U. S. AIR FORCE

PROJECT RAND

RESEARCH MEMORANDUM

DESCRIPTIVE GUIDE TO A CARD DIRECTORY OF U.S. MILITARY RADIO COMMUNICATION EQUIPMENT

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RM-2445

July 31, 1960

Assigned to_____

This research is sponsored by the United States Air Force under contract No. AF 49(638)-700 monitored by the Directorate of Development Planning, Deputy Chief of Staff, Development, Hq USAF.

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SUMMARY

Research Memorandum RM-2445 describes and gives instructions for the use of A Card Directory of U.S. Military Radio Communication Equipment, which is published separately as RAND Research Memorandum RM-2444. The directory consists of a deck of edge-punched cards on which is recorded a variety of data on radio communication equipment of interest to systems planners. Certain of these data also appear in the form of coded notches around the edges of the cards, permitting easy manual search of the deck for cards describing equipments having a prescribed combination of characteristics.

RM-2445 gives the nomenclature for all the equipment described in the card directory, explains how the blanks and holes on each card have been used for recording equipment characteristics, and describes the technique of sorting the cards by their edge punchings.

The card directory is published in two parts: Part I is unclassified and comprises 1571 cards. Part II is classified Secret and comprises 63 cards classified Confidential, 21 classified Secret, and 4 unclassified cards. Part II is distributed separately in accordance with the regulations governing the transmittal of classified material.

Data for the directory were compiled for The RAND Corporation by Jansky and Bailey, Inc., of Washington, D.C., under subcontracts 58-28 and 59-34 of Air Force contract AF 18(600)-1600. Information concerning the distribution of the directory can be obtained from the Publications Department, The RAND Corporation, 1700 Main Street, Santa Monica, California.

ACKNOWLEDGMENTS

The majority of the information in the card directory was obtained from extensive compilations of communication-equipment data published by the individual military services and by the Department of Defense.

The directory would not be nearly so complete as it is, particularly in its coverage of developmental equipment, had it not been for the generous cooperation of personnel at the several agencies of the Army, Navy, and the Air Force listed in Appendix 7. The help of these agencies is gratefully acknowledged.

Finally, the authors wish to express their gratitude to P. M. Sears of The RAND Corporation staff for his critical review of the card directory.

CONTENTS

SUMMARY iii

ACKNOWLEDGMENTS v

Section
I. INTRODUCTION 1

II. EQUIPMENT DESCRIBED IN THE CARD DIRECTORY 5

III. INFORMATION STORAGE 11
Spaces on the Face of the Cards 11
Explanation of Edge Punching 18

IV. SORTING TECHNIQUE AND OPERATIONS 29
Card-Sorting Technique 29
Card-Sorting Operations 33

Appendix
1. ABBREVIATIONS USED ON CARDS 41
2. TOTAL NUMBER OF CARDS WITHIN EACH OF THE NOMENCLATURE CATEGORIES COVERED BY THE DIRECTORY 45
3. NOMENCLATURE AND CLASSIFICATION OF CARDS IN THE CARD DIRECTORY 47
4. SUMMARY OF "AN" NOMENCLATURE SYSTEM 55
5. CODE LIST OF MANUFACTURERS AND DEVELOPMENTAL CONTRACTORS 59
6. DEFINITION OF EQUIPMENT STATUS 79
7. SOURCES OF INFORMATION (REFERENCES) USED IN COMPILING COMMUNICATIONS EQUIPMENT DIRECTORY 81
8. CODE FOR TYPE OF SIGNAL 85

REFERENCES 87

I. INTRODUCTION

This memorandum provides instructions for the use of a card directory of U.S. military radio communications equipment. The directory itself is being published as a companion RAND Research Memorandum.(1) It was compiled for Project RAND by Jansky & Bailey, Inc., as part of a continuing effort to develop improved data and procedures for planning military communication systems. The directory consists of 1659 edge-punched cards. The intention was to record on the cards the characteristics of most of the radio communication equipment used by or under development for the U.S. Armed Forces. Data on obsolete equipment are also included, where available.

A typical card is described in Section III. Spaces on the face of the card are provided for recording electrical, physical, and logistic specifications, and data on operational status, security classification, manufacturer, cost, procurement, tactical use, environmental tolerances, and other characteristics of interest to the system planner. Certain of the data also appear in the form of coded notches along the edges of the cards. These notches permit the cards to be arranged in various sequences -- for example, alphabetically by nomenclature, in order of increasing radio frequency, etc. More important, the notches provide a convenient means of data retrieval. By their use, a wide variety of questions about communication equipment can be answered.

The questions that might be asked fall into two categories. In the first, information will be desired about a particular equipment whose nomenclature is known. For example, what frequency range and type of modulation

is the AN/ARC-63 designed to employ? Who manufactures the AN/PRC-17? How much does the AN/TRC-66 weigh?

In the other category, the problem will be to find which equipments have prescribed characteristics. For example: What airborne communication equipment is available at frequencies above 400 mc? What is the cost of HF transmitters designed for fixed service? What sets are being developed to employ meteor burst propagation?

Questions in both categories can be answered by a manual sorting technique, which depends principally on inserting a sorting needle into the appropriate holes along the edges of the cards.

The equipments described in the card directory are listed in Section II. Section III explains how the spaces and holes on the cards have been used for recording equipment characteristics. Section IV explains the techniques of sorting to make use of the edge punchings.

Appendix 1 lists the abbreviations used on the cards. Appendixes 2 and 3 summarize the nomenclature categories and security classifications of the cards. Appendixes 4 through 8 consist of codes pertinent to interpreting the cards. They are set aside for convenience of reference or due to unwieldy length.

In the card directory, a considerable effort was made to obtain accurate and complete information on all equipments; for many, however, it has been possible to assemble only fragmentary data. As might be expected, the data are most complete for sets which have been or are the accepted standard items of issue. Data are least complete for very old equipment, or for equipment in the early stages of development.

No arrangements have been made for publishing future supplements to the card directory; such arrangements will depend in part on the response to this first edition. Users are urged to submit corrections, additional equipment data, and suggestions for improvements directly to

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1700 Main Street
Santa Monica, California
Attention: Electronics Department

II. EQUIPMENT DESCRIBED IN THE CARD DIRECTORY

The card directory is intended to describe most of the radio transmitters, receivers, and antennas that have been developed for communication for the U.S. Armed Forces during the last two decades. The term communication is used here in its conventional sense. Thus the directory does not include radio equipment designed primarily for target location (radar), identification (IFF), direction finding, telemetry, beaconry, electronic countermeasures, or remote control.

Certain transmitters, receivers, and antennas are designed to be used with each other, and these combinations, or sets, are usually given separate designations in one of the military nomenclature systems. In the card directory these nomenclature assignments determine the equipment combinations for which individual cards have been prepared. Generally speaking, cards for separate components are included only when the component is not part of a nomenclatured set.

Three military nomenclature systems are represented in the directory: the former Navy system, the former Signal Corps system, and the current Joint Communication-Electronic Nomenclature System. The current system is referred to in this publication as the "AN" (for "Army-Navy") system. (It is also known as the JCENS system.) Only the AN system will be described in detail, since it has been used to designate nearly all military electronic equipment introduced since 1943.

In the AN system, electronic equipment is divided into two classes: operating sets and components. An operating set (or simply a set) is defined as a "complete group of two or more major components deriving power from one or more sources and delivering output to the required load. An

operating set is capable of operation by itself and is not dependent on other sets or accessories to perform its intended purpose. In some cases, a set may consist of a single major component with accessories and spares."(2)

A component is defined as "a group of parts such as resistors, capacitors, transformers, etc., which assembled together as a unit perform a definite function necessary to the operation of the entire set of equipment."(2)

The nomenclature for both sets and components consists of two parts separated by a slant bar (/). For sets, the first part is always the letters AN, which indicate that the designated equipment is a set and that the nomenclature in question is based on the AN system. The second part consists of three letters known as "indicators," and a number. The three letters of the indicator tell, respectively, the type of installation for which the set was designed, the type of equipment it is, and its purpose, using the definitions given in Appendix 4. The number distinguishes the set from others having the same installation, type, and purpose. Thus the AN/ARC-23 is the 23rd airborne radio communication set to be assigned a nomenclature in the AN system. Numbers in the range 500 and above are used to identify Canadian equipment approved for joint use.

In the case of components, the first part of the nomenclature consists of a one- or two-letter indicator and a number. The indicator identifies the function of the component in accordance with the definitions given in Appendix 4. The number distinguishes the component from all others having the same function. The second part of a component nomenclature is similar to the second part of a set nomenclature and indicates the set (if any) to which the component belongs. Thus, the RT-428/PRC-22 is the 428th receiver-transmitter to be assigned a nomenclature in the AN system and forms a part of the portable radio communication set AN/PRC-22. When a component is

designed to be used with more than one set, the second part of its nomenclature usually does not include a number. Thus the R-869/DPN is a receiver designed for use in a missile as part of a radar navigation system. When a component is intended for even more general-purpose use, the purpose indicator (third letter), and sometimes even the type of equipment indicator (second letter), are also omitted from the second part of its nomenclature. Thus RG-8/U is an RF cable intended for general utility installation.

Additional indicators and letters are sometimes added to the basic equipment nomenclatures to identify experimental equipment, cognizant development organizations, training sets, and modified versions. Only basic equipment nomenclatures are distinguished in the card directory, however.

In the AN system, an equipment nomenclature serves as a label and also provides a brief description of the equipment. With the exceptions noted later in this section, the card directory includes all AN-nomenclatured sets having the type-of-equipment indicator R (radio), and one of the purpose-indicators C (communications), R (receiving), or T (transmitting). All installation indicators are included. In addition, the directory includes AN components used for radio communication which have indicators T (transmitters), R (receivers), RT (receiver and transmitter), AS (simple antennas), AT (complex antennas), and OA (operating assemblies).

When the component is part of a specific radio set, its description appears on the card for that set. For example, the transmitter T-308/FRC-21 is described on the card for the AN/FRC-21. Independent components -- i.e., components whose nomenclature does not refer to a specific set -- are described on separate cards.

To provide more complete coverage of equipment in the military radio communication field, many sets and components that were in use or under development prior to the adoption of the AN system are also included in the directory. Most of these equipments bear designations from the obsolete nomenclature systems of the Signal Corps and the Navy. The total numbers of sets and independent components within each of the nomenclature categories covered by the directory are listed in Appendix 2.

In preparing the directory, every equipment bearing a designation in one of the nomenclature categories listed in Appendix 2 was considered. Experimental equipment is included. However, a number of developmental and operational sets and components are not included in the directory for one or more of the following reasons:

- The nomenclature has been cancelled.
- The equipment is not used for communication in the sense described at the beginning of this section.
- No information is available.
- No procurement is planned.

Equipment was not excluded because of obsolescence. Many obsolete and obsolescent equipments are, in fact, still widely used. In addition, their inclusion permits study of long-term design and cost trends.

A list of the equipments described in the card directory, giving the nomenclature of each set and independent component for which a card was prepared, is displayed in charts in Appendix 3. Some users of the directory may find it convenient to establish separate files for cards of different security classification; therefore the classification of each card is also indicated in Appendix 3. (The cards can easily be sorted by classification.)

This permits the user to go directly to the proper file when looking for the card corresponding to a given nomenclature. It should be noted here that the classification of the card may be higher than that of the equipment it describes. If the desired nomenclature is not included in the directory, the reason for its exclusion is often of interest. Appendix 3 presents this information for AN sets only.

III. INFORMATION STORAGE

A sample card used in the directory is shown in Fig. 1. Data on the characteristics of radio communication equipment are entered both in the spaces on the face of the card and as notches punched along the edges of the card. The meanings of the spaces and notches are explained in this section.

SPACES ON THE FACE OF THE CARDS

The spaces on the left half of the card apply to the characteristics of the equipment whose nomenclature appears in the upper left corner. This equipment may be an entire system, including transmitters, receivers, antennas, switchboards, power units, shelters, and the like, or it may be only a single component.

The spaces on the right half of the card deal with the electrical specifications of the individual transmitters, receivers, and antennas that are included as components of the nomenclatured equipment. These spaces are grouped into separate blocks for each of these three types of components.

The block at the bottom of the card labeled "additional information" provides space for information on any other major components that the set may include, such as switchboards, multiplexing units, etc. It may also be used to record data on operational performance, or to continue the description of an item for which the assigned space is inadequate.

The abbreviations used in labeling the spaces, and in recording data in them, are defined in Appendix 1.

A detailed description of the type of information presented in each space follows:

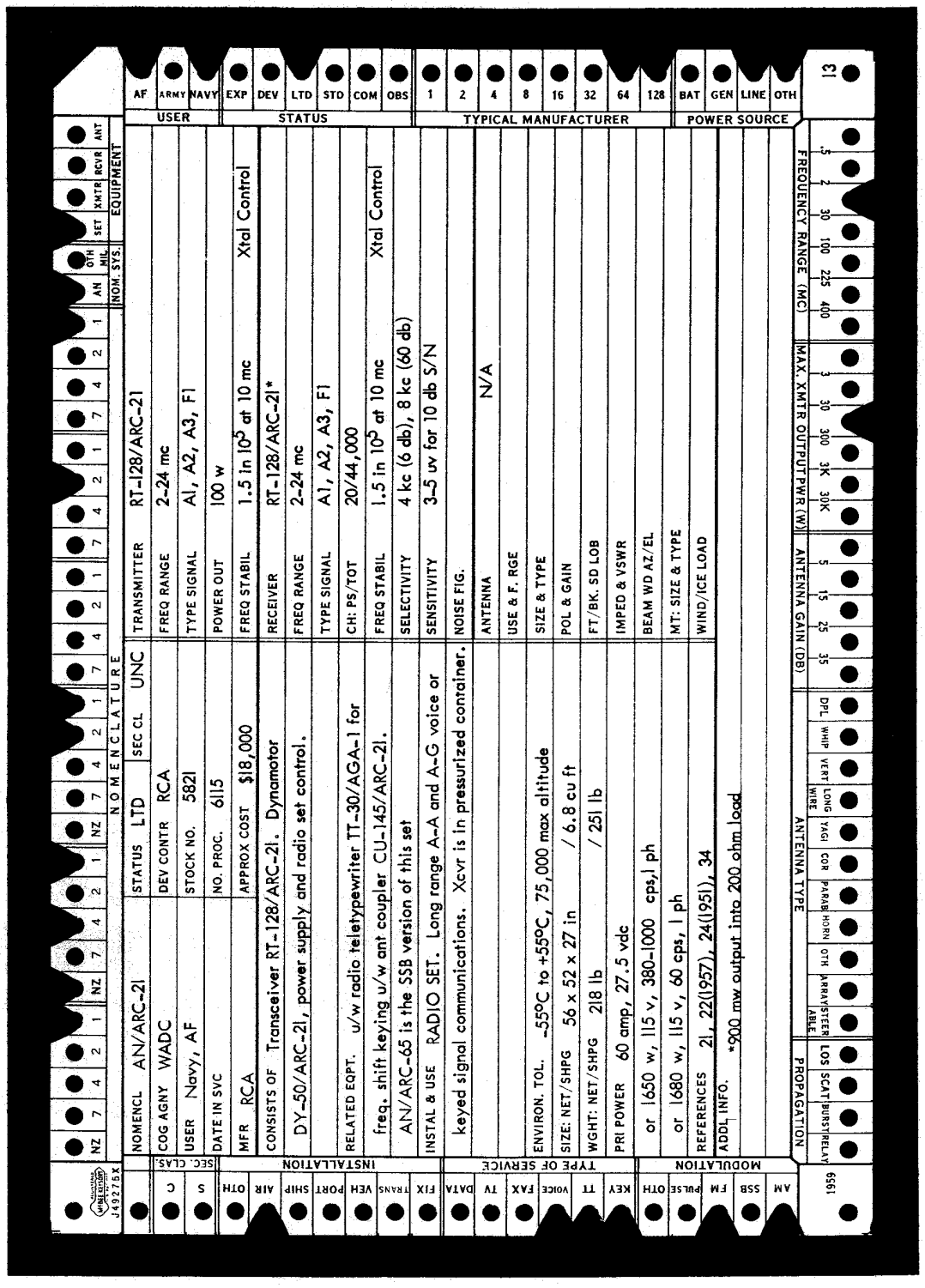


Fig. 1 — Typical card from directory

NOMENCL -- (Nomenclature) The official military or commercial nomenclature of the equipment described on the card.

