACSM) STANDARDIZATION (AC/301) AND ITS SUBSIDIARIES - CAN ALSO RESULT IN COMMON METRIC STANDARDS IN DEVELOPING THE ACSM STANDARDIZATION PROGRAM AMONGST OTHER THINGS THE FOLLOWING PRINCIPLES SHALL BE OBSERVED BY AC/301:

- PRIORITY SHALL BE GIVEN TO THOSE ACSM MATTERS WHERE NATO MILITARY USERS HAVE REPORTED, THROUGH THE APPROPRIATE CHANNELS A NEED FOR STANDARDIZATION.
- USE OF INTERNATIONAL AND NATIONAL INDUSTRIAL STANDARDS BY NATO THROUGH ADOPTION SHEETS IS PREFERRED TO THE PREPARATION OF NEW DOCUMENTS.
- THE SI SYSTEM WILL BE USED IN NATO STANDARDIZATION DOCUMENTS UNLESS THERE IS A PARTICULAR NEED TO AUTHORIZE THE USE OF THE INCH-POUNDS UNITS. THE USE OF DUAL METRIC AND INCH-POUND UNITS IS DISCOURAGED.

AC/301 HAS DIVIDED THE COMMODITY SPECTRUM INTO FOUR AREAS:

- ELECTRICAL/ELECTRONIC
- MECHANICAL HARDWARE

- MATERIALS
- CHEMICALS AND RELATED PRODUCTS

AND HAS CHARGED THE U.K.,U.S.A., FRANCE AND GERMANY RESPECTIVELY TO DEVELOP PLANS AND PROGRAMS FOR THE STANDARDIZATION ACTIVITIES IN THESE COMMODITY AREAS. ADVANCEMENT HAS BEEN MADE AND IN THE FUTURE AC/301 WILL HOPEFULLY ACHIEVE MEASUREMENT PROGRESS. THIS GROUP HAS ALSO DEVELOPED A NATO METRICATION POLICY THROUGH THE PREPARATION OF A STANAG, WHICH ONLY LAST WEEK WAS ACCEPTED BY ALL NATIONAL REPRESENTATIVES FOR RATIFICATION. I AM HOPEFUL THAT THIS WILL REDUCE THE PROBLEMS THAT I HAVE TALKED ABOUT TODAY.

AC/301 IS ALSO ACTIVE IN MANY OTHER FACETS OF MATERIEL STANDARDIZATION, ALL DESIGNED TO IMPROVED COOPERATION WITHIN NATO. I LIKE TO MENTION JUST TWO IMPORTANT SUBJECTS: DRAWINGS AND CONFIGURATION MANAGEMENT. A NEW AREA FOR THE FUTURE IS TEST METHODS. FINALLY AC/301 IS HIGHLY INTERESTED IN THE RECOMMENDATION OF THE NATO GROUP AC/308 FOR A CENTRALIZED NATO STANDARDIZATION PROGRAM THROUGH THE ESTABLISHMENT OF A "NATO STANDARDIZATION MANAGEMENT OFFICE" DESIGNED TO BRING ORDER TO MUCH OF THE STANDARDIZATION CHAOS NOW EXISTING AND RECOGNIZED IN VARIOUS AC/308 DOCUMENTS. AC/308 IS PRESENTLY DELIBERATING THE SCOPE, STRUCTURE, RESPONSIBILITIES AND STAFFING OF SUCH AN OFFICE.

FINALLY SOME REMARKS ABOUT METRICATION ITSELF. I HOPE YOU WILL NOT CONCLUDE FROM MY DISCUSSION THAT DOD SHOULD START CONVERTING ALL THINGS INTO METRIC. I BELIEVE IT SHOULD BE DONE ON A LOGICAL BASIS. THERE ARE EVEN SOME AREAS WHERE CONVERTING SHOULD NOT BE CONSIDERED UNLESS A NEW DEVELOPMENT INDICATES THE NEED. AS AN EXAMPLE: ¼" AUDIOTAPE IS STANDARD ALL OVER THE WORLD.

I WOULD SAY THAT ACTION SHOULD BE DIRECTED TO THOSE AREAS WHERE NATO STANDARDIZATION AIMS CAN AND MUST BE REALIZED. "SOFT CONVERSION" SHOULD BE DISCOURAGED. THERE IS NO POINT TO CALLING A ¼" BOLT A 6.3MM BOLT; THE DESIGNATION IN MM MIGHT EVEN BE MISLEADING. AFTER ALL A ROSE BY ANY NAME IS STILL A ROSE. THERE ARE NO OBJECTIONS UNDER CERTAIN CONDITIONS TO ADD THE METRIC UNITS BETWEEN BRACKETS TO THE CUSTOMARY UNITS, BUT CAUTION IS REQUIRED (ROUNDING OFF, TOLERANCES AND FIT).

I MUST MENTION THE FACT THAT THERE ARE REAL ADVANTAGES TO BE REALIZED THROUGH METRICATION. ONE IS THAT IT PROVIDES FOR REDUCING VARIETIES, QUALITY RANGES, INVENTORIES. THUS, CAUSING A DECREASE IN COSTS. I HAVE BEEN TOLD THAT IN THE U.K. THE FORD MOTOR COMPANY IN ITS CORTINA MODEL REDUCED THROUGH METRICATION ITS RANGE OF FASTENERS FROM 1,200 SIZES TO 300, ANOTHER COMPANY IS REPLACING MORE THAN 280 TYPES OF IMPERIAL SIZE BALL RACES BY 30 METRIC TYPES.

IT IS ONLY FAIR TO ALSO SAY THAT THERE ARE SOME DISADVANTAGES TO METRICATION. DURING THE TRANSITION PERIOD THE TOTAL DOD INVENTORY WILL INCREASE. A DUAL INVENTORY WILL BE REQUIRED FOR SOME TIME. DESPITE THIS DISADVANTAGE, IN TIME, THE NUMBER OF ITEMS IN METRIC UNITS WILL INCREASE AND THOSE IN CUSTOMERY UNITS WILL DECREASE. HALFWAY, THE TOTAL STOCK MAY BE ABOUT 150% OF THE PRESENT LEVEL, BUT IN THE END I JUDGE THAT IT SHOULD LEVEL OUT AT DOWNWARDS OF 75% OF THE PRESENT LEVEL. THIS REPRESENTS AN ENORMOUS SAVING THROUGH ITEM REDUCTION. MORE IMPORTANTLY, U.S. METRICATION WILL ALSO BE A BLESSING TO THE ALLIANCE PARTNERS SINCE IT WILL REDUCE THEIR DUAL STOCK PROBLEM, WHICH THEY HAVE BEEN EXPERIENCING SINCE NATO WAS BORN.

IF THERE IS A MESSAGE IN WHAT I HAVE SAID TODAY, IT IS THIS: METRICATION OVER THE LONG TERM OFFERS MANY ADVANTAGES TO BOTH THE INDUSTRIAL AND MILITARY

COMMUNITIES. THERE ARE DOLLARS TO BE SAVED. COOPERATIVE DEVELOPMENT AND PRODUCTION PROGRAMS CONDUCTED ON BOTH SIDES OF THE ATLANTIC WILL BE SERVED. BUT MORE IMPORTANTLY, WITHIN THE NATO ALLIANCE, A STRONGER MILITARY POSTURE WILL EVOLVE THROUGH THE REDUCTION OF CURRENT PROBLEMS THAT JEOPARDIZE MILITARY READINESS. THERE ARE SOME DISADVANTAGES TOO, BUT THE ADVANTAGES THAT WILL ACCRUE TO US ALL, OUTWEIGHT THEM.

IN CONCLUSION I MAY SAY, THAT IT IS NOT ONLY VALUABLE BUT THAT THERE IS A NEED FOR THE U.S. DOD TO METRICIZE, SO AS TO HELP TO ACHEIVE THE NATO MILITARY AND ECONOMIC STANDARDIZATION AIMS. LIKE A CARTOON I RECENTLY SAW IN A U.S. METRIC REPORTER, WHERE ONE MAN SAYS TO THE OTHER: "WHY DOES WATER FREEZE AT 0^{o} CELSIUS?" THE OTHER REPLIES: "LIKE US, IT HAS NO CHOICE".

ROBERT F. TRIMBLE

Mr. Trimble was born in Alabama and reared in Virginia. He graduated from the United States Military Academy in 1945 with a Bachelor of Science Degree and from the University of Michigan in 1951 with a Masters Degree in Business Administration.

He served in the United States Air Force with primary duty starting in 1951 in the acquisition of major systems, modifications, supplies, and services. His last military position was that of Director of Procurement Policy in Headquarters, USAF. He retired from Military service in 1975 in the rank of Major General.

During the period of 1975-1977 he was the Assistant Administrator for Contract Administration, Office of Federal Procurement Policy, where he specialized in Contract Administration, Cost Accounting Standards, and Socio-economic matters.

He is currently serving as the Director, Contracts and Systems Acquisition, Office of the Deputy Under Secretary of Defense for Research and Engineering (Acquisition Policy).

ROBERT F. TRIMBLE

SUMMARY REMARKS

18 NOVEMBER 1980
11:30 - 11:40

WE HAVE COVERED OUR INTERFACE RELATIONSHIPS WITH THE PRIVATE SECTOR, OTHER FEDERAL AGENCIES AND NATO.

IN ORDER TO ACHIEVE THE BENEFITS OF METRIC CONVERSION, WE PLAN TO GET STARTED INTO ENSURING THAT ACQUISITIONS SPECIFY THE USE OF METRIC DIMENSIONS WHEN IT MAKES SENSE TO DO SO. THAT INCLUDES BOTH MAJOR AND LESS THAN MAJOR WEAPON SYSTEMS. ALL KINDS OF METRIC SUPPLIES AND SERVICES, INCLUDING BULK MATERIAL, ARE NOW BECOMING COMMERCIALLY AVAILABLE FOR DEFENSE USE. WE SHOULD CONSIDER THESE AND IF THERE IS NO SIGNIFICANT REASON NOT TO USE THEM THEY SHOULD BE INTRODUCED INTO THE DOD INVENTORY. THIS IS ESPECIALLY IMPORTANT WITH REGARD TO NATO. IT IS NOT NECESSARY TO JUST KEEP PACE WITH INDUSTRY IF AND WHEN METRIC DIMENSIONED MATERIAL IS IN THE BEST INTEREST OF U.S. AND NATO DEFENSE.

WE HAVE MADE SOME PROGRESS, BUT I KNOW OF NO SINGLE AREA, INCLUDING ALL THE WORK WE HAVE DONE IN MAJOR WEAPON AND SUPPORT SYSTEMS ACQUISITION, THAT CAN DO MORE TO FOSTER INTEROPERABILITY AND STANDARDIZATION THAN GETTING ON WITH METRICATION.

NOW THAT THE UNDER SECRETARY OF DEFENSE HAS ESTABLISHED A TARGET DATE OF 1990 TO MAKE AVAILABLE A COMPLETE SPECTRUM OF METRIC SPECIFICATIONS AND STANDARDS, WE WILL BE ASKING YOU FOR PROGRESS REPORTS TOWARD THIS GOAL. IT IS NOT IN THE BEST INTERESTS OF DOD TO LOSE METRIC APPLICATION

OPPORTUNITIES BECAUSE THE NEEDED SUPPORT DOCUMENTATION AND OTHER PLANNING CRITERIA WERE NOT COMPLETED IN TIME AND MADE AVAILABLE TO OUR ACQUISITION COUNTERPARTS. FOR THIS REASON, IT IS ESSENTIAL THAT WE WORK CLOSELY WITH OUR U.S. INDUSTRIAL SECTORS AND INTERNATIONAL COUNTERPARTS. I EXPECT THAT DOD'S WORKLOAD AND REPRESENTATION ON ANMC'S PRIVATE SECTOR COMMITTEES WILL INCREASE. THESE SECTORS ARE KEY AND PROBABLY THE MOST INFORMED SINGLE SOURCE THAT DEFENSE CAN TURN TO FOR UP-TO-DATE INFORMATION ON THE AVAILABILITY, PRODUCIBILITY AND COST OF CURRENT AND PLANNED METRIC PRODUCTS. OUR DSARC AND METRIC DIRECTIVES VERY CLEARLY ESTABLISH THAT REVIEWS AND SUPPORTING DOCUMENTATION WILL ADDRESS THE USE OR REASONS FOR NON-USE OF THE METRIC SYSTEM IN DEFENSE ACQUISTIONS. OF PARTICULAR CONCERN IS THE ECONOMIC IMPACT THAT METRIC DESIGN AND PRODUCTS HAVE ON LIFE CYCLE COSTS, ESPECIALLY THOSE ITEMS HAVING AN INVENTORY LIFE SPAN IN EXCESS OF TEN YEARS. AS THE U.S. MOVES INTO THE METRIC AREA, THE SUPPLY, RESUPPLY AND OVERHAUL OF INCH POUND HARDWARE WILL BECOME INCREASINGLY COSTLY AS THEY BEGIN TO PHASE OUT OF U.S. PRIVATE MANUFACTURING CAPABILITIES.

ALTHOUGH I TALKED BEFORE ABOUT THE INCREASING DOD ACTIVITY IN THE USE OF METRIC UNITS, THE SCOPE OF THIS ACTIVITY NEEDS BETTER DEFINITION. IN THIS REGARD, THE FORTHCOMING DEFENSE INSTRUCTION WILL ASSIST YOU BY IDENTIFYING SELECTED TASKS THAT REQUIRE SOLUTIONS AND IMPLEMENTATION.

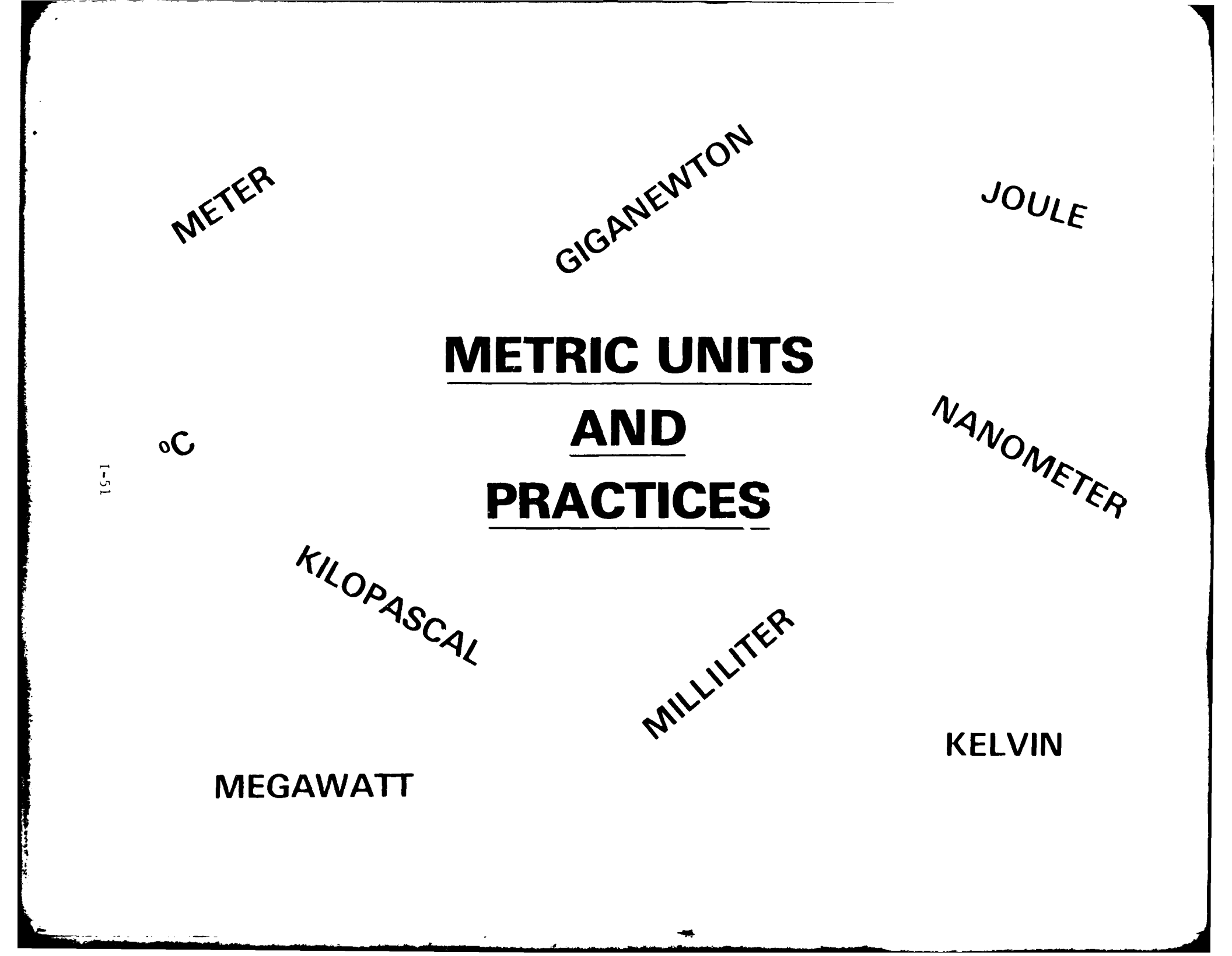
ON 12 JUNE 1980, DR. DINNEEN REQUESTED THE PERSONAL COMMITMENT OF TOP LEVEL OFFICIALS TO SUPPORT AND APPLY DOD'S METRIC POLICIES AND PROCEDURES. I NOW ASK THAT YOU PREPARE TO MOVE OUT IN IMPLEMENTING THIS KEY DISCIPLINE FOR THE DEFENSE DEPARTMENT.

