WASHINGTON AREA LAW ENFORCEMENT SYSTEM

(WALES)

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ORIGIN OF WALES

The origin of the Washington Area Law Enforcement System (WALES) extends back to March, 1965. At that time, Assistant Chief of Police Jerry V. Wilson visited the St. Louis, Missouri Police Department for the purpose of observing the techniques of automation as applied to several areas of law enforcement. As a result of that visit, the Systems Science Corporation was asked to conduct preliminary discussions to determine the feasibility of introducing data processing to the D. C. Metropolitan Police Department.

Systems Science Corporation conducted a feasibility study for the D. C. Metropolitan Police Department through a Federal grant of $30,000 from the Urban Renewal Administration of the Housing and Home Finance Agency, under the Urban Planning Assistance Program.

The feasibility study was submitted to the Metropolitan Police Department on February 1, 1966, and it pointed out the applicability of data processing to five functions:

- Automatic message switching between jurisdictions.
- A central repository of information about people, events and other data of interest on an area-wide basis.
- A management information system to enhance administrative decision making.
- A resource allocation capability to improve the utility of police resources.
- A command and control capability to improve responses to changing tactical environments.

The feasibility study also determined the cost of developing and operating the system. The cost was estimated at $1.4 million over a three year period for development, and $1 million yearly for operating the system. This operating cost was estimated to represent approximately 2% of the combined 1968 annual budgets of all law enforcement agencies within the Washington Metropolitan area. The feasibility study also recommended that detailed systems analysis be conducted in order to establish technical specifications for a regional (area-wide) law enforcement system. The estimated cost was $300,000.

Upon acceptance of the feasibility study, the D. C. Metropolitan Police Department applied to the Office of Law Enforcement Assistance (OLEA) of the Department of Justice, for a grant under the Law Enforcement Assistance Act. OLEA accepted the recommendations and a request for such a study was put out for competitive bidding in July of 1966.

In June of 1967, the Systems Science Corporation of Silver Spring, Maryland was selected as the successful bidder, and was awarded a contract to undertake the design and implementation of a prototype on-line, real time, telecommunications system. The value of the contract was $270,000.

THE SYSTEM APPROACH

The study contract addressed itself to two separate and yet related problems. First, it addressed itself to the problem of designing a law enforcement system that would accommodate the various departments within the multi-jurisdictional Washington Metropolitan area. Second, it addresses itself to the problem of designing a limited on-line, real time, random access, telecommunication system designed primarily to serve the D. C. Metropolitan Police Department, with limited regional participation. In its larger context, the contract called for a study which had the objective of defining the software, hardware, and operating specifications of a regional law enforcement system, while in its smaller context it called for the acquisition and implementation of a limited software and hardware capability.

Regional Participation

All throughout the long cycle of studies and proposals, the Metropolitan Washington Council of Governments (COG) played a vital role in providing guidance and facilitating the participation of the regional law enforcement organization in the study and evaluation process. The participation of COG was made possible by an $11,000 grant from OLEA.

Very early in the contract period, COG, working with the Police Chiefs Committee, was instrumental in organizing a Technical Task Force to insure the necessary technical and administrative coordination between the many police jurisdictions, as well as between the same organizations and the contractor. The task force contained representatives from all the Metropolitan Washington police jurisdictions as well as the

contractor. It was chaired by a senior police official and met regularly to review, coordinate and resolve technical and administrative problems. The first problem addressed by the Task Force was the development and preparation of the operating and interface standards of the prototype system to assure the proper integration of the regional police agencies. Upon completion of this phase, the group then addressed itself to the definition and design of the regional system.

The task group performed extremely valuable services in data collection; explaining and interpreting their individual departmental operations; critiquing the results of the analysis and recommendations; providing a platform for discussions of technical and administrative problems of regional concern; coordination of their individual programs of system development and acquisition with the acquisition plans and schedules of WALES, and other problems as they arose. Experiences to date indicate that such a task force, when properly constituted and supported, can perform invaluable services in any regional law enforcement system acquisition and is, therefore, recommended as a most efficient method of operation.

Total Approach to Law Enforcement

One of the more significant factors that contribute to present day law enforcement problems is the ever increasing size of Metropolitan areas brought on through population growth and mobility. The jurisdictional fragmentation of these large metropolitan areas, where each jurisdiction enjoys virtually complete autonomy, further compounds the problems of law enforcement.

WALES addresses ifself to the total system problems posed by the requirements of a regional law enforcement system. Within this total approach concept, it calls for an evolutionary acquisition process to insure the orderly development, integration and implementation of the total system.

The following police departmqnts are participating in the WALES system:

Alexandria Police Department, Alexandria, Va.

Arlington County Police Department, Arlington, Va.

Armed Forces Police, Washington, D.C.

Dulles Airport Police

Fairfax City Police Department, Fairfax, Virginia

Fairfax County Police Department, Fairfax, Virginia

Metropolitan Police Department, Washington, D.C.

Montgomery County Police Department, Montgomery County, Maryland

National Airport Police, Alexandria, Virginia

U.S. Park Police, Washington, D. C.

Prince Georges County Police, Hyattsville, Maryland

PROTOTYPE SYSTEM DESCRIPTIONS

The WALES prototype system provides real time, on-line retrieval capabilities for vehicle registration, driver permit, and traffic warrant information from a local computerized file, and interfaces directly with the FBI's National Crime Information Center (NCIC) to provide information on stolen autos, stolen tags, stolen guns, stolen articles, and wanted persons. The WALES data base was derived from the D. C. Department of Motor Vehicles (DMV) Master File, consisting of records for all District of Columbia driver permits and vehicle registrations. Other pertinent police information, including traffic warrants for the metropolitan area, is superimposed upon this data. Data which is proprietary to the Department of Motor Vehicles, such as driver points, are not included in the data base.

The WALES prototype system was implemented on the D. C. Government SHARE computer. The SHARE computer is a system 360, model 40, and is utilized by seven agencies of the D. C. Government. The remote terminal devices consist of thirty IBM 2740 Keyboard/Printers and eight IBM 2260 Video/Display Keyboard terminals. These terminals are located in all police precincts, the communications center, selected investigative units and in each participating police department.

The system currently operates in a multi-programming environment. An additional IBM System 360, Model 50 is scheduled for installation in March, 1969. When the Model 50 is installed, the Model 40 will be a

dedicated system exclusively for use by the WALES system, and the Model 50 will provide a duplexed capability in case of hardware failure.

Current Capabilities

The WALES prototype system currently provides inquiry capabilities from any of the terminals in the system. Inquiries relating to D.C. driver permits, D.C. vehicle registration information, and traffic warrants issued in D.C. are answered by the WALES data base. Inquiries relating to stolen autos, stolen tags, stolen articles, stolen guns, and wanted felons are transmitted directly to NCIC. Updating of the NCIC data used by the D.C. Metropolitan Police Department is accomplished through a 1052 command terminal located in the MPD teletype room. Had system recovery programs been designed into the WALES software by the contractor, the WALES system would not have the capability of updating the WALES and NCIC data bases from the WALES terminals. The Metropolitan Police Department has assumed the responsibility for developing these programs and expects to have them ready to support on-line updating by 1969.

Local wanted persons, local stolen autos, and D.C. permit status information were expected to have been included in the WALES data base as set forth in the original design specifications. They were not. However, this capability will be in existence in May 1969. The WALES-NCIC interface, although

somewhat lengthy in response time, has provided WALES participants with a method of obtaining most of the required information. The installation of high speed communication lines between WALES and NCIC will eliminate the delays now experienced in awaiting responses from NCIC.

WALES allows for one data entry to check both data bases (WALES and NCIC) automatically through message switching. When information is requested from WALES on an individual, whether or not it contains information on that individual, the WALES computer will automatically ask NCIC for information, and then transmit the reply to the requesting terminal.

The single query concept of WALES allows an officer to ask any question of the computer and receive all police information available. The officer is given the information he requested and any additional police information related to the question.

Prototype Software

Several complex software packages were required for the implementation of the prototype. A brief description of these software packages follows.

Operating System

The IBM System 360 full operating system was selected for the implementation of WALES. Although several factors were involved in this selection, the primary consideration involved the data base. The operating system provides support for the IBM 2314 disk hardware, which was requested to provide fast retrieval of records in the data base. OS also supports the "deleted records" facility providing efficient

updating and eliminating excessive file reorganization.

BTAM

The Basic Telecommunications Access Method (BTAM) is used to support the teleprocessing functions of the prototype. A series of subroutines was required to interface between BTAM and the Gentry software. The combination of BTAM and the Gentry subroutines perform several vital functions in the real time system. These programs cause all terminals on the system to be polled, receive messages entered at the terminals, decode the messages and pass them to the Gentry software. After the Gentry software has completed the message processing, the BTAM programs transmit the responses to the terminals.

Gentry Modules

A set of special macros, received with the Gentry Monitor, was used to program the message processing functions. These macros allowed the message processing programs to be coded in a language somewhat similar to COBOL. Whenever a message is entered on a WALES terminal, the first four characters of the message determine which Gentry Module will process the message. These Gentry Modules, when assembled, simply provide a list of parameters that determine the processing that will be performed by the Gentry Monitor.

