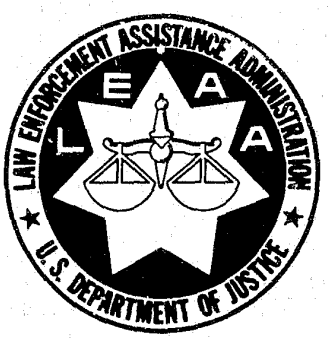
INTEGRATED CRIMINAL APPREHENSION PROGRAM

Review of Patrol Operations Analysis: Selected Readings from ICAP Cities

June 13, 1978



LAW ENFORCEMENT ASSISTANCE ADMINISTRATION

U.S. DEPARTMENT OF JUSTICE

INTEGRATED CRIMINAL APPREHENSION PROGRAM

REVIEW OF PATROL OPERATIONS ANALYSIS:

SELECTED READINGS FROM ICAP CITIES

June 13, 1978

Prepared for the U.S. Department of Justice, Law Enforcement Assistance Administration, under Contract No. J-LEAA-003-76 by the Westinghouse National Issues Center. Points of view or opinions stated in this document are those of the author(s) and do not necessarily represent the official position or policies of the U.S. Department of Justice.

TABLE OF CONTENTS

Chapter 1 - Introduction 1-1

Chapter 2 - Preliminary Considerations Patrol Operations Analysis 2-1

Chapter 3 - Staffing the Patrol Functions According to Demand: A Technique for Preportional Staffing 3-1

Chapter 4 - Simi Valley Police Department Patrol Workload Study 4-1

Chapter 5 - Patrol Operations Overview 5-1

Chapter 6 - Integrating Patrol Assignments: Directed Patrol In Kansas City 6-1

CHAPTER 1

INTRODUCTION

1. INTRODUCTION

The National Advisory Commission on Criminal Justice Standards and Goals, Task Force on Police, has recommended that the following standard relating to deployment of patrol officers be implemented by all police chief executives:

- Every police agency immediately should develop a patrol deployment system that is responsive to the demands for police services and consistent with the effective use of the agency's patrol personnel. The deployment system should include collecting and analyzing required data, conducting a workload study, and allocating personnel to patrol assignments within the agency.

The proper use of available resources is one of the most important aspects of administration faced by law enforcement agencies today. Efficiency of patrol force allocation and deployment is of interest because it has the potential of alleviating the cost pressures felt by police departments everywhere.

The greatest expenditure of police efforts in response to citizen demands is, in its vital features, reflected in the patrol response. This is so for several reasons. First, the patrol force consumes a plurality, or more usually a majority, of the entire work force of the typical municipal police agency (70 percent and up). Second, the

major expenditure of resources takes place in the patrol area. The majority of a department's vehicles and communication facilities are devoted to the patrol function. In other words, the greatest allocation of departmental overhead is related to support of patrol. Third, the patrol force provides the most services actually delivered to the public; patrol responds to the greatest number of calls, provides the widest range of services, and in the aggregate, devotes the greatest time of all department elements responding to citizen demands. Finally, patrol units can and do provide most of the specialized services theoretically the province of other units; the citizen in need usually seeks and, in most situations, is entirely served by patrol units.

These factors alone would justify a comprehensive effort to ensure the efficient delivery of patrol services. In addition to these general considerations, however, there are other, operational imperatives for effective planning and management of the patrol effort. Typically, most citizen encounters with the police are with patrol elements, leading to client evaluation of the entire department based on the performance of one division or function. The initial, and frequently the only, response to emergencies and high-priority incidents is invariably made by patrol units. In addition, the work of specialized service elements depends largely on information and assistance from the patrol force. Thus, the probability of solution for most crimes, even after prolonged investigation, is described by a steeply declining curve plotting the number of minutes required for patrol units to arrive on the scene of the initial call for service.

To be consistent with the standard for deployment of patrol resources established by the National Advisory Commission, the effective management of the patrol function requires the collection and assessment of information affecting decisions related to the employment of department resources. At a minimum, the following should be considered:

- *Workload* or the demands made for patrol service.
- *Manpower* available to meet those demands.
- *Assignment* of that manpower to patrol commensurate with the workload requirements.
- *Allocation* of the assigned manpower to shifts in proportion with the occurrence of service demands.
- *Distribution* of manpower allocated to each shift in such a way as to relate rationally to the geography of the service demands.
- *Analysis* of incidents occurring.
- *Identification* of suppressible incidents, their location, times, and characteristics.
- *Tactics* calculated to direct the efforts of individual officers against suppressible incidents in the most effective manner.
- *Evaluation* and refinement of patrol efforts after assessment of such suppressive tactics.

Existing techniques for evaluating service demands, or workload, are generally one of two types: The mathematical or hazard formula introduced by Vollmer in the 1930's, and the recent computer programs operating more or less predictive models for patrol activity based on pre-selected performance criteria. Both methods have recently been criticized.

The hazard formula has come under attack for its failure to provide any reliable indication of the effects of using different allocation schemes. Further, it cannot be used to develop an allocation scheme that will meet some specified criterion of performance. Most computer simulation techniques, on the other hand, are oriented toward a proactive rather than a reactive philosophy. Proponents of the proactive patrol philosophy tend to over emphasize the availability and in-service status of a patrol unit to respond to calls for service. In addition, the tendency of modern methods to require flexibility in beat boundaries and unstructured distribution of patrol units ignores the benefits obtained from a beat patrolman's familiarity with his sector.

The procedure for conducting a patrol operations analysis study outlined in this manual is presented for those departments which have not previously undertaken such a task. The method of analysis is based on the measurement of patrol time consumed by three categories of activity; calls-for-service, patrol-initiated activity, and personal or administrative activity. The analysis of patrol activity

using a time consumption technique is certainly not a new approach, but appears to be the most feasible technique in comparison to both the hazard formula and modern computer predictive methods. The rationale for a consumed time study is one likely to appeal to most police administrators:

- Experience shows that using the number of calls-for-service and the number of arrests *without regard for time expended* is of little or no value in determining workload. For example, the same number of service calls and arrests may occur on two different shifts. All the activities on one shift, however, may take twice as long as on the other shift. Therefore, using only the number of incidents would indicate falsely that the workload was the same on both watches.

In practice, it *is* important that the theoretical base for resource decisions be demonstrable to the patrol officers and commanders who will be required to abide by those decisions and to operate the data-collection system necessary to the planner. Otherwise, the quality of the data will be insufficient for *any* reliable determinations regardless of the techniques employed, and prospects for institutionalizing the technique will be limited.

In addition, for departments that have been using hazard formulae, only slight computational adjustments will be necessary for, in effect, the hazard formulae were attempts to arrive at the same thing prior to adequate data collection for measurement of time factors.

CHAPTER 2

PRELIMINARY CONSIDERATIONS

PATROL OPERATIONS ANALYSIS

by

Richard Grassie
Westinghouse National Issues Center

Lt. Lee Morgan
Lexington Police Department

2. PRELIMINARY CONSIDERATIONS FOR PATROL OPERATIONS ANALYSIS

2.1 Measuring Service Demand

As previously mentioned, several different methods have been used to measure demand for patrol service. Those most commonly encountered are:

- "Count of Calls" for service. This method, whether or not it incorporates a hazard formula, is both the simplest and the least instructive of the traditional allocation schemes. If a hazard formula is not used, there is an implicit assumption that all calls are equally important. If a hazard formula is used, the assumption is that all calls of a similar general type (e.g., "All Part I Crimes") are equally important. A comparatively recent innovation, which improves the utility of the count-of-calls method, is the concept of priority dispatching. Incoming calls for service are evaluated by communications center personnel and assigned dispatch priorities based on information received from complainants. This practice (vital in itself as a basis for directed patrol) allows the workload to be seen as a set of actual, rather than theoretical, priorities.

- Unit responses to calls for service. This method is, in effect, an informal weighting system, in that it emphasizes those times and areas which consistently generate calls requiring multiple unit responses. From an analytical standpoint, it does not matter whether the assignment of backup units is controlled by dispatchers, or by supervisors, or handled on a "volunteer" basis by patrol officers; the analysis will reflect actual priorities assigned to the various segments of the workload by operational personnel. Unit-response analysis can be of particular value to police managers as a basis for evaluating department policy with respect to one-man versus two-man car staffing. By identifying those times and areas in which multiple unit responses are most frequent, the analysis can suggest an appropriate "mix" of cars for any shift on any day of the week. Research currently being conducted in two ICAP cities (San Jose, California and Lexington, Kentucky) seems to suggest a stable relationship between calls and unit responses; that

is, the number of calls for any given area or time period (expressed as a proportion of total calls) is the same as the number of unit responses for the same area or time (expressed as a portion of total unit responses).

- Consumed time. This method, although the most demanding in terms of data collection requirements, is the most comprehensive single measure of patrol workload. Indeed, if department policy mandates patrol officer involvement in preliminary and followup investigations, it is probably the only measure which will produce an accurate representation of obligated patrol time. The sample workload analysis which comprises the remainder of the chapter is in the form of a consumed-time study.

2.2 Incident and Activity Recording

To accomplish a consumed-time patrol study, the time expended by patrol officers on various field activities must be collected. To facilitate the collection of relevant data, three main categories of activities are identified.

This first category, calls for service, includes those activities assigned to patrol officers through the dispatch or communications center. The majority of departments already have prepared an incident code list for use by dispatch personnel in assigning appropriate numerical codes for

citizen requests for service. These lists are usually standardized in most departments to account for virtually every type of call received; normally, they reflect an attempt to categorize activity either by type or, in some cases, according to seriousness of the incident.

Since the dispatcher is the link between the patrol units and the department, it is recommended that time expended on calls for service be captured in the communications center. A proven method of recording the necessary data is through the use of police dispatch or incident cards. These cards are completed by the dispatcher to record all assignments made to patrol officers and, in some cases, to account for various activities initiated by the officers themselves. A suggested dispatch/incident card, together with accompanying instructions for its use, is presented in Section 2.3. It should be borne in mind that the actual structure of a police dispatch/complaint card, or any other data-gathering instrument, will be influenced by many local factors. Among these factors are the time stamping equipment used, and such specific local needs as whether a control number is required.

The second category, patrol-initiated activity, includes those activities initiated by the patrol officers during the tour of duty which are related to crime control and order maintenance. Included are vehicle checks, field interviews, followup investigations, and arrests generated by the officer himself. The purpose of separating assigned and officer-initiated events and backup data is to determine the amount of self-initiated events for which field officers are responsible. The level of officer-initiated activities at any given time in any given area will be directly influenced by the amount of unobligated time.

An important element to be considered is that consumed-time patrol studies measure the actual time engaged in activities. Officer-generated activities require patrol time -- time to find or observe the activity. This patrol time must be considered in relation to the work it produces, since few activities would be generated by officers if they lacked the time in which to observe them. All of the consumed time recorded during the study, whether initiated by the patrol officers or the public, can be lumped into one figure for allocation and deployment purposes. However, if the events are not separated initially at the time they are recorded, there will be no way to analyze the activities individually at a later time. This particular step in the patrol planning process is vitally important for eventual analysis of time factors for directed patrol efforts and increased understanding of the service problem by management personnel.

The third and final category of activity that should be included in a time consumption study is personal and administrative time. This includes an accounting of total time spent eating meals, attending court, servicing equipment, rollcall training, and other related activities. Once obtained, this information can have obvious implications for decision-making regarding the expenditure of on-duty time. For purposes of a patrol time consumption study, identification of gross time expended in this category allows for determination of actual time available for services and patrol.

In most cases, selected expenditures of patrol time included in this category can be reasonably estimated, based upon expected occurrences for predetermined durations. An example would be the computation of gross

time consumed by meals and coffee breaks. Rather than have the dispatcher record such instances on a dispatch/incident card each time they occur, the planner conducting the consumed-time study can just as easily compute the time expenditure by simply multiplying the number of officers available for the duration of the time study by the total time allotted for each activity. An important consideration for dispatchers in this particular case is the service status of a unit while taking a meal or coffee break. In some departments, these breaks are taken as the call-for-service rate permits, and it is not unusual for a unit to remain available for service calls even though dispatchers or patrol supervisors have authorized the activity. Consequently, departments engaged in a consumed time study will necessarily have to decide for themselves whether certain activities in the personal and administrative category should be recorded. In any case, the determining factor should be the service availability of the patrol unit.

As an alternative for those departments that view the accumulation of times for all three categories as burdensome, it is suggested that a separate officer activity record be maintained by each patrol officer to record non-calls-for-service activity. Administrative and personal activities should be recorded on the officer activity record, regardless of whether initiated by the officer or assigned by the dispatcher.

2.3 Police Dispatch and Incident Reporting Card

The principal data collection instrument in use by many police departments is a record of various aspects of the dispatch process and the police response as they relate to each individual incident reported to the

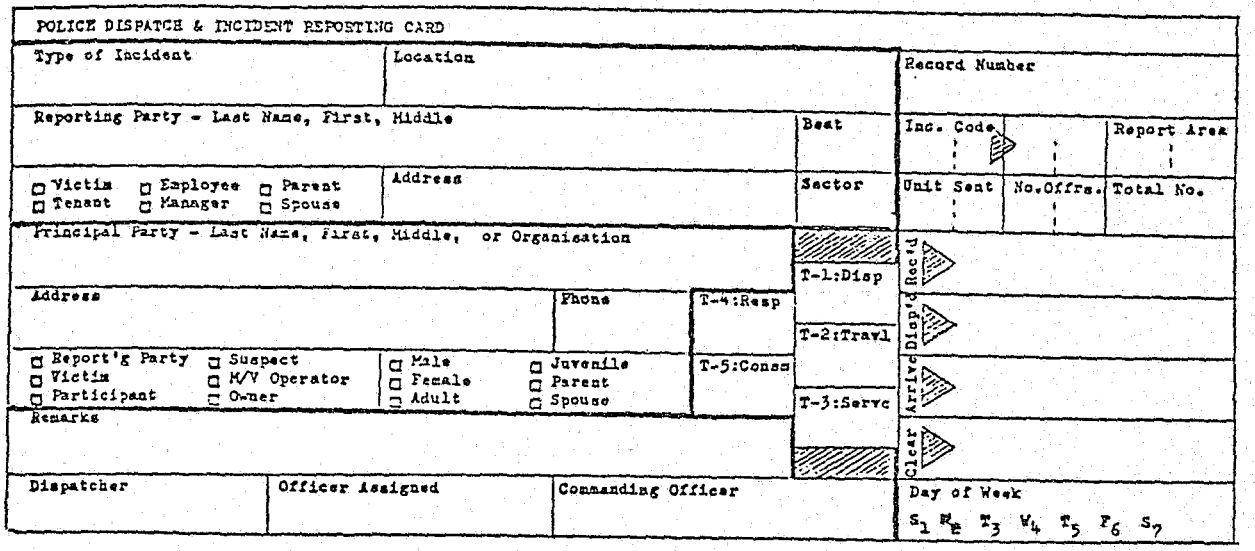
department. Commonly in the form of an index card or tab card and usually filled out by the dispatcher, this instrument is variously called an "Incident Card," "Dispatch Card," "Run Card," "Complaint Card," or a myriad of other similar names indicative of its function. In the interests of efficient use of manpower, the card should be as easy to fill out as possible. The card should also serve more than the bare purposes of statistical tabulation, since it contains a rich collection of information about the dispatch, patrol, and complaint processes. Thus, the data collection instrument generally serves the department in three important ways:

- It is the basic record of the dispatch process.
- For many minor events, it may be the sole departmental record of an event.
- It frequently forms the basic card index for entry into the records system.

An example of a dispatch and incident reporting card is shown in Figure 2-1. Designed to meet the three basic departmental functions listed above, it is also intended to provide the basic material for crime, incident activity, and manpower analysis, whether manual or automated.

The face of the Police Dispatch and Incident Reporting Card is divided into the following five fields of information.

- Type and location of incident and the way in which it was reported. This is the basic information for initiating the dispatch process.


POLICE DISPATCH & INCIDENT REPORTING CARD

Type of Incident | Location | Record Number

Reporting Party - Last Name, First, Middle | Beat | Inc. Code | Report Area

☐ Victim ☐ Employee ☐ Parent ☐ Tenant ☐ Manager ☐ Spouse | Address | Sector | Unit Sent | No. Offrs. | Total No.

Principal Party - Last Name, First, Middle, or Organization | T-1:Disp | Rec'd

Address | Phone | T-4:Resp | T-2:Travl | Disp'd

☐ Report'g Party ☐ Victim ☐ Participant ☐ Suspect ☐ M/V Operator ☐ Owner | ☐ Male ☐ Female ☐ Adult ☐ Juvenile ☐ Parent ☐ Spouse | T-5:Consm | T-3:Servc | Arrive

Remarks | Clear

Dispatcher | Officer Assigned | Commanding Officer | Day of Week: S1 M2 T3 W4 T5 F6 S7

Front

REMARKS AND REPORTING OFFICER'S REPORT

Remarks | Ambulance Dispatched | Fire Dept. Dispatched | Tow Truck(s) Dispatched

Suspect No. 1 - Last Name, First, Middle | Sex M F | Race | Age | Height | Weight | Hair | Eyes | Complx | Build

Suspect No. 2 - Last Name, First, Middle | Sex M F | Race | Age | Height | Weight | Hair | Eyes | Complx | Build

Vehicle Involved: ☐ Theft From ☐ Stolen ☐ Operation of ☐ Parked | Colour | Year | Make | Body Style | Reg. No. | State | Direction of Travel: ☐ N ☐ E ☐ S ☐ W ☐ NE ☐ SE ☐ SW ☐ NW

Property:No | Colour | Material | Type or Purpose | Size | Model | Ser. No. | Value $

Reporting Officer's Signature | I.D. No. | C.O.'s Initials | Disposition: ☐ Report ☐ Civil ☐ To Dets. ☐ Unfound ☐ No Act ☐ To Juv. ☐ Arrest

Rear

Figure 2-1. Sample Incident Card

- Principal party, or the main person connected with the incident. This is the basic information necessary for creating a name index to the record of the event.
- Miscellaneous and departmental control information, such as the recording dispatcher, patrol officer assigned, and the officer in command of the shift or area who will ultimately be responsible for the handling of the incident and adequacy of reporting.
- Basic statistical information, including the type of incident in numerical code, the reporting area of occurrence, the number of units responding to the call, the benchmark times for the department's handling of the incident.
- Small, pyramidal field of elapsed times, for later calculation from the four benchmark times recorded by the dispatcher.

The reverse side of the Police Dispatch and Incident Reporting Card allows more room for remarks and general information primarily of value to the actual dispatching process. Standard formats for recording data on suspects and any vehicle or property involved in the report of the incident assist the dispatcher in making a prompt broadcast, as well as in taking a report on a minor incident where the original telephone call is the sole contact with the complainant.

There are four benchmark times captured at the dispatch center which form the basis of subsequent analysis for field operations. The four times should be recorded as follows:

- "Rec'd," or time call is received, is the time at which the initial contact was made between the reporting party and any department element, usually a complaint clerk, telephone operator, or dispatcher.
- "Disp'd," or time the initial response unit was sent on the call, is the time *immediately* after transmission of the service call to patrol responding units.
- "Arrive" is the time the first unit acknowledges arrival at the scene of the incident.
- "Clear" is the time the first unit to clear the call is through on the scene and signals that it is available for further assignments. It should be noted that, where multiple unit responses are concerned, the arrive and clear times should, ideally, be recorded for each unit responsing to the call. If this is not practical (and in many departments it will not be), a decision must be made as to whether to record the times on a first-in/last-out

basis. This decision should be taken with care, since it will govern the assumptions that must be made later on regarding time consumed on multiple unit calls.

2.4 Time Factors

The four milestone times for handling of each incident by the department define three stages in the life of the incident. The time that elapses between the receipt of the call and the dispatch of the first unit, called "T-1" (or Dispatch Time Elapsed), is the delay involved in getting the information on the call for transmittal to the patrol unit. To use the model of a motor vehicle operator's stopping distance, it is that time necessary for perceiving an obstacle and setting the muscles in motion in response.

The time that elapses from dispatch of the first patrol unit to arrival of the first unit on the scene is called "T-2" (or Travel Time Elapsed). This is the time necessary for a unit to get to the scene once it has been notified. While this entire period may not be spent driving to the scene (but may be consumed by disengaging from a previous scene or picking up backup officers), it is, for all practical purposes, the unit response time to the call.

The time from arrival of the first unit to the clearing of the call by the first unit is referred to as "T-3" (or Service Time Elapsed). This is the basic measure of the length of time necessary for a patrol officer to handle the incident or to deliver the necessary service to the scene.

The first two elapsed times, Dispatch Time Elapsed (T-1) and Travel Time Elapsed (T-2), together make up "T-4" (or Total Response Time). This

is actually the time difference between Received and Arrived and is the basic quantitative measure for evaluating police emergency response systems.

The following equation defines T-4:

Received To Dispatched	Dispatched Time Elapsed (T-1)	=	Total Response Time (Time (T-4)
To Arrived	+ Travel Time Elapsed (T-2)		

The sum of the time differences between Dispatched and Received, and between Arrived and Dispatched equals Total Response Time (or T-4).

