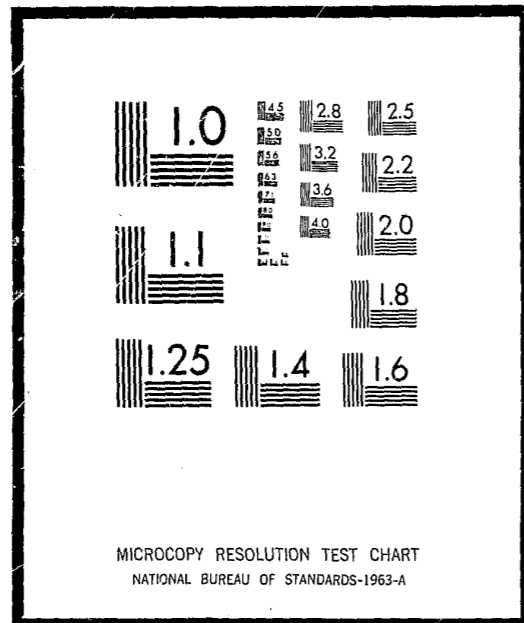


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 CIVIL DISTURBANCE  
 AERIAL PATROL

ANNOTATION:  
HELICOPTER PATROL PROVIDES A CRIME ABATEMENT POTENTIAL UNMATCHED BY ANY OTHER DIRECT METHODOLOGY.

ABSTRACT:  
THE HELICOPTER AERIAL SURVEILLANCE PATROL PROJECT DEMONSTRATES DAY AND NIGHTTIME OPERATIONS. OFFICERS CAN BE INSTANTANEDUSLY AVAILABLE AT THE SCENE OF AN EMERGENCY, THAT ROUTINELY AND ALMOST CONSTANTLY THEY ARE IN A POSITION TO OBSERVE OFFENSES AND OFFENDERS AND CAN PROVIDE ASSISTANCE IN BACK-UP TO FIELD UNITS. PRIMARY GOALS OF THE PROJECT WERE IMPROVEMENT OF POLICE RESPONSE TIME, DEMONSTRATION OF DAYTIME SURVEILLANCE METHODS, INITIATION OF EFFECTIVE NIGHTTIME SURVEILLANCE, INCREASED PATROL OBSERVATION, INCREASED OFFICER SECURITY, AND REDUCTION OF CRIME IN THE PROJECT AREA. THE PROJECT DEMONSTRATES THAT THESE GOALS CAN BE ACCOMPLISHED BY AN AERIAL POLICE UNIT, IN CONJUNCTION WITH EXISTING GROUND UNITS, WITHOUT INCREASING THE NUMBER OF OFFICERS AND RADIO CARS AT THE PACE FOUND NECESSARY TODAY. (AUTHOR ABSTRACT MODIFIED)

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COPY 2

**SKY**

**KNIGHT**

**PROJECT REPORT  
SHERIFF'S DEPARTMENT  
LOS ANGELES COUNTY  
Peter J. Pitchess, Sheriff**

• A DEMONSTRATION PROJECT •

THE OFFICE OF LAW ENFORCEMENT ASSISTANCE.  
THE LOS ANGELES COUNTY SHERIFF'S DEPARTMENT.  
THE CITIES OF: LAKEWOOD, BELLFLOWER, PARAMOUNT,  
ARTESIA, CERRITOS AND HAWAIIAN GARDENS.  
THE HUGHES TOOL COMPANY/AIRCRAFT DIVISION.

MAY 1968

GRANT 198 (S-022)  
LAW ENFORCEMENT -  
AERIAL SURVEILLANCE METHODS  
OF CRIME PREVENTION

A REPORT BY THE SHERIFF'S DEPARTMENT  
LOS ANGELES COUNTY  
MAY 1968

LOS ANGELES COUNTY  
SHERIFF'S DEPARTMENT  
PETER J. PITCHESS, SHERIFF

## FOREWORD

With a deep awareness of this nation's intense crime problem -- and with an earnest will to pursue every reasonable method which could provide law enforcement with increased ability to deter and apprehend criminal offenders, President Johnson executed the Law Enforcement Assistance Act of 1965.

Unstintingly aided through this Act by the United States Department of Justice, Office of Law Enforcement Assistance and with the cooperative pioneering efforts of the City of Lakewood, California, and the Hughes Tool Company/Aircraft Division, the Los Angeles County Sheriff's Department undertook a program to demonstrate effectiveness of helicopters as law enforcement patrol vehicles.

This report embodies the general findings of a technological advancement in the patrol aspect of law enforcement work -- the first innovative tool made available to the "man on the beat" since the advent of radio equipped patrol cars in 1929.

Helicopter patrol, by enhancing patrol unit's opportunities for apprehension and repression, provides a crime abatement potential unmatched by any other direct methodology. Expansive observational advantages, coupled with unmatched response speeds substantially increase officer presence without significantly increasing officer manpower demands.

The concept has been conducted under careful internal and independent evaluation. Accomplishments are many and varied, indicative that a tool has been developed which strikes universal policing problems with considerable impact and, at the same time, is readily adaptable to rendering service in a multitude of singular community problems.

The import of this vehicle's continuing effect upon the criminal element of our society cannot be overlooked. Law enforcement administrators must, by actual and moral standards, recommend and employ all available means to provide the best possible protection to the citizens of their community. If this demonstration project has done nothing beyond pointedly challenging law enforcement to continue its quest to provide ever improved service, then it has attained a truly significant measure of success.

  
PETER J. PITCHESS  
SHERIFF

LAW ENFORCEMENT - AERIAL SURVEILLANCE

METHODS OF CRIME PREVENTION

BACKGROUND

Los Angeles County is the twelfth largest county, geographically, in the State of California, covering 4,083 square miles. It is by far the most heavily populated county with over 7,000,000 residents.

Jurisdiction of the Los Angeles County Sheriff's Department, as set forth by government code, is the total territory and inhabitants encompassed within boundaries of the County. These boundaries extend to include two islands south of the mainland and three nautical miles surrounding the coastline.

In addition to services rendered all of Los Angeles County, the Sheriff's Department is the sole policing agency for more than 1,750,000 citizens. Over 4,000 sworn personnel provide service in a geographical area encompassing 3,209 square miles.

Permissive California legislation enables incorporated cities to independently provide police service, or through mutual agreement, to contract for such service with the Sheriff. In Los Angeles County thirty (30)

incorporated cities covering 177 square miles with a combined population of 710,000 residents avail themselves of contract police services.

Growth of Los Angeles County has been phenomenal for over four decades with ever increasing demands on law enforcement. The original necessity for addition of an aerial enforcement unit to the rapidly expanding responsibilities of the Los Angeles County Sheriff's Department was predicated upon two growing requirements:

- Increased general aviation flying necessitated local control of State aeronautics regulations and protection of aircraft, airports and aviation facilities.
- Expanses of mountainous, desert and shoreline areas, required ever-increasing need of aerial search platforms for missing aircraft and persons.

In 1925 a reserve Aero Squadron, the first of its kind, was organized utilizing dedicated volunteer aviators and aircraft on an "on call" basis.

So impressive was the function of this unit during the earthquake of 1933 that a regular full-time Aero Detail was established that same year. A fixed wing aircraft was obtained and, by the time helicopters were becoming effective as tools of the military, the fixed wing fleet was increased to three.

After thorough studies of helicopter versatility and potential, with special emphasis placed on application in the County of Los Angeles, the Sheriff's Department obtained its first helicopter in 1955.

This County's first criminal capture by helicopter occurred in July of 1956 when a Sheriff's pilot spotted a suspect who had shot a man near Newhall, California, then escaped into rugged canyon area. The helicopter not only located the suspect and deployed personnel to effect a capture; it also distracted the suspect and provided protective cover for ground officers.

The helicopter fleet began to grow. Two were added in 1957, another in 1962, the fifth was obtained in 1965. By that time, with but one fixed wing aircraft still in operation, helicopter missions outnumbered those of the conventional airplane 18 to 1.

Helicopter service expanded even faster than the fleet. Assignments from the beginning were manifold:

- Rescues averaged more than one per week.
- Rapid transportation of special investigators annually saved many hundreds of man hours.
- Applied to special surveillance, the helicopter proved many times that there was little hope for a suspect to escape once he was spotted.



- . In major operations, the helicopter provided field commanders with a highly mobile observation and communications command post.
- . Helicopters became command posts, observation platforms and primary fire fighters dropping water, retardant and hoses during forest and brush fires.
- . Float equipped helicopters patrolled shorelines, rescued swimmers and have, on several occasions, been used to tow disabled small craft.
- . On special patrols of high hazard areas, helicopters proved they could be a major factor in apprehending criminals.
- . When helicopters were available near trouble spots; high speed chases, gang fights, vandalism, robberies or other activities, aerial surveillance substantially aided involved ground units.

In 1964, Antelope Valley -- patrolled by the Sheriff's Department's northern-most station at Lancaster, California -- was selected as an area of special need for daylight helicopter patrol. The Antelope Valley Station area of responsibility encompasses 1,300 square miles and serves a population of 73,400. Two cities account for nearly a third of the

population; the balance is scattered amongst small communities, rural, agricultural and high desert summer homes.

This expansive patrol district, by no means free from rising crime rates despite remoteness, was further hampered by the great distances separating ground units from areas of police hazard.

In far northeastern Antelope Valley is a large area of weekend, summer and part-time occupied homes. Repressive ground patrol of this district was nearly impossible due to long periods of time spent enroute.

Burglars, bold and nearly secure, were having a "field day" stripping these places of furnishings and appliances. Vandalism was high.

This area of prime concern became a "must" on the helicopter's patrol beat. The results were all that could be expected -- and more! Within the first five weeks of patrol, burglaries in that district completely ceased!

Helicopter patrol is now a routine policing assignment in Antelope Valley. Flexible and effective, airborne officers easily adjust to concentrate their patrols in the area of greatest need, day or night.

Twelve of fourteen Los Angeles County Sheriff's Station Districts reported





increases in the seven major offenses for the 1966-67 fiscal year, (a national trend also). Antelope Valley was one of two stations showing a decrease in these major crimes.

In that same year, ninety-six miles to the south of Antelope Valley, the resort island of Catalina with a summer population exceeding 60,000 and separated from the mainland by twenty-two miles of Pacific Ocean channel became the second area of daylight helicopter patrol.

The island -- with its many coves, harbors and camps -- was part of this helicopter's beat. Coastal waters and the tricky Catalina Channel, populated with a constant flow of pleasure boats, were also kept under surveillance by Deputy Sheriffs in a float equipped helicopter. Stretchers, life preservers and ropes were everyday tools of this unit.

Law enforcement responses to remote island areas, formerly consuming half a day by boat or overland in jeeps, were handled by air in minutes.

In one forty minute tour, officers were able to observe sections of the island they may not otherwise have seen in an entire summer season.

Disturbances and molestations diminished, illegal hunting and spear fishing all but ceased, boat "joy-riding" thefts were drastically reduced and boat recoveries increased.

Of prime importance was the service rendered injured or sick persons now only minutes, instead of hours, from medical aid. Presence of the helicopter patrol with its wide range of vision quickly resolved the dilemmas of many foundering, lost or disabled small craft. Numerous such boats were towed to safety by helicopter.

Effectiveness of the island and coastal helicopter patrol, also established it as a routine policing function operating from mid-June through mid-September each year.

The Los Angeles County Sheriff's Department, always progressive in its efforts to render the highest possible level of service, continued to study areas of helicopter application as a total aid to law enforcement. Despite continued successful operations, many Department administrators shared the feeling that the full potential of the helicopter had not been totally explored.

A system was established wherein aircraft were made available at a centrally located Departmental heliport for responses to major offenses; robberies, burglars "there now," silent alarms and other incidents which should prove productive. On several occasions the "stand-by" system netted substantial results and suspects were apprehended due to aerial coverage.

More often than not, distance and "warm up" required before flight so increased response time that aerial surveillance effectiveness remained questionable when men and machines were operated on "stand by" basis.

Economics of such a system were also questionable as the most expensive commodity, wages, continued even though pilots were not totally productive.

Manned helicopters patrolling a defined area, immediately available in the air for long periods of time and more quickly within reach when on the ground, could provide the necessary elements to substantiate the potential of aerial patrol. Even though serious consideration was being given to such an experiment, nighttime patrol, on a routine basis, was not being extensively investigated.

Then, in August of 1965, massive and disastrous civil disturbances in the Watts area of South Los Angeles made demands on helicopters and crews which demonstrated that these machines could be effectively used as patrol units, even at night, under extreme conditions never before considered feasible. At the same time it proved air-ground liaison could be a most important law enforcement tool when applied in a defined area throughout a lengthy operation.

Utilizing existing ground and street lighting, with occasional application of helicopter landing lights, most ground activity could be observed, analyzed and reported. Rooftops suspected of harboring snipers were quickly checked with landing lights. In several cases, suspected sniper fire ceased after repeated passes by the helicopter. Some deterrence of such activities was very likely being produced by presence of the aircraft.

Concentrated patrol had not only demonstrated that visibility of the officers was vastly improved, it also placed officers in a position where they were highly visible to offenders. One of the most effective deterrents to crime is the "would be" offender observing a policeman nearby. This two way visibility factor, coupled with the fact helicopters would not become involved with the petty routine demands made on radio cars, presented the probability that helicopters could provide the sorely needed crime deterrent link sometimes missing in ground unit deployment.

#### PROJECT PARTICIPANTS

Knowledge and experience had been gained, and no one denied the need for new technology. The Los Angeles County Sheriff's Department was now anxious to implement a comprehensive aerial surveillance demonstration.

The Law Enforcement Assistance Act of 1965, designed to provide law enforcement with funds to encourage advancement of techniques in combating catastrophic crime rate increases, presented an opportunity for aerial surveillance crime control methods to be thoroughly tested.

Before the Los Angeles County Sheriff's Department could propose an intelligent demonstration project to the Department of Justice, Office of Law Enforcement Assistance, additional helicopter availability had to be explored and a patrol district within the Sheriff's jurisdiction had to be selected.

In Culver City, California, the Hughes Tool Company/Aircraft Division, manufacturers of the Hughes 300, light helicopter, agreed to lend support to an experimental program of aerial patrol.

The Hughes Tool Company proposal offered three model 300 helicopters equipped with dual controls, night flying kits, 90 channel VHF radios and running time meters, at a reduced lease rate of \$24.60 per flight hour including fuel, oil, labor and materials for total maintenance of airframe, engines and all components. (This rate was subsequently changed to \$26.95 per hour, to include complete Hull Insurance coverage on all three helicopters.)

After careful consideration, the Mayor and City Council of the City of Lakewood were contacted in a request for that political entity to participate as a test city. The Council wholeheartedly endorsed the proposed project and pledged full cooperation.

Lakewood was the first incorporated city to contract with the Los Angeles County Sheriff's Department for police services; the original contract was signed on April 16, 1954.

Lakewood has a Council-Administrator form of city government which is comparable in most aspects to the Council-Manager concept. The City Council of Lakewood consists of five elected councilmen who elect a mayor to represent the city. The City Administrator is responsible to the City Council. This is the principle contrast with the Council-Manager form of city government, where the City Manager has uninhibited administrative powers.