Gentry Monitor

The Gentry Monitor is now an IBM Type 3 software package, consisting of sixty-eight subroutines. It was not supported by IBM at the time we began to use it. These subroutines were designed to perform the many general functions required in a real time system, such as file

retrieval, addition and updating of records, message formatting and routing, and general data processing functions. The Gentry Monitor supports only the Index Sequential method of file organization.

Index Sequential

The Index Sequential method of file organization, supported by the Gentry Monitor, is provided by the IBM Operating System (OS) software. Because the file design for the WALES data base required several ways of accessing the same records, separate files of Index and Master records were required. The Index Sequential method of file organization was used for the WALES Index Files.

Direct Access

The Direct Access method of file organization was selected for the WALES Master Files. A special COBOL subroutine provides the link between the Index and Master Files.

NCIC Package

The NCIC package was designed to provide a direct computer-to-computer link between the WALES system and the FBI's NCIC system. This package transmits messages to NCIC, receives the responses from NCIC, and manages a special queue of messages waiting to be transmitted to NCIC.

Batch Programs

Many normal batch programs were required for the development and implementation of the WALES system. These programs provide the following functions:

Editing and loading the WALES data base.

Dumping and restoring the WALES data base.

Printed listings to serve as back-up to WALES.

Updating the data base with traffic warrant data.

Log tape analysis.

The programs developed by the contractor to update the data base with DMV data were poorly written and finally abandoned at the request of the contractor. These same programs are now being designed and written by MPD personnel.

Prototype Files

The computer files developed for the WALES Prototype are divided into two general categories -- Index Files and Master Files. The records in the separate files are chained together to provide multiple accessing techniques.

Index Files

The WALES Prototype contains the following separate Index Files:

Name Index

Permit Index

Tag Index

VIN Index

TVN/Warrant Index

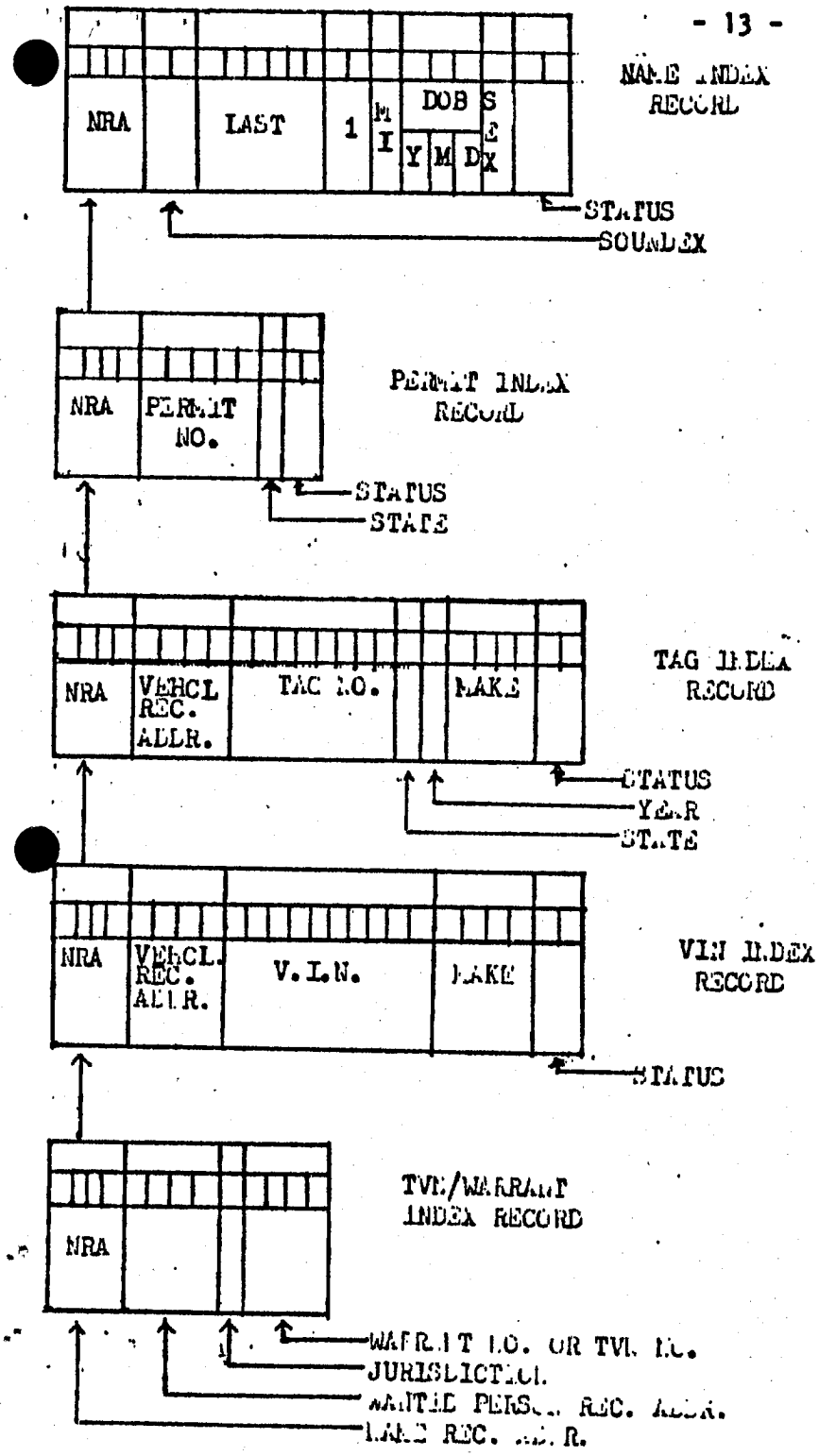
Each of these index records contains the address of related records in the Master File. Thus, identical information concerning a specific individual could be obtained by inquiring on his Name, Driver's Permit Number, License Tag Number, or Vehicle Identification Number. The capability of inquiring on Warrant Number was not completed by the contractor.

In addition to providing linkage to the Master Files, the Index Files provide fast retrieval of certain types of status information. Each record of the Index Files contains sixteen "status bits". These bits are normally set to "0". However, whenever status exists for a person, such as the person being wanted for a traffic offense, the status bits in the related index records are set to "1". This enables WALES to determine certain types of police status directly from the Index Files without accessing the Master Files. Since stolen autos, misdemeanor warrants, and felony warrants were not supported in the basic WALES prototype data base, only limited status information is available to WALES users at this time.

The metropolitan area wanted person capability is currently being designed and programmed, with May 21 being the target date for implementation.

The record layouts for the Index Files are illustrated on the following page.