COG AGNY -- (Cognizant Agency) The agency having original cognizance over the development of the equipment:

AEL	Wright Air Development Center
BuAer	Bureau of Aeronautics, U.S. Navy
BuShips	Bureau of Ships, U.S. Navy
Coast Guard	U.S. Coast Guard
CRC	Air Force Cambridge Research Center, USAF
PAE	Plant Engin. Agency, US Army Signal Engineering Agency
RADC	Rome Air Development Center, USAF
RCAF	Royal Canadian Air Force
RCUE	Rome Air Development Center, USAF
SCL	Signal Corps Laboratory, U.S. Army
SEL	U.S. Army Signal R&D Laboratory
SESA	U.S. Army Signal Equipment Support Agency
USAEPG	U.S. Army Electronic Proving Ground
USCG	U.S. Coast Guard
USMC	U.S. Marine Corps
WADC	Wright Air Development Center, USAF
WL	Rome Air Development Center, USAF

USER -- Branch(es) of the Armed Services which use or formerly used the equipment, or are sponsoring its development.

DATE IN SVC -- (Date in Service) Approximate year during which the equipment was, or is expected to be, first placed into service. In practice, various dates have been used, such as the date of instruction books,

dates of production contracts, or estimates by the developmental engineer in the case of equipments not yet in use.

MFR -- (Manufacturer) Where many manufacturers are involved, the largest producers are listed. The abbreviations used are listed in Appendix 5.

STATUS -- The least restrictive status as assigned by any using service. The terms are defined in Appendix 6.

SEC CL -- (Security Classification) The security classification of the equipment whose nomenclature appears in the upper left-hand corner of the card. Note that the card may bear a higher classification than the equipment, as where classified tactical use is revealed.

DEV CONTR -- (Development Contractor) The developer of prototype models of the equipment.

STOCK NO. -- (Stock Number) The four-digit number identifying the Federal Supply classification to which the equipment belongs. This constitutes the first part of the 11-digit Federal Stock Number. Supply class, rather than stock number, is given because different stock numbers may be assigned to sets which bear the same AN designation, but differ in power supply, packaging, inclusion of spares, etc.

NO. PROC. -- (Number Procured) The number of equipments in use, in stock, and/or on order according to best available information at the time technical characteristics were collected. This number should be regarded only as a lower limit -- i.e., at least this many equipments have been procured or ordered.

APPROX COST -- (Approximate Cost) A cost estimate for the nomenclatured item based on current or planned military purchases. These cost figures were obtained from a variety of sources (see Appendix 7), and

in most cases could not be associated with the date of purchase or the number of units purchased.

CONSISTS OF -- The quantity and nomenclature of the major components (transmitters, receivers, transceivers, power supplies, antennas, terminal units, RF amplifiers) that comprise the equipment whose nomenclature appears in the upper left-hand corner of the card. Minor components such as control units, racks, cabling, etc., are listed by name only.

RELATED EQPT. -- (Related Equipment) Equipments that are used with, replaced by, or similar to the equipment described on the card. Also, equipment of which the described equipment is a part, or which will replace it.

INSTAL & USE -- (Installation and Use) The officially assigned name of the equipment described on the card (for example RADIO SET, RADIO RECEIVER), followed by a general description of the equipment, its normal installation and intended operational use. Performance data (range, capacity, reliability) are included when known.

ENVIRON. TOL. -- (Environmental Tolerances) The special temperature, weather conditions, or altitudes for which the equipment is designed.

SIZE: NET/SHPG. -- (Size: Net/Shipping) External dimensions or volume of the equipment. The first figure refers to the equipment as normally installed. The second figure is its size when packed for shipment.

WGHT: NET/SHPG. -- (Weight: Net/Shipping) Weight of the equipment. The first figure applies to the operating equipment; the second to its weight when packaged for shipment.

PRI POWER -- (Primary Power) The types and amounts of primary power required by the equipment.

REFERENCES -- The sources of the information used in preparing the card. The code used here is defined in Appendix 7.

ADDL INFO -- (Additional Information) Pertinent data for which space is not provided (or is inadequate) elsewhere on the card. For example, IF frequencies, number of vacuum tubes, etc.

TRANSMITTER -- The nomenclature of the transmitter(s) included with the equipment being described. If more than one type of transmitter is included, technical data are entered in columns below the nomenclature of each. If the number of transmitters is so large that there is insufficient space on the card to list their characteristics individually, only aggregate data are given on the set card, and separate cards are included for each of the component transmitters.

FREQ RANGE -- (Frequency Range) RF frequencies covered by the transmitter.

TYPE SIGNAL -- (Type of Signal) Signal emitted by the transmitter, using the code defined in Appendix 8.

POWER OUT -- (Power Output) Maximum RF power output of the transmitter. Peak envelope power is specified in the case of single-sideband transmitters.

FREQ STABIL -- (Frequency Stability) Stability of the transmitter and type of frequency control employed.

RECEIVER -- Nomenclature of receiver(s). When more than one receiver is included, their specifications will be listed in a column under their nomenclature. As in the case of transmitters, when there is a large number of receivers, only their aggregate characteristics will be given.

FREQ RANGE -- (Frequency Range) Tuning range of the receiver.

TYPE SIGNAL -- Type of signals which may be received, using the code presented in Appendix 8.

CH: PS/TOT -- (Channels: Preset/Total) The number of preset channels and the total number of RF channels provided by the receiver.

FREQ STABIL -- (Frequency Stability) Frequency stability of the receiver and the type of frequency control employed.

SELECTIVITY -- Selectivity of the receiver at the 6 and 60 db points. Other points on the selectivity curve may be given if this information is not available.

SENSITIVITY -- For AM receivers, the signal input in microvolts required to achieve a specified demodulated output signal-plus-noise to noise ratio for a specified modulation percentage (usually 100 per cent, sometimes 30 per cent). For FM receivers, the signal input in microvolts required to achieve a specified level of noise quieting (usually 20 db) at the detector output.

NOISE FIG. -- (Noise Figure) The noise figure of the receiver in db. Noise figure is defined as the ratio of the available noise power output of the receiver to that part of the noise output due solely to the noise generated by the matched source.

ANTENNA -- Nomenclature of the antenna(s). This block will be filled in only when the equipment being described includes an antenna.

USE & F. RGE -- (Use and Frequency Range) The use (transmitting or receiving) and operating frequency range of the antenna.

SIZE & TYPE -- Size and generic type of antenna. Size refers to the electrically significant dimensions of the antenna, such as an 8-foot whip, 30-foot dish, etc. A list of antenna types is given on page 25 in connection with the description of the ANTENNA TYPE punching field.

POL & GAIN -- (Polarization and Gain) Polarization (horizontal, vertical, circular, etc.) and gain of the antenna in db above an isotropic radiator.

FT/BK-SD LOB -- (Front/Back, Side Lobe) Front-to-back ratio and the ratio of the maximum side-lobe to the main-lobe radiation, both expressed in db.

IMPED & VSWR -- (Impedance and Voltage Standing Wave Ratio) The radiation resistance in ohms and the voltage standing wave ratio of the antenna.

BEAM WD AZ/EL -- (Beamwidth Azimuth/Elevation) The beamwidth at the half-power points of the main lobe of the antenna in azimuth and elevation at its design frequency.

MT: SIZE & TYPE -- (Mounting: Size and Type) Size and type of antenna supporting structure. For example, 30-ft telescoping aluminum tower.

WIND/ICE LOAD -- The wind and ice loads which the mounted antenna will withstand, usually expressed in terms of the maximum permissible wind speed (mph) without and with a standard ice load (1/2-inch or 1-inch thick), respectively.

EXPLANATION OF EDGE PUNCHING

The holes along the edges of the cards provide a simple means for storing and retrieving some of the data that appear on the face of the card.

For example, to indicate which branches of the armed forces use a particular piece of communication equipment, one hole on each card is assigned to each of the three services: Air Force, Army, and Navy. To indicate that an equipment is used by the Air Force, a notch is cut from the edge of the card to the hole labeled AF, and similarly for the Army and Navy. To retrieve such data -- i.e., to select from the directory those equipments used by a particular service -- the sorting techniques described in Section IV are used.

This type of direct code is also used to indicate operational status, power source, frequency range, power output, antenna gain, antenna type, type of modulation, type of service, type of installation, security classification of the card, nomenclature system, and type of equipment.

The codes for equipment nomenclature and typical manufacturer require a large number of alternatives to be distinguished. In such cases direct coding requires too many holes. For instance, an equipment nomenclature would require 26 holes for each letter and 10 for each digit in its nomenclature. For these two categories a binary coding scheme is used. Since each hole may be either notched or left unnotched, it is possible to represent 2^n alternatives with n holes. It thus takes four holes to represent a digit and five to represent a letter. The assignment of combinations of notches may obviously be made in a variety of ways. The scheme used in the card directory is particularly straightforward.

For a digit, the required four holes are labeled with the numbers 7, 4, 2, and 1. These holes are then notched so that the labels on the notched holes add up to the digit being represented, as follows:

Digit	0	1	2	3	4	5	6	7	8	9
Notching	none	1	2	2,1	4	4,1	4,2	7	7,1	7,2

In this way a maximum of two notches per digit are required.

To represent a letter, the required five holes are labeled NZ, 7, 4, 2, and 1. For the letters A through M, holes are notched so that the sum of their labels adds up to the numerical position of the letter in the first half of the alphabet, as follows:

Letter	A	B	C	D	E	F	G	H	I	J	K	L	M
Notching	1	2	2,1	4	4,1	4,2	7	7,1	7,2	7,2,1	7,4	7,4,1	7,4,2

For the letters N through Z, the hole labeled NZ is notched in addition to the numbered holes whose labels add up to the numerical position of the letter in the second half of the alphabet, as follows:

Letter	N	O	P	Q	R	S	T	U	V	W
Notching	NZ,1	NZ,2	NZ,2,1	NZ,4	NZ,4,1	NZ,4,2	NZ,7	NZ,7,1	NZ,7,2	NZ,7,2,1

X	Y	Z
NZ,7,4	NZ,7,4,1	NZ,7,4,2

To indicate equipment manufacturers, eight holes labeled 1, 2, 4, 8, 16, 32, 64, and 128 are used. In this way, up to 2^8-1, or 255, manufacturers can be distinguished by a combination of one or more notches. When the manufacturer is not known none of the holes in this field are notched.

The following paragraphs explain the notching plan for each of the data categories for which holes have been provided. These explanations are presented in the same sequence that the categories appear on the card, starting with the upper left-hand corner and proceeding clockwise.

NOMENCLATURE -- Holes have been provided for recording three letters and three digits of the nomenclature that appears in the upper left-hand corner of the card. The three groups of five holes required for the letters will be referred to as the alphabetic fields, and the three groups of four holes required for the digits will be called the numeric fields.

For AN sets, the portion of the nomenclature following the slant bar is given, whereas for AN components, it is the portion preceding

the slant bar. For components whose indicator consists of a single letter (see Appendix 4), the second alphabetic field is notched. For components with two-letter indicators, the second and third alphabetic fields are used. Thus the nomenclature of an AN component can be distinguished from that of an AN set (which requires all three alphabetic fields) by the absence of punching in the first alphabetic field. For both sets and components, the three numeric fields, reading from left to right, will be used for hundreds, tens, and units, respectively.

There is the possibility of ambiguity in the case of a few components whose nomenclature includes a four-digit number, e.g., OA-1502/FRC-39, since the thousands-digit is not represented. Such an ambiguity can be easily resolved by inspecting the nomenclature space on the faces of the two cards involved.

Examples of the notching pattern corresponding to various AN nomenclatures are shown in Table 1.

Designations in the old Navy nomenclature system consist of two or three letters only (numbers were merely to distinguish between variants of the same basic equipment). For two-letter nomenclatures, the first and second alphabetic fields are used, as shown by the example in Table 1.

Designations in the old Signal Corps nomenclature system consist of two or three letters followed by a number. The second and third alphabetic fields are used for two-letter nomenclatures, and, as with AN nomenclatures, the three numeric fields are used for hundreds, tens, and units, as indicated in Table 1.

In the case of commercial nomenclatures, the first letter encountered in the nomenclature is recorded in the first alphabetic field, the

Table 1

EXAMPLES OF THE USE OF THE NOMENCLATURE AND NOMENCLATURE SYSTEM FIELDS

Equipment Nomenclature	Letters and Digits Associated With Alphabetic and Numeric Nomenclature Fields[a]						NOM. SYS.
	Alphabetic Field			Numeric Field			
	1	2	3	1	2	3	
AN System (Sets)							
AN/FRT-34	F	R	T		3	4	AN
AN/PRC-7	P	R	C			7	AN
AN/ARC-503	A	R	C	5	0	3	AN
AN System (Components)							
T-27/ABC-7		T			2	7	AN
AS-513/GR		A	S	5	1	3	AN
RT-6/CRC-27		R	T			6	AN
OA-1502/FRC-39		O	A	5	0	2	AN
Navy System							
MN	M	N					Oth Mil
RBT	R	B	T				Oth Mil
Signal Corps System							
BC-610		B	C	6	1	0	Oth Mil
BC-1206		B	C	2	0	6	Oth Mil
SCR-117	S	C	R	1	1	7	Oth Mil
Commercial							
18S4	S			1	8	4	
50 FMTR-7A	F	M	T	5	0	7	

[a]Fields are separated by double lines on the edges of the cards.

second in the second alphabetic field, and the third in the third alphabetic field. Any additional letters in the manufacturer's designation are dropped. The first three digits encountered are similarly notched into the three numeric fields. If the nomenclature includes only one digit, it appears in the right-hand numeric field. If there are two digits, the two right-hand numeric fields are used. Examples of this procedure are given in Table 1.

