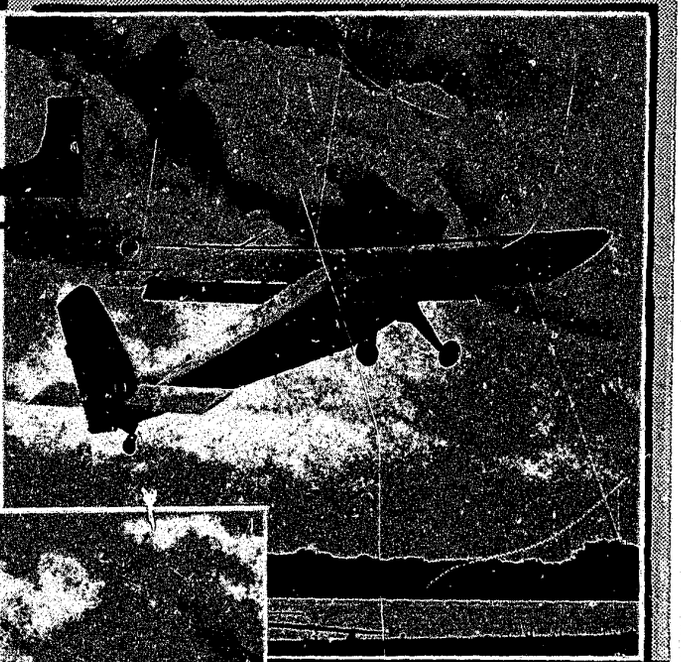
DADE COUNTY PUBLIC SAFETY DEPARTMENT

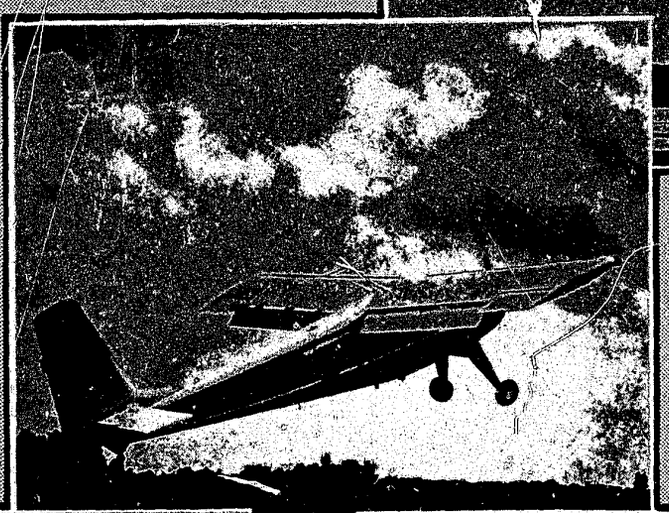
STOL



PREPARED FOR:

NATIONAL INSTITUTE OF LAW ENFORCEMENT
AND CRIMINAL JUSTICE LAW ENFORCEMENT ASSISTANCE
ADMINISTRATION
UNITED STATES DEPARTMENT OF JUSTICE

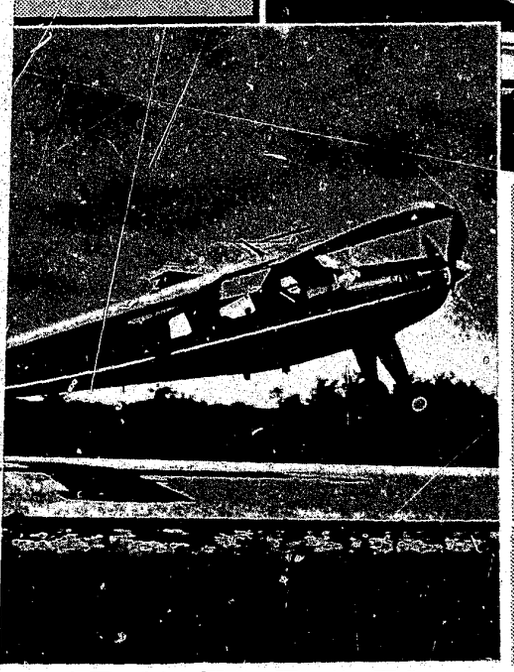
GRANT 70–DF–036

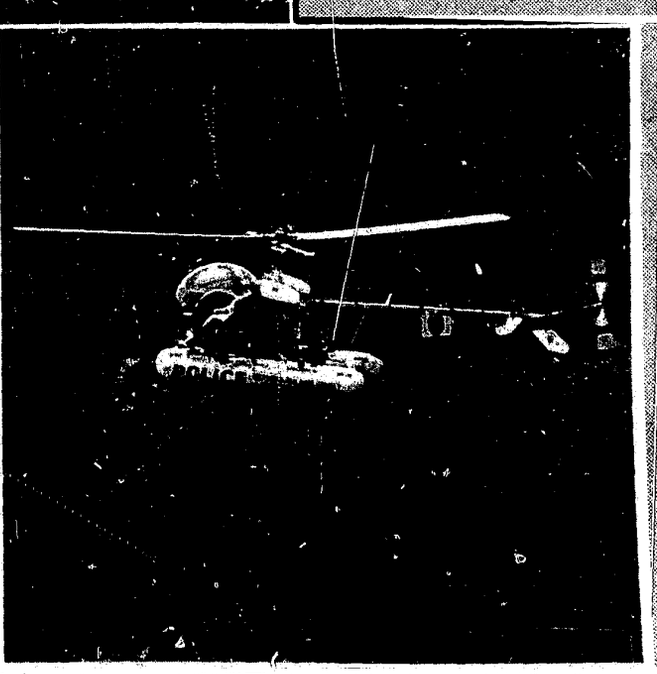


PREPARED BY:

DADE COUNTY PUBLIC SAFETY
DEPARTMENT PLANNING AND
RESEARCH BUREAU

AUGUST 15, 1971





INTRODUCTION

The Dade County Public Safety Department is indebted to the Law Enforcement Assistance Administration, United States Department of Justice, for the opportunity which was provided through the STOL Project to participate in an innovative program designed to inquire as to the applicability of modern technological advances and methodologies to improve law enforcement.