The second two elapsed times, Travel Time Elapsed (-2) and Service Time Elapsed (T-3) together make up "T-5" (or Total Patrol Time Consumed). Of the four original milestone time, T-5 is the difference between Dispatched and Clear. For time consumption analysis, T-5 represents the time required to handle an incident by patrol units in the field. The following equation is provided:

Dispatched To Arrived	Travel Time Elapsed (T-2)	=	Total Patrol Time Consumed (T-5)
To Clear	+ Service Time Elapsed (T-3)		

The sum of the time differences between Dispatched and Arrived, and Clear and Arrived, equal Total Patrol Time Consumed (or T-5).

The exemplar shown in Figure 2-2 was designed for manual extraction of these times from the time punches and entry of the results right on the face of the card. These calculations can be made with a calculating machine, if nothing else is available, and recorded in the appropriate spaces for later use.

2.5 Data Collection

The first step in collecting incident data is capturing data; the next is organizing the data collection. Eash feasible method and each feasible pattern has drawbacks and advantages. It is for the individual managers in the various municipal agencies to decide on the methods and patterns best adapted to their situations.

2.5.1 Extraction of Times

There are various ways of extracting the required elapsed and total times from the times punched on the cards by the dispatchers. The simplest involves manual extraction by paper and pencil or calculating machine. The most complex involves keypunching of the data or analysis by speci lly prepared electronic data processing (EDP) programs. What is essential for the operation of an incident and crime analysis system, let alone a manpower analysis system, is that time duration data for various classes of incident be extracted in some reliable fashion.

Judicious sampling may be needed to obtain average times for the different classes of incident (three are recommended herein). The duration and extent to such sampling must depend on the volume of incidents handled. The greater the volume, the quicker a statistically valid sample may be compiled. It is recommended that a standard text on graduate statistical methods be consulted for guidance on sampling techniques.

Whatever method is employed, it must be remembered that the objective is to extract, for the three classes of data, mean times to complete the format shown in Figure 2-2.

Incident Categories	DIFFERENCES OF BENCHMARK TIMES			SUMS OF DIFFERENCES	
	T-1 (Dispatch Time Elapsed)	T-2 (Travel Time Elapsed)	T-3 (Service Time Elapsed)	T-4 (Response Time) (T-1 + T-2)	T-5 (Patrol Time Consumed) (T-2 + T-3)
Calls-for- Service					
Patrol-Initiated Activity					
Personal & Administrative					

Figure 2-2. Extraction of Times -- Sample Format

2.6 Manpower Analysis

2.6.1 Manpower Available to Meet Service Demands

The first requisite for manpower analysis is the determination of what manpower is assigned to the patrol function (that is, what is potentially available) and then what fraction of that assigned manpower is actually available on the street. This availability is conditioned by various time-off factors (vacations, days off, etc.) and, for planning purposes, is best expressed in terms of an "average patrolman" or "average daily strength." These are statistical conveniences for *predicting* the amount of work time to be expected from any one officer or the number of officers likely to be on duty any day.

Since no officer works 365 days a year with no vacations, days off, illness, injuries, or other reasons for absence, the number of officers *available* for duty will always be some fraction of the total number *assigned*. The ratio of officers assigned to the number actually available is called the Assignment/Availability Factor.

The availability of police personnel to perform routine patrol functions is one of the most important considerations for a manpower analysis study. Among those factors that directly affect the assignment of personnel are:

- The daily work schedule for the entire department.
- Sick leave.
- Injured leave.
- Vacation.
- Training.

- Area to be covered.
- Patrol vehicles available for patrol.

The task for the police administrator is to have patrol officers available at the times and places needed to best serve the community. The department's total strength must be evaluated in terms of:

- Requirements for followup investigative service by specialists.
- The scope of activity that can be assigned to patrol officers.
- The nature of duties that result in officers being unavailable for patrol for any other reason.

To illustrate the sequence of calculations and judgements necessary for manpower analysis, sample data from a fairly typical, medium-sized city are shown. For the full year January 1 through December 31, 1976, the police department had 47 full-time patrolmen who each worked the full year. (Those working only the full year are used to simplify the calculations). These 47 patrolmen had a potential 17,155 man-days available for duty that year (47 x 365 = 17,155). The calculations are shown in Table 2-1.

For every man who was actually available for duty, 1.73 officers must have been assigned. This ratio of 1.73 to 1 is designated as the Assignment/Availability Factor. In other words, the average patrol officer worked 211 days per year (58 percent) and was off patrol duty 154 days per year (42 percent).

TABLE 2-1

Total Man-Days Actually Available

Gross Man-Days Available			17,155
Less:	Days Off	5,640	
	Sick Leave	497	
	Holidays	--	
	Vacation Days	1,089	
	Injury Leave	0	
	Training	10	
	Death in Family	0	
	Conventions	0	
	Military Leave	14	
	Miscellaneous	0	
	Subtotal	7,250	7,250
			9,905

Total Man-Days Actually Available (17,155 - 7,250) = 9,905

To staff one position on one shift required 1.73 (i.e., 2) officers on the force; to staff one position around the clock (three shifts) required three times as many, 5.19 (i.e., 5) officers.

Similar ratios can be calculated for supervisory personnel (1:1.74 for the seven patrol sergeants in 1976), for ranking officers (1:1.82 for the eight lieutenants and above in 1976), or for all patrol personnel (patrolmen and sergeants together).

2.6.2 Allocation of Patrol Manpower to Shifts

The purpose of patrol resource allocation is generally considered to be distributing the workforce in proportion to the workload. This should clearly be by time (that is, onto shifts in such a way that the manpower available during a given hour relates reasonably to the work demanded during that hour) and by area (that is, that the sectors are assigned patrolmen in some reasonable relation to the geography of the occurrences). While the value of this proportional distribution has been called into question by some theoreticians, academics, and statiticians, it has not received much criticism from practitioners, police executives, and patrolmen.

The demand for patrol services is commonly assessed in terms of *how many* (that is, how many homicides, how many breaks, how many noise complaints, on down to how many telephone calls were received in a given period). This raw count, the "incidence of incidents," is essential for an understanding of *what* the patrol division confronts and for incident analysis leading to directed or crime-specific patrol. For manpower analysis, however, it is not how many, but rather for *how long* (or how much time is

demanded for various classes of service). This should be totalled and arranged by hour of the day, as shown in Table 2-2.

In the hypothetical department shown in Table 2-2, there are three patrol sergeants and 46 patrolmen assigned to regular shifts. Of these 49 persons, each represents 2.04 percent of the available workforce. The workload shown in Table 2-2 and the present manpower distribution are shown together graphically in Figure 2-3. The staffing pattern producing manpower distribution is shown in Table 2-3. If this distribution is reduced to an average hourly percentage of total manpower, the results are those shown in Table 2-4. It should be noted that these percentages apply whether the numbers of men are viewed as assigned (potentially available) manpower or as actually available manpower (that is, deflated by the Assignment/Availability Factor). Application of a constant ratio to the assigned manpower will not alter the percentage distribution.

After upcoming staffing changes, there will be 50 sworn officers assigned to patrol duties; an easier number for calculations:

6 Patrol Sergeants

44 Patrolmen

50 Sworn Officers

These 50 officers, each working an 8-hour shift, will provide a total of 400 man-hours assigned to patrol duty daily. The problem is to distribute them to shifts in a way that approximates the distribution of workload shown in Table 2-2 and Figure 2-4. While the recorded activity shown in this distribution is only a fraction of the officers' total available time, two factors suggest its use for distributing the total available time:

TABLE 2-2

Percentage Distributions of Workload and Manpower by Hour

Hours	Total Hourly Workload %	Current Average Hourly Distribution of Total Manpower (%)
0000-0059	4.96	4.34
0100-0159	3.84	"
0200-0259	3.44	"
0300-0359	1.94	"
0400-0459	1.09	"
0500-0559	0.99	"
0600-0659	1.55	"
0700-0759	2.57	"
0800-0859	2.37	3.83
0900-0959	2.85	"
1000-1059	2.83	"
1100-1159	2.49	"
1200-1259	2.30	"
1300-1359	2.10	"
1400-1459	2.65	"
1500-1559	2.71	"
1600-1659	9.20	4.34
1700-1759	7.97	"
1800-1859	6.61	"
1900-1959	6.75	"
2000-2059	9.25	"
2100-2159	8.26	"
2200-2259	6.02	"
2300-2359	5.26	"

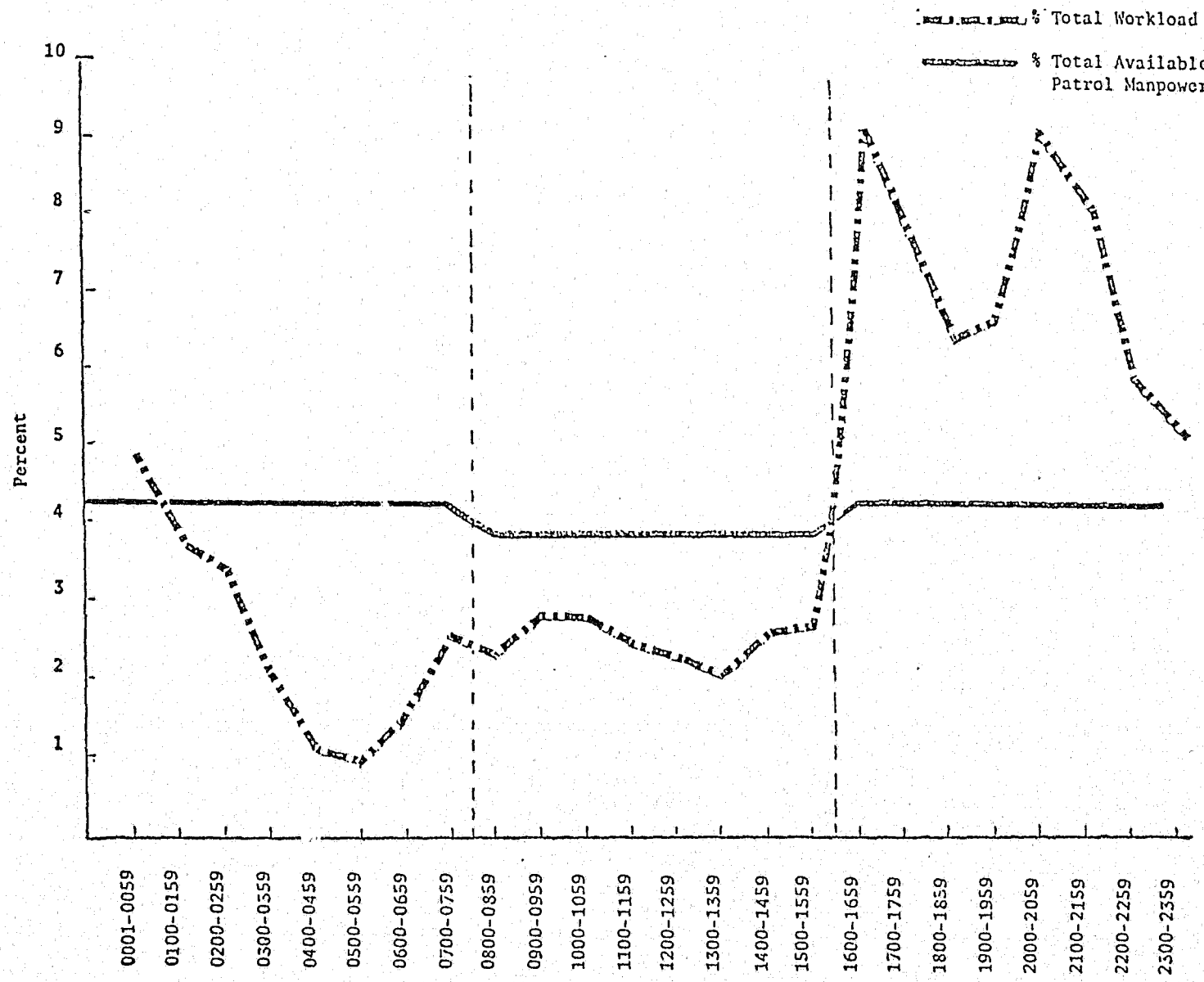


Figure 2-3. Workload Distribution Vs. Manning Level by Hour

TABLE 2-3

Manning Levels in the Patrol Force, 1975-76

Shift	Rank	No. of Officers
I	Sergeant	1
	Patrolmen	16
	Total	17
II	Sergeant	1
	Patrolmen	14
	Total	15
III	Sergeant	1
	Patrolmen	16
	Total	17
Total	Patrol	49

TABLE 2-4

Average Hourly Percentage of Total Manpower

Shift	Percentage of Total Patrol Manpower Allocated to Each Shift	Average Hourly Percentage of Total Manpower
I	34.69	4.34
II	30.61	3.83
III	34.69	4.34

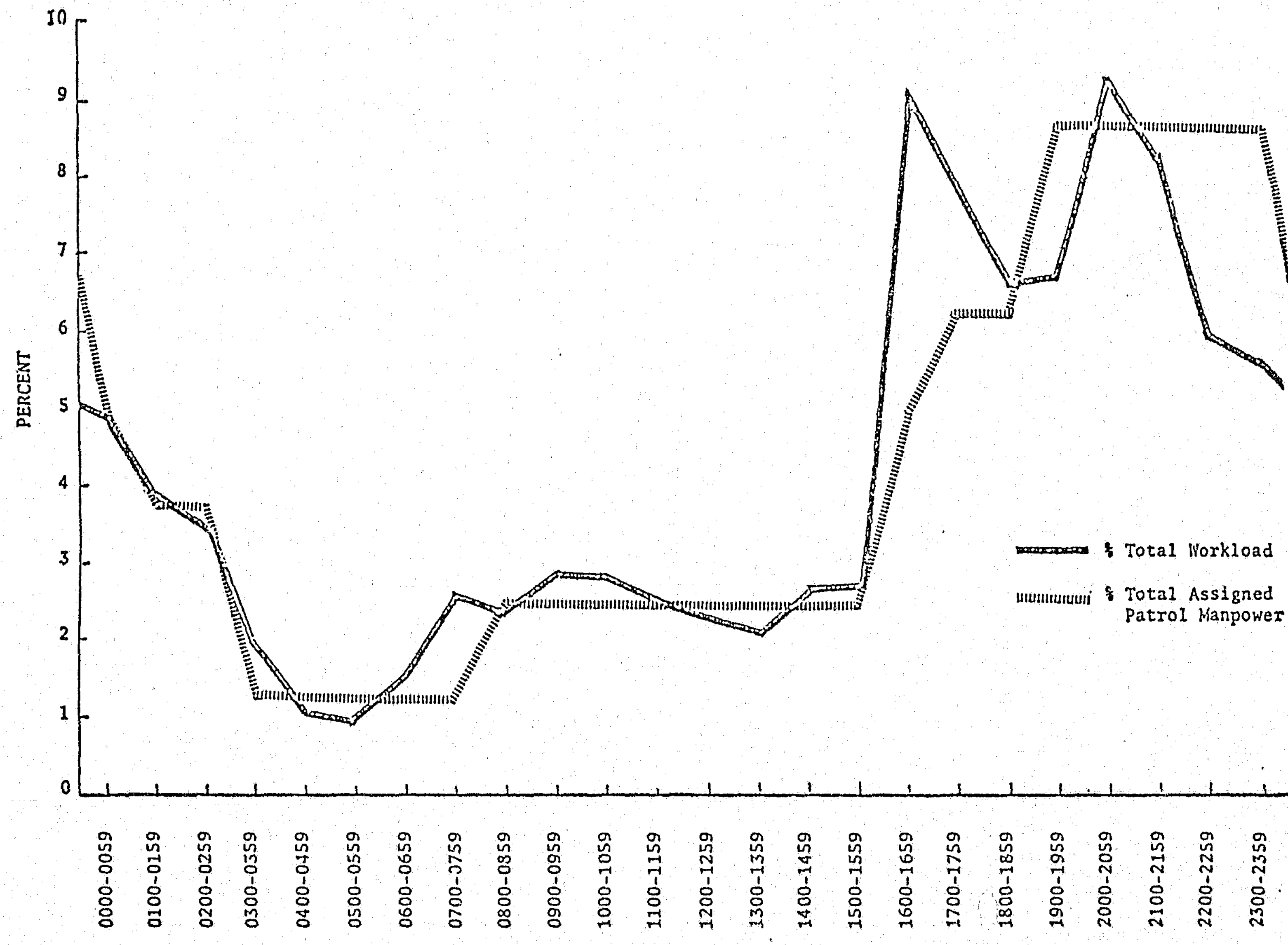


Figure 2-4. Workload Distribution vs Proposed Manning by Hour

(a) It is highly probable that calls-for-service reflect the pattern of total police activity, and (b) the consumed time for calls-for-service is the only measure readily available for such manpower distributions.

Table 2-5 shows the percentage of this recorded workload occurring in each hour and the ideal number of man-hours (rounded off to the nearest whole hour) that would distribute the 400 assignable man-hours in exact proportion to that workload. The last column gives the number of men assigned to that hour under the proposed shift pattern. This cannot exactly duplicate the workload distribution or the ideal manpower, since each man must work a full 8-hour shift at something approximating normal shift hours.

The comparison of workload and proposed manpower distribution is shown graphically in Figure 2-4. The proposed shift pattern is shown in Table 2-6. The proposed shifts were worked out by hand on graph paper by an empirical (cut and try) technique. For any but the largest departments, this is probably more feasible than mathematical techniques using "average hourly deviations from average shift workload" and similar textbook exercises.

2.6.3 Geographical Distribution of Shift Manpower

Once the available manpower has been assigned to shifts on a rational basis, each shift commander should be given the responsibility for distributing the officers assigned to his or her shift. It is quite possible for this to be done in exactly the same way as the assignments: Determine the workload in each beat or sector, calculate the percentage of the shift's workload represented by that sector, and assign a similar percentage of the shift's manpower to it.

TABLE 2-5

Derivation of Proposed Hourly Manpower Levels

Hours	Total Hourly Workload %	"Ideal" Hourly Distribution Of Manpower Proportionate To Workload		Proposed Hourly Manpower Distribution	
				Number	%
0000-0059	4.96	19.84	(20)	20	5.00
0100-0159	3.84	15.36	(15)	15	3.75
0200-0259	3.44	13.76	(14)	15	3.75
0300-0359	1.94	7.76	(8)	5	1.25
0400-0459	1.09	4.36	(4)	5	1.25
0500-0559	0.99	3.96	(4)	5	1.25
0600-0659	1.55	6.20	(6)	5	1.25
0700-0759	2.57	10.28	(10)	5	1.25
0800-0859	2.37	9.48	(9)	10	2.50
0900-0959	2.85	11.40	(11)	10	2.50
1000-1059	2.83	11.32	(11)	10	2.50
1100-1159	2.49	9.96	(10)	10	2.50
1200-1259	2.30	9.20	(9)	10	2.50
1300-1359	2.10	8.40	(8)	10	2.50
1400-1459	2.65	10.60	(11)	10	2.50
1500-1559	2.71	10.84	(11)	10	2.50
1600-1659	9.20	36.80	(37)	20	5.00
1700-1759	7.97	31.88	(32)	25	6.25
1800-1859	6.61	26.44	(26)	25	6.25
1900-1959	6.75	27.00	(27)	35	8.75
2000-2059	9.25	37.02	(37)	35	8.75
2100-2159	8.26	33.04	(33)	35	8.75
2200-2259	6.02	24.08	(24)	35	8.75
2300-2359	5.26	21.04	(21)	35	8.75

TABLE 2-6

Proposed Shift Schedule for Hypothetical Police Department

Shift	Hours	No.	Rank
I	0000-0800	1	Sergeant
		4	Patrolmen
II	0800-1600	1	Sergeant
		4	Patrolmen
III	1600-2400	1	Sergeant
		19	Patrolmen
		1	Sergeant
		4	Patrolmen
IV	1900-0300	1	Sergeant
		9	Patrolmen
Days Off:		1	Sergeant

Sectors are typically rather small areas. Therefore, one or two events of some duration could easily influence the workload allocated to the sector in which they occur, so as to give it a disproportionately high workload and consequently manpower distribution. The result could easily be an officer or two's riding around in response to events that will never recur or at best can recur very infrequently. A better technique is to determine some fraction of the available patrol strength that will be dedicated to the routine and recorded-service demands, the remainder to be used in preemptive crime-specific patrols or followup investigations.

For example, it can be assumed that the First Shift (Midnight - 0800) in a department is assigned 15 patrol officers, with an Assignment/Availability Factor of 1:1.8, to cover five beats or sectors. It can be further assumed that the relative workload between the five sectors on that shift is:

Sector	Relative Workload on Shift I (Percent)
1	32
2	28
3	20
4	15
5	5
	100

The shift commander knows that on an average day he will have 8.33 officers available for duty. It can be assumed that, of these, he decides to devote one-third to preemptive patrol; therefore, 2.8 officers will be assigned according to the results of a crime analysis effort, being directed to follow specific crime-suppression tactics developed from the analysis of target crimes.

The remaining 5.56 officers can be distributed to the sectors according to their relative workloads:

Sector	Officers Assigned
1	1.78
2	1.56
3	1.11
4	0.83
5	0.28
	5.56

The fractions can be taken care of by: (a) Using part of an officer's time in one sector and part in another; (b) assigning joint or overlapping responsibilities for some sectors; or (c) aggregating sectors together until whole numbers are reached. The exact method should be left to the discretion of the commander concerned.