The City of Lakewood has a population of 86,412 and encompasses an area of 9.2 square miles. The Sheriff's Lakewood Station is located within the City of Lakewood and has 201.8 budgeted personnel. The Lakewood Station services five other contract cities in addition to the City of Lakewood with a total population of 210,359. The City of Lakewood

contracts for a total of sixty-eight police personnel; at an annual cost of \$113,079.00 per patrol unit which consists of a police vehicle, one officer for the day shift, two officers each for evening and early morning hours, operating twenty-four hours a day throughout the entire year.

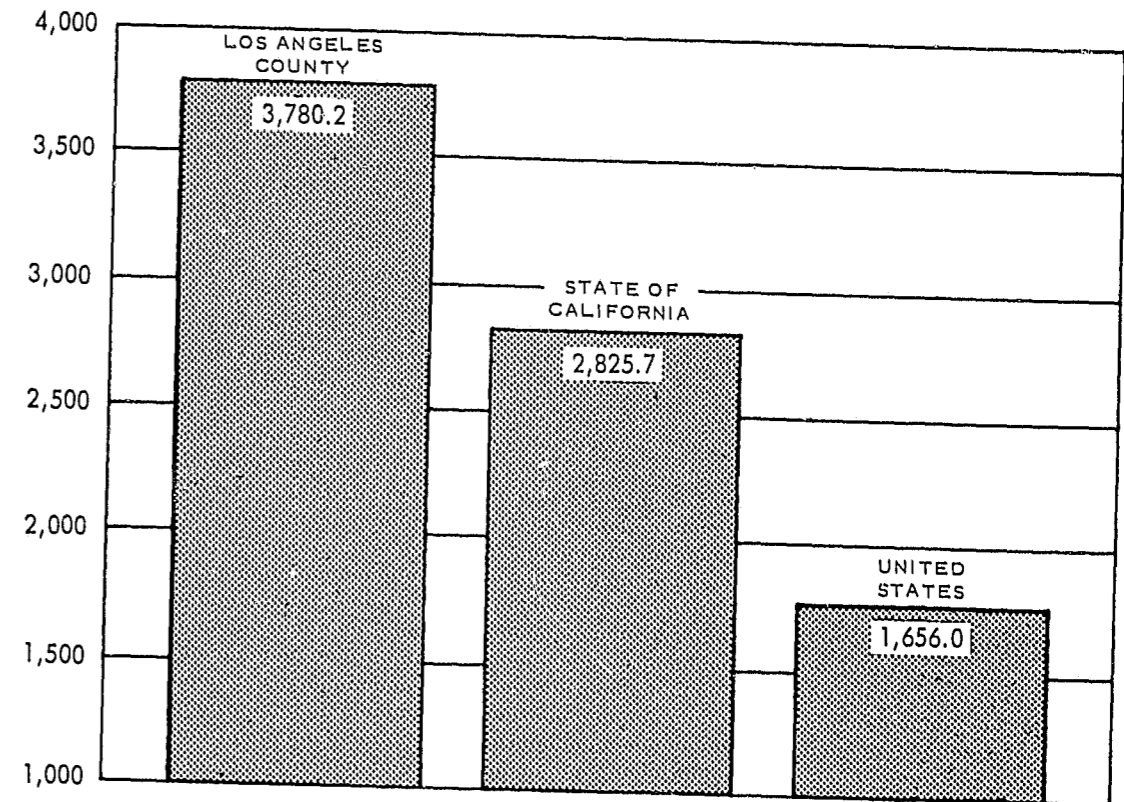
Lakewood, the thirteenth largest city in Los Angeles County, headed city growth rate with a fourteen per cent population increase in 1964. Despite its relatively quiet sociological composition (it is a "bedroom" city, with well planned commercial centers, upper and middle class residences and no industrial area), its crime rate kept pace with national rising trends.

Between 1961 and 1965, Lakewood's crime rate increased from 974 per 100,000, to 1,383 per 100,000. This rise was at a peak in 1965 with a five year increase of forty-two per cent.

Total elements for implementation of a radically new police patrol concept, had been firmly welded. The project was to be a singularly cooperative one involving Federal, County and Local Government together with industry, all demonstrating mutual concern in universal problems. It had the overt support of each.

### UNIFORM CRIME REPORTS - 1966

ACTUAL MAJOR CRIMES  
PER 100,000 POPULATION



Los Angeles County Crime rate per 100,000 population exceeds that of the State of California by more than 34% and the national average by more than 128%.

### PROJECT GOALS

Since 1958, crime in the United States has increased at a rate far surpassing population growth.

There have been numerous technological advances through the years, many of them effectively aiding police functions. However, this technology has principally been directed toward the investigation of criminal offenses already committed -- quite removed from the preventive aspects of police patrol procedures.

Not since the advent of radio-equipped patrol cars in 1929 has there been any truly significant development designed to improve effectiveness of the "man on the beat." In fact, increased officer mobility was preceded by criminal mobility, with the police hard pressed to "second guess" criminal activity patterns.

A trend developed to increase the number of patrolmen, based on the knowledge that more officers in the field broadened the crime repression potential of law enforcement. The tremendous cost, in terms of direct police expenditure, handicaps most communities and optimum staffing is seldom reached. Crime's upward spiral continues to increase.

The helicopter aerial surveillance patrol project was to demonstrate to law enforcement, throughout the United States and the world, that in both day and nighttime operations, officers would be instantaneously available at the scene of an emergency, that routinely and almost constantly they would be in a position to observe offenses and offenders and in the majority of cases could provide unprecedented assistance in "back-up" to field units.

Primary goals of the project were sixfold:

1. Improve police response time.
2. Demonstrate successful daytime surveillance methods.
3. Initiate effective nighttime surveillance.
4. Increase patrol observation.
5. Increase officer security.
6. Reduce crime in the project area.

Further, the project was to demonstrate that these ambitions could be accomplished by an aerial police unit, in conjunction with existing ground units, without the requirement of continuously increasing the number of officers and radio cars at the pace found necessary today, to cope with spiraling crime rates.

From the onset, law enforcement administrators, most of whom never contested the validity of the overall concept, discussed potential of criminal deterrence, rapid response, immediate availability and observational advantage of aerial patrol. Day-to-day implementation of the program would have to prove practicability of the economics while substantiating predicted results and exploring "spin-off" application information unattainable without such implementation.

Potentially, the project was to contribute a valuable and innovative dimension in the movement and deployment of patrol personnel; too, perhaps, revolutionize present day operations almost overnight.

Were all potentials not realized, the project would nevertheless form the very foundation upon which future programs would be established -- programs utilizing still greater technical knowledge and improvement in the state of the art.

#### PREPARATION, MANPOWER AND EQUIPMENT

Federal Grant support to the demonstration project commenced May 1, 1966. From that date through June 5, 1966, efforts were devoted to final planning and operational tests in and over the project city.

As a prelude to the project, officially entitled "Law Enforcement Aerial Surveillance Methods of Crime Prevention," a code name was established. The name selected was "Sky Knight." This was done to provide quick and positive identification of air units and to establish colloquial nomenclature distinctly identifying the project to the public, an unobtrusive title with connotations of protection and gallantry.

During this final planning period, police-classification pilots, selected from the Department's Aero Bureau, all holding F.A.A. commercial helicopter ratings and with several thousand hours of flight time, commenced serious re-training in two major areas:

- . Pilots were assigned to patrol Lakewood City as working radio car partners with veteran area patrol officers. This training provided intimate knowledge of district geography and exposure to police problems peculiar to the area they would be working.
- . Participating pilots underwent continuous intensified flight training in all phases of day and night flying with special emphasis on emergency procedures, including "touch-down" autorotations in darkness.

Coincidental with this training, Lakewood radio car officers were flown on patrols over the city while pilots were establishing routes and pin pointing emergency landing areas. This exchange provided basis for a healthy working rapport between ground and air units while introducing field unit personnel to the potential of helicopters as patrol vehicles.

There never existed any doubt that helicopters on police patrol must be staffed with two men: One to concentrate on the intricacies of operating the aircraft safely and efficiently; the other to observe, analyze, record and report ground activity.

As plans progressed, air orientation -- coupled with police experience -- were observed to be the most important commodities in personnel.

Because of this "air emphasis," existing pilots were initially assigned as observers, i.e., both officers aboard patrol helicopters were pilot rated.

Importance of the observer, while not overlooked, was not originally treated with the singular care it deserved. Pilots, all of whom would be alternately serving in the capacity of observer, were already trained in map reading and in relating their actual air position to depicted

position on the ground below. Further, they could immediately respond by direction of flight to a given location. Their observer training, for the great part, consisted of repetitive exposure to local geography by training flights, simulated problems and actual response.

This flight crew complement was felt to be a satisfactory arrangement in the first stages of the project. The two-pilot patrol team seemed to function routinely.

Preliminary assessment was that two pilots would suffer a minimum of fatigue by periodic relinquishment of controls. This was an erroneous assumption. Both pilots complained of equal fatigue on long flights regardless of which handled the controls or how often they switched from the role of pilot to the role of observer. Additionally -- and this is of particular significance -- pilots, of necessity, cultivate a sense of responsibility concerning the operation and flight path of the aircraft. Consequently, pilot-observers split their attention excessively from ground to air which proved to be some deterrent to the efficiency of ground observation.

Moreover, many police agencies may find qualified officer-pilots at a premium. In such cases, doubling pilots in the helicopter could prove

to be an inefficient deployment of personnel as well as a less proficient application of talent. (As the project progressed, key changes would be made in observer development and application.)

Initial training for ground units, in addition to familiarization flights, consisted of mass introduction to the project through a station meeting. This exposure was expanded by repeated dissemination of information and plans during pre-shift briefings. More specific training was conducted "on the job" with helicopter crews and ground units sharing simulated problem exercises and frequent radio contacts as they jointly responded to calls regardless of nature or productivity potential. This "over-exposure" to one another was designed to minimize a gap which historically exists between ground and air functions universally. If the project was to survive, it must be nurtured in an atmosphere of total cooperation and knowledge of inter-dependency between units.

Although listed as optional equipment by all aircraft manufacturers, radios on special aircraft frequencies (VHF) for contact with airport towers and other Federal Aviation Administration facilities must be included on helicopters operating in any area served by controlled airports. All three patrol aircraft were so equipped with ninety channel VHF transceivers.

Key communication for law enforcement patrol is, of course, that radio link connecting patrolmen with the dispatcher and other district units.

Initial helicopter installations consisted of a two-frequency Sheriff's radio on F.M. band; one frequency duplexed for communication from dispatcher to helicopter and return, the other simplex for direct communication with ground units.

The latter frequency, used car-to-car by every Sheriff's unit in the field which number in excess of 250 on many shifts, proved to be so cluttered that comprehensive communication between the helicopter and area ground units, so vital to cooperative effort, was frustratingly inadequate. The line of sight reception created by altitude of the helicopter completely spoiled any degree of exclusion on car-to-car frequency. The problem became so acute immediate change was mandatory.

Project helicopters were then equipped with four frequency transceivers capable of producing 100 watts of power. One frequency, already F.C.C. designated and periodically used by Detective units, was included as a simplex frequency for exclusive use between Lakewood ground units and the aerial patrol. Free from heavy car-to-car traffic,



all project units, air and ground, interlaced to become almost extensions of one another. There is little room for doubt that immediate exclusive communication between air and ground units is imperative to successful aerial surveillance.

Air-to-ground communications were rounded out through installation of public address horns operated through a lightweight 100 watt amplifier. The units employed are standard on most radio cars County-wide and incorporate the electronic siren.

Addition of a public address system provides unilateral communication air to ground permitting vocal direction to officers away from their units. Pertinent information or instructions regarding evacuation or lost children can be imparted to citizens on the ground as well as dispersal orders in cases of disturbance. Periodic need for such contacts with the public produced excellent results, especially in searches for lost children. The P.A. System is a definite aid in bridging the gap of limited contact between flying officers and the people they serve.

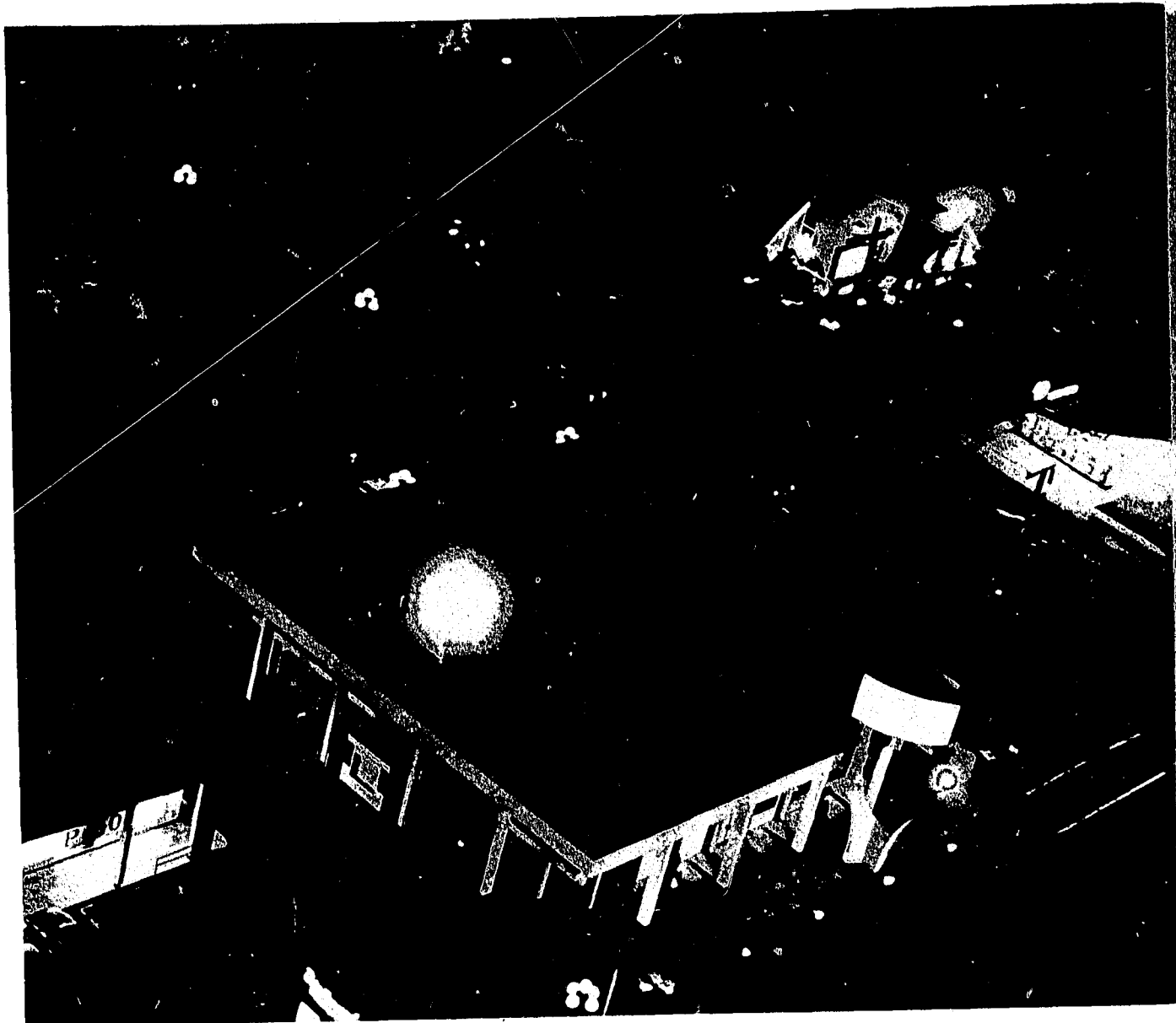
Because aircrewmembers should be relatively unencumbered their standard equipment included a stripped gunbelt with sidearm, handcuffs and loop cartridge slides. They were uniformed in khaki, including official insignia on shirts and jackets (regular woolen uniforms were foregone

due to heat native to helicopter bubbles). A crash helmet with headset and microphone completed the personal equipment. Lighted kneeboards were employed by observers to facilitate necessary paperwork while in flight day or night.