In order to maintain a free society and to insure the maintenance of public order and the enforcement of the criminal law, we in the police service must recognize a complete dedication of not only the man in the field but also the man in the administrative areas wherein new methods to better serve the public are explored. Many of these areas were until the recent past, considered outside the realm of a law enforcement agency's capabilities.

Such an exploration has been made by the Dade County Public Safety Department with the help and support of the Law Enforcement Assistance Administration, and it is with this note of cooperation that this report of our mutual efforts is dedicated to the citizenry whom we both serve.

E. Wilson Purdy

E. WILSON PURDY
Director
Public Safety Department

ACKNOWLEDGEMENTS

The Dade County Public Safety Department is grateful to the following people for their assistance in helping to prepare the **STOL** Project Evaluation Analysis Report.

Mr. Robert M. Michie, Supervisor, Planning, and Research Bureau

Irving Heller, Captain, Aviation Section, (Project Director)

Mr. C. M. McDonald, Budgetary Federal Grant Analyst

Walter P. Cowart, Police Officer, Staff Technical Writer

Carole Baldwin, Police Woman, Grammarian

Pilots: Sergeant William Elliott

Aircraft Operator Bobby W. Riggs

Aircraft Operator Francis M. Beirne

Aircraft Operator Herbert L. Williams, Jr.

Aircraft Operator George E. Mitchell, Jr.

Aircraft Operator Charles E. Gibson

All Clerical support personnel in the Planning and Research Bureau, the Aviation Section, and other members of the Public Safety Department who contributed to the preparation of this report.

PHOTOGRAPHY

The Photographs in this report were taken with a motorized Niken F camera and either 50 or 135 mm lens. Film speed: ASA 400, Shutter speed 250/500 second, with no filters.

Photo credits:

Mr. Ralph Page

Public Information Office

Dade County Public Safety Department

Other Photographs, as indicated, are courtesty of The Miami News.

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PART I

PROGRAM DETERMINATION

CHAPTER I

1. FORWARD

The President's Commission on Law Enforcement and Administration of Justice's publication **THE CHALLENGE OF CRIME IN A FREE SOCIETY** contains a recurring theme of the need for Police Agencies to effect progress through greater utilitzation of 20th Century Science and Technology. Few can challenge the fact, that during the past two decades fantastic gains have been made in the total spectrum of the scientific disciplines. Basic and advanced research have repeatedly provided the impetus for improved technology, manufacturing techniques and system designs. We are now a society capable of computerization, miniaturization, automation, space travel and even surgical techniques involving the transplants of life controlling organs, but, still relatively incapable of controlling those who exist by preying physically and financially upon others.

It is with this latter jackal-type social group that recognizes no political, financial, ethnic or social boundaries, and possesses few if any moral scruples with whom the police are primarily concerned and it is with Law Enforcement's traditional and changing needs, as partially noted in the **TASK FORCE REPORT: THE POLICE** that "Law Enforcement cannot remain static and still serve the public adequately," that this innovative project was concerned.

Police Agencies are generally expected to be effective, efficient and immediately available at minimal costs. The previously identified publication, **THE POLICE**, summarizes this philosophy as follows:

> "The Difficulties and inherent limitations of law enforcement are seldom appreciated by the public when it considers what the Police can do and reacts to what they do. Americans are a people used to entrusting the solutions of social ills to specialists, and to expecting results from the institutions those specialists devise. They have entrusted the problem of crime to the Police, forgetting that they still operate with many of the limitations of constables of years past, even though today's citizens are no longer villagers."

Fortunately, for the Police and the Community of which they are a part, there has occurred in the very recent past specialized research that has served to identify many basic Police needs. This research has suggested techniques and procedures that, because of the critical responsibilities of the Police service, must be adequately field-tested in order to determine the practical aspects of their capabilities to Law Enforcement. One of the more innovative programs suggested as a result of aroused interest among specialists within and without Law Enforcement circles is the increased use of aircraft in Police services.

Few persons in this latter stage of the 20th Century can deny the impact of the use of airplanes upon our society. This method of travel and transportation affects every phase of our economic and social life. Obviously then it follows, that if the Police service is to

fulfill its community obligations and perform effectively in this milieu, it must determine the practicality of utilizing aircraft in the performance of routine and specialized duties.

Whenever any program of an innovative nature is suggested, however, currents of conflicting opinions are generated. The optimists will look upon the new as possibly providing absolute answers to multi-faceted problems, while the pessimists suspiciously regard innovative programs as violating sacred dogmas of the distant past. Neither of these two extremes should be considered valid, and the introduction, acceptance, modification or rejection of new techniques or systems in the Police field, should be rather based on balanced programs with an in-depth research of operational factors in order to determine effectiveness and efficiency. The use of aircraft, of varying types, must be done on a programmed basis with built-in requirements for continual evaluation, updating and revisions, just as the professional Police Administrator constantly reviews patrol, traffic and investigative operations.

In keeping with the practice of providing the citizens of Metropolitan Dade County, Florida, with the finest police protection possible, the Dade County Public Safety Department undertook the task of implementing and evaluating an Aviation Patrol Service, which, when fully operational could provide protection and services to the community never before possible. This report deals with the varied aspects of using

helicopters and fixed wing aircraft and the advantages and disadvantages of having either or both in service. Helicopters continue to prove their versatilities in private transportation and are proving to be an essential element in Police work. As operating costs are always given primary consideration and with the trend of large metropolitan areas to become more congested, the large airports are being moved away from the cities, which leaves a gap in commuting for short distances.

To fill the gap, only Short Take Off and Landing (STOL) type aircraft along with Helicopters as airborne carriers appear suitable in the minimum landing and takeoff space availabilities. Throughout this report, we have tried to show these advantages, but also to explore the problem areas in general.