2.6 Operations Analysis and Policy Considerations

The purpose of operations analysis is to assess the extent to which resources are allocated and deployed consistent with the problems with which those resources are expected to cope. It is to be expected that a proper operations analysis will suggest policy changes in such areas as shift staffing and beat or sector configuration; this will be especially true in departments which have not employed operations analysis in the past.

The police manager undertaking an operations analysis for the first time should carefully examine all current department policies and assumptions governing patrol service delivery. For example, if department policy is to involve patrol officers in criminal investigations, then "Count of Calls" is probably useless as a measure of service demand; likewise, the

use of unit responses as a measure of demand is not appropriate to the agency which is locked into a policy of fielding only two-man cars.

More importantly, however, the police manager should be aware of the potential of operations analysis (when used in conjunction with tactical crime analysis) to support the practice of directed patrol. By identifying activities which might be more appropriately handled by means other than patrol field response (e.g., by telephone, mail, walk-in, or by civilian paraprofessionals), and by identifying periods of uncommitted patrol time which may be blocked together (by means of call stacking) and managed, operations analysis can provide the police manager with valuable information with which to improve both the efficiency and the effectiveness of his agency. This approach to patrol management is treated in detail in Chapters 5 and 6 of this volume.

CHAPTER 3

STAFFING THE PATROL FUNCTION ACCORDING TO DEMAND:

A TECHNIQUE FOR PROPORTIONAL STAFFING

by

Jim Gibson
Elba Lu

San Jose Police Department

Staffing the Patrol Function According to Demand: A Technique for Proportional Staffing

Introduction:

One of the more pressing problems facing managers of police departments throughout the nation is the need to allocate limited patrol resources in as an efficient manner as possible. In times of even tighter police budgets and during a time when there are vocal cries for governmental efficiency, it is important to be able to demonstrate to city management some rationale for the use of existing resources. Managers must demonstrate that they are using existing resources efficiently and that they are considering the demand for police services as a key element in their staffing decisions. It is likely that this will have to be done before city management or councils will recommend and appropriate the expenditure of further funds for police services.

In addition to reasons of efficiency, there is another reason for staffing the patrol function with an eye toward demand. Scheduling has to be done with some regard for equity i.e., some attention need be paid to equalizing the workload among individual officers. Historically, many departments (the S.J.P.D. included) have been concerned with officer safety, especially between the hours of 1000 and 0300 or 0400 the next morning. This concern is a valid one, but it has lead to some staffing decisions with some unforeseen and generally undesirable consequences. Individual officers working the evening hours can have two or three times the workload of officers working the daylight hours. In San Jose, the period of high demand

begins about 1630 and usually peaks at from 2230 to midnight; the period of low demand begins about 0100 and bottoms out at about 0600. These generalizations hold true even for the weekends. The concern for officer safety during the early morning hours has historically led to a high level of staffing on the midnight watch when demand is relatively low. This drew manpower away from the swing watch when demand is high. Those officers working the swing shift were severely impacted responding, in some areas of the community, to as many as three times the number of calls as the midnight watch.

For two reasons then - reasons of efficiency and equity - some attention must be paid to the demand for patrol services when staffing decisions are being made. What follows is a description of the methodology the San Jose Police Department follows when staffing its patrol function. It goes without saying; however, that some appreciation of demand is but one of the concerns that should be addressed when staffing levels are set; others may be officer safety, the internal workings of the organization (e.g., sometimes certain levels of staffing are required to assure the smooth flow of paper and other intra-organizational communications), and of course outside constraints placed on police management when city management dictates certain levels of staffing. In spite of these constraints, staffing to meet the demand is probably the most useful starting point for most allocation plans. The ideal distribution of resources over time and space based on some measure of demand can serve as a necessary guide when the police manager is assessing the importance and costs

of other constraints on and demands for certain staffing levels.

The remainder of this section is divided into two parts. The first describes how the department allocates its manpower resources to each of three ten hour shifts. It also speculates on how the methodology might be adapted for use by departments utilizing four eight-hour shifts. The second part of the paper discusses how the methodology developed in the first part can be applied to police districts by day of the week in order to produce a schedule that is manned proportionally by day of the week and area of the city. Finally, it is important to note (again) that the technology about to be described is a pencil and paper technology; it requires no automation and does not require the user to undergo extensive training.

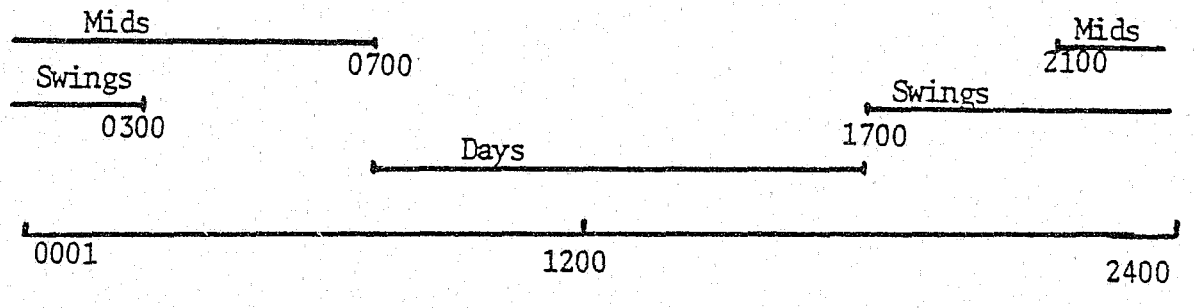
Distribution Resources Among Three Ten Hour Shifts:

One of the most persistent questions facing police managers when they set staffing levels is, "How many people do I assign to each shift?" Assuming that the manager has some meausre of demand, (The S.J.P.D. uses the number of units assigned to respond to calls for service.) then it should be possible to supply a satisfactory answer to the question. The answer is a simple one if there are only three eight-hour shifts in the 24-hour working day. For example, suppose there were three eight hour shifts starting at 0700, 1500, and 2300 and that there were 100 officers to be assigned to the entire patrol function. Suppose also that 30% of the demand occurs during the day shift (0700), that 45% occurs during the swing shift (1500), and that 25% occurs during the midnight shift (2300). Assuming the manager was using demand information to schedule his people and that there were no outside constraints, he would schedule 30 officers to work the day shift to service 30% of the demand, 45 officers to work the swing shift to service 45% of the demand, and 25 officers to work the midnight shift to service 25% of the demand. The solution here is straightforward; however, it becomes less obvious when there are overlapping shifts i.e., when officers from two or more shifts work at the same time.

Many departments using a variety of schedules have overlapping shifts. Among these are any schedule where more than three eight hour shifts in a 24 hour day or any three shift schedule where the length of a shift exceeds 8 hours. (This occurs, as it does in the case of San Jose, when individual officers work four ten hour shifts

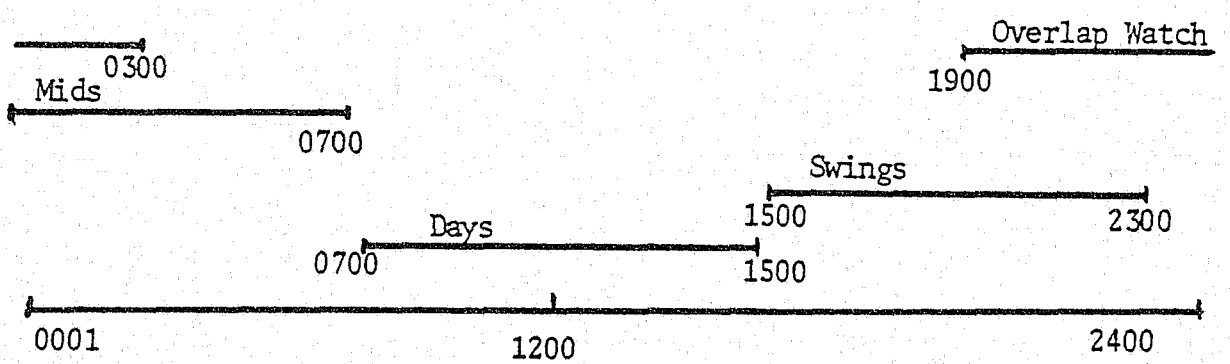
Figure 8

THE TEN HOUR PLAN WITH THREE SHIFTS



0700-1700	Days Work Alone
1700-2100	Swings Work Alone
2100-0300	Mids and Swings Work Together
0300-0700	Mids Work Alone

THE EIGHT HOUR PLAN WITH FOUR SHIFTS



0700-1500	Days Work Alone
1500-1900	Swings Work Alone
1900-2300	Swings and Overlap Work Together
2300-0300	Mids and Overlap Work Together
0300-0700	Mids Work Alone

in the forty hour work week resulting in three ten hour work shifts in a 24 hour day.) The problem one faces with overlapping shifts is that they are interdependent during the overlap period; the officers on one shift have a direct impact on the officers on other shift(s). For example, we would expect, all things being equal, that if two shifts overlap during a given time period and the first shift has twice as many officers as the second shift, that the officers on the first shift would do twice as much work as the officers on the second shift. If they do not, they would not be doing the work in proportion to their numbers. Furthermore, we would want to staff all shifts roughly in proportion to the workload on each shift. This is made more difficult by overlapping shifts.

The most common overlapping schedule is where one or more shift(s) works for a time without the benefit of an overlap shift and then for a time with the benefit of an overlap shift. The most common of these are illustrated in Figure 8 below. The important thing to note here is that the 24-hour demand can be broken down into its component parts and that a given number of patrol officers can be allocated to any number of shifts in a 24 hour period using a set of simultaneous equations. The solution results in staffing each shift proportional to the workload.

Appendix A attached to this narrative discusses in detail the equations that can be used to solve for proportional staffing. Which solution to use depends on the number of independent periods of demand into which the 24-hour day can be divided and upon the number of shifts working patrol. The equations in Example 1 can be used to obtain the

This is because there are four distinct periods of demand and three shifts in the first instance and five distinct periods of demand and four shifts in the second instance. Obviously the number of distinct periods of demand will change as the schedule changes. For example: six, seven, or even eight distinct periods of demand could result from plans with three to five staggered start shifts. Although equations for only three cases are solved in the appendix, the rationale developed there can be used to set up the equations for almost any schedule. High school algebra is all that is required to these equations.

Although the methodology for proportional manning is discussed in detail in the appendix, some discussion of the equations' components seems in order. Consider the components of the equations on page three of the appendix. Note that these equations can be used to solve for proportional manning when there are four independent components to the demand and three overlapping shifts in patrol; using the example of three ten hour shifts with an overlap between the swing and midnight shifts, these equations can be solved to obtain the number of officers to be assigned to each of the three ten hour shift (N_1 = Days; N_2 = Swings; N_3 = Mids).

Equations (1), (2), and (3) on page 3 of the appendix can be rewritten as they appear in Figure 9 below. Using Figure 10, we can explain the terms of equations (1) and (2) in Figure 9. (The explanation for (3) is the same as for (2)).

Figure 9

$$(1)\quad N_1 = \left(\frac{A}{T}\right) N$$

$$(2)\quad N_2 = \left(\frac{B}{T} + \frac{\frac{N_2}{N_2 + N_3}}{1} \quad \frac{C}{T}\right) N$$

$$(3)\quad N_3 = \left(\frac{D}{T} + \frac{\frac{N_3}{N_2 + N_3}}{1} \cdot \frac{C}{T}\right) N$$

Figure 10

(1) Number of officers to be assigned to the day shift = $\frac{\text{Demand when Day Shift Works}}{\text{Total Demand for 24 hour day}}$ X Number of officers to be assigned to the Patrol Function

(2) Number of officers to be assigned to the swing shift =

$$\left(\frac{\text{Demand when swing shift works alone}}{\text{Total Demand for 24 hour day}} + \frac{\frac{\text{Number of officers to be assigned to the swing shift}}{\text{Number of officers to be assigned to both the swing and midnight shifts}}}{1} \cdot \frac{\text{Demand when the swing and midnight shifts are on together}}{\text{Total Demand for 24 hour day}}\right) \text{Number of officers to be assigned to the Patrol Function}$$

Note that in equation (1) the number of officers to be assigned to the day shift (N_1) is a function of that part of the total day's 24-hour demand (T) which occurs during the time day shift is on duty (A) and the number of officers assigned to the patrol function (N). Recall that under the 10 hour plan described earlier the day shift did not overlap with any other shift; this is why manning on the day shift is a function of only one element of demand (A).

Now review equation (2); there the number of officers to be assigned to the swing watch (N_2) is a function of two elements of daily demand -- B (when swings work alone) and C (when swings work with mids). Because B represents the demand when swings work alone, it can be treated like A in equation (1) i.e., as a simple percentage of the daily demand - $^{A}/_{T}$ or $^{B}/_{T}$. Notice, however, that the percentage of the daily demand represented by $^{C}/_{T}$ (This is when swings works with mids.) must be modified by the expression $\frac{N_2}{N_2 + N_3}$. This is because we do not expect the swing shift to handle all of the work during the time it overlaps with the midnight shift (C); they will handle some proportion of that work but not all of it. In fact, the expression $\frac{N_2}{N_2 + N_3}$ gives the proportion of the work we would expect the swing shift to handle during the overlap period. We can see that this proportion is expressed by the ratio of the number of swing officers to the number of swing officers plus the number of midnight officers. In other words, we want the swing shift to handle that proportion of the workload during the overlap period (C) that their number justifies.

This implies that if, for example, 70% of the officers during the overlap period are swing officers then they should handle 70% of the workload.

Note, however, that we do not know how many officers are on any of the watches i.e., we do not know N_1, N_2, or N_3. That is exactly what we are trying to find out. The solutions to these equations expressed in terms of the demand for service during each time period and the number of officers assigned to the patrol function can be found in the appendix. (See example 1.)

The Problem of Making Patrol Assignments to Geographic Areas By Work Shift By Day of the Week

We have seen that the rationale described in the previous section can be adapted to a variety of starting times and schedules. It remains for this section to describe how it can be used together with daily demand data on police areas (beats, district, and/or precincts) to produce an overall allocation plan for patrol resources. Obviously, it would be unsatisfactory to use any method to make allocation decisions which did not take into account variations in demand by the day of the week. Equally unsatisfactory would be any method which ignored geographic differences in demand. Ideally, a manager would like to know what proportion of his resources to allocate to a designated time and place. He would like an answer to this or a similar question, "What per cent of my total resources should I allocate to District 1 on Thursdays while the day shift is on duty?"

Consider the following example. Big City provides police service (only) three days a week (Thursday, Friday, and Saturday). The patrol division works three ten-hour shifts which begin at 0700 (Days); 1700 (Swings), and 2100 (Mids). There are three patrol districts and the demand for patrol services requires the responses of 1000 patrol units per week. The demand is broken down by day of the week, time of the day, and district in Table 8.

TABLE 8

No. of Units Required to Respond to Calls For Service

by District

Time/Day	Thurs	Fri	Sat	
Days Work Alone 0700-1700	20	40	30	
Swings Work Alone 1700-2100	20	30	40	DISTRICT 1
Swings & Mids Work Together 2100-0300	20	40	45	
Mids Work Alone 0300-0700	15	20	30	
	75	130	145	350

Table 8 (continued)

Time/Day	Thurs	Fri	Sat	
Days Work Alone 0700-1700	15	25	40	
Swings Work Alone 1700-2100	15	25	35	DISTRICT 2
Swings & Mids Work Together 2100-0300	15	35	50	
Mids Work Alone 0300-0700	5	15	25	
	50	100	150	300

Time/Day	Thurs	Fri	Sat	
Days Work Alone 0700-1700	25	40	35	
Swings Work Alone 1700-2100	30	35	40	DISTRICT 3
Swings & Mids Work Together 2100-0300	20	40	30	
Mids Work Alone 0300-0700	5	25	25	
	80	140	130	350

Note the work day extends from 0700 to 0700 the next day; e.g., Thursday goes from 0700 Thursday to 0700 Friday.

In this example on Thursdays in District 1, the demand can be broken down as follows:

A = 20; units responding when days work alone (0700-1700)

B = 20; units responding when swings work alone (1700-2100)

C = 20; units responding when swings and mids work together (2100-0300)

D = 15; units responding when mids work alone

T = 75; units needed to meet demand on Thursday

Assuming that only one officer were to be assigned to work in District 1 on Thursdays and that his efforts would have to be divided among each of the three shifts in proportion to the workload, then the equations can be solved to determine what proportion of his efforts should be expended on each shift. The equations are solved below:

$$N_1 = \frac{20}{75} \cdot 1 = .2667$$

$$N_2 = 20 \cdot 1 \left(1 - \frac{20}{75}\right) \frac{1}{20 + 15}$$

$$20 \ (.7333) \quad .0286 = .4194$$

Note: Since $N_1 + N_2 + N_3 = N$

And: $N = 1$ (one officer)

$$N_3 = 1 - N_1 - N_2$$

$$1 - .2667 - .4194 = .3139$$

(Note: There may be slight errors due to rounding.)

Obviously, it is impossible to assign one officer to police a part of the city for a full 24 hours. However, from the above we can say the 26.67% of the manpower resources assigned to District 1 on Thursdays should be assigned to staff the day shift; while 41.94% of the manpower should be assigned to the swing shift and 31.39%, the remaining manpower, should go to staff the midnight shift.

This begs the next question, "How much of the patrol division's total resources (manpower) should go to staff District 1 on Thursdays?" In the preceeding paragraph, we arbitrarily chose to assign one officer in order to obtain simple percentages; we know that this is just an assumption of convenience.

If 75 of the 1000 total units needed by the patrol division are needed in District 1 on Thursdays then $\frac{75}{1000}$ or 7.5% of the division's total manpower should go to service District 1 on Thursdays. There are 50 officers in the patrol division (N); therefore, there are 150 mandays available for assignment in the patrol division. (This is because each officer works 3 days a week, and 50 x 3 = 150.) We would expect that 7.5% of the 150 mandays or 11.25 mandays (officers) would be assigned to patrol District 1 on Thursdays. We know that 26.67% of the 11.25 officers should go to the day watch (from the equations above). Therefore, three officers should theoretically work the day watch Thursdays in District 1.

$$150 \times .075 \times .2667 = 3.000$$

Recall that this is also what we concluded using the "simple" method described earlier; also recall that we were unable to solve the problem for the swing and midnight shifts using the simple method because they are overlapping shifts. Now because we know that 41.94%

of the 11.25 officers should go to swings, we can now say the demand justifies 5.445 officers on swing shift.

$$150 \times .075 \times .4194 = 4.7183$$

We know that 5.495 officers should theoretically be assigned to the swing shift. Using the same method, we can see that 3.5314 officers should be assigned to the midnight shift.

Looking at the problem from yet another perspective, the answer to the question, "What proportion on the patrol resources should be assigned to a given district on a given day on each of the three shift?" is an obvious one, and sometimes the obvious answer is the correct answer. For example, 20 or the 1000 units necessary to provide patrol services are needed in District 1 during the day shift on Thursdays. This $\frac{20}{1000}$ or 2% of the total. If a department had 50 officers to assign to patrol, each working 3 days a week for a total of 150 man-days of resources, two per cent of that total (150 x .02) three day-shift officers should be assigned to patrol District 1 on Thursdays. The difficulty arises when overlapping shifts are introduced as a part of the schedule. The obvious solution cannot be used for any shift which overlaps with another. For example, how many officers should be assigned to the swing shift in District 1 on Thursdays? Theoretically, at least 2.25 officers should be assigned to service the demand that occurs when the swing shift works alone. (Fifteen units is 1.5% of the total 1000 units needed for patrol. 1.5% of the 150 mandays available to patrol is 2.25). But how many of the officers needed to work the overlap period with mids should be swing officers? Three? Five? There is no obvious answer. The

equations developed in the previous section provide the solution.

It is not really necessary to know exactly how many officers are available for assignment in the patrol division in order to use the procedures described in the preceeding paragraphs. In fact, managers often do not know exactly how many officers they will have either because of last minute illnesses or resignations or because the division receives additional manpower allocations. Recall in our example that 7.5% of the division's manpower resources should work Thursdays in District 1 and that 26.67% of the 7.5% should work the day shift. This is .0200025 of the total manpower resources allocated to the patrol division (.075 x .2667 = .0200025). This is the proportion of the division's manpower resources that should be assigned to work the day shift in District 1 on Thursdays, no matter what the size of the patrol division. We call these proportions resource factors, and they can be found for District 1 in Table 9.

TABLE 9

Manpower Resource Factors

SHIFT/DAY	THURS	FRI	SAT
DAYS	.0200025	.0400000	.0300000
SWINGS	.0314550	.0540000	.0657150
MIDS	.0235425	.0360000	.0492750

The resource factors in Table 9 are based on the data in Table 8; these factors give the percentages of the department's manpower resources which are needed to service the demand in District 1 of Big City by shift and day of the week. After adjustments are made to account for rounding errors (Not made here) all of the factors for all three districts will add up to 1.0. The factors in Table 9 add up to approximately .35. (Recall that 35% of the city's demand occurs in District 1.) As we shall see, these factors can be especially useful to any agency using some concept of team policing in the operations of the patrol function.

Team Policing and the Use of Resource Factors:

Like many agencies of the San Jose Police Department uses the team policing concept. A patrol team each shift is assigned to police a given area of the community. The manpower resource factors can be used to determine the staffing on each team. For example, suppose the day shift team in District 1 of the fictional Big City worked all three days (Th, F, S) each week. The size of the team can be set simply by adding the appropriate manpower resource factors and multiplying this sum by the number of officers to be assigned to the patrol function, in this example: 50 cfficers. (.0200025 + .0400000 + .0300000 = .0900025 times 50 = 4.500125 officers) Note: Because we are no longer concerned with manning by day, we can multiply the manpower resource factors by the available manpower totals not man-days.