Although ambient light in urban areas permits considerable observation from the air at night, more specific, intense and definitive light was needed for darkened areas and pinpoint illumination.

Initial experimentation included a projector type light requiring 110-115 volts A.C. The light was very effective; however, a weight penalty had to be paid for the extra generator. Additionally, vibration levels from this belt driven generator were high, and the light was reluctantly abandoned.

Two aircraft landing lights, 200,000 beam candlepower apiece, after being tested in a hand held configuration, were mounted through the cockpit floor to be controlled by the observer in much the same manner as that of the conventional automobile spotlight. The light proved to be very effective, relatively simple to install, inexpensive (total cost less than \$70.00), quick and definite in control, serviceable and capable of operating from the helicopter's electrical system.



Considering operations limits: Weight, voltage and space, advantages of the light outweighed its disadvantages. The principal disadvantages were that optimum altitudes for best definition are approximately 300 feet and its intensity forestalled adequate night photography, a limited but sometimes useful need.

To expand usefulness of helicopter crews in detection and apprehension, local merchants were contacted and encouraged to install beacon type alarm lights on the roofs of their buildings. Representatives from: Banks, markets, liquor stores and other high hazard establishments met with project officials. They were thoroughly briefed on the aerial surveillance concept and requested to participate through purchase and installation of alarm signal lights. An available light, tested at great length prior to commencement of the experiment, was a 110-115 volt, 26,000 candlepower reflector lamp revolving thirty times a minute. Tests proved the light could attract aircrew attention from three to five miles distance during the day and considerably further during darkness.

As the program progressed, nine of the alarm lights were purchased and installed by Lakewood merchants. In all cases the alarm lights were coupled with existing alarm systems through low voltage relay switches for simultaneous activation. Continued testing and inadvertant

activation indicate that helicopter patrolmen will, in most cases, observe the alarm light, transmit information to the dispatcher and ground units, then arrive at the location much sooner than is possible utilizing existing communication systems. Although, to date, no arrests have resulted through use of the light, the on-going, long range potential is considerable. As a "spin-off" benefit, participating merchants developed an increased awareness of law enforcement's efforts on their behalf. Cooperation has been excellent and continuous. (Information concerning specifications and availability of the alarm lights utilized is appended to this report.)

Preliminary plans included marking key intersections of the city by placing numbered signs on rooftops of available buildings. The markings were designed to aid aircrews by sectionalizing the city in relation to map quadrants. By relating numbered signs to locations, aircrews were to orient themselves and ground units to any area of response. The theory remains valid; however, practical application was abandoned in the first weeks of the patrol because air units became as thoroughly familiar with the terrain and locations as do ground officers in any community and merely had to relate to existing maps for accurate responses. The theory and system could only be of total value if it was

extensively applied (i.e., street names and block segments painted on major thoroughfares). When the expense of such markings is compared to the duration of direct application, it does not appear to be economically efficient.

To facilitate helicopter crew identification of Lakewood City radio cars, twenty-four inch black letters were painted on white roofs. For night identification, letters were lighted with thirty-two candlepower hooded lamps -- truck-type license plate lights, available at auto parts stores were used. Smaller letters, "A" through "Z," were placed on the dashboard, corresponding to the rooftop letters, for quick reference by operating officers. Radio car crews were responsible for answering the letter calls in relation to "Sky Knight" activities, as well as responding to their regular call numbers.

This system proved to be valuable, particularly throughout the first several months of the experiment. Physical identification of ground units visible to aircrews was immediate and positive. Psychologically, radio car officers, utilizing the special "Sky Knight" letter calls, were constantly aware of productively participating in the experiment.

Although it eventuated that helicopter crews again became so

thoroughly familiar with their district and corresponding radio car beats -- they knew with which car they were dealing without reference to the markings -- efficiency of the system was of enough value that it will be used as new aerial patrols are established in Los Angeles County Sheriff's jurisdiction.

The City of Lakewood is served by Long Beach Municipal Airport which borders the city on the southwest. In fact, all but a fraction of the entire city lies within the airport's control area (five mile radius).

Long Beach Municipal Airport is listed as the fifth busiest airport in the United States. Consequently, all patrol helicopters were required to maintain communication with tower operators and conduct patrols in accordance with applicable Federal Aviation regulations.

A base of operations was established on the airport at the beginning of the program because of availability of maintenance facilities, helicopter storage space, and ease of refueling.

In view of these combined facts, meetings were held with Federal Aviation Administration tower controllers. Letters of agreement were mutually established which provided for special arrival and departure routes, minimum standards for altitude and operation under special visual flight rule conditions and a system for helicopter position reporting.

Cooperation with the F.A.A. has been excellent. Some operational freedom was slightly curtailed due to required restrictions in control areas, but the effect was miniscule. These restrictions have, in fact, been beneficial to law enforcement aerial surveillance as they proved aerial patrol is compatible with airport areas having heavy air traffic. Other agencies desiring to establish helicopter patrols need not feel airspace control procedures present any serious obstacle if proper approaches to the matter are taken and agreements are complied with.

To further evaluate all facets of the project and more closely approximate similar operations in areas further removed from adequate airport facilities, an operating site was later established at the Lakewood Sheriff's Station.

Some difficulties, including excessive tail rotor noises (to be treated at some length further on in this report) were overcome prior to establishing the station helistop.

- . Lakewood City instituted permissive ordinance provisions for the operation of a helistop.
- . Federal Aviation Administration officials were contacted for airspace allocation.
- . State of California, Division of Aeronautics, issued

- a State license after thorough examination of the site.
- Trees, some antenna lines, and parking lot light standards were removed, relocated or shortened to provide recommended clearances: One to eight vertically and one to two horizontally, to a fifty foot circle on the asphalt parking lot. (Refer F.A.A. advisory circular AC 150/5390X)
  - Power poles and antennas adjacent to the site which constituted possible hazards were equipped with red obstacle lights.
  - A 500 gallon aviation gasoline tank truck was moved to the station for refueling purposes.

All patrol flights commenced and terminated from the new helistop. Off shift storage and all maintenance remained at Long Beach Airport.

Note: This system very closely simulates the type operation to be expected in communities where aircraft service and maintenance will be procured at an available airport, usually located away from city centers, while the patrol vehicle itself is available at the agencies headquarters.

This operation has been exceedingly satisfactory. The helicopter patrol became even more closely knit to general station activities

through complete integration of all functions. This closeness generated spontaneous exchanges among the officers, including critiques of and suggestions for air-ground operations. Physical proximity and complete cooperative attitudes of all personnel resulted in a situation healthy enough to preclude any apparent need for scheduled or formal joint briefing sessions beyond those already conducted prior to going on patrol. Air crews on the ground were able to respond to an incident much more rapidly from the station because of central location and proximity to the source of complaints and communications. Departure delays caused by tower contact during periods of heavy airport traffic were also eliminated. (Pilots still remained in contact with Long Beach tower, but were not required to obtain special clearance when departing Lakewood Station.) In several simulated field problems, air crews on the ground became airborne and arrived at the scene of the problem at the same time or before radio car units already in the field. Operation "Sky Knight" became completely united to the station.

As will any community, Lakewood and its surrounding areas contain a substantial number of open sections, parks, school yards, vacant fields, broad wire-free boulevards, parking lots and other unimproved areas.

All of these available emergency sites were taken into consideration in establishing patterns for routine observation patrols. Pilots concerned themselves with subconsciously recording such possible landing spots as they learned all other facets of the patrol district. Normal approaches to and departures from the district were flown over "safety corridor" routes.

Tactical efficiency and aircraft safety were prime factors in equating proper patrol and operational altitudes. The minimum safe altitude for "out of ground effect" hovering in the type aircraft used is 500 feet above the terrain. With this as a basis, and considering the observer's ability to "read" ground activity together with availability of emergency landing sites, patrol altitudes of 600 to 700 feet above the terrain were established. Airspeed for routine patrol averaged fifty-five to sixty miles per hour. (Top speed of the Hughes 300 is eighty-seven MPH.)

Utilizing these altitudes and airspeeds, project air crews reported excellent observational efficiency. Observers reported an ability to see into lighted windows of closed stores from the 600 foot altitude by flying parallel to store fronts approximately one block distant. Vehicular and pedestrian traffic was readily discernable and could be handily analyzed from assigned heights.

Operations in specific instances requiring lower altitudes are accomplished within the safe operating limits of the aircraft's height-velocity curve (spelled out in aircraft manuals); i.e., speed and altitude ratios recommended for safe landings in case of emergency were strictly complied with.

Emphasis placed on safety and emergency procedures proved to be singularly important.

- Shortly after the start of the second quarter of the project (July 15, 1966 at 10:30 p.m.), helicopter engine failure caused a night emergency landing (autorotation). Subsequent investigation by the Civil Aeronautics Board and Federal Aviation Administration disclosed the failure was caused by a faulty fuel injector. The patrol pattern established at the beginning of the project enabled the pilot to quickly select an open area for landing. Although the helicopter was damaged due to one skid digging into soft sand, there were no injuries. The aircraft was repaired and placed back into service within thirty days. Worthy of note is that despite normal coverage in local newspapers, Lakewood

residents paid little more than fleeting attention to the fact a project helicopter had been involved in an emergency.

- On May 30, 1967, while patrolling at 600 feet over the City of Lakewood, a "Sky Knight" pilot experienced an engine failure caused by a piston rod connector failing, breaking the cam shaft and freezing the engine. He quickly and calmly executed an autorotation landing in the street with no injuries to crewmen, persons on the ground nor damage to property.

To accelerate air and ground crew orientation, a system of periodic simulated problems was established.

All station units were briefed on the problem prior to going on shift. This briefing precluded misinterpretation of the incident by monitoring officers.

Briefing did not include information concerning: Time of the problem, description of suspect, description of vehicle (if any to be used), escape routes nor suggestions for method of operation. From the time "Sky Knight" and supporting units were alerted to execute the problem,

their action were exactly those which would be encountered during an actual incident.

The simulated field problem, designed principally as a continuous training device and tactics development technique, engendered a gratifying by-product. Problem participation and subsequent critiques contributed considerably to continued interest of all station personnel. Ground units, heretofore reticent concerning criticism of the air patrol, analyzed air support methods from every practical viewpoint and, more important, contributed valuable suggestions for tactical improvements.

To further encompass Lakewood officers into the program and thoroughly expose all participants to aerial patrol potential, a "split-shift" system was inaugurated and continued for a thirty day period. One pilot, with a regular radio car officer as observer, flew a half shift while the second pilot worked the district with another officer in a ground unit. At mid-shift, after approximately three hours in the air, the two teams exchanged assignments. Implementation of this training plan increased intimacy with both types of patrol for all participants and continued to build a valuable rapport between flying and non-flying field officers.

Because a positive public reaction would be required if the new patrol was to be totally successful, all sources of information to the public were kept informed of plans and progress. Television, radio, newspaper, magazine and all media available were contacted through the Sheriff's Information Bureau and Hughes Tool Company, and public relations outlets. All were invited to attend press conferences at inaugurating ceremonies and during periods of significant progress. Routinely, information concerning activities of the patrol, whether favorable or unfavorable, were quickly disseminated to the press. All media desiring in-depth stories, films or pictorial documentation of the project were encouraged and cooperated with completely.

The City of Lakewood kept their residents intimately informed through newsletters and widespread mailing of their annual report.

These methods resulted in levels of public interest considerably higher than was anticipated. This interest presented an opportunity to benefit law enforcement and the people it serves by establishing a sympathetic relationship, utilizing the project as an object of mutual concern.

Officials within the Lakewood City School System enthusiastically received this Department's suggestion that a formal presentation of the

project be made to all students in the district. Sheriff's Department audio-visual aids were utilized in a thirty minute presentation which included arrival and departure of a fully equipped helicopter and radio car on the school grounds. Presentations were planned sufficiently in advance to permit attendance by parents and to enable teachers to prepare students by pre-discussion. Take-home material was provided so that adult exposure to the program would be increased. This type of presentation enabled students to observe law enforcement utilizing a new patrol concept. Principals, teachers and students were complimentary of the program and sincere in their expressions of interest. Some classes started minor projects related to the helicopter and its role in law enforcement.

Because it presents a picture of police protection and service, coupled with a connotation of the "space age," the police helicopter has captured interest and sympathy for local law enforcement. It is sincerely felt that any community utilizing helicopter patrol should take advantage of this highly significant community relations opportunity, as it will doubtless have major crime deterrent capacities when viewed as an on-going, long range project.

Progress of the project was coordinated through weekly meetings attended by city officials, Aero Bureau administrators, the Lakewood



Station Commander, Hughes Tool Company officials, the independent evaluator and the Sheriff or his personal representative.

Past results, future plans, operations problems, maintenance factors, deployment of men and machines and myriad details of varied degree of importance were thoroughly explored by this group in a concerted cooperative effort throughout the project. Total support rendered by this group of diverse entities was a singularly significant factor in the continued contribution of the demonstration project.

#### INSTITUTION AND APPLICATION - PROJECT SKY KNIGHT

The day-night patrol became officially operational on June 6, 1966, with an inaugural flight attended by local and national media as well as officials representing all participants.

With an initial crew complement of two pilots, the helicopters employed pre-studied patrol routes, altering frequently enough to preclude establishment of a predictable pattern of patrol.

In general, patrol patterns were flown in a mesh effect, combing alternately east to west, then north to south. Particular attention was paid to locations considered to be of high hazard for major offenses, commercial

complexes, liquor stores, cocktail lounges, service stations, schools and residential sections with prowler or burglary problems.

Information concerning specific problem areas, burglaries, gang activities, auto stripping, etc. and persons or objects recently involved in offenses or incidents, vehicles, boats or large equipment were emphasized in pre-shift briefings to aircrews. Alarm light installations were daily objects of periodic checks with the added advantage of light definition keeping them nearly always within view range in case of activation.

In the course of one shift, helicopter crews covered an average of 300 unobstructed linear miles. For the same period of time, radio cars averaged 100 linear miles. Unobstructed views enjoyed by helicopter crews further increased flying officers' observational advantage by another high percentage. (Approximating an eight to one ratio) Moreover unobstructed line of sight permitted officers "eyes," in effect, to be at the scene of an incident before his actual physical presence.

In addition to constant responses based on briefing information, "Sky Knight" crews were dispatched on calls originating at the complaint desk during their shift, calls covering the typical gamut of law enforcement activities.

Without specific request, helicopter crews responded, when able, to all calls received by Lakewood units whenever the nature of the call appeared to be such that a "back up" may be required -- "Man with Gun," "Gang Fight," "Large Juvenile Disturbances," "Drag Race," etc. Aerial coverage was also provided to all units requesting any assistance with suspects.