HOWARD ELLSWORTH WILL NOW INTRODUCE THE WORKSHOP CHAIRPERSONS AND PROVIDE A BRIEF SUMMARY OF THE ROLE AND PURPOSE OF THE WORKSHOPS THEMSELVES.

HOWARD ------

JOHN HAAS

Mr. Haas is currently the Director, Engineering Standards Division, Naval Sea Systems Command. In this capacity, his metric involvement includes NAVSEA Metric Coordinator; Navy Metrication Project Officer; Chairman, Navy Metrication Group; Navy representative on DoD Metrication Steering Group; DoD representative on Metric Practices and Units Subcommittee of the Federal Interagency Committee on Metric Policy; DoD representative on Metric Practice Committee E-43 of the American Society for Testing and Materials; Vice Chairman of Technical Subcommittee E-43.10; DoD representative on Metric Practice Committee of the American National Metric Council; Member of Subcommittee 19 (Letter Symbols for Units) of American National Standards Institute Committee (same as Subcommittee 14.2 of Institute of Electrical and Electronic Engineers); U.S. Project Officer (and Pilot) on Metrication Panel, Project Z-62 of the American-British-Canadian-Australian Naval Quadripartite Standardization Program; and representative on several measurement units Technical Advisory Groups of the International Standards Organization.


METER
GIGANEWTON
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METRIC UNITS
AND
PRACTICES
°C
NANOMETER
KILOPASCAL
MILLILITER
KELVIN
MEGAWATT

CGS SYSTEM

- CENTIMETER
- GRAM
- SECOND

(CENTIMETERS, SQUARE CENTIMETERS, CUBIC CENTIMETERS, DYNES, ERGS, ETC.)

MKS SYSTEM

- METER
- KILOGRAM
- SECOND

(METERS, SQUARE METERS, LITERS, NEWTONS, JOULES, ETC)

SI SYSTEM

"LE SYSTÈME INTERNATIONAL
D'UNITÉS"

THE INTERNATIONAL SYSTEM
OF UNITS

(RESOLUTION 12 OF THE 11TH CGPM-1960)
GENERAL CONFERENCE OF WEIGHTS AND MEASURES

SI CONSISTS OF:

7 base units

2 supplementary units

Many derived units

16 decimal prefixes

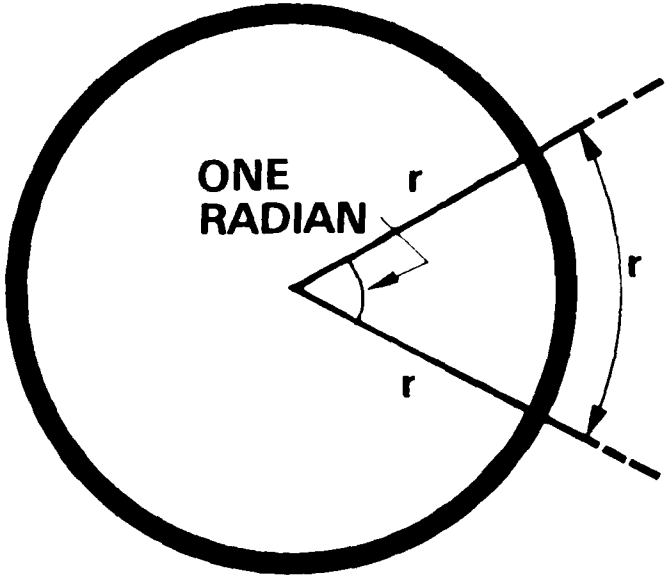
SI serves all measurement needs of commerce, engineering, and science.

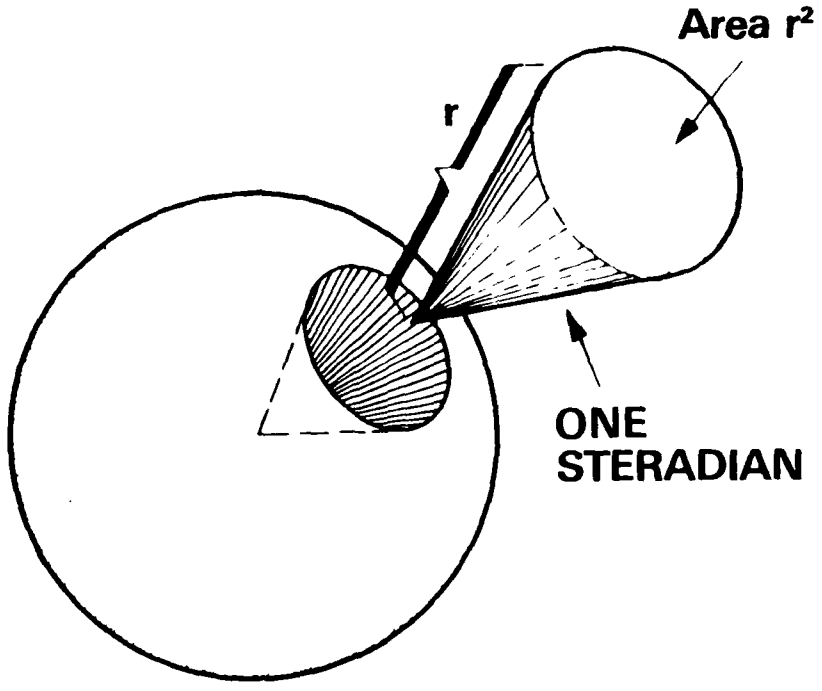
SI BASE UNITS

PHYSICAL QUANTITY	UNIT NAME	SYMBOL
LENGTH	meter	m
MASS	kilogram	kg
TIME	second	s
ELECTRIC CURRENT	ampere	A
THERMODYNAMIC TEMPERATURE	kelvin	K
LUMINOUS INTENSITY	candela	cd
AMOUNT OF SUBSTANCE	mole	mol

SI SUPPLEMENTARY UNITS

PHYSICAL QUANTITY	UNIT NAME	SYMBOL
Plane Angle	radian	rad
Solid Angle	steradian	sr





ADVANTAGES OF SI

1. Simple, rational—Decimally related

2. Unique—Only one unit for any given physical quantity.

3. Coherent—The product or quotient of any two SI units is unit of resultant quantity.

4. Absolute—Mass is a base quantity while force is a derived quantity.

SI NUMERICAL PREFIXES

PREFIX	SYMBOL	PRONUNCIATION	MULTIPLICATION FACTOR
exa	E	ex'a	1 000 000 000 000 000 000 $= 10^{18}$
peta	P	pet'a	1 000 000 000 000 000 $= 10^{15}$
tera	T	ter'a	1 000 000 000 000 $= 10^{12}$
giga	G	ji'ga	1 000 000 000 $= 10^{9}$
mega	M	meg'a	1 000 000 $= 10^{6}$
kilo	k	kil'o	1 000 $= 10^{3}$
★ hecto	h	hek'toe	100 $= 10^{2}$
★ deka	da	dek'a	10 $= 10^{1}$
Base, supplementary, or derived unit			1 $= 10^{0}$

★ Non-preferred

SI NUMERICAL PREFIXES

PREFIX	SYMBOL	PRONUNCIATION	MULTIPLICATION FACTOR
Base, supplementary, or derived unit			$1 = 10^{0}$
★ deci	d	des'i	$0.1 = 10^{-1}$
★ centi	c	sen'ti	$0.01 = 10^{-2}$
milli	m	mil'i	$0.001 = 10^{-3}$
micro	μ (mu)	mi'kro	$0.000\ 001 = 10^{-6}$
nano	n	nan'o	$0.000\ 000\ 001 = 10^{-9}$
pico	p	peek'o	$0.000\ 000\ 000\ 001 = 10^{-12}$
femto	f	fem'to	$0.000\ 000\ 000\ 000\ 001 = 10^{-15}$
atto	a	at'to	$0.000\ 000\ 000\ 000\ 000\ 001 = 10^{-18}$

★ Non-preferred

SIMPLE DERIVED UNITS

PHYSICAL QUANTITY	UNIT NAME	SYMBOL
AREA	square meter	m^2
VOLUME	cubic meter	m^3
DENSITY	kilogram/cubic meter	kg/m^3
VELOCITY, SPEED	meter/second	m/s
ACCELERATION	meter/second squared	m/s^2

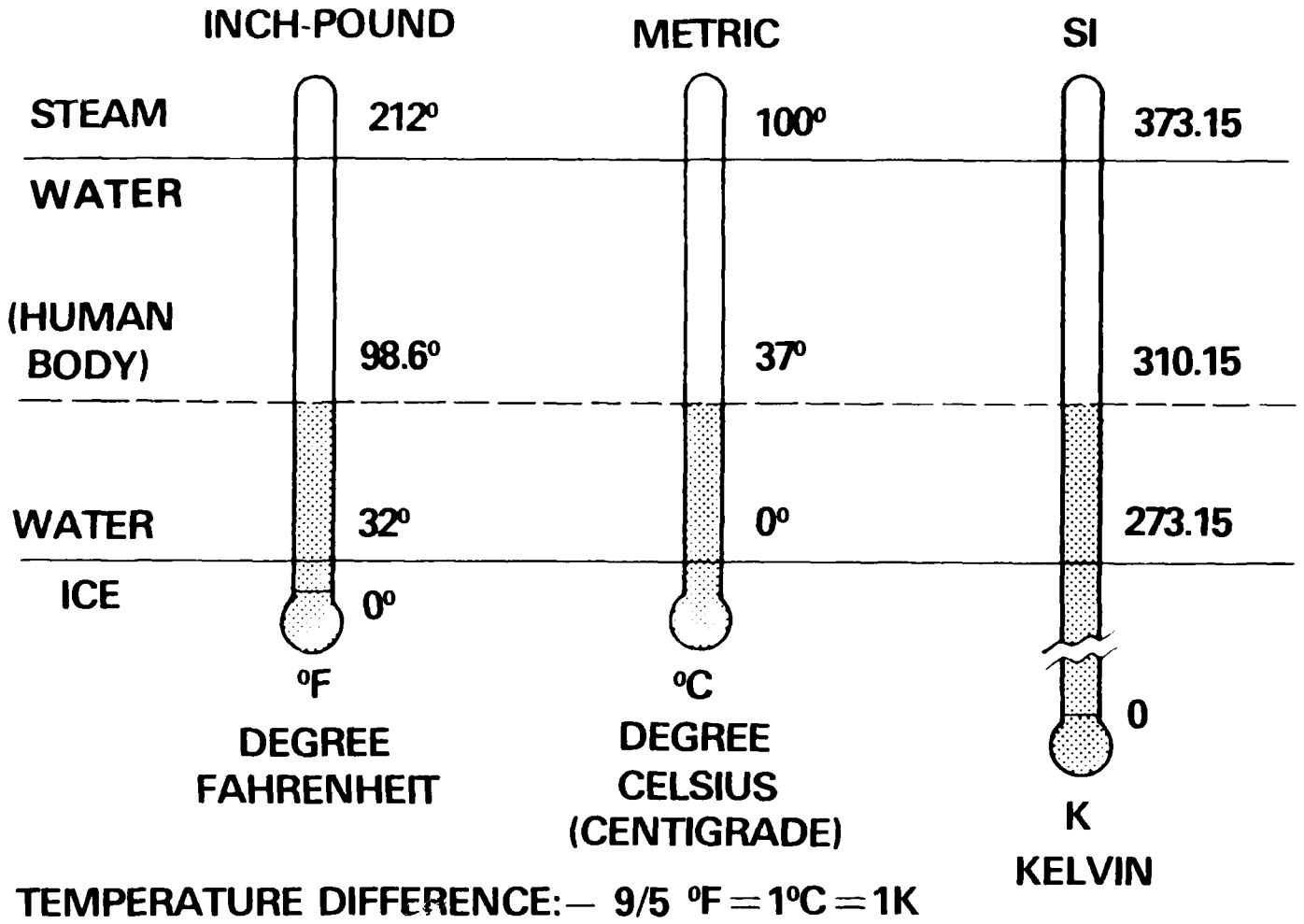
OTHER DERIVED UNITS

PHYSICAL QUANTITY	UNIT NAME	SYMBOL	UNIT
FORCE	newton	N	$kg \cdot m/s^2$
PRESSURE	pascal	Pa	N/m^2
ENERGY, WORK, QUANTITY OF HEAT	joule	J	$N \cdot m$
POWER (RATE OF DOING WORK)	watt	W	J/s
MOMENT, TORQUE	newton meter	$N \cdot m$	$N \cdot m$

SI ELECTRICAL UNITS

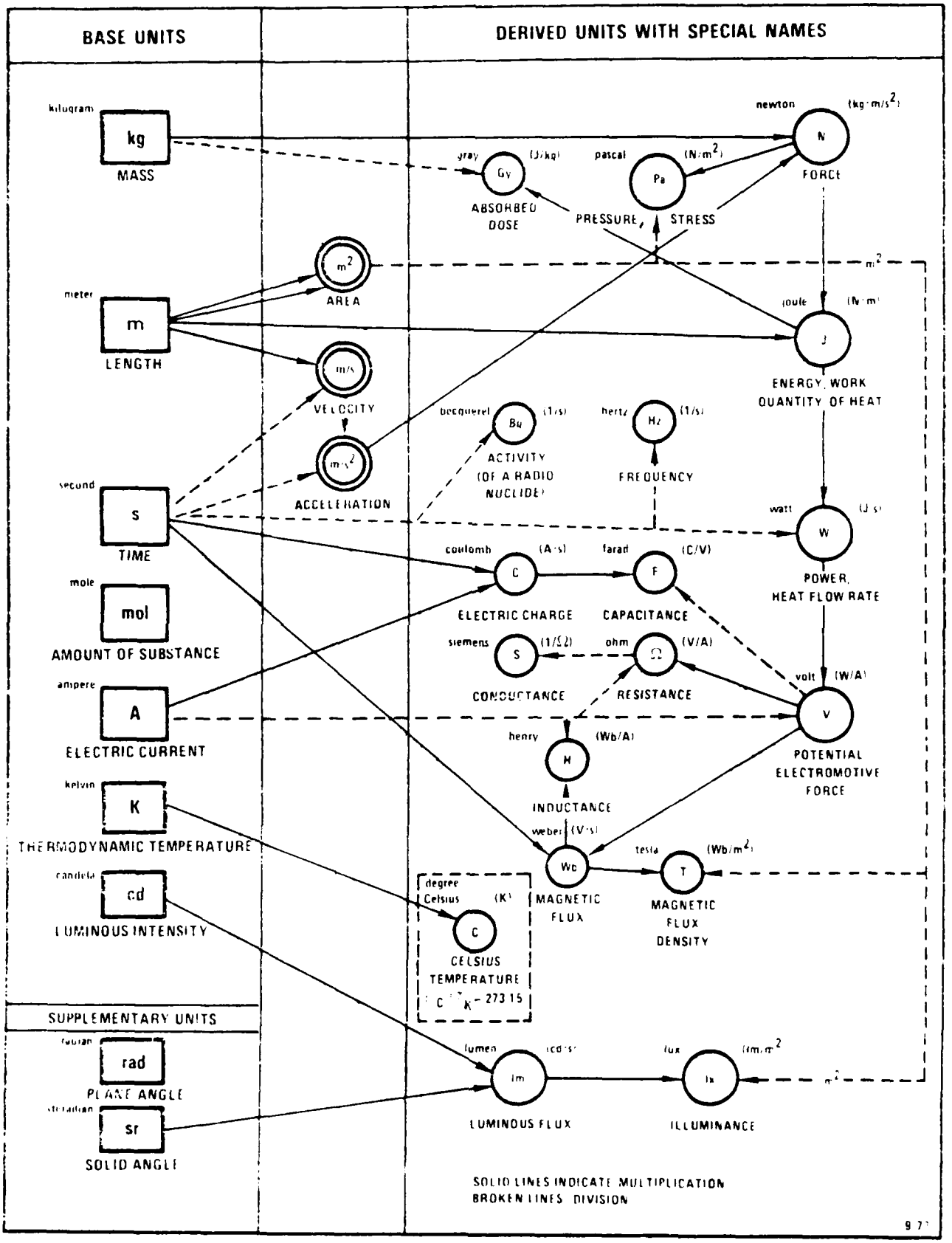
PHYSICAL QUANTITY	UNIT NAME	SYMBOL	UNIT
CURRENT	ampere	A	(basic)
POWER	watt	W	J/s
VOLTAGE (POTENTIAL DIFFERENCE)	volt	V	W/A
RESISTANCE	ohm	Ω	V/A
CONDUCTANCE	siemens	S	A/V
FREQUENCY	hertz	Hz	s^{-1}