NOM. SYS. -- (Nomenclature System)

AN -- The Joint Communication-Electronic Nomenclature System.

OTH MIL -- Denotes other military nomenclature systems such as the old Navy or Signal Corps systems.

If no notch is found in this field, the nomenclature given is a manufacturer's designation, and the hole labeled COM (commercial) in the STATUS field is punched.

EQUIPMENT -- The nature of the equipment described on the card.

SET -- Equipment that provides all components, except possibly antennas, required for two-way communications.

Note that this hole will <u>not</u> be notched for those AN set-type nomenclatures which apply to individual transmitters and receivers -- e.g., AN/FRT-27, AN/GRR-11.

XMTR -- Equipment provides transmission facilities only.

RCVR -- Equipment provides receiving facilities only.

ANT -- A group of components comprising an antenna or antenna system.

In the case of transceivers, both "XMTR" and "RCVR" will be punched.

USER -- The branch(es) of the armed services that use the equipment or are sponsoring its development.

AF -- Air Force

ARMY

NAVY -- Including Marine Corps.

STATUS -- The current status of the equipment as defined in Appendix 6.

EXP -- (Experimental)

DEV -- (Developmental)

LTD -- (Limited Standard)

STD -- (Standard)

COM -- (Commercial)

OBS -- (Obsolete)

TYPICAL MANUFACTURER -- Many of the widely used equipments have been manufactured by more than one company. Due to the limited number of holes around the perimeter of the cards, only one manufacturer can be notched. The coding for this field is given in Appendix 5.

POWER SOURCE

BAT -- Capable of extended use on batteries alone.

GEN -- Equipment includes its own generator to supply required power.

LINE -- Primary power is required at standard commercial voltages and frequencies (115 or 230 volts; 25-60 cps).

OTH -- (Other) Primary power is required at other than commercial voltages and frequencies. For example, vehicular battery supplies, 350-1700 cps supplies, etc.

Both LINE and GEN will be punched when the equipment includes a generator that provides power at standard commercial voltages and frequencies.

FREQUENCY RANGE -- The RF frequencies that the equipment is designed to transmit or receive. A notch indicates that the frequency range of the equipment lies between the numerical limits given on either side of the hole. Thus, if the first hole of this category is notched, the equipment operates below 500 kc, whereas a notch in the next hole denotes that the equipment operates at frequencies between 500 kc and 2 mc. More than one

hole will be notched when the frequency range of the equipment is wider than that corresponding to a single hole. For sets where transmitter and receiver frequency ranges are not the same, only the common frequency range is punched.

MAXIMUM POWER OUT -- The maximum RF power output of the transmitter described on the card. For example, a notch in the first hole denotes a power output of less than 3 watts. A notch in the second hole denotes a power output between 3 and 30 watts. A notch in the last hole denotes a power output greater than 30 kilowatts. On cards describing only antennas the power output may be punched, indicating maximum power handling ability of the antenna.

ANTENNA GAIN -- The approximate gain of the antenna(s) described on the card expressed in db relative to isotropic radiator.

ANTENNA TYPE --

DPL -- (Dipole) A balanced center-fed antenna one-half wavelength long.

WHIP -- A vertical radiator, supported only at the base. This includes all radiators with counter-poise ("Unipole," "Monopole," and "Bi-directional").

VERT -- (Vertical) A guyed vertical radiator. Includes all tower radiators.

LONG WIRE -- A wire radiator. This includes inverted "L" and "T," rhombics, vertical wire, etc. In the case of rhombics, the hole labeled ARRAY is also notched.

YAGI -- A driven dipole with one or more parasitic reflectors and directors.

COR -- (Corner Reflector) A driven element utilizing two plane surfaces joined to act as a reflector.

PARAB -- (Parabolic Reflector) A driven element utilizing a parabolic surface as a reflector.

HORN -- A horn-shaped termination for a transmission line providing unidirectional radiation.

OTH -- (Other) Other types of antennas -- such as Discone, helical, lines, etc.

ARRAY -- An antenna consisting of two or more driven antennas.

STEERABLE -- An antenna whose beam can be directed in azimuth and/or elevation.

PROPAGATION -- The type of radio propagation which the equipment was designed to utilize. This field is not coded on cards which describe only a single component.

LOS -- Line-of-sight. The normal communication range of the equipment lies within the radio horizon.

SCAT -- Ionospheric or tropospheric scatter.

BURST -- Meteor burst or any other type of low-duty-cycle intermittent communication.

RELAY -- Equipment is normally used as part of a relay system.

MODULATION --

AM -- Amplitude modulation (including cw).

SSB -- Single sideband.

FM -- Frequency or phase modulation.

PULSE -- Pulse modulation.

OTH -- (Other) Other types of modulation -- for example, synchronous detection.

TYPE OF SERVICE -- The type of service for which the equipment is normally used.

KEY -- On-off keyed telegraph including FSK teletype (A1, F1, P1) (See Appendix 8).

TT -- Modulated telegraphy (A2, F2, P2).

VOICE -- (A3, F3, P3).

FAX -- Facsimile (A4, F4).

TV -- Television (A5, F5).

DATA -- (A9, F9, P9).

INSTALLATION -- The type of installation for which the equipment was designed.

FIX -- Equipment designed to be used at a permanently fixed ground installation.

TRANS -- (Transportable) Equipment which has been packaged to facilitate conveyance from one point to another, but which is not designed to be operated in transit. Includes equipments mounted in trailers or in shelters which can be loaded on trucks or trailers, etc., but are operable only when the equipment is stationary.

VEH -- Equipment designed for installation in vehicles, and operable while the vehicle is in motion.

PORT -- Equipment which can be carried by man or beast and may be operated in transit.

SHIP -- Equipment designed to be mounted and operated on surface ships, submarines, free-floating rafts, buoys, etc.

AIR -- Equipment designed to be mounted and operated in airplanes, rockets, guided missiles, balloons, kites, etc.

OTH -- (Other) Equipment having an installation not covered above.

SEC. CL. -- (Security Classification) The security classification of the card. This may be higher than the classification of the equipment.

S -- Secret.

C -- Confidential.

IV. SORTING TECHNIQUE AND OPERATIONS

In this section, the technique of sorting the cards by the notches along their edges will be described, and the operations made possible by the sorting technique will be discussed.

CARD-SORTING TECHNIQUE

The holes around the edges of the cards permit the card deck to be sorted by a needle to retrieve information, or to arrange the cards in various sequences. At any given hole some of the cards in the deck will be notched and others will not be notched. When the sorting needle is inserted in the hole and lifted, the notched cards will drop out, and can thus be separated from the unnotched cards, which are left on the needle. This step usually has to be repeated several times to isolate the stack of cards bearing the desired information.

In practice it is not feasible to work with a stack of cards more than about 1 1/2 inches thick (about 150 cards). To insure success of the sorting technique, the card manufacturer suggests the following procedure. (Read through all steps carefully before actually starting Step 1 with the cards.)

1. Make certain that all cards are face up with corresponding edges together. A special procedure, called corner sorting, may be used for this purpose if the cards should become accidentally mixed. Line up the cards as shown in Fig. 2 and insert the sorting needle through the unlabeled hole in the extreme top right-hand corner. Raise the needle, and set aside the cards that drop out. Repeat this step on the remaining cards for two of the other corners. In each case, the cards that drop will have their clipped corners

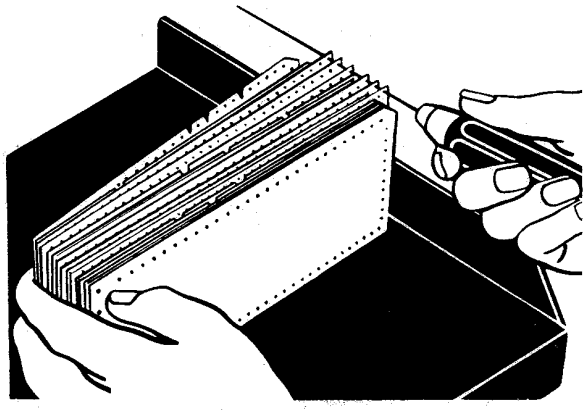


Fig. 2 — Corner sorting

together, and the resultant batches can readily be put together with identical orientations.

2. Choose a convenient handful of the cards to be sorted (not over 1 1/2 inches thick) with the front of the cards facing the operator and the edge to be sorted at the top.
3. Holding the cards loosely, jog them on a flat but rough surface such as a desk blotter to align the holes (Fig. 3a).
4. Grasping the cards close to the position to be sorted, insert the sorting needle through the hole to be sorted until its handle is about an inch from the front card (Fig. 3b).
5. Slide the left hand to the left side of the cards. Hold them lightly with only a slight pressure of the thumb and fingers against the cards (Fig. 3c).
6. Move the handle of the sorting needle to the left and, at the same time, exert pressure with thumb in the lower left corner. The inside of the fingers should be flush against the beveled edge of the cards (Fig. 3d and 3e).
7. Swing the sorting needle to the right until resistance is felt. This will cause the cards to fan out on the needle. This action tends to separate one card from another and reduce the resistance of the cards which are to be dropped from the deck (Fig. 3f).
8. Release the pressure of the left hand. Spread the fingers to balance the cards that will fall (Fig. 3g).
9. Raise the sorting needle with a gentle shaking action. The desired cards will begin to fall from the deck. Never pull out the cards that are falling, but rather lift out the cards that are on the needle. Always keep the sorting needle parallel with the top of

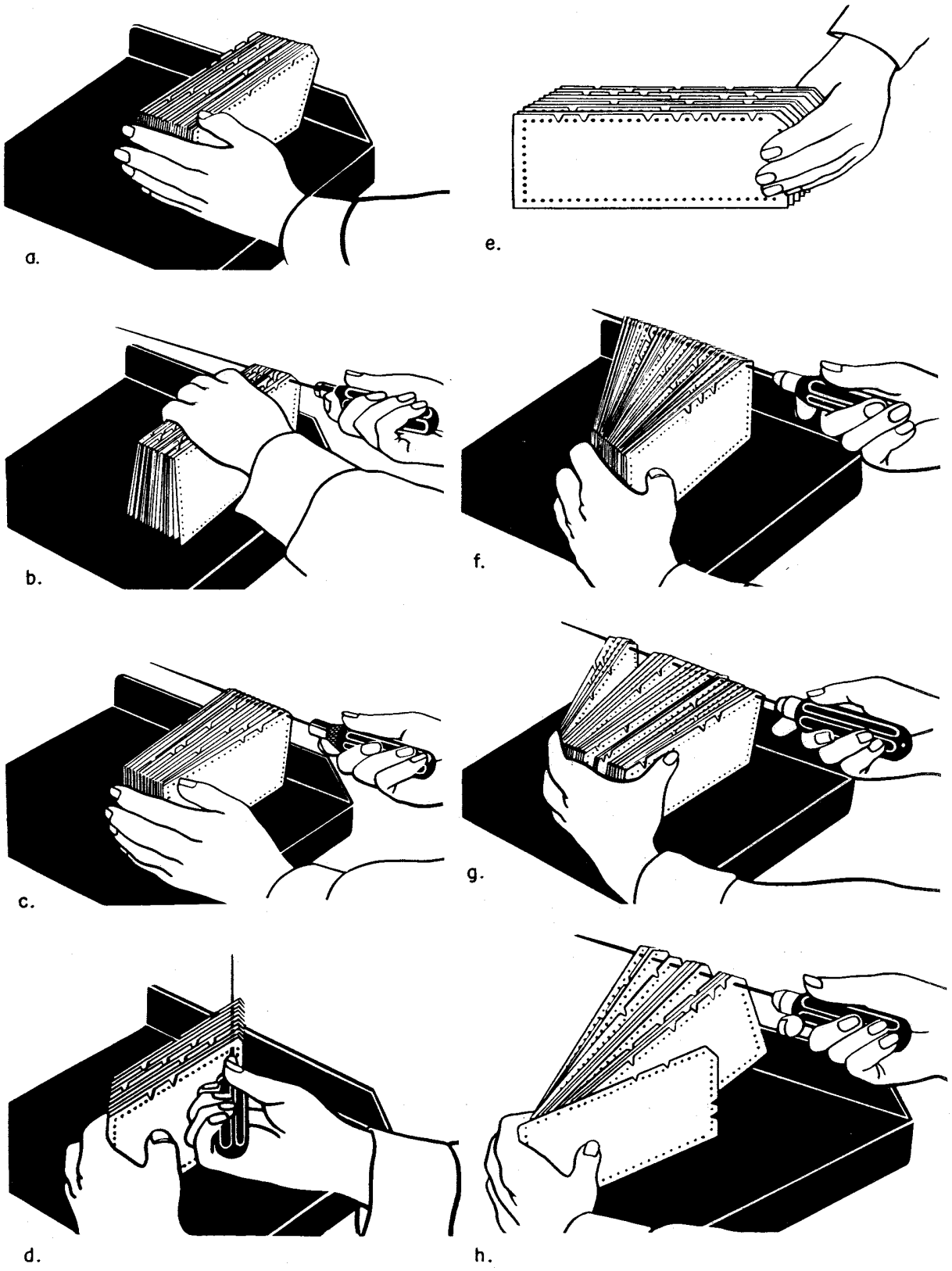


Fig. 3 — Steps in sorting edge-punched cards when holes are on a long edge

the desk. If tilted down, the cards will fall off the end of the needle, and if tilted up, the cards will bind and the notched cards will not fall (Fig. 3h).

Figure 4 illustrates the above technique when sorting from the fields at the ends of the cards.

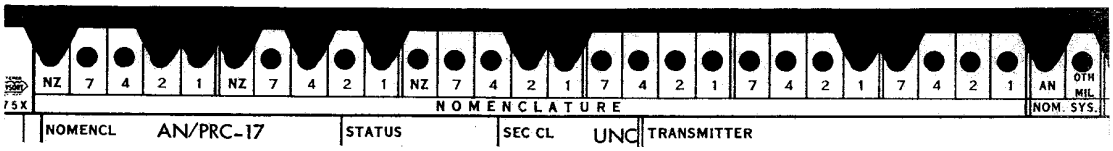
CARD-SORTING OPERATIONS

The notches and sorting technique permit two kinds of operations:

1. Finding cards describing equipment with prescribed characteristics, such as a particular nomenclature or a certain combination of technical characteristics; and
2. Arranging cards in a prescribed sequence, such as alphabetically and numerically by nomenclature.

