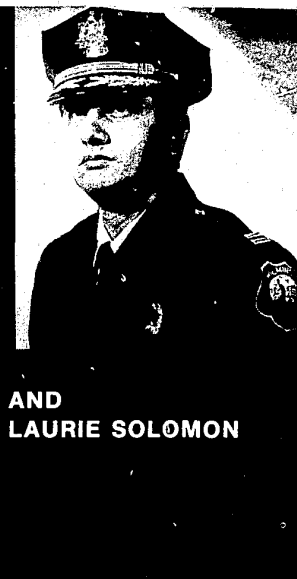


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AN ALTERNATIVE APPROACH
IN POLICE PATROL:
THE WILMINGTON
SPLIT-FORCE EXPERIMENT



BY
JAMES T. NOLAN



AND
LAURIE SOLOMON

JAMES T. NOLAN, a captain with the Wilmington Bureau of Police, 1000 King Street, Wilmington, Delaware 19801, is the commander of its planning, research, and budgeting division. A 1973 graduate of Wilmington College, he holds the B.S. degree in criminal justice and an M.S. degree in criminal justice from West Chester State College. His twenty-year career in law enforcement has included experience in all facets of police operations and administration with heavy emphasis on local and regional planning. He authored and directed the implementation of the Wilmington Split Force Experiment. He is continuing his research into more effective methods of police manpower allocations.

LAURIE SOLOMON was formerly an agency representative for the Delaware Council on Crime and Justice, Inc. Prior to that, he served as research and evaluation specialist in the Wilmington Youth Services System. He is currently an assistant professor in the Department of Law Enforcement Administration at Western Illinois University. He holds a B.A. in political science and sociology from the University of Delaware and an M.A. in political science from the University of Illinois, where he is currently a doctoral candidate.

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LOCAL LAW ENFORCEMENT agencies throughout the United States, during the past several years, have been caught in an impending socioeconomic crisis in the form of conflicting public expectations. On the one hand, local police departments are being faced with a continually expanding community demand for increased police services and protection. On the other hand, they are being asked to meet this growing demand while maintaining current performance quality and utilizing existing personnel levels without benefit of any additional budgetary resources. Insofar as this state of affairs seems unlikely to change for the better in the predictable future, police administrators are recognizing the need to formulate ways of achieving greater organizational efficiency and effectiveness in the allocation, deployment, and utilization of their patrol manpower and resources. Thus, the issue of police productivity has become a priority concern among administrators within the law enforcement field.

The issue of police productivity is both a conceptually and operationally complex subject, which may be approached from a number of different points of view. One perspective is to view police productivity as an economic problem involving cost-benefit questions, and deal with the subject in terms of economic models.¹ A second approach addresses the issue as if it were a management problem pertaining to regulation of demand, training and supervision, communication and record-keeping techniques, system performance operations and maintenance, etc.² Another alternative way conceives of police productivity as an administrative problem related to questions of structural features and functional arrangement of police activities.

Although these various approaches are not mutually exclusive, they are regarded as being so for the analytical purposes of this article, which will seek to concentrate its attention on the topic of police productivity as an administrative problem. The discussion which follows has its basis, to a large degree, in an exploratory experimental project, known as the "Split-Force Patrol" project, which was designed and carried out by the Bureau of Police in Wilmington, Delaware. In formulating this project, the designers undertook to create an organizational arrangement which would take into account and correct a number of unproductive structural and functional features associated with traditional patrol arrangements. In doing so, the project sheds light on the administrative problem of police productivity and provides some valuable insights into how patrol efficiency and effectiveness might be increased as a result of structural-functional changes in the organization of patrol arrangements. Consequently, this program provided the illustrative materials upon which the arguments contained in this article are predicated.³

TRADITIONAL PATROL ARRANGEMENTS

Traditionally, the patrol units of a police department have two main tasks: (1) responding to basic complaints and service calls and (2) conducting crime prevention activities and deterrent patrols. The first patrol task is performed in conjunction with a dispatching process, whereas the latter task typically involves the utilization of some form of random patrolling process. However, despite the implied functional differentiation, local police agencies generally have not sought to structurally organize their patrol operations in terms of such a division of labor. Instead, historically under the traditional patrol arrangements, they have instituted a structural arrangement wherein patrol operations are organized almost exclusively in terms of geographically segmentalized patrol (or radio) districts.