TEMPERATURE MEASUREMENT



TEMPERATURE DIFFERENCE:— 9/5 °F = 1°C = 1K

RELATIONSHIPS OF SI UNITS WITH NAMES



NON-SI UNITS PERMITTED WITH SI

PHYSICAL QUANTITY	UNIT NAME	SYMBOL	VALUE IN SI UNIT
TIME	minute	min	1 min = 60 s
	hour	h	1 h = 60 min = 3600 s
	day	d	1 d = 24 h = 86 400 s
PLANE ANGLE	degree	°	$1^{\circ} = (\pi/180)$ rad
	minute	′	$1' = (1/60)^{\circ} = (\pi/10800)$ rad
	second	″	$1'' = (1/60)' = (1/648)$
VOLUME	liter	L	$1L = 1\ dm^3 = 0.001\ m^3$
MASS	metric ton	t	1 t = 1 Mg = 1000 kg

NON-SI UNITS USED TEMPORARILY

PHYSICAL QUANTITY	UNIT NAME	SYMBOL	VALUE IN SI UNIT
LENGTH	nautical mile		1 nautical mile = 1852 m (EXACT)
VELOCITY	knot		1 knot = 1 nautical mile/hour = (1852/3600) m/s
AREA	hectare	ha	1 ha = 1 hm^2 = 10 000 m^2
PRESSURE	bar	bar	1 bar $\doteq$ 100 kPa = 10^5 Pa

COMMON EQUIVALENTS

1 inch = 0.0254 meters = 25.4 mm (EXACT)

1 foot = 304.8 mm (EXACT)

1 mile = 1.609 --- km

1 meter = 39.37 --- inches = 3.281 --- feet = 1.09 --- yards

100 m = 328.1 --- feet

1 km = 3281. --- feet = 0.621 --- MILES (APPROX 5/8 MILE)

1 pound (MASS) = 0.453 592 37 kg (EXACT)

1 kg = 2.2046 --- pounds (MASS)

EQUIVALENTS FOR NEW UNITS

1 pound (FORCE) = 4.448 221 615 260 5 newtons (EXACT)

1 kip (FORCE) = 4448.221 --- newtons

1 newton = 0.225 ---- pounds (FORCE)

1 pound (FORCE)/sq.in. = 6 894. --- pascals ≈ 7000 pascals = 7 kPa

1 pound (FORCE)/sq.ft. = 47.88 --- pascals

1 kPa = 0.144 --- pound (FORCE)/sq.in.

200 kPa ≈ 29 --- pounds (FORCE)/sq.in.

COMMON METRIC PRACTICES

- MILLIMETER USED FOR ENG'N'G. DRAWINGS
- SOFT CONVERSION :—
  - SAME ITEM ; JUST DIFFERENT UNITS
  - ROUND INWARD TO PRESERVE TOLERENCES
- HARD CONVERSION (OR HARD METRIC):—
  - DIFFERENT ITEM
  - NOT REALLY A CONVERSION
- DONT USE DUAL DIMENSIONS
  - USE TABLES, IF NECESSARY

CONTINUING CONTROVERSIES

- SPELLING: METER/METRE AND LITER/LITRE
- MASS vs WEIGHT
- USE OF THE BAR (EQUALS 10^5 PASCALS)
- VISCOSITY UNITS (CENTIPOISE AND CENTI-STOKES)
- OTHER "LESS FAMILIAR" UNITS

METRIC GUIDELINES

- ASTM E 380-79
  - STANDARD FOR METRIC PRACTICE
- ANMC-78-1
  - METRIC EDITORIAL GUIDE
- FED. STD. NO. 376 (8 JULY 1980)
  - PREFERRED METRIC UNITS FOR GENERAL USE BY THE FEDERAL GOVERNMENT (ALSO KNOWN AS NBS LC 1098, NOVEMBER 1978)

DONALD R. MITCHELL

Mr. Donald R. Mitchell has served with the Office of the Secretary of Defense since the Defense Standardization Program came under its direction in 1964. He assumed the position of Director of the Defense Materiel Specifications and Standards Office (DMSSO) in January of this year after serving as DMSSO's Deputy Director since December 1973.

Prior to his affiliation with DMSSO, Mr. Mitchell performed various engineering functions within the Secretary's office as Staff Director for Product and Production Engineering and Assistant for Technical Data Programs. He has held positions with the Office of the Chief of Army Ordnance, HQ Army Materiel Command, and HQ Defense Supply Agency dealing with standardization and value analysis.

Mr. Mitchell has had numerous articles published in various journals and industry publications.

He received a B.S. degree in Industrial Engineering from Pennsylvania State University in 1950 and a Master's degree in Engineering Administration from George Washington University in 1960.

METRIC SEMINAR
18 NOVEMBER 1980

GOOD AFTERNOON. I WILL TALK ABOUT SEVERAL ASPECTS OF STANDARDIZATION AS IT RELATES TO THE METRIC SYSTEM INCLUDING THE NEED FOR -- AND PROBLEMS CONNECTED WITH -- PREPARATION OF METRIC SPECIFICATIONS AND STANDARDS.

THIS AUDIENCE IS, OF COURSE, AWARE OF DEPARTMENT OF DEFENSE POLICY ESTABLISHED BY DR. PERRY IN MARCH WHICH REQUIRES THAT A COMPLETE SPECTRUM OF METRIC SPECIFICATIONS AND STANDARDS BE AVAILABLE FOR USE BY THE YEAR 1990 -- A TEN YEAR TARGET DATE. YOU WILL NOTE THAT THE WORD "CONVERTED" WAS NOT USED. THIS IS BECAUSE VERY FEW SPECIFICATIONS AND STANDARDS WILL BE CONVERTED PER SE. INSTEAD WE ENVISION THAT NEW, SO CALLED "HARD METRIC" DOCUMENTS WILL BE PREPARED. IN ADDITION, THE WORD "AVAILABLE" WAS USED WITH PURPOSE. IT IS DESIRED THAT METRIC SPECIFICATIONS AND STANDARDS BE AVAILABLE FOR USE. WHETHER OR NOT THEY ARE ACTUALLY USED OR ARE EXCLUSIVELY USED IS A SEPARATE SUBJECT, ALTHOUGH IT IS RELATED. WE ARE NOT NECESSARILY ADVOCATING METRIC USE IN DESIGN OR OTHER FUNCTIONS WITH THE TEN YEAR POLICY, BUT ARE OBLIGATED TO PROVIDE AN ELECTION SO THAT EITHER METRIC OR INCH POUND STANDARDS CAN BE USED IN FUTURE DESIGNS. WITHOUT METRIC STANDARDS WE OFFER NO CHOICE BUT TO USE ONLY INCH POUND OR NON-STANDARD METRIC ITEMS.

YOU MAY BE THINKING "SO WHAT -- WHY DOES THE DEFENSE DEPARTMENT NEED TO MOVE ANY FASTER THAN THE REST OF THE COUNTRY?" THERE ARE SEVERAL GENERAL REASONS THAT MIGHT BE OFFERED, SUCH AS THOSE YOU PROBABLY HEARD BEFORE -- THE SIMPLIFIED MATHEMATICAL MECHANICS, OR THE FACT THAT METRIC USE IS INEVITABLE AND WILL NEVER BE ANY CHEAPER, OR METRIC IS EASIER FOR THE KIDS TO LEARN, OR METRIC IS LOGICAL -- INCH-POUNDS AREN'T. BUT, TO THE DOD THESE ARE PERIPHERAL REASONS. THE MAIN FORCE

ACTING TO MAKE THE U.S. A METRIC COUNTRY RELATES TO THE FACT THAT ALL OTHER COUNTRIES IN THE WORLD EXCEPT SOME SMALL ONES WITH EXOTIC NAMES ARE METRIC OR ARE GOING METRIC. IF YOU SCRATCH A U.S. COMPANY THAT IS GOING METRIC YOU WILL ALMOST ALWAYS FIND A COMPANY WITH HEAVY INTERNATIONAL INVOVLEMENTS. IT'S THE SAME WITH THE DOD -- INTERNATIONAL CONSIDERATIONS, PRIMARILY NATO DEALINGS ADD UP TO THE NEED TO USE THE METRIC SYSTEM.

MUCH HAS BEEN SAID LATELY ABOUT NATO STANDARDIZATION. FOR SEVERAL YEARS CONGRESS HAS REQUIRED -- THROUGH THE GOOD GRACES OF SENATOR NUNN, THAT ALL EQUIPMENT SENT TO NATO BE NATO STANDARD OR BE INTEROPERABLE WITH OTHER EQUIPMENT USED IN NATO.

STANDARDIZATION WAS EASY WHEN NATO FIRST STARTED. MOST OF THE EQUIPMENT WAS OF U.S. ORIGIN -- VOILA, COMPLETE STANDARDIZATION -- COMPLETE PARTS INTERCHANGEABILITY -- COMPLETE INTEROPERABILITY. NOW LOOK. METRIC SYSTEMS AND EQUIPMENT ARE EVERYWHERE. THERE CAN BE NO NATO STANDARDIZATION WITHOUT STANDARD MEASUREMENT UNITS EXCEPT FOR END EQUIPMENT WHERE PERFORMANCE IS THE ONLY CRITERIA AND A FEW CASES WHERE A GIVEN ITEM OF METRIC OR INCH POUND EQUIPMENT IS PRODUCED IN MORE THAN ONE COUNTRY. WITH RESPECT TO THE PARTS AND COMPONENTS WITH WHICH OUR STANDARDS AND SPECIFICATIONS WORLD DEALS ALMOST EXCLUSIVELY, THERE CAN BE NO MEANINGFUL STANDARDIZATION WITHOUT GOING METRIC -- PERIOD. THIS IS OUR PRINCIPLE REASON FOR ADVOCATING EARLY PREPARATION OF METRIC STANDARDS.

I HAVE HAD THE HONOR OF SERVING AS U.S. MEMBER ON THE NATO COMMITTEE CHARGED WITH STANDARDIZATION OF ASSEMBLIES, COMPONENTS, SPARE PARTS AND MATERIALS OF WHICH COLONEL DE GROOT IS CHAIRMAN. THIS GROUP IS ACUTELY AWARE OF THE NEED FOR METRIC STANDARDS TO ACHIEVE TRUE NATO STANDARDIZATION. THE LIST OF ADVANTAGES TO SUCH STANDARDIZATION IS IMPRESSIVE. THESE ADVANTAGES INCLUDE: (1) EASING CO-PRODUCTION AMONG NATO NATIONS OF EVEN DIFFERENT END EQUIPMENTS, (2) REDUCING NATO STOCKS, (3) SIMPLIFYING MAINTENANCE, AND (4) ALLOWING THAT ESSENTIAL FACET OF

INTEROPERABILITY WHICH PERMITS THE DEPOTS OF ONE COUNTRY TO REPAIR EQUIPMENT OF ANOTHER. NONE OF THIS IS FEASIBLE WITHOUT THE STANDARDIZATION FOR WHICH METRIC USAGE IS ESSENTIAL.

THIS, PERHAPS, EXPLAINS WHY WE HAVE FELT SO STRONGLY THE NEED FOR A GOAL WHICH MOVES US POSITIVELY TOWARD METRIC USAGE IN THE DOD. WITHOUT A GOAL, WE HAVE FOUND OURSELVES DRIFTING IN THE INCH-POUND SEA WAITING FOR "THE OTHER GUY" TO DO SOMETHING. PROMISES WE MADE TO INDUSTRY GROUPS SEVERAL YEARS AGO ABOUT DOING OUR SHARE IN PREPARING METRIC STANDARDS WERE NOT BEING KEPT IN ABSENCE OF ANY POSITIVE POLICY STATEMENT THAT DEMONSTRATED THAT THE OFFICE OF THE SECRETARY OF DEFENSE EXPECTED THE SERVICES TO BEGIN PREPARING METRIC STANDARDS. WE SAW THE CLASSIC "CHICKEN AND EGG" PROBLEMS FIRST HAND, WHERE DECISIONS TO REQUIRE METRIC SYSTEMS AND EQUIPMENTS WERE DEFERRED BECAUSE THERE ARE PRACTICALLY NO METRIC STANDARDS, AND METRIC STANDARDS WERE NOT BEING PREPARED BECAUSE THERE WAS NO DECISION TO REQUIRE METRIC SYSTEM AND EQUIPMENT.

SOMETIMES WE FORGET THAT GOOD STANDARDS ARE NOT DEVELOPED OVERNIGHT. IT TAKES TIME TO DRAFT LOGICAL STANDARDS AND THEN HAVE USERS AND PRODUCT MANUFACTURERS AGREE UPON THEM.

IT IS MUCH TOO LATE TO PRODUCE A STANDARD BY THE TIME IT'S NEEDED IN THE DESIGN PROCESS. SURE, METRIC HARDWARE CAN BE DESIGNED ON SHORT NOTICE FROM STANDARD METRIC ELEMENTS. FOR EXAMPLE, ISO STANDARD METRIC THREADS AND WIDTH ACROSS FLATS CAN BE SPECIFIED ON BOLTS, AND -- FOR A PRICE -- THEY CAN BE PROCURED WITHOUT TOO MUCH DIFFICULTY. BUT THEY ARE BASTARDS. THEY ARE BASTARDS TO BUY AND BASTARDS IN SUPPLY. WE WOULD BE MUCH BETTER OFF STICKING TO OUR STANDARD INCH POUND JOBS THAN PAY THROUGH THE NOSE FOR SPECIALS AND SCREWING UP OUR SUPPLY SYSTEM BY MAKING THINGS METRIC FOR METRIC SAKE. THAT WE DON'T NEED. REMEMBER, BASTARD METRIC DOESN'T GIVE US ANY NATO ADVANTAGE, AND IN FACT, IT GIVES NO ADVANTAGE AT ALL!!

A PROBLEM IN THIS CONNECTION IS THAT PEOPLE SEEM TO THINK OF METRIC EQUIPMENT IN TERMS OF METRIC HARDWARE USED ON THAT EQUIPMENT. THE FUNDAMENTAL POLICY OF DODI 4120.18 AND THE PRACTICE ENVISIONED BY MIL-STD-1476 WOULD PERMIT AN END ITEM OR SYSTEM TO BE DESIGNED COMPLETELY IN METRIC MEASUREMENTS BUT ALLOW THE COMPONENTS TO BE IN INCH POUND UNITS IF IT IS MOST ECONOMICAL IN THE LONG RUN TO DO IT THAT WAY. UNFORTUNATELY, THIS SEEMS TO RUN AGAINST HUMAN NATURE AND FOLKS SEEM TO WANT TO USE BASTARD METRIC HARDWARE OR THEY DON'T FEEL THAT THE END ITEM IS METRIC. WE'VE GOT TO GIVE THESE FOLKS METRIC STANDARDS.