This method would result in staffing the team working the day shift in District 1 with four to five officers. This means that on Thursday, there would be four or five officers in District 1 instead of the ideal three officers. On the other hand, if we assign four or five officers to the dayshift team in District one, we run the risk of understaffing the day shift on Friday. This is because .040, the manpower resource factor for Friday, multiplied by 150 Mandays would suggest that at least 6.00 officers be assigned to the day shift in District 1 on Friday. This brings up an important point not often appreciated by police managers. That is, team policing will inevitably conflict with the ability to staff the patrol function in a manner that is proportional to the workload as long as perfect team

integrity is maintained. In other words, so long as team policing is conceived of as a group of officers who always work at the same time usually under the same supervision in the same geographic area, it will not be possible to achieve proportional staffing by day of the week. In the example we have just developed, no matter whether four or five officers are assigned to day shift in District 1, there will be more manpower than is justified by the workload on Thursdays and less manpower than justified by the workload on Fridays.

Using the resource factors in Table 9, we would staff the district at the levels indicated below.

DAYS .0200025 + .0400000 + .0300000 = .0900025 x 50
= 4.500125 or 5 officers

SWINGS .0314550 + .0540000 + .0657150 = .151170
x 50 = 7.5585 or 8 officers

MIDS .0235425 + .0360000 + .0492750 = .1088175
x 50 = 5.440875 or 5 officers

Suppose for the moment that the city council appropriated money for one additional police officer and mandated that the additional officer work in District 1. Then the above factors for District 1 would be multiplied by 51 in order to obtain the ideal team sizes with 51 officers in the manpower pool.

Days: .0900025 x 51 = 4.5901275

Swings: .156345 x 51 = 7.70967

Mids: .1036425 x 51 = 5.5496925

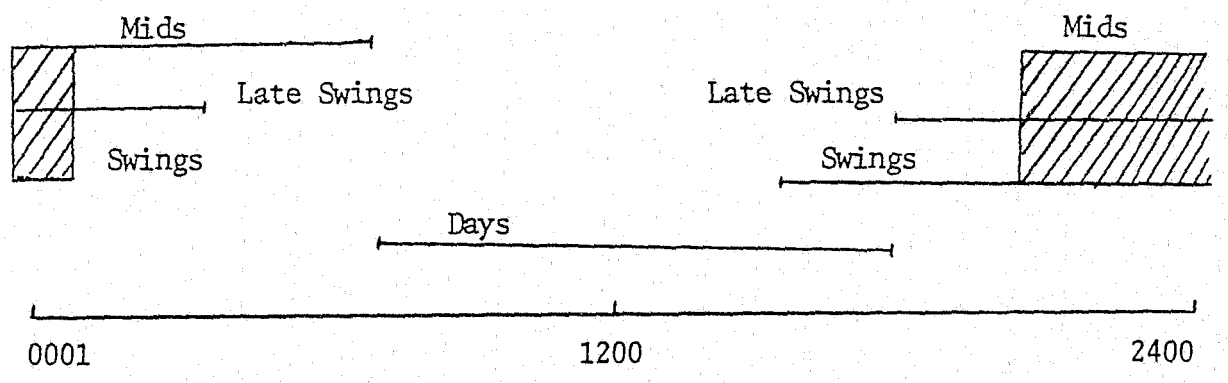
When there were only 50 officers in the patrol division the staffing in District 1 was Days - 5; Swings - 8; and Mids - 5. The ideal

team sizes for a total patrol strength of 51 officers are: .4098725 officers less than the actual field strength of 5 on the day shift; .026405 officers less than the actual field strength of 8 officers on the swing shift; and .2857675 officers greater than the actual field strength of 5 officers on the midnight shift. The midnight shift is under its ideal strength while the other two shifts are over strength; therefore the additional officer should be assigned to the midnight shift. Of course, if the council had not mandated that the additional officer go in District 1, then we would have performed the same operation in all three districts in Big City, choosing that team that was most understaffed no matter to what district it was assigned.

Summary:

What follows are some additional comments about the methodologies described in the previous pages.

1) Equations for three different situations appear in the appendix; two are solved for schedules where two shifts overlap and demand can be broken down into either four or five segments in the 24 hour day. In addition, one is solved for a schedule where three overlapping shifts work at the same time and the demand can be broken down into six segments. See below.



2) By solving the equations by day of the week, we are able to staff different schedules on different days. For example, in San Jose we have a late swing unit on the three busiest nights of the week when the demand is greater and when it occurs at a slightly later time in the evening. On Sunday through Wednesday, we have only three shifts while on Thursday, Friday, and Saturday we have a late swing shift. The equations in example 1 of the appendix are used to solve the scheduling problems on the four week days when there are three shifts while the equations in example 3 are used to solve

the weekend scheduling problems.

3) The equations can be used to assign staff to each shift without using demand data broken down by day of the week; this will result in proportional staffing by week, but it may also result in under- or over-staffing particular shifts on some days of the week.

4) The equations can be used to determine the starting times for each shift. If the most efficient use is to be made of the material resources, then the shifts should be as equal in size as possible. This is necessary so that material resources e.g., cars or motorcycles do not lie idle. By solving the equations for different time periods, that schedule of starting hours and shift length resulting in the most efficient use of material resources can be determined. This, of course, would be the schedule where the staffing on each shift was most nearly equal.

5) Not all of the patrol division's resources have to be scheduled using the methods described here. For example, in San Jose, some units are administratively assigned. The council has requested that the major parks be assigned an officer during the daylight hours and that there be walking units in certain commercial areas. These units perform specialized functions and, therefore, for purposes of proportional staffing were not included in the manpower pool.

6) It was noted earlier that the manpower resource factors could be used to determine where to assign additional manpower resources. They can also be used to determine which teams can most afford to lose staff when that is necessary. For example, after completing an initial manpower allocation plan for the city based

on the concept of staffing by demand, the command staff concluded that for reasons of officer safety, too few officers had been allocated to the midnight shift. Using the manpower resource factors for the day and swing teams, we were able to draw from teams where a loss of manpower would hurt the least. Likewise, during the course of day to day administration, area lieutenants can use the factors to draw from teams which can most afford to give up manpower in the event of absences on other teams resulting from illness or vacations.

7) The resource factors can still be used when two teams overlap on one day in the same district. Consider two teams each shift working four days a week overlap one day a week. For example, two teams working the day shift four days a week overlap on Monday in District 1. At the time the team sizes were being determined, the manpower resource factor for that day (Monday) for that shift (Days) simply needs to be divided by two since only one team works the district on the overlap day. This, in turn, is added to the other factors used to determine the appropriate team size.

Two words of caution:

1) The method we have described here does not work well for departments with rotating shifts. In fact, it is not possible to have proportional manning on three shifts more than one third of the time with perfect team integrity and rotating shifts unless of course the demand is equal on all shifts. This is because the large swing teams will eventually rotate into the midnight shift when demand is light, and team integrity requires that the team not be broken up.

2) If there are unusual peaks or valleys in demand, then use of the equations may perform a disservice. For example, if in a part of the community, there is a predictable but brief peak in demand (say for two hours) that is double or triple the demand the remainder of the shift, the equations will produce a solution which will result in the potentially serious understaffing of that team working that area of the city during those peak periods. We think this will be the exception rather than the rule, but users should be aware of this problem. It is highly likely that no universal method of allocating manpower could be used to deal with these unusual circumstances.

APPENDIX A

PROPORTIONAL MANNING FOR OVERLAPPING SHIFTS

Elba R. Lu

Crime Analysis Unit

San Jose Police Department

March 20, 1978

PROBLEM BACKGROUND

It was proposed to develop a methodology that would permit determining the desired number of patrol officers by shift based on historical workload[1] demands. With non-overlapping shifts, the solution would simply be to determine the percentage of the total workload demand during a particular shift and to apply that percentage to the available manpower; e.g., if a shift experiences 40% of the workload demand, it is reasonable to supply that shift with 40% of the available manpower.

The problem arises when shifts are overlapping; i.e., officers from two or more separate shifts are on duty at the same time. This occurs with the 4-10 plan (4 workdays of 10 hours each) and with many staggered-start-time plans. With overlaps, it is still intuitively desirable to determine the number of officers by shift based on demand but the procedure to be followed is not quite as obvious as with non-overlapping shifts.

PROPOSED APPROACH

The problem one faces when dealing with overlapping shifts is that the shifts become interdependent; i.e., the number of officers assigned to one shift have a direct impact on the other shift(s) during their overlap period. All other things being equal, it is reasonable to expect that if shift A has twice as many officers as shift B, then during the overlap period twice as much work can be anticipated from shift A as from shift B.

---

[1] Workload was defined as the number of units assigned to calls for service. This definition was used instead of calls for service in order to weigh more heavily those calls requiring multi-unit responses. However, the same rationale and procedures could apply to any other measure of workload.

The proposed solution to obtaining proportional manning is to express the interdependence of the overlapping shifts within the definition of each shift's workload; a set of simultaneous equations are thus created which can be solved for each shift. The examples make the method clear and give solutions for three different situations.

EXAMPLES

In the following examples, N represents the number of available patrol officers to be prorated among the various shifts. T is the total workload or service demand which can be broken down into individual time segments for the various combinations of either shifts alone or with overlaps. The service demands for the individual time segments are called A, B, C, etc. It is desired to solve for the required complement of patrol officers in terms of N, T, A, B, C, etc.

For clarity, the notation will be defined for each example in terms of actual working hours in military time. For a ten-hour day, it was considered realistic to remove the initial half-hour and last half-hour in order to allow for travel and briefing. Thus each shift is assumed to work nine hours per day.

EXAMPLE 1

Three shifts. First one alone, last two overlapping.

First shift: 0800 - 1700

Second shift: 1700 - 0200

Third shift: 2300 - 0800

Let

N = number of available patrol officers

N_1 = number of patrol officers assigned to the first shift

N_2 = number of patrol officers assigned to the second shift

N_3 = number of patrol officers assigned to the third shift

(2) The number of patrol officers assigned to the second shift (N_2) is equal to the sum of two parts ((a) and (b)) multiplied by the total number of available officers (N).

(a) expresses the proportion of the total workload demand that occurs during the time the second shift is alone ($\frac{B}{T}$).

(b) expresses the proportion of the total workload demand that can be placed on the second shift during the time the second and third shifts are together; i.e., $\frac{C}{T}$ is the proportion of the demand occurring from 2300-0200 but only part of that demand ($\frac{N_2}{N_2 + N_3}$) is served by the second shift. Thus, the second shift's "share" of the workload between 2300-0200 is $\frac{N_2}{N_2 + N_3} \frac{C}{T}$.

$$\text{Hence } N_2 = \left(\frac{B}{T} + \frac{N_2}{N_2 + N_3} \frac{C}{T}\right) N$$

$$= \left(B + \frac{N_2}{N_2 + N_3} C\right) \frac{N}{T}$$

(3) The number of patrol officers assigned to the third shift (N_3) is equal to the sum of two parts ((a) and (b)) multiplied by the total number of available officers (N).

(a) expresses the proportion of the total workload demand that occurs during the time the third shift is alone ($\frac{D}{T}$).

(b) expresses the proportion of the total workload demand that can be placed on the third shift during the time the second and third shifts are together; i.e., $\frac{C}{T}$ is the proportion of the demand occurring from 2300-0200 but

only part of that demand $(\frac{N_3}{N_2 + N_3})$ can be served by the third shift. Thus, the third shift's "share" of the workload between 2300-0200 is $\frac{N_3}{N_2 + N_3} \frac{C}{T}$.

Hence $N_3 = (\frac{D}{T} + \frac{N_3}{N_2 + N_3} \frac{C}{T}) N$

$= (D + \frac{N_3}{N_2 + N_3} C) \frac{N}{T}$

It is now desired to solve (1), (2) and (3) in terms of N, A, B, C, and D. Noting that

$$N_2 + N_3 = N - N_1$$

and substituting in (2) and (3) and simplifying give the final solutions:

(1) $N_1 = \frac{A}{T} N$

(2) $N_2 = BN (1 - \frac{A}{T}) \frac{1}{B + D}$

(3) $N_3 = DN (1 - \frac{A}{T}) \frac{1}{B + D}$

EXAMPLE 2

Three shifts. Middle shift overlaps with other two at either end.

First shift: 0800 - 1700

Second shift: 1600 - 0100

Third shift: 2300 - 0800

Let

N = number of available patrol officers

N_1 = number of patrol officers assigned to the first shift

N_2 = number of patrol officers assigned to the second shift

N_3 = number of patrol officers assigned to the third shift

Hence

$$N = N_1 + N_2 + N_3$$

Also let

T = total workload demand

A = workload demand from 0800-1600 (served by first shift alone)

B = workload demand from 1600-1700 (served by first and second shifts)

C = workload demand from 1700-2300 (served by second shift alone)

D = workload demand from 2300-0100 (served by second and third shifts)

E = workload demand from 0100-0800 (served by third shift alone)

Hence

$$T = A + B + C + D + E$$

The workload demand of each shift can be expressed as

$$(1)\quad N_1 = \left(A + \frac{N_1}{N_1 + N_2}\, B\right) \frac{N}{T}$$

$$(2)\quad N_2 = \left(\frac{N_2}{N_1 + N_2}\, B + C + \frac{N_2}{N_2 + N_3}\, D\right) \frac{N}{T}$$

$$(3)\quad N_3 = \left(\frac{N_3}{N_2 + N_3}\, D + E\right) \frac{N}{T}$$

Adding (1) and (2) and solving for N_2 in terms of N_1 gives

$$(2)\quad N_2 = \frac{N(A + B + C) - TN_1}{T - \frac{ND}{N - N_1}}$$

Substituting in (1) allows solving for N_1 as a quadratic equation.

The final solutions are:

$$(1)\quad N_1 = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

where $a = -(A + C + D)$

$$b = N\left(2A + C + \frac{DB - AE}{T}\right)$$

$$c = -\frac{AN^2(A + B + C)}{T}$$

$$(2)\quad N_2 = \frac{N(A + B + C) - TN_1}{T - \frac{ND}{N - N_1}}$$

$$(3)\quad N_3 = N - N_1 - N_2$$

EXAMPLE 3

Four shifts. First shift alone. Second and third shifts overlap; third and fourth shifts overlap; second, third and fourth shifts overlap.

First shift: 0700 - 1600

Second shift: 1600 - 0100

Third shift: 1900 - 0400

Fourth shift: 2100 - 0700

Let

N = number of available patrol officers

N_1 = number of available patrol officers assigned to first shift

N_2 = number of available patrol officers assigned to second shift

N_3 = number of available patrol officers assigned to third shift

N_4 = number of available patrol officers assigned to fourth shift

Hence

$$N = N_1 + N_2 + N_3 + N_4$$

Also let

T = total workload demand

A = workload demand from 0700-1600 (served by first shift alone)

B = workload demand from 1600-1900 (served by second shift alone)

C = workload demand from 1900-2100 (served by second and third shifts)

D = workload demand from 2100-0100 (served by second, third and fourth shifts)

E = workload demand from 0100-0400 (served by third and fourth shifts)

F = workload demand from 0400-0700 (served by fourth shift alone)

Hence

$$T = A + B + C + D + E + F$$

The workload demand of each shift can now be expressed as

(1) $N_1 = \frac{A}{T} N$

(2) $N_2 = (B + \frac{N_2}{N_2 + N_3} C + \frac{N_2}{N_2 + N_3 + N_4} D) \frac{N}{T}$

(3) $N_3 = (\frac{N_3}{N_2 + N_3} C + \frac{N_3}{N_2 + N_3 + N_4} D + \frac{N_3}{N_3 + N_4} E) \frac{N}{T}$

(4) $N_4 = (\frac{N_4}{N_2 + N_3 + N_4} D + \frac{N_4}{N_3 + N_4} E + F) \frac{N}{T}$

Substituting

$N_1 + N_2 + N_3 = N - N_4$ in (2)

and

$N_2 + N_3 = N - N_1 - N_2$ in (3),

adding (2) and (3) and solving for N_3 in terms of N_1 and N_2 yield:

$$(3)\quad N_2 = \left(B + C + \frac{DN_2}{N - N_1} - \frac{TN_2}{N}\right) \Big/ \left(\frac{T}{N} - \frac{D}{N - N_1} - \frac{E}{N - N_1 - N_2}\right)$$

Substituting in (2) and solving for N_2 as a quadratic equations give the final solutions:

$$(1)\quad N_1 = \frac{A}{T} N$$

$$(2)\quad N_2 = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

where $a = \frac{ED}{N - N_1} - \frac{ET}{N}$

$$b = \frac{TB(N - N_1)}{N} + B\,(C + E - D) + CE$$

$$c = -\,B\,(B + C)\,(N - N_1)$$

$$(3)\quad N_3 = \left(B + C + \frac{DN_2}{N - N_1} - \frac{TN_2}{N}\right) \Big/ \left(\frac{T}{N} - \frac{D}{N - N_1} - \frac{E}{N - N_1 - N_2}\right)$$

$$(4)\quad N_4 = N - N_1 - N_2 - N_3$$

LIMITATIONS/CONSTRAINTS

The above procedures provide idealized manning levels for the various shifts. Operational considerations such as officer safety, absenteeism, number of vehicles, other deployment policies (e.g., team integrity), other non-called-for-service demands (e.g., court and training), etc. must be taken into to provide realistic manning levels. Subsequent reports will specify how the formulae were applied in San Jose.

CHAPTER 4

SIMI VALLEY POLICE DEPARTMENT

PATROL WORKLOAD STUDY

by

Lt. Ralph Ioimo

Simi Valley Police Department

Designed in Cooperation with
The California
Commission on Peace Officer
Standards and Training

4.1 INTRODUCTION

The proper use of resources is one of the most important aspects of sound police administration problems faced by law enforcement agencies today. The allocation of these resources, specifically patrol resources, is crucial for three main reasons -- economy, effectiveness and productivity.[1]

The greatest expense in most law enforcement agencies' budget is for personnel salaries. Since the patrol function usually constitutes the largest division within a department, the most economic use of patrol personnel is of paramount importance.

The Simi Valley Police Department, at the time of implementation of the Patrol Workload Study, was operating with fifty-four (54) sworn personnel. The City of Simi Valley has a population of approximately 73,000 residing within twenty-five (25) square miles. This represents a ratio of 0.7 officers per thousand citizens. This ratio of officer to population is the lowest in the nation as reported by the Federal Bureau of Investigation's 1975 publication of "Crime in the United States." Due to economic conditions being experienced by the City of Simi Valley as with other cities, it became apparent to the Administration of the police department that an increase in manpower was not likely to occur within the near future.

This problem is greatly compounded by the fact that the City of Simi Valley is continuing to experience a trememdously rapid growth rate. With

---

[1] "Allocation and Distribution of Police Patrol Manpower," Police Administration, McLaren and Wilson.

growth, increased workloads can be anticipated. To counteract this workload increase, it is absolutely necessary to ensure the most efficient allocation of the department's resources.

Enhancing the patrol manpower resource allocation/deployment decision-making capacity within the department is also a major functional element in our current Law Enforcement Assistance Administration grant. The crime analysis unit's ability to assist the patrol force in formulating day-to-day crime reduction strategies has to be based upon the certainity that the existing resource allocation is appropriate. This study provides that basis.

4.2 ANALYSIS OF SIMI VALLEY POLICE DEPARTMENT/COMPLAINT AND RECORDS SYSTEM

In any type of study that has a major impact on the everyday functions of a working unit, it becomes necessary to fully understand how that unit operates. It is hoped that any research project will disrupt that function as little as possible. A patrol workload study is no different than any other descriptive research project. Descriptive research requires data gathering, that when analyzed, "paints a picture" of some particular situation rather than ferreting out so-called "cause and effect" relationships. In order to accomplish this, an analysis of the current system must be accomplished.

The most direct and effective way to gain the necessary knowledge of the dispatching function was to directly observe the process. A great deal of time was spent observing the dispatchers and discussing with them how the system worked. In addition to learning the processes associated with dispatching, this observation time allowed for discussions with

dispatchers about the workload study, which provided the opportunity to obtain their input. Through these discussion and observation sessions, it was determined that the simplest way of capturing the necessary data was by the use of two cards -- one for dispatched calls and one for officer activity data. Since calls for service were already being captured, it was necessary to develop a method of capturing officer activity.

The most efficient method of capturing this data would be through the use of a card which could be coded as to activity and reporting district. Upon the decision to switch to the progressive stamping time clocks, the current record for capturing calls for service was changed from a DR slip to a dispatch card. The dispatch card contained the same information as the old DR slips with several exceptions. The new cards were smaller in size and now contained a box for an activity code. This required developing a list of those activities that most commonly occurred and numerically coding them. These codes would be used for both dispatch and officer activity. The officer activity cards were designed on a similar format, however, one card was assigned to an officer and each activity recorded on the cards.

The next area of concern was the patrol personnel. After a systematic review, it was determined that this area would be least impacted by the study. The most important consideration was in the proper use of the vehicle radio. It was discovered that often times officers would not notify dispatch of all activity. It was important to stress the need for notifying dispatch of all such activity. It was determined that this would be accomplished through training sessions prior to the implementation of the study.