Under such a structural arrangement, each member of the patrol force functions as a generalist, who is responsible for carrying out the duties associated with both patrol tasks within the particular geographic territory to which he has been assigned. Since this structural arrangement does not

provide for a functional division of labor, wherein members of the patrol unit are employed as specialists having responsibility for carrying out the duties of only one of the two patrol tasks, the allocation of patrol personnel and resources has been geographic rather than functional.

Moreover, traditional patrol arrangements have tended to be organized around the premise that service demand and the incidence of crime is and will be evenly distributed spatially across geographic patrol districts. Consequently, patrol manpower and resources typically have been deployed across patrol districts in approximate proportion to the geographic size of the respective patrol districts. For example, if patrol districts A and B are equal size and district C is twice the size of districts A and B, then an equal amount of manpower and resources would be allocated to patrol districts A and B, while district C would be assigned twice the number of personnel and resources allocated to either A or B. Any additional manpower and resources which might be assigned to a given territory would be so allocated only in the event of some extraordinary trouble or unusual situation arising within that district. It would be a special case occasioned by exceptional circumstances and not an everyday phenomenon.

Similarly, traditional patrol arrangements presume that basic patrol service demands and the incidence of crime are characterized by an equal temporal distribution. Predicated upon the presupposition of a more or less equal distribution of service demands and criminal incidents across time, traditional patrol operations have been organized structurally into three or more work shifts of the same relative size in terms of time, manpower, and resources. Accordingly, at any particular given time, there would be the same number of persons scheduled to work patrol; and thus, there would be a more or less equal number of patrol personnel out on the streets at all times. Additional manpower and resources might be deployed during a particular shift under certain conditions as the need arose; however, such situations are to be considered and treated on a case by case basis as required by special circumstances, not as a regular routine daily practice.

LIMITATIONS

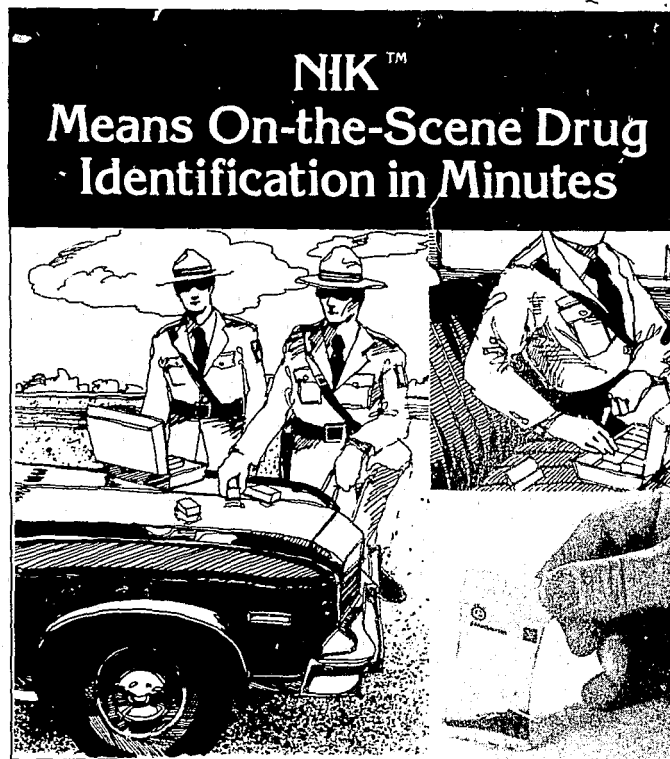
When examined in light of the administrative problem of productivity, traditional patrol arrangements are found to be lacking in a number of significant respects; and each of the deficiencies constitutes a factor which contributes to the reduction of a patrol operation's capacity to be organizationally efficient and effective in the performance of its intended duties. Among the more notable weaknesses of traditional patrol arrangements are the following:

- The almost total reliance on a geographically segmented structural organization of patrol operations and the generalist roles which patrol personnel must perform within such a structurally organized format;
- The assumption of an equal distribution of basic service demands and incidents of crime across patrol districts as a basis for the spatial allocation and deployment of patrol manpower and resources; and
- The presupposition of an equal distribution of basic service demands and criminal events across time as the premise for defining temporal apportionment of patrol personnel and resources in terms of work shifts and schedules.

¹For examples of this viewpoint, see Carl S. Shoup, "Standards for Distributing a Free Governmental Service: Crime Prevention," *Public Finance*, Vol. 19, No. 4 (1964), pp. 383 - 392, and Douglas Dosser, "Notes on Carl S. Shoup's 'Standards for Distributing a Free Governmental Service: Crime Prevention,'" *Ibid.*, pp. 395 - 401.

²Cf. Wilmington Bureau of Police, *Wilmington Split-Force Patrol Experiment: Planning Report*, Wilm., De., 1975, Section 2.2 *passim* and James M. Tien, James W. Smith, and Richard C. Larson, *An Evaluation Report of An Alternative Approach in Police Patrol: The Wilmington Split-Force Experiment*, Public Systems Evaluation, Inc.: Cambridge, 1977, pp. 5-14ff. and 11-7ff. Also see James T. Nolan, *Managing The Police Demand: A Concept in Police Administration*, Unpublished paper, 1977.

³For detailed descriptive information and evaluative materials on the Split-Force project, see James T. Nolan, *Police Patrol Productivity: The Split-Force Concept*, published thesis, 1976, and James M. Tien et al., *loc. cit.*, *passim*.



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The first of the above listed weaknesses has limited the productive capacity of police patrol operations in several ways. Under a geographically segmentalized organizational structure in which patrol personnel function as generalists within their various respective patrol districts, there exists a predominate tendency to give priority to the job of responding to basic police complaints and service calls. The performance of crime prevention activities tends to be treated as a residual task, which is attended to only if and when there is some free time available to undertake random preventative patrols. Subsequently, all too often, patrol personnel are too busy answering basic complaints and service calls to engage in crime prevention patrols. Therefore, this functional patrol task frequently either is completely neglected or, if it is carried out at all, is attended to in only the most superficial manner.

Moreover, patrol personnel often are dispatched repeatedly on basic complaints and service calls which have their origin in a particular sector of their assigned patrol district. Subsequently, for very practical operational reasons, patrol personnel are predisposed to remain in the sector of their complaint and service calls rather than undertaking to run all over their assigned district. This inertia results in their confining any random preventative patrol activities which they might engage in between calls to the given sector in which they happen to be located. Consequently, other sectors of their patrol district generally receive sparse and ineffective crime prevention coverage or are ignored entirely.

Furthermore, the random preventative patrol activities associated with the crime prevention task of patrol are not regarded as being a functionally specialized duty. Therefore, patrol manpower is not specifically assigned responsibility for performing the crime prevention task nor is the random preventative patrol process operationally defined in terms of

specific tactical operations and practices, such as the hand-checking of buildings or the routine field interviewing of potential suspects and street sources. Since the crime prevention duties of patrol are such diffuse and vague responsibilities, accountability for their performance is low. It, thus, becomes easy for patrol personnel to claim that they had been engaged in the carrying out of random preventative patrol duties when they were not otherwise engaged in answering basic complaints and service calls without being concerned about the possibility of their being held accountable for the actual performance of crime prevention activities. As a result, random crime prevention and deterrent patrol activities, in many instances, serve to promote inefficient and ineffective patrol operations; and frequently, this category is used to cover or justify practices which are unrelated to the crime prevention task.