LET'S TALK A MOMENT ABOUT SOFT CONVERSION AND ITS COUSIN DUAL DIMENSIONING, BOTH OF WHICH ARE FROWNED UPON BY POLICY. YOU SHOULD REALIZE THAT THERE IS A GREAT DEAL OF FUZZINESS SURROUNDING THESE WORDS. ONE CAN COME UP WITH A NUMBER OF COMBINATIONS OF WAYS TO EXPRESS DIMENSIONS ON A DRAWING OR STANDARD OR SPECIFICATION. FOR EXAMPLE, INCH AND METRIC EQUIVALENTS CAN BE ADDED AT THE LOCATION OF THE DIMENSION OR IN A TABLE. EITHER MAY BE PLACED IN THE DOMINANT POSITION. A DIMENSION MAY BE SHOWN IN ONLY METRIC OR INCH-POUND UNITS AND A TABLE OF EQUIVALENTS PLACED IN A TABLE. THE TABLE MAY BE ON A SEPARATE SHEET. SOME FEATURES OF AN ITEM MAY BE IN ROUND METRIC NUMBERS AND OTHER FEATURES OF THE SAME ITEM IN ROUND INCH POUND NUMBERS. VARIOUS PEOPLE MAY DECLARE ANY OF THE ITEMS EXPRESSED IN THESE DIFFERENT WAYS TO BE EITHER "METRIC" OR "SOFT CONVERTED METRIC," OR CONTINUE TO CONSIDER THEM INCH POUND ITEMS.

AT ANY RATE, INCLUSION OF BOTH METRIC AND INCH POUND DIMENSIONS MAKES SENSE ONLY ON ONE CONDITION. THAT IS, WHERE THE DIMENSIONS WILL BE READ BY AT LEAST TWO DIFFERENT GROUPS OF PEOPLE, EACH OF WHOM WORK WITH A DIFFERENT MEASUREMENT SYSTEM. EXPERIENCE HAS SHOWN WELL THAT IF ONLY ONE GROUP OF PEOPLE -- A SINGLE COMPANY FOR EXAMPLE -- WILL BE USING A DRAWING OR SPECIFICATION, ONLY ONE DIMENSIONAL SYSTEM IS NEEDED -- EVEN IF THE SYSTEM IS METRIC AND THE GROUP IS

ACCUSTOMED TO INCH. ADDING BOTH DIMENSIONS ONLY ADDS THE COST TO DO THE ADDING, INTRODUCES THE POSSIBILITY (EVEN PROBABILITY) OF ERROR, AND CLUTTERS UP THE DATA MAKING IT HARD TO READ.

WITH RESPECT TO SOFT CONVERSION, WE NORMALLY THINK OF SOFT CONVERSION AS NOT INVOLVING ANY FORM OF DUAL DIMENSIONING BUT SIMPLY TRANSLATING THE INCH POUND DIMENSIONS OF AN INCH POUND ITEM INTO EQUIVALENT METRIC DIMENSIONS. THE QUESTION -- WHAT DOES IT BUY YOU? YOU'VE SPENT MONEY REDIMENSIONING. YOU'RE LIKELY TO MAKE ERRORS. YOU'VE GOT THE SAME ITEM THAT ISN'T INTERCHAGEABLE WITH ANY TRULY METRIC ITEM. YOU'VE CREATED AN ILLUSION OF A METRIC ITEM -- METRIC FOR METRIC'S SAKE. ONLY WHEN AN ITEM WILL LIVE INDEFINITELY AS A METRIC ITEM IN A METRIC WORLD IS IT LOGICAL TO SOFT CONVERT -- EXAMPLES OF LOGICAL SOFT CONVERSION MIGHT BE WALL RECEPTICLES, MAPS, RAILROAD GUAGES, ETC.

GETTING BACK TO THE TEN YEAR GOAL FOR A MOMENT, WE CAN APPRECIATE THE FACT THAT THE DOD CAN'T GO IT ALONE MOST OF THE TIME. IT WOULDN'T DO MUCH FOR US IF WE DECIDED ON THE CHARACTERISTICS OF A METRIC STANDARD ITEM ONLY TO HAVE THE COMMERCIAL WORLD LATER STANDARDIZE DIFFERENT CHARACTERISTICS. BUT OUR TEN YEAR GOAL WILL DO SEVERAL THINGS IN THIS RESPECT. ONE, IT WILL HELP SERVE AS A SPUR TO THOSE WHO ARE VASILATING IN PRODUCTION OF METRIC STANDARDS. TWO, IT WILL INFLUENCE THOSE WHO MAY GO METRIC LATER TO USE THE SAME STANDARDS, AND THREE, IT WILL GIVE US A LEG-UP WITH THE PRODUCING INDUSTRY TO CAUSE THEM TO THINK ABOUT METRIC AND STANDARDIZE THEIR OWN METRIC PRODUCTS. HOWEVER, WITH THE TEN YEAR SPAN IT SHOULDN"T REALLY BE NECESSARY TO GO IT ALONE -- BUT IF WE MUST -- WE MUST.

I WILL WIND UP THIS DISCUSSION WITH SOME COMMENTS ON OUR NUMBERING SYSTEM FOR METRIC SPECIFICATIONS AND STANDARDS. AS YOU KNOW, THE WELL KNOWN "MIL" IS REPLACED BY THE SYMBOL "DOD" ON METRIC SPECIFICATIONS AND BOOK FORM STANDARDS. AND "MS" BY "DS" ON

ON SHEET FORM STANDARDS. MOST STANDARDIZATION ORGANIZATIONS IN THE COUNTRY HAVE FOUND IT WISE TO DISTINGUISH METRIC SUBJECTS FROM OTHERS BY A DISTINCTIVE NUMBERING FEATURE. IN OUR CASE, WE WANTED TO RETAIN A MILITARY DESIGNATION AND AT THE SAME TIME NOT FOUL UP OUR COMPUTER INDEXING SYSTEM AND GENERAL NUMBERING RULES, AND AVOID POSSIBLE DUPLICATION IN THE NUMERICAL PORTION OF THE NUMBER. SEVERAL PROBLEMS HAVE ARISEN. WE HAD HOPED TO BE ABLE TO KEEP THE SAME NUMERICAL STEM AND JUST CHANGE THE "MIL" TO "DOD" ON DOCUMENTS WHICH WERE NOT MEASUREMENT SENSITIVE BUT ARE USABLE IN METRIC APPLICATIONS, AND FOR LEGITIMATE SOFT CONVERSION. UNFORTUNATELY, FOR REASONS I DON'T FULLY APPRECIATE, THIS SEEMS TO FOUL UP OUR FEDERAL CATALOGING RECORDS BECAUSE COMPUTERS DO NOT SEE THE DOD SYMBOL AS INTERCHANGEABLE WITH THE MIL SYMBOL, EVEN THOUGH NUMERICAL PORTION OF THE NUMBER IS THE ONLY TRULY SIGNIFICANT PORTION OF THE NUMBER. THEREFORE, WE OUTLAWED ANY NUMBER CHANGES INCLUDING CHANGING THE MIL TO DOD WHEN THE SAME DOCUMENT IS USED. A SECOND PROBLEM WE HAD AND STILL HAVE, IS DETERMINING WHEN AN ITEM SHOULD BE CONSIDERED TO BE METRIC. ASIDE FROM DUAL DIMENSIONING SITUATIONS, WHAT DO YOU CALL METRIC WRENCHES WITH 1/2 INCH OR 3/8 INCH DRIVES, OR 25 FT OF 35MM FILM, OR 13/16 INCH DRIVE 14MM SPARKPLUGS -- TO NAME OBVIOUS PROBLEMS? MY FAVORITE IS PAINT. MANY NAVY SPECIFICATIONS CALL OUT ALL METRIC UNITS IN FORMULATING AND TESTING PAINT -- BUT PACKAGE THE PAINT IN GALLON SIZES. TO THE PRODUCER I GUESS IT'S METRIC, BUT THE USER WOULD BE CORRECT IN BELIEVING US TO BE IDIOTIC IN CALLING A GALLON OF PAINT "METRIC PAINT."

AND SO IT GOES -- LET'S GET THOSE METRIC SPECS AND STANDARDS COOKING.

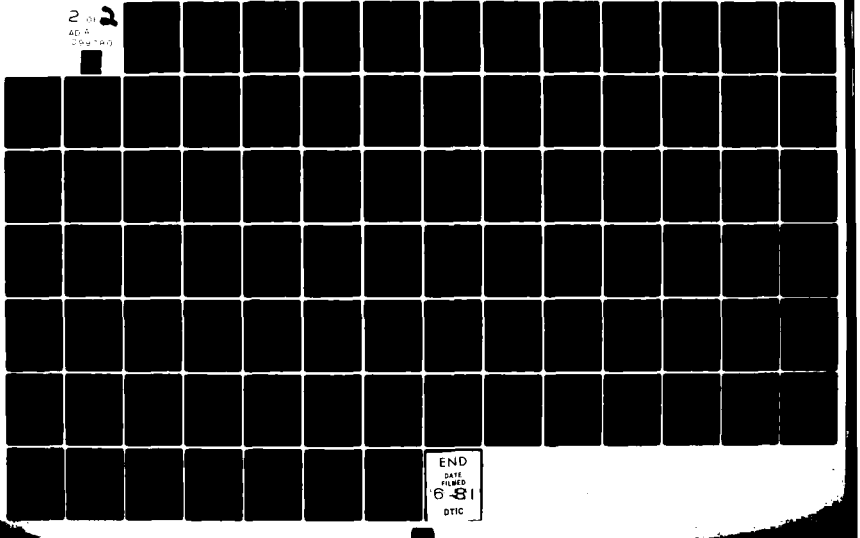
PART II

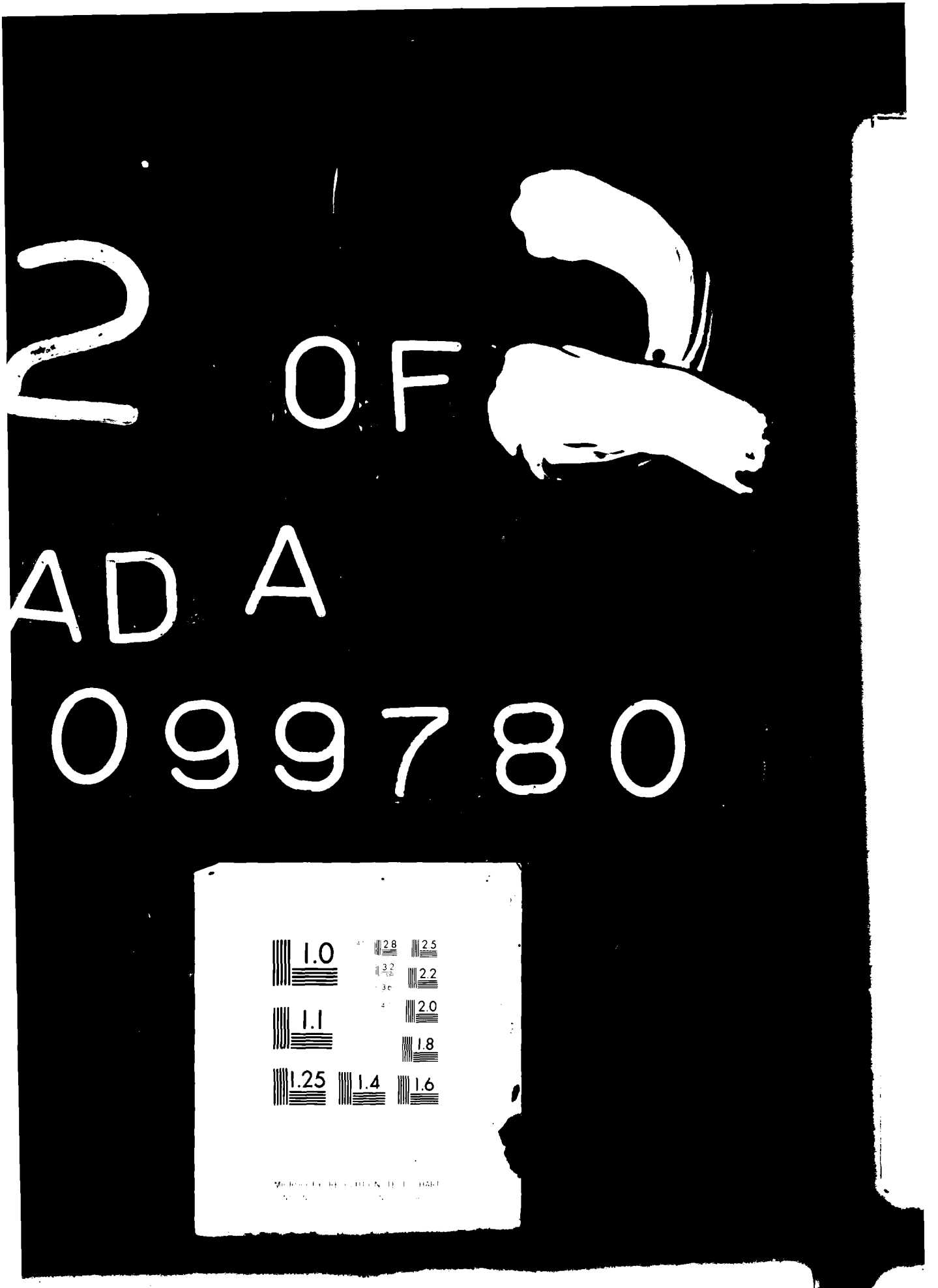
WORKSHOPS

\CQUIS ITION WORKSHOP

AD-A099 780 OFFICE OF THE DEPUTY UNDER SECRETARY OF DEFENSE RESEA--ETC F/G 14/2
DOD METRIC SEMINAR/WORKSHOP (1980) HELD IN WASHINGTON, DC 18-20--ETC(U)
APR 81

UNCLASSIFIED NL

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DOD Metric Seminar

Acquisition Workshop - Recommendations

1. Action Item - DOD, at the highest levels, must decide if we are to more strongly advocate metric measurements in the total acquisition process and, thus, help stimulate the movement toward more rapid metric conversion as an active metric customer. Guidance, yea or nay, must emanate as a result of the many pro and con discussions of this topic throughout the workshop.

Recommendation - MSG should determine need for and direction of additional emphasis on advocacy.

2. Action Item - Query: Should additional costs for metrication be allowed or encouraged in contracting?

Recommendation - Refer to MET-9 Action Office for review, recommendation and implementation as appropriate.

3. Action Item - Query: What changes should be made to the DAR?

Recommendation - Refer to MET-9 Action Office; additional emphasis for on-going effort there.

4. Action Item - Investigate the impact of metrication on Small/Disadvantaged Businesses.

Recommendation - Refer to MET-9 Action Office for investigation and further recommendation as appropriate.

5. Action Item - Development of a metric handbook for program managers and project engineers/managers.

Recommendation - Refer to MET-1 Action Office; additional emphasis for on-going effort there.

6. Action Item - Develop training in metric policies/procedures for Service Schools, DOD schools (DSMC etc), and graduate schools.

Recommendation - Refer to MET-4 Action Office to provide additional emphasis/scope to on-going effort.

7. Action Item - DOD should encourage greater participation in Industry Associations and should stimulate greater understanding of industry positions and progress in metrication for the benefit of the entire acquisition community.

Recommendation - Refer to MET-2 Action Office (MSG) as an indication of workshop concern and for possible added emphasis.

8. Action Item - Logistics - DOD should encourage the metrication of "stand alone" items as a first priority. This will ease the logistics support problems.

Recommendation - Refer to MET-6 Action Office for review and implementation.

9. Action Item - DOD should recognize and fund for the potential inventory and cataloging work associated with any dual system requirements during the metric conversion process. Increased life cycles of weapon systems make the potential impacts in this area substantial.

Recommendation - Refer to MET-6 Action Office to provide additional emphasis and direction to on-going effort.