The final area examined that would be impacted by the workload study was the departmental Records Section. The DR slips, which represented each call for service, are listed and filed in numerical order. This generated a substantial amount of paperwork which, if interrupted, could greatly reduce records processing efficiency. Under the old system, a call was given a DR slip with a number. If a report was taken, it was stamped, "Report." At the end of the day, those stamped "Report" were placed in the Watch Commander's office so that he could match the report with the DR slip. Those not stamped "Report" went into the files.

After numerous discussions with the Records Supervisor, the most efficient method of processing the paperwork was resolved. It was determined that the dispatchers would copy those dispatch cards stamped "Report", place the copies and all the other cards in a special tray. The cards stamped "Report" went into the Watch Commander's office for processing as they would normally. After all the data was inputted, the remaining dispatch cards would be filed and the officer activity cards were returned to Planning, Training, and Research for filing. The process would be followed daily.

After analyzing all three areas impacted by the workload study, the entire function was mapped. The mapping of the system provided visual reference as to the functions of the system.

4.3 SIMI VALLEY STUDY DESIGN

After completing the preliminary review of the study and evaluating our system as it functioned at that time, we were then prepared to design the study as it would be conducted by our agency. In reality our

concern was not in redesigning the P.O.S.T. model but rather modifying our system to obtain the information necessary for the study. This was accomplished through various methods, therefore, it is important to describe the study as it was finally implemented.

Under the newly designed system when a call for service is received, the dispatcher fills out a Dispatch Card. It contains several bits of information pertaining to the call, such as the nature of the event by numerical code, the location of the event, the beat, the reporting district and a place for times. The times necessary are:

1. The time the call was received.
2. The time the call was dispatched.
3. The time the unit arrives.
4. The time the unit clears.

The back of the dispatch card provides writing space and a place to stamp other important times to be noted. Essentially, this card and its use did not change from the old DR slip design. The cards, however, were now designed for compatibility with the new time-stamping clocks.

The final design for the officer activity card was based on the need to be able to capture the location of each activity, the type of activity, the time the officer initiates the activity and the time he clears from each activity. As each officer comes on duty, an officer activity card is started for him. The officer's name is placed at the top of the card as well as his badge number, the beat to which he is assigned and the date. The dispatcher time stamps the card and indicates, by means of a numerical code, the activity which corresponds to

the specific activity the officer is engaged in. The dispatcher also places the appropriate reporting district number next to the time. When the officer clears from the activity, the clearing time is stamped.

The problem of capturing the back-up time had to be addressed. After careful consideration, it was determined that back-up data concerning an officer dispatched to assist another unit or initiated by himself was best captured on the officer activity card. This was also in conformance with the study design and recommended by P.O.S.T.

Once the new cards were developed, it was necessary to codify for eventual computer input processing as many activities as possible. A list of events and officer activities was generated. Each of the events were assigned a numerical code. Assigning numbers to the activities allowed for increases in the types of events. By assigning a number to the type of event, a dispatcher need only refer to the list of events; find the event that most nearly describes the activity she is concerned with and place the numerical code corresponding to that event on either the Dispatch Card or the Officer Activity Card. This eliminates having to write out each of the events. It saves time, space and is compatible with most computer programs.

After the procedure for capturing the data was established, a procedure for inputting this information into the computer was developed. This required writing the programs for both input and output requirements, as well as identifying and training the clerk who would be responsible for inputting the information on a daily basis.

The computer input system was designed in the following manner:

1. When inputting the dispatch data, the following input format and procedure had to be followed:
   a. Input type of activity by code
   b. Input location of occurrence
   c. Input the beat
   d. Input the reporting district
   e. Input the date and time the call was received, the time a unit was dispatched, the time the unit arrived, and the time the unit cleared
2. When inputting the activity data, the following format and procedure had to be followed:
   a. Input officer's badge number
   b. Input the beat the officer is assigned to
   c. Input the reporting district where each activity takes place
   d. Input the activity code
   e. Input the date and time the activity was initiated and the time the officer cleared that activity

The study began on September 27, 1976, at 0730 hours. The first week of the study was dedicated to working the "bugs" out of the system. The time captured during this period was not used in computing the total workload. The actual study period began October 5, 1976, and ended January 3, 1977.

4.4 TRAINING

A study of this nature required that all persons involved be thoroughly trained as to their part in the study in order to obtain accurate recording of all data. It is for this reason that once the study design was completed, it was necessary to conduct the following four district training programs:

1. Staff training which encompassed all lieutenants and sergeants.
2. Officer training which encompassed all patrol officers
3. Dispatcher training. This training encompassed all dispatchers and those officers who most often relieved the dispatcher and any other officer who might be interested
4. Records clerk training.

The intent of the staff training was not to teach the staff how to conduct the study but rather to inform them of the study purpose, how the study would be conducted and what information the study would generate.

Each staff member was provided with a detailed written explanantion of the workload study. Questions pertaining to the study were entertained and answered. There were open discussions on problem areas which might effect the study outcome.

All of the concerns raised in this meeting were investigated. In some areas, the design was improved. The staff presentation provided a viable interchange of information and proved very beneficial for smooth transition into the study.

The officers' training was conducted next. Several briefing sessions for each watch were conducted. All the officers were provided with a

CONTINUED

1 OF 2

written explanation of the workload study. Questions were asked about the study and answers were provided. One of the major concerns raised by the officers at the time of the study's implementation was the "Big Brother" syndrome. The officers were assured that potential disciplinary action was not the basis for the study.

Although the officers' participation in the study is limited to following proper radio procedures, their cooperation is greatly needed. It is well known that in projects of this nature, without the cooperation of the patrol officers, success is remote. Therefore, the emphasis of this training was geared to gaining officer cooperation.

The dispatcher training was obviously the most comprehensive training of all. All the dispatchers were required to attend the training sessions. An invitation to all interested officers was extended and seven officers participated in the training also.

For this portion of the training, a written procedure was drafted and supplied to each dispatcher and all other persons in attendance. This procedure explicitly described the entire study design and how the system operated. The dispatchers were explained in full detail how to capture the call for service information and the officer activity information. The routing of these cards was also fully explained.

Since new time clocks were purchased for the study, the dispatchers had to become familiar with how they functioned. Each dispatcher was given the opportunity to operate the clocks and told where to obtain service for these clocks when they were in need of repair.

Providing a training session such as this is important. However, practical experience is obviously the best teacher in this type of

learning mode. At the time the study was instituted, a one week training period was established. This one week period allowed for mistakes, as this data would not be included in the final study outcome. It was during this week that each dispatcher received individual instruction. Their performances were monitored and they were tutored as how to effectively handle situations not anticipated prior to the implementation of the study. When this period ended, it was felt that all the dispatchers had sufficient knowledge to carry out the requirements of the workload study.

4.5 WORKLOAD STUDY ANALYSIS

A. LOCAL ANALYSIS OF DATA

The data generated through the study was analyzed twice -- once by the department and again by the P.O.S.T technical staff. The conclusions reached by both the author and P.O.S.T. were synonymous. The following provides a comprehensive breakdown of the patrol workload as analyzed by the author.

The following is a breakdown of workload by each shift as they existed during the study period:

TABLE 1.1

Time	Total Time Expended	Percentage of the Total Workload
2300-0659	2,676 hours	27%
0700-1459	3,251 hours	32%
1500-2259	4,104 hours	41%

This data becomes even more significant when viewed by beat for each of the three shifts. The following is a listing of each beat, showing the percentage of time expended in each beat by the three shifts.

TABLE 1.2

Beat	% of Total Time Expended on Morning Watch	% of Total Time Expended on Day Watch	% of Total Time Expended on Night Watch	% of Total Workload
One	5%	4%	6%	15%
Two	2%	4%	4%	10%
Three	3%	4%	6%	12%
Four	2%	3%	4%	10%
	12%	13%	15%	20%
Five	3%	4%	6%	13%
	27%	32%	41%	100%

Beat four creates a problem when trying to compute the workload for that area. Located within Beat Four is the police station, therefore, Beat Four is represented by two percentages for each watch. The top number represents an estimated percentage of workload actually being generated in that beat. The bottom figures represent the workload being created by the station.

The following pertinent information can also be obtained from the printout:

1. Total activity appears to sharply decrease at approximately 0200 hours and activity remains quite low until approximately 0700 hours.
2. Activity sharply increases for the first hour of each of the shift changes. This appears to represent activity being held over from the previous shift.
3. The total activity shows a large increase in workload from 1500 hours through 2300 hours. Calls for service, however, show a larger increase from 1400 hours through 2200 hours. It is important to compare this data with that of dispatched calls. The printout for dispatched calls is read

exactly as the one for combined data. In reviewing the calls for service data, we can see that calls for service drop radically between the hours of 0200 hours through 0600 hours. This conforms to the information provided in the combined data matrix. By comparing the two matrixes, it can be seen that not only calls for service drop off but so does officer activity. The five hours prior to 0200 hours accounts for twenty-one percent (21%) of the total calls for service. Between the hours of 0200 through 0659 hours accounts for six percent (6%) of total calls for service and the next five hours, from 0700 through 1159 hours, accounts for seventeen percent (17%) of the calls for service. When viewing only officer-initiated activity, we note that five hours prior to 0200 hours accounts for thirty-one percent (31%) of all officer-initiated activity. From 0200 hours through 0659 hours accounts for eighteen percent (18%) of all officer-initiated activity; and the next five hours accounts for twenty-nine percent (29%) of all officer-initiated activity. The following displays this information in tabular form.

TABLE 1.3

Time Span	Percent of Total Number of Calls for Service	Percent of Total of the Officer-Initiated Activity
2100-0159	21%	31%
0200-0659	6%	18%
0700-1159	17%	29%

When comparing calls for service by our existing shifts, we note the following:

TABLE 2.1

Time	Hours Expended	Percent of Total Time Calls for Service
2300-0700	506 hours	17% of all calls for service
0700-1500	917 hours	31% of all calls for service
1500-2300	1,494 hours	52% of all calls for service

A minor manipulation of time periods reveals a very important factor. In taking an eight-hour period from 1500 hours through 2259 hours, we note that fifty-two percent (52%) of all calls for service occur between those times. However, by backing up one hour and using an eight-hour period from 1400 hours through 2159 hours, we note that fifty-seven percent (57%) of all calls for service occur between those hours. This phenomenon does not occur when analyzing the combined officer-initiated activity and calls for service. Those percentages as stated above remain fairly constant regardless of hour manipulation. This would suggest that the greatest percentage of calls for service are occuring from 1400 hours through 2159 hours. This information could be useful in determining proper shift times or the use of midwatch cars. Both matrices show the peak activity time to be from 1500 hours through 1859 hours.

The percentages of calls for service by beat and by watch conform closely to that of the total workload. The following chart graphically displays this information.

TABLE 2.2

Beat	% of Calls for Service -- Morning Watch		% of Total Calls for Service -- Day Watch		% of Total Calls for Service -- Night Watch	
		% of Total Workload Per Beat		% of Total Workload Per Beat		% of Total Workload Per Beat
One	3%	15%	7%	33%	11%	53%
Two	3%	17%	6%	33%	9%	52%
Three	4%	19%	5%	31%	11%	55%
Four	3%	19%	5%	30%	9%	54%
Five	4%	16%	8%	35%	11%	48%

Of the total calls for service, the following is a breakdown by percentage of the calls for service for each beat:

BEAT ONE: 22% of all calls for service

BEAT TWO: 18% of all calls for service

BEAT THREE: 20% of all calls for service

BEAT FOUR: 17% of all calls for service

BEAT FIVE: 23% of all calls for service

In terms of calls for service the following is a listing of each beat from the busiest to the least busy:

1. BEAT FIVE 23% of all calls for service
2. BEAT ONE 22% of all calls for service
3. BEAT THREE 20% of all calls for service
4. BEAT TWO 18% of all calls for service
5. BEAT FOUR 17% of all calls for service

Both the combined data printout and the dispatch activity printout depict descriptive information regarding reporting districts. In looking at the calls for service matrix, we note several RD's that are significantly higher in terms of calls for service than other RD's. For example:

TABLE 2.3

RD	Amount of Time Expended
20	136 hours
30	101 hours
32	125 hours
34	113 hours
40	168 hours
37	114 hours
60	130 hours
67	114 hours

In comparing this data to the matrix depicting combined dispatch and officer activity data, it was discovered that these same reporting districts indicated large amounts of time expended within their bounds. In addition to these RD's, the combined data matrix indicated high activity in RD's 37, 44 and 52. Examination of these reporting districts provides an explanation as to the reason for this high activity. In reporting district 37 there are several shopping centers and restaurants which are frequented by patrol officers for dinner breaks, etc. Reporting district 44 is where the police station is located. At first glance at RD 52, it could not be logically explained as to why there was an unusually high amount of activity expended.

Detailed examination revealed that this area had been the scene of numerous cat burglaries. It appears that officers being aware of the problem were spending more time in the area, as the officer-initiated activity accounted for the increased time.

Both matrixes depict the amount of time spent outside of the city limits. In terms of calls for service for the entire study period, only ten (10) hours were spent on calls dispatched outside of the city. When we observe the combined matrix, we note that 188 hours were expended outside the city limits. Some of the common reasons for activity outside of our jurisdiction would be court appearances in Oxnard or Ventura, follow-up investigations, assisting other agencies, prisoner transportation to jail, and time spent at local hospitals for various police activities.

A different examination of this data is possible by viewing each day of the week. This is accomplished by the construction of a matrix showing the average Monday, Tuesday and so on for each day of the week.

In reviewing each of the printouts, we noted that patterns depicted on the previously discussed matrixes also held constant for each day of the week. The reporting districts that consumed a great deal of time on the larger matrix, also consumed a great deal of time each day of the week. The busiest period of any given day is generally from 1500 hours through 1600 hours. This information can be generalized for each day of the week.

The workload for each day of the week varies to some degree. The busiest day of the week is Saturday. Most of the time expended on Saturday is from 1500 hours to 2300 hours. The remainder of the day is fairly normal in terms of workload, as compared to the other days of the week. The total time

consumed for all the Saturdays and in the study period was 1,599 hours.

The least busy day of the week is Tuesday. Tuesdays show a decrease in all activity for each of the shifts. Total time consumed for each of the Tuesdays within the study period is 1,348 hours.

The following is a rank order from the busiest to the least busy day of the week depicting total hours spent on all days during the study period:

1. Saturday 1,599 hours
2. Thursday 1,520 hours
3. Friday 1,481 hours
4. Sunday 1,417 hours
5. Wednesday 1,400 hours
6. Monday 1,372 hours
7. Tuesday 1,348 hours

The two least busy days of the week are Monday and Tuesday. This information may be useful in determining days off and shift scheduling.

The printouts for each day of the week allow for a detailed analysis by shift. Below is a breakdown of the workload by time of day for each day of the week. The breakdown includes percentage of total workload for that particular day of the week, the percentage of total workload by time of day and the number of hours expended by shift. Thus, it can be observed that there is not much fluctuation from day to day in the amount of workload handled by each shift. That is, morning watch on Monday handles approximately twenty-three percent (23%) of the workload for that day. Morning watch will handle about the same percentage of work each day of the week. This is also true for night watch and day watch. This can best be seen by examining each day

of the week individually.

MONDAY

Time of Day	Total Hours	% of Total Monday Workload	% of Total Workload
2300-0659	309	23%	3%
0700-1459	475	35%	3%
1500-2259	590	42%	5%
	1,374	100%	12%

Monday is a fairly normal day. All other data is comparable to the larger matrix which depicts the total combined area.

TUESDAY

Time of Day	Total Hours	% of Total Tuesday Workload	% of Total Workload
2300-0659	322	24%	3%
0700-1459	449	33%	4%
1500-2259	577	43%	5%
	1,348	100%	12%

Those comments describing the Monday activity are also valid for Tuesday data. The exception being that Tuesday is the least busy day of the week. This is also reflected for each shift.

WEDNESDAY

Time of Day	Total Hours	% of Total Wednesday Workload	% of Total Workload
2300-0659	350	25%	3%
0700-1459	460	33%	4%
1500-2259	590	42%	5%
	1,400	100%	12%

Wednesday is a typical day in terms of workload. No unusual activity is noted.

THURSDAY

Time of Day	Total Hours	% of Total Thursday Workload	% of Total Workload
2300-0659	371	25%	3%
0700-1459	493	33%	4%
1500-2259	656	42%	6%
	1,520	100%	13%

Thursday is the second busiest day of the week. It appears that the evening watch generates the largest portion of workload for this day. Reporting District 68 is exceptionally busy on Thursday between the hours of 0700-1500 hours. Located within this RD are several parks, schools and a condominium complex which generates a great deal of activity between these hours.

FRIDAY

Time of Day	Total Hours	% of Total Friday Workload	% of Total Workload
2300-0659	422	26%	4%
0700-1459	492	31%	5%
1500-2259	685	43%	6%
	1,599	100%	15%

Friday is somewhat busier than the other days of the week. The evening watch shows the largest amount of time expended. No other peculiarities are noted for Fridays.

SATURDAY

Time of Day	Total Hours	% of Total Saturday Workload	% of Total Workload
2300-0659	422	26%	4%
0700-1469	492	31%	5%
1500-2259	685	43%	6%
	1,599	100%	15%

Saturday is the busiest day of the week. There is a marked increase in activity on both day watch and night watch for this day.

On the busier days of the week, it can be noted that the evening watches account for the majority of the increased work activity.

The final printout to be analyzed is the printout depicting the amount of time expended on each activity. This printout shows each activity, the number of times each activity occurred, the average response time to each activity, if it was a dispatched call, and the hours spent on the activity. This printout most accurately depicts total time expended on all calls for service, officer-initiated activity and administrative functions. From this printout, we can break out approximately ninety-three (93) various activities We list the number of times each activity occurred and the total amount of time spent on that activity throughout the duration of the study period.

Table 3.1 is a breakdown of all activities. It shows the number of incidents and the amount of time expended on these activities. The table is broken down into five categories:

1. Crimes
2. Miscellaneous activities

3. Traffic

4. Patrol activity

5. Administrative

Reviewing each of these activities, we note that time expended on Part I and Part II crimes totalled 1,018.3 hours to handle 1,001 calls for this nature. This amounts to nine percent (9%) of the total time expended on all activities. Miscellaneous activities accounted for 1,749.2 hours or sixteen percent (16%) of total activity. There were 3,464 incidents in this category. In terms of traffic, we expected 1,385.5 hours or thirteen percent (13%) of the total time spent on all activities. This time comprised 5,898 calls or incidents. Patrol activities amounted to 7,299 incidents totalling 3,775.5 hours or thirty-four (34%) of all activities. Administrative duties amounted to 3,045.8 hours to complete 6,868 incidents and accounted for twenty-eight percent (28%) of all activity.

It should be clear that many of these activities may have overlapped on each other from time to time. This breakdown also does not necessarily reflect the number of times these incidents actually occurred but rather the number of times and the amount of time spent on responses to this type of call. Often times what may appear to be a certain type of call to a dispatcher may later turn out to be something quite different. Thus, the data represents the number of times a unit responded to these particular incidents.

From the Police Activity chart we note that patrol activities account for the largest percentage of our time expenditure and Part I and Part II

crimes account for the least amount of time. Patrol activities account for thirty-four percent (34%) of our time and Part I and Part II crimes account for nine percent (9%) of our time. It is very important that the reader thoroughly understand that patrol activity does not reflect unobligated patrol time. Patrol activities are often a result of activity generated from other areas. This is also true of the crimes category. Many of the crimes generate activity at a latter point in time which may be reflected in other areas such as follow-up, report writing, investigations and court appearances. This melding overlapping of activities is unavoidable. The chart does allow for a fairly accurate overview of all police activities.

This printout is also important in that it provides us with the most accurate time figures. In review of the time figures, we note that the total amount of time expended on both calls for service and officer-initiated activity amount to 10,952.7 hours. This time is consumed by a total of 24,408 incidents. Given the total manpower available during the study of 12,544 hours, we can begin to equate percentages. In calculating the total workload and the percentage of the total manhours available, we note that eighty-seven percent (87%) of the total patrol manpower expended during the survey period was taken up on calls for service, administrative activity and officer-initiated activity. The remaining thirteen percent (13%) appears to be dedicated to unobligated patrol.

The activity data printout allows for an even more detailed breakdown of the patrol division activity. For instance, the officer-initiated events

accounted for 7,775.6 hours and was consumed by 19,800 incidents. This time expended was seventy-one percent (71%) of the total time consumed. In terms of calls for service, 3,1771.1 hours was expended during the study period. This accounts for twenty-nine percent (29%) of the total time consumed. Of the total number of dispatched calls, 131 were considered emergency responses and 4,477 were normal responses to calls. On these same lines, the response times for emergency calls was six (6) minutes and seventeen (17) minutes for non-emergency calls.

CHAPTER 5

PATROL OPERATIONS OVERVIEW

by

Lt. Sam Griffin

Norfolk Police Department

5. INTRODUCTION

Many police departments now find themselves suffering in the aftermath of the expansionistic era of the 1960's and early 1970's. During this period law enforcement agencies could look toward municipal and county officials as well as the Law Enforcement Assistance Administration for the necessary financial aid to increase the quality and expand the scope of police operations. Presently, however, many local officials have become hesitant to increase existing police budgets; as a result, budget increases of the past are now typically replaced by only marginal increases or by recommendations for cutbacks in the future.