The second weakness associated with traditional patrol arrangements (i.e., the assumption that basic complaints and demands, as well as crime incidents, are — or will be — evenly distributed across districts) also leads to less efficient and effective utilization of patrol manpower and resources. Some patrol districts experience a larger service demand and higher crime rate than others. A small territory can have a greater incidence of crime and basic service demand rate than a larger territory, thereby requiring more patrol personnel and resources than the larger area. Under such conditions, the deployment of patrol manpower and resources tends to result in the wasting of manpower and resources on districts in which their deployment is not actually necessary and of marginal utility, while supplying inadequate coverage to those areas where additional personnel and resources might have been more advantageously and productively employed.

The third limitation on the productivity of traditional patrol arrangements arises out of the presupposition that the temporal demand for basic services and the occurrence of criminal activities can be treated as if they were distributed evenly across time. Under this premise, the need for patrol manpower and resources is regarded as being more or less constant around-the-clock regardless of the particular hour of the day. Consequently, duty shifts are defined so as to permit an equal apportionment of personnel and resources among them; and the work schedules of patrol personnel tend to be organized so as to result in an even allocation of manpower within each shift. Thus, there characteristically will be the same number of patrol personnel on duty and in service at all periods of the work day and at any point in time during a given duty shift.

However, in contrast to the traditional supposition, the actual distribution of basic complaints and service demands and criminal events generally tends to be uneven. It typically varies according to the hour of the day, with some portions of the day usually having a greater service demand and occurrence of criminal activity than others. The need for patrol manpower and resources does not remain more or less constant across time; but instead, it is variable and will differ from shift-to-shift, as well as within the various duty shifts.

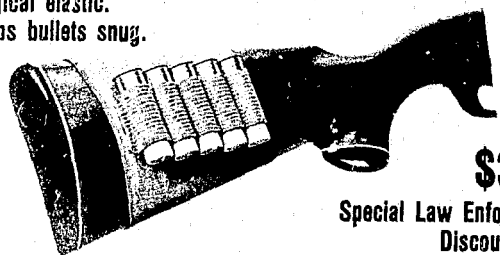
Subsequently, traditional allocation formulas tend to produce frequent mismatches of available manpower and resources to actually existing complaints and service demand needs. Such mismatches mean that patrol personnel are being wasted on periods in which their availability is of marginal benefit and are not deployed during periods when the availability of additional manpower and resources might be beneficial and more effectively utilized.

ALTERNATIVE PATROL ARRANGEMENTS

When faced with the realities of these structural limitations, many local police departments have responded by experimenting with various ad hoc modifications and

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pragmatic adjustments which were devised to strengthen the traditional patrol arrangements. These practical ad hoc attempts to counter the intrinsic organizational defects of traditional patrol arrangements have proven to be of limited success. At best, such band-aid treatments constitute temporary expedient solutions to immediate problems at hand, but are unable to provide a fully developed alternative patrol arrangement that would bring a long-ranging increase in the programmatic capabilities of the patrol operation which could result in greater patrol efficiency and effectiveness.

Recognizing this to be the case, a number of police administrators have begun to explore the organizational possibilities of new structural frameworks within which to devise alternative patrol arrangements.⁴ The "Split-Force" project undertaken in Wilmington, Delaware, and funded by a National Institute of Law Enforcement and Criminal Justice grant from the Law Enforcement Assistance Administration, represents a concrete example of one such viable possibility. It offers an instructive illustration of an organizational arrangement which has been structured to attain increased police productivity at the patrol level.

THE WILMINGTON PROJECT

The Wilmington "Split-Force" project was designed to achieve the following program objectives:

- An organizational arrangement which is capable of programmatically recognizing and providing for the organizational differentiation and structural separation of basic patrol complaint and service tasks and crime preventive patrol tasks into functionally distinct and specialized operations within the patrol force;

- An empirically based, demand related, spatio-temporal system of geographically distributed, basic service district configurations with built-in flexibility to accommodate changing service demand patterns;

- A scheduling mechanism which is capable of providing a demand-relevant deployment of patrol personnel and resources among and within the various different work shifts; and

- An ongoing organizational capacity to maintain and update existing empirical information pertaining to current service patterns and crime trends and to make timely assessments of patrol needs and revised projections of basic service and crime trends.

