A REPORT CONCERNING:

Automated processing of complaints in the Communications Center of the Seattle Police Department,

Collection and use of dispatch data toward effective patrol manpower allocation and

Increased police communications capability,

THROUGH:

The installation of a real time data collection and display system.

(SELECT)

Points of view or opinion expressed in this report do not necessarily reflect the official position or policies of the Seattle Police Department.

Lieutenant Paul H. Knapp
Project Director, LEAA Grant 507
August 23, 1974

CONTENTS

Introduction

This document is an overview of the developments leading to and the installation of a real time data collection and display system used in the communications dispatch center of the Seattle Police Department.

The purpose of this document is two-fold:

First; to present a comprehensive final report of this project which was funded in part by a Law Enforcement Assistance Administration grant.

Second; to assist other law enforcement agencies that may venture forth into the technical and troublesome areas described in this report.

ACKNOWLEDGEMENTS

The concept of the SELECT system was introduced to the Seattle Police Department in early 1969 by Major C.R. Connery and Capt. D. Douglass. Both were instrumental in extensive preplanning required for the system and initiated the original grant request for the project.

Mr. Ray Ganner, Kustom Electronic's, Inc., was on site vendor representative for the duration of the project. After being trained by department personnel in all areas of our communications center operation, Mr. Ganner completed the design and installation of the present system and is given much credit for its success. The system specifications portion of this document was prepared by Mr. Ganner.

Sgt. T. E. Jensen, Data Control Section, and his staff who assisted in the design, development and implementation of the system were the major attribution toward the successful operation of SELECT. Sgt. Jensen's staff is responsible for training of department personnel, operating manual preparation, and physical operations of the system. The operations manual portion of this document was prepared by his staff.

Mr. Cal Clawson, Research and Inspections Division, headed a research team during the projects duration concerned with sophisticated analytical manipulations of the data to be produced by the system toward a more effective utilization of patrol manpower allocation. Mr. Clawson's efforts are continuing under LEAA Grant 1371. A portion of the work completed by his team is included in the preventive patrol portion of this document.

Mr. Peter Tarbell, Kustom Electronic's, Inc., who produced the planning portion of this document, provided extensive information during the project period concerning alternative approaches to meet communication demands and solve future growth problems.

SUMMARY OF PROJECT

During the mid 1960's, the Seattle Police Department was using a manual data card system of recording and processing complaints in the communications center.

The system provided little control or accountability and the demand for statistical and operations information concerning patrol activities was met by untimely reports containing inaccurate and incomplete data.

An examination was made of the communication division's requirements for processing of complaints and the overall departments information requirements for a more effective utilization of patrol manpower assignments.

A long range conceptual design was developed in which complaints would be processed through a real time data collection and display system allowing complete and accurate capture of data which could be speedily processed. The designprovided for future growth by allowing the original complaint recorded to be transmitted automatically rather than by voice to the assigned patrol unit and allowing line units full automated access to data base information systems - bypassing the dispatcher.

A grant request was developed in 1970 addressing the first portion of this concept; the automation of complaint processing activity within the communications center.

A request for proposal (turn key operation), was let and responses reviewed. Kustom Electronic's, Inc., of Chanute, Kansas, was selected as the contract

vendor. The project began officially on January 12, 1973. The original project cost was $218,000 of which $165,000 was provided by an LEAA Grant. Personnel, $83,000; consultants, $35,000; equipment, $98,000 and supplies, $1,500.

An on site representative was installed by the vendor. This individual was thoroughly indoctrinated and trained in complaint processing and dispatching activities within the department's communications center.

During the same period two other teams were formed:
The first comprised a small group of communications division personnel. This group was extensively involved in the design, development, implementation, operation and training required for the system and worked continually with the vendor during the project period.

The second group was comprised of analysts who were concerned with data to be recorded in the system and its later use toward a more effective assignment of the patrol force.

In June, 1973, the systems specification document was approved by the department and programming was commenced at Chanute, Kansas by Kustom.

During August and September 1973, equipment was delivered and installed and during the same period, a transition of complaint information recorded in the manual system was occurring which would later conform to the automated system.

Originally, dispatcher CRT's for the system were installed in an area separate from the operating communications center work area. System familiarization and training began for the divisions 70 employees in a test mode.

In February, the CRT's were moved to the communications center working area. The first live operational tests were conducted for short periods.

On April 9, 1974, Version I of the SELECT system became fully operational.

On August 15, 1974, Version II of the SELECT system became fully operational. Enhancements contained in Version II are proprietary and are neither discussed nor documented in this report. Because of those proprietary rights, the department is limited to on site explanations.

At this writing, the research team has completed some batch programming for data required in their particular fields of interest.

Other reporting requirements for the uniformed patrol section have been defined; however, programming for these reports has not been completed.

Further enhancements and expansion of the system are occurring and include:

A fully duplexed system;

Additional CRT's for the dispatchers which constantly display resource summaries;

A proposal for 103 mobil communications terminals to be installed in line unit vehicles.

MANUAL COMPLAINT PROCESSING SYSTEM

SEATTLE POLICE – MIR DISPATCH CARD

O.V. 1
EMER 2
RPT. 3

LOCATION
COMPLAINANT PHONE

STICK-UP
ALARM
ACCIDENT
ASSAULT
BURGLARY
CAR
DISTURB.
LARCENY
OFFICER
PARKING
SUSPICIOUS
S M W C
E CLK./MGR.
E SECURITY
SICK-INJURY
M W C

DISPATCHED AS
SEE REVERSE SIDE ☐

JUN 24 15:02 16:02
JUN 24 15:02 16:02
JUL 24 15:02 16:02

WEAPON USED ☐

NEED: AID CAR, AMBULANCE, CORONER, DETECTIVE, FIRE, LIGHT, SERGEANT, SIGNAL, SPEC. DETAIL, STREET, TAXI, TELEPHONE, TOW, WATER

DATE TIME
DISTRICT CAR NO. SERIAL NO.
TIME SPENT MIR/DISP SERIAL NO.
OPERATOR DISPATCHER RESP. TIME
MAJOR CASE NO. WARRANT NO.
HELICOPTER: UN 1 2 3 4 5 6 7
SENT
VEHICLE: LICENSE NO. LIC./STATE; YEAR MAKE; COLOR MODEL/STYLE

CC DIST. TIME SPENT UNIT INCID. DISP. FIRST OFFICER SECOND OFFICER DISP TIME CASE NUMBER HELI. MONTH DATE DAY HOUR TYPE
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40 41 42 43 44 45 46 47 48 49 50 51 52 53 54 55 56 57 58 59 60 61 62 63 64 65 66 67 68 69 70 71 72 73 74 75 76 77 78 79 80
DATA CARD 154-015

_____ SUSPECTS LAST SEEN _____ MINUTES AGO: AT _____
(STREET, ALLEY, ETC.)
HEADING N. S. E. W. ON _____ ☐ ON FOOT ☐ IN VEHICLE

WEAPONS ⇨ | HANDGUN | RIFLE | SHOTGUN | KNIFE | OTHER | UNKNOWN | NONE

PERSON(S) – SUSPECT(S)

	RACE	SEX	CLOTHING						
1	AGE	HGT	WGT	HAIR	EYES	COMPL.	GLASSES	UNUSUAL MARKS	
2	RACE	SEX	CLOTHING						
	AGE	HGT	WGT	HAIR	EYES	COMPL.	GLASSES	UNUSUAL MARKS	
3	RACE	SEX	CLOTHING						
	AGE	HGT	WGT	HAIR	EYES	COMPL.	GLASSES	UNUSUAL MARKS	

DATA CARD 154-014X

In the manual complaint processing system replaced by SELECT, eighty (80) column data cards with english format were used by 911 operators to record incoming complaints.

The cards were transferred to dispatchers by means of a conveyor belt. A series of time stamps were used and relevant information concerning the complaint was recorded by writing on the card.

About 400,000 similar cards were produced annually of which around half concerned dispatched calls; the rest concerned administrative down time or calls handled internally without dispatch.

These cards were forwarded daily to a separate section within the department where selected information from the source document was key punched directly onto the card.

A series of manipulations with sorters and EAM equipment were conducted with twenty-eight (28) day segments of these cards and statistical reports generated concerning the patrol force activity.

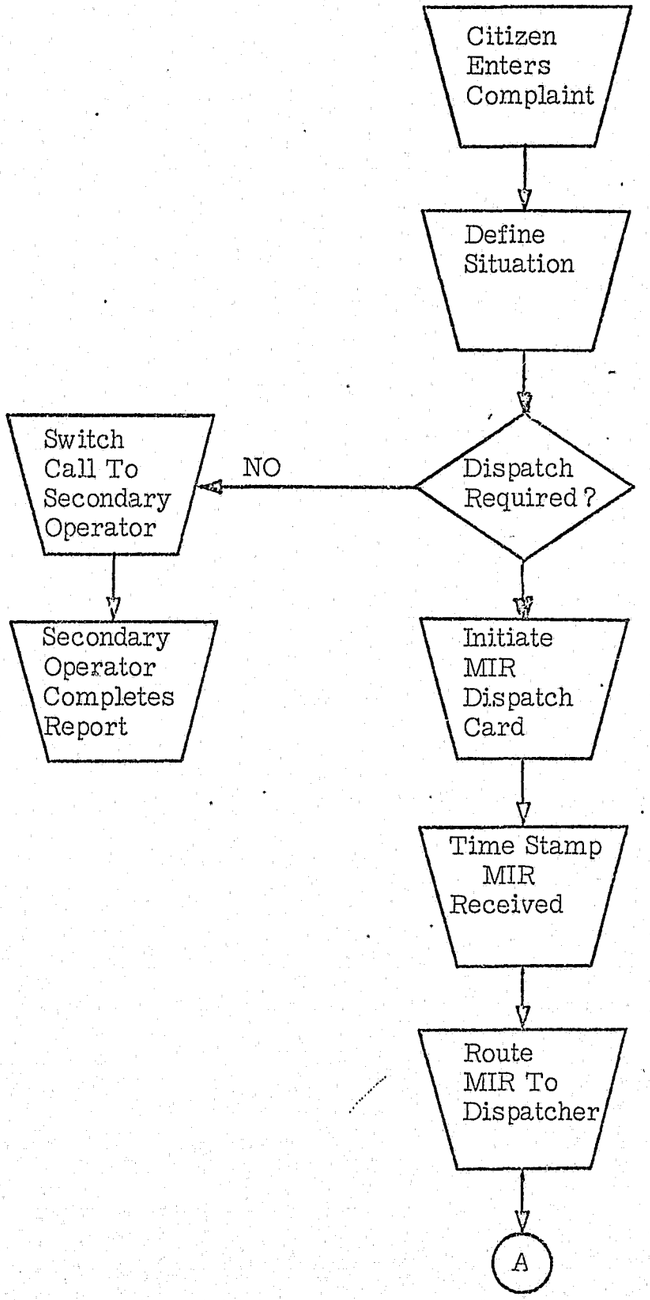
Data produced in this system was far from accurate. Cards were not completed when required; Were lost or destroyed; reliance on operating personnel to record dispatch, receiving, arriving and clearing times by the manual hand stamp methods was impossible to attain with any degree of accuracy.

To compound the problem, data processing methods utilized produced reports which were of historical or long range value, could not be obtained quickly and contained information of questionable value.

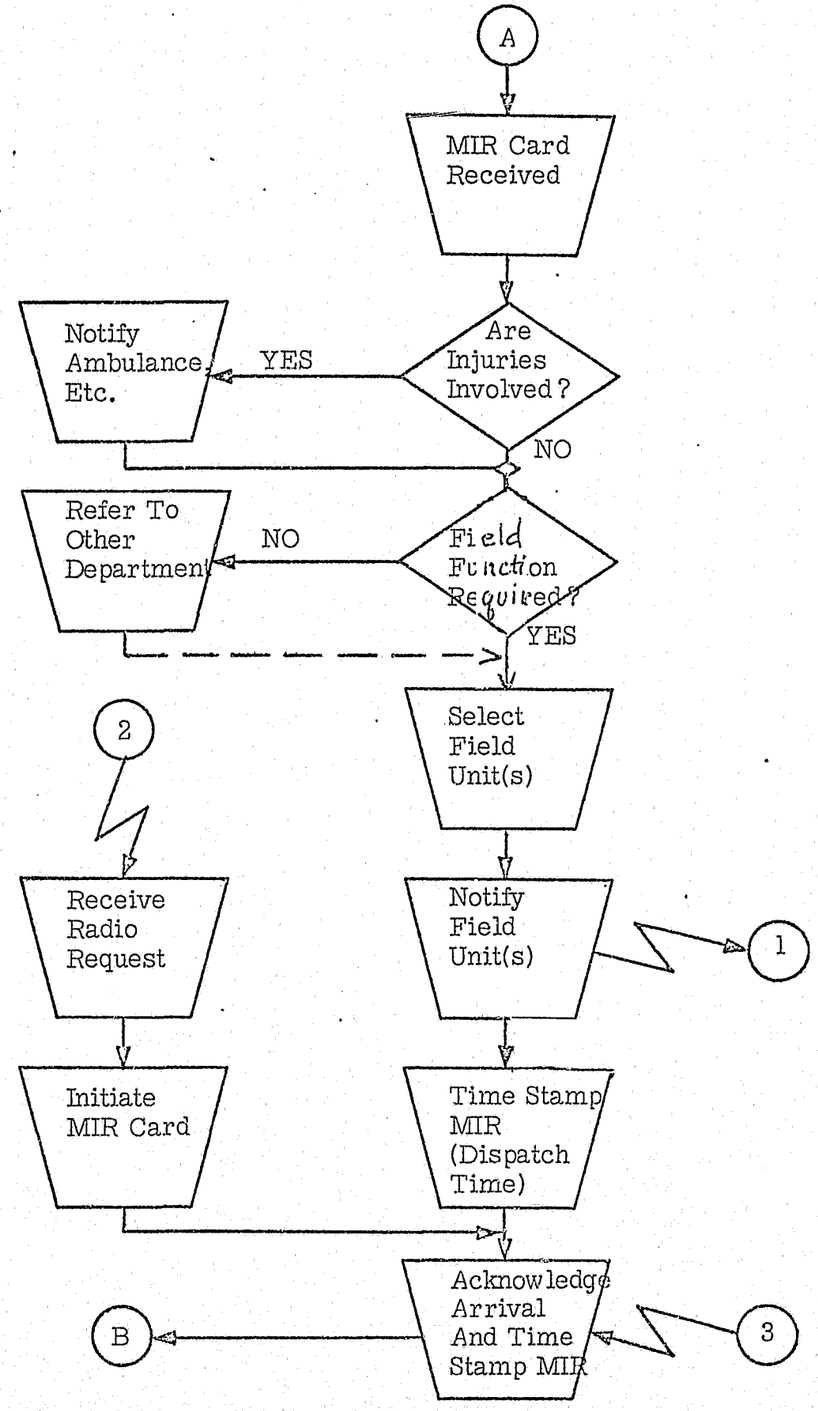
The physical card was limited to eighty columns and this restricted the information on the source document that could be placed in machine readable form.

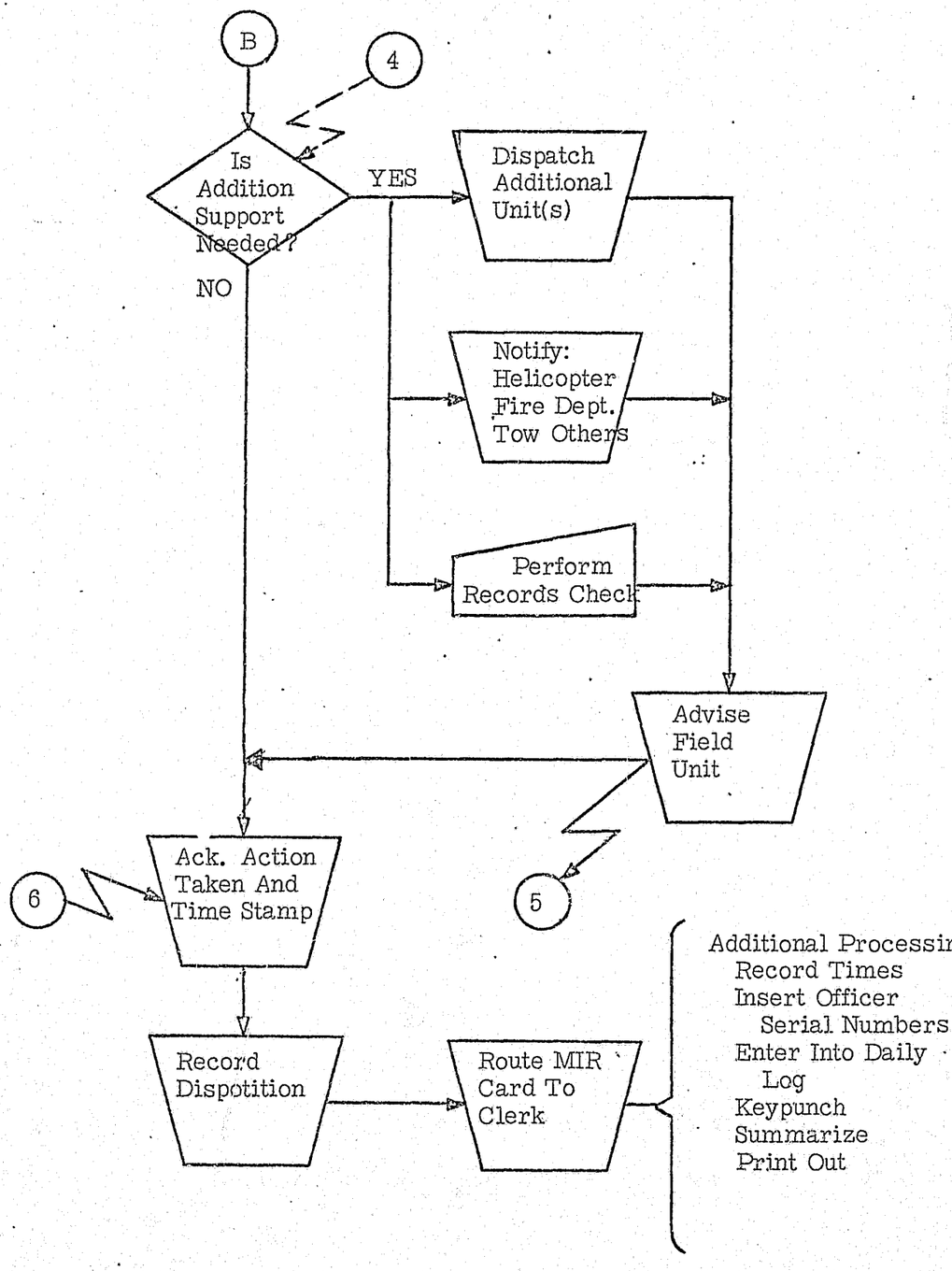
The system is still being used as a back-up to SELECT; however, statistical information is not being produced from the cards. Those cards produced during down times for SELECT are used as a manual reference only and not re-entered into SELECT when the system becomes operational. Data for the down period is considered as lost.

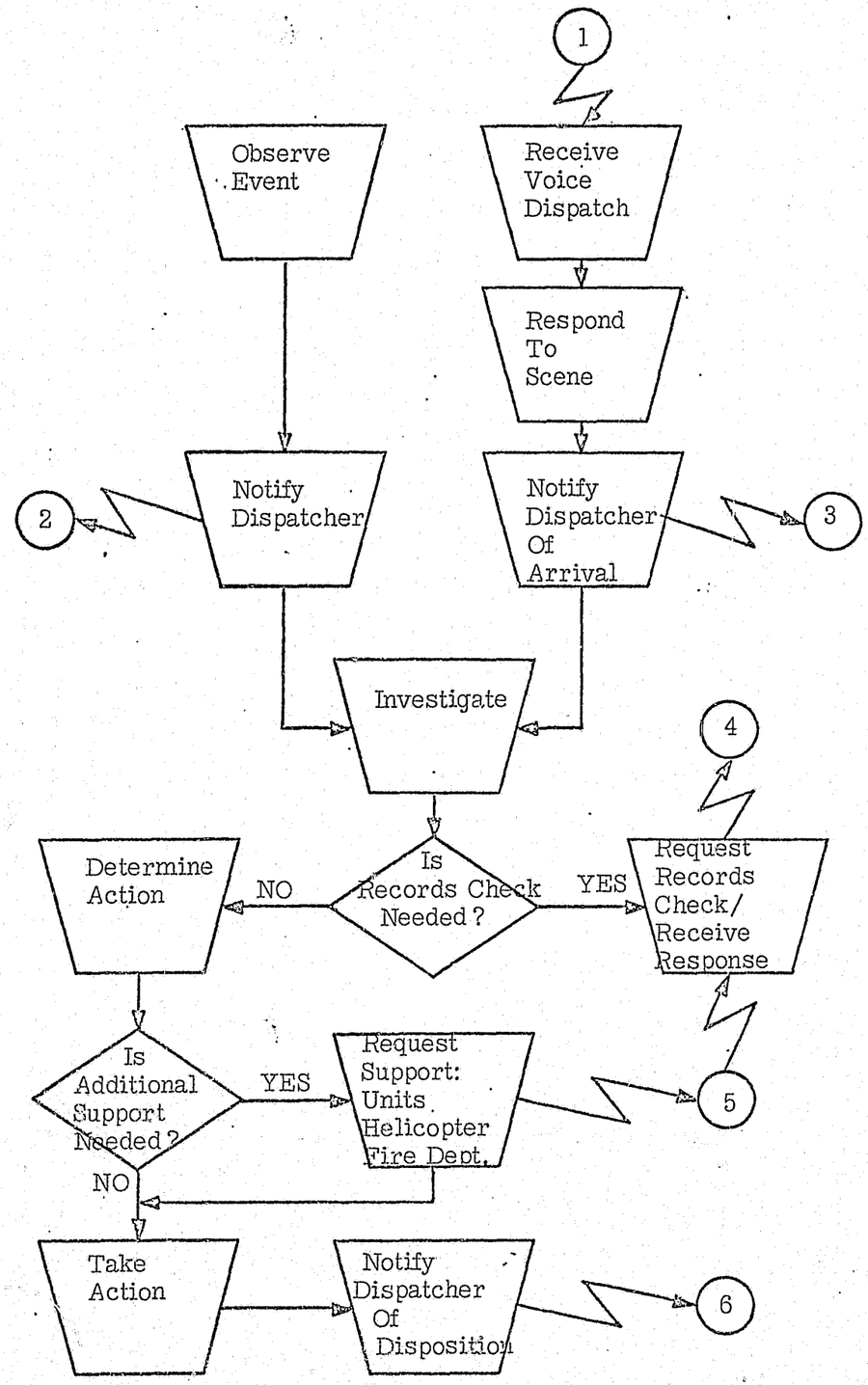
COMPLAINT OPERATORS



DISPATCHER




B
4
Is Addition Support Needed?
YES
NO
Dispatch Additional Unit(s)
Notify: Helicopter Fire Dept. Tow Others
Perform Records Check
Advise Field Unit
Ack. Action Taken And Time Stamp
6
5
Record Dispotition
Route MIR Card To Clerk
Additional Processing:
Record Times
Insert Officer Serial Numbers
Enter Into Daily Log
Keypunch
Summarize
Print Out


1
Observe Event
Receive Voice Dispatch
Respond To Scene
Notify Dispatcher
Notify Dispatcher Of Arrival
2
3
Investigate
4
Determine Action
NO
Is Records Check Needed?
YES
Request Records Check/ Receive Response
Is Additional Support Needed?
YES
Request Support: Units Helicopter Fire Dept.
5
NO
Take Action
Notify Dispatcher Of Disposition
6

NARRATIVE OF SELECT SYSTEM OPERATIONS

On receipt of a telephoned complaint, the 911 operator enters the information on a prepared mask displayed on a CRT. Automatic time stamping, operator identification and other rote tasks are performed by the computer.

On completion of the call, the operator routes it to one of the centers dispatchers. An image resides live on disk (open event) and a line printer records the complaint on a permanent log at the same time.

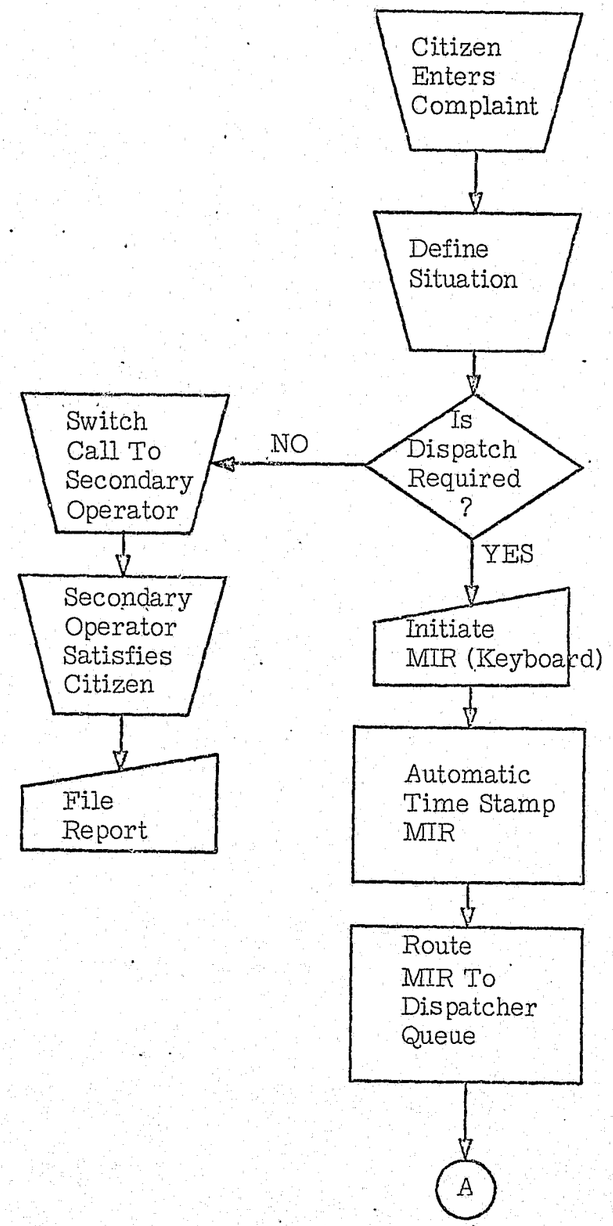
The dispatcher assigned "works" the call from the disk until complete, at which time he closes the event. In the present system, all communications with patrol units are by voice.

On closing of the event, the call is removed from disk and transferred to tape for later processing while at the same time the closed event is logged again on the line printer.

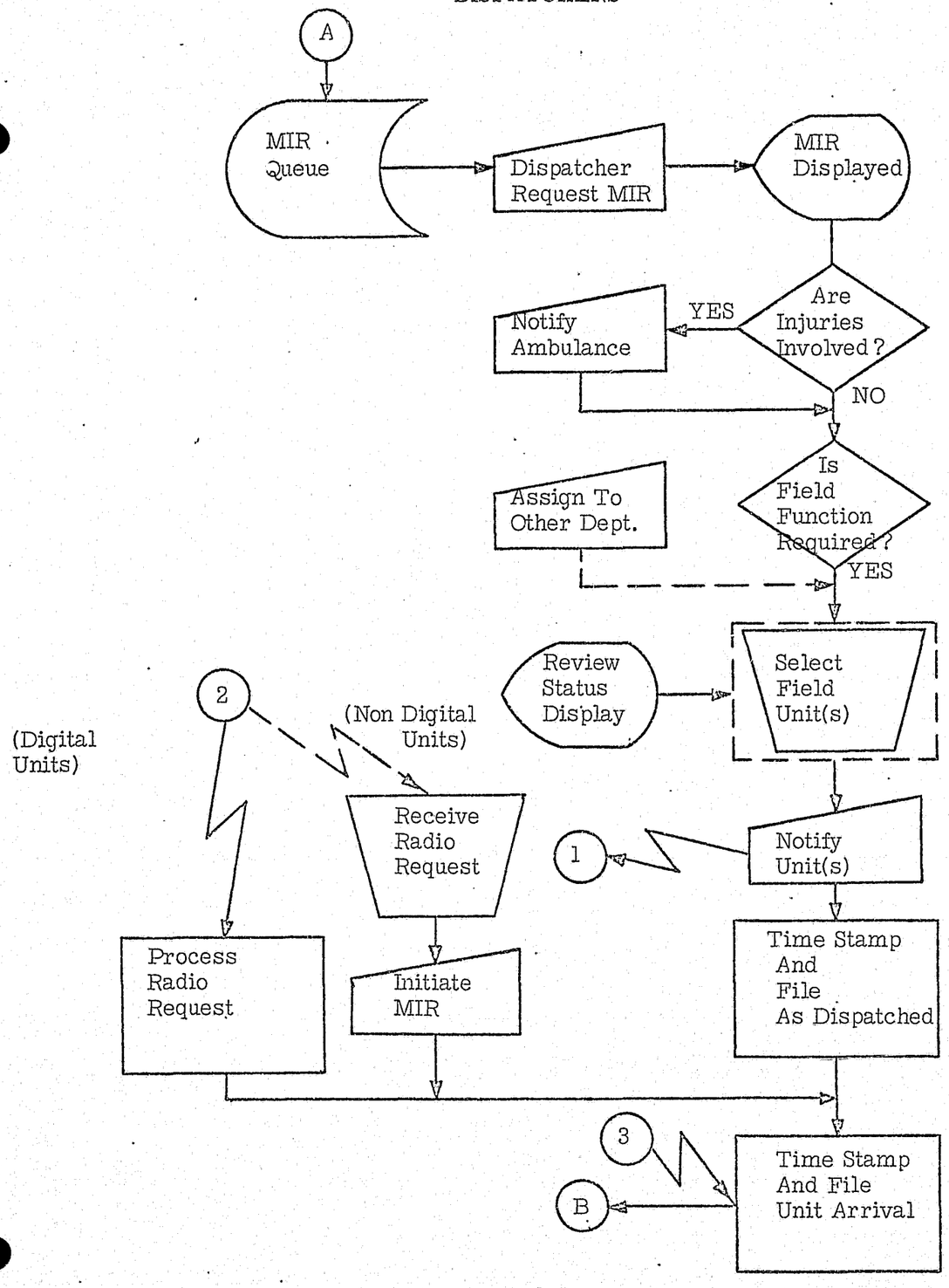
The tape is removed daily and "compacted" onto a master tape. Each master tape contains a 28 day segment of data. During the compacting process, administrative reports containing the previous twenty-four hours activity are produced.

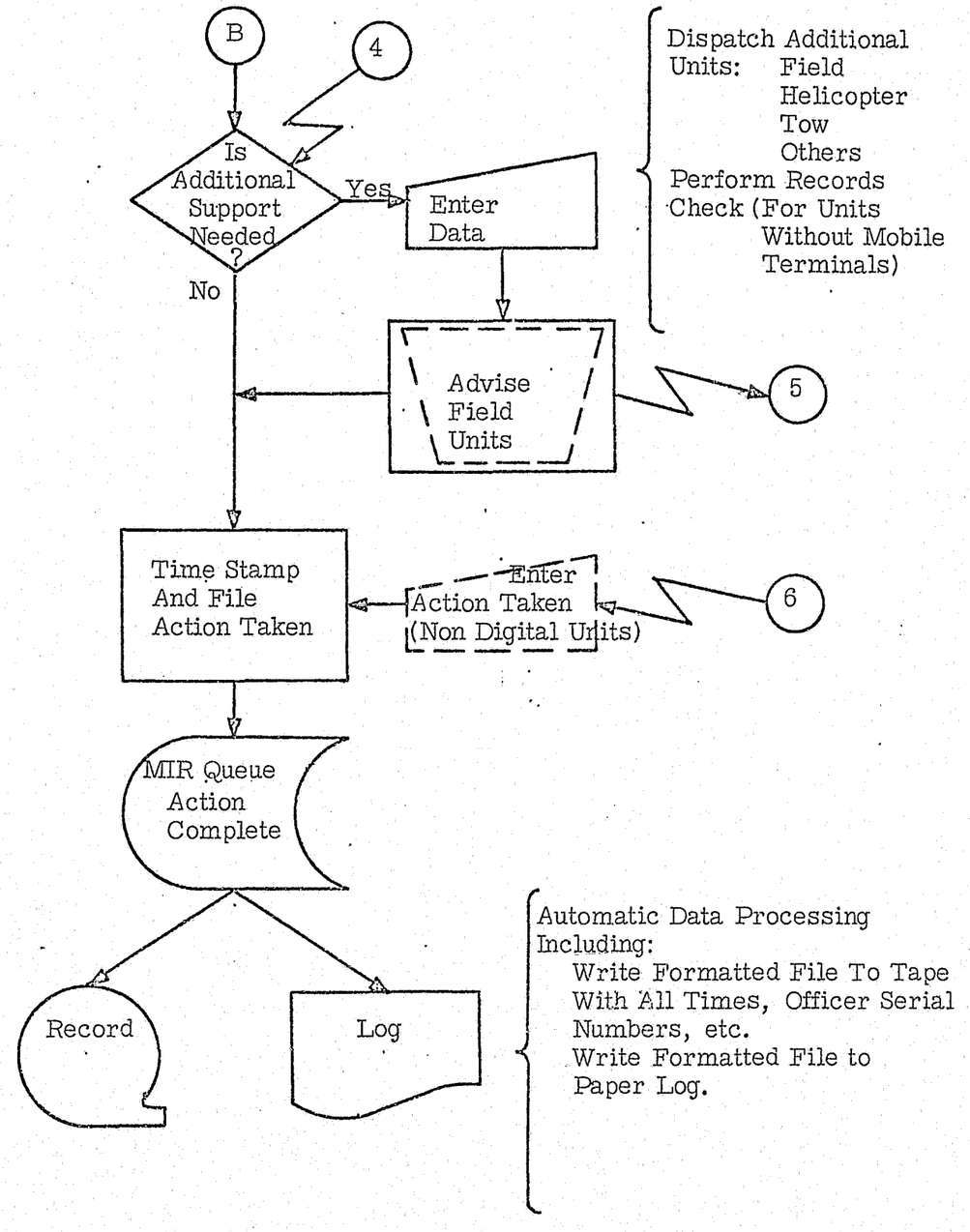
Periodically during this process, information concerning calls in Que, that have not been dispatched, dispatched call information and summaries of patrol car status are recorded on the line printer for back-up use in case of system failure.

COMPLAINT OPERATORS



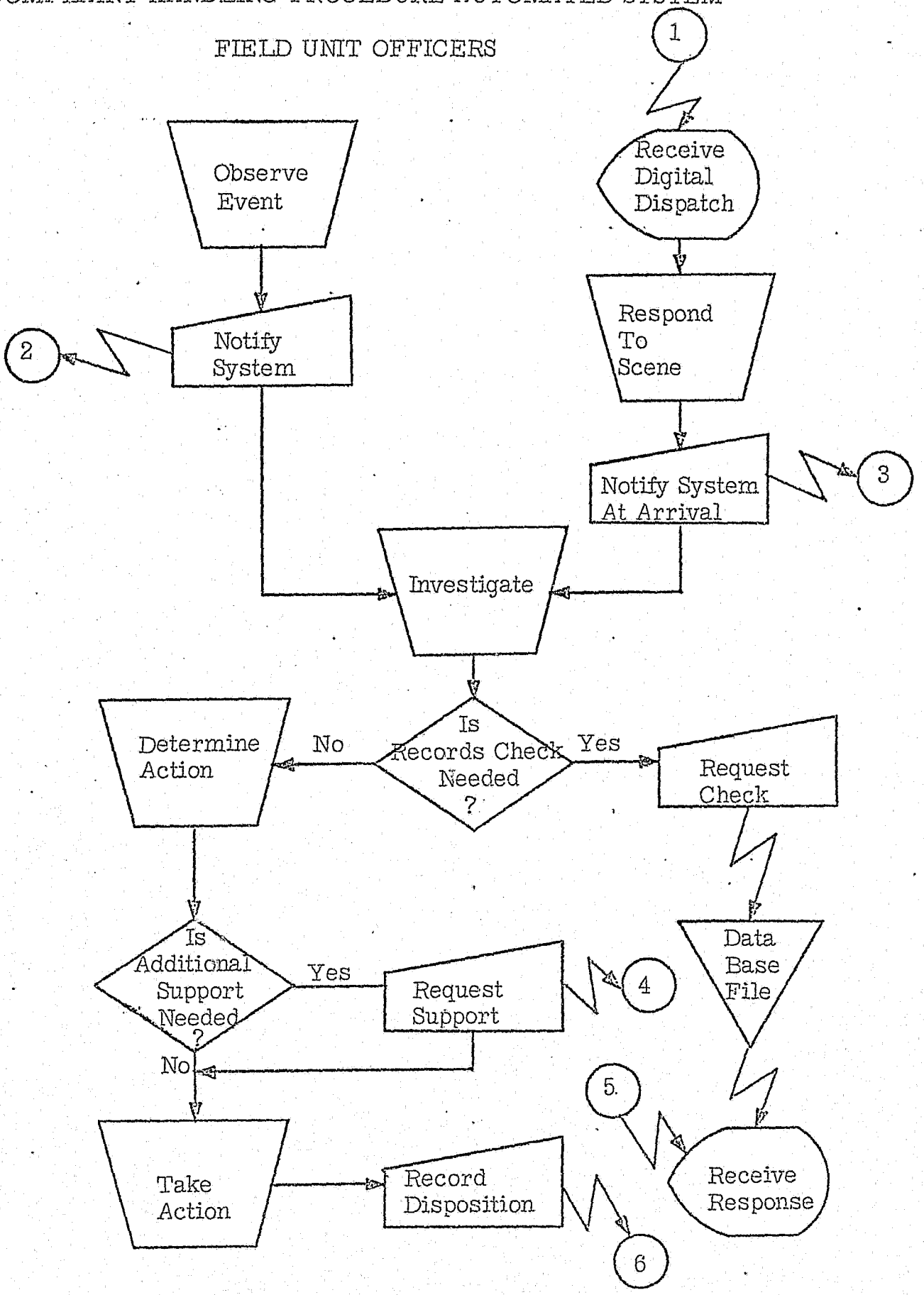
COMPLAINT HANDLING AUTOMATED SYSTEM


A
MIR Queue
Dispatcher Request MIR
MIR Displayed
Are Injuries Involved?
YES
Notify Ambulance
NO
Is Field Function Required?
YES
Assign To Other Dept.
Review Status Display
Select Field Unit(s)
2
(Digital Units)
(Non Digital Units)
Receive Radio Request
Process Radio Request
Initiate MIR
1
Notify Unit(s)
Time Stamp And File As Dispatched
3
B
Time Stamp And File Unit Arrival


B
4
Is Additional Support Needed?
Yes
No
Enter Data
Dispatch Additional Units: Field
Helicopter
Tow
Others
Perform Records Check (For Units Without Mobile Terminals)
Advise Field Units
5
Time Stamp And File Action Taken
Enter Action Taken (Non Digital Units)
6
MIR Queue Action Complete
Record
Log
Automatic Data Processing Including:
Write Formatted File To Tape With All Times, Officer Serial Numbers, etc.
Write Formatted File to Paper Log.

COMPLAINT HANDLING PROCEDURE AUTOMATED SYSTEM

FIELD UNIT OFFICERS



EVENT SUMMARY EXAMPLE

```
W/2 1223 4235 FRAUD  14Ø1 NE 145        D/8 1251 4299 PARKIN 17Ø2 NE ST
D/1 1256 43Ø7 ALARM  15457 15 AVE NE    D/9 12Ø6 423Ø 92Ø
D/Ø 1237 4271 ROBBER 1724 NW MARKET     D/9 12Ø5 4238 95Ø
D/1 1153 42Ø1 PROWLE 1 AVE NE & NE 1ØØ  D/9 1219 4247 97Ø
D/1 1222 4231 BURGLA 2712 NW 65 ST      D/9 1255 43Ø1 98Ø CAR
D/1 1239 4275 TRAFFI 47ØØ 1 AVE NE
D/2 112Ø 4192 FRAUD  BON MARCHE NORTHG
D/2 12Ø3 4237 LARCEN 2915 NE 133 ST
D/2 1247 4296 DRUNK  66Ø2 26 AVE NE
D/2 1244 4239 ACCIDE 1 AVE NW & NW 85
AVAL: 2B4* 2B45* 2B7 2N 2U 2U1 2U56*                          LAST PAGE
```

UNIT SUMMARY EXAMPLE

```
2B2 * D124Ø TRAFFI   2N1 * D1259 ALARM   2U34 D1251 PARKIN
2B23  A124Ø BURGLA   2N2 * D1259 ALARM   2U44 A11Ø2 A/T
2B3 * D1255 98Ø      2N3   D1224 ACCIDE  2U56*
2B4 *                2N34* D1251 DRUNK
2B45                 2N7   D1219 97Ø
2B6   A1122 FRAUD    2N78  D1259 ALARM
2B7                  2U
2B8   D12Ø5 95Ø      2U1 *
2B89* A1252 PROWLE   2U2   D12ØØ 92Ø
2N:                  2U3   A1217 LARCEN
AVAL: 2B4* 2B45* 2B7 2N 2U 2U1* 2U56*                         LAST PAGE
```

PRINTER DISPLAY

OPENING EVENT EXAMPLE

```
*********CURRENT EVENT NUMBER:741Ø8452/ NEXT OCA:74-3632Ø*********

EV741Ø8452 AREA:S      EN 8452    TIME Ø1:Ø3 DATE Ø7/Ø9/74 ORIG P1/ 3863 FROM P1/ 3863 AREA S PREC 1
TIME:Ø1Ø3 PREC:1      LOC=4 S & LANDER\RE=AUDIBLE ALARM BEEN GOING OFF FOR THE LAST 5 MIN  SOUNDS LI
                      KE IT IS COMING FROM N OF THIS ADDRESS\PHN=442 746Ø\ NAM=DENEA \ TYPE=ALAR A\ MI
                      R      OCA   -     ASGN:
```

CLOSING EVENT EXAMPLE

```
*********CURRENT EVENT NUMBER:741Ø8488/ NEXT OCA:74-3632Ø*********

EN 8452   TIME Ø1:Ø3 DATE Ø7/Ø9/74 ORIG P1/ 3863 FROM S / 2862 AREA WC PREC 2     UNIT:  3K3 TIME:Ø149
BEAT=3K2\ LOC=4 S & WALKER \ RE=AUDIBLE ALARM BEEN GOING OFF FOR THE LAST 5 MIN    MIR:213L OCA:
  SOUNDS LIKE IT IS COMING FROM N OF THIS ADDRESS\PHN=442 746Ø \ NAM=DENEA \ TYPE=A
LAR A\SENT=  SFD RESPONDING Ø115 HR.\ MIR 213L OCA   -     ASGN:
                                                          3K3

 UNIT   3K3  MIR 213L  OCA          D-T Ø1Ø4  A-T Ø111  C-T Ø149  EN Ø452
```

SYSTEM FAILURE RECORDS EXAMPLE

```
AREA: EC    DATE: Ø7/Ø9/74  TIME:ØØ:Ø6
 EVENT SUMMARY FOR EC
D/9 8341 23:13 991    2Ø & HOLGATE      D/9 8345 23:15 991    2Ø & HOLGATE
D/1 8347 23:15 PURSE  17Ø5 E HOWELL     D/1 8361 23:33 ROBB   YALE & E JOHN
D/3 8369 23:44 DIST N 1831 S WELLER     D/1 8373 23:47 ALAR A 1859 BOYER AVE E

RESOURCES BELONGING TO EC
264          3C1     8373  3C2          3C3          3C4     8361  3C5
3C7     8347 3G1           3G2          3G3          3G4     8369  3G5     8341
3G6     8345 3G7P
```

EVENT FORMAT (mask) SAMPLE

```
---------------------------------------------------------------------

EN     TIME  :   DATE  /  /    ORIG  /    FROM  /     AREA     PREC

BEAT=    / LOC=                          / XST=             / VEH

                  / SUSP

DIR=                              / WPN                  /RE


                                                  / SEE=
PHN=                    /NAM=                       / ADR=       TYPE=
SENT=                                  /S1=       /S2=      /MIR    OCA
ASGN=
AVAL=

---------------------------------------------------------------------
```

SEATTLE POLICE DEPARTMENT

REAL-TIME DATA COLLECTION AND DISPLAY SYSTEM

The following list summarizes the hardware to be implemented in the Seattle system. The configuration is shown in the following diagram. Complete specification sheets for each component are also included.

No.	Qty.	Description
TC10-1	1	Terminal Controller (DEC PDP 11/45 w/ 24k memory)
LP10-2	1	Line Printer--165 cps (Centronic's 101A)
MT10-1	1	Magnetic Tape Controller (DEC)
MT10-1A	1	Magnetic Tape Drive (DEC)
TT10-1	1	Operator ASR 33 Teletype and Interface
DK10-1	1	Disk Controller (DEC)
DK10-1A	1	Disk Drive--2.4×10^6 Characters (DEC)
LI10-A	1	Asynchronous Line Interface
DT10-2	10	Display Terminals (Bee-Hive, horizontally split screen)
DT10-2MLIA		Multiline asynchronous multiplexor for DT10-2

SPECIFICATIONS

TC10-1 TERMINAL CONTROLLER

GENERAL

The TC10-1 Terminal Controller is a programmable communications processor for system control of the Digital Communications Network. The TC10 provides the link between the radio digital terminals, the data base, and the communications center; by performing required communications control, format conversions, buffering, queuing and status file management. Line interfaces controlled by the TC10 maintain communications with the data base and the communication center. The TC10 communicates with the mobile terminals via the encoder/decoder interface (ED10) and the user's base radio. Modular design gives flexibility for future expansion or terminal additions and system functional requirements.

OPERATIONAL

CONFIGURATION

Terminal Controller, expandable to 32K of core consisting of:

Central Processor
Basic Mounting Box
16K 900 ns 16 bit read/write Memory System
Power Supply
Programmer's Console
Power Fail Restart
Four Lines Priority Interrupt
Line Frequency Clock

Peripheral Mounting Panel
Bootstrap Loader
General Purpose Interface
Extension Mounting Box
Extension Box Power Supply

Free Standing Cabinet with Fans
Power Distribution Panel
Extension Feet and Bezel

Teletype Control

ELECTRICAL

POWER REQUIREMENTS	115 volts ± 10%, single phase, 47-63 Hz, 6 amperes (230 volt available)
LOGIC LEVEL	Ground and +3 volts
INTERNAL CIRCUIT POTENTIALS	+5, -15 V.
LOGIC	Fully integrated TTL and MSI

PHYSICAL

ENCLOSED CABINET	Dimensions: 52" H x 22" W x 39" D Weight: 400 pounds (approximate - with standard configuration equipment)

GENERAL

ENVIRONMENTAL TEMPERATURE	0° to 50° C
HUMIDITY	20% to 95%

INTERFACE

TC10 TO DATA BASE EQUIPMENT	Asynchronous Line Interface - LI10-A Synchronous Line Interface - LI10-S Local or remote communications are RS-232-C Standard (for specifications, refer to LI10-A or LI10-S data bulletin)
BASE RADIO TO TC10	Encoder/Decoder Interface - ED10 (Refer to ED10 data bulletin)
OPERATOR INTERFACE	ASR33 Teletype
TC10 TO COMMUNICATIONS CENTER	Asynchronous Line Interface LI10-A 1800 baud

OPTIONS

MEMORY	Expandable to 32K words (16 bit) in 8K increment	
PERIPHERALS	Standard:	Disc Memory Line Printer
	Special:	Mag Tape Paper Tape Reader Paper Tape Punch

SPECIFICATIONS

CENTRAL PROCESSOR OF TC10-1

PHYSICAL

DIMENSIONS	5 1/4" H x 19" W x 20" D (13.3 cm. x 48.3 cm. x 50.8 cm.)
WEIGHT	65 pounds (29.4 kg.)