INDEX FILE RECORD LAYOUTS



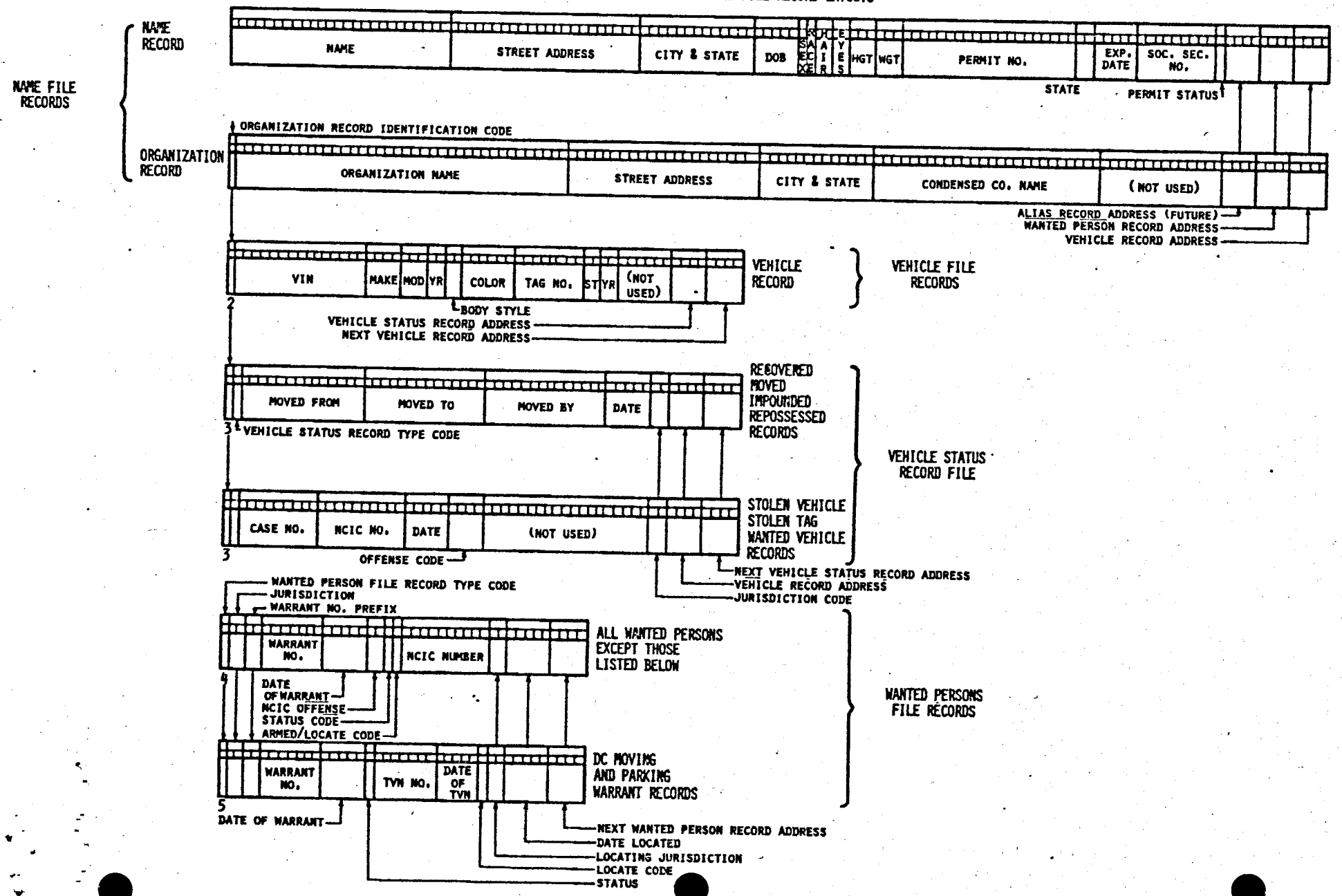
Master Files

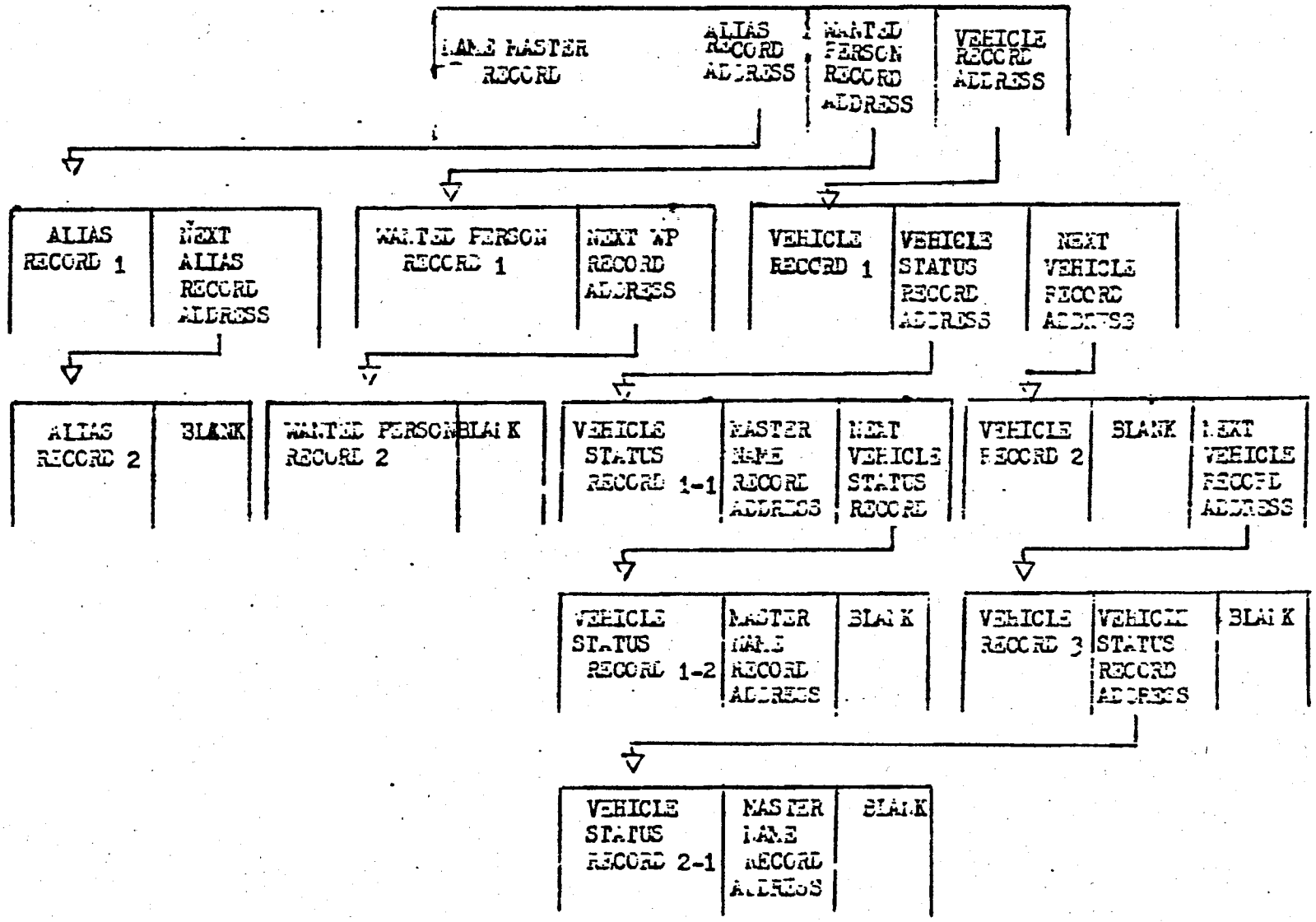
The WALES Master File format was designed to accommodate detailed information concerning persons and vehicles. Because of the limited capabilities of WALES at this time, however, the Vehicle Status File and Wanted Person File (other than traffic warrants) are not constructed, therefore no information on stolen automobiles or wanted persons, other than traffic warrants, is contained in the WALES data base. This capability will exist in May 1969.

Separate record formats were designed to be used for individuals and organizations on the Name File. The vehicle status file was designed to accept detailed information concerning recovered, moved, impounded, repossessed, stolen and wanted vehicles, and stolen tags. The wanted person file was designed to contain information for criminal and traffic warrants.

The record layouts for the Master Files are illustrated on the following page. Following the Master File record layouts is a chart illustrating the relationship between the "chained" records in the various Master Files. Note that the alias records, stolen vehicle records, stolen tag records, moved vehicle records, repossessed vehicle records, and criminal records have not been implemented in WALES, although some of the information is available through the WALES-NCIC interface.

MASTER FILE RECORD LAYOUTS




NAME MASTER RECORD
ALIAS RECORD ADDRESS
WANTED PERSON RECORD ADDRESS
VEHICLE RECORD ADDRESS
ALIAS RECORD 1
NEXT ALIAS RECORD ADDRESS
WANTED PERSON RECORD 1
NEXT WP RECORD ADDRESS
VEHICLE RECORD 1
VEHICLE STATUS RECORD ADDRESS
NEXT VEHICLE RECORD ADDRESS
ALIAS RECORD 2
BLANK
WANTED PERSON RECORD 2
BLANK
VEHICLE STATUS RECORD 1-1
MASTER NAME RECORD ADDRESS
NEXT VEHICLE STATUS RECORD
VEHICLE RECORD 2
BLANK
NEXT VEHICLE RECORD ADDRESS
VEHICLE STATUS RECORD 1-2
MASTER NAME RECORD ADDRESS
BLANK
VEHICLE RECORD 3
VEHICLE STATUS RECORD ADDRESS
BLANK
VEHICLE STATUS RECORD 2-1
MASTER NAME RECORD ADDRESS
BLANK

Processing WALES Transactions

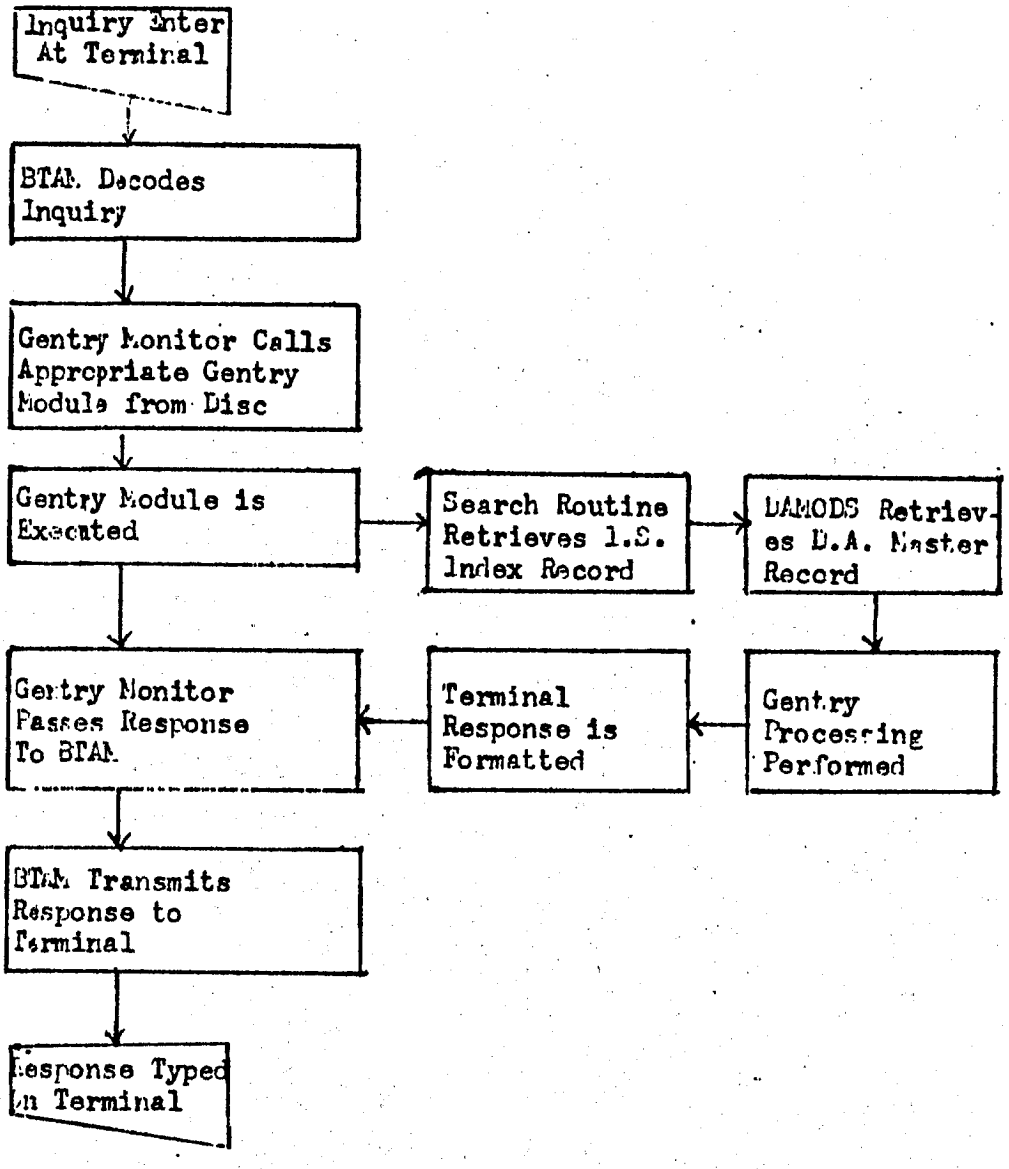
The charts on the following pages show the general relationship of the WALES software, and sequence in which a message passes through the various software packages. The processing of an inquiry into the WALES data base is straight-forward.