Under this program, the Wilmington Bureau of Police sought to accomplish the first objective by splitting its patrol forces into a complementary pair of functionally distinct and operationally specialized constituent patrol components: a Structured Patrol Force (SPF) and a Basic Patrol Force (BPF). The SPF group was assigned primary responsibility for the around-the-clock performance of crime preventive and deterrent patrol functions. It was composed of an organized corps of 27 full-time sworn police officers. The members of the SPF corps would engage in a systematically orchestrated set of pre-established "area-based," "problem-based," and "incident-based" preventive and deterrent patrol strategies. These strategies were undertaken in accordance with well-defined "high-visibility" and "low-visibility" tactical plans, and employed specific pre-selected techniques (e.g., hand-checking commercial es-

⁴For some examples, cf. George L. Kelling and Tony Pate et al., *The Kansas City Preventive Patrol Experiment, A Technical Report*, Police Foundation: Wash., D.C., 1974; New Haven Department of Police Service, *Directed Deterrent Patrol*, Connecticut Justice Commission: New Haven, 1976; Wilmington Bureau of Police, *Patrol Experimentation and Evaluation*, NILE/CJ Wash., D.C., 1974; and William H. Carbone, *Innovative Patrol Operations*, South Central Criminal Justice Supervisory Board: New Haven, 1976.

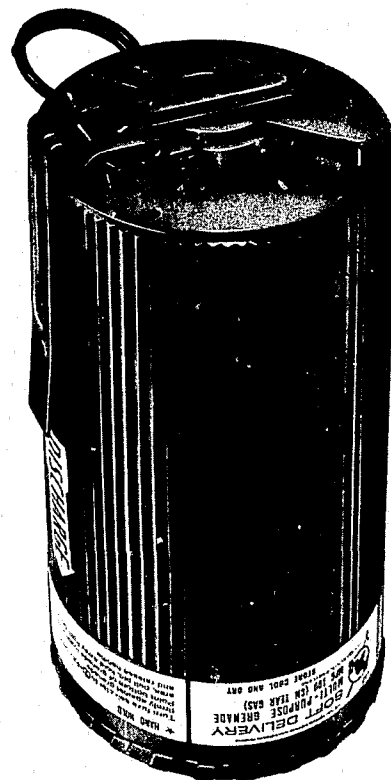
For an in-depth description of the computer-based models that were employed and a detailed discussion of the procedures by which those models were applied, see James T. Nolan, *Police Patrol Productivity: The Split-Force Concept*, op. cit., pp. 51-62 and James M. Tien and Juan A. Pineda, *Decision-Makers and Computer-Based Models: The Wilmington Experience*, Public Systems Evaluation, Inc.: Cambridge, 1975.

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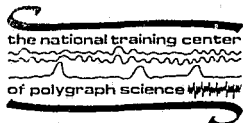
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tablishments, stake-outs, decoy activities, etc.). The BPF group's duties consisted primarily of carrying out basic police complaints and service functions. This group was made up of the remainder of the patrol force — excluding mounted personnel, evidence detection and traffic units, and personnel temporarily assigned to housekeeping duties. The members of the BPF corps would engage primarily in answering dispatches for basic complaints and services. When not responding to complaints and service calls, they undertake the maintaining of fixed-post special attentions, routine traffic duties, and the service of court capias.

There are several noteworthy features of this splitting of the patrol force which bear mentioning. First, unlike standard "tactical squads" and "task forces" in the usual sense of the terms, the SPF and BPF groups are not ancillary entities which are temporarily assembled for the practical purpose of achieving a specific limited duration special purpose missions or resolving particular concrete problems. Instead, both of the groups were designed to be permanently established components within the total structure of the patrol organization and were to perform integral roles in the operation of that organization. This contributed an element of organizational stability and structural continuity to the split-force arrangement, enabled each of the groups to develop feasible standard operating procedures, facilitated the orderly growth of viable working practices and relations within each of the two respective groups, and provided a firmly grounded basis for intergroup coordination and cooperation.