ELECTRICAL

PROCESSOR POWER REQUIREMENTS	90-135 volts, 47-63 Hz (180-270 volt model available)
BUS LOGIC LEVELS	Ground and +3 volts
INTERNAL CIRCUIT POTENTIALS	5 volts, -15 volts, +15 volts
LOGIC	Fully integrated TTL and MSI
POWER	325 watts
CURRENT	5A, 115 volts; 2.5A, 230 volts

FUNCTIONAL

WORD LENGTH	16 bits

DIRECT MEMORY ACCESS

Memory Cycle Time	BUS Rate	DMA Rate
900 ns	2,500,000 w/s	1,100,000 w/s

MULTIPLE DEVICE CAPABILITY WITHOUT MULTIPLEXER

CALCULATED MTBF

Central Processor	38,900 hours
Power Supply	31,201 hours
Operator's Console	82,309 hours
Memory (8K)	25,200 hours

BUS DATA RATE 2,500,000 words/second

FOUR LEVELS AUTOMATIC PRIORITY INTERRUPT

POWER FAIL AND RESTART

GENERAL REGISTERS	Eight high-speed flip-flop registers within central processor Used as accumulators, 16 bit index registers and auto-increment or auto-decrement registers. All registers may serve as stack pointers. Register 6 is used as the processor stack pointer. Register 7 is the program counter
INSTRUCTIONS	Over 400 hard-wired instructions through use of general register address modes. Machine directly byte and word addressable to 65,576 bytes or 32,768 words.

ENVIRONMENTAL (PROCESSOR)

Temperature	0° to 55° C
Humidity	10-95% (non-condensing)

PERIPHERALS Teletypes, line printer, industry-compatible magnetic tape units, disc memories.

SPECIFICATIONS

DT10-2 DISPATCHER TERMINAL
WITH DETACHABLE KEYBOARD

GENERAL

The Dispatcher Display is used in the Command/Communications center for controlling the deployment of resources. The terminal is an operator-controlled computer display terminal used to transmit and receive information from the interfaced TC10 terminal controller. The detachable keyboard is designed to allow installation for operator convenience.

The terminal consists of a detachable keyboard, 12 inch diagonal display monitor, character generator, MOS memory, programmable I/O processor unit and power supply.

The DT10-2 is used for:

Displaying status of system resources

Routing information and dispatch messages to the mobile terminals

Retrieving detail status of resources maintained by the system

Dispatcher inquiry into data bases in a manner similar to the mobile terminals

SPECIFICATIONS

DISPLAY SIZE	12" diagonal
DISPLAY AREA	Approximate 6" x 9"
DISPLAY FORMAT	25 lines of 80 characters
DISPLAY REFRESH RATE	60/50 Hz

DISPLAY MEMORY	MOS shift registers
CHARACTER TYPE	5 x 7 dot matrix (7 x 9 scan)
CHARACTER SIZE	Approximately 0.1" x 0.2"
CHARACTER SET	224 displayable character 32 control codes (displayed in program entry mode only) 64 upper case ASCII set 32 lower case ASCII set (with decenders shifted down two scan lines) 96 escape sequence control codes (display a detensified characters in program entry mode only) Upper case only 64 ASCII set switch selectable
CHARACTER GENERATION	MOS ROM
CURSOR TYPE	Blinking underscore
CURSOR CONTROLS	Cursor up Cursor down/line feed Cursor left Cursor right Cursor home Carriage return New line ETX search Format search Horizontal tab
CURSOR ADDRESS	Positions by column character and line
CURSOR SENSE	Cursor positions transmitted
MEMORY ORGANIZATION	Efficient paging
COMMUNICATION INTERFACE	Serial RS232C
AUXILIARY POLL ADAPTER	RS232C

PRINTER I/O	RS232C/Receiving only
CASSETTE I/O	RS232C
I/O CONTROLLER	Micro-processor
I/O PROGRAM	MOS ROM
TRANSMISSION RATE	1,200
BAUD RATE SELECTION	Switch
TRANSMISSION MODE	Full duplex
DATA TRANSMISSION	10 bits asynchronous
	8 bits synchronous (switch selection)
PARITY	Even/non asynchronous
	Odd/non synchronous
	LRC after ETX in block transmissions
FORMAT	Protected fields
ERASE FUNCTIONS	Clear memory Erase to end of line Erase to end of memory Clear memory to delete codes
ALARM	Audible tone
KEYBOARD	Layout attached Detachable N key rollover ANSI logical paired Auto repeat Lighted mode indicator

INPUT VOLTAGE	117 VAC ±10% 60 Hz 230 VAC ±15% 50 Hz	
INPUT POWER	200 watt maximum	
ENVIRONMENTAL	Non-operating temperature	10° C - 50° C
	Operating temperature	5° C - 40° C
	Humidity	5% - 80% non-condensing
	Vibration	
	Altitude	0-10,000 ft.
MECHANICAL DIMENSIONS	Display	20"W x 15"H x 15"D Weight 25 pounds
	Keyboard	20"W x 3 1/2" H x 10"D Weight 10 pounds

OPTIONS AVAILABLE

EDIT (OPTION A)	Insert character Delete character Insert line Delete line Page edit Keyboard per attached drawing
POLLING (OPTION B)	Address up to 95 terminals (sequence as defined)
HIGH RESOLUTION (OPTION C)	7 x 9 dot matrix 15" diagonal monitor

FUNCTIONAL SPECIFICATION

Dispatcher Display Terminals

1. PURPOSE

This specification defines the functional characteristics of the Dispatcher Terminal (DT10-2).

2. GENERAL SPECIFICATIONS

The Dispatcher Terminal is used for:

- general vehicle status upon request
- detailed vehicle status upon request
- format presentation
- other operations available at an MCT-10

3. SCREEN FORMAT

The screen format is as defined in Figure 1. The screen is divided into two (2) areas. Each area (A and B) is equal in size and uses half of the total screen area. They are identical in their use. The operator may work in either area by giving the appropriate command.

3.1 CRT QUEUING

Only one queue of messages is held for the Terminal. The messages from the queue are on a First-In-First-Out (FIFO) basis. The next message to be unqueued (via operator command) may be brought into either area, depending upon which area the operator is working in when the unqueue request is given.

A message on queue is indicated by activating the DT10-2 "bell" tone. This tone will repeat once every five seconds as long as a message is queued. The time element is modifiable by system.

All messages sent to the DT10-2 will be queued on this single queue with the exception of the response to a request for general or detailed status. Those responses will be returned immediately

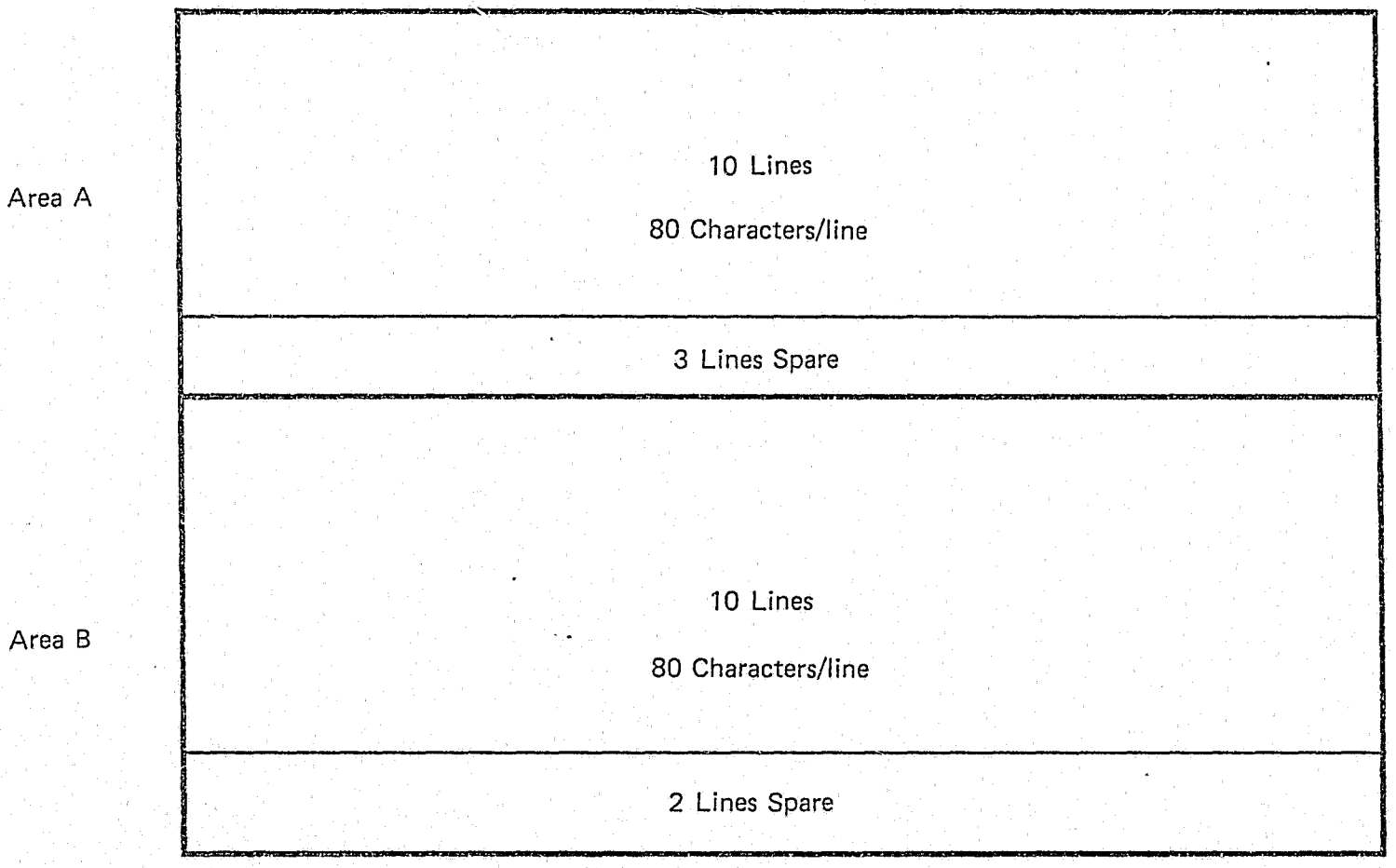


FIGURE 1
DISPATCHER TERMINAL SCREEN LAYOUT

to the area containing the request and bypass the queue. All input from the CRT between receipt of the status request and response is ignored.

3.2 AREA A AND B LAYOUT (FORMAT)

Each area utilizes approximately half of the screen. Ten (10) lines of eighty (80) characters each are used in each area for the functions described. This area can contain any data layout desired, however, a layout must be present before the operator may perform any terminal operations. Layout 1 is the default layout and whenever the system must "fall back" to a standard condition, it will contain Layout 1. Up to nine (9) layouts may be utilized by using the appropriate code (L1-L9).

Layout 1 (L1) may be retrieved by depressing the ESC key. This causes the area (A and B) being worked in to be cleared and Layout 1 to be displayed. The operator may then proceed to another layout by keying the layout desired.

3.2.1 LAYOUT 1

Layout 1 simulates an MCT-10 screen in that it consists of seven lines of thirty-two (32) characters each. This is the layout which would normally be used for function/status changes, car-to-car communications, status requests, and the like.

3.2.2 LAYOUTS 2 THRU 9

These layouts may be defined according to the particular needs of the installation.

The layout can consume up to the full ten lines of an area and may contain protected and unprotected areas. The operator can only key into the unprotected areas.

4. CURSOR CONTROL

The cursor is always present on the screen and indicates the next position to be keyed or transmitted. The operator moves the cursor either by keying a character, tabbing, or with the cursor control keys. All of these keys are further defined in the User's Manual for the DT10-2

Once the operator requests an area to be transmitted (via EOM), the cursor will reposition itself automatically to the beginning of the appropriate area and move as all unprotected areas are transmitted until the end of the format in the area is reached.

It should be noted that the operator is able to get the cursor outside of the area being used. As a result, text in the other area can be modified. However, the transmission request will only deliver information from the area originally being sent.

5. CONTROL FUNCTIONS

Various control functions are used by the operator to determine the area to use, when to transmit, and the like.

5.1 DISPLAY AREA CONTROL

The operator determines the area to be worked in by:

CONTROL A - Operate out of Area A

CONTROL B - Operate out of Area B

After the above operation, the cursor goes to the first unprotected position of the appropriate area.

5.1.1 TRANSMISSION AREA (TO PROCESSOR)

Transmission from the area being worked in is initiated by depressing the EOM key. This causes the transmission of all text contained in the layout. After transmission, the cursor returns to the beginning of the area.

5.2 RESTART

At any time during the keying process, the operator may abort the operation being performed by depressing ESC (Escape). The area will be cleared, Layout 1 displayed, and the cursor positioned to the first unprotected location.

5.3 LAYOUT CONTROL

In addition to being able to call Layout 1 as described in 5.2, any layout in the system can

be called by keying:

Lx

where x = layout number

The system will clear the area, bring up the layout and position the cursor to the first unprotected location. The operator may only request another layout when in Layout 1.

The "Lx" must be in the first two unprotected positions with no other variable text in the area.

5.4 FUNCTION REQUESTS

The function keys as used on the MCT-10 are simulated on the DT10-2 via the following:

Fx_

where x = function 1 - 7

The text following the space should be the same text as that entered on the MCT-10 for the appropriate function. Functions must be performed in Layout 1.

5.5 STATUS RETRIEVAL

The status information available to a Command Terminal (MCT-10) is retrievable on the DT10-2 using Function 7 as defined in 5.4. In addition, the general status of all resources, including the resource number and current status code, can be retrieved. This is done by keying the following:

ST

This causes the area to be cleared and the general status of the resources to be displayed.

5.5.1 GENERAL STATUS FORMAT

A specific ten-character area is reserved for each resource. The information included is:

Position	Description
1	Space
2-6	Resource ID
7-9	Current Status
10	Space

An entry only appears on the screen for each vehicle which is logged on the system.

Reverse video is used if the resource is available.

A resource in EMERGENCY status will blink.

Seven (7) resources are shown on each of the ten (10) lines. Thus, a total of 70 resources can be shown.

5.6 CHARACTER ECHOING

Each graphic character that is keyed is "echoed" by the system. Thus, if the character shown on the screen does not correspond to the character keyed, then a transmission error has occurred and the cursor should be repositioned and the character rekeyed.

5.7 DISPATCHER MONITOR

Kustom recommends that its Dispatcher Monitor (DT10-3) be used in conjunction with the DT10-2. This monitor maintains general status as defined herein on a real time basis, thus, eliminating the need to retrieve it on the DT10-2.

A functional specification describes the DT10-3 in more detail.

SPECIFICATIONS

DK10-DISC CARTRIDGE SYSTEM

GENERAL

The DK10 is a mass storage system for the Terminal Controller (TC10) used to maintain large volumes of programs and data for the Digital Network. The DK10 System consists of the disc controller and one to four disc drives with removable cartridges. Each cartridge has storage for 1,228,800 words of 16 bit length.

FEATURES

LOW-COST RANDOM-ACCESS MASS STORAGE — The DK10 offers an economical solution for large-volume random-access data storage requirements.

LARGE CAPACITY — Provides storage for 1.2 million words per drive. Expandable to 4.8 million words (9.6 million bytes). Additional controllers may also be installed.

HIGH PERFORMANCE — The average total access time on each drive is 70 milliseconds. On expanded systems, operations are overlapped for efficiency; one drive may read or write while one or more additional drives are seeking new head positions for the next transfer. All data transfers utilize the DMA (Non Processor Request) facility during transfers; no processor overhead is consumed.

DUST FREE — Each disk is permanently mounted inside a protective case that automatically opens when inserted in the disk drive. While on-line, dust contamination is prevented by a continuous air-filtration system.

RELIABILITY — The DK10 provides accurate data storage and transfers by means of a write check function, correct cylinder verification, hardware check sum, and hardware maintenance features.

SPECIFICATIONS

CONFIGURATION	1 disk/drive 203 cylinders/drive	256 data words/sector
	2 surfaces/drive	3072 data words/track
	12 sectors/track	614,400 data words/surface
	1 to 4 drives/control	1,228,800 data words/drive

ACCESS TIME (INCLUDING HEAD SETTLING; TYPICAL)	Track to track	12 ms
	Average random move	60 ms
	Average rotation delay	20 ms

DATA TRANSFER RATE	11.08μ s. per word
TRANSFER PATH	Non Processor Request (NPR) Direct Memory Access
MINIMUM BLOCK SIZE	One sector (256 words)
MINIMUM TRANSFER	1 word
DENSITY	2200 BPI maximum
SPEED	1500 RPM
ENVIRONMENTAL REQUIREMENTS	60° to 90° F and 20% to 80% relative humidity

SPECIFICATIONS

LP10-2 LINE PRINTER

GENERAL

The LP10-2 is a serial matrix impact line printer used for logging and documentation, programming assistance, and management information reporting. It has a print rate of 165 characters per second. The print structure is 132 characters per line.

SPECIFICATIONS

PRINTING RATE	165 characters per second
CHARACTERS	60 lines per minute (132 characters)
LINES	200 lines per minute (short lines)
TRANSMISSION RATE	
SERIAL	4800 baud
PARALLEL	75,000 characters per second
DATA INPUT	Serial or Parallel
CHARACTER STRUCTURE	9 x 7 dot matrix (10 pt. equivalent)
INPUT LANGUAGE	7-level ASCII (8-bit input)
PAPER REQUIREMENTS	Standard paper, carbon produces up to four copies
PAPER FEED	Pin feed, adjustable up to 14 inch forms
CHARACTER BUFFER	132 character buffer (1 line)
PRINTING STRUCTURE	132 characters per line 6 lines per inch Single manual line spacing
CHARACTER SET	Full 64 characters (including blank)
DIMENSIONS	11¼" high, 19¾" deep, 27½" wide
STANDARD FEATURES	Form feed Buzzer Vertical format control Paper runaway (with 6 second time out)

	Gate strobe pulse (data input) Separate prime line to connector Third board (for optional character set) Hardware code selector (x on, x off) 50/60 cycle, multi-voltage
OPTIONAL FEATURES	Elapsed time indicator Line driver Device-coded select

SPECIFICATIONS

MT10 MAGTAPE TRANSPORT AND CONTROL SYSTEM

GENERAL

The MT10 Magtape Transport and Control System for the Terminal Controller (TC10) is used to collect and store data for later processing. Data is stored in an industry compatible manner on industry standard tape to allow future processing in an off-line manner by a data processing facility.

One to eight transports may be interfaced to the magnetic tape controller. The controller is integrally mounted in the TC10 Terminal Controller. Each transport is mounted in a standard 19 inch cabinet.

The MT10 is ideally suited for writing, reading, and storing large volumes of data in a serial manner for later use of this data or for low cost data serial data filing.

FEATURES

HIGH PERFORMANCE	Transfer rates at 45 IPS at 800 BPI. Approximately 3 minute rewind time for 2400 foot reel.
INDUSTRY COMPATIBILITY	Compatibility with industry standard provides for efficient transfer of data. 9-channel at 800 BPI.
LONG TAPE LIFE	The Transport uses vacuum columns and a servo-controlled single capstan to control tape motion. The only contact with the oxide surface is at the magnetic head and a rolling contact on one low-friction, low-inertia bearing.
HIGH RELIABILITY	Dual-gap, read-after-write head checks parity character-by-character. Longitudinal Redundancy Check automatically performed. Cyclic Redundancy Check automatically performed. Ruggedized construction; shock mounted. Power failure interlocks prevent tape damage or data loss.
HIGH CAPACITY	10-1/2 inch reel capacity permits up to 2400 feet of tape per transport.
EXPANDABLE	Up to 8 transports may be driven by one controller. Thumbwheel indicator switch selects logical unit assignments.

SPECIFICATIONS

TAPE	0.5-inch wide, industry standard
TAPE SPEED	45 inches per second, reading and writing
PACKING DENSITY	9-channel: 800 BPI
MAXIMUM TRANSFER RATE	36,000 characters per second
REWIND SPEED	150 IPS
INTERRECORD GAP	Will read tape with gap of 0.48 in. or more; will write tape with gap of 0.52 in. or more (compatible with industry standard)
RECORDING MODE	NRZI, industry compatible
MAGNETIC HEAD	Dual gap, read after write
DATA TRANSFER METHOD	Non Processor Request (DMA "cycle stealing")
TAPE HANDLING METHOD	Direct-drive reel motors, servo-controlled single capstan, vacuum tape buffer chambers with constant tape winding tension. No dancer arms to cause nonuniform tape tension and stretching
BOT, EOT DETECTION	Photoelectric sensing of reflective strip, industry compatible
SKEW CONTROL	Deskewing electronics included in transport to eliminate static skew
WRITE PROTECTOR	Write protect ring sensing on transport
DATA CHECKING FEATURES	Read after write parity checking of characters; Longitudinal Redundancy Check. Cyclic Redundancy Check.

PROGRAMMABLE COMMANDS ACCEPTED BY TRANSPORT	Rewind and Go Offline Read Write Write End of File Character Space Forward Space Reverse Write with Extended Interrecord Gap Rewind to BOT
EXTENDED FEATURES	Self-test of controller control with transport.
ENVIRONMENTAL REQUIREMENTS	40° F to 110° F, 20% to 95% relative humidity
LOCAL TRANSPORT CONTROLS	Online/Offline, Forward/Reverse/Rewind, Unit Select, Power On/Off, Start/Stop Brake Release/Load

SPECIFICATIONS

LI10-A ASYNCHRONOUS LINE INTERFACE

GENERAL	The LI10-A series of serial line interface units connect TC10 systems to a variety of serial communication channels. These channels may be local, as in the case of a console terminal or another computer, or remote, using modems or datasets and private line or public switched telephone facilities. The LI10-A is versatile. It may be connected to terminals whose data rate is from 50 to 9,600 baud, and whose code set has 5, 6, 7, or 8 data bits, with or without odd or even parity, and one, one-and-one-half or two stop bits. The LI10-A provides all of the necessary signals to control Bell 103A, E, and F, 113A, 202C, and D datasets or their equivalents. The connector pinning and electrical signal characteristics of the LI10-A meet specifications of Electronic Industries Association Specification RS-232-C, and the CCITT Recommendation V.24. The TC10 BUS serves as a multiplexer for adding multiple LI10-A's. Address space has been assigned for up to 31 LI10A's.
SPECIFICATIONS	Double character-buffered receiver and transmitter Full or half duplex operation under software control Selectable data rate (13 standard rates between 50 and 9,600 baud, or non-standard rates to order) Independent receive and transmit speeds (except for 110 baud and 134.5 baud units) Strap-selectable character size (5, 6, 7, or 8 bits) Strap-selectable parity generation on transmit and checking on receive (even, odd, or none)

Strap-selectable stop code length (1, 1.5, or 2 bits)

Full dataset control option for Bell 103, 113, 202, or equivalent data sets

ORDERING

1. Specify full or half duplex operation
2. If full duplex, specify split speeds (NA for 110 or 134.5 baud)
3. Specify level code 5, 6, 7, or 8 bit
4. Specify stop bits 1, 1.5, 2
5. Specify parity checking none, odd, or even
6. Specify baud rate 110, 134.5, 150, 300, 600, 1,200, 1,800, 2,400, 4,800, 7,200, 9,600
7. Specify terminal or modem

OPTION

LI10-AB — Null modem for direct connection to asynchronous controller

SEATTLE POLICE DEPARTMENT

REAL-TIME DATA COLLECTION

AND DISPLAY SYSTEM

Detail System Specifications

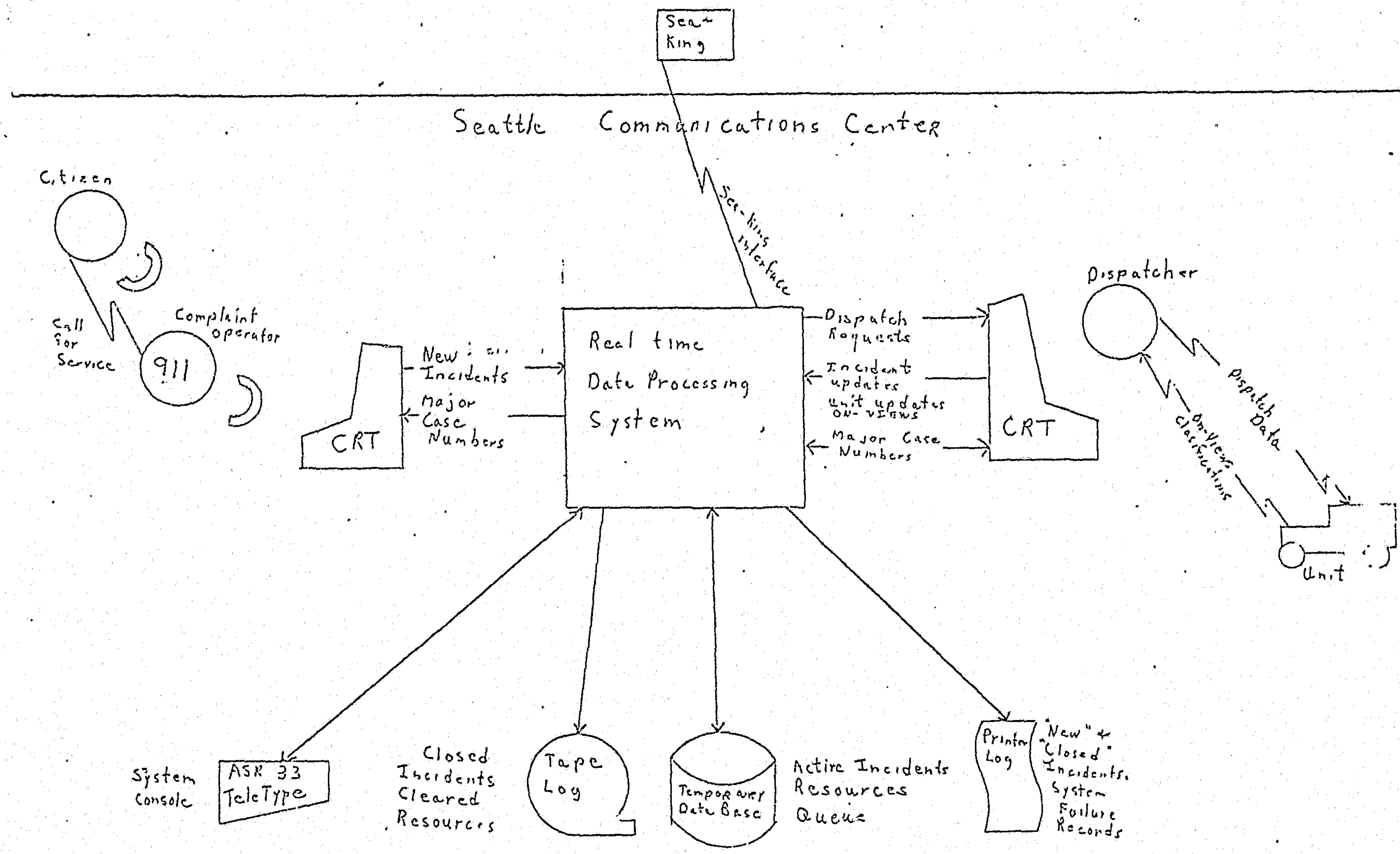
June 14, 1973

TABLE OF CONTENTS

LIST OF EXHIBITS

INTRODUCTION

The purpose of this report is to provide a detailed functional description of the Real-Time Data Capture and Display Sub-System to be provided for the Seattle Police Department. Exhibit A illustrates the hardware configuration to be provided by the City of Seattle on which the RTDCD System will be implemented. This report will not discuss the internal operation of the system but consider it from an external viewpoint entirely. This report will also describe functionally all dialogue possible between the real-time system and the external environment. This description is based on discussions between Kustom personnel, Seattle Police Department personnel and members of the Sea-King. Exhibit B depicts the handling of incidents and the dispatch of field units by the police department.



Information flow

Exhibit B

System Title: COMCTN - Seattle

Chart Title

Program Title

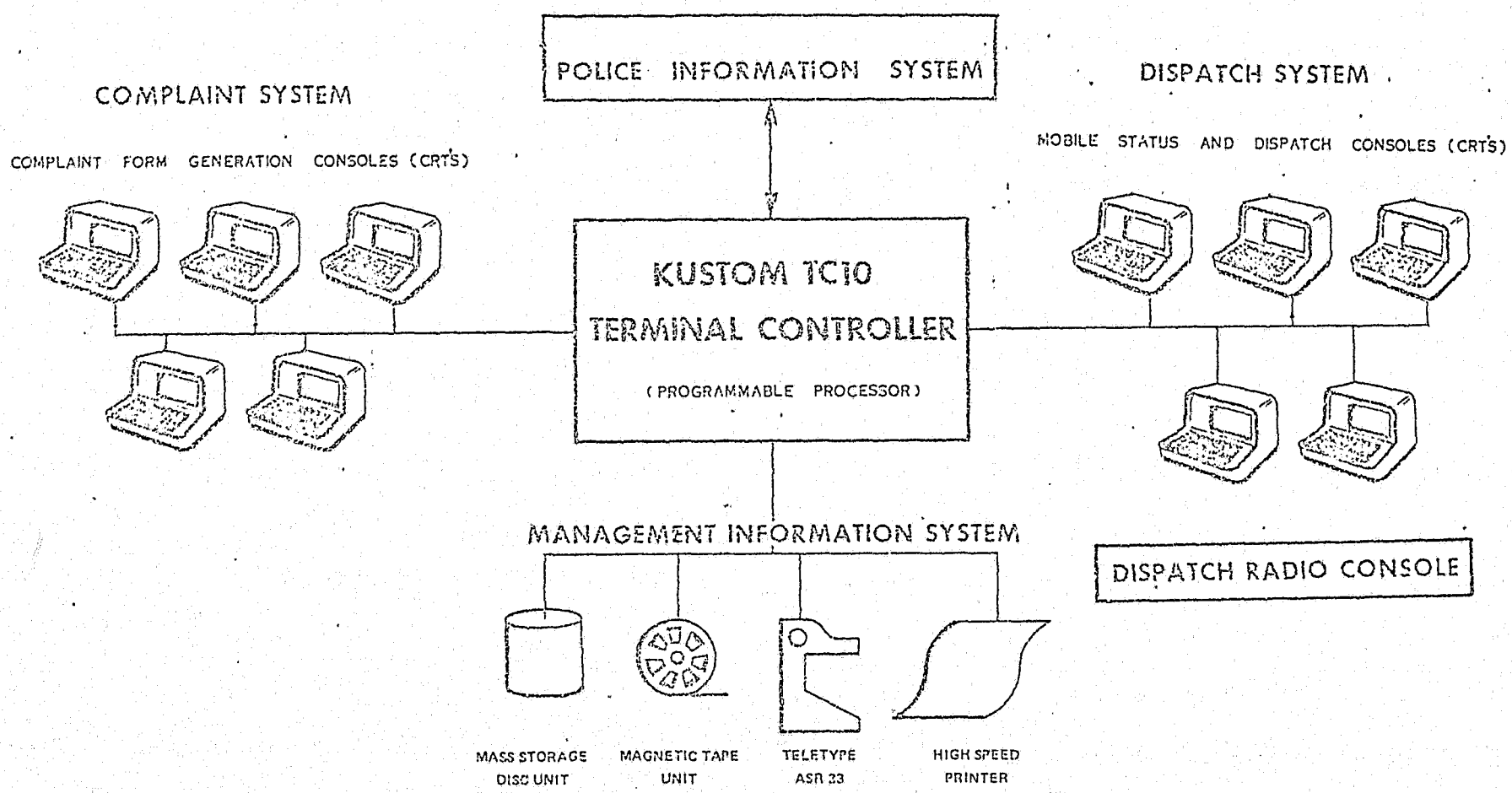
Date

Letter

Chart No. ____ of ____

Revision

Date



SYSTEM SEATTLE	PROGRAM HARDWARE CONF.	PROJ. NO. E13713 J	DATE FEB. 1
PROGRAMMER/ANALYST			SEQ. NO: 1 OF 1

GENERAL NARRATIVE

1. The Seattle Police Department has contracted with Kustom Electronics to provide a computer assisted dispatching and manpower utilization study system. This selection of hardware and software is called the Real Time Data Collection and Display System.

2. Currently, complaints are received by the Seattle Police at Complaint Writer positions; notes and complaint data are handwritten on IBM key-punch cards and sent via conveyor belts to Dispatchers. The Dispatchers have one or more radio frequencies and relay pertinent data to patrol cars. The limited manpower of Seattle's Communications Center does not allow the capturing of all statistical data in the manual Complaint Flow.

3. Kustom is providing 10 Cathode Ray Tubes (CRT's) and a TC10 processor to assist in automating many of the complaint phases. Five CRT's will be devoted to Complaint Writing functions and 5 to Dispatching and data base interrogation.

   a. Complaint (or Event) Forms will replace the punch cards. The Event Form will be displayed on the Complaint Writers CRT position, filled in and sent via the processor to a Dispatchers CRT.

   b. The Dispatcher may file the Complaint for later action, route it to another dispatcher, cancel it as a duplicate (information only) or assign resources (units) to handle it.

   c. Back up and Historical logging of event generation, processing and resource assignments will occur on a printer and magnetic tape unit.

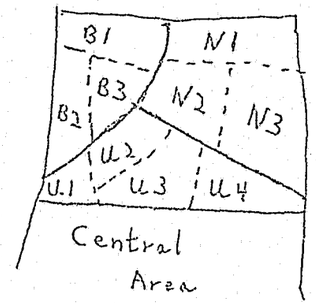
   d. Many display summaries and monitoring aids are built into the system to aid the Communications Center personnel in following the complaint cycle to satisfactory conclusion.

TERMINOLOGY

COMPUTER ASSISTED DISPATCHING - SEATTLE

Geography of city: Seattle is divided into AREAS (like North, East, etc.). Each Area is divided into SECTORS (like Queen, Boy, etc.). Further, Sectors are divided into BEATS. Beats are referred to as Q1, Q2, (Queen one and two) etc.

CITY OF SEATTLE



Thus, there is a NORTH AREA with Sectors N, B, & U with Beats N1, N2, N3, B1, B2, etc.

ACTIVE FILE: The file which contains events awaiting Dispatcher action (Unassigned) and those with resources posted against them (Assigned). The ACTIVE File key is the event number and all items are in event number sequence by precedence.

AREA: Major Region of City - NORTH, CENTRAL, EAST, etc. ALSO: The Area Name is the name associated with a Dispatcher or Complaint Writer position.

BEAT: The smallest patrol division in a city.

BIG NUMBER (ALSO: Major Case Number, CSE): The number assigned to certain events of significance. For example, a burglary may be closed with a disposition of "E" which means arrest made. The arresting officer would request a Big Number which is a unique number assigned by Communications Center personnel. The Big Number is the numbering sequence which allows unique identification of major cases in all police proceedings (i.e.: beyond the jurisdiction of the Communications Center personnel).

CANCEL: Cancel an event from system. This is a Dispatcher option only for those events in his file. Moves the event to the cleared file and writes appropriate history record.

CLEAR: Removing a resource from an event with a disposition and making that resource available for another event.

CLOSE: An Event has been assigned a MIR Code and Disposition and no other Resources are assigned to the event. Dispatcher can force an event to close without a MIR Code and Disposition.

CLOSED FILE: The file which contains all events which have been processed by Communications Center personnel and no longer require services. The system does not "maintain" the closed file nor access it except to post events against it.

COMMAND AND SYSTEM "ACK" LINE: Line One of each CRT display position. Valid commands are entered from the 'Home' position and Responses are displayed in the right hand corner of line 1.

COMPLAINT FORM: Lines 3-10 of the individual Event display. See individual Event layout form. This form is the same for Complaint Writers and Dispatcher.

DISPLAYS: There are four displays (available to anyone on system) (SEE APPROPRIATE DRAFT LAYOUTS).

Event - Individual. This is a Complaint form with some or all data elements present. Only the Dispatcher in whose file this event exists may update the event. Other CRT's may look at it only.

Event - Summary. An Abstract of all events assigned to a Dispatcher's Active File. Pertinent data only is shown. May require paging.

Resource - Individual. A display of all major fields relevant to a resource and his status. The information is derived from Status tables generated when the resource is logged on.

Resource - Summary. An abstract of all resources available to a Dispatcher. May require paging.

DISTRICT: See AREA.

EVENT: An incident requiring Communications Center personnel services. At the CRT positions - an Event is a partial or fully completed Complaint Form. To the System - an Event is an element of data that is filed in one of two (2) files:

1. Active-Unassigned: No resources posted against it.
   Active-Dispatched: Resources assigned to the event.

2. Close: (Or cleared) no longer active nor retrievable.

NOTE: Each active file entry is in either of two states: Dispatched or Unassigned.

EVENT NUMBER: 4 Digit Numbering scheme for events. Each number unique. Rollover to 1 is a system initialization parameter.

EVENT PROCESS SUB-SYSTEM: The portion of the system software (program instructions) responsible for Event processing in the system.

FILE: Elements of data stored for user in some sequence. See Event (above).

FILE NAME: Same significance as in queue name except this refers to a file of active events known by the Terminal's name. The name was established at log-on time (LT).

FREE: Release resource from an event. The Dispatcher may be Freeing the only resource from an event and the event will be filed in the Active-Unassigned File (it was in the Assigned File prior to the Free Command).

LOG-ON RESOURCES (LR): The procedure followed by Communications Center personnel is establishing a resource identification to the system. Resource ID's are in the form 1Q3, 2A3, etc.

LOG-ON TERMINAL (LT): The procedure followed by Communications Center personnel in establishing a Complaint-writer or Dispatcher CRT position on the system. Each terminal must have a unique (and valid) ID.

LOG SUB-SYSTEM: The portion of the system software (program instructions) responsible for Log Processing in the system.

MIR CODE: Used specified incident close processing. Seattle's Incident reporting and disposition scheme. Each incident (event) may be assigned by MIR by type, i.e.:

FRAUD = 100 MIR Series
KIDNAP = 110 MIR Series

The three (3) digit MIR coupled with a DISPOSITION Code to close an event. A resource could Clear from an event with:

MIR 102 - FRAUD Bad Checks
DISP Code E - Arrest made

PRECEDENCE (PRIORITY): The specified (or implied) urgency of manual and system attention that an event (or message) must receive. Usually, the more serious an event, the higher the precedence assigned by a Complaint Writer or a Dispatcher. The precedence assignment decides where a message is placed in files after it has been seen by a Dispatcher. A message has no system precedence between Complaint Writer and Dispatcher. (i.e.: Placed on Dispatcher's queue on a first in-first out basis.)

Ø represents emergency (highest) precedence
7 represents lowest precedence
8 represents on-view precedence
9 represents administrative precedence

PRIMARY UNIT: The resource which has been assigned responsibility for any event requiring police services. The primary unit is responsible for assigning the MIR and Disposition Code before an event can be closed. Paper work relevant to an event will be accomplished by the primary unit.

QUEUE: A list of messages (events) for each CRT position. (They are awaiting action at that position - i.e., File, Route, Cancel, etc.). The queue will have a name (N=North, C=Chief Dispatcher, etc.) which is derived from the log-on identification name.

QUEUE ALIAS ('): A CRT position for a dispatcher may be logged on with more than one name. If the North Dispatcher also wished to accept South dispatching responsibility, he would log-on with names N and S. The system would know him as "N" (name) with an alias of "S" (name). All queues, files, and resources of the South area would be handled as an alias of North.

QUEUE NAME: Each CRT position is associated with a unique "name" by the system. The Dispatcher for North area may have performed a log-on (LT) with a name of "N". Once log-on is completed, all messages are queued to that name (N's Queue).

RESOURCES: Cars, boats, helicopters, etc. - Resources belong to a single Dispatcher and are known by an I.D. (such as 1B3). If 1B3 belongs to North Dispatcher, North would almost always assign 1B3 to events. In this system however, any area may dispatch other area's resources. Resources must be cleared from an event (they become available) before event can be closed. Last resource can be cleared simultaneously with closing the event.

RESOURCE PROCESS SUB-SYSTEM: The portion of the system software (program instructions) responsible for Resource processing in the System.

SECONDARY (X-RAY) UNIT: The resource which is assigned as "back-up" or "assistance" to the primary unit on an event. An "X-Ray" unit clears an event with a disposition code of "X".

SECTOR: An area of patrol and dispatching. A sector may be larger than a beat and is smaller than an area.

TYPE: A field in the complaint form used to describe the event.

UPDATE: A Command: Replacing an event in the Active File.

VALID AREA TABLE (VAT): An area of system memory reserved for identifying valid names and positions in the system. Every legal queue and file name will be contained in the VAT. Examples are: N (North Dispatcher), P1 (Primary Complaint Writer 1), etc. The VAT contains pointers to active files, queues, resources, etc.

WATCH: The period of time during which a resource is assigned to patrol. They are also accepting assignments for Communications Center personnel for investigation. A watch is usually an 8 hour shift. A unit (resource) ID was explained as Q1, B2, etc. The "watch" notation is placed in front of unit ID such that 1Q1, means 1st watch (i.e. Midnite - 8:00 a.m.), for Queen One (etc.).

X-RAY: Seattle code for the Disposition of a resource that is acting as back-up (or secondary) unit to the responsible (primary) unit. An X-Ray unit does not need a MIR to clear a case and X is the disposition.

DESIGN OBJECTIVES

1. Ease of use - maximum consideration is given to the human factors aspects of the system. The system relieves the burden of Communications Center Personnel, not add new and complex procedures. This system is dispatcher oriented.

2. Reliability - the system minimizes the probability of hardware and software failure and also provides adequate procedures to fall back on a manual system should a failure occur.

3. Management - to capture data regarding the activities of Seattle Police Department. This system is to provide an aid to the effective management of the resources of Seattle Police Department.

4. Growth potential - the system is designed in a manner which permits additional functions to be added to the system as their future need is established.

CRT DISPLAY

General:

All commands are entered on Line 1 beginning in Position 1 (Home Position). All responses to commands are on the right side of Line 1. Line 12 in each display always shows the resources that are available for the areas assigned to that terminal. In some cases, not all resources can be displayed on Line 12. If this happens, "##" in positions 79 and 80 indicates that additional resources are available, but are unable to be displayed on this line.

The CRT Display screen is divided into two "working" sections of 12 lines each. Each half of the screen may be doing a unique function. For example, a dispatcher may use the top half for viewing events and the bottom half for event summaries. Lines 1 thru 12 as explained above are logical lines--that is--independent of which half the screen is being used. A control key is allocated for switching between working sections of the CRT screen. A line of asterisks will be used to separate the sections. Commands may be entered in either "logical" line 1. See Exhibit C for an example of the screen and Exhibit D for the keyboard layout.

1. DETAIL EVENT DISPLAY

   The Detail Event Format appears on Lines 2 thru 11 on the terminal. Lines 2 and 11 are updated by the system. Lines 3 thru 10 represent the Complaint (Event) Form. This form is specified by the user. See Exhibit E for a sample. Line 2 is computer generated information for the Complaint Form. Line 11 indicates the resources that are currently assigned to the event appearing from left to right on the line. Resources that had been assigned to the event appear on Line 11 going from right to left. A special delimiter (//) separates the "currently" assigned resources from the "previously" assigned resources. If more resources are indicated in the event record than can appear on Line 11, resources are pushed off of the right end of the line and "##" in position 79 and 80 indicates that this has happened.

2. RESOURCE RECORD DISPLAY

   The Resource Record Format appears in Lines 2 thru 11 on the CRT. Exhibit F is a sample of the data that is displayed. All data that is in the resource record is not displayed on the CRT (see Tape Record Formats).

3. EVENT SUMMARY DISPLAY

   The Event Summary appears on the Lines 2 thru 11 on the CRT. Each event entry occupies 40 characters on a line, two entries per line. An entry consists of whether the event is flagged as dispatched or unassigned and its precedence, the time the event number was assigned, the TYPE field, (first 6 characters only) the Location Field (first 16 characters only) and the Event Number. If more than twenty events are active for any one

1015 PRINT CHART PROG. ID. COMCIN - SEATTLE PAGE

DATE

DRAWN BY OR DOCUMENTALIST

PT TITLE CRT SCREEN — NO EUCNT. FORMS DISPLAYED

Fold back at dotted line

Fold in at dotted line.

System Title

COMCIN SEATTLE

EXHIBIT C. CRT SCREEN

Fold in at dotted line

I/O PRINT CHART PROG. ID. PAGE

PROG. DESCRIPTION SPAN, AT 10 CHARACTERS PER INCH, 6 LINES PER VERTICAL INCH DATE

PGM. TITLE

PROGRAMMER OR DOCUMENTALIST.

PRINT TITLE

Fold back at dotted line

Fold in at dotted line

System Title COMCIN - SEATTLE.

CARRIAGE CONTROL

TAPE CHAN

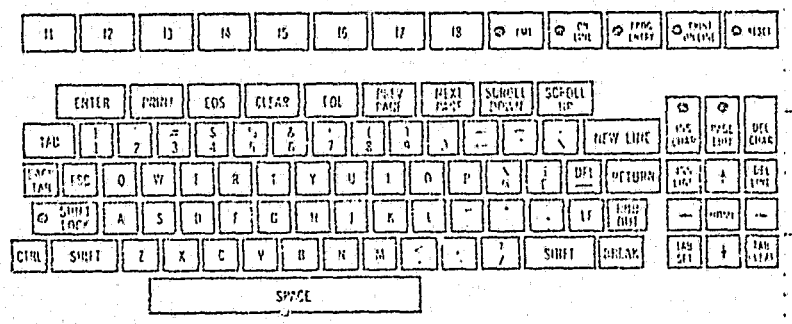


EXHIBIT D.

KEYBOARD LAYOUT

61

Fold back at dotted line

Fold in at dotted line

CHARGE NO.

DATE REC'D.

Kustom
ELECTRONICS, INC.

FLOW CHART REFERENCE

DATE 6/18/73 PAGE OF

PROGRAM

PROGRAMMER Conner

EN[ ] TIME: DATE: / / ORIG: / FROM: / AGEN: PREC: DIR:

BEAT[ ] SERC] LOCC] TYPEC

] WPNC

VEHC] DIRC

SUSPC

NEEDC] OCAC -

NAMC

ASGN:

AVAL:

COMPLAINT (EVENT) FORMAT

Exhibit E

29

CHARGE NO.

DATE REQ'D.

Kustom ELECTRONICS, INC.