Because of the nature of the WALES-NCIC interface, a message sent to NCIC, and the response received from NCIC, must be considered two separate transactions by the WALES system. This enables a terminal to enter an NCIC inquiry, and then to enter additional inquiries to both NCIC and WALES while awaiting the NCIC response.

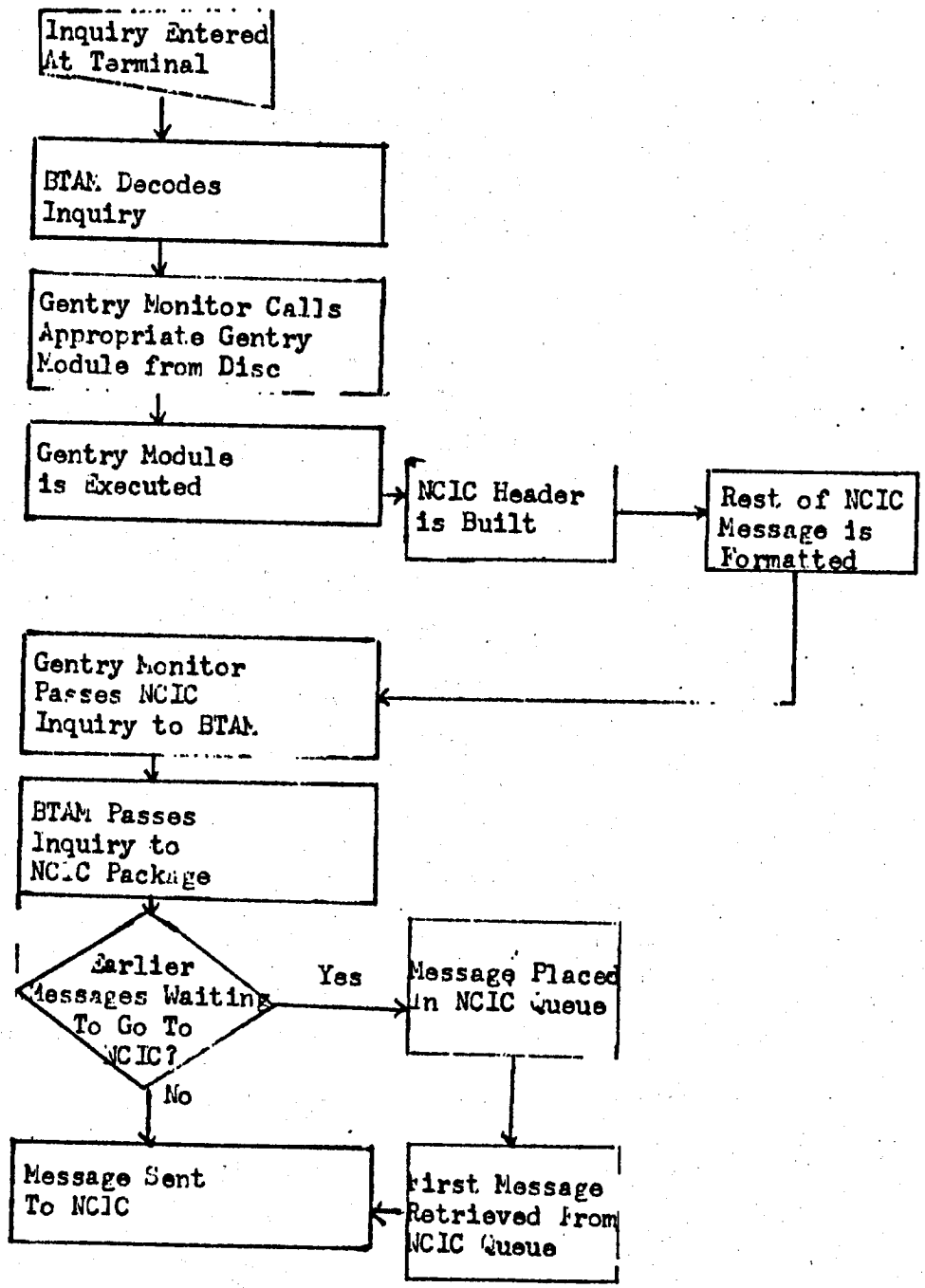
A nine character header, added to each NCIC inquiry, maintains the relationship between the NCIC inquiry and response. This header contains the WALES transaction number, the originating terminal identifier, and the message key that will determine the Gentry processing of the response.

Processing indicated in flowcharts A, B, or C require from less than 1 second to over 6 seconds, depending on the nature of the response. The transmission time between WALES and NCIC is considerably longer because a low-speed line is currently being used. A high-speed connection between WALES and NCIC is planned for early 1969.

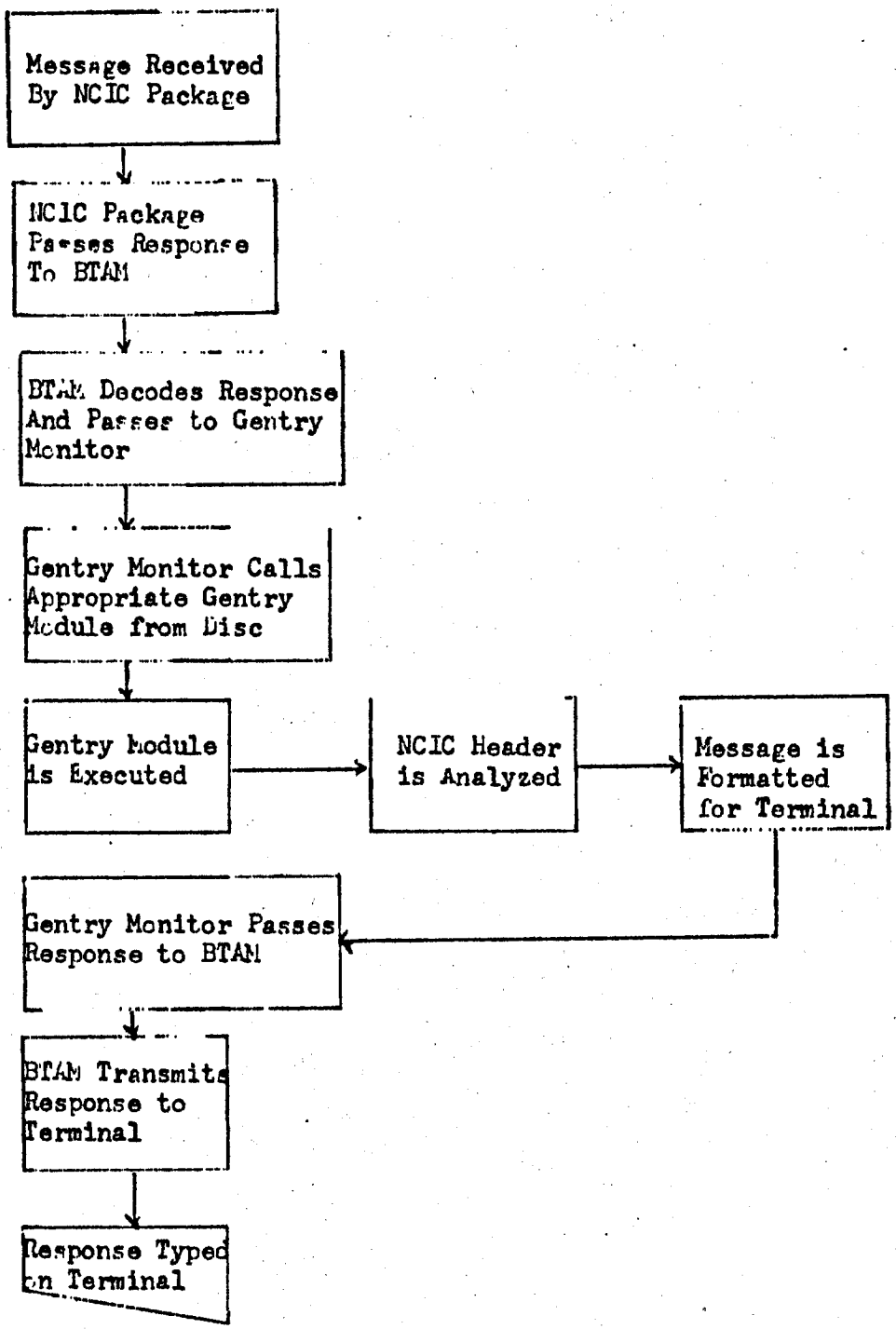
INQUIRY TO WALES DATA BASE



INQUIRY TO NCIC THROUGH MALES



RESPONSE FROM NCIC THROUGH WALES



CONCEPT OF OPERATION

Responsibility, Use and Security

The centralization of responsibility of a police information system is considered an essential requirement for the management and control of the system. It was decided that by assigning fixed entry points for data into the WALES system, it would be possible to eliminate duplication and maintain an accurate file. In most instances, the addition and deletion of information from the WALES data base is assigned to specific units within the Metropolitan Police Department that have the responsibility for the information.