Based upon the existing financial situation, law enforcement agencies have come to realize that in order to continue to function effectively, a concerted effort must be made to increase internal efficiency. For most agencies, this increased effort has been directed towards more efficient utilization of patrol officers. Since patrol officers constitute approximately 70 percent of most agencies' personnel (as well as a corresponding percentage of most agencies' budgetary appropriations) more efficient utilization of these personnel will result in the most noticeable impact upon total departmental effectiveness.

5.1 Traditional Patrol Workload Analysis

An analysis of data obtained from a number of police departments throughout the country indicates that traditional patrol activity consists of four segmented responsibilities. The patrol officer is responsible for the following activities:

1. calls for service
2. preventative patrol
3. officer-initiated activities
4. administrative tasks

In the figure below, each of these activities is represented by the corresponding portion of the day designated to fulfilling these tasks:

(See Figure 5-1)

Results of the Patrol Workload Analysis further indicate that service calls have become the single most important element in the structuring and directing of patrol operations as the illustrational example indicates, only 23% of the patrol officer's day is devoted to service calls while 40 % of the day is devoted to undirected preventative patrol.

5.2 ICAP

With this situation in mind the Norfolk Police Department has set about reorganizing the administrative aspects of patrol activities by initiating an Integrated Criminal Apprehension Program (ICAP): ICAP is based upon a number of innovative managerial practices which make more efficient and effective use of existing resources. ICAP contains such tactics as directed preventative patrolling, district profiling, decentralized decision-making, management by objectives, participative management, sector command and clearly defined lines of authority.

5.3 Directed Preventative Patrol

Even though it was found that 40% of the patrol officer's day was spent in preventative patrolling, crime rates continued to increase.

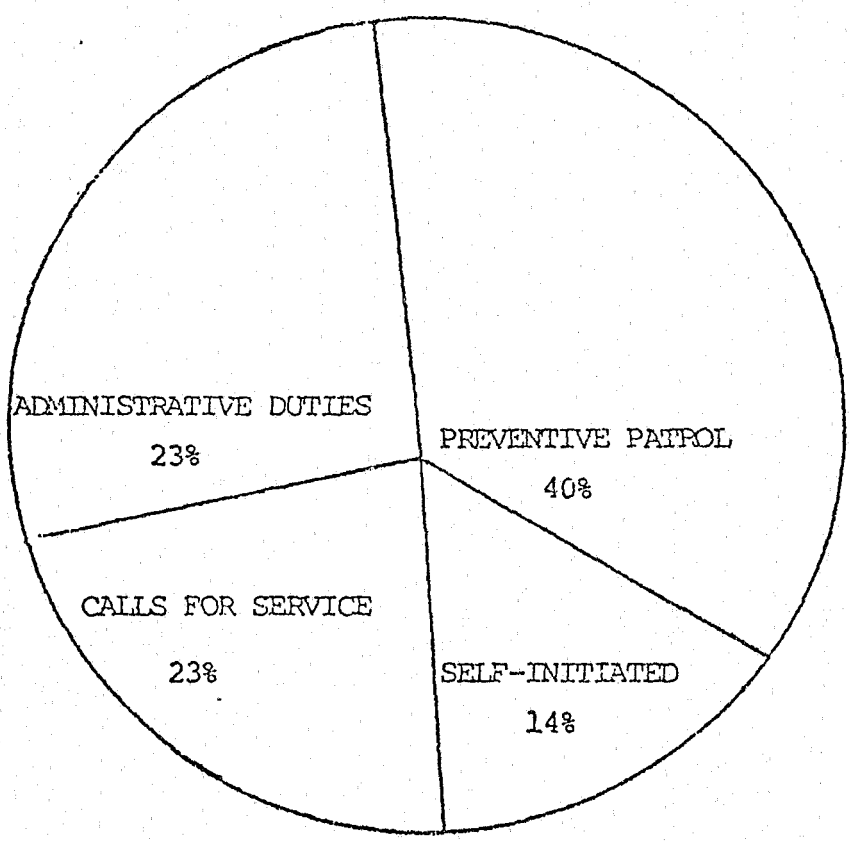


Figure 5-1. Results of Patrol Workload Analysis

Based upon this fact as well as the knowledge that financial constraints had been placed upon the department, police administrators and criminal justice planners agreed that an alternative to standard patrol procedures might serve as a more feasible crime deterrent. A directed preventative patrol program was initiated. This program is based upon the following three concepts:

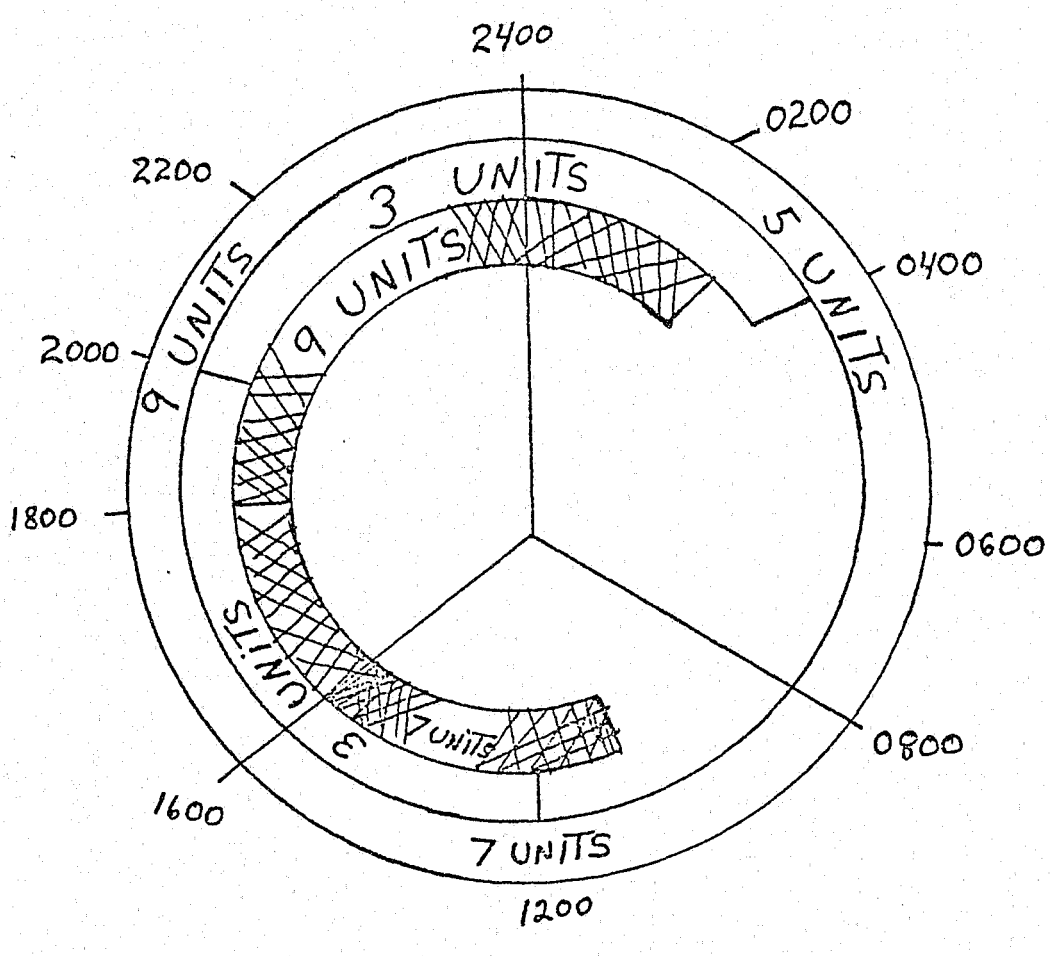
1. identification through rigorous crime analysis of the locations and times when crimes are occurring and are likely to occur in the future.
2. preparation of written directions describing in detail the way problem areas are to be patrolled.
3. activation of these patrol directions at specific times determined by crime analysis.

The above concepts are structured by patrol administrators and are called directed deterrent runs or D-Runs.

By structuring and assigning patrol activities, patrol managers have more efficiently and effectively utilized patrol time.

Figure 5-2 illustrates patrol assignments for a particular 24-hour period where both basic patrol and structured patrol activities are indicated. Based upon this type of information, the availability of patrol resources for answering service calls and engaging in directed activities is determined.

Figure 5-3 is an example of a Directed Patrol Assignment Sheet. This would be used by officers who become available for directed activities during the course of a work day.



BASIC PATROL OFFICERS

STRUCTURED PATROL OFFICERS (Uniform & Plain Clothes)

NUMBER OF UNITS ON DUTY

WATCH 1		WATCH 2		WATCH 3	
TIME	NUMBER	TIME	NUMBER	TIME	NUMBER
24-02	17	08-10	7	16-18	19
02-04	8	10-12	14	18-20	21
04-08	5	12-16	17	20-24	21

Figure 5-2. Availability Chart for Patrol Resources

DIRECTED BURGLARY ASSIGNMENT:

PARKVIEW SHOPPING CENTER AND RIVER ROAD COMMERCIAL STRIP

PROBLEM

During the past month, 23 commercial burglaries have occurred in the Parkview-River Road commercial area. Most have occurred between 10 P.M. and 4 A.M. Primary targets are small businesses, restaurants, and gas stations. Most entries have occurred at rear or side entrances, known suspects: Frank Carey, W/M 26; Sam Griffin, W/M 16; and Marie Gonz, W/F 18.

OBJECTIVE

This high visibility deterrence effort is designed to augment the crime prevention and target hardening program being carried out by officers on the day watch. Saturation of the area between 10 P.M. and 4 A.M. should reduce the number of burglaries. These patrols may displace some perpetrators to the Bellview Commercial strip, where visible patrol has been reduced and replaced by covert activities and the use of tactical alarms.

GENERAL INSTRUCTIONS

Watch commanders will select specific times. This assignment takes approximately 50 minutes and should be activated three to four times each day between 10 P.M. and 4 A.M. Changes in burglary will be monitored to adjust the hours and frequency of this patrol. Watch for known suspects and suspicious autos. Use vehicle and pedestrian stops when justified.

Figure 5-3. Directed Patrol Assignment Sheet

LOCATION	
1300-1400 Block of River Road	Park car on River Road. Turn on light bar to increase visibility. Foot patrol the back alleys on both sides of the street. Check rear entrances. 15 minutes.
1300-1400 Block of River Road	Cruise slowly around the block and stop any suspicious vehicles in the alleys on both sides of River Road. 15 minutes.
1300-1400 Block of River Road	Circle the blodk by car, observing alleys and suspicious vehicles. Make vehicle and pedestrian stops when necessary. 5 minutes.
Parkview Shopping Center	Cruise slowly through the shopping center. Check rear and side entrances of building. 15 minutes.
1300-1400 Block of River Road	Return to River Road area and cruise slowly through back and side alleys. Use spotlight on buildings. Stop suspicious vehicles. 10 minutes.

Figure 5-3. (Continued)

The directed patrol program is further based upon the district profiling concept and the concept of a sector command.

5.4. District Profiling

The fundamentals of the District Profiling concept include the familiarization of patrol officers with particular district conditions through long-term district assignments. While assigned to the district, the officer has the responsibility for performing directed patrol assignments and for clearing most service calls relevant to the particular district. In conjunction with these procedures, a structured system which aids officers in the analysis of district conditions and assists with the planning of patrol activities combine to serve as the basis for the district patrol program.

More specifically district profiling is an attempt to decentralize the decision-making process. Authority is delegated to the patrol officers, who are most familiar with the sociological profile of a particular sector of the city, rather than remaining with those in command positions as is traditionally done. Because patrol officers are encouraged to analyze and develop appropriate solutions for such problems as robbery, traffic accidents, auto theft and residential or commercial burglary, they are actively involved in the problem-solving process.

5.5 Sector Command

Each sector of the city is managed by a Lieutenant who is the Sector Commander.

Within the context of an organizational chart, the Sector Commander position is located directly beneath the Precinct Captain, parallel to

other Lieutenants who are also Sector Commanders and directly above the patrol officers. The Sector Commander has the following responsibilities:

1. He is responsible for the effective utilization of his sector's personnel and is held accountable by his precinct Captain.
2. He is responsible for maintaining a healthy work environment with his peers. This environment should be void of any destructive competition and should be conducive to finding joint solutions to existing problems.
3. Finally, he is responsible for monitoring the performance of all personnel assigned to his sector.

The duties of the sector commander are outlined as follows:

1. Exercise line supervision over sector supervisors (sergeants and corporals) assigned to the sector.
2. As a supervisor will perform the following duties:
   a. develop his subordinates' talents
   b. resolve misunderstandings among subordinates
   c. evaluate the quality of work being performed
   d. investigate acts of unsatisfactory performance and violations of department policy.
3. Plan for and administer the general direction to be taken by the sector.

4. Delegate administrative activities to lower levels so that he has time to develop both long and short range sector objectives and goals.
5. Maintain open lines of communications within and outside the sector by:
    a. identifying, isolating and dealing with any barriers to effective communications.
    b. developing an effective communication process among all reliefs
    c. performing liaison duties between uniformed officers and investigative personnel
    d. providing relevant feedback concerning the status of his sector to superiors.

Similarily, the responsibilities of the sector commander are defined as follows:

1. develop and promote training programs for his personnel.
2. seek out, identify and utilize every available training resource.
3. implement and coordinate the sector's involvement in crime prevention.
4. maintain liaison with community organizations and other groups involved in crime reduction activities.

5. set goals for his sector and ensure that they are achieved.
6. promote a cooperative working environment with other sector commanders to reduce the level of dysfunctional intersector competition.
7. monitor the on-going activities of all personnel assigned to his sector to verify that their work performance and direction is in line with department standards.
8. adjust his working schedule in order to be thoroughly familiar with his sector's problems.

The sector commander utilizes the system's approach to management in that planning, implementation and feed-back are the integral parts of his approach to administration.

Perhaps one of the most important benefits of the sector command position is that the level of decision making is now located at the level of accountability.

Prior to ICAP, a rotating platoon system was utilized by the Norfolk Police Department. A platoon followed a schedule whereby personnel would work 6 days - off 2 days - work 7 days - off 2 days - work 7 days - off 3 days. Platoon personnel consisted of three sergeants x number of police officers and one lieutenant -- who was the platoon (watch) commander. With this system there was no fixed command in that all personnel were only responsible for their sector during their 8 hour work shift.

5.6 Fixed Command

In contrast, the sector command concept places the Sector Lieutenant accountable for his terrain on a 24 hour-a-day basis. Accountability rests solely with each Sector Lieutenant as opposed to being segmented among the four platoon commanders (lieutenants) as in the old system. By more clearly defining the lines of authority, more efficient and effective utilization of patrol resources (officers and equipment) can be attained.

The ICAP system is further strengthened by the concentration of knowledge concerning each sector in the position of the Sector Commander (as opposed to the segmentation of knowledge among 4 Lieutenants which occurred with the previous system). Because a sole Sector Commander possesses the most knowledge concerning all facets of his territory, he is better able to coordinate shift-to-shift assignments and to make more objective evaluations of his subordinates' performances.

This system readily lends itself to performance-based evaluative measures. Not only is the quality of patrol officers' performances made visible to the Sector Commander but the performance of the Sector Commander is more visible to the Precinct Captain. With the emphasis on crime control, sector crime statistics are taken into account in all evaluations.

In the sector command system sergeants are directly responsible for assigning work schedules. The major benefit of a sergeant being responsible for the work schedules of 10 - 13 officers (as opposed to a Lieutenant being responsible for the work schedules of 35 - 40 officers in the old

system) is that a reduction in the number of work assignments issued by one individual results in a proportionate reduction in the amount of flexibility allowed in shifting work assignments on short notice. This system insures that each area of a sector will be adequately staffed.

5.7 Preliminary Investigations

A final advantage of ICAP over traditional patrol procedures is that in the ICAP system patrol officers are not only encouraged to conduct preliminary investigations at the scene of a crime but also become an integral force in the preparation of prosecution case files. By reducing the duplication of time and effort of patrol and detective units, more efficient operations are attained, rivalry between detective and patrol units are reduced and more knowledgeable investigations are conducted because patrol investigators are the primary units at the scene of a crime and are therefore more knowledgeable concerning the facts which surround the incident.

5.8 Summary

Needless to say, the Norfolk Police Department is extremely proud of this innovative approach toward patrol management. The effects of this program will only be measureable in the future, but it is hoped that through such measures as job enlargement and decision making placed in the hands of those who are held accountable, additional positive benefits such as increased job satisfaction and heightened self-esteem will be by-products of this program.

CHAPTER 6

INTEGRATING PATROL ASSIGNMENTS: DIRECTED PATROL IN KANSAS CITY

by

Captain Floyd Bartch
Kansas City Police Department

6.1 KANSAS CITY DIRECTED PATROL PROJECT: AN OVERVIEW

The intent of the Kansas City Directed Patrol Program is to use uncommitted patrol time to address identified problems through the implementation of a planned sequence of activities developed by officers in whose area a particular problem(s) exist. In essence, officers who work a particular area are involved in designing activities to address problems in their area.

The development of program plans requires that individuals involved address themselves to answering the following basic set of questions as part of the problem identification and analysis process:

- What is occurring
- How is it occurring
- Where is it occurring
- When is it occurring
- To whom, what area, etc.
- What is the extent or magnitude of these similarly related occurrences

Of course, the primary basis for developing program plans are the objectives of the program which should be both realistic and measurable. Thus, the objectives provide the framework for identifying the extent to which available resources will be addressed to each problem. For each problem and objective, specific actions that can be taken are identified by patrol personnel who ultimately select the problem solution strategy based on an analysis of available information. Specific steps involved in this process include:

- Statement of possible solution strategies
- Review of advantages and disadvantages of each solution strategy
- Definition of the relationship between solution strategies and objectives
- Selection of solution strategie(s)

The next step involves the development of an implementation plan which addresses each of the following areas:

- What specific activities need to be performed to accomplish each solution strategy?
- Who will perform each activity?
- Where?
- When/How Often?

Lastly, actual program implementation is monitored to determine and document that each activity was both accomplished and performed as well as possible.

Patrol sector supervisors and officers who work a particular area are the ones who most often develop ideas for program plans and identify problems. Specific responsibilities of those involved are as identified below:

- Sector Officer - Should be sufficiently informed to identify problems occurring in their area and ways they feel would be appropriate to address each problem and convey same to sector supervisors.

- Sector Sergeants - Should solicit problem/solution information from officers under their supervision and participate in discussions toward the development of written program plans to address identified problems.
- Assistant Division Commanders - Should review program plans submitted for completeness, appropriateness, feasibility, cost. As cross-watch implementation of a program plan is deemed appropriate, to provide leadership in the coordination of meetings and resources necessary for implementation operations. Also, to keep the division commander informed of progress as plans are approved for implementation.
- Division Commander - In conjunction with each Assistant Division Commander review and either approve or reject program plans submitted for implementation.

6.2 DEVELOPING DIRECTED PATROL ASSIGNMENTS

The East Patrol Division of the Kansas City Police Department is organized for operations into three watches. The division consists of three patrol sectors each containing five districts or district cars. A sergeant is responsible for each district and his patrol resources include five district cars plus one patrol wagon.

Directed patrol is an alternate concept of police patrol that uses community education, crime prevention and crime and workload analysis

techniques to improve the delivery of police services with existing resources. The steps in the development of a directed patrol plan include the following:

- Identify problem
- Identify directed patrol objectives (document what he expects to achieve)
- Identify strategy and tactics
- Identify resources
- Implement plan
- Evaluate outcome/plan

Each week, on or about Wednesday, Thursday, or Friday, each sector sergeant obtains a copy of the following week's manpower utilization forecast. An example of a manpower utilization forecast is shown in Figure 6-1. Using the manpower forecast the sector sergeant can determine the expected workload or projected time consumed by patrol activities for the upcoming week beginning on Sunday and ending on Saturday. Each day's projected workload for the Sector is based upon a data base of the previous years accumulated data and for each day the total hours and minutes expected to be consumed by patrol activities is reflected for 24 hours. Thus, if a sergeant was assigned sector 310 for the week during the midnight watch he would refer to the forecast printout shown in Figure 6-1 to determine the expected hourly time consumed by patrol activities for his sector and shift for the week.