2. HISTORY OF AIRCRAFT IN LAW ENFORCEMENT

The history and utilization of fixed wing aircraft in the area of Law Enforcement date back to 1925, when the Los Angeles County Sheriff's Department formed a Reserve Aero Squadron, made up on strictly volunteers serving on an "On Call" basis. During the earthquake of 1933, the Reserve Aero Squadron performed missions which were so impressive, that the Los Angeles County Sheriff's Department decided to maintain the Aero detail as a full time official unit.

The New York Police Department began using aircraft prior to 1929 and initiated a regular Aviation Section during the same year. The New York Port Authority began using Helicopters in 1947 for surveillance, transportation and rescue. Many City and State Agencies have followed this same concept of the use of helicopters, limiting, however, their operations to day-light hours. The use of helicopters as a police patrol vehicle was envisioned by authorities in California as a result of a pilot program, known as Sky Knight, but this was not until May 1968.

The Dade County Public Safety Department entered the aerial patrol concept during the latter part of 1959, when the Department purchased its first Helicopter through a Civil Defense Federal Matching Funds Grant. Subsequent to this Grant and during the 1960's, the Helicopter, a Bell 47G2 was utilized on an "As Needed" basis rather than on a concentrated effort directed toward the aerial Patrol concept of crime prevention and Selective enforcement.

CHAPTER II

1. NEED FOR AERIAL PATROL

The value of aerial patrol is reflected in the success of crime prevention, apprehension and surveillance when pertinent relationships between ground and aerial units are established and considered.

A study of geography and terrain is of primary importance in determining the feasibility of aerial patrol in terms of area (square miles). Factors necessarily will vary from place to place, but common to all will be a requirement for a careful analysis of geography and terrain, population and clientele and the rate and type of crime.

The crime rate, type of crime and frequency is perhaps the most important consideration in determining the feasibility and justifications of aerial patrol. Crime in the United States as measured by the Crime Index, increased 13 percent during the first three months of 1970 when compared with the same period in 1969. Nearly every city in the nation experienced a steady increase in crime. Nationwide, the violent crimes as a group were up 12 percent; Robbery increased 15 percent, Murder 13 percent, Aggravated Assault 8 percent and Forcible Rape 6 percent. Property crimes rose 13 percent. Larceny's of $50.00 and over in value were up 17 percent, Burglary and Auto Theft closely behind at 12 percent and 11 percent respectively.

Dade County also experienced an increase in major crimes. During the first six months of 1970, robberies increased 49 percent, burglaries rose 38 percent and larcenies 16 percent. Total Class I Crimes in Dade County rose 29 percent over this same period of 1969.

This Crime increase led to increased apprehension and concern on the part of Police Officials within the Metropolitan Dade County Area, as well as with the populace in general.

2 A. ADVANTAGES

Probably the most dramatic impact aerial patrol can have on law enforcement is reduced response time, along with the ability to assist with efficiency the traditional ground units. Ground Units, which heretofore were at a disadvantage in locating fleeing suspects, discovering stolen vehicles or finding lost children can be aerially directed away from areas which would prove fruitless, or they can be guided, without delay, directly to the subject, vehicle or into a more desirable search area.

Aerial patrol has the ability to reduce the time required to conduct rooftop surveillances at suspected burglary locations. Additionally it provides the means to routinely search rooftops or other questionable locations in commercial areas, thus reducing the burglary potential and the man-hours spent on such checks.

Lost children, missing persons and rescues require the expenditure of considerable time in locating and recovering the victims. Searches of large, fenced storage areas, railroad yards, parks, beaches and other rough terrain requiring many hours to search on foot can be scanned from the air in minutes. Rescues, for example, from the Everglades, recreational areas and from boating mishaps can be more quickly and easily effected by an adequately equipped aerial patrol.

In essence, remote areas within a given jurisdiction become so readily accessible that under proper conditions they can be routinely and effectively patrolled.

Additionally, ground units obtain a sense of increased security through the "Backup" offered by aerial patrol. Individual officers involved in hazardous or potentially hazard-our investigations or control situations, in remote or urban areas, have the security of an almost immediate aerial backup. Within its capability, and dependent on certain other factors, aircraft may land, enabling the crew to render actual physical aid to the ground unit.

Hazardous practices, heretofore required of ground units in apprehending violators can be markedly reduced. High speed vehicle pursuits "taken over" by the aircraft, eliminate both unnecessary hazards to the pursuing ground units and to the public.

Aerial patrol may provide assistance to other police agencies. It may be utilized to assist public utilities, fire and road departments in emergency and survey type operations.

2 B. DISADVANTAGES

Among the disadvantages of relying upon aerial patrol are periodic limitations due to weather. Inclement weather occasionally requires grounding of aircraft, but on a yearly basis, the flight time is probably higher in Florida that the National average, due to the sub tropical conditions.