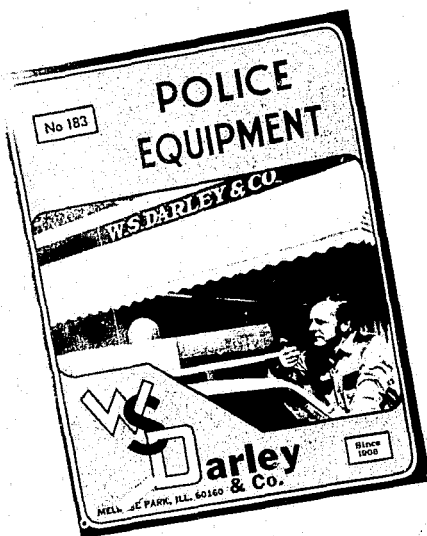
Secondly, this split adds an element of increased accountability and supervisibility to patrol operations. Having eliminated virtually all random patrol activities and replaced them with directed patrol activities, the roles of each component are clearly defined so that the personnel of each group know precisely what is expected of them. Supervisors are able to delineate the specific tasks to be performed by their people, thereby enabling them to monitor the performance of their subordinates and hold them accountable for their actions and unperformed duties.

This organizational arrangement also contains a built-in element of operational flexibility which enables the patrol force to be very responsive to the situational fluidity of the street scene. The division of labor implied by the structural division of the patrol force into two functional components is a dynamic division of labor. That is to say, SPF personnel, in addition to performing their routine directed crime prevention and deterrent patrol functions, comprise an available reserve force which can be called on to provide support to BPF personnel by rendering necessary assistance in instances of an "officer-in-trouble" call or a "crime-in-progress" dispatch. Furthermore, in critical situations where there exists an immediate need for manpower to answer ordinary basic complaints and service calls and BPF personnel are not free to respond due to an unusually high basic complaint and service demand, SPF personnel can be dispatched and employed as if they were members of the BPF component. After conditions return to normal, the SPF members can then resume their assigned crime prevention and deterrence tasks. On the other hand, BPF personnel and resources are at the disposal of SPF personnel if they should require assistance in apprehending a suspect or preventing a crime from taking place.

To achieve the second program objective, the Wilmington Bureau of Police sought to design a flexible demand-relevant system of space-time matrixed basic complaint and service district configurations which would govern the geographic deployment of BPF manpower within the city during a 24-hour workday. This was done in the following fashion. The 24-hour maximum productive efficiency and effectiveness by a single BPF unit (a one-man or two-man patrol car), and so as to minimize travel times and workload

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imbalances between the constituent districts in the configuration.

The resulting outcome was the following matrix of configurations:

0000-0400 hours: 8 district configuration
 0400-0800 hours: 5-district configuration
 0800-1200 hours: 7-district configuration
 1200-1600 hours: 10-district configuration
 1600-2000 hours: 12-district configuration
 2000-2400 hours: 12-district configuration


By virtue of this spatio-temporally matrixed system, the Wilmington Bureau of Police was able to distribute its BPF manpower and resources in such a way as to reflect a closer correspondence to bureau's basic complaint and service demand characteristics.

Employing for administrative purposes four equally staffed BPF platoons operating under a system of three rotating eight-hour shifts, the operational day was segmented into six sequential four-hour intervals, and informational data on basic complaints and service demand and manpower utilization was examined to ascertain the levels and origins of complaint and service demands and the personnel requirements for each of the respective four-hour periods. Relying on a set of computer-based models, this information was fed into a computer C and several empirically possible basic complaint and service response district configurations then were generated for each of the six respective four-hour periods within the 24-hour operational day.

