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FORTY-FIFTH REPORT TO CONGRESS

(July 1 Through December 31, 1974)

OF THE

DEPARTMENT OF DEFENSE

In Accordance With Section 2455, Title 10, U.S.C.

(Formerly Section 8 of Public Law 426, 82d Congress)

ON THE

DEFENSE CATALOGING AND STANDARDIZATION ACT OF 1952

REPORT

OF THE

ARMED SERVICES INVESTIGATING SUBCOMMITTEE

OF THE

COMMITTEE ON ARMED SERVICES

UNITED STATES HOUSE OF REPRESENTATIVES

NINETY-FOURTH CONGRESS

FIRST SESSION

MAY 30, 1975

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NINETY-FOURTH CONGRESS, FIRST SESSION

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JOHN F. LALLY, *Counsel*

28 APR 1975

Honorable Melvin Price
Chairman, Committee on Armed Services
House of Representatives
Washington, D. C. 20515

Dear Mr. Chairman:

As prescribed by Section 2455, Title 10, United States Code, there is transmitted herewith the Forty-Fifth Semiannual Report on the Department of Defense Cataloging and Standardization Programs. This report covers the period from July 1 through December 31, 1974. The next report will cover the period January 1 through December 31, 1975 in accordance with Public Law 93-608 which modified the report requirements from a semiannual to an annual basis.

Reports on these two programs have been combined in accordance with the provisions of Section 2455. Inasmuch as the Congress in its legislation directed that the Secretary of Defense report any other data which he considers will best inform Congress on the status of the Cataloging and Standardization Programs, there is included information concerning such Department of Defense Programs as Materiel Utilization, Provisioning Screening, North Atlantic Treaty Organization (NATO) Codification, Item Management Responsibilities and the Parts Control System. These programs are directly associated with the development and/or utilization of cataloging or standardization data and have been initiated to provide additional means of insuring more effective utilization of materiel resources.

In addition we have attached for your information, but not as an integral part of the report, a copy of the Electronics Panel Report on High Density Connectors and a copy of the Standardization Program Analysis on Piezoelectric Crystals. These two attachments document the accomplishments referred to in the standardization section of the semiannual report.

Sincerely,

(Signed)
JOHN J. BENNETT
Acting Assistant Secretary of Defense
(Installations and Logistics)

45TH SEMIANNUAL REPORT

DEPARTMENT OF DEFENSE

CATALOGING AND STANDARDIZATION PROGRAMS

1 JULY - 30 DECEMBER 1974

FEDERAL CATALOG PROGRAM

ITEMS MANAGED BY THE UNITED STATES GOVERNMENT

During the reporting period 114,447 items were added to and 48,218 items were deleted from the U. S. Government portion of the Federal Catalog System files. This resulted in a government-wide inventory of 4,036,764 items, a net increase of 66,229 during the period. This total includes National Stock Numbers (NSNs) assigned to items managed by the civil agencies, as well as to items managed by the Department of Defense (DoD).

SEMIACTIVE ITEMS

This report contains a category of items called "semi-active". A semi-active item is defined as a potentially inactive National Stock Numbered item of supply which must be retained in the system as an item of supply because stocks of the items are in use or on hand below the wholesale level. The item is not currently stocked at the wholesale level, nor is future wholesale stockage authorized. Although the semiactive items are included in the active totals, it is now possible to more clearly identify active items at the wholesale level. Also, the efficacy of efforts to reduce the total number of active items within the system will become more readily apparent.

FEDERAL CATALOG SYSTEM TOTALS

In addition to the 4,036,764 items managed by the U. S. Government, 468,267 items were recorded in the central Federal Catalog System files as being managed solely by NATO countries or agencies, or by other foreign countries. Thus, 4,505,031 NSNs represented active items of supply as of 31 December 1974 and include 70,101 semiactive items. The central files also contained 1,288,352 item identifications in an inactive status (without recorded managers). Item identification requests from participating activities are being screened in a single processing cycle against both active and inactive identifications in the total file of 5,793,383 items. The matching of incoming new submittals (requests for NSN assignment) against inactive item identification make possible the reactivation of some inactive numbers, thus avoiding assignment of new NSNs.

ITEMS MANAGED BY THE DEPARTMENT OF DEFENSE

The ending inventory for this reporting period indicates 3,726,336 items, including 70,101 semiactive items, managed by DoD, a net increase of 64,911. This was the result of 99,175 additions to and 34,264 deletions from the Federal Catalog File. 79,493 of the 99,175 additions were accounted for by assignment of NSNs to new item identifications. The remaining were reactivations of inactive item identifications and reinstatement of previously canceled items.

ANALYSIS OF DEPARTMENT OF DEFENSE ITEMS

As of the end of the reporting period, and within the total of 3,726,336 DoD item identifications, there were 2,873,505 which reflected items centrally managed, stocked, stored and issued. Of this latter quantity, 161,907 were designated as having no requirement for future procurement and should become inactive when existing wholesale stocks are exhausted.

CHRONOLOGY OF ITEMS USED BY THE MILITARY SERVICES

The following table reflects the total quantities of items recorded in the central files of the Federal Catalog System as being used by the Army, Navy, Air Force, and Marine Corps on the 31st day of December for the years 1971 through 1974. The figures include items for which the Military Services operate as their own inventory managers and also those items for which the Military Services operate only as retail managers. Excluded from the U. S. Army figures are U. S. Army Tank Automotive Command (USATACOM) items. These items have been included under "Other Items Subject to Integrated Management".

Military Service	31 Dec 1971	31 Dec 1972	31 Dec 1973	31 Dec 1974
Army	982,631	924,397	871,969	883,911
Navy	1,652,772	1,662,740	1,659,365	1,750,964
Air Force	1,708,537	1,687,607	1,703,749	1,751,893
Marine Corps	275,260	267,660	258,616	289,128

COMMONALITY OF ITEMS AMONG THE MILITARY SERVICES

The total shown for each Military Service includes many stock numbers which are used also by one or more of the other three Services and which are, therefore, included in their totals as well. The degree to which this commonality exists among the Services is revealed by the following table:

Military Service	TOTAL	Used Also by One or More of the Other Services	Percentage Commonality
Army	883,911	458,550	51.9
Navy	1,750,964	566,709	32.4
Air Force	1,751,893	596,480	34.1
Marine Corps	289,128	208,071	72.0

ITEMS MANAGED BY THE DEFENSE SUPPLY AGENCY

Of the 3,726,336 items recorded in the central files as being managed by DoD, on 31 December 1974, 2,622,421 items, or 70.4 percent, were in the 332 commodity classes assigned to the general cognizance of the DSA for integrated materiel management. Of these, 1,839,747 items, or 70.2 percent, were designated for inventory management by DSA, including 64,208 items which were designated by DSA as authorized for local procurement. The remaining 29.8 percent are retained for management by the Military Services. During the period, 1 FSC was designated for integrated management by the Defense Supply Centers under DSA. The FSC is 2850.

OTHER ITEMS SUBJECT TO INTEGRATED MANAGEMENT

On 31 December 1974, there were 2,220 items in the 3 classes of tires and tubes assigned to the U. S. Army Tank Automotive Command (USATACOM), of these, USATACOM was recorded as integrated manager on 2,195 items. USATACOM's mission includes integrated management of items peculiar to combat and tactical vehicles of Army design in any FSC class. USATACOM is presently recorded as the integrated manager for 45,013 items in other classes, making a total in all classes of 47,208 items.

GSA has been assigned integrated materiel management for 68 FSC classes. At the end of the reporting period, there were 102,045 DoD items in these classes and GSA was recorded as the integrated manager for 67,640 of these items.

ITEMS MANAGED BY THE CIVIL AGENCIES

GSA prepares and submits catalog data on behalf of all civil agencies except the Federal Aviation Administration (FAA) and the Coast Guard which prepare and submit their own data. At the end of the reporting period, the central files included 310,428 items recorded as being managed by civil agencies only, and an additional 221,544 items managed in common with DoD or a total of 531,972 items. During the reporting period, 49,125 items were reported as entering the civil agency supply system and 20,353 as being deleted, resulting in a net increase of 28,772 items.

PARTICIPANTS IN THE FEDERAL CATALOG SYSTEM

At the end of the period, the central cataloging files and processing operations were serving the needs of 63 wholesale and retail materiel managers in DoD and 79 in the civil agencies. In certain commodity areas, proposed new and revised DoD item identifications are first reviewed by the cognizant Defense Technical Review Activity (DTRA), as a function of the DoD Item Entry Control Program, before being forwarded to the central cataloging files for final review and assignment of NSNs when appropriate. Currently, there are 10 DTRAs and each DTRA is a satellite submitter on the wire service of an established cataloging activity. In addition, cataloging services were furnished to 11 NATO countries, 5 other foreign countries and 2 NATO agencies.

MANUFACTURERS' DATA

Latest records show 86,390 currently valid manufacturers' codes in the Cataloging Handbook, Federal Supply Code for Manufacturers (FSCM). The FSCM is a coding system of five-digit numbers assigned to establishments which are manufacturers of items of supply procured by agencies of the Federal Government. Represented in the publication are 50,244 U. S. and Canadian manufacturers. The remaining 36,146 identify manufacturers in other NATO countries and other foreign countries. Of the total number of assigned manufacturers' codes, 35,360 are referenced in the central files to 9,510,014 manufacturers' part or reference numbers. These reference numbers are cross-referenced to 5,716,912 National Stock Numbers (NSNs). The remaining 76,471 NSNs in the central screening files represent items not requiring reference numbers for identification purposes. Of the 86,390 valid manufacturers' codes, 19,241 have been assigned 2,694 association codes, indicating that these manufacturers' codes relate to manufacturers who are members of a larger corporate complex, each association code representing one such complex. In cataloging operations, these association codes help reveal duplicates which otherwise would give the appearance of being separate and distinct items.

CONSOLIDATED MANUFACTURERS/NONMANUFACTURERS FILE

The "Handbook for Nongovernment Organization Codes for Military Standard Contract Administration Procedures (MILSCAP)" contains data from a consolidated Federal Supply Code for Manufacturers/Federal Supply Code for Nonmanufacturers (FSCM/FSCNM) File. This basic publication contains 128,058 coded facilities and is used in the mechanical interchange of data required by MILSCAP and the agencies/activities Automated Data Processing Systems.

MANUFACTURERS' PART AND DRAWING NUMBERING SYSTEMS

The Cataloging Handbook, H-7, now contains 477 summaries of numbering systems. Some of these pertain to the entire corporate complex and others pertain only to one facility. There are 2,639,877 reference numbers and 2,317,232 National Stock Numbers recorded against the FSCMs assigned to the manufacturers utilizing these numbering systems.

FEDERAL CATALOG SYSTEM IMPROVEMENTS

The following paragraphs detail actions taken during the reporting period to improve the comprehensiveness, quality, accuracy, responsiveness, efficiency and utilization of the Federal Catalog System.

FEDERAL SUPPLY CLASSIFICATION

During this reporting period, one new Federal Supply Classification (FSC) Class was established. The new Class is FSC 2850 entitled: Gasoline Rotary Engines and Components. The establishment of this Class was originally proposed by the United Kingdom and approved by the Military Services and Civil Agencies of the United States. The FSC structure is currently comprised of 77 Groups containing 604 classes.

FEDERAL SUPPLY CATALOG PUBLICATIONS

The Master Cross Reference (RL) Part One (Reference Number to NIIN) and Part Two (NSN to Reference Number) is published on 48:1 microfiche by a Government Printing Office contractor. Magnetic tapes of the 1974 RL are also furnished to the Department of Commerce for sale to the general public (RL Part One only).

PROVISIONING SCREENING

During the reporting period, 2,453,889 manufacturers' reference numbers were screened against the master files in support of provisioning actions; 1,016,909 or 41.0 percent were matched to existing NSNs. There were 291,078 NSNs screened for the same purpose. Additionally, there were 1,007,478 manufacturers' reference numbers screened against the master file, of which 320,248 or 32.0 percent matched existing NSNs for purposes other than provisioning, i.e., to obtain management data recorded in the master file, such as item user information, validation of NSNs, standardization decisions, related manufacturers' codes and reference numbers and to provide support to procurement. Also, there were 1,985,732 NSNs screened for this purpose. In addition to the above, provisioning screening also provides the capability (by matching reference numbers to NSNs) for the screening of Program PLUS files to ascertain the availability of assets for materiel utilization purposes. During this reporting period, assets were found to exist for 2.1 percent of the NSNs matched.

PARTICIPATION IN THE NATO CODIFICATION SYSTEM

During the reporting period, 74,018 numbers (reference number or NSN) were processed against the central files; 637,466 ownership registrations were processed and the pertinent EAM file data on cards or ADP tape were furnished; and 10,005 original item identifications were prepared under the applicable international agreements.

As of 31 December 1974, a gross total of 3,036,928 management registrations were recorded to 11 NATO countries, 10 other foreign countries and 2 NATO agencies. The quantity of management registrations by country or agency was as follows:

NATO COUNTRIES

Belgium	303,974	Germany	670,621
Canada	278,797	Italy	66,506
Denmark	2,360	Norway	266,845
France	304,176	United Kingdom	194,125
Netherlands	151,162	Turkey	5,541
Greece	5,162		

OTHER FOREIGN COUNTRIES

Australia	438,677	South Africa	65,402
Japan	29,012	*Iran	6,442
*Brazil	60	*Philippines	21
Israel	11,580	*Spain	259
*South Korea	77	New Zealand	54,977

NATO AGENCIES

NATO Supply Center	74,662
Logistics Working Group	106,490

The net total of NSNs with registered foreign managers was 1,447,631. Of this total, 468,267 were managed solely by foreign governments and the remainder, 979,364, were managed by one or more U. S. activities, as well as by one or more foreign countries.

ITEM MANAGEMENT RESPONSIBILITIES FOR DoD USED ITEMS

The following table displays the wholesale and retail management responsibilities of the 3.7 million items used by DoD. The Federal Catalog Program is the vehicle that collects, maintains and disseminates the management data elements necessary to assist in making management assignments and to achieve the overall DoD objective of "one item one manager" for all DoD used items.

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*DLSC does not furnish catalog services to these foreign countries. Management registration in the DLSC files was recorded by the U. S. Military Services under the Foreign Military Sales Program.

The DoD wholesale manager can take three forms:

1. The Commodity Integrated Materiel Manager (CIMM); i.e., DSA, GSA, TACOM, etc., which is defined as an activity designated to exercise Integrated Materiel Management for a FSC Group/Class, commodity or item on a DoD or Federal Government-wide basis. The CIMM functions normally include computation of requirements, funding, budgeting, storing, issuing, cataloging, standardization, procurement and disposal.

2. The Weapons Integrated Materiel Manager (WIMM), which is the Military Service Inventory Control Point that performs the DoD or Federal Government-wide Integrated Materiel Manager functions as outlined in 1. above for assigned items.

3. The Military Inventory Manager (MIM), which is an activity assigned the prime responsibility for the inventory management of a reparable, investment or end item of supply within a particular Military Service/Agency.

The retail manager takes two forms:

1. A Service Item Control Center (SICC) which performs the residual materiel management or retail management functions for a weapons system oriented consumable item of supply when the wholesale materiel management functions for the item have been assumed by a Weapons Integrated Materiel Manager (WIMM), or the principal of an inter-service supply support agreement for a reparable, investment or end item where wholesale inventory management responsibility has been assumed by another Service in the role of an agent.

2. The Military Retail Manager (MRM) which is an activity within a Service/Agency having retail responsibility for an item of supply where the wholesale materiel management functions are performed by a Commodity Integrated Materiel Manager.

The figures in columns one and two are the total number of items (3,251,628) currently under the single integrated management concept regardless of the number of activities using the items.

The quantity of items shown in column three falls into three categories: (1) Reparable Items, (2) End Equipments, and (3) Consumable Items. The latter category is scheduled to be transferred to the wholesale manager concept. The totals shown in the vertical columns are net DoD figures for CIMM, WIMM and Total DoD Managed Items. The totals for MIM, SICC or Principal, and MRM are gross registrations because a single item may be in the inventory of more than one Service. The total DoD Managed Item column reflects net item registrations in each case.

Activity	CIMM	WIMM	MIM	SICC or Principal	MRM	Total DoD Managed Items
Army	47,208	183,950	66,972	14,998	617,991	931,119
Navy	-	497,285	186,726	70,365	996,589	1,750,964
Air Force	-	569,317	233,924	63,462	885,201	1,751,893
Marine Corps	-	30,724	10,247	22,586	225,571	289,128
DSA	1,840,011	-	-	-	-	1,840,011
Other DoD	-	14,649	26,350	8,437	20,485	69,778
*GSA	68,485	-	-	-	-	68,485
TOTAL	1,955,704	1,295,924	524,219	179,848	2,745,837	3,726,336

* These items are managed by GSA but used by DoD.

IDENTIFICATION LISTS

Beginning 1 October 1973, Identification Lists (ILs) previously published by the Defense Supply Centers (DSCs) were made available on 48:1 microfiche to all DoD activities, civil agencies, other governmental and public agencies having the need for item descriptive data. A total of 36,093,639 microfiche have been distributed during the first 15 months of operation.

CONVERSION TO NATIONAL STOCK NUMBER (NSN)

On 30 September 1974 the 11-digit Federal Stock Number (FSN) was converted to a 13-digit NSN. The NSN contains a two-digit code to identify the central cataloging office of the NATO country which assigned the stock number. In order to minimize the impact of the change, Defense Automatic Addressing System (DAAS) personnel agreed to convert FSNs to NSNs for a period of 60 days after conversion. Commencing on 17 October 1974, DAAS furnished a report to each Military Service Headquarters pinpointing the activities who were continuing to use FSNs so that corrective action could be taken.

Of the 42 million requisitions processed by DAAS from 17 October 1974 thru 30 November 1974, only 32,317 FSNs were converted to NSNs. The DAAS conversion was therefore terminated on 30 November 1974.

DEFENSE TECHNICAL REVIEW ACTIVITIES

During this period there were 30,278 requests for new National Stock Numbers (NSNs) for Military Service managed items processed through the Defense Technical Review Activities. As a result of the reviews performed by those activities, 947 (3%) of these requests were identified to an existing stock number or a potential replacement item. An additional 610 (2%) of the requests were corrected by the Defense Technical Review Activities with 2,317 (8%) requests returned to submitting activities for corrective action.

Defense Supply Agency Defense Technical Review Activities reviewed an additional 63,496 requests for new National Stock Numbers (NSNs). These were items being coded to DSA for management. As a result of the reviews performed, 16,918 (27%) of these requests were identified to an existing stock number or potential replacement item. An additional 16,742 (26%) were returned to submitting activities for more information or corrective action.

MATERIEL REUTILIZATION

The central mechanized screening system (PLUS) provides a mechanized means of matching potential and/or declared excess assets of one Service/Agency against the requirements of another user within the Department of Defense. Mechanized matching is keyed on the NIIN portion of the NSN; therefore, the Federal Catalog System provides the base which makes the system possible.

During the reporting period, releasable assets valued at $75.4 million were offered to satisfy reported requirements of materiel managers. During the same period, Defense Property Disposal Service (DPDS) received transaction reports indicating that of the materiel offered, approximately $19.0 million had been accepted for transfer and $7.5 million had been shipped.

The cataloging file contains descriptive data keyed to the NIIN. This has been invaluable in the reporting of declared excess materiel from the Defense Property Disposal Offices (DPDOs) to DPDS. Declared excess assets with few exceptions can be reported mechanically by NSN to DPDS and upon receipt can be matched against the description file to provide the item description required. Through this program, declared excess assets are screened by various methods, such as declared Excess Personal Property Listings (EPPLs), High Value Flyers, High Value Phone Referrals, Front End Screening (FES) Referrals, Final Asset Screening (FAS) offers and offers of materiel to fill Want List requirements to obtain reutilization of declared excess and surplus property.

Another reutilization technique used is advertising potential excess property for the Services when referred for specialized screening consideration. This effort usually involves weapon system excesses which are advertised by flyer for single items or by brochure for large systems.

The total transfers of declared excess and surplus through the aforementioned efforts during the reporting period were $74.4 million. The EPPLs, published weekly, utilize the complete NSN where available, along with descriptive data in layman's language or the manufacturer's code and part number. During the reporting period $428.9 million worth of assets were advertised via the EPPL, with $28.2 million being transferred. The flyer goes a step further than the EPPL and provides a picture of the excess materiel along with alternate uses for the equipment, where available. During the reporting period, $34.9 million worth of assets were advertised via the

High Value Flyer with $11.5 million being transferred. Where there is a potential user of high value declared excess assets, phone referrals are made. During the reporting period $8.9 million was offered via telephone and $7.9 million was transferred. In an effort to inform Service/Agency item managers of those single Service/Agency user and integrated managed items reported as declared excess or surplus by the Defense Property Disposal Office (DPDO), these items upon receipt at DPDS are matched against the single Service/Agency user and integrated manager item file. All matches are referred to the appropriate Service/Agency item managers. Of the declared excess and surplus assets referred, 1,552 line items valued at $2.3 million were transferred to the DSA Centers and 1,237 line items valued at $3.0 million were transferred to the Services.

The "want list" is another reutilization approach to locate available excess equipment, and authorizing the transfer to satisfy a requirement. The want list contains those items not currently available and maintained until the requirement is filled or cancelled. During the reporting period a total of 1,523 items valued at $8.5 million were reutilized by this effort.

To further enhance the Reutilization efforts of declared excess material the following actions have been taken to increase visibility of available excess as applicable to the above programs:

a. Lower EPPL Screening Floor - Previously, excess materiel appearing in the EPPLs was limited to reportable excess with an extended line item value of $3,000 and up. This limit has now been reduced to include excess materiel with an extended line item value of $1,500 and up.

b. Expansion of Front End Screening (FES) - Previously the FES Program referrals of excess materiel was applicable to only the reportable excess materiel as reported to DPDS from the DPDOs. This Program has been expanded to include all non-reportable excess materiel with an extended line item value of $100.00 and up and in specified condition codes. This action provides complete visibility of assets within each DPDO to all integrated item managers.