FLOW CHART REFERENCE

DATE PAGE OF

PROGRAM Comcen-Seattle

PROGRAMMER Gause/Fox

```
UNIT:XXXX  AREA:XX                    EN:XXXX
OFC1:XXXX  OFC2:XXXX                  DISPATCH:
CARH:XXXXXXXXXX                       MM/DD/YY  HH:MM
LOW BY:XXX  AT:                       ARRV:
MM/DD/YY HH:MM                        MM/DD/YY  HH:MM
COMMENTS:

                                                    EXHIBIT F

AVAIL:

                EXHIBIT F  SEATTLE DETAIL RESOURCE SUMMARY
     LINE 1:  Command AND SYSTEM ACK LINE.

     LINE 2:  UNIT=ID; AREA=M,S,,CTC TO WHICH UNIT ASSIGNED;
              EN=CVCMT NUMBER
     LINE 3:  OFC1/2=OFFICER BADGE #'S; DISPATCH=TITLE FOR DATE&TIME
     LINE 4:  CARH=PHYSICAL RESOURCE ID; MM/DD/YY(DATE) HH:MM(TIME)
     LINE 5:  LOW BY=ID OF TERMINAL LOGGING RESOURCE ON SYSTEM
              AT=TITLE FOR DATE/TIME BELOW. ARRV=ARRIVE TITLE FOR
              DATE TIME BELOW.
          6   MM/DD/YY=DATE(04/02/73),HH:MM=HOUR & MINUTE OF ACTION
        7-11  COMMENT FIELD(IE COUNT TIMES@ 100HRS,ETC)
       12     AVAIL=UNITS AVAILABLE & UNASSIGNED
```

NS 13931

terminal, the event summary will require paging. Line 11 positions 41-80 indicate that more pages of the event summary exist. Entries in the Event Summary are in sequence by unassigned and assigned (by precedence in each). An event that has a zero precedence appears on each dispatchers Event Summary. If a Dispatcher is responsible for more than one area, all events (irrespective of area) will be sequenced as above. See Exhibit G for sample of the format.

4. RESOURCE SUMMARY DISPLAY

The Resource Summary Display appears on Line 2 thru 11. In the Resource Summary, four (4) resources appear per line. In some cases, it may be necessary to have additional pages of resources. Line 11, positions 41-80, will indicate that more pages of the event summary exist.

Each entry consists of a Resource number, an indicator as to whether it is a one-man or a two-man unit, the TYPE Field (first six characters), a "D" (Dispatch) or "A" (Arrival) indicator and the time of "D" or "A". If only the unit number appears in a resource, the unit is available for dispatch. The sequence of resources in the resource summary is in alpha-numeric sequence on unit number. See Exhibit G for a sample of the format.

System Title

COMCIN - SEATTLE

```
2B2 * D1240 TRAFFI   2N1 * D1259 ALARM    2434 D1251 PARKIN
2823  A1240 BURGLA   2N2 * D1259 ALARM    2U4  A1202 A/T
2B3 * D1255 980      2N3  D1224 ACCIDE    2U56*
2B4 *                2N34* D1251 DRUNK
2B45                 2N7  D1219 970
2B6  A1122 FRAUD     2N78 D1259 ALARM
2B7                  2U
2B8  D1205 950       2U1 *
2B89* A1252 PROWLE   2U3  D1200 920
2N                   2U3  A1217 LARCEN                    LAST PAG
AVAL: 2B4* 2B45* 2B7 2N 2U 2U1* 2U56*
```

RESOURCE SUMMARY

```
W/2 1223 4235 FRAUD   1402 145 NE          D/8 1251 4299 PARKIN 1702 142 AVE NE
D/0 1256 4307 ALARM   101 104 AVE NE       D/9 1200 4230 920
D/0 1237 4271 ROBBER  1102 DEARBORN SW     D/9 1205 4238 950
D/1 1153 4201 PROWLE  1st & 100 NE         D/9 1219 4247 970
D/1 1222 4231 BURGLA  2312 65 AVE NW       D/9 1255 4301 980
D/1 1239 4275 TRAFFI  2500 1st NE
D/2 1120 4192 FRAUD   BON MARCHE NORTHGA
D/2 1203 4237 LARCEN  2915 20 AVE NE
D/2 1247 4296 DRUNK   1602 26 AVE NE
D/8 1224 4239 ACCIDE  1st AND 122 SW                       LAST PAG
AVAL: 2B4* 2B45* 2B7 2N 2U 2U1* 2U56*
```

EVENT SUMMARY

Exhibit G

TERMINAL/UNIT LOG SUB-SYSTEM

The Terminal/Unit Log Sub-System is divided into three (3) functions: (1) terminal log-on command, (2) unit log-on command, and (3) terminal/unit log-off command.

TERMINAL LOG-ON FUNCTION

The Terminal Log Command verifies the area name against the Valid Area Table to see if another terminal is logged on with that area name and to check for a valid log-on name. If the name (i.e.: area) is valid and the area is not assigned to another CRT, the terminal automatically takes the queue, Active File and all resources that are assigned to that area. If another CRT is responsible for that area, he must log-off the area before the new position can log-on with that area name. The format for logging on terminals is:

LT. ID.Duty.Area F8
Duty is D = Dispatcher, S = secondary, P = Primary, O = Other.

RESOURCE LOG-ON FUNCTION

When a resource logs on no validation of the resource name is made. The format for the resource log-on command is:

LR Unit.area.officer1.officer2.car#.comments F8

The unit and Officer 1 fields are required. Officer 2, car #, and comments are optional. Area is optional only if a dispatcher is logging on his own resources and he is responsible for only one area.

The same unit can not be logged on more than one time. A resource record is written to tape each time a unit logs on.

TERMINAL/UNIT LOG-OFF FUNCTION

To log-off a terminal, the area name is used. To log-off a resource, the unit name is used. A record is written to tape each time a log-off occurs. The logging off of an area starts a log-off timer.

After a given area is logged-off for x minutes (defined by user installation), his queue, Active File, and resources is alternately routed to the Alt-route (another dispatcher) specified in the valid Area Table. If this happens, the terminal receiving the queue, Active File and resources is notified of his additional responsibility. The formats for logging off are:

LO Unit F8.
LO Area F8.

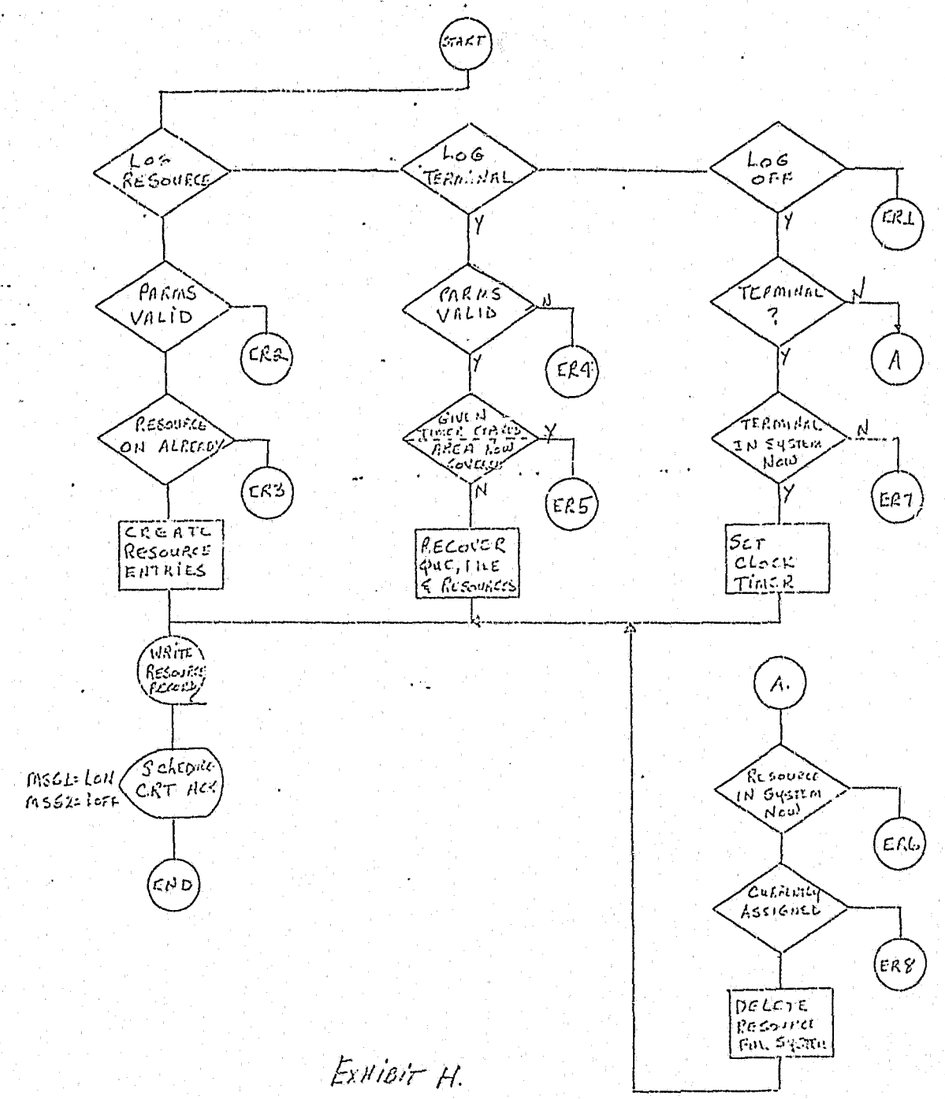


EXHIBIT H.

	Chart Title: LOG SYSTEM - GROSS	Date	Chart No. ___ of ___
System Title: CONCTN-SEATTLE	Program Title	Revision: Letter	Date

FOR/SOURCE

NS-13332

EVENT PROCESSING SUB-SYSTEM

The Event Processing Sub-System is divided into four functional areas. (1) Creating an event, (2) Que management, (3) File management, and (4) closing an event.

CREATE EVENT FUNCTION

The Event Processing Sub-System realizes that a new event is to be created when a special character is returned with the event from the screen. The Event Processing Sub-System once realizing it had encountered a new event will do the following:

1. Assign a four (4) digit event number.

2. Time/Date stamp the event and save the operator numbers and area codes of origin and destination terminals.

3. Place the event on a queue or a file. If the event is created with a routing command, the precedence and area is specified with this command and the event is placed on a queue. If the event is created with a Dispatch command (on-view), the precedence is eight (8) and the area is the same as the unit that is assigned to the event. The event is placed into the Active file. If the event is created with the administrative command, the precedence is nine (9) and the area is the same as the unit assigned to the event. The event is placed in the Active file.

4. Route the event to the printer and indicate that it is a new event. See Exhibit I for print format. Any fields in lines 2 through 11 that are blank will be omitted. Any field that is not omitted will have trailing blanks deleted.

5. Wait for acknowledgement of successful completion of printing the event.

6. Acknowledge to the originating terminal operator that the event has been processed by returning Line 1 and 2 of the event. Acknowledgement to an administrative event creation will be on Line 1 only.

7. No editing on Lines 3 thru 10 of the complaint (event) Form will be done.

QUEUE MANAGEMENT FUNCTION

Queue processing is divided into two (2) functions:

1. Get the next event from a queue. This function retrieves the next event on queue for the terminal. The format of the command that retrieves events from the queue is:
F6.

PROG ID. _____ PAGE _____

X, AT 10 CHARACTERS PER INCH, 6 LINES PER VERTICAL INCH) DATE _____

MENTALIST _____

Fold back at dotted line.

Fold in at dot

System Title

EN: XXXX AREA:XX EO:XXXX TIME:XXXX DATE:XX/XX/XX ORIG:XXX/XX FROM:XXX/XX AREA:XX PREC:X LOC[XXXX]XXXXXXXXXX
TIME:XXXX PREC:X XX XX] TYPE[XXXXXX]
XX] PHNE[ ]

BLANK

PRINT FORMAT FOR "NEW" EVENT

BLANK

EN:XXXX TIME:XXXX DATE:XX/XX/XX ORIG:XXX/XX FROM:XXX/XX AREA:XX PREC:X MIR:XXXX BEAT[ ] L
CC[XX XXX] TYPE[XXXX XXX) NAME[XXXXX UNIT:XXXX TIME:XXXX
] ADR[XXXXXXXXXX XX] PHNE[ ] ASGN:XXX MIR:XXXX CSE:XXXXX

PRINT FORMAT FOR "CLOSED" EVENT

Exhibit I

Fold back at dotted line

Fold in at dotted line

COMCTN-SEATTLE

Chart Title

Program Title

Letter

Date

Revision

Date

Chart No. _____ of _____

69

On retrieving the event, the event is automatically placed in the active file and flagged as being unassigned. The precedence of this event in the Active file is that which was assigned in the Routing command issued by the originator. Once an event is retrieved it no longer exists on the queue. If the event is the last event on queue the queue light is turned off. An event on the queue cannot be displayed by any other terminal until it is retrieved by the CRT to whom it is originally routed. All events go to a terminals queue on a FIFO basis.

An event that is routed at Precedence 0 exists on each Dispatchers queue but can only be updated by the dispatcher to whom the event was routed. On the other queues, the Event is flagged for information only.

2. Placing events on queue. An event is placed on a queue only thru the use of the routing command. The format of the command is:
R precedence. Area F6.

The precedence and area must be specified with the command and the event must be on the CRT.

Each time an event is placed on queue, the queue light is turned on.

FILE MANAGEMENT FUNCTION

File Processing is divided into three (3) functional areas. (1) Writing new events in the file, (2) Rewriting events in the Active file and (3) Reading events from the file.

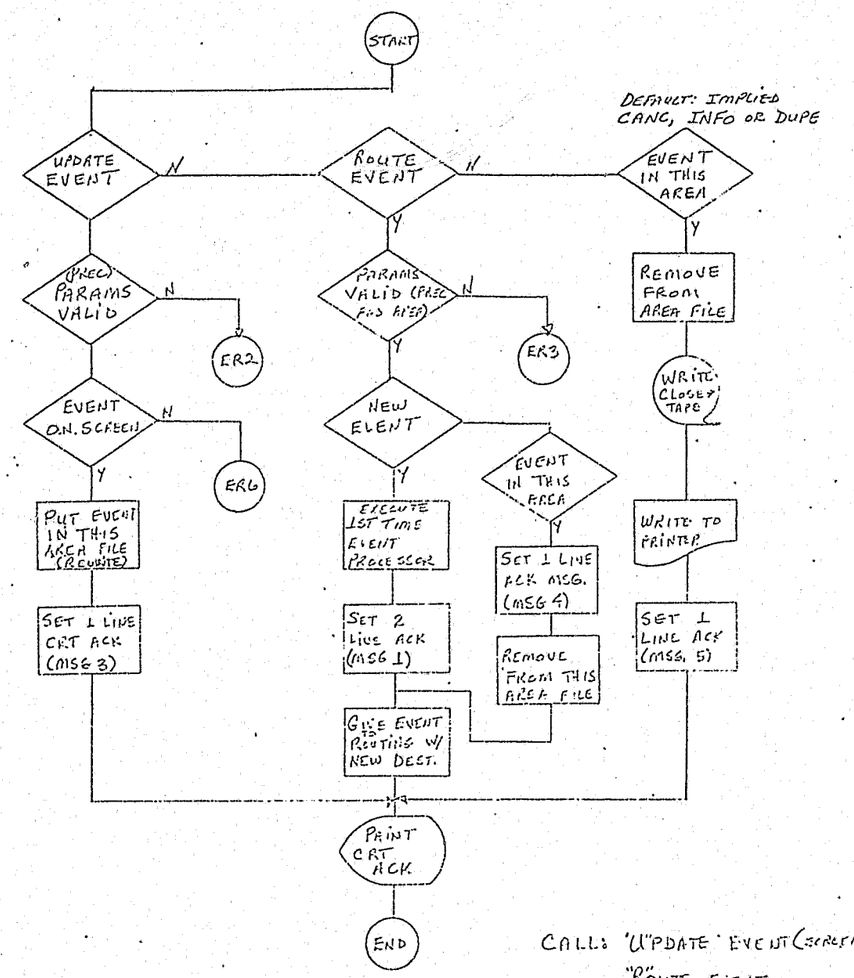
1. Writing new events on the file. A new event is written to the Active file, flagged dispatched, each time the administrative command is issued when the dispatch command is issued and the Event Processing Sub-System realizes a new event is to be created. A new event is written to the Active file and flagged unassigned each time an event is taken off a queue.

   An event is written to the closed file if a CANC, INFO, DUPL or the Clear Command (which closes the event) is issued. The event is also deleted from the Active file. For the CANC, INFO, DUPL commands the event must be on the CRT. The format of these commands are specified in the Close Event Function Section of the Event Processing Sub-System.

2. Rewrite event in Active file. An event is normally rewritten to the active file with the use of the Update command. The format of this command is:
UP precedence F6.

   The precedence is optional. If it is omitted the value in the PREC field (Line 2) will be used. The event must be on the CRT for the update command.

   Dispatch and Clear commands may also rewrite an event to the Active file. For the Clear and Dispatch command, the event must exist in the Active file to be rewritten. An event can be rewritten only by the terminal that is responsible for that event.



CALLS: "UPDATE" EVENT (SCREEN)
"ROUTE EVENT
"CANC" EVENT
"INFO" EVENT
"DUPE" EVENT

EXHIBIT J.

	Chart Title: EVENT PROCESS SUBSYSTEM	Date	Chart No. ___ of ___
System Title: CONCIN - SEATTLE	Program Title	Revision: Letter	Date

GRUMMAN

NS 13932

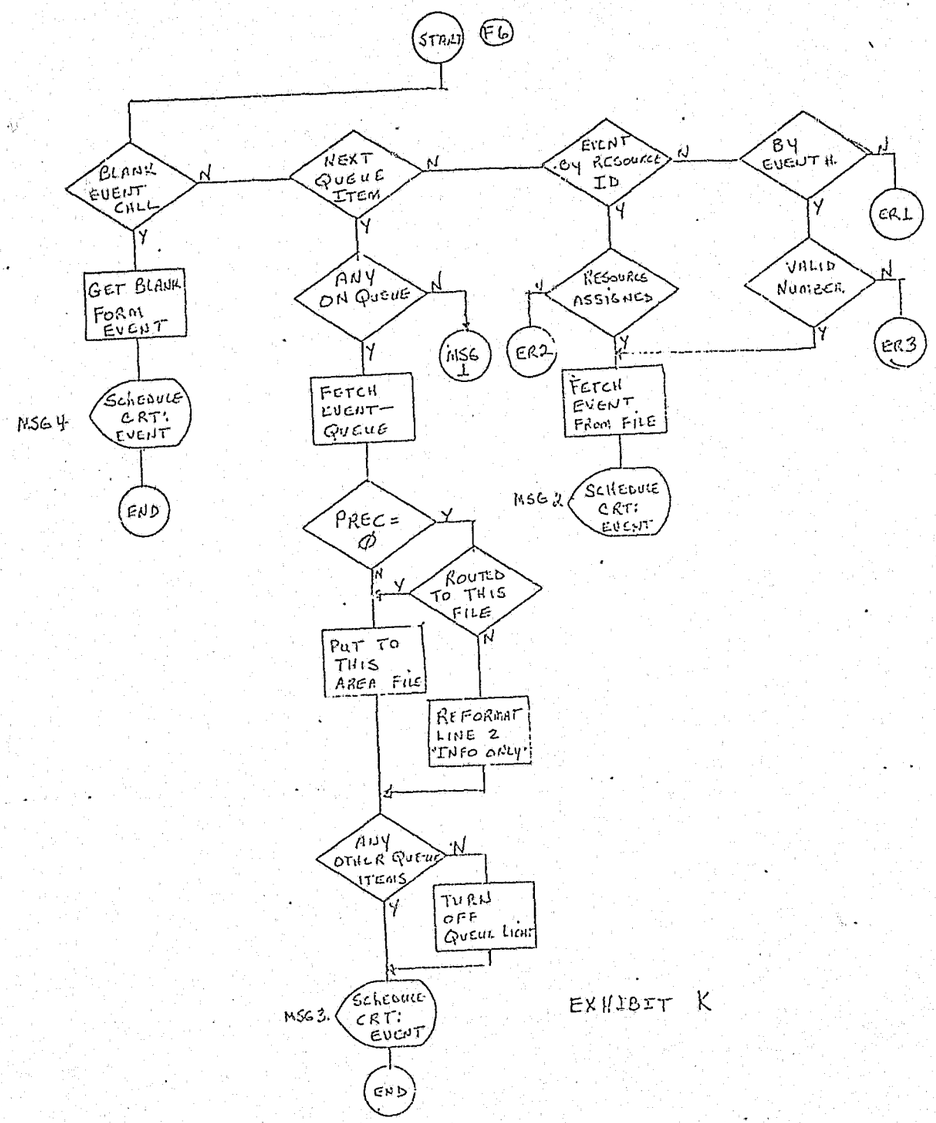


EXHIBIT K

	Chart Title: CALL EVENT EVENT PROCESS SUBSYSTEM	Date	Chart No. ____ of ____
System Title: CONCEN-SCAMP	Program Title	Revision: Letter	Date

FOR/GRUMPF

RESOURCE PROCESSING SUB-SYSTEM

The Resource Processing Sub-System is divided into five (5) functional areas: (1) Dispatching Units, (2) Arriving Units, (3) Clearing Units, (4) Freeing Units and (5) Major Case Numbers.

1. Dispatching Units

Resources are dispatched against an event. An event is not updated when a resource is dispatched. The resource is updated with the event number and the time of the dispatch. Only events in the Active file may have Resources dispatched against it (except administrative and on-views). As long as a Resource is dispatched against any event, the event will be reflected in the Active file as being assigned. Multiple Resources may be dispatched with the dispatch command. Four (4) forms of the Dispatch Command are available.

(A) Dispatching Resources to an event by event number. The format of this command is:
D Event.Unit.Unit.---F8.

(B) Dispatching Resources to the event that appears on the CRT. This dispatch updates the event. The format of the command is:
D .Unit.Unit.----F8.

(C) Dispatching Resouraces to an on-view event. The format to this command is:
D .Unit.Unit----F8.
To create an on-view event the dispatcher first calls up a blank event format and fills the format in. Then on line 1 (one) the dispatcher dispatches one or more units. The precedence of the event is eight (8) and the AREA is the same as the resources area.

(D) Dispatching a resource to an administrative event. The format of the command is:
S Unit.Type.Address F8.
This command creates an administrative event and assigns a resource to the event. The TYPE field must be 900-999 or the command will fail. The precedence of the event is nine (9) and AREA is the same as the resources AREA. The address field is optional.

2. Arriving Units

Resource Records are time stamped with the current time upon entering the arrival command and the Resource number. No update of the event is done. Multiple Resources may be arrived on one command. The format of the command is:
A Unit.Unit.Unit.----F8.

3. Clearing Units

In the Clear Resource Function, provision is made for event editing and updating. The clear command updates the MIR and Disposition codes and may (optional) enter the BEAT number. Editing is done to insure that each event has a MIR code, Disposition code and beat number before the event closes. Whenever the last resource clears from an event with the Clear Command the event is closed and moved from the Active file to the Closed file. An indicator is placed in the event record indicating the event closed via the Clear Command. Each resource, MIR and Disposition code is stored in the event record. Twenty (20) resources may be assigned to a single event. When the last resource clears the event is printed.

Three (3) types of Clear Resource functions are provided.

(A) A Resource may be cleared without a beat, MIR and Disposition if the complaint (TYPE) is a 900-999 code. In clearing an administrative event, a resource number alone is sufficient to clear the resource and close the event. The format of this command is:
C Unit F8.

(B) A Resource may be cleared without a MIR code but with a disposition of X. This resource is a "X-Ray" or a back-up resource to a primary Resource. In clearing Resources with a disposition of X, sufficient checking is done to insure that if it is the last resource clearing on the event that some previous resource has provided a MIR code and a disposition of other than X. If the resource is not the last unit clearing on the event, a disposition of X is always valid. The BEAT parameter is optional.
The formats of these commands are:
C Unit.X F8 no beat specified
C Unit.X.BEAT F8 beat specified.

(C) The most common clear of a resource is when a Resource, MIR code, and a disposition is specified. The BEAT parameter is optional. The last Resource that clears with an MIR code is designated the Primary unit. No validation is performed to check for valid MIR's or if another Resource has already specified one. The formats of these commands are:
C Unit.MIR/Disposition F8 no beat specified
C Unit.MIR/Disposition.beat F8 beat specified.

A Disposition code of either A, B, or C generates a major case number. The next unique number generated by the computer is entered into the event record. If the major case number already exists in the event record, the Clear command will respond with the number already in the record and not generate a new major case number.

4. Freeing Units

This command is used if a resource has been assigned by mistake or to pull a unit for reassignment. This is not to be used to X-Ray a resource. If the resource freed was the only resource on the event, the event will be flagged as unassigned. If other resources are still assigned to the event, the event will remain flagged as assigned. When a resource is freed from an event, the event is updated with the resource number and a resource record is written to tape. The format of the command is:
F Unit F8.

5. Major Case Numbers

The major case number function provides a five (5) digit number in response to the command. The format of the command is:
M Unit F8.

The event is updated with the next unique number generated by the computer. The number is entered into the event record.

If a major case number already exists in the event record, the command will respond with that number and not generate a new major case number.

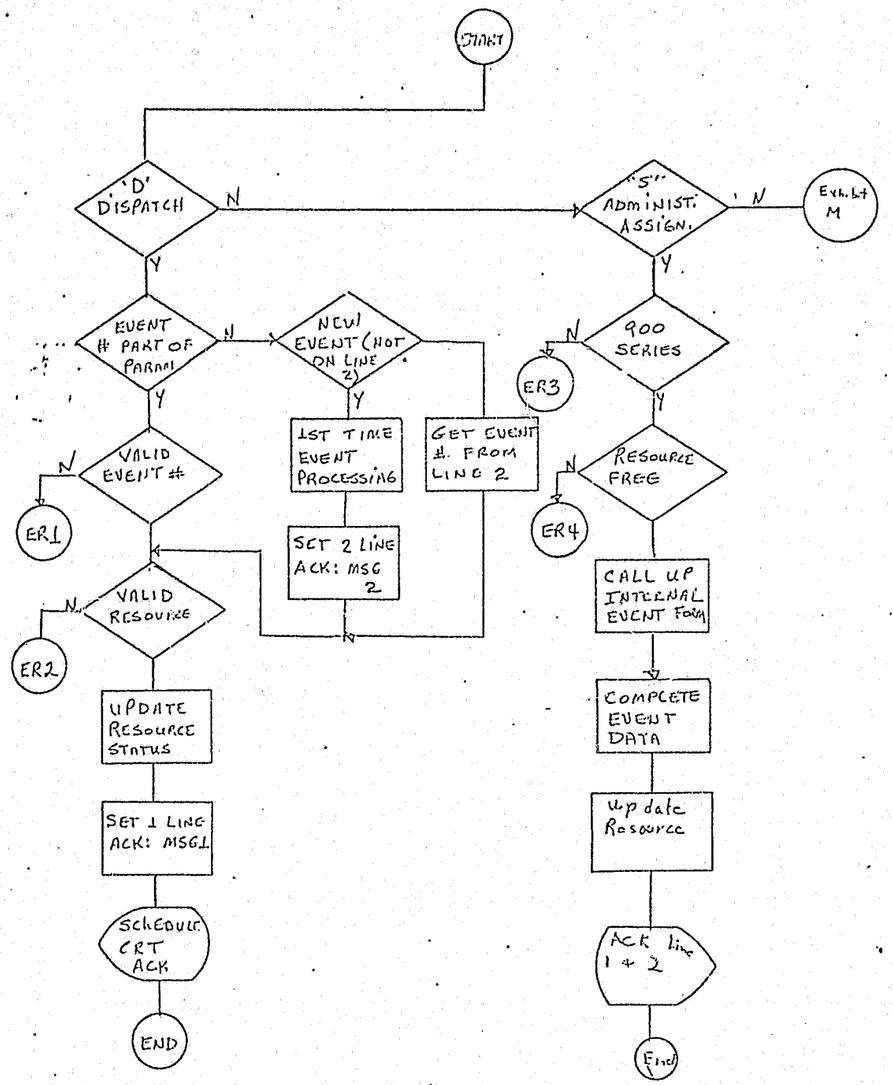
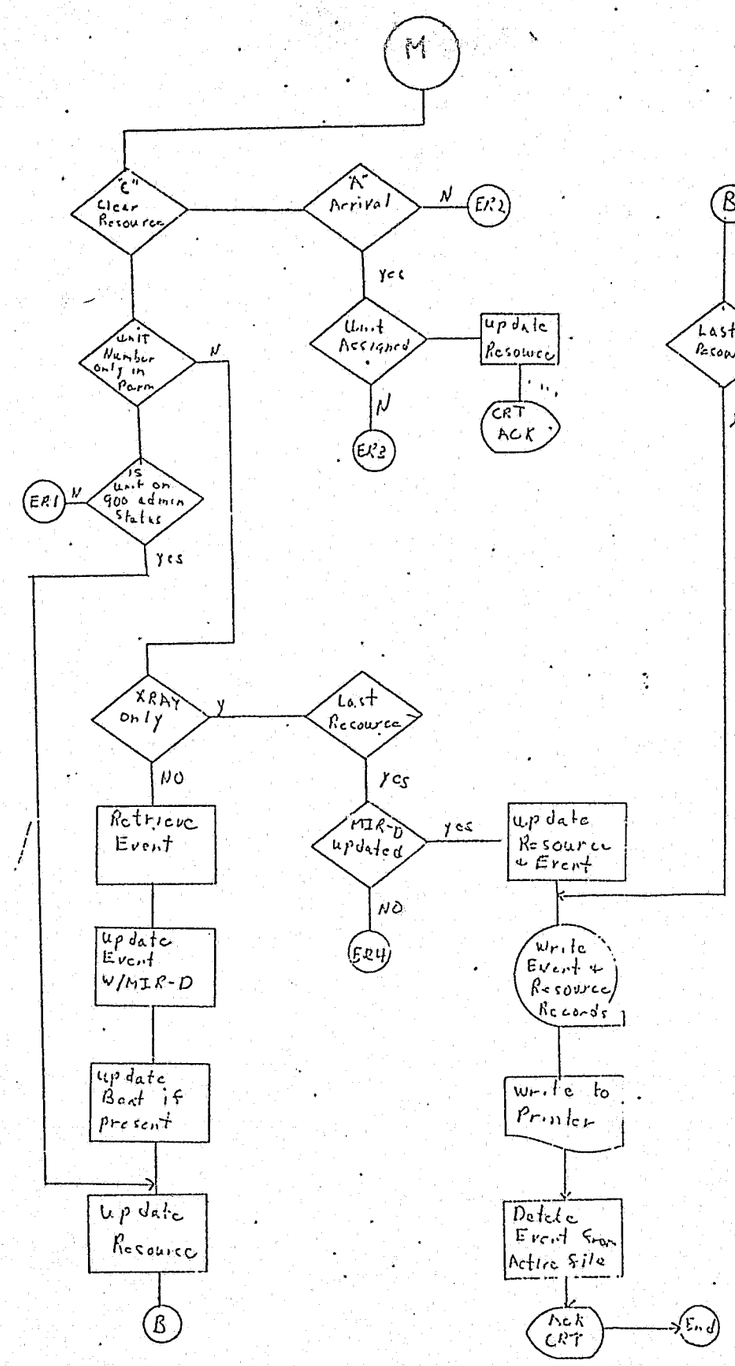


EXHIBIT L

	Chart Title: "RESOURCE CHANGE" Resource Process Subsystem	Date	Chart No. ____ of ____
System Title: COMCTN - SEATTLE	Program Title	Revision: Letter	Date

NS-13932



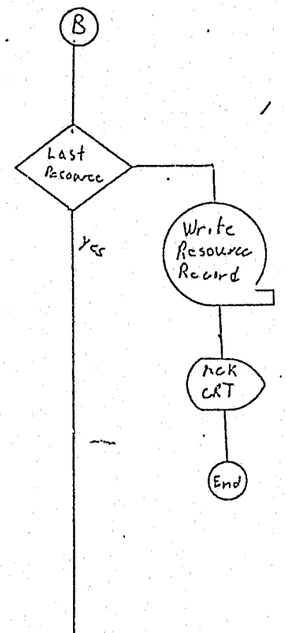


	Chart Title: Resource Change	Date	Chart No. ____ of ____
System Title: COMCIN Seattle	Program Title: Exhibit M	Revision: Letter	Date

NS-13932

SYSTEM FAILURE RECORDS

System Failure Records (SFR) are printed every X minutes (defined by user installation), for the purpose of hard copy backup if the system fails. An entry is created for each unassigned event. The record contains the precedence, time the event was assigned, the TYPE field, (first 6 characters only), the Location field (first 16 characters only), and the Event number. In addition to the unassigned events, the event number for each Event in queue is printed. See Exhibit N for a sample format.

Each SFR is printed by area. Multiple SFR's may be printed for one area if more than 20 unassigned events and event numbers exist. New event records are higher in priority for the printer than SFR's. New events may print in between SFR records.

CONTINUED

1 OF 4

System Title
COMCIN - SEATTLE

AREA:XX
W/1 0417 6423 DISTAR 1234 ANYSTREET XX
W/2 0402 6400 BURGLA 5678 SAMESTREET
EW: XXXX XXXX

Exhibit N

System Failure Record

TAPE FORMATS

The system produces an 800 BPI, IBM compatible, fixed blocked, no label tape. The record size is 256 bytes.

Each record has an eight (8) byte header. Bytes 1-6 is an event number, Byte seven (7) is the record type. The system creates three record types; (1) resource records, (2) event records and (3) statistical records. Byte eight (8) indicates the record number within record type. The resource record has three record types. They are: (1) Log-on record, (2) Log-off record and (3) clear/free record. The event record has four (4) record types. They are: (1) Lines 3-5 of event form, (2) Lines 6-8 of event form, (3) Lines 9-10 of event form, and Line 2 and Line 11 of event form. The statistical record is undefined at this time. The detail record formats will be provided later.

SEA-KING INTERFACE

The specification on the Sea-King interface is not complete at this time. This specification will be submitted separately on or before July 15, 1973. The Sea-King interface will provide the same capabilities (except no print key) as the CRT terminals now in the communications center.

ROUTING EVENTS

R Precedence.Area F6

Examples:

R	2.N F6	Route event on CRT to North, precedence 2.
R	O.S F6	Route event to South, all other Dispatchers also receive a copy of event.

UPDATING EVENTS

UP precedence F6

Examples:

UP	2 F6	Update event-change precedence to 2
UP	F6	Update event-do not change precedence

DISPATCHING UNITS

D Event.unit.unit---F8

Examples:

D	1432.1B3 F8	Dispatch 1B2 to event 1432
D	1451.1B4.1B5.1B6 F8	Dispatch 1B4, 1B5, 1B6 to event 1451

D .unit.unit.---F8

Examples:

D	.1B4 F8	Dispatch 1B4 to event number on line 2
D	.1B5 F8	Dispatch 1B5 to event on screen, no event number on line 2 (on-view)
D	.1B6.1B7 F8	Dispatch 1B6, 1B7 to event on screen

S unit.type.address F8

Examples:

S	1B1.980.CAR F8	1B1 coffee in car
S	1B.950 F8	1B out of car

ARRIVING UNITS

A unit.unit.---F8

Examples:

A 1B5 F8
A 1B5.1B6.1B7 F8

CLEARING UNITS

C unit.MIR/Disposition.Beat F8

Examples:

C	1Q2 F8	Clear administrative event
C	1Q1.X F8	Clear 1Q1 as X-Ray
C	1Q4.X.1Q3 F8	Clear 1Q4 as X-Ray with Beat
C	1D2.1O2E F8	Clear 1D2 with MIR
C	1D7.1O2D.1D7 F8	Clear 1D7 with MIR and Beat

FREEING UNITS

F unit F8

Example:

F 1B5 F8 — Remove 1B5 from event without clear

MAJOR CASE NUMBER ASSIGNMENT

M unit F8

Example:

M 1Q2 F8 — Assign 1Q2 and the vent a Big number

DISPLAYING RESOURCE RECORDS

L unit F8

Example:

L 1D4 F8 — Display 1D4 detail resource record

DISPLAY RESOURCE SUMMARY

Area F2

Examples:

F2	Display resource summary for this CRT's areas
N F2	Display North's resource summary
. F2	Display next page of summary

DISPLAY EVENT SUMMARY

AREA F1

Examples:

F1	Display event summary for this CRT's areas
N F1	Display North's event summary
. F1	Display next page of summary

SUMMARY OF COMMANDS WITH EXAMPLES

TERMINAL LOG-ON

LT ID.Duty.Area F8

Examples:

LT	91.P.P4 F8	Primary
LT	17.D.N F8	Dispatcher
LT	23.S.S1 F8	Secondary

UNIT LOG-ON

LR Unit.Area.Officer1.Officer2.Car#.Comments F8

Examples:

LR	1Q4.N.1453 F8	One man in North
LR	1Q5.N.1459.1473 F8	Two men in North
LR	1Q67.N.1500.4132..Rider F8	Two men in North with Rider.

TERMINAL/UNIT LOG-OFF

LO Area/Unit F8

Examples:

LO P4 F8
LO 1Q4 F8

CALLING UP EVENTS

B F6	Call up blank event format
F6	Call up next event from queue
Event F6	Call up event by event number

Examples:

1432 F6
1731 F6
.Unit F6 — Call up event by unit number

Examples:

.1B4 F6
.1B7 F6

CLOSE EVENTS

CANC F6	Cancel event
INFO F6	Information event only
DUPL F6	Duplicate event

TAPE SUB-SYSTEM

1. The Tape Subsystem is given control for every event which is closed, every resource which is logged on, cleared, freed, and logged off. Additionally, statistical records are written to tape. The statistical data is collected on a scheduled basis by the tape subsystem. System records are also written to tape.

2. The following details the information in each system tape record:

   a. System initialization/restart. Format of the data is:

Description	Byte # in Record
Type (=0)	1
Sub-Type (=0)	2
Blank (=40)	3 - 16
Time (4 digit - HHMM)	17 - 20
Date (6 digit - MMDDYY)	21 - 26
EVENT # (6 digit next to be used)	27 - 32
OCA # (5 digit next to be used)	33 - 37
Unused	38 - 256

   b. System discovers a hardware error forcing a close of an event builds a record in the following format:

Type (=0)	1
Sub-Type (=1)	2
Blank	3 - 16
Time (4 digits - HHMM)	17 - 20
Date (6 digit - MMDDYY)	21 - 26
EVENT (Least significant 4 digits)	27 - 32
Unused	33 - 256

   c. System discovers a hardware error forcing a close of a resource builds a record in the following format:

Type (=0)	1
Sub-Type (=2)	2
Blank	3 - 16
Time (4 digit - HHMM)	17 - 20
Date (6 digit - MMDDYY)	21 - 26

   c. Continued -

EVENT # (LSD significant 4 digits - if applicable)	27 - 32
Resource ID (5 digit)	33 - 37
Unused	38 - 256

3. The following details the information in each close event tape record:

Description	Byte # in Record
Type (=2)	1
Sub-Type (=0)	2
Event # (9 digits)	3 - 11
Blank (=40)	12 - 16
Line 2	17 - 96
Line 3	97 - 176
Line 4	177 - 256
Type (=2)	1
Sub-Type (=1)	2
Event # (9 digits)	3 - 11
Blank (=40)	12 - 16
Line 5	17 - 96
Line 6	97 - 176
Line 7	177 - 256
Type (=2)	1
Sub-Type (=2)	2
Event # (9 digits)	3 - 11
Blank (=40)	12 - 16
Line 8	17 - 96
Line 9	97 - 176
Line 10	177 - 256

3. Continued

Type (=2)	1
Sub-Type (=3)	2
Event # (9 digits)	3 - 11
Blank (=40)	12 - 16
Line 11	17 - 96
Close Time (4 digits HHMM)	97 - 100
Close Date (6 digits MMDDYY)	101 - 106
Close Type Code (1 digit)	107
I - Information	
D - Duplicate	
C - Cancel	
R - Resource Action	
Unused	108 - 256

4. The following details the information in the Resource type records:

a. Log-on Resource Record Format

Description	Byte # in Record
Type (=3)	1
Sub-Type (=0)	2
Blank (=40)	3 - 11
** Resource ID (5 digits)	12 - 16
* Area Logged on to (2 digits)	17 - 18
* Officer #1 (5 digits)	19 - 23
* Officer #2 (5 digits)	24 - 28
* Car # (10 digits)	29 - 38
* Log-on Comments (20 digits)	39 - 58
* Log-on Operator ID (4 digits)	59 - 62
Log-on Time (4 digit - HHMM)	63 - 66
Log-on Date (6 digit - MMDDYY)	67 - 72
Unused	73 - 256

b. Clear Resource Record Format:

Description	Byte # in Record
Type (=3)	1
Sub-Type (=1)	2
#1 Event # (9 digits)	3 - 11
** Resource ID (5 digits)	12 - 16
* Area Logged on to (2 digits)	17 - 18
* Officer #1 (5 digits)	19 - 23
* Officer #2 (5 digits)	24 - 28
* Car # (10 digits)	29 - 38
* Log-on Comments (20 digits)	39 - 58
* Log-on Operator ID (4 digits)	59 - 62

Log-on Time (4 digits - HHMM)	63 - 66
Log-on Date (6 digits - MMDDYY)	67 - 72
Unused	73 - 104
Dispatch Time (4 digits HHMM)	107 - 110
Dispatch Date (6 digits MMDDYY)	111 - 116
Arrive Time (4 digit - HHMM)	117 - 120
Arrive Date (6 digit - MMDDYY)	121 - 126
Clear Time (4 digit - HHMM)	127 - 130
Clear Date (6 digit - MMDDYY)	131 - 136
MIR (3 digit)	137 - 139
Disposition (1 digit)	140
OCA (YR +5 digits)	141 - 147
TYPE (6 digits)	148 - 153
Unused	154 - 258

c. Log-off Resource Record Format

Description	Byte # in Record
Type (=3)	1
Sub-Type (=2)	2
Blank (=40)	3 - 11
** Resource ID (5 digits)	12 - 16
* Area logged on to (2 digits)	17 - 18
* Officer #1 (5 digits)	19 - 23
* Officer #2 (5 digits)	24 - 28
* Car # (10 digits)	29 - 38
* Log-on Comments (20 digits)	39 - 58
* Log-on Operator ID (4 digits)	59 - 62
Log-on Time (4 digits - HHMM)	63 - 66

	Log-on Date (6 digits - MMDDYY)	67 - 72
*	Log-off Operator ID (4 digits)	93 - 96
	Log-off Time (4 digits - HHMM)	97 - 100
	Log-off Date (6 digits - MMDDYY)	102 - 106

* Left justified - binary zero filled.

#1 The 4 most significant digits (YYDD) is derived from the current event number.

#2 Disposition = "?" - Resource freed.

** Right justified - Blank filled.

5. The following details the information in each event statistical record:

Description	Byte # in Record
Type (=4)	1
Sub-Type (=0)	2
SPACES	3 - 16
Time (4 digit - HHMM)	17 - 20
Date (6 digit - MMDDYY)	21 - 26
Statistical Field 1	27 - 32
Statistical Field 35	231 - 236
Spaces	237 - 256

#1 Each Statistical field format is:

Description		Byte # in Record
Event # (4 digits - Binary)		1 - 2
Precedence (1 digit - ASCII)		3
Status		4
Unused	Bits 0-3	
Filed	Bit 4	
Old En route (Que)	Bit 5	
Assigned	Bit 6	
New En route (Que)	Bit 7	
Area (2 digit - ASCII)		5 - 6

6. The following details the information in each resource statistical record:

	Description	Byte # in Record
	Type (=4)	1
	Sub-Type (=1)	2
	SPACES	3 - 16
	Time (4 digit - HHMM)	17 - 20
	Date (6 digit - MMDDYY)	21 - 26
#1	Statistical field 1	27 - 34
	Statistical field 26	227 - 234
	Spaces	235 - 256

#1 Each statistical field format is:

Description	Byte # in Record
Resource # (5 digits - ASCII)	1 - 5
Status	6
Unused Bit 0	
Assigned (=1) Bit 1	
2 Man car (=1) Bit 2	
Unused Bits 3 - 8	
Area (2 digits ASCII)	7 - 8

THE CITY OF SEATTLE

DEPARTMENT OF

POLICE

SEATTLE WASHINGTON 98104

SEATTLE ELECTRONIC LAW ENFORCEMENT COMPUTER TECHNOLOGY

Manual prepared by:
Seattle Police Department
Communications Division

INTRODUCTION

The "SELECT" Computer System serves a dual purpose:

1. It provides an automated support system for Communications Division activity: the taking of 911 emergency calls, and the dispatching of police units to handle those calls.

2. It provides a means of collecting extensive, accurate data which is used for both the supervision of police personnel and the efficient allocation of police manpower.

The system equipment consists of individual CRT (cathode ray tube) terminals, and a printer which provides a hard-copy record of information pertaining to dispatched events.

The computer system itself is one which is adapted to the Seattle Police Department's particular needs and requirements.

Properly used, the system enhances our efforts to reach our objective of meaningful, efficient communication. It is an important tool in the person-to-person contacts which are vital to our work, whether it be operator-to-citizen, operator-to-dispatcher, or dispatcher-to-field unit.

The system facilitates and streamlines the interdependent functions of every member of the

Communications team. It promotes the precise recording and rapid relaying of vital, accurate information, and it assures that the information the field units receive is as complete and current as possible.

In addition, the system provides the dispatcher with highly sophisticated tools which help him to 1) maintain a high degree of awareness concerning his units; and 2) make accurate, rapid decisions in support of his field units' efficiency and safety.

Our use of this automated system has a strong, positive impact on the field units. It maximizes efficiency and professionalism in their work as well as our own.

This system was acquired through federal funding on LEAA Grant number 507. The primary purpose of the grant is to provide data to be utilized for manpower deployment within the Seattle Police Department. The subsequent contract for development and installation of this system was awarded to Kustom Data Communications, Inc., Chanute, Kansas.

INDEX

EQUIPMENT DESCRIPTION

Each CRT terminal consists of a screen and a keyboard. The screen on each terminal is divided into two sections (upper and lower), which are separated by a line of dashes running horizontally across the middle of the screen. Each section has the same capabilities and operates independently of the other. For example, an operator can use one half of the screen to display a unit summary and use the other half to display an event in queue. There is only one cursor on each terminal, so only one command can be entered at a time.

There are twelve lines on each half of the screen. Line One of each half is the command line, and all commands are entered on these lines. The first position on each command line is the home position for the screen half being used.

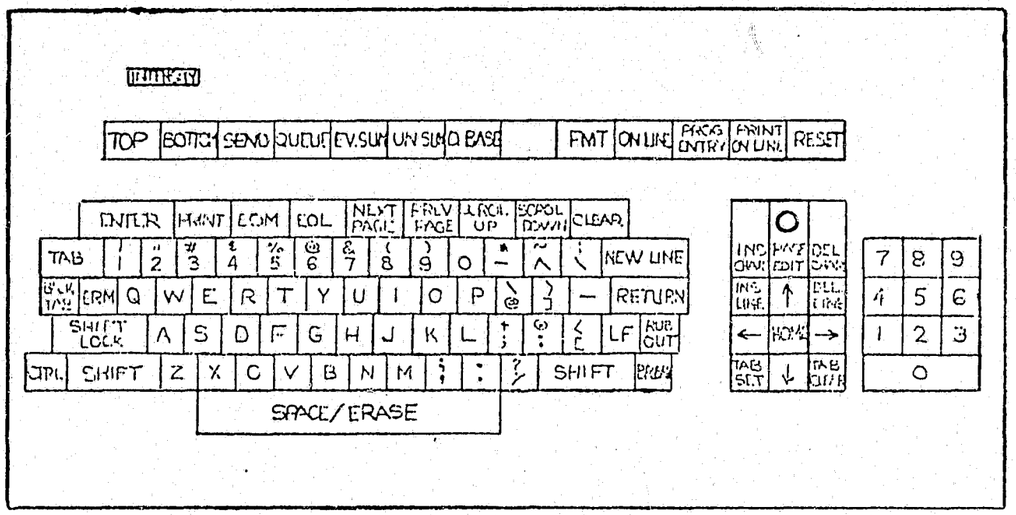
Line Twelve of each half shows, whenever an event is displayed, the units which are available.