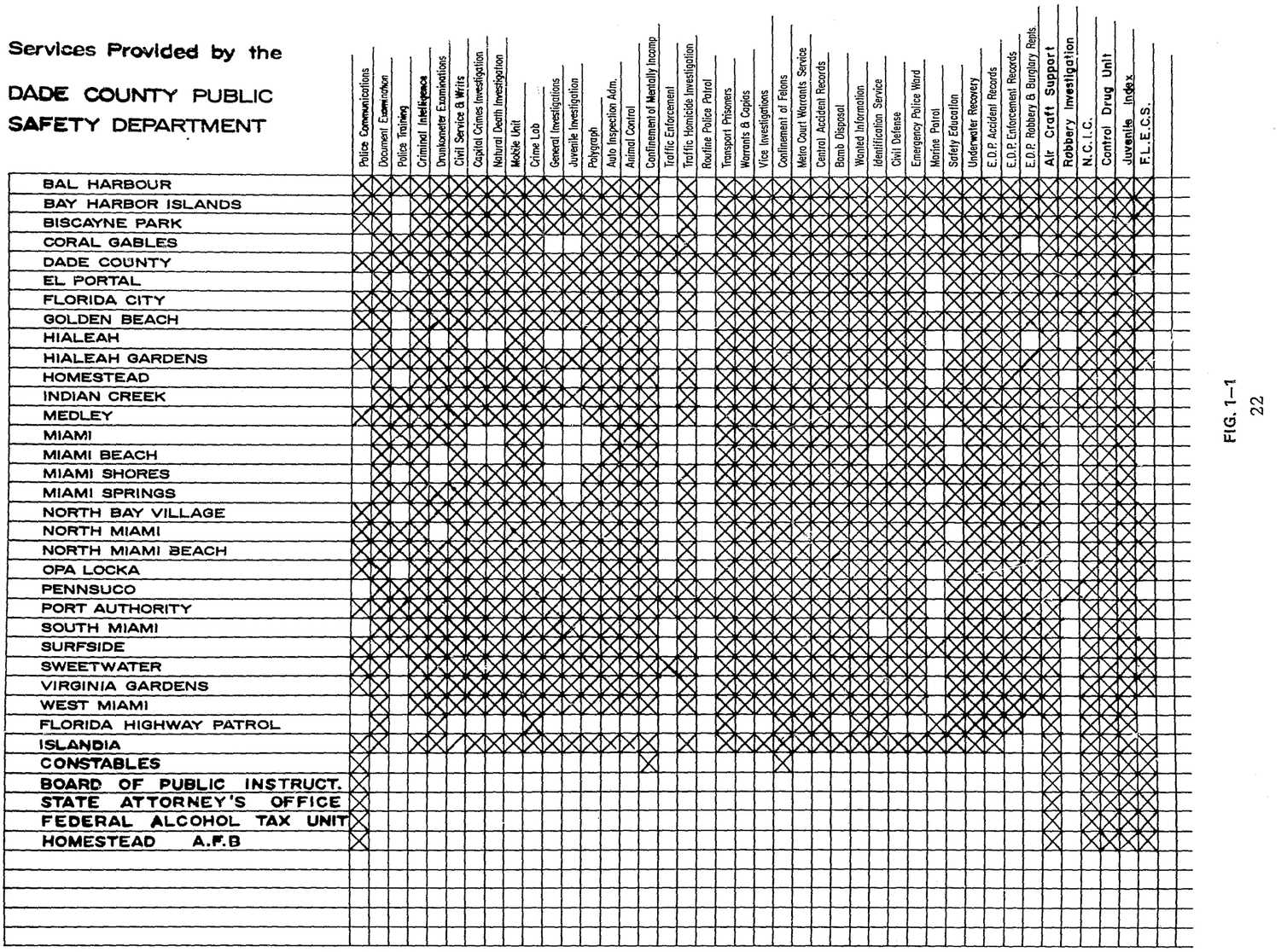
The nature of aerial patrol requires Police Officers with special skills, historically the combination of men, machinery and motion has resulted in accidents, however much of the hazard potential can be overcome and all but eliminated through appropriate training.

Limited ground contact is another factor for consideration. A responding aerial patrol element will not routinely land in urban areas and in most such instances it may only observe, control and direct ground units as an Airborne Command facility.

Some adverse public reaction may follow the inauguration or increased usage of aerial patrol. This is particularly noted during instances of civil tension or disorder when extensive use of airborne surveillance is employed by the police. The omnipresence of police under these conditions are viewed as a disadvantage to disruptive tactics by some dissident leaders and by a limited number of our populance.

Positive public reactions can, however, be accomplished through proper community relations activities. Adequate press coverage explaining the goals of the program; public display of equipment; talks before service organizations and schools, all of which emphasizing the advantage of aerial partol can quickly achieve public support.

Services Provided by the DADE COUNTY PUBLIC SAFETY DEPARTMENT



The Majority of the Services listed above are provided on a routine basis, others are performed on request.

FIG. 1-1

3. GRANT BY THE LAW ENFORCEMENT ASSISTANCE ADMINISTRATION (LEAA) GRANT NO. 70DF036

The primary purpose of this grant was to determine if a STOL-type Aircraft could effectively be used in police operations and the ancillary result was hopefully to provide LEAA with guidelines for designing future Police Air Mobility Evaluation Program.

As the Dade County Public Safety Department has been using a Helicopter for the preceding eleven years, a secondary goal of the project was to determine the relative capabilities of the STOL and helicopters with respect to mission performance and cost of operation.

Consultants of Cornell Aeronautical Laboratory, Inc. (CAL) under National Institute of Law Enforcement and Criminal Justice LEAA Grants No. NI-70-006 and NI-71-038 prepared "Phase I of the STOL Evaluation"[1] with the first phase having three main purposes. The first purpose was to survey the current use of helicopters for Police Air Mobility. This included the type of missions performed by helicopters in various agencies, the types and number of helicopters employed, and special equipment and performance characteristics.

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[1] TECHNICAL REPORT, Police Air Mobility: STOL Evaluation, Phase I, CAL No. VY-2901-G-2, September 30, 1970.

The second purpose was to evaluate the STOL as a vehicle for Police Air Mobility while using the helicopter as a control vehicle.

The third purpose was to gather pertinent data for the National Institute of Law Enforcement and Criminal Justice (NILECJ) to evaluate further applications for similar grants.

This report explores the utilization and operating cost analysis of the STOL Aircraft in conjunction with the Dade County Public Safety Department's related experiences with helicopters.

United States Department of Justice, Law Enforcement Assistance Administration Grant Number 70-DF-036 (Project duration May 15, 1970 through May 15, 1971) was approved as applied for under section 306 of the Omnibus Crime Control and Safe Streets Act of 1968 (P. L. 90-351) and provided for the following expenditures by the Federal Government and Metropolitan Dade County.