With the implementation of "one item, one manager" concept within DoD, the PLUS Program is being disestablished effective 1 July 1975. Therefore, future reports will not contain "materiel reutilization" as a topic.

STANDARDIZATION SECTION
SEMIANNUAL REPORT

DEFENSE STANDARDIZATION PROGRAM:

Within the Department of Defense the standardization of materiel is a joint responsibility of the Director DDR&E and the Assistant Secretary of Defense (I&L), operating through the Defense Materiel Specifications and Standards Board (DMSSB) which was established by revision to Department of Defense Directive 4120.3 and dated 6 June 1973. The DMSSB develops policies and procedures for the implementing program.

DEFENSE MATERIEL SPECIFICATIONS AND STANDARDS BOARD:

The DMSSB is comprised of senior executives for engineering and for logistics from the Office of the Secretary of Defense and each of the three Military Departments, plus a logistics member from the Defense Supply Agency. The Board meets periodically to consider policy, procedural and technical problems of a broad nature. Panels, pertinent to technological areas, have been established by the DMSSB for electronics, materials, metrication, and clothing and textiles. The panels, within their respective charters, conduct studies, perform analysis and develop policy recommendations for consideration by the DMSSB.

An example of the kind of problem that is eventually escalated to the Board and the method by which resolution may be achieved can be illustrated by the case of the high density connectors which was processed during the last reporting period.

Simply stated, the case involved differing military requirements for families of circular high density connectors used to interconnect low power signal cables between electronic devices. Each connector family was supported by its own military specification and had been used in design and production for some time. Notwithstanding the similarities between the two, unanimity in the selection of one connector family as standard could not be achieved at the service level. Since the duplicative nature of the two specifications for these connectors fostered continued proliferation of items in the supply system, with the attendant economic burden, the matter was referred to the DMSSB for resolution, and assigned to its Electronics Panel for action.

During the subsequent proceedings, written and oral arguments were presented by each of the services and from principal industry associations. A thorough technical review was made of the advantages and disadvantages of each connector family as well as the economic effect on the logistics system. After evaluating all of the information presented, the Panel concluded that one of the two connector families offered advantages over the other and recommended to the Board that it be adopted as standard for use by the services.

The Panel recommendations were subsequently adopted by the Board and joint implementing instructions issued by the Assistant Secretary of Defense, Installations and Logistics, and the Director, Defense Research and Engineering.

SCOPE OF THE DEFENSE STANDARDIZATION PROGRAM:

The Defense Standardization Program (DSP) encompasses the broad range of equipments, parts, materials, processes and practices described in specifications, standards, engineering drawings, and purchase descriptions which are prepared and used by the Department of Defense activities. The DoD Index of Specifications and Standards lists more than 44,000 active documents (38,000 in the Military series and 5,000 in the Federal series in addition to 1000 industry standards which have been adopted for use by DoD and have equal status).

CONSOLIDATION OF DOCUMENTS:

Since passage of Public Law 436, 82nd Congress, 4,455 specifications and standards have been consolidated into 1638 specifications. During this reporting period 55 documents were consolidated into 29.

MAINTAINING DOCUMENTS CURRENT:

The program for reviewing and updating standardization documents continued during the report period. Under this program, all of those documents listed in the DoD Index of Specifications and Standards which have not been acted upon for five years or more are identified and reported to the proponent activity for action. The proponent must either validate the document as current, schedule a project to bring it up to date, or cancel the document as applicable.

In September 1974, a total of 9,828 documents were identified for maintenance review by the services. Through the end of December, 246 of these were validated as current and 67 were cancelled. The balance of 9,515 are awaiting review action by the responsible service components.

In all, there were a total of 1256 documents processed in this period, which included the preparation of new, revised and amended specifications and standards to implement standardization decisions, to support new procurement, or to bring about a general update of document coverage in accordance with the maintenance program outlined above.

ADOPTING INDUSTRY STANDARDS:

A continuing objective under the Department of Defense Standardization Program concerns improved coordination with the industry and adoption of standards promulgated by industry technical associations such as ANSI, ASTM, and the like. To that end, the services participate actively with recognized industry technical standards organizations and retain membership on these committees to assure compatibility between our respective needs. During the report period, the number of industry documents adopted for use by DoD rose to 1084, an increase of 384 over the prior total (700).

ITEM REDUCTION:

As a result of actions taken under the DSP to reduce the number of sizes, kinds and types of items that are generally similar, there are now 112,568 stock numbered items which have been identified in the Federal Cataloging records

as "not to be procured." These items are awaiting attrition by cognizant supply managers. The number of items so identified has increased 2,593 since the last report.

SIGNIFICANT ASPECTS OF THE PROGRAM

As was explained in our previous semiannual report, it is intended that each successive report would single out a significant aspect of the Defense Standardization Program and address it in detail in order to further acquaint the Congress and the Public with the manner in which the program functions, its accomplishments and important undertakings.

As in the case of any broad program that is continuous in nature, embraces many areas of technology and directly affects all facets of materiel acquisition, thorough planning, programming, analysis, and evaluation of progress are essential ingredients in assuring adequate and timely performance. Within the Defense Standardization Program, our document, the Program Analysis, is the vehicle through which these management principles are invoked. The Program Analysis covering Federal Supply Class 5955, Piezoelectric Crystals represents a typical example of a Program Analysis prepared by the assignee activity in conjunction with the participating departments.

A Program Analysis is prepared annually for each FSC or area in which a standardization potential is considered to exist. It establishes the goals and objectives to which standardization effort will be directed. The plan represents a technical evaluation of the condition of the class from a standardization point of view, identified engineering problems requiring resolution, assesses the potential for achieving standardization in the various segments of the class and establishes the work units (projects) that must be undertaken to attain the degree of standardization anticipated. A five year schedule for accomplishing these projects is incorporated in the Program Analysis.

Existing procedures require that each Program Analysis be revised annually, thus assuring a continuous reappraisal of the goals and objectives previously established for the particular class and the work to be undertaken. The program for each class is not inflexible. The annual revision attempts to identify and take advantage of new ideas, approaches or techniques that will contribute to the attainment of standardization objectives. Successive revisions assure the infusion of new innovative approaches, particularly in dynamic areas that are subject to continuous technological change.

52-453 O - 75 - 2

OFFICE OF THE SECRETARY OF DEFENSE
WASHINGTON, D.C. 20301

C O P Y

C O P Y

1 AUG 1974

MEMORANDUM FOR Secretaries of the Military Departments
Chairman of the Joint Chiefs of Staff
Directors of Defense Agencies

SUBJECT: Standardization of Circular High Density Electrical Connectors

Over the past several years there has been a proliferation of items and materials used in the equipments manufactured for the Department of Defense. Of all the attempts to control the proliferation by standardization actions, few, if any, of the products have been the subject of the intense controversy which has focused on the circular high density electrical connectors used in communications and electronic equipments and systems. The duplicative and overlapping nature of the respective specifications violated the purpose and intent of the Defense Standardization Program and demanded special management attention. In order to resolve this matter, the Defense Materiel Specifications and Standards Board, under DoD Directive 4120.3, assigned to the Electronics Panel of the Board, responsibility for studying the problem and recommending one standard family of circular high density electrical connectors for use throughout DoD. The report of the panel has been reviewed and is approved.

The Director, Defense Supply Agency, as the Standardization Assignee for the Federal Supply Class governing electrical connectors, shall take appropriate action to immediately revise Military Standard MIL-STD-1353 to identify Series I and Series II connectors of Military Specification MIL-C-38999 as standard for use in new design. The items under Military Specification MIL-C-81511 should be identified as inactive for new design.

Additional implementing guidance with respect to this decision is attached and shall be applied on a case by case basis by the addressees.

Enclosure
Supplemental Guidance

MALCOLM R. CURRIE
Director
Defense Research and Engineering

ARTHUR I. MENDOLIA
Assistant Secretary of Defense
(Installations and Logistics)

SUPPLEMENTAL GUIDANCE

Standardization of Circular High Density Electrical Connectors

The following guidance is furnished with respect to the implementation of the decision to identify Series I and Series II of MIL-C-38999 as standard for use in new design and to declare MIL-C-81511 inactive for use in new design. DoD components will apply the guidance on a case by case basis to assure that the intent and purpose of the decision is carried out. The continued application of the non-standard items in new design tends to perpetuate waste, parts proliferation, and excessive costs to DoD.

1. DoD components, respectively, may specify Series I of MIL-C 38999 exclusively for use on equipments designed and procured for single service use by appropriately annotating MIL-STD-1353.

2. DoD components, at their option, may limit the application of Series II of MIL-C-38999 to controlled situations and to identified approved applications. Procedures should be referenced in MIL-STD-1353.

3. Equipments now under development shall be subject to the following change control:

a. Effective Immediately

(1) Those in phases 6.1 (Basic Research) and 6.2 (Concept Development) shall require, or be modified to require, the use of MIL-C-38999 connectors where MIL-C-81511 is now specified.

(2) Those in advanced development (6.3) shall be changed by Engineering Change Proposal (ECP) to require MIL-C-38999 connectors where MIL-C-81511 is now specified. Where this action will adversely affect current effort, the conversion to MIL-C-38999 shall be effected before proceeding to engineering development (6.4) or Operational Systems Development.

b. Effective 1 October 1974

(1) Those in Engineering development (6.4), especially the early phases, should incorporate the use of standard connectors. (It is recognized that no precise change criteria can be devised for equipments in this category.) An in-process milestone to evaluate the affect of the change from non-standard connectors to standard items before final configuration and testing and to justify the retention of the non-standard via MPCAG would be in order.

(2) Those equipments in Operational Systems Development (or the equivalent) may continue to employ non-standard items if it is determined that conversion to standard connectors would be disadvantageous.

(3) Those equipments in production may be continued without change.

REPORT ON HIGH DENSITY CONNECTORS

7 JUN 1974

THE ELECTRONICS PANEL
DEFENSE MATERIEL SPECIFICATIONS AND STANDARDS BOARD

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FOREWORD

The Electronics Panel, chartered by the Defense Materiel Specifications and Standards Board (DMSSB) to study and plan for improved standardization of materiel falling in the area of electronic and communications systems, equipments and items (including parts) was tasked by the Chairman of the DMSSB to recommend either of two families of high density circular connectors to be designated as the "Standard for use in New Design."

By separate action, the Panel will present to the DMSSB its analysis of the procedures which affect the resolution of standardization problems in a timely manner. (The instant case is but one example.)

The cooperation and assistance of individuals and organizations made it possible for the Panel to expedite the collection and evaluation of the technical and logistical information used in its deliberations. The Panel Members, listed below, are appreciative of the efforts of all who participated and contributed advice.

JOHN A. MITTINO
Chairman

PANEL:

Mr. V. J. Kublin, Army
Mr. D. Braunstein, Navy
Mr. D. Anderson, Air Force
COL J. P. Martino, DSA
Mr. R. E. Oderwald, Marine Corps
(Observer)

Mr. John Smith, OASD(I&L)
Mr. E. N. Myers, ODDR&E
Mr. H. Bigelow, ODTACCS
Mr. S. H. Meiselman, DMSSO
(Advisor)

PART I
EXECUTIVE SUMMARY

A. STATEMENT OF THE PROBLEM:

Two Military Specifications, MIL-C-81511 and MIL-C-38999, describe the requirements for circular high density electrical connectors which are used to interconnect multiple conductor cables carrying low-power signal between electronic devices in an hostile environment (temperature, pressure, humidity). The two sets compete with each other for selection in design and production. In addition to the duplicative nature of the specifications, the proliferation of items in the supply system constitute an economic burden. Many peripheral problems (such as training of technicians in production of equipment wiring harnesses by equipment manufactures, broad base sources of supply and production of the connectors, relationships with related but different connecting mechanisms and the involvement of various treaty and international standards bodies) constitute considerations along with purely Military operational requirements.

The Electronics Panel has been tasked to recommend to the DMSSB one of two families of connectors as standard "for use in new design" so as to reduce item proliferation and improve materiel acquisition costs.

B. RECOMMENDATIONS:

1. The Panel considered the following options:

   I. Adopting Series I and Series II of MIL-C-38999.
   II. Adopting Series 3 and Series 4 of MIL-C-81511.
   III. Adopting Series 3 and Series 4 of MIL-C-81511 and Series II of MIL-C-38999.
   IV. Developing a new generic specification to consolidate and unify the technical requirements.

2. The Panel recommends that items in Series I and Series II of MIL-C-38999 be designated as standard for use in new design and that MIL-C-81511 be declared inactive for new design. It is further recommended that an immediate revision of Military Standard MIL-STD-1353 be issued to implement the above.

The recommended course of action was selected since MIL-C-38999 has greater flexibility for design selection and extensive commonality with other series

connector; there is already competitive production in the United States and in Europe; there is longer and greater experience in its use; there is broad acceptance of the product by manufacturers; there are many, many more in service systems and programs than the competitive devices; it is of lower unit price; and the scoop proof features of MIL-C-81511 are also available under MIL-C-38999, Series I (i.e., scoop proof, protection of the pins during the mating of the connector sections).

C. SYNOPSIS OF FINDINGS:

The Panel invited position papers from the Military Departments, the Defense Supply Agency and industry associations (Aerospace Industry Association, Electronics Industry Association and the Society of Automotive Engineers). Copies of their position papers are attached (Part II, Section D.2). The competition between the two families of specification items had crystallized over a period of seven years. The respective proponents recognized the attributes of both sets and were well versed in the advantages and disadvantages of the connectors. There were accepted justifications for using each series and the protagonists mutually used items in both sets.

1. Statement of Positions:

(a) The Army position stated that both families were needed; however, if one must be selected in preference to the other, the Army preferred to have the MIL-C-81511 series so identified.

(b) The Navy position clearly identified MIL-C-81511 as the preferred family. The Navy allowed that in some specific designs the Series II of MIL-C-38999 could be advantageous. (The shell can be slightly shorter and lighter in weight when scoop proofing is not needed.)

(c) The Air Force preferred MIL-C-38999 based upon their need for flexibility of equipment design and the weight advantage when using the Series II items.

(d) The Defense Supply Agency, predicated upon logistic considerations, preferred the MIL-C-38999. The relationship of MIL-C-38999 to other connectors and the importance of common contacts to production and inspection of equipments weighed heavily in their recommendation.

(e) The consolidated industry position (taking the form of a joint recommendation of AIA, EIA and SAE) supported MIL-C-38999 for both technical and business reasons. Some individual companies and important divisions within the large corporate structures had separate dissenting views. The precise degree of support or dissent was not made known.

2. Some of the more significant differences in the respective connectors are contained in the following table:

	MIL-C-38999	MIL-C-81551
1. Scoop Proofing-i.e., protection from pin damage while being mated	Series I only	Plug & recepticle in Series 3 Recepticle only in Series 4
2. Variability of conductor sizes	Adaptable to variations	No variation in conductor sizes
3. Density of conductors per unit diameter Small Shell Sizes	Up to #17-equal or slight disadvantage	Up to #16-very slight advantage
Large Shell Sizes	Over #19-disadvantage increase as size increases	Over #18-advantage increases as size increases
4. Cost Comparison Average per Shell (DSA) Average per Contact (DSA) Average per Contact (Navy) (Navy)	$37.61 .344 Series I 1.32 Series II .88	$50.30 .504 Series 3 .68 Series 4 .85
5. Number in System (DSA)	1,000	100
6. Number in Use	7 million	200,000
7. Contact Retention Method	Metal finger (a supplier is testing dielectric retention-expect more will go)	Dielectric Retention
8. Integrity of Keying	Variable (susceptible to forcing)	Constant key location (positive location for blind mating)
9. Grounding fingers which engage before contacts	Series I only	Series 3 and 4
10. Durability (mate and unmate cycles)	500 cycles w/o grounding fingers 250 cycles w/ grounding fingers	500 cycles

PART II

A. STATEMENT OF THE PROBLEM:

1. Background:

The need for small lightweight electrical connectors has increased over the years through the mid-60's with the increase use of electronic devices such as sensors, firecontrol, computers, etc. The two specifications with which we are concerned had their beginnings in nearly the same time. MIL-C-38999 evolved in 1966 with two series; Series I was "scoop proof" and Series II was a shorter connector and not "scoop proof".

> (NOTE: Scoop proof is a term applied to the ability of the connectors to resist pin damage when they are being mated. This is achieved through the use of an extended lip on the male half to prevent the female shell from bending or otherwise distorting the pins before the two halves are properly aligned. Thus "scoop proof" connectors are less susceptible to damage especially when they must be mated in "blind situations" (e.g., poor visibility, cramped space, etc.)).

MIL-C-81511 was published early in 1967 as the result of a search for a suitable connector which would displace the varieties then being used. The specification was prepared to incorporate the design of an item which satisfied the predetermined array of objectives prescribed by the Navy. There were two series in the specification until late 1971. At that time, series 3 and 4 were incorporated into the document. The difference between the Series 1 and 2 and Series 3 and 4 is that in the former all of the contacts are released at the same time while in the latter each contact is released separately. The Series 3 and 4 overcame field problems caused by errors of the technicians when reinserting the numerous contacts during maintenance and repair procedures. MIL-C-81511 items are scoop proof; Series 3 is scoop proof on either terminal end whereas Series 4 is scoop proof on the receptical end only.

There have been numerous attempts to select one of the two families for use in new design (i.e., standard) but none have been successful in arriving at an agreement at the technical/engineering level.

Attached is a chronology of recent events furnished by the Defense Electronics Supply Center (Part II.D.1, #1).

2. Current Status:

On 1 March 1974, the Standardization Assignee (Defense Supply Agency) referred the problem of high density circular connector standardization to the Chairman of the Defense Materiel Specifications and Standards Board (Part II, D.1, #1, DSAH-SE memorandum, 1 March 1974).

In view of the Standardization Assignee, it is imperative that a DoD decision on the competitive connector (MIL-C-38999 or MIL-C-81511) be made prior to the International Electrotechnical Commission meeting which is scheduled in September 1974. An agreement to standardize on MIL-C-81511 for use in new design had been developed at an inter-departmental meeting on 9 January 1974. This is revealed in DSAH-SE memorandum, 1 February 1974, which contains the minutes of the meeting (see Part II D.1, #2). The Headquarters, USAF withdrew the Air Force from that agreement by letter dated 13 February 1974 (see Part II D.1, #3). The problem was referred to the DMSSB since the Assignee expected a reclama from either the Navy or Air Force were DSA to decide on either connector specification.

By memorandum, dated 11 April 1974, the Director of the Secretariat, DMSSB, in compliance with direction from the Chairman of the DMSSB referred the case to the Chairman of the Electronics Panel for "....selection of one family of circular high density electrical connectors for use in new design." (See Part II, D.1, #4.)

B. RECOMMENDATION TO DMSSB:

1. Alternatives and Recommended Action:

a. The Panel considered various alternatives and settled on the principal options setforth below:

(1) Adopting Series I and Series II of MIL-C-38999.

(NOTE: In the course of developing this option, consideration was given to adopting only Series I; however, in view of the statements which supported the need for the shorter and lighter weight connectors, there was an apparent need for the Series II. Further, the high use incidence of this non-scoop proof item did not warrant imposition of the "non-standard parts control process" in each instance of its selection.)

(2) Adopting Series 3 and Series 4 of MIL-C-81511.

(3) Adopting Series 3 and Series 4 of MIL-C-81511 and Series II of MIL-C-38999.

(4) Developing a new generic specification to consolidate and unify the technical requirements.

b. Recommendations:

The Panel recommends that items in Series I and Series II of MIL-C-38999 be designated as standard for use in new design and that MIL-C-81511 be declared inactive for new design. It is further recommended that an immediate revision of Military Standard MIL-STD-1353 be issued to implement the above.

The recommended course of action was selected since MIL-C-38999 has greater flexibility for design selection and extensive commonality with other series of connectors; there is already competitive production in the United States and in Europe; there is longer and greater experience in its use; there is broad acceptance of the product by manufacturers; there are many, many more in service systems and programs than the competitive device; it is of lower unit price; and the important technical features of MIL-C-81511 are also available under MIL-C-38999 Series I (i.e., scoop proof, the protection of the pins during mating of the connector sections).

2. Rationale for Recommended Course of Action:

The Electronics Panel, in judging the merits of the MIL-C-81511 vs the MIL-C-38999 considered the following factors which are discussed below and summarized under the section on options:

RELIABILITY - The only reliability problems cited by the Navy were in the non-scoop proof Series II of MIL-C-38999; however, the Panel could find no evidence to support the claim that failures attributed to Series II of MIL-C-38999 could be extrapolated to the Series I design. While Series I of MIL-C-38999 was alleged to have inherent design deficiencies (interdependent seals, single key interference, and lower durability tests) the allegations were not satisfactorily substantiated. Hence, the Panel concludes that in terms of reliability, either MIL-C-38999 or MIL-C-81511 scoop proof designs are satisfactory.

WEIGHT/VOLUME/OEM COST - In comparing these factors, the reports submitted to the Panel contained major conflicts. There is a large variety of Series and shell types among the two connector specifications. Hence, it appears possible to attribute OEM cost, weight or volume advantage to the favored connector by selecting the appropriate combination. Although the majority of the MIL-C-81511 connector sizes has more contact pins and thus appear to offer an inherent weight and volume advantage in shell sizes greater than #17, there is a paucity of application in information which ascribe a practical advantage. MIL-C-81511 does not provide a non-scoop proof connector so direct comparison with Series II MIL-C-38999 is not possible. The Panel concludes that neither Series 3 and Series 4 of MIL-C-81511 nor Series I of MIL-C-38999 offers a weight/volume advantage.

COST (LOGISTICS SUPPORT) - MIL-C-38999 is used by 115 weapon systems and hence must be maintained in the DoD supply system for many years. There are about 1000 stock numbers. If MIL-C-81511 were adopted as standard, many of these would be duplicated at an entry cost of about $1000 each and an annual maintenance cost of $100 each per year.

COMMONALITY

Tools - Insertion and removal tools for MIL-C-38999 are common with seven other connector specifications. The contact crimping tools are common with two others. MIL-C-81511 tools are unique.