(See Page 1.03 for diagram of CRT keyboard.)

In addition to the CRT terminals, another important part of the system is the printer.

The printer provides a hard-copy record of all events. The event is printed, in an abbreviated form, when it is routed from one terminal to another for the first time. The same event is printed again when the event is closed, and the second printing includes all the information in the event record.

THE CRT KEYBOARD



1. Function Keys

The top row of keys on the CRT keyboard are function keys, and they are used as follows:

TOP	Returns cursor to home position, top half
BOTTOM	Returns cursor to home position, bottom half
SEND	Activates general commands
QUEUE	Activates "Q" command
EV-SUM	Activates command to display event summary
UN-SUM	Activates command to display unit summary
D BASE	Activates and routes to Sea-King data base

2. Other Keys

Other specified keys on the CRT keyboard perform predetermined functions, as follows:

EOL	Erases from cursor to end of line or end of field
TAB	Advances cursor forward, to first blank space of next field
BACK TAB	Moves cursor backward, to first blank space of preceding field
HOME	Returns cursor to home position, top half
↑	Moves cursor one space directly upward (without erasing characters)
↓	Moves cursor one space directly downward (without erasing characters)
→	Moves cursor one space directly forward (without erasing characters)
←	Moves cursor one space directly backward (without erasing characters)

SPACE/ERASE	Moves cursor forward (erasing characters as it goes)
PAGE EDIT	Key containing light which comes on when something is in the queue

GLOSSARY OF SYSTEM TERMS

ACKNOWLEDGMENT	A computer-generated message which indicates that a command entered has been accepted by the computer.
AREA	The area of responsibility for any radio or telephone position; for example, N for North Radio, and P1 for Primary Position 001.
BEAT	The smallest patrol division in the city; the district of occurrence for any event; for example, 2B3.
CLEAR	Removing a unit from an event with a disposition or MIR and disposition, making that unit available for another event.
COMMAND	An instruction to the computer to perform a specific task.
COMMAND LINE	Line One on each half of the CRT screen. (All commands are entered on this line.)
CURSOR	A moveable spot of light on the CRT screen which indicates where the next character will be typed.
DISPOSITION	The action taken by the assigned unit in handling the event; report written, peace restored, etc.
ERROR MESSAGE	A computer-generated message indicating that something is wrong in a command which has been entered.
EVENT	A call or incident; includes administrative events, which are downtime situations classified in the 900 to 999 category in the MIR code.
EVENT FORMAT	The blank format which is the message vehicle used to transmit information between terminals.

EVENT NUMBER	An eight-digit number issued by the computer to every event when it is initially routed. The numbers are issued in consecutive order. Only the last four digits of this number are displayed on the CRT screen. All eight digits appear on the printer's record. The first two digits indicate the year, and are separated from the last six digits by a dash; for example, 73-123456.
EVENT SUMMARY	A listing of all the events in an area's file, showing each event's precedence, the time it was created, the location, the type of call, and whether or not it has been dispatched.
FIELD	A space or series of spaces in a computer format which contain specified items of information.
FILE	The computer's storage of events, from the time they are called out of queue until they are closed. Events are stored in order of their precedence, with the most urgent calls first. Within each precedence category, events are stored in numerical order by event number.
FREE	Releasing a unit from an event to which he is assigned without requiring a MIR and disposition from that unit.
FUNCTION KEY	A key on the keyboard which activates a command.
HARDWARE	The physical, mechanical components of a computer system; for example, the CRT terminals and the printer are pieces of hardware.
HOME POSITION	The first position of each command line. (There is one home position on each half of the CRT screen.)

PRECEDENCE	The urgency of dispatch for any event, as indicated by the precedence code assigned to the event. The more urgent an event is, the higher its precedence.
QUEUE	A status in which an event is maintained immediately after it is created and initially routed, and before it is displayed for the first time by the operator to whom it was routed. Events are stored in the queue on a first in/first out basis.
ROUTING	Sending an event from one terminal to another by means of a specified command.
SOFTWARE	The features of a computer system which are not hardware; for example, the programming is software.
UNIT SUMMARY	A listing of units in their logical order (alpha-numerical), with an indication whether they are one- or two-man units, the location of the event if they are assigned, the type of event, and the time of dispatch or arrival, whichever is most current.

FUNDAMENTALS FOR USING THE COMPUTER SYSTEM

Transactions

A transaction consists of a command, or formalized instruction to the computer, and an acknowledgment or error message. If a command is correctly typed and entered, the computer responds with an acknowledgment message. If an error message is received instead, the operator has failed to initiate a correct command.

All commands are entered on the command line. The first position on each command line is called the home position. Every command begins in the home position.

After a command has been typed and entered, the acknowledgment or error message appears on the right-hand side of the command line on which the command was typed.

There are numerous different acknowledgment messages, most of which contain a direct reference to the specific command which has been entered.

For example, a command, "D..2B3", which tells the computer to record the dispatch of Unit 2B3

to the event displayed on the CRT screen, receives the explicit acknowledgment message:

DISP: 2B3

There are also numerous different error messages. Many of these address themselves to the specific error.

For example, an attempt to dispatch Unit 2B3 to an event, when that unit has not been "logged on" the system, receives the error message:

*DISP: NONE ERR: 2B3

Function Keys

Each command is activated by depressing a function key. Specific commands require the use of specific function keys. (See Index of Commands.)

As the operator types on the command line, the cursor advances, placing itself at the next blank space in which the operator may type. When the function key is depressed, the cursor returns to the home position, and advances again on its own, reading what the operator has typed.

The function key is a vital part of any command--without it, the command is not complete.

Fields

In the computer system, both commands and blank event formats are made up of fields. Each field is separated by a field delimiter, or divider. The field delimiters in the commands are periods (.). The field delimiters in the event formats are backward slashes (\). The equal signs (=) in the event format are the keyword delimiters, separating the field names and the information items entered in those fields.

When the computer reads a command or an event format, it uses the field delimiters and keyword delimiters to recognize the beginning and end of fields.

Fields in a command must be completed in their correct sequence. The computer reads the fields in a specified order (called fixed field format) and assimilates the information in the fields in this order. The information in a field must be what the computer expects to find there, or the command will not be accepted as valid.

Commands

Certain commands must be performed on the

command line of the displayed event. Other commands can be typed on a command line without the event itself displayed on the screen. (See Index of Commands.)

The first field in a command contains a one- or two-letter code. This code is the instruction to the computer regarding the specific action to be taken. (In some cases, this code is the entire command.)

The next field or fields contain variable information, explaining the specific unit or event the transaction is intended to affect.

An example of a command with several fields is a log-resource command:

LR.2B3.N.1234.2346

In this example, the first field, "LR", is the command itself: "log on resource." The next field identifies the resource, or unit, to be logged on: 2B3. The next field is the area to which the unit will be logged: N, for North Radio. The final two fields contain the serial numbers of the police officers working Unit 2B3.

Some commands affect units, others affect events.

It is important to remember that an event belongs to an area (the area to which it is routed), and resources, or units, belong to all areas, even though each unit is logged on to a specified area.

Only the area which "owns" an event can perform commands which affect the event; but any area can perform a command which acts upon a unit.

The command line may sometimes have information displayed on the left-hand side. (This will most commonly occur when there is an event or unit summary displayed on the screen--the column headings are on Line One.)

If the operator wishes to perform a command function on a command line which has characters displayed on the left-hand side, he can use either of two methods to clear the line.

The command can be typed over the existing characters and the operator can then depress the space bar for several seconds, erasing any

characters which may follow the last character of the command. The other method is to press the EOL key, either directly after typing the complete command and before pressing the function key, or immediately after returning the cursor to home position and prior to typing the command.

If the extra characters are not erased, the computer reads them as part of the command and rejects the command as incorrect.

Event Formats

The event format is the message vehicle by which all messages are transmitted between computer terminals.

The event format is comprised of fields, and each field is intended to contain specified information. Each field is identified by two or more letters which signify the type of information which belongs in the field, for example: LOC, for "location of occurrence."

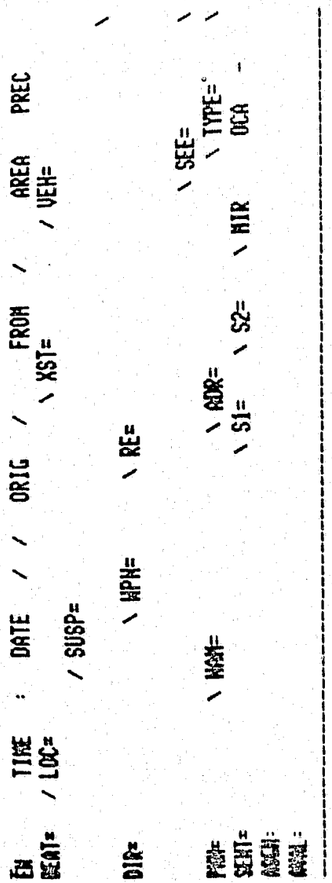
The field identifier, or keyword, is immediately followed by an equal sign (=), the keyword delimiter. The next space is used to begin typing information in that field.

The end of each field is indicated by a

backward slash (\). No information can be typed beyond the slash.

The following page is a picture of a blank event format.

SAMPLE EVENT FORMAT



The fields in the blank event format on the preceding page are, in sequence:

BEAT — The district of occurrence

Example: 2B3

LOC — Location, or address, of occurrence

Example: 1500 - E PINE ST
or
NE 125 & LK CITY WY NE

XST — Cross street, if the location itself is not an intersection

Example: MADISON

VEH — Description of suspect vehicle or vehicle involved in incident

Example: ODC123 WHI/RED 1965 S/W

SUSP — Description(s) of suspect(s)

Example: 1 - WM 35 6-2 210 BLK BLU WRNG DK CLOTHING 2 - WM 30 5-8 150 BRO WRNG DK JACKET BLU JEANS

DIR — Direction of travel of suspect(s) and/or suspect vehicle(s)

Example: E/B ON PINE ST FR 15 E

WPN — Type of weapon involved, if any

Example: 6" RAZOR

RE — Any details or comments pertaining to the event

Example: BURG - TWO SUSPS ENTERED THROUGH BASEMENT WINDOW ON S SIDE OF HOUSE INSIDE NOW

SEE — Any specific person the officers assigned to the event should see or contact

Example: MGR

PHN — Telephone number of complainant

Example: EA2-1356

NAM — Name of complainant

Example: MR JOHNSON

ADR — Address of complainant

Example: 1356 - E MADISON
or
SAME (if complainant's address is same as location)

TYPE — Type-of-call code

Example: BURG*

SENT — Equipment or personnel other than SPD requested by assigned unit(s), and time sent to location by dispatcher
(This field completed by dispatcher)

Example: LANG 1545

S1 — Serial number of first officer working a unit
(This field completed by Control Terminal Operator)

Example: 2356

S2 — Serial number of second officer working a unit
(This field completed by Control Terminal Operator)

Example: 3420

MIR — MIR and disposition code
(This field completed by computer)

OCA — Major case number
(This field completed by computer)

SYSTEM MESSAGES

System messages are computer-generated messages which are sent to appropriate areas. A system message advises of a change in the status of all or part of the computer system, usually a system problem and/or failure.

An example of a system message is:

*HDWR ERR-EV 1234 CLOSED AND 2B3 CLEARED

This message is generated by the computer and sent to the area which has Event #1234. It tells the operator working that area that the system hardware has malfunctioned and closed the event, possibly prematurely. The event, now closed, is lost to that operator, whether or not the operator intended that the event be cleared and closed at that time.

AREA COLLAPSE

When one operator logs off at a CRT terminal, it is important that another operator log on that area immediately.

Each terminal has an assigned area, and if an operator logs off and another operator does not log on within a specified length of time, the area assigned to the terminal "collapses."

If an operator coming on duty does not log on within two minutes, a warning message is generated by the computer and sent to every area's queue, for example:

AREA N WILL COLLAPSE IN 1 MINUTE

If another minute elapses, and no operator logs the area on, collapse occurs. This is not critical if only one, or possibly two, telephone areas are allowed to collapse (probably at change of shift). When a radio area collapses, however, a major change takes place in the routing of events to that area.

When a radio area collapses, any event which is in queue or any event which is subsequently routed to that area goes directly to the area's file. Events routed after collapse occurs bypass

the queue. When any event is routed to a collapsed area, a computer-generated message is sent to every other area's queue, for example:

A ROUTE HAS JUST OCCURRED TO N; NO OPERATOR COVERING THIS AREA

An area collapse can be avoided in either of two ways:

1. An oncoming operator logs on the area immediately; or
2. Another operator, already logged on to one area, logs on the area about to collapse (and is then logged on to two areas)

The required procedure is for the next operator to log on the area promptly after the previous operator has logged off.

If this is not possible, it is important for the area to be logged on by an already-assigned operator--before the warning message has been generated or as soon as possible after the warning message has been displayed.

If an already-assigned operator logs on a collapsed area, he must examine the event summary as soon as possible. The event summary will now be a combined listing of events, those assigned to his regular area and those assigned to the

collapsed area.

Using the event numbers in the third column from the left, the dispatcher must display every waiting event listed which belongs to the collapsed area he has recovered.

As each of these events is displayed, the dispatcher must read it carefully and completely before making a decision regarding dispatch. He must also complete the BEAT field for each event in which this information is missing.

The dispatcher, if he wishes, can obtain individual event summaries, using the summary command and completing the second field with the area designator of the area whose events he wishes to examine. (See Page 14.05)

If the dispatcher examines the unit summary, he will find that the summary for his own area and that of the collapsed area are now merged also, with the units listed in alpha-numerical order. The unit summaries can also be examined separately, by adding the area designator to the summary command.

THE PRECEDENCE CODE

The Precedence Code is a numerical designation which indicates the relative urgency of an event. It is a required item of information in every route command.

To the Dispatcher, the code indicates the type of dispatch the event requires--critical, urgent, immediate or prompt. While all dispatches are to be executed as soon as possible, in compliance with both Department and Division policy, it is sometimes necessary for the Dispatcher to make discretionary decisions concerning dispatches, based on manpower considerations. The Precedence Code, properly used, is an important tool in the making of these decisions.

Events which are assigned a precedence of zero (0) are available to every dispatch area for display. When the zero-precedence event is displayed on the CRT terminal at the area to which it was routed, a copy of the event goes to every other dispatch area's queue.

Two numbers in the Precedence Code are computer-generated: eight (8), which designates

on-view events, and nine (9), which designates administrative events.

DISPATCH PRECEDENCE CODES	SUGGESTED GUIDELINES
0 - CRITICAL DISPATCH	Stickup in progress; Help the officer; Shootings; Stabbings; (Displays at all dispatch positions)
1 - URGENT DISPATCH	All alarms; Major disturbances; Disturbances with weapons; Other crimes in progress; Other crimes having just occurred; All other calls needing urgent dispatch.
2 - IMMEDIATE DISPATCH	Incidents without weapons but with possible threat of violence, bodily harm or damage to property Assaults with suspects still in the area.
3 - PROMPT DISPATCH	Investigations; Minor incidents
4 - DISPATCH AS AVAILABLE	Information (cars racing, firecrackers, snowballs, misc. mischief).
8 - On View Incidents	Computer generated.
9 - Administrative Downtime	Computer generated. (900 series MIR's).

THE TYPE CODE

The Type Code is used to classify an event, according to its nature. The Type Code is required in the format of every event which is created.

This code appears in both the event summary and the unit summary--it is a "cue" for the dispatcher, to help him remember the kinds of calls to which his units are assigned.

While a dispatcher will never dispatch from his summaries, the Type Code coupled with the Precedence Code helps him to be constantly aware of his units' situations. These codes assist him in remaining alert and anticipating possible developments on his frequency. They also assist the dispatcher is assessing his manpower situation and estimating projected unit status.

An important part of the Type Code is the hazard indicator. The hazard indicator (*) is used to flag any event to which the dispatcher should pay special attention, for reasons of special urgency or inherent danger.

TYPE CODES

* - HAZARD/ATTENTION FLAG

TYPE OF INCIDENT	TYPE CODE	MIR CODE
ABANDONED CAR	ABAND	410
ABDUCTION	KIDNAP	110
ACCIDENT		
INJURY	ACC I	420
NON-INJURY	ACC N	430
UNKNOWN INJURY	ACC U	430
ALARM		
AUDIBLE	ALAR A	210
SILENT	ALAR S	210
UNKNOWN	ALAR U	210
ARSON	ARSON	090
ASSAULT	ASLT	040
AUTO THEFT	AUTO T	070
THEFT & RECOVERY	AUTOTR	070
RECOVERY	AUTO R	070
PLATES	AUTO P	070
REQUEST TO LOCATE	AUTO L	320
BOMB (THREATS,QUESTIONABLE DEVICES, ETC.)	BOMB	090
BURGLARY	BURG	050
CHILD,NEGLECT,ABUSE,ABANDONED	CHILD	150
DEAD BODY	DOA	330
DISTURBANCE		
FAMILY	DIST F	240
FIGHT	DIST X	240
JUVENILE	DIST J	240
NOISE	DIST N	240
OTHER	DIST O	240
PEACE: STANDBY TO ASSURE	DIST P	240
DRUNKENNESS	DRUNK	230
EXPLOSION	EXPLO	090
FIRE	FIRE	350
FRAUD,BAD CHECK,BUNCO	FRAUD	100
GAMBLING	VICE	120
GUNSHOTS	SHOTS	240
HARBOR (WATER EMERGENCY)	HARBR	350
HAZARD	HAZ	350
HELP THE OFFICER	HELP	510
HOMICIDE	HOM	010
JUVENILE RUNAWAY	JUV R	360
JUVENILE RUNAWAY PICKUP	JUV P	360
KIDNAPPING	KIDNAP	110
LARCENY (INCLUDE A/A, C/P)	LARC	060
PURSE SNATCH, WITHOUT FORCE	PURSE	060
SHOPLIFT	SHOP	060
TILL TAP	TILL T	060
MENTAL COMPLAINTS	MENTL	220
MINOR CONSUMING	MINOR	230
MISCELLANEOUS MISDEMEANOR (litter,illegal burning, etc.)	MISC	170
MISCHIEF, NUISANCE	NUIS	250

NARCOTICS	VICE	120
OPEN PREMISE	OPEN	260
PARKING COMPLAINT	PARK	470
PERSON DOWN	DOWN	330
FOUND	FOUND	360
INJURED	INJ	330
MISSING	MISS	360
SICK	SICK	330
WITH WEAPON	WEAPN*	290
PHONE CALLS,OBSCENE,NUISANCE	PHONE	140
PREMISE CHECK	PREMIS	270
PROPERTY DAMAGE (include vandalism)	DAMG	130
PROPERTY,LOST,FOUND,MISSING	PROP	370
PROSTITUTION	VICE	120
PROWLER	PROWL	160
RAPE	RAPE	020
REQUEST TO WATCH	RW	270
ROBBERY	ROBB	030
SERVICE, SPD	SVC S	520
SERVICE, OTHER AGENCY	SVC O	310
SERVICE, PUBLIC	SVC P	390
SEX OFFENSE (EXCEPT RAPE)	SEX	140
SUICIDE and ATTEMPT	SUIC	380
SUSPICIOUS PERSON,VEHICLE,CIRC.	SUSP	280
THREATS	THRET	040
TRAFFIC	TRAF	400
TRAFFIC,DRIVING WHILE INTOXICATED	DWI	450
UNKNOWN COMPLAINT	UNK	240

INDEX OF AREA INDENTIFIERS

Radio Positions

CD	Chief Dispatcher
N	North Radio
S	South Radio
EC	East Central Radio
WC	West Central Radio

Primary Positions

PØ	Primary Position 000
P1	Primary Position 001
P2	Primary Position 002
P3	Primary Position 003
P4	Primary Position 004
P5	Primary Position 005
P6	Primary Position 006
P7	Control Terminal 007

Secondary Positions

S8	Primary-Secondary Position 008
S9	Secondary Position 009
SØ	Secondary Position 010
S1	Secondary Position 011
S2	Secondary Position 012
S3	Secondary Position 013

INDEX OF COMMANDS

** Must be performed on command line of displayed event

1. TERMINAL LOG-ON

   Format: LT.operator's Department serial number.area (SEND)

   Example: LT.3060.N (SEND)

2. UNIT LOG-ON

   Format: LR.unit number.area.serial number.serial number..comments (SEND)

   Example: LR.2B3.N.2356.3467 (SEND)
   or
   LR.2B3.N.2356.3467..RIDER (SEND)

3. TERMINAL LOG-OFF

   Format: LO.area (SEND)

   Example: LO.N (SEND)

4. UNIT LOG-OFF

   Format: LO.unit number (SEND)

   Example: LO.2B3 (SEND)

5. DISPLAY BLANK EVENT FORMAT

Format: B (SEND)

Example: B (SEND)

6. DISPLAY EVENT OR MESSAGE IN QUEUE

Format: Q (QUEUE)

Example: Q (QUEUE)

7. DISPLAY EVENT BY EVENT NUMBER

Format: EN.event number (SEND)

Example: EN.1234 (SEND)

8. DISPLAY EVENT BY RESOURCE (UNIT) NUMBER

Format: ER.unit number (SEND)

Example: ER.2B3 (SEND)

** 9. ROUTE EVENT

Format: R.precedence code.area (SEND)

Example: R.2.N (SEND)

** 10. UPDATE EVENT

Format: UP (SEND)

Example: UP (SEND)

** 11. UPDATE PRECEDENCE OF EVENT

Format: UP.precedence code (SEND)

Example: UP.2 (SEND)

** 12. DISPATCH UNIT TO DISPLAYED EVENT

Format: D..unit number (SEND)

Example: D..2B3 (SEND)

** 13. DISPATCH UP TO FIVE UNITS TO DISPLAYED EVENT

Format: D..unit number.unit number.unit number.unit number (SEND)

Example: D..2B3.2B4.2U1.2U3 (SEND)

14. DISPATCH UNIT TO EVENT NOT DISPLAYED

Format: D.event number.unit number (SEND)

Example: D.1234.2B3 (SEND)

15. DISPATCH UP TO FIVE UNITS TO EVENT NOT DISPLAYED

Format: D.event number.unit number.unit number.unit number (SEND)

Example: D.1234.2B3.2B4.2U1 (SEND)

16. DISPATCH UNIT TO ADMINISTRATIVE EVENT

Format: AD.unit number.MIR.location (SEND)

Example: AD.2B3.912.DEPT 4 (SEND)

17. ARRIVE UNIT

Format: A.unit number (SEND)

Example: A.2B3 (SEND)

18. ARRIVE UP TO FIVE UNITS

Format: A.unit number.unit number.unit number.unit number (SEND)

Example: A.2B3.2B4.2U1.2U3 (SEND)

19. FREE UNIT

Format: F.unit number (SEND)

Example: F.2B3 (SEND)

20. CLEAR UNIT WITH MIR AND DISPOSITION

Format: C.unit number.MIR and disposition (SEND)

Example: C.2B3.052F (SEND)

21. CLEAR UNIT WITH X-RAY DISPOSITION

Format: C.unit number.X (SEND)

Example: C.2B3.X (SEND)

22. CLEAR UNIT FROM ADMINISTRATIVE EVENT

Format: C.unit number (SEND)

Example: C.2B3 (SEND)

23. GENERATE MAJOR CASE NUMBER

Format: M.unit number (SEND)

Example: M.2B3 (SEND)

24. RECORD PREDETERMINED CASE NUMBER

Format: M.unit number.case number (SEND)

Example: M.2B3.7400001 (SEND)

25. DISPLAY DETAILED UNIT RECORD

Format: DR.unit number (SEND)

Example: DR.2B3 (SEND)

26. DISPLAY UNIT SUMMARY FOR OWN AREA

Format: S (UN-SUM)

Example: S (UN-SUM)

27. DISPLAY UNIT SUMMARY FOR ANOTHER AREA

Format: S.area (UN-SUM)

Example: S.N (UN-SUM)

28. DISPLAY NEXT PAGE OF UNIT SUMMARY

Format: P (UN-SUM)

Example: P (UN-SUM)

29. DISPLAY EVENT SUMMARY FOR OWN AREA

Format: S (EV-SUM)

Example: S (EV-SUM)

30. DISPLAY EVENT SUMMARY FOR ANOTHER AREA

Format: S.area (EV-SUM)

Example: S.N (EV-SUM)

31. DISPLAY NEXT PAGE OF EVENT SUMMARY

Format: P (EV-SUM)

Example: P (EV-SUM)

** 32. CANCEL EVENT

Format: CA (SEND)

Example: CA (SEND)

** 33. DUPLICATE EVENT

Format: DU (SEND)

Example: DU (SEND)

** 34. INFORMATION EVENT

Format: IN (SEND)

Example: IN (SEND)

THE PRIMARY OPERATOR

The Primary Operator is responsible for receiving and routing incoming 911 calls. For each call which is routed to a radio area for the dispatch of a patrol unit, the Operator must obtain as much information as possible, complete the event format, assess the urgency of the event, and route the event to the Radio Dispatcher as promptly as possible.

The Primary Operator must provide the Radio Dispatcher with the information obtained, in a clear, complete and concise manner, in order to enable the Radio Dispatcher to make sound judgments and valid decisions on the basis of that information.

The role of the Primary Operator is a particularly critical one, in that many times the Operator is not only the first but the sole contact with the caller until an officer arrives at the scene. Thus the Primary Operator is often the only medium through which information can be obtained and relayed--information on which the actions of many people must be based.

The Primary Operator is the key to the

decision-making process--he can complete the call himself by providing information, route an event to radio for dispatch, or transfer the call to either a Secondary Operator or another agency. The Primary Operator's sound judgment and prompt, decisive actions are crucial.

The Primary Operator will, in all duties and functions, exercise self-discipline, courtesy, empathy, and the highest degree of professionalism.

LOGGING ON AND OFF

When the Primary Operator reports for duty at the assigned telephone position, the first task is to log on the area assigned to that position.

This is done using the command:

LT.operator's Department serial number.area

The first field in this command is "LT", for "log on terminal." The next field contains the operator's Department serial number. The final field contains the area designator. (See Index of Area Identifiers, page 8.01)

An example of this command is:

LT.3060.P1

Each time the Primary Operator leaves the assigned position for any length of time (coffee and lunch breaks), he must log off at his terminal.

The log-off-terminal command is:

LO.area

An example of this command is:

LO.P1

The letters "LO" designate "log off terminal."

This procedure is to be conscientiously maintained throughout the work shift--logging on when assuming or resuming the primary position, logging off when leaving the position; the final log-off command is performed when the Operator's duty shift is completed.

DISPLAYING BLANK EVENT FORMATS

The Primary Operator will have a blank event format displayed on at least one-half of the CRT screen at all times.

A blank event format is displayed by typing the command:

B

The letter "B" designates "blank event format."

CREATING EVENTS

The Primary Operator creates an event for each incident or situation which will be routed to a radio area for the dispatch of a police unit.

This is done by:

1. Completing the fields in the displayed blank event format;
2. Determining the precedence code and the

correct radio area; and

3. Routing the event to the correct radio area.

For each event routed to a radio area, the Primary Operator will complete as many of the fields in the blank event format as possible and applicable. The fields the Operator should attempt to complete are:

LOC	Location, or address, of occurrence
XST	Cross street at the location
VEH	Description(s) of suspect or involved vehicle(s)
SUSP	Description(s) of suspect(s)
DIR	Direction of travel of suspect(s) and/or vehicle(s)
WPN	Type of weapon, if any
RE	Any pertinent details or comments
SEE	Specific person the officer assigned to the event should see or contact
PHN	Telephone number of complainant
NAM	Name of complainant
ADR	Address of complainant
TYPE	Type-of-call code

ROUTING EVENTS

When the event format has been completed, the Primary Operator determines the appropriate precedence code and the area to which the event is to be routed.

The Operator returns the cursor to the home position on the command line of the event being created, and routes the event using the command:

R.precedence code.area

The "R", for "route," is followed by the precedence code the Primary Operator has selected. The final field contains the area designator of the dispatch position to which the event will be routed.

An example of this command is:

R.2.N

Changes the Operator may wish to make in the event format can be made at any time prior to pressing the function key which activates the route command.

SECOND- AND THIRD-CALL EVENTS

When the Primary Operator receives a second or third call on an event, it is regarded as a first call and is treated as a new event. Another event is routed to the Dispatcher. This is the procedure, even when an operator has personally received all the calls on the event and feels certain that there is no new information.

A new blank event format is completed with the information provided in the call. The Operator then routes this event to the radio area, using the route command.

ADDITIONAL-INFORMATION EVENTS

When the Primary Operator receives a call and obtains information that is exceptionally lengthy, it may be necessary to utilize two blank event formats. If this is the case, the Primary Operator completes one blank event format with as much information as possible and routes it to the radio area. A second blank format is then completed, containing the remainder of the information. Both formats must contain the location and the type-of-call code, and the information in these fields will be identical on both formats. In addition, the Primary Operator will make a notation in the RE field of the second format, indicating the event number of the first event to which the second is related. (The event number assigned to the first format is found on Line Two of that event.)

Additional-information events will be utilized if for any reason there is a critical

time factor which makes it important to get the first event, with a minimum of information, to the radio area as soon as possible. The Primary Operator will then use a second blank event format to route more complete information to the Dispatcher, again making reference in the RE field to the event number of the first format routed.

DISPLAYING EVENTS AND MESSAGES IN QUEUE

The Primary Operator may receive an event back from the Radio Dispatcher, if more information is needed, or something in the event requires clarification. The Operator may also receive system messages.

In either case, the Operator is notified when there is something in the area queue by the queue light on the CRT keyboard, which comes on whenever there is anything in queue. (See Kyboard Diagram, page 1.03)

If there is more than one message or event in the queue, the one which has been in queue the longest will be displayed first. The queue light remains on until the queue is again empty and all its contents have been displayed.

To display an event or message in queue, the Operator types the command:

Q

The letter "Q" is followed by pressing the function key marked "QUEUE".

UPDATING EVENTS

If an event has been routed back to the Primary Operator, for further information or clarification, there will be a notation in the RE field, indicating the Dispatcher's specific request.

If it is necessary for the Primary Operator to make changes in the body of the event format, in order to comply with the Dispatcher's request, the Operator simply makes the needed changes and routes the event back to the radio area.

The route command itself updates the event--the command replaces the previous version of the event record with the new, updated one.

THE PRIMARY-SECONDARY OPERATOR

The Primary-Secondary Position covers a wide range of responsibilities and duties. Because the operator assigned to this position functions in a dual capacity, extensive knowledge of Department and Division policies and procedures is required. This Operator is in a key position to assure that the Division's work flows smoothly and that the work itself is highly professional in quality.

The Primary-Secondary Operator's first responsibility is to answer overload 911 emergency calls. The Operator handles these calls in the prescribed manner, with courtesy, empathy and skill. The information the Operator obtains must be relayed in complete, concise form, promptly after skillful, thorough questioning of each caller.

This Operator is responsible for completing the necessary paperwork and providing for the dispatch of a police unit, for all calls regarding vehicle investigations.

The Primary-Secondary Operator answers calls transferred to Secondary positions and, as time is available, takes major case reports, follow-up

reports, hospital reports, and primary-action calls. The Primary-Secondary Operator is responsible for recording, in the computer system, all Unit 543 functions performed at the Secondary positions.

While functioning in the Secondary capacity, the Primary-Secondary Operator is in a special position, one which allows him to repeatedly fulfill our internal objective in the Communications Division: service to the public. This Operator performs, as a Secondary Operator, functions which can critically affect public relations. He takes the available time to foster good rapport between the public and the Seattle Police Department, by utilizing his communication skills and by imaginative problem-solving.

LOGGING ON AND OFF

When the Primary-Secondary Operator reports for duty at Position 008, the first duty is to log on at the terminal.

This is done using the command:

LT.operator's Department serial number.area

The first field in this command is "LT", for "log on terminal." The next field contains the Primary-Secondary Operator's Department serial number. The final field contains the area designator, S8.

An example of this command is:

LT.3060.S8

Each time the Primary-Secondary Operator leaves Position 008 (for coffee and lunch breaks), the terminal must be logged off. This is done using the command:

LO.S8

The letters "LO" in this command designate "log off terminal."

This procedure will be adhered to throughout

the Operator's work shift. The Operator will log on each time he assumes or resumes Position 008, and he will log off each time he leaves that position, with the final log-off command performed at the end of the duty shift.

CREATING EVENTS

Each time the Primary-Secondary Operator takes an overload 911 call which requires the dispatch of a police unit, he will create an event and route it to the correct radio position.

The Operator will have a blank event format displayed on at least one half of the CRT screen at all times, in order to facilitate creating and routing events.

A blank event format is displayed by typing the command:

B

The letter "B" designates "blank event format."

To create an event, the Operator performs the following steps:

1. Complete the appropriate fields in the blank event format;
2. Determine the precedence code and correct dispatch area; and
3. Route the event to the dispatch area.

The Primary-Secondary Operator will complete, for each event to be routed, as many of the following fields as possible, with the information obtained from the caller:

LOC	Location, or address, of occurrence
XST	Cross street at the location, if the location itself is not an intersection
VEH	Description of suspect vehicle(s) or vehicle(s) involved in incident
SUSP	Description(s) of suspect(s)
DIR	Direction of travel of suspect(s) and/or suspect vehicle(s)
WPN	Type of weapon, if any
RE	Any pertinent details or comments
SEE	Specific person the officer assigned to the event should see or contact
PHN	Telephone number of complainant
NAM	Name of complainant
ADR	Address of complainant
TYPE	Type-of-call code

ROUTING EVENTS

To route an event when the blank format has been

filled in, the Primary-Secondary Operator returns the cursor to the command line of the event and types the command:

R.precedence code.area

The "R", for "route", is followed by the precedence code the Operator has selected for the event. The last field contains the area designator for the dispatch area to which the event will be routed.

An example of this command is:

R.2.N

DISPLAYING EVENTS AND MESSAGES IN QUEUE

An event may be rerouted from a radio area to a telephone area, when a dispatcher needs more information, needs an item of information clarified, or needs an operator to call a complainant back. Computer-generated system messages may also be sent to the Primary-Secondary Operator's terminal.

The Operator is notified that there is an event or message in the S8 area queue by the

queue light on the CRT keyboard. The light comes on when there is something in the queue. It remains on as long as there is anything in the queue and goes out again when the queue is emptied.

The Primary-Secondary Operator will promptly display the contents of the queue and will regularly check the queue light on the terminal throughout the work shift.

The command used to display an event or message in the queue is:

Q

The letter "Q" is followed by pressing the function key marked "QUEUE".

The Primary-Secondary Operator will then read the displayed message or event. If it is an event, the Operator will pay special attention to the RE field, where the Radio Dispatcher has typed his specific request concerning the event.

The Primary-Secondary Operator will comply with the request. If further information or corrected information is obtained, the Operator will update the event (type in the new information) and route the event back to the radio area promptly.

If the radio dispatcher's request cannot be met, the Primary-Secondary Operator will type a notation in the RE field explaining this.

When the event is routed back to the radio area, the route command makes the changes in the event record--either the new information or the Primary-Secondary Operator's notation--replacing the old version of the event with the new, updated version.

If new information causes the Operator to feel that the event's previous precedence should be changed, the new precedence code is simply added within the route command in place of the previous precedence code.

VEHICLE-INVESTIGATION EVENTS

The Primary-Secondary Operator handles calls concerning:

1. Auto thefts
2. Loss or theft of one or two license plates
3. Recoveries of stolen vehicles
4. Requests to locate vehicles

When a call of this nature requires investigation by a police unit, the operator will:

1. Complete Form 5.1.5 (Preliminary Vehicle Report);
2. Create and route an event to the appropriate dispatch area, using the information on Form 5.1.5; and
3. Hand-carry Form 5.1.5 to the dispatch area to which the event was routed.

Vehicle-investigation events are created and routed in the same manner as any other events routed to radio for dispatch.

RECORDING UNIT 543 ACTIVITIES

The Primary-Secondary Operator will create, dispatch and clear an event for each function completed at any Secondary position, in the following categories:

1. Hospital reports
2. Primary actions
3. Major case reports and follow-up reports

For each completed function, a blank event format is filled out, with the following fields completed:

BEAT	District of occurrence
LOC	Location or address of occurrence
RE	Details pertaining to the event

PHN	Telephone number of complainant
NAM	Name of complainant
ADR	Address of complainant
TYPE	Type-of-call code
S1	Serial number of Secondary or Primary-Secondary Operator who performed the function

(NOTE: The S1 field contains the serial number of the Operator who handled the call and completed the function. The Primary-Secondary Operator places his own serial number in this field only when he performed the entire task.)

After completing these fields, the Operator returns the cursor to the home position on Line One of the new event and assigns Unit 543 to the event, using the dispatch command:

D..543

When this command is acknowledged and the computer has completed Line Two of the new event, the Operator clears Unit 543 from the event with the appropriate MIR and disposition. The clear command is:

C.543.MIR and disposition

The "C", for "clear," is followed by the

assigned unit number, 543. The final field contains the MIR and disposition selected by the Operator who handled the call.

An example of this command is:

C.543.410K

To record hospital reports, the information for the event format is obtained from the hospital report form itself. When the Operator has created and cleared the event, the hospital report is returned to the Operator who handled it. That Operator then completes the form with the correct sequential Division number, places the original on the clipboard, makes the appropriate entry in the Hospital Report Log Book, and takes the carbon copy of the report into Data Control for routing to the Records Section.

To record primary actions, the Primary-Secondary Operator creates events using the information on the white dispatch cards the Secondary Operators have completed. The cards are then returned to the Secondary Operators who filled them out, and those Operators place the cards in the appropriate

section of the metal divider for routing to the Patrol Division.

If an event is being created to record a major case report, the Primary-Secondary Operator will clear Unit 543 from the event with a disposition of "C." In response, the computer will generate a major case number, which will appear in the acknowledgment message. The Operator will then copy the case number onto the case report, in the space designated "Case Number" in the upper-right corner of the form.

As each report is recorded, it will be placed in the metal file located between Positions 008 and 009, to be signed by the Sergeant.

Events which are being created to record follow-up reports will be cleared with dispositions of "F", with no case number generated. These reports also will be placed in the metal file for the Sergeant's signature.

THE CONTROL TERMINAL OPERATOR

The Control Terminal Operator (Position 007) is an integral part of the Department's records-keeping system, and important to the overall operation of the Communications Division.

This Operator is responsible for receiving and acting upon specified system messages generated by the computer. Many of these messages, and the resulting actions taken by the Control Terminal Operator, vitally affect the ongoing operation of the computer system and, as a result, are critical to the maintenance of a smooth, uninterrupted work flow within the Division.

The Control Terminal Operator has the additional responsibility of answering the Division business lines and issuing major case numbers to telephone callers who request them.

Because of multiple, varied duties, the Control Terminal Operator's job is one which requires consistent, conscientious accuracy, courtesy, and thoroughness.

LOGGING ON AND OFF

When the Control Terminal Operator reports for duty at Position 007, the first function is to log on. This is done using the command:

LT.operator's Department serial number.area

In this command, the letters "LT" designate "log on terminal." The next field contains the Control Terminal Operator's Department serial number. The final field contains the area designator, P7 (for Control Terminal Position 007).

An example of this log-on command is:

LT.3060.P7

After logging on the P7 area, the Operator is prepared to receive the messages sent to that area and to issue major case numbers to telephone callers.

Each time the Control Terminal Operator leaves Position 007 (for coffee and lunch breaks), the area must be logged off, using the command:

LO.P7

This procedure is repeated throughout the work shift--logging on when assuming or resuming

Position 007 and logging off when leaving the position, with the final log-off command performed at the end of the duty shift.

ISSUING CASE NUMBERS

The Control Terminal Operator issues major case numbers to persons who are <u>not</u> working units assigned to radio areas (officers taking in-station reports, store security officers, etc.).

To issue a major case number, the Operator will:

1. Call up a blank event format on the CRT screen;
2. Complete the appropriate fields in the format;
3. Select the appropriate unit number;
4. Dispatch the unit to the new event; and
5. Clear the unit from the event, with a MIR and disposition which generates a case number.

In effect, the Operator is creating, dispatching and clearing an event for each case number to be issued.

To display a blank event format on the CRT screen, the Control Terminal Operator types the command:

B

The letter "B" designates "blank event format."

Moving the cursor to the appropriate fields, the Operator completes the following:

BEAT	District of occurrence
LOC	Location, or address, of occurrence
RE	Any pertinent information or details
TYPE	Type-of-call code
S1	Serial number of officer requesting the case number
S2	Serial number of second officer, if any, working the unit obtaining the case number

After completing these fields, the Operator returns the cursor to the home position of the event and dispatches the correct unit to the event.

The command used to dispatch the unit is:

D..unit number

The "D" designates "dispatch," followed by the unit number the Operator has selected. This command must be performed on the command line of the displayed event.

When the acknowledgment message has been received and the computer has completed Line Two of the event, the Control Terminal Operator clears

the unit from the event, using the command:

C.unit number.MIR and disposition

An example of this command is:

C.887.071C

The disposition must be an A, B or C, in order to generate a major case number. In response to the clear command, the computer will generate the case number, which will appear in the acknowledgment message. The Operator will then relay the case number to the telephone caller.

THE CHIEF DISPATCHER

The Chief Dispatcher is a sworn police officer with operational experience who is knowledgable in police procedures and thoroughly familiar with all duties of the Communications Division.

The Chief Dispatcher is the supervisor of the radio dispatching positions in the Communications Division. He is responsible for training, evaluating, and monitoring the radio dispatchers, and for resolving procedural or operational problems which may arise in connection with police radio work.

The Chief Dispatcher is responsible for providing radio supervision of the tactical radio frequencies and multiple-unit responses involving two or more radio frequencies. He is further responsible for acting as liaison with other police agencies.

The Chief Dispatcher is a vital part of the communications team--he assures the maintenance of a high level of professional radio work.

LOGGING ON AND OFF

When the Chief Dispatcher reports for duty at the radio console, the first duty is to "log on" at the CRT terminal. This is done using the command:

LT.operator's Department serial number.area

The first field in this command is "LT", for "log on terminal." The next field contains the Chief Dispatcher's Department serial number. The last field contains the area designator, the letters "CD."

An example of this command is:

LT.2356.CD

Each time the Chief Dispatcher leaves his position and the position is to be covered by another radio operator, the Chief Dispatcher must log off at the terminal. This is done using the command:

LO.area

An example of this command is:

LO.CD

This procedure is maintained throughout the work shift--each time the Chief Dispatcher sits

down at the terminal to assume or resume the position of Chief Dispatcher, he will log on the "CD" area. Each time he leaves the position and someone else takes it over, he will log off the "CD" area.

When he has completed his duty shift, the Chief Dispatcher performs the log off command for the last time.

CREATING EVENTS

When the Chief Dispatcher receives direct notification of a situation or incident, via telephone/intercom, which requires the dispatch of a police unit, he will create an event. An event is created by:

1. Calling up a blank event format;
2. Completing the necessary fields;
3. Determining the correct area and precedence code; and
4. Routing it to the appropriate radio area.

The Chief Dispatcher calls up a blank event format by typing the command:

B

The letter "B" designates "blank event format."

The Chief Dispatcher then completes the appropriate

fields in the format, moving the cursor to each field and typing in the required information.

The fields which are completed include:

LOC	Location of occurrence
RE	Any pertinent details relating to the event
NAM	The complainant or referring agency
TYPE	Type-of-call code

ROUTING EVENTS

Having selected the appropriate precedence code for the event and decided to which radio area the event will be routed, the Chief Dispatcher routes the event he has created, using the command:

R.precedence code.area

The "R" in the command designates "route"; the next field contains the precedence code the Chief Dispatcher has selected for the event; and the last field contains the area designator for the correct radio area.

An example of this command is:

R.2.N

DISPLAYING EVENT AND UNIT SUMMARIES

The Chief Dispatcher will regularly utilize the event and unit summaries, to make appropriate evaluations and decisions concerning redistribution of patrol manpower or realignment of individual radio operators' workloads. He will use these summaries to maintain a constant awareness of police activities, both general and specific.

To display an event summary for a specific radio area, the Chief Dispatcher will enter the command:

S.area

The "S", for "summary", is followed by the area designator for the radio area whose event summary the Chief Dispatcher wishes to display. The command is followed by pressing the function key marked "EV-SUM".

An example of this command is:

S.N

The event summary is a listing of all the events in an area's file. The events are listed in order of their precedence. The summary shows whether each event is dispatched or waiting ("D" or "W"). Each event's precedence is shown,

as well as the event number, the time the event was created, the location, and the type-of-call code.

To display the unit summary of a specific radio area, the Chief Dispatcher enters the same command:

S.area

The command is followed by pressing the function key marked "UN-SUM".

The unit summary is a list of all units who are logged on to an area. The units are listed in alpha-numerical order, with the symbol ⚜ denoting two-man units. The summary shows whether each unit is assigned or un-assigned. If event information is listed with the unit, he is assigned. If only the unit number appears, he is unassigned. If a unit is assigned, the entry in the summary shows whether the unit has arrived. (A "D" designates "dispatched," and an "A" designates "arrived.") The entry also shows the dispatch or arrival time, whichever is most current.

DISPLAYING EVENTS

There are two commands which can be used to display an event on the CRT screen. One is the command to display an event by event number. The other is to display an event by unit number.

If an event is waiting (not dispatched), only the command to display the event by event number can be used. If an event is dispatched, either command can be used.

To display an event by event number, the Chief Dispatcher obtains the event's number from the event summary, and types the command:

EN.event number

An example of this command is:

EN.1234

To display an event by unit number, the Chief Dispatcher types and enters the command:

ER.unit number

An example of this command is:

ER.2B3

DISPLAYING EVENTS AND MESSAGES IN QUEUE

The Chief Dispatcher's area queue may receive system messages, or "copies" of zero-precedence events.

The queue light on the CRT keyboard comes on when there is anything in the queue. If there is more than one event or message in the queue, the light remains on until all the queue's contents have been displayed. The event or message which has been in queue the longest is displayed first.

To display something in queue, the Chief Dispatcher types the command:

Q

The letter "Q" is followed by pressing the function key marked "QUEUE".

The queue light should be regularly checked throughout the work shift and, if on, the queue's contents must be promptly displayed and examined.

THE RADIO DISPATCHER

The Radio Dispatcher is responsible for the assignment of police units to events, in order to maximize prompt response and efficient service to every citizen who requests the assistance of the Seattle Police Department.

The Dispatcher will assign police units to events as soon as possible after he receives them. These events are to be removed from the queue and displayed immediately. The Dispatcher will thoroughly read each event, analyze the recorded information, and evaluate the indicated circumstances.

The primary concern is safety: for the citizen, and for any responding police officers and other emergency units. The Dispatcher will evaluate every event for any present, imminent or probable danger. Assess the hazard factors.