Given the expected patrol resources made available for his sector, the sergeant plans the following week's directed activities with input from:

KANSAS CITY MISSOURI POLICE DEPARTMENT MANPOWER UTILIZATION FORECAST
TITLE: PROJECTED PATROL MAN EVENTS: SECTOR 110
DATE PREPARED: 11/14/77, DATA DATE: 10/07/77, EVENT CLASSES: 1 2 3 4 5 6 7

HOUR	SUN. 11/20/77 EVENTS	DEV	MON. 11/21/77 EVENTS	DEV	TUE. 11/22/77 EVENTS	DEV	WED. 11/23/77 EVENTS	DEV	THU. 11/24/77 EVENTS	DEV	FRI. 11/25/77 EVENTS	DEV	SAT. 11/26/77 EVENTS	DEV	SUN THRU SAT EVENTS	DEV
0000 - 0100	5.71	63%	3.85	74%	4.27	72%	3.62	79%	4.17	73%	4.56	70%	6.46	59%	32.65	28%
0100 - 0200	6.16	60%	2.01	89%	3.33	82%	3.29	82%	3.40	81%	3.60	79%	5.97	61%	28.56	28%
0200 - 0300	4.67	69%	1.98	100%	2.41	96%	2.31	96%	2.43	96%	2.66	91%	4.80	68%	21.38	32%
0300 - 0400	3.05	86%	1.22	100%	1.89	100%	1.85	100%	1.66	100%	1.77	100%	3.35	82%	14.59	39%
0400 - 0500	2.29	99%	1.11	100%	1.05	100%	1.11	100%	1.37	100%	1.39	100%	2.10	100%	10.42	46%
0500 - 0600	1.66	100%	1.04	100%	1.22	100%	.81	100%	1.24	100%	1.16	100%	1.55	100%	8.66	51%
0600 - 0700	1.08	100%	1.37	100%	1.50	100%	1.35	100%	1.37	100%	1.31	100%	1.53	100%	9.51	49%
0700 - 0800	1.34	100%	2.01	100%	2.02	100%	1.98	100%	1.95	100%	2.00	100%	1.45	100%	12.75	42%
MATCH TOTAL	25.96	29%	15.39	38%	17.69	36%	16.22	37%	17.59	36%	18.49	35%	27.21	29%	138.55	13%
0800 - 0900	1.99	100%	2.52	94%	2.43	96%	2.61	93%	2.57	93%	2.36	97%	2.26	100%	16.74	37%
0900 - 1000	2.22	100%	2.43	92%	2.27	99%	2.70	91%	2.38	97%	2.63	92%	2.59	93%	17.42	36%
1000 - 1100	2.38	97%	2.56	94%	2.74	90%	2.44	96%	2.67	92%	2.74	90%	2.82	89%	18.33	35%
1100 - 1200	2.91	80%	2.87	88%	2.98	87%	2.81	89%	3.03	86%	3.05	86%	2.97	87%	20.62	33%
1200 - 1300	3.32	82%	3.38	81%	3.20	84%	3.16	84%	3.12	85%	3.19	84%	3.28	83%	22.65	31%
1300 - 1400	3.31	82%	3.15	84%	3.29	82%	3.41	81%	3.44	81%	3.19	84%	3.77	77%	23.56	31%
1400 - 1500	3.14	84%	3.49	80%	3.14	84%	3.48	85%	3.35	82%	3.54	80%	3.50	80%	23.29	31%
1500 - 1600	3.50	79%	4.08	74%	3.78	77%	3.88	76%	3.82	77%	3.88	76%	5.09	76%	29.91	29%
MATCH TOTAL	27.93	31%	24.68	30%	23.83	31%	24.12	30%	24.38	30%	24.58	30%	25.08	30%	169.52	12%
1600 - 1700	3.54	80%	4.99	67%	4.19	73%	4.10	74%	4.25	73%	4.10	74%	4.75	69%	29.92	27%
1700 - 1800	3.97	76%	4.89	68%	4.64	70%	4.56	71%	4.64	70%	4.29	72%	4.78	68%	31.58	27%
1800 - 1900	3.77	77%	4.59	70%	4.33	72%	4.31	72%	4.46	71%	4.63	70%	4.63	70%	30.70	27%
1900 - 2000	3.70	78%	4.66	69%	4.31	72%	4.21	73%	4.08	68%	4.05	68%	4.63	70%	31.24	27%
2000 - 2100	4.20	73%	4.81	68%	4.89	68%	4.69	69%	5.00	67%	4.87	68%	5.19	66%	33.69	26%
2100 - 2200	4.38	72%	5.17	66%	5.22	66%	4.91	68%	5.15	66%	5.31	65%	5.51	64%	35.65	25%
2200 - 2300	4.58	70%	5.02	67%	4.82	68%	5.03	67%	4.93	67%	5.16	65%	6.51	59%	36.65	25%
2300 - 2400	3.92	76%	4.73	69%	4.23	73%	4.60	70%	5.01	67%	5.00	62%	6.07	61%	34.41	26%
MATCH TOTAL	41.96	26%	38.86	24%	36.63	25%	36.33	25%	38.30	24%	39.65	24%	42.07	23%	263.80	9%
DAY TOTAL	80.77	17%	78.93	17%	78.15	17%	76.67	17%	80.27	17%	82.72	16%	94.36	15%	571.87	6%

TITLE: PROJECTED PATROL MAN HOURS, SECTOR 110
DATE PREPARED: 11/14/77, DATA DATE: 10/07/77, EVENT CLASSES: 1 2 3 4 5 6 7

HOUR	SUN. 11/20/77 HRS:MINS	DEV	MON. 11/21/77 HRS:MINS	DEV	TUE. 11/22/77 HRS:MINS	DEV	WED. 11/23/77 HRS:MINS	DEV	THU. 11/24/77 HRS:MINS	DEV	FRI. 11/25/77 HRS:MINS	DEV	SAT. 11/26/77 HRS:MINS	DEV	SUN THRU SAT HRS:MINS	DEV
0000 - 0100	3:00	96%	1:58	100%	2:09	100%	1:52	100%	2:11	100%	2:22	100%	3:25	90%	16:57	90%
0100 - 0200	3:19	72%	1:28	100%	1:42	100%	1:35	100%	1:51	100%	1:52	100%	3:16	92%	15:01	93%
0200 - 0300	2:26	100%	1:03	100%	1:14	100%	1:14	100%	1:15	100%	1:21	100%	2:30	100%	11:01	90%
0300 - 0400	1:34	100%	:38	100%	:58	100%	:42	100%	:50	100%	:56	100%	1:42	100%	7:20	81%
0400 - 0500	1:11	100%	:32	100%	:35	100%	:33	100%	:42	100%	:43	100%	1:07	100%	5:23	72%
0500 - 0600	:53	100%	:32	100%	:40	100%	:25	100%	:39	100%	:36	100%	:51	100%	4:16	79%
0600 - 0700	:34	100%	:51	100%	:38	100%	:41	100%	:41	100%	:40	100%	:52	100%	4:37	71%
0700 - 0800	:44	100%	1:20	100%	1:20	100%	1:18	100%	1:20	100%	1:23	100%	:51	100%	8:16	50%
MATCH TOTAL	13:37	45%	8:22	97%	9:30	54%	8:42	56%	9:33	54%	9:57	53%	14:34	44%	74:15	19%
0800 - 0900	1:18	100%	1:40	100%	1:36	100%	1:44	100%	1:42	100%	1:32	100%	1:22	100%	10:48	91%
0900 - 1000	1:28	100%	1:42	100%	1:48	100%	1:44	100%	1:32	100%	1:39	100%	1:39	100%	11:33	90%
1000 - 1100	1:29	100%	1:54	100%	1:42	100%	1:51	100%	1:40	100%	1:51	100%	1:47	100%	11:34	93%
1100 - 1200	1:55	100%	1:47	100%	1:58	100%	1:52	100%	1:53	100%	1:59	100%	1:51	100%	12:01	92%
1200 - 1300	2:10	100%	2:17	100%	1:59	100%	1:58	100%	1:58	100%	1:59	100%	2:01	100%	14:00	94%
1300 - 1400	2:06	100%	1:58	100%	2:01	100%	2:10	100%	2:09	100%	1:57	100%	2:16	100%	14:37	94%
1400 - 1500	1:52	100%	2:11	100%	1:56	100%	1:56	100%	2:05	100%	2:08	100%	2:12	100%	14:23	94%
1500 - 1600	2:01	100%	2:35	100%	2:22	100%	2:27	100%	2:20	100%	2:29	100%	2:22	100%	16:36	91%
MATCH TOTAL	13:13	95%	15:34	92%	14:49	97%	15:00	93%	15:15	93%	15:20	92%	15:30	92%	105:14	18%
1600 - 1700	2:02	100%	3:10	91%	2:37	100%	2:42	100%	2:39	100%	2:40	100%	2:53	98%	18:43	96%
1700 - 1800	2:15	100%	3:00	90%	2:50	99%	2:47	100%	2:50	99%	2:54	100%	2:48	99%	19:11	94%
1800 - 1900	2:05	100%	2:59	100%	2:26	100%	2:24	100%	2:34	100%	2:37	100%	2:42	100%	17:27	96%
1900 - 2000	2:03	100%	2:57	100%	2:20	100%	2:24	100%	2:44	100%	2:45	100%	2:39	100%	17:33	96%
2000 - 2100	2:15	100%	2:58	100%	2:41	100%	2:38	100%	2:42	100%	2:43	100%	2:51	99%	18:28	98%
2100 - 2200	2:20	100%	2:47	100%	2:50	99%	2:40	100%	2:47	100%	2:54	98%	2:52	97%	19:15	98%
2200 - 2300	2:07	100%	2:39	100%	2:33	100%	2:30	100%	2:38	100%	3:08	94%	3:28	89%	19:29	98%
2300 - 2400	2:00	100%	2:22	100%	2:14	100%	2:22	100%	2:58	100%	3:02	95%	3:40	93%	17:48	99%
MATCH TOTAL	17:27	40%	21:51	36%	20:31	37%	20:45	37%	21:52	36%	22:30	35%	23:28	34%	147:53	14%
DAY TOTAL	44:51	25%	45:47	25%	44:50	25%	44:27	25%	46:20	24%	47:47	24%	53:32	23%	327:22	9%

Figure 6-1. Manpower Utilization Forecast

- Workload forecast for the sector for each day reflected in hours (minutes of expected patrol activity for each hour of the shift).
- Weekly manpower availability forecast for his sector which is updated daily so the sergeant knows how many men will be available during the shift.
- Crime analysis bulletins reflecting city wide and district crime patterns and trends.
- Expected events of an unusual nature such as parade, rock concert, etc.

Figure 6-2 shows completed Directed Patrol Daily Assignment Sheets for Sector 330, watch B, for the entire week from 3/26 (Sunday) through 4/1 (Saturday). For example, on Monday (3/27) five sector cars were available during the watch with an expected patrol workload of 7 1/2 hours. For the first four hours of the watch approximately 4 1/2 hours of time was expected to be consumed by activity. Using the formula reflected in Figure 6-2, a 25 percent buffer factor is added to the expected workload resulting in a total expected workload of 5 plus hours. However, for reasons of safety, backup, and unusual circumstances, one car is always added to the total number of cars determined to be required to answer calls. Thus, for the first four hours of watch B on Monday, at least three cars will be available to answer calls. In those instances where the sergeant does not add one car as a safety factor, he will always assign a car to a task which he can retrieve immediately.

SUN

DIRECTED PATROL DAILY ASSIGNMENT SHEET

DATE 3/26/78 SECTOR 330 WATCH B

RADIO #	NAME	TIME				HOURS CANCELLED
		CALLS FOR SERVICE		PLANNED UNCOMMITTED HOURS		
331	HALTEMAN			N/O	D.P.	
332	WILLIAMS					
333	~~DANIELS~~ → N/C					
334	BIDWELL					
335	V-DAY, N/C					
339	~~HALOW~~ → N/C					

FORCAST HRS. FOR 4 HR. INCREMENT 9½ + 25 % D.F. = 12+ HRS. OR 4 CARS ANSWERING CALLS.

FORCAST HRS. FOR 4 HR. INCREMENT 3 + 25 % D.F. = 3+ HRS. OR 2 CARS ANSWERING CALLS.

ASSIGNMENTS

RADIO # _____ AREA, NATURE AND TIMES OF ASSIGNMENTS: No D.P., SAT. NIGHT

☐ HOURS USED AS PLANNED ☐ HOURS CHANGED TO: _____

RADIO # _____ AREA, NATURE AND TIMES OF ASSIGNMENTS: _____

☐ HOURS USED AS PLANNED ☐ HOURS CHANGED TO: _____

RADIO # _____ AREA, NATURE AND TIMES OF ASSIGNMENTS: _____

☐ HOURS USED AS PLANNED ☐ HOURS CHANGED TO: _____

Sgt. J. Leiker
SECTOR SERGEANT

IF MORE THAN ONE ACTIVITY IS TO BE PERFORMED BY EACH OFFICER, INDICATE WITHIN SPACE PROVIDED THE TIMES AND DESCRIPTION OF EACH ACTIVITY.

Form 5?62 P.D. (2-77)

Figure 6-2. Directed Patrol Daily Assignment Sheets

MON

DIRECTED PATROL DAILY ASSIGNMENT SHEET

DATE 3/27/78 SECTOR 330 WATCH B

RADIO #	NAME	TIME				HOURS CANCELLED
		CALLS FOR SERVICE		PLANNED UNCOMMITTED HOURS		
331	HALTEMAN					
332	WILLIAMS					
333	BIDWELL					
334	BEAL			0200	0600	
335	JULIANA			0200	0600	
339	~~CALVIN~~ → N/C					

FORCAST HRS. FOR 4 HR. INCREMENT 4½ + 25 % D.F. = 5+ HRS. OR 2 CARS ANSWERING CALLS.

FORCAST HRS. FOR 4 HR. INCREMENT 3 + 25 % D.F. = 3+ HRS. OR 2 CARS ANSWERING CALLS.

ASSIGNMENTS

RADIO # 334 & 335 AREA, NATURE AND TIMES OF ASSIGNMENTS: 335's DISTRICT, IN SHOPPING CENTER AREAS, BUILDING, CAR & PED CHECKS FOR BURGLARIES & SUSPECTS, CODE 23-18

☐ HOURS USED AS PLANNED ☐ HOURS CHANGED TO:

RADIO # AREA, NATURE AND TIMES OF ASSIGNMENTS:

☐ HOURS USED AS PLANNED ☐ HOURS CHANGED TO:

RADIO # AREA, NATURE AND TIMES OF ASSIGNMENTS:

L 9 11

☐ HOURS USED AS PLANNED ☐ HOURS CHANGED TO:

Sgt. J. Leiker
SECTOR SERGEANT

IF MORE THAN ONE ACTIVITY IS TO BE PERFORMED BY EACH OFFICER, INDICATE WITHIN SPACE PROVIDED THE TIMES AND DESCRIPTION OF EACH ACTIVITY.

Form 5262 P.D. (2-77)

Figure 6-2 (continued)

TUES

DIRECTED PATROL DAILY ASSIGNMENT SHEET

DATE 3/28/78 SECTOR 350 WATCH B

RADIO #	NAME	TIME				HOURS CANCELLED
		CALLS FOR SERVICE		PLANNED UNCOMMITTED HOURS		
331	SOLIGO			0100	0600	
332	WILLIAMS			0100	0600	
333	BIDWELL			2330	0300	
334	BEAL					
335	JULIANA					
339	CALVIN					

FORCAST HRS. FOR 4 HR. INCREMENT 5½ + 25 % D.F. = 6+ HRS. OR 2 CARS ANSWERING CALLS.

FORCAST HRS. FOR 4 HR. INCREMENT 3 + 25 % D.F. = 3+ HRS. OR 2 CARS ANSWERING CALLS.

ASSIGNMENTS

RADIO # 331 & 332 AREA, NATURE AND TIMES OF ASSIGNMENTS: 39TH - CLARY BLVD, VINEYARD DRIVE - VAN BRUNT, RESIDENCE, CAR & PED CHECKS FOR BURGLARIES & SUSPECTS, CODE 23-10

☐ HOURS USED AS PLANNED ☐ HOURS CHANGED TO:

RADIO # 333 AREA, NATURE AND TIMES OF ASSIGNMENTS: RADAR, RAYTOWN ROAD (OZARK ROAD TO 47TH) & BLUE RIDGE CUTOFF (43RD TO 51ST), CODE 23-11

☐ HOURS USED AS PLANNED ☐ HOURS CHANGED TO:

RADIO # AREA, NATURE AND TIMES OF ASSIGNMENTS:

☐ HOURS USED AS PLANNED ☐ HOURS CHANGED TO:

Sgt. J. Leiker
SECTOR SERGEANT

IF MORE THAN ONE ACTIVITY IS TO BE PERFORMED BY EACH OFFICER, INDICATE WITHIN SPACE PROVIDED THE TIMES AND DESCRIPTION OF EACH ACTIVITY.

Form 5262 P D (2-77)

Figure 6-2 (Continued)

DIRECTED PATROL DAILY ASSIGNMENT SHEET

DATE 3/29/78 SECTOR 330 WATCH B

RADIO #	NAME	TIME				HOURS CANCELLED
		CALLS FOR SERVICE		PLANNED UNCOMMITTED HOURS		
331	SOLIZO					
332	WILLIAMS.					
333	CALVIN			0100	0600	
334	BEAL			0100	0600	
335	BIDWELL					
339	INLOW.					

FORCAST HRS. FOR 4 HR. INCREMENT 5 + 25 % D.F. = 6+ HRS. OR ____ CARS ANSWERING CALLS.

FORCAST HRS. FOR 4 HR. INCREMENT 3 + 25 % D.F. = 3+ HRS. OR ____ CARS ANSWERING CALLS.

ASSIGNMENTS

RADIO # 333 & 334 AREA, NATURE AND TIMES OF ASSIGNMENTS: 43RD - 47TH INDIANA JACKSON, CAR & PED CHECKS FOR ROBBERY, BURGLARY & LARCENY SUSPECTS, 1DE 23-10

☐ HOURS USED AS PLANNED ☐ HOURS CHANGED TO: ____

RADIO # ____ AREA, NATURE AND TIMES OF ASSIGNMENTS: ____

☐ HOURS USED AS PLANNED ☐ HOURS CHANGED TO: ____

RADIO # ____ AREA, NATURE AND TIMES OF ASSIGNMENTS: ____

☐ HOURS USED AS PLANNED ☐ HOURS CHANGED TO: ____

Sgt. G. Luke
SECTOR SERGEANT

IF MORE THAN ONE ACTIVITY IS TO BE PERFORMED BY EACH OFFICER, INDICATE WITHIN SPACE PROVIDED THE TIMES AND DESCRIPTION OF EACH ACTIVITY.

Form 5262 P.D. (2-77)

Figure 6-2 (Continued)

DIRECTED PATROL DAILY ASSIGNMENT SHEET

DATE 3/30/78 SECTOR 330 WATCH B

RADIO #	NAME	TIME				HOURS CANCELLED
		CALLS FOR SERVICE		PLANNED UNCOMMITTED HOURS		
331	HALTEMAN			0100	0600	
332	BIDWELL			0100	0600	
333	DANIELS					
334	SOLIGO					
335	CALVIN					
339	INLOW					

FORCAST HRS. FOR 4 HR. INCREMENT 6 + 25 % D.F. = 7+ HRS. OR 2 CARS ANSWERING CALLS.

FORCAST HRS. FOR 4 HR. INCREMENT 3 + 25 % D.F. = 3+ HRS. OR 2 CARS ANSWERING CALLS.

ASSIGNMENTS

RADIO # 331 & 332 AREA, NATURE AND TIMES OF ASSIGNMENTS: 335 DISTRICT, SHOPPING CENTER AREAS, BUILDING, CAR & PED CHECK FOR BURGLARIES & SUSPECTS, CODE 23-18

☐ HOURS USED AS PLANNED ☐ HOURS CHANGED TO:

RADIO # AREA, NATURE AND TIMES OF ASSIGNMENTS:

☐ HOURS USED AS PLANNED ☐ HOURS CHANGED TO:

RADIO # AREA, NATURE AND TIMES OF ASSIGNMENTS:

T-JH

☐ HOURS USED AS PLANNED ☐ HOURS CHANGED TO:

Sgt. G. Lackey
SECTOR SERGEANT

IF MORE THAN ONE ACTIVITY IS TO BE PERFORMED BY EACH OFFICER, INDICATE WITHIN SPACE PROVIDED THE TIMES AND DESCRIPTION OF EACH ACTIVITY.

Form 5262 P.D. (2-77)

Figure 6-2 (Continued)

FRI

DIRECTED PATROL DAILY ASSIGNMENT SHEET

DATE 3/31/78 SECTOR 330 WATCH B

RADIO #	NAME	TIME				HOURS CANCELLED
		CALLS FOR SERVICE		PLANNED UNCOMMITTED HOURS		
331	HALTEMAN					
332	SOLIZ			2330	0300	
333	DANIELS					
334	CALVIN			0100	0600	
335	JULIANA			0100	0600	
339	INLOW					

FORCAST HRS. FOR 4 HR. INCREMENT 6 + 25% D.F. = 7½ HRS. OR 2 CARS ANSWERING CALLS.

FORCAST HRS. FOR 4 HR. INCREMENT 3 + 25% D.F. = 3¾ HRS. OR 2 CARS ANSWERING CALLS.

ASSIGNMENTS

RADIO # _____ AREA, NATURE AND TIMES OF ASSIGNMENTS: 39TH - CLARY BLV. VINEYARD DRIVE - VAN BRUNT, RESIDENCE, CAR & PED CHECKS FOR BURGLARIES & SUSPECTS CODE 23-11

☐ HOURS USED AS PLANNED ☐ HOURS CHANGED TO: _____

RADIO # _____ AREA, NATURE AND TIMES OF ASSIGNMENTS: RADAR, RAYTOWN ROAD (OZARK ROAD TO 47TH) & BLUE RIDGE CUTOFF (43RD TO 51ST) CODE 23-11

☐ HOURS USED AS PLANNED ☐ HOURS CHANGED TO: _____

RADIO # _____ AREA, NATURE AND TIMES OF ASSIGNMENTS: _____

2 1/1

☐ HOURS USED AS PLANNED ☐ HOURS CHANGED TO: _____

Sgt. G. Lesley
SECTOR SERGEANT

IF MORE THAN ONE ACTIVITY IS TO BE PERFORMED BY EACH OFFICER, INDICATE WITHIN SPACE PROVIDED THE TIMES AND DESCRIPTION OF EACH ACTIVITY.