Contacts - Size 22D contacts used MIL-C-38999 are common to two other specifications. MIL-C-81511 contacts are unique.

Throw away insertion and removal tools are supplied with connectors. However, maintenance and production line assembly usually involves metal tools. The unique training and tools specified for MIL-C-81511 will be a problem in that MIL-C-81511 will always be used in combination with the other more widely used common connectors. This can lead to confusion or misapplication of tools (or training) resulting in improper assembly or damage to the MIL-C-81511 unless there is constant, special surveillance.

NON-SCOOP PROOF CONNECTORS - Are generally lighter, cheaper and smaller than scoop proof and consequently are more prone to failure through damage. There are applications where the cost, weight and/or size of the scoop proof connectors preclude their use. The Air Force claims that 90% of their high density connector requirements are met with a non-scoop proof connector and MIL-C-38999 Series II meets their needs. The Navy, on the other hand, states that all their requirements are for scoop proof connectors with a few exceptions. For their non-scoop proof needs, the Navy proposes that MIL-STD-1353 allow the use of MIL-C-38999 Series II subject to approval of the procuring agency.

3. Pro's And Con's Of Options:

OPTION	PROPOSED DoD STANDARD FOR HI-DENSITY CONNECTORS	
	SCOOP PROOF	NON-SCOOP PROOF
I	MIL-C-38999 Series I	MIL-C-38999 Series II
II	MIL-C-81511 Series 3 & 4	None*
III	MIL-C-81511 Series 3 & 4	MIL-C-38999 Series II
IV	Develop a new general specification to consolidate and unify the technical requirements and reduce the number of options.	

*MIL-C-38999 Series II recommended for non-standard approval when application dictates weight, cost and space saving as more important than the larger, heavier, more costly scoop proof design.

OPTION I - MIL-C-38999 Series I and II

PRO -

o Commonality - Pin structure is common with seven other military specification connector series, hence, tools and training are common.

o Non-Scoop Proof Connector - Available and acceptable to all Military Services for those applications where weight/size/cost of scoop proof connectors do not permit their use.

o Application - Scoop proof and non-scoop proof series are now used or specified for over 115 current or planned DoD systems.

o Reliability - No known operational failures due to design deficiencies in the scoop proof Series I.

o Availability - Four manufacturers and seven assembler/distributors.

CON -

o Pin Density - Some MIL-C-81511 shell types have higher pin density.

o Radiation Hazards - Grounding fingers on Series II (non-scoop proof) do not engage before pin engagement. However, Series I fingers do, hence it can be used if radhaz is a problem.

o Failures - Thin shells and scooping on Series II have resulted in field damage; Series I, however, has thick shells. Interfacial seal failures have been cited as a failure mechanism but field experience does not substantiate a significant seal problem.

o Weight-Size - MIL-C-81511 (3 & 4) proponents claim weight and size of MIL-C-38999 (Series I) is greater. This varies with shell type and a significant difference only exists in sizes 18, 21, 23 and 25.

o Mating - Major key position varies with shell type which makes blind mating difficult and increases risk of bent pins in non-scoop proof connectors.

o Durability - Grounding finger connector, needed for radhaz is only tested to 250 mated cycles.

OPTION II - MIL-C-81511 Series 3 and 4

PRO -

o Pin Density (Volume) - Higher pin density than available for comparable shell sizes in MIL-C-38999.

o Mating - Fixed position of principle keyway simplifies blind mating.

o Weight - Series 4 is lighter (in some shell types) than MIL-C-38999 Series I. Average maximum difference over all shell types, 38999 - I vs 81511-4 is .00016 lb per mated pair.

o Jacketed Cable - Rear end hardware designs exist for jacketed cables.

CON -

o Logistic Support - DESC has entered only about 100 types. More may be needed at $1000 each and $100 per type per year maintenance. This is in addition to continued maintenance of the 1000 existing MIL-C-38999 types.

o Non-Scoop Proof Connector - Designers needing a low cost, light weight, small connector would be forced to use a non-standard connector. This is important to USAF.

o Commonality - Pins are not common to any other Military Specification. Hence, special tools and training are required for assembly and maintenance. Plastic throw away tools with connector reduces changes of assembly damage but additional training is a problem and misapplication of the common tools causes damage during subsequent maintenance operations.

o Initial Availability - Only one manufacturer and assembler/distributor of MIL-C-81511 Series 3 and 4. MIL-C-38999 Series I has four manufacturers and seven assemblers/distributors.

o Failures - O-ring seal is subject to damage when the leading edge of the male shell is damaged.

OPTION III - MIL-C-81511 Series 3 and 4 and MIL-C-38999 Series II

PRO - Same as Option II plus --

o Non-scoop proof connector available as alternate design choice.

CON - Same as Option II except --

o Several agencies object to combining unmateable connectors in the same specification.

OPTION IV - DEVELOP A NEW GENERAL SPECIFICATION

PRO -

o Consolidate technical requirements and eliminate "leap frogging" of technical improvements.

o Establish a controlled set of characteristics optimizing the important best features.

o Provides a mechanism for establishing preferred connectors available under the common specification.

CON -

o Delays decision on selecting the "standard for use in new design."

o Does not confront the philosophical differences, i.e., scoop proof, design selection, technological progress in connectors.

o No assurance of service agreement on the engineering requirements to be incorporated therein.

FINDINGS

II. C. 1 - Panel Hearing Procedures

The Panel established the following procedures for collecting positions, advice and data:

(a) The Military Departments and the Defense Supply Agency were invited to submit a position paper with respect to the selection of the family of connectors to be designated as standard for use in new design. The papers were to be limited to five-pages and provided to the Panel by 10 May 1974. (Reference memorandum DASD(PE&MA), 24 April 1974, subject: Standardization of Electrical Connectors (See II.D.1, #5)).

(b) The Electronics Industries Association (EIA), the Aerospace Industries Association (AIA) and the Society of Automotive Engineers (SAE) were invited to submit a joint position paper. Since they had previously acted to combine their views on this subject, a single consolidated submission was felt to be in order.

(c) In addition to the position paper, each of the same participants was invited to express the oral arguments in a 20-minute presentation to be followed by about 10-minutes of Panel questions. The presentation and question/answer period were to be made privately to the Panel.

(d) A period of Questions and Answers, in open forum with all presenters in attendance, was instituted to obtain clarification of conflicting opinions and data. The period offered an open opportunity for additional comparison of views.

(e) Industry (i.e., company representatives) were invited to contribute viewpoints and dissenting arguments to supplement the Industry Association Joint Presentation.

(f) The Panel, in executive session, considered the information and advice and developed the recommended position, supporting viewpoints and those related to the viable alternatives which they devised.

II. C. 2 - Synopsis of Hearings

The Panel received oral briefings to supplement the written positions. In addition, a brief question and answer period followed each presentation during which specific points were clarified or amplified to assure that the Panel grasped the thrust of the presentation. (Copies of position papers are included as Part II.D.2.)

a. ARMY - The attributes of both specification items were illustrated by the following table (Chart I).

Feature	MIL-C-38999 Series I	MIL-C-81511 Series 3/4
Jacketed Cable Hardware	No	Yes
Scoop Proof	Yes	Yes
EMI/RFI	No	Yes
Quality of Specification	Moderate	Good
Rear Insert and Withdrawal	Yes	Yes
Ruggedness	Good	Adequate
Price Based on F 14/F 15	Less Costly	Comparable on Basis of Mated Contacts

The presentation discussed the keying characteristics, the use of metal finger retention versus the dielectric retention systems, and a comparison of the moisture sealing systems. During the summarization, the Army indicated that MIL-C-81511 can coexist with MIL-C-38999 which will provide the non-scoop proof items when such requirements occur. Of significance to the Army was the cooperative attitude of the Navy with respect to their accommodating Army technical requirements in contrast to the intransigence of the Air Force to adopting important Army requirements.

During the question period, it was revealed that the NATO consideration of MIL-C-81511 was in terms of Series 1 and 2 (gang release) which was not satisfactory to the Army. The Series 3/4 (single contact release) were not included in the specification when endorsed by NATO.

In response to a question concerning weight, the Army indicated that MIL-C-38999 Series II would be used on the basis of a nonstandard part when weight and space were critical.

It was also learned that MIL-P-11268 cites MIL-C-38999 for Army use in electronic equipment. Since Army felt that MIL-C-81511 was superior they would change the call out in their general specification (MIL-P-11268).

The major field problems concerning connectors has been the keying and the thin leading edge of MIL-C-38999.

With respect to cooperation in the preparation of specifications, the Army stated that their comments (see Army position paper, Part II.C.2.) were withdrawn and that they were not "essential."

(NOTE: Essential comments must be resolved to the satisfaction of both the Review Activity submitting the comment and the Preparing Activity; otherwise, the specification would be referred to the Assignee for decision.)

b. NAVY - The Navy presentation compared the technical characteristics of the two sets of connectors, discussed the deficiencies of the MIL-C-38999 items, emphasized the satisfactory use of MIL-C-81511. Specifically, the contact density and the 100% (Series 3) and 50% (Series 4) scoop proof characteristics were stressed. Of significance was the fact that due to higher density of contacts which allowed for a net reduction in the number of connector shells used in the F 14 there was a weight savings of 40 pounds. The cost comparison demonstrated that the MIL-C-81511 was least costly based upon "contact count."

In its summary, the Navy referred to the agreement of January 1974 which adopted MIL-C-81511 for use in new design. (As indicated earlier, this agreement was abrogated by HQ USAF.)

During the question period, several points were developed. The Navy has used the MIL-C-81511 on controlled systems and had received no feed back to indicate a failure problem. They did have, on the other hand, substantial failure reports of the MIL-C-38999 items - mostly bent pins (Series II).

The Navy stated that they preferred not to mix conductor sizes in the same shell based upon their practice of isolating power cables from signal cables.

c. AIR FORCE - The Air Force compared the attributes of both connector families with respect to the static seal versus dynamic seal, weight advantage when Series 2 is selected, cost data, production sources and the use of assembly distributors versus manufacturers, compatibility with other existing connectors (e.g., contacts and tools), design flexibility allowed by mixing various conductor sizes in a single shell.

The following table revealed an example of comparison of the contact density.

(See next page for Table)

SHELL SIZE	NUMBER OF SIZE 22 CONTACTS PER SHELL		
	MIL-C-81511	MIL-C-38999	DIFFERENCE
8	4 (7)*	6	(-1)*
10	12 (11)*	13	(-1)*
12	Not Provided	22	-
14	37	37	0
16	55	55	0
18	85	66	-19
20	92	79	-13
22	121	100	-21
24	155	128	-27

*Number shown in parentheses reflects current spec provision

During the brief discussion period, the Air Force stated that 90% of the F15 high density circular connectors used on the aircraft were Series 2 of MIL-C-38999 which permitted a 30 pound weight savings. In response to queries on product defects, the Air Force indicated that the shell for MIL-C-38999 is being improved to prevent rim damage.

The Air Force advised the panel that use of the small connectors with jacketed cable was not a good practice; however, hardware was available.

With respect to RADHAZ, the Air Force advised that MIL-C-38999 has been approved for nuclear use by Kirkland AFB (Defense Nuclear Agency).

d. DEFENSE SUPPLY AGENCY - The DSA presentation stated that MIL-C-38999 met the minimum requirements of the DoD, the items (their parts) were compatible with other connectors, they used common tools and they were smaller and lighter than MIL-C-81511. The MIL-C-38999 did not have cable adopting hardware. The MIL-C-38999 was being updated to include Army requirement for static discharge grounding and other features required by MIL-C-50880 so that specification could be eliminated. The cost features were also stressed concluding that MIL-C-38999 was least expensive.

In the question and answer period, the DSA advised that the MIL-C-38999 connectors are lightweight for aerospace use and are susceptible to damage when not used correctly. The commercial aircraft now use MIL-C-26500 but seem to be swinging over to the circular high density use. The use of MIL-C-38999 which employs a common contact with other connectors should facilitate manufacturing by reducing confusion caused by differing cable terminations.

The lack of industry (private sector) standardization and their dependence of DoD was attributed to the fact that they input to DoD and expect to influence the result of our efforts. The fact that DSA (DESC) did not take a firm decision was explained as their desire for "agreement" among the Services. Since either Navy or Air Force would object to DSA decision they referred the problem to OSD level. The urgency for decision now is the international standardization conference in September for which the U. S. has no firm position.

e. INDUSTRY - The Electronics Industry Association (EIA), Aerospace Industries Association (AIA) and the Society of Automotive Engineers (SAE) jointly presented an industry briefing in support of MIL-C-38999 connectors. The presentation reviewed their efforts to assist DoD to improve the connector specifications problems including the high density circular ones. It was pointed out that some failures of MIL-C-81511 items were caused by the use of "standard tools" which are not compatible with the MIL-C-81511 items. Of significance were the following facts:

(1) Failure per million hours of test or use was greater for MIL-C-81511 than MIL-C-38999 for example:

Termination	81511 - 1.6	as compared to 38999 - 0.0011
Couping	81511 - 1.1	as compared to 38999 - 0.0058
Mechanical	81511 - 4.9	as compared to 38999 - 0.0034

(2) Industrial experience heavily leaned to MIL-C-38999 based upon the following:

MIL-C-38999	MIL-C-81511
8 years	2 years
7 million items used	0.2 million
116 major programs	one (F-14)

(3) Industry views the MIL-C-38999 items (Series I and 2) as providing economy through design flexibility, i.e., grounding fingers used only when needed, low profile used when scoop proofing was not needed, mixed contact sizes in single shell facilitates the designers problem with respect to outlet panels, wiring harness layout and connector selection. Designs exist for rear end hardware to accommodate the jacketed cable on MIL-C-38999 items.

Important to industry is the scheduled IEC/ISO meeting in September 1974 at which time a French designed and manufactured connector is expected to be in competition with both MIL-C-81511 and MIL-C-38999. Unless the U. S. has a position around which it can rally support industry (vendors) stand to forfeit sales. A final point, the industry support for MIL-C-38999 was first presented to DoD about one year ago.

During the Question and Answer period, two manufacturers indicated dissent to the industry position (both are sources for MIL-C-81511 items). The following points were expressed by dissenting industry representatives.

(1) The Rome Air Development Center Test Report which supported the use of MIL-C-38999 did not have any data with respect to MIL-C-81511.

(2) MIL-C-38999 Connectors were unuseable because of problems and damage caused in coupling and uncoupling operations.

(3) Under MIL-C-81511 shielding is available.

(4) Under MIL-C-81511 the dynamic "O" ring seal survived the 500 cycles requirement.

(5) Hemetics are available under MIL-C-81511 and are not under MIL-C-38999.

(6) MIL-C-81511 represents the most advanced connector.

(7) MIL-C-38999 Series II does not provide a certain grounding through the fingers now used.

(8) There is no black/white with respect to weight/size. The decision must be in terms of trade-offs.

II. C. 3 - Question and Answer Session: The questions and answers have been edited for clarity. The following is not a complete transcript nor, in most cases, is it verbatim.

Braunstein Question: Does Navy have any information on defects of MIL-C-38999?

Kerr Answer: Experience reveals bent pins, bent coupling rings seals. Other damage due to scooping of Series 2. There is very limited data on the Series 1 (Scoop Proof).

Braunstein Question: Was the experience isolated? How was it overcome?

Kerr Answer Scoop proof connectors are used to prevent the damage and eliminate failures.

Braunstein Question: Will there be a standardization problem due to the introduction of MIL-C-81511 items to the same array that MIL-C-38999 is now available?

Kerr Answer: There is no need to have the same variety.

Braunstein Question: What is the significance of the relationship with rack and panel connectors?

Kerr Answer: Manufacturing difficulty due to differences is questionable. Rack and panel needs more contact engagement and is much more precise. They are different problems.

Braunstein Question: Do we need standardization among rack and panel, rectangular and printed circuit connectors?

Kerr Answer: No.

Braunstein Question: Does DESC wish to challenge the response?

Tonar Answer: Equipment manufacturing is facilitated if the same contacts are used at both ends of the harness. Training and supervision of technicians use in fabrication is easier.

Kerr Answer: Navy would prefer to have only one contact but it does not appear feasible.

Braunstein Question: What major costs are incurred on logistics when items enter the system?

Kerr Answer: It will cost $200 coming in, $100 to maintain, and $200 to take out.

Braunstein Question: Will you need the same array as under MIL-C-38999?

Kerr Answer: We think that one should maintain a limit over the number of variations. For example, plating; with and without grounding; recepticals, etc.

Braunstein Question: Is the variety under the Air Force specification greater?

Kerr Answer: The number of items in supply is greater.

Braunstein Question: What was the problem of moisture in MIL-C-81511?

Chief Craige Answer: There was moisture behind the connector. No specific defect was noted. We suspect it was tension on the connector which distorted it and permitted penetration.

Anderson Question: Was there suspicion of "O" ring failure?

Craige Answer: No. We just don't know the cause.

Anderson Question: In view of the Air Force change with respect to the Picatinny specification requirements, will the Army reconsider its position?

Godwin Answer: No. Army will not change.

Anderson Question: Will DSA comment?

Tonar Answer: When the tests being conducted (to incorporate MIL-C-50880 requirements) they will go into MIL-C-38999.

Anderson Question: Were QPL tests actually run or was QPL status granted?

Kerr Answer: It was a validated test by NAD Crane.

Mittino Question: Was the MIL-C-81511 used on the F-14 directed or voluntary?

Kerr Answer: The contractor proposed both. Navy opted for MIL-C-81511.

Anderson Question: Concluding industry presentation the TRW-Cynch representative spoke out as disagreeing with the presentation, was he representing TRW-Cynch, the firm, a broader segment of industry or what?

Toth Answer: Industry associations are very sensitive in their representations. They conduct formal surveys and obtain ballots which are the official responses from member

companies. In this case, the tally showed an overwhelming response in favor of our position. In the case of TRW, the TRW-Aerospace Corporation voted for MIL-C-38999. (Mr. W. I. Bull of EIA augmented response: EIA represents two segments, the Parts and Gov't Products). The position was developed by the User Division. It was cleared by the Parts - more specifically the connector section. They did not raise objection. The users favor MIL-C-38999 over MIL-C-81511.

Myers Question: How are non-member company viewpoints accommodated?

Toth Answer: They may participate.

Myers Question: What if they don't choose to?

Toth Answer: They have had opportunities. SAE does not wash the same way as EIA or AIA.

Trummers Answer: The committees, in this case, A2C, are comprised of individuals. Of the 34 members, there may be 4 people from one company. The ballot here was 23 in favor of MIL-C-38999 and 3 in favor of 81511.

Vetter Answer: (TRW-Cynch) The industry presentation was not "unanimous" as was stated. It did not go across the entire industry.

Myers (Comment): One thing in particular is disturbing in this entire case, there has been a complete lack of objectivity in every presentation.

Myers Question: With respect to MIL-C-81511 and the "O" ring seal damage, will the Navy discuss this point?

Binderman Answer: The leading edge is subject to damage. When it is misused, it will damage the mating surface of the seal. Laboratory test have been satisfactory but there is no practical way to test "real life" or service use for obvious reasons. One system, VAST, uses 81511 connectors which get service far beyond what may be normal. They have reported no troubles at any of the five stations.

Myers Question: Will Air Force react to this point?

King Answer: We went to Miramor on hearing that the "O" rings were leaking. The F-14 project office did verify "damage". The system was subject to accellerated maintenance on the computer. This has been verified by Grumman. It is standard practice.

Myers Question: Do you have similar problems with MIL-C-38999? That is, is there a pin seal problem?

King Answer: MIL-C-38999 has the same system as MIL-C-81511. A cork and bottle seal.

Myers Question: Do we have experience on failures?

Kerr Answer: The interfacial seal problem is a separate matter from the contact.

Craige Answer: The Miramor situation showed real damage. The problem was not moisture but water which was standing in the C.A.D.C.

Myers Question: (After dialogue concerning McD Testing of MIL-C-38999 beyond spec requirements which caused them to reject one lot of connectors which conformed to the spec). How was the F-15 requirements met?

Utz Answer: McD did test the items but not to MIL-C-38999. The connectors were corrected.

Tonar Answer: The harness testing at McD was not within the specification. The failures were noted and the spec was upgraded. The connector manufacturer used two gland seals which was unusual - he now uses three as everyone else does.

Martino Question: What is the practice on using jacketed cable inside of aircraft?

Toth Answer: Use in aircraft is unusual due to the weight penalty of the cable.

Martino Question: Would you use either?

Toth Answer: No. We would use back shell and other.

Martino Question: Is it a fact that MIL-C-38999 is tested for 250 cycles with grounding fingers?

King Answer: Ungrounded is 500 - but it should be tested.

Martino Question: What about RFI?

King Answer: Don't know if it is detrimental.

Martino Question: Can you discuss the metal versus dielectric retention?

Tonar Answer: MIL-C-81511 is the only connector which uses dielectric retention. It is by far the best method. It costs more but ultimately the cost will reduce. All three suppliers of MIL-C-38999 use metal to metal although one manufacturer will go to dielectric. As soon as he does more will follow.

Martino Question: Will you discuss series 5/6 of MIL-C-81511?

Kerr Answer: Back threaded requirements were incorporated to NAS back hardware without any apparent defects. We do not have a requirement. Navy is not planning a series 5/6.

Bigelow Question: If MIL-C-38999 is made standard, would it meet Army's requirements?

Godwin Answer: As far as minimum requirements both specifications meet Army's. There are other needs, back end hardware for jacketed cable.

Bigelow Question: Suppose MIL-C-38999 were standard, could Navy live with series 1? Series 2?

Kerr Answer: Series 1, yes! Series 2, no!

Anderson Question: Would you clarify use of scoop proof versus non-scoop proof?

Kerr Answer: Navy must know each case where non-scoop proof is used.

Bigelow Question: Then scoop proof is used in general application?

Kerr Answer: Non-scoop proof is used only in controlled situations.

Bigelow Question: In the Miramar discussion of the specifications, would it have occurred if they meet the specs? Was it a defect in manufacture?

