

THE GENERAL DETERRENCE OF DRIVING WHILE INTOXICATED

Volume II: Subsystem Analyses

Leland G. Summers

Douglas H. Harris

Anacapa Sciences, Inc.

P.O. Drawer Q

Santa Barbara, CA 93102

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16. Abstract A system analysis was completed of the general deterrence of driving while intoxicated (DWI). Elements which influence DWI decisions were identified and inter-related in a system model; then, potential countermeasures which might be employed in DWI general deterrence programs were examined by means of a computer-based simulation based on the model. The simulation program, DETER, employed fixed-time step simulation in which the processing of events, within a time step, was based on an expected value Poisson flow model. Simulation experiments assessed the sensitivity of system parameters and evaluated alternative countermeasure approaches. Detailed descriptions are provided of subsystems which potentially influence the DWI decision--patrol deployment, arrest, adjudication, and public information. Subsystem changes are suggested that are likely to enhance the general deterrence of DWI.					
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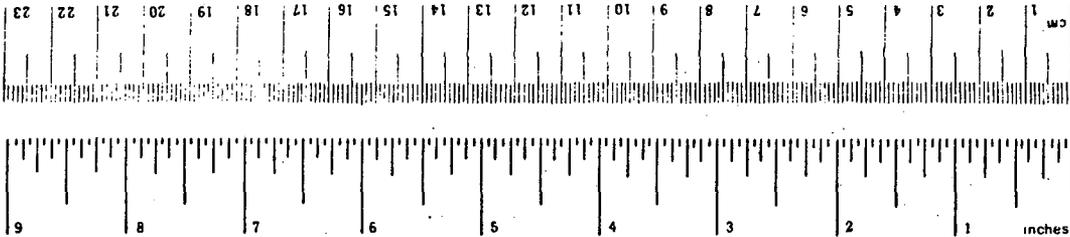
METRIC CONVERSION FACTORS

Approximate Conversions to Metric Measures

Symbol	When You Know	Multiply by	To Find	Symbol
LENGTH				
in	inches	2.5	centimeters	cm
ft	feet	30	centimeters	cm
yd	yards	0.9	meters	m
mi	miles	1.6	kilometers	km
AREA				
in ²	square inches	6.5	square centimeters	cm ²
ft ²	square feet	0.09	square meters	m ²
yd ²	square yards	0.8	square meters	m ²
mi ²	square miles	2.6	square kilometers	km ²
	acres	0.4	hectares	ha
MASS (weight)				
oz	ounces	28	grams	g
lb	pounds	0.45	kilograms	kg
	short tons (2000 lb)	0.9	tonnes	t
VOLUME				
tsp	teaspoons	5	milliliters	ml
Tbsp	tablespoons	15	milliliters	ml
fl oz	fluid ounces	30	milliliters	ml
c	cups	0.24	liters	l
pt	pints	0.47	liters	l
qt	quarts	0.95	liters	l
gal	gallons	3.8	liters	l
ft ³	cubic feet	0.03	cubic meters	m ³
yd ³	cubic yards	0.76	cubic meters	m ³
TEMPERATURE (exact)				
°F	Fahrenheit temperature	5/9 (after subtracting 32)	Celsius temperature	°C

Approximate Conversions from Metric Measures

Symbol	When You Know	Multiply by	To Find	Symbol
LENGTH				
mm	millimeters	0.04	inches	in
cm	centimeters	0.4	inches	in
m	meters	3.3	feet	ft
m	meters	1.1	yards	yd
km	kilometers	0.6	miles	mi
AREA				
cm ²	square centimeters	0.16	square inches	in ²
m ²	square meters	1.2	square yards	yd ²
km ²	square kilometers	0.4	square miles	mi ²
ha	hectares (10,000 m ²)	2.5	acres	
MASS (weight)				
g	grams	0.035	ounces	oz
kg	kilograms	2.2	pounds	lb
t	tonnes (1000 kg)	1.1	short tons	
VOLUME				
ml	milliliters	0.03	fluid ounces	fl oz
l	liters	2.1	pints	pt
l	liters	1.06	quarts	qt
l	liters	0.26	gallons	gal
m ³	cubic meters	35	cubic feet	ft ³
m ³	cubic meters	1.3	cubic yards	yd ³
TEMPERATURE (exact)				
°C	Celsius temperature	9/5 (then add 32)	Fahrenheit temperature	°F



* 1 in = 2.54 inches. For other exact conversions and more detailed tables, see *SI Units*, Publ. 286, Units of Weights and Measures, Part 52, 28-30 (1974), NBS, Gaithersburg, Md., U.S.G.P.O.

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INTRODUCTION AND SUMMARY

A system analysis was completed of the general deterrence of driving while intoxicated (DWI). The analysis identified system elements relevant to the DWI decision and assessed the potential of countermeasures that might be employed in general deterrence programs. The results were reported in two volumes. Volume 1 defined the DWI general deterrence framework, described the analytical methods employed, and presented conclusions and recommendations. This report, Volume 2, supplements Volume 1 by presenting detailed descriptions of the subsystems--patrol deployment, arrest, adjudication, and public information--which potentially influence the DWI decision, and by suggesting subsystem changes likely to enhance the general deterrence of DWI.

OBJECTIVES

The ultimate purpose of this line of research is to assess the feasibility and the potential effectiveness of DWI general deterrence programs. The specific objectives of the subsystem analyses were to:

- Describe subsystems, in terms of functional flow and tasks performed, which might influence the DWI decision.
- Define existing procedures used by different jurisdictions.
- Identify alternatives to existing procedures which might increase the general deterrence of DWI.
- Specify research priorities relative to the development and evaluation of procedural alternatives.

DWI GENERAL DETERRENCE SUBSYSTEMS

The system model described in Volume 1 showed that the DWI decision might be influenced by three basic kinds of information--word-of-mouth, enforcement visibility, and public information--generated within the system and fed back to the driver. Word-of-mouth information is generated by specific enforcement and adjudication actions and reaches the driver through acquaintances who informally report these events; enforcement visibility

includes information generated by any enforcement presence that is perceived by the driver; public information includes any information that reaches the driver through public communications media.

For each type of information, there are two variables which influence the impact of the information on DWI: exposure rate and message content. Exposure rate refers to the frequency, duration, and extent to which the information reaches the driver; message content refers to the structure and meaning of the information, particularly its potential to modify the DWI decision of drivers.

Information for the general deterrence of DWI is generated by one or more of four subsystems: patrol deployment, arrest, adjudication, and public information. The interrelationships among the four subsystems, and the flow of information generated by each, are illustrated in Figure 1. Of particular significance to this analysis are the paths of information flow to the DWI decision. These are the paths that are important to the general deterrence of DWI; if DWI is to be deterred, it will be through the exposure rate and message content of the information which flows along these paths to the DWI decision. Thus, DWI deterrence might be enhanced by changing the subsystems which generate the information.

Activities within several different types of agencies are involved in the four subsystems. Police, prosecutors, courts, and mass communications are involved directly; legislators and administrators are involved indirectly. For example, city administrators control enforcement policies within the legal framework established through legislation; however, the enforcement agency and individual patrol officers define the actual practices employed in the enforcement of DWI laws. The prosecuting attorney weighs the evidence against an arrested driver and decides to prosecute or negotiate. Using personal discretion, a presiding judge might impose a sanction, accept a negotiated plea, or dismiss the case. Finally, although information might be made available by the enforcement or adjudicative agencies, exposure of the information to the public depends upon the actions of mass communications. A summary of the functions performed, information generated, and agencies involved is provided for each subsystem in Table 1.

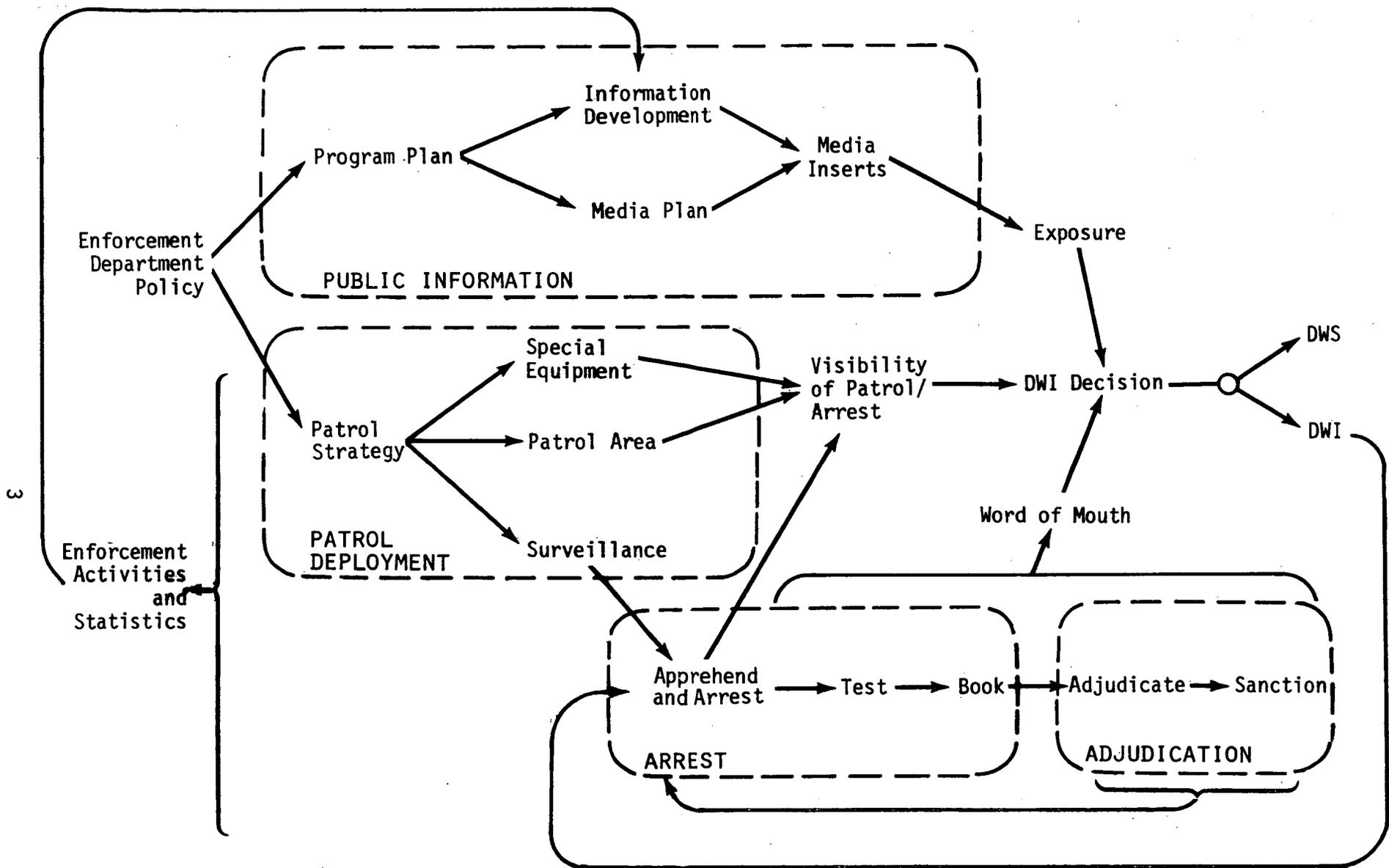


Figure 1. The DWI general deterrence system flow diagram.

TABLE 1

DWI GENERAL DETERRENCE SUBSYSTEMS, FUNCTIONS, INFORMATION FEEDBACK PATHS
AND PERFORMING AGENCIES

Subsystem	Overall Function	Information Feedback	Performing Agency
Patrol Deployment	1) Enforcement exposure 2) DWI Surveillance	1) Enforcement visibility exposure 2) Word-of-mouth exposure 3) Message content for public information	Enforcement
Arrest	Detection, apprehension, and citation of offenders	1) Word-of-mouth exposure 2) Message content for public information and visibility	Enforcement
Adjudication	Process and sanction of offenders	1) Word-of-mouth exposure 2) Message content for public information and visibility	1) Court system 2) Prosecutor
Public Information	Exposure of enforcement activity by mass communication	1) Public information exposure	1) Enforcement 2) Mass media

SUBSYSTEM ANALYSES

Typical patrol deployment, arrest, and adjudication subsystems were defined from analyses of the procedures employed in a sample of 25 jurisdictions. Information from secondary sources (Hawkins, et.al., 1976, Loveless, et.al., 1975 a-d, NHTSA, 1972, NHTSA, 1974) was available for a sample of 22 jurisdictions which had participated in Alcohol Safety Action Projects (ASAP); these data were supplemented with surveys of three non-ASAP jurisdictions--rural areas of the state of New Jersey; Santa Ana, California (with an ongoing DWI enforcement program); and Tacoma, Washington (with no special emphasis on DWI enforcement).

The public information subsystem was defined mainly from secondary sources which presented commercial promotional strategy and communications theory (Engel, et.al., 1971 and Sandage and Fryburger, 1971). The few public information programs found to be directed toward DWI were so poorly defined that they defied description of a typical subsystem. As a consequence, under the assumption that functions similar to those employed commercially would be applicable to DWI general deterrence, an "ideal" subsystem rather than a typical subsystem was defined for public information.

Four main types of descriptions were prepared for each subsystem: a *flow diagram* of the primary subsystem functions and interrelationships; a detailed *functional sequence diagram* showing how the typical subsystem operates; a *task sequence list* showing, for each task, the information needed, the decision involved, and the alternative actions to be taken; and a *listing of procedural alternatives* employed in the 25 different jurisdictions.

These descriptions were then used to explore subsystem changes that might lead to greater general deterrence of DWI. This part of the analysis was facilitated by results of the simulation experiments described in Volume I. Results of these experiments identified the system parameters which have the greatest potential influence on DWI deterrence. In general, those changes which influence the exposure rate and message content of DWI enforcement activity and the exposure rate and message content of associated public information were assigned the highest priorities.

SUBSYSTEM CHANGES

The most promising changes to typical existing subsystems are presented below. Based on the analyses completed, research on and development of these alternatives are likely to have the greatest long-term payoff for the general deterrence of DWI. These alternatives are not necessarily new; many have been employed or emphasized previously in some form or another. However, they are not now typical of existing subsystems.

PATROL DEPLOYMENT

- *Selective enforcement.* The use of special-emphasis patrol units at times and locations of high DWI incidence and high traffic density might increase exposure of patrol units to drivers. (Selective patrol was used universally in ASAP jurisdictions; although its use was found to increase enforcement rate, little was learned about its impact on perceived risk of DWI).
- *Patrol strategies.* Some strategies might be better than others for increasing the actual exposure of drivers to patrol or increasing the perceived rate of DWI enforcements. Alternatives include random patrols, random rotation of saturation patrol from area to area, patrol of areas of high DWI incidence, etc. Some trade-off might be necessary among patrol exposure, perceived enforcement rate, and actual enforcement rate. Research is needed to determine the relative impact of alternative strategies in terms of perceived risk of DWI.
- *Patrol conspicuity.* Both the exposure rate and message content of information generated from patrol deployment might be enhanced by increasing the conspicuity of patrol vehicles. Research is required to determine the most effective types of equipment and markings in terms of information exposure rate and message content.