To determine the extent of police response, the Dispatcher will consider the potential developments in each specific event. Any time there is reasonable cause to expect confrontation, more than one officer will be dispatched.

Police work is inherently dangerous. A simple parking complaint can develop into a dispute, or worse, a disturbance. The Dispatcher will acknowledge all radio calls promptly: an officer may have only one brief moment to request help.

The Dispatcher is called upon to exercise sound judgment at all times.

The Dispatcher will transmit all information in a clear, precise manner. Before transmitting information from an event, the Dispatcher must first understand the facts recorded in the event format. It is important to mentally organize the information, so that the dispatch transmission is accurate, clear and complete. The assigned unit should receive firm directions and instructions which tell him the type of incident and exactly where it is. The unit will be advised of <u>all pertinent information</u>.

Information must be relayed in a logical sequence:

1) What
2) Where
3) Specific details

The field units expect a uniform format of information broadcasting. The above sequence allows officers to prepare to copy the information.

In addition to the assignment of police units to events, the Radio Dispatcher's responsibilities include providing supportive service to the field units by utilizing inquiry capability into the various computer information systems--Sea-King, WACIC, NCIC and DMV, and maintaining accurate, up-to-date listings of all units assigned to his area.

The Dispatcher will perform all his duties in a <u>professional</u> manner. Some fundamental characteristics of this professional demeanor are:

1) Empathy
2) Courtesy
3) Discipline
4) Responsibility

While the Dispatcher must exercise firm control and must demonstrate the highest degree of professionalism in all duties, he must also recognize that he is a link in the chain of service the Department strives to provide. He is an important part of the service <u>team</u>.

LOGGING ON AND OFF

When the Radio Dispatcher reports for duty at the assigned radio console, the first function is to log on the area(s) assigned. This is done using the command:

LT.dispatcher's Department serial number.area

The first field in this command is "LT", for "log on terminal." The next field contains the Dispatcher's Department serial number. The last field in the command contains the area designator.

An example of this command is:

LT.3060.N

Each time the Radio Dispatcher leaves the assigned console, the area(s) must be logged off. The command used to do this:

LO.area

The letters "LO" in this command designate "log off terminal."

This procedure will be adhered to throughout the work shift. The Dispatcher will log on each

time he assumes or resumes the radio position, and he will log off each time he leaves the position, with the final log-off command performed at the end of the duty shift.

THE EVENT SUMMARY

When the Dispatcher has assumed control of a radio frequency, it is vital that he familiarize himself with the various situations involving the frequency. The event summary is one of the tools he uses to accomplish this.

The event summary will be displayed immediately after logging on the dispatch area. The event summary is displayed by typing the command:

S

The "S", for "summary," is followed by depressing the function key marked "EV-SUM".

(If the Dispatcher is working more than one area, the event summary which is displayed in response to the above command will be a combined listing of the events belonging to both areas. Individual summaries can be obtained by adding the area designator in the command, after the "S"--for example, S.N)

SAMPLE EVENT SUMMARY

```
N/2 1223 4235 FRAUD  1401 NE 145
D/0 1256 4307 ALARM  15457 15 AVE NE
D/0 1237 4271 ROBBER 1724 NW MARKET
D/1 1153 4201 PROWLE 1 AVE NE & NE 100
D/1 1222 4231 BURGLA 2712 NW 65 ST
D/1 1239 4275 TRAFFI 4700 1 AVE NE
D/2 1120 4192 FRAUD  BON MARCHE NORTHG
D/2 1203 4237 LARCEN 2915 NE 133 ST
D/2 1247 4296 DRUNK  6602 26 AVE NE
D/2 1244 4239 ACCIDE 1 AVE NW & NW 85
AVAL: 2D4* 2D45* 2D7 2N 2U 2U1 2U56*
D/8 1251 4299 PARKIN 1702 NE ST
D/9 1206 4230 920
D/9 1205 4238 950
D/9 1219 4247 970
D/9 1255 4301 980 CAR
```

LAST PAGE

The event summary is a listing of all the events in the area file. The events in the summary are listed in order of precedence. Each event has its own entry in the summary, giving specific information about the event in an abbreviated form.

The information included for each event consists of a "D" or "W", for "dispatched" or "waiting," the event's precedence, the event number, the time the event was created, the location, and the type-of-call code.

The Dispatcher will carefully examine the summary, making special note of those events which are waiting to be dispatched, their locations, and their precedence.

THE UNIT SUMMARY

The unit summary is another tool provided for the Dispatcher, to enable him to quickly survey the manpower situation for his frequency.

To display the unit summary, the Dispatcher types the command:

S

The "S", for "summary," is followed by de-

pressing the function key marked "UN-SUM". (If the Dispatcher is working more than one dispatch area, the unit summary which will be displayed in response to the above command will be a combined listing of units--all the units logged on to both areas, in alpha-numerical order. To obtain a listing of the units assigned to a specific area, the area designator is included in the command; for example: S.N)

Each unit in the unit summary is listed in alpha-numerical order, with the symbol ✙ denoting two-man units. The summary shows if a unit is assigned to an event and, if so, the type of event (type-of-call code), and whether the unit has arrived (a "D" designates "dispatched", an "A" indicates that he has notified the Dispatcher of his arrival). The entry for dispatched units also includes the dispatch or arrival time, whichever is most current.

The Dispatcher will carefully examine the displayed unit summary quickly and thoroughly, and will rapidly formulate an accurate conception of his manpower status--how many units assigned, and how many clear.

SAMPLE UNIT SUMMARY

```
2B2 * D1240 TRAFFI   2N1 * D1259 ALARM    2U34 D1251 PARKIN
2B23  A1240 BURGLA   2N2 * D1259 ALARM    2U44 A1202 A/T
2B3 * D1255 980      2N3   D1224 ACCIDE   2U56*
2B4 *                2N34* D1251 DRUNK
2B45                 2N7   D1219 970
2B6   A1122 FRAUD    2N78  D1259 ALARM
2B7                  2U
2B8   D1205 950      2U1 *
2B89* A1252 PROWLE   2U2   D1200 920
2N                   2U3   A1217 LARCEN
AVAL: 2B4* 2B45* 2B7 2N 2U 2U1* 2U56*                          LAST PAGE
-------------------------------------------------------------------------
```

DISPLAYING EVENTS AND MESSAGES IN QUEUE

After having promptly and rapidly assessed the area's activity (from the event summary) and the area's manpower (from the unit summary), the Dispatcher's next step is to check the area queue. Anything which may be waiting in queue when the Dispatcher takes over the frequency must be promptly displayed and examined. Having already checked the waiting events, the Dispatcher will know whether any new event displayed from the queue has dispatch priority over those which have been holding.

When an event is routed to a dispatch area from a telephone area, it goes to that dispatch area's queue. Computer-generated system messages are also routed to the area queue. The queue light on the CRT keyboard comes on whenever there is anything in the queue, and remains on until all the contents of the queue have been displayed.

An event or message in queue is displayed by typing the command:

Q

The letter "Q" is followed by depressing

the function key marked "QUEUE". When the command is activated by pressing the function key, the event or message which has been in queue the longest will be displayed on the screen.

ADDING BEAT INFORMATION

As soon as the Dispatcher has displayed and examined an event called from the queue, the decision is made regarding whether the event will be immediately dispatched, or will remain in file as waiting. In either case, the district of occurrence will be promptly determined and the BEAT field completed in the body of the event format.

There are three reasons why it is important to complete the BEAT field immediately:

1. It assists the Dispatcher in selecting the appropriate unit(s) to handle the event;
2. It alleviates the need for repeating this procedure if the event is going to remain in file as waiting, by making the BEAT information a permanent part of the event record; and
3. This information is required before the event can be closed and the last resource cleared from it.

After moving the cursor to the BEAT field

the function key marked "QUEUE". When the command is activated by pressing the function key, the event or message which has been in queue the longest will be displayed on the screen.

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As soon as the Dispatcher has displayed and examined an event called from the queue, the decision is made regarding whether the event will be immediately dispatched, or will remain in file as waiting. In either case, the district of occurrence will be promptly determined and the BEAT field completed in the body of the event format.

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1. It assists the Dispatcher in selecting the appropriate unit(s) to handle the event;
2. It alleviates the need for repeating this procedure if the event is going to remain in file as waiting, by making the BEAT information a permanent part of the event record; and
3. This information is required before the event can be closed and the last resource cleared from it.

After moving the cursor to the BEAT field

and typing in the appropriate three-character code (example: 2B3), the Dispatcher returns the cursor to the home position of the displayed event.

If the event is going to be immediately dispatched, the dispatch command which is entered updates the event record with the BEAT information. (See Dispatching Events, page 14.12.)

If the event is not going to be immediately dispatched but is going to remain in file as waiting, an update command must be entered, to add the BEAT information to the event record. (See Updating Events, page 14.15.)

DISPATCHING EVENTS

To dispatch a unit to an event, the Dispatcher first selects the unit or units who are going to handle the event. As soon as the unit or units have acknowledged the assignment, the Dispatcher records the dispatch in the computer system.

The dispatch command, performed on the command line of the displayed event, is:

D..unit number

The letter "D" designates "dispatch." The second period in the command signifies to the computer that the event being dispatched is the one displayed. The last field contains the unit number of the unit being dispatched.

Up to five units can be dispatched on one dispatch command. A total of twenty units can be assigned to one event, and the Dispatcher uses as many dispatch commands as needed, listing up to five units per each command.

An example of a single-unit dispatch command is:

D..2B3

An example of a multiple-unit dispatch command is:

D..2B3.2B4.2U1.2U3

To dispatch a unit or units to an event not displayed on the CRT screen, the event number must be included in the dispatch command:

D.1234.2B3 or D.1234.2B3.2B4.2U1.2U3

DISPLAYING EVENTS IN FILE

When the Dispatcher has made a decision to dispatch an event which is shown as waiting in the event summary, he will display and examine that event before assigning any police unit(s) to it. The Dispatcher will also need to display a filed event when an assigned officer provides information that must be added to the event record.

Displaying Events by Event Numbers

To display an event by its event number, the Dispatcher types the command:

EN.event number

The letters "EN" in this command designate "event by number." The next field contains the four-digit event number assigned to the event when it is initially routed to the dispatch area.

An example of this command is:

EN.1234

The event number for any event in file, dispatched or waiting, can be obtained by looking at the event summary, in the third column from

the left, under the heading "EVT#".

Displaying Events by Unit (Resource) Numbers

If an event is in file as "dispatched," the event can be displayed by typing the command:

ER.unit number

The letters "ER" in this command designate "event by resource," followed by the unit number of the dispatched unit. If there is more than one unit assigned to the event, the unit number of any dispatched unit can be used in the command.

An example of this command is:

ER.2B3

A dispatched event can be displayed using either the event by event number command, or the event by resource command.

UPDATING EVENTS

The update command is used to add, delete or change information in the body of an event record. After an update transaction has been performed, the new information appears in the

event format each time it is displayed until the event is closed, unless that information is changed again before the event is closed.

To update an event, the event itself must be displayed on the CRT screen, and the update command must be entered on the command line of the displayed event.

The Dispatcher types the information in the appropriate field(s), returns the cursor to the home position, and types the command:

UP

The letters "UP" designate "update." The cursor scans the event, noting the changes, deletions or additions, and replaces the previous version of the event record with the new, updated version. (Before activating the update command, the Dispatcher will carefully re-read what he has typed, to assure that there are no extra characters in the changed field, remaining from the previous information in that field.)

To change the precedence of an event, the same update command is used, but the new precedence

code is simply added:

UP.precedence code

An example of this command is:

UP.2

(NOTE: The Dispatcher will use caution before lowering the precedence code assigned to an event by the operator who created it. It must be kept in mind that the operator who received the call and talked to the caller is in the best position to assess the urgency of that event.)

REROUTING EVENTS

A dispatcher might reroute an event because:

1. It has been routed to the wrong dispatch area;
2. The Dispatcher has no units of his own to handle the event within a reasonable time; or
3. Additional or more complete information is needed from the operator who created the event.

To reroute an event, the Dispatcher types the command:

R.precedence code.area

In this command, the letter "R" designates "route." The next field contains the precedence code, which the Dispatcher copies carefully from Line Two of the event. The final field is the area to which the event is to be routed.

An example of this command is:

R.2.N

The computer will then route the event to the correct area and remove it from the area file of the Dispatcher who has rerouted it.

If the Dispatcher is rerouting the event because he does not have a unit or unit(s) to handle the event, he must make a notation in the RE field of the event format, stating that this is the case. The notation will be made prior to performing the route command; the route command updates the event with the Dispatcher's comment, and the Dispatcher who then receives the event will understand the reason for the reroute.

If the event is routed back to the telephone operator who created it, a comment should be typed in the RE field explaining the Dispatcher's request. The notation

must be typed prior to activating the route command, in order to make it a part of the event record the telephone operator receives.

To route any event, the event itself must be displayed on the CRT screen and the route command must be entered on the command line of the displayed event.

RECORDING ARRIVAL TIMES

When a unit notifies the Dispatcher that he has arrived at the event to which he is assigned, the information will be recorded in the computer system using the command:

A.unit number

The "A" in the command designates "arrival," followed by the unit number of the arriving unit.

An example of the arrival command is:

A.2B3

Up to five units can be arrived using one command. An example multiple-unit arrival command is:

A.2B3.2B4.2U1.2U3

The arrival recorded by this transaction appears in the unit summary--the letter "A" follows the unit number of each assigned unit who has arrived at the location of his event.

FREEING UNITS

If a unit must be released from an event to which he has been assigned, the dispatcher will enter the command:

F.unit number

The letter "F" designates "free," followed by the unit number of the unit to be released from the event.

An example of this command is:

F.2B3

If the unit who has been freed is the only unit assigned to the event, it will remain in the area file as a waiting event, until another unit is available to handle it or until the original unit can be assigned to it again.

If there is another unit or other units still assigned to the event, it will remain in the area file as a dispatched event. The

Dispatcher will make the decision whether one of the units still assigned will be told to handle the event and, if so, will relay that decision to the appropriate unit(s).

It is important to remember that a unit cannot be assigned to more than one event at a time. This includes regular events, administrative events, and on-view events.

Freeing a unit from an event does not make a disposition of that event--it may alter the status of the event from dispatched to waiting, but freeing a unit is not to be confused with clearing a unit.

CREATING ON-VIEW EVENTS AND ASSIGNING UNITS TO THEM

When a unit notifies the Dispatcher that he has encountered an on-view situation which he is going to handle, the Dispatcher creates an on-view event for that unit by:

1. Displaying a blank event format;
2. Completing the necessary fields; and
3. Dispatching the unit to the new event.

The Dispatcher displays a blank event format

on the CRT screen by typing and entering the command:

B

The letter "B" designates "blank event format."

The Dispatcher then completes the BEAT, LOC (location), RE (details about the event), and TYPE (type-of-call code) fields.

After completing these fields, the Dispatcher returns the cursor to the home position of the event and enters the dispatch command:

D..unit number

An example of the dispatch command is:

D..2B3

The computer then generates a new event record, assigns it a precedence code of 8 (the precedence for all on-view events), and the event becomes a part of the area's event file until it is closed.

CREATING ADMINISTRATIVE EVENTS AND ASSIGNING UNITS TO THEM

In order to show a unit out-of-service for any reason which falls in the category of "Administrative Downtime", the Dispatcher will select the appropriate MIR code for the unit's specific detail from the list of 900 to 999 MIR codes. After determining the correct code, the Dispatcher types the command:

AD.unit number.MIR code.location

The letters "AD" which begin the command designate "Administrative Dispatch." The next field contains the unit number of the unit going out of service, and the MIR code is in the next field. The final field contains the location where the unit will be.

The location field can be omitted in commands recording the following details:

922 - No Answer When Called
931 - Eat
932 - Coffee
933 - Garage/Car Maintenance
934 - Station

The location field will be completed in commands recording the following details:

911 - Community and School Meetings
912 - Court
913 - Hospital Guard
914 - Prisoner Escort
915 - Other Escort
916 - Request to Watch
917 - Stakeout
918 - Assigned Warrant and Subpoena Service
919 - Other Assigned Downtime
921 - Out of Car - No Reason Given

An example of the administrative-event command is:

AD.2B3.931

Another example, in which the location is given, is:

AD.2B3.912.DEPT 4

When this command is performed, the computer generates an event record, which has a precedence of 9 (the precedence code for all administrative events). The unit number, the administrative MIR code, and the type-of-call code appear in the unit summary. If the location has been

included in the command, this information appears in the summary also.

An administrative event record can be displayed in the same manner as any other event, using either the command to display an event by event number, or the command to display an event by unit number.

CREATING TRAFFIC-VIOLATION EVENTS AND ASSIGNING UNITS TO THEM

When a unit advises the Dispatcher that he is handling a traffic violation, the Dispatcher records this using the administrative-dispatch command. The MIR code used is 990.

The command to assign a unit to a traffic-violation event is:

AD.unit number.990.location

The location field is a required part of this command.

An example of this command is:

AD.2B3.990.70 & GREENWOOD

This command creates an event record, which has a precedence of 9. The event record can be displayed, and the information appears in both

the event and unit summaries.

CLEARING UNITS FROM EVENTS

Clearing Administrative Events

To clear a unit from an administrative event, the Dispatcher enters the command:

C.unit number

The letter "C" in the command designates "clear," followed by the unit number of the clearing unit.

An example of a clear command for a unit assigned to an administrative event is:

C.2B3

Clearing Units from Traffic-Violation Events

An officer who clears from a traffic-violation event will provide the Dispatcher with a MIR and disposition. The MIR will probably be 460, in combination with any valid disposition code.

To clear the unit, the Dispatcher types the command:

C.unit number.MIR and disposition

An example of this command is:

C.2B3.460H

Clearing X-Ray Units

If a unit clears from an event with a disposition of x-ray, the Dispatcher enters the command:

C.unit number.X

The "C" for "clear" is followed by the clearing unit's number. The last field contains the letter "X", designating that the unit's disposition is x-ray.

An example of the x-ray clear command is:

C.2B3.X

If every unit assigned to an event clears with an x-ray, the dispatcher will receive an error message when the clear command for the last unit is entered. The computer requires that at least one assigned unit clears with a MIR and disposition. The unit clearing with

the MIR and disposition need not be the last unit to clear, and more than one unit assigned to an event can clear with MIR's and dispositions, but the computer will not allow the last unit clearing to take an x-ray if all units who cleared before him did so.

Clearing with MIRs and Dispositions

At least one unit assigned to an event will clear with a MIR and disposition. When this unit clears, the Dispatcher enters the command:

C.unit number.MIR and disposition

The "C" for "clear" is followed by the clearing unit's number. The final field contains the MIR and disposition the unit has selected for clearing.

An example of this command is:

C.2B3.052P

When all units assigned to an event have cleared and at least one of the units has cleared with a MIR and disposition code, the computer closes the event and removes it from the area's file.

GENERATING CASE NUMBERS

When a unit assigned to an event requests a major case number prior to clearing from the event, the Dispatcher will type and enter the command:

M.unit number

The letter "M" designates "major case number," and it is followed by the unit number of the unit requesting the case number. An example of this command is:

M.2B3

In response to this command, the computer generates a major case number, which appears in the acknowledgment message.

An example of an acknowledgment message containing a major case number is:

2B3 ASSIGNED OCA 74-123456

It is not necessary for the event to which the requesting unit is assigned to be displayed on the CRT screen when performing this command.

Certain dispositions will cause the computer to generate a major case number. If a unit

clears from an event with a disposition of A, B or C, a major case number is generated, and the case number appears in the acknowledgment message.

An example of this type of acknowledgment message is:

2B3 CLEARED - OCA 74-123456 APPLIED
AND EVENT CLOSED

Whether a unit is requesting a case number prior to clearing or clears with an A, B or C disposition, only one major case number is generated for any one event. If a case number has already been issued to the event (another assigned unit requested a case number earlier), the computer will respond with the previously-issued case number. If no number has yet been requested for the event, the computer will generate one.

Preassigned Case Numbers

Certain types of cases are filed under a predetermined case number. Two examples of these types of cases are found narcotics, and loss or theft of license tabs. Each time a major case report which falls into one of these

categories is taken, it is assigned the case number shared by all cases of that type throughout the calendar year.

When a dispatched unit handles an event which falls into this classification, it is necessary to make the specified case number a part of the event record before the officer clears from the event. The officer handling this type of case will advise the Dispatcher that he has taken this type of case report, before he offers a MIR and disposition for the event. When the Dispatcher is so advised, he types the command:

M.unit number.case number

The "M", for "major case number," is followed by the unit number of the assigned unit. The next field contains the specified case number which the Dispatcher wishes recorded in the event record.

An example of this command is:

M.2B3.7400001

The assigned unit can be cleared from the event with his MIR and disposition at any time, after the above command has been acknowledged.

If the unit clears with a disposition of A, B or C, the acknowledgment message will contain the case number the Dispatcher entered in the earlier command.

CANCELLING EVENTS

Only waiting events can be cancelled by the Dispatcher. The cancel command is:

CA

The letters "CA" designate "cancel," and this command must be performed on the command line of the displayed event. The Dispatcher will use this command only when a telephone operator routes an event to him stating that a citizen wishes the event cancelled. In each instance where such notification is received, the Dispatcher will carefully match the information in the NAM and PHN fields--this information must be identical on the original event and the cancel notification event.

When the original event has been cancelled by the cancel command, the Dispatcher then cancels the event notifying him of the request to cancel, using the same command: CA.

If an event is received notifying the Dispatcher that a citizen wishes an event cancelled, and a police unit has been assigned to the event, the assigned unit will be advised of the cancel request and the event will be cleared with a proper MIR and disposition. The disposition used will probably be "S" ("cancelled by radio").

When the event has been cleared, the Dispatcher cancels the event which notified him of the request to cancel, using the cancel command: CA.

DUPLICATE EVENTS

When the Dispatcher receives more than one event pertaining to the same situation or incident, it is necessary to retain only one of the events in the area's active event file. The Dispatcher must assure, however, that there is no pertinent information on the duplicate events. If there is additional pertinent information, the Dispatcher will update the original event (the event he is going to retain in file) with this information. When this is done, the duplicate events can be dropped from the area file by entering the command:

DU

The letters "DU" designate "duplicate." This command must be performed on the command line of the displayed event, and each duplicate event requires a separate command.

INFORMATION EVENTS

If the Dispatcher receives an event and, after carefully reading and evaluating the information in the format, determines that it is not necessary to dispatch a specific police unit or units but broadcasts the information for all units, the event can then be dropped from the area's active event file by entering the command:

IN

The letters "IN" designate "information."

Extreme discretion must be used in making the determination that an event is to be classified as information only. These events must be very carefully assessed before deciding that no specific dispatch is required.

information. It is important to acknowledge all radio calls as soon as possible, and clearing units must be acknowledged promptly.

To remove a unit from the system, the Dispatcher enters the command:

LO.unit number

The letters "LO" in this command designate "logg off resource." The next field is the unit number of the unit going out of service.

An example of this command is:

LO.2B3

As soon as the log-off command is acknowledged by the computer, the unit is deleted from the area's resources and will no longer appear in the unit summary.

A unit must be clear (not assigned to any event) in order to be logged off.

THE DETAILED UNIT RECORD

For each unit logged into the system, there is a Detailed Unit Record available for display by any operator. This record contains certain information

pertaining to the unit; this information is displayed in two columns. The column on the left contains information which is permanent throughout the workshift. The items of information which appear in this column are as follows:

UNIT:	The unit number
AREA:	The area designator for the area to which the unit is logged
OFC1:	The serial number of the first officer working the unit
OFC2:	The serial number of the second officer working the unit
CAR#:	The unit's equipment number
LON BY:	The serial number of the Dispatcher who logged the unit into the system
AT:	The time the unit was logged into the system
COMMENTS:	A twenty-character field which contains any pertinent details concerning the unit (riders, scheduled court appointment, etc.)

The column on the right contains information relating to any event to which the unit is currently assigned. (This information changes, as the unit clears one event and is dispatched to another, so that only outstanding-event information appears in this column.)

The information in this right-hand column is:

EN:	The event number
OCA:	The major case number, if any, assigned to the event
TYPE:	The type-of-call code
DISPATCH:	The time the unit was dispatched to the event
ARRIVE:	The time the unit arrived at the event, if he has arrived

In the Detailed Unit Record, the information in the UNIT, AREA, OFC1, OFC2, and COMMENTS categories is provided by the Dispatcher, in the log-on-resource command. The information in the other areas is generated by the computer.

To display a Detailed Unit Record, the operator enters the command:

DR.unit number

The letters "DR" designate "Detailed Record," followed by the unit number of the unit whose detailed record the operator wishes to display.

the end

I. CONVERTING FROM "SELECT" SYSTEM TO MANUAL SYSTEM

There will be at least one person on each watch assigned to attempt restart, in the event of a mid-operational system failure. This assignment will be announced at the shift roll call preceding the duty shift.

There will be another person on each watch assigned to recover and distribute the system failure records and print-outs from the printer (see page 15.07). This assignment also will be made at the shift roll call preceding the duty shift.

If two attempts at restarting the system fail, the person assigned to restart will advise the shift sergeant or acting sergeant. The sergeant will then instruct his personnel to begin converting to the manual system.

The specific duties and procedures for each position in the Division are outlined below.

A. Sergeant

1. Advise the primary operators and primary-secondary operator to switch to manual system.
2. Assess personnel status and workload considerations.
   a. If sufficient personnel, assign persons to assist dispatchers in converting to manual system. If only one person can be spared for this, carefully assess which dispatcher is most in need of this assistance. If two persons are available, select the two dispatchers who can best utilize assistance, and so forth.

   b. Advise those radio dispatchers who are going to receive assistance that this is the case, and notify those dispatchers who are responsible for converting themselves.
   c. Notify the Chief Dispatcher that there has been a "SELECT" System failure.
3. During conversion process, reallocate personnel as necessary or desirable, according to changes in work-load (i.e., if necessary reassign a person assisting a dispatcher to a telephone position if incoming calls increase, or if possible assign an additional person to assist a dispatcher who is not converting rapidly enough).

B. Chief Dispatcher

1. Broadcast on all frequencies that there has been a "SELECT" System failure and request that all units stand by except for emergencies.
2. When conversion to manual system has been completed by every zone dispatcher, broadcast on all frequencies that the air is clear for routine business.

C. Control Terminal Operator

1. The person assigned to attempt restart will provide the next major case number to be issued manually. Begin using this number immediately for any requests by telephone or from dispatchers for case numbers.
2. Maintain a list of case numbers and the units to which these numbers have been assigned. For all case numbers

issued to Units 887, 888, 889 and 999, complete a buff IBM dispatch card, including unit number, officers' serial number(s), location, type of call, complainant's name, and major case number issued.

D. Primary Operators

1. Begin immediately routing all calls requiring dispatch to radio on IBM dispatch cards.
2. Transcribe to an IBM dispatch card information pertaining to the last event routed to radio, if:
   a. that event is still displayed on the CRT screen; and
   b. approximately one minute or less has passed between the routing of that event and the "SELECT" System failure.

E. Primary-Secondary Operator

1. Begin routing all calls requiring dispatch to radio on IBM dispatch cards.
2. Transcribe the information on the last event routed to radio onto an IBM dispatch card if:
   a. that event is still displayed on the CRT screen; and
   b. approximately one minute or less has passed since the routing of that event and the "SELECT" System failure.
3. As soon as the sergeant has advised that there has been a system failure, obtain any major case numbers needed from the Control Terminal Operator.

F. Radio Dispatchers

1. The shift sergeant will advise each dispatcher that

a "SELECT" System failure has occurred, and will further advise whether the dispatcher will have assistance in converting to manual operation. If the dispatcher is advised that he will have no assistance, he is responsible for accomplishing this conversion himself.

2. Each dispatcher will receive a copy of the system failure records for his radio area(s) (see page 15.07).
   a. These records consist of both an event failure record and a unit failure record.
   b. There are three factors each dispatcher will consider in regaining a complete working knowledge of his frequency:
      1) how current the system failure records are (time shown at the top of the record versus current time);
      2) whether there is a current summary (either event or unit) displayed on the CRT screen at time of failure, plus the most current Line 12 (available units). The most current Line 12 is the one on the last half of the screen used;
      3) how long the dispatcher has been working on the particular console prior to failure.
3. Converting to the manual system is done in two steps: recovering event status, and recovering unit status. A record of each active (current) event will be made on an IBM dispatch card, beginning with waiting events.

a. Each pair of adjoining consoles will share a copy of the printout of events, and the printout will be utilized, with the failure records, to recover waiting calls.

1) First, check the line which says "EVENT #S IN QUEUE." If there are none, proceed with the next step. If there are event numbers listed (preceded by EN:), locate the originally-routed copy of each event, by event number, and transcribe all the information in that event record to an IBM dispatch card.

2) Next, check the event failure record (event summary), pick out the event numbers of waiting events, and locate the originally-routed copy of each waiting event, by event number, on the printout. Transcribe the information to IBM dispatch cards.

b. Unit status is recovered utilizing the last Line 12 on the CRT screen, the system failure records, and the dispatcher's own recall.

1) If Line 12 was displayed after the unit failure record was printed, any unit shown clear on Line 12 but assigned in the unit failure record can be assumed to be clear.

2) For each assigned unit, an IBM dispatch card will be completed, with <u>minimum</u> information.

a) For each unit assigned to a regular call, record the unit number, location and type code. For some calls the dispatcher may

wish to record additional details, which can be obtained from the printout by event number.

b) For each unit assigned to an administrative event, record the unit number and the 900-series MIR code on a pink IBM dispatch card.

c. For assigned units, the dispatcher <u>may</u> wish to hold a <u>partial</u> roll call. If there is any doubt as to a unit's location and/or assignment, that unit will be queried over the air to clarify this information.

4. While operating on the manual system, all calls dispatched on IBM dispatch cards will be completed on the dispatch cards, including MIRs and dispositions, and major case numbers, if any. All calls dispatched and cleared on dispatch cards will be retained and given to the Control Terminal Operator.

a. Calls dispatched in the "SELECT" System and transcribed to dispatch cards may have major case numbers on them at time of failure, and units clearing calls will be carefully queried at time of clearance as to whether a case number was previously obtained.

b. To record the dispatch of a unit on a dispatch card during the manual operation, write in only the unit number and the time of dispatch, in the upper right hand corner of the card.

SYSTEM FAILURE RECORDS

AREA: N DATE: 03/07/74 TIME:15:36

EVENT SUMMARY FOR N

```
W/3 2563 15:25 AUTO T 4313 STONE WAY N   W/3 2573 15:34 DIST O 10330 MERIDIAN N
D/3 2480 13:58 FRAUD  103RD & AURORA     D/3 2482 14:01 ACC N  13216 3 NW
D/3 2492 14:08 FRAUD  125 & ROOSEVELT    D/9 2522 14:46 934
D/9 2523 14:46 934                       D/9 2535 15:06 931
D/3 2554 15:19 DIST   917 N 137 # 9      D/3 2559 15:22 BURG   747 N 85
D/3 2560 15:22 SEX    2630 NW 87         D/3 2568 15:29 TRAF   12848 GREENWOOD
```

EVENT #S IN N QUEUE

NO EVENT NUMBERS ON QUEUE FOR THIS AREA

RESOURCES BELONGING TO N

```
281    2560  2823   2535  284   2559  285    286   2522  287   2523
2N15   2480  2N2    2568  2N3         2N4    2554  2N6   2482  2N7
2N8    2492  2U1         2U2         2U3          2U4         2U89
7T20         7T21        7T22        7T30         7T31        7T32
8T31         8T32        8T33        8T35
```

SYSTEM FAILURE RECORDS

AREA: S DATE: 03/07/74 TIME:15:39

EVENT SUMMARY FOR S

```
W/3 2549 15:16 SHOPL  7101 EMPIRE WAY    W/3 2562 15:23 DRUNK  7555 RENTON S
D/9 2414 12:51 912                       D/9 2434 13:06 919    DRIVER TRAINING
D/9 2460 13:28 992    COLUMBIA CITY      D/9 2475 13:51 912    SUPERIOR
D/2 2504 14:23 ACC I  COLUMBIAN S & 15   D/3 2506 14:25 SUSP   4246 S JUNEAU
D/2 2524 14:47 BURG   5219 32ND S        D/3 2536 15:09 ARSON  3013 MT BAKER BL
D/3 2539 15:11 BURG   8608 16SW          D/9 2558 15:21 919    MAIL RUN
D/3 2567 15:29 SUSP   2717 61 SW ALKI    D/9 2569 15:29 918    SAM LEE 032151
D/2 2570 15:30 BURG   6752 41 SW
```

EVENT #S IN S QUEUE

EN:2577,

RESOURCES BELONGING TO S

```
2R1    2434  2R2    2506  2R23   2460  2R3    2536  2R4    2524  2310   2524
2513   2558  252    2504  254    2524  2W1    2567  2W2    2567  2W3    2570
2W4    2569  2W44   2475  2W5    2539  2W6    2569  7T26   2567  7T27   2414
7T28
```

SYSTEM FAILURE RECORDS

AREA: WC DATE: 03/07/74 TIME:15:40

EVENT SUMMARY FOR WC

```
D/9 2418 12:54 931                          D/9 2426 13:00 912
D/9 2435 13:06 912    CT 3                  D/9 2446 13:12 922
D/9 2455 14:12 931                          D/8 2516 14:40 SVC S  600 THIRD
D/8 2523 14:55 PARK   4 & MADISON           D/3 2533 15:01 DIST   1962 1 S
D/3 2541 15:11 ACC N  365 WHEELER           D/9 2548 15:16 992    WESTLAKE MALL
D/9 2556 15:20 992                          D/9 2557 15:20 931
D/3 2564 15:27 SVC P  1409 3RD AVE          D/9 2575 15:37 931
D/9 2576 15:38 931
```

EVENT #'S IN WC QUEUE

EN:2574,2581,

RESOURCES BELONGING TO WC

```
2D1          2D2     2548  2D3     2556  2D4     2533  2D5          2D7
2D8          2D9     2564  2D99          2K1     2516  2K2     2575 2K3
2K8          2Q12    2557  2Q34          2Q5     2541  2Q6     2576 7T12
7T13         7T14    2446  7T2           7T23          7T24         7T25
8T10         8T11          8T12          8T13          8T14         8T15     2529
8T17    2435 8T18    2455  8T19    2418  8T2           8T21         8T22
8T23         8T26          8T27    2426  8T28          8T29         8T30
```

SYSTEM FAILURE RECORDS

AREA: EC DATE: 03/07/74 TIME:15:36

EVENT SUMMARY FOR EC

```
W/3 2546 15:14 INJ    1127 35TH             W/3 2555 15:20 SVC    PIER 90 CSO
W/3 2565 15:26 SVC    2515 WESTERN          D/3 2410 12:48 SVC S  1200 MADISON
D/9 2515 14:33 918     RANGE BANG!!!!!      D/3 2528 14:44 LARC   521 21ST E
D/2 2531 14:58 SHOPL  1410 E JOHN           D/3 2532 14:59 BURG   1719 E SPRING #1
D/9 2542 15:12 931                          D/2 2544 15:13 HAZ    ON 16E AT MERCER
D/3 2547 15:16        UNIV & SUMMIT         D/3 2551 15:17 SVCP   901 EMPIRE
D/8 2553 15:19 ACC N  1300 MADISON
```

EVENT #'S IN EC QUEUE

NO EVENT NUMBERS ON QUEUE FOR THIS AREA

RESOURCES BELONGING TO EC

```
251     2551  264           365           2C12    2528  2C37    2544  2C4     2542
2C5     2410  2C6     2531  2C73          2F1           2F2           2F7
2G1           2G2     2553  2G3     2532  2G4     2515  2G5     2410  2G6     2547
```

II. CONVERTING FROM MANUAL SYSTEM TO "SELECT" SYSTEM

If the "SELECT" System becomes operational with resources but without events, the following will apply:

A. Primary Operators

1. Begin routing all calls requiring dispatch to radio on the CRT terminal.

B. Primary-Secondary Operator

1. Begin routing all calls requiring dispatch to radio on the CRT terminal.
2. Record all functions performed by Unit 543 during the "SELECT" System downtime in the system, using the prescribed procedure. Begin recording all new Unit 543 activities in the system.

C. Control Terminal Operator

1. As soon as advised that the "SELECT" System is again operational, terminate issuing case numbers manually.
2. Collect all IBM dispatch cards completed by dispatchers while the "SELECT" System was down. (These cards will probably not all be completed until some time after the system has been operating again.)
3. Pick out the dispatch cards containing major case numbers, place them with the cards made for case numbers issued during downtime to Units 887, 888, 889 and 999, and sort them into order, consecutively by case number, oldest number first. Create an event for each case number issued during downtime by completing

the following steps:

a. Call up a blank event format;
b. Complete the format, including location, complainant's name, S1 (first officer's serial number) and S2 (if applicable), and type. In the RE field put the unit number of the unit to whom the case number was issued (e.g., RE=3B4).
c. Dispatch Unit 999 to the event.
d. Record the correct case number, using the command to manually issue a case number, for example: M.999.7456789
e. Clear Unit 999 from the event using the MIR and disposition recorded on the IBM dispatch card.

4. After completing step three, sort the cards in order (including those without case numbers) according to time of dispatch, bind them with rubber bands and place them in the box on the floor under the typewriter table.

D. Radio Dispatchers

1. For each unit assigned to a call on an IBM dispatch card, the dispatcher will create an event using the AD command. The type used in the AD command is 997. An example of this command is: AD.3B4.997.45 & DAYTON
   a. When viewing an event or unit summary after dispatching units to 997 events, the dispatcher will recognize that a type code of "997" indicates that complete information on the event is available

on an IBM dispatch card, which the dispatcher will retain until the unit clears.

b. If there is a major case number already recorded on the IBM dispatch card, the command to manually issue a case number will be done after the AD command, for example: M.3B4.7456789

2. Events received on the terminal will be dispatched on the terminal, with no recording of information on IBM dispatch cards.

3. As units assigned in the system to 997 events clear, the "C.unit number" command will be used to clear them in the "SELECT" System and the unit's MIR and disposition will be recorded on the IBM dispatch card.

a. If the acknowledgment message to the clear command contains a major case number, that case number will be recorded on the IBM dispatch card also.

b. Units dispatched in the system to regular events (other than 997 events) will be cleared in the system, and there is no recording of information on dispatch cards required for these units.

4. Any unit who has been assigned to a 997 event and who requests a case number after the system is again operational will be given the case number using the "M.unit number" command, and when the unit clears the case number will be recorded on the IBM dispatch card along with the unit's MIR and disposition.

III. CONVERTING FROM MANUAL SYSTEM TO "SELECT" SYSTEM

If the "SELECT" System becomes operational without resources and without events (at a patrol shift change), the following will apply:

A. Primary Operators

1. Begin routing all calls requiring dispatch to radio on the CRT terminal.

B. Primary-Secondary Operator

1. Begin routing all calls requiring dispatch to radio on the CRT terminal.
2. Log resource 543 into the system, with serial number 0543.
3. Record all Unit 543 activities which occurred while the "SELECT" System was down on the CRT terminal, and record new Unit 543 functions as they are received.

C. Control Terminal Operator

1. Log on the following dummy resources:
   Unit 887 - serial # 7777
   Unit 888 - serial # 8888
   Unit 889 - serial # 9999
   Unit 999 - serial # 1111
2. Use dummy resources to issue case numbers to anyone requesting a major number by telephone.
3. For requests from radio dispatchers for case numbers, issue numbers from manual list (up to number provided

by person assigned to restart).

4. Collect all IBM dispatch cards completed by dispatchers while the "SELECT" System was down. (These cards will probably not all be completed until some time after the system has been operating again.)

5. Pick out the dispatch cards containing major case numbers, place them with the cards made for case numbers issued during downtime to Units 887, 888, 889 and 999, and sort them into order, consecutively by case number, oldest number first. Create an event for each case number issued during downtime by completing the following steps:

   a. Call up a blank event format;

   b. Complete the format, including location, complainant's name, S1 (first officer's serial number) and S2 (if applicable), and type code. In the RE field put the unit number of the unit to whom the case number was issued (e.g., RE=3B4). (Serial numbers for patrol units will be obtained from the carbon-copy list of numbers telephoned to Position 007 at patrol shift change.)

   c. Dispatch Unit 999 to the event.

   d. Record the correct case number, using the command to manually issue a case number, for example: M.999.7456789

   e. Clear Unit 999 from the event using the MIR and disposition recorded on the IBM dispatch card.

6. After completing step five, sort all the cards (including those without case numbers) into order according to time of dispatch, bind them with rubber bands, and place them in the box on the floor under the typewriter table.

D. Radio Dispatchers

1. Log on resources as they clear in-service.

2. Units dispatched on IBM cards will be cleared on IBM cards, and these calls will not be recorded in the "SELECT" System by the radio dispatcher.

3. Dispatch events received on the terminal as units become available and are logged on.

4. Use the M command to issue case numbers to units logged and dispatched in the system; obtain case numbers for units dispatched on IBM cards from the Control Terminal Operator.

5. Units dispatched on IBM cards who clear with major case numbers will have their MIRs and dispositions and major case numbers, recorded on the dispatch cards by the dispatcher.

IV. RESUMING OPERATION ON "SELECT" SYSTEM AFTER SHORT DOWNTIME

Under most circumstances, the "SELECT" System will come up again after a short down period with both events and resources. To resume operation, the following will apply:

A. Primary Operators

1. Begin routing all calls for dispatch to radio on the CRT terminal.

B. Primary-Secondary Operator

1. Begin routing all calls for dispatch to radio on the CRT terminal.
2. Begin recording Unit 543 activities on the CRT terminal. Record Unit 543 functions which were performed during the "SELECT" System downtime.

C. Control Terminal Operator

1. As soon as advised that the "SELECT" System is again operational, terminate manually issuing major case numbers.
2. Collect any IBM dispatch cards completed by dispatchers during the down period, place them with cards made for Units 887, 888, 889 and 999 during the downtime, and pick out those cards with major case numbers. Record each major case number by completing the following steps:
   a. Call up a blank event format;
   b. Complete the format, including location, complainant's name, type code, S1 and S2. In the RE field

   put the unit number of the unit to whom the case number was issued (e.g., RE=3B4).
   c. Dispatch Unit 999 to the event.
   d. Record the correct case number, using the command to manually issue a case number, for example: M.999.7456789
   e. Clear Unit 999 from the event with the MIR and disposition recorded on the IBM dispatch card.
3. Sort all the cards according to time of dispatch, bind them with a rubber band, and place them in the box on the floor under the typewriter table.

D. Radio Dispatchers

1. Display a unit summary on one half of the CRT screen and an event summary on the other.
   a. Remember that calls which were in queue at the time the system went down are now in the event summary as "waiting." This means that there are waiting calls shown in the summary which the dispatcher has not yet seen in their complete form.
2. Check the contents of these summaries against any IBM dispatch cards containing current information.
   a. Units shown assigned to administrative events in the unit summary who are now clear will be cleared with the "C.unit number" command.
   b. Units shown assigned to one call in the summary who are clear of that call and now assigned to another will be cleared from the call in the summary with the command "C.unit number.999Z". The unit will

then be dispatched to his current assignment (shown on the IBM dispatch card) using the AD command and type 997: AD.3B4.997.45 & DAYTON

1) If there is a major case number recorded on the IBM dispatch card, the manually-issued case number command will be used after the AD command: M.3B4.7456789

2) Units who have been assigned to administrative events during the downtime will be dispatched using the AD command and the appropriate 900-series MIR, i.e., AD.3B4.934

c. Units requesting major case numbers after they have been assigned to a 997 event, or after dispatch to a regular event in the system, will be issued major case numbers using the M command.

d. Units clearing 997 events will be cleared using the C.unit number command, and the MIR and disposition will be recorded on the IBM dispatch card. If the acknowledgment message to the clear command contains a major case number, this will be recorded on the IBM dispatch card also.

RESTART PROCEDURE FOR "SELECT" SYSTEM

The following instructions are for restarting the system when it has gone down mid-shift, and it is necessary and/or desirable to retain the events and units which were in the system at time of failure.

1. If system is still running (red light is moving on front of processor) but all CRTs are "locked up", put the HALT switch down. Put all numbered switches in the "down" position also.

2. Depress LOAD ADRS switch, raise HALT switch, and depress START switch.

3. Teletype will respond with a printout, for example:

```
SYS ERR ØØØØ2Ø
PC = ØØØØØ2
PS = ØØØØØØ
REGS =
ØØØØØØ/Ø52525
ØØØØØ1/ØØØØØ2
ØØØØØ2/ØØØØØØ
ØØØØØ3/ØØØ36Ø
ØØØØØ4/ØØØØØØ
ØØØØØ5/Ø41Ø12
ØØØØØ6/ØØØ774
STACK =
ØØØ774/ØØØØØ2
ØØØ776/ØØØØØØ
ØØ1ØØØ/ØØØØØØ
```

(If system has already halted, teletype printout will already have occurred and steps 1 through 3 can be ommitted. If this is the case, proceed with step 4.)

4. Load dump tape in teletype (see illustration).

5. Set switches 15, 14, 13 and 11 in the "up" position.

6. Depress LOAD ADRS switch, and depress START switch.

7. Tape will run through, and bell will ring. After bell has rung, remove tape.

8. Set switches 15, 14, 13, 11, 7, 6, 5 and 3 in the "up" position.

9. Depress LOAD ADRS switch, and depress START switch.

10. Teletype will type: I,ENTER DATE - FORMAT MM/DD/YY
and will return to next line.

Type: I- and current date, and depress RETURN key.
Example date format: I-02/18/74

11. Teletype will type: I,ENTER TIME - FORMAT HH:MM
and will return to next line.

Type: I- and current time, and depress RETURN key.
Example time format: I-03:50

12. Teletype will type: I,NEW MAG TAPE? - YES, NO, OR NONE
and will return to next line.

Type: I-NO and depress RETURN key.

13. Teletype will type: I,NEW SYSTEM INITIALIZATION? - YES OR NO
and return to next line.

Type: I-NO and depress RETURN key.

14. Teletype will type: I,EVENTS TO BE PURGED? - YES OR NO
and will return to next line.

Type: I-NO and depress RETURN key.

15. Teletype will type: I,UNITS TO BE PURGED? - YES OR NO
and will return to next line.

Type: I-NO and depress RETURN key.

16. Go to printer and obtain most recent event number and most recent case (OCA) number, and copy them down on a piece of scratch paper, designating which number is which. (These numbers are obtained from line on printout which reads:

*******CURRENT EVENT NUMBER:74XXXXXX/ NEXT OCA:74-XXXXX*******

Be sure to obtain this information from the last, most recent of these lines printed.)

17. Teletype will type: RECO HIGH EVENT # FROM RECOVERY: 74XXXXXX
HIGH OCA FROM RECOVERY: 74-XXXXX
END OF RESOURCE RECOVERY
I,ENTER NEXT EVENT NUMBER

18. Add one to the event number contained in the above teletype message. Compare it to the event number obtained from the printer. Whichever number is higher will be entered in the next step.

19. Type: I- and next event number, and depress RETURN key.
Example format: I- 234567

20. Add one to the OCA number contained in the teletype message, step 17. Compare it to the OCA number obtained from the printer. Whichever number is higher will be entered in the next step.

21. Teletype will type: I,ENTER NEXT OCA NUMBER, and will return to next line.

Type: I- and next case (OCA) number, and depress RETURN key.
Example format: I-18476

22. If restart procedures have been correctly done, the system will restart and new blank formats will appear on each CRT screen.