King Answer: Dropping a connector will cause damage.

Ball Answer: (Deutsch) The dynamic "O" ring is superior. The plug will travel until it closes on the recepticle. There are static seal difficulties. "O" ring causes main joint sealing. When there are small nicks they will not affect the integrity of the "O" ring. Actually, the "O" ring is replaceable on the pin side. Replacement on the socket side is not feasible.

Kublin Question: Concerning estimated demands which were stated as equal the ratios bother me. There is 35 to 1 ratio of use 380 styles of MIL-C-38999 show no demands - while 140 styles of MIL-C-81511 show no demand?

Tonar Answer: The demand data are predictions. We have no knowledge of the reasons for requisitions.

Kublin Question: Concerning EMI/RFI capacility, can both connectors meet the requirements?

Kerr Answer: MIL-C-81511 and MIL-C-38999 are tested identically.

Godwin Answer: The number of cycles is different.

Smith Question: Your comparison on data on the MIL-C-38999, can you tell us if 81511 was available?

Toth Answer: MIL-C-38999 meets availability, reliability, and price. If MIL-C-81511 did so it may have been selected.

Smith Question: Would MIL-C-38999 be chosen if safety were a paramount consideration?

Answer: Series I, MIL-C-38999 was selected for nuclear use.

Myers Question: Do we know if MIL-C-81511 does or does not meet the requirement?

Answer: They do have experience and they do require solderability via removeable inserts.

Myers Question: Although MIL-C-38999 is now cheaper is there any reason to believe it will remain so?

Tonar Answer: Nothing inherent in its design to make MIL-C-81511 cheaper. Believe the price will reamin there for a near term.

Ball Answer: (Deutsch) The cost of tooling will be absorbed by the vendor. We plan to.

Mittino Question: Has there been other system experience with the MIL-C-81511 besides the F-15?

Answer: Army? About 6 common equipments.
Air Force? Blank.

Kerr Answer: We have projects for the Series 3 and 4 such as F-14, S3A -

Mittino Question: Does the Navy agree with DSA system approach in their brief?

Kerr Answer: We've not checked.

Question: Regarding the RADC study, does any one wish to comment on it?

Ball Answer: The summary statements do say MIL-C-38999. There is no data to support the conclusion. There is absolutely no data on the series 3/4 of MIL-C-81511 since it was not available in the time period of the study.

Toth Answer: We've talked to the author of the study. The coupling, where the damage takes place, is common to the series 1/2 and 3/4.

King Answer: Boeing in their "fly by wire" program recommended MIL-C-38999.

Toth Answer: The failure modes of series 1/2 will be common to the 3/4. That is the failures occur in termination, coupling and mechanics.

Myer Question: Does Navy have data on MIL-C-38999 series 1 failure?

Kerr Answer: No.

Myers Question: Where is your major need for high density connectors?

Godwin Answer: Special applications.

Myers Question: Under what conditions are the connectors most used with jacketed cable?

Toth Answer: On ground applications.

Myers Question: Do I understand that the back part of MIL-C-81511 is not strong enough but that MIL-C-38999 is?

Kerr Answer: Unless special support is provided neither is strong.

Myers Question: How do they come out under test?

Kerr Answer: If both are tested, neither will probably pass the high impact shock.

Myers Question: Does Navy plan to use the full density of varieties?

Kerr Answer: The F-14 uses a portion. Some will use all. Aegies uses all contacts.

Myers Question: What is total requirements for scoop-proof versus non-scoop-proof?

Binderman Answer: When the box is designed, he may not know where it will be used. The box may be reversed and "blind" connections may be necessary.

King Answer: On the F-15, 90% were non-scoop proof.

Myers Question: Is interchangeability a problem?

Answer: No real problem. In fact, action is often taken to prevent mismatch of similar connectors.

Anderson Question: Air Force saved weight - 30 lbs per F-15.
Navy saved weight - 40 lbs per F-14.
Can you explain that?

Binderman Answer: On the F-14 there were 476 mated pairs. 82 are #24 shell which under MIL-C-81511 has 155 contacts as compared to 128 contacts in MIL-C-38999. The savings were due to the use of fewer connectors - even so - they left 10% spare contacts.

Myers Question: With respect to RADHAZ, what would be involved to assure positive grounding?

Bruce Answer: (Bendix) Bendix would have to redesign the item.

Myers Question: Reliability/Assurance how is it applicable to MIL-C-38999 but not to MIL-C-81511? Why is it not applied?

Kerr Answer: ER that is MIL-STD-790 was put out to control the manufacturing process. It does not require action.

Toth Answer: 100% inspection rather than sampling. Periodic requalification and surveillance by DESC-E.

Kerr Answer: The specification requires testing.

Tonar Answer: Both people are correct. The standard checks the manufacturer to assure that he does what he says he'll do rather than checks the product.

Anderson Question: The assumed cost of $100 million over 10 years would this require adopting other styles? Can Air Force live with it?

King Answer: You'd be penalizing the designer, which will impact on fuel consumption and operating time. The designer needs both.

Anderson Question: Would DSA endorse the industry estimates on costs?

Tonar Answer: Growth would occur. Industry would be a better judge as to costs to OEM's. Costs at DESC is $82. No overhead is added.

DEFENSE SUPPLY AGENCY
HEADQUARTERS
CAMERON STATION
ALEXANDRIA, VIRGINIA 22314

IN REPLY
REFER TO
DSAH-SE

1 [illegible]74

MEMORANDUM FOR CHAIRMAN, DEFENSE MATERIEL SPECIFICATIONS AND STANDARDS BOARD

SUBJECT: High-Density Circular Electrical Connectors

Reference: Memorandum, DMSSO, 28 November 1973, subject: Circular Electrical Connectors.

The duplication of high-density circular electrical connector specifications MIL-C-81511 (Navy) and MIL-C-38999 (USAF) continues to adversely affect the Department of Defense logistics system and has resulted in considerable criticism from industry. Numerous attempts by this Agency to resolve this long-standing problem at the Assignee Activity and Departmental Standardization Office level have not been successful. Since an Electronics Panel has been established under the Defense Materiel Specifications and Standards Board (DMSSB), this problem is being referred to the DMSSB for resolution in accordance with Department of Defense Directive 4120.3.

The reference directed that DSA make a final attempt to resolve this problem, and our actions to date are reflected in the attached chronology of events (Enclosure 1). A DSA analysis of the logistic and technical differences between the two connector specifications is detailed in Enclosure 2.

It should be noted that the International Electrotechnical Commission is scheduled to meet during 9-21 September 1974. At that time, connectors conforming to the above specifications, and a French connector, will be considered for international standardization. Industry has expressed fears that failure of the United States to reach agreement on either the Navy or Air Force connector could result in adoption of the French connector, and a significant loss of U. S. industry sales to foreign countries. Therefore, it is imperative that a DoD decision regarding the standardization of connectors conforming with MIL-C-38999 or MIL-C-81511 be made prior to the International Electrotechnical Commission meeting.

DSAH-SE
SUBJECT: High-Density Circular Electrical Connectors

The Defense Supply Agency is available to brief the Board, should this be required.

2 Encl

STANDARDIZATION OF HIGH-DENSITY CIRCULAR ELECTRICAL CONNECTORS

CHRONOLOGY OF EVENTS

25-26 April 1972

Military meeting, chaired by DESC at HQ DSA, attempted to resolve connector specification duplication problem. No resolution obtained. Navy and USAF were unwilling to modify previous positions. Both USAF and Navy prefer their own specification.

3 August 1972

HQ DSA letter sent to the National Aerospace and Standards Committee, AIA, requesting a coordinated industry association consensus recommending the industry position on connector standardization. Similar letter sent to EIA on 15 August 1972.

10, 11 & 12 January 1973

Meeting held at DESC to resolve the duplication problem; it appeared that agreement had been reached for resolution. Projects were initiated to coordinate the offending specifications: MIL-C-83723, MIL-C-005015 and MIL-C-0026482. All work to be completed by 29 March 1974. The need to standardize high-density connectors covered by MIL-C-38999 and MIL-C-81511 was recognized by attendees.

30 March 1973

NAVAIR letter to Army and USAF called for a meeting to be held at the Naval Ammunition Depot, Crane, Indiana, to discuss a testing program for evaluating connectors conforming with 38999 and 81511, to determine the "best" connector to achieve standardization.

18 April 1973

Connector meeting held at Crane to establish the connector evaluation tests and testing sequence.

25 May 1973

Joint recommendation received from AIA/EIA/SAE stating that the Services should standardize on 38999 connectors over 81511 connectors.

8-9 August 1973

A second meeting held at Naval Ammunition Depot, Crane, Indiana, to discuss adequacy of the previously established test program and to consider proposed changes and special test requirements.

15 August 1973

DESC chaired meeting at HQ DSA to consider joint comments. Navy insisted that both connectors should be tested before standardizing on a connector for the next five years. Army and USAF concurred.

13 September 1973

Informal information received indicated that industry felt that their comments were not being given consideration. Meeting held with joint associations and Departmental Standardization Offices to provide industry an opportunity to comment.

15 October 1973

Meeting held at DESC on expedited test criteria and sequence for the comparative evaluation of 38999 and 81511 connectors by Naval Ammunition Depot, Crane, Indiana. Test completion originally planned for late 1974 or early 1975 will be expedited and a connector selected prior to scheduled NATO September 1974 standardization meeting.

16 November 1973

NAVAIR briefed the Engineering Programs Division, HQ DSA, regarding their high-density connector standardization position with particular emphasis on their preference for the 81511 connector in lieu of the 38999 connector preferred by the Air Force. Briefing emphasized better construction and specification testing requirements of the 81511 connector as opposed to reported inadequate test and tolerance requirements of the 38999 connector. NAVAIR also indicated that most users of 38999 connectors were buying to the specification, but with changes.

28 November 1973

Memorandum from OASD(I&L)DMSSO directed DSA to resolve the high-density connector problem and to notify that office of our decision and plans for implementation within 30 days.

6 December 1973

Message 061630Z Dec 73 from DESC requested that the cognizant military engineering activities select their preferred high-density connector specification (38999 or 81511) by 14 December 1973.

9 January 1974

Meeting of Departmental Standardization Offices (DEPSOs) (with engineering representatives present) was held at HQ DSA. DESC made presentation on technical and logistical differences. Result: Complete agreement. Series 3 and 4 of 81511 are preferred for new design. Series II of 38999 may be used when size and weight prohibits use of preferred connectors - subject to nonstandard parts approval procedures. Series 1 and 2 of 81511 and Series 1 of 38999 will be made inactive for new design.

10 January 1974

AFLC representative, who attended the 9 January 1974 meeting, called and indicated that there was some AFLC dissatisfaction with the joint military decision and stated that he would ask HQ USAF to reverse USAF position.

21 January 1974

Memorandum prepared in reply to DMSSO memorandum of 28 November 1974. DMSSO was advised of the 9 January 1974 consensus agreement and that DESC would develop the necessary plans for implementation. These plans will be included in the FY 75 Program Analysis for FSC 5935, Connectors.

5 February 1974

DMSSO letter to AIA, EIA and SAE advised of the above decision, but indicated that implementation was being withheld until 15 February 1974 pending the outcome of a position re-evaluation by the Air Force. Industry to be further advised within 30 days.

13 February 1974

HQ USAF letter reversed Air Force decision and again selected 38999 as the standard. USAF indicated that if the decision to standardize on 81511 is allowed to stand, they will appeal to the DMSSB.

26 February 1974

HQ DSA memorandum forwarded to DMSSB referring connector problem to the DMSSB since an appeal to the Board can be expected regardless of the connector selected as standard.

HIGH-DENSITY CIRCULAR ELECTRICAL CONNECTORS

DSA SUMMARY EVALUATION

	38999	81511
Logistics		
Used in major weapons systems	X	X
Lower DSA unit price	X	
More users	X	
More assets in stock	X	
Standardization		
Commonality of contacts with other connectors	X	
More FIINs	X	
Commonality of insertion and removal tools with other connectors	X	
Technical		
Preferred shell keying		X
Greater durability (mate/unmate)		X
Higher dielectric withstanding voltage		X
Greater contact density		X
Lighter weight per shell size	X	
Heavier construction		X
Overall		
DSA preference	X	

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IN REPLY
REFER TO

1 FEB 1974

DSAH-SE

SUBJECT: Minutes of 9 January 1974 High Density Circular Electrical Connector Standardization Meeting

TO: Distribution

1. References:

a. Memorandum, DMSSO, 28 November 1973, subject: Circular Electrical Connectors.

b. Letter, DSAH-SE, 26 December 1973, subject: Standardization of High Density Circular Electrical Connectors.

c. Memorandum, DSAH-SE, 21 January 1974, subject: Circular Electrical Connectors.

2. Meeting Place: HQ DSA, Room 4C510.

3. Personnel in Attendance: See Enclosure 1.

4. Purpose: The meeting was called by reference 1b to determine whether connectors conforming with MIL-C-38999 or MIL-C-81511 should be preferred for new design applications.

5. Background: Reference 1a required the standardization of high density circular electrical connectors, and notification of the selection decision and plans for implementation within 30 days. This date was extended to 18 January 1974 because previously scheduled meetings had to be cancelled due to inclement weather.

6. Discussion:

a. The Chairman indicated that the purpose of the meeting was to obtain a consensus agreement on standardization of high density connectors. This agreement would result in the selection of a connector as preferred for new design. The nonpreferred connector would continue in use for logistics purposes, and for new design when justified.

DSAH-SE
SUBJECT: Minutes of 9 January 1974 High Density Circular Electrical Connector Standardization Meeting

b. DESC presented a point by point analysis of the factors relating to the connector decision. Each of these points was thoroughly discussed by the attendees and a consensus reached on each one. Several additional comments associated with this discussion are as follows:

(1) Design objectives for 81511 were set by the Army, Navy and Air Force in 1965.

(2) Statements 1-7 on page 4 of enclosure 2 provide a description of the connector only.

(3) In quantity, it was stated that the cost of both the 38999 and 81511 connectors would run about the same price (see page 11 of enclosure 2).

(4) Navy tried to limit the variety of 81511 connectors through standardization. This may account for the smaller numbers of FSNs assigned to these connectors (see page 12 of enclosure 2).

(5) The 81511 connectors have more contacts for the same shell size. (See page 15 of enclosure 2.)

(6) USAF objects to use of the 81511 highest density shell sizes, preferring to use two connectors in lieu thereof.

(7) There are instances where connectors of both specifications are required, to permit certain systems to be satisfactorily completed.

(8) Bent contacts can result from using improper keying.

(9) Specifications should provide a test to ascertain that contact engagement depth requirements are met.

(10) Current problems with both 38999 and 51511 must be corrected since both specifications will continue in use.

7. Agreements: The following unanimous agreement was reached:

a. Scoopproof Connectors: Series 3 and 4 of MIL-C-81511 are preferred for use in new design. Series 1 and 2 of MIL-C-81511 and Series I of MIL-C-38999 will be made inactive for new design.

DSAH-SE
SUBJECT: Minutes of 9 January 1974 High Density Circular Electrical Connector Standardization Meeting

b. Nonscoopproof Connectors: Where system design size and weight prohibit the use of the preferred connector, the nonscoopproof connector conforming with Series II of MIL-C-38999 may be used, subject to non-standard parts approval procedures.

The above agreement does not preclude the use of a particular design connector where necessary to maintain system compatibility.

8. Follow-on Action: Reference 1c forwarded this agreement to the Defense Materiel Specifications and Standards Office.

FOR THE DIRECTOR:

RICHARD A. [illegible]
Acting Chief
Engineering Programs Division

2 Encl

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Director
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LIST OF ATTENDEES

HIGH DENSITY
CONNECTOR MEETING

9 January 1974

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P. M. Cowett	DSAH-SE	274-6775
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J. M. Kerr	NAVELEX (ELEX 50452)	692-3928
Phil Binderman	NAVAIR (AIR 5335)	692-3884
R. W. Tonar	DESC-E	850/5391
Lt. Col. S. F. Choate	HQ AFSC/SDDP	858-7367
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Lt. Col. John Clune	HQ USAF/LGYE	OX 78159
H. J. Dickinson	NAVMAT (0423)	OX 23186
E. D. Proudman	USAMC (RD-EM)	2749801
R. A. Stimson (Chairman)	DSAH-SE	274-6782
Col. Joseph P. Martino	DESC-E	850/6531
Elmer F. Godwin	AMSEL-TL-ME	201-535-2770
Bob Dunlap	AMSEL-RD-EML	201-535-2770

DEPARTMENT OF THE AIR FORCE
HEADQUARTERS UNITED STATES AIR FORCE
WASHINGTON, D.C.

REPLY TO ATTN OF LGYE

SUBJECT Circular Electrical Connectors

TO Director, Defense Supply Agency
Attn: DSAH-SE
Cameron Station
Alexandria, Va 22314

1. Reference:

a. OASD (DMSSO) ltr, 28 Nov 73, same subject.

b. DSAH-SE ltr, 1 Feb 74, minutes of 9 Jan 74 DEPSO meeting.

2. The Air Force has carefully reviewed the details involving the proposed designation of a preferred high density circular electrical connector for use in new design. Particular attention was given to the criteria for decision forwarded to DSA by OASD (Reference a) which in part requested DSA to "review the data on hand so as to determine which of the connectors in question meet (sic) the minimum requirements of the three military departments and can be procured most economically for military applications." The discussions at the 9 January 1974 DEPSO meeting, which led to the present agreement (Reference b), focused on the technical rather than the economic aspects of the matter.

3. Neither connector (MIL-C-38999 (USAF) or MIL-C-81511 (Navy)) is clearly technically superior. Both connectors can, and currently are meeting the requirements of all three military departments. The Air Force connector currently predominates the DOD inventory. The Navy connector (Series 3&4) is relatively new and has limited application. It is not in the best interest of the DOD to expand the use of the Navy's connector in light of the associated costs (industrial tooling, maintenance tools, supply actions, training) when it is not clearly technically superior to the Air Force connector which currently predominates the DOD inventory. From a standardization standpoint, expansion of the use of the Navy connector would further proliferate the connector inventory.

3. In light of the above, the Air Force members on the Defense Materiel Specifications and Standards Board, have directed the AF DEPSO to inform DSA that:

a. The Air Force withdraws its agreement with the position established at the 9 January 1974 DEPSO meeting.

b. The Air Force will formally initiate an appeal under the provisions of DSM 4120.3-M if a decision is made to designate the MIL-C-81511 connector as preferred for use in new design.

4. A detailed package which supports the Air Force position favoring MIL-C-38999 for use in new design will be forwarded to your office NLT 28 February 1974.

E.P. EATON, JR., COL, USAF
Ch, Eningeering Support Div.
Dir Maint, Eng, & Sup DCS/S&L

ASSISTANT SECRETARY OF DEFENSE
WASHINGTON, D.C. 20301

24 APR 1974

INSTALLATIONS AND LOGISTICS

MEMORANDUM FOR The Assistant Secretary of the Army (I&L)
The Assistant Secretary of the Navy (I&L)
The Assistant Secretary of the Air Force (I&L)
Director, Defense Supply Agency

SUBJECT: Standardization of Electrical Connectors

The Electronics Panel of the Defense Materiel Specifications and Standards Board has been charged with developing a recommendation leading to the selection of one family of circular hi-density electrical connectors for use in new design. The candidate connectors are governed by Military Specifications MIL-C-38999 and MIL-C-81511.

A Department or Agency position on this matter is invited via the presentation of oral and/or written information for consideration by the Panel according to guidelines outlined in enclosure 1. The Panel will meet on 20 May 1974 in Room 1E801, Pentagon. Written briefs should be dispatched directly to the individual Panel members listed as such on enclosure 2 to arrive by 10 May 1974. Oral briefs will be presented on 20 May 1974 according to a schedule to be developed and announced.

Questions and arrangements should be referred to Mr. John A. Mittino, Chairman, Electronics Panel, Office of the Assistant Secretary of Defense (OASD (I&L)), Room 2A 318, Washington, D. C., telephone OX5-7915.

FLOYD H. TRESDON
Brigadier General, USAF
Acting Deputy Assistant Secretary of Defense
(Production Engineering & Materiel Acquisition)

Enclosures 2
Guidelines
Panel (Distribution) List

cc: Director, Defense Research and Engineering (DDR&E)(Mr. Gansler)
Defense Materiel Specifications and Standards Board (DMSSB) Mr. Fox
Members, Electronics Panel, DMSSB
Mr. Witt

GUIDELINES FOR PROVIDING INFORMATION ON THE CONNECTOR PROBLEM

A. If your input does not result in a specific endorsement for one or the other connector specifications, cover (as a minimum) cost, performance, and availability considerations.

B. If your input goes to the specific endorsement of one or the other connector specifications:

1. Cover information as in A above;

2. Provide a statement of impact on your activity should the competing specification be adopted as the standard;

3. Describe the competing candidate's deficiencies, precisely, and in terms of attendant system or subsystem operational and functional performance;

4. Describe the technical, economic, and operational feasibility of modifying your candidate's specification so as to meet validated deficiencies attributed thereto.

C. Time and space limitations:

1. A written brief of your position may be submitted for review and consideration by the Panel prior to the meeting date. If submitted, the brief will be limited to five pages, including attachments and enclosures, and should be mailed directly to the Panel members so as to arrive at least ten (10) days prior to the meeting date.

2. An oral brief, not to exceed 20 minutes, exclusive of questions and discussion, may be presented to the Panel on the meeting date.