10. Action Item - Early Planning - Metrication must be considered as part of the business/acquisition strategy for all new developments or systems. DOD should develop policy making metrication an important check-list item, even if the tank, ship or plane does not enter the system for ten years, with follow-on support 30 years into the future.

Recommendation - Refer to MET-1 Action Office to provide additional emphasis and direction to on-going effort.

DEPARTMENT OF THE AIR FORCE
WASHINGTON 20330

OFFICE OF THE ASSISTANT SECRETARY

December 16, 1980

MEMORANDUM FOR MR. JOHN A. MITTINO, DIRECTOR, MATERIEL ACQUISITION POLICY, OFFICE OF THE UNDERSECRETARY OF DEFENSE, RESEARCH AND ENGINEERING

SUBJECT: 1980 Metric Workshop

The purpose of this memorandum is two-fold:

I wish to summarize for your further consideration the findings, opinions, and recommendations of the Acquisition Workshop convened under the purview of the subject seminar. Secondly, I would like to transmit the attached copies of the subgroups' reports prepared by the respective chairmen. Since my summary is intended more as an overview rather than an indepth analysis, there is some added value in making available to you the more explicit and detailed comments underlying that overview.

The principal and fundamental consensus was that absent advocacy, success of the program is seriously inhibited if not impossible. Related to that point, but somewhat collateral, is our finding that there today exists provisions in the DAR and in our hardware specifications which inhibit acquisition of metric products. If no other role is assumed by OSD, an absolute prerequisite is timely and effective coordination of all implementing guidance promulgated by the various services to insure compatibility and uniformity.

We believe that the fundamental decision must be made by management for the decision to go metric or not to go metric is an intrinsic aspect of program direction. It should not be deferred until or left for the discretion of the procuring activity. Irrespective of where the decision is made or by whom, there is a discernible and troublesome lack of guidance and criteria for use in formulating a rationale and cost effective reasoned decision. Obviously, success in metrification will require sustaining emphasis with a degree of industrial participation and interface not found today in either the qualitative or quantitative sense. There is a demonstrated failure to plan for or to actually exploit collateral commercial opportunity so as to reduce transition cost to Government.

We feel that the issue should be an intrinsic part of the agenda addressed at the business/acquisition strategy. If metrification is to be accomplished in any specific program, let alone across the board, it must be considered as early as possible in planning for new developments. If it is in fact to be important, then, where appropriate, metrication should be treated as an evaluation factor for consideration in proposal evaluation and source selection. Concurrently, there is a need to conduct an intensive training and educational type program to better acquaint the

acquisition community and the program management community to DOD policy and the associated benefits/problems. Lastly, further consideration must be given to the potential adverse impacts during the transition phase on the small and disadvantaged business community and the treatment in the contract of the associated costs, if any, that might be incurred during that transition.

I wish to express my appreciation for the opportunity tendered me to personally participate in the 1980 DOD Metric Seminar/Workshop. I can honestly admit that my professional knowledge and understanding of the problem has been significantly enhanced by reason thereof.

HARVEY J. GORDON
Deputy for Acquisition

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ACQUISITION WORKSHOP

Acquisition Management Subgroup

DISCUSSION

General discussion revolved around several major areas of consideration, all hand out questions were discussed, but the major concerns were the following:

1. Will the DOD be able to "drive" or coerce industry to metrify?

This discussion addressed the possibility of offering incentives for metrifying. The premise was that industry will metrify when it is economically beneficial for them to do so or when they have a customer who desires metric products. The point was also made that because there is no firm implementation date for the DOD to metrify, that it would be difficult to justify a demand for metric dimensions in a weapon system proposal.

2. Is there a general resistance to metrics?

It was generally believed that resistance to change was a problem that might be eased through educational efforts. A group member pointed out that if a metric conversion did not adversely affect the public, there has been slight resistance. Examples cited were the liter soft drink bottle and gasoline sold by the liter.

3. Do existing DOD acquisition directives require changes?

It was decided that the acquisition directives from the DOD (DODD 5000.1 and DODI 5000.2) adequately addressed the metrication requirement. There was some discussion concerning the adequacy of the Defense Acquisition Regulation and individual Service directives. It was noted that direction has a snowballing effect, and is not normally implemented until it is specified in Service or Command directives.

RECOMMENDATIONS

Based on the discussions as outlined above, the following recommendations are presented:

Recommendation:

1. In an attempt to overcome a general resistance to metrication through education and awareness, one or more of the following should be considered.

a. A metric handbook for program directors, project engineers/managers. Would not only explain the metric system and conversion process, but contain historical data outlining problems and advantages found in other systems which are partially or totally metricated.

b. A training course for program directors, project engineers/managers.

c. Inclusion of metric orientation in existing courses (DSMC etc.)

d. Introduction of metrics into R&D efforts. Early consideration of metrication could prevent later problems.

Recommendation:

2. Requests for proposal should recommend that bidders include metrication in their proposals. Beyond this the group was divided. Some members advocate awarding weighted advantage or incentive points during source selection for proposals submitted in standard metric dimensions, with project engineers having discretion to select which systems or subsystems should be metricated. Other group members recommended that DOD should follow industry's lead in metrifying and be prepared to respond as required.

Recommendation:

3. The acquisition plan section (section 2100) of the defense acquisition regulation reflect the requirement for the program manager to assess the feasibility of metrification of the system. This suggestion was subsequently modified to recommend that the consideration occur earlier; during the business strategy assessment process.

Individual Service regulations should reflect the direction outlined in DOD documents. DOD directives will require revision if the above recommendations are accepted as DOD policy.

DOD METRICATION

SEMINAR AND WORKSHOP

1980

REPORT OF THE
CONTRACTING SUBCOMMITTEE

MR. DONALD E. PHILLIPS
CHAIRMAN

21 NOVEMBER 1980

PREFACE

The following represents a summation of six major points as identified during discussions by the contracting committee. These issues, we felt, were the most compelling in our four hour overview of the metrication impact on contracting.

CONTRACTING SUBCOMMITTEE

Point: Involvement of Contracting Community in Metrication

Problem: Contracting is fundamentally a support function. As such the PCO should get a procurable package. This should include a clear decision on metrication.

Discussion: We are fearful that the PCO will be drawn into the metrication decision itself to the possible detriment of that decision.

For example, there has been discussion at this conference that the metrication decision will be made after the RFP--not before. This is wrong.

We do not think we should obtain alternate or dual proposals, for example, but we feel we will be called upon to do so.

We do not think metrication can be used as a viable source selection criterion. We are concerned with the potential legal problem involved. If metrication is not required by law and if we propose to make it optional in our source selections, what justification is there for giving the metrication proposal a higher rating, or conversely a lower rating? This is the very murky area where we are trying to have our cake and eat it too! It is better to make up our minds before hand--if we need to study the subject, we can write a study contract.

Solution: Decision to metricate should be made before releasing the requirement to contracting.

On major programs or similar size acquisitions, metrication and the ramifications thereof can be made a part of the conceptual phase.

To ensure that the PCO has the authority to resist premature or incorrect metrication influence, the DAR should be amended to establish policy and the various roles each acquisition function is to fulfill.

CONTRACTING SUBCOMMITTEE

Point: Scope of the Metrication Conversion Problem

Problem: Our subcommittee felt we didn't really have sufficient details to determine how big or how small the problem is.

Discussion: For example, where do the various industries stand on metrication? Obviously, some industries are more metricated than others--or are they? The electronics industry or some parts of it is apparently metricated to a large degree. But where is the airframe industry?

This information is needed to make some rational judgements, as will be needed in business strategy panels, contract strategy papers, acquisition plans, as well as negotiation sessions with contractors.

Are we asking too much to solicit a metricated proposal from an industry that is just not ready or that only one or two firms in that industry can respond, thus curtailing competition unnecessarily?

Another example is the nature of the business involved. Is it really necessary for the airframe industry to be metricated? Do they have a product that can be soft-converted?

Solution: A survey of all industry along these lines is needed.

CONTRACTING SUBCOMMITTEE

Point: Overzealous Implementation of Metrication

Problem: That we may move too fast in our implementation of metrication overlooking pitfalls that can be counter productive.

Discussion: This conference seems to carry a note of urgency that may not be all that justified. The transition period may well take 20 to 30 years--or more (we understand no country is fully metricated).

Urgency could also adversely impact competition as we force unmetricated firms to do business with metricated firms without any grace periods. An even more disturbing consideration is the probable prolonging of lead times if and as we force-fit our metrication prerogative.

Solution: We need to achieve metrication in a deliberate, orderly, business-like manner.

We need to implement metrication via customary and standardized procedures in DOD: Necessary changes to DAR (policy, functional responsibilities, cost allowability/allocability, etc.); a DOD regulation (perhaps a redo); service regulations; etc.; with all attendent and customary public forums (via the Federal Register). (This will have the fringe benefit of educating the public, including defense industry personnel.) Additionally, we should have a parallel in-house educational program to bring our own people on board.

CONTRACTING SUBCOMMITTEE

Point: Small and minority and disadvantaged business community being adversely impacted by metrication.

Problem: The small business community including minority owned and disadvantaged businesses may not be able to compete because of their size with firms who have already converted to a metrication capability, further eroding this important part of the industrial base.

Solution: Some consideration may have to be given to this category of contractors in the metrication initiative in much the same vein as the socio-economic area. Perhaps even some capital type investments.

CONTRACTING SUBCOMMITTEE

Point: Price/Cost Negotiation for Metrication.

Problem: Metrication will involve costs not clearly allowable/allocable in negotiation.

Discussion: During the metrication transition period, there will be many costs encountered not clearly within the purview of the PCO to accept. One is the fast write-off of tooling cost, the cost of money to retool, maintaining two inspection systems, two QA systems, etc.

Solution: Appropriate changes to DAR will have to be made and perhaps even some cost accounting standards.

CONTRACTING SUBCOMMITTEE

Point: System Specifications

Problem: System specifications not going into sufficient detail to cover all aspects of metrication.

Discussion: Unless the system specifications are written to cover the prime as well as all levels of supporting technical parameters, various subcontractors and/or suppliers will have an option to furnish what they want.

Furthermore, this may adversely impact our current initiative to use commercial products whenever feasible if indeed that industry or supplier has not metricated.

Solution: The conceptual phase of the program should be used to study the metrication issue to provide answers to problems of this nature.

ACQUISITION WORKSHOP

Logistics Support Subgroup

Metric Specifications

A specification, by which all drawings describing anything we wish to buy, already is available in both metric and conventional terms. Hence at this time a decision can be made to require new design to be fully metric by requiring that the drawings be metric, exclusively. The specification is DOD-D-1000B(1), Drawings, Engineering and Associated Lists, which is fully coordinated and accepted by all the services. The standard, which describes the drawing methods, is also in metric terms. It is DOD-STD-100C, Engineering Drawing Practices, with change notice dated 30 April 1980. Both were "MIL" documents, which became "DOD" documents, to indicate "METRIC". Therefore procurement of metric drawings, where the metric adoption must begin, can be initiated now with the specification (to buy) and the standard (how to prepare). By a stroke of the pen, all new drawings can be required to be fully metric exclusively. This may seem arbitrary, but if we must bite the bullet, this is the place to start.

Evolutionary not Revolutionary

The requirement that new drawings be metric, would allow a gradual transition because new weapon systems are, in some cases, on a twenty year cycle. The existing systems must be supported in conventional measuring terms until phased out. The basic problem with two systems exists only when an interface exists; if mating is required, compatibility is required. However if there is no matching requirement either system (metric or conventional) may be used. Hence a "stand alone item", which does not require an interface for matching, (e.g., threads, gears, electronic plugs, ammunition, tires, flanges) can be fully metric now. A single-point repair item such as a black box (electronics, mechanical, reduction-gear or transmission) can be fully metric, internally, now. As long as the interface (plug, thread or flange) matches, it is immaterial which system is used inside the box, so the repair item is a valid candidate for metrication.

Dual Transition Period

The systems recently introduced into the military arsenal, tanks, ships, planes, facilities, have a useful life of twenty years or more and may approach 30 years. They must be supported for that length of time with repair parts and supplies in the conventional mode (non-metric). The exception would be the non-interface items mentioned above. When fully metric hardware is introduced, we must be prepared to support a dual supply system for at least 25 years. A system must be devised to prevent mixing the two measures utilized to prevent improper subsitiutions; they just won't match. The dual system does not mean complete duplication; the total supply system should not be more than it is now and in fact it may be less, as metric standardization can reduce the numbers of types and sizes using preferred numbers (sizes) in new equipment design.

Commercial Opportunities

During this transition period, manfacturers may find beneficial commercial opportunities which will aid in their competitive position. Success stories, such as Timken Bearings, will encourage suppliers to convert on their own which will reduce the overall cost to the government. The benefits of "going metric" have been shown for companies, such as General Motors and Ford, wherein during the "dual" period, supply stocks increased to 125%, but once the conventional parts were phased out, the net stock was only 75% of the previous (conventional) stockage.

Industry Participation

The non-government associations, such as The American Society of Mechanical Engineers (ASME), The American National Standards Institute (ANSI), the Society of Automotive Engineers, Inc. (SAE) are presently preparing standards for metric items for their clients. Such metric documents are being adopted for use by the Government. It is appropriate, therefore, that the government assist in preparation of such documents. Memberships in such associations, as working group members, rather that elected officers, should be supported by the government for government employees. It may be accomplished by service memberships rather than on an individual basis. Hence the Army may contribute financially to the support of such non-profit associations since it benefits indirectly. By being a cooperative effort, the metric transition can be a voluntary one and led by industry as the law envisioned. Once the system of conversion becomes routine and acceptable, the process will work successfully, and the government will be supportive and a strong advocate.

Early Planning for New Development

It is considered that the one, if not the most important, feature of successful metric conversion is the timing the government wishes metrication to commence. The Acquisition Plan for a system may be too late in the cycle to call for metric. It is strongly recommended the metric requirement surface early in the planning for a new development or system. Metrication must be considered as part of the business/acquisition strategy. It must be a first step and should be an important check-list item, even if the tank, ship or plane does not enter the system for ten years, with follow-on support thirty years into the future.

ACQUISITION WORKSHOP

Policy Subgroup

A. Five key points were raised as a result of the concerns the sub-group members had about the lack of a clear cut policy within DOD on metrication.

1. It was the consensus of the group that the success of our conversion effort will be adversely affected if OSD and the Federal Government do not change their role from one of a follower to one of clear cut advocacy.

2. With or without advocacy and mandate, the acquisition community must be educated in SI, not necessarily in the detail needed by the engineering community. The training should be identified now and scheduled to be given at the appropriate time during the transition. Of special interest should be the use of the film made of the metric symposia for executive level personnel held in 1980.

3. The participants recognized that the manufacturers, contractors, and Government users would have some initial increased tooling costs but historically these can be expected to be recouped and in fact some savings recognized as a result of reductions in design time, and elimination of uneeded sizes and parts.

4. In order to minimize the disruption caused during the initial phases of the conversion, each DOD component should be required to coordinate its implementing guidance and training programs with a central OSD office to insure compatibility and reduce duplicative effort.

5. There are many procurement specifications which contain inhibitions to metrication, although they may contain few if any measurement sensitive requirements. For example, MIL-L-7158E in its title indicates that only a 24-inch rotating beacon light is acceptable. Very possibly, a 600-mm light, less than 1-mm smaller would have been acceptable. In many cases, the quantity noted in a title is only a nominal capacity such as "10 cubic feet" in the title of MIL-L-28627. This could inhibit a supplier from offering his metric equivalent. Elimination of these bars to metric could improve interoperability with our NATO allies, and enhance competition by allowing our manufacturers involved in international trade to compete with those still working in the inch-pound system. Such action could also serve as a catalyst and encourage those suppliers holding back on SI to move forward. By either conversion to SI or as a minimum, allowing a manufacturer, already making metric products, to offer them to the Government without being declared non-responsive, we have an opportunity to expand the potential for use of commercial products.

B. In summary, the policy sub-group felt that adoption of SI throughout the economy was inevitable and that the DOD should maximize its opportunities by a cohesive program of planning, coordination and timely conversion.