Every effort is made to encourage officers to make inquiries regardless of the method of inquiry. Officers may make use of the WALES terminal located in each police precinct station; they may make telephone calls to the teletype center, hot desk and precincts; they are allowed to make footman radio calls to their precincts or make scout car radio contacts to the radio room. The use of scout car radios is presently limited due to the lack of sufficient radio frequencies allocated to law enforcement.

Security is a major concern in all aspects of the system. Since a central computer shared by other departments of the D. C. Government is being utilized, all police information is controlled and managed by the D. C. Police Department. The subject of file security can not be

over emphasized. Its demands will have to be re-evaluated as larger computer systems containing vast amounts of public and police information are introduced. WALES file security is presently being achieved through hardware and software techniques that go a long way toward insuring that only authorized individuals have access to the privileged information.

SYSTEM MANAGEMENT

The management of the WALES prototype system rests with the D. C. Metropolitan Police Department, and is the direct responsibility of the Data Processing and Information Division. The assignment by MPD of highly qualified system and programming analysts to WALES has facilitated this function.

The success or failure of a large and sophisticated system such as WALES depends greatly on the availability of highly trained technical personnel on the staff of the user. The building of such a staff at MPD was a very slow and difficult process. Because these personnel were not on-board to follow the prototype from development through implementation, a separate contract had to be negotiated with the contractor to provide the new MPD personnel with the training necessary to assume full control of the WALES prototype. No matter how competent an outside source such as a contractor is, and no matter how complete a data processing package is when received from such a source, the user must assume the responsibility for planning, budgeting, and training its staff at all levels. This is necessary in order to continue to develop, upgrade, and operate the system. Another important factor in the successful implementation of a computer system is time to successfully complete the project. The WALES prototype was developed and implemented within a period of about 12 months. As a result, many of the original design specifications were not incorporated into the prototype,

although they were expected to have been.

Reasonable schedules should be developed in the early planning stages, and should be reviewed periodically to assure all concerned that the quality and content of original designs are not being sacrificed to realize a superficial project completion date.

MONITORING USE OF THE SYSTEM

Two essential monitoring and controlling functions are essential to the operation of WALES. The first is to be cognizant of what is going on in the system, such as data volumes, individual terminal use, communications to NCIC, police checks, reference checks, etc. The second is to monitor for system security.

The technique used to satisfy both functions is simply to log, onto magnetic tape, all activities flowing in and out of the system. This is done simply by assigning time, date, and internal serial numbers to all activity originating from any and all terminals connected to the system. From the system management standpoint, the data from these log tapes provide all the elements of information needed to properly monitor the system.

In addition to the above, the log tape output is used for the following purpose:

Analysis of messages by tape, category, etc.

Analysis of terminal activity

Evaluation of dedicated verses multi-point line loadings

Analysis of error messages to pinpoint areas where training and improvement is necessary.

Message switching and traffic to NCIC

Analysis of the log tape also provides some degree of assurance that terminals are not being used for invalid purposes.

Even though security is a broad police department function, a portion of this function must be continually performed by the data processing section in relation to all message traffic to and from WALES. Security of police information, once it becomes computer based, also becomes an integral part of the total internal security of the department.

WALES TRAINING

Once a system such as WALES is developed and implemented, the problem of its utilization and integration into the operational inventory must be undertaken. The efficiency with which such an integration occurs is a factor of the amount and degree of training that the operational elements and user staff, at all levels, have received.

Early in the development period, training commenced on three levels:

Executive level

Operational level

Working level

The MPD Chief of Police, John B. Layton, established, during the early stages of the project, an Executive Committee comprised of all assistant and deputy chiefs to review and approve the plans as they were developed. Each executive in the department, therefore, had an opportunity to take part in the overall planning of the system.

The training officers and their assistants were first given classroom instructions by the staff of the Data Processing and Information Division. These officers were required, in turn to conduct two sessions each, attended by all officers in their command. Instructional material was developed jointly by the contractor and MPD personnel. The objective was to give the training officer a self-instructing document that he could use while conducting the training class. The document would have

been much more effective however, had it been distributed to all members of the MPD and participating forces.

Policemen were given two one-hour classroom sessions on the system prior to the implementation of the prototype. These classroom sessions were conducted by the training officer in each command and were grossly inadequate as an overall effective training tool. The training officers, not having achieved a detailed understanding of the prototype, were unable to impart a firm understanding of the system to their subordinates.

Since the Metropolitan Police Department has not designated specific personnel to function as terminal operators, the entire operating force must be trained in terminal operations.

The Training Academy temporarily suspended WALES instruction for a period of 5 months, the reason being inadequate space accommodations at the training site. The training terminal at the Training Academy was recently relocated, however, and an accelerated WALES training program is being readied for implementation. Upon implementation of the program, all new policemen are expected to have a good background knowledge of WALES prior to going in the street.

The MPD Data Processing and Information Division has scheduled a series of field trips by two police officers assigned to the Division to bring the operational units abreast of current developments in the system. They will also give basic instructions on the WALES system wherever they find it lacking.

The Director of Data Processing has ordered a terminal installed in the division to be used as a training tool whenever requests for such training are directed to the division. The same terminal is also used as a training and debugging aid by all programmers and analysts attached to the division.

SUMMARY OF PROTOTYPE EXPERIENCES

During the design and implementation of the Wales prototype, many problems were encountered. The severest of these was, perhaps, the problem of communication between the many organizations involved, such as the:

Equipment manufacturer

Local telephone company

Share organization

Council of Governments

System Contractor

Agencies of the Metropolitan Police Department

Eight regional law enforcement agencies

The task force mentioned earlier contributed very effectively toward solving interjurisdictional problems. The other coordination problems were approached through weekly status meetings. The system, as expected, was plagued with its share of hardware and software problems. Getting the hardware into operational status was especially vexing.

In summary, the following is recommended.

1. Early and complete project planning, indentifying organizations, schedules, tasks, objectives and products.

2. Get all individuals and organizations involved in the job as early as possible.

3. Meet and review activities and progress regularly. Identify problem areas and assign people to resolve them.

4. Continously review system design and other technical activities. Provide guidance to contractor.

5. Provide maximum training at all organizational levels. Prepare adequate training manuals and provide facilities and instructions.

6. Assure complete and thorough documentation of system.

WALES PROTOTYPE DEVELOPMENT PROGRESS

October thru December, 1967

During this period, significant progress was made toward development of the prototype, and it was believed that the prototype could be implemented by early spring, 1968. General guidelines and directions for the total system were developed. The contractor's staff also gathered a considerable amount of background information, and developed a good working relationship with various elements of the D.C. Metropolitan Police Department at different administrative levels.

Liaison was established with the Virginia State Police, Virginia Department of Motor Vehicles, and Maryland State Police. The D.C. Metropolitan Police Department planned, at the time, to eventually use these and other sources of data to add significantly to the WALES data base.

The initial delivery and installation of equipment was begun during this period, therefore, all concerned felt that there would be no significant delay in the implementation of the system due to equipment delayes.

A WALES status meeting was conducted weekly for the purpose of briefing Mr. Charles Ross, the Technical Director, on the program of the system. The meetings also served to further communication between the many agencies involved, and thereby eliminate many small problems before they could become serious ones. The agencies involved in the prototype

development were:

1. The Metropolitan Police Department
2. The eight area Police Departments
3. The Systems Science Corporation
4. The D.C. Management Office
5. The International Business Machine Company
6. The C & P Telephone Company
7. The D.C. Personnel Department
8. The D.C. Public Works Department

Programming commenced, during this period, in several areas. The basic program functions were as follows:

1. Load D.C. vehicle registration file on disk
2. Load D.C. driver's license on disk
3. Load all outstanding traffic warrants on disk
4. Establish the computer to computer interface with the National Crime Information Center

It should be noted, however, that the warrant-load programs were not ready for implementation until December, 1968.

The D.C. Metropolitan Police Department was able during this time, however, to interrogate the F.B.I.'s NCIC file through an NCIC control terminal located in the MPD teletype unit.

It was planned during this period to incorporate D.C., Maryland and Virginia stolen automobiles and tags into the WALES data base as soon as the prototype became operational. This capability was not implemented, however, as of January 1969. The prototype, in comparison, was put into operation in August, 1968.

Progress was also made during this period on the total system design.