Form 5262 P.D. (2-77)

Figure 6-2 (Continued)

SAT

DIRECTED PATROL DAILY ASSIGNMENT SHEET

DATE 4/1/78 SECTOR 330 WATCH B

RADIO #	NAME	TIME				HOURS CANCELLED
		CALLS FOR SERVICE		PLANNED UNCOMMITTED HOURS		
331	HALTEMAN					
332	WILLIAMS			No		
333	DANIELS				D.P.	
334	SOLIGO					
335	JULIANA					
339	INLOW					

FORCAST HRS. FOR 4 HR. INCREMENT 10½ + 25 % D.F. = 13+ HRS. OR 4 CARS ANSWERING CALLS.

FORCAST HRS. FOR 4 HR. INCREMENT 3½ + 25 % D.F. = 4+ HRS. OR 2 CARS ANSWERING CALLS.

ASSIGNMENTS

RADIO # _____ AREA, NATURE AND TIMES OF ASSIGNMENTS: No D.P., FRI NIGHT

☐ HOURS USED AS PLANNED ☐ HOURS CHANGED TO: _____

RADIO # _____ AREA, NATURE AND TIMES OF ASSIGNMENTS: _____

☐ HOURS USED AS PLANNED ☐ HOURS CHANGED TO: _____

RADIO # _____ AREA, NATURE AND TIMES OF ASSIGNMENTS: L 1/1

☐ HOURS USED AS PLANNED ☐ HOURS CHANGED TO: _____

Sgt. J. Leiby
SECTOR SERGEANT

IF MORE THAN ONE ACTIVITY IS TO BE PERFORMED BY EACH OFFICER, INDICATE WITHIN SPACE PROVIDED THE TIMES AND DESCRIPTION OF EACH ACTIVITY.

Form 5262 P.D. (2-77)

Figure 6-2 (Continued)

Continuing with the example, the sergeant determined that the last four hours of the watch will be relatively slow so he assigns two out of the five patrol cars to perform directed activities from 0200 to 0600. The remaining three cars continue to answer calls and patrol their areas.

At the beginning of each watch, a sergeant will not only check the manpower availability for his sector but also for other sectors in the district. He normally uses the master duty roster to determine manpower available for assignment. He also considers other sectors manpower availability in the event he will have to supply men to fill in other areas. In those case where no other sector requires personnel and all his men are available for duty, the sergeant will normally carry out the planned activities reflected on the Directed Patrol Assignment Sheet. In any event, the sergeant does have the latitude to change plans as current circumstances and situations dictate.

In developing the Directed Patrol Assignment the sergeant also reviews other material in addition that reflect manpower availability and workload forecasts. Using crime analysis information input, the following additional factors are considered in the Directed Patrol assignment:

- Problem areas
  - crime related
  - general service
  - crisis situations
- City wide crime picture
  - trends
  - major problems by type/area

- Division crime problems
  - types
  - trends
  - sector problems (i.e., burglary, etc.)
- Specific analysis of problems
  - types
  - patterns/trends
  - relationship to sector
  - tactical problems
- Unusual occurrences/influences
  - parade
  - concert

Figure 6-3 shows examples of the types of crime analysis information made available to the sergeant to assist him in identifying problem areas. Based on problems identified, he then determines the specific area that will be worked and the tactic to be employed. In effect, the sergeant is only limited as to what he can do to address a problem by his and his officer's own initiative and resourcefulness. All planned activities are within reason and the sergeant will always plan activities so that personnel can be called back at anytime for whatever reason. The range of tactics available generally fall within the following areas:

- Assignment of patrol techs who function as detectives for a particular shift and conduct followup investigations of low solvability cases. They are generally in uniform and in a marked car while performing patrol tech assignments.
- Surveillances.
- Tac II alarm set ups.

M E M O R A N D U M

March 15, 1978

TO: Lt. Col. Leroy Swift, Executive Officer to the Chief of Police

FROM: Sergeant Michael S. Guinn, Commander, Crime Information Unit

SUBJECT: Monthly Grid Map

Sir:

Enclosed is a copy of the crime data for the month of February 1978. The twenty-five square block area maps indicate where each crime occurred.

The information for this summary is taken from the reports as we receive them daily at the Crime Information Unit. They do not take into consideration the reports that have been unfounded or reclassified. The crimes listed below are those covered in this report.

COMPARISON TO PREVIOUS MONTH

	January 1978	February 1978	% of Change
Residence Burglary	616	392	- 36.4%
Non-Residence Burglary	203	199	- 2.0%
Armed Robbery	68	91	+ 33.8%
Strong-arm Robbery	25	27	+ 8.0%
Aggravated Assault	153	132	- 13.7%
Larceny Purse Snatch	13	15	+ 15.4%
Auto Theft	226	208	- 8.0%
Larceny Auto Accessories	367	349	- 4.9%
Larceny Theft from Auto	168	176	+ 4.8%
Malicious Dest. of Property	318	275	- 13.5%
Sex Crimes	35	28	- 20.0%

COMPARISON TO PREVIOUS YEAR

	February 1977	February 1978	% of Change
Residence Burglary	614	392	- 36.2%
Non-Residence Burglary	226	199	- 11.9%
Armed Robbery	109	91	- 16.5%
Strong-arm Robbery	44	27	- 38.6%
Aggravated Assault	161	132	- 18.0%
Larceny Purse Snatch	22	15	- 31.8%
Auto Theft	222	208	- 6.3%
Larceny Auto Accessories	590	349	- 40.8%
Larceny Theft from Auto	199	176	- 11.5%
Malicious Dest. of Property	398	275	- 30.9%
Sex Crimes	45	28	- 37.8%

Figure 6-3. Types of Crime Analysis Information

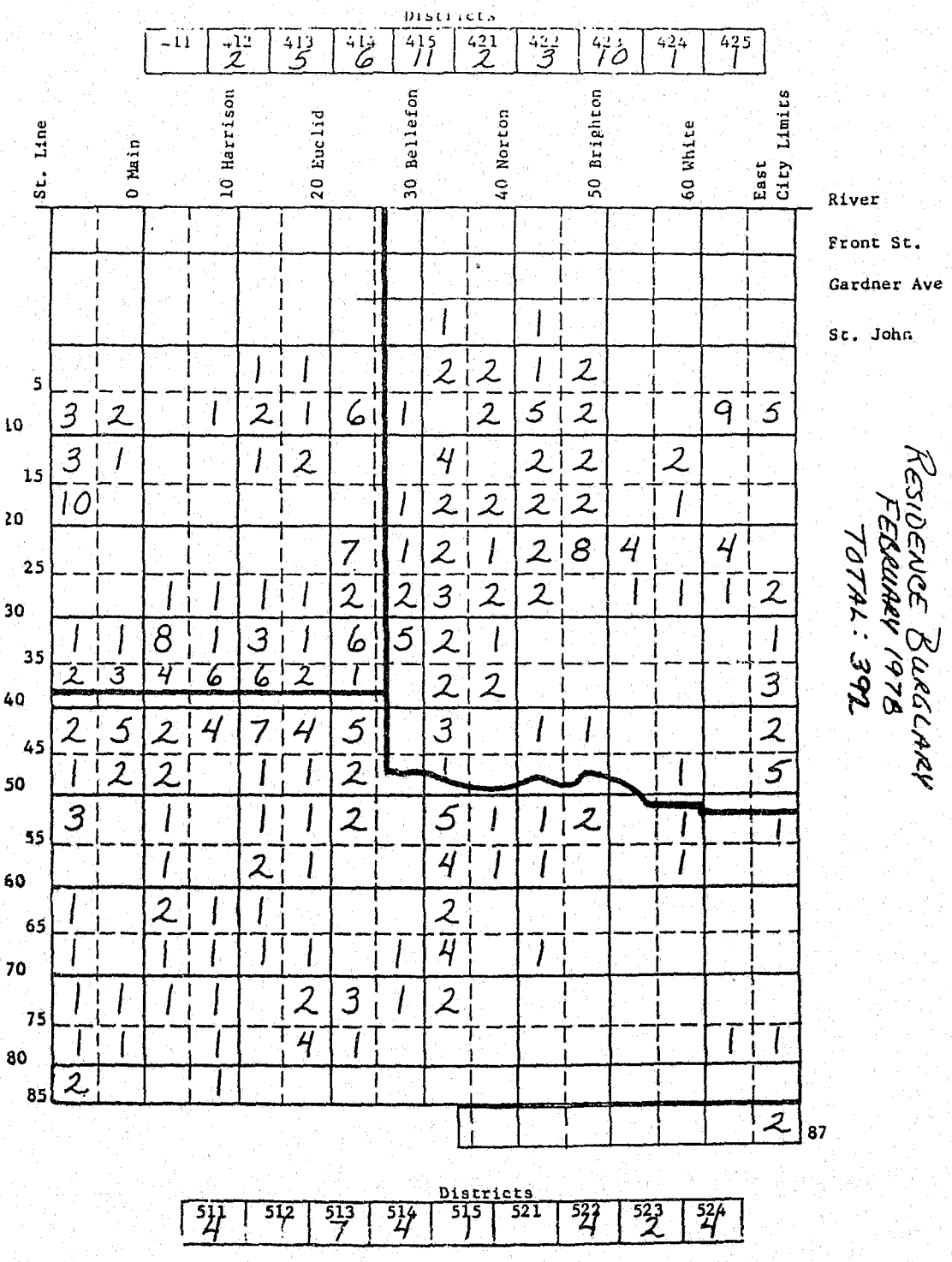


Figure 6-3 (Continued)

M E M O R A N D U M

March 15, 1978

TO: Lt. Col. Leroy V. Swift, Executive Officer to the Chief of Police

FROM: Sergeant Michael S. Guinn, Commander, Crime Information Unit

SUBJECT: Monthly Crime Summary by Division

Sir:

Attached is a copy of the Monthly Crime Summary by Division Report. This report reflects both monthly totals and yearly accumulative totals of all Part I Offenses by Division and comparisons of these totals to the previous year.

Part I offense clearances are also presented in monthly and accumulative totals by Division with comparison to the previous year.

The following tables display monthly and accumulative Part I offense totals of each Division compared to the previous year.

Part I Offense Totals February

	Feb. 1977	Feb. 1978	% of Change
Central Patrol Division	924	649	- 29.8%
South Central Patrol Division	870	610	- 29.9%
East Patrol Division	714	510	- 28.6%
North Patrol Division	216	201	- 6.9%
South Patrol Division	232	165	- 28.9%
Not Stated	21	33	+ 57.1%
Total Part I Offenses	2,977	2,168	- 27.2%

Part I Offense Totals Two Months

	2 Months 1977	2 Months 1978	% of Change
Central Patrol Division	1,810	1,377	- 23.9%
South Central Patrol Division	1,723	1,349	- 21.7%
East Patrol Division	1,387	1,112	- 19.8%
North Patrol Division	414	427	+ 3.1%
South Patrol Division	423	387	- 8.5%
Not Stated	37	64	+ 73.0%
Total Part I Offenses	5,794	4,716	- 18.6%

Figure 6-3 (Continued)

Part I Offense Clearances February

	Feb. 1977	Feb. 1978	% of Change
Central Patrol Division	213	128	- 39.9%
South Central Patrol Division	170	120	- 29.4%
East Patrol Division	145	114	- 21.4%
North Patrol Division	62	42	- 32.3%
South Patrol Division	38	28	- 26.3%
Not Stated	28	1	- 96.4%
Total Part I Clearances	656	433	- 34.0%

Part I Offense Clearances Two Months

	2 Months 1977	2 Months 1978	% of Change
Central Patrol Division	422	277	- 34.4%
South Central Patrol Division	312	275	- 11.9%
East Patrol Division	309	264	- 14.6%
North Patrol Division	129	88	- 31.8%
South Patrol Division	81	62	- 23.5%
Not Stated	69	7	- 89.9%
Total Part I Clearances	1,322	973	- 26.4%

* *

All Division's indicate decreases in Part I offenses in February 1978, as compared to February 1977, with decreases ranging from 6.9% for North Patrol Division to 29.9% for South Central Patrol Division.

The city wide total of Part I offenses decreased 27.2% in February 1978 when compared to February 1977.

Total Part I Clearances for February 1978 decreased 34.0% when compared to February 1977.

Total Part I Clearances decreased on a comparative basis at all Division's

Respectfully,

Sgt. Michael S Quinn

Sergeant Michael S Quinn
Commander
Crime Information Unit

MSG;jas:gdd
Attachment

Figure 6-3 (Continued)

M E M O R A N D U M

April 12, 1978

TO: Major Larry Joiner, Commander, East Patrol Division

FROM: Sergeant Michael S. Guinn, Commander, Crime Information Unit

SUBJECT: Crime Information Unit Spot Maps

Sir:

Attached please find the March 1978 spot maps for East Patrol Division. If further information is needed please contact the Crime Information Unit at extension 321.

Respectfully,

Sgt. Michael S. Guinn

Sergeant Michael S. Guinn
Commander
Crime Information Unit

MSG:pgw:gdd
Attachment

Figure 6-3 (Continued)

Residence and Non-Residence Burglaries
Frequency By Beat

310 Sector	Residence Burglary	Non-Residence Burglary
311	6	7
312	19	7
313	4	4
314	5	6
315	11	7
TOTAL	45	31
320 Sector		
321	12	6
322	13	2
323	4	4
324	13	1
325	7	1
TOTAL	49	14
330 Sector		
331	3	1
332	9	3
333	9	0
334	16	3
335	6	6
TOTAL	43	13
DIVISION TOTAL	137	58

Figure 6-3 (Continued)

Residence Burglary

March Analysis

310 Sector

Beat 311: There were six (6) offenses scattered throughout the beat.

Beat 312: There were nineteen (19) offenses with the major concentration in the area of Askew to Hardesty, Independence Ave. to Smart.

Beat 313: There were four (4) offenses in the beat.

Beat 314: There were five (5) offenses in the beat, all occurring north of 9th Street.

Beat 315: There were eleven (11) offenses in the beat with six (6) occurring in the area of Bennington to Ewing, Independence Ave. to 14th Street.

320 Sector

Beat 321: There were twelve (12) offenses in the beat, with five (5) occurring in the area of College to Askew, 23rd to 26th Street.

Beat 322: There were thirteen (13) offenses scattered throughout the beat.

Beat 323: there were four (4) offenses in the beat.

Beat 324: There were thirteen (13) offenses in the beat with ten (10) occurring north of 27th Street.

Beat 325: There were seven (7) offenses in the beat, all occurring in the area of Topping to Winchester, 15th to 20th Street.

330 Sector

Beat 331: There were three (3) offenses in the beat.

Beat 332: There were ten (10) offenses in the beat, with no concentration.

Beat 333: There were nine (9) offenses scattered throughout the beat.

Beat 334: There were sixteen (16) offenses in the beat, with the major area of concentration being in the area 39th to 43rd, Elmwood to Van Brunt.

Figure 6-3 (Continued)

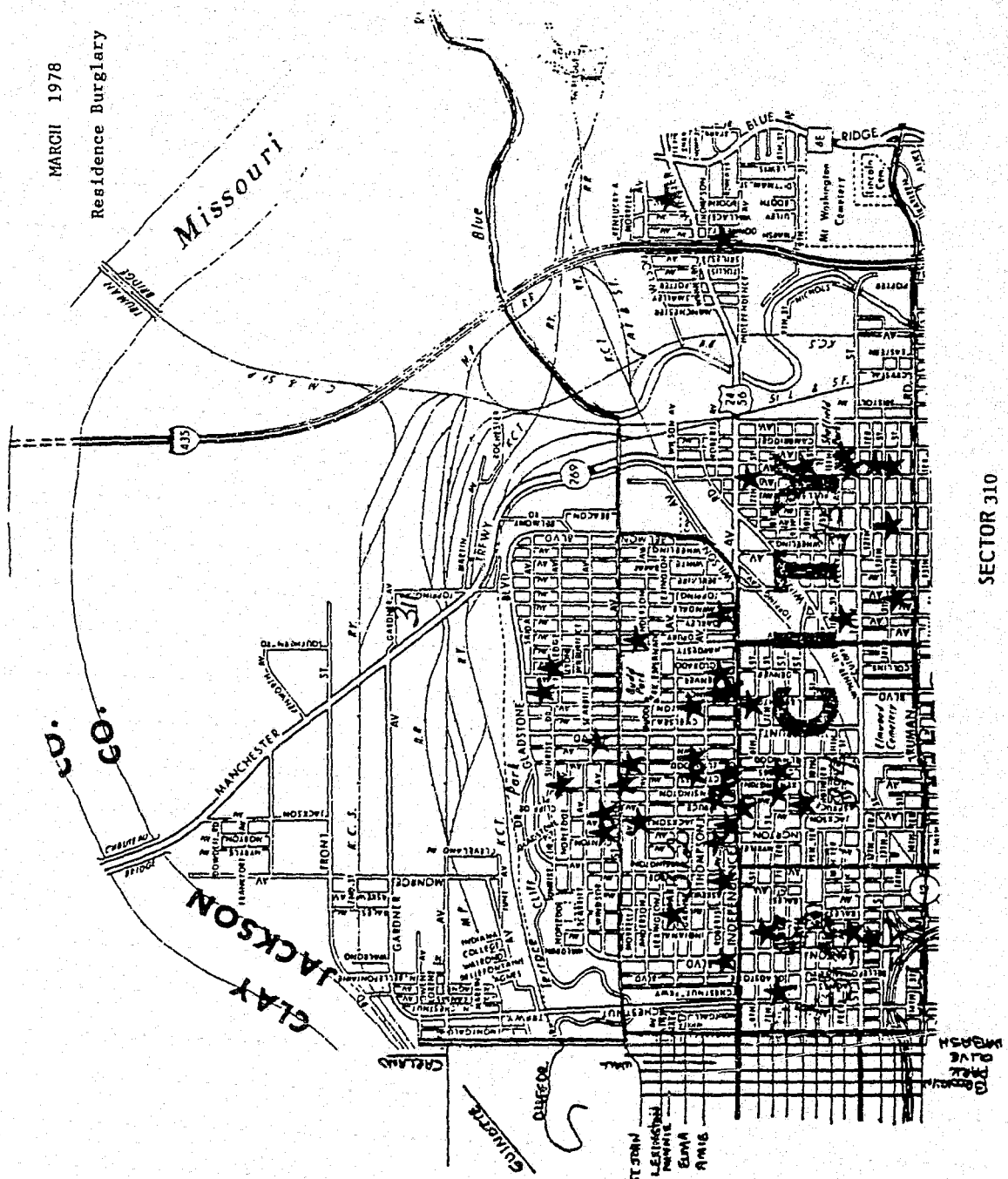


Figure 6-3 (Continued)

- Routine car checks in specific areas.
- Perpetrator oriented patrol.
- Camera emplacements.
- High visibility/saturation patrol.
- Old clothes/unmarked car.
- Any other tactic available that sergeant thinks will impact on problem (i.e., stolen auto problem- assign people to check towing/wrecking yards).

As mentioned, assignments can be cancelled for a number of reasons such as lack of manpower, lack of vehicles, or unusual occurrences. Within the division resources are made available to the sergeant to support his directed assignments. These include, but are not limited to:

- Overtime
- Funds (for rent-a-car)
- Equipment
  - cameras
  - Tac II's

In summary, the following are the critical factors to address in establishing a viable directed patrol program:

- Role and responsibility of field supervisor
  - planners of all sector activities
  - solicits ideas from officers, but is ultimately responsible himself
  - increased responsibility/challenge
- Commanders relinquish certain decisionmaking functions
  - sergeants are planners and decisionmakers
  - CO's retain control and review

- Prioritization of calls for service

  - makes patrol non-committed time available in usable amounts to perform D.P. activities
  - delays non-urgent calls which do not require the immediate response of an officer and to refer such calls to the division station where reports will be taken over the telephone or by the caller reporting to the station
  - ideal method of operation for a department at or nearing C.F.S. saturation point, or a department that may be undermanned
  - importance of prioritization cannot be over stated

- Necessity of using meaningful programs

  - combats crime effectively
  - uses existing resources
  - holds officers' interest
  - retains citizen satisfaction

- Necessity of grass-roots level planning

  - attacking problems in timely manner
  - officers and sergeants are usually aware of problems before staff or support functions
  - officer interest remains high with personal involvement in planning and implementation
  - officers usually know <u>best</u> way to attack problem

- Manpower allocation

  - with the addition of computer manpower forecast - sergeant can plan days or weeks in advance, allocating his manpower accordingly.
  - allocation critical because it's the third step in the process of utilizing uncommitted time:
    1. Identification of uncommitted time
    2. Planning how to use it (identify a problem)
    3. Allocation of manpower
    4. Implementation of plan
    5. Evaluation

- Evaluation

  - critical step to evaluate activities so as to identify those that are non-productive as well as productive
  - increases record-keeping efficiency

- Necessity of crime analysis to planning

  - good data
  - factual data
  - timely response to inquiry
  - linkage between crimes (trend & suspect)

- Training

  - better response to project with good training
  - generates interest
  - must be ongoing
  - can make or break an entire effort
  - strengthen skills in which analysis shows need for improvement

END