PANEL (DISTRIBUTION) LIST

Mr. John A. Mittino	Office of the Assistant Secretary of Defense Directorate of Ships, Wpns and Electronics Sys (OASD I&L(WI)) Washington, D. C. 20306	OX7-9175 Room 2A 318	Chairman
Mr. David Braunstein	Department of the Navy NAVMAT 03422 Washington, D. C.	CP #6 Room 820 OX2-2144	USN Member
Cdr C. E. Mandel, Jr.	Naval Electronics Systems Command (National Center #1) Washington, D. C. 20306	692-3877 Room 4E28	USN Alternate
Mr. Vincent J. Kublin	U. S. Army Electronics Command Attn: AMSEL-RD-T Fort Monmouth, N. J. 07703	Hexagon Room 2C-118 8-99-52724	USA Member
Mr. Ronald D. Thomas	Office of the Assistant Secretary of Defense Directorate of Aircraft & Missile Systems (OASD I&L(WM)) Washington, D. C. 20306	Room 2A 340 OX7-6191	OSD(I&L) Member
Mr. E. N. Myers	Office of the Secretary of Defense (Director, Defense Research and Engineering (Electronics & Physical Sciences)(ODDR&E (E&PS)) Washington, D. C. 20306	Room 3D 1079 OX7-3749	OSD(DDR&E) Memb

16 April 1971

52-453 O - 75 - 5

Mr. Andrew M. Hartigan	Office of the Secretary of Defense Office of Director, Telecommunications and Command and Control Systems (ODTACCS) Washington, D. C. 20306	Room 3D 158 OX5-5091	OSD(ODTACCS)Mem
Col Joseph P. Martino	Director, Engineering Standards Defense Electronics Supply Center Dayton, Ohio 45444	8-850-6531	DSA Member
Mr. S. Harry Meiselman	Defense Materiel Specifications and Standards Office (DMSSO) Dwyer Building Cameron Station Alexandria, Virginia	274-7063	DMSSB Representati
Mr. Richard E. Oderwald	Headquarters, Marine Corps Code LMC-4 Washington, D. C.	Room 4119 Navy Annex 43206	USMC Observer
Mr. David Anderson	Hq AFSC/DLCE Andrews AFB Washington, D. C.	Room CD 306 981-2364	USAF Member

OFFICE OF THE ASSISTANT SECRETARY OF DEFENSE
WASHINGTON, D. C. 20301

INSTALLATIONS AND LOGISTICS

24 April 1974

Colonel Charles W. Flint
Electronic Industries Association
2001 Eye Street, N. W.
Washington, D. C. 20006

Mr. Jack P. Reese
Aerospace Industries Association
of America, Inc.
1725 De Sales Street, N. W.
Washington, D. C. 20036

Mr. M. L. Stoner
Society of Automotive Engineers, Inc.
Two Pennsylvania Plaza
New York, New York 10001

Gentlemen

By letter dated 11 April 1974, Mr. Fox advised you that the matter involving standardization of circular electrical connectors has been referred to the Electronics Panel, Defense Materiel Specifications and Standards Board (DMSSB).

A single industry position on this matter, incorporating the views of your respective groups, is invited via the presentation of oral and/or written information for consideration by the Panel according to guidelines outlined in enclosure 1. It was noted that in your joint letter of 20 November 1973 to Mr. Fox, mention was made of a position previously forwarded to the DSA relative to a preferred standard for new design. In any event, the Panel will meet on 20 May 1974 in Room 1E801, Pentagon. A written brief should be dispatched directly to the individual Panel members listed as such in enclosure 2 to arrive by 10 May 1974. An oral brief would be presented on 20 May 1974 according to a schedule to be announced.

Similar invitations are being dispatched to the Military Departments and Defense Supply Agency. Based on your past statements of interest in this matter, I trust you will accept this invitation to participate. In our estimation, an industry view constitutes a major consideration. Also, if applicable, we would be interested in the nature and scope of minority opinions as contributed by your respective member companies.

Questions and arrangements should be referred to Mr. John A. Mittino, Chairman, Electronics Panel, Office of the Assistant Secretary of Defense (Installations and Logistics), Room 2A 318, Washington, D. C. 20301, telephone OX5-7915.

Enclosures
Guidelines
List of Panel Members

JOHN A. MITTINO
Chairman, Electronics Panel
Defense Materiel Specifications and
Standards Board

GUIDELINES FOR PROVIDING INFORMATION ON THE CONNECTOR PROBLEM

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2. An oral brief, not to exceed 20 minutes, exclusive of questions and discussion, may be presented to the Panel on the meeting date.

Mr. John A. Mittino	Office of the Assistant Secretary of Defense Directorate of Ships, Wpns and Electronics Sys (OASD I&L(WI)) Washington, D. C. 20306	OX7-9175 Room 2A 318	Chairman
Mr. David Braunstein	Department of the Navy NAVMAT 03422 Washington, D. C.	CP #6 Room 820 OX2-2144	USN Member
Cdr C. E. Mandel, Jr.	Naval Electronics Systems Command (National Center #1) Washington, D. C. 20306	692-3877 Room 4E28	USN Alternate
Mr. Vincent J. Kublin	U. S. Army Electronics Command Attn: AMSEL-RD-T Fort Monmouth, N. J. 07703	Hexagon Room 2C-118 8-99-52724	USA Member
Mr. Ronald D. Thomas	Office of the Assistant Secretary of Defense Directorate of Aircraft & Missile Systems (OASD I&L(WM)) Washington, D. C. 20306	Room 2A 340 OX7-6191	OSD(I&L) Member
Mr. E. N. Myers	Office of the Secretary of Defense (Director, Defense Research and Engineering (Electronics & Physical Sciences)(ODDR&E (E&PS)) Washington, D. C. 20306	Room 3D 1079 OX7-3749	OSD(DDR&E) Membe

16 April 1974

52-453 O - 75 - 6

Mr. Andrew M. Hartigan	Office of the Secretary of Defense Office of Director, Telecommunications and Command and Control Systems (ODTACCS) Washington, D. C. 20306	Room 3D 158 OX5-5091	OSD(ODTACCS)M
Col Joseph P. Martino	Director, Engineering Standards Defense Electronics Supply Center Dayton, Ohio 45444	8-850-6531	DSA Member
Mr. S. Harry Meiselman	Defense Materiel Specifications and Standards Office (DMSSO) Dwyer Building Cameron Station Alexandria, Virginia	274-7063	DMSSB Represent
Mr. Richard E. Oderwald	Headquarters, Marine Corps Code LMC-4 Washington, D. C.	Room 4119 Navy Annex 43206	USMC Observer
Mr. David Anderson	Hq AFSC/DLCE Andrews AFB Washington, D. C.	Room CD 306 981-2364	USAF Member

DEPARTMENT OF THE ARMY
HEADQUARTERS UNITED STATES ARMY ELECTRONICS COMMAND
FORT MONMOUTH, NEW JERSEY 07703

AMSEL-RD-ET-2

13 MAY 1974

SUBJECT: Standardization of Electrical Connectors

Brigadier General Floyd H. Trogdon
Acting Deputy Assistant Secretary of Defense
Washington, DC 20301

1. Relative to request in your Memorandum, 24 Apr 74, subject as above, this command's comments of 20 Dec 73 (Incl 1) are herewith reaffirmed; namely, the Army favors retaining both specifications as applicable. This position is not an avoidance of choice but in fact a positive expression which reflects multi-faceted Army needs.

a. MIL-C-38999 has had many applications in the past and is a necessary document for maintenance procurements. If used in new design, it would be considered a non-standard part. In the past, Army efforts to revise MIL-C-38999 to include additional requirements such as

(1) Acoustical Noise - 150 dB, 2 minutes

(2) Shock - 300g, 6 milliseconds, 1/2 sine, 8 drops

(3) Acceleration - 200g, 2 minutes, 4 directions

(4) Random vibration - $1.0g^2$, 54.3g RMS 50-3000 Hz

(5) Develop standard back-end hardware for jacketed cable

were not looked upon favorably by the preparing activity (USAF).

b. MIL-C-81511 nominally has superior requirements and provides for an essential Army requirement, which MIL-C-38999 does not; it provides "J" hardware at back-end of connectors to accommodate jacketed cable necessary for outside ground use. On this basis the Army would generally apply MIL-C-81511 to newly designed equipments. It is to be noted that MIL-C-81511 is a preferred NATO document and must be maintained.

13 MAY 1974

AMSEL-RD-ET-2
SUBJECT: Standardization of Electrical Connectors

2. We therefore, again, do not believe that a decision should be made between one specification and the other. If, however, it is limited to such a decision, we support the standardization of MIL-C-81511. Furthermore, the Army, prior to being placed in the position of making this choice, had supported the obtaining of hard data. These tests were cancelled at the recommendation of SAE.

3. The following is offered in response to your "Guidelines for Providing Information on the Connector Problem":

a. As stated in paragraph 1 above, the Army as a positive choice prefers retaining both specifications as applicable.

b. In the event this preference cannot be exercised, the Army would favor the standardization of MIL-C-81511.

(1) The cost in certain insert configurations of MIL-C-81511 is higher but generally if the cost is based on higher density configurations the cost per mated contact pair is equal or lower to MIL-C-38999. The performance of MIL-C-81511 will generally meet more severe environmental conditions. Both specifications have one QPL supplier for the 100% scoop proof design.

(2) The impact, should the competing connector be adopted, would mainly rest on the fact that the standard document would not provide for jacketed cable. The Army, then, would have to develop technical data covering non-standard connectors. There would be consequent additional costs for evaluations and drawings. In addition, the 100% scoop proof feature would be compromised in certain instances.

(3) If the competing connector were adopted, we would be forced to use a connector of nominally lesser quality and without standard back-end hardware for jacketed cable. This would require special drawings for non-standard parts for each equipment.

(4) The Army has been advised that the Navy has expended $50,000 to provide for jacketed cable in MIL-C-81511. It is therefore believed that the Air Force would have to spend at least a like amount or more to modify MIL-C-38999 provided, of course, the Air Force were willing to undertake this modification.

13 MAY 1974

AMSEL-RD-ET-2
SUBJECT: Standardization of Electrical Connectors

4. Inquiries pertaining to this correspondence should be directed to Mr. J. R. Dunlap, Area Code 201, 535-3173 or Autovon 995-3173. Written communications should be addressed to Commander, US Army Electronics Command, ATTN: AMSEL-RD-ET-2, Fort Monmouth, New Jersey 07703.

FOR THE COMMANDER:

S. F. DANKO
Deputy Director, US Army Electronics Technology and Devices Lab

HANS K. ZIEGLER
Director, US Army Electronics
Technology & Devices Laboratory

1 Incl
as

CF:
All Members of Panel

AMSEL-RD-EM-2 20 DEC 1973

SUBJECT: Decision between MIL-C-38999 and MIL-C-81511

Commander
Defense Electronics Supply Center
ATTN: DESC-E
1507 Wilmington Pike
Dayton, Ohio 45444

1. Reference is made to your message P061630Z, December 1973, regarding Specifications MIL-C-38999 and MIL-C-81511. This is in confirmation of telephone conversation between your Colonel Martino and Mr. Dunlap of this headquarters, 13 December 1973.

2. This headquarters does not concur in the necessity of designating a preferred connector at this time and would rather have deferred this decision until completion of the evaluation tests.

3. In view of the fact that a decision will be made at this time regardless of our position, this headquarters position is as follows:

a. The MIL-C-81511 connector is preferred in lieu of MIL-C-38999.

b. The MIL-C-81511, series 3 shall be listed as preferred for new design in MIL-STD-1553.

4. The reasons for this preference are:

a. The specification is up to date; there are no problems with dimensioning or interchangeability among suppliers. There are the same number of suppliers to each specification for the scoop-proof series.

b. The specification contains all of the accessory hardware required by the Army.

20 DEC 1973

AMSEL-ND-E4-2
SUBJECT: Decision between MIL-C-38999 and MIL-C-81511

5. The selection of this specification is compatible with the US position taken at NATO.

6. Notwithstanding the fact that this command and other Army commands have used the MIL-C-38999 connector, our decision is directed toward new design and what is the best specification for attaining our requirements.

7. Inquiries pertaining to this correspondence should be directed to Mr. Robert Dunlap, Area Code 201, 893-1391 or Autovon 995-1391. Written communications should be addressed to Commander, US Army Electronics Command, ATTN: AMSEL-ND-E4-2, Fort Monmouth, New Jersey 07703.

FOR THE COMMANDER:

William H. Thompson, Jr.

THEODORE S. BLOCK
Colonel, SigC
Chief, Production Engineering Division

DEPARTMENT OF THE NAVY
NAVAL ELECTRONIC SYSTEMS COMMAND
WASHINGTON, D. C. 20360

IN REPLY REFER TO
5045/JMK
Ser 187
8 MAY 1974

From: Commander, Naval Electronic Systems Command
To: Distribution List

Subj: Standardization of Electrical Connectors

Ref: (a) ASD (I&L) memo dated 24 Apr 1974 to the Assistant Secretary of the Army (I&L); The Assistant Secretary of the Navy (I&L); The Assistant Secretary of the Air Force (I&L); Director, Defense Supply Agency

1. This Command has been requested by the Assistant Secretary of the Navy (I&L) to respond to reference (a) and prepare and forward to the members of the Electronics Panel of the Defense Materiel Specifications and Standards Board the coordinated Navy position concerning the selection of a high density connector for preferred use in new design.

2. The Navy endorses the MIL-C-81511, Series 3 and 4 (SCOOP-PROOF) as the specification for high density connectors for general use in new design for the following reasons, recognizing that there are bound to be applications where trade-offs dictate use of a short, non-scoop design, such as MIL-C-38999, Series II, to the detriment of reliability and maintainability.

3. The MIL-C-38999 has the following deficiencies:

A. Series I - Scoop Proof

(1) Lack of independent, individual contact and peripheral seals- the location of one seal can prevent sealing by the other.

(2) Lower density of contacts per unit mounting surface area than the MIL-C-81511.

(3) Non-positive keying - four keys can partially mate giving false impression of connector alignment.

(4) Difficult alignment - to prevent cross-mating of adjacent connectors with identical contact configuration the major key is rotated from the 12 o'clock position. (Same as trying to blind insert TV tube when key-way location on tube socket varies).

Subj: Standardization of Electrical Connectors

(5) Less separation (lower safety factor) between current carrying members:

MIL-C-81511	.028" min.
MIL-C-38999	.012" min.

(6) Greater average weight per mated contact pair:

MIL-C-81511, Series 3	.00364 lbs.
MIL-C-81511, Series 4	.00351
MIL-C-38999, Series I	.00367

B. Series II - Non-Scoop Proof

(1) Scoopable - pin contacts subject to bending and push back if mating connectors are not in alignment, allowing contacts to be scooped.

(2) Thin coupling rings (wall thickness at bayonet pin grove) - subject to being bent and cracked during handling.

(3) Deficiencies (1), (2), (3), (4) and (5) as indicated for Series I.

(4) No grounding fingers for EMI, EMP and RADHAZ (radiation hazard) protection (MS27473T Series).

(5) Probability of cross-mating bayonet pins requires extra care in coupling connectors.

(6) Lack of specified critical .024 inch compression for main sealing member.

(7) Durability of design with grounding fingers limited to 250 cycles of mating and unmating. Minimum requirement for circular connectors is 500 cycles.

(8) Grounding fingers engage after electrical engagement resulting in a dangerous RADHAZ condition.

4. The price of MIL-C-81511, Series 3 and 4 high density connectors, based on the average price per mated pair of contacts, is less than that for MIL-C-38999 connectors with one exception: the ungrounded MIL-C-38999, Series II.

Subj: Standardization of Electrical Connectors

A. MIL-C-38999, Series I, would entail the use of a heavier, more costly connector, requiring more panel space, having seals of questionable reliability, non-positive keying to prevent mismating, and blind mating difficulty.

B. If the Series II, scoopable, was used we would have bent pins, distorted coupling nuts and limited durability which seriously reduce the availability of the systems. We have experienced these on the A-7, S-3, ALM-110 and A-6 systems. One very costly case required partial aircraft disassembly to remove computer equipment for return to the manufacturer for replacement with a non-standard scoop-proof connector since the Series II cut-outs are smaller than those of the Series I scoop-proof connector. In addition, we would also have seal, panel space and keying problems similar to those with Series I, as well as not using the most economical connector, unless we neglect the ever present EMI, RADHAZ, and EMP problems.

10. Modifications to eliminate so called deficiencies attributed to MIL-C-81511 connectors are not desirable since such modifications would negate its superior design. The use of throwaway servicing tools common to other connectors, reduction of length and weight at the sacrifice of scoop-proofness, and reduction of contact density at the sacrifice of panel space would require major design and tooling change as well as sacrifice of intermateability with existing MIL-C-81511 connectors.

11. In view of the above, and the Navy's reliability, maintainability and operational requirements, the Navy endorses the MIL-C-81511, Series 3 and 4 scoop-proof connector as the design preferred for general application of high density connectors in new design. It is further recommended that MIL-STD-1353 (Selection and Use of Electrical Connectors) allow the use of MIL-C-38999, Series II (non-scoop-proof connectors) subject to approval of the procuring activity, where system design size and weight precludes the use of the preferred connector.

J. M. KERR, JR.
By direction

Subj: Standardization of Electrical Connectors

MIL-C-81511, Series 3	$ .68 per mated contact pair
MIL-C-81511, Series 4	.85 per mated contact pair
MIL-C-38999, Series I	1.32 per mated contact pair
MIL-C-38999, Series II (grounded)	.88 per mated contact pair
MIL-C-38999, Series II (ungrounded)	.80 per mated contact pair

5. Concerning availability, MIL-C-81511, Series 3 and 4 and MIL-C-38999, Series I each have a single source, however, MIL-C-81511 has an additional source in the process of tooling. It is recognized that there are three sources for the scoopable MIL-C-38999, Series II. The cost of tooling additional sources for both connectors would be comparable.

6. Military specifications must provide sufficient detail and performance requirements to assure interchangeability and intermateability of parts procured from competitive sources and this position was unanimously accepted by EIA, G-11 committee on 11 October 1973. MIL-C-0081511D (Navy) Amend-1 meets this requirement, while MIL-C-0038999D (USAF) and the proposed MIL-C-38999E are defective in this regard. The majority deficiency is lack of dimensional control to assure adequate electrical engagement and environmental sealing at the interface, when connectors are manufactured to the maximum tolerance conditions allowed by the specification.

7. MIL Standard servicing tools (contact insertion and extraction) are specified for both the MIL-C-38999 and MIL-C-81511 connectors. These are plastic throwaway tools packaged with each connector. While the tools specified for MIL-C-38999 are useful on other rear release connectors, this is of no particular advantage in view of the low cost, throwaway design.

8. With reference to standardization and proliferation of the connector inventory, the Navy has intentionally limited the variations in MIL-C-81511 to keep the FSNs to a minimum in accordance with Manual 4120.3-M. Variations in MIL-C-38999 have not been so restricted (front and back mounting receptacles, both grounded and ungrounded versions of Series II, etc.) therefore, more part numbers to support with stock numbers. While MIL-C-81511 connectors are procured to that specification only, procurement of MIL-C-38999 type connectors is being done to a number of specifications with associated multiplicity of stock numbers.

9. Selection of MIL-C-38999 would impact implementation of the Navy's policy that reliability and maintainability be given major consideration in equipment design and application.

A. MIL-C-38999, Series I, would entail the use of a heavier, more costly connector, requiring more panel space, having seals of questionable reliability, non-positive keying to prevent mismating, and blind mating difficulty.

B. If the Series II, scoopable, was used we would have bent pins, distorted coupling nuts and limited durability which seriously reduce the availability of the systems. We have experienced these on the A-7, S-3, ALM-110 and A-6 systems. One very costly case required partial aircraft disassembly to remove computer equipment for return to the manufacturer for replacement with a non-standard scoop-proof connector since the Series II cut-outs are smaller than those of the Series I scoop-proof connector. In addition, we would also have seal, panel space and keying problems similar to those with Series I, as well as not using the most economical connector, unless we neglect the ever present EMI, RADHAZ, and EMP problems.

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J. M. KERR, JR.
By direction

Distribution List:

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ASN (I&L), (L. Johnson)

Office of the Assistant Secretary of Defense
Directorate of Ships, Wpns and Electronics Sys (OASD I&L (WI))
Washington, D.C. 20360
Attn: J. Mittino

Department of the Navy
NAVMAT 03422
Washington, D.C. 20360
Attn: D. Braunstein

Naval Electronics Systems Command
National Center #1
Washington, D.C. 20360
Attn: Cdr C. Mandel, Jr.

U.S. Army Electronics Command
Attn: AMSEL-RD-T (V. Kublin)
Fort Monmouth, N.J. 07703

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Engineering (Electronics & Physical
Sciences) (ODDR&E (E&PS))
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Office of Director, Telecommunications and
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Washington, D.C. 20360
Attn: A. Hartigan

Director, Engineering Standards
Defense Electronics Supply Center
Dayton, Ohio 45444
Attn: Col J. Martino

Defense Materiel Specifications and Standards Office (DMSSO)
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Alexandria, Virginia 22314
Attn: S. Meiselman

Distribution List (continued):

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Code LMC-4
Washington, D.C. 20390
Attn: R. Oderwald

Headquarters
AFSC/DLCE
Andrews Air Force Base
Washington, D.C. 20390
Attn: D. Anderson

DEPARTMENT OF THE AIR FORCE
HEADQUARTERS UNITED STATES AIR FORCE
WASHINGTON, D.C.

10 MAY 1974

IN REPLY TO ATTN OF LGYE

SUBJECT Standardization of Electrical Connectors

TO Distribution List

1. Ref OASD(I&L) memorandum dtd 24 April 1974, same subject.

2. As requested in Ref 1, the attached Air Force Position Paper is forwarded for your review and evaluation in developing the panels recommendation, on selection of a standard connector for adoption by DOD. An oral briefing will be presented to the panel on 20 May 1974, at the panels convenience.

FOR THE CHIEF OF STAFF

[illegible]
[illegible] JR., Col, USAF
Ch[illegible] Div.
[illegible] /I&L

2 Atch
1. Distribution List
2. AF Position Paper

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AIR FORCE POSITION
ON
HIGH DENSITY CONNECTORS

The Air Force has chosen MIL-C-38999 as the standard high density circular connector. These connectors have been in field use for approximately ten years and are performing satisfactorily.

If MIL-C-81511 is chosen, the Military Services will be required to bear the cost of developing and approving additional sources for the MIL-C-81511 connector. This additional cost is not justified because the MIL-C-81511 connectors have not demonstrated any superior attributes.