Department-wide training was begun during this period. A procedure was established to give every MPD officer two hours of classroom training on WALES and NCIC. Handouts were prepared and distributed to all members of the Department, and participating jurisdictions. Although the WALES training was fairly ineffective, the NCIC training made possible a one hundred percent increase in MPD message traffic to NCIC.

January thru March, 1968

During this period, some of the software for the prototype was completed. Significant delays were experienced, however, in getting the hardware installed. The hardware delay caused an approximate two months delay in debugging the software packages. The contractor offered to test the software packages at another site if one with the proper configuration could be found. No similar hardware configuration was found, therefore, every attempt was made to accelerate the installation of the WALES hardware.

Additional liaison was established during this period. Many meetings were held to further the knowledge of, and participation in, the WALES system. The COG Committee developed an area-wide Warrant Card that was to be used in developing the Wanted Person Files. The contractor, Systems Science Corporation, did not complete the software designed to support the wanted person capability.

A major accomplishment during this period was the development of the WALES operator's manual. After the manuals were distributed, however, the MPD found that the manuals were not condensed enough for practical use and were being ignored by those very individuals who should have been learning the WALES functions. Plans were immediately established to revise the manual.

The second major accomplishment during this period was the completion of the computer-to-computer hookup with NCIC. The hookup was a "first" using I.B.M. 360 computers. Many law enforcement agencies requested the MPD interface software, and copies were mailed to all requestors.

During this period the contractor, in accordance with his proposal, used a subcontractor to assist in his design study. A major decision was reached as to the method that would be used to address the total design as required by the contract. The approval would be based on regional information and a local information concept. During this period, MPD and SSC agreed on the final scope of the project that would satisfy MPD requirements.

The prototype system was to have been comprised of the following capabilities.

1. Establish a master data base on the IBM-2314
   A. Using the current DMV Master File for the WALES Name Vehicle File:
      *1. Thoroughly edit
      2. Extract police information

**3. Develop error correction procedures

**4. Develop error file update program

5. Convert various codes to NCIC codes for standardization

B. Use current warrant tape to generate a Wanted Person File (felony, misdemeanor, traffic)

*1. Minor editing

*2. Superimpose warrant information on the name file where applicable, and/or add pertinent information to Warrant File

II. Provide update programming for the master data base

**A. Develop the daily edit/update batch programming for DMV transactions

*B. Develop periodic edit/update batch programming for warrants.

*C. Develop on-line maintenance programming for stolen, repossessed, moved, etc. vehicles and warrants.

III. Provide on-line inquiry capabilities on all data from all terminals.

IV. Provide computer-to-computer capabilities between WALES and NCIC

V. Develop programming to provide statistical analysis of terminal I/O's by stations, shifts, time, etc., from the log tape.

NOTE: A single asterisk (*) indicates that the item was in partial operation by February 1969.

A double asterisk (**) indicates that the item was never satisfactorily accomplished by the contractor, and considered by MPD to constitute a default or breach of contract.

April thru June 1968

This period can best be described as a testing phase. The software modules that were completed were put together to determine whether they would all work as a unit.

Many problems were discovered, and at the conclusion of this period only a few of them had been solved. The contractor, realizing that some of the major programs were experiencing severe difficulties, refused to test some of them on an on-line environment unless MPD wrote software that would properly close the disk files in the event of a hard stop that aborted the system. The use of test files during the test period could have temporary negated the necessity of the restart programs. MPD viewed this procedure as an obvious attempt to avoid having to execute, in an on-line environment, a series of highly questional programs.

The major testing that was accomplished during this period involved the NCIC interface and the DMV permit and registration file.

A major decision was reached during this period. The contractor's staff, after consultation with MPD, OLEA, and the staff of IACP, decided to discontinue the development of an automated modus operandi

and fingerprint file. The MPD staff agreed with their decision.

During this period, classroom training was begun on the system by the MPD training academy. All regional departments were invited to participate in this training.

July thru October, 1968

This final contract period can best be described as a period of very substantial and significant progress in the development and implementation of the WALES prototype. The hardware and software used to support the WALES system gradually underwent a progression of refinements that made possible the evolvement of WALES into an operational vehicle. It should be noted, however, that although the basic prototype was operational, certain major capabilities were not available. The areas lacking were:

1. DMV file update capability
2. Permit status information
3. Wanted person information (other than thru NCIC)
4. Stolen vehicle information (other than thru NCIC)
5. On-line updating

Full operational tests with the NCIC interface and DMV permit and registration files were conducted in an operational environment and, as expected, many foreseen and unforeseen problems arose. A majority of the problems, however, were resolved to a point where WALES was scheduled to be available to all users during two 4 hour periods each day of the

week. The allocated operational periods served to:

a. expose system deficiencies

b. familiarize participants with WALES terminal operating procedures, codes, etc.

c. provide real-time responses to requests for police and reference information

Achievements worth mentioning during this period also include:

a. additional 2740 remote keyboard terminals were linked to the system bringing the total number of WALES terminals to 39. Several of the new terminals were multi-dropped to existing lines.

b. the WALES data base was updated to include moving and parking traffic warrants issued in D.C.

c. the NCIC interface program was modified to provide faster responses to WALES-to-NCIC inquiries.

d. five civilian technical positions were filled within the MPD, Data Processing Division, in a step toward preparing for the takeover of the WALES system from the contractor.

e. NCIC training handbooks were distributed to all WALES users in an attempt to familiarize each individual with the functions of NCIC.

PROPOSED WALES SYSTEM

The WALES design has evolved to meet the requirement of inter-regional information exchange, as well as to perform some of the internal data processing of the individual departments which participate in the utilization of the system. WALES provides centralized access to information currently available only through the data files of the individual jurisdictions. It also provides the capability for local data processing needs of the individual departments.

The system is composed of several distinct subsystems. Each subsystem addresses an important aspect of law enforcement need. The subsystems are:

- Message Switching and Communications
- Information Storage and Retrieval
- Command and Control
- Resource Allocation
- Statistical Information

System Information Flow

Message Switching and Communications, Information Storage and Retrieval, and the Statistical Information Subsystems perform functions which are of area-wide importance. The design of these subsystems reflects this regional concept of information exchange.

The Resource Allocation and Command and Control Subsystems perform tasks which are relevant only within the geographic and administrative

boundaries of any single department. Although the designs of these two subsystems were developed for the Metropolitan Police Department, each department in the area could, with minor changes, adapt the designs to their needs.

WALES communications are controlled by a central module referred to as Message Control. This is the part of the Message Switching and Communications Subsystem which processes all WALES messages. As an example, a message from a Command and Control terminal would be routed to the Command and Control Subsystem. A message from another WALES terminal may request data on an individual and be routed to the Information Storage and Retrieval Subsystem. Another message might request routing to several other WALES terminals and be routed as a teletype or broadcast message. Regardless of the message type or the sending terminal, Message Control receives and examines the messages and routes it to its appropriate destination. The same process works in reverse when Message Control sends a message from a WALES subsystem to an appropriate destination terminal. Records of messages passing through the system will be maintained on a magnetic tape for purposes of back-up and analysis of system utilization.

WALES has the capability to access data bases other than its own. Access to the DMV in the District of Columbia will be direct, but in Maryland and Virginia, WALES will interface through the appropriate State Police Departments. A direct computer-to-computer interface will exist between WALES and NCIC.

The Information Storage and Retrieval Subsystem (ISR) addresses two principal data bases: files pertaining to vehicles and files pertaining to people. One function of this subsystem is the maintenance and updating of these files while another function is the retrieval of data.

The Statistical Information Subsystem (SIS) maintains files on police activities. It receives input from WALES terminal devices, as well as from a computer log produced by the Command and Control Subsystem. Outputs may be returned to the terminal requesting the information or may be printed as a formal report on a high-speed printing device at the requesting terminal. It should be noted that the Statistical Information Subsystem functions on-line to produce certain outputs at the requesting terminals.

The Resource Allocation Subsystem (RAS) does not operate on-line as do the other subsystems. Inputs come from the log of activity maintained by the Command and Control Subsystem. The RAS keeps its own files and produces output reports on demand from users.

The Command and Control (C/C) Subsystem maintains files on a high-speed storage device and keeps a log of mobile patrol activities which will be used as input to the Statistical Information and Resources Allocation Subsystems. C/C has associated with its operation dedicated terminal devices. The Message Control program acknowledges the dedicated terminals and relays the Command and Control messages.

All the subsystems comprising WALES, with the exception of Resource

Allocation, interact with the message control function. Message control, therefore, acts as the interface between the on-line users of the system, WALES itself, and the external data of DMV and NCIC. The characteristics of the subsystems are described in the following sections.

External Characteristics

WALES has been designed around the concept of a central control and switching module which serves to control an integrated group of subsystems. Terminals are connected to this module via land lines. This configuration provides the users with access to the system on an as-needed basis. The terminals act both as a source for information entry into the system, and as the means by which information already in the system is retrieved. The terminals provide a capability to perform searches and updating against the various files and also to transmit and receive information in a manner similar to that employed in the present teletype networks.