23. If the system does not restart, repeat the above procedures once more. If system still fails to restart, notify the shift sergeant or acting sergeant that this is the case.

To load dump tape, do the following:

1. Determine that switch is on "START"; if it is not, push it into that position.

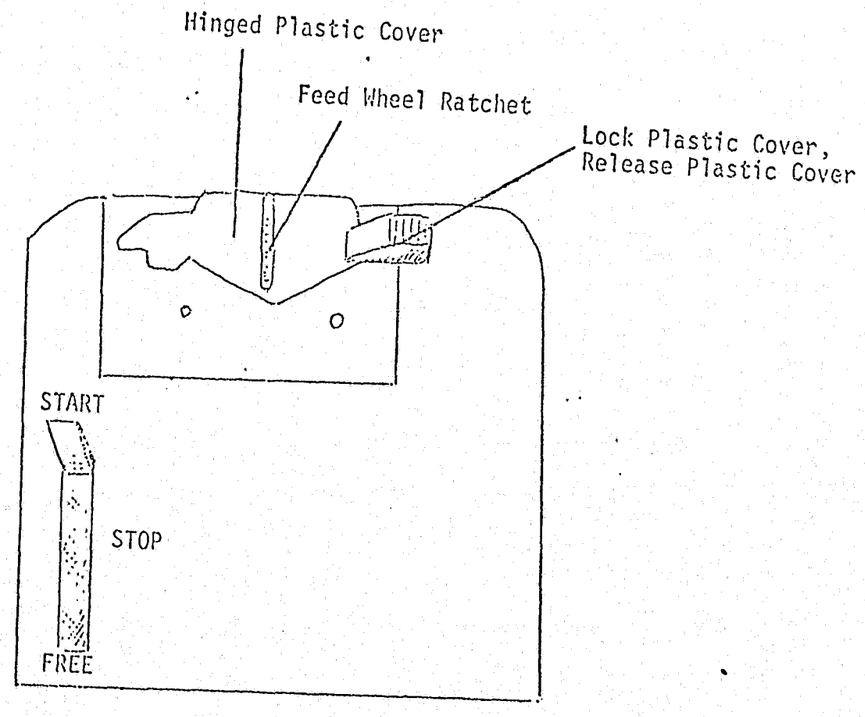
2. Raise hinged plastic cover, if it is down. To release plastic cover, push gray button at right-hand side of cover to the right.

3. Load the tape from behind; place the holes in the tape header over the feed wheel ratchet.

   (The tape "header" is the end with the paper label pasted on it. Also the letters "PDP", printed on the tape, are upright when header is in the left hand.)

4. Press hinged plastic cover down over tape and lock it under gray button on the right.

5. Proceed with Step 5 in RESTART PROCEDURES.



The following is an example of the teletype messages which are generated and answered as part of restarting the "SELECT" System.

```
I,ENTER DATE - FORMAT MM/DD/YY
I-Ø3/Ø3/74
I,ENTER TIME - FORMAT HH:MM
I-Ø5:45
I,NEW MAG TAPE? - YES, NO, OR NONE
I-NO
I,NEW SYSTEM INITIALIZATION? - YES OR NO
I-NO
I,EVENTS TO BE PURGED? - YES OR NO
I-NO
I,UNITS TO BE PURGED? - YES OR NO
I-NO

RECO HIGH EVENT # FROM RECOVERY:  74000428
HIGH OCA FROM RECOVERY:  00-00000.
I,ENTER NEXT EVENT NUMBER
I-429
I,ENTER NEXT OCA NUMBER
I-11900
```

PROGRESS REPORT - GRANT #507
PATROL MANPOWER ALLOCATION

Section II: Research Team

The first year of the Patrol Manpower Allocation Project was designed to achieve the following results:

1) Implementation of a sophisticated dispatcher assisting and data collection system in the Communications Division of the Seattle Police Department;

2) Design, implementation and analysis of a preventive patrol test as one sub-element to a comprehensive patrol manpower allocation system.

The following material applies to item 2), above, only.

The original grant schedule called for the Department to conduct a preventive patrol test during the first year. Due to developments occurring during that first year the Department determined that it would be in the best interests of the Grant research effort to cancel the preventive patrol test and in its place, carry out other research designed to support patrol manpower allocation. The following explains the reasons for reaching this conclusion.

1. Grant 507 was written in the summer and fall of 1970 but funding was not available until January of 1973. When the grant was originally conceived it was recognized that one of the major tasks of the grant Research Team was to determine which factor or factors were to be used to distribute patrol cars. At that time preventive patrol was considered as one of the primary products of the patrol operation because of its supposed impact on crime. Hence, it was a belief of the grant writers that crime distribution should be one of the allocation factors in the allocation system. In order to determine the impact on crime of the volume of preventive patrol a preventive patrol test was written as part of the grant. The test was to determine how sensitive crime volumes are to preventive patrol volumes. This data would then be used to determine the importance of crime distribution in the overall distribution scheme. At the same time it was believed that other factors would be found which would substantially impact resource allocation.

2. In July of 1972, the Kansas City Police Department implemented a field preventive patrol test. Because of implementation problems, the official starting date was delayed until October, 1972. The test

ended in October of 1973. Hence, Kansas City was conducting a field test before the Seattle Police Department had been awarded the LEAA funds for the design of the Seattle preventive patrol test. When the original Seattle grant was written in 1970, it was not known that Kansas City was planning such a test nor was it anticipated that a delay in receiving the grant money would delay the start of the Seattle grant for more than two years.

3. During the spring and summer of 1973, research work on the design of the Seattle Preventive Patrol Test was carried on by a Research Team. At the same time, the Research Team became aware of the design features of the Kansas City Test. Because of the similarities in concept between the two test designs the Research Team decided to postpone the Seattle Test until some preliminary results were available from Kansas City. By delaying the Seattle Test it was hoped that the test design could be improved.

Kansas City was gracious enough to provide the Seattle Research Team with preliminary data on the results of the Kansas City Test. Our analysis of this data indicated that, for the Kansas City Test, preventive patrol did not significantly impact crime. In November of 1973, the Kansas City Police Department made an announcement regarding the preliminary results of their test. Their preliminary results agree with the analysis performed by the Seattle Research Team (see attachments A and B). The final report from Kansas City is at present not available.

Even though there existed some problems in the Kansas City Test design, the design, in general, was good. In a comparative sense, the design was superior to most tests carried out within the law and justice system.

In terms of the Seattle Test, the test results from Kansas City suggested to the Seattle Research Team that crime distributions should not be considered as a primary allocation factor for patrol resources.

4. The Research Team determined that to properly carry out a preventive patrol test in Seattle, a rather complex and lengthy test design would be required. The test design also had to satisfy service policy parameters of the Department. Working within the two conditions mentioned, the Research Team discovered that the Seattle test design could be no more significant , and probably would be less significant, than the Kansas City Test design.

5. During 1973, the Research Team reviewed other possible allocation factors. In cooperation with the Patrol Division it was determined that response times should be considered as the primary allocation factor in the Seattle allocation system.

6. The Department was now faced with the following alternatives:

   a. To duplicate the Kansas City Test with a test design that is inferior or at best equal to the Kansas City Test design; or

   b. To accept the work done by Kansas City and conduct research to measure the impact of car levels on response times.

7. It was decided by the Department that the best use would be made of the grant research capability by accepting the results of the Kansas City Test in terms of preventive patrol's relationship to resource allocation.

In addition to designing a preventive patrol test (which was not implemented) and performing an analysis of the Kansas City Test, the Research Team completed the following through April of 1974:

1. Forecasting models to forecast calls for police service were reviewed. The Box and Jenkins computer program was selected for forecasting purposes (see Attachment C).

2. A new M.I.R. dispatch and clearance code was designed and implemented (see Attachment D).

3. An operational field test for measuring the impact of patrol units was designed to be used if systems modeling techniques are not adequate to approximate travel times (see Attachment E).

4. Reviewed factors affecting response times to police calls in relation to achieving the Department's Response Time Goal (see attachment F).

5. Worked in cooperation with the Communications Division and the Kustoms Electronics representative to ensure that the data collection system fulfilled the information needs of the allocation program.

6. Ran a computer analysis of the patrol workload variation by patrol sector, season of the year, hour of day and day of week to assist the Patrol Division in determining whether a change in the furlough system was necessary.

7. Various data tapes of 1972-73 dispatch information were prepared for testing the Box and Jenkins forecasting method and to perform a regression analysis on travel times.

8. Performed a preliminary review of the Hypercube Queuing Model (see Attachment G).

In addition to the above, work was started and is continuing in the following areas:

1. Review of various operating computer systems to determine the most efficient systems for processing data;

2. Reviewing modeling techniques for simulating the patrol dispatch operation;

3. Determining report formats for patrol management reports;

4. Testing the Box and Jenkins Forecasting method.

SEATTLE POLICE DEPARTMENT

Patrol Manpower Allocation

Grant 507

Preliminaries from the Kansas City Proactive-Reactive Patrol Deployment Experiment

FOR INTERNAL USE ONLY

At this writing the Kansas City experiment has not been completed. An initial report is not anticipated before January of 1974. For these reasons, this document is for internal use only.

September 1973

Mike Mills
Statistician

Preliminaries from the Kansas City Proactive-Reactive

Patrol Deployment Experiment

In March, 1973, the Seattle Police Department received LEAA Grant 507, "Patrol Manpower Allocation". Part of this grant involves a test to investigate the relationship between preventive patrol and crime.

The Kansas City Police Department is also investigating this relationship. Their test officially runs from October 1, 1972 through October 6, 1973; but there will be no final results reported until January 1974, the time the Seattle test is scheduled to begin. In order to prevent duplication of effort and profit from their experience, preliminary information was sought from them.

In August, 1973 an evaluation status report containing data on 34 of 52 official experimental weeks was received from Kansas City. On September 7, 1973 a call was made to Officer Charles Brown of the Kansas City Police Department. The purpose of this communication is to summarize the information obtained, compare the design to the Seattle Police Department's proposed preventive patrol test design, and to outline the implications for the Seattle test.

Much of the Kansas City effort, and most (53 of 62 pages) of the report is concerned with the effect of patrol deployment on citizen perception and behavior. Since the effect of principal concern for the Seattle test is crime, discussion will be confined to this aspect.

Design

Fifteen beats were designated as the experimental area. These fifteen beats were matched on the basis of calls for service, ethnicity, income, and transience of population into similar triplets. One beat in each triplet was then designated as proactive, another reactive, and the third control. In the control areas normal operation was to be maintained (a single one-man unit). In the reactive areas assigned cars were to enter the beats only in response to calls. In the proactive area four to five times the normal assignment level was to be maintained. Baseline data for Part I offenses for the years 1969 through 1972 was to be used to determine trends and seasonality for beats. Measurements were to be taken weekly during the test.

Problems Encountered by Kansas City

Officer Brown said that his group encountered every conceivable problem. The main problems, however, seemed related to opposition, both external and internal, to the reactive feature of the test. They were forced to announce their intentions publicly. Also, opposition from command personnel in the test areas apparently hindered implementation. The experiment was begun July 15, 1972, but was not fully operating until October. For purposes of data analysis, they

have declared October 1, 1972 through October 6, 1973 to be the test period.

Another difficulty involves the proactive beats. They are getting an estimated two and one-half to three times normal patrol volume rather than the four to five times normal planned.

Examination of Design

General: Scant information precludes appraisal of the Kansas City design in toto. A sound basic design incorporating features described in the Evaluation Status Report would require (1) that experimental units (beats) be randomly chosen, (2) that assignment of treatments to units be random, (3) that treatment and control groups be internally homogeneous, and (4) that observations continue to be taken for some time after ending treatment application. The first requirement was not met; the second, according to Officer Brown, was. An attempt was made to meet the third, but no specific information was given on the method or success of the attempt. The fourth probably will be done, but whether it is incorporated into the analysis (this is real point) is unknown.

Specific; There are some disputable design particulars. The preannouncement of the experiment could, because of a Hawthorne effect, bias results. Also, the imprecision in starting time may adversely affect accuracy; and if beats are contiguous (all experimental beats are in the same patrol division), treatment effects may be contaminated both directly (if reactive units patrolling the perimeters of their own beats are in or near control or proactive beats) and indirectly (by displacement effects).

Comparison of Seattle and Kansas City Designs

The Kansas City design has the following advantages:

1. Kansas City will probably have greater crime volumes in test areas than will Seattle (see appendix C).

2. Kansas City is using a greater range of treatment application. Its test is operating with an approximate treatment range of from 0 to $2\frac{1}{2}$ - 3 times normal preventive patrol. The present Seattle plans calls for 0.65 to 2 times normal.

The Seattle design has these comparative advantages:

1. Experimental and control sectors are randomly chosen (although not from the population of all city sectors - a weakness).

2. The Seattle design eliminates geographical and temporal differences from treatment comparisons and tests their significance. Kansas City assumes geographical homogeneity within treatments, and evidently plans to make trend and seasonal adjustments based on historical data.

3. Seattle, with periods of normal operation interspersed between treatment periods, makes an effort to avoid direct intercontamination of treatment effects.

4. Seattle does not intend to publicly announce their experimental intentions.

Analysis of the Kansas City Status Report Data

Data in the status report were presented as a series of overlapping graphs. Data used for analysis were extracted from these graphs by linear interpolation (Appendices A and B). The method of analysis is described in Patrol Manpower Allocation file "Prediction Models", Section II.

Plots (Appendix D) suggest:

1. An increase in crime in proactive areas, relative to control areas, during the test.

2. A decrease in crime volume variance in the proactive and control areas during the test and an increase in variance, perhaps, in the reactive areas.

3. A relative initial increase in crime volume in the reactive areas followed by a compensatory decrease, so that there was no overall treatment effect in these areas.

4. The trend of crime is down in all areas.

The first three impressions were confirmed, the second by calculation (appendix B) and the first and third by statistical test, by further analysis (Patrol Manpower Allocation file "Prediction Models", Section II).

Implications

To summarize, to date Kansas City data indicate that, relative to control areas, crime volume probably increased in proactive areas and remained the same in reactive areas. If these indications are correct, two possible explanations are:

1. Increasing preventive patrol results in more crime; decreasing it has no effect.

2. Faulty design and uncontrolled variation disguise the real relationship between preventive patrol and crime.

As explained previously, the Kansas City design does have its faults and does fail to eliminate several obvious sources of variation. Thus further experimentation, on the effects of preventive patrol, by other cities is desirable. The question is: can Seattle by avoiding the errors made by Kansas City and controlling more sources of variation, as is the plan, confirm the first explanation above or

unmask the one disguised in the second? Since Seattle, compared to Kansas City, apparently will have fewer crimes in experimental areas, will have a smaller range of treatment application, and will presumably have unforseen problems of its own, the answer to this question is now very much in doubt. Final data from the Kansas City test may clarify this. If this final data is forthcoming before decisions must be made, this communication will be revised in that light.

Appendix A

Interpolated Part I Offenses (crimes per week) from the Kansas City Evaluation Status Report.

Date	Proactive	Reactive	Control
7/31/71-8/13/71	69.5	58.5	58.5
8/14/71-8/27/71	73	49	48.5
8/28/71-9/10/71	70	54.5	46
9/11/71-9/24/71	64	45	47.5
9/25/71-10/8/71	78	56.5	69.5
10/9/71-10/22/71	73.5	49.5	62
10/23/71-11/5/71	70	57	72
11/6/71-11/18/71	61	59	63
11/19/71-12/2/71	70.5	53.5	51.5
12/3/71-12/17/71	75	55.5	66.5
12/18/71-12/30/71	65.5	68.5	60
12/31/71-1/13/72	46.5	49.5	42
11/14/72-1/27/72	50.5	64.5	42
1/28/72-2/10/72	56.5	49.5	34.5
2/11/72-2/24/72	56.5	57.5	50
2/25/72-3/10/72	58	58	44
3/11/72-3/24/72	44.5	36	35
3/25/72-4/7/72	44.5	36.5	35.5
4/8/72-4/21/72	52.5	48.5	39.5
4/22/72-5/5/72	41	49.5	41
5/6/72-5/19/72	37.5	37.5	38
5/20/72-6/2/72	49	42	42
6/3/72-6/16/72	54.5	50	43.5
6/17/72-6/30/72	52.5	44	53
7/1/72-7/14/72	57.5	44.5	43
7/15/72-7/28/72	54	41	38.5
7/29/72-8/11/72	52	53.5	38.5
8/12/72-8/25/72	50.5	51.5	43
8/28/72-9/10/72	65	42	42.5
9/11/72-9/24/72	52	43.5	45
9/25/72-10/8/72	55	54	47
10/9/72-10/22/72	46	61	52.5
10/23/72-11/5/72	39	65	42.5
11/16/72-11/18/72	48.5	45	45.5
11/19/72-12/2/72	56.5	51.5	46.5
12/3/72-12/16/72	44	38.5	41.5
12/17/72-12/30/72	44	39.5	55
12/31/72- 1/13/73	27	18	30.5
1/14/73-1/27/73	40.5	35	31.5
1/28/73-2/10/73	43.5	42	30.5
2/11/73-2/24/73	42	42	40.5
2/25/73-3/10/73	50	41	39
3/11/73-3/24/73	43	45	44

Date	Proactive	Reactive	Control
3/25/73-4/7/73	44.5	49	34.5
4/8/73-4/21/73	50.5	41.5	47.5
4/22/73-5/5/73	46	37.5	33.5
5/06/73-5/19/73	57.5	33	31.5
5/20/73-6/2/73	49.5	52	38
Mean	53.8	47.8	45.1

Appendix B

Crimes per week before (1971-72) and during (1972-73) the Kansas City Proactive-Reactive Experiment

	Proactive		Reactive		Control	
	1971-1972	1972-1973	1971-1972	1972-1973	1971-1972	1972-1973
10/9 - 10/22	73.5	46	49.5	61	62	52.5
10/23-11/5	70	39	57	65	72	42.5
11/6 - 11/18	61	48.5	59	45	63	45.5
11/19-12/2	70.5	56.5	53.5	51.5	51.5	46.5
12/3-12/16	75	44	55.5	38.5	66.5	41.5
12/17-12/30	65.5	44	68.5	39.5	60	55
12/31- 1/13	46.5	27	49.5	18	42	30.5
1/14 -1/27	50.5	40.5	64.5	35	42	31.5
1/28-2/10	56.5	43.5	49.5	42	34.5	30.5
2/11-2/24	56.5	42	57.5	42	50	40.5
2/25 - 3/10	58	50	58	41	44	39
3/11 - 3/24	44.5	43	36	45	35	44
3/25 - 4/7	44.5	44.5	36.5	49.5	35.5	34.5
4/8 - 4/21	52.5	50.5	48.5	41.5	39.5	42.5
4/22 - 5/5	41	46	49.5	37.5	41	33.5
5/6 - 5/19	37.5	57.5	37.5	33	38	31.5
5/20 - 6/2	49	49.5	42	52	42	38
$\bar{X}$	56.0	45.4	51.3	43.4	48.1	40.0
S^2	137.92	48.32	88.66	116.84	146.99	55.45

Appendix C

Test Area Crime Volumes (1972)

I. Seattle - One half of 1972 totals (estimated)

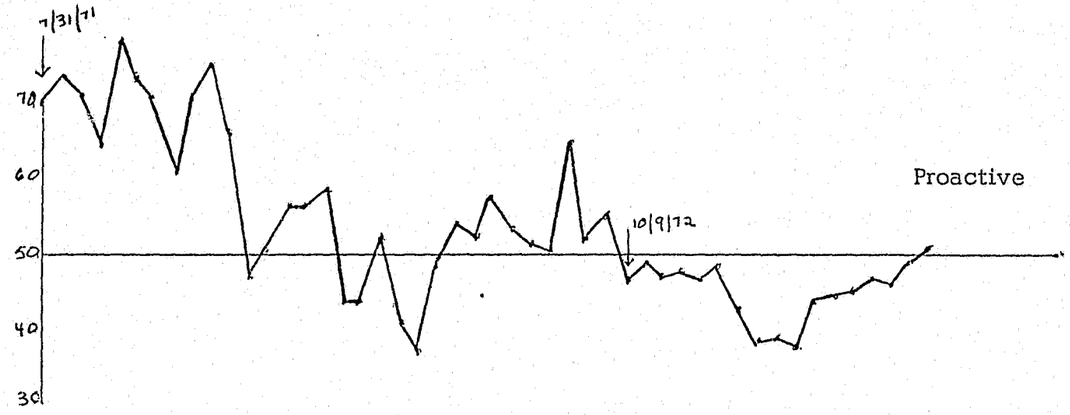
	Nora	Union	William	Total
Robbery	37	31	45	113
Assault	163	70	189	422
Burglary	686	412	703	1,801
Larceny	1,111	937	900	2,948
Auto Shift	208	153	199	560
Total	2,205	1,603	2,036	5,844

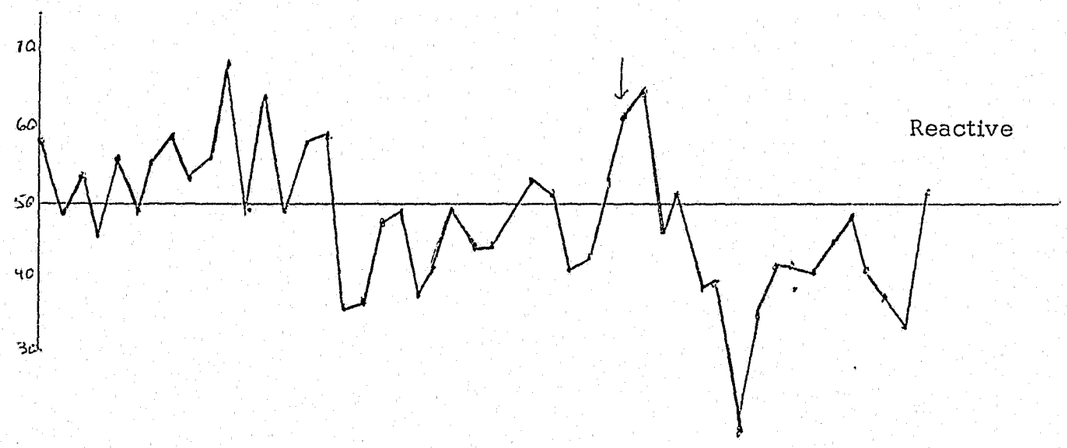
II. Kansas City Aggregate Part I Offenses for 1972

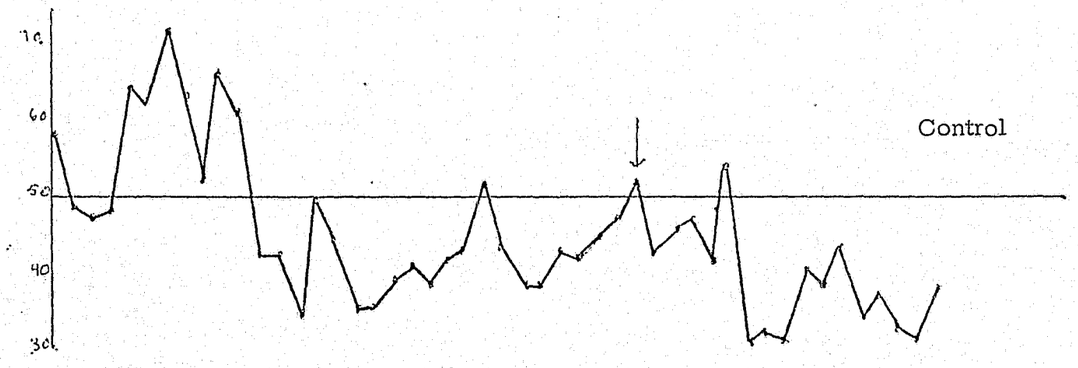
Proactive	Reactive	Control	Total
2,616	2,507	2,242	7,365

Appendix D

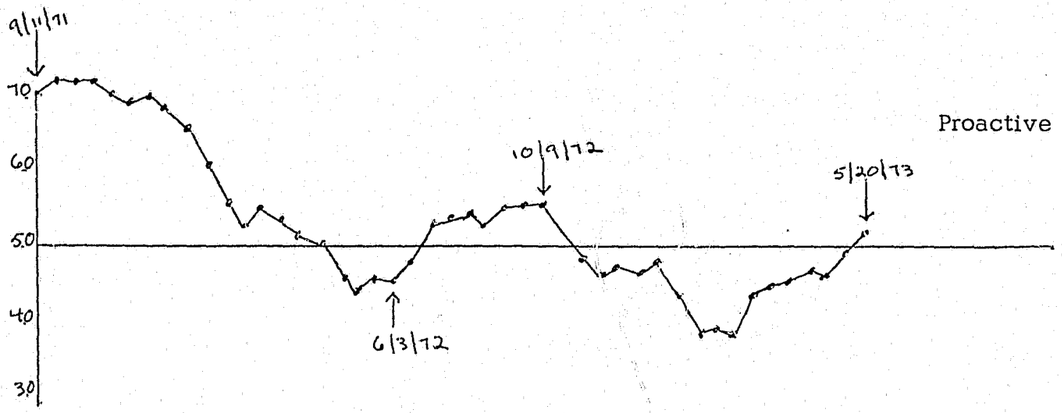
Crimes / week — Kansas City Test — 2 week intervals



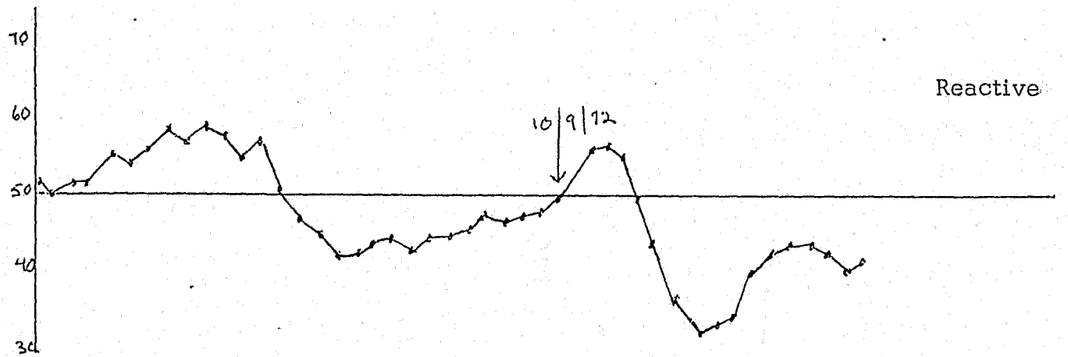




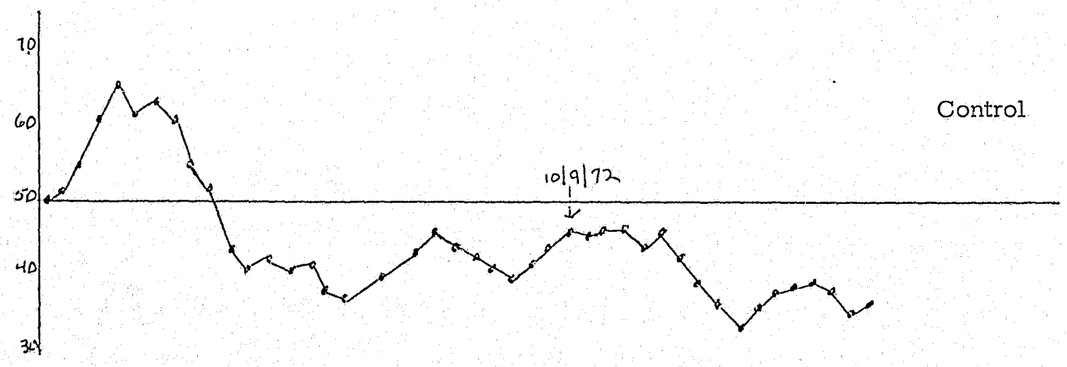
Crimes / week 8 week moving average (n=4)
Two week intervals



Proactive

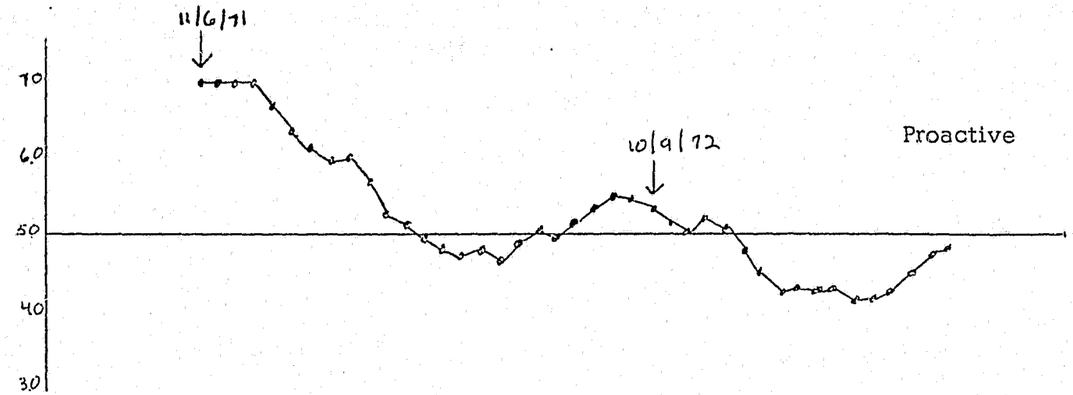


Reactive

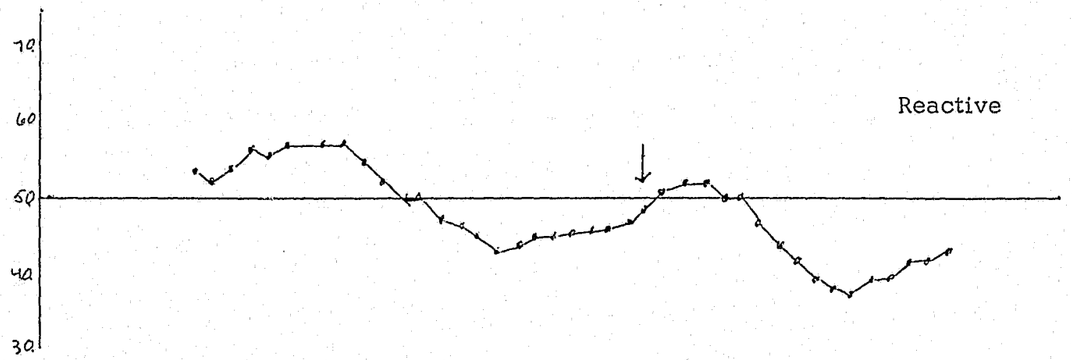


Control

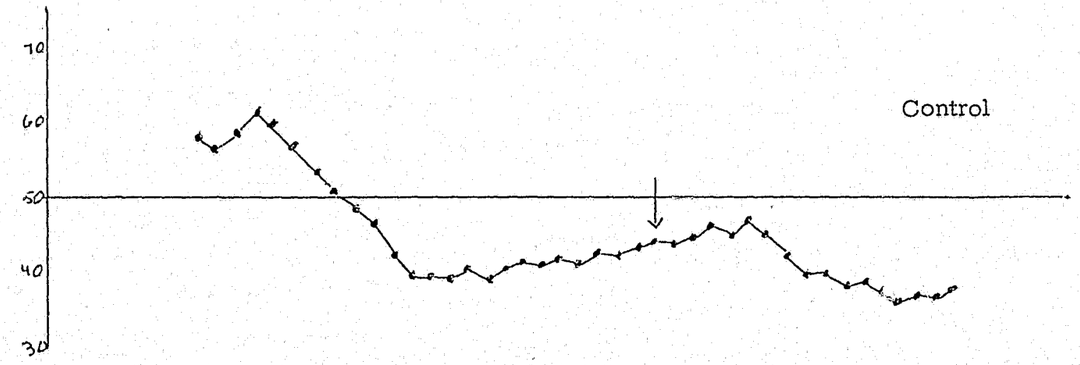
Crimes / week Kansas City Test 16 week moving average (n=8)



Proactive



Reactive



Control

A Statistical Test for Analysis of Preliminary Data from the Kansas City Proactive--Reactive Experiment

In March, 1973 the Seattle Police Department received LEAA Grant 507, "Patrol Manpower Allocation." Part of this grant involves a test to investigate the relationship between preventive patrol and crime.

The Kansas City Police Department is also investigating this relationship. Their test officially runs from October 1, 1972 through October 6, 1973; but there will be no final results reported until January 1974, the time the Seattle test is scheduled to begin. In order to prevent duplication of effort and profit from their experience, preliminary information was sought from them.

In August, 1973 an evaluation status report containing data on 34 of 52 official experimental weeks was received from Kansas City. The purpose of this memorandum is to document the statistical analysis of that report.

A preferred method for analyzing data from the Kansas City experiment is analysis of covariance. This method combines features of regression and analysis of variance. Differences in treatment effects (preventive patrol levels) are compared after adjustment by a linear least squares regression on a concomitant variable (in this case pretest beat crime volumes). This comparison of treatment differences involves separation of a total sum of squares into several portions. This separation, as well as calculation of the total sum of squares, requires observations on individual experimental units (beats). Kansas City did not include these observations in the status report. The use of covariance analysis was thus impossible. An alternative method depending only on overall means is derived and described below.

Notation

X_{ijk} -- a random variable representing the mean number of crimes per week for the kth two week interval for treatment i and period j

i = P, R, or C (corresponding to proactive, reactive, or control treatments)

J = B or A (corresponding to before and after treatment application)

k = 1,..., N_{ij} where N_{ij} is the number of two week intervals for treatment i in period j

$\bar{X}_{ij} = (\sum_{k=1}^{N_{ij}} X_{ijk})/N_{ij}$ -- the mean of the N_{ij} observations for treatment i, period j

$s^2_{ij} = [\sum_{k=1}^{N_{ij}} (X_{ijk} - \bar{X}_{ij})^2/(N_{ij} - 1)]$-the sample variance

μ the mean of the distribution

σ^2 the variance of the distribution

L will represent P or R (proactive and reactive)

$N(\mu,\sigma^2)$ a normal distribution with mean μ and variance σ^2

$X^2(r)$ a chi-square distribution with r degrees of freedom

t (r) a Students t distribution with r degrees of freedom

A subscripted distribution (e.g., t_α, $X^2.95$) represents that point below which the subscripted proportion of the distribution lies.

THE TEST

Null hypothesis H: $\bar{X}_{LA} - \bar{X}_{LB} = \bar{X}_{CA} - \bar{X}_{CB}$ where $\sigma_{PA} = \sigma_{PB} = \sigma_{RA} = \sigma_{RB} = \sigma_{CA} = \sigma_{CB}$

Alternative hypothesis A: $\bar{X}_{LA} - \bar{X}_{LB} < \bar{X}_{CA} - \bar{X}_{CB}$ or $\bar{X}_{LA} - \bar{X}_{LB} > \bar{X}_{CA} - \bar{X}_{CB}$

Type I error: α.

Statistic:

$$T_{LC} = \frac{[(\bar{X}_{LA} - \bar{X}_{LB}) - (\bar{X}_{CA} - \bar{X}_{CB})]\sqrt{n}}{\sqrt{S^2_{LA} + S^2_{LB} + S^2_{CA} + S^2_{CB}}}$$

where $N_{ij} = n$ for all i, j.

Distribution: Under the null hypothesis T_{LC} has a Student's distribution with 4(n-1) degrees of freedom.

Critical region Ω: $T_{LC} < t_{\frac{1}{2}\alpha}(4n-4)$ or $T_{LC} > t_{\frac{1}{2}\alpha}(4n-4)$.

Interpretation: If $T_{LC} <$ Ω reject H at level α.

Test Derivation

If X_{ij}, i = A, B; j = L, A, are independent $N(\mu,\sigma^2)$ and X_{ij}, k=1,...,n, are independent random samples from the respective X_{ij}; then the statistic

$$T_{LC} = \frac{[(\overline{X}_{LA} - \overline{X}_{LB}) - (\overline{X}_{CA} - \overline{X}_{CB})] \sqrt{n}}{\sqrt{S^2_{LA} + S^2_{LB} + S^2_{CA} + S^2_{CB}}}$$

has a Student's t distribution with 4(n-1) degrees of freedom.

Outline of proof:

$$\text{Let } U = \frac{[(\overline{X}_{LA} - \overline{X}_{LB}) - (\overline{X}_{CA} - \overline{X}_{CB})]}{\left[\frac{4\sigma^2}{n}\right]^{1/2}}$$

$$E(U) = \left[\frac{n}{4\sigma^2}\right]^{1/2}[E(\overline{X}_{LA}) - E(\overline{X}_{LB}) - E(\overline{X}_{CA}) + E(\overline{X}_{CB})]$$

$$= \left[\frac{n}{4\sigma^2}\right]^{1/2}[u - u - u + u] = 0.$$

$$\text{Var } (U) = \left[\frac{n}{4\sigma^2}\right] \text{Var } [(\overline{X}_{LA} - \overline{X}_{LB}) - \overline{X}_{CA} - \overline{X}_{CB})]$$

$$= \left[\frac{n}{4\sigma^2}\right] \text{Var } \left[\frac{\Sigma X_{LAk}}{n} - \frac{\Sigma X_{LBk}}{n} - \frac{\Sigma X_{CAk}}{n} + \frac{\Sigma X_{CBk}}{n}\right]$$

$$= \left[\frac{n}{4\sigma^2}\right] \left[\frac{1}{n^2}\right] [\text{Var } (\Sigma X_{L_{Ak}}) + \text{Var } (\Sigma X_{L_{Bk}})$$

$$+ n \text{ Var } X_{CAk} + n \text{ Var } X_{CBk}]$$

$$= \left[\frac{n}{4\sigma^2}\right] \left[\frac{1}{n^2}\right] [4n\sigma^2] = 1.$$

Since the X_{ij}'s are independent normal random variables, U must be normal--the sum of independent normal random variables is normal. Thus U has a normal distribution with mean zero and variance one.

The random variable $\sum_{k=1}^{n} \left(\frac{X_{ijk}-\mu}{\sigma}\right)^2$ is X^2 (n).

Now,

$$\sum_{k=1}^{n} (X_{ijk} - \mu)^2 = \sum_{k-1}^{n} (X_{ijk} - \overline{X} + \overline{X}_{ij} - \mu)^2$$

$$= \sum_{k=1}^{n} (X_{ijk} - \overline{X}_{ij})^2 + 2(\overline{X}_{ij} - \mu) \sum_{k=1}^{n} (X_{ijk} - \overline{X}_{ij})$$

$$+ n (\overline{X}_{ij} - \mu)^2$$

$$= \sum_{k=1}^{n} (X_{ijk} - \overline{X}_{ij}) + n (\overline{X}_{ij} - \mu)^2$$

So,

$$\sum_{k=1}^{n} \frac{(X_{ijk} - \mu)^2}{\sigma^2} = \frac{(n-1)\ S_{ij}}{\sigma^2} + \frac{n(\bar{X}_{ij} - \mu)^2}{\sigma^2}$$

Since the X_{ijk} are $N(\mu,\sigma^2)$, $\frac{n(\bar{X}_{ij} - \mu)}{\sigma}$ is N (0,1).

The sum of squares of m independent normal random variables with mean zero and variance one is $X^2(m)$. Thus $\frac{n(\bar{X}_{ij} - \ )^2}{\sigma^2}$ is X^2 (1).

Since $\bar{X}_{ij}$ and $S^2{}_{ij}$ are independent, $\frac{n(X_{ij} - \mu)}{\sigma^2}$ and $(n - 1)\ S_{ij}{}^2$ are independent, and the characteristic function of $\sum_{k=1}^{n} \frac{(X_{ijk} - \mu)^2}{\sigma^2}$ is

$$E\ [\exp\ [\ it \sum_{k=1}^{n} \frac{(X_{ijk} - \mu)^2]\}}{\sigma^2}$$

$$= E\ \{\exp\ [it\ \frac{n(\bar{X}_{ij} - \mu)^2}{\sigma^2} + it\ \frac{(n - 1)\ S_{ij}{}^2]}{\sigma^2}\ .$$

$$= E\ \{\exp\ [\ it\ \frac{n(\bar{X} - \mu)^2]\}}{\sigma^2}.\ E\ \{\exp[\ it\ \frac{(n-1)S^{\ 2}]\}}{\sigma^2}\ .$$

Substituting X^2 characteristic functions for

$\sum_{k=1}^{n} \frac{(X_{ijk} - \mu)^2}{\sigma^2}$ and $\frac{n(\bar{X}_{ij} - \mu)^2}{\sigma^2}$ gives

Therefore, the characteristic function for $\frac{(n - 1)\ S_{ij}{}^2}{\sigma^2}$ is

$$E\ \{\exp\ [it\ (n - 1)\ S_{ij}{}^2]\}\ = (1-2\ it)^{\frac{-(n - 1)}{2}}, t < \tfrac{1}{2}\ .$$

This is the characteristic function of a $X^2(n-1)$ distribution, thus

$\frac{(n-1)\ S_{ij}{}^2}{\sigma^2}$ is $X^2(n-1)$.

The sum of m independent $X^2(k)$ random variables is $X^2(mk)$. The $S_{ij}{}^2$ are independent, therefore

$$V = \frac{(n-1)\ S_{LA}{}^2}{\sigma^2} + \frac{(n-1\ S_{LB}{}^2}{\sigma^2} + \frac{(n-1)\ S_{CA}{}^2}{\sigma^2} + \frac{(n-1)\ S_{CB}{}^2}{\sigma^2}$$

has a X^2 distribution with $4(n-1)$ degrees of freedom. And since $\bar{X}_{ij}$ and $S^2{}_{ij}$ are independent for all pairs $(\bar{X}_{ij}, S^2{}_{ij})$, then

$$(\bar{X}_{LA} - \bar{X}_{LB}) - (\bar{X}_{CA} - \bar{X}_{CB}) \text{ and } S^2{}_{LA} + S^2{}_{LB} + S^2{}_{CA} + S^2{}_{CB}$$

are independent.

The ratio of a N(0,1) random variable and the square root of a $X^2(p)$ random variable divided by its degrees of freedom is distributed as Student's t with p degrees of freedom. Therefore,

$$\frac{U}{V} = \frac{\dfrac{[\,(\bar{X}_{LA} - \bar{X}_{LB}) - (\bar{X}_{CA} - \bar{X}_{CB})\,]}{\left[\,\dfrac{4\sigma^2}{\eta}\,\right]^{\frac{1}{2}}}}{\left[\dfrac{(n-1)S^2_{LA}}{\sigma^2} + \dfrac{(n-1)S^2_{LB}}{\sigma^2} + \dfrac{(n-1)S^2_{CA}}{\sigma^2} + \dfrac{(n-1)S^2_{CB}}{\sigma^2}\right]^{\frac{1}{2}}}{4(n-1)}$$

$$= [\,(\bar{X}_{LA} - \bar{X}_{LB}) - (\bar{X}_{CA} - \bar{X}_{CB})\,] \Big/ \left[\frac{4\sigma^2}{\eta}\right]^{\frac{1}{2}} \left[\frac{4(n-1)\sigma^2}{(n-1)\,(S^2_{LA} + S^2_{LB} + S^2_{CA} + S^2_{CB})}\right]^{\frac{1}{2}}$$

$$= \frac{[\,(\bar{X}_{LA} - \bar{X}_{LB}) - (\bar{X}_{CA} - \bar{X}_{CB})\,]\sqrt{n}}{\sqrt{S^2_{LA} + S^2_{LB} + S^2_{CA} + S^2_{CB}}} = T_{LC}$$

has a Student"s t distribution with 4(n-1) degrees of freedom.

Q. E. D.

SEATTLE POLICE DEPARTMENT

Patrol Manpower Allocation Research Team

Proposed

Preventive Patrol Test

June 1973

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TABLE OF CONTENTS

I INTRODUCTION

On March 2, 1973, the Seattle Police Department received a LEAA grant entitled "Patrol Manpower Allocation" to develop a comprehensive patrol allocation system. One part of this grant involves a preventive patrol test to determine what effect preventive patrol has on crime. This report outlines the details of this test.

A. Need for a Preventive Patrol Test

The patrol operation has long been recognized as the backbone of any municipal police agency. This is no less true for the Seattle Police Department. During 1972, 7.9 million dollars were allocated to the Patrol Division, or approximately 33% of the total police budget for the year. If the cost of all support services is considered, approximately 12 million dollars were spent on the patrol operation, or 50% of the entire budget.

During 1972, patrol units had available 56% of their time for conducting preventive patrol. If both direct costs and support services are considered, preventive patrol cost the tax payers approximately 6.7 million dollars (28% of the budget) for the year. Hence, preventive patrol represents one of the largest allocations of police resources for a single operation. Therefore, it is imperative that the Department seek ways to measure the effectiveness of preventive patrol and then allocate its resources to obtain maximum impact.

It has been a standing assumption among police agencies that preventive patrol suppresses crime. Yet, to date, no statistically reliable test has demonstrated that this assumption is sound. Through years of experience, individual officers have gained some knowledge regarding the value and application of preventive patrol. However, the present knowledge regarding preventive patrol is, for the most part, subjective.

To know how much preventive patrol to plan for, and where and when it should be applied, is vital to running an efficient patrol operation.

The preventive patrol test outlined below is intended to:

1. determine if preventive patrol does suppress crime
2. determine which specific crimes are involved if crime is suppressed
3. determine how much crime is suppressed

B. Management of the Test

In order to perform general research on patrol manpower allocation problems, a

research team has been formed. One of the duties of this team is the design of the preventive patrol test. The team members are:

Cal Clawson, Management Systems Analyst, Team Leader

Mike Mills, Statistician

Samson Chang, Assistant Methods Analyst

Margo Beyer, Clerk

The team reports to Lt. Knapp, Project Director for the Patrol Manpower Allocation Project. The work station of the team is in the Research & Development Division.

Final approval for test design rests with the Patrol Division and the Department staff.

II TEST DESIGN

In order to determine what effect preventive patrol has on various crimes, different amounts of preventive patrol will be applied to Sergeant Sectors Nora, Union and William during 1974 to see if any changes in crime rates can be detected. The schedule of preventive patrol application in these sectors is as follows:

Table 1
Relative Amounts of Preventive Patrol

	N	U	W
1st Test Period, January 19 - March 15, (56 days)	Low	High	Medium
(Normal Period), March 16 - April 12, (28 days)	-	(Normal)	-
2nd Test Period, April 13 - June 7 (56 days)	Medium	Low	High
(Normal Period), June 8 - July 5 (28 days)	-	(Normal)	-
3rd Test Period, July 6 - August 30 (56 days)	High	Medium	Low
(Normal Period), September 1 - September 28 (28 days)	-	(Normal)	-

A. Application of Preventive Patrol Resources

The research team has determined that the differences in the volumes of preventive patrol to be applied to the three test sectors must be substantial in order that any change in crime rates will be detectable. Table 2 shows the average amount of preventive patrol which was applied during 1972 for a 28 day period. The high preventive patrol application for the test has been planned as

approximately 50% greater than the 1972 average. The low preventive patrol application is planned as zero with patrol cars parked between calls. The medium preventive patrol application has been selected as midway between the high and low. All three sectors will receive each of the three treatments in order to eliminate the effects of sector peculiarities and seasonal changes.