Dade County Public Safety Department contribution:

In-Kind Support: $90,776.00

Law Enforcement Assistance Administration Contribution:

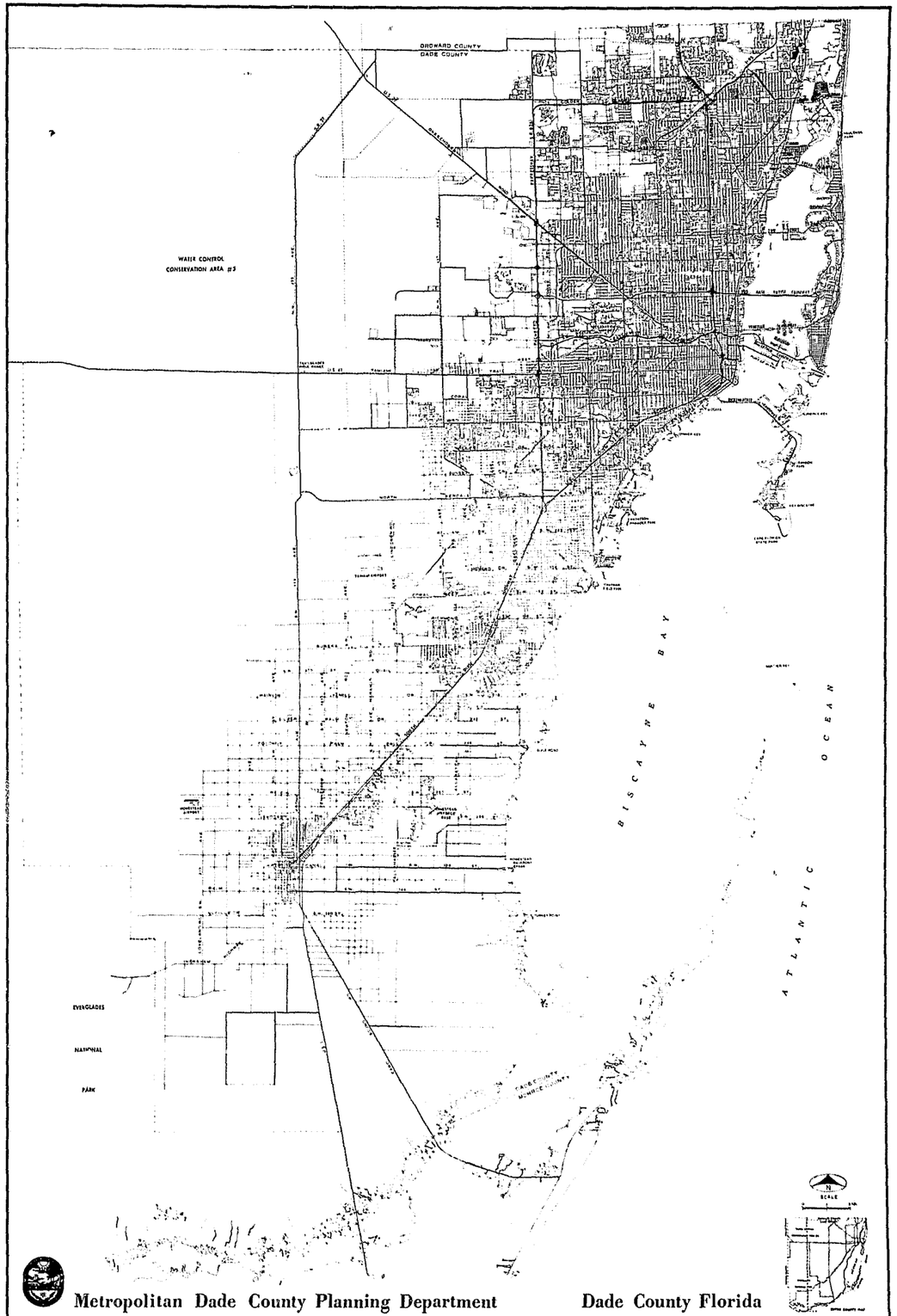
A. Purchase of Helio Super Courier Model H-295 Short TakeOff and Landing (STOL) Aircraft including the Standard and certain optional equipment $63,117.00

(See Pages 58 & 75)

B.	Cost for Projected operation and Maintenance	$64,495.00
	TOTAL LEAA CONTRIBUTION	$127,612.00
	COMBINI.) PROJECT MONIES AVAILABLE	$218,388.00

4. DADE COUNTY GEOGRAPHICAL LOCATION

The Dade County Public Safety Department is Florida's largest Law Enforcement Agency with an assigned personnel strength of 1385. The jurisdictional authority and operational responsibilities of the Dade County Public Safety Department, notwithstanding 27 Municipal Police Agencies within the county, cover a geographical area of 2,088 square miles which include 292 miles of waterways and 5,216 miles of paved roadways. Dade County's population estimated in 1971, at 1,259,184 includes persons of whom 536,000 reside in the unincorporated area. Dade County is the most densely populated county in Florida, with an annual influx of approximately twenty (20) million tourists.



Metropolitan Dade County Planning Department — Dade County Florida

FIG. 1–2

CHAPTER III

1. CHRONOLOGICAL SEQUENCE OF EVENTS

A. 1000 Foot Waiver

Prior to the delivery of the STOL aircraft, a formal request was sent to the Federal Aviation Agency, for a waiver of Federal Aviation Regulation 91.796 "Minimum Safe Altitudes Over Congested Areas." Because the STOL Aircraft was classified as a Fixed Wing Aircraft, and had to conform to the same minimum altitudes over congested areas as any other fixed wing aircraft, the request for waiver was denied.

Supporting data that was sent to the Federal Aviation Agency (FAA) included a compilation of data titles "Glide Distance in Event of Power Failure" (See Page 28), and a map of Dade County, with approximately one hundred (100) emergency landing sites having been predetermined and identified. These sites were selected as acceptable for the STOL to land without any fear of damage to the aircraft or to structure or persons on the ground.

As documentated later in this report, the minimum altitude limitation had little if any perceivable effect on the type of missions the STOL performed although the altitude limitation did effect the results of the various type missions assigned or initiated.