Four types of terminals have been identified:

- Standard Terminal - These terminals would be located at such places as precincts and bureaus and would constitute the bulk of the terminal in the system. They would perform file searches, updates and a limited amount of message routing to other terminals. In this latter regard, the terminal will function as local teletype stations.
- Privileged Terminal - These terminals would typically be located in department headquarters and similar areas where command functions are performed. They would be capable of performing all the operations possible with a Standard Terminal and, in addition, they would be able to perform broadcasting of messages both within

and outside departmental boundaries. These terminals will operate in a manner similar to both a Metropolitan Teletype and a local teletype terminal.

- Master Terminal - One or more such terminals will be located at the computer site. These would be capable of performing all the operations possible with a Privileged Terminal. In addition, they would perform the WALES system control functions: monitor central hardware and software, monitor the communication network, collect system statistics, and activate and deactivate portions of the network.
- Command and Control Terminal - These terminals would be dedicated to performing the Command and Control functions associated with the radio dispatch of field units.

The Standard, Privileged and Master Terminals can route messages to another terminal or terminals. To facilitate predetermined selective routings, distribution lists will be stored within WALES for each terminal. Three types of message distributions will exist. Note that a terminal may have multiple distribution lists.

- Standard Distribution - This will route the common and typical messages to the terminals defined in the list.
- Special Distribution - Master or Privileged terminals will be able to invoke Special Distribution Lists to supercede the Standard List. These will be used to route messages to non-typical receivers or to cover extraordinary situations.
- Selective Addressing - Master or Privileged Terminals may specify in the message the specific terminal or terminals which are to

receive the communication.

In order to communicate with WALES certain conventions associated with messages must be established. A message will consist of two parts: a header and the text. The text is the body of the message; it contains all the information necessary for WALES to update or search its files. In the case of a routed message, the text is the communique itself and will be in completely free form. For non-routed messages, the text will vary depending upon the type of message.

The information contained in the header tells WALES the message type: whether a WALES information file is to be accessed, whether the text is to be routed to another set of terminals, whether the text contains system control information, or whether this is a training message to access the training files. Next, the header contains an operation code which specifies the type of information file, routing procedure, etc. The final mandatory field of the header will tell WALES that the text of the message follows immediately.

A series of additional fields exist for the header. One of them, used at the option of the operator, is an external routing code which tells the operator where to send the response. As an example, suppose in a precinct house an operator has several inquiries for WALES - each one originating from a different officer. He could designate where the responses go by typing the appropriate officer's badge number as the external routing code for each message. A radio dispatcher would use this field to determine to what unit the response goes.

In case a message is to be routed to other terminals, the header must identify the distribution list to be used or the list of specific

terminal for which the message is intended.

If the message concerns a WALES information file, the specific file must be named. This could be the Statistical Information System File, Vehicle File, or the Persons File. In this case, the action to be taken is specified; it may include entering a new record, clearing an old record, querying to find a particular record, searching to find records with similar characteristics or modify an existing record.

Most terminals will have access to all the WALES subsystems, except the Command and Control subsystem. It will be possible to limit the activity of a terminal so it can only access particular files if such restrictions are desired.

Message Switching and Communications

This subsystem consists of a collection of core resident programs which provide the communication link between all the other WALES subsystems and the user terminals. It logs all incoming and outgoing messages, builds message queues for each of the subsystems, determines priorities of messages, and performs the function of message routing. This latter function allows certain privileged terminals to broadcast messages to all terminals or to a select few. It also routes messages internally from one subsystem to another.

The Message Switching Subsystem provides centralized message switching of Metropolitan and local teletype networks, and an interface between the terminals in each of the jurisdictions and the data files maintained by WALES subsystems.

Information Storage and Retrieval

The files accessed through the Information Storage and Retrieval Subsystem are:

- Vehicles: those vehicles which are of interest to the police.
- Names: those persons who are of interest to the police.

From the Name File, access is made to the following files:

- Wanted Persons - files which contain information about people with any type of warrant outstanding, missing persons, bailees, parolees, people on probation, or those about whom intelligence information is wanted.
- Police History - files which contain historical police data regarding the person's contacts with the police. It will also contain his associates, aliases, identifying marks, etc.
- Arrest History - those persons who constitute the current jail population of the department.

These files may be searched by accessing and examining each of their records. However, for speedy access, five major entering indices have been built into the system: Tag Number, Vehicle Identification Number (VIN), Permit Number, Case Number, and Name.

In addition to the above area-wide files, WALES will maintain direct and automatic access to the nationwide files maintained by the FBI in the NCIC system.

Four types of messages are used to update the WALES files:

Enter - This message adds a new record to the file.

Modify - This message is used to change or add to a record in WALES.

Clear - This message marks a record as being of a lower level of interest and will cause the item to be either eliminated from the file or placed in a different status.

Delete - This message will remove a record placed in the file in error.

Two types of data retrieval messages are available: queries and searches.

Queries - Queries the file to be entered in an attempt to access information on a particular item. For example: What information is associated with Maryland Tag Number XY123? Or, what is the criminal record of Charles H. Johnson, white, male, date of birth March 19, 1937?

Searches - This is an inquiry of a broader nature. It requires a more comprehensive scanning of the WALES files for possible matches to the question asked. It may result in many responses if more than one record with the proper characteristics is discovered. For example: List all white males, 5'10", 30 years of age, with scars on their cheeks. Or, list all Pontiacs, registered in the District of Columbia, which have a 7 and a 2 in their license plates.

Queries will be of particular use to the Metropolitan area officers in the field, providing them with rapid information about automobiles, their owners and drivers. Further, police information about individuals who need to be identified will be available. If a query is made to WALES

and no hit is made, a query is automatically generated to NCIC.

Searches will prove of most value to investigating units, because they deal with fragmentary information. WALES can provide these units with lists of suspects or other items of interest.

WALES will not maintain a file on stolen articles. Instead, it will utilize the services provided by NCIC for that purpose.

The general content of information files maintained by and available through the Information Storage and Retrieval Subsystem is presented below.

Vehicle File

WALES will maintain a central repository of records describing extraordinary vehicles and associated equipment for the combined jurisdictions in the Washington Metropolitan area.

- Stolen vehicles
- Impounded vehicles
- Repossessed vehicles
- Moved vehicles
- Wanted vehicles
- Stolen engines
- Recovered engines
- Stolen tags
- Recovered tags
- Vehicles of special interest

Should a vehicle not be in the WALES vehicle file, and more information is desired about the vehicle, owner, or driver, the DMV data base would be queried through appropriate communication links: In Maryland

and Virginia, the respective State Police Departments.

Either the Vehicle Identification Number (VIN), Tag, or the Case Number must be entered in a query. The WALES response will contain:

- Record type (stolen, wanted, etc.)
- Status of vehicle (hold for prints, driver dangerous)
- Tag (number, state, year, type)
- VIN
- Vehicle description (year, make, model, style, color)
- NCIC number (if applicable)
- Case number

If the vehicle is not found in this file, a negative response is sent to the inquirer.

Name Oriented Files

- Wanted persons
- Arrest processing
- Criminal arrest history
- Aliases/associates
- Personal profile

All persons in any of the above files will be represented in a Primary Name File. This primary file provides a basic route to every record whenever the name is given as an inquiry parameter. Inquiries to these files may be made using combinations of several identifiers. In the absence of numeric identifiers (tag, permit number), the files may be accessed by using the person's name and any combination of social security number, race, sex, height, and weight.

The Wanted Persons File will contain information on individuals sought by the police. The Wanted Persons File includes individuals who are:

- Wanted on a felony or misdemeanor warrant
- Wanted for questioning
- Wanted on a traffic warrant
- Missing persons
- Persons of concern to the police, such as those on parole, probation, or bail

It is the object of this file to provide the officer in the field with immediate information on the individual. The status of the person (wanted, on bond, parolee, etc.) will be the primary output along with, where applicable, the offense for which he is wanted, type of warrant, location of the warrant, NCIC number, and whether intelligence information is wanted.

Arrest Processing File

This file contains data on all persons arrested in the Metropolitan area. Because of the security associated with this information, the data are maintained on a departmental basis with access permitted only to the originating department. Thus, the Metropolitan Police Department terminals could access MPD arrest data files only and would have no access to the files of any other department.

The data maintained in addition to name includes:

- Place of arrest
- Time of arrest

- Arresting officer
- Arrest number
- Prisoner's physical location
- Charge

Each arrest entry initiates a search of the Wanted Persons File to discover outstanding warrants. The system will constantly monitor the passage of time with respect to each prisoner and notify the department of the approach of statutory time limits so appropriate action may be taken.

Specified terminals will have the ability to access the arrest processing files to inquire into the status of individual prisoners or to receive various summary prisoner population data. These files will also be used to generate monthly arrest summaries.

Police History File

The Police History Files are currently designed to contain four classes of information regarding persons known to the police. They are:

Personal Profiles: This includes information such as detailed physical characteristics: special marks, scars, tattoos, deformities, unusual personal characteristics, etc.

Aliases: This would include all names under which the person in question has been known to the police, or is known by to his associates.

Associates/Gang Contacts: This would include a list of known individual and group associates of the person in question.

Criminal/Arrest History: This would include a reference to all jurisdictions in which the person in question has a police record, and

his central record ID number in the police files of each jurisdiction where such records exist.

A query about a person's record contained in the name files would result in a limited amount of output. Included in the return would be:

- Name
- Date of birth
- Race
- Sex
- Height
- Weight
- Social Security Number
- Driver Permit Number
- Various status codes

Arrest Processing

Although properly a component of the Information Storage and Retrieval Subsystem, arrest processing is described separately because of its unique relationship with the Police History File.