- Early in the patrol, the helicopter flew to the location of a traffic unit requesting assistance with a large group of juveniles protesting a traffic citation. The unit was surrounded when the helicopter arrived. A landing was negotiated in a vacant field nearby. The unruly gathering dispersed immediately on arrival of the helicopter. When ground units responded to the location, the traffic Deputy was continuing with the citation unmolested.
- Repressive effect of the helicopter on restless crowds was again reflected in the words of a patrol Deputy responding to a juvenile disturbance in a city park, "The helicopter responding to the scene dispersed the crowd before we were able to interrogate any of them."

In the first month of operation, helicopter crews received fifty-seven calls, were assigned forty-eight details and made ninety-four

observations. The majority of activities fell into the following general classifications:

Burglary Calls	27
Robbery Calls	11
Prowlers	8
Suspicious Circumstances (Vehicles & Persons)	34
Auto Thefts	6
Disturbances	26
Traffic Assists (Racing, Hit & Run, etc.)	26
Fires	8

A great number of details in this first few weeks of operation included special flights for training ground personnel, supervisor familiarization and public relations.

The first twenty-five days of active patrol, did, to some degree, reflect the type of response to be predominate throughout the project.

By the end of August, patterns of response were being established to an extent that they permitted opportunity for comprehensive critiques of procedure. It was at this juncture that material for an operating manual



began to be collected. Contents of this manual kept pace with problems encountered and with their resolvment. Applied patrol and response methods of helicopter surveillance have been incorporated into a publication entitled, "Manual of Aerial Patrol," available through the same source, and considered a part of this project report. In the interest of brevity and to avoid repetition in this report, the "Manual of Aerial Patrol" should be referred to for specifics on patrol and response procedures.

Ten days after the patrol took to the air, their first felony arrest was in the books:

At approximately 2:00 p.m., June 16, 1966, a car salesman observed a suspect speed from the rear of the lot in a stolen bright red sports car. An immediate pursuit was instituted by employees. They lost sight of the suspect during a ninety miles per hour chase and reported the theft to Lakewood Station. Alerted by radio, Sky Knight quickly located the suspect and vehicle speeding south through residential streets. Switching to air-to-car frequency, Sky Knight directed ground units toward an intercept. Aware of, but unable to escape the helicopter, the suspect panicked and lost control of the car, hitting a tree at Long Beach College campus. Uninjured, he attempted to hide in bushes but was observed continuously by the helicopter crew, and taken into custody at that location (Y-275-010).

Other functional contributions were made prior to the middle of August, 1966:

- . July 8, Sky Knight crews located and recovered a stolen automobile abandoned in an area not visible to ground units.
- . August 12, the helicopter was used to light the scene of a fatal traffic accident. Lighting speeded investigation and aided in traffic control.
- . August 10, 1966, Lakewood patrol helicopter aiding in a high speed chase enabling Norwalk Sheriff's deputies to locate and arrest a theft hit-and-run suspect who had abandoned his vehicle and was hiding behind a tree.
- . August 13, 1966, Sky Knight crews observed a vehicle meeting the description of one used in a theft. Patrol units directed to the location by air-to-ground communications effected an arrest.
- . On several occasions, airborne officers directed ground units to illegal dumping, trespass and traffic law infractions routinely unobservable from the ground.

For the most part, aerial patrol crews maintained five hours in the air per eight-hour shift. (For the eighteen month period of the project, daily patrol flights averaged nine hours, twenty-four minutes.)

Aircraft availability lost due to unscheduled maintenance accounted for a small portion of this variance. Weather, principally low visibility, caused the balance of flight time loss. In view of the fact Lakewood, California, is in an area affected by moisture-laden marine air which moves inland during winter months, night and early morning hours, considerably decreasing visibility, flight restrictions were nominal. The low time loss was partially due to the fact flights generally terminated prior to 4:00 a.m.; but more particularly due to the versatility of helicopters which permit safe flight in poor visibility conditions. Project aircrafts were grounded only when daylight visibility dropped below one-half mile. Night flights were suspended when visibility steadily held below one mile. High winds in excess of twenty-five knots and gusting or exceedingly heavy rains were other weather factors which determined grounding, albeit infrequently.

Two operational difficulties became major problems early in the patrol: First, because of requirements that the pilot monitor aircraft radio (VHF) on tower frequencies, helicopter crew intercommunication via radio was nearly impossible as the observer monitored Sheriff's frequency. This was partially resolved by interfacing VHF, intercom and Sheriff's traffic through a switch controlled by the observer which permitted him to give

verbal instructions to the pilot at will. A separate noise cancelling mike was connected to the Sheriff's frequency transceiver permitting dual monitoring and broadcasting when necessary. This system was augmented with hand signals from observer to pilot which were standardized, recorded and extensively utilized. (Signals used are described in detail in the "Manual of Aerial Patrol".)

The second operational difficulty developed almost immediately following the inaugural flight. Lakewood Sheriff's Station and city hall were flooded with calls and letters from residents strenuously complaining of intolerable noise created by helicopters. Local press printed letters to the editor and columnists discussed citizen discomfort caused by constant helicopter sounds, especially during the night.

Complaint calls were recorded on a special station log. They averaged twenty-four a day during the first weeks of patrol. Such reaction from residents could not be ignored. A new program such as this could not enjoy any real measure of success if it did not receive public acceptance. At this stage the public was condemning, not accepting.

The major noise source from the aircraft used was the small, high R.P.M. tail rotor which produced unusually penetrating and irritating high

pitched droning sounds. In an effort to reduce irritation, patrol helicopter altitudes were increased to 1,500 feet above the terrain, airspeeds were reduced to 40 M.P.H. and engines were operated at the lowest allowable R.P.M. (2,700).

These operational changes reduced noise to a more tolerable level; however, the restrictive effect on the aerial patrol's intended purpose was crippling. An alternate solution must be reached.

Hughes' engineers attacked the problem at its source. The offending tail rotor was replaced with one designed for and used on the Hughes turbo-shaft army OH6A helicopter. The new blades, with increased length and longer chord, turned 1,300 R.P.M. slower and actually increased the aircraft's stability. More important, this engineering change coupled with engine mufflers produced the quietest reciprocating engine helicopter currently available.

Patrols returned to original altitudes and airspeeds. The already considerably diminished complaints continued to fall off. By the end of the first week, citizen complaints had -- for all practical purposes -- ceased. Throughout the balance of the project, only chronic and crank complaints trickled in. Charges of "big brother," "excessive police



surveillance" and similar expressions of attitude were few and considered nearly insignificant when compared to the overall attitude of citizens in the area.

No longer encumbered with noise problems, helicopter crews were now able to concentrate on repressive patrolling, particularly at night.

The dual sealed beam lights, utilizing aircraft power source, adequately provided light needed for specific illumination.

- Sky Knight responded to a burglary call at a variety store in a shopping complex. After initially circling the area to check for vehicles, the observer utilized the light to illuminate the rooftops. A burglary suspect was observed crouching near a hole cut in the roof. Responding units, armed with this information, took the suspect into custody along with his crime partner who was inside the building.

Although the twelve-volt light is used nightly on regular patrol or specific problems with continuing success, helicopter crews are interested in a light which may be effectively utilized from altitudes as high as 1,000 feet above the terrain.

Experiments have been conducted with a Xenon Arc Light, capable of producing up to 30,000,000 candle power. This twenty-nine pound lamp was engineered by Electro Optical Systems, Inc., a subsidiary of Xerox, with offices in Pasadena, California. Potential of this light is being further explored. Because twenty-four volts (minimum) are required for operation, electrical changes or an additional generator is required for twelve-volt equipment. Such changes, when designed to be permanent, must be F.A.A. approved.

Requirements for further engineering forestall total comprehensive analysis of the light at this time. Preliminary experiments have indicated the light is very effective from higher altitudes and airborne television cameras were able to record objects on the ground with good definition utilizing the Xenon Arc Light. Because the light is a prototype, no firm production price has been established. (Current plans include extensive testing of the light during the month of May, 1968.)

Extremely important to the success of aerial patrol is the safe efficient operation of helicopters. In-service flight training was established to maintain total proficiency of all pilots. Each was required to perform full "touchdown" autorotations day and night until such procedure became second nature. A system of periodic proficiency flights was

established wherein all pilots were continuously "spot checked" by instructor pilots and ranking personnel for quality of standard flight techniques with emphasis on emergency procedures. It is the considered opinion of administrators in the Los Angeles County Sheriff's Department that continuous training is requisite to continuous efficiency of law enforcement. There is no doubt that such is the case with aerial patrol as improper handling of emergencies or careless standard flight procedures can be disastrously detrimental to the advancement of this law enforcement technique.

During any given shift of patrol in helicopters, officers spend much more time routinely patrolling than they do participating in apprehensions, chases or activities which exhilarate and relieve boredom. (This is more prevalent in the air than on the ground as diversification and contact with others is more restricted.) Consequently, the factor of boredom fatigue is added to physical fatigue of flight. Because fatigue affects efficiency, aircrews were restricted to five flight hours per shift. Flights were divided without pattern into increments of forty-five minutes to one and a half hours with "down time" utilized for refueling, reporting and meal break. Pilots performed complete post-flight inspections of aircraft at each landing to be quickly available for possible response from the ground.

Moving routine helicopter operations to the station was the singularly most important measure taken to produce a total mix between air and ground units. Subconscious separation of identity disappeared as all crews were mutually briefed and totally shared station facilities from parking lot to lockers. Pilots and observers became "driver" and "bookman," totally integrated as functioning radio car partners in day to day law enforcement activities. Veteran patrol officers who initially viewed the project "with tongue in cheek" and tended to, at times, ignore the presence of "partners" in the air were soon asking, "where were you guys when asked for an assist?", if the helicopter was not immediately available.

Primary analysis of patrol effectiveness, as utilized on standard day and evening shifts, indicated possible need for increased aerial coverage; however, to avoid increased costs attendant with addition of personnel and equipment -- matters of considerable importance to most agencies hoping to implement aerial patrols -- studies were made of offenses and incidents which should be most productively handled or prevented by aerial surveillance methodology. Helicopter availability was then established during times these situations appeared most

prevalent, and existing crews could be most effectively deployed. Times of some furtive offenses, such as burglary, could not be pinpointed but could be intelligently bracketed.

The most productive areas of effectiveness appeared to be generally between the hours of 10:00 a.m. (when banks and business establishments are first open) and the early morning hours 2:00 a.m. to 4:00 a.m. (when most late night activities diminish). These times will, of course, vary slightly in any community; consequently, aerial patrol shifts were kept flexible on both ends to meet any noticeable changes. If a particular problem should appear which could be related to other time periods, patrol schedules could easily be adapted to alteration. Constant attention by patrol supervisors to times and areas of greatest need, accompanied by proper application of available aerial coverage, maintain greatest effectiveness at nominal cost. Sky Knight patrols followed this criteria, altering times as needed but generally patrolling two shifts 10:00 a.m. to 6:00 p.m. and 6:00 p.m. to 2:00 a.m.

After thorough analysis and consideration, the use of pilots as observers was discontinued and veteran district radio car officers were assigned to observe. Because these officers were well experienced in "what" to observe, it was necessary only to train them in "how" to observe from the medium of height.



The observer training course, now developed, formalized and practically applied, consists of forty-eight hours -- twenty-four hours ground school on specialized police functions (adaptation of standard practices to aerial patrol), eight hours of ground school on helicopter familiarization, eight hours of flight training days, and eight hours of flight training nights. (The observer training course, and pilot's flight syllabus, are outlined in a companion publication, "The Police Helicopter Patrol Team," available with and considered a part of this report.)

During flight training, observers participated in orientation flights coupled with practical mapreading. In subsequent flights, they were required to direct pilots on simulated patrols within their district. Each trainee was also required to conduct, to a successful conclusion especially assigned simulated missions, with total responsibility being theirs unaided by the pilot who merely followed observer's instructions.

"On the job" training continued after observers were assigned to shifts. The specialized observer approach and planned training were quite effective as incidents of productive application increased after the change and the project settled down into a smoothly running operation which became increasingly successful.

As the demonstration project progressed, inquiries from local communities indicated that early serious thought must be given to patrol expansion within Los Angeles County. It appeared evident that additional law enforcement pilots would have to be developed.

To facilitate these long range plans, a controlled pilot training program was undertaken. The program was designed to bring selected members of the Department to a state of proficiency permitting future assignment as patrol pilots. Equally important, the Department would gain knowledge of the time required, methods necessary and system best adaptable for producing aerial patrol pilots from the most logical source -- the ranks of a law enforcement agency. Such knowledge was obtained and has been included in the previously mentioned manual, "The Police Helicopter Patrol Team."

Seven officers started the training, on off duty hours, in the third week of September, 1966. Two trainees held commercial fixed wing ratings; three had private pilot ratings; two were non-rated. None had any prior helicopter flight experience.

Because of scheduling difficulties, arranging training during off duty hours, the course was relatively lengthy for the number of hours flown. From the beginning of the course through December 31, 1966 -- a total

of fifteen and a half weeks -- trainees flew 455 hours, combination dual and solo. In that period, the following progress was recorded:

- . One of the non-rated officers dropped out of the course, principally because of a conflict of duty hours with the availability of instructor.
- . All the remaining six soloed and continued advanced training.
- . One commercial fixed wing pilot passed a flight test and obtained a commercial helicopter license.
- . Two private fixed wing pilots successfully passed commercial written and flight tests and obtained commercial helicopter ratings.
- . One non-rated officer successfully passed private helicopter written and flight tests and obtained a private helicopter rating.