HELIO "SUPER COURIER" MODEL H-295 STOL
(GLIDE DISTANCE IN EVENT OF POWER FAILURE)

DEGREE FLAPS	INDICATED AIRSPEED MPH	STANDARD DAY CONDITIONS	LOAD 3000 LBS.	ALTITUDE LOST 1000 MSL TO SL	HORIZONTAL DISTANCE FEET
* 0	60	YES	YES	YES	6001*
0	70	"	"	"	8048
0	80	"	"	"	7206
10	60	"	"	"	7682
10	70	"	"	"	8048
10	80	"	"	"	7445
20	60	"	"	"	6799
20	70	"	"	"	6429
20	80	"	"	"	7206
30	60	"	"	"	7060
30	70	"	"	"	6200
30	80	"	"	"	5862
40	60	"	"	"	6354
40	70	"	"	"	5782
40	80	"	"	"	5562

*SLATS OUT

SOURCE OF DATA – HELIO AIRCRAFT COMPANY
P. O. BOX 604
PITTSBURG, KANSAS 66762

B. DELIVERY

On May 25, 1970 at 12:30 P.M., the STOL aircraft Model H-295 was flown into Opa Locka Airport by a Helio Courier factory Respresentative. The aircraft was given a post flight examination and all equipment on board was inventoried. Pilot briefings began the same day, with ground school beginning the following day.

By the afternoon of May 27, the Dade County Public Safety Department's pilots selected for the project, had completed eleven (11) hours and fifty (50) minutes of flight time each and had accomplished a combined total of seventy-two (72) landings.

During this same period of time, attention had to be given to such details as having the aircraft outfitted with Dade County Public Safety Department decals, securing a new certificate in the name of Dade County, and securing physical examinations of all pilots to meet the insurance requirements.

One of the most important considerations, was the public awareness factor and the involvement of other muncipalities and agencies. With all the local news media's cooperation, an awareness program was initiated. The response being gratifying as many civic groups pledged to help the Dade County Public Safety Department in any way possible.

EXCERPT FROM THE COUNTY NEW'S

"THE COUNTY EMPLOYEE"

Page 3 July, 1970

PUBLIC SAFETY'S NEW PLANE

Dade County Public Safety Director, **E. WILSON PURDY**, announced the start of a year–long program to evaluate the use of a short takeoff and landing aircraft and its application to law enforcement.

The STOL Aircraft can operate at speeds ranging from 30 to more than 165 mph; can takeoff and land in a 660 foot. area. The single engine airplane can carry up to six persons or one pilt and more than a ton of cargo.

Director Purdy said, "The aircraft will be used in conjunction with our helicopter and will be tested in all possible Law Enforcement situations." It was significant that the U. S. Justice Department selected our agency out of many across the country to test the STOL aircraft and its Law Enforcement application."

Mr. **ROBERT MICHIE**, Supervisor, Planning and Research Bureau, has been designated Project Director for the STOL evaluation program. Captain IRVING HELLER, has been assigned as the Project Coordinator and will be directly responsible for the supervision of the evaluation program. Captain Heller, former Supervisor of the Internal

Review Section, holds an Airframe and Powerplant Technicians License, and is a graduate of Embry Riddle Aeronautical Institute. In addition, Captain Heller was a flight engineer and crew chief on Heavy Bomber during the Korean War.

Five Pilots have been assigned from within the Department and will be doing the flying of the aircraft. These Policemen-Pilots bring to this evaluation program a total of 74 years and 16,300 hours flying time.

EXCERPT FROM NEWSPAPER

THE MIAMI HERALD

METRO POLICEMEN GIVEN U. S. GRANT TO TEST AIRCRAFT

Metro Police Officers, now using just squad cars, boats, motorcycles and helicopters to move about the county, will soon have another form of mobility, this one by courtesy of the U. S. Department of Justice.

The Public Safety Department has received a $127,612 Federal Grant to field-test and evaluate a Short Take-Off and Landing (STOL) aircraft for possible police applications.

The aircraft can fly at speeds from 30 to 165 miles per hour and can operate from strips or waterways 600 feet in length. Officers are busily plotting all fields, roads, canals, lakes and even golf courses in Dade that can take the plane.

"We're going to put it through its paces," said Lt. Robert M. Michie, operations officer of the test program. "We want to really test it out to see just where it fits in the Police work."

The plane actually is capable of flying backward, relative to the ground, pilots have told the Sheriff's Department.

Flying into a 31-mile-an-hour wind at 30 mph, for example, results in a backward movement of one mile an hour.

The craft was used in Vietnam, and deputies anticipate that it will be immediately useful as an aerial command post during civil emergencies and for aerial photography.

Dade's Public Safety Department won the opportunity to test the airplane for at least a year in competition with several other law enforcement agencies that were invited by the Justice Department to submit applications, Sheriff E. Wilson Purdy said.

The aircraft, H-295 Helio Courier made by Helio Aircraft Corp., of Pittsburg, Kan., can carry six officers, or a pilot and four strechers, or a pilot and a ton of equipment.

Metro will have use of it for about a year. It will be piloted by three officers with flying experience. Their salaries during the evaluation period will be covered by the grant.

The only costs the county will be responsible for will be ground maintenance and upkeep, Michie said.

The Grant came from the Law Enforcement Assistance Administration of the Justice Department which asked Dade to test the aircraft with assignment such as search and

rescue, routine patrols in rural areas and over waterways, surveillance and photographic work and emergency officer mobility.

According to a Justice Department Official, Dade received the Grant because if its metropolitan layout and "its status in the field of Law Enforcement."

Michie said he expects delivery of the plane in the next several weeks and said the services of the plane would be available on request to other police departments in Dade.

"We're more than willing to try it out anywhere," he said.