To date there is no extensive field data on the series 3 and 4 connectors of MIL-C-81511. Specification wise there are deficiencies with the MIL-C-81511 connectors which could present problems if they were produced and supplied by more than one source.

The development and subsequent qualification of multiple sources has already been accomplished for MIL-C-38999. In our opinion, it would be unnecessary and involve additional expense to perform this exercise again.

The following discussion supports the Air Force position for choosing the MIL-C-38999 connectors.

SIZE & WEIGHT

The MIL-C-38999 connector design provides design people significant size and weight savings over the MIL-C-81511 connector with no reduction in reliability or maintainability. If the Air Force was required to use MIL-C-81511 connectors in design this would levy a weight penalty up to 40% increase in over 90% of the present system applications. In restricted, blind mating applications where a scoop proof connector is a design requirement (approx 10% of USAF design applications) the Air Force will still save weight and size by using series "1" of MIL-C-38999 in lieu of MIL-C-81511 series "3".

As an example, this over all system weight savings equates to approx 30 lbs savings per F-15 aircraft.

COST

The current cost ratio of the MIL-C-81511 is 2 to 1 over MIL-C-38999. This price differential equates to an initial purchase cost increase of approximately $20,000 per F-15 aircraft. Multi-vendor sourcing of the MIL-C-81511 connector will reduce this cost ratio, but please keep in mind that additional vendor sources will take a significant investment in time and money. A conservative estimate would be two to three million dollars per additional vendor with a minimum of two years lead time. These vendor costs will be amortized in connector sales to the Services. Also, additional costs will be incurred in adding and maintaining these additional part numbers in the DOD System.

AVAILABILITY

The MIL-C-38999 series "1" connector has two manufacturing sources available. There are also three distributor assembly locations. The series "2" connector has three manufacturing sources (USA) and two in Europe. There are also five distributor assembly locations in the USA and one in Europe. Delivery on the MIL-C-38999 standard layouts is three days for small quantities (1-12) and for factory quantities (13 and up) is 12 weeks.

The MIL-C-81511 series "3" and "4" connector has one manufacturing source available and to our knowledge no additional major connector vendor tooling. Delivery time is 16 weeks on standard layouts.

RELIABILITY ASSURANCE

The Reliability Assurance Program for Electronic Parts Specification covered by MIL-STD-790 places this discipline, monitored by DESC against all MIL-C-38999 connector manufacturers to maintain a documented system which guarantees quality in manufacturing. At the present time, there is no reliability assurance of this type in MIL-C-81511 specification. The MIL-C-38999 connector is backed by ten years of field experience with the installation of over seven million connectors. This design has resulted in a highly refined service proven connector system well accepted in field use. The basic design of the MIL-C-38999 has met the stringent requirements imposed by the F-15, B-1, safe guard missile, and the space shuttle system with no major design changes.

In the eight years of MIL-C-81511 specification existence, it has yet to achieve this recognition.

MAINTAINABILITY

The contact release design, and contact insertion and removal tooling of the MIL-C-38999 are compatible for a given contact size with other major military connector specifications. These specifications are:

a. MIL-C-83723 (USAF)

MIL-C-0026482 (NAVY)

MIL-C-005015 (NAVY)

b. Rack and Panel Connectors

MIL-C-83733 (USAF)

MIL-C-24308 (NAVY)

c. Terminal Junction System

MIL-T-81714 (Tri Service)

MIL-STD-1549 (Tri Service)

The contact insertion and release on the MIL-C-81511 series "3" and "4" are executed in a similar manner but require the use of non-standard application tools not compatible with any other military specification termination system. This design (MIL-C-81511) is not acceptable as a DOD Standard. Unnecessary DOD costs will be incurred in the training of maintenance personnel and the publication of maintenance instructions.

Another major factor is contact spacing; MIL-C-81511 .083 centers, MIL-C-38999 .090 to .095 centers. In field modifications, where maintenance technicians are required to work the system installed on the vehicle, reduced contact spacing increases the complexity of the modification.

DESIGN FLEXIBILITY

The MIL-C-38999 connector design provides the DOD engineering design people a selection of 48 insert patterns to cover all design requirements. Also these insert patterns provide multi contact size combinations. One of the many design advantages is, as an example, bring power into a black box unit on a #20 size contact and carry signal level circuits out on #22 size contacts. The MIL-C-81511 design does not possess this design capability.

MAJOR DOD APPLICATIONS

In reviewing the background history of MIL-C-38999, it was born out of necessity by the nuclear design people at Kirtland AFB in their search for a high reliability electrical termination system for nuclear weapons. It is still today the only approved electrical termination for nuclear systems. In evaluation of the major DOD applications listed below, it is very evident that the MIL-C-38999 design is well accepted in the aerospace design field.

Major DOD design applications using MIL-C-38999 are:

F-15
B-1
SRAM
MKXII Minuteman II
AWACS
A-10
All Satellites
MK17 Nose Cone (Minuteman)
407-L Air Control System
Captor (Navy)
Hawk (Army/NATO)
Mark 48 (Navy)
Safe Guard (Army)
Phoenix
Poseidon (Navy)
All Nuclear Weapons
Space Shuttle
Major DOD Design Applications Using MIL-C-81511 are:
F-14

INDUSTRY SUPPORT

As the result of many industry surveys, a Joint Electronic Industry Association (EIA), Aircraft Industry Association (AIA), and Society of Automotive Engineers (SAE) letter dated 20 Nov 1973 was forwarded to the defense materials, specifications and standard office supporting the selection of MIL-C-38999 as a DOD Standard for high density circular electrical connectors.

SUMMARY

In summation the Air Force requirements and system usage clearly document the need for high density electrical connectors covered by MIL-C-38999. This MIL-C-38999 connector design offers the following advantages to DOD design and maintenance people.

a. Size and weight reduction

b. Cost reduction

c. Availability-Multi-Vendor sources

d. Reliability assurance

MIL-STD-790 required

e. Maintainability-contact system and contact tooling compatible with existing military connector specifications. Contact spacing of .090 to .095 provides additional spacing between electrical contacts for maintenance action.

f. Design flexibility - 48 connector insert patterns available - also multi contact size combinations available within these contact insert patterns.

g. DOD applications using MIL-C-38999 in design are:

F-15
B-1
SRAM
MKXII Minuteman II
AWACS
A-10
All Satellites
MK17 Nose Cone (Minuteman)
407-L Air Control System
Captor (Navy)
Hawk (Army/NATO)
Mark 48 (Navy)
Safeguard (Army)
Phoenix
Poseidon (Navy)
All Nuclear Weapons
Space Shuttle

h. As the result of many industry surveys, industry is in total support of military specification MIL-C-38999.

DEFENSE SUPPLY AGENCY
HEADQUARTERS
CAMERON STATION
ALEXANDRIA, VIRGINIA 22314

IN REPLY
REFER TO DSAH-SE

8 [illegible] 1974

MEMORANDUM FOR MEMBERS OF THE ELECTRONICS PANEL OF THE DEFENSE MATERIEL SPECIFICATIONS AND STANDARDS BOARD (DMSSB)

SUBJECT: Standardization of Electrical Connectors

This is in response to DASD(PE&MA) memorandum, 24 April 1974, inviting the Military Departments and the Defense Supply Agency to submit "oral and/or written information" on the subject for consideration by the Electronics Panel of the DMSSB. This Agency, as Standardization Assignee for connectors, previously attempted to resolve the high density connector problem, but was unable to reach agreement with the Services. The problem was therefore referred to the DMSSB by memorandum dated 1 March 1974 (Enclosure 1), together with the DSA position which remains valid today.

DSA recommends that connectors conforming with specification MIL-C-38999 be selected as the standard high density circular connector. This position is based on the fact that the connectors covered by MIL-C-38999 meet the minimum requirements of the Military Departments for high density circular connectors, and the cost and availability of MIL-C-38999 connectors are far superior to those of connectors covered by specification MIL-C-81511.

As of December 1973, 127 military weapons systems had current program usage of the MIL-C-38999 type connectors. The volume of usage by the Original Equipment Manufacturers (OEMs) prevents DSA from questioning the validity of the statement that "MIL-C-38999 connectors meet the minimum service requirements."

Since DSA is primarily a logistics organization, our primary consideration in the selection of a standard high density general purpose circular connector is logistical support to the Military Departments. Logistics can be broken down into two categories: short-term logistics, such as initial cost and availability; and long-term logistics, such as maintenance and standardization. The following comments are submitted for each category:

a. Initial Cost: The initial cost of a circular connector is variable, depending on the quantity to be procured and whether or not it can be purchased from distributors as an off-the-shelf item. Our investigations into weapon system procurements show that in general the MIL-C-38999 connectors cost about 30% to 40% less than equivalent MIL-C-81511 connectors.

DSAH-SE
SUBJECT: Standardization of Electrical Connectors

We have also obtained the prices paid for connectors by the Defense Electronics Supply Center. The average cost of a MIL-C-38999 connector was $37.61 versus $50.30 for the MIL-C-81511 connector. It should be noted that the materials used to manufacture the connectors are essentially the same. The difference in price is probably the result of competitive bidding for MIL-C-38999 connectors.

b. Initial Availability: The availability of a connector is dependent upon the number of qualified sources and the number of assembly plants/ distributors available. These are summarized in Enclosure 2.

c. Maintenance: The maintainability of a circular connector is dependent on the design of the retention system, and the required tooling to assemble/disassemble the connectors and attach wires to the contacts. There is no significant difference between the MIL-C-81511 and MIL-C-38999 connectors with regard to the retention system except for MIL-C-81511, Series 1 and 2. The gang release retention system used by Series 1 and 2 of MIL-C-81511 creates many maintenance problems; however, since the Series 1 and 2 are not being considered for standardization, the problems with the gang release connector are not relevant. The insertion/removal tool required for both the MIL-C-81511 and the MIL-C-38999 connector is a standard plastic tool which is supplied with each connector. However, the crimping tools and locators used by the connectors are different. The locators required by the MIL-C-81511 are distinct, and are not common to any other connector in use today; however, the locators used by the MIL-C-38999 connectors are common to MIL-C-83733 (rack and panel connectors), MIL-C-24308 (rectangular connectors) and MIL-T-81714 (termination systems).

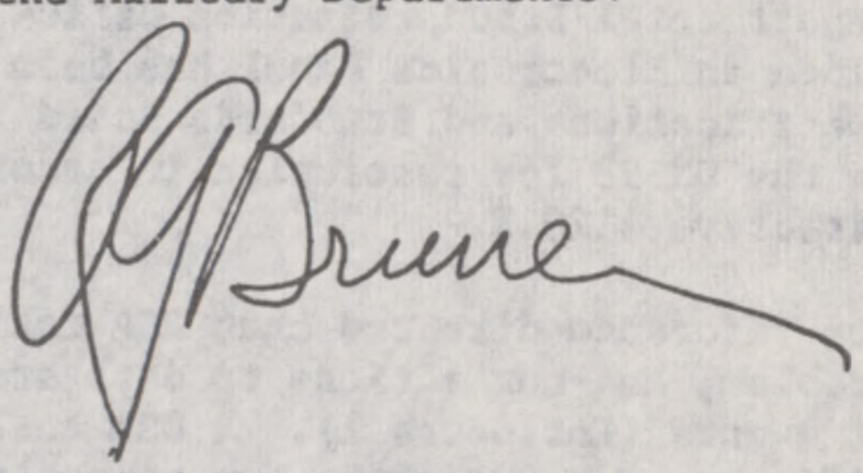
d. Standardization: The eventual impact on the DoD Standardization Program if MIL-C-81511 connectors are selected as standard would be the evolution of new specifications. To bring MIL-C-81511 into conformity with the coverage of MIL-C-38999 would require a new rack and panel connector specification, a new rectangular connector specification and a new printed circuit board connector specification. These actions would be required to standardize on the contacts which lead to tool standardization. It is technically impossible to modify the MIL-C-81511 connectors to accept the contacts used in MIL-C-38999 due to the spacing of the contacts. Since both rectangular and rack and panel connectors use the MIL-C-38999 contacts, the impact on the inventory and the standardization program caused by selecting the MIL-C-81511 connectors would be considerable.

DSAH-SE
SUBJECT: Standardization of Electrical Connectors

In summary, MIL-C-38999 connectors appear to meet the minimum performance requirements of the Military Departments, and are the choice of most of the OEMs. The MIL-C-38999 connectors are less expensive at initial procurement, and can be procured from more QPL sources and a number of distributors. The impact of selecting MIL-C-81511 connectors as standard would be a substantial increase in the number of connectors in the supply system, and an additional duplication of connector specifications. DSA therefore recommends that MIL-C-38999 connectors be selected as "standard."

An oral presentation will be given to the members of the DMSSB Electronics Panel on 20 May 1974 by the Defense Electronics Supply Center. It is strongly suggested that your Panel make a definitive recommendation to the DMSSB, and refrain from a compromise solution which would further proliferate our logistics system, and detract from DSA'a ability to provide timely and economical support to the Military Departments.

FOR THE DIRECTOR:



2 Encl

Copy furnished:
DMSSO

RICH... C...
Exec...
Technical ... - ...vices

1 MAR 1974

DSAH-SE

MEMORANDUM FOR CHAIRMAN, DEFENSE MATERIEL SPECIFICATIONS AND STANDARDS BOARD

SUBJECT: High-Density Circular Electrical Connectors

Reference: Memorandum, DMSSO, 28 November 1973, subject: Circular Electrical Connectors.

The duplication of high-density circular electrical connector specifications MIL-C-81511 (Navy) and MIL-C-38999 (USAF) continues to adversely affect the Department of Defense logistics system and has resulted in considerable criticism from industry. Numerous attempts by this Agency to resolve this long-standing problem at the Assignee Activity and Departmental Standardization Office level have not been successful. Since an Electronics Panel has been established under the Defense Materiel Specifications and Standards Board (DMSSB), this problem is being referred to the DMSSB for resolution in accordance with Department of Defense Directive 4120.3.

The reference directed that DSA make a final attempt to resolve this problem, and our actions to date are reflected in the attached chronology of events (Enclosure 1). A DSA analysis of the logistic and technical differences between the two connector specifications is detailed in Enclosure 2.

It should be noted that the International Electrotechnical Commission is scheduled to meet during 9-21 September 1974. At that time, connectors conforming to the above specifications, and a French connector, will be considered for international standardization. Industry has expressed fears that failure of the United States to reach agreement on either the Navy or Air Force connector could result in adoption of the French connector, and a significant loss of U. S. industry sales to foreign countries. Therefore, it is imperative that a DoD decision regarding the standardization of connectors conforming with MIL-C-38999 or MIL-C-81511 be made prior to the International Electrotechnical Commission meeting.

DSAH-SZ
SUBJECT: High-Density Circular Electrical Connectors

1 MAR 1974

The Defense Supply Agency is available to brief the Board, should this be required.

2 Encl

(Signed)
D. H. RICHARDS
Major General, USA
Deputy Director

8-9 August 1973

A second meeting held at Naval Ammunition Depot, Crane, Indiana, to discuss adequacy of the previously established test program and to consider proposed changes and special test requirements.

15 August 1973

DESC chaired meeting at HQ DSA to consider joint comments. Navy insisted that both connectors should be tested before standardizing on a connector for the next five years. Army and USAF concurred.

13 September 1973

Informal information received indicated that industry felt that their comments were not being given consideration. Meeting held with joint associations and Departmental Standardization Offices to provide industry an opportunity to comment.

15 October 1973

Meeting held at DESC on expedited test criteria and sequence for the comparative evaluation of 38999 and 81511 connectors by Naval Ammunition Depot, Crane, Indiana. Test completion originally planned for late 1974 or early 1975 will be expedited and a connector selected prior to scheduled NATO September 1974 standardization meeting.

16 November 1973

NAVAIR briefed the Engineering Programs Division, HQ DSA, regarding their high-density connector standardization position with particular emphasis on their preference for the 81511 connector in lieu of the 38999 connector preferred by the Air Force. Briefing emphasized better construction and specification testing requirements of the 81511 connector as opposed to reported inadequate test and tolerance requirements of the 38999 connector. NAVAIR also indicated that most users of 38999 connectors were buying to the specification, but with changes.

28 November 1973

Memorandum from OASD(I&L)DMSSO directed DSA to resolve the high-density connector problem and to notify that office of our decision and plans for implementation within 30 days.

6 December 1973

Message 061630Z Dec 73 from DESC requested that the cognizant military engineering activities select their preferred high-density connector specification (38999 or 81511) by 14 December 1973.

9 January 1974

Meeting of Departmental Standardization Offices (DEPSOs) (with engineering representatives present) was held at HQ DSA. DESC made presentation on technical and logistical differences. Result: Complete agreement. Series 3 and 4 of 81511 are preferred for new design. Series II of 38999 may be used when size and weight prchibits use of preferred connectors - subject to nonstandard parts approval procedures. Series 1 and 2 of 81511 and Series 1 of 38999 will be made inactive for new design.

10 January 1974

AFLC representative, who attended the 9 January 1974 meeting, called and indicated that there was some AFLC dissatisfaction with the joint military decision and stated that he would ask HQ USAF to reverse USAF position.

21 January 1974

Memorandum prepared in reply to DMSSO memorandum of 28 November 1974. DMSSO was advised of the 9 January 1974 consensus agreement and that DESC would develop the necessary plans for implementation. These plans will be included in the FY 75 Program Analysis for FSC 5935, Connectors.

5 February 1974

DMSSO letter to AIA, EIA and SAE advised of the above decision, but indicated that implementation was being withheld until 15 February 1974 pending the outcome of a position re-evaluation by the Air Force. Industry to be further advised within 30 days.

13 February 1974

HQ USAF letter reversed Air Force decision and again selected 38999 as the standard. USAF indicated that if the decision to standardize on 81511 is allowed to stand, they will appeal to the DMSSB.

26 February 1974

HQ DSA memorandum forwarded to DMSSB referring connector problem to the DMSSB since an appeal to the Board can be expected regardless of the connector selected as standard.

HIGH-DENSITY CIRCULAR ELECTRICAL CONNECTORS

DSA SUMMARY EVALUATION

	38999	81511
Logistics		
Used in major weapons systems	X	X
Lower DSA unit price	X	
More users	X	
More assets in stock	X	
Standardization		
Commonality of contacts with other connectors	X	
More FIINs	X	
Commonality of insertion and removal tools with other connectors	X	
Technical		
Preferred shell keying		X
Greater durability (mate/unmate)		X
Higher dielectric withstanding voltage		X
Greater contact density		X
Lighter weight per shell size	X	
Heavier construction		X
Overall		
DSA preference	X	

Initial Availability of MIL-C-38999:

QPL Sources:

Series I: Hermetics - Bendix, Sidney, NY
Sealtron, Cincinnati, OH
Environmental - Bendix (Full Line)
ITT Cannon (Shell Size 23 and 25), Santa Ana, CA

Series II: Hermetics - Bendix
Sealtron
Environmental - Bendix (Full Line)
ITT Cannon (Shell Size 10 thru 24)
Burndy (Full Line), Norwalk, CN

Assembly Plants/Distributors

Bendix: Powell/Gulf Electronics
Miami Springs, FL

Avnet Electronics
Culver City, CA

Hamilton/Avnet
Westbury, LI, NY
Dallas, TX

Powell Electronics
Philadelphia, PA
Mountain View, CA

Milo of CA, Inc
Kansas City, KS

ITT Cannon: Electro Air Corporation
Atlanta, GA

Time Electronics
Woburn, MA
Inglewood, CA
Hanppange, LI, NY

Initial Availability of MIL-C-81511:

QPL Sources:

Series I: Hermetics - NONE
Environmental - Amphenol (Full Line), Broadview, IL
Cinch-Hulline (Full Line), Minneapolis, MN

Series II: Hermetics - NONE
Environmental - Amphenol (Full Line)
Cinch-Hulline (Full Line)

Series III: Hermetics - Deutsch (in process), Banning, CA
Environmental - Deutsch (Full Line)

Series IV: Hermetics - Deutsch (In process)
Environmental - Deutsch (Full Line)

Assembly Plants/Distributors:

Deutsch: C. S. Marshall El Monte, CA

ELECTRONIC INDUSTRIES ASSOCIATION

AEROSPACE INDUSTRIES ASSOCIATION OF AMERICA, INC.

SOCIETY OF AUTOMOTIVE ENGINEERS

May 10, 1974

Mr. John A. Mittino, Chairman
Electronics Panel - DMSSB
Office of the Assistant Secretary of Defense
Directorate of Ships, Weapons and Electronics
Systems (OASD I&L (WI))
Washington, D. C. 20306

Dear Mr. Mittino:

In response to your 24 April 1974 letter, we are pleased to submit the attached Industry (AIA-EIA-SAE) reaffirmation and further substantiation of the unanimous joint-association selection of MIL-C-38999 as the preferred MIL standard for circular subminiature connectors.

MIL-C-38999 meets the requirements involved in its broad usage in 116 DoD projects, many airlines, NASA and AEC projects at a minimum cost and with requisite reliability. Your selection of MIL-C-38999 would achieve the desired elimination of unwarranted duplication inasmuch as MIL-C-81511 has limited use, has a single source and is an uncoordinated specification.

We appreciate the opportunity to participate in this important standardization action and we are looking forward to discussing this further at the May 20 meeting and will plan to present an oral briefing.

Very truly yours,

Electronic Industries Association
C. W. Flint

Aerospace Industries Association
J. P. Reese

Society of Automotive Engineers
M. L. Stoner

cc: Members Electronic Panel - DMSSB
Lester Fox

AIA-EIA-SAE INDUSTRY BRIEF
ON
DOD STANDARDIZATION OF CIRCULAR SUBMINIATURES ELECTRICAL CONNECTORS

This brief reaffirms the AIA-EIA-SAE unanimous joint-associations selection of MIL-C-38999 as the preferred MIL standard for circular subminiature connectors to be used in new DoD designs as expressed in our letters of 25 May 1973 and 20 November 1973.