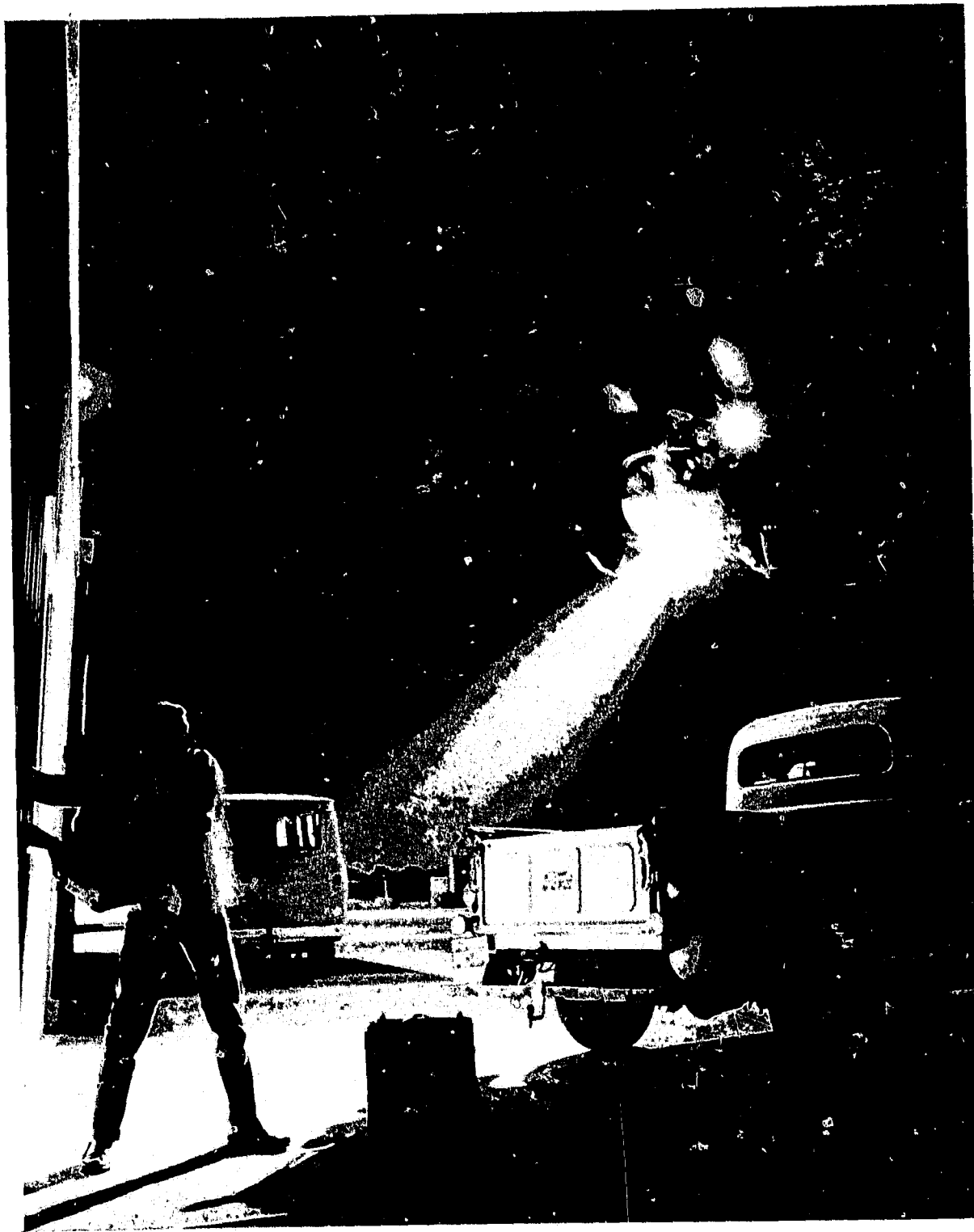
Two of the officers rated as commercial helicopter pilots concentrated on the flight course to a greater extent than other trainees by taking advantage of vacation and overtime due them. Both officers reached a state of proficiency in the helicopter, sufficient to permit assignment as law enforcement patrol pilots (one officer was assigned to "Project Sky

Knight" as a pilot, effective January 1, 1967). There is little doubt, based on results obtained, that flight training must be conducted on a firmly scheduled basis, with trainees assigned on a full-duty basis or at least four hours a day. Further recommendation on police officer flight training is available in the previously mentioned training manual developed during the course.

Continuous training of flight crews and ground crews was conducted routinely with no interference to patrol functions. In addition to the successful simulated field problem, pilot proficiency re-checks and standard joint briefings, training was expanded to include critiques of actual operations. These critiques were presented first by all participants, air and ground, in written form on prepared sheets. At subsequent briefings or station meetings, subjective and productive analysis of the operations were made and the best points of criticism or suggestion were applied to future efforts.

Observers were trained and assigned on a rotating basis throughout the Project, until most Lakewood Deputies received actual exposure to the program as working observers.

The training value of observer rotation lies, of course, in their improved



viewpoint concerning application of procedures after exposure to air and ground unit operations from both sources. Harmonious relationships, thus created, continued to provide the best possible coordination between units.

#### CONTINUOUS CONTRIBUTION OF THE PROJECT

Ability of the helicopter to respond to an incident with speed and directness exceeding any vehicle employed in law enforcement is a considerable contribution of aerial patrol.

Early response, as pointedly documented by the President's Commission on Law Enforcement, is a prime factor in the apprehension of offenders. In many cases, the helicopter provided the slight time edge needed to effect apprehensions.

- . Quickly responding to a silent burglar alarm at an automotive supply store, helicopter crews observed the burglary suspect attempt to escape through the darkness, utilizing a hole in the fence at the rear of the property. Unable to avoid lights of the hovering helicopter, the suspect surrendered to deputies who had been directed to him by the air crew. (Case #Y-365-966)

- . Answering a call concerning a possible burglary at a school, the helicopter arrived at the location within a minute. Two figures were observed to run from the school and hide as the helicopter approached. "Sky Knight" crews directed ground units to the location, where two juveniles with burglary tools had entered the school. The juveniles were detained -- cash and school property were recovered. (Case #Y-468-129)
- . At the request of the F.A.A. tower at Long Beach Airport, a night helicopter patrol intercepted a fixed wing aircraft flying over residential areas at 100 feet altitude in a careless and reckless manner. After observing the violation, "Sky Knight" followed the aircraft to the ground at Long Beach Airport. They were able to place the suspect pilot at the controls and turned him over to Long Beach Police on a charge of flying under the influence of alcohol.  
(Long Beach case)
- . A stolen car was observed speeding southbound along the freeway, by a northbound Lakewood ground unit. Unable to overtake the vehicle due to freeway separations, the unit notified "Sky Knight." The helicopter crew quickly located

the car and set up an intercept. Two juvenile auto thieves were taken into custody. (Case #Y-364-555)

Ground units continuously availed themselves of the "third dimensional" law enforcement "eyes" provided by fellow officers in the air. Aerial patrol support to ground units, uniform and detective, was repeatedly a significant contribution of Sky Knight, demonstrative of the total cooperation and coordination developed during the project.

- . The helicopter patrol located a vehicle containing the wife of a rape-sodomy suspect after she had eluded detective units. Keeping the vehicle constantly in view, they observed the woman meet with the suspect. Ground units directed to the location took the suspect into custody. (Case #Y-340-278)
- . Two armed robbery, kidnap and grand theft suspects fled on foot into the dark after collision with a police unit ended a high speed chase. A responding "Sky Knight" crew quickly observed the fleeing suspects, flooded the area with light, giving them no place to hide. Ground units easily located and arrested both suspects. (Case #Y-345-678)

. Acting on information concerning proposed activities of a grand theft forgery suspect, "Sky Knight" concentrated surveillance in the area of these activities. Suspect and vehicle were spotted circling the area. Detective units directed to the location took the suspect into custody. (Case #Y-360-715)

. "Sky Knight" assisted ground units in a long period of surveillance on a kidnap-rape suspect. The helicopter crew was able to keep the suspect vehicle in sight at all times despite darkness. Surveillance resulted in the subsequent arrest of the suspect and his accomplices.

Note: Two helicopters were used because of the length of time involved. Relieving each other in the air, they maintained constant contact and preserved the chain of evidence.

. A Lakewood Sky Knight crew assisted Norwalk Sheriff's Station patrol units during a major gang fight by illuminating the area, enabling officers to apprehend participants who would otherwise have escaped.

It is difficult without actually participating in such flights to fully comprehend the observational advantage and efficiency of the helicopter





patrol unit. Perhaps in some way the following diverse incident can impart an understanding of the minute details which can be observed and analyzed from the bubble of a helicopter:

- On the afternoon of August 30, 1967, "Sky Knight" crews observed a collie dog struggling to exit a large plastic (18-foot diameter) above ground swimming pool. The dog appeared nearly exhausted and in danger of drowning. The observer sounded the siren to attract attention then used the public address system to inform residents of the problem. The dog was rescued by the alerted family who subsequently built an exit ramp for him.

Of exceptional importance is the fact that airborne officers were easily able to observe and identify a rather obscure incident occurring on the ground. Equally important, they were equipped to take positive action and bring about desired results.

Observational efficiency was constantly demonstrated throughout the experimental project:

- On night patrol, air crew members observed school district vehicles being illegally and recklessly driven

within the district's storage yard. They then directed ground units to the location where suspects hid after discovery. Two juveniles were readily picked up and detained at Lakewood Station. (Case #Y-360-715)

- . During routine night patrol, a "Sky Knight" crew became suspicious of an unlighted vehicle driving evasively. Responding radio car deputies directed to the location stopped the car. Three suspects were detained on suspicion of robbery and burglary when a gun, numerous pry tools and unaccountable property was found in the vehicle. (Case #Y-370-864)
- . Helicopter observation of a suspicious vehicle during the night resulted in the arrest of three suspects stealing construction tools and flashing barrier lights from a construction area. Erratic behavior of the vehicle, as observed by the crew, initiated the investigation.
- . When the station desk received a call that a robbery just occurred at a retail dairy outlet, "Sky Knight" and two ground units were dispatched. The victim had only a meager description of a suspect who fled on foot.



The helicopter crew thoroughly checked the vicinity while deputies obtained report information. Unable to locate the suspect, the radio units departed. Meanwhile, the helicopter crew observed a vehicle drive from a darkened area behind a row of apartments. Because it drove some distance without lights, "Sky Knight" requested a ground unit intercept. Deputies directed to the vehicle detained the driver, found the stolen money and obtained a positive identification from the victim. The suspect was arrested.

(Case #Y-351-501)

- At 2:40 a.m., March 17, 1967, airborne deputies observed a man attempting to force a woman into a car in a dark area. Due to the apparent emergent nature of the situation, "Sky Knight" landed at the nearest intersection while radioing for assistance. The suspect immediately abandoned his assault attempt and fled. He was subsequently taken into custody by a responding ground unit who had received a vehicle description from "Sky Knight."

(Case #Y-376-996)

Offenders became increasingly aware of the helicopters' observation potential.

- A sixteen year old reckless driver pursued at speeds to 120 MPH pulled to the side when overtaken from the air. His reason? "I thought I could outrun a radio car, but when I saw the helicopter, I knew it was all over."
- Three forgery suspects easily taken into custody by ground units while parked in their vehicle at a market lot explained they "were afraid to move, because the helicopter overhead would become suspicious."
- An unlighted vehicle "cruising" city streets was intercepted at direction of "Sky Knight." Three youths in the car stated, "We were just curious to see how good the helicopters are." (This occurred the night after a "Sky Knight" documentary was aired on television.)

Particularly demonstrative of the helicopters' versatility and tenacity is the following burglary arrest:

- On December 16, just prior to 10:00 p.m., a "Sky Knight" crew observed activity within a fenced area surrounding an aluminum extrusion plant in Paramount. When they lighted the area, one person jumped into a vehicle with a third person and departed without lights. "Sky Knight"



further observed another person, on foot, exit the building and climb the fence, tearing his jacket and losing a shoe as he did so. Because the suspect on foot had obviously been in the building and could be connected with any illegal entry, the helicopter crew elected to keep him in sight and radioed the vehicle description and direction to ground units. There followed nearly ten minutes of chase wherein the running suspect fled through backyards, over fences, down alleys, between buildings and finally underneath bushes where a responding ground unit took him, shoeless and exhausted, into custody without a struggle. Subsequent checks disclosed the building had been entered and valuable aluminum ingots removed. With the chain of evidence intact, the suspect was processed for burglary and his two crime partners were subsequently apprehended. (Case #Y-489-561)

Aerial observation aided in deterring and apprehending regulatory offenders in addition to its contribution in major incidents:

- . A day helicopter unit observed a vehicle in a remote area, apparently preparing to dump illegally from a trailer

heavily laden with junk. The driver of the vehicle observed the helicopter and departed. "Sky Knight" followed him to the public dump.

- . "Sky Knight" crews observed two suspicious persons with rifles in an unauthorized area. A ground unit directed to the location cited two suspects for illegal shooting.
- . A 110 mile an hour chase of a vehicle and suspect was brought to an end with minimum of danger to officers and citizens because a helicopter crew was able to direct a road block to trap and arrest the suspect.
- . A time-consuming and repetitive regulatory offense, the racing of motorcycles in the Flood Control river bed, has been completely stopped by "Sky Knight" intervention.

Although traffic regulation was not designed as a major function of the demonstration project, it has been a "spin-off" benefit. (Any deterrent to offenders, criminal or regulatory, is a considered part of the total law enforcement function.)

Youthful drivers have particularly exercised caution because of the helicopter and the assistance periodically rendered by it in traffic incidents.

Many traffic assistance activities were responses to units which lost sight of violators in traffic, observed several violations at one time, stopped vehicles containing four to six occupants, or were involved in pursuits. Several were calls from citizens disturbed by speeding or other violations on their streets. A few were flagrant violations observed from the air.

Of the latter number, one typical incident is worthy of note because the defendant contested the citation:

- On the evening shift of October 10, 1967, the aerial patrol observed a motorcycle speeding in a residential area. In an attempt to warn the cyclist to desist speeding, the observer trained flood lights on the motorcycle and driver. Instead of slowing, the driver turned off his lights and attempted to "ditch" the helicopter, meanwhile increasing speed to an estimated seventy miles per hour. A ground unit, summoned to intercept, cited the driver for excessive speed and driving after darkness without lights. A court trial was held on December 12, 1967 at which time the defendant was found guilty on the observer's testimony.

The court did not question the airborne officer's ability to reasonably judge speed from the helicopter after an explanation of the relationship between air speed (indicated) and ground speed had been given.

Aerial patrolmen were equally versatile in contributing to public service, including public health and safety. Routinely they reported outages of street lights or were used to report and photograph open sumps, abandoned chests, uncovered excavations and other potential hazards. In a special service to the Mosquito Abatement District, they were able within a few days to locate abandoned or neglected swimming pools and natural pools which annually provided breeding places for mosquitoes, thus enabling technicians to treat these waters which otherwise would not have been detected.

Helicopter patrolmen have frequently been the informants on all types of fires: Garages, stores, homes and grass or brush. On one occasion a distraught housewife called the Fire Department saying, "come quickly the garage is burning," then promptly hung up without giving an address. The Telephone Company gave a general exchange location, information was relayed to "Sky Knight" and they located the smoke of a garage fire almost immediately and directed fire equipment to the spot.

In many such cases the helicopter was equally involved in contributing to public or individual safety:

- "Sky Knight" helicopters assisted the Orange County Sheriff's Department in rushing badly needed rare whole blood for a young child from Orange County to a clinic in the City of Van Nuys. The "Sky Knight" helicopter was immediately available and flew this blood during peak evening traffic hours. A ground unit would have had to travel forty miles on crowded freeways and streets.
- Patrol helicopters located a missing child in the Lakewood area at an abandoned dairy, then directed ground units to the location for pick-up and return to his parents.  
(Similar searches were almost weekly occurrences.)

In other productive instances, "Sky Knight" crews:

- Used rotor blade downwash to force an inner-tube raft, containing two persons, out of the flooded Los Angeles River and safely to shore. (This occurred during routine patrols of the river after heavy rains. Many persons, mostly juveniles, were protected from their own curiosity by presence of the helicopter.)

- Observed market strike pickets detaining and harassing a delivery truck at the rear of a market, summoned ground units to keep the peace.
- Landed and removed a drunk from the street for his safety and that of motorists. (This tactic was used as a safe landing spot was available, traffic was jammed and ground units were tied up in the traffic.)
- During the night shift on November 22, 1967, observed an aircraft flying very erratically, as low as seventy-five feet above houses. After moving closely enough to read the aircraft numbers with the aid of spotlights, they followed it to the ground at Long Beach Airport and arrested its sole occupant (a sixteen year old juvenile) for grand theft aircraft, careless and reckless operation and flying without a license. (Case #Y-478-206)

These few selected instances were briefly mentioned to illustrate the complete participation of aerial patrol crews in the total range of law enforcement responsibilities.