Sorting For Cards Having Prescribed Characteristics

First, determine the pattern of notches that represents the desired characteristics. Suppose that the card on the AN/PRC-17 is desired. By reference to Section III it can be determined that the desired card will be notched in the Nomenclature field as follows:



The deck is then sorted in turn at each of the holes which is notched in this pattern. After each sorting, only the cards that drop out are retained for the next sort. When all ten notches are sorted, a number of cards will usually remain, all of them apparently bearing the desired pattern of notches. However, some of these cards may have additional notches in

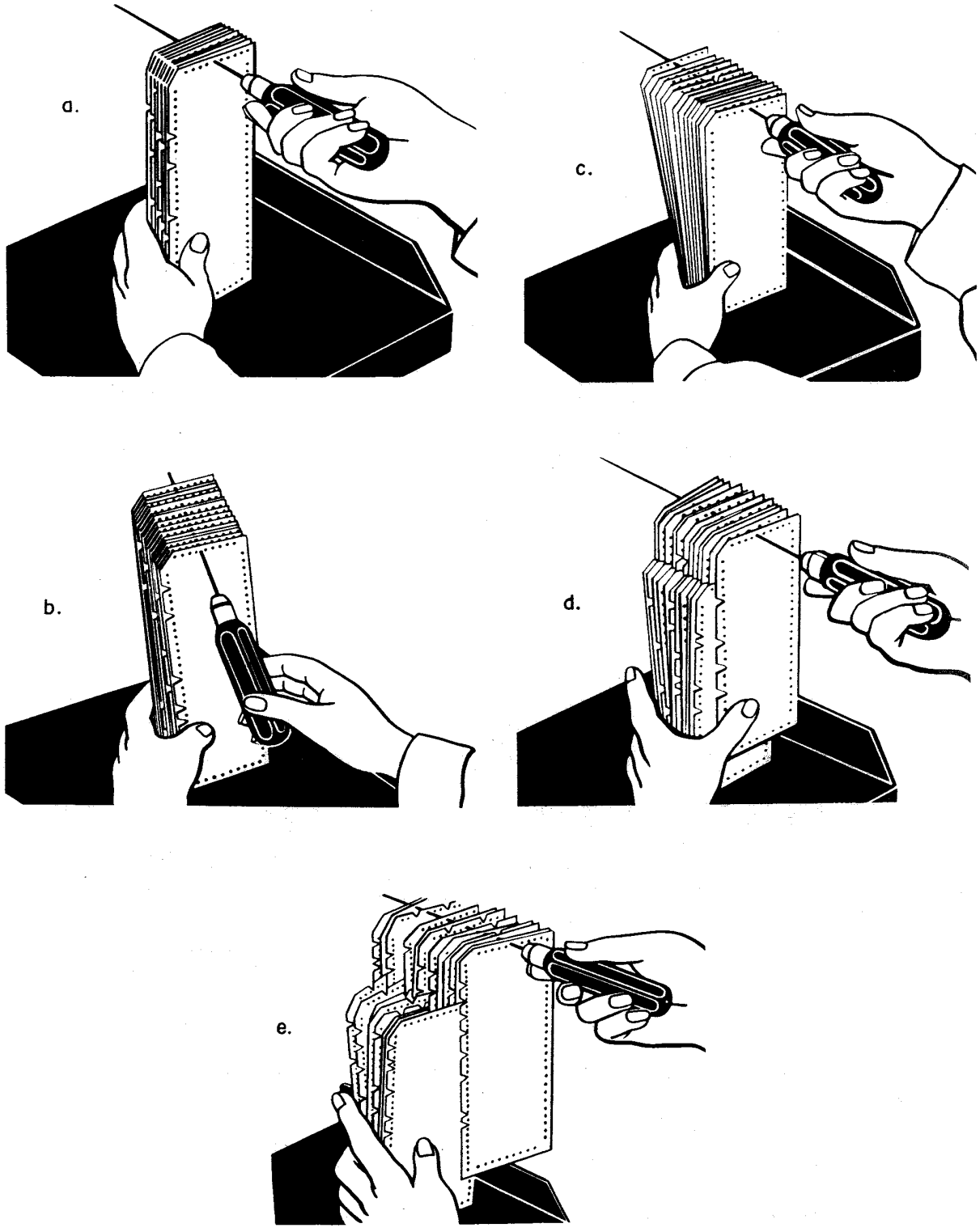


Fig. 4 — Sorting technique when holes are on a short edge

the Nomenclature field, going beyond the desired pattern. To eliminate these cards, the cards surviving from the first ten sortings are sorted again, this time by each hole in the Nomenclature field that is not notched in the desired pattern. Any cards that drop out on this second series of sortings are discarded since the notches that allow them to drop out are not in the desired pattern. The card or cards remaining from the second series of sortings should be in the desired pattern.

As a second example, suppose that information is desired on HF transmitters designed for fixed service in general. The desired cards will have a notch in the "2-30" hole of the Frequency Range field, a notch in the "Fix" hole of the Installation field, and a notch in either the "Set" or "Xmtr" hole of the Equipment field. In this case the nature of the coding and of the information desired is such that the possible presence of additional notches is immaterial. Sorting to screen out cards with additional notches is not necessary in this situation, and in fact might cause many valid cards to be dropped out.

Practice with sorting procedures using the actual card deck will soon make it possible to determine when a second series of sortings is or is not necessary. It is important to be clear about this requirement before beginning any information search.

When the stack of cards to be sorted is too thick to be managed at one time, it is divided into parts about 1 1/2 inches thick, and the sorting sequence is performed for each part separately. The results of these operations may then be readily combined.

Sorting Into Alphabetic and Numeric Sequence

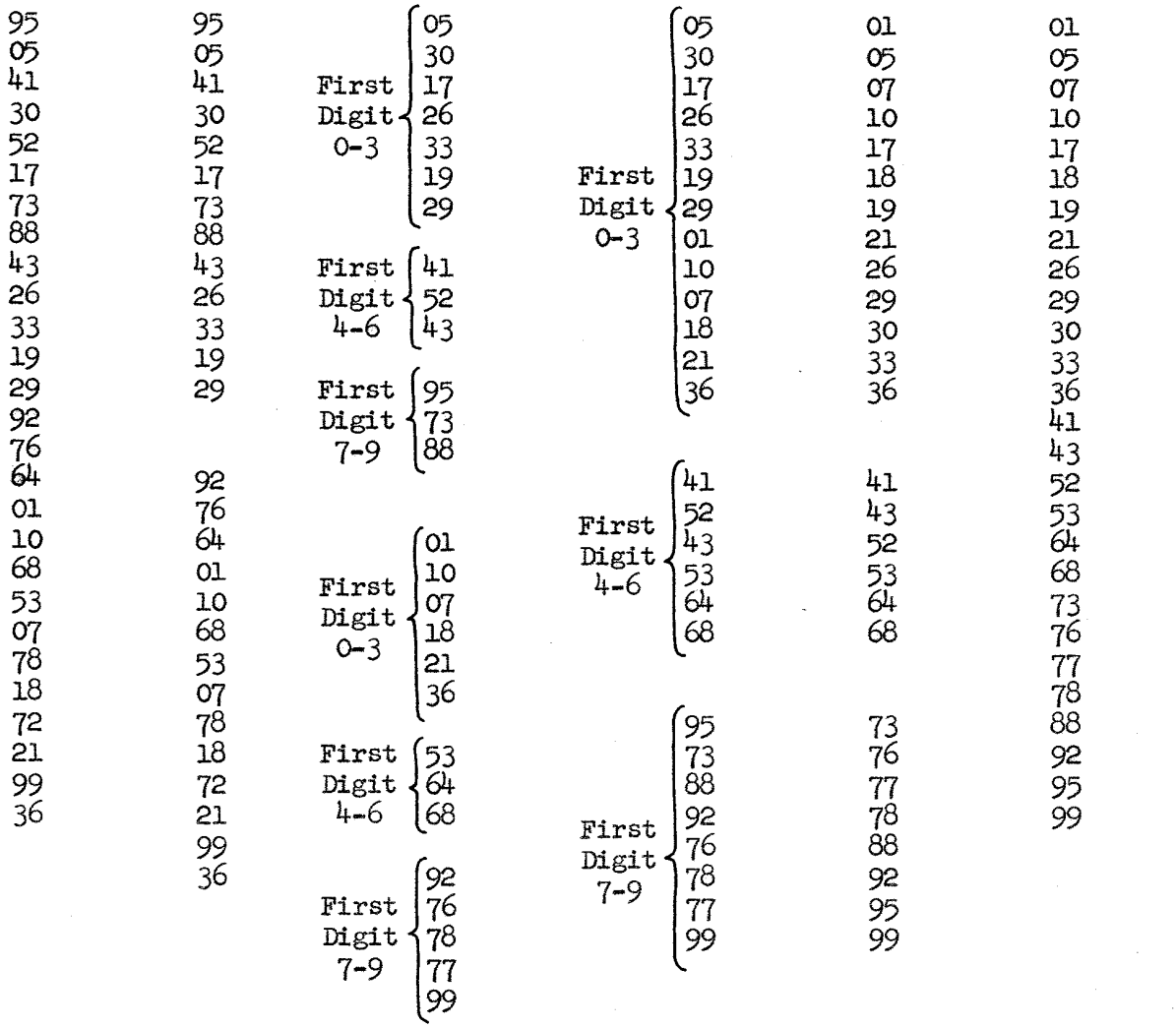
To arrange a stack of cards in sequence by nomenclature, it is first sorted on the right-most hole of the Nomenclature field -- i.e., the "1" hole in the 3rd numeric field. The cards that drop in this sort are placed behind the cards that remained on the needle. Care must be taken to preserve the sequence of the cards. The entire stack is then sorted on the next hole to the left -- the "2" hole in the 3rd numeric field -- again placing the cards that drop from the needle behind the cards that do not. Proceeding in this way from hole to hole in sequence from right to left across the Nomenclature field, the cards will, after a total of 27 sorts, lie in the desired alpha-numeric order.

When the entire directory (or any part of it more than about 1 1/2 inches thick) is to be arranged in alpha-numeric sequence, a series of steps is necessary. Batches of cards, chosen randomly from the directory and separately sorted into alpha-numeric order cannot be combined in any simple way to yield a single alpha-numerically ordered deck. In dividing the directory into parts of manageable thickness, a preliminary sorting procedure is necessary to arrange the parts so that the left-most portion of the nomenclatures included in each part represents a different known subsequence of the range of values that this portion of the nomenclature can have. For example, the first part of the deck might include nomenclatures whose first letter lies in the range A-C inclusive, the second D-F inclusive, etc. Each part is then sorted separately into alpha-numeric order, using the right-to-left 27-hole procedure previously outlined. Finally, these separate parts are combined manually so that the left-most portion of the nomenclature covered by each part falls in the correct sequence.

The preliminary procedure used to sort cards into piles according to the left-most portion of the nomenclature differs from that used to arrange a deck in alphabetical or numeric order, in that it proceeds from left to right. Thus the cards are first sorted on the left-most hole of the Nomenclature field (the "NZ" hole of the first alphabetic field). The cards that remain on the sorting needle then include all nomenclatures whose first letter is in the range A-M, while the cards that drop correspond to first letters in the range N-Z. Each of these two piles of cards is then sorted on the next hole to the right (the "7" hole of the first alphabetic field) to produce four piles representing first letters A-F, G-M, N-S, and T-Z. If desired, this procedure may be repeated for the "4," "2," and "1" holes in turn to divide the original pile of cards into a separate group for each of the letters that have been punched in the first numeric field, plus a pile of cards that have not been punched at all in this field, (e.g., AN components). However far this breakdown is carried, it is then repeated for each of the other piles into which the cards to be alphabetized were originally divided. When this has been done, the subpiles for corresponding parts of the range of the first alpha-numeric field are combined.

When arranging cards in alpha-numeric order, it is first desirable to separate cards corresponding to different nomenclature systems by sorting on the "Nom Sys" field.

The entire procedure is illustrated schematically by the example depicted in Fig. 5. For simplicity, we suppose that there is a total of 27 cards corresponding to two-digit nomenclatures in the range 1 to 99, initially in the random sequence indicated by the column of numbers in Fig. 5a. We further suppose that 15 is the maximum number of cards that can be sorted at one time. For this reason, the deck is first split into two roughly



a. Complete deck -- cards in random order

b. Deck divided into parts of manageable thickness without sorting

c. Each part sorted into 3 separate piles according to first digit using left-to-right sorting procedure

d. Corresponding piles combined, i.e., piles with same first digits put together

e. Each pile sorted into numerical order using right-to-left sorting procedure

f. Three piles combined into one -- cards in numerical order

Fig. 5 Procedure for sorting deck into numerical order when the total number of cards is too great to permit sorting all cards at one time

equal parts as shown in Fig. 5b. Each of these is then sorted into three stacks, such that the first includes all cards with left-hand digit in the range 0-3, the second with left-hand digit 4-6, and the third with left-hand digit 7-9, as shown in Fig. 5c. Corresponding stacks are then combined as in Fig. 5d, and each of the three resultant sets of cards is individually sorted into numerical sequence, with the result shown in Fig. 5e. The last step is simply to place the three stacks together in proper order as shown in Fig. 5f.