ATTENDEES

ACQUISITION WORKSHOP

Chairman

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George W. Craig	Armament Materiel Readiness Command

Policy Subgroup

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Al South	ODCS RDA
Chris C. Schuller	Defense Communications Agency
Mark Flaming	Electronics Research & Development Command
Ken Mintzer	Naval Sea Systems Command
John K. Meson	Defense Advanced Research Projects Agency
Ms. Althea Ray	DARCOM
K. Richard Becker	Defense Electronics Supply Center

DESIGN AND ENGINEERING WORKSHOP

23 JAN 81

DoD Metric Seminar

Design and Engineering Workshop - Recommendations

1. Action Item - Assure that "standardization" acquisition policies do not impede introduction of metric machinery/equipment, since they could be construed as "new" items.

Recommendation - Refer to MET-9 Action Office for review and implementation.

2. Action Item - Promulgate policy that system specifications be written in metric, but allow industry to respond in metric, inch-pound, or a mixture of both (hybrid).

Recommendation - Refer to MET-9 Action Office for review and implementation

3. Action Item - Provide increased funding for the preparation/conversion of metric specifications and standards to meet the 1 Jan 90 target date established by UNDSECDEF memo of 7 Mar 80.

Recommendation - DoD budget office to emphasize this philosophy to the budget offices in the various DoD components.

4. Action Item - Relative to computer programs, review software to remove dimensional constants, and assure that operational software interfaces properly with systems with which it communicates.

Recommendation - DoD MSG to prepare a new MET TASK under DoD INST 4120.XX to study entire computer problem and develop appropriate guidelines.

5. Action Item - Provide appropriate metric training for engineers, draftsmen, and technicians.

Recommendation - Refer to MET-4 Action Office for review and implementation.

DESIGN AND ENGINEERING WORKSHOP

It was generally agreed that new systems would, of necessity, be hybrid for a long period of time. The principal hard reason to go metric is for inter-operability or support within NATO. A good reason to go metric is in the case of long-lived systems, e.g., ships or airplanes, which must be supported well into the future when it is expected that we will be metric.

In order to design a metric system it is necessary to have specs and standards in SI, as well as hardware and material which meets those specs and standards. Both will require funding and people. The target date of 1990 to have a complete set of SI specs and standards will meet the former requirement but it will take an additional effort to meet the latter. Otherwise, DoD will have to wait until the market place generates hardware and material to meet those SI specs and standards. In any case, special MILSPEC items, which have no commercial counter-parts will have to be built and tested.

Groundwork has been done to facilitate the preparation of SI specs and standards in the following five areas:

1. Metric practice guides exist in:

Aerospace	- NAS 10001 (Aerospace Ind. Assoc)
Steel Construction	- AISI (Amer. Iron and Steel Inst)
Electronics (draft)	- Electronics Sector Comm. ANMC
Marine	- Dept. of Commerce (now DoD standard)
Electrical goods (draft)	- Electrical Goods Sector Committee, ANMC
Welding	- American Welding Society

2. Fasteners:

   Screw threads standardized by FED-STD-28
   Fastener specs will be published incrementally over the next two years.

   There are approximately 80 Aerospace standards (NA's) in SI for Aerospace fasteners.

3. Three new drawing practices (ANSI Y-14 series) are in process of being issued over next year. There is no intent to change paper sizes for drawings at this time.

4. ANSI can contact ISO for relevant European specs and standards which can be used as a basis for developing new SI specs and standards.

5. ANSI X 3.50 has been developed so that existing computers can be used to generate SI text.

One impediment to change to SI is our acquisition policies, i.e., we provide an incentive to utilizing what is already in the inventory for new system acquisitions. Any metric item would, of necessity, be a new item and would have to bear front end costs in design, testing, etc..

A second impediment is that there are no short term benefits, other then when NATO interperability is desireable, to going metric. The system's performance will not improve, its cost will be somewhat higher, and a schedule risk is probably introduced. That the system may be much cheaper (with no creditable estimate of how much cheaper) to support in 15 years is not much of an incentive to an acquisition manager. It may be necessary for DoD to promulgate policy which requires that system specifications be written in SI but allow industry to respond either way or with a hybrid approach. This may be the catalyst needed to get out of our current "Catch 22" where we are waiting for industry to offer SI and industry is waiting for us to ask for SI.

Our interpretation of current DoD policy is that we strive, by working with industry, to have a complete set of SI specs and standards (along with a complete set of inch-pound specs and standards) in 1990. The former is to support new acquisitions and the latter is to support continuing acquisitions of existing systems. We see the need for increasing funding for specs and standards, by a factor of two as a first guess, to support this for the next decade.

There is a definite problem in converting engineering/scientific computer programs and operational computer programs. Such software needs a complete internal review to remove dimensional constants. This is a matter of time and will be a hidden cost. Operational software must be interfaced properly with the other systems it talks to. For example, the navigation system, command and control computer, fire control computer, and weapon must all communicate in the same units or have translation devices that enable this. These problems apply to both new and old operational systems.

Each equipment should be designed and defined in either SI or inch-pound, but the interface with other equipments may be in a different system of units.

There are side issues, not directly related to SI, which occur when exchanging drawings with NATO partners, for example:

1. Different drawing practices (e.g., expressing tolerances or angle projections).

2. Different materials standards.

Steps are being taken to standardize drawing practices by NATO.

Finally, we do not see training as a problem. Engineers need about a day plus on-the-job experience. But technicians and draftsmen will need a more extensive program because they were not trained in metric like engineers were in college.

R. S. JOHNSON
Committee Chairman

ATTENDEES

DESIGN AND ENGINEERING WORKSHOP

Chairman

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Aerospace Group

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Mr. Don E. Taylor	Defense Logistics Agency
Mr. Duane Wenberg	Los Angeles Air Force Station

Machinery Group
Power Generation Group
Electrical Goods Group
Automotive Group

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Mr. Elbert M. Howard	Defense General Supply Center
Mr. John Kicak	DARCOM
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Mr. Julius Jaskot	AFCC Scott AFB
Mr. Francis Jones	MICOM
Mr. B. Machinchick	NSA
Mr. Philip Selvaggi	DCA
Mr. B. A. Smith	NAVSEA
Mr. Dean Steyer	NAVSEA
Mr. Pete Zimbran	Defense Electronics Supply Center

PRODUCTION WORKSHOP

II-27

RECOMMENDATIONS

PRODUCTION WORKSHOP

1. ACTION ITEM: Insure that all new Government-owned production equipment be procured with metric or dual capability.

RECOMMENDATION: Metrication Steering Group (MSG) take action to incorporate requirement into appropriate regulations.

2. ACTION ITEM: Establish policy prohibiting designers from mixing inch-pound and metric parts in the same subsystem to minimize inventory and tool control problems related to similar parts.

RECOMMENDATION: Action item be referred to the MSG for further study.

3. ACTION ITEM: Rejuvenate the "Tools for School" Program to help alleviate the predicted shortage of qualified technicians and engineers during the 1980s.

RECOMMENDATION: MSG submit a request to the appropriate DoD element for additional information and consider appropriate action.

PRODUCTION WORKSHOP

The production workshop working group identified and discussed problems and potential solutions in conversion to the metric system of measurement in facilities for DOD production. As background, the group assumed that both inch-pound and metric products would be manufactured in these facilities for some time and that DOD would support prudent metrication programs. There were twenty-five attendees at the Workshop representing the Army, Navy, Air Force, Defense Logistics Agency, Defense Mapping Agency and the American National Metric Council.

This report presents the highlights of the discussions and recommendations of the working group, and is organized by topics, in the order discussed at the workshop.

Discussion:

Manufacturing Technology. The group discussed the effects of metric equipment on technology, requirements for new technology for metrication and opportunities to employ new technology.

It was agreed that the reindustrialization of the United States for productivity is driving technology in a direction that eases metrication. Further, it was agreed that innovations such as adaptive controls and three axis displays are available to upgrade many existing facilities to manufacture both inch-pound and metric products, thereby giving capital-poor companies or low payback facilities an opportunity to participate in the conversion. Numerically controlled machine tools, processes and test equipment were found to have inherent capabilities that eased the problems of manufacturing products designed to either system of measurement.

In the policy area, the working group recommended all new government-owned facilities be procured with dual measuring systems. This practice would not materially affect the cost of the facilities, but would broaden their potential useage.

Manufacturing Processes. The working group discussed methods of control of document changes and methods needed to review the readiness of the private sector to produce reliable and economical metric products.

It was agreed that drawings, specifications and internal documents in metric should be marked with the international metric symbol. Also, individual metric parts should be marked with a metric stamp whenever feasible. This would avoid inadvertent mixing of parts in hybrid systems or multiple-product plants manufacturing both inch-pound and metric items. The group advocated DOD support for the conversion of industry standards, such as ASTM standards, to metrics. This conversion is essential to DOD specifications that rely on commercial standards.

The working group concluded that no new methods were required to review the readiness of the private sector to produce reliable and economical metric products. The assessment was considered straightforward in any fundamentally sound program for assessing industrial capacity to make a product. The group did feel that metrication plans should be addressed in mobilization planning agreements, e.g., government intent to convert a product to metric or the manufacturers' intent to convert his commercial products and facilities to metrics. Also, it was agreed that preaward surveys should assess the ability of producers to manufacture in metrics if metrication is a valid consideration for the product in question.

Policy-wise, it was agreed that designers should be prohibited from mixing inch-pound and metric parts on the same subsystem. This policy would minimize inventory and tool control problems related to similar parts.

Dual Inventories. The group discussed requirements for storage space, inventory control and segregation of metric and inch-pound materials.

Dual inventories were not expected to have a major impact on industrial storage space, especially in modern facilities using computer aided inventory and process control. Also, the group felt that a diligent effort to standardize parts and materials in both systems would contribute significantly to minimizing the space problem. Generally, small businesses and multi-product, short production-run houses were expected to feel the effects on storage more than most other facilities. DOD depot storage and rebuild operations were expected to be impacted by parts "buy outs" and "end-of-life" consolidation of assets caused by metrication of the production base for the next generation of products.

Distinctive metric package and part identification and good housekeeping were considered essential to good inventory control. Also, it was agreed that more personnel will be required if computer aided inventory control systems are not employed or standardization is given low priority.

The group concluded that parts segregation was not required just because some were metric and some were inch-pound. Segregation would be required in cases where similar parts exist in the system and the use of the wrong part would cause serious problems. That situation, however, exists in inch-pound systems, e.g., aircraft and utility grade fasteners, etc.

Supplies and Suppliers. The group discussed the availability of metric supplies and suppliers and assessed the adequacy of competition.

It was generally agreed that there would be a short-term loss of suppliers especially those with adequate, primary inch-pound markets. However, over the intermediate and long term, the marketplace was expected to accommodate demand without difficulty. The group noted that there is currently a sellers market in metric gages and standards and certain numerically controlled tools. If delivery schedules are not sufficiently flexible to absorb greater leadtimes, manufacturers will be driven to foreign suppliers in these areas. Raw materials suppliers were not expected to pose a serious problem in metrication, but would need timely conversion of industrial standards.

The working group suggested that communications be kept open between DOD and suppliers, that metric objectives and manufacturing opportunities be clearly stated and that publicly announced metric production decisions not be reversed. No new policies are required in this area, but guidelines to the Services would be useful.

Hand Tools. Metric tool sets, supplements to existing tool sets and the potential for use of the wrong tools or sets were discussed.

The group found that positive and permanent identification of tools in sets and supplements, both in the tool crib and in production areas, is essential to avoid the use of the wrong tools. The systems to monitor the identification process, however, are in place in the form of MIL-I-45208A, Inspection System and MIL-Q-9858A, Quality Assurance Program.

Test Equipment and Measuring Devices. The group explored the need for additional equipment, conversion charts and the probability of production errors.

The problems in this area are quite manageable. Additional equipment is required but whenever possible, it should be dual purpose N.C. equipment, thereby solving both metrication and productivity problems. A soft conversion of charts is required, a process that is economical and fast. Also, industrial standards must be converted, as stated earlier, and the current market conditions in the test equipment and measuring industry must be considered in scheduling. Production errors will occur, but are much less likely in programmable N.C. systems than in manual systems in the opinion of the working group.

Machine Tools. The potential for dual capabilities, modification of inch-pound tools, conversion charts and machine shop space were discussed by the group.

These areas have been discussed under earlier topics in this report, but in summary, the working group found that dual capability tools are readily available at minor additional cost, existing tools can be modified for metrics by adaptive controls and other techniques coming into the marketplace and charts can be converted by soft, inexpensive techniques.

The modern machine shop will accommodate both inch-pound and metrics with less total floor space than current processes due to better control of in-process inventories, more efficient machine loading (higher up time) and more productive processes. The Army reported its new $100M continuous motion, small arms cartridge manufacturing plant required 70% less floor space and 75% less direct labor than the batch process it replaced. Other examples were cited also.

Software. The working group considered both computer and other software in these deliberations.

It was concluded that soft conversion technology was available for computer software and should be used wherever possible. Hard conversion is both costly and limited by the availability of programmers.

Other software was defined as processed control sheets and similar documentation in the factory. Most plants are not equipped today to make soft conversion of this type of documentation and, therefore, must rely on hard conversion, which will be both costly and time-consuming. The Army reported that it has undertaken a manufacturing technology project for the digital conversion of factory documentation and, if successful, the results will be available throughout DOD and to its suppliers. The project is expected to undergo pilot evaluation late in 1981.

Specifications and Standards. General specifications and standards and hybrid items were discussed.

The working group concluded that the most practical approach to specifications and standards was a commonsense soft conversion rather than a precise arithmetic conversion that has been seen in a number of instances. The group also felt that a common set of units should be retained throughout the system, i.e., one should not mix millimeters and centimeters in a dimensioning system. Such practices only lead to confusion and errors.

Numeric Tapes. Discussions on this topic were brief and limited to whether or not duplicate metric and inch-pound tapes are required and whether the soft conversion is practical.

The working group concluded that duplicate tapes are definitely not required and that soft conversion is current state-of-the-art technology.

Materials Handling Equipment. The working group discussed the various types of equipment that are involved in materiels handling, the physical changes that may be required and the need for dual marking for capacities.

Numerous types of materiel handling equipment were identified, categorized principally as packaging, weighing, lifting and flowing equipments. The physical changes that are required or desired are machine readable markings, dual markings readily visible to the materials handling equipment operators and adjustments in stacking and palletization equipments to accommodate both systems.

Reliability and Quality Assurance Standards (Including Calibration). Changes to QA documentation, requirement for additional inspection equipment, and requirements for new calibration standards and conversion charts were discussed.

In the opinion of the working group, systems specifications will not pose a problem to metrication, but non-system specifications require special attention. Precise identification of these specifications is important in the recertification of technical data packages to avoid use of the wrong revision. Insofar as calibration is concerned, metrication itself is not a problem, but there is a general shortage of qualified technicians. This situation will worsen with the reindustrialization process that is expected to take place in the 80's. The group concluded that positive action is required now to mitigate this problem.

Training. Training may very well be the key to the success of metrication. Two types of training are required, orientation and familiarization training for managers and formal classroom and on the job training for workers. The timing and progression of the training is important in that it must occur before the employee needs the knowledge, but not so far in advance that one has the opportunity to forget before it can be applied.

Participants in the working group identified several training programs for metrication, some of which offer certification. DCAS has a 40-hour Quality Assurance Representative certification program, and the US Metric Association offers both certification of Metrication Specialists and Advanced Metrication Specialists. In the way of literature, the group identified a metric conversion guide, DARCOM-P-706-470, which is available within DOD and to contractors.

The shortage of qualified technicians and engineers is expected to have a continuing adverse effect on metrication as well as modernization of manufacturing plants and depots. Trade and vocational schools, colleges and universities are very short of equipment for the laboratory training of students in these areas. The group recommended that DOD rejuvenate its "Tools for Schools" program, puting unused tools and equipment into the hands of these institutions to accelerate and expand the available training before the students enter the job market.

Production LeadTime. The implications of metrication on production leadtime have been discussed at various points in this report. The group felt it necessary to summarize those impacts in a separate production leadtime section.

There is a current shortage of capacity for the manufacture of gages, standards and certain numerically-controlled machine tools. These adversely affect production leadtimes. The metrication of industrial plants will require time and capital. It is necessary, therefore, that DOD time phase its product metrication program in harmony with the conversion of the industry to manufacture metric products.