ARREST

- *DWI detection procedures and skills.* A detection model--cues, procedures, and strategies--is needed to increase the accuracy of DWI detection. The emphasis should be on identifying the most discriminating cues from among those most frequently encountered during patrol, and on developing skills among patrol officers in using these cues for DWI detection. (This research has been initiated under Contract DOT-HS-7-01538). Both actual enforcement rate and perceived enforcement rate is likely to be enhanced by the implementation of a more efficient DWI detection model.
- *Pre-arrest breath testing.* The use of procedures in which a patrol officer routinely conducts a breath test, in the field, prior to arrest, of any driver suspected of DWI, is likely to increase both the actual and perceived enforcement rate. Twelve states presently

have statutes which permit, under varying circumstances, pre-arrest breath testing; legislative action would be required in the remaining states. However, the mixed results with respect to DWI deterrence in states which now have statutes suggests that much research and development is required before the potential value of pre-arrest breath testing procedures can be realized.

- *Evidential field testing.* The use of a breath sample collector or a portable breath tester of evidential quality has the potential of increasing enforcement rate by reducing the amount of time required of the patrol officer for transporting and processing a DWI suspect, thus increasing the time available for enforcement activity. The suspect could be cited and released to a responsible individual or at the suspect's residence.

ADJUDICATION

- *Administrative adjudication.* In lieu of traditional litigation and sanction, administrative adjudication might enhance the general deterrence of DWI. Current adjudication procedures are typically time-consuming and seldom provide certain results. As a consequence, the information now generated by the adjudication subsystem often has a negative impact on DWI general deterrence. The deterrent effect on the driver that would otherwise come from knowledge that justice is swift and certain is often mitigated; the potential for motivating police agencies and patrol officers to enforce DWI laws is frequently lost.
- *Trial procedures.* Modifications in trial procedures might increase both the motivation and cost-effectiveness of the enforcement effort, and thereby increase the rate of DWI enforcement. Trial only by judge, the use of judicial notice for evidential testing, and modifications of court scheduling could reduce the enforcement resources required for adjudication, thus freeing these resources for the enforcement effort. Also, procedures that would eliminate plea bargaining and would enhance the consistency of judicial actions would probably increase the perceived risk of DWI.

PUBLIC INFORMATION

- *Subsystem design.* Little attention has been given to the optimal design of the public information subsystem procedures for the dissemination through mass communications media of information likely to deter DWI. Since the system analysis and simulation experiments indicated that this subsystem might have the greatest potential impact on DWI general deterrence, factors in its design appear critical. Therefore, priority research and development efforts should be devoted to design of this subsystem and to the process whereby public information is generated by other subsystems, but reaches the driver through mass communications media.

- *Exposure rate and message content.* As the two dimensions of information through which DWI general deterrence is influenced, exposure rates and message content need to be determined and specified for different communications media. Extensive amounts of information is generated by the patrol deployment, arrest, and adjudication subsystems; however, little is now known about what types of information influence the DWI decision or about the media and frequency of exposure required to effect the DWI decision. As a consequence, research and development efforts are required to address these issues.

PATROL DEPLOYMENT SUBSYSTEM

Patrol deployment generates two kinds of information that might influence the DWI decision: information on specific enforcement actions which is transmitted by word-of-mouth, and visibility of the enforcement presence which is transmitted directly. Exposure rates of both types of information vary with the number of patrol units and the traffic density of the patrolled area.

FUNCTIONAL ANALYSIS

A flow diagram of the primary functions and interrelationships of patrol deployment is presented in Figure 2. A detailed functional sequence diagram showing how the typical patrol deployment subsystem operates is presented in Figure 3. This diagram also shows the specific individual or unit in the enforcement agency which performs each function. A task sequence list for patrol deployment is provided in Table 2. For each task the information needed, decision involved, and alternative actions to be taken are shown.

EXISTING PROCEDURES

The analysis of existing patrol deployment procedures revealed significant variation among jurisdictions in types of patrol, methods for selecting patrol areas, nature and extent of special DWI training, and efforts to enhance patrol visibility. In Table 3 the typical procedure is described and then followed by noted deviations from these procedures within the various jurisdictions studied.

As noted, all of the ASAP jurisdictions employed selective patrol. Roadblocks were tried in only a few cases but were discontinued because they were found to be inefficient by the enforcement agency (number of DWI arrests were low) and because the reaction of the public was negative (Loveless, et.al., 1975c). Saturation patrol of areas with high alcohol-related incidences was reportedly used by only one jurisdiction.

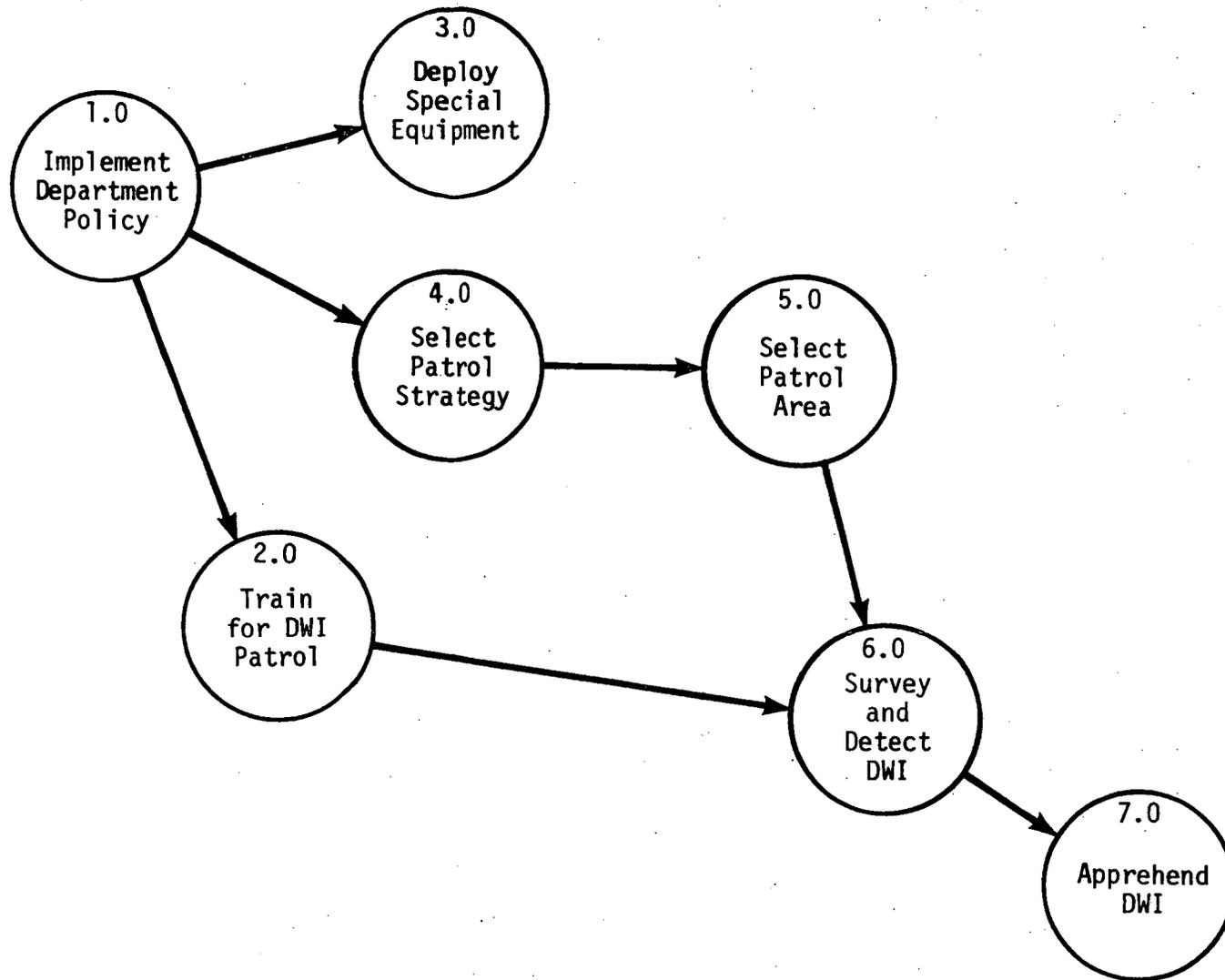


Figure 2. Patrol deployment subsystem flow diagram.

INDIVIDUAL OR PERFORMING UNIT

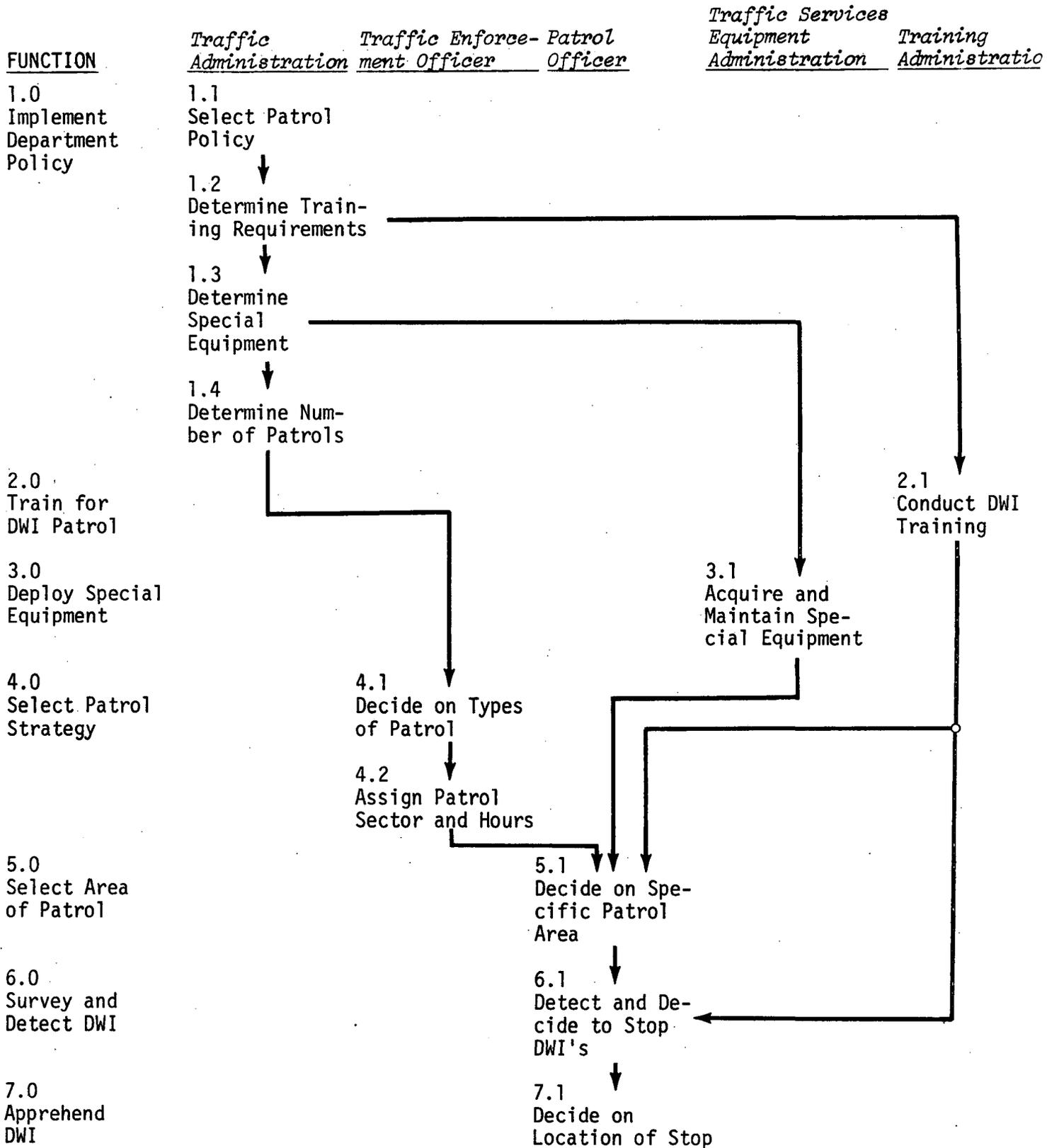


Figure 3. Patrol deployment functional sequence diagram.

TABLE 2

TASK SEQUENCE LIST OF PATROL DEPLOYMENT FUNCTIONS

	Information Requirements	Decisions Required	Actions
1.1 Select Patrol Policy	1) Supervisor's attitude 2) Department policy on selective enforcement 3) Department budget	1) To select patrol policy	1) Select enforcement strategy 2) Allocate budget for personnel and equipment
1.2 Determine Training Requirements	1) Budget allocation	1) To select training program	1) Specify requirements for training branch
1.3 Determine Special Equipment	1) Budget allocation 2) Enforcement strategy	1) To select special equipment 2) To select markings of equipment for high conspicuity	1) Specify requirements for traffic services equipment branch
1.4 Determine Number of Patrols	1) Budget allocation 2) Enforcement strategy	1) To select the number of patrols	1) Request personnel 2) Send directive to enforcement officer
2.1 Conduct DWI Training	1) Requirements for DWI training	1) To select special DWI training or include in basic training	1) Implement DWI training
3.1 Acquire and Maintain Special Equipment	1) Requirements for special equipment 2) Budget allocation	1) To select equipment 2) To determine deployment and maintenance schedules	1) Request personnel 2) Send directive to enforcement officer

TABLE 2 (Cont.)