The helicopter need not be reserved for the exotic -- rescues, riots or disasters. It has proven to be realistically effective whether applied

to control of illegal dumping and driving, or to the apprehension of murderers and bandits. Unquestionably, the helicopter is a law enforcement patrol vehicle!

From June 6, 1966 to December 31, 1967, the total period of eighteen months and twenty-five days flown by aircrews during the federally supported demonstration, Project "Sky Knight," crews responded to 2,676 calls, handled 508 details and made 2,039 observations. A major portion of these 5,223 logged activities were broken down into the following general law enforcement classifications:

Burglary response . . . . .	783
Robbery response . . . . .	328
Disturbances (includes assault). . . . .	1,067
Suspicious circumstances . . . . . (persons and vehicles)	1,300
Auto theft . . . . .	98
Prowler . . . . .	362
Fires (all types) . . . . .	93
Missing children . . . . .	220

As is the case throughout all of law enforcement, not all of these classifications were actual offenses. Burglary and robbery responses

included numerous aerial checks of locations from which silent, sound or verbal alarms had erroneously initiated. Details to search for vehicles stolen or reported used in offenses committed in the district or contiguous areas were also logged as burglary and robbery responses. Similarly included were surveillance missions of persons thought to be involved in these illegal activities and periodic checks of homes or places they frequented.

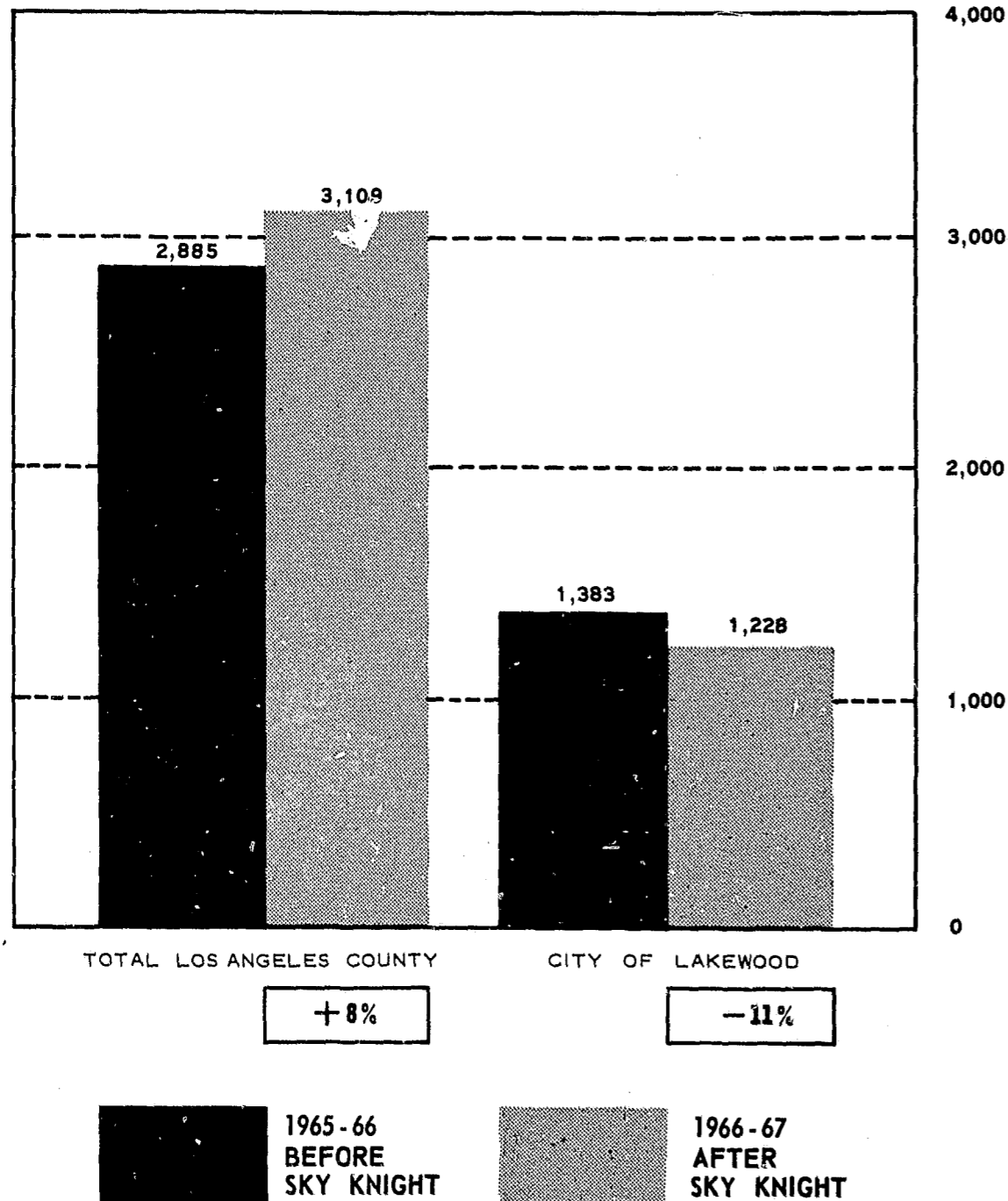
Airborne officers were directly involved in or were, through combined air-ground tactical support, responsible for seventy-eight felony arrests during the demonstration project (approximately one per week). A productive score for one unit covered two shifts a day.

Indication that the all important repressive features of helicopter patrol had a measurable effect on crime rates in the City of Lakewood may be noted in the following crime trend changes.

CITY OF LAKEWOOD CRIME TREND (Part 1 Offenses)

- 1961-62 - Crime Rate 974 per 100,000
- 1962-63 - Crime Rate 991 per 100,000
- 1963-64 - Crime Rate 1161 per 100,000
- 1964-65 - Crime Rate 1372 per 100,000

# CRIME RATE PER 100,000 POPULATION



1965-66 - Crime Rate 1383 per 100,000

1966-67 - Crime Rate 1228 per 100,000

The crime rate in the City of Lakewood increased forty-two per cent in the five (5) fiscal year period 1961 through 1966, reaching its peak in 1965-66. It was at this time that "Sky Knight" was initiated. During the first full year of operation, the crime rate dropped eleven per cent below the existing peak year.

COMPARISON OF LAKEWOOD WITH NORWALK, THE ONLY CITY CONTRACTING WITH LOS ANGELES COUNTY SHERIFF HAVING SIMILAR POPULATION AND SQUARE MILES OF AREA, IT IS THE SAME GEOGRAPHIC LOCATION, THREE MILES TO THE NORTHEAST.

### Calendar Year 1966

	<u>Population</u>	<u>Square Miles</u>	<u>Crime Rate</u>
Lakewood	87,065	9.2	1228
Norwalk	95,572	9.2	2147

Helicopter patrol, with its "space age" connotation, induced increased citizen interest in and awareness of law enforcement. While helicopter crews were enjoying unobstructed visibility of large areas, they were also more readily visible to persons on the ground. A citizen who may have

complained he rarely saw a police ground unit observed the patrol helicopter numerous times in the course of a day.

Two separate incidents demonstrate how the presence of a helicopter will encourage the citizen toward effective action.

- "Sky Knight" was utilized for a period of approximately one hour to assist Norwalk Sheriff's Station deputies in a combined search of a residential area for two felony suspects. Although the helicopter crew did not observe either suspect directly, their presence was responsible for ultimate success of the operation.

It brought a great number of curious residents out into the street where they were briefed by Norwalk crews concerning the reason for the helicopter and police patrol units.

The presence of the helicopter panicked one suspect to the extent that he was constantly on the move within the search area.

Due to these movements, he was observed by numerous citizens who alerted searching ground units.

As a result, the suspect was arrested and charged with grand theft auto, robbery and burglary. A stolen vehicle and stolen gun were recovered. Subsequent investigation cleared several cases throughout Los Angeles County (Y-456-403).

The second instance involved information from one citizen:

- On September 4, 1967, two young male narcotic users assaulted and murdered an acquaintance in the Lakewood Station district. They then used the victim's car, a two-tone grey over green, 1955 Chevrolet tudor sedan to effect an escape from the area.

At 5:05 p.m. "Sky Knight" was alerted concerning the murder vehicle (approximately forty-five minutes after the crime was committed). By 5:10 p.m. airborne officers located the vehicle near a multiple dwelling area at the edge of the city. The vehicle was empty. The helicopter orbited the site pending arrival of ground patrol units and Homicide Bureau. During this period of circling, the helicopter, unknowingly but directly, led detectives to the two suspects.

As Homicide Detectives and Fingerprint Technicians were examining the victim's vehicle, they were approached by a young female resident who, although she did not know what they were seeking, gave the following highly significant information:

"Some time ago," she said to the officer, "when the helicopter was overhead, a woman shouted from that house over there (pointing to a nearby residence), 'You better put that car under the carport before the helicopter sees it!' "I didn't see anyone near the car," she added, "But I heard what she said."

Acting on this information, detectives went to the house in question where a protective mother, not knowing the serious involvement of her sons, but from experience heartbreakingly aware of their illegal activities, had called a warning to them when she saw the helicopter. Both suspects, in the house when officers arrived, surrendered without a struggle. (Case #Y-445-207)

After seven months of successful aerial patrol over the City of Lakewood (9.2 square miles 86,400 population), a particularly significant

alteration in the operation of "Sky Knight" was undertaken.

On February 21, after careful consideration by all participants and receipt of permission from the Office of Law Enforcement Assistance, responsibilities of the helicopter patrol were enlarged to include the total jurisdiction of Lakewood Station; six cities, thirty-five square miles, and a combined population exceeding 265,000.

Almost simultaneously with this expansion an additional request was submitted to the Office of Law Enforcement Assistance to extend the original project expiration date (May 30, 1967) in order to have time to intelligently evaluate effectiveness of the concept in a much larger area. A seven month extension was subsequently granted which rendered valuable support through December 31, 1967.

Factors influencing project participants decision to expand and request a time extension were products of tests which indicated helicopter patrol potential far exceeded its existing application.

- . While airborne over their district, officers already could observe activity deep within contiguous communities.
- . Approximately one-third of air crews logged responses were in areas outside Lakewood's city limits with no loss in patrol effectiveness.

- A series of time tests disclosed that helicopter crews could while airborne respond from one extreme end of the expanded area to the other within five minutes.
- Responses from normal inner-perimeter patrol to the most distant location within the expanded area required less than four minutes.
- After receiving an alert while on the ground at the station, air crews could man their machine and respond to the most distant point in the expanded area in slightly over seven minutes.

Advantages to the demonstration project and eventual advantages to all law enforcement were also considered.

- The number of productive "task oriented" assignments, most adaptable to the helicopter patrol concept, would increase in proportion to increases in police hazards, population and geographic area.
- The expanded area more closely approximated in composition and size those communities, or combination of communities, throughout the nation

who would receive the most benefit from knowledge gained during the experiment.

- A larger area of responsibility would utilize helicopter capabilities to a higher degree than was before possible and increase airborne officer's contributions toward control of crime and related law enforcement services.
- Of vital significance in the area of helicopter patrol cost effectiveness was the fact that a much larger more populous area was to be patrolled and serviced with efficiency equivalent to that already demonstrated with no increase in personnel or equipment costs.

Physical expansion of the patrol would in itself be a significant step toward proving economic feasibility of aerial surveillance in law enforcement. It was, for instance, a great deal more expensive per capita to patrol 86,000 population than it would be to patrol 205,000 population.

Expansion and time extension presented the opportunity to implement and evaluate cooperative use of a shared law enforcement tool among several communities or public entities.



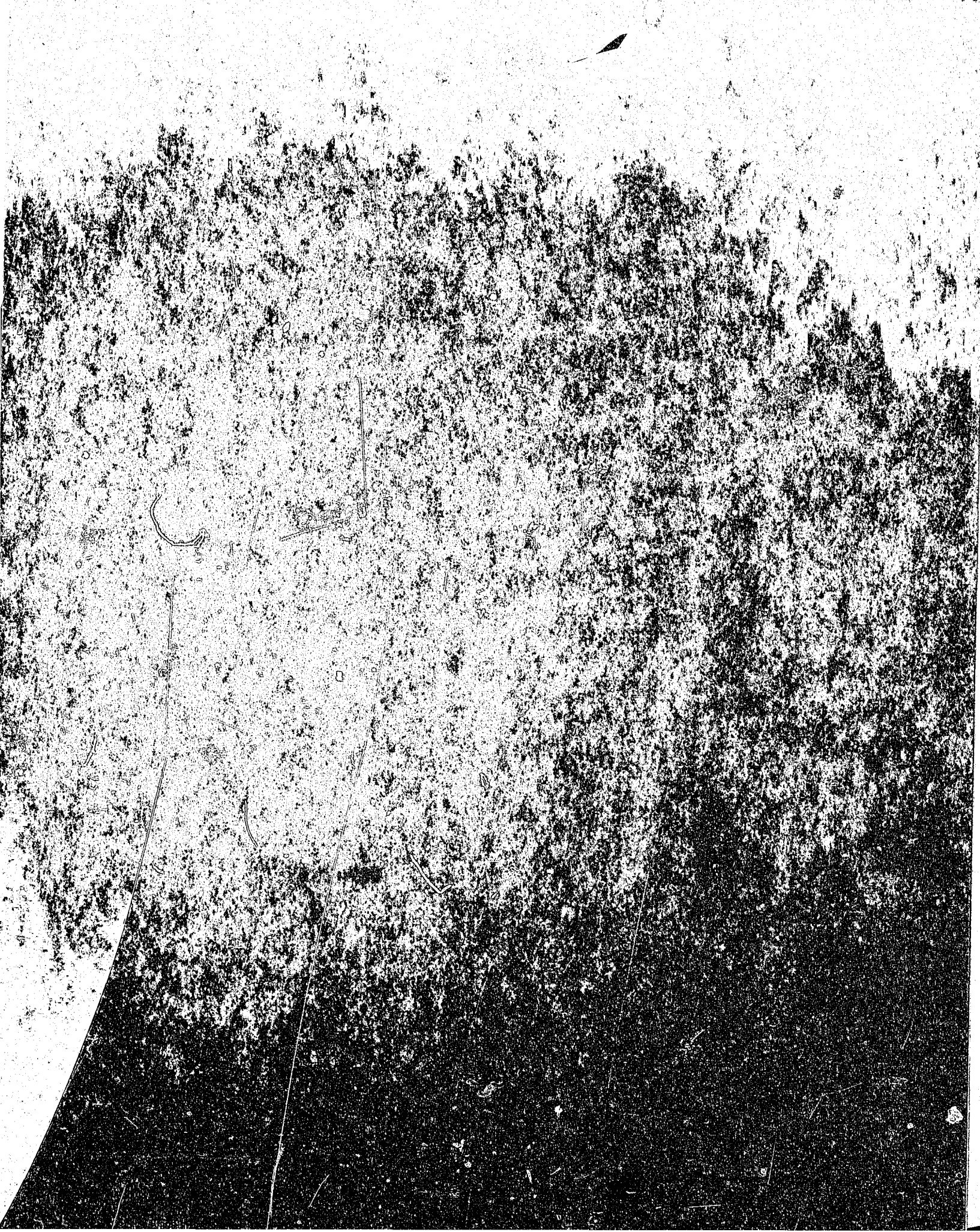
Periodic requests for helicopter assistance had been received from other jurisdictions during the first months of the experiment. Qualified responses to such requests disclosed a "task force" potential unrealized prior to the advent of ready availability of helicopters performing scheduled day-night patrols.