EXCERPT FROM NEWSPAPER

THE MIAMI HERALD

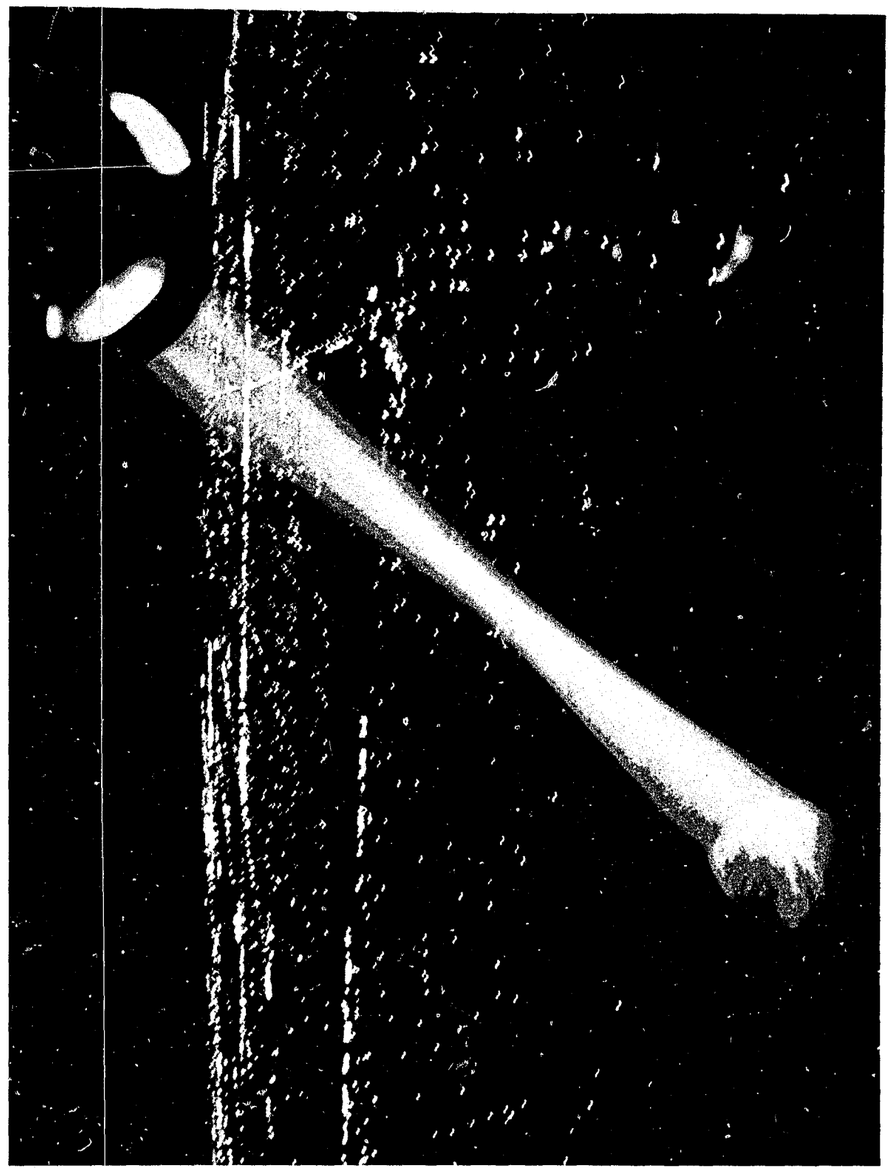
"PLANE SPIES FROM SKY"

Page 2B – July 5, 1970

If a blinding circle of light suddenly cascades out of the night sky and engulfs you next week, don't start yelling flying saucer.

Chances are it will be the Metro Police STOL (Short Take Off and Landing) aircraft on night maneuvers. The plane will be flying nightly between 4 P.M. and 2 A.M. from July 5 through July 12.

The plane is equipped with a high-powered searchlight that will be used in the tests. According to a Dade Public Safety Department spokesman, "The program is designed to determine the best possible method of using the aircraft to detect Burglary, Robbery or other crimes."



NIGHTSUN OVER DADE COUNTY
Photo Courtesy: THE MIAMI NEWS By: Nathan Benn

FIG. 1–3

C. PILOT QUALIFICATIONS

1. Prior to Aircraft Operator selections, the following criteria were established in the area of pilot qualifications:

   A. Possess a desire and be adaptable for this position.

   B. Must hod a valid Commerical Pilot's Rating in Fixed Wing Airplane or rotor wing.

   C. Flight time should be a minimum of 500 hours of logged with experience commesurate to ratings.

   D. Recent flight experience must show that he has maintained proficiency within the past year.

   E. Age has no minimum or maximum qualification.

   F. An F.A.A. Medical Certificate must be possessed with at least a current Class II Flight Physical Certificate.

   G. General physical condition must be excellent.

   H. A non-probationary status with the Public Safety Department with adequate experience as a Police Officer and with a knowledge of Dade County's geographical setting and characteristics.

   I. Must be self motivated possession leadership abilities.

D. PILOT TRAINING

The Dade County Public Safety Department was fortunate in having as Chief Pilot, a man with approximately 2500 hours of helicopter time and over ten years of experience as a Police Officer. Another valuable asset was his rating as a Federal Aviation Agency Certified Helicopter Instructor.

IN-HOUSE VERSE COMMERCIAL TRAINING

A detailed analysis of pilot training revealed there were definite advantages in utilizing our Chief Pilot and creating a Pilot Training Program within the Dade County Public Safety Department. The most distinct advantages were:

1. Flying in a police capacity is unique, and the learning of definite methodologies of patrol would be lost or delayed if the pilots were initially trained at a commercial facility and then oriented to fly the various police type missions. i.e. with the Pilots on a training mission, any request for assistance (ground unit request or a specific radio signal to which the aircraft could respond could be responded to, which would give the needed **POLICE** flying experience.
2. Supervision of the trainee pilot was enhanced as corrections could be made in the initial training period.
3. The third benefit achieved through in-house training was a savings of over $19,000. The minimum hour requirements are as follow:

A. F.A.A. Certification - 25 hours

B. Insurance requirements - 75 hours

C. DCPSD requirements - 100 hours

Commercial rates in the Dade County area are $75.00 per hour or approximately $80.00 per hour including the pilots salary. The In-House cost per hour is approximately $27.32 per flight hour which includes the direct operating cost of the helcopter and the salaries of the Instructor and Trainee Pilot. As of the time of this report, three (3) pilots have completed their 100 hour minimum requirements and the fourth pilot has completed 75 hours, for a total of 375 hours.