We believe your selection of MIL-C-38999 is the only deci ion in conformance with Deputy Secretary of Defense Clements' 14 December 73 emphatic equest to DoD agencies and the Services to reduce support costs via standardization across DoD components. The selection of the functionally equivalent and incomplete MIL-C-81511 family of connectors will unnecessarily increase DoD's support and other costs. Substantiation of this and other factors favoring MIL-C-38999 selection follows:

A. Cost, Performance, and Availability

1. Costs

Cost comparisons, between connectors conforming to MIL-C-38999 and MIL-C-81511, consider (a) purchase price (b) logistics entry and (c) logistics maintenance.

(a) Purchase Price - The most meaningful and realistic price comparison is to utilize price book quotations for normal quantities, known and verified quotations for production/package buys and known and verified DESC procurements for stocking and logistics purposes. The following illustrates the average ratio of purchase price differences between connectors conforming to MIL-C-38999 and MIL-C-81511 by type of "user."

	MIL-C-38999	MIL-C-81511
OEM	1.0	2.01
NOL	1.0	1.88
DESC	1.0	1.66

(b) Logistics Item Entry - The average cost to enter each new connector into the DESC logistics program is $1000 per item. At present time, there are approximately 1000 MIL-C-38999 connectors presently in the supply system compared to approximately 100 MIL-C-81511 connectors. The cost to provide for comparable utilization and coverage for MIL-C-81511 would be $900,000.

(c) Logistics Maintenance - DESC annual costs to maintain each connector in the logistics system is $1000 per connector or an additional $100,000 per year to maintain MIL-C-81511.... in addition to maintaining present MIL-C-38999 connectors in the system for existing design applications.

In summary, MIL-C-38999 is the lowest cost selection and offers distinct and highly competitive pricing without any additional costs to the Government for logistics item entry. Conversely, selection of MIL-C-81511 represents an 88% average unit purchase price increase (over MIL-C-38999) plus a one million dollar initial cost to the Government for logistics item entry followed by an additional annual cost to the Government of $100,000 for logistics maintenance.

2. Performance

Performance capabilities of MIL-C-38999 connectors are covered under Section b, Operational and Functional Requirements, where the feature of (a) Weight, (b) Volume, (c) Application, (d) Reliability, (e) Experience and (f) Compatibility/Commanality are discussed.

MIL-C-38999 epitomizes flexibility of design to maximize (a) cost effectiveness, (b) weight and size conservation and (c) compatibility with unique application requirements. MIL-C-38999 permits:

(a) Specification of grounding fingers only when required - no unnecessary cost penalties.

(b) Specification of low profile type where scoop proofing (approximately 10% of application requirements) is not required - no unnecessary weight and size penalties.

(c) Specification of mixed contact sizes in given layout to permit use of power and signal currents in the same connector - no need to use two separate connectors.

(d) Specification of appropriate finish compatible with the demands of the application - minimizes the introduction of proprietary types into the logistics system.

(e) Use of service tooling compatible with other major military connectors - no need to establish a new set of unique service tools.

3. Availability

By any test only MIL-C-38999 meets all the criteria of availability required by industry and the Services. This connector series provides -

a. An optimum number of types, sizes, and styles and contact arrangements with design features required by today's programs.

b. Multiple sources for both manufacturers and distributor/assemblers.

c. Responsive delivery

There are twice as many insert arrangements qualified to MIL-C-38999 (including configurations with mixed contact sizes as well as coax contacts), as to MIL-C-81511. Even when MIL-C-81511 has been specified, 38999 connectors are incorporated due to a lack of appropriate configuration or appropriate materials and finishes. This proliferation is contrary to the basic principles of standardization.

The following is a comparison of qualified sources for these connectors:

	MIL-C-38999 Series 1	MIL-C-81511 Series 3
No. of manufacturers	2	1
No. of Assembly Facilities (other than manufacturers)	2	0

	MIL-C-38999 Series 2	MIL-C-81511 Series 4
No. of manufacturers (USA)	3	1
No. of Assembly Facilities (USA)	5	0
No. of manufacturers (Europe)	2	0
No. of Assembly Facilities (Europe)	1	0

Delivery of MIL-C-38999 is approximately 3 days for small quantities with factory quantities in approximately 12 weeks.

B. Impact

Selection of competing MIL-C-81511 would impact our industry in the areas of (a) cost, (b) availability, (c) flexibility, and (d) logistics.

(a) Cost - Purchase costs and DESC logistics are discussed in Item A1 above. Hidden additional costs to the user excluding the connector basic cost:

User Added Cost - (Not including connector(s) basic cost)
When a new connector series is introduced to replace a connector series currently in use, the following are experienced:

a. Experience	- Training - learning
b. Tooling	- Insertion/extraction, crimp • Procurement/calibration/ maintenance/bookkeeping
c. Purchasing Power Dilution	- Reduced quantity per buy = more buys
d. Documentation/Distribution/ Maintenance	- Internal drawings, standards, procedures
e. Processing	- Duplicate planning, assembly lines/tooling, incoming test/ inspection, stocking, releasing, accounting
f. Program Requirements	- Qualification above specification requirements
g. Field Support	- Instructions, stock documentation

These cost elements will exist to a varying degree depending on the program requirements, the performing organizations and the mix of programs in-house. Some such as experience, tooling and program requirements have short term impact. The others are of long term durations entailing a variable cost with time.

An integrated approximation of user added cost as a percentage increase over continuing with a single connector series is to be at least 10%, during the initial years declining to about 3% (excluding the cost of the connectors) by the 10th year.

Manufacturers Added Cost - The cost for the currently qualified MIL-C-38999 connector manufacturers to tool and supply MIL-C-81511 at the same level as MIL-C-38999 is estimated at 12 million dollars.

(*b) Operational and Functional Requirements - (Availability, Flexibility)
If the MIL-C-0081511 connector were selected as the preferred connector for new design in lieu of the MIL-C-38999 connector, it would affect system or subsystem operational and functional performance by the following factors:

(1) Weight, Volume and Performance - The penalty that must be paid due to the increase of weight could have a major affect on total system cost and performance. System performance is directly related to weight. It can range from $100 to $25,000 per pound depending on the system and application. An increase of only one pound of weight for a specific tactical surface to surface missile would decrease its effective range by one mile. The increased volume dictated by the use of MIL-C-0081511 imposes design restraints during product development, which is directly related to total system performance. There is no equivalent in MIL-C-81511 to the low silhouette, Series II, of MIL-C-38999. Because of this, specific Navy applications such as the MK 48 torpedo require use of MIL-C-38999 connectors to meet limitations of size and geometry. Evaluation of typical USAF applications indicate that the USAF would be forced to pay a weight penalty of up to 40 percent in over 90 percent of connector applications, if the MIL-C-81511 connector would have been used.

In restricted, blind mating applications where a scoop proof connector is required (10 percent of USAF applications), the USAF will still save weight and length by use of the MIL-C-38999, Series I, connector in lieu of MIL-C-81511, Series 3. As an example, this factor equates to a 30 pound weight savings on the F-15 aircraft..

(2) Reliability

Reliability assurance of the MIL-C-38999 connectors is stipulated through imposition on the connector manufacturers of MIL-STD-790, Reliability Assurance Program for Electronic Parts Specification. No such control and discipline exists in the MIL-C-81511 specification.

The MIL-C-38999 type connectors have gained significant experience in the field for over eight years with use of more than 7 million connectors from the current sources; accumulation of data indicates connector performance adequacy. RADC-TR-171 report, dated June 1973, substantiates this fact and points up the inadequacies of the MIL-C-81511 connectors:

* = Also applies to Q on page 5

MIL-C-38999 overall failures per million part hours is orders-of-magnitude better than MIL-C-81511, based on 6,800+ MIL-C-38999 series 1 and 2 connectors and 4,800+ MIL-C-81511 series 1, 2, 3, and 4; test and field data accumulated from 1967 to late 1972. "It is apparent from the proceeding data that the overall connector of choice is MIL-C-38999."

The MIL-C-38999 connectors have established over eight years experience on more than 116 military service programs, and all NASA and AEC programs as compared to less than two years experience with series 3 and 4 MIL-C-81511 connectors.

(3) Compatibility/Commanlity

The MIL-C-38999 connector is compatible with other connector-types in prominent use in the military including specification 5015, 26482, 83723, 83733, 81714, 24308. This compatibility is characterized by commonality of contact configurations and process tooling (contact crimp, installation and removal) as contrasted to MIL-C-81511 which is not compatible with any other military connector specification. This factor cannot be over-emphasized especially in consideration of contractors and Government need to interface with the myriad types of connectors in existing systems and Government Furnished Equipment. The F-14 contractually required only MIL-C-81511 connector and still uses approximately seventy-five MIL-C-38999 connectors to accomodate the Phoenix, CAINS and other systems.

C Competing Candidate Deficiencies (*b on page 4 also applies here)

There are a minimum of twenty three (23) MIL-C-81511 deficiencies falling into two main categories: (1) performance and (2) intermateability. The latter is especially significant in the event a second source would attempt to qualify to series 3 and 4 of MIL-C-81511. This may require complete redesign.

D MIL-C-38999

As of this date, industry has no knowledge of validated deficiencies in connectors conforming to MIL-C-38999.

E SUMMARY

Electronics Industry Association, Aerospace Industries Association and the Society of Automotive Engineers appreciates the opportunity to participate with this panel in this standardization action. It is a challenging assignment that will have major impact on every weapon system and every element of the design-test-production-support cycle. The breadth of this impact is the basic reason for industry's selection of a connector system which has the proven capability of meeting the technical requirements of our latest systems, yet has been an item of supply and successfully supported for more than eight years. Any action that directs the utilization of another connector in place of the MIL-C-38999 series will result in significantly greater total life costs with no over-all improvements in performance. Your selection of MIL-C-38999 as the preferred connector series will provide an affirmative response to Secretary Clements' urgent request for standardization efforts to reduce support costs.

II. D. 3 - **Electronic Panel Meeting, 20 May 1974, Standardization of High Density Circular Electrical Connectors**

Attendance List: (Some attendees failed to register)

Name	Activity/Association/Company	Telephone
J. M. Kerr, Jr.	NAVELEX	(202)692-3928
Don Galiardwien	Deutsch Company	(703)569-9570
R. W. Tenar	DESC-EMT	(513)296-5391
Elmer F. Goodwin	U. S. Army Electronics Command	(201)535-2770
J. F. Chappell	U. S. Army Electronics Command	
V. J. Kublin	U. S. Army Electronics Command	
J. R. Dunlap	U. S. Army Electronics Command	
P. C. Hannacord	HQ AFLC/MM	787-6202
James Marshall	HQ AFLC/MMCA	787-2007
D. M. Skaggs	HQ AFLC/MMC	787-6681
Stanley F. Choate	HQ AFSC/SDDP	858-7367
Paul Presnell	HQ AFSC/SDDP	858-7367
Lt Col Ellis	HQ AFLC/MMGE	785-3387
Rich Lewandowski	ASD/ENAEC	695-2934
Harry King	Sacramento ALC/MMCA	
Phillip M. Cowett	HQ DSA	274-6778
Lt Col Thomas Brooks	DESC-EP	296-6533
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J. M. Moore	ITT Cannon	(703)370-5733
B. Brush	Bendix	(607)563-9511
F. Bulken	Bendix	(607)563-9511
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J. M. Loudon	G.E.C.O. (EIA Users)	(315)456-7152
Ron Hammond	Matrix Science	(213)320-4040
John Schnepf	Matrix	(213)320-4040
Ken Truhn	Bendix	(607)563-9511
Henry Comeau	Deutsch	(714)849-6701
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David Ball	Deutsch	(714)849-6701
J. M. Houston	AIA	(202)DI7-2315
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Bob Toth	AIA - Industry Spokesman	(305)855-6100
NVCM Jim Craig	VF 124 (USN)	(714)271-2281

DEPARTMENT OF DEFENSE

STANDARDIZATION PROGRAM ANALYSIS

FSC CLASS: 5955

TITLE: PIEZOELECTRIC CRYSTALS

APPROVED: 31 October 1974

FISCAL YEARS: 1975, 1976, 1977, 1978, 1979.

ASSIGNEE ACTIVITY: ARMY ELECTRONICS COMMAND (EL)

PARTICIPATING ACTIVITIES:

ARMY- ELECTRONICS COMMAND (EL)

NAVY- NAVAL ELECTRONICS SYSTEMS COMMAND (EC)

AIR FORCE- WARNER ROBINS AIR MATERIEL AREA (84)

INDUSTRY ASSOCIATIONS/SOCIETIES: EIA, IEC

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APPENDIX. 17

I. Executive Summary

A. Problems/Opportunities and Work Required.

1. It has become very difficult for the government to procure quartz crystals at a reasonable price and in an acceptable time phase. Manufacturers have been unresponsive to purchase requests, have asked for expensive test charges and have given extremely long lead times for delivery. The situation has resulted in a large number of backorders, increased procurement costs and greatly affecting the overall logistics management of quartz crystals.

2. Improvement in the capability of manufacturers has made the requirement for an undercut in crystal holders obsolete. Military specifications that contain this requirement must be revised to remove this unnecessary operation that could increase purchase costs.

3. The increased use of microelectronic devices has brought about a need for crystals, crystal holders and crystal oscillators that are compatible with these devices. Military specifications are needed for these new crystal devices to establish preferred items for new design and for procurement when they become part of the supply inventory.

B. Summary of Coordinated Program.

1. An investigation is being made by DESC organizations to determine the reason for the inability to obtain crystals in a reasonable manner. The study has included the

Military Departments and representatives from the crystal industry. A series of alternates has been recommended but no real conclusions have been made at this time. The investigation is continuing on this serious matter.

2. Projects have been scheduled to revise all specifications that specify an undercut in the crystal holder making the undercut optional. The option will be retained in the event a small manufacturer has not attained the capability of the current crystal industry.

3. Projects have been scheduled to develop detail specifications for new miniaturized crystals and crystal oscillators that will be compatible with microelectronic devices. The general specification will also be changed to include new test methods for these devices.

C. Backlog. Resources are considered adequate to accomplish the scheduled projects for this supply class.

II. Statistical Information

A. Support of Procurement.

1. Table I - Specification Coverage Statistics (DESC-ISIS-INC Report of 28 Feb 1974) 1/

	Spec 2/	Non Spec	Total	Percent
Active FSN's	13,904	9,059	22,963	60.6
NonDESC Managed	5,528	2,986	8,514	65.0
DESC Managed	8,376	6,073	14,449	58.0
NSO 3/	4,992	3,955	8,947	55.8
Under $400 demand	2,982	1,805	4,797	62.5
$400 to $4500 demand	242	244	486	49.8
$4500 and over demand	5	27	32	15.2

1/, 2/, 3/-See appendix

2. Specification Coverage Analysis. The percent of military specification items to the total number in the class is 60.6 percent. This is a high ratio compared to other component supply classes of the 5900 group. Since only 15 percent of the high dollar/volume items are covered by a specification, an investigation is needed to determine if specification actions are warranted on these items not covered. Approximately 50 percent of the items with demand over $4500 are crystal ovens.

B. Support of Engineering.

1. Standard Coverage. The standard for the selection of preferred crystals and crystal holders is MIL-STD-683. There is no standard for crystal oscillators or crystal ovens which are included in the 5955 class. The state-of-the-art for crystals has improved so that ovens are not usually needed. Specifications for crystal oscillators are a recent development and a standard is not needed until some future time when more specifications are issued.

C. Support of Supply Management.

1. Class Population. The total number of Federal stock numbered items in FSC 5955 is 36,980. Of these, 10,612 are considered inactive with no recorded user of the items. Inactive items are normally purged from the system after five years if no users are recorded within this time. Table II lists the number of items used/managed by governmental activities. The quantities listed do not total because an item may be used by more than one activity.

TABLE II. Class Population.
(Data from quarterly DLSC-IMSS-8-B Report of June 1973) 4/

Total Catalog System, FSC 5955			36,980
Items without users			10,612
Items with user/managers			26,368
Other Governments		8,732	
U. S. Government		23,072	
Civil Agencies		8,620	
DoD		16,302	
Other DoD	73		
Military Departments	15,898		
Army		4,313	
Navy		7,964	
Air Force		7,468	
Marines		1,142	

2. Growth Rate.

a. Table III lists the total number of active items used by the Military Departments since 1965.

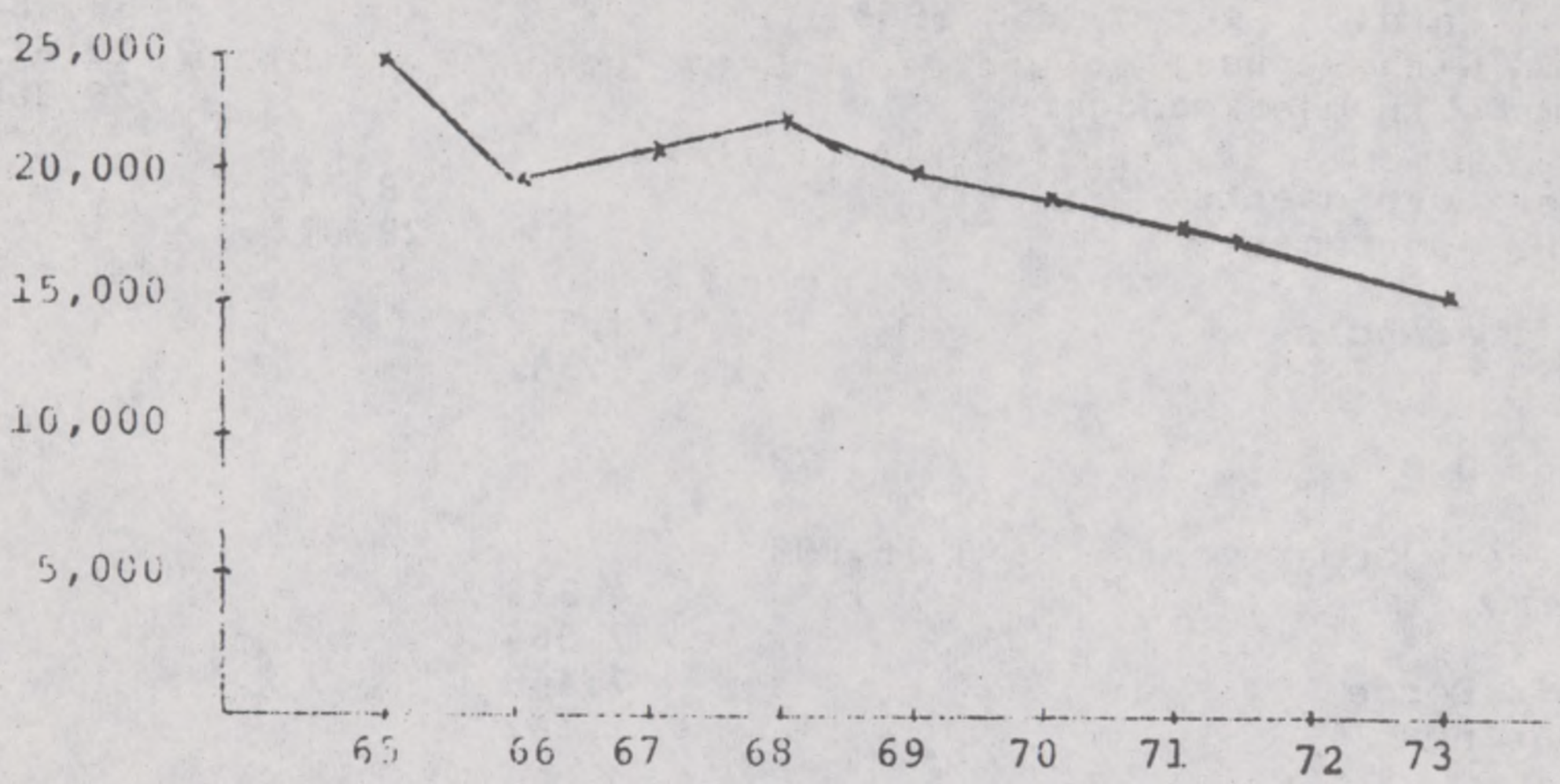
TABLE III. Growth Rate by Year.
(Quarterly DLSC-8-B Reports) 5/

Year	No. of FSN's	Year	No. of FSN's
Jan 1965	24,362	Jan 1970	19,272
Jan 1966	19,946	Jan 1971	18,750
Jan 1967	21,015	Jun 1971	18,429
Jan 1968	21,485	Jun 1973	15,898
Jan 1969	20,584		

b. Table IV is a graph showing the variation in the number of FSN's used by the military departments. The number used has been decreasing slightly since 1969. EIA data shows that sales to the military have remained the same for the past two years and with reduction of items by inactive FSN's the number has declined slightly.

4/, 5/-See appendix

TABLE IV. Active Items used by the Military Departments.



3. Item Standardization Code Coverage.

a. Table V is a listing of active items used/managed by DoD activities and shows the assigned supply standardization codes.

Supply Standardization Code 6/	June 1971	June 1972	June 1973
None	8,127	324	278
0	2	1	0
1	5,554	5,660	4,952
2	2,504	6,618	5,832
3	2,751	1,986	1,418
6	316	313	294
A	-	948	1,527
B	-	11	467
C	2	1,787	1,454
D	-	44	57
E	-	-	23
Total	19,256	17,692	16,302

Source: DLSC-1MSS-10 Reports 7/

6/, 7/- See Appendix

b. The majority of the items that were non-coded have now been assigned a standardization code. The number of items with insufficient data (codes C and D) is relatively high for these types of items.

III. Analysis of FSC 5955

A. Support of Procurement.

1. Problem No. ES-75-5955-P-01. It has become very difficult for the government to procure piezoelectric quartz crystals at a reasonable price and in an acceptable time phase.

a. Background. Within the past year, DESC has had difficulty in purchasing quartz crystals made to MIL-C-3098. Crystal manufacturers have unresponsive or unrealistic bids, asked for expensive test charges and given extremely long lead times for delivery. A series of meetings have been held by DESC internal organizations and with the Military Departments and industry representatives to determine the cause. Facts, data and possible solutions to the problem have been discussed at each meeting. From the data received concerning crystal sales, it seems that industry has enough business and does not need military orders. Information shows that sales to the military and military contractors have remained about the same number for the past two years but commercial sales have expanded almost 50 percent.

b. Action Required. Continue the investigation with the Military Departments into the reasons for the inability to purchase quartz crystals. To resolve this problem causing the large number of backorders for crystal demands.

c. Program. Projects will be scheduled for change in the specification requirements if considered necessary by the Military Departments.

d. Backlog. None.