Arrest Processing maintains a complete file describing the status of persons who are any where in the arrest process. The person's name is entered as soon as possible after he is arrested, and any changes in his status are noted. The arrestee's name remains in this file until he leaves the jurisdiction of the police department, whether being released or sent to the court. Information to this file is available only to the jurisdiction originally entering the data.

When an arrest record is first entered into the system, the Wanted Person's File is automatically checked to see if the person has any outstanding warrants. When a record is released from the Arrest Processing File, the information is used to update the Police History File.

This subsystem maintains volume statistics and can respond to queries relating to a specific individual: where he is, what is his status, who arrested him, etc. It maintains a watch on the time elapsed since arrest and notifies the proper terminal operator when the time span becomes critical and the person should be released, arraigned, or moved on to some new status.

Command and Control (C/C)

The Command and Control Subsystem (C/C) is designed to provide for continuous control of the mobile resources of an individual department within rapidly changing tactical environments.

The data base for the Command and Control System is maintained on a high-speed drum. All C/C terminals are dedicated, and handle no other type of communication. Thus, C/C messages need no header information in order to be identified.

The proposed computer-assisted Command and Control Subsystem is a significant change and improvement over all previous methods, without necessitating drastic changes in the department's operating policy or the qualifications required of operating personnel. The system contains all the functions normally performed by current communications/dispatch operations with respect to complaints, mobile units, and central control.

All actions which take place external to the computer are initiated at any one of several keyboard/display stations. The actions correspond to points in the current system where data is handwritten on cards. In virtually every case, the amount of information to be typed is less than the amount which is handwritten.

In addition to assisting the dispatcher in his function of assigning units to calls, Command and Control will also accept and execute pre-stored contingency plans for the dispatching and shifting of additional units in any of several situations. This feature will prove useful, for instance, in sealing off an area after a holdup or in dispatching units during a riot.

The proposed C/C system can be described in general by contrasting its features with those techniques currently in use.

- Automatic collection of complete activity data with no additional peripheral or manual handling operations which might introduce errors.
- Information transfer from station to station by the computer. Transfer rates are at line speeds (300 characters per second). Operators are presented with information only when their attention is required, and are not burdened with the handling and organization of other data.
- Automatic updating of data files which record the calls-for-service environment and the status of mobile units.
- Automatic recording of numerous data elements on each unit activity. These include times of occurrence, translation of address to beat and city block location, issuance of complaint

numbers, personnel identification, priority classification, etc.

- Application of analytic methods for determining the best assignment of units to each call-for-service.
- Compatibility with future development plans of the Metropolitan Police Department Radio Room and for the utilization of automatic car locators, mobile teleprinters and other new devices.

The efficient allocation of police resources is basically a local law enforcement problem. Any system for allocating resources is fundamentally a series of mathematical relationships programmed to analyze available historical data describing incidents and resources, both available and committed.

The subsystem being discussed here is designed specifically to function as part of the Metropolitan Police Department. Once developed, it may be utilized by any of the law enforcement agencies that participate in WALES.

Resource allocation involves two separate functions. Each function is represented by a relatively complex set of computer programs:

- A series of programs which acquire performance data for use by the analytical programs.
- Analytical programs which perform calculations required to analyze source data and derive predictions of manpower needs.

The data needed by the system falls into three general categories:

Frequency of Police Events is the actual number of events reported to the police which require an expenditure of manpower and equipment. The resource allocation data acquisition system will provide a method of event

classification to permit detailed analysis of work requirements. Thus, for each arbitrary geographic unit, a classification of events required for resource allocation is maintained. This classification contains the number of events that have occurred in each category.

Time Required to Service Events is part of the information needed for resource allocation. The time required to service police calls determines the amount of police manpower that must be expended for call answering services. Thus, for each classification of events, the average time for servicing such an event must be carried in addition to the frequency of the occurrence.

Distribution of Events Over Time reflects the density of event occurrence for finite time periods during the past. The intervals of time which are of most value for resource allocation purposes are:

- Hour of the day
- Day of the week
- Week of the year

By maintaining event frequency data by hour of the week, the day of the week density is known. Information on events frequency maintained for week of the year contains implicit information concerning the density of events during any month of the year.

In each arbitrary geographic area, the number of events that have occurred in each class and the average time to service these events are retained as exponentially smoothed averages. Thus, the data in each record automatically gives more weight to the more recent behavior of the area being analyzed.

The data required for resource allocation purposes is obtained at the dispatch point for mobile units. Information that is recorded and accumulated includes:

- Type of call
- Unit assigned
- Time the call was assigned
- Time the call was completed
- Disposition of call
- Location of event

Recording and entering the information into the system may be accomplished in one of two ways: the radio run slips are coded and entered into the system, or the log maintained by Command and Control Subsystem is used.

Statistical Information

Statistical Information Systems have existed within law enforcement agencies for many years. Many of the files now maintained by police departments, particularly those which pertain to traffic accidents, the frequency with which crimes occur, and daily activity reports supply management with information upon which to base decisions. The main difficulty with management information systems in the past has been their lack of complete and timely data. The mechanics of processing information through a manual system and the attendant problems of retrieval resulted in only a small portion of the total information being available when needed. WALES will alleviate some of these problems.

The WALES Statistical Information Subsystem will maintain two years' work of data concerning offenses reported in the Metropolitan area. Police

officials will access the data base to obtain counts, lists, and CCR numbers of events which have been reported. A need has been identified to access historical data to obtain counts of occurrences at specified times and locations and to obtain specific case numbers so the original reports may be found. WALES users may specify a time or time range, a geographic area of interest, and the event categories to be accessed.

Two additional features are also provided. The first allows the preparation of the Uniform Crime Reports for each jurisdiction; the second allows the preparation of reports for the National Safety Council.

The Statistical Information Subsystem includes, for each offense, data of common concern to the Metropolitan area:

- The offense
- Jurisdiction
- Location code
- Date
- Time
- Report number
- Status of case (opened or closed)

Several optional fields will allow departments to code data about offenses which they feel are important. Although it is desirable that all police departments use a common offense coding system, WALES is general enough as not to require rigid uniformity.

The information is entered into WALES on-line from the various stations and precincts. This will greatly enhance the timeliness of the file since a record will be entered in WALES a short time after it is

prepared. An interplay with the Command and Control Subsystem exists at this stage; Command and Control keeps a log of all CCR numbers issued which may be matched against the incoming reports to make sure that a copy of each report is entered into WALES.

Statistical Information Subsystem files are structured to permit searches of records by department, by day, by time, and in combination. The establishment of search criteria would, as an example, allow a compilation of all armed robberies which occurred in Precinct 1, between 1:00 P.M. and 5:00 P.M., during the month of March.

An interesting feature of this subsystem is its ability to keep track of selected criminal events. When the rate of occurrence exceeds a preselected value, a warning message will advise each department of the existence of a potential crime problem.

Output will be of two categories. On-line outputs which are unformatted will provide simple searches and counts. For instance, a count of the number of auto thefts last week, or a CCR number corresponding to a particular event specified by time, place, and appropriate masking criteria. The system will also output formal reports and prepare maps and tables based on the data from a search request.

SYSTEM SECURITY AND RELIABILITY

The design of WALES provides features which insure maximum security of the data base. However, these features must be supplemented with a sense of responsibility on the part of the users of the system in order to insure the desired degree of security.

Security is first obtained by rigid control over access to terminal devices. Misuse of the system can ensue if members of the various law enforcement agencies have unlimited access to the terminals. By insisting that designated personnel only be allowed to use the terminal devices, system integrity can be maintained. Further, these terminal operators must be thoroughly trained in the proper use of the system. The WALES file control program examines files, referenced in queries and decides whether particular requesting terminals are qualified to access them.

A need exists to validate terminals accessing WALES files because certain data can only be changed by the same terminal or jurisdiction which entered the original information.

SUMMARY OF BENEFITS

- Certain manual filing systems, and the clerical expense of maintaining them, will be eliminated.
- The computer-based files will be purged automatically, thus providing a more timely data base.
- Data of an area-wide nature will be centrally located in readily accessible form.
- The centralization of files will eliminate, in many cases, the present necessity for calling the various participating jurisdictions for information.
- Less time will be required to conduct investigations because of the ready availability of criminal information.
- The rapid information retrieval capability will allow officers in the field to respond to each encounter, and resume their

patrol duties more quickly.

- The capability to draw upon complete files of area-wide wanted persons, stolen property, and criminal histories will aid in identifying such persons and property when encountered by the police.
- WALES will provide large-scale computer capabilities for participating jurisdictions who, otherwise, could not afford such capability on an individual basis.
- The Resource Allocation Subsystem will realize a saving through more efficient use of manpower. Police resources will be allocated more realistically in relation to the problem. This, correlated with the data supplied by the Statistical Information Subsystem, will insure a more efficient use of resources.
- The Command and Control Subsystem will help improve the crime suppression capability of the Metropolitan Police Department.
- The system will improve overall police efficiency, thereby providing better services to the community at reduced costs.

While it is not possible to relate the effects of WALES on crime rates, it is possible to relate WALES to an anticipated economic saving through increased efficiency in the performance of law enforcement tasks. The feasibility study estimated that the implementation of WALES would result in a minimum of a 10% increase in efficiency, or an increase in resources amounting to 10%, or a 10% decrease in operating costs.