	Information Requirements	Decisions Required	Actions
4.1 Decide on Types of Patrol	<ul style="list-style-type: none"> 1) Enforcement strategy 2) Personnel and equipment 	<ul style="list-style-type: none"> 1) To select type of patrol 	<ul style="list-style-type: none"> 1) Select patrol type
4.2 Assign Patrol Sector and Hours	<ul style="list-style-type: none"> 1) Patrol type 2) Personnel and equipment 3) Sector traffic density, DWI arrest and accident frequency 	<ul style="list-style-type: none"> 1) To assign personnel 2) To select deployment schedule 3) To assign sectors 	<ul style="list-style-type: none"> 1) Assign personnel to patrol type, sectors, and hours.
5.1 Decide on Specific Patrol Area	<ul style="list-style-type: none"> 1) Patrol type 2) Sector assignment 3) Training and experience 	<ul style="list-style-type: none"> 1) To select area 2) To select patrol pattern 	<ul style="list-style-type: none"> 1) Patrol area 2) Survey for DWI's
6.1 Detect and Decide to Stop DWI's	<ul style="list-style-type: none"> 1) Detection cues 2) Department and personal policy 3) Experience 	<ul style="list-style-type: none"> 1) To apprehend driver 	<ul style="list-style-type: none"> 1) Attract driver's attention
7.1 Decide on Location of Stop	<ul style="list-style-type: none"> 1) Experience 2) Department policy 	<ul style="list-style-type: none"> 1) To select location of apprehension 	<ul style="list-style-type: none"> 1) Stop vehicle at pre-determined location

TABLE 3

SIMILARITIES AND DIFFERENCES IN PATROL DEPLOYMENT PROCEDURES
FOR THE ASAP PROGRAMS

	Patrol Strategy	Patrol Area	Special Equipment	DWI Training
Nominal Case for ASAP	Selective patrol was used with one or two man units on a volunteer basis.	Patrol was assigned to areas. Patrols were allowed to patrol randomly or at high DWI areas.	Marked police cruisers were used.	Patrol officers had no special DWI training.
Differences Between Individual Sites Phoenix, AZ.		Alcohol-related accident statistics were used to define sector. Patrol units were rotated from sector to sector.	Motorcycles were used for patrol.	
Pulaski Co., AR.		There was no area assignment.		
Covina, CA.		There was no area assignment.	Mobile van was used for evidential field tests.	
Tampa, FL.		Alcohol-related statistics were used to select patrol areas.		
Columbus, GA.				Patrol officers had 80 hours of special DWI training.

TABLE 3 (Cont.)

	Patrol Strategy	Patrol Area	Special Equipment	DWI Training
Indianapolis, IN.		Alcohol-related statistics and traffic volume were used to select areas.	Mobile vans were used for evidential field tests.	
New Orleans, LA.			Mobile vans were used for evidential field tests.	
Maine		Alcohol-related statistics and traffic volume were used to select areas.		
Baltimore, MD.		There was no area assignment.		
Boston, MA.		Traffic volume and accident occurrence were used to select areas.		Patrol officers had 10 hours of DWI training.
Hennepin Co., MN.		There was no area assignment.	Mobile van was used for evidential field tests.	
Kansas City, MO.		Accident, traffic and drinking establishments were used to select areas.		

TABLE 3 (Cont.)

	Patrol Strategy	Patrol Area	Special Equipment	DWI Training
Lincoln, NE.		Alcohol-related statistics were used to select areas.		
New Hampshire				
Cincinnati, OH.	Saturation patrol of high alcohol-related incidences.			Patrol officers have special DWI training.
Oklahoma City, OK.	Roadside checkpoints were used in addition to random patrol.	Areas were selected on number of accidents, number of drinking establishments, and experience.	Mobile vans were used for evidential field tests.	Patrol officers had 12 hours DWI enforcement training.
Richland Co., S.C.		Areas were selected on traffic volume.		
South Dakota	Roadside checkpoints were used in addition to random patrol.	Areas were selected by alcohol-related accidents.		
San Antonio, TX.			Mobile van was used for public information.	Patrol officers had 12 hours DWI training.

TABLE 3 (Cont.)

	Patrol Strategy	Patrol Area	Special Equipment	DWI Training
Salt Lake City, UT.		No area assignment.		
Vermont	Roadside checkpoints were used in addition to random patrol.			Patrol officers had special DWI training
Fairfax, VA.			Mobile vans were used for evidential field tests.	

Patrol assignment was by geographic area in most ASAP jurisdictions. Where area assignment occurred, it was based on the following factors: incidence of alcohol-related accidents, incidence of alcohol-related arrests, traffic density, and number of drinking establishments. The patrol within the assigned area was left to the discretion of the patrol unit which typically patrolled randomly with concentration on high DWI incident locations within the area.

DWI activity was typically no more conspicuous than regular patrol. Regularly marked patrol vehicles were used almost universally; only a few communities added special DWI markings. Several jurisdictions had mobile vans for evidential testing and for the dissemination of public information. The vans had special conspicuous markings denoting DWI enforcement. However, patrol officers tend to avoid stopping DWI suspects in conspicuous areas for the stated reason of protecting both the driver and patrol officer from harassment and injury.

Most jurisdictions did not have special training programs for DWI enforcement. Patrol officers were trained on the job to detect cues, conduct and evaluate physical coordination tests, and to employ appropriate arrest procedures. However, several ASAP programs did provide special course work for officers engaged in selective patrol.

As shown in Table 4, comparable results were obtained for the non-ASAP jurisdictions surveyed. Deployment procedures included regular patrol only as well as selective DWI-emphasis patrol. In each jurisdiction, the patrol was random at the patrol officer's discretion within assigned patrol areas. In one jurisdiction, Santa Ana, special DWI markings were employed on patrol equipment. Special DWI enforcement training programs were not available at any of the jurisdictions surveyed.

PATROL DEPLOYMENT ALTERNATIVES

Alternatives to typical patrol deployment practices might increase exposure of the driver to patrol and of patrol to the driver, without increasing the number of patrol units. The three which appear to have the highest potential for DWI deterrence are summarized below. Each procedure has been implemented previously but is not typical of existing practices.

TABLE 4

DIFFERENCES IN PATROL DEPLOYMENT PROCEDURES FOR THE THREE NON-ASAP JURISDICTIONS

Jurisdiction	Patrol Strategy	Patrol Area	Special Equipment
New Jersey State Police	<p>Regular - Patrol is divided into five troops. Three troops are assigned to area patrol and two troops are assigned to linear patrol.</p> <p>Selective - Tactical units are used for area patrol. These units may be assigned to DWI activity.</p>	<p>Patrol area and DWI enforcement are at the patrol officer's discretion.</p> <p>Patrol areas are assigned. Patrol officer uses his discretion within the area.</p>	None.
Santa Ana, Ca. City Police	<p>Regular - Patrols are assigned to sectors</p> <p>Selective - Drinking driver team selects patrol areas.</p>	<p>Patrol area and DWI enforcement are at the patrol officer's discretion.</p> <p>Patrol team selects high DWI incidence area. The usual area is the central area.</p>	A station wagon with block letters "Drinking Driver Team" is used. Three patrol cars are used by the team which have special markings.
Tacoma, Washington City Police	Regular patrols are assigned to sectors.	Patrol officer uses random patrol at his own discretion.	None.

- *Selective enforcement.* The use of special-emphasis patrol units at times and locations of high DWI incidence and high traffic density might increase enforcement visibility (selective patrol was universally used in ASAP jurisdictions and was found to increase the enforcement rate in these communities). However, research is required to determine the impact of selective enforcement on perceived risk of DWI.
- *Patrol strategy alternatives.* Some patrol strategies might be more effective than others in raising a driver's perceived risk of DWI, providing an impact beyond the actual exposure they provide. Alternatives include the random rotation of saturation patrol from area to area, the random rotation of roadside checkpoints or roadblocks from area to area (if allowed by statute), and different configurations of patrol patterns within the area. However, research is required to determine if certain patrol strategies and techniques are more effective than others.
- *Patrol conspicuity.* The use of special patrol equipment or visual markings on the patrol vehicles might increase the driver's awareness of DWI enforcement. Both the exposure rate and message content of information generated from patrol deployment might be enhanced by these measures. Some of the techniques which have been employed include mobile vans, special patrol wagons, and conspicuous letters and symbols signifying DWI patrol. Research is required to determine which of these various techniques actually increases information exposure rate, enhances message content, and, ultimately, increases the perceived risk of DWI.

DWI ARREST SUBSYSTEM

The arrest subsystem might influence the DWI decision through the generation of three types of information: word-of-mouth, enforcement visibility, and public information. Changes in the subsystem might enhance DWI general deterrence in two ways. First, improved detection and arrest procedures are likely to increase enforcement efficiency and hence the enforcement rate. Second, changes which reduce the amount of time spent by patrol officers in other than enforcement activities are also likely to increase enforcement rate. Increases in enforcement rate, in turn, might enhance both exposure rate and message content of information fed back to the driver to deter DWI.

FUNCTIONAL ANALYSIS

A flow diagram of the primary arrest subsystem functions and interrelationships is provided in Figure 4. Seven primary functions are performed: apprehension, field sobriety testing, arrest, transportation to testing and booking facilities, evidential testing, booking, and release. A detailed functional sequence diagram is provided in Figure 5 to illustrate how the typical arrest subsystem operates. The task sequence list provided by Table 5 shows for each task the information needed, the decision involved, and the alternative actions that might be taken.

EXISTING PROCEDURES

A number of alternative procedures and procedural variations were found among the 25 jurisdictions studied. These differences are summarized in Tables 6 and 7. Those procedures which, upon review, appeared to have greatest potential for enhancing DWI general deterrence were identified and highlighted in the paragraphs which follow.

- *Prearrest breath screening.* Several ASAP jurisdictions experimented with prearrest breath screening as an aid to the arrest decision. In most cases the officer selected the test arbitrarily

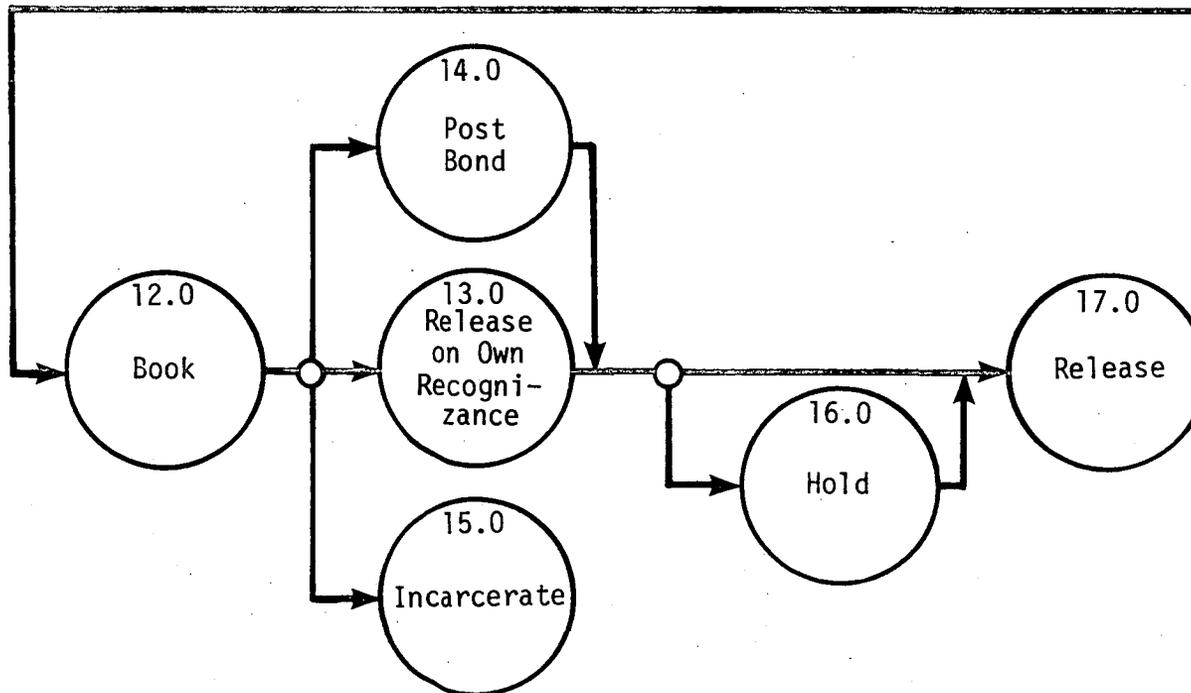
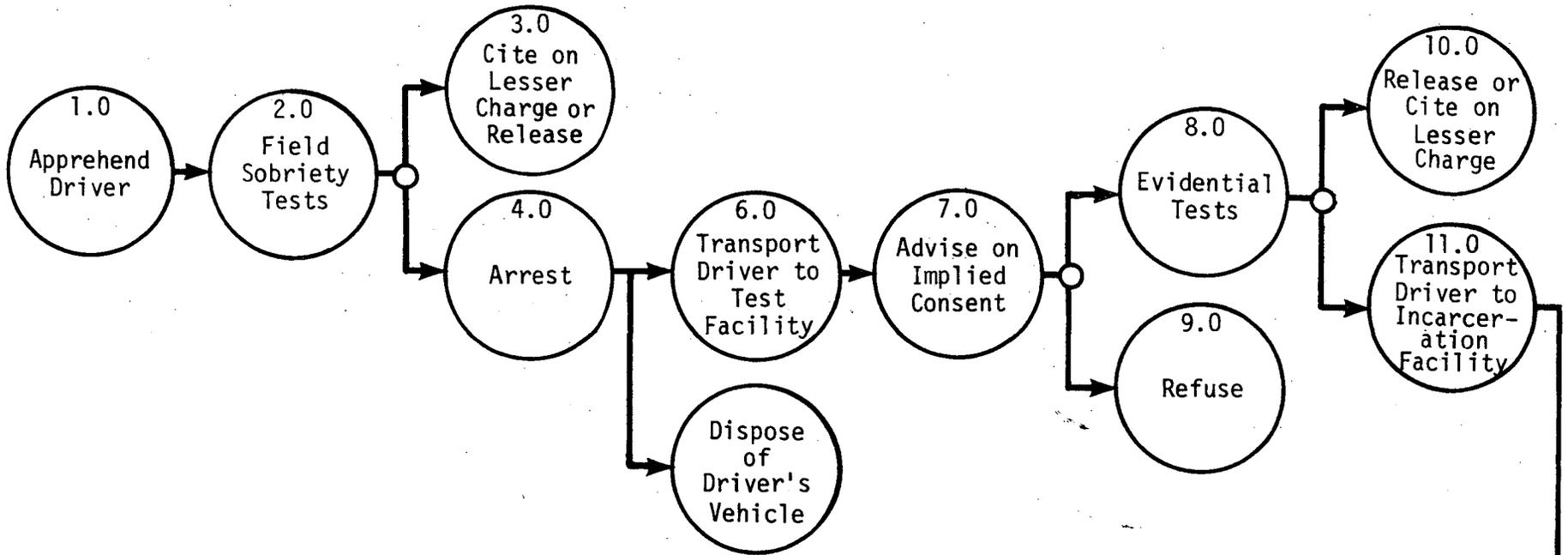


Figure 4. DWI arrest subsystem flow diagram.