Appendix 1

ABBREVIATIONS USED ON CARDS

a, amp	ampere(s)	CRT	cathode ray tube
A.A.	audio amplifier	cw	continuous wave
A-A, a-a	air-to-air	cyl	cylinder
adj	adjusted	db	decibel(s)
AF	audio frequency	desig	designation
AFC	automatic frequency control	dev	deviation
		D/F	direction finder
A-G, a-g	air-to-ground	DSB	double sideband
AM	amplitude modulation	dynm	dynamotor
ampl	amplifier(s)	ea	each
ant	antenna(s)	eq, equip eqpt	equipment
aux	auxiliary	ext	external
avg	average	^{o}F	degrees Fahrenheit
bat(t)	battery	FAX	facsimile
BFO	beat frequency oscillator	FDM	frequency division multiplex
C, c, ^{o}C	degrees Centigrade	FM	frequency modulation
CAA	Civil Aeronautics Authority	freq	frequency
ch, chan	channel(s)	FSK	frequency shift keying
C/O	consists of	G-A, g-a	ground-to-air
coax	coaxial (cable)	gen	generator
comm	communications	G-G	ground-to-ground
cont	control	gr	group(s)
cp, cps	cycles per second		

H	horizontal
HF	high frequency(band)
IF	intermediate frequency
IFF	Identification, Friend or Foe
imped	impedance
incl	includes
instal	installation
inv	inverted
k	kilo(thousand)
kc	kilocycle(s) (per second)
kw	kilowatts
LF	low frequency(band)
lg	long
m	milli(thousandth) or meter
ma	milliamperes
man	manual
mcw	modulated continuous wave
MF	medium frequency (band)
min	minimum
MO	master oscillator
mov	moving
mod	modulator
mtd	mounted
mtg	mounting
MUX, mux	multiplex(ing)
mw	milliwatts
N/A	not applicable
op	operation
PCM	pulse code modulation
PEP	peak envelope power
ph	phase
pk	peak
pkg	package
PM	phase modulation
p/o	part of
pol	polarization
PPI	plan position indicator
PPM	pulses per minute
PPS	pulses per second
pri	primary
psi	pounds per square inch
pt-pt	point-to-point
PTM	pulse time modulation
quant	quantity
pwr	power
R, Rec	receiving
rcvr	receiver
rect	rectifier
refl, reflec	reflector
RF	radio frequency

RH	relative humidity
s(ec)	(per) second
shpg	shipping
Sig C	Signal Corps
S/N	signal-to-noise ratio
SRI	Standford Research Institute
SSB	single sideband
stat	stationary
stby	standby
std	standard
sup	supply
sych, sync	synchronizing, synchronization
synth	synthesizer
T	transmitting
term	terminal
Tg	telegraph
Tp	telephone
TR	transmit and receive
TRF	tuned radio frequency
TTY	teletype
u	micro(millionth)
UHF	ultra high frequency (band)
uf	microfarad
uuf	micromicrofarad
u/w	used with
v	volt
V, vert	vertical
va	volt amperes
vac	volts attenuating current
vdc	volts direct current
VFO	variable frequency oscillator
VHF	very high frequency (band)
vol	volume
w	watt
w/	with
w/o	without
wpm	words per minute
xcvr	transceiver
xmt	transmitting
xmtr	transmitter
xtal	crystal

Appendix 2

TOTAL NUMBER OF CARDS WITHIN EACH OF THE NOMENCLATURE CATEGORIES COVERED BY THE DIRECTORY

AN Sets

AN/ARA	1	AN/MXT	1
ARC	68	PRC	39
ARR	43	PRR	4
ART	20	PRT	1
ARW	3	SRA	3
AXA	1	SRC	16
AXT	12	SRR	7
BRR	2	SRT	18
CRC	11	TRA	1
CRR	1	TRC	57
CRT	5	TRQ	5
DRC	0	TRR	9
DRR	3	TRT	8
FRA	21	TXQ	1
FRC	59	TXB	1
FRR	55	TXT	1
FRT	49	URC	31
GRA	4	URR	26
GRC	94	URT	16
GRR	8	VRC	40
GRT	7	VRQ	3
GXA	1	VRR	7
MRC	79	VRT	1
MRR	9	WRR	2
MRT	10	WRT	4
		TOTAL	868

Independent AN Components

AS	133
AT	131
OA	50
R	119
RT	23
T	85
TOTAL	541

Equipment in Old Navy Nomenclature System

AN_	2
AT_	1
GF_	1
M_	4
MA_	10
MB_	5
RA_	10
RB_	18
RC_	8
RD_	5
RE_	4
TA_	9
TB_	15
TC_	21
TD_	15
TE_	6
TZ_	1
TOTAL	135

Equipment in Old Signal Corps Nomenclature System

BC	33
SCR	60
TOTAL	93

Commercial

Misc	14

GRAND TOTAL 1651

Appendix 3

NOMENCLATURE AND CLASSIFICATION OF CARDS IN THE CARD DIRECTORY

AN/-Nomenclatured Sets

In this Appendix, a rectangular grid ten squares wide has been constructed for each AN category (AN/ARC, AN/FRT, etc.) included in the directory. Each square of each grid corresponds to a number; the first horizontal row to the numbers 0, 1, 2,...,9; the second row to the numbers 10, 11, 12,...,19; etc.

In this way, squares in the grid are associated with equipments. Thus the squares in the fifth row of the AN/ARC grid correspond to the equipments AN/ARC-40, AN/ARC-41, AN/ARC-42,...,AN/ARC-49. The first square in the first row of each category will, of course, be left blank since the number zero is not assigned in the AN system.

A letter appears in each square. A capital letter indicates that the directory includes a card on the corresponding equipment and tells the classification of the card. A lower case letter indicates that there is no card and tells why not. The letters have the following meanings:

Cards Included In Directory	Cards Not In Directory
U Unclassified Card	a Nomenclature cancelled
C Confidential Card	b Equipment not used primarily for communication
S Secret Card	c No information available
	d No procurement planned

Other Equipment

For all other equipment, only cards included in the directory are listed. Confidential and Secret cards are indicated by the letters C and S, respectively, in parentheses following the nomenclature.

In the case of independent AN components, the grid is not used and only the portion of the nomenclature preceding the slant bar is given.

AN Sets

AN/ARA

	0	1	2	3	4	5	6	7	8	9
0		b	b	b	U					

AN/ARC

	0	1	2	3	4	5	6	7	8	9
0		U	U	U	U	U	d	d	U	U
1	U	C	U	d	C	C	C	C	U	U
2	a	U	d	C	C	U	a	U	U	d
3	U	a	U	U	U	U	U	C	U	U
4	d	U	U	U	U	U	C	U	U	U
5	S	C	U	U	U	U	S	C	U	U
6	U	S	U	U	a	U	U	a	U	a
7	U	a	U	U	C	U	c	U	C	

50		U	U	U
55			U	

AN/ARR

	0	1	2	3	4	5	6	7	8	9
0		b	U	U	U	b	d	b	b	U
1	a	U	a	a	U	U	U	U	a	U
2	U	U	a	U	b	b	C	U	U	b
3	C	C	a	b	a	a	U	C	b	C
4	U	C	C	C	C	b	U	U	C	U
5	a	C	C	U	b	S	C	U	C	a
6	C	C	C	C	U	C	C			

AN/ART

	0	1	2	3	4	5	6	7	8	9
0		a	b	b	b	b	b	b	b	b
1	b	b	a	U	a	U	a	U	U	U
2	a	U	U	U	U	U	U	U	U	C
3	U	U	U	U	U	U				

AN/ARW

	0	1	2	3	4	5	6	7	8	9
0			U	U						
3					U					

AN/AXA

	0	1	2	3	4	5	6	7	8	9
0		U								

AN/AXT

	0	1	2	3	4	5	6	7	8	9
0		U	U	U	S	U	U	U	a	U
1	U	a	C	C	U					

AN/BRR

	0	1	2	3	4	5	6	7	8	9
0		C	c	C						

AN/CRC

	0	1	2	3	4	5	6	7	8	9
0		U	U	U	U	U	a	U	U	U
1	U	U	U							

AN/CRR

	0	1	2	3	4	5	6	7	8	9
0		U								

AN/CRT

	0	1	2	3	4	5	6	7	8	9
0		U	b	U	U	U	U	c	c	c
1	c	c	c							

AN/DRC

	0	1	2	3	4	5	6	7	8	9
0		b	b	b						

AN/DRR

	0	1	2	3	4	5	6	7	8	9
0		S	S	S						

AN/FRA

	0	1	2	3	4	5	6	7	8	9
0										
1	U		U	U				U	U	
2		U	U	U	U	U	U		U	
3			U	U	U	U	U	U	U	
4	U	U								

AN/FRC

	0	1	2	3	4	5	6	7	8	9
0		U	U	a	a	a	U	U	U	U
1	U	U	U	U	U	U	a	U	U	b
2	U	U	U	U	U	U	U	U	U	a
3	U	U	U	a	U	U	U	U	U	U
4	C	C	U	U	U	U	C	U	a	a
5	U	U	U	U	U	c	U	U	U	U
6	U	S	U	S	U	U	U	U	U	U

AN/FRR

	0	1	2	3	4	5	6	7	8	9
0		U	U*	U	U	U	U	U	a	U
1	U	U	U	C	d	U	U	b	U	U
2	U	U	U	U	U	U	U	U	U	U
3	U	U	U	U	U	a	U	U	U	U
4	U	U	U	U	U	U	U	C	U	U
5	U	U	U	U	U	S				

50		a	U	U

*Also 12X

AN/FRT

	0	1	2	3	4	5	6	7	8	9
0		U	C	U	U	U	U	U	U	U
1	U	b	b	a	U	U	U	U	U	U
2	U	U	U	U	U	U	U	U	b	U
3	U	U	U	U	U	a	U	U	U	U
4	U	b	U	U	U	U	U	U	S	U
5	U	U								

50		c	U	U		U	U

AN/GRA

	0	1	2	3	4	5	6	7	8	9
0					U					
1			U							
2	a									U
3				U						
4	b								b	b

AN/GRC

```
   0 1 2 3 4 5 6 7 8 9
 0   U a U U U U U U U
 1 U U U U U U U a U U
 2 U U U U U U U U a U
 3 U U U U U U U U U U
 4 U U U a a a U U U S
 5 U U U U U U U U U U
 6 U U U U U a U U U a
 7 S S U U U U U U U U
 8 U U U U U U U U U C
 9 U C U U U U U U U U
10 U U

50   c U
```

AN/GRR

```
   0 1 2 3 4 5 6 7 8 9
 0   U U U a U a U U b
 1 U U
```

AN/GRT

```
   0 1 2 3 4 5 6 7 8 9
 0   U U U U U S c U
```

AN/GXA

```
   0 1 2 3 4 5 6 7 8 9
 0         U
```

AN/MRC

```
   0 1 2 3 4 5 6 7 8 9
 0   U U*U U U U U U U
 1 U U U U a a U U U U
 2 U a U U U U U U U U
 3 U U U U U U U U U U
 4 U U U U a C U U U a
 5 a a a c U U U a a U
 6 U U U U U a U U U U
 7 U U U U U U U U U U
 8 U U U U U U U

50   U U U U
  * Also 2(V)
```

AN/MRR

```
   0 1 2 3 4 5 6 7 8 9
 0   U U U b U U U U

50   U U
```

AN/MRT

```
   0 1 2 3 4 5 6 7 8 9
 0   b C U C b U U U U

50   U U U
```

AN/MXT

```
   0 1 2 3 4 5 6 7 8 9
 0   U
```

AN/PRC

```
   0 1 2 3 4 5 6 7 8 9
 0   U a a U U U U U U
 1 U U a a U U U U C U
 2 U U U U U U a U U U
 3 U U U U U U U U U U
 4 U C U U U
```

AN/PRR

```
   0 1 2 3 4 5 6 7 8 9
 0   a U U b a U C b
```

AN/PRT

```
   0 1 2 3 4 5 6 7 8 9
 0   b C
```

AN/SRA

```
   0 1 2 3 4 5 6 7 8 9
 0         U
 1 U                 U
```

AN/SRC

```
   0 1 2 3 4 5 6 7 8 9
 0   a U U a U U U U U
 1 U U U U U U U U U

50 U
```

AN/SRR

```
   0 1 2 3 4 5 6 7 8 9
 0   U U U C b b a a a
 1 a b b b b U U U
```

AN/SRT

```
   0 1 2 3 4 5 6 7 8 9
 0   U a U U a U U U U
 1 U a a U U U U U U b
 2 U U U U
```

AN/TRA

```
   0 1 2 3 4 5 6 7 8 9
 0                   U
```

AN/TRC

```
   0 1 2 3 4 5 6 7 8 9
 0   U U U a a U U U U
 1 U U U U a a a U U U
 2 U b U U U U U U U U
 3 a a U U U U U a U U
 4 U U U U U a U U U U
 5 a a a a a a a U a a a
 6 U U b C b b U U U U
 7 U U U U U U

50   C C U U
```

AN/TRQ

```
   0 1 2 3 4 5 6 7 8 9
 0   U
 1 U U U U
```

AN/TRR

```
   0 1 2 3 4 5 6 7 8 9
 0   S U b a U a U U U
 1 U U c c U
```

AN/TRT

```
   0 1 2 3 4 5 6 7 8 9
 0   U b U U U U U U U
```

AN/TXQ

	0	1	2	3	4	5	6	7	8	9
0		U								

AN/TXR

	0	1	2	3	4	5	6	7	8	9
0		U								

AN/TXT

	0	1	2	3	4	5	6	7	8	9
0		U								

AN/URC

	0	1	2	3	4	5	6	7	8	9
0		a	U	C	U	U	U	U	U	U
1	U	U	a	U	U	S	U	U	U	U
2	U	U	U	S	U	U	U	C	U	U
3	a	C	U	S	U					

AN/URR

	0	1	2	3	4	5	6	7	8	9
0		a	U	a	a	a	a	a	a	U
1	U	U	U	U	b	b	a	a	a	a
2	b	U	U	U	U	a	U	U	a	U
3	U	b	b	b	b	U	U	U	a	U
4	U	C	U	U	U	U	U	U		

AN/URT

	0	1	2	3	4	5	6	7	8	9
0		U	U	U	U	a	U	U	U	U
1	U	U	U	U	U	U	U	U		

AN/VRC

	0	1	2	3	4	5	6	7	8	9
0		U	U	U	U	U	U	U	U	U
1	U	a	U	U	U	U	U	U	U	U
2	U	U	U	U	U	U	U	U	U	U
3	U	U	U	U	U	U	U	U	U	c
4	U	U								

50 U

AN/VRQ

	0	1	2	3	4	5	6	7	8	9
0		U	U	U						

AN/VRR

	0	1	2	3	4	5	6	7	8	9
0		U	U	U	U	U	U	U		

AN/VRT

	0	1	2	3	4	5	6	7	8	9
0		U								

AN/WRR

	0	1	2	3	4	5	6	7	8	9
0		C	U							

AN/WRT

	0	1	2	3	4	5	6	7	8	9
0		U	U	U	S					

Independent AN Components

AS 19, 81, 89, 97, 121, 139, 150, 161, 169, 191, 192, 193, 194, 195, 196, 197, 198, 199, 200, 203, 211, 265, 285, 286, 315, 325, 334, 341, 343, 350, 351, 352, 353, 357, 362, 363, 364, 365, 366, 371, 372, 374, 376, 390, 401, 406, 408, 411, 416, 417, 418, 419, 420, 421, 422, 423, 424, 425, 426, 427, 450, 465, 466(C), 480, 493(C), 505, 533, 534, 535, 541, 542, 543, 544, 552, 554, 558, 559, 574, 576, 581, 582, 583, 584, 585, 586, 587, 590, 595/GR, 595/MRT, 610, 612, 613, 620, 631, 636, 638, 639, 640, 642, 643, 660, 661, 662/FRC, 662/TRC, 663, 668, 725, 726, 727, 733, 755, 756, 759, 768, 778, 786, 787, 794, 831, 837, 842, 857, 858, 861, 862, 863, 864, 870, 882, 933, 948, 961, 970.