The phase out of inch-pound dimension systems will require some deliberate choices among several alternatives, in order to assure the availability of repair parts to the logistic system. Those alternatives include the acquisition of tools and test equipment at the completion of the production run, the buyout of the parts inventory, or the redesign of the product or part to metrics.

SUMMARY. The participants in the production workshop concluded that metrication of industrial facilities can be readily accomplished by the emerging technologies in machine tools, materials handling equipment and test and gaging equipment. Further, that the reindustrialization required to improve productivity provides a unique opportunity for metric conversion or dual capability manufacturing facilities. DOD must keep open the channels of communication to industry, have an even-handed set of policies and keep this goal very visible.

General Motors Corporation and other major corporations in the United States have converted to metrics without undermining their competitive position or the quality of their products. They have accomplished this by establishing policies and goals, making them known to their suppliers, and following through. We believe that formula will succeed for DOD as well. The more serious problems are likely to occur in the defense logistics systems rather than in the industrial production base, and plans should be made accordingly.

ATTENDEES

PRODUCTION WORKSHOP

Chairman

Mr. Darold Griffin	DARCOM

MSG Member Responsible for Workshop

Primary - Mr. Jack Rivers	Alternate - Mr. LaVon Vestal

Major J. Adkins, USAF	AFIT/LSP Wright-Patterson AFB
Mr. Mario Amante	Naval Sea Systems Command
Mr. Sal Bertino	DCASR Boston
Mr. Tim Corbett	DCASR St. Louis
Mr. Douglas C. Davy	Defense Logistics Agency
Mr. David D. Fredlund	DMA
Capt. T. Garland, USAF	AFLC/MAX Wright-Patterson AFB
Mr. William F. Gill	Defense Fuel Supply Center
Mr. George Gebhardt	DCASR Los Angeles
Mr. Len Hoffman	Electronics Research and Development Command
Mr. Carl W. Jackson	DCASR Dallas
Mr. Robert Jordan	Army Tank-Automotive Material Readiness Command
Mr. F. Lee	AFLC/QE Wright-Patterson AFB
Mr. Leonard	Defense Logistics Agency
Mr. McAninch	Naval Material Command
Mr. Joseph Owens	Defense Industrial Supply Center
Mr. Nicholas Ranalli	Defense Industrial Supply Center
Mr. Willie Stanley	DCASR Atlanta
Mr. Ferdinand J. Tramontin	Defense General Supply Center

E. H. Visscher	American National Metric Council
Mr. Richard Campolmi	Watervliet Arsenal
Mr. Reuben E. Dunlap	Army Missile Command

MAINTENANCE AND SUPPLY WORKSHOP

RECOMMENDATIONS

MAINTENANCE AND SUPPLY WORKSHOP

1. Action Item - Identify the extent of and provide funding for additional resources, depot storage space, tools and test equipment, etc., necessitated by concurrency of metric and non-metric operations.

Recommendation - Refer to MET-6 Action Office for review and implementation.

2. Action Item - Provide for early awareness of intention to metricate specific weapon systems/components to smooth the impact of transition and assure continuing support to the operating forces.

Recommendation - Require that for each new weapon system/component being designed substantially metric a time schedule for logistic support be developed. Refer to MET-1 and MET-6 Action Office for review and implementation.

3. Action Item - Provide for identification of metric items coming into the inventory in order to assess transition progress, evaluate extent transition is impacting upon support, and enable maintenance personnel to identify the items and have the proper tools available.

Recommendation - Refer to MET-6 Action Office for review and implementation.

4. Action Item - Provide appropriate metric education and training to prepare personnel for the transition.

Recommendation - Refer to MET-4 Action Office for review and implementation.

1980 METRICATION SEMINAR

SUPPLY AND MAINTENANCE WORKSHOP

Chairman: Mr. J. P. Bartley
Office of the Assistant Secretary of Defense
(Manpower, Reserve Affairs and Logistics)

Associate
Chairman: Mr. A. Hochman
Chief, DoD Logistics Data Element and Standardization and
Management Office (LOGDESMO)

November 18, 1980

The initial session of the workshop panel was convened in Room 1E801, Pentagon at 1400 hours. After a brief introduction by the Chairman, each participant was afforded the opportunity of introducing himself or herself, identifying his or her affiliation and voicing what he or she considered to be the primary concerns with metrications considering the presentations made during the morning lectures. Upon completion of this participant input, the Associate Chairman distributed a package of documents (Attachment 1) designed to provide an overview of the realms of supply and maintenance. Forms were provided with this package to be completed by the participants to present for consideration those recognized impacts on the management and operations of supply and maintenance. The Associate Chairman indicated that the functional management structure included in the package was that of the Army; that it was recognized that the Office and Secretary of Defense, the Military Departments and Defense Agencies were organized differently; and that the distribution of the handout was for the purpose of providing a checklist of operations' processes in supply and maintenance to be considered in identifying impacts and, as such, did not constitute Office of Secretary of Defense approval or disapproval of the structure. The meeting concluded with a request from the Chairman that the worksheets contained in the package be completed by each participant prior to the next session.

November 19, 1980

The second meeting of panel convened at 0900 hours in Room 1E801, Pentagon. The entire discussion was devoted to review of various completed statements of impacts or concern. Functional areas considered included supply catloging, inventory control, requirements determination, disposal, storage, quality control, calibration, cannibalization, processing unidentified turn-ins, packaging, preservation and packing, planning for shipment and movement, storage space planning, inspection, facilities maintenance, life expectancy of equipment, item reduction, development of acquisition sources (qualified products lists), depot repair, tools, education, technical documentation, safety in flight, substitutability and interchangeability, test equipment, depot reconditioning/overhaul, automatic data processing, etc. The statements of participants as to their perception of impacts are provided in the completed forms included with attachment 1. The work planel session was completed with a general summary of conclusions which formed the basis for the Chairman's report on November 21.

Summary of Conclusions Concerning Metrication in Supply and Maintenance

I. Change in Emphasis

In building its supply and maintenance support base, DoD has emphasized the use and reuse of existing capabilities (e.g., items, tools, facilities and systems) to support new requirements and has consistently sought to constrain the entry of new resources to the extent that existing resources would do the job. This approach contributes significantly to effective and economical logistics support.

Metrication will significantly limit DoD's ability to apply existing nonmetric resources to new requirements and in so doing will adversely impact several key areas of logistics support over what promises to be a rather long transition phase.

II. Concurrency of Metric and Non-Metric Operations

For some time there will be concurrency of effort which will require additional resourcing in terms of manpower, equipment, training and funding therefor. Also, there will be a requirement for additional facility space; tools and test equipment; and education resources. For example, concurrency will result in more items entering the supply system; there will be fewer opportunities to substitute among existing items; sources of supply will become more restricted and the inability to clearly identify metric items and tools will impair effective supply and maintenance support particularly at field level activities.

III. Impacts Result From Decisions Made Outside the Supply and Maintenance Community

It was the consensus of the participants that the supply and maintenance community is not directly involved with the decision to metricate or not to metricate but rather is in the position of having to react to the side effects of decisions made by others both within and outside the Federal Government. However, to smooth the impact of transition to metrication and assure continuing support to the operating forces, basic needs should be identified and pursued;

A. Need for Awareness at the Earliest Point in Time

The detailed discussions of potential impacts of metrication on the various aspects of supply and maintenance highlighted a need for awareness of impending changes at the earliest point in time. Accommodation of changes requires extensive planning. Without such awareness, the time frame for implementing change can be unnecessarily extended. Also, early communication of intention to metricate can result in meaningful feedback as to the impacts of the change which logically should be considered in making a decision.

B. Need for Education and Training

There is a critical need to educate, orient, train and prepare personnel for the task of implementing changes. The significant impacts recognized in the areas of supply and maintenance dictate a formal training program to assure a meaningful supply of cognizant personnel capable of effecting the determined changes.

C. Need to Identify Metric Items

Both the managers and operators have expressed a need to know which items are metric. Such information allows management to assess how rapidly transition to metric is progressing and to evaluate the extent to which the transfer is impacting upon support. Operators need to know that they have the proper items and tools to do their jobs and need a base for determining if and when substitutions can be made. These needs require an early effort to identify the items and tools themselves and to carry that identification in key catalog files.

IV. Long Term Benefits

Although there was a tendency to focus on transition, the long term pressures toward metrication were generally recognized and accepted as beneficial. The long run should eliminate the problems of concurrency, greatly increase interoperability and ultimately improve the sources of supply and reduce the number of items in the logistics system - making it better for operating forces which is why we're here.

ATTENDEES

MAINTENANCE AND SUPPLY WORKSHOP

Chairman

Mr. Jack Bartley	OASD(MRA&L)
Mrs. Ranjit Bawa	Army Troop Support Activity
Mr. William R. Burge	Naval Air Systems Command
Mr. Robert Busch	ARRCOM
Mr. Robert Calogero	Naval Sea Systems Command
Mr. Roy B. Carlisle	HQ ATC-TTY
LTC Ronald E. Connors	AFCC/LGX
Mr. G. A. Cooper	USACERCOM
Major George Creed, USAF	AF/REXR
Mr. Sam Dyches	AFCSC Kelly AFB
Mr. J. Edler	Defense Industrial Supply Center
Mr. James Freiburger	DARCOM
Mr. William Finkel	Defense Logistics Agency
Capt. Mark Haram, USAF	HQ ATC/XPQ
Mr. Roland Hartmann	NSA
Mr. Aaron Hochman	Defense Logistics Agency
LTC C. Hurst, USAF	HQ TAC/LGMD
Mr. James A. Johnson	Defense Logistics Agency
Mr. V. J. Kuberski	Defense Logistics Agency
Mr. Paul Chaen Kwok	Naval Supply Systems Command
Mr. Freeman G. Lee	AFLC/QA WPAFB
Mr. Robert Lehr	DNA
Mr. Henry E. Lindsey	DMA

Mr. Victor Morris	HQ MAC
Mr. Scott Radler	Defense Logistics Agency
Ms. B. Scarboro	Defense Logistics Agency
Mr. Donald N. Schonhardt	Defense Construction Supply Center
Mr. Allen Smith	Defense Logistics Agency
Mr. Charles Spikes	National Guard Bureau
Maj. Link Turner, USA	DA DCSLOG
Mr. Thomas E. Wolf	HQ DESCOM

MILITARY OPERATIONS WORKSHOP

RECOMMENDATIONS

MILITARY OPERATIONS WORKSHOP

1. Action Item: Conduct a study to assess the impact of human factors upon military aviation should flight operations be conducted in the metric system.

   Recommendation: The Federal Aviation Administration (FAA) is planning to initiate a Human Factors Study for the benefit of general and commercial aviation. A planning conference will be held by FAA in the March-April 1981 timeframe. AFSC will send a representative to insure the aspects of military air operations are also within the scope of the FAA study. Therefore, recommend the Metrication Steering Group (MSG) consider having the Air Force MSG member monitor and report on the FAA study scope and results.

2. Action Item: Make a study to identify both DoD and other Federal Agency constraints to metric conversion.

   Recommendation: That the MSG evaluate this action item and make a determination concerning the feasibility of its inclusion as an additional MET item in the DoD Metrication Plan.

3. Action Item: Explore and evaluate the software conversion problems relative to military operations in the metric system.

   Recommendation: This action item in more general terms has already been suggested as a new MET item for the DoD Metrication Plan. Therefore, recommend the MET action office designated to conduct the proposed study be requested to include an examination of the software systems related to military operations.

MILITARY OPERATIONS WORKSHOP

The Military Operations Workshop began with opening remarks by Col. Barrett and LTC Dearden. An open discussion period followed which addressed all identified subject areas. Each of these areas will be presented with their associated "bullet" items.

A general discussion area brought out some relevant factors involving the International Civil Aviation Organization (ICAO) which bears on the operations panel. The following information will relate to the overall evaluation of the panel.

- ICAO Airspace

  -- State controlled - aircraft flying in that state follows its rules.

  -- International - when flying between states.

- Temporary allowances have been granted to use.

	Termination
1. Distance - nautical mile -	
2. Speed - knots -	NET 31 Dec 1990
3. Altitude - feet -	No date

- Airline pilots lobbying strongly against metrication of airspace.

- Charts/maps need metrication prior to flight.

- Dual instrumentation is an open question to be answered.

1. CURRENT SERVICE METRIC USE

- Navy

  -- Artillery fire uses metric.
  -- During sea refueling operations a NATO standard coupling is used which is metric.
  -- Electronic equipment which has been metric is used.

- Air Force

  -- Tactical operations with Army result in use of metrics for ground distances.
  -- Overseas visibility and altitude in some countries are metric and require conversion.
  -- Metrics not used by USAF except in previous [illegible]s.

- Army

  -- Tactical operations use metric.
  -- Basic Military Trainees are taught metrics.
  -- Artillery is metric.
  -- Standardized with NATO for the large port.
  -- Tools, however, are currently <u>not</u> metric.

- Coast Guard

  -- Uses metrics in its operations.

- Intelligence

  -- Metric reporting and photography.
  -- Directed use by NSA/CSS.

- Marines

  -- Air operations same as Air Force.
  -- Ground operations same as Army.
  -- Those facts assumed by panel since no USMC representative.

SUMMARY OF #1

- Ground Operations - primarily metric
- Air Operations - primarily inch-pound
- Intelligence Operations - primarily metric
- Air/Ground Operations - requires conversion

2. TRAINING/EDUCATION OF MILITARY PERSONNEL

- Intelligence Community

  -- Buys equipment and trains personnel in metrics.
  -- No formalized training.
  -- OJT type primarily in communications/security area.

- Coast Guard

  -- Not currently training/uses "Rules of the Road" approach

- Army

  -- Teaches by virtue of use.
  -- Reacts to type of equip/material being used.
  -- Consensus is public schools "soft" conversion approach is not doing a good job.

- Air Force

  -- TAC intertace with Army has small orientation program.
  -- No concerted effort AF-wide.

- Navy

  -- Some training in metric areas of measurement.
  -- Pensacola developed correspondence course on metrics.
  -- Feels private sector should take more action.

- Needs for Service Plans

  -- Human factors study should be completed to examine real or perceived problems.
     --- Identify problems of flying in metric system.
     --- Identify problems of flying during transition period
     --- Identify problems of flying following overnight conversion.
     --- Flying safety aspects.
     --- Unfamiliar data base for crews.
     --- Conversion chart usage by personnel in flight.

  -- Economics is a large factor bearing on each Service.
  -- Initiative on a National level is required.

- Education

  -- Consensus is exposure in schools is lacking and needs expansion to "hard" conversion.

SUMMARY OF #2

- Some training is conducted (OJT, specialist, etc.)
- Transition training plans need development.
- Public schools need to do more.

3. MILITARY MATERIAL

- Dual gauging acts as a deterrence to total conversion.
  - -- Personnel would revert to old gauge.
  - -- Air Operations would probably necessitate dual gauging (actual dual gauging or dual marking).
  - -- General consensus is "soft" conversion is not complete.
  - -- Ideally, train pilots in their first aircraft with metrics in a metric aircraft (cost/safety).
- Driving areas of concern are cost, safety, and human factors problems.
- Related acquisition problems.
  - -- Cost most likely would go up.
  - -- Limit available spares suppliers.
  - -- FAA equipment and related problem areas.

SUMMARY OF #3

- Not necessary to convert all equip prior to conversion.
- Dual gauging deters transition program.
- Interface between operators and equip may require:
  - -- Some dual gauging in aviation during transition.
  - -- Metric/inch-pound areas related to safety.
- Recommend a Human Factors Study to determine total requirements.

4. SERVICE PECULIAR REQUIREMENTS

- Aviation
  - -- Measurements
  - -- Charts/maps for flight
  - -- Training
  - -- Operations
- Nuclear weapon safety requirements
  - -- Required years of development.
  - -- Conversion not foreseen due to systems involved.
- Preplanned Products Improvement (P3I) Program seems to deter thrust of metrification (emphasis on retention/improvement of existing systems).
  - -- Stretch 8 inch and Stretch C-141 programs extend life of current weapon systems and inch-pound system.

- Satellites were discussed and their longitude/latitude orientation (GPS, LORAN, etc.).

- Initiatives

  -- Need a national incentive and policy to compete in international markets.
  -- DoD willingness to pay conversion costs and keep contractors busy.

- Areas needed to operate in metric/preclude operation.