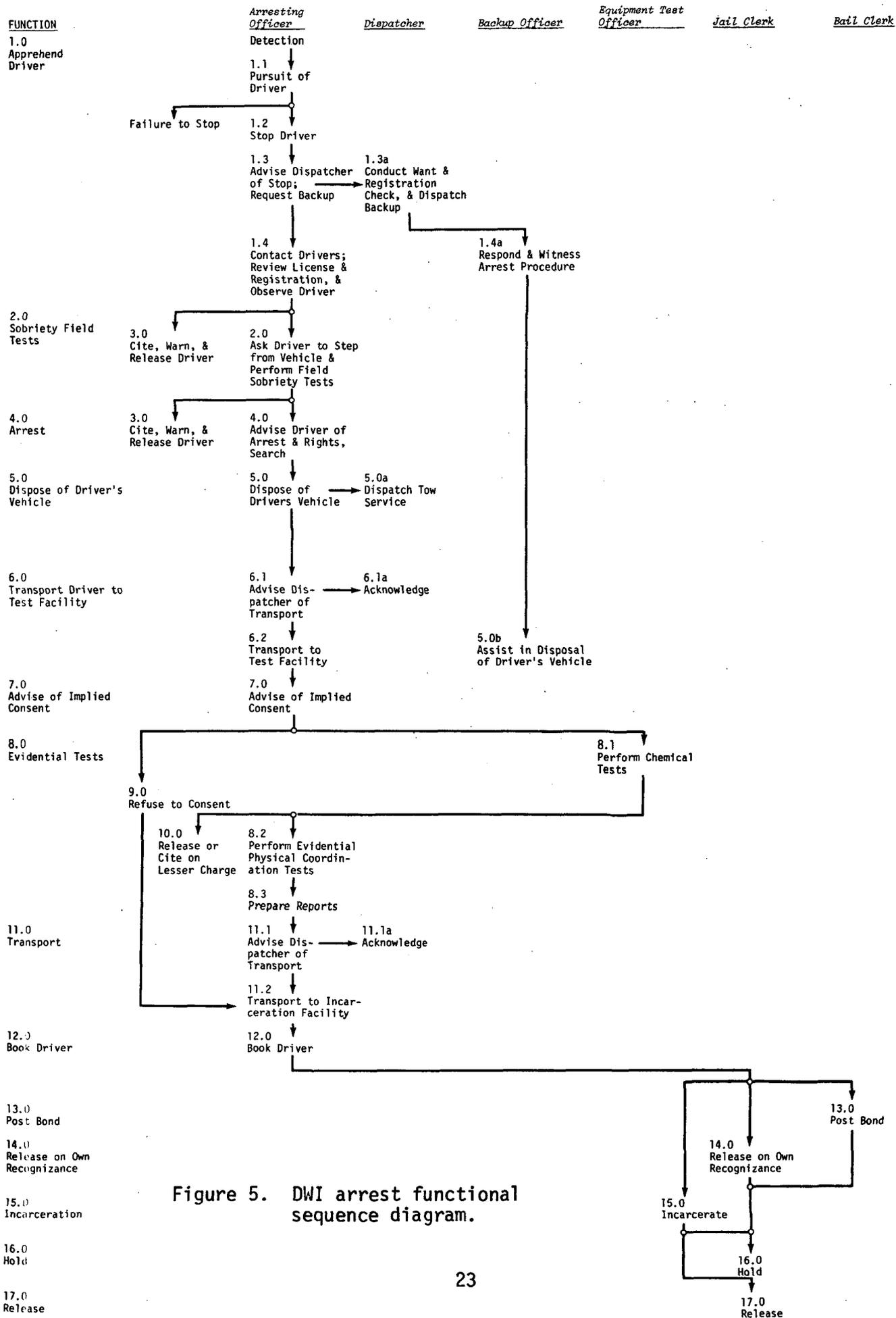


TABLE 5

TASK SEQUENCE LIST OF THE DWI ARREST FUNCTIONS

	Information Requirements	Decisions Required	Actions
1.1 Pursuit of Driver	1) DWI detection cues 2) Experience	1) To pursue driver	1) Pursue vehicle 2) Turn on flashing lights
1.2 Stop Driver	1) Driver yields and stops 2) License number	1) To notify dispatcher 2) To obtain a want check	1) Advise dispatcher of stop
1.3 Advise Dispatcher and Request Back-up	1) License number 2) Want check	1) To request backup 2) To approach vehicle	1) Request backup 2) Approach vehicle
1.4 Contact Driver, Review License and Registration, and Observe Driver	1) Driver's license and registration 2) Reactions of the driver	1) To release, cite, arrest, or perform field sobriety tests	1) Advise driver of reason for stop 2) Request license and registration 3) Request driver to step from vehicle
2.0 Ask Driver to Step from Vehicle and Perform Physical Coordination Tests	1) Reaction of driver during egress 2) Response of driver to physical coordination tests 3) Response of driver to breath screening tests	1) To arrest, cite, or release driver	1) Conduct physical coordination tests 2) Conduct breath screening test

TABLE 5 (Cont.)

	Information Requirements	Decisions Required	Actions
3.0 Cite, Warn, and/or Release Driver	<ol style="list-style-type: none"> 1) Driver appears sober 2) Moving violation was the detection cue 	<ol style="list-style-type: none"> 1) To cite, warn, and/or release driver 	<ol style="list-style-type: none"> 1) Cite or warn driver 2) Release driver
4.0 Advise Driver of Arrest and Rights, and Search Driver	<ol style="list-style-type: none"> 1) Conduct and behavior of driver 	<ol style="list-style-type: none"> 1) To advise of rights 2) To search and subdue driver 	<ol style="list-style-type: none"> 1) Advise of arrest or request driver to accompany officer 2) Inform driver of his rights 3) Search driver 4) Place driver in patrol vehicle
5.0 Dispose of Driver's Vehicle	<ol style="list-style-type: none"> 1) Department policy 2) Tow service available 3) Other driver available 4) Backup officer available 	<ol style="list-style-type: none"> 1) To search vehicle 2) To select method of disposal 	<ol style="list-style-type: none"> 1) Search vehicle 2) Release vehicle to responsible driver or tow service operator
6.0 Transport Driver to Test Facility	<ol style="list-style-type: none"> 1) Department procedures 2) Location of test facility 	<ol style="list-style-type: none"> 1) To select route to test facility 	<ol style="list-style-type: none"> 1) Notify dispatcher 2) Drive to test facility
7.0 Advise of Implied Consent	<ol style="list-style-type: none"> 1) Test alternatives 2) Driver's response 	<ol style="list-style-type: none"> 1) To select type of test 	<ol style="list-style-type: none"> 1) Advise driver 2) Select type of test 3) Release to test operator 4) Book driver if refused

TABLE 5 (Cont.)

	Information Requirements	Decisions Required	Actions
8.1 Perform Chemical Test	<ul style="list-style-type: none"> 1) Test apparatus and procedures 2) Test selected 3) Fifteen minute wait period satisfied 4) BAC reading 	<ul style="list-style-type: none"> 1) To retest 2) To release or book 	<ul style="list-style-type: none"> 1) Perform test 2) Record test results 3) Arresting officer witnesses
8.2 Perform Evidential Physical Coordination Tests	<ul style="list-style-type: none"> 1) Test procedures 2) Driver's response to tests 	<ul style="list-style-type: none"> 1) To evaluate and describe driver responses 	<ul style="list-style-type: none"> 1) Conduct tests 2) Record results
8.3 Prepare Reports	<ul style="list-style-type: none"> 1) Report forms 2) Information collected 	<ul style="list-style-type: none"> 1) To describe observations during detection and the arrest process 	<ul style="list-style-type: none"> 1) Fill out required reports
9.0 Refuse Chemical Test	<ul style="list-style-type: none"> 1) Refusal form 	<ul style="list-style-type: none"> 1) To incarcerate driver 	<ul style="list-style-type: none"> 1) Request driver to sign refusal form 2) Proceed to book driver
10.0 Release or Cite on Reduced Charge	<ul style="list-style-type: none"> 1) BAC reading below legal limit 2) Initial detection based on moving violation 	<ul style="list-style-type: none"> 1) To cite driver on other charge or release 	<ul style="list-style-type: none"> 1) Cite driver 2) Release driver
11.0 Transport to Incarceration Facility	<ul style="list-style-type: none"> 1) Department procedures 2) Location of facility 	<ul style="list-style-type: none"> 1) To select route to facility 	<ul style="list-style-type: none"> 1) Transport driver

TABLE 5 (Cont.)

	Information Requirements	Decisions Required	Actions
12.0 Book Driver	<ol style="list-style-type: none"> 1) Department procedures 2) Record check 	<ol style="list-style-type: none"> 1) To release driver according to policy 	<ol style="list-style-type: none"> 1) Allow driver to make phone calls 2) Fingerprint and photograph 3) Check records
13.0 Release Driver on Own Recognizance	<ol style="list-style-type: none"> 1) Department policy 2) Record check 3) Driver's state of intoxication 	<ol style="list-style-type: none"> 1) To release driver on own recognizance 2) To hold driver until detoxified 	<ol style="list-style-type: none"> 1) Issue citation and summons 2) Hold driver 3) Release driver
14.0 Post Bond	<ol style="list-style-type: none"> 1) Department procedures 2) Driver's record 3) Driver's ability to post bond 	<ol style="list-style-type: none"> 1) To select amount of bail 	<ol style="list-style-type: none"> 1) Review record and charges 2) Determine amount of bail 3) Collect bail and issue bailing slip to driver
15.0 Incarcerate	<ol style="list-style-type: none"> 1) Department procedures 2) Driver's appearance and condition 	<ol style="list-style-type: none"> 1) To determine if medical exam or treatment is required 	<ol style="list-style-type: none"> 1) Search driver 2) Remove valuables and personal items 3) Place in cell
16.0 Hold Driver	<ol style="list-style-type: none"> 1) Department procedure 2) Driver's state of intoxication 3) Time since arrest 	<ol style="list-style-type: none"> 1) To determine amount of time to hold driver 	<ol style="list-style-type: none"> 1) Place driver in holding cell 2) Issue summons 3) Release driver

TABLE 6

SIMILARITIES AND DIFFERENCES IN ARREST PROCEDURES FOR THE ASAP PROGRAMS

	Field Sobriety Testing	Arrest of Driver	Transport of Driver	Evidential Testing	Booking, Bail, Release	Records
Nominal case for ASAP	Officer discerned state of driver by appearance, odor of breath, and speech. Officer requested driver to step from vehicle and to perform physical coordination tests. Decision to arrest was based on officer's judgement of driving behavior and the above.	Officer advised driver of arrest and of Miranda rights. Officer "frisked" driver and placed him in patrol vehicle. Officer could arrest a driver involved in accident for DWI if he had reasonable proof the driver was operating the vehicle (according to statute).	Officer transported driver in patrol vehicle to test facility. Officer secured, released to responsible individual, or requested tow service for driver's vehicle. Officer remained at arrest scene until vehicle was removed.	Driver advised of implied consent and requested to take a breath test. Test was administered by test officer and arresting officer observed. If driver's BAC was below the legal limit he was released. If driver refused breath test he was booked for DWI and subject to administrative hearing for license revocation.	Driver was released after posting bail. If incarcerated, he was searched, personal effects removed and placed in holding tank.	<ol style="list-style-type: none"> 1) Citation or summons 2) Alcohol Influence Report 3) Arrest record 4) Refusal forms 5) Chemical Test Report
Differences between individual sites. Phoenix, AZ.		Officer advised driver of implied consent, collected breath sample, cited, and released driver to a responsible person.	As a rule the car did not require disposal.	Pre-labeled samples were analyzed by chemist.	Drivers were released on own recognizance at arrest site.	
Pulaski Co., AR.	Physical coordination test was given at the discretion of officer.				Driver could surrender license in lieu of posting bond. He was held for 6 hours.	
Boston, MA.	Alcohol Influence Report was filled in using observations of behavior.					

TABLE 6 (Cont.)

	Field Sobriety Testing	Arrest of Driver	Transport of Driver	Evidential Testing	Booking, Bail, Release	Records
Covina, Ca.				Driver could select breath, blood or urine test.	Driver was released on own recognizance after being held for 4-6 hours (L.A. Co.).	
Tampa, FL.				Physical coordination tests were given second time at station. Refusals were charged with 2 offenses: DWI and Implied Consent Refusal. Both charges were adjudicated by court. Officer had option to reduce charge to lesser offense.		
Columbus, GA.	No physical coordination tests were given. Breath screening was given with driver consent.	Officer must witness accident to arrest driver at scene of accident.		Drivers could choose between blood or breath test. Summons was issued after the test. Arresting officer had option to reduce charge.		
Indianapolis, IN.		Driver was not advised of arrest until after evidential tests.		Refusals were adjudicated by court. Mobile van responded to arrest site or if it were multiple arrests it remained at a fixed location within the patrolled area.	Driver could be released on own recognizance. Driver was held for 4 hours.	

TABLE 6 (Cont.)

	Field Sobriety Testing	Arrest of Driver	Transport of Driver	Evidential Testing	Booking, Bail, Release	Records
New Orleans, LA.				Physical coordination test was given at test facility. Mobile van responded to arrest site or was used at fixed location.		
Maine	Physical coordination tests were optional.			Driver was given choice of tests. Breath sample was collected at arrest site. Chemist reported BAC level via mail.		
Baltimore, MD.			City police called wagon, driver's vehicle was always impounded.	Driver was given choice of test. City police conducted physical coordination test at facility. Refusals appeared before commissioner.	Driver was charged before district commissioner. Driver was released on own recognizance.	
Hennepin Co., MN.	Breath screening was given at officer's discretion.			Mobile van responded to arrest site or was used at fixed location. Refusals were tried by a judge.	Driver was released on own recognizance.	
Kansas City, MO.	Physical coordination tests were given at officer's discretion.			Arresting officer performed the test. Physical coordination tests were performed at test facility. Arresting officer was allowed to reduce charge if BAC was less than 0.10.		

TABLE 6 (Cont.)

	Field Sobriety Testing	Arrest of Driver	Transport of Driver	Evidential Testing	Booking, Bail, Release	Records
Lincoln, ME.	Physical coordination tests were given at officer's discretion.			Officer was allowed to reduce charge if BAC was less than 0.10.		Survey report for tests under .10 BAC.
New Hampshire	Physical coordination tests were given at officer's discretion.			Arresting officer administered test. Officer could reduce the charge to operating after drinking.	Driver was released on own recognizance.	Operating after using intoxicating liquor report.
Cincinnati, OH.	No physical coordination tests were given.			Physical coordination tests were given at facility.	Driver was released on own recognizance	
Oklahoma City, OK.	No physical coordination tests were given.	Officer could charge DWI at accident if witness was present.		Driver could choose blood or breath. Mobile van was used at fixed location within area selective patrols were working.	Driver was held for 4 hours.	
Richland Co., S.C.	Physical coordination tests were given at officer's discretion.	Officer could charge with reckless driving or public drunkenness at accident.			Driver was held for 4 hours.	
South Dakota	The use of physical coordination tests varied with agency. The use of breath screening tests varied with agency.			Arresting officer could reduce the charge.	Driver was held for 4-6 hours.	Breath Screening Report

TABLE 6 (Cont.)