AT 5, 8, 27, 28, 29, 30, 38, 50, 51, 69, 70, 71, 72, 73, 74, 75, 76, 77, 78, 119, 129, 134, 141, 145, 150, 175, 190, 197, 202, 243, 246, 247, 252, 256, 271, 272, 274, 278, 279, 281, 286, 287, 288, 308, 317, 330, 336, 337, 339, 340, 343, 348, 350, 383, 405, 412, 413, 414, 427, 429, 438, 439, 440, 441, 446, 450, 454, 455, 456, 458, 461, 469, 470, 473, 479, 486, 496, 497, 500, 503, 530, 532, 534, 551, 552, 553, 563, 594, 595, 629, 633, 642, 644, 672, 674/5, 677, 700, 701, 708, 720, 723, 724, 725, 726, 727, 728, 730, 739, 740, 741, 747, 748, 751, 752, 755, 765, 766, 774, 781, 791, 803, 804, 816, 818, 837, 840, 841, 865, 869, 870, 880.

OA 58, 59, 60, 104, 192, 232, 233, 238, 252, 298, 299, 306, 314, 315, 316, 317, 321, 353, 384, 482, 483, 501, 503, 510, 512, 684, 751, 1234, 1235, 1238, 1378, 1387, 1446, 1447, 1448, 1451, 1460, 1473, 1499, 1502, 1507, 1543, 1953, 1954, 1955, 1956, 1957, 1958, 2021, 2099.

R 3, 19, 23, 24, 25, 26, 27, 28, 30, 46, 48, 53, 62, 77, 80, 96, 100, 105, 108, 109, 110, 125, 129, 137, 159, 172, 174, 181, 183, 187, 201, 202, 203, 204, 205, 206, 207, 208, 209, 210, 211, 212, 213, 215, 219, 220, 224, 229, 237, 243, 257, 270, 272, 274, 275, 278, 279, 291, 303, 319, 320, 345, 359, 361, 388, 389, 390, 391, 392, 394, 415, 417, 418, 448, 451, 452, 460, 483, 504, 508, 513, 515, 520, 563, 583, 592, 593, 596, 620, 644, 649, 705, 709, 710, 712, 725, 727, 731, 744, 745, 749, 750, 761, 774, 775, 788, 792, 809, 825, 840, 853, 859, 861, 864, 873, 878, 880, 893, 894.

RT 18, 66, 67, 68, 70, 77, 173, 175, 178, 209, 250, 252, 263, 323, 327, 332, 334, 348, 357, 380, 435, 452, 464.

T 4, 5, 14, 18, 19, 20, 21, 22, 23, 28, 29, 30, 47, 67, 83, 88, 103, 104, 106, 107, 110, 158, 159, 160, 168, 169, 170, 171, 172, 173, 174, 175, 177, 180, 181, 182, 183, 189, 195, 198, 208, 217, 225, 235, 256, 278, 282, 302, 303, 326, 347, 350, 362, 363, 364, 365, 366, 368, 401, 410, 416, 417, 431, 452, 559, 575, 576, 578, 589, 594, 595, 596, 597, 604, 605, 620, 640, 653, 667, 676, 681, 682, 690, 691, 5015.

Navy-Nomenclatured Equipment

ARJ, ARK

ATK

GF-11/RU 16

MAA, MAB, MAC, MAH, MAK, MAM, MAN, MAR, MAW, MAY

MBB, MBF, MBK, MBL, MBS

MB, ME, MN, MQ

RAA, RAB, RAK, RAL, RAN, RAS, RAT, RAX, RAY, RAZ

RBA, RBB, RBC, RBD, RBE, RBF, RBG, RBH, RBJ, RBK, RBL, RBM, RBO, RBP RBQ, RBS, RBT, RBZ

RCB, RCE, RCF, RCG, RCH, RCK, RCO, RCP

RDE, RDF, RDM, RDR, RDZ

REA, RED, REH, REK

TAB, TAD, TAG, TAJ, TAP, TAQ, TAR, TAW, TAZ

TBA, TBC, TBF, TBJ, TBK, TBL, TBM, TBN, TBO, TBS, TBT, TBU, TBW, TBX, TBY

TCA, TCB, TCC, TCE, TCF, TCG, TCH, TCJ, TCK, TCM, TCN, TCO, TCP, TCQ, TCR, TCS, TCT, TCU, TCX, TCY, TCZ

TDA, TDB, TDD, TDE, TDF, TDG, TDH, TDK, TDN, TDO, TDQ, TDR, TDT, TDU, TDZ

TEB, TEC, TED, TEF, TEG, TEJ

TZU

Signal Corps-Nomenclatured Equipment

BC 191, 229, 230, 312, 339, 342, 348, 365, 375, 401, 447, 603, 604, 610 620, 624, 625, 639, 640, 642, 659, 583, 684, 764, 787, 794, 923, 924, 1000, 1004, 1100, 1147, 1206.

SCR 177, 183, 187, 188, 194, 244, 274, 277, 281, 283, 284, 287, 288, 293 294, 298, 300, 399, 499, 506, 508, 509, 510, 511, 522, 528, 536, 538, 542, 543, 562, 563, 564, 566, 567, 573, 574, 575, 578, 585, 593, 607, 608, 609, 610, 614, 616, 619, 624, 628, 632, 633, 641, 643, 644, 678, 694, 704, 808, 828.

Commercial

18S-4, 25/FSTR, 30K-5, 35 FMTR-7A, 50,FMTR-7A, 51 J-4, 75A-4, 149-A, 265, 431D-1, 618S-1, 1498, RTA-1-B, AN-104-B

Appendix 4

SUMMARY OF "AN" NOMENCLATURE SYSTEM

I. INDICATOR LETTERS FOR "AN" SETS

Letter	Type of Installation	Type of Equipment	Purpose
A	Airborne (installed and operated in aircraft)	Invisible light, heat radiation	Auxiliary assemblies (not complete operating sets used with or part of two or more sets or sets series)
B	Underwater mobile, submarine	Pigeon	Bombing
C	Air transportable (inactivated, do not use)	Carrier	Communications (receiving and transmitting)
D	Pilotless carrier	Radiac	Direction finder, reconnaissance, and/or surveillance
E		Nupac	Ejection and/or release
F	Fixed	Photographic	
G	Ground, general ground use (includes two or more ground type installations)	Telegraph or teletype	Fire control or searchlight directing
H			Recording and/or reproducing (graphic, meterological and sound)
I		Interphone and public address	
J	Combination of two or more types of installation	Electro-mechanical (not otherwise covered)	
K	Amphibious	Telemetering	Computing
L		Countermeasures	Searchlight control (inactivated, use G)

Letter	Type of Installation	Type of Equipment	Purpose
M	Ground, mobile (installed as operating unit in a vehicle which has no function other than transporting the equipment)	Meterological	Maintenance and test assemblies (including tools)
N		Sound in air	Navigational aids (including altimeters, beacons, compasses, racons, depth sounding, approach and landing)
P	Pack or portable (animal or man)	Radar	Reproducing (inactivated, do not use)
Q		Sonar and underwater sound	Special, or combination of purposes
R		Radio	Receiving, passive detecting
S	Water surface craft	Special types, magnetic, etc., or combinations of types	Detecting and/or range and bearing, search
T	Ground, transportable	Telephone (wire)	Transmitting
U	General utility (includes two or more general installation classes, airborne, shipborne, shipboard, and ground)		
V	Ground, vehicular (installed in vehicle designed for functions other than carrying electronic equipment, etc., such as tanks)	Visual and visible light	
W	Water surface and underwater	Armament	Control
X		Facsimile or television	Identification and recognition
Y		Data Processing	

II. INDICATOR LETTERS FOR "AN" COMPONENTS

Letter	Family Name
AB	Supports, antenna
AM	Amplifiers
AS	Antennas, complex
AT	Antennas, simple
BA	Battery, primary type
BB	Battery, secondary type
BZ	Signal devices, audible
C	Controls
CA	Commutator, assemblies, sonar
CB	Capacitor bank
CG	Cable assemblies, rf
CK	Crystal kits
CM	Comparators
CN	Compensators
CP	Computers
CR	Crystals
CU	Couplers
CV	Converters (electronic)
CW	Covers
CX	Cable assemblies, non-rf
CY	Cases and cabinets
D	Dispensers
DA	Load, dummy
DT	Dynamotors
E	Hoists
F	Filters
FN	Furniture
FR	Frequency measuring devices
G	Generators, power
GO	Goniometers
GP	Ground rods
H	Head, hand, and chest sets
HC	Crystal holder
HD	Air conditioning apparatus
ID	Indicating devices, non-crt
IL	Insulators
IM	Intensity measuring devices
IP	Indicators, cathode-ray tube
J	Junction devices
KY	Keying devices
LC	Tools, line construction
LS	Loudspeakers
M	Microphones
MA	Magazines
MD	Modulators
ME	Meters
MF	Magnets or mag-field gens
MK	Miscellaneous kits
ML	Meteorological devices
MT	Mountings
MX	Miscellaneous
O	Oscillators
OA	Operating assemblies
OC	Oceanographic devices
OS	Oscilloscope, test
PD	Prime divers
PF	Fittings, pole
PG	Pigeon articles
PH	Photographic articles
PP	Power supplies
PT	Plotting equipments
PU	Power equipments
R	Receivers
RC	Reels
RD	Recorder--reproducers
RE	Relay assemblies
RF	Radio frequency component
RG	Cables, ef, bulk
RL	Reeling machines
RO	Recorders
RP	Reproducers
RR	Reflectors
RT	Receiver and transmitter
S	Shelters
SA	Switching devices
SB	Switchboards
SG	Generators, signal
SM	Simulators
SN	Synchronizers
ST	Straps
T	Transmitters
TA	Telephone apparatus
TB	Towed body
TC	Towed cable
TD	Timing devices
TF	Transformers
TG	Positioning devices
TH	Telegraph apparatus
TK	Tool kits
TL	Tools
TN	Tuning units
TR	Transducers
TS	Test items
TT	Teletypewriter and fascimile
TV	Tester, tube
TW	Tapes, recording wires

Letter	Family Name	Letter	Family Name
U	Connectors, audio and power	WF	Cables, four-conductor
UG	Connectors, rf	WM	Cables, multiple-conductor
V	Vehicles	WS	Cables, single-conductor
VS	Signaling equipment, visual	WT	Cables, three-conductor
WD	Cables, two-conductor	ZM	Impedance measuring devices

Appendix 5

CODE LIST OF MANUFACTURERS AND DEVELOPMENTAL CONTRACTORS

Abbreviation on Card	Name & Address of Organization	Code for Sorting
Ace	Ace Engineering and Machine Co. Tomlinson Rd. Huntingdon Valley, Pa.	1
Adler	Adler Electronics, Inc. 1 Le Fevre Lane New Rochelle, N.Y.	2
Admiral	Admiral Corp. 3800 W. Cortland St. Chicago 47, Ill.	1-2
AIL	Airborne Instruments Lab., Inc. 160 Old Country Rd. Mineola, N.Y.	1-2-4
Airadio	Airadio Co., Inc. Stamford, Conn.	2-4
Air Assoc	Air Associates, Inc. Electronic Communications, Inc. Electronic Division Orange, N.J.	1-4
Aircraft Acc	Aircraft Accessories Corp. of Missouri Aireon Mfg. Corp., Electronics Div. Kansas City, Kansas	4
Aircraft Rad	Aircraft Radio Corp. Boonton, N.J.	8
Aireon	Aireon Mfg. Corp. Kansas City, Mo.	1-8

Air Marine	Dumont Airplane & Marine Instruments, Inc. 15 William St. New York, N.Y.	2-8
Airtech	Airtech, Ltd. Haddenham, Buck, England	4-16-32-128
Air Track	Air Track Mfg. Corp. College Park, Md.	2-4-16-64-128
Alden	Alden Products Co. 119 N. Main St. Brockton 64, Mass.	1-2-8
AMF	American Machine & Foundry Co. Electronics Division 1085 Commonwealth Ave. Boston 15, Mass.	1-4-8-64-128
Amphenol	Amphenol-Borg Electronics Corp. 1858 S. 54 Ave. Chicago 50, Ill.	4-8
Andrea	Andrea Radio Corp. 2701 Bridge Pl., N. Long Island City, N.Y.	4-128
Andrew	Andrew Antenna Corp., Ltd. 606 Beech St. Whitby, Ont., Canada	1-4-8
Antenna Res	Antenna Research Lab., Inc., Columbus, Ohio Thompson-Ramo-Wooldridge Corp. Cleveland, Ohio	2-4-8
Atomic Eng	Atomic Engineering Corp. P. O. Box 1701 Grand Junction, Colorado	1-2-4-8

Audio Prod	Audio Products Corp. 2265 Westwood Blvd. Los Angeles, Calif.	1-4-16- 32-128
Avco	Avco Mfg. Corp. Crosley Div. 1329 Arlington St. Cincinnati 25, Ohio	1-2-32
Balco	Balco Research Labs. 51 Edison Pl. Newark, N.J.	1-16
Bell Tel	Bell Telephone Labs., Inc. Whippany, N. J.	1-64-128
Belmont	Belmont Radio Corp. Admiral Corp. Chicago, Ill.	1-2-16
Bendix	Bendix Radio Div. of Bendix Aviation Corp. Towson, Md.	4-16
Bergen	Bergen Engineering & Development Teterboro, N.J.	1-4-16
Bird	Bird Electronic Corp. 1800 E. 38th St. Cleveland 14, Ohio	2-4-16
Birnbach	Birnbach Radio Co., Inc. 145 Hudson St. New York 13, N.Y.	1-2-4-16
Blaw-Knox	Blaw-Knox Co. P.O. Box 1198 Blaw Knox, Pa.	8-16
Boes	Boes, W.W., and Co. (Valtronics, Inc.) Dayton, Ohio	1-8-16

Broadway	Broadway Electronics Redbank, N.J.	2-8-16
Buehrie	Buehrie & Son, Philip H. South River, N.J.	8-16-32-64
Bunnell	Bunnell & Co., Inc. J.H. 81 Prospect St., Brooklyn 1, N.Y.	1-2-8-16
B & W	Barker & Williamson, Inc. Canal & Beaver Sts. Bristol, Pa.	2-16
Canadian Comm	Canadian Communications Corp.	4-8-16
Cardwell	Cardwell, Allen D., Electronics Production Corp. Plainville, Conn.	1-4-8-16
Collins	Collins Radio Co. 855 35th St., N.E. Cedar Rapids, Iowa	16-32
Colonial	Colonial Radio Corp. (Sylvania Electric Products, Inc.) Buffalo, N.Y.	1-2-16-32
Comm Co	Communications Co., Inc. 300 Greco Ave. Coral Gables 34, Fla.	1-32
Comm Meas	Communication Measurements Lab., Inc. 350 Leland Ave. Plainfield, N.J.	1-2-4-16- 32-128
Conn Tel	Connecticut Telephone & Electric Corp. (Great American Electronics, Inc.) 70 Britannia St. Meriden, Conn.	1-2-4- 16-32-64