Afterwards, each of these different response district configurational patterns were examined, evaluated, and compared in light of several key practical administrative considerations, organizational concerns, and environmental factors (e.g., operationally viable travel times, traffic patterns, natural boundaries, safety factors, and workload imbalances). On the basis of this assessment, the relative applicability and feasibility of the various configurational patterns was ascertained and a set of six (one per four-hour interval) satisfactory response district configurations were selected for implementation. Within each of the different response district configurations that was chosen, individual complaint and service response district boundaries were drawn so as to be adequately covered when the Wilmington Bureau of Police sought to accomplish the third program objective. A scheduling mechanism was devised which would maintain the organizational integrity of the existing platoon system while providing a flexible, demand-related method of allocating tours of duty so as to adapt the platoon system to the spatio-temporal requirements of the various basic complaint and service response district configurations. This was achieved with the development of a systematic "push-pull" scheduling procedure which would govern the way in which BPF platoon personnel were to have their eight-hour tours of duty distributed.


Under this scheduling procedure, the BPF platoon on duty during each of three respective eight-hour shifts would allocate the duty tours of its members in accordance with a preplanned program; a specified number of platoon members would be required to report for work either earlier than usual or later than normal. For example, the BPF platoon working the midnight shift (0000-0800 hours) would schedule the number of personnel necessary to man three units to report for duty four hours early at 2000 hours instead of at the usual reporting time of 0000 hours. The day shift (0800-1600 hours) platoon would require all its members to report to work as normal at the usual time of 0800 hours, while the evening shift (1600-2400 hours) BPF platoon would have personnel needed to man three units come into work four hours earlier than usual at 1200 hours.

The SPF group, under this procedure, would be composed of two teams. One team was nominally assigned to work the day shift from 0800 hours to 1600 hours, while the



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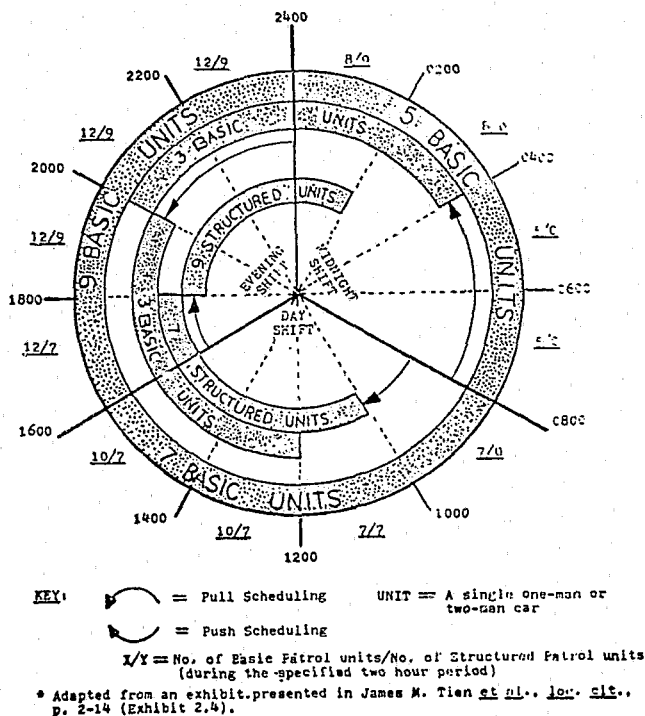
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FIGURE 1

PUSH-PULL SCHEDULING PROCEDURES



other team was formally assigned to work the evening shift from 1600 hours to 2400 hours. However, both SPF teams, under the "push-pull" scheduling procedures, could report for duty two hours later than the normally designated starting times of those shifts (viz., at 1000 hours and 2000 hours respectively rather than at the usual 0800 hours and 1600 hours respectively). See Figure 1 Above.