	Field Sobriety Testing	Arrest of Driver	Transport of Driver	Evidential Testing	Booking, Bail, Release	Records
San Antonio, TX.	No physical coordination tests were given.	Officer could arrest at scene of accident if there was a witness or the driver admitted it.				
Salt Lake City, UT.	Breath screening test was used experimentally.			Arresting officer could administer test. Arresting officer could reduce charge if under 0.5 BAC.	Driver was released on own recognizance.	
Vermont	Breath screening test was used experimentally.	Driver was advised of implied consent and breath sample was collected at site. Driver signed citation, consent and rights forms. Officer had authority to arrest at scene of accident..	Patrol transported driver home. Second officer transported driver's car.	Chemist analyzed sample. If under 0.10, the charge was reduced to reckless driving.	Driver was released on own recognizance after being driven home.	
Fairfax, VA.	Physical coordination tests were at officer's discretion. Breath screening was used experimentally.			Mobile van responded to arrest site or was used at fixed location.	Driver appeared before magistrate and a warrant was issued. Driver was held for 4 hours.	

TABLE 7

DIFFERENCES IN ARREST PROCEDURES FOR THE THREE NON-ASAP JURISDICTIONS

	Field Sobriety Testing	Arrest of Driver	Transport of Driver	Evidential Testing	Booking, Bail, Release	Records
New Jersey State Police	Officer discerns state of driver by appearance, breath, and speech. Officer requests driver to step from vehicle and perform physical coordination tests.	Officer advises driver of arrest. Miranda rights are not given. Officer has right to arrest a suspect at scene of accident.	Officer transports driver in patrol vehicle to test facility. Driver's vehicle is legally parked and secured or towed and impounded. If backup available, he takes responsibility for securing driver's vehicle.	Arresting officer conducts test if certified. Otherwise test operator conducts test and arresting officer witnesses. Physical coordination tests are conducted and used as evidence. If driver's BAC is below limit he is released. If driver refuses breath test he is booked for DWI and subject to administrative adjudication for license revocation.	Driver is released on his own recognizance. There is no minimal holding period.	<ol style="list-style-type: none"> 1) Traffic summons 2) Alcohol Influence Report 3) Drinking Driver Report 4) Refusal forms
Santa Ana City Police	Officer discerns state of driver by appearance, breath, and speech. Officer requests driver to step from vehicle and perform physical coordination tests.	Officer advises driver of arrest and of Miranda rights. Officer requests mobile test wagon to come to the scene of an arrest. Officer has the right to arrest a suspected DWI driver at scene of accident.	Officer transports driver to mobile test wagon if multiple arrests are occurring. After evidential test, officer transports driver to county jail. Driver's vehicle is legally parked and secured.	Test wagon officer conducts test and arresting officer witnesses. If driver's BAC is below the limit he is released at the discretion of the arresting officer. If driver refuses breath test he is booked for DWI and subject to administrative adjudication for license revocation.	Driver is booked at county jail and may be released on posting bail. There is a minimum 4-hour holding period.	<ol style="list-style-type: none"> 1) DWI report 2) Intoxilyzer Report 3) Arrest Report 4) Refusal form

TABLE 7 (Cont.)

	Field Sobriety Testing	Arrest of Driver	Transport of Driver	Evidential Testing	Booking, Bail, Release	Records
Tacoma City Police	Officer discerns state of driver by appearance, breath, and speech. Officer requests driver to step from vehicle and perform physical coordination tests.	Officer advises driver of arrest and Miranda rights. Officer has the right to arrest a suspect at scene of accident.	Officer transports driver in patrol vehicle to test facility. Driver's vehicle is legally parked and secured at arrest site, otherwise it is impounded. Arresting officer may wait or request backup.	Arresting officer conducts test if he is certified; otherwise he witnesses the test. Physical coordination tests are conducted and used as evidence. If driver's BAC is below limit he is released. If driver refuses breath test he is booked for DWI and subject to administrative adjudication for license revocation.	Driver is released on his own recognizance to a responsible individual. There is no minimal holding period.	<ol style="list-style-type: none"> 1) Traffic citation 2) Alcohol Influence Report 3) Arrest Report 4) Evidence form 5) Refusal form

and used personal judgement in deciding whether or not to test. Also, in most cases, prearrest breath screening was not covered by a statute and testing required the cooperation of the driver.

- *Breath sample collection.* Two jurisdictions collected breath samples for subsequent analysis. The arresting officer collected the sample, cited the driver, and either released the driver to a responsible person or provided transportation home.
- *Evidential testing at the arrest scene.* Employing a mobile van, some jurisdictions provided evidential testing at the arrest scene upon the request of the arresting officer. In some cases the van went to the location of the arrest; in other cases the van was at a fixed location in the area of patrol. When the BAC was above the legal limit the arrested driver was transported to the booking facility. Otherwise the driver was released. The primary advantage of the mobile van was the savings of time in those cases where the driver's BAC was below the legal limit.
- *Securing or releasing driver's vehicle.* Several jurisdictions employed procedures other than those which required towing the driver's vehicle to an impound area. Some would secure and leave the driver's vehicle at the arrest location. Others would release the driver's vehicle to a responsible individual.
- *Evidential test selection.* Many jurisdictions permitted the arresting officer to select the particular chemical test to be used for evidential testing. In these jurisdictions the breath test was selected unless the driver was incapacitated and unable to perform. In jurisdictions in which the driver was allowed to decide upon the test, the procedure was more involved and time consuming.
- *Breath test administration.* In many jurisdictions the arresting officer was certified to administer the breath test. Since the arresting officer was otherwise required to witness the test, allowing him to perform the test as well reduced staffing requirements.
- *Reducing the charge.* If a driver was below the legal BAC limit, some ASAP jurisdictions gave the officer the authority to reduce the charge to driving while impaired, in lieu of simply releasing the driver. Extending this authority to the arresting officer appeared to improve confidence in the arrest decision. There was less chance for false arrest or case dismissal, ultimately.
- *Releasing the arrested driver.* In some ASAP jurisdictions the suspect was given a citation and summons to appear, and then released on personal recognizance in lieu of booking, posting bond, or incarceration. Typically, for the protection of both the driver and the public, the suspect was held for a minimum detoxification period.

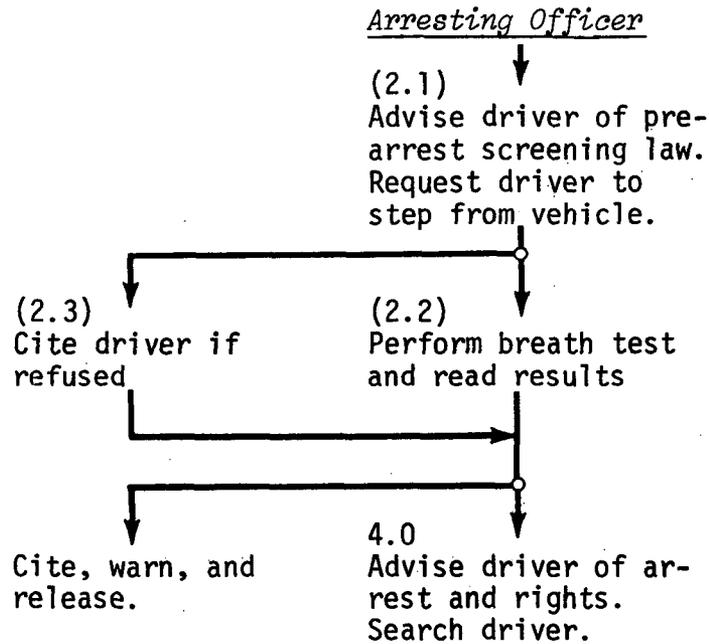
ARREST PROCEDURE ALTERNATIVES

As discussed in Volume 1, the general deterrence of DWI depends upon the credibility provided by a strong DWI enforcement program. Such a program depends on the ability and motivation of the patrol officer to detect and arrest the intoxicated driver. Thus, subsystem changes which might increase detection accuracy and associated arrest rate should, ultimately, impact the DWI decision via the information generated. Changes might effect information transmitted to the driver by both word-of-mouth and public information. Those changes in the DWI arrest subsystem which, as a consequence of the analyses performed, appear to have the greatest potential for DWI general deterrence are summarized below.

- *DWI detection procedures and skills.* A detection model--cues, procedures, and strategies--is needed to increase the ability of patrol officers to detect intoxicated drivers. The emphasis should be on identifying the most discriminating cues from among those frequently encountered during patrol and on developing skills among patrol officers in using these cues for DWI detection. The low detection probabilities that currently exist weaken the entire DWI enforcement system. Not only would the actual enforcement rate be enhanced by the implementation of a more efficient model, but the perceived enforcement rate should as well. Research has been initiated under Contract DOT-HS-7-01538 "On-the-Road Detection of DWI" for development and implementation of such a model.
- *Prearrest breath testing.* The use of procedures in which the patrol officer routinely conducts a breath test in the field prior to arrest of a driver suspected of DWI or involved in a traffic infraction is likely to increase both the actual and perceived enforcement rate. Twelve states have statutes which permit, under varying circumstances, prearrest breath testing. Legislative action would be required to initiate this procedure in other states. The changes in the arrest functional flow process and in the task analysis, should this procedure be initiated, are shown in Figure 6. Research is required to realize the potential value of prearrest breath testing procedures: the most effective methods of implementing procedures permitted by such statutes need to be determined; in addition, the impact of these laws and their implementation on both actual and perceived enforcement rates needs to be determined.
- *Evidential field tests.* Much time and effort is now consumed by transporting an arrested driver to a test facility for evidential chemical testing and possible incarceration. A breath sample collector or portable evidential breath tester employed by the arresting officer might increase the efficiency of arrest procedures. The procedural changes likely to result from the use of evidential field tests are summarized in Figure 7.

FUNCTION

2.0
Field Sobriety
Tests

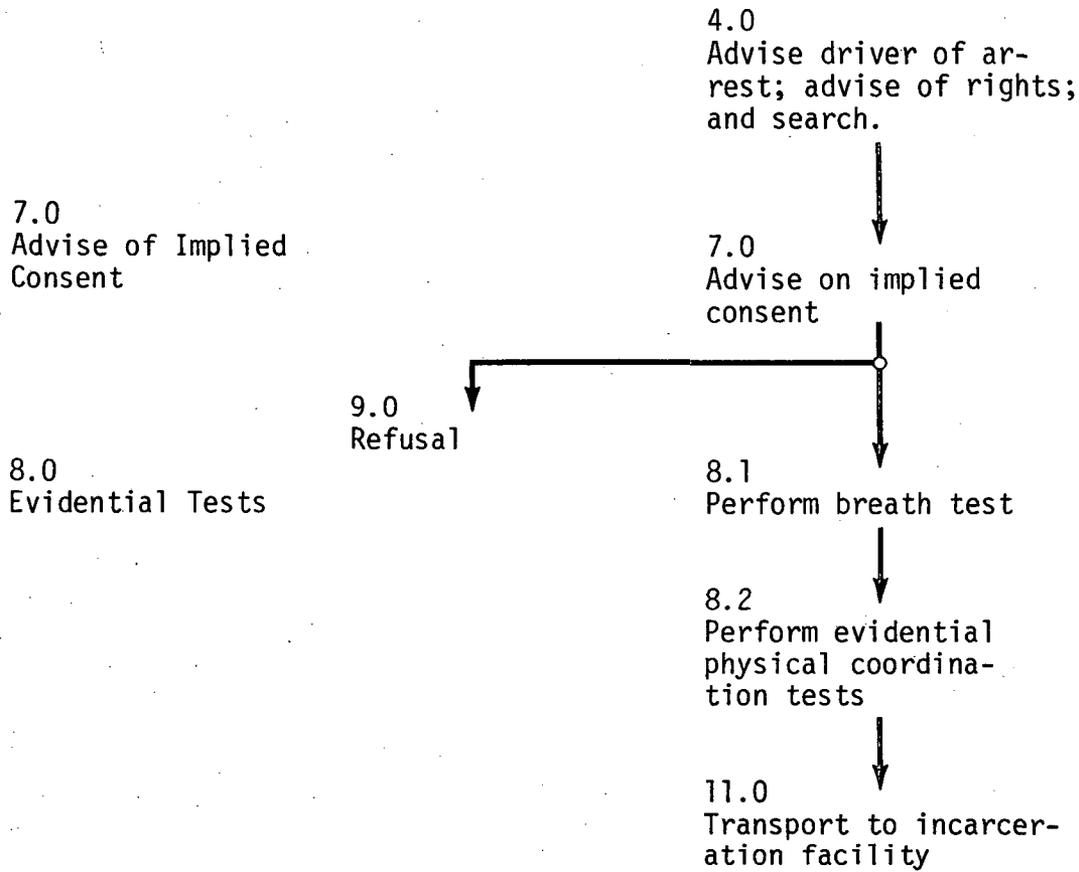


	<u>Information Requirements</u>	<u>Decision Requirements</u>	<u>Actions</u>
(2.1) Advise driver of prearrest screening law.	1) Driver involved in infraction or accident. 2) Reactions of the driver.	To arrest driver prior to test.	1) Advise of rights. 2) Request driver to step from vehicle.
(2.2) Perform breath test.	1) Results of breath test.	To arrest, release, or cite driver.	1) Perform test. 2) Read results.
(2.3) Cite driver for refusal.	1) Driver refuses to cooperate. 2) Reactions of driver.	1) To cite driver for refusal. 2) To arrest, release or cite driver for DWI.	1) Request driver to sign refusal form. 2) Cite driver for refusal.

Figure 6. Changes in functional and task sequences for prearrest breath testing.