  -- ICAO decisions have to be made.
  -- FAA decisions.
  -- Charts are required based on ICAO/FAA decisions.
  -- Costs/money will be high.
  -- Gauges may require duplication especially in aviation.
  -- Training costs and published/reprinted materials will be costly.
  -- Training equipment needs to be acquired.
  -- Flight planning materials (FLIP, approach plates, etc.).
  -- Human Factors Study completion/recommendations.

SUMMARY OF #4

- Over-riding factors preclude conversion.
  -- DMAAC decision could cause rippling effect.
  -- P3I Program extends inch-pound equip.
- Major points.
  -- Additional resources.
  -- National policy.

5. METRIC TRANSITION IMPACT ON READINESS

- Impact greatest during transition.

  -- After conversion readiness level would come back up.

- Air National Guard/AF Reserve impact would be critical.

- Alternative costs

  -- Money used could be spent for other readiness resources.

- Large amounts of money for conversion just to attain current level of readiness.

- Dual conversion requirements.

  -- Supply
  -- Equipment

- Personnel acceptance problem with conversion

  -- Cannot quantify

- Consensus is Engineering and Maintenance impact is more critical than Operations impact.

SUMMARY OF #5

- Impact greatest during transition.

  -- Ops missions would convert to transition mission.

- Large impact on Engineer and Maintenance.

- Ripple effect on Reserve components.

6. COMPILATION OF KEY PARAMETERS

- Favorable to transition

  -- Some industries have converted to metrics
  -- Time for planning
  -- Some DoD agencies currently involved in metrics.
  -- Interoperation with NATO.
  -- Long term economics is favorable.

- Constraints to transition

  -- Current National policy.
  -- Costs (duplication/reprint, etc.).
  -- Aviation constrained to ICAO lead.
  -- FAA direction (probably same as ICAO) is needed.
  -- Education (early public education).
  -- Human Factors Study and results.
  -- Industry and other government agency conversion.
  -- Present DoD profit policy and tax structure needs review and restructure to create incentives for conversion.
  -- No substitution of materials between equipment with NATO.
  -- National prejudice against metric transition.
  -- Impact on labor unions during industry conversion.

SUMMARY OF #6

- Tied to civilian conversion
  - -- Dependent on them.
  - -- Costs could be exorbitant otherwise.
- Constraints are many.

7. FEASIBILITY OF "M" DAY

- Not enough data to establish "M" day at this time.
- "M" day depends on other agencies and factors.
  - -- Industry and its conversion.
  - -- National policy.
  - -- Other DoD agencies, their constraints and conversion.
- Study should be completed to determine all agencies' constraints and identify milestones.
  - -- Milestones based on total national events.
  - -- Each agency's milestones could affect others.

SUMMARY OF #7

- Target date ideal as an aid.
  - -- Currently not feasible.
  - -- Tied to civilian and other agencies.
- Should set multiple goals (milestones) tied to events.

RECOMMENDATIONS

1. Human Factors Study be conducted to determine aviation requirements.

2. Agency study to identify constraints of DoD and non-DoD agencies.

3. Software conversion problems be explored.

ATTENDEES

MILITARY OPERATIONS WORKSHOP

Chairman

Col. W. M. Barrett, USA	Department of the Army
Lt. Col. S. Dearden, USAR	OJCS/J4
Lt. Col. D. Hosley	AF/XOXLD
Lt. Col. T. Hutchinson, Jr., USAF	OJCS/C35
Lt. Col. T. James	SAC/DOTT Offutt AFB
Lt. Col. Larsen	DAMO-TRU
LCDR T. Uber	Chief of Naval Operations
Maj. R. Neal	HQ MAC/DOOS
Maj. J. Warfel	HQ USAF/XOOTF
Capt. R. Handley	SAC/DOTP Offutt AFB
Mrs. B. Barsh	DMAAC
Mr. R. Hagood	Navy Training Equipment Center
Mr. H. R. Kennedy	DIA
Mr. W. McKay	NSA
Mr. D. Sharland	DIA
Mr. J. Singletary	Chief of Naval Education & Training

PART III

APPENDIX

APPENDIX A

ROSTER

FOR

1980 METRICATION SEMINAR/WORKSHOP

1980 METRICATION SEMINAR/WORKSHOP ATTENDANCE

	Name	Organization/Telephone
1.	Major Joel E. Adkins, USAF	Course Director, Planning for Systems Production AFIT/LSP Wright-Patterson AFB, OH 45385 513-255-3944 AV 785-3944
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APPENDIX B

USE

OF THE

METRIC UNIT OF MEASUREMENT

IN

STANDARDIZATION DOCUMENTS

THE UNDER SECRETARY OF DEFENSE

WASHINGTON D C 20301

1 DEC 1980

RESEARCH AND
ENGINEERING

MEMORANDUM FOR COMMANDING GENERAL, USA MATERIEL DEVELOPMENT & READINESS
COMMAND, ATTN: DRCDE-E
CHIEF OF NAVAL MATERIAL, ATTN: NAVMAT 0423
COMMANDER, AIR FORCE SYSTEMS COMMAND, ATTN: AFSC/SDDS
DIRECTOR, DEFENSE LOGISTICS AGENCY, ATTN: DLA-SE

SUBJECT: Use of the Metric Unit of Measurement in Standardization Document

On 7 March 1980, the Under Secretary of Defense, Research and Engineering, issued a memorandum which established policies and goals for developing metric specifications and standards (copy attached).

In response to numerous questions raised regarding how that memorandum can best be implemented, the attached guidance has been prepared. This guidance is effective immediately and supersedes guidance forwarded by memorandum on this subject dated 1 July 1975.

Attachment

JOHN A. MITTINO
Director
Materiel Acquisition Policy

Guidance for Using Metric Units
of Measurement in
Preparing Standardization Documents

I. Introduction

A. On 1 July 1975, the Defense Materiel Specification and Standards Office (DMSSO) issued implementing guidance for the use of metric units of measurements in standardization documents based on interim metric policies conveyed in a DEPSECDEF memorandum, dated 10 June 1975. In December 1975, the President signed Public Law 94-168 declaring a national policy of coordinating the increasing use of the metric system in the United States. Section 6 of the Metric Act specifically encourages activities of standardization organizations to develop or revise, as rapidly as practicable, engineering standards on a metric measurement basis.

B. The Defense Department, on 28 January 1980, reissued DoD Directive 4120.18, "Use of the Metric System of Measurement," which, like the Metric Act, emphasized the conversion or development of specifications, standards, and other general purpose technical data.

C. Since the issuance of these documents, very little has been accomplished by the Defense Department in the preparation toward increasing the use of metric units of measurements in new design programs by way of new metric documentation. The Under Secretary of Defense, Research and Engineering, on 7 March 1980, established a target date of 1 January 1990 for the availability of a complete spectrum of metric specifications and standards.

D. Policies and Guidance conveyed herein state the goals and objectives of metrication, present means for determining priorities, and provide detailed instructions for specific functions.

II. Explanation of Terms

A. Standardization Documents - Specifications, standards, handbooks, QPL's, and such other engineering records, drawings, purchase descriptions, etc., as are or may be utilized for comparable purposes.

B. Metrication - The process of changing to the metric system, including the act of developing metric standardization documents or converting current standardization documents to metric units of measurement.

C. Soft Conversion - The process of changing a measurement from inch-pound units to equivalent metric units within acceptable measurement tolerances without changing the physical configuration.

D. Hard Conversion - The process of changing a measurement from inch-pound units to non-equivalent metric units which necessitates physical configuration changes outside those permitted by established measurement tolerances. (see note)

NOTE: The term "hard conversion" is in general use in the U.S., although it is technically incorrect when applied to specific items because no "conversion" takes place; rather, a new metric item requiring a new part identification is created to eventually replace the customary item. The new item is often referred to as being in "hard metric."

E. Rationalization - Planned simplification by reducing the number of item configurations and relating such configurations in a rational manner, usually in a preferred number progression.

F. Metric Units - Units defined by the International System of Units based on "Le Systeme International d'Unites (SI)," of the International Bureau of Weights and Measures. These units are described in ASTM E380-79, "Standard for Metric Practice," as listed in the DoD Index of Specifications and Standards.

III. General Policies

A. Programming for and preparation of standardization documents using metric units of measurement shall be accomplished on an accelerated basis beginning at the earliest practical date, where the private sector cannot or will not prepare metric documents when such documents are required by DoD.

1. The Standardization Program Analysis or Program Plan prepared by each assignee or lead service activity for each assigned FSC or area will include information regarding metrication requirements and recommended courses of action, and will identify specific actions which have been or are programmed to be taken.

2. Inputs for the Standardization Accomplishment Report (RCS-I&L-(SA)-758) will be expanded to include the status of the development of metric documents and problems related thereto.

3. The Defense Materiel Specifications and Standards Office, in collaboration with the Standardization Assignees, will review Program Analyses, Program Plans and Standardization Accomplishment Reports, correlate metrication activities and provide necessary guidance for their accomplishment.

B. When an existing inch-pound (or non-SI metric) standardization document is revised, a conscious decision shall be made as to how to metricate such document (refer questions to the DMSSO). In general, the following methods shall be used:

1. New parallel document - For very complex documents filled with many conversion-susceptable measurements, the logical method is to issue a new SI metric standardization document (with a new DoD number) following the guidance herein. Great care shall be used to assure that the new document is hard metric, and that equivalents are carefully selected. After that, the basic document and the metric document would be revised concurrently, until such time as the inch-pound document is no longer required and is cancelled.

2. Metric appendix - For less complex documents, or for very

complex documents where retention of the original document number is considered necessary, a hard metric appendix may be prepared. The basic document would remain in inch-pound units and refer to the appendix for metric information. The appendix shall refer to the basic document for technical features and cite only the metric equivalents, exercising care to assure that equivalents are carefully selected.

3. Metric notes - For relatively simple documents with only a few measurement units, metrication may be handled by appropriate notes in the NOTES part of the document, by one or more footnotes, or by use of conversion tables. In some cases, simply citing the conversion factor(s) will be sufficient; however, great care is required to avoid a mere soft conversion.

C. There shall be no soft conversion merely for the sake of conversion. Soft conversion may be used only where citation of metric units will serve a useful purpose, such as where an industry sector has made a determination that certain items will probably never be hard converted or where required for international standardization.

D. International standards and U.S. industry standards will be used to the maximum practical extent when they meet DoD requirements in accordance with DoDI 4120.20. Standardization documents for DoD use may establish more stringent requirements for preferred sizes or performance ranges within the established rationalization.

E. The following criteria will be used in determining when new metric standardization documents are required:

1. New metric design standardization documents will generally be developed for:

a. Items which have universal application and which require standardization in order to provide metric components for designers of metric materiel.

b. Items where dimensions will be affected by metrication, such as wire sizes, screw thread forms, fasteners, tubing sizes, and dimension stock material.

c. Items where a reduction in the ranges, types, styles, or classes of products will be facilitated by adoption of a family of metric items.

d. Items which are peculiar to the DoD and represent technological advances for operational application in new materiel.

2. New metric standardization documents will supplement inch-pound standardization documents and will not necessarily supersede them. As transition progresses, use of metric standardization documents will increase, while use of inch-pound standardization documents will decrease.

3. For any specific standardization document, the preparing activity has flexibility within these general policies to determine the course of action based on the known DoD requirements and/or assessments of industry

conversion status. Should any conflict arise, the matter shall be referred to the DMSSO.

F. Optimum rationalization shall be achieved in preparation of standardization documents. Metric sizes will generally be expressed in whole numbers.

G. Use of dual dimensions (i.e., both metric and U.S. customary inch-pound dimensions) on drawings or other pictorial illustrations will be avoided unless it is determined in specific instances that such usage will be beneficial. However, the use of tables to translate dimensions from one system of measurement to the other is acceptable.

H. Preparing activities, or their agents, shall participate with national standardization activities of the private sector in the preparation of metric documents and assume a fair share of the workload.

I. Priorities for development of new metric standardization documents will be based on the following:

1. Emphasis will be placed on standardization documents for basic items such as fasteners, wire, tubing, bulk stock material, engineering practices and other common areas. Liaison with industry shall be established or maintained to determine progress and projected programs, and provide assistance when indicated in preparation of national metric documents.

2. Emphasis will also be placed, but to a lesser degree, on standardization documents for other areas wherein transition to metric units of measurement has been initiated by industry or is programmed for the near future.

J. Preparation and Numbering of Metric Standardization Documents

1. Criteria for use of symbol "DOD" in lieu of "MIL" in Document Numbers (except specification sheets).

a. The "DoD" symbol will be used:

(1) In new metric (including hard conversion) standardization documents that are measurement-sensitive (i.e., contain measurements).

(2) In new standardization documents that are not measurement-sensitive, but which are usable in a metric environment.

b. The "MIL" symbol will not be changed to "DOD" on any standardization document that is already numbered.

c. Existing soft conversion documents already changed to the "DOD" symbol will not revert back to the "MIL".

d. Exceptions to criteria a, b, and c, above, must be approved by the DMSSO.

2. Specification Sheets and Sheet Form Standards (new Sheet Form Standards are permitted only with Federal Specifications).

a. Specification Sheets:

(1) Never mix inch-pound and metric items on the same numbered specification sheet.

(2) Separate specification sheets shall be used for inch-pound items and metric items.

b. Sheet Form Standards:

(1) Use "DS" in place of "MS" in Document Numbers for standards covering new metric items (e.g., DSXXX in lieu of MSXXX).

(2) Never mix inch-pound and metric items on the same MS standard.

(3) Separate sheet form standards shall be used for inch-pound items and metric items.

3. Part Numbers.

a. Never change an existing item's part number.

b. Part numbers for all new "DS" or "DOD" documents shall use the alpha character "D" as the first digit.

4. Continue to identify documents as "Military" specifications, standards, or handbooks, i.e., do not use the term "Department of Defense" specifications, standards, or handbooks.

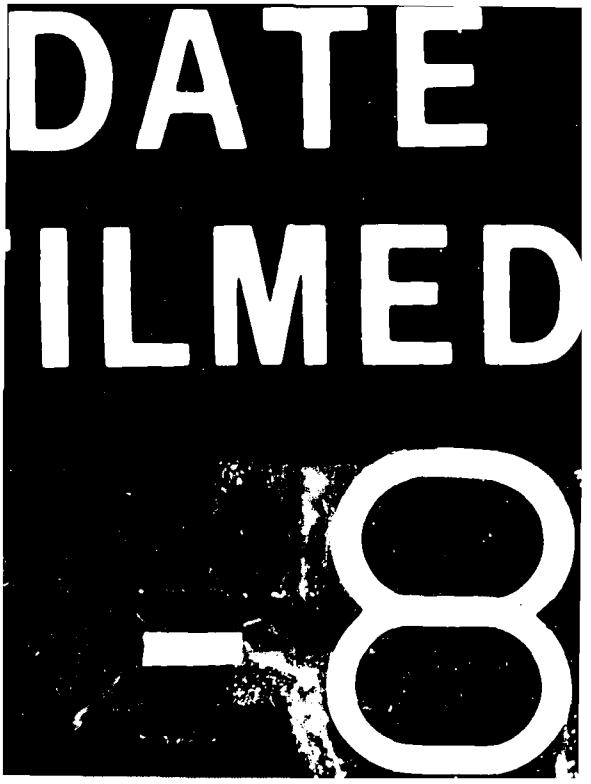
5. The numerical portion of new document identifiers will continue to follow current policies and will not be duplicated or reused.

6. Recognizing that many special cases may exist, when in any doubt as to which symbol should be used, refer questions to the DMSSO.

K. Standardization documents for new items, not previously existing in inch-pound units, will normally be developed in metric units consistent with industry's capability to produce the item economically.

L. Metric standardization documents that are measurement sensitive will be clearly identified with the word "METRIC" as the last word of the title and will be shown in a box in the upper right-hand corner immediately above the document number; for drawings, the box shall appear just above the title block. Soft converted standardization documents, including engineering drawings, will not be marked in this manner. The symbol "IOD" should be used for documents which are not measurement sensitive, but which are useable in a metric environment; but the word "METRIC" should be omitted in such cases.

M. Preferred Units. Unless otherwise specified, the preferred metric units for the commonly used quantities shall be in accordance with FED-STD-376.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