In order to determine the number of cars which must be assigned to each sector during each test period, the workload of each sector during 1972 was analyzed. The car strength for each sector and test period is based on (1) the workload, which consisted of the calls for service, administrative downtime, backup calls and on-view calls; and (2) the planned amount of preventive patrol desired. Table 3 lists the number of cars to be assigned under low, medium and high preventive patrol treatments. Table 4 lists the number of cars assigned for each test period and normal period.

To insure that the workload for patrol units would not be severe during the low and medium preventive patrol treatments, the average number of dispatches per unit per shift was estimated and compared to the average experienced during 1972. Table 5 lists these estimates. It can be seen that the dispatch averages per unit increase during the low and medium treatments, but this anticipated workload is not abnormally high.

To avoid confusion, the present beat maps will be utilized during the test. This will be accomplished by adjusting the unit call numbers to match the present beat configuration.

In order to assist the Patrol Division in determining specific car assignments during the test, the research team has prepared a suggested car assignment listing (Table 6). A sample study was made of the number of dispatches per car beat in the three test sectors. Car assignments were then made in order to best distribute the work between cars. These car assignments should be carefully reviewed by patrol supervisors to insure that they cover the respective sectors in the best manner possible.

To enable the Patrol Division to field the number of cars outlined, the distribution of patrol officers and one and two man cars has been prepared (Table 7). In addition, the suggested officer assignment levels for the North and South Precincts are presented in Table 8.

B. Patrol Operation During the Test

1. Low Application of Preventive Patrol: It is hoped that during the application of low resources, preventive patrol can be held to an absolute minimum. This can best be accomplished by having patrol cars park between calls. Hence, the only times when the presence of police units should be apparent is when they are handling calls, traveling

to and from calls, and when traveling to and from the Precinct Station. Problems can be anticipated if patrol units park in easily observable places and appear to be inactive. This could cause an abnormal number of citizen complaints. To avoid this situation, sector sergeants should confer with individual officers and select appropriate locations to park while waiting for their next call. These locations should be somewhat centrally located within the beat and accessable to major arterials. Most important, they should be locations where the patrol car cannot be easily viewed by the public.

There may be some tendency by officers to remain on calls for an extended period of time since there will be no pressure to go back into service and perform preventive patrol. However, this should be avoided. If this situation were to take place, an abnormally high number of cars would be out of service and fewer cars would be available for emergencies. Hence, officers should complete their calls efficiently but swiftly in order to insure sufficient car availability for serious calls.

2. Medium Application of Preventive Patrol: During the application of medium resources, patrol officers should conduct normal preventive patrol when not handling calls for service. It is recommended that officers use their own discretion in conducting patrol, but the following considerations should be remembered:

   a. patrolling in areas of high public visability

   b. patrolling in areas of high crime

   c. keeping mobile to cause the impression of omnipresence

3. High Application of Preventive Patrol: During the application of high resources, officers should perform preventive patrol in the same manner as during the medium application of resources. Because of the larger number of patrol units in each sector in relation to the normal workload (especially during the First Watch) there may be a tendency for officers to become bored because of inactivity. Every effort should be made to utilize available time for preventive patrol and for officers to continually apply themselves to creating the impression of omnipresence among citizens within the sector.

   Because of the availability of resources during the high resource periods, dispatchers must be cautioned against stripping cars from test areas to work non-test areas.

C. Patrol Car Mileage

Very little is known today about the statistical characteristics of preventive patrol. Specifically, it is not known what percent of the total patrol car mileage is devoted to preventive patrol and what percent is devoted to other duties. Since patrol units are visible when responding to calls during the application of low resources, we may assume that there will exist some degree of "preventive patrol" at least in the sense that cars will be visible to the public. The visibility should be roughly proportional to the miles driven. Conversely, we cannot assume that during preventive patrol (application of medium and high resources), patrol units are always mobile since some preventive work requires that the car remain stationary.

In order to gain added insight into the patrol operation, total car mileages will be measured for the test areas during the course of the test. Comparisons will then be made of car mileages between low, medium and high resources. To facilitate the data collection, patrol officers will announce their mileage when checking into service with dispatchers, and when checking out of service with dispatchers. The dispatchers will enter the car mileages into the mini-computer to be summarized into aggragate figures at the end of the test.

III CRIME INFORMATION

In order to meaningfully test whether preventive patrol is suppressing crime, those crime types under consideration must occur in sufficient numbers. Crime volumes for 1972 were studied, and it was determined that the following crimes be considered.

1. Burglary
2. Larceny
3. Auto Theft
4. Assault
5. Robbery (marginal)

Other crimes occur too infrequently to be considered for testing purposes.

Preventive patrol may suppress crime, not according to crime type (burglary, robbery, etc.) but based on some other characteristic of crime, e.g., visibility of location from the street. Therefore, the above crime types have been further subdivided into the following categories:

Characterization of Preventable Variables

Robbery, Assault, Larceny

#1. Crime committed in a location which can be viewed from a public street, i.e., on street, in store and observable from street, etc.

#2. Crime committed in a public area but not directly observable from street, i.e., park, hotel lobby, inside of tavern not observable from street.

#3. Crime committed in a private location; i.e., inside private home, apartment, etc.

Burglary (Residence & Non Residence)

#1. Burglaries committed such that the offender is exposed to street observation while in the victim's premises, i.e., burglarizing a room which has a window facing, and observable from a public street.

#2 Burglary committed such that the burglar is exposed to street view while entering or leaving the premises, but not while he is in the premises, i.e., burglary through front door of store.

#3. Burglary committed such that burglar is not exposed to street view while on premises or while making entry or exit, i.e., burglary of shielded residence, with entry through rear door, not exposed to street.

Auto Theft

#1. Auto Theft from area which is observable from public street, i.e., from street, public lot, driveway, etc.

#2. Auto theft from area which is not observable from public street, i.e., garage, etc.

To collect data regarding the above characteristics, it will be necessary that all crime reports issuing from the test areas be altered to account for the above categories. This includes patrol officers taking field reports, secondary phone operators, in-person complaints and detectives. In order to best facilitate the data collection, it is recommended that the standard Offense Report be amended to account for the preventable categories and that this data be collected city-wide.

Crime volumes by type and preventable category will be compiled on a weekly basis by the Operations Analysis Unit with the assistance of Mike Mills, the research team statistician

IV SPECIAL TEST PROBLEMS

A. Philosophical Difficulties

One difficulty regarding this kind of test involves the appropriateness of reducing service to one area of the city, even for a short period of time. Does the Police Department have the right to deny or decrease service to the public in order to conduct a test? Can the Department be held responsible in a moral sense for any increase in crime which occurs during the application of low resources? On the surface, it may appear that the Department is placed in an untenable position to propose such a test. However, the following must be considered:

1. If preventive patrol does not significantly suppress crime, then the temporary denial of this service will have no undesirable effects on the public.

2. If preventive patrol does suppress crime, then during the application of high resources, the test areas will receive increased service with a resulting decrease in crime and to a certain extent, the negative effects of the low application of resources will be compensated.

3. If the test demonstrates that crime is suppressed by preventive patrol then it will be possible to increase services to the entire city for extended periods of time by properly allocating preventive patrol resources. Hence, the possible benefits of the test far outweigh the negative aspects of a temporary decrease of service to limited areas.

Because of the above considerations, the Department is justified in conducting the test. It is unfortunate that the test cannot be conducted without decreasing preventive patrol service. However, this would require a substantial increase in manpower to provide sufficient added preventive patrol beyond the present level to make the test valid.

B. Difficulties with Special Enforcement

In addition to the normal Patrol Division deployment of patrol units, other department resources are deployed in the field. Of special interest are the traffic enforcement units and the Tactical Operations units. These units represent special problems in relation to the test since their presence within test areas may have an uncontrolled effect upon crime and hence, tend to invalidate the test. To anticipate such difficulties the following recommendations are made:

1. Traffic Enforcement; it may be inadvisable to stop all traffic enforcement in the test sectors during the course of the test. However, the preventive effect of traffic units may be somewhat reduced because of the lack of overt marks on traffic cars. For the duration of the test, traffic enforcement should be applied uniformly to all three test sectors. That is, if traffic units are assigned to one sector, they should be proportionately assigned to the other two sectors. Traffic units working in test areas should restrict their activities to traffic enforcement.

2. Tactical Operations presents another type of problem. It is possible for the Tactical Operations Section to be assigned to a test sector to provide intense crime suppression for a particular problem. This should be avoided. If the application of low resources results in an increase in crime, and the Tactical Operations Section responds by suppressing crime, then the test results will be in error. Therefore, the activity of Tactical Operations units in the test areas should be restricted to specific problems (i.e., assisting in the surveillance of narcotics suspects, assisting in a gambling raid, etc.) and not allowed to perform intensive preventive patrol.

As a safety feature, crime will be reviewed on a weekly basis. If problem areas develop within sectors receiving low resources, the situation will be reviewed by the Patrol Division Staff, Operations Analysis Unit, Tactical Operations Section and Research Team. If it is considered absolutely necessary to apply special enforcement because a problem is getting out of control, then the application of special enforcement will be carefully planned and documented. Where possible, special enforcement in areas receiving medium and high resources should be limited to preventive patrol by assigned patrol units.

V INTERPRETATION OF TEST RESULTS

If the test detects no preventive patrol effect, this does not imply that preventive patrol is, in general, ineffective or that city car strengths should be reduced. It does suggest that the present method of application has negligible effect on crime and that under it resources could be deployed more satisfactorily by considering workload only.

If the test indicates that certain crimes are suppressed by preventive patrol, then decisions to maximally suppress crime, given available resources and workload constraints, will be possible.

In either case, whether new patrol methods can better suppress crime will be relevant.

VI ASSIGNMENT OF RESPONSIBILITIES

A. Patrol Manpower Research Team; will be responsible for:

1. design of the preventive patrol test, and the adjustment of design to conform to the needs of the Patrol Division.

2. adjusting the format of the Offense and Arrest and Offense report to accommodate the collection of preventive crime characteristics

3. preparing appropriate training materials for patrol officers, dispatchers and primary phone operators

4. monitoring the implementation of test procedures

5. assisting Operations Analysis to monitor crime data

6. performing the statistical analysis at the conclusion of the test

7. preparing the final report on test results.

B. Patrol Division; will be responsible for:

1. review of overall test design

2. training patrol officers and sergeants in test procedures

3. insuring that proper car assignments are made

4. selecting parking locations for the low application of resources

C. Communications Division; will be responsible for:

1. informing dispatchers and primary phone operators of test procedures

2. training secondary phone operators to solicit data on preventable characteristics when taking crime reports

3. entering of mileage data into mini-computer by dispatchers

D. Operations Analysis; will be responsible for:

1. compiling data regarding crime volumes

2. monitoring for serious crime problems within test sectors

E. Traffic Division; will be responsible for applying equal enforcement to all test areas.

F. Tactical Operations Section; will be responsible for limiting enforcement in test areas to specific activities as opposed to saturation patrol.

TABLE 2

Preventive Patrol Test

Estimated Hours Available for Preventive Patrol

		Average Achieved, 1972	Estimated Low Resources*		Estimated Medium Resources	Estimated High Resources
	N	790	(420)	0	630	1280
1st Watch	U	480	(320)	0	370	730
	W	680	(380)	0	630	1200
	N	1010	(540)	0	640	1260
2nd Watch	U	490	(310)	0	380	730
	W	660	(390)	0	620	1220
	N	1150	(550)	0	600	1290
3rd Watch	U	570	(370)	0	390	760
	W	690	(360)	0	580	1240
	Total	6520	(3640)	0	4840	9710

*Units will be parked between calls, hence the figures in parenthesis represent how much time would be available for preventive patrol while it is actually planned that none will be carried out.

TABLE 3

Preventive Patrol Test

Distribution of Patrol Units
(Sun-Thur) - (Fri & Sat)

		Present Car Plan	Cars Planned Low Resources	Cars Planned Medium Resources	Cars Planned High Resources
	N	5-6	3-4	4-5	7-10
1st	U	3-4	2-3	2-4	4-6
	W	5-5	3-4	4-6	7-10
	N	8-9	5-6	5-8	9-10
2nd	U	4-5	3-4	3-5	5-7
	W	6-7	4-5	5-7	8-11
	N	8-10	5-6	5-7	9-10
3rd	U	4-6	3-4	3-4	5-6
	W	6-8	4-5	5-7	9-10

TABLE 4

Preventive Patrol Test

Schedule of Patrol Unit Distribution

(Sun - Thur) - (Fri & Sat)

		Present Distribution	Phase I Test Period 1 1/19-3/15	Phase 2 Normal Per.1 3/16-4/12	Phase 3 Test Period 2 4/13-6/7	Phase 4 Normal Per.2 6/8-7/5	Phase 5 Test Per.3 7/6-8/30	Phase 6 Normal Per. 9/1-9/28
	N	5-6	3-4 (L)	5-6	4-5 (M)	5-6	7-10 (H)	5-6
1st Watch	U	3-4	4-6 (H)	3-4	2-3 (L)	3-4	2-4 (M)	3-4
	W	5-5	4-6 (M)	5-5	7-10 (H)	5-5	3-4 (L)	5-5
	N	8-9	5-6 (L)	8-9	5-8 (M)	8-9	9-10 (H)	8-9
2nd Watch	U	4-5	5-7 (H)	4-5	3-4 (L)	4-5	3-5 (M)	4-5
	W	6-7	5-7 (M)	6-7	8-11 (H)	6-7	4-5 (L)	6-7
	N	8-10	5-6 (L)	8-10	5-7 (M)	8-10	9-10 (H)	8-10
3rd Watch	U	4-6	5-6 (H)	4-6	3-4 (L)	4-6	3-4 (M)	4-6
	W	5-8	5-7 (M)	6-8	9-10 (H)	6-8	4-5 (L)	6-8

Note: When Sector is using low resources (L), patrol units are parked between calls.

TABLE 5

Preventive Patrol Test

Estimated Number of Dispatches Per Unit Per Shift

		Average 1972	Estimated #, Low Resources	Estimated #, Medium Resources	Estimated #, High Resources
1st Watch	N	1.69	2.76	2.05	1.12
	U	1.84	2.56	2.28	1.28
	W	1.83	2.80	1.95	1.13
2nd Watch	N	2.58	3.85	3.48	2.19
	U	2.97	3.91	3.48	2.23
	W	3.45	4.63	3.57	2.24
3rd Watch	N	2.76	4.45	4.23	2.53
	U	3.14	4.23	4.10	2.54
	W	3.89	5.60	4.31	2.59

Suggested Car Assignments

TABLE 6

PREVENTIVE PATROL TEST

Test Period I

1-19 to 3-15

	NORA		UNION		WILLIAM	
	Sun-Thur.	Fri-Sat.	Sun-Thur.	Fri-Sat.	Sun-Thur.	Fri-Sat.
1st Watch	1N12 1N35 1N4	1N12 1N3 1N4 1N5	1U1 1U2 1U3 1U12	1U1 1U2 1U3 1U11 1U22 1U33	1W1 1W2 1W35 1W45	1W1 1W2 1W3 1W4 1W5 1W23
2nd Watch	2N12 2N3 2N46 2N5 2N78	2N14 2N2 2N3 2N5 2N67 2N8	2U1 2U2 2U3 2U4 2U13	2U1 2U2 2U3 2U4 2U12 2U33 2U34	2W1 2 W2 2W3 2W45 2W65	2W1 2W2 2W3 2W4 2W5 2W6 2W34
3rd Watch	3N12 3N3 3N46 3N5 3N78	3N14 3N2 3N3 3N5 3N67 3N8	3U1 3U2 3U3 3U4 3U13	3U1 3U2 3U3 3U4 3U12 3U34	3W1 3W2 3W3 3W45 3W65	3W1 3W2 3W3 3W4 3W5 3W6 3W34

Suggested Car Assignments

TABLE 6

PREVENTIVE PATROL TEST

Test Period 2

4-13 to 6-7

	NORA		UNION		WILLIAM	
	Sun-Thur.	Fri-Sat.	Sun-Thur.	Fri-Sat.	Sun-Thur.	Fri-Sat.
1st Watch	1N12 1N3 1N4 1N5	1N1 1N2 1N3 1N4 1N5	1U13 1U2	1U1 1U2 1U3	1W1 1W2 1W3 1W4 1W5 1W12 1W34	1W1 1W2 1W3 1W4 1W5 1W11 1W22 1W33 1W44 1W55
2nd Watch	2N12 2N3 2N46 2N5 2N78	2N1 2N2 2N3 2N4 2N5 2N6 2N7 2N8	2U12 2U3 2U4	2U1 2 U2 2U3 2U4	2W1 2W2 2W3 2W4 2W5 2W6 2W12 2W45	2W1 2W2 2W3 2W4 2W5 2W6 2W11 2W22 2W33 2W44 2W55
3rd Watch	3N12 3N3 3N46 3N5 3N78	3N14 3N2 3N3 3N5 3N6 3N7 3N8	3U12 3U3 3U4	3U1 3U2 3U3 3U4	3W1 3W2 3W3 3W4 3W5 3W6 3W12 3W35 3W46	3W1 3W2 3W3 3W4 3W5 3W6 3W44 3W11 3W23 3W56

Suggested Car Assignments

TABLE 6

PREVENTIVE PATROL TEST

Test Period 3
7-6 to 8-30

	NORA		UNION		WILLIAM	
	Sun-Thur.	Fri-Sat.	Sun-Thur.	Fri-Sat.	Sun-Thur.	Fri-Sat.
1st Watch	1N1	1N1	1U13	1U1	1W12	1W1
	1N2	1N2	1U2	1U2	1W35	1W2
	1N3	1N3		1U3	1W45	1W35
	1N4	1N4		1U12		1W45
	1N5	1N5				
	1N14	1N11				
	1N35	1N22				
		1N33				
		1N44				
		1N55				
2nd Watch	2N1	2N1	2U12	2U1	2W12	2W1
	2N2	2N2	2U3	2U2	2W3	2W2
	2N3	2N3	2U4	2U3	2W45	2W3
	2N4	2N4		2U4	2W65	2W4
	2N5	2N5		2U13		2W56
	2N6	2N6				
	2N7	2N7				
	2N8	2N8				
	2N35	2N25				
		2N38				
3rd Watch	3N1	3N1	3U12	3U1	3W12	3W1
	3N2	3N2	3U3	3U2	3W3	3W2
	3N3	3N3	3U4	3U3	3W45	3W3
	3N4	3N4		3U4	3W65	3W4
	3N5	3N5				3W56
	3N6	3N6				
	3N7	3N7				
	3N8	3N8				
	3N35	3N38				
		3N57				

TABLE 7

Preventive Patrol Test
Distribution of Patrol Car Officers & Two-Man Units
North Precinct

		Normal Car Assignments				Test Period 1 7/6 - 8/30				Test Period 2 9/29 - 11/23				Test Period 3 12/22- 2/15			
		1-Man Cars	2-Man Cars	Total Cars	Officers In Cars	1-Man Cars	2-Man Cars	Total Cars	Officers In Cars	1-Man Cars	2-Man Cars	Total Cars	Officers In Cars	1-Man Cars	2-Man Cars	Tot. Car	Off
	N	3	2	5	7	1	2	3	5	2	2	4	6	5	2	7	9
1st	B	4	1	5	6	4	1	5	6	4	1	5	6	4	1	5	6
	U	2	1	3	4	2	2	4	6	0	2	2	4	1	1	2	3
Total Officers					17				17				16				18
	N	6	2	8	10	2	3	5	8	2	3	5	8	7	2	9	11
2nd	B	7	1	8	9	7	1	8	9	7	1	8	9	7	1	8	9
	U	3	1	4	5	3	2	5	7	1	2	3	5	1	2	3	5
Total Officers					24				24				22				25
	N	4	4	8	12	1	4	5	9	1	4	5	9	5	3	9	11
3rd	B	5	3	8	11	5	3	8	11	5	3	8	11	5	3	8	11
	U	2	2	4	6	2	3	5	8	1	2	3	5	1	2	3	5
Total Officers					29				28				25				27

TABLE 7

Preventive Patrol Test
Distribution of Patrol Car Officers & Two-Man Units
South Precinct

		Normal Car Assignments				Test Period 1 1/19 - 3/15				Test Period 2 4/13 - 6/7				Test Period 3 7/6 - 8/30			
		1-Man Cars	2-Man Cars	Total Cars	Off. In Cars	1-M. Cars	2-M. Cars	Tot. Cars	Officers in Cars	1-M. Cars	2-M. Cars	Total Cars	Off. in Cars	1-M. Cars	2-M. Cars	Tot. Cars	Off. Car
	W	4	1	5	6	3	1	4	5	6	1	7	8	1	2	3	5
st	R	2	1	3	4	2	1	3	4	2	1	3	4	2	1	3	4
	S	2	1	3	4	2	1	3	4	2	1	3	4	2	1	3	4
otal Officers					14				13				16				13
	W	5	1	6	7	4	1	5	6	7	1	8	9	2	2	4	6
nd	R	3	1	4	5	3	1	4	5	3	1	4	5	3	1	4	5
	S	3	1	4	5	3	1	4	5	3	1	4	5	3	1	4	5
otal Officers					17				16				19				16
	W	2	4	6	10	1	4	5	9	6	3	9	12	0	4	4	8
rd	R	0	4	4	8	0	4	4	8	0	4	4	8	0	4	4	8
	S	2	2	4	6	2	2	4	6	2	2	4	6	2	2	4	6
otal Officers					24				23				26				22

TABLE 8

Preventive Patrol Test

Suggested Officer Assignments - North & South Precincts

		Present Planned Assignments	Test #1 1/19-3/15	Normal 3/16-4/12	Test #2 4/13-6/7	Normal 6/8- 7/5	Test #3 7/6-8/30	Normal 9/1-9/28
North Precinct	1st Watch (A)	32	32	32	30	32	33	32
	2nd Watch (B)	49	49	49	46	49	51	49
	3rd Watch (C)	56	55	56	49	56	53	56
	Total North	137	136	137	125	137	137	137
South Precinct	1st Watch (D)	26	25	26	30	26	25	26
	2nd Watch (E)	33	31	33	36	33	31	33
	3rd Watch (F)	44	42	44	48	44	40	44
	Total South	103	98	103	114	103	97	103
	Total North & South	240	234	240	239	240	234	240

A. Includes one station clerk
B. Includes two officers - walking beat, two station managers, and one station clerk
C. Includes two officers - plain clothes, and one station clerk
D. Includes one station clerk
E. Includes one station clerk and one station manager
F. Includes one station clerk

FORECASTING MODELS REVIEWED

I. Deterministic - Statistical

- A. Algebraic
  - 1. Constant
  - 2. Linear
  - 3. Polynomial
- B. Transcendental
  - 1. Exponential
  - 2. Trigonometric (Fourier Series)
- C. Composite - Algebraic and Transcendental
- D. Regression

II. Probabilistic

- A. Poisson
- B. Normal
- C. Uniform
- D. Exponential
- E. Gamma

III. Estimation

- A. Simple Average
- B. Moving Average
- C. Exponential Smoothing
- D. Maximum Likelihood Estimation
- E. Least Squares

EXPONENTIAL SMOOTHING

In order to reduce data storage, the observations X_{t-n}, X_{t-n+1}, ..., X_{t-1}, used for computation of the moving average, can be estimated. The best, minimum variance unbiased, estimate of X_{t-n} is M_{t-1}. The moving average, see previous section,

$$M_t = \frac{1}{n}(X_t - X_{t-n}) + M_{t-1}$$

then becomes

$$M'_t = \frac{1}{n}(X_t - M_{t-1}) + M_{t-1}$$

$$= \frac{1}{n}(X_t) + \left(1 - \frac{1}{n}\right) M_{t-1}.$$

This simple series, calculated using only the last moving average and the most recent observation, requires minimum data storage. It has, however, a notable fault. It is inflexible. The importance of new data, X_t, relative to old, M_{t-1}, is determined completely by the choice of n. For example, a 365 day moving average would weight data for the most recent period by 1/365. This weighting is so small that it might very well take months before a major change in the underlying process measured by X was detected, a stable but very insensitive model. To allow a desirable balance between sensitivity and stability, the basic exponential smoothing model is defined as

$$S_t = \alpha X_t + (1 - \alpha) S_{t-1}$$

where S_t is the exponential smoothed average through period and α, $0 \leq \alpha \leq 1$, is the smoothing coefficient. An exponential forecast equivalent to a given moving average can be found by choosing α such that

$$\alpha = \frac{2}{n+1} \text{ or } n = \frac{2-\alpha}{\alpha}.$$

S_t and S_{t-1} replace M_t and M_{t-1} because n is no longer fixed.

S_{t-1} was calculated from S_{t-2} and X_{t-1}:

$$S_{t-1} = \alpha X_{t-1} + (1 - \alpha) S_{t-2}$$

so that

$$S_t = \alpha X_t + \alpha(1-\alpha) X_{t-1} + (1-\alpha)^2 S_{t-2}$$

Similarly, since $S_{t-2} = \alpha X_{t-2} + (1-\alpha) X_{t-3}$,

$$S_t = \alpha X_t + \alpha(1-\alpha)^2 X_{t-1} + \alpha(1-\alpha)^2 X_{t-2} + (1-\alpha)^3 S_{t-3}.$$

Continuing in this manner,

$$S_t = \alpha X_t + \alpha(1-\alpha) X_{t-1} + \alpha(1-\alpha)^2 X_{t-2} + \cdots + \alpha(1-\alpha)^n X_{t-n} + (1-\alpha)^{n+1} X_{t-n-1}.$$

That is,

$$S_t = \alpha \sum_{i=0}^{n} (1-\alpha)^i X_{t-i} + (1-\alpha)^{n+1} X_{t-n-1}$$

where S_{t-n-1} is the initial value of S_t.

If n becomes large, this will be the case when S_t is calculated without reinitializing the exponential series, and the sequence of random variables X_i, $i = 1, \cdots, n$, is orthogonal (a sequence of random variables is orthogonal if, for any integer j and any integer $k \neq 0$, $E[X_j X_{j+k}] = 0$), then S_t is an unbiased estimator of the underlying stationary series:

$$n \to \infty \Rightarrow (1-\alpha)^{n+1} \to 0$$

so S_t takes on the limiting forms

$$S_t = \alpha \sum_{i=0}^{\infty} (1-\alpha)^i X_{t-i}.$$

$$E[S_t] = E[\alpha \sum_{i=0}^{\infty} (1-\alpha)^i X_{t-i}] = \alpha \sum_{i=0}^{\infty} (1-\alpha)^i E[X_{t-i}]$$

$$= \frac{\alpha}{1-(1-\alpha)} E[X] = E[X].$$

If necessary, the above basic model can be adjusted for seasonal or trend effects.

Seasonal adjustment may be either additive, if X is independent of the seasonal pattern, or multiplicative, if X is proportional to the seasonal pattern. A simple additive model would be

$$S_t = \alpha X_t + (1-\alpha) S_{t-1} + W_t.$$

Where W_t is the appropriate seasonal adjustment for period t. The multiplicative model, often more useful, would be

$$S_t = \alpha \frac{X_t}{W_{t-L}} + (1-\alpha) S_{t-1}$$

where

$$W_{t-L} = \beta \frac{X_{t-L}}{S_{t-L}} + (1-\beta) W_{t-2L}$$

and $W_t = \beta \frac{X_t}{S_t} + (1-\beta) W_{t-L}.$

β, $0 \leq \beta \leq 1$, itself an exponentially smoothed average, is the current coefficient for the seasonal adjustment. L is the periodicity of the seasonal effect. A forecast, or estimate, of X_{t-1} would be

$$\hat{X}_{t+1} = S_t W_{t-L+1}.$$

A forecast of X_{t+T}, the observed value for T periods into the future would be

$$\hat{X}_{t+T} = S_t W_{t-L+T}$$

for $T \leq L$. For $T > L$ forecasts can be obtained by reusing $W_{t-L+1}, \cdots, F_t$.

In terms of past data and initial conditions, the multiplicative seasonally adjusted smoothed average is

$$S_t = \alpha \sum_{n=0}^{M} (1-\alpha)^n \frac{S_{t-n}}{W_{t-L-n}} + (1-\alpha)^{M+1} S_{t-M-1}$$

and

$$W_t = B \sum_{n=0}^{J} (1-B) \frac{X_{t-n\,L}}{S_{t-n\,L}} + (1-B)^{J+1} W_{t-(J+1)L}.$$

J is the largest integer less than or equal to M/L.

Trend adjustment may also be either additive or multiplicative. The multiplicative seasonally adjusted model

$$S_t = \alpha \frac{X_t}{W_{t-L}} + (1-\alpha) S_{t-1}$$

becomes

$$S_t = \alpha \frac{X_t}{W_{t-1}} + (1-\alpha)(S_{t-1} + C_{t-1})$$

when adjusted for additive trend. C_{t-1} is the additive trend factor through period $t-1$. The seasonal adjustment for period t, W_t, remains the same:

$$W_t = \beta \frac{X_t}{W_t} + (1-\beta) W_{t-1},$$

and the trend estimate is updated by

$$C_t = \gamma S_{t-1} + (1-\gamma) C_{t-1}, \quad 0 \leq \gamma \leq 1.$$

Since crime volume and calls for service may have both long and short term trend effects, as well as seasonal patterns, this model would be the most appropriate exponentially smoothed model.

Initial Conditions

To begin the exponential smoothing process a prior value, S_{t-1}, is needed. If past data is available, the arithmetic mean should be used

$$S_{t-1} = M_{t-1} = \frac{\sum_1^n X_i}{n}.$$

If there is no past data, a subjective estimate of the arithmetic mean can be used.

The importance of the initial S_{t-1} can be controlled by the choice of the smoothing coefficient, α. The weight given S_{t-1} after m observations will be $(1-\alpha)^m$. If the initial smoothed average is based on accurate quantitative data and n is large, a small beginning value of α (thus giving a large weight to S_{t-1}) can be chosen. If the initial smoothed average is probably inaccurate, a large beginning value (close to 1,) can be chosen, afterwards α can be adjusted to enhance predictive accuracy and to affect sensitivity and stability. Later choice of α and the other smoothing coefficients will be discussed next.

Selection of Smoothing Coefficients

In order to choose satisfactory smoothing coefficients $(\alpha\beta\gamma)$, some basis of comparison is needed. The variance of the forecast error is often used. If the forecast error for future period T using smoothed data through period t is

$$\varepsilon_{t,T} = X_{t+T} - S_{t,T},$$

then the forecast error variance is

$$\sigma_T^2 = \frac{1}{n-1} \sum_{t=1}^{n} \varepsilon_{t,T}^2$$

where n is the number of data points used in estimation. Ideally, smoothing coefficients should be selected to minimize σ_T^2.

If a computer is available, coefficients can be determined iteratively or by trial and error. That is, a broad range of values of the smoothing coefficients is chosen. Then σ_T^2 is calculated, using past observations, for all combinations. The set of coefficients that give the smallest value of σ_T^2 are chosen either for use or for further comparison with coefficients in their numerical vicinity.

If a computer is not available, then the same procedure may be used, but on a narrower range of coefficient values. Often σ_T^2 is flat in the area of its minimum (,) so reasonably good values may be obtained.

The coefficients should, of course, be periodically reviewed and updated.

THE MOVING AVERAGE

One of the simplest quantitative measures for predicting crime or calls for service volumes is the moving average. If $X_1, X_2, \ldots, X_t$ are observations associated with t successive time intervals the t^{th} moving average M_t, may be defined as

$$M_t = \frac{1}{n} \sum_{i=t-n+1}^{t} X_i \quad .$$

Where n is the number of time intervals used in computing the moving average ($n \leq t$).

For ease of continuous computation the following derived recursive form of the moving average is useful:

$$M_t = \frac{1}{n} \sum_{i=t-n+1}^{t} X_i$$

$$= \frac{1}{n} \cdot (X_t - X_{t-n} + \sum_{i=t-n+1}^{t-1} X_i + X_{t-n})$$

$$= \frac{1}{n} (X_t - X_{t-n}) + \frac{1}{n} \sum_{i=t-n}^{t-1} X_i$$

$$= \frac{1}{n} (X_t - X_{t-n}) + M_{t-1}$$

As an example, suppose $X_1 = 2994$, $X_2 = 2835$, $X_3 = 3243$, $X_4 = 3275$, $X_5 = 3195$, and $X_6 = 4302$ represent the number of Part I Offenses for t = 6 successive months. Then the 5th three month moving average (n = 3) is

$$M_5 = \frac{1}{3} \sum_{i=3}^{5} X_i = \frac{1}{3} \quad (3243+3275+3195) = 3238$$

and

$$M_6 = \frac{1}{3} (X_6 - X_3) + M_5$$

$$= \frac{1}{3} (4302-3243) + 3238$$

$$= 3591.$$

To be effective a moving average may require the following three adjustments:

(1) The number of time intervals, n, used in computation of the averages must be chosen, usually by some trial and error, to give a usable compromise between stability and sensitivity. Choosing n large will make the effects of recent observations on the moving average small, i.e., the moving average will be stable but insensitive. Choosing n small will make the effects of recent observations on the moving average large, i.e., the moving average will be sensitive but unstable.

(2) Since the moving average depends on data from past time periods, there is a lag that requires adjustment. To correct for this a long term trend effect, estimated using data from many more time intervals than n, can be added to the moving average. Estimation of this trend is often done by linear regression. Other methods (e.g., simple averaging), however, can be used.

(3) The moving average should be adjusted for recurring seasonal variations. A simple method of accomplishing this is to calculate the average percentage of observations that occur in a time interval for many years back, and then apply this percentage to the trend-adjusted moving average for the corresponding present time interval.

There are two notable reasons for considering the moving average as a method of forecasting crime or calls for service volumes. The first is that the moving average is fundamental to understanding exponential smoothing, a forecasting method that will be discussed in detail in the next section. Secondly, the moving average can serve as a standard of comparison for other forecasting methods and predictive models. It is simple in concept and depends on data that is readily available. It is quantitative, hence evaluable. If trend and seasonal adjustments are made using simple averaging, and if time intervals are large, continuous computation involves moderate time and effort and can be done without the aid of a computer. It is adaptable: new information is easily introduced; improvements and refinements are easily made. Also, replacement by a superior system should be uncomplicated. Thus, unless other more sophisticated predictors substantially increase accuracy and utility (utility in the economic sense) when compared with the moving average, there can be little reason to implement them.

The moving average has several shortcomings that lead to predictions inferior to those of other methods. Without adjustments it frequently is inaccurate. With adjustments much information must be stored, (this is especially true for seasonal adjustments) and complexity increases. Complexity may increase to the point where the moving average is more difficult to implement and control than are models that are more profound and mathematically more complicated. Other deficiencies in the moving average, in the basic adjusted form presented here, include its failure to address the problems of unstable seasonal patterns and inherent probabilistic variation. Also, related variables that could enhance predictive accuracy are not incorporated. Other methods do attack these problems. Thus the question is, not are other methods better predictors, but are they sufficiently better to justify their use.

Notes on

BOX-JENKINS TIME SERIES ANALYSIS

Box and Jenkins have developed an iterative method for modeling the dependence among the observations in a time series. It is a model-building process rather than model-fitting process, as the model is determined on the basis of the data. The Box and Jenkins methods deal with "Univariate Discrete Time Series", which is a sequence of observation of a single variable that could be ordered in a logical manner, e.g., time, distance, required that observations are taken at equally spaced distance, say Z_t, t=1, 2, ...n. The most general form of Box-Jenkins models has an "Autoregressive-Integrated - Moving Average" form:

$$(1 - \phi_1 B - \cdots - \phi_p B^p) \quad (1 - B)^d z_t = (1 - \theta_1 B - \cdots - \theta_q B^q)\, a_t$$

where $Z_t = \begin{cases} Z_t & \text{if } d > 0 \\ Z_t - u & \text{if } d = 0 \end{cases}$ with u representing its mean of the series

B is an operator such that $BZ_t = Z_{t-1}$

a_t are random shocks which are assumed to be independent, normally distributed with zero mean and constant variance σ_a^2.

We may denote the model as ARIMA(p, d, q).

There are four steps to building a model. They are:

1. Model Identification
2. Model Preliminary Estimation
3. Model Estimation (Checking)
4. Model Forecasting.

The methods are applicable only to time series which are either stationary or could be reduced to be stationary by a suitable differencing. With the Box-Jenkins Model, the best forecast at a given time origin is its conditional expectation of its future observation according to the model. Besides forecasts, confidence limits and updated forecasts are included.

SEATTLE POLICE DEPARTMENT

M.I.R. CODE - Numerical

When clearing use only numbers without parenthesis

CRIMINAL

- 010 HOMICIDE
- 020 RAPE
- (030) ROBBERY
  - 031 Armed
  - 032 Strong Arm (include purse snatch with force)
- (040) ASSAULT
  - 041 Non-Aggravated (include threats)
  - 042 Aggravated
- (050) BURGLARY
  - 051 Residence
  - 052 Non-Residence
- (060) LARCENY
  - 061 Auto Accessories (include license tabs)
  - 062 Car Prowl
  - 063 Purse Snatch (without force)
  - 064 Shoplift
  - 065 Other
- (070) AUTO THEFT
  - 071 Theft
  - 072 Theft and Recovery
  - 073 Recovery
  - 074 Theft of License Plate(s)
- 090 ARSON, BOMB, EXPLOSION (include found device)
- 100 FRAUD (include bad checks, bunco, forgery)
- 110 KIDNAP
- 120 VICE (liquor, gambling, prostitution, narcotics)
- (130) PROPERTY DAMAGE
  - 131 Vandalism
  - 132 Other Property Damage
- 140 SEX OFFENSE (excluding rape)
- 150 CHILD, ABANDONED, ABUSE, NEGLECTED
- 160 PROWLER
- 170 MISCELLANEOUS MISDEMEANOR (curfew, litter, etc.)
- 190 WARRANT ARREST (not from assigned warrant service - 918)

INVESTIGATE PREVENTIVE

- (210) ALARM
  - 211 Burglary Alarm
  - 212 Robbery Alarm
  - 213 Other Alarms
- 220 MENTAL COMPLAINT
- 230 DRUNKENNESS
  - 231 Minor Consuming
- (240) DISTURBANCE
  - 241 Family (include standby to maintain peace)
  - 242 Fight
  - 243 Juvenile
  - 244 Noise
  - 245 Other Disturbance
- 250 MISCHIEF OR NUISANCE
- 260 OPEN DOOR
- 270 PREMISES CHECK
- (280) SUSPICIOUS
  - 281 Car
  - 282 Circumstances
  - 283 Person

ASSIST PUBLIC

- (290) WEAPON, PERSON WITH
  - 291 Gun
  - 292 Other Weapon
- (310) ASSIST OTHER AGENCY
  - 311 Assist Law Enforcement Agency
  - 312 Assist Other Public Agency
- 320 AUTO, REQUEST TO LOCATE
- 330 CASUALTY (NON-TRAFFIC, NON-CRIMINAL)
- (350) HAZARD (NON-TRAFFIC)
  - 351 Fire
  - 352 Water
  - 353 Other Hazard
- (360) PERSONS, LOST, FOUND, MISSING
  - 361 Person Found
  - 362 Missing Person
  - 363 Runaway
- 370 PROPERTY, LOST, FOUND, MISSING
- 380 SUICIDE AND ATTEMPTS
- 390 ASSIST PUBLIC — OTHER NON-SPECIFIED

TRAFFIC

- 410 TRAFFIC, ABANDONED CAR
- 420 TRAFFIC ACCIDENT, INJURY OR DEATH
- 430 TRAFFIC ACCIDENT, NON-INJURY
- 440 TRAFFIC, ASSIST MOTORIST
- 450 TRAFFIC, DWI
- 460 TRAFFIC, MOVING VIOLATION
- 470 TRAFFIC, PARKING VIOLATION (except abandoned car)
- 480 TRAFFIC CONTROL
- 490 TRAFFIC HAZARD

- 510 HELP THE OFFICER (EMERGENCY)
- 520 ASSIST THE OFFICER (NON-EMERGENCY)

DOWNTIME

- (910) ADMINISTRATIVE DOWNTIME — ASSIGNED
  - 911 Community and School Meetings
  - 912 Court
  - 913 Hospital Guard
  - 914 Prisoner Escort
  - 915 Other Escort
  - 916 Request to Watch
  - 917 Stakeout
  - 918 Assigned Warrant and Subpoena Service
  - 919 Other Assigned Downtime
- (920) ADMINISTRATIVE DOWNTIME, NON-ASSIGNED
  - 921 Out of Car — No Reason Given
  - 922 No Answer When Called
- (930) ADMINISTRATIVE DOWNTIME — OTHER
  - 931 Eat
  - 932 Coffee
  - 933 Garage/Car Maintenance (gas, wash, etc.)
  - 934 Station

ADVISING A SUSPECT

PRIOR TO CUSTODIAL INTERROGATION

1. YOU HAVE THE RIGHT TO REMAIN SILENT.
2. ANYTHING YOU SAY CAN BE USED AGAINST YOU IN A COURT OF LAW. FOR JUVENILES, SEE FOOTNOTE.*
3. YOU HAVE THE RIGHT AT THIS TIME TO AN ATTORNEY OF YOUR OWN CHOOSING AND TO HAVE HIM PRESENT BEFORE AND DURING QUESTIONING AND THE MAKING OF ANY STATEMENT.
4. IF YOU CANNOT AFFORD AN ATTORNEY, YOU ARE ENTITLED TO HAVE AN ATTORNEY APPOINTED FOR YOU BY A COURT AND TO HAVE HIM PRESENT BEFORE AND DURING QUESTIONING AND THE MAKING OF ANY STATEMENT.
5. YOU HAVE THE RIGHT TO EXERCISE ANY OF THE ABOVE RIGHTS AT ANY TIME DURING ANY QUESTIONING AND THE MAKING OF ANY STATEMENT.

WAIVER BY SUSPECT

1. DO YOU UNDERSTAND EACH OF THESE RIGHTS I HAVE EXPLAINED TO YOU?
2. HAVING THESE RIGHTS IN MIND, DO YOU WISH TO TALK TO US NOW?

* FOOTNOTE, ADD: INCLUDING A CRIMINAL PROSECUTION IN THE EVENT THAT JUVENILE COURT DECLINES JURISDICTION IN YOUR CASE.

RADIO INFORMATION CHECKLIST

- A. TYPE OF CRIME
- B. TIME OF OCCURRENCE
- C. LOCATION OF OCCURRENCE
- D. TYPE OF PREMISES
- E. NUMBER OF SUSPECTS
- F. BRIEF DESCRIPTION OF SUSPECTS
- G. WEAPON USED BY SUSPECTS
- H. DIRECTION SUSPECTS LEFT SCENE
- I. HOW DEPARTED, FOOT OR AUTO
- J. VEHICLE DESCRIPTION, IF ANY
- K. PROPERTY TAKEN

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SEATTLE POLICE DEPARTMENT

M.I.R. CODE - Alphabetical

When clearing use only numbers without parenthesis

- ADMINISTRATIVE DOWNTIME — ASSIGNED (910)
  - Community and School Meetings 911
  - Court 912
  - Hospital Guard 913
  - Prisoner Escort 914
  - Other Escort 915
  - Request to Watch 916
  - Stakeout 917
  - Assigned Warrant and Subpoena Service 918
  - Other Assigned Downtime 919
- ADMINISTRATIVE DOWNTIME — NON-ASSIGNED (920)
  - Out of Car — No Reason Given 921
  - No Answer When Called 922
- ADMINISTRATIVE DOWNTIME — OTHER (930)
  - Eat 931
  - Coffee 932
  - Garage/Car Maintenance (gas, wash, etc.) 933
  - Station 934
- ALARM (210)
  - Burglary Alarm 211
  - Robbery Alarm 212
  - Other Alarm 213
- ARSON, BOMB, EXPLOSION (INCLUDE FOUND DEVICE) 090
- ASSAULT (040)
  - Non-Aggravated (include threats) 041
  - Aggravated 042
- ASSIST THE OFFICER (NON-EMERGENCY) 520
- ASSIST OTHER AGENCY (310)
  - Assist Law Enforcement Agency 311
  - Assist Other Public Agency 312
- ASSIST PUBLIC — OTHER NON-SPECIFIED 390
- AUTO, REQUEST TO LOCATE 320
- AUTO THEFT (070)
  - Theft 071
  - Theft and Recovery 072
  - Recovery 073
  - Theft of License Plate(s) 074
- BURGLARY (050)
  - Residence 051
  - Non-Residence 052
- CASUALTY (NON-TRAFFIC, NON-CRIMINAL) 330
- CHILD, ABANDONED, ABUSE, NEGLECTED 150
- DISTURBANCE (240)
  - Family (include standby to maintain peace) 241
  - Fight 242
  - Juvenile 243
  - Noise 244
  - Other, Disturbance 245
- DRUNKENNESS 230
  - Minor Consuming 231
- FRAUD (include bad checks, bunco and forgery) 100
- HAZARD (NON-TRAFFIC) (350)
  - Fire 351
  - Water 352
  - Other Hazard 353
- HELP THE OFFICER (EMERGENCY) 510
- HOMICIDE 010
- KIDNAP 110
- LARCENY (060)
  - Auto Accessories (include license tabs) 061
  - Car Prowl 062
  - Purse Snatch (without force) 063
  - Shoplift 064
  - Other 065
- MENTAL COMPLAINT 220
- MISCELLANEOUS MISDEMEANOR (curfew, litter, etc.) 170
- MISCHIEF OR NUISANCE 250
- OPEN DOOR 260
- PERSONS, FOUND, MISSING (360)
  - Found Person 361
  - Missing Person 362
  - Runaway 363
- PREMISES CHECK 270
- PROPERTY DAMAGE (130)
  - Vandalism 131
  - Other Property Damage 132
- PROPERTY, LOST, FOUND, MISSING 370
- PROWLER 160
- RAPE 020
- ROBBERY (030)
  - Armed 031
  - Strong Arm (include purse snatch with force) 032
- SEX OFFENSE (EXCLUDING RAPE) 140
- SUICIDE, AND ATTEMPTS 380
- SUSPICIOUS (280)
  - Car 281
  - Circumstances 282
  - Person 283
- TRAFFIC, ABANDONED CAR 410
- TRAFFIC ACCIDENT, INJURY OR DEATH 420
- TRAFFIC ACCIDENT, NON-INJURY 430
- TRAFFIC, ASSIST MOTORIST 440
- TRAFFIC, DWI 450
- TRAFFIC, MOVING VIOLATION 460
- TRAFFIC, PARKING VIOLATION (EXCEPT ABANDONED CAR) 470
- TRAFFIC CONTROL 480
- TRAFFIC HAZARD 490
- VICE (Liquor, Gambling, Prostitution, Narcotics) 120
- WARRANT ARREST (not from assigned warrant service-918) 190
- WEAPON, PERSON WITH (290)
  - Gun 291
  - Other Weapon 292

Dispositions

PUBLIC ORDER OR CRIMINAL CALL

Major Case Number Needed
- A. Physical Arrest Made
- B. Citation Issued (No Physical Arrest)
- C. Report Made, No Arrest

NO Major Case Number Needed
- D. Physical Arrest Made
- E. Citation Issued (No Physical Arrest)
- F. Report Made
- G. FIR Made
- H. Oral Warning Given
- I. Incident Located — Public Order Restored

SERVICE CALL
- J. Transportation or Escort Provided
- K. Other Service Rendered by Seattle Police Department
- L. Service Rendered with Assistance from Other Agency.