Continental	Continental Electronics Mfg. 4212 S. Buckner Blvd. Dallas 27, Texas	1-8-64-128
Craig	Craig Systems, Inc. 360 Merrimack St. Danvers, Mass.	2-32
Daystrom	Daystrom, Inc. 430 Mountain Ave. Murray Hill, N.J.	4-32
DeJur	DeJur-Amsco Corp. 4501 Northern Blvd. Long Island City 1, N.Y.	16-32-128
DFI	Designers For Industry, Inc. 4241 Fulton Pkwy. Cleveland 9, Ohio	1-4-32
D & M	Dorne and Margolin, Inc. 29 New York Ave. Westbury, N.Y.	2-4-32
Douglas	Douglas Aircraft Co., Inc. 3000 Ocean Park Blvd. Santa Monica, Calif.	1-2-4-32
Dynamic	Dynamic Television Associates, Inc. Brooklyn, N.Y.	8-32
Eldico	Eldico Corp. Mineola, N.Y.	1-8-32
Elec Meas	Electronic Measurements Co. Lewis St. & Maple Ave. Eatontown, N.J. or Red Bank, N.J.	2-8-32
Elec Res	Electronic Research Co. 5115 Westheimer Houston, Texas	1-2-8-32

Eller	Eller Avionics	2-4-64-128
Emerson	Emerson Radio & Phonograph Corp. 14 Coles St. Jersey City 2, N.J.	4-8-32
ERCO	ERCO Division ACF Industries Hyattsville, Md.	1-4-8-32
Espey	Espey Mfg. Co., Inc. 200 W. 57th St. New York 19, N.Y.	2-4-8-32
Farnsworth	Farnsworth Electronics Co. Div. of IT&T Corp. Ft. Wayne, Ind.	1-2-4-8-32
Federal Elec.	Federal Electric Co., Ltd.	1-2-4-8-16
Federal Mfg	Federal Mfg. & Engineering Corp. 1055 Stewart Ave. Garden City, N.Y.	1-16-32
Ferris	Ferris Instrument Corp. 110 Cornelia St. Boonton, N.J.	2-64-128
Fisher	Fisher Research Lab., Inc. 1961 University Ave. Palo Alto, Calif.	1-4-16-32
Freed	Freed Electronics & Controls Corp. (Fairchild Controls Corp.) New York, N.Y.	2-4-16-32
FTL	Federal Telecommunication Labs. Co. Div. of IT&T Corp. Nutley, N.J.	2-16-32
FTR	Federal Telephone & Radio Co. Div. of IT&T Corp. 100 Kingsland Rd. Clifton, N.J.	32

FTV	Federal Television Corp. Long Island City, N.Y.	4-16-32
Gabriel	Gabriel Electronics Div. Gabriel Co. 135 Crescent Rd. Needham Heights 94, Mass.	1-2-4- 16-32
Galvin	Galvin Mfg. Corp. (Motorola, Inc.) Chicago, Ill.	8-16-32
Garad	Garad Radio Brooklyn, N.Y.	1-8-16
GCC	General Communication Co. 677 Beacon St. Boston 15, Mass.	1-2-8-16-32
GE	General Electric Co. Heavy Military Electronic Equipment Department Syracuse, N.Y.	64
GEC	General Electronics Corp. 4200 Mobile Rd. Montgomery, Ala.	1-4-8- 16-32
General Bronze	General Bronze Corp. 711 Stewart Ave. Garden City, N.Y.	2-16-64-128
Geophysical	Geophysical Service, Inc. 6002 Lemmon Ave. Dallas, Texas	1-2-8-64-128
GIC	General Instrument Corp. Newark, N.J.	8-16-32-128
Gilfillan	Gilfillan Bros., Inc. 1815 Venice Blvd. Los Angeles 6, Calif.	2-4-8-16-32

Gille	Gille Bros.	1-2-4- 64-128
Goodyear	Goodyear Aircraft Corp. Akron, Ohio	4-8-16-32
Goslin	Goslin Electric & Mfg. Co. Burbank, Calif.	1-64
Granite	Granite State Machine Co., Inc. 124 Joliette St. Manchester, N.H.	2-64
Hallamore	Hallamore Electronics Co. A Division of the Siegler Corp. 8352 Brookhurst Ave. Anaheim, Calif.	8-64-128
Hallicrafters	Hallicrafters Co. 4401 W. 5th Ave. Chicago, Ill.	1-2-64
Hamlyn	Hamlyn Electronics Corp. Hicksville, N.Y.	1-8-16- 32-128
Hammarlund	Hammarlund Co., Inc. 460 W. 34th St. New York 1, N.Y.	4-64
Hazeltine	Hazeltine Electronics Div. of Hazeltine Corp. 58-25 Little Neck Pkwy. Little Neck, N.Y.	1-4-64
Herold	Herold Radio & Electronics Corp. 716 S. Columbus Mt. Vernon, N.Y.	2-16-32-128
Higgins	Higgins, Inc. Box 8001 New Orleans, La.	2-4-64

Hoffman	Hoffman Electronics Corp. Hoffman Labs Div. 3740 S. Grand Ave. Los Angeles 7, Calif.	1-2-4-64
Howard	Howard Radio Co. Chicago, Ill.	8-64
Hughes	Hughes Products Div. of Hughes Aircraft Co. Los Angeles 45, Calif.	1-8-64
Hycon	Hycon Electronics, Inc. 370 S. Fair Oaks Ave. Pasadena, Calif.	2-8-64
Industrial	Industrial Radio Corp. 428 N. Parkside Ave. Chicago 44, Ill.	1-2-8-64
International	International Electronics Corp. 81 Spring St. New York 12, N.Y.	4-8-64
ITE	I-T-E Circuit Breaker Co. Philadelphia 30, Pa.	1-4-8-64
IT&T, LTD	International Telephone & Telegraph Aldwich WC2, London, England	32-64-128
Jefferson	Jefferson, Ray, Inc. 40 E. Merrick Rd. Freeport, N.Y.	1-2-4-8-64
JFD	JFD Electronics Corp. 1462 62nd St. Brooklyn 19, N.Y.	2-4-8-64
Johnson	Johnson Co., E.F. Waseca, Minn.	16-64
Kaar	Kaar Engineering Co. 2995 Middlefield Rd. Palo Alto, Calif.	1-16-64

Kennedy	Kennedy & Co., Inc., D. S. Route 3A Cohasset, Mass.	2-16-64
Kings	Kings Electronics Co., Inc. 40 Marbledale Rd. Tuckahoe, N.Y.	1-2-16-64
Kingston	Kingston Products Corp. Kokomo, Ind. or Bronson, Mich.	4-16-64
Lavoie	Lavoie Labs, Inc. Matawan-Freehold Rd. Morganville, N.J.	2-4-16-64
Lewyt	Lewyt Mfg. Corp. Long Island City, N.Y.	1-2-4-16-64
Link	Link Radio Corp. 110 Jericho Tpke. New Hyde Park, N.Y.	8-16-64
Locke	Locke Insulator Corp. (Locke, Inc.) Baltimore, Md.	1-8-16-64
Mackay	Mackay Radio and Telegraph Co. 198 Broadway New York 38, N.Y.	1-2-4-8-16- 32-64
Magnavox	Magnavox Co., The Fort Wayne, Ind.	2-8-16-64
Mallory	Mallory & Co., Inc., P.R. 28 S. Gray St. Indianapolis 6, Ind.	4-8-16-64
Manson	Manson Labs. 207 Greenwich Ave. Stamford, Conn.	2-8-16-32-128

Mare Island	Mare Island Naval Shipyard San Francisco, Calif.	1-4-8-16-64
Marine	Marine Radio Co. Baltimore, Md.	2-4-8-16-64
Martin	Martin Co. Baltimore 3, Md.	1-2-4-8- 16-32
Meck	Meck, John, Industries, Inc. (Div. of Scott Radio Labs., Inc.) Plymouth, Ind.	1-2-4-8- 16-64
Melpar	Melpar, Inc. 3000 Arlington Blvd. Falls Church, Va.	32-64
Memco	Maryland Electronic Mfg. Corp. College Park, Md.	8-16-64-128
Mercury	Mercury Trading Corp. Cincinnati, Ohio	1-32-64
Molded Ins	Molded Insulation Co., Inc. 335 E. Price St. Philadelphia 44, Pa.	1-2-32-64
Motorola	Motorola, Inc. Chicago, Ill.	4-32-64
Munston	Munston Mfg. & Service, Inc. Beech St. Islip, N.Y.	1-4-32-64
Nablitt	Nablitt-Sparks Columbus, Ind.	1-2-4-32-64
NAPhillips	North American Phillips Co., Inc. Amperex Electronic Co. 230 Duffey Ave. Hicksville, N.Y.	1-4-8-32-64

NASDiego	U.S. Naval Air Station San Diego, Calif.	2-4-32-64
National	National Co., Inc. 61 Sherman St. Malden 48, Mass.	8-32-64
NEL	Navy Electronics Lab. San Diego, Calif.	1-2-64-128
Nems-Clarke	Nems-Clarke Co. (Div. of Vitro Corp. of America) Silver Springs, Md.	2-8-32-64
NGF	U.S. Naval Weapons Plant Washington 25, D.C.	1-8-32-64
Northeastern	Northeastern Engineering, Inc. 25 S. Bedford St., Box 150 Manchester, N.H.	2-4-8-32-64
N Radio	Northern Radio Co., Inc. 147 W. 22nd St. New York 11, N.Y.	1-2-8-16-64
NYNOR	Norfolk Naval Shipyard Norfolk, Va.	4-8-32-64
NYPHIL	U.S. Naval Shipyard Philadelphia, Pa.	1-4-16- 32-64
Offner	Offner Electronics, Inc. 3900 N. River Rd. Schiller Park, Illinois	2-8-64-128
Olympic	Olympic Radio & Television Div. of Unitronics Corp. 34-01 38th Ave. Long Island City, N.Y.	1-2-4-8- 32-64
Packard B	Packard Bell Electronics 12333 W. Olympic Blvd. Los Angeles 64, Calif.	16-32-64

Parkchester	Parkchester Machine Corp. 204 Lafayette St. New York, N.Y.	2-16-32-64
Petroff	Petroff, Peter A. (Amer. Dev. Elec. Co.) 210 Central Ave. Newark, N.J.	4-16-32-64
Petrola	International Petrola Corp. Detroit, Michigan or Indianapolis, Ind.	1-2-16- 32-64
Philco	Philco Corp. 4700 Wissahickon Ave. Philadelphia, Pa.	2-4-16- 32-64
Philharmonic	Philharmonic Radio & Television Corp. New Brunswick, N.J.	4-8-16- 32-128
Phoenix	Phoenix Electronics Lawrence, Mass.	1-8-16-32-64
Polarad	Polarad Electronics Corp. 43-20 34th Street Long Island City 1, N.Y.	2-4-8-64-128
Polytronic	Polytronic Research, Inc. 7326 Westmore Rd. Rockville, Md.	2-8-16-32-64
Premax	Premax Products Div. of Chisholm Ryder Co., Inc. 500 Highland Ave. Niagara Falls, N.Y.	2-4-8-16
Press Wire	Press Wireless Labs., Inc. 25 Prospect Pl. West Newton 65, Mass.	1-2-8-16- 32-64
Prodelin	Prodelin, Inc. 307 Bergen Ave. Kearney, N.J.	1-4-16- 64-128

Quist	Quints Sons Co., Inc., S.H. Philadelphia, Pa.	1-2-16- 64-128
Radiation Prod	Radiation Products, Inc. Radiaphone Corp. Monrovia, Calif.	2-4-8-16- 32-64
Radio Recep	Radio Receptor Co., Inc. 240 Wythe Ave. Brooklyn 11, N.Y.	1-128
Radiomarine	Radiomarine Corp. of America 66 Broad St. New York 4, N.Y.	128
Rauland	Rauland Borg Corp. 3535 W. Addison St. Chicago 18, Ill.	2-128
Raytheon	Raytheon Mfg. Co. 100 River St. Waltham, Mass.	1-2-128
RCA	Radio Corp. of America Camden, N.J.	64-128
Reeves	Reeves Instrument Corp. Roosevelt Field Garden City, L.I., N.Y.	1-2-4-8- 64-128
REL	Radio Engineering Labs., Inc. 29-01 Borden Ave. Long Island City 1, N.Y.	4-64-128
Remington Rand	Sperry Rand Corp. Sperry Microwave Div. Clearwater, Florida	1-4-8-32
Remler	Remler Co., Ltd. 2101 Bryant San Francisco, Calif.	1-4-128

Republic Avn	Republic Aviation Corp. Conklin St. Farmingdale, L.I., N.Y.	8-16-128
Roflan	Roflan Co. Rte 17 Topsfield, Mass.	1-2-4-128
Rogers	Rogers Majestic, Ltd. (Standard Radio, Ltd.) Toronto, Canada	2-4-128
Rowe	Rowe Radio Research Lab, Co. Chicago, Ill.	8-128
Schuttig	Schuttig Div. of Varo Mfg. Co., Inc. 220 Walnut Garland, Texas	1-2-16- 32-128
SCI	Setchell-Carlson Corp. New Brighton, Minn.	4-8-128
Scott	Scott Radio Labs Inc. Chicago, Ill.	1-8-128
Sealtron	Sealtron Co. Reading Rd. at Amity Cincinnati 15, Ohio	2-8-128
Service	Service Associated Inc. Chicago, Ill.	16-64-128
Servo	Servo Corp. of America 20-20 Jericho Tpke. New Hyde Park, N.Y.	1-2-8-128
Sierra	Sierra Electronic Corp. 3753 D. Bohannon Dr. Menlo Park, Calif.	1-4-8-128
Slate	Slate, Claude C. Los Angeles, Calif.	2-4-16-32-128