Throughout the balance of the experiment, helicopters and crews were made available to neighboring law enforcement commanders. Requests for service were restricted to those appearing to be emergent in nature and suited to the unique services provided by helicopters. Such assignments were made when probable results would considerably exceed those that could reasonably be expected using any other police methodology.

In one such response, in the neighboring city of Downey, California, a wanted felon ran down a motor officer during a routine check. Crashed into a pole and fled into the night. "Sky Knight" was called and arrived on the scene in a matter of minutes. Utilizing flood lights, the helicopter crew spotted the suspect in a nearby yard and held him in their beam. The suspect fired three shots at ground officers but missed them in the darkness. The suspect, wounded in the ensuing exchange of fire, was taken into custody on the existing narcotics warrant, assault with intent to murder and a variety of related charges.

# CONTINUED

# 1 OF 2



During the first month of operation in the expanded area, "Sky Knight" crews flew 317 hours (slightly over ten hours per day). In that time they logged 381 activities. This was a thirty-three per cent increase over those logged in each of two months prior to expansion.

Flight crews, already basically familiar with the expanded area, encountered little difficulty in gaining intimate knowledge of their new "beat" -- patrol productivity increased. Review of past logged activities, June, 1966 through February, 1967, disclosed an average of seven responses per day. In the first three months subsequent to expansion, "Sky Knight" averaged thirteen responses per day, an increase of eighty-six per cent over the first nine months average.

Additional advantages of the expanded patrol soon became evident.

- . The enlarged area of responsibility was less restrictive to air crews, increased productivity and reduced somewhat that fatigue attributable to boredom.
- . Operation in those areas free from airport tower control permitted pilot and observer more freedom of inter-communication.
- . The entire station ground complement exhibited renewed

interest in the project due to the total identification now experienced as opposed to partial exposure during Lakewood city patrol only.

Efficient, effective patrol of the expanded area became a routine matter with minimum operational, jurisdictional and supervisory patrol problems, largely due to the fact that all cities served contract law enforcement services from the Los Angeles County Sheriff's Department.

1. CERRITOS was incorporated in April, 1956 and contracted with the Sheriff's Department for police services. The present budget consists of eight police positions. Cerritos has a Council-Manager form of city government and a geographical area of 8.8 square miles. The population is 5,035.
2. HAWAIIAN GARDENS incorporated in April, 1964 and is administered by a Council-Manager form of government. The city at the present time is contracting for ten police personnel. It has a geographical area of .9 square miles and a population of 8,353.

3. ARTESIA incorporated in May, 1959, has a population of 13,974, and a Council-Manager form of government. The city contracts with the Sheriff's Department for eight police positions and has a geographical area of 1.6 square miles.
4. PARAMOUNT has a population of 34,019, was incorporated in January, 1957, and has a Council-Manager form of government. The city is 4.4 square miles in size and is contracting for thirty-six positions from the Sheriff's Department.
5. BELLFLOWER incorporated in September, 1957 and at present has a population of 56,501. The city has a Council-Administrator form of government, comparable with that of Lakewood. Bellflower contracts with the Sheriff's Department for fifty-two patrol deputies and has a geographical area of 6.2 square miles.

It is of interest to note that the seven major offenses (part one offenses) for the entire Lakewood Station area decreased seven per cent in fiscal 1966-67 from the year prior, fiscal 1965-66. In fact, Lakewood Station and Antelope Valley Station, also patrolled by helicopter, were the only

two of fourteen stations to show major offense decreases for the reported period.

The fact must be faced that it is more expensive to field a single airborne patrol unit than it is to field a single surface vehicle patrol unit.

Airborne officers' salaries in the Los Angeles County Sheriff's Department are but slightly higher than those of their ground counterparts. The principal personnel cost variance lies in the fact that helicopters carry two officers on all shifts while this Department, as do many others, field one-man cars on the day shifts. (Any inclination requiring the pilot to man the helicopter as sole occupant filling the roles of flyer and observer should be resisted. Flight efficiency and safety demand that the pilot's primary responsibility be aircraft operation, leaving ground observation to the observer.)

Thus the most expensive single law enforcement commodity -- wages -- is not extraordinarily altered.

Apparent imbalance of original costs between ground and airborne equipment is partially countered by controlled maintenance, federal regulation and airframe and component manufacturer support. These result in aircraft service life which far surpass that of the automobile.

(Los Angeles County Sheriff's Department personnel still utilize helicopters on day-to-day assignments that were purchased in 1957 -- eleven years ago. During that period of time, based on current market value, these aircraft depreciated only \$22,000.00 each -- \$2,000.00 per year. This is less than annual replacement costs for automobiles.)

The principal cost variance between helicopters and surface vehicles lies in hourly operation expenses -- fuel, oil, parts, labor and incidental support. This figure ranging upwards from approximately \$25.00 per hour, depending upon the type of machine and maintenance facilities used, must be equated with the efficiency and operation potential of aerial surveillance.

As has been previously stated, ground units in the test area averaged approximately 100 linear miles per eight-hour shift. The helicopter averages 300 linear miles per shift. While traversing their beat many times over, helicopter crews maintain an observational advantage eight to ten times that possible from ground vehicles. These facts produce a phenomenal efficiency increase. Any investment producing a return of increased efficiency is a sound investment.

In an effort to totally explore potential fiscal support for aerial patrol, the last four months of "Project Sky Knight" were conducted with the

total ground unit complement of Lakewood Station depleted by two cars from each of two shifts -- day and evening. The normal number of general law cars per shift, 16.5, was reduced to 14.5. (Traffic cars remained at 18.5.)

Prior to discussing results of the test in terms of data extracted from officers working logs and station statistics, basic cost factors will be considered.

For the two shifts involved during the four-month study, the audited cost of helicopter patrol was \$65,333.00.\*

Potential savings through deletion of two ground units on two shifts for the same period was \$45,265.00.\*

Because of contractual obligations and the unique six city service rendered by Lakewood Station, this policing jurisdiction was perhaps not the most typical test area for a totally comprehensive evaluation of ground unit removal.

Some seasonal variance may also have existed as control months and

\*Based on all costs encompassed, computed by Auditor Controller, County of Los Angeles.

test months, of necessity, were within the period of expanded patrol which did not become totally effective until March, 1967.

Statistics for the test months when compared to the same period the year prior indicate that removal of two patrol cars did not evidence any documentable decrease in the quantity of work performed.

Total adult arrests -- felony and misdemeanor -- were sixty-three per cent higher in the test months of 1967 than they were for the same period in 1966. Total cases handled were thirty-two per cent higher.

Note: There is no method of measuring these percentages as they may have been if the cars had not been removed; however, to ascertain if a considerable trend of increase in cases handled and adults arrested existed elsewhere, the same figures were extracted from statistics gathered in control cities used by the independent evaluator for comparison purposes. Total cases handled during September, October, and November of 1967 in these two "control" cities increased 25.3% over the same period in 1966. Total adult arrests increased 44.6%.

Extracts from working logs of field units taken during the control months of July and August, 1967 and test months of September, October, November, and December, 1967 indicated a decrease of 16.2 per day in average daily number of calls to remaining general law cars. Increases in

criminal calls to traffic cars, 13.6 per day coupled with increased production per general law car (10.8 to 11.8 per day) maintained a good level of service. The greatest penalty paid during the test period appears to have been a slight decrease in traffic enforcement. Citations issued dropped 3.5 per day per car. The juxtapositioning of calls is also reflected in the increased time spent by traffic cars on criminal calls -- twelve hours daily.

To expand the study, traffic accident statistics for the test months in the six cities were compared with the same period for the year prior. Traffic accidents did increase by 17.3% over those recorded in September, October, and November of 1966. However, the increase in accidents is apparently not attributable to removal of cars as a similar increase, 16.4%, occurred during the control months. At the same time accidents increased 23.4% in the comparison cities. It would appear that accident increase was a phenomenon not significantly related to the test.

When all factors were measured, the study indicated that units can be removed for extended periods of time with minimum loss of efficiency and adverse effect, if such moves are fiscally requisite to provide support for advanced police techniques.

## RESULTS, RECOMMENDATIONS AND PROJECTED PLANS

As the project neared conclusion, principal goals expressed during development of the demonstration were reviewed for measurement against original optimism.

Working results of the experiment substantiate this optimism.

1. Improve police response time -- "Sky Knight" crews are able to respond with speed and directness far exceeding expectations. Even from a "ready stand-by" position on the ground, the helicopter can become airborne in two and one-half to three minutes. When this vehicle is airborne, the response time from any given point within the project area is never more than five minutes and often a matter of but a few seconds.
2. Demonstrate successful daytime surveillance methods -- "Sky Knight" has been operating up to expectations in the daytime. The usefulness of the helicopter had already been proven by the Sheriff's Department in innumerable

cases and situations throughout the County, prior to the initiation of this project; the purpose of this goal was to display the utility of the helicopter as a patrol vehicle within the project area.

3. Initiate successful nighttime surveillance -- The "Sky Knight" program has conclusively demonstrated that aerial patrol and surveillance are not only possible during nighttime, but that in most categories, nighttime activities are just as effective as those conducted in the daytime. This goal has been successfully accomplished to the extent that it may be recorded as a major contribution of the "Sky Knight" project.

4. Increase patrol observation -- As is apparent from the aforementioned accomplishments, the observational potential of the helicopter as a police patrol vehicle is phenomenal. One need only to fly over a designated area to realize how much more can be observed from patrol altitudes than from a ground unit. There is no questioning the fact that in certain situations the

helicopter is without equal in its capabilities. It has been discovered that helicopter crews can observe individual movement on the ground with a clarity not heretofore realized. The nighttime prowler and rooftop burglar are both highly susceptible to aerial observation, and psychologically deterred from operation within the area patrolled by air.

5. Increase officer security -- Ground crew officers within the project area have stated that the mere presence of "Sky Knight" gives them a sense of security while performing their tasks; thus, citizens and police alike receive a psychological benefit. Standard procedure in the Lakewood Station area now includes "Sky Knight" "back up" of any ground unit requesting this service. Ground units routinely avail themselves of this security during the performance of certain hazardous activities. The presence of this police vehicle hovering overhead acts as a distinct and positive deterrent to the possible assault of ground officers by suspects. Officer security is also enhanced when "Sky Knight" can check hazardous

areas, such as rooftops or high-fenced grounds which normally are also out of the ground officer's view.

6. Reduce crime in the project area -- This can best be illustrated by using the following data: During

1966-67, the first full fiscal year after "Sky Knight" --

a. Actual major crimes --

- in the City of Lakewood decreased eight per cent;
- in the total Los Angeles County area increased nine per cent.

b. Crime rate per 100,000 population --

- in the City of Lakewood decreased eleven per cent;
- in the total Los Angeles County area increased eight per cent.

c. Robberies --

- in the City of Lakewood decreased six per cent;
- in the total Los Angeles County area increased twenty-two per cent.

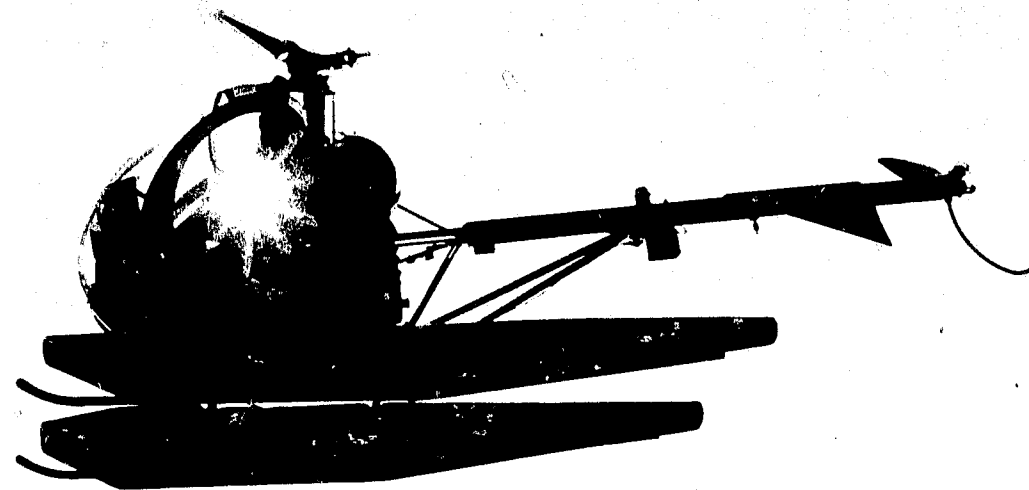
d. Burglaries --

- in the City of Lakewood decreased seven per cent;
- in the total Los Angeles County area increased nine per cent.

**CRIME COMPARISON**  
Between  
**Fiscal 1965-66 and 1966-67**  
(Sky Knight initiated June 6, 1966)







**SUPPRESSED  
CRIME**

While major crime in Los Angeles County increased approximately nine per cent in 1966 over that of 1965, the population increased only one per cent. However, the City of Lakewood's eight per cent crime decrease came in the face of a three per cent increase in population. During the controlled study in the Lakewood area, no increase in manpower or other new law enforcement technique was used except for the helicopter.

A survey of Lakewood residents was jointly conducted by city officials and the Sheriff's Department. Each resident received a prepaid, pre-addressed postcard enclosed with the mailing of Lakewood City's annual report. No directions for use were included and it asked but a few simple questions.

SURVEY - PROJECT SKY KNIGHT

1. Are you aware that Project Sky Knight (helicopter patrol) is being conducted in your city?  
Yes \_\_\_\_\_ No \_\_\_\_\_
2. Do you feel more secure:
  - A. While your children are away from home  
(playground, park, school)? Yes \_\_\_\_\_ No \_\_\_\_\_
3. Is "Sky Knight" service of value to the community?  
Yes \_\_\_\_\_ No \_\_\_\_\_

4. Would you favor continuation of Project Sky Knight?

Yes \_\_\_\_\_ No \_\_\_\_\_

5. Comments: \_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

Nearly thirty per cent of the survey questionnaires were returned to city hall, most cards were signed although no provisions were made for signatures.

More than ninety-two per cent of respondents favored continuation of helicopter patrol, less than six per cent voiced disapproval, two per cent responded with no opinion.

This near unanimous approval and support, voiced by such a substantial number of residents, is indicative of the general public's attitude toward spiraling crime rates and a significant endorsement for continuing long-range program to deter the criminal.

Several months before the scheduled conclusion of the grant supported demonstration project, all six participating cities conducted joint council meetings and affirmed their desire to continue the patrol and established working agreements to facilitate that function.

The Lakewood City Council, at its regular meeting on November 28, 1967, approved the purchase of the helicopters already assigned to the patrol.

It was further agreed that none of this capital cost would be assessed against the other cities.

A joint cities agreement provided that apportioned shares of total patrol costs, including Sheriff's personnel, all insurance, fuel, oil and maintenance, be assessed each participating city.

All cities mutually agreed that despite other variances in city composition each consisted of a computable percentage of three known factors making up the entire patrol district -- population, geographic area (square miles), and assessed evaluation.