FUNCTION

Arresting Officer

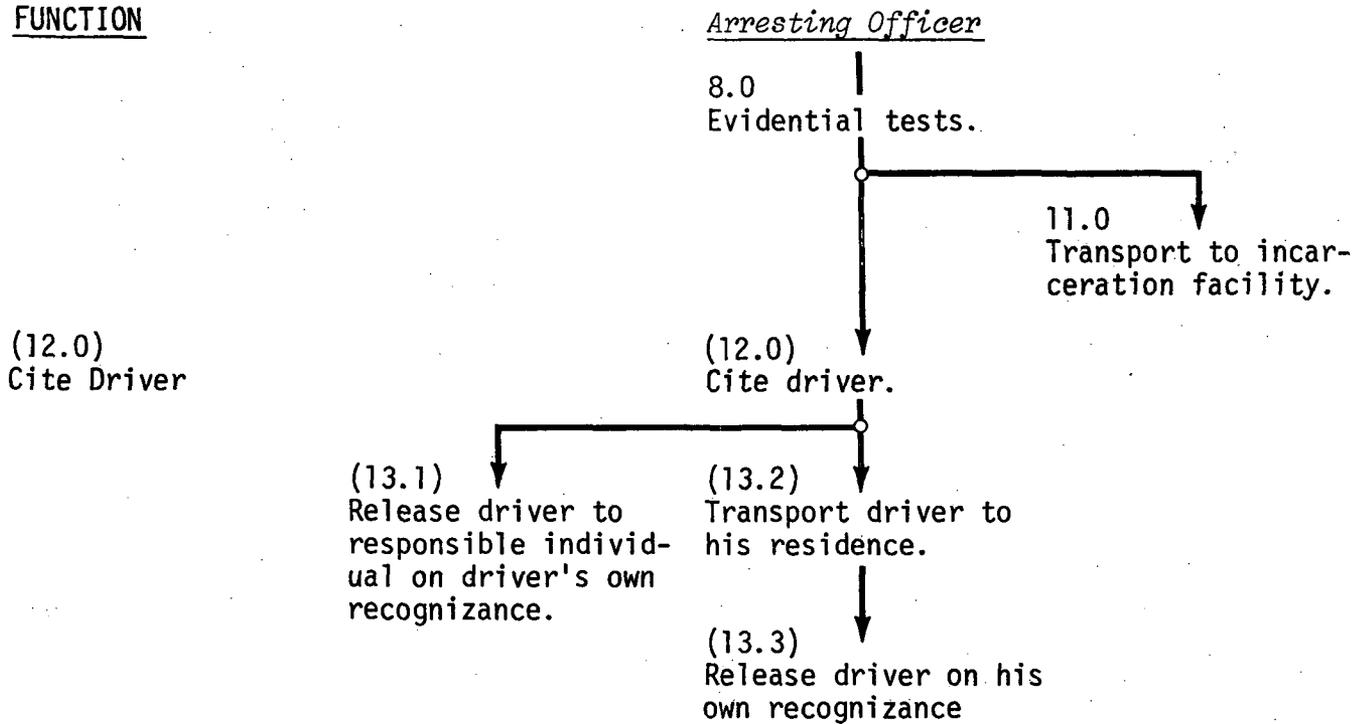


	<u>Information Requirements</u>	<u>Decision Requirements</u>	<u>Action</u>
8.1 Perform Breath Test	1) Fifteen minute wait period. 2) Test procedure. 3) BAC reading.	1) To retest. 2) To book or release.	1) Perform test. 2) Record results. 3) Release driver or prepare to incarcerate.

Figure 7. Changes in functional and task sequences for evidential field tests.

- *Citing and releasing an arrested driver.* Certain steps in the typical arrest procedure--transportation, booking, bond posting, incarceration--might be eliminated if the apprehended driver is cited and released to a responsible individual or transported to the driver's residence and released. The functional flow of this modified procedure is shown in Figure 8. Citing and releasing the driver would probably be employed in conjunction with an evidential field test. If so, a large reduction in the arrest processing time might result. For example, the average arrest processing time for ASAP jurisdictions was two hours (from apprehension to return of the arresting officer to patrol). In Phoenix where a breath sample was collected from the driver and the driver cited and released, the time required was twenty minutes (Loveless, et.al., 1975c). Research is needed to determine if reducing the number of processing steps actually enhances motivation toward DWI enforcement and results in an increased enforcement rate. In addition, the impact of these changes on perceived enforcement rate needs to be determined.

FUNCTION



	<u>Information Requirements</u>	<u>Decision Requirements</u>	<u>Action</u>
12.0 Cite Driver	1) State of driver (intoxication level).	1) To hold or release the driver.	1) Issue citation and summons. 2) Release or hold driver.
13.0 Transport Driver to His Residence	1) Location of driver's residence.	1) To transport driver to his residence.	1) Transport driver. 2) Release on own recognizance. 3) Complete reports.
14.0 Release to Responsible Individual	1) Availability of responsible individual.	1) To release driver.	1) Release driver. 2) Complete reports.

Figure 8. Changes in functional and tasks sequences for citing and releasing an arrested driver.

DWI ADJUDICATION SUBSYSTEM

The adjudication subsystem can provide information to the DWI decision through word-of-mouth and mass communications media. Message content consists mainly of the certainty and severity of sanction for the DWI offense. In addition, adjudication might impact the emphasis and effectiveness of DWI enforcement. For example, leniency in the disposition of persons arrested for DWI might reduce enforcement motivation and, hence, enforcement rate.

Because of prosecutor and court resource limitations, many cases are disposed of through diversion programs or by plea bargaining. These methods tend to satisfy the requirements of the prosecutors and courts because they keep the number of court cases at a manageable level and yet show a large percentage of convictions. However, they have a potentially negative influence on DWI general deterrence. The driver's perceived risk of DWI might be lessened as a consequence of reduced enforcement rates and the possibility of less certain and less severe sanctions.

FUNCTIONAL ANALYSIS

A flow diagram of the primary adjudication functions and interrelationships is presented in Figure 10. A detailed functional sequence diagram is provided in Figure 11 to show how the typical adjudication subsystem operates. A task sequence list is presented in Table 8; it shows, for each task, the information needed, the decision involved, and the alternative actions to be taken.

EXISTING PROCEDURES

Adjudication procedures were found to vary substantially among the 25 different jurisdictions studied. The analysis focused on procedural differences in arraignment, diversion, prosecution, plea negotiation, and trial. The results are summarized in Table 9 in which the typical (modal) case is presented first followed by differences found between each ASAP jurisdiction

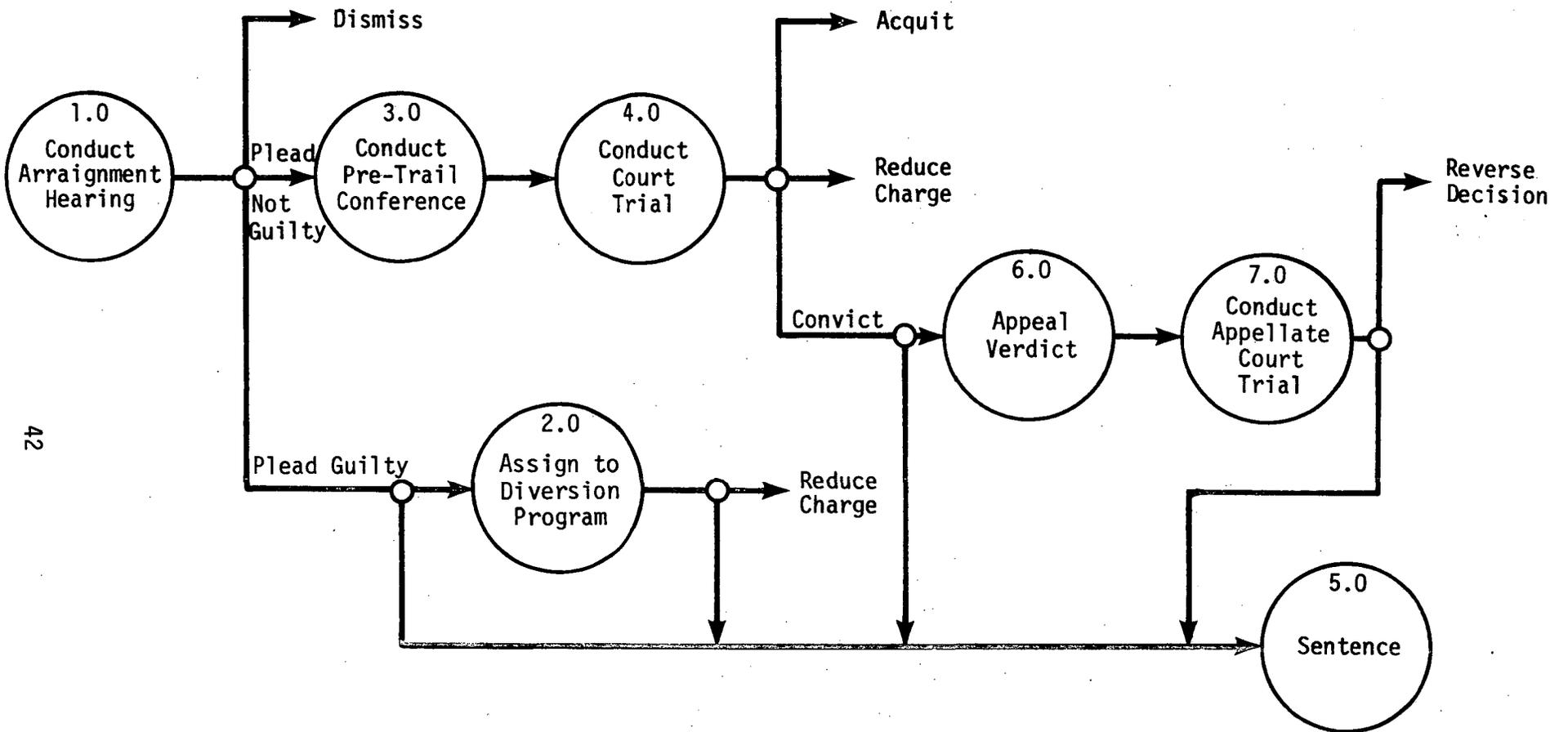


Figure 9. DWI adjudication subsystem flow diagram.

PERFORMING INDIVIDUAL OR UNIT

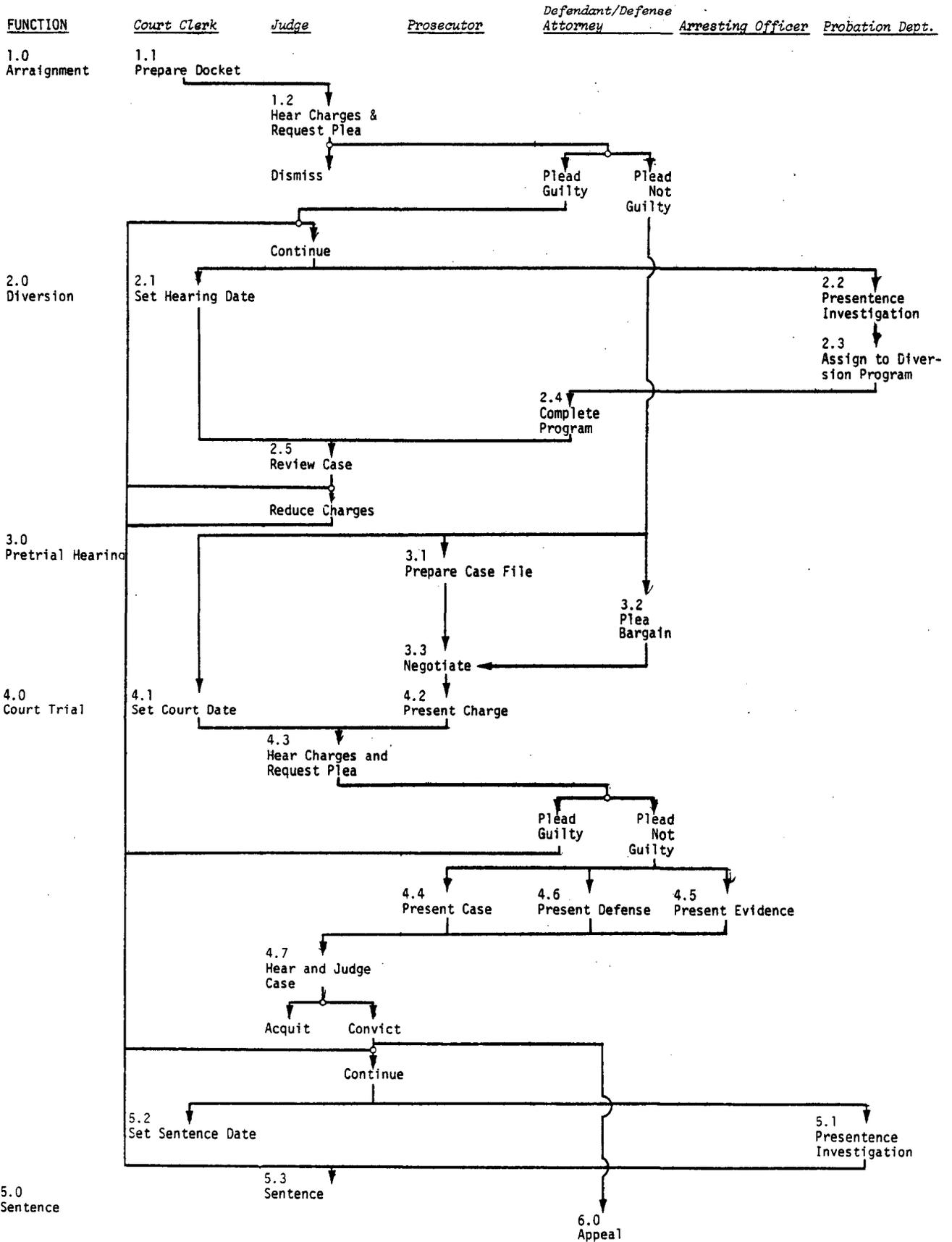


Figure 10. DWI adjudication functional sequence diagram.

TABLE 8

TASK SEQUENCE LIST OF DWI ADJUDICATION FUNCTIONS

	Information Requirements	Decisions Required	Actions
1.1 Prepare Docket	<ol style="list-style-type: none"> 1) Summons citation 2) Alcohol Influence Report 3) Chemical test report 	<ol style="list-style-type: none"> 1) To set arraignment date 	<ol style="list-style-type: none"> 1) Obtain driver's records 2) Prepare docket 3) Set arraignment date
1.2 Hear Charges and Request Plea	<ol style="list-style-type: none"> 1) Docket file 2) Defendant's plea 3) Prosecutor's recommendation 4) Defendant's record 	<ol style="list-style-type: none"> 1) To determine if evidence is sufficient 2) To accept plea 3) To determine if defendant should enter diversion program 	<ol style="list-style-type: none"> 1) Dismiss case 2) Continue case on completion of diversion 3) Continue for court trial, or 4) Sentence
2.1 Set hearing date	<ol style="list-style-type: none"> 1) Docket file 2) Guilty plea 3) Duration of diversion program 	<ol style="list-style-type: none"> 1) To set final hearing date 	<ol style="list-style-type: none"> 1) Set final hearing date
2.2 Presentence Investigation	<ol style="list-style-type: none"> 1) Defendant's record 2) Interview defendant 3) Diagnostic tests 	<ol style="list-style-type: none"> 1) To determine treatment requirements 	<ol style="list-style-type: none"> 1) Recommend treatment program 2) Prepare presentence report
2.3 Assign to Diversion Program	<ol style="list-style-type: none"> 1) Types of programs and availability 	<ol style="list-style-type: none"> 1) To select program 	<ol style="list-style-type: none"> 1) Assign defendant to a program
2.4 Complete Program	<ol style="list-style-type: none"> 1) Program requirements 	<ol style="list-style-type: none"> 1) To remain in program 	<ol style="list-style-type: none"> 1) Complete program

TABLE 8 (Cont.)