By utilizing this type of "push-pull" scheduling mechanism, the Wilmington Bureau of Police was able to allocate its patrol manpower and resources in a way so as to take into account the slack and peak periods which occur within the various respective shifts. This in turn, resulted in a much more efficient and effective usage of patrol personnel and resources. The "push-pull" scheduling procedure also enabled the bureau to maintain constant street coverage during those changes of shifts when high numbers of complaint and service calls could be anticipated (e.g., at 1600 hours and 2400 hours). Such scheduling provides a continuity of available patrol personnel to service the community throughout the working day without much of the normal disruption in services which usually accompanies the transition from one shift to another.

The accomplishment of the fourth program objective was facilitated by coordinating the activities of the bureau's existing crime analysis unit with the operations of the SPF and BPF patrol groups. As a result of this linkage, the crime analysis unit would maintain a file of statistical information, compiled and updated daily, on burglaries, robberies, thefts, assaults, street muggings, etc. On the basis of this statistical material, it would assemble and distribute a daily report, which provided a listing of all the crimes of the kind indicated above which were committed during the past two weeks (14 days) according to the number of incidents, the type of crime, the time and location of the crime, and possible suspects. This report would go to all BPF and SPF personnel. The information contained in this report was discussed with SPF supervisors each morning; and as a result of that discussion, the SPF supervisors would determine the assignments of their personnel for that day and formulate

TABLE 1

INDEXES OF PATROL EFFECTIVENESS

FACTORS MEASURED	PERCENTAGE CHANGE
Number of Violent Crime Arrests (April-November, 1976)	14.6% Increase
Number of Property Crime Arrests (April-November, 1976)	12.2% Increase
Total Part I Crime Arrests Per Assigned Officer Per Month (Dec., 1975-Nov., 1976)	4.0% Increase
Total Part I Charges Per Arrest Per Assigned Officer Per Month (Dec., 1975-Nov., 1976)	13.2% Increase
Uniform Crime Rate (April-Dec., 1976)	20.0% Decrease

SOURCE: James M. Tien et al., loc. cit.

the types of strategies, tactics, and methods which were to be employed by their personnel.

In addition, the crime analysis unit would prepare periodic forecasts projecting potential changes in current crime trends and existing complaint and service demands. These revised projections enabled BPF and SPF supervisors to plan and coordinate their activities and the actions of their personnel. They also provided a systematic empirical foundation upon which BPF and SPF supervisors could monitor and evaluate the quality of their respective group's performance so as to propose and institute corrective measures when necessary.

After implementing its "Split-Force" program and instituting the various structural changes in organizational arrangement of patrol operation, the Wilmington Bureau of Police experienced higher levels of productivity. According to performance measures, the bureau evidenced greater patrol efficiency and effectiveness, including a 20.6 percent productivity increase per officer in the patrol division. There were fewer instances of excessive over- or under-supply of available officers on duty compared to basic complaint and service demand; there was a small general decrease in response times; the service times for assisting units decreased; unit utilization increased (i.e., patrol units spent more time actually responding to calls and providing basic services); and individual officer workloads were greater (e.g., patrol personnel spent more of their time and energy engaging in the actual servicing of calls-for-service and in the actual doing of basic police work). Similarly, the number of Part I crime arrests per assigned officer increased as did the number of Part I charges per arrest per assigned officer. Moreover, there was a significant overall reduction in Wilmington's Part I Uniform Crime Rate.

CONCLUSIONS

Representing a concrete example of the sorts of structural changes in the organization of patrol arrangements suggested in this article, the Wilmington "Split Force" project provides supporting evidence for the thematic arguments central to this article. First, it reveals that feasible systematic organizational alternatives to the traditional patrol arrangements are possible and available to local police departments. Secondly, it indicates that such structural changes do in fact contribute to increased levels of patrol efficiency and effectiveness, thereby providing a potential source of greater total police productivity.

Preliminary evidence from Wilmington's "Split-Force" project strongly suggests that local law enforcement agencies have viable organizational alternatives to the traditional conceptions of proper patrol arrangements which can advantageously assist them in their efforts to meet the continually increasing community demand for police services while remaining within existing budgetary parameters. ★

END