CALL, INCOMPLETED OR ERRONEOUS
- M. Circumstances of Incident Misinterpreted, No Police Action Possible/Necessary
- N. Unable to Locate Suspect, Complainant
- O. On Scene Investigation, Unable to Determine Validity
- P. No Such Address or Location
- Q. Event Beyond Police Authority and/or Jurisdiction
- R. Deliberately Falsified
- S. Cancelled by Radio
- T. Cancelled or Terminated by Citizen After Officer Arrives

- X. Extra Unit

SEATTLE POLICE DEPARTMENT

TRAINING BULLETIN

#73-4 Sept. 20, 1973

MISCELLANEOUS INCIDENT REPORTING (MIR)

An M.I.R. reporting system is vital to the efficient management of our street operations. Without a coded system, it would be impossible to make any sense of the more than two hundred thousand calls which the Department handles each year.

The first M.I.R. code was adopted by the Department in October, 1966. This code consisted of 49 categories (incident types) and 15 dispositions. Because of the demand for more specific data regarding police calls, a revised code was adopted in July of 1969. This code consisted of 80 categories and 20 dispositions. This change required officers to become familiar with an entirely new numbered sequence of incidents.

Since its inception, the present M.I.R. coding system has proved to be a valuable aid in the analysis of Department workload. Many operational problems have been solved with the aid of MIR data runs. However, much still remains to be done in improving the efficiency of operations; and the present code has a number of deficiencies which restrict its usefulness.

Because of an ever-increasing demand for information regarding street operations, and the installation of a mini-computer in the Communication Division under Grant 507, it has been necessary to again consider adopting a revised code. Yet it has been recognized that it is undesirable to utilize a coding system that requires officers to re-memorize an entire code each time it is changed. Therefore a new coding system has been devised. The code has been expanded from two digits to three digits, and incidents reorganized into groups that will allow for future changes without requiring that the entire numbering sequence be altered.

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The new code has several added advantages over the present code. First the new code will allow for a more meaningful analysis of the dispatch function. Second, the new code is compatible with the FBI crime numbering system. Third, the new dispositions are more realistic of street operations.

Even though the MIR code has been changed, the procedures for using the code will remain the same. Every officer assigned by radio to investigate an incident will be required to advise the radio dispatcher of his arrival at the scene, and on completion of the call, check back into service by giving the codes for the type and disposition of the incident. Officers who observe an incident "on-view" which has occurred or is occurring in their presence will report themselves out of service, describe the incident which they will be handling, and give the location. Upon return to service, the police unit will "clear" with radio and, by code, furnish the radio dispatcher with the type of incident and disposition.

An officer handling an incident is expected to clear with the code which most nearly describes the situation as he actually found it to be upon investigation.

It is recognized that the adoption of a new code requires that officers take the time to familiarize themselves with the new categories and numbering system. But in the long run, the new code will prove to be a much more valuable aid in the analysis of street operations and the improvement of Department efficiency.

SEATTLE POLICE DEPARTMENT

Patrol Manpower Allocation Research Team

Proposed

Operational Patrol Test

Part A

December 1973

Cal Clawson
Systems Analyst
Mike Mills
Statistician
Samson Chang
Methods Analyst

1 Introduction

On March 2, 1973 the Seattle Police Department received an LEAA grant entitled "Patrol Manpower Allocation": to develop a comprehensive patrol allocation system. One part of the grant involves the selection of allocation factors to be used in the proper deployment of patrolcars. In cooperation with the staff of the Patrol Division, the Patrol Manpower Allocation Research Team has selected response time to calls for service as the basic allocating factor. Therefore, the goal of the allocation system will be to distribute patrolcars in such a manner as to reduce response times to a minimum throughout the city.

In order to achieve the above stated goal the Research Team will develop a computer program which will simulate the proper distribution of patrolcars. In order to estimate the correct coefficients to be entered as part of the computer program an operational patrol test will be conducted in the various patrol sectors of the city. This test will measure the impact of various patrolcar levels on response times within the sectors.

In order to determine the general sensitivity of response times to car levels and to iron out test implementation problems a short term (6 week) test will be conducted in William Sector. Once this test has been analysed a generalized test procedure will be developed for the other sectors. The following material outlines the preliminary test to be conducted in William Sector.

II Test Design -- William Sector

Three patrolcar levels will be tested over six weeks in William Sector according to the following schedule:

Number of Patrol Cars by Week and Watch

	Week					
	Jan 19 Jan 25	Jan 26 Feb 1	Feb 2 Feb 8	Feb 9 Feb 15	Feb 16 Feb 22	Feb 23 Mar 1
1st Watch	5	9	5	7	7	9
2nd Watch	5	7	9	9	7	5
3rd Watch	9	9	7	7	5	5
Total	19	25	21	23	19	19

The patrol car levels given cannot be considered as recommended levels only. To make the test meaningful they must be considered as manditory for the course of the test period. Hence, every effort must be made by patrol supervisors to insure that the exact number of cars called for are, in fact, assigned. The Research Team will monitor the patrol car levels during the test.

III Improving Response Time Statistics

At the present time it is estimated that on approximately 40% of all patrol dispatches, officers do not give their arrival time or dispatchers do not enter arrival time on dispatch cards. In order to improve the test results and to generally improve response time statistics, the Research Team will prepare a training bulletin to retrain officers in giving valid arrival times. It will be the responsibility of the Patrol supervisors to see that the importance of carring out correct procedures is understood by all officers under their command.

IV Assignment of Responsibilities

1. Patrol Manpower Allocation Research Team:

   A. Provide any assistance necessary to the Patrol Division in implementating the test.

   B. Prepare a training bulletin to retrain officers in the proper methods of giving arrival times.

   C. Work with dispatchers to ensure that arrival times are entered into the computer system.

   D. Do the necessary programing to obtain test data from the Communications Division's PDP--11 computer.

   E. Monitor car assignment levels.

   F. Perform the analyses at the conclusion of the test and make recommendations to the Patrol Division regarding the design of the city wide test.

2. Patrol Division

A. Determine the correct procedures to reassign officers to William Sector to achieve the proper car levels according to the test schedule.

B. Ensure that the proper number of cars are assigned to William Sector during the test.

C. Ensure that all officers receive and understand the training bulletin regarding response time procedures.

OPERATION TEST -- WILLIAM SECTOR

Operating Procedures

1. Operating procedures--Patrol cars: Patrol cars will operate in a normal manner in performing preventive patrol, driving to the scene of a call, and handling calls. If the officer has been informed that he is the only available car in William Sector, he will always notify the radio if, for any reason, he has to leave his radio.

2. Operating procedures - Communications

A. Dispatchers will always maintain at least one William Car in service unless there is a call of precedence zero or one to be dispatched.

B. If only one William Car is in service then dispatches of precedence two or greater will be stacked until additional cars are back in service.

C. If only one William Car is in service, that car will not be allowed to go out of service on an on-view call unless he can remain in continuous radio contact with radio (or unless he has an on-view call which would be considered as precedence zero or one).

D. When only one William Car is in service, the dispatcher will notify that car of this fact by an approprate code.

E. If the dispatcher receives a request for a William Car and only one car is in service, this fact will be communicated to the individual making the request. If the person making the request still desires a William Car, the dispatcher

will comply and note the incident (identifying the person making the request) on the Patrol Unit Status Report.

3. Operating Procedures--Patrol Sergeant, William Sector:
Initial patrol car assignments will be made by the William Sector Sergeant in such a manner as to give the most uniform distribution of cars throughout the sector. Additional cars will be selectively located to avoid saturation patrol in any one car beat.

TESTING MODEL FOR THE PRELIMINARY OPERATIONS TEST

MODEL

$$Y_{ijk} = u + \alpha_i + \beta_j + \gamma_{ij} + \delta X_{ij} + \varepsilon_{ijk}$$

ε_{ijk} are independent $N(0,\sigma^2)$

Y_{ijk} = mean response time for car level i, week j, replication k

X_{ijk} = mean numbser of calls for service for level i, week j, replication k

u = an additive constant

α_i = the main effect due to car level i

β_j = the main effect due to watch j

γ_{ij} = the interaction between car level i, week j

δ = the coefficient for the regression of calls for service on mean response time

ε_{ijk} = an error term for car level i, watch j, replication k

Factors Affecting Response Time

The response time goal as stated in the Long-Range Planning Report #2 reads as follows:

> "Response Time Goal - In at least 85% of all cases, response to emergency calls, including Communication Center time, will not exceed 2.5 minutes. For non-emergency calls, total response time will not exceed 7.5 minutes in 85% of all cases."

The following factors have been identified as having a significant influence on our ability to meet the response time goal.

1. Volume of Calls for Service. The volume of calls for service is not under the Department's direct control; however, we can expect the volume of calls to increase as the public gains more confidence in the Police Department and is more willing to contact us in problematic situations.

2. Time Spent Contacting Department. With the use of the 911 dialing system and the configuration of primary and secondary phone operators within the Communications Center, the time delay for citizens contacting the Department is at a minimum. Primary phone operators answer incoming calls with an average delay of approximately 2-1/2 seconds; therefore, the potential magnitude for improvements here is nominal.

3. Communications Center Call Screening Policy. The ability to efficiently screen incoming calls is one of the most effective means to control the dispatches going to patrol units. However, the Communications Center is presently carrying out a procedure of heavy call screening and it cannot be expected that a refinement of this procedure will substantially decrease the volume of dispatches. Credit must be given to the Communications Center for recognizing the importance of screening.

4. Transfer of Information Between Phone Operators and Dispatchers. At the present time the use of MIR cards and a conveyor belt make the time delay a matter of seconds. With the installation of the mini-computer to replace the MIR card, the time delay should decrease several seconds. This will not represent a substantial decrease in overall response time.

5. Number of Primary Phone Operators. A shortage of primary phone operators causes a queing of incoming calls. This has been recognized by the Communications Center, and as long as the Center can maintain sufficient staff this factor should not become a problem. On the other hand, because of the efficiency of the Communications Center, this factor does not represent an area for meaningful improvement.

6. Number of Dispatchers. In general, the same comments apply to this factor as factor #3. With the use of the CRTs, the workloads of individual dispatchers should decrease and hence improve the efficiency of dispatchers at busy times. This should have an impact on overall response time.

7. Number of Cars Assigned to the Street. The following factors determine the number of cars which can be assigned to street duty for handling calls:

   a. The utilization of one- and two-man cars. The policy controlling the number of two-man units greatly affects the number of units which can be assigned to street duty. Recognizing this, the Patrol Division has adopted a policy of using 54% two-man cars. It was felt that this percentage was compatible with the need for a sufficient number of units and the need for ensuring officer safety in problem areas. Any attempt to significantly reduce the number of two-man units would have to be countered with a method to significantly increase officer safety. No such method has as yet been suggested. Yet, data regarding the need for two-man cars is incomplete, and therefore any research concerning two-man cars would be helpful.

   b. Adding non-patrol units to the dispatchable unit pool. One area where significant gains might be possible is the area regarding the addition of traffic and/or detective units to the pool of units which are available for dispatching. This should certainly be a high priority research area. Detective mobile office patrols (mobile phones).

   c. Number of men assigned to the Patrol Division. This represents another area where significant improvements are possible. However, the increase in men assigned to the Patrol Division implies a decrease in other divisions. Hence, to consider such a move, more information is needed regarding the cost-effectiveness of non-patrol functions.

   d. Number of cars maintained for street assignment. Any increase in car assignments must be related to leasing a sufficient number of cars from MTD. However, since the cost of maintaining cars is only a small fraction of the cost of maintaining a patrol unit on the street, funds should be available to maintain a sufficient fleet of cars. This is primarily a problem of convincing the OMB office of the inefficiency of maintaining too few cars.

8. Number of Assigned Units Available for Dispatch. Of all units assigned to street duty, only a percentage are available for assignment at any specific time. Some of the factors controlling the number of cars available include:

   a. Distribution of units by area and by time. The problem of determining the optimum distribution of units is very complex. Federal Grant 507 is intended to demonstrate the optimum distribution for Seattle, and therefore the successful completion of Grant 507 should help us to reach the response time goal.

b. Volume of downtime. By learning to better control on-street downtime we will be better able to increase the number of cars available to receive calls. However, since the per cent of time spent on downtime is presently approximately 12.5%, the magnitude of improvement cannot be great.

c. Constant communications with units. Through the use of portable radios it will be possible to pull units from low priority calls for assignment to high priority calls. To a limited extent this will improve response times.

d. Length of time spent on calls. By decreasing the average time spent on calls we can increase the number of units available. This may cause a negative trade off if the quality of the dispositions of calls decreases.

e. Time spent completing reports. This is related to both 8b and 8d, but is believed to be of significant importance to be listed separately. It is anticipated that a sampling of times for report writing will illustrate the true extent of the problem.

9. Faster Communications (Patrol Car Terminals). It is anticipated that the use of terminals will speed the dispatching process by avoiding delays caused by heavy radio traffic.

10. Car Locator System. A car locator system would decrease dispatching time but the high cost of the system may offset the advantages. More study is needed in this area.

11. Officer Motivation. Too little is known regarding the effect that officer motivation has on response time. This could prove to be a very fruitful area of research.

MEAN EMERGENCY RESPONSE TIMES

Assume emergency response times are exponentially distributed. The following table then gives the required mean emergency response time, $\bar{R}$, to give a probability of .70, .85, and .99, that a call for service will be answered in less than T minutes (i.e., in the long run, 70%, 85%, or 99% of all emergency calls will be responded to in less than, or equal to, T minutes if the attained emergency response time is $\bar{R}$).

T (minutes)	$\bar{R}$ (minutes:seconds) .70	.85	.99
2.0	1:40	1:03	:26
2.5	2:04	1:19	:33
3.0	2:29	1:35	:39
3.5	2:54	1:51	:46
4.0	3:19	2:06	:52
4.5	3:44	2:22	:59
5.0	4:09	2:38	1:05
5.5	4:34	2:54	1:12
6.0	4:59	3:10	1:18
6.5	5:24	3:26	1:25
7.0	5:49	3:41	1:31
7.5	6:14	3:57	1:38
8.0	6:39	4:13	1:44
8.5			
9.0	7:29	4:45	1:57
9.5			
10.0	8:18	5:16	2:10
10.5			
11.0	9:08	5:48	2:23
11.5			
12.0	9:58	6:20	2:36
12.5			
13.0	10:48	6:51	2:49
13.5			
14.0	11:38	7:23	3:02
15.0	12:28	7:54	3:15

Notes On

Larson's Hypercube Queuing Model

Richard C. Larson, of the M.I.T. Operations Research Center, has supervised the development of an analytical model of a spacially distributed queuing system. The major uses of this "hypercube" queuing model are as a tool for investigating alternative methods of dispatching and deploying police patrol forces and as an aid in the redesign of police sectors.

The Seattle Police Department wishes to develop a model, using emergency response time as a performance criterion, to deploy its police patrol forces. A consideration of the potentialities of the hypercube model is presented here.

It should be emphasized that a complete description of the hypercube model has not been received by the Department. Information is derived from references listed at the end of this commentary.

The hypercube model requires as input data:

"the spatial distribution of calls for police service, by geographical cell; the average service time per call; an estimate of the travel time from each geographical cell to every other geographical cell; a description of the dispatching strategy; the spatial distribution of response units whil not responding to calls" (4, Vol. 1, No.6, p. 9). Geographical cells are basic sector subdivisions.

Comments: (1) In choosing basic geographical cells a balance between accuracy of estimation and practical utility would be required. (2) The matrix of intercell travel times may be estimated either empirically or analytically. If estimated empirically a great amount of work and computer time would be involved. If estimated analytically, the assumptions required

for mathematical tractability may severly limit usefulness. (3) The dispatching strategy (method of deciding which available car to dispatch to a call) must be specified through a predetermined dispatching matrix. If a dispatching system cannot be so specified, the hypercube model cannot be used.

The core of the hypercube model is a multiserver queuing model. This model focuses on two activities: (1) preventive patrol, (2) response to calls for service. According to Campbell's description of the queuing system, a car may exist in one of two states: (1) busy - handling a call or (2) free - performing preventive patrol. He assumes a Poisson input and an exponetial service time with mean independent of time and patrol car. If a car is available, it must be dispatched to a call. A call is answered by a car from an outside area if none is available where the call originated. A queue of waiting calls is not allowed to form. Order of dispatching is according to the predetermined dispatch matrix.

Comments: (1) Patrol activity consists of more than preventive patrol and servicing calls. (2) How realistic are the requirements that no calls be held and no queue of waiting calls be allowed? (3) Are service times independent of time and patrol car? (4) Is it feasible to predetermine dispatching order? (5) To what extent are the above assumptions necessary to the hypercube model? Would the model be tractable with other assumptions?

Model output includes: "the district-wide travel time; the workload of each response unit; the workload imbalance among units; the region-wide fraction of dispatches; the fraction of dispatches to each unit that are out-of-sector dispatches; the fraction of dispatches in each sector that require out-of-

sectors units; the fraction of calls that are delayed in queue due to all units being simultaneously busy; the travel time to calls in each sector; the travel time for each unit; the travel time to calls from each geographic cell; the fraction of calls from each geographical cell that are handled by each of the response units" (ibid.).

Police administrators would use the model output as performance measures. Input would be varied. If the output measures were unsatisfactory, input would be varied again. This iterative process would be continued until output measures were satisfactory to the administrator. -- Or a number of alternatives would be examined to see which gave the most satisfactory performance measures. Comment: The hypercube model is not designed for optimization. Also, with no prior quantification of goals, administrator evaluation might be intuitive or based weightings of performance criteria ("hazard formulas"). These methods have in the past proved inefficient for manpower deployment.

It is unknown whether the following approximations are necessary for the hypercube model. Campbell (1) invokes them in his model (GEOQUEUE), which is based on the hypercube. They deserve comment.

(1) Campbell makes no distinction in types of calls. Thus there is no system of priorities.

(2) The time between completing a call and returning to preventive patrol in its own sector, is assumed to be zero for every patrol car.

(3) Input travel times between geographical cells are calculated by assuming constant speeds and using distances between cell centroids for small cells. If cells are large, travel times are averaged over cells. In order to simplify computations Campbell assumes square sectors, uniform

location distributions over sectors, and deterministic travel speeds. Comment: In order to make the model computationally manageable, simplistic assumptions may be necessary.

References

1. Campbell, Gregory L. A Spatially Distributed Queuing Model For Police Patrol Sector Design. Technical Report No. 75, Operations Research Center, Massachusetts Institute of Technology, June, 1972.

2. Chaiken, Jan M. and Larson, Richard C. Methods For Allocating Urban Emergency Units. The New York Rand Institute, May, 1971.

3. Larson, Ricahrd C. Working Paper, Illustrative Police Sector Redesign in District 4 in Boston. Prepared at M.I.T. Operations Research Center, July, 1973.

4. Newsletters of the Operations Research Center, Massachusetts Institute of Technology, Vol. 1, No.'s 2-8, April - November, 1973.

ADMINISTRATIVE PATROL REPORTS

Programming has not been completed. Output samples are not available.

1. Daily activity by geographic beat area.

   Originating time
   Type of call
   Location
   Unit dispatched
   Time dispatched
   Time arrived
   MIR code and disposition
   Clearance time
   Event number
   Case number

   In chronological order grouped by sector and precinct.

   Sub reports to include:

   Daily, monthly and seasonal work measurements
   Time required for called for services by area, by shift, by period
   Total administrative and other down time by area
   Preventive patrol time available by area
   Calls requiring back-up by area

2. Monthly activity report.

   Establish standard and allowable deviation of time spent within MIR code breakdown by disposition.

3. Weekly report on response time to specific calls by precedence assigned and/or specific MIR code.

   Include dispatch delay.

   Determine averages and make sector comparison.

4. Numbers and time spent on back-up calls by car, beat, sector and type of call.

5. Disposition reports.

   List calls given disposition other than what is normally required for type of call assigned.

   By sector, weekly.

6. Strength report by sector.

   Weekly report listing one and two man car totals; by day, by sector and by shift.

7. Officer originated activity.

   Weekly reports concerning on-view or officer initiated activity including field interviews.

   Report tailored to individual officer - not area or assignment.

8. Cross dispatch analysis, by beat.

   Numbers of incidents assigned in other areas.
   Numbers of incidents in owned area handled by others.
   Numbers of incidents handled in owned area.

9. Special demand reports.

   Down time
   Early and late log on times

PROBLEM AREAS IN PROJECT

The following criticism is intended only to portray factual problem areas that occurred during this project toward the end that others may avoid the same pitfalls.

Location of computer installed

The Seattle Police Department communications center was intentionally designed with a low noise level consideration to produce a continual calm aura. Telephones and radio dispatching are conducted with head sets - open speakers are negligible.

Inspection of similar computing equipment operating in a like condition was not conducted.

On vendors advice, in order to alleviate environmental and installation problems, the equipment was installed in the communications center working area after assurance of no noise impact.

When operating, the system raised noise levels 12 decibels at the closest position. Subsequently, the system was moved out of the operations area of the communications center.

Rewiring and movement costs plus the additional delay impeded progress.

Power specifications

Vendors specifications and manufacturers specifications differed. Rewiring was required.

Environmental problems (Heat)

Equipment specifications indicated a satisfactory temperature range of:

Terminal controller,	0-50	degrees C
Central processor,	0-55	" "
Disk Cart System,	60-90	" F
Mag tape transport and control,	40-110	degrees F

Both vendor and maintenance personnel indicate that data transfer to the tape may become distorted at over 76 degrees F. This was in response to the system movement from the operating area of the communications center to an area maintaining a temperature average of 72 - 80 degrees F.

Temperature specifications for operating equipment supplied by vendors does not address either heat supplied by the units to be installed or the more limited and critical requirements of items such as the tape which is actually mounted on the machines and thus, those environmental requirements as listed above are apparently meaningless.

Static electricity

Minute amounts of static electricity transferred from the terminal operator to the CRT caused system failures. Often, terminal operators were unaware of the transfer.

The communications center which has a raised floor covered by carpeted hard tile squares is shampooed and sprayed with anti-static solution monthly and this seems to have solved the problem.

Problem with CRT's

Internal components were found either not connected or poorly connected for grounding purposes with the outside cover on the bee-hive terminals. This problem was discovered in conjunction with the preceding static electricity problem and contributed to system failures.

Tape Compacting

Compacting and processing costs for the tape produced by this system were addressed early in 1973 because of 1974 funding requirements.

The vendor at the time assurred that closed events would be transferred from disk to tape in blocks of ten. Based on that information, processing costs for compacting were allotted at $400 for 1974.

This item was not included in the specifications document signed off in June 1973 and was unfortunately missed in the review of that document. The vendor would not honor the earlier verbal agreements which were not included in the specifications document.

Because closed events (five records each) are transferred to tape individually as they occur, rather than in blocks of ten, annual processing costs for compacting rose from $400 to over $13,000.

Too much activity on CRT for dispatcher

Although the present CRT being used in the system has superior capabilities, too much activity occurs on the screen to process complaints at the speed which is desired.

The vendor suggested raising the speed from 2400 to 4800 Baud but also indicated he could not be responsible for accurate system operation at that speed.

The system is interfaced with SeaKing Alert, a regional police information system and it was intended that the CRT's in the SELECT system be used for those transactions in place of the present SeaKing terminals. Because of the voluminous activity now occurring on the SELECT's CRT's, dispatchers are continuing to use the SeaKing terminals at their positions for data base inquiries rather than the SELECT CRT's.

Status monitors are scheduled for each dispatch position that will automatically display constant unit status and relieve some of the transactions now occurring over the SELECT CRT's. Those monitors plus a higher operational speed may allow the removal of the second CRT at each dispatcher's station.

System reliability

Down times because of normal maintenance and other contingencies indicate that a duplexed system is in order to provide an adequate 24 hour operational system in the communications center.

An additional tape drive, disk drive and line printer have been ordered and a second CPU and controller is expected to be added shortly. An eleventh CRT was also acquired as a spare.

Until the system is fully duplexed and status monitors have been installed, reliability of the system to support mobile communications terminals is very doubtful.

System specifications document sign-off

Signing off the systems specifications document with a written knowledge of expectations rather than a visual operating knowledge was a critical point in this project. The vendor was very cooperative in this area and subsequently, many operating changes were made that deviated from the original document.

Line printer

Approximately twenty system failures in a four month period were attributed to the centronics 101A line printer. One of these failures accounted for a week of down time while repairs were being attempted.

The printer is supplying approximately 16,000 lines daily. Other users contacted indicated superior performance of this printer; however, from this department's experience, a more heavy duty printer is required for this type of operation.

Although the system can operate satisfactorily without the tape system (since only data is lost), the line printer supplies that back up transition to the manual system. Without a record of events in Que that have not been dispatched and a summary of current activity at the time of a system failure, the communications center would be hard pressed to perform as required.

SEATTLE POLICE DEPARTMENT

THREE YEAR TELECOMMUNICATION PLAN

Prepared by

KUSTOM DATA COMMUNICATIONS, INC.

August 15, 1974

SEATTLE POLICE DEPARTMENT
FIVE YEAR COMMUNICATIONS PLAN

The importance of reliable effective communications to the modern police department can hardly be understated. Communications is increasingly essential in meeting expected demands for public service within acceptable funding levels. It is vital in maintaining adequate response times, providing officer safety, increasing criminal apprehensions through data base inquiries, and many other areas too numerous to mention. Virtually every action undertaken by the modern police department relies in some way on communications and adds to communications traffic.

In a plan adopted in August 1972, the Seattle Police Department recognized the importance of adequate communications by setting the following response time goal:

Response time goal - In at least 85% of all cases, response to emergency calls, including communications center time, will not exceed 2.5 minutes. For non-emergency calls, response time will not exceed 7.5 minutes in 85% of all cases.

Explanation: The perceived response time, from the citizens point of view, is that span of time from our answering the phone until the arrival of the first police unit. We know that communication center reaction time ranges from a low of 30 seconds from an average of 1 minute. This goal then allows 1.5 minutes driving time to emergency calls. The assumption made is that this will be achieved with existing man-power. To make this possible we'll have to significantly increase our sophistication in man-power allocation. This might include the establishment of full-time communications with each man, an increase in helicopter patrols, and other heavy capitol investment programs. Spin off benefits to be derived from achieving this goal should include an increased feeling of protection on the part of the public, an increase in the rate of on-scene apprehension (impacting our goals for robbery, burglary), and an increase in citizen cooperation.

This report contains a detailed plan for the following 3-year period which is consistent with the above stated goal of the Seattle Police Department.

Communications Technology

Communications and computers are two of the most rapidly expanding fields of technology. Rapid advances in these fields are opening potentials on many fronts for improving law enforcement efficiencies. Some of the more important technological developments in these fields which are applicable and could be installed within a 3-year time span in the Seattle Police Department are discussed below.

Mobile Digital Communications

The question of technical feasibility of Mobile Digital Communications has now been answered and proof exists in actual operation. Mobile Digital Communications offers a viable alternative to adding additional radio channels and corresponding high overhead communications center personnel to handle them. Virtually any operation that can be done by voice can be handled via digital communications with significant reductions in operating costs. Appropriately Mobile Digital Communications are an essential part of the Seattle Police Department long range communications plan.

Automatic Vehicle Location Systems

Prototype vehicle location systems are now becoming operational in many areas of the country; although less proven than Mobile Digital Communications, vehicle location offers significant operational potential that will become

viable towards the end of the three year period.

Computer-Aided Dispatching

The Seattle Police Department has taken significant initial first steps towards implementing a computer aided dispatching capability. The SELECT System is now operational within the communications center. This system was a prototype computer aided dispatching system that is being widely copied in many other areas of the country. Lack of funds however, for adequate hardware and maintenance has limited its effectiveness in totally meeting department requirements. Necessary hardware and software components to complete the system and expand it into new and significant operational areas is included in the plan. One of the major benefits of computer aided dispatching in meeting the Seattle Police Departments stated response time goal is that it provides basic management and crime data necessary for sophisticated man-power allocation which will allow the Seattle Police Department to meet response time requirements with available field personnel. Expansion of this potential into a complete Management Information System is included in the proposal.

Existing Communications Operations

The existing Seattle Police Department communication center is basically a well organized highly efficient operation. One of the first 911 centers in the nation, it has served as a prototype and pioneered many concepts now widely copied and used in other cities. The basic phone answering and telephone equipment is functioning efficiently and will require few modifications in the coming 3-year period.

In 1973 the Seattle Police Department took another bold move in an effort to maintain efficient reliable communications. Through implementation of SELECT the Seattle Police Department undertook to eliminate time consuming paper transfers within the communications center and automate the collection of data which is required for effective reliable management reports. Although implemented for a total cost of approximately $210,000 the Seattle Police Department now has operational a system which installed in cities of equivalent size requires expenditures of approximately $500,000. There are however, severe deficiencies in the SELECT System which must be corrected to achieve a satisfactory level of operational efficiency. This must be the highest priority in any Seattle Police Department communications expenditures.

Site Preparation

Adequate site preparation is essential to a Computer Assisted Dispatch operation. Although mini-computers and related peripherals are rugged by data processing standards, certain minimum standards of air conditioning and electrical supply must be met. Failure to meet these standards result in an abnormally high failure rate and system degradation. Present facilities for equipment in the SELECT system are inadequate and further expansion is impossible.

Primary recommendation to solve this problem is to construct a computer room in the far end of the existing conference room. The existing conference room is a controlled area, which is highly desirable, and sufficiently close to the communications room to minimize cabling problems. Construction would involve placing a floor to ceiling glass partition around the designated area and installing additional air conditioning capacity. Typical air conditioning loads for mini-computer equipment is shown in the attached list.

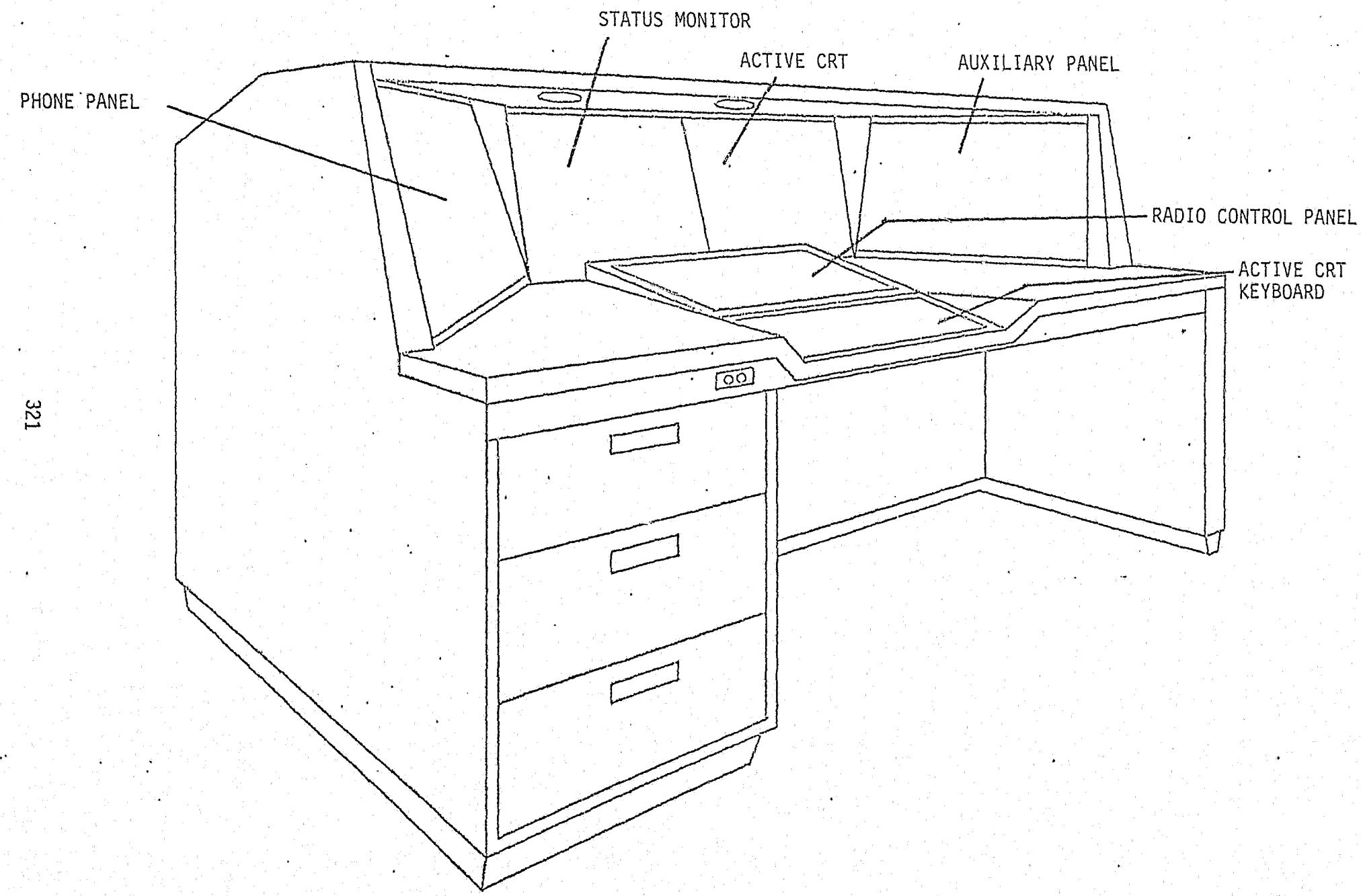
TYPICAL HARDWARE SPECIFICATIONS

DESCRIPTION	POWER REQUIRED	BTU REQUIRED
24K Terminal Controller	1000 W	3400
Disc System Controller	400 W	1400
Disc Drive	260 W	900
Memory System Verticase	750 W	2600
Memory Module	250 W	850
80 Col. Printer/Interface	700 W	2400
12 Inch CRT	180 W	600
16 Line Multiplexer	600 W	2000
Line Adapter 4 Lines	---	---
Operator Terminal (TTY)	400 W	1400
Synchronous Line Interface	12 W	41

Status Monitors

Installation of a CAD system such as SELECT necessarily changes procedures by which information is handled. The controlling processor has great capability for storing and manipulating data, but it is not in human readible form unless displayed. The existing SELECT system employs a single CRT at each dispatch position. This limits the amount of available information available to the dispatcher, most of which is essential to monitoring the activity of field resources and making intelligent dispatch decisions that maximize the efficiency of field resources in responding to public demands. The solution to this problem is the installation of separate status monitors at each dispatch position. This provides continuously updated information on field resources as well as events (dispatchers) which are active in the systems. Status monitors are mandatory for a department operating mobile digital terminals. Many communications, such as status information, are received directly from mobile units. Without a status monitor these communications inundate a dispatcher with routine communications.

It should be further noted that the addition of two CRT's at each dispatch position, because of physical size, creates human factors engineering problems at dispatch consoles. A satisfactory layout is shown in the accompanying figure. To achieve this layout, special engineering of components such as CRT's is required and close integration of console and computer equipment supplies is required.


STATUS MONITOR
ACTIVE CRT
AUXILIARY PANEL
PHONE PANEL
RADIO CONTROL PANEL
ACTIVE CRT
KEYBOARD

Redundant Configuration

As the CAD system increases in functional capability and mobile digital communications are increasingly relied on, any system downtime will become increasingly intolerable. Every effort must thus be made to maximize system reliability and uptime. As a minimum, redundant peripherals and a redundant processor operating on a cold restart basis should be utilized. This will allow the department to recover quickly (2-3 minutes) from any failure. The second processor could be utilized for processing log tapes or other departmental data. It should be kept foremost in mind however, that the processor is heart of a communications system, not a data processing operation.

Redundant recording of active disk files should also be implemented. This minimizes the imput of a disk failure which may destroy data.

EQUIPMENT 1975

	Estimated Equipment List Purchase	Monthly Mainten.
Back Up Computer Equipment		
-Line Printer	$ 4,500	$ 15
recommend 600 line per minute line printer	17,500	100
-Disk Drive	5,700	65
-Magnetic Tape Drive	8,500	75
Dispatcher Status Monitors		
-One per dispatcher position totaling 5 @ $4500.00 each	22,500	200
CRT Interface @ 100 each	5,000	30
Back-up Processor & Bus Switch		
-Installation	57,000	355
-Disc Controller	6,500	45
Site-Preparation of New Computer Room to include air conditioning	20,000	
Digital Interface to UHF Radio System		
-Two Radio Base Stations	8,000	
-Computer Interface	2,500	90
-Telephone circuits and Modems	1,800	40
-Two Encoder/Decoders installed	18,000	120
Digital Radio		
-30 @ $600 each	18,000	300
Computer Core Memory, 40K Total	21,500	150
Mobile Communication Terminals		
-30 Terminals installed @ $3500 each	105,000	900

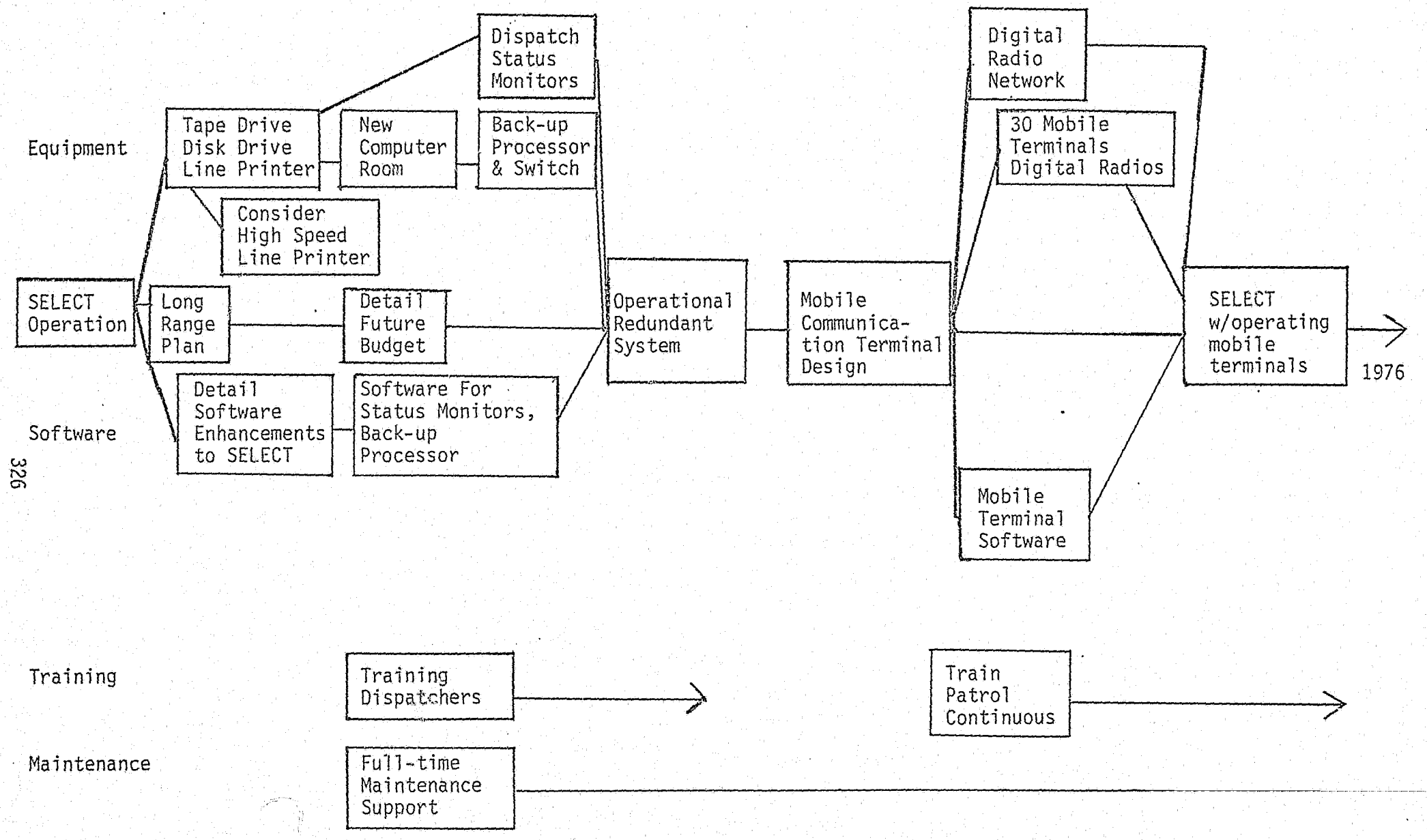
EQUIPMENT 1976

	Estimated Equipment List Purchase	Monthly Mainten.
Consider Redundent Digital -Encoder/Decoder & Radio Base Stations	$ 25,000	$ 240
Add approximately 60 Mobile Terminals for Patrol and 10 MCT's for Traffic		
Mobile Terminals @ 3,500 each	210,000	1,800
Digital Radios @ 600 each	36,000	600
CRT's and Printers at each precinct and in Divisions Offices		
Patrol, Detectives, Traffic	82,000	1,000

Software Enhancements

Year 1975	Estimated Cost
Support of Dispatcher Status Monitors	$ 5,500
Support for Back-up Processor	
-Ghosting on disc	6,500
-Bus Switch Support	10,000
Mobile Terminal Software	36,000
Year 1976	
Management Information System to maximize use of standby processor, and improve management and statistical information Reports:	80,000
Year 1977	
Address Data Base to provide address varification of complaints	55,000 $2,100

Year 1975



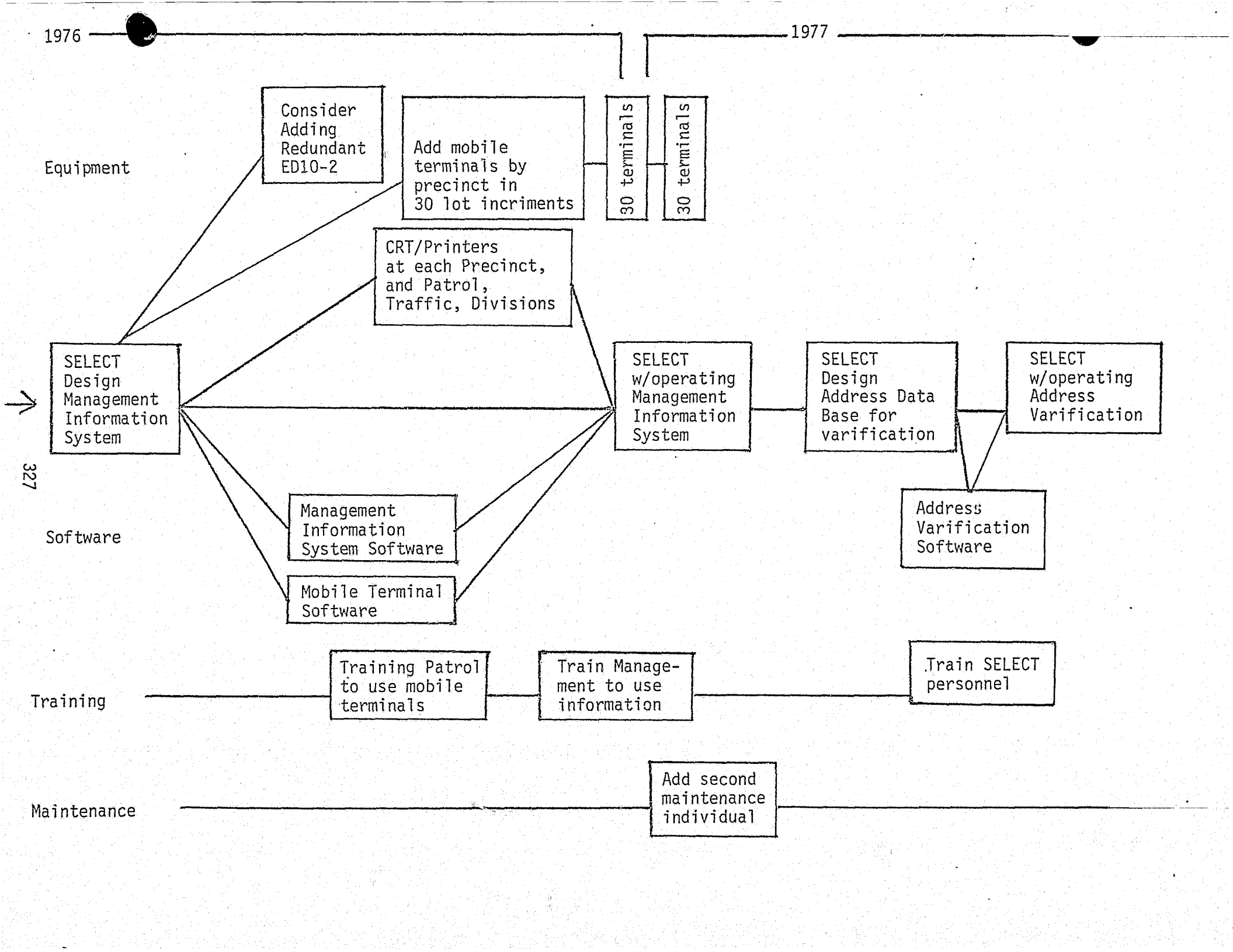
Training

Training Dispatchers →

Train Patrol Continuous →

Maintenance

Full-time Maintenance Support


1976
1977
Equipment
Consider Adding Redundant ED10-2
Add mobile terminals by precinct in 30 lot incriments
30 terminals
30 terminals
CRT/Printers at each Precinct, and Patrol, Traffic, Divisions
SELECT Design Management Information System
SELECT w/operating Management Information System
SELECT Design Address Data Base for varification
SELECT w/operating Address Varification
Address Varification Software
Software
Management Information System Software
Mobile Terminal Software
Training
Training Patrol to use mobile terminals
Train Management to use information
Train SELECT personnel
Maintenance
Add second maintenance individual

PERT Chart Narrative--Year 1975 through 1978

Year of 1974

1. Implement redundant Magnetic Tape Drive, Disk Drive, and Line Printer. It is recommended at this point that a heavy duty 600 line per minute line printer be considered.

2. Consider heavy duty line printer.

3. Outline future SELECT software enhancements. To include back-up processor, dispatcher status monitors, ghosting of information on a second disk, Mobile Communication Terminals, a management information system (MID) and address data base.

4. Produce software for dispatcher status monitors, and switch for back-up processor.

5. Install back-up processor and bus switch. Move computer equipment to permenant computer location.

6. Install Dispatcher status monitors.

7. Train Dispatch personnel to use status monitors.

8. Recommend contract for full-time individual to maintain system.

9. SELECT System now operational with redundent computer equipment, and supported by full-time maintenance.

10. Mobile Communication Terminal Design.

11. Produce mobile communication terminal software

12. Install Digital radio network to provide interface from computer to two radio base station locations; one in south Seattle, the other in north Seattle.

13. Training dispatchers on procedures for mobile communication terminal system and train patrol men in the precinct to use the first mobile communication terminals.

14. Install thirty UHF digital radios and mobile communication terminals.

15. SELECT System with operational mobile communication terminal.

Year of 1976

16. Consider adding redundent digital encoder/decoders and radio base staions.

17. Train each precinct prior to installation of mobile communication terminals in vehicles.

18. Install mobile communication terminals and digital radios in the vehicles of one precinct at a time.

19. Design Management. Information system utilizing SELECT System.

20. Produce Management Information System

21. Implement CRT/Printer Terminals at each precinct office, and in Detective, Patrol, and Traffic Divisions, as part of management Information System.

22. SELECT System operational with feature of Management Information System.

Year of 1977

23. Design Address Data File from U.S. Census DIME File.

24. Produce software using address data file to provide address verification in SELECT System.

Year of 1978

25. Evaluate Vehicle Location.

END