	Information Requirements	Decisions Required	Actions
2.5 Review Case	<ul style="list-style-type: none"> 1) Presentence reports 2) Completion of program 3) Court docket 	<ul style="list-style-type: none"> 1) To continue, reduce charges, or sanction 	<ul style="list-style-type: none"> 1) Reduce charges 2) Sentence the defendant
3.1 Prepare Case File	<ul style="list-style-type: none"> 1) Docket file 	<ul style="list-style-type: none"> 1) To determine if evidence warrants prosecution 	<ul style="list-style-type: none"> 1) File criminal complaint 2) Prepare case file
3.2 Plea Bargain	<ul style="list-style-type: none"> 1) Disclosure of evidence 2) Defendant's requirements 	<ul style="list-style-type: none"> 1) To determine if plea should be negotiated 	<ul style="list-style-type: none"> 1) Set pretrial conference with prosecutor 2) Negotiate with prosecutor
3.3 Plea Negotiation	<ul style="list-style-type: none"> 1) Case file 2) Court policy 3) Court backlog 4) Defendant's negotiation 5) Arresting officer's input 	<ul style="list-style-type: none"> 1) To accept plea to lesser charge 	<ul style="list-style-type: none"> 1) Enter in case file for presentation at court
4.1 Set Court Date	<ul style="list-style-type: none"> 1) Trial priority policy 2) Court backlog 3) Judge's instructions 4) Arresting officer's schedule 	<ul style="list-style-type: none"> 1) To determine court date 	<ul style="list-style-type: none"> 1) Assign trial date

TABLE 8 (Cont.)

	Information Requirements	Decisions Required	Actions
4.2 Present Charges	<ol style="list-style-type: none"> 1) Case file 2) Negotiated plea 3) Court hearing date 		<ol style="list-style-type: none"> 1) Present charges
4.3 Hear Charges and Request Plea	<ol style="list-style-type: none"> 1) Docket file 2) Prosecutor's charges 3) Defendant's record 4) Defendant's plea 	<ol style="list-style-type: none"> 1) To accept or reject 	<ol style="list-style-type: none"> 1) Accept plea or reject 2) Sentence if plea is guilty 3) Continue hearing
4.4 Present Case	<ol style="list-style-type: none"> 1) Case file 2) Driver arrest records 3) Judicial notices 4) Witnesses 	<ol style="list-style-type: none"> 1) To select method of presentation 	<ol style="list-style-type: none"> 1) Present evidence 2) Call witnesses
4.5 Present Evidence	<ol style="list-style-type: none"> 1) Alcohol Influence Report 2) Arrest report 3) Chemical test report 	<ol style="list-style-type: none"> 1) To select the method of presentation 	<ol style="list-style-type: none"> 1) Prepare statement 2) Present statement
4.6 Present Defense	<ol style="list-style-type: none"> 1) Disclosure of evidence 2) Defendant's statements 3) Defense witnesses 	<ol style="list-style-type: none"> 1) To select the method of presenting the defense 	<ol style="list-style-type: none"> 1) Present defense 2) Call defense witnesses
4.7 Hear and Judge Case	<ol style="list-style-type: none"> 1) Case presentation, testimony, and evidence 2) Defense 	<ol style="list-style-type: none"> 1) To convict or acquit 2) To sanction or continue for presence investigation 	<ol style="list-style-type: none"> 1) Pass judgement 2) Impose sanction or continue case

TABLE 8 (Cont.)

	Information Requirements	Decisions Required	Actions
5.1 Presentation Investigation	<ul style="list-style-type: none"> 1) Docket file 2) Guilty plea 3) Duration of diversion program 	<ul style="list-style-type: none"> 1) To set final hearing date 	<ul style="list-style-type: none"> 1) Recommend treatment or sentence 2) Prepare presentence report
5.2 Set Sentence Date	<ul style="list-style-type: none"> 1) Judge's instruction 2) Presentence investigation schedule 3) Court backlog and schedule 	<ul style="list-style-type: none"> 1) To determine hearing date 	<ul style="list-style-type: none"> 1) Set hearing date
5.3 Sentence	<ul style="list-style-type: none"> 1) Charges 2) Conviction or guilty plea 3) Presentence investigation report 4) Satisfactory completion of diversion program 5) Precedent 	<ul style="list-style-type: none"> 1) To select sanction 	<ul style="list-style-type: none"> 1) Pronounce sentence

TABLE 9

SIMILARITIES AND DIFFERENCES IN ADJUDICATION PROCEDURES FOR THE ASAP PROGRAMS

	Arraignment	Diversion Program	Prosecution	Plea Negotiation	Court Trial
Nominal case for ASAP	Arraignment occurred within 48 hours of arrest between the defendant, judge, and prosecutor. The defendant was advised of his rights and asked for a plea of guilty or not guilty. For a guilty plea the judge pronounced sentence. For a not guilty plea the judge continued the case for a court trial.	A rehabilitation program was part of the sentence.	The prosecutor became involved when not guilty pleas were entered. The prosecutor decided if there was enough evidence for a criminal complaint, prepared a case file, and notified the defendant of the court date.	The defense attorney negotiated with the prosecutor to lower the charge for a guilty plea in a pretrial conference. The prosecutor negotiated in order to obtain a conviction and to lower the court backlog.	For most jurisdictions DWI cases were tried by a judge. The prosecutor presented the case, the arresting officer was required to testify, and the chemical test evidence was presented. If the chemical test was challenged, the test operator was required to testify. Upon conviction, the judge pronounced sentence or continued the case and based the sentence on the presentence investigation report.
Differences between individual sites Phoenix, AZ.		A diversion program was offered in lieu of litigation. For a guilty plea, a presentence investigation was conducted by the probation department. Based on its findings the defendant is assigned to a treatment program. Upon successful completion the judge will lower the charge to reckless driving.			

TABLE 9 (Cont.)

	Arrestment	Diversion Program	Prosecution	Plea Negotiation	Court Trial
Pulaski Co., AR.					Defendant elected between judge and jury trial.
Covina, CA.					Defendant elected between judge and jury trial.
Tampa, FL.				Plea bargaining occurred at court prior to trial.	Defense attorney filed motion for jury trial.
Columbus, GA.	Case heard one day after arrest by recorder's court. Arresting officer acted as prosecutor. Not guilty pleas were turned over to state court.			Plea bargaining "did not occur".	
Indianapolis, IN.				Plea bargaining occurred at court prior to trial.	Defendant selected judge or jury.
New Orleans, LA.				Arresting officer was part of pretrial conference.	
Maine					
Baltimore, MD.		Probation without verdict wherein defendant completed rehabilitation and charges were essentially dropped.			
Hennepin Co., MN.					

TABLE 9 (Cont.)

	Arrestment	Diversion Program	Prosecution	Plea Negotiation	Court Trial
Kansas City, MO.				There were no pretrial conferences. Arresting officer was involved in plea bargaining before court trial.	
Lincoln, NE.		Charges were dropped on completion of a rehabilitation program.		Pretrial conferences were held in unusual cases.	
New Hampshire			Arresting officer was prosecutor.	There were no pretrial conferences.	
Cincinnati, OH.				Arresting officer attended pretrial conference.	
Oklahoma City, OK.				Plea bargaining occurred at court prior to trial.	Defendant selected judge or jury trial.
Richland Co., S.C.		Charges were reduced on completion of a rehabilitation program.			Defendant was tried by jury.
South Dakota				Arresting officer attended pretrial conference.	
San Antonio, TX.				Charge reduced to public intoxication in plea bargaining.	
Salt Lake City, UT.				Plea bargaining was <i>not</i> a usual procedure.	Defendant selected judge or jury trial.
Vermont				Arresting officer attended conference.	
Fairfax Co., VA.		Charges were reduced on completion of a rehabilitation program.			

and the typical case. Differences among the non-ASAP jurisdictions are presented in Table 10.

ADJUDICATION ALTERNATIVES

Changes that might enhance DWI general deterrence include those which influence the rate and content of messages generated by the adjudication process and transmitted to the driver by word-of-mouth or public information. They also include those which impact the driver indirectly through their influence on enforcement rate. Message content from adjudication concerns the certainty and severity of sanction. The following alternatives to typical practices might enhance DWI general deterrence.

- *Administrative adjudication.* In lieu of traditional litigation and sanction, administrative adjudication might enhance deterrence through the generation of information reflecting that justice is swift and certain. Court procedures are typically time consuming, require relatively large numbers of personnel, and institute delays in the justice system. However, the success of the more efficient administrative adjudication depends upon whether the treatment program has about the same perceived risk to the driver as court sanction, and whether or not the handling of DWI offenders through this process provides positive reinforcement to patrol officers. Research is needed to determine the impact of administrative adjudication on variables such as amount of plea bargaining, conviction rate, court backlogs, enforcement rates, and perceived risk of DWI.
- *Court procedures.* Modification of pre-trial and trial procedures might increase the motivation of enforcement and the cost effectiveness of adjudication. Examples of changes include: trial only by judge, the use of judicial notice for evidential testing, and court scheduling to reduce the resources required for adjudication. Changes in procedures that would eliminate or minimize the need for plea bargaining might enhance the consistency of judicial actions.

TABLE 10

DIFFERENCES IN ADJUDICATION PROCEDURES FOR THE THREE NON-ASAP JURISDICTIONS

	Arraignment	Diversion Program	Prosecution	Plea Negotiation	Court Trial
New Jersey State Police	Defendant is arraigned only if incarcerated. Arraignment occurs before first available magistrate. If released on bail or own recognizance, driver is given court date.	None. Education or rehabilitation program is part of sentencing.	Municipal prosecutor becomes involved in not-guilty pleas. Pretrial conferences do not occur.	Plea bargaining occurs on an informal basis.	Court appearance date set by arresting officer. Defendant must notify court three days in advance and signify how he pleads. Trial is before judge only. Arresting officer is required to witness.
Santa Ana, CA.	All defendants are arraigned. If incarcerated, they are arraigned within forty-eight hours. At arraignment defendants are advised of rights and enter plea.	A defendant entering a guilty plea at arraignment enters a rehabilitation course and the case is continued. If he successfully completes the course and does not have another arrest within a year, the charges are reduced to reckless driving. An alcohol-related conviction does not appear on record.	Prosecutor only becomes involved in not-guilty pleas. Prosecutor decides if there is enough evidence for criminal prosecution.	Plea negotiation is standard procedure. Every attempt is made to reach an agreement prior to court trial.	Defendant has choice between judge or jury. District Attorney has to approve jury trial. Testimony is required of the arresting officer, the certified test operator, and the criminologist.
Tacoma, WA.	If the defendant is incarcerated, arraignment occurs within forty-eight hours. If the defendant is released on his own recognizance, defendant has the responsibility to appear in seven days.	Two programs: 1) For first offenders, cases are continued for six months to one year. If no major violations occur, the charges are reduced to "being in physical control" and defendant pays court costs. (Cont. on following page).	City Attorney is present at arraignments. Pretrial conferences occur only when a jury trial is requested.	Plea bargaining is a common practice but it is performed unofficially. Charges are reduced to being in physical control.	Defendant has choice of trial by judge or jury. Arresting officer is required to testify. Cases are scheduled in same manner as other cases. Statute of limitations is sixty days.

TABLE 10 (Cont.)

	Arrestment	Diversion Program	Prosecution	Plea Negotiation	Court Trial
Tacoma, WA. (Cont.)		2) For problem drinkers, the defendant's attorney petitions court that defendant has alcohol-related problem. The case is continued and defendant is evaluated at treatment center. A one to two-year treatment program is recommended. Upon successful completion, charges may be dismissed.			

PUBLIC INFORMATION SUBSYSTEM

The public information subsystem uses mass communications media to disseminate information generated by the other subsystems or by the public information subsystem itself (messages need not necessarily contain information from patrol, arrest, or adjudication). Functions include message preparation, media selection, message insertion into the media, and the evaluation of message content and exposure rates. The objective of the subsystem is to facilitate the flow of information to the driver in a manner that will deter DWI.

FUNCTIONAL ANALYSIS

Description of the public information subsystem was based primarily on methodology developed from research on promotional strategy and mass communications theory (Engel, et.al., 1971, Sandage and Fryburger, 1971, and Gensch, 1973). Public information programs directed toward DWI were found to be both rare and poorly defined. Consequently, it was not meaningful to define a typical subsystem. Therefore, proceeding under the assumption that functions similar to those employed commercially would be applicable to DWI general deterrence, an "ideal" subsystem was defined. It was assumed that the resources required for such a subsystem would exist primarily within an enforcement agency. However, they could be supplemented by other agencies, such as those devoted to traffic safety.

A flow diagram of the primary public information subsystem functions and interrelationships is provided in Figure 11. A detailed functional sequence diagram showing how a public information subsystem might operate is presented in Figure 12. Table 11 consists of a task sequence listing showing, for each task, the information needed, the decision involved, and the alternative actions to be taken.

EXISTING PROGRAMS

The nature of existing public information programs is summarized in Tables 13 and 14. These data suggest that the utilization of public information

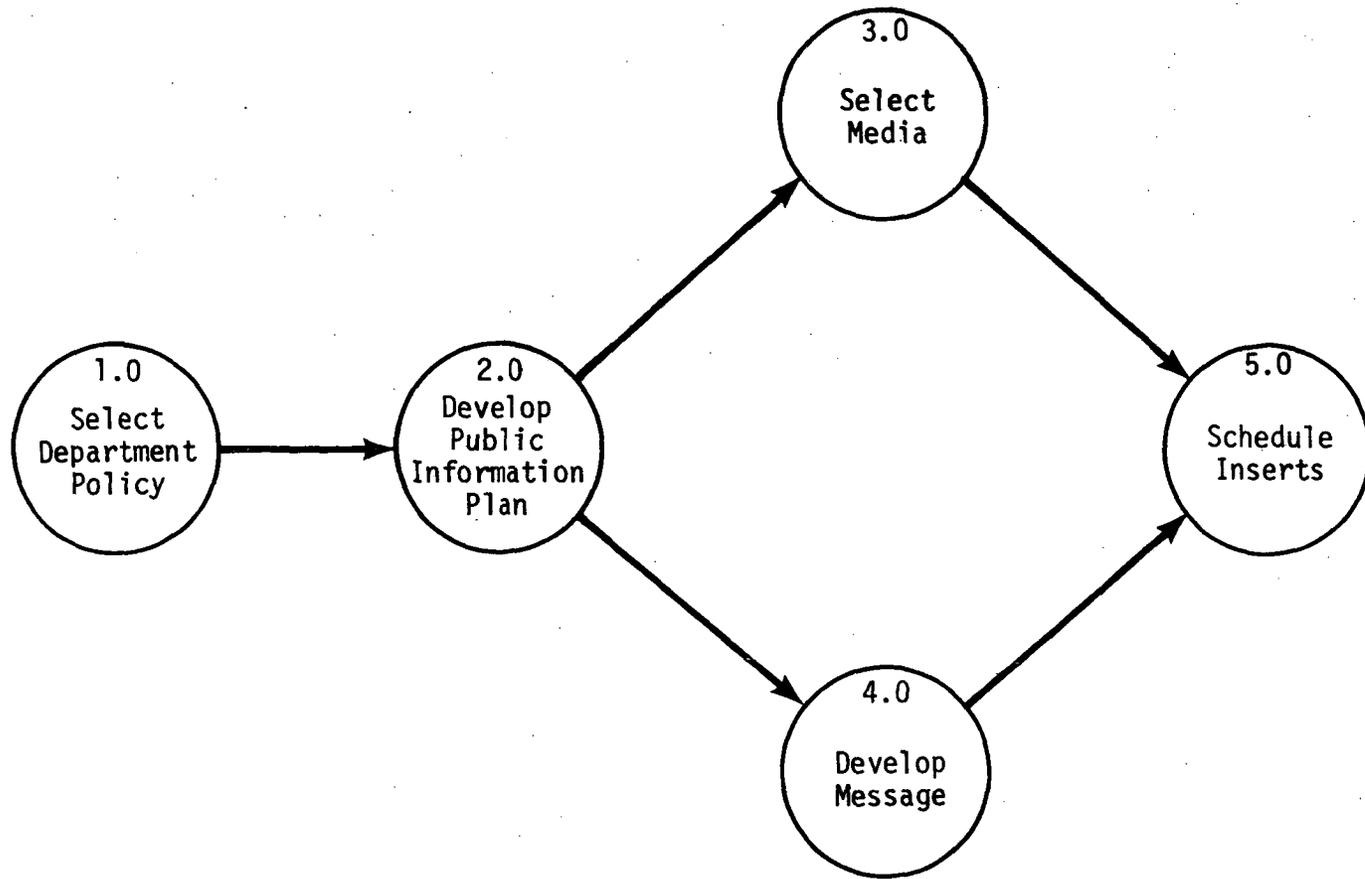


Figure 11. Public information subsystem flow diagram.