Smith	Smith Mfg. Co., J & H Little Britain Rd. Newburgh, N.Y.	2-4-8-128
Smucker	Smucker and Co., Inc., A.F. Brooklyn, N.Y.	1-2-4-8-128
Snyder	Snyder Mfg. Co. 22nd & Ontario Philadelphia 40, Pa.	1-2-4- 16-128
Sparton	Sparton Electronics Div. of Sparton Corporation 2400 E. Michigan Avenue Jackson, Michigan	16-128
Sperry	Sperry Gyroscope Co. Great Neck, N.Y.	2-16-128
Starrett	Starrett Television Corp. New York, N.Y.	1-2-16-128
STC	Standard Telephone and Cables Connaugh House 63 Aldwych, London W.G. 2, England	4-16-64-128
Stewart-Warner	Stewart-Warner Corp. 1300 N. Kostner Ave. Chicago, Ill.	4-16-128
Stoddart	Stoddart Aircraft Radio Co. 6644 Santa Monica Blvd. Hollywood 38, California	1-16-32-128
Stromberg	Stromberg Carlson Div. of General Dynamics Corp. Rochester, N.Y.	1-4-16-128
Sub Sig	Submarine Signal Co. (Raytheon Mfg. Co.) 100 River St. Waltham, Mass.	2-4-8-16- 32-128

SWC	Self-Winding Clock Co., Inc. 11 E. 40th St. New York 16, N.Y.	4-8-64-128
Sylvania	Sylvania Electric Products, Inc. 1740 Broadway New York 19, N.Y.	2-4-16-128
Syracuse University	Syracuse University Syracuse, N.Y.	16
Taffet	Taffet Radio & TV Co. 27-05 Bklyn-Queens Expwy. Woodside 77, N.Y.	1-2-4-8- 16-32-128
TACO	Technical Appliance Corp. 1 Taco St., P.O. Box 38 Sherburne, N.Y.	1-8-16-128
TBS	Manufacturer to be selected	8-16-128
TDC	Technical Devices Co. 2340 Centinela Ave. Los Angeles 64, Calif.	2-8-16-128
Tele-King	Teleking Corp. New York, N.Y.	4-8-16-128
Telephonics	Telephonics Corp. Huntington, N.Y.	1-4-8-16-128
Telrex	Telrex, Inc. Rt. 35 Asbury Park, N.J.	2-4-8-16-128
Temco	Transmitter Equipment Mfg. Co. (Electronic Div. of Otis Elevator Co.) 35 Ryerson St. Brooklyn 5, N.Y.	1-2-4-8-16-128
TMC	Technical Material Corp., The P.O. Box 142 Mamaroneck, N.Y.	1-2-8-16-128

Trad	Trad Electronics Corp. 1001 First Ave. Asbury Park, N.J.	32-128
TRC	Technical Radio Co. (San Francisco Radio & Supply) San Francisco, Calif.	1-4-64-128
UE UEC	Utility Electronic Corp. Newark, N.J.	1-32-128 2-32-128
Varo	Varo Mfg. Co., Inc. 2201 Walnut St. Garland, Texas	1-2-8-16- 32-128
VBI	Victor-Bernard Industries, Inc. 1511 N. 26th St. Philadelphia 27, Pa.	1-2-32-128
WAC	Washington Aluminum Co. Baltimore, Md.	1-4-32-128
Ward	Ward Products Corp. 1148 Euclid Ave. Cleveland, Ohio	4-32-128
Watson	Watson Elevator Co., Inc. 342 Worth St. New York, N.Y.	1-2-4-32-128
WCE	West Coast Electronics Co. 9261 W. 3rd St. Beverly Hills, Calif.	8-32-128
WEC	Waterproof Electric Co. 801 Main St. Burbank, Calif.	2-4-32-128
WECO	Western Electric Co., Inc. 195 Broadway New York, N.Y.	1-8-32-128

Wells	Wells Co., Inc., Gary 361 Rockaway Ave. Valley Stream, N.Y.	1-16-128
Wells-Gardner	Wells Gardner & Co. 2701 North Kildare Ave. Chicago 39, Ill.	1-2-4-16- 64-128
Westinghouse	Westinghouse Electric Corp. P.O. Box 868 Pittsburgh 30, Pa.	2-8-32-128
White	White Tuning Corp. (White Industries, Inc.) New York, N.Y.	1-4-8-16- 32-128
Wickes	Wickes Engineering & Construction Co. 12th St. & Ferry Ave. Camden, N.J.	1-2-8-32-128
Wilcox	Wilcox Electric Co., Inc. 1400 Chestnut St. Kansas City 27, Mo.	4-8-32-128
Willys	Willys Motors, Inc. Toledo, Ohio	1-4-8-32-128
Workshop	Workshop Associates (Gabriel Electronics Div. of Gabriel Co.) Needham Hts., Mass.	2-4-8-32-128
Zenith	Zenith Radio Corp. 6001 W. Dickens Ave. Chicago 39, Ill.	1-2-4-8- 32-128

Appendix 6

DEFINITION OF EQUIPMENT STATUS

Abbreviation on Card	Equivalent Service Terminology			Definition (Paraphrased from Handbook MIL-161)
	Army	Navy	Air Force	
EXP				Experimental or "breadboard-type" equipment for use in exploratory research.
DEV				Equipment under development as prototype to meet specified military requirements.
LTD	STD B	Substi-tute Standard	Alternate Standard	Equipment which does not fully meet military specifications but is a usable substitute for standard equipment. May be procured only to supplement inadequate stocks of Standard equipment.
	STD C	Limited Standard		Equipment less satisfactory than Substitute or Alternate Standard, but suitable for use until present stocks are exhausted. No new procurement authorized (Army, AF). May be procured to supplement inadequate stocks of Substitute Standard equipment (Navy).
STD	STD A	Standard		Adopted for general use to provide specified military characteristics. In general, only one equipment will be "standard" for a given set of military characteristics. It will be the preferred procurement for this type of service.
		Planned Standard	Tentative Standard	An equipment whose characteristics warrant the risk of initiating production in limited quantities, prior to completion of acceptance tests or development in order to meet weapon production schedules.
COM				Commercial equipment used by the military but not assigned a military nomenclature.
OBS		Obsoles-cent		Equipment whose design no longer meets military specifications but which can be maintained with parts on hand. No further procurement of equipment or parts authorized.
	Obsolete			Equipment to be phased out of service as quickly as possible.

Appendix 7

SOURCES OF INFORMATION (REFERENCES) USED IN COMPILING COMMUNICATIONS EQUIPMENT DIRECTORY

Code No. of Source

1 Card Directory of Military Radio Communications Equipment (U), The RAND Corporation, Research Memorandum RM-2444, to be published concurrently with this RM.

When this reference number appears on a card it means the information was obtained at least in part from one or more additional cards in the directory.

2 Catalogs and other commercial sources published by various manufacturers.

4 Data acquired by interview of military communications equipment engineers.

6 Electronic Programmed Procurement Report, Electronic Production Resources Agency (EPRA) (Confidential).

Published quarterly, this report is obtainable from Electronic Production Resources Agency, Navy Service Center, Washington 25, D.C. Gives the Federal Stock Number and quantities under procurement for all types of electronic equipment used by the armed forces.

8 Headquarters USAF, AFDCO-FE, Frequency Allocation Group, Frequency Assignment List for U.S. Military Electronics Equipment, 5th Issue, July 12, 1956 (Secret).

Data include frequency coverage, power output, type modulation, type of service, and bandwidth for approximately 200 equipments included in the directory.

9 Index to Bureau of Ships Controlled Electronics Equipment (F Cognizance), Bureau of Ships, Assistant for Technical Logistics, NAVSHIPS 92563(A), July 1, 1958.

Data include nomenclature, Federal Stock Number, cost, and cognizant code within the Bureau of Ships.

10 Department of the Army, Signal Corps, Technical Manuals.

Available from U.S. Army Signal Publications Agency, Fort Monmouth, New Jersey. These manuals cover the technical data included in the Directory for Signal Corps cognizant equipments.

12 Department of the Air Force, Technical Orders.

Available from 4030 PDO Adjutant, Oklahoma City Air Materiel Area, Tinker AFB, Oklahoma. These manuals cover the technical data included in the directory for AF cognizant equipments.

14 Department of the Navy, Bureau of Ships and Bureau of Aeronautics, NavShips and NavAer Instruction Books.

Available from Department of the Navy, Bureau of Ships, Assistant for Technical Logistics, Washington 25, D.C. These manuals cover the technical data included in the directory for Navy cognizant equipments.

16 Army Inventory Records, Philadelphia Signal Depot.

Unpublished tabulation from machine records. Information includes number in use by area for Signal Corps equipment.

18 Air Force Inventory Records, Air Materiel Command, Dayton, Ohio.

Unpublished tabulation from machine records. Information includes Federal Stock Number, quantities in use, in stock, and on order.

19 Department of the Army, Electronic Communication Equipment, Military Handbook MIL-HDBK-161 (TM11-487A/NAVEXOS P2058/T031-3-73), June 11, 1959.

This document covers much of the technical and logistical data required on the card for currently used equipment. It supersedes source number 21, JANAP 161, March 6, 1953; JANAP 161, C1.1, October, 1956; TM11-487A, August 28, 1950; and TM11-487B, March 5, 1951.

20 Electronics Supply Office, Quarterly Electronic Equipment Inventory Report, Great Lakes, Illinois, December 30, 1958.

Tabulation of nomenclature, Federal Stock Number, quantities and location of equipment installed, in stock, and on order.

21 Joint Communications-Electronics Committee of the Joint Chiefs of Staff, Directory of Communications-Electronics Equipment (U), JANAP 161, March, 1953 (Confidential). Out of print.

This document covers much of the technical and logistical data required on the card for equipment in use at the time of publication.

22 Electronic Supply Office, Navy Stock List of the Electronics Supply Office, Great Lakes, Illinois, periodically revised, 8 volumes unclassified, 1 volume confidential.

Obtainable from Electronics Supply Office. This document contains much of the technical and logistical data required on the card for equipment used by the Navy.

24 Signal Equipment Support Agency (SESA), Nomenclature File, Fort Monmouth, New Jersey (Unclassified, Condidential, and Secret).

A card file containing the military characteristics and other data available at the time military nomenclature was assigned.

27 Avionics Division, Surveillance Department, Principal Technical Characteristics of Avionics Equipment, U.S. Army Signal Research and Development Laboratory, Fort Monmouth, New Jersey, September, 1958.

This document was published by U.S. Army Signal Research and Development Laboratory for a special distribution. It gives nomenclature, manufacturer, equipment developer, status, and much of the technical and logistical data for airborne and ground-to-air communications equipment used by the Army.

28 Principal Technical Characteristics of Radio Communications Equipment, U.S. Army Signal Corps Engineering Laboratory, Fort Monmouth, New Jersey, June 1, 1957.

Published for a special distribution. This document contains most of the technical and some of the logistical data required on the cards for communications equipment, under cognizance of the Signal Corps, which are used for other than airborne and ground-to-air communications.

29 Electrical Communication Systems Equipment, War Department, Technical Manual TM-11-487, October 2, 1944. Out of print.

Includes most of the technical and logistical data required by the cards for equipment nomenclatured in the old Signal Corps system, plus a few equipments using AN nomenclatures used by Army and Air Force at the date of publication.

30 Department of the Army, Signal Corps Adopted Items of Materiels, Department of the Army Supply Bulletin SB-11-253, March 19, 1959.

Published by the Adjutant General's Office with quarterly changes. Contains electronic accounting machine number, Federal stock number, noun name, type number, status, and related equipment information.

31 Department of the Army, Stock List of All Items, Price List of Signal Corps Equipments and Repair Parts, FSC Class 1220 through FSC Class 5895, Department of the Army Supply Manual SM 11-2-1, January 21, 1959.

Published by the Adjutant General's Office with quarterly changes. This reference was generally not used since the information was available from other sources.

32 Catalog Standard Facilities Equipment List, Fixed Communications -- Electronics Facilities, Air Force and Bureau of Aeronautics Technical Order TO 31-1-11, October 2, 1958.

Available through 4030 PDO Adjutant, Oklahoma City Air Materiel Area, Tinker AFB, Oklahoma. Contains information on installation, use, and cost of equipment.

34 Status of U.S. Air Force Equipment, Headquarters Air Research and Development Command, Andrews AFB, Washington 25, D.C., April 1959 (Unclassified and Classified).

Distributed through Headquarters ARDC to authorized organizations. Contains nomenclature, noun name, status with date of adoption, specification number, stock class number, development agency, and replacement data.

36 Office of the Signal Officer, Technical Characteristics of Principal Signal Corps Radio Sets, Headquarters, U.S. Army Alaska, APO 949, Seattle, Washington.

Contains much of the technical information required on the cards for Signal Corps equipment, in a form similar to source number 27.

38 Fixed Communication and Meteorological Equipment Directory: Vol. 1, Radio Communication Equipment, U.S. Air Force and Bureau of Aeronautics, T.O. 31R-1-1, August 6, 1955.

Available through 4030 PDO Adjutant, Oklahoma City Air Materiel Area, Tinker AFB, Oklahoma. Includes most of the technical and logistical information required on the cards.

Appendix 8

CODE FOR TYPE OF SIGNAL

Amplitude Modulation

Aø	Absence of any modulation
A1	On-off keying (cw)
A2	Modulated continuous wave (mcw)
A3	Telephony double sideband, full carrier
A3a	Telephony single sideband, reduced carrier
A3b	Telephony two independent sidebands, reduced carrier
A4	AM facsimile
A5	Television
A9	Composite transmissions and cases not covered by the above
A9c	Composite transmissions and cases not covered by the above, with reduced carrier

Frequency Modulation

Fø	Absence of any modulation
F1	Telegraphy without the use of modulating audio frequency--frequency shift keying (FSK)
F2	Telegraphy by keying a modulating audio frequency or frequencies, or by keying the modulated emission.
F3	Telephony -- (voice-frequency modulation)
F4	Facsimile
F5	Television
F9	Composite transmissions and cases not covered by the above

Pulse Modulation

Pø	Absence of any modulation
P1	Telegraphy without the use of modulating audio frequency

P2d	Telegraphy by keying an audio frequency or audio frequencies by modulating the pulse in amplitude
P2e	Telegraphy by keying an audio frequency or audio frequencies by modulating the width of the pulse
P2f	Telegraphy by keying an audio frequency or audio frequencies by modulating the phase (or position) of the pulse
P3d	Telephony -- Amplitude-Modulated (PAM)
P3e	Telephony -- Width-Modulated (PDM or PWM)
P3f	Telephony -- Phase- (or Position-) Modulated (PPM)
P9	Composite transmission and cases not covered by the above

REFERENCES

1. Reinhart, E. E., W. A. Backus, J. J. Crenca and K. G. Heisler, Jr., A Card Directory of U.S. Military Radio Communication Equipment: Part I, 1571 Unclassified Cards; Part II, 88 Cards (4 Unclassified; 63 Confidential; 21 Secret), The RAND Corporation, Research Memorandum RM-2444, July 31, 1960 (Secret).

2. Department of Defense, Military Standard -- Joint Electronics Type Designation, MIL-STD-196, May 9, 1957.