2. Problem No. ES-75-5955-P-02. Through improvements in crystal manufacturing, an undercut on the mounting pins of the crystal holder is no longer required. Elimination of the undercut requirement in specifications will save an extra operation and should reduce the cost of manufacturing.

a. Background. The undercut in the mounting pins of the crystal holder was a necessary operation to maintain the pins perpendicular to the base. Manufacturers have improved their capability to where this operation is not normally needed. The undercut is presently a requirement of the crystal holder specification MIL-H-10056 and the crystal specification MIL-C-3098. This requirement, therefore, adds an unnecessary operation for military crystals or the contract requirement is waived.

b. Action Required. Revision of the applicable specifications of MIL-H-10056 and MIL-C-3098 to make the undercut an optional requirement for the holder. The undercut will be retained as an option in the event that a small manufacturer has not attained this capability.

c. Program. Projects have been scheduled to revise MIL-C-10056 and 18 detail specifications in the 4th quarter of FY74 and the 1st quarter of FY75. Seventy-one detail specifications of MIL-C-3098 have been scheduled for revision beginning in the 1st quarter of FY75.

d. Backlog. Resources are adequate to accomplish these projects.

2. Problem No. ES-75-5955-P-03. Microelectronic technology such as TTL and CMOS devices has developed a need for compatible crystal oscillators.

a. Background. MIL-O-55310 is the general specification for crystal oscillators of the solid state types. Detail requirements have been developed as oscillator devices are being used in military applications. At present, three coordinated and five limited coordinated detail specifications have been issued. Requirements for solid state oscillators have been obtained from the MPCAG program.

b. Action Required. Prepare detail specifications for solid state crystal oscillators as requirements data are obtained.

c. Program. Four projects for new detail specifications are scheduled for the fourth quarter of FY74. An estimated six devices will be prepared during FY75.

d. Backlog. Resources are considered adequate to accomplish these projects.

3. Problem No. ES-75-5955-P-04. New detail specifications are needed under MIL-C-3098 to cover miniature crystal types that are compatible with microelectronic circuitry.

a. Background. The change in technology to integrated microelectronic devices has brought about a need for new crystal types. Revision of MIL-C-3098 is also required to add appropriate test methods for these miniaturized crystals.

b. Action Required. Revise MIL-C-3098 to include test methods applicable to miniaturized crystal types. Prepare new detail specifications to establish definitive requirements for 30 to 40 new crystal types.

c. Program. Projects to revise MIL-C-3098 and develop requirements for miniaturized crystals are scheduled for approximately the fourth quarter of FY 75. This will allow time to obtain the necessary requirements data.

d. Backlog. None.

B. Support of Engineering.

1. Problem No. ES-75-5955-E-01. As specifications are developed and revised to establish military requirements, these decisions must be reflected in the standard of preferred crystals, crystal holders and crystal oscillators.

a. Background. MIL-STD-683 is the standard for crystals and crystal holders that are preferred for new design. Since specifications for these items do not change frequently, an annual update of the preferred standard is sufficient to keep it current. There is no standard for crystal oscillators. Requirements have only recently expanded and there are too few existing types to warrant a standard at this time.

b. Program. A standardization project for a notice or revision to MIL-STD-683 will be scheduled annually to keep the document current. A standard for preferred crystal oscillators is scheduled for FY77.

c. Backlog. Resources are sufficient to accomplish these projects.

C. Support of Supply Management. There are no significant problems under this category, however efforts are being made to reduce the new types, kinds and sizes of crystals and crystal accessories as items enter the supply system.

D. Other Information.

1. DoD/Industry Relationships. Industry associations such as the P-5.4 committee of Electronics Industry Association (EIA) and the International Electrotechnical Commission (IEC) have been active participants in crystal standardization and have made valuable contributions. Both organizations have supplied recommendations and comments to military specifications and standards in FSC 5955. The IEC has recently proposed a document for synthetic quartz crystals for consideration as a military specification.

2. Five Year Plan of Standardization.

a. Planning standardization projects for fiscal years 75 through 79 are listed in Table VI of this program analysis. These projects are estimated based on present conditions of the supply class and may be changed in future program analyses as new conditions become apparent.

b. It is recognized that not all needed projects can be anticipated. Projects which are not in Table VI should be recommended and justified by providing a clearly defined scope and purpose. This information is needed since these

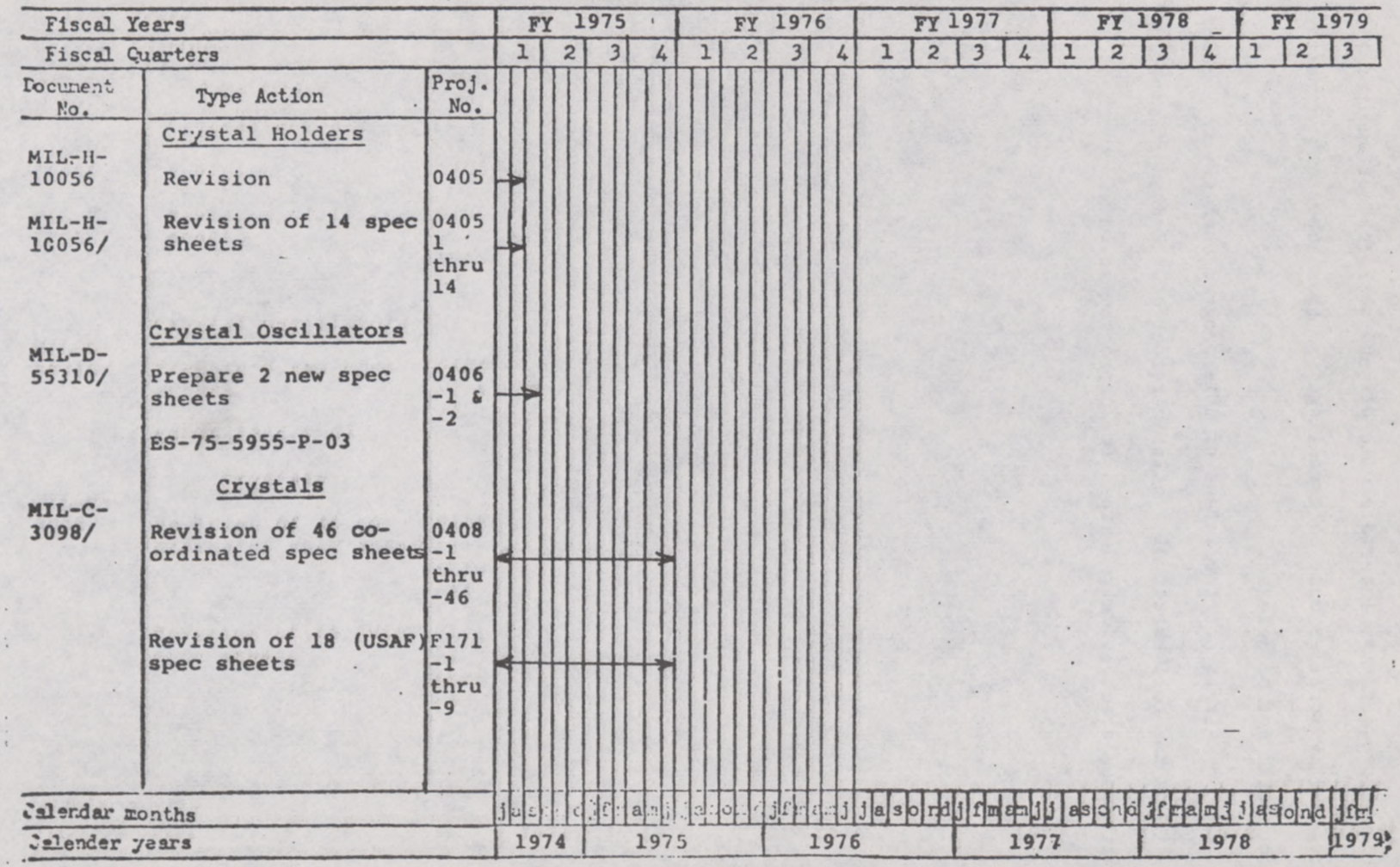
additional projects may interfere with planned work load of another Military Department. Priorities must be established so that important standardization projects will not be delayed.

c. It is not the intent of this program analysis to schedule projects to the full extent of available resources. Each participating activity should set aside resources for unprogrammed work.

Program Group
FSC: 5955

Five Year Plan for Standardization
TABLE VI

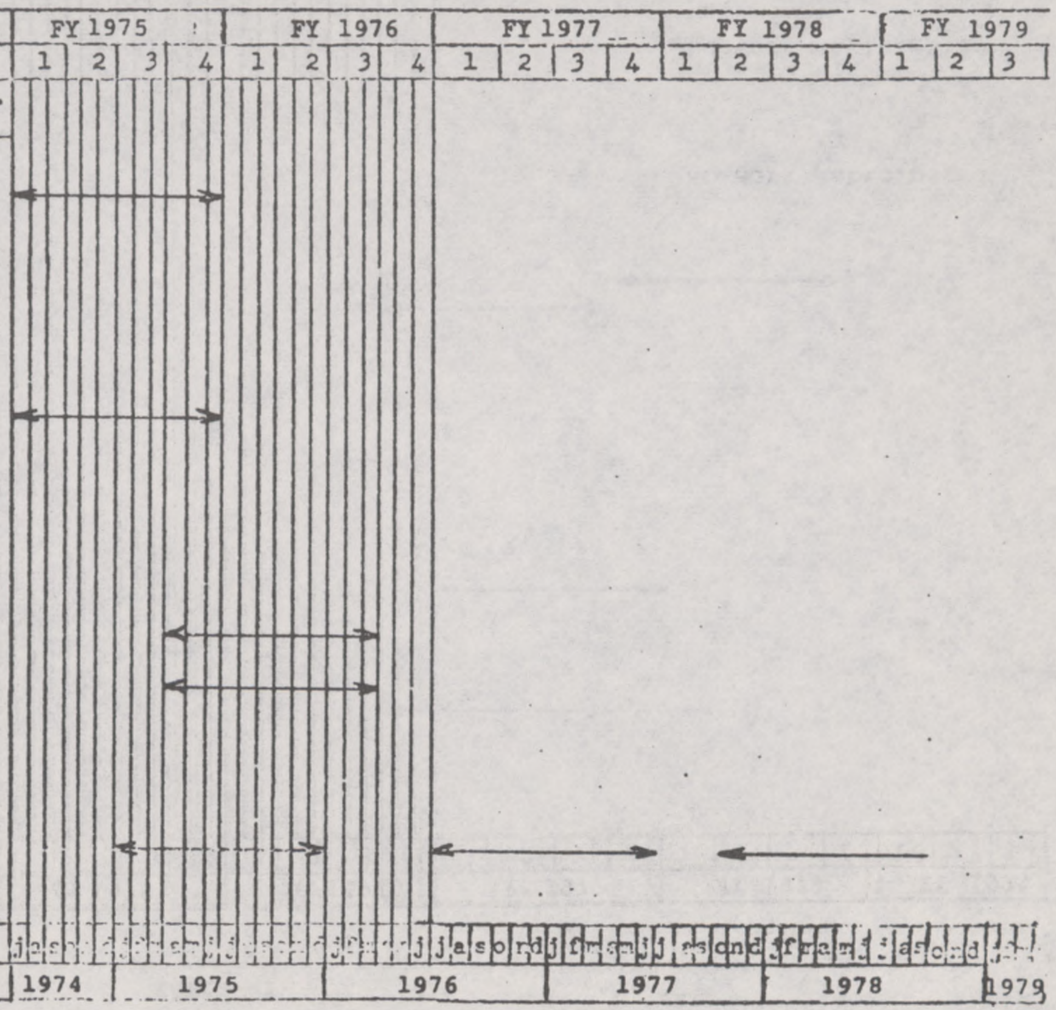
Document No.	Type Action	Proj. No.
	Crystal Holders	
MIL-H-10056	Revision	0405
MIL-H-10056/	Revision of 14 spec sheets	0405 1 thru 14
	Crystal Oscillators	
MIL-D-55310/	Prepare 2 new spec sheets	0406 -1 & -2
	ES-75-5955-P-03	
	Crystals	
MIL-C-3098/	Revision of 46 co-ordinated spec sheets	0408 -1 thru -46
	Revision of 18 (USAF) spec sheets	F171 -1 thru -9



Program Group
FSC: 5955

Five Year Plan for Standardization
TABLE VI

Document No.	Type Action	Proj. No.
MIL-C-3098/	Revision of 7 Army spec sheets	A172 -1 thru -7
	ES-75-5955-P-02	
	Crystal Holders	
MIL-H-10056	Revision of 4 spec sheets	0409 -1 thru -4
	ES-75-5955-P-02	
	Crystals	
MIL-C-3098	Prepare new spec sheets and revise the general spec ES-75-5955-P-04	
	Preferred Crystals & Holders	
MIL-STD-683	Revision to keep current	

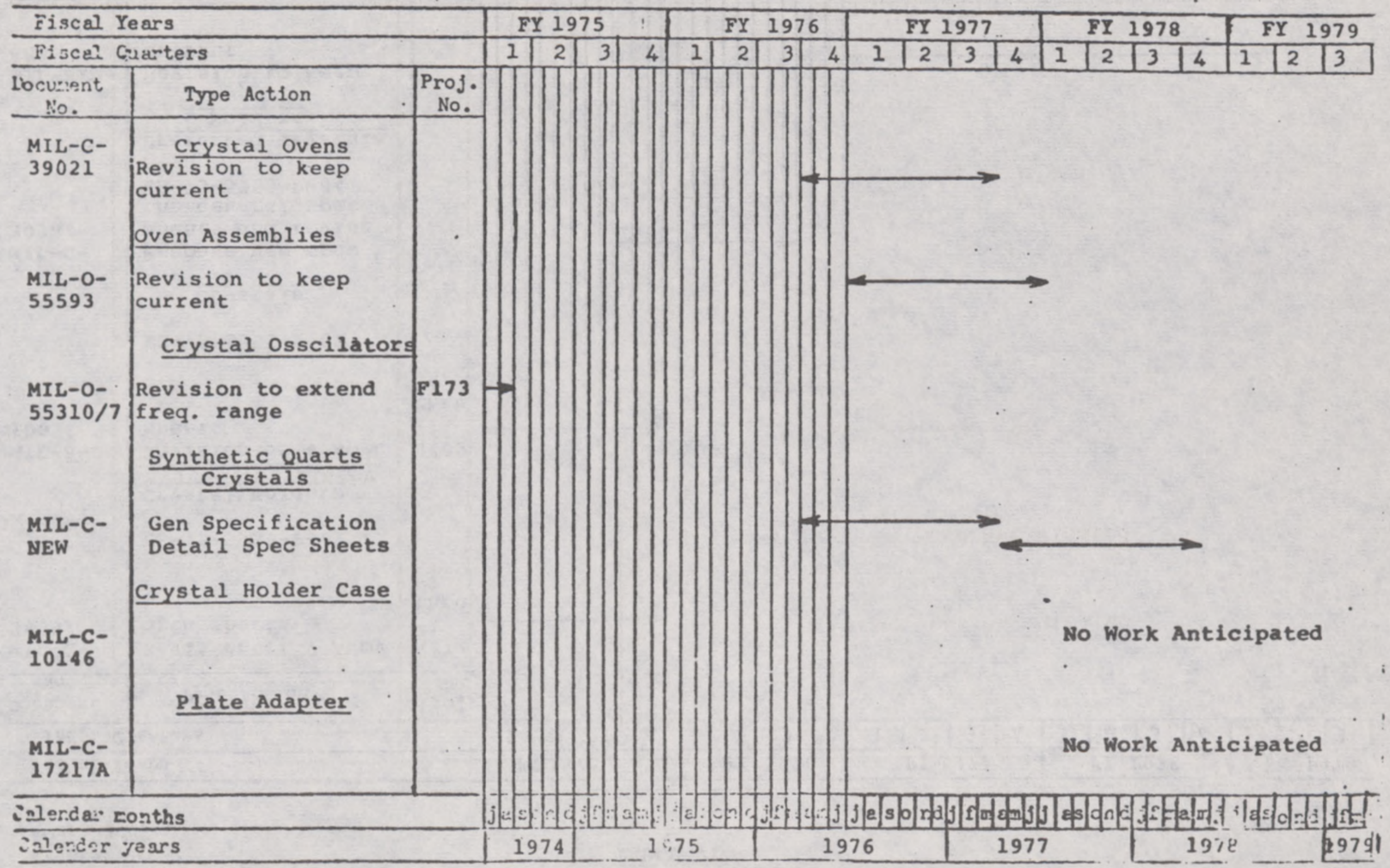


Program Group
FSC: 5965

Five Year Plan for Standardization

TABLE VI

Document No.	Type Action	Proj. No.
	Crystal Ovens	
MIL-C-39021	Revision to keep current	
	Oven Assemblies	
MIL-O-55593	Revision to keep current	
	Crystal Osscilators	
MIL-O-55310/7	Revision to extend freq. range	F173
	Synthetic Quarts Crystals	
MIL-C-NEW	Gen Specification Detail Spec Sheets	
	Crystal Holder Case	
MIL-C-10146		
	Plate Adapter	
MIL-C-17217A		



Program Group
FSC: 5955

Five Year Plan for Standardization
TABLE VI

Document No.	Type Action	Proj. No.	FY 1975 1 2 3 4	FY 1976 1 2 3 4	FY 1977 1 2 3 4	FY 1978 1 2 3 4	FY 1979 1 2 3
	Crystal Units						
MIL-C-10405					No Work Anticipated		
	Crystal Units						
MIL-C-12813A					No Work Anticipated		
	Crystal Oscillator						
MIL-STD-NEW					←	→	

Calendar months: J F M A M J J A S O N D J F M A M J J A S O N D J F M A M J J A S O N D J F M A M J J A S O N D J F M A M J J A S O N D J F M

Calendar years: 1974 | 1975 | 1976 | 1977 | 1978 | 1979

APPENDIX

1/ - DESC-ISIS-INC-Report. This is an internal DESC computer report on Item Name Code statistics. It cross-classified items at four levels of demand data; DSA managed versus nonDSA managed versus no users; standardization status code; and specification versus nonspecification items.

2/ - Count of Specification Items in ISIS-INC Report. Any item that was a reference part number in the Logistics Item Data File (DD635) identified to one of the following Federal Supply Codes for Manufacturers (FSCM) is counted as a "specification" item.

FSCM	Type of Specification or Standard
06542	Federal standard
81348	Federal specification
81349	Military specification
81350	Joint Army-Navy specification
81351	Army Specification
81352	Air Force-Navy aeronautical specification
88044	Aeronautical standards group
88827	Naval aircraft standard
94135	Naval ordinance standard
96906	Military standard (MS sheet)
99237	Air Force-Navy aeronautical design standard
99238	Air Force standard

3/ - Numeric stock objectives (NSO), is a DESC management label assigned to items with low demand, specifically those with less than three requisitions and less than 12 items ordered within the last 12 months.

4/ - DLSC-IMSS-8-B Report. This is a limited distribution report published quarterly by Defense Logistics Services Center, Battle Creek, Michigan.

IMSS - Item Management Statistical Services
8 - Catalog additions and deletions
B - DSA assigned Federal Stock Classes

5/ - Item Standardization Code Structure (Per DSAM 4120.3-M, appendix VII-A):

a. Items Authorized for Procurement:

Code	Definition and Application
0	Items under the specification control of AEC or NSA.

Code	Definition and Application
1	An item authorized for procurement which was initially so identified as the result of a formal item reduction study and which was accepted as a replacement for one or more items not authorized for procurement.
2	An item authorized for procurement which has been included in an item reduction study and initially does not replace an item not authorized for procurement.
A	A new item processed through a DTRA and authorized for procurement that cannot be replaced with an existing item.
B	A new item authorized for procurement that is contained in a new or revised superseding specification or standard that replaces prior items. This item will not be assigned an FSN or an item standardization code until a requirement for the item is generated.
6	An item authorized for procurement that is in a specific FSN class or item name grouping consisting primarily of items which are "one-of-a-kind" and therefore little or no potential exists for elimination of items through formal item reduction studies (see 7-202 and 7-303, DSAM 4120.3-M).
5	An item authorized for procurement that has not yet been subjected to item standardization.
C	An item authorized for procurement that has been included in an item reduction study but an intelligent decision could not be made due to lack of sufficient technical data.
D	A new item processed through a DTRA and authorized for procurement but an intelligent decision could not be made due to lack of sufficient technical data.

b. Items Not Authorized for Procurement:

Code	Definition and Application
3	An item, which as a result of a formal item reduction study, is accepted as not authorized for procurement.
E	An item no longer authorized for procurement which has been replaced by a new item as the result of new or revised superseding specifications or standards being promulgated. The replacement item will not have an FSN assigned until a requirement is generated. In the interim period, the specification or standard part number shall be shown as the replacement.

6/ - DLSC-IMSS-10 Report. This is a limited distribution report published twice yearly by Defense Logistics Service Center, Battle Creek, Michigan.

IMSS - Item Management Statistical Services
10 - DoD Item Standardization Codes (see 5/).

7/ - Military Parts Control Advisory Group (MPCAG), located at DESC.

PHASE I - Provides for the central collection of data on approved nonstandard electronic parts for the purpose of updating military specifications in the light of significant new part trends.

PHASE II - Provides for a central advisory agency to make recommendations to military equipment contractors on parts to meet system requirements. The advisory agency makes an engineering evaluation to uncover possible standard or advanced technology parts which would meet design needs and interrogates a central catalog data bank for possible acceptable parts already existing in the supply system.