PERFORMING INDIVIDUAL OR UNIT

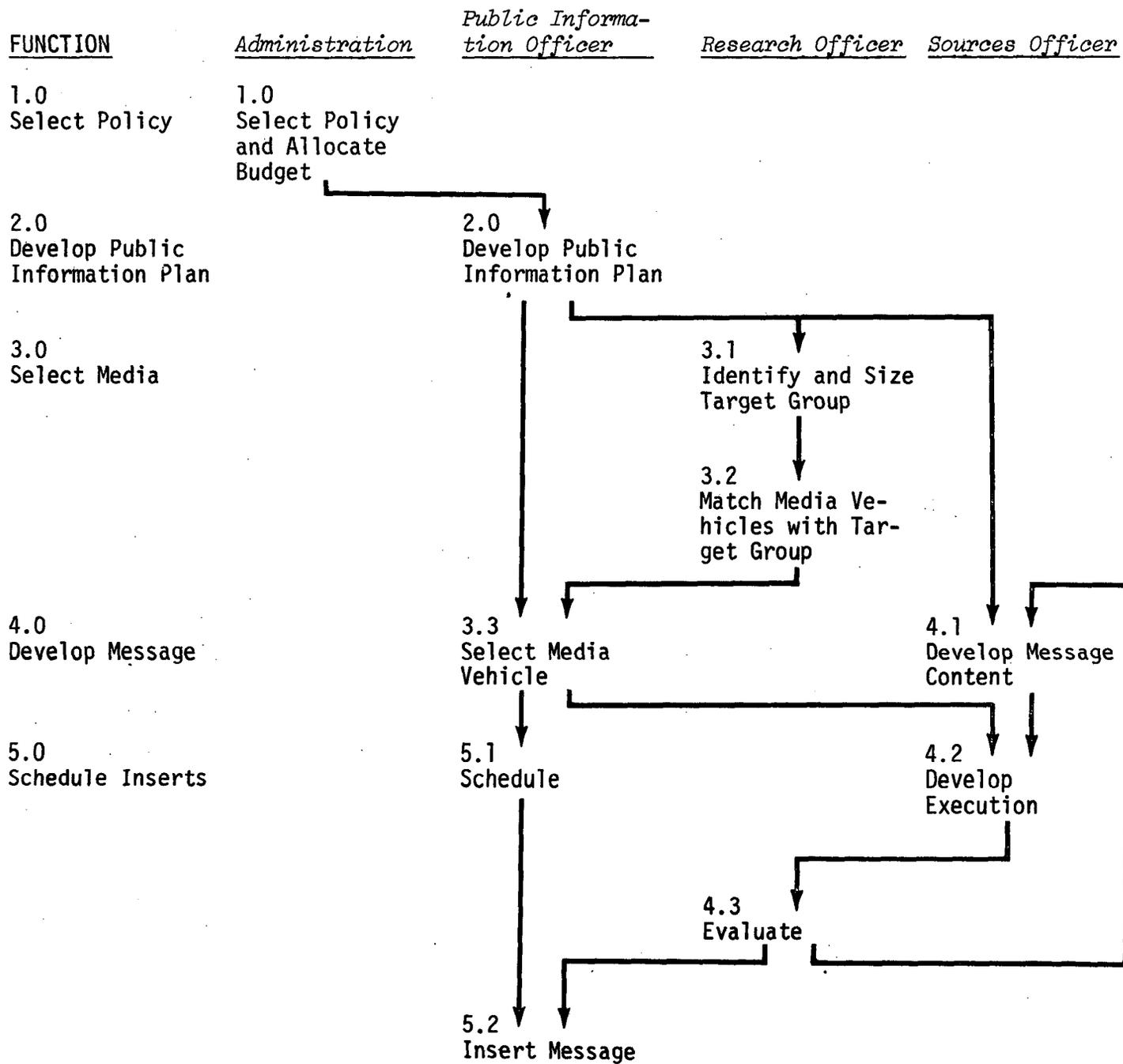


Figure 12. Functional sequence diagram for public information.

TABLE 11

TASK SEQUENCE LIST OF PUBLIC INFORMATION FUNCTIONS

	Information Requirements	Decisions Required	Actions
1.0 Policy and Budget	<ol style="list-style-type: none"> 1) Policy on public information 2) Budget 	<ol style="list-style-type: none"> 1) To hire personnel 2) To budget for media insertions 3) To set policy statement 	<ol style="list-style-type: none"> 1) Request personnel 2) Specify budget 3) Set policy
2.0 Develop Public Information Plan	<ol style="list-style-type: none"> 1) Policy on public information 2) Budget 3) Personnel resources 	<ol style="list-style-type: none"> 1) To determine research requirements 2) To determine message development requirements 3) To select media vehicles vs. budget 	<ol style="list-style-type: none"> 1) Identify research 2) Identify message development requirements 3) Identify media vehicles according to budget
3.1 Identify and Size Target Group	<ol style="list-style-type: none"> 1) Accident and arrest statistics and reports 2) Studies on target group characteristics 	<ol style="list-style-type: none"> 1) To determine the nature and extent of the problem 2) To select the target group profile 	<ol style="list-style-type: none"> 1) Specify characteristics and size of target groups
3.2 Match Media Vehicles with Target Group	<ol style="list-style-type: none"> 1) Characteristics and size of target groups 2) Reach and demographic data on media audiences 	<ol style="list-style-type: none"> 1) To match the media audiences to target group characteristics 	<ol style="list-style-type: none"> 1) Determine reach and frequency of media vehicles for the target group

TABLE 11 (Cont.)

	Information Requirements	Decisions Required	Actions
3.3 Select Media Vehicle	<ol style="list-style-type: none"> 1) Match between vehicle and target group 2) Reach and frequency of media vehicles 3) Budget 	<ol style="list-style-type: none"> 1) To select media vehicle(s) 	<ol style="list-style-type: none"> 1) Select media vehicles
4.1 Develop Message Content	<ol style="list-style-type: none"> 1) Accident and arrest research 2) Characteristics of target group 3) Objective of Message 4) Method of appeal 	<ol style="list-style-type: none"> 1) To select message content 	<ol style="list-style-type: none"> 1) Develop message content
4.2 Develop Execution	<ol style="list-style-type: none"> 1) Media vehicle 2) Message content 3) Type of appeal 4) Source 	<ol style="list-style-type: none"> 1) To select message execution 	<ol style="list-style-type: none"> 1) Develop execution
4.3 Evaluate Message Content	<ol style="list-style-type: none"> 1) Develop message 2) Evaluation methodology 	<ol style="list-style-type: none"> 1) To select test procedures 2) To modify message 	<ol style="list-style-type: none"> 1) Analyze results 2) Modify message 3) Approve message
5.1 Schedule	<ol style="list-style-type: none"> 1) Media vehicles 2) Frequency and reach of vehicles 3) Budget allocation 	<ol style="list-style-type: none"> 1) To determine maximum exposure for budget 	<ol style="list-style-type: none"> 1) Select insert schedule 2) Contract with media
5.2 Insert Message	<ol style="list-style-type: none"> 1) Schedule 2) Developed messages 3) Contracts with media 	<ol style="list-style-type: none"> 1) To select messages and insertions 	<ol style="list-style-type: none"> 1) Insert messages

TABLE 13

ASAP PUBLIC INFORMATION PROGRAMS

Phoenix, AZ.	The project produced print advertisements. The newspapers inserted the ads as public service announcements.
Los Angeles, CA.	The project distributed miscellaneous advertisements.
Denver, CO.	The project produced a TV film on alcohol and safety. The TV media inserted it as a public service announcement.
Tampa, FL.	The project produced two documentaries on ASAP. The local TV media inserted the documentaries during prime time.
Indianapolis, IN.	A utility company donated advertisements on the project and paid for insertion in local newspapers.
New Orleans, LA.	The project produced radio spots on the project. The radio media inserted them as public service announcements.
Baltimore, MD.	The project produced TV spot messages on alcohol and safety. The media inserted messages as public service announcements.
Kansas City, MO.	The project produced one radio and one TV spot announcement on the project. The media inserted the messages as public service announcements.
Albuquerque, N.M.	The project produced miscellaneous advertisements on the alcohol and safety problem for distribution by liquor stores.
Nassau Co., N.Y.	The project produced miscellaneous advertisements on alcohol and safety for distribution to the general public.
Oklahoma City, OK.	The project produced multimedia messages (TV, radio, newspaper) on alcohol and safety. The media inserted the messages as public service announcements.
Portland, OR.	The project produced miscellaneous advertisements on alcohol and safety for distribution through liquor stores.

TABLE 13 (Cont.)

Richland Co., S.C.	Local merchants produced multimedia messages on the ASAP program. The media inserted the messages as public service announcements.
Vermont	An auto manufacturer paid for the development of a film on the project. The project developed TV spot messages on alcohol and safety. The TV media inserted the messages as public service announcements.
Fairfax, VA.	The project produced miscellaneous advertisements on alcohol and safety for distribution at state liquor stores.
Lincoln, NE.	The project produced a large public display and miscellaneous advertisements on the alcohol and safety problem.

TABLE 14

DIFFERENCES IN DWI ENFORCEMENT PUBLIC INFORMATION PROGRAMS FOR THE
THREE NON-ASAP JURISDICTIONS

	Department Policy	Public Information Plan	Message Development	Media Insertion Plan
New Jersey State Police		The agency has no public information program.		
Santa Ana, Ca. City Police	There is no formal policy.	The agency uses the news media and public service announcements on TV and radio. It has prepared miscellaneous advertisements (bus benches and posters) and has an active program for public speaking engagements.	The agency has prepared a TV spot insert simulating a DWI arrest. TV and radio spots concentrate on enforcement. Special enforcement officers prepare speeches and demonstrate breath test.	Agency depends on media for inserts.
Tacoma, Wa. City Police	There is no formal policy.	Agency uses news media and radio public service spots during holiday periods on special emphasis teams.	Agency prepares press releases and radio spots. News media have used TV crew to film DWI arrest and breath test.	Agency develops news releases and has a briefing plan. News media controls content and inserts.

to enhance DWI general deterrence has not at this time been well developed. Even though public information was considered to be an important part of ASAP, public information programs were not systematically developed and were not given much emphasis; messages were developed on the dangers of drinking and driving, but not on associated enforcement efforts. Messages disseminated through the communications media took the form of news items or public service announcements.

SUBSYSTEM DESIGN

Results of the system analysis and computer-based simulation reported in Volume 1 identified the public information subsystem as an important one in DWI general deterrence. The greatest potential for reduced DWI trips and related accidents was found to be through wide-spread dissemination of information emanating from effective and consistent DWI enforcement and adjudication action. Results of the simulation experiments indicated that public information is potentially the most effective method of exposing drivers to information on the risks of drinking and driving.

There are three main avenues through which a public information subsystem can channel information to the driver--items reported as news, public service announcements, and paid advertising. News items involve minimum insertion costs to the agency. The news media control the insertion rate, exposure, and content of any message. Obtaining the maximum potential from this communications avenue requires a liaison function to organize information and provide regular information releases.

Public service announcements are typically made at no insertion cost to the agency. They are either sponsored directly by the media, or by others, within the framework of providing a public service. The agency might pay for and have some control over message content. Paid advertising permits the greatest agency control but also requires the greatest cost. Control can be exerted over message content, media selection, and insertion rate. The agency develops and pays for the message content, and schedules and pays for message insertions.

The design of an effective public information subsystem requires the development of procedures for specifying message content, selecting media,

and evaluating results, within the framework of tested motivation and communications principles. For example, the development of message content requires the consideration of methods of gaining attention of target populations, exploring methods of appealing to individuals, and assessing visual and verbal techniques for presenting the selected content. Media selection requires the establishment of procedures for defining target populations, matching media to targets, determining the reach of the media (proportion of target population likely to be exposed), and defining desired message insertion schedules.

Data sources required by the public information subsystem include those which provide the size and composition of target populations, the potential reach of various media and media vehicles, and the learning and retention capacity of those targeted.

Since much is yet to be learned about what is required of a public information subsystem to deter DWI, the subsystem needs an evaluation component to provide feedback for subsystem improvement. In addition to evaluating message content, media, insertion rates, and other aspects of specific programs, techniques should be included to evaluate the overall subsystem design and its associated procedures. Design evaluation is particularly important at this time because a public information subsystem for DWI general deterrence has not as yet been developed or tested. The following research and development recommendations are provided:

- *Design of a pilot DWI public information subsystem.* Within the framework of available resources and promotional strategy, a pilot subsystem should be designed, implemented, and tested. Recognizing the resource limitations that prevail, design emphasis should be given to cost-effectiveness criteria. Furthermore, the subsystem should be designed as an extension of what has been learned previously about promotional strategies and communications methods.
- *Development and evaluation of message content.* Toward the general deterrence of DWI, a relatively wide range of message content might be employed. Thus, criteria need to be established for the selection of message content and the design of specific appeals. At present, little is known about the relative effectiveness of the content and presentation mode for messages designed to deter DWI. Although some general guidelines can be obtained from the commercial arena, effort will be required to transform and amplify these guidelines for the specific requirements of DWI general deterrence.

- *Selection of media and media vehicles.* Of the three vehicles available for the dissemination of public information--news items, public service announcements, and paid advertising--little is now known about how they should be used to impact the DWI decision. Some are less costly to the sponsoring agency than others; however, little is known of their cost-effectiveness for DWI deterrence. It is possible, for example, that providing information releases to news media systematically and frequently in accordance with a well defined strategy might be both the least costly and the most effective.

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