Joint acceptance of police aerial surveillance and unhesitating implementation of its function as a regular part of the police service in the demonstration cities is a singularly important endorsement of the project.

Another endorsement, unsolicited and perhaps even atypical of many citizen responses to law enforcement endeavor, came to the City of Lakewood in the form of dollar contributions from residents who read press releases quoting a cost of approximately \$1.00 per year per resident to continue "Project Sky Knight." In such gestures may be found the basic

elements for a novel measurement of success.

Throughout this report, reference has been made to specific incidents involving utilization of the unique services provided by helicopters.

These could in effect be classed as high priority task-oriented responses.

There is a singular fact concerning most of these incidents which should be given consideration -- an offense or offenses had been committed prior to action by the helicopter and would irreversibly be statistically recorded as such. Although valuable residual deterrence no doubt resulted from publicity given these productive incidents, in themselves these activities probably did not produce the previously mentioned decrease in offenses.

A most significant contribution of aerial surveillance is that helicopter crews are rarely restricted in their continuous patrol action. The very nature of the vehicle and the medium through which it travels permit concentrated surveillance of selected or high hazard areas in addition to total district patrol. Helicopter crews, unhampered by much of the multiplicity of detail confronting ground units, are nearly omnipresent and plainly visible to potential offenders. Proper supervisory application and utilization of this important feature of aerial patrol

produces singularly effective results in crime deterrence. (For instance, Lakewood School District officials report marked and substantial reductions in school vandalism complaints since inception of "Sky Knight.")

It is strongly recommended that the unencumbered repressive patrol potential of helicopter crews not be neglected or possibly overlooked by line supervisors who are responsible for but somewhat physically removed from functions of the aerial patrol vehicle. No matter how dedicated they may be, airborne officers require direction and supervision equivalent to and consistent with that given radio car crews.

Controlled application of the helicopter, manned by competent law enforcement personnel, has proven it to be a versatile unit capable of widespread utility.

Basic needs of public service are generally universal and hundreds of communities have the fiscal capabilities to implement fully autonomous use of this tool with the same measure of success demonstrated in "Project Sky Knight."

Within such communities productive supplemental use may be found for

many departments and agencies -- traffic engineers, public utilities, zoning and planning commissions, parks and recreation, school districts, building and safety, tax assessment and a multitude of other special districts or services. Cooperative inter-agency use can provide maximum utilization of personnel, equipment and time with the added advantages of shared monetary considerations.

Today, many area cities although self-sustaining in most endeavors are participating in such undertakings as joint computer agreements, expansive mutual aid programs and other technological applications which provide substantial savings enabling them to take advantage of such needs not otherwise feasible on an individual basis.

The helicopter offers similar jurisdiction-wide cooperative sharing potential which, as noted in the case of six Los Angeles County cities, is already operational.

Eight additional cities within Los Angeles County have established a joint powers agreement to share a two shift, two district aerial patrol. This latest agreement is to be effective and operating in July, 1968.

At least twenty other cities of various size are earnestly involved in studies to obtain aerial surveillance programs for their combined communities.

The concept of helicopters as totally integrated units of law enforcement and public safety has by no means reached an apex; it is in fact in its infancy. There is little doubt that expanded application will produce increased sophistication and broadened utilization of the medium. This is especially true when one remembers that sixty years ago many considered the automobile to be unsafe, inordinately expensive, non-utilitarian, a "noisy eyesore" and no match in transportation efficiency with the dependable horse and buggy.

Potential of aerial patrol is boundless, limited principally by possible lack of imagination or innovation on the part of those responsible for implementing its service.

Helicopter manufacturers, already aware of the marketing potential in law enforcement, are studying the demonstration project and expanding optional equipment to include those refinements necessary for police adaptation. To date, the helicopter industry has demonstrated completely responsive cooperation with any law enforcement agency seeking assistance in aerial patrol studies. Through such cooperation, the industry is contributing to its growth as well as to growth of aerial surveillance methods of law enforcement.

The almost phenomenal expansion of helicopter use in military tactics is creating a potential manpower pool of young helicopter pilots, many of whom will doubtless be suitable for and interested in careers in law enforcement.

Long range potential of this "third dimensional" law enforcement technique has generated plans to establish aerial patrols throughout Los Angeles County. Task force discussions with the County Board of Supervisors and representatives from many cities, including Los Angeles, have already begun.

This is a program of considerable magnitude which must have adequate time to properly develop. In the interim, local jurisdictions wishing to more immediately apply the benefits provided by this new patrol technique may do so on a contractual basis.

The Los Angeles County Sheriff's Department is continuing research in technological fields for future application to aerial patrol.

These include more powerful lights, improved aural communications, infra-red and ultra violet light filters for passive surveillance (when suspects are not aware of surveillance as they may be during an open



pursuit), portable television cameras and video recorders, audio alarm systems to augment existing visual alarms and studies to apply electronic digital transceivers to helicopters and radio cars.

Beyond the pre-planning stage and soon to be operational (July, 1968) is an inter-agency radio dispatch system which will provide the previously mentioned eight city patrol with total communication on an expandable six frequency system including immediate, efficient communication between ground units of the several jurisdictions to be served and helicopter crews in their district. Each jurisdiction will be able, through a low frequency "sele-call" system, to institute a combination visual-aural signal alerting helicopter crews to monitor that jurisdiction's frequency. Changes in frequency will be accomplished by a simple toggle switch readily available to pilot and observer.

#### SUMMATION

The helicopter makes aerial procedures possible which increase efficiency of the "man on the beat," improving the potential of law enforcement patrol functions and aid in the reduction of major criminal activities.

Ability of the patrol helicopter to see more, travel further, and respond with speed and directness heretofore not considered possible, make it

potentially the most important crime deterrent vehicle available to law enforcement today!

In addition to accomplishment of initial project goals, the following advantages of aerial patrol were made clearly evident during the demonstration project:

- . Constant availability of a helicopter for purposes of surveillance and tailing vehicles or suspects has been an impressive investigation tool.
- . Its ability to transport investigative specialists to a crime scene can be a definite aid to early apprehension and successful prosecution.
- . In hot pursuit, the helicopter has no equal. An additional efficiency factor is its ability to "lock on" to a vehicle and maintain visual contact until the conclusion of the activity. This aids the welfare and safety of the general community, by significantly reducing the need for prolonged "high speed" chases. Correlated with its success at pursuing vehicles is the helicopter's proven ability for either pursuing or immobilizing individuals on foot.

- The helicopter can become an integral part of the progressive police administrator's planning function. There is no substitute for this vehicle in its ability to place the police administrator in a position to command an overall view of his jurisdiction, its police hazards and available physical resources for problem solving.
- Civil disturbances often result in a vast amount of confusion, particularly at night, with ground patrol units unable to identify the key points of difficulty, and participants often claiming they did not hear an order to disperse. The helicopter's overall view of the scene, together with loudspeaker and riot suppression equipment, will do much -- both tangibly and psychologically -- to bring the situation to a rapid and acceptable conclusion. The recent "hippie riot" experienced by the City of Arcadia serves as a prime example:

On Sunday, June 4, 1967, 2,500 to 3,000 "hippies" and "beatniks" gathered at a park in Arcadia for the purpose of a "love-in."

Traffic on the adjacent streets was virtually at a standstill. Several fights had broken out, and two people were taken to the hospital. In removing the injured persons from the park, the ambulance and the Arcadia Police Department units were delayed from leaving by "hippies" and others who climbed onto the vehicles and rocked them back and forth, taunting the officers. The "hippies" had two or three loud musical groups and the Arcadia Police Department was receiving numerous phone calls from citizens protesting the noise. At 8:45 p.m. the Arcadia Police Department requested assistance from the Los Angeles County Sheriff's Department. One Captain, two Lieutenants, eight Sergeants, and fifty-five Deputies were deployed within one hour. A helicopter was also dispatched. The helicopter and crew made several passes over the area, announcing that the park was "closed"; a caravan of radio cars circled the park in a show of force. The crowd quickly dissipated, until only 800 people remained. One-half hour later, the helicopter with an Arcadia Police Department officer aboard, again flew over the area, this time issuing a dispersal order, declaring the situation an unlawful assembly. On the ground, Deputies and Arcadia Police Officers formed a line and cleared the park of the remaining people and vehicles.

- Give citizens a feeling of security. An example of this can be shown in the crime of assault. Unlike burglary or robbery, assault is strictly a personal, rather than a property offense. The average citizen feels more

strongly about his personal safety than he does about the safety of his property, and rightfully so. Personal safety and security may be a vital consideration in the choice of a neighborhood in which to live or raise a family. The mental health or psychological well being of an entire community is adversely affected by the existence of known predators, such as the Boston Strangler. If the risk of personal assault can be lessened by aerial surveillance techniques, the value of this service goes beyond monetary calculation.

. In the area of citizen safety, the ability of this vehicle to detect fires through the early observation of smoke or flames is of extreme importance. It is quite apparent that such smoke or flames would be observed much sooner by aerial patrol than by ground units. It is equally capable of noting and reporting many other safety hazards.

. It is an excellent supervisory tool when periodically utilized by those responsible for directing general law enforcement functions.

The most significant return from helicopter patrol, one that is extremely difficult to gauge, concerns total use of the helicopter to improve the overall quality of police services which must be performed in order to insure the safety and further development of a community. An appreciation of this challenges the vision of all government officials.

"Project Sky Knight," employing but a single unit per shift, has been effective in a thirty-five square mile area with a population exceeding 205,000. It is more than reasonable to assume that other jurisdictions or combinations of jurisdictions can, after intelligent investigation of their own environment and needs, achieve equally effective benefits of the helicopter as an extremely efficient law enforcement tool.

The physical, legal, scientific or social tools capable of ultimately eliminating crime may hopefully -- but doubtfully -- be developed in some Utopian future. Meanwhile, law enforcement administrators and government officials must take full advantage of every workable, innovative step to fulfill their primary purpose -- public protection. Airborne patrol is such a step -- perhaps the most revolutionary change in four decades.



**ALPHA NATIONAL SYSTEMS**

P. O. Box 1142, Orange, California 92668

Specification Sheet No. 1A Alpha 5 Alarm Beacon  
Patent Pending All Rights Reserved

Approved by the City of Los Angeles Electrical  
Testing Laboratory No. 053228 Oct. 3, 1967.

**BEACON SPECIFICATIONS:** VOLTS - 120  
WATTS - 500  
AMPS - 4.55

Beacon consists of heat resisting lens with gasket sealed to Alzak aluminum reflector which mates to cast aluminum body containing lamp receptacle through waterproof seal. Also 500 watt, T4, mini can screw base.

**MOTOR MECHANISM MOUNTING PLATE AND INTEGRAL BUSHINGS:**

Consists of shaded pole gear motor 1/100 hp at 115 volt 60 cycle 35 rpm drawing 0.75 amps., brush and step slip ring assembly, all securely attached to cast aluminum cover which is compressed asbestos gasketed and fastened to cast motor mechanism housing by No. 6 self tapping screws. With neoprene shaft seal.

**MOTOR MECHANISM HOUSING:**  
Cast Aluminum

**CONDUIT ATTACHMENT OUTLET:**  
Cast Aluminum

**MOUNTING FEET:**  
Galvanized Steel Strap\*

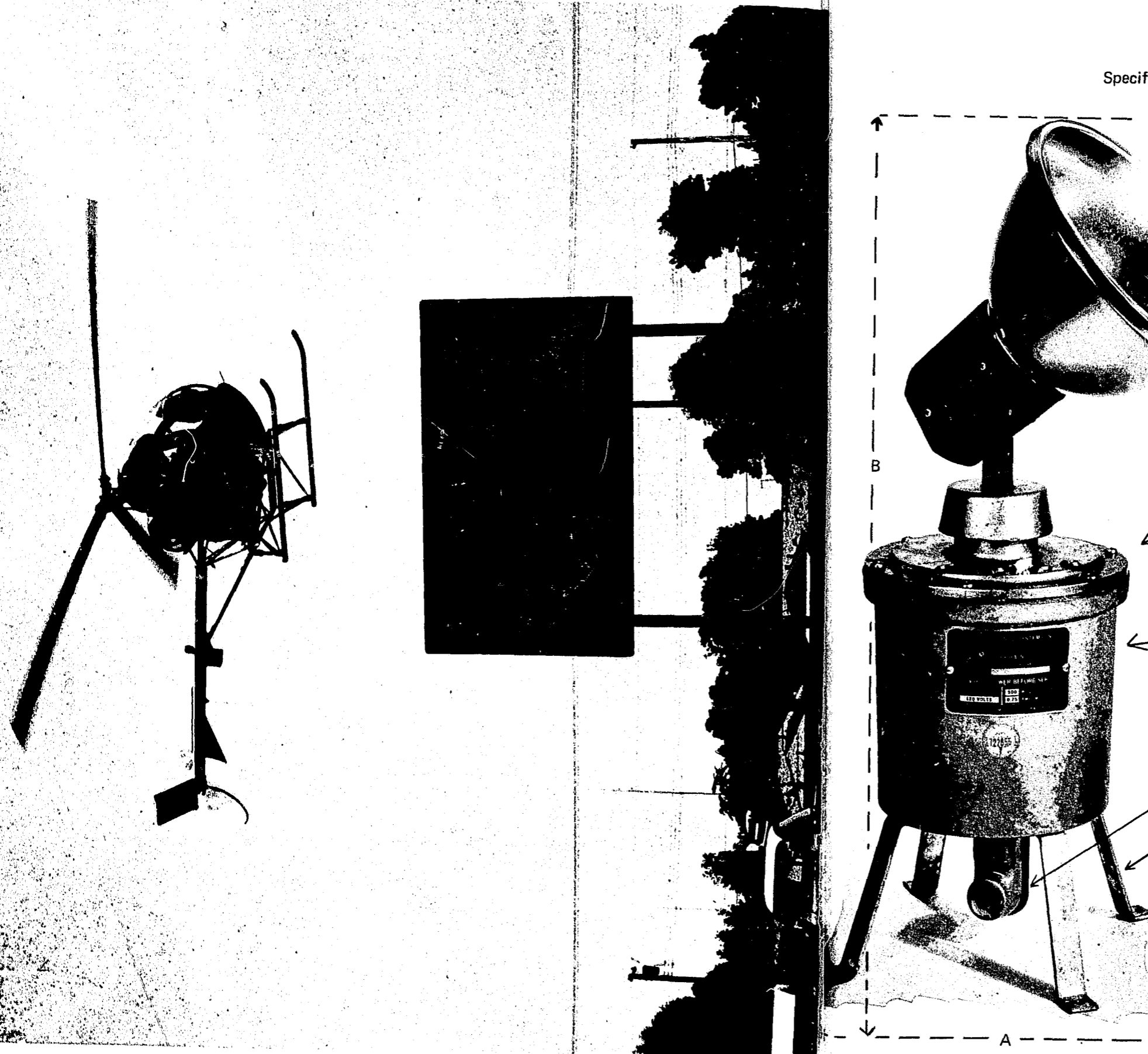
Entire unit is completely waterproof,  
pre-wired and pre-tested.

**Total Electrical Characteristics:**

VOLTS	120
WATTS	636
AMPS	5.30

**OVERALL DIMENSIONS:** A = 11-5/8"  
B = 22-1/4"

\* Government units to be aluminum strap.



**END**