Commercial costs for 375 hours - $30,000

In-House cost for 375 hours - 10,245

Total Savings $19,755

The minimum requirements for the STOL Aircraft has been set at 15 hours, which complies with the insurance minimum. Again the Dade County Public Safety Department was fortunate to have one of its men certified by the F.A.A. as a fixed wing instructor and also have nine (9) years of police experience. There was no distincitive cost savings, but the advantage was as stated above items 1 and 2.

E. OBSERVER PROGRAM

The observer program was designed to allow permanent Police Officers of the Public Safety Department to participate in the STOL and helicopter evaluation. The program was to consist of strictly volunteers, who would go through a orientation program that would familarize them with the techniques of Aerial Observation.

In anticipation of organizing the Aerial Observer Program, memorandums requesting volunteers were sent to all districts. Within a few days there were approximately one hundred and fifty (150) applicants. At the same instance that the applications were being reviewed it was realized that:

1. All Districts were limited as to the number of personnel that could be loaned to the program.

2. Full attention had to be given to the training of the pilots and the particulars involving a new program had to be considered prior to its implementation.
3. The question of either training a road patrolman for aerial observance or utilizing the Pilots as observers was still to be resolved.

The ramifications of item number three is elaborated upon further in this report.

F. STOL FUNCTIONS

With the Dade County Public Safety Department's eleven (11) years experience of utilizing a Helicopter, and with the desire to determine the relative capabilities of the STOL Aircraft with respect to the known performance characteristics of the helicopter, a special test program had to be conceived and initiated. The basic criteria of the program involved not only the known accomplishments of the helicopter but was to include the flight parameters within the normal capabilities of each aircraft.

The following is a partial listing of specific functions, in which each aircraft participated:

1. Routine Patrol (Land and Water)
2. Special Patrol
3. Civil Disturbance
4. Surveillance (Day and Night)
5. Traffic Control or Enforcement
6. Photographic Missions
7. Civil Defense
8. Assistance to other Agencies
9. Assistance to other units or departments
10. Airborne Command Post
11. Search and Rescue

12. Initiate effective and efficient night time surveillance
13. Special Events
    A. Orange Bowl Festivities
    B. Regattas
14. Special Sensor Details

Another area of consideration was the documentation of the aerial patrols. Utilizing the road patrolman's daily activity report, (See Figure 1-6) as a guideline, the aerial patrol activity report was devised. (See Figure 1-4). This report was kept daily, along with each Aircraft's log books.

FLIGHT REPORT

Date _____
Pilot _____
Observer _____ Badge No. ____
Weather _____
Visibility _____
No. of Mission Activities _____
Routine Patrol Time _____
(Total Flight Time Minus Total Mission Times)

Time Begun _____
Time Airborne _____
Time Secured _____
Time Committed _____
Abort _____
Tach time - End _____
(-) Start _____
Difference _____

Flight Zone Areas (Minutes)

Zone 1	Zone 4	Zone 7
1A-15 ____	4A-152 ____	7A-38 ____
1B-22 ____	4B-23 ____	7B-37 ____
1C-15 ____	4C-180 ____	7C-36 ____
(52 sq. mi.)	4D-76 ____	7D-38 ____
	(431 sq. mi.)	(149 sq. mi.)
Zone 2	**Zone 5**	**Zone 8**
2A-15 ____	5A-28 ____	8A-113 ____
2B-15 ____	5B-15 ____	8B-31 ____
2C-12 ____	5C-42 ____	8C-263 ____
2D-15 ____	5D-31 ____	8D-89 ____
(57 sq. mi.)	(116 sq. mi.)	(496 sq. mi.)
Zone 3	**Zone 6**	**Zone 9**
3A-31 ____	6A-132 ____	9A-48 ____
3B-6 ____	6B-51 ____	9B-66 ____
3C-10 ____	6C-240 ____	9C-83 ____
3D-13 ____	6D-36 ____	9D-71 ____
(60 sq. mi.)	(459 sq. mi.)	(268 sq. mi.)

TOTAL MILES COVERED _____

Mission Costs (Check)

1. Fuel _____ gallons @ _____ $ _____
2. Oil _____ quarts @ _____ $ _____
3. Grease _____ @ _____ $ _____
4. Labor _____ hours @ _____ $ _____
5. Parts _____ $ _____

TOTAL $

Equipment Condition (Check)

___1. Structure
___2. Engine
___3. Electrical (Cockpit)
___4. Hydraulic Brakes
___5. Radio
___6. P.A./Siren
___7. Nightsun
___8. Navigational Lights
___9. Other (Specify)
___10. Flight Hrs. to PM
A. Type of PM Due
___11. Equipment Unavailable for Service

Remarks: _____

FIG. 1–4

MISSION ACTIVITY REPORT

Mission #_____
Time Begun_____
Time Ended_____
Flight Time_____
Day _____ Night _____
Requested by_____
Signal 3_____
In progress _____

Incorporated_____
Unincorporated_____

District_____
Grid_____
Flight Zone_____

Land Minutes_____
Agricultural_____
Business_____
Residential_____
Industrial_____
Undeveloped_____
Other_____

Marine Minutes ____
Bay_____
Canal_____
Intercoastal_____
River_____
Rockpit_____
Ocean _____
Lakes_____

Description

_____ 1. Traffic
_____ 2. Photo
_____ 3. Maintenance/Test
_____ 4. Training/Administrative
_____ 5. Community Relations
_____ 6. Search
_____ 7. Surveillance
_____ 8. School Patrol
_____ 9. Marine
_____ 10. Robbery
_____ 11. Burglary
_____ 12. Pollution
_____ 13. Other (Explain)
_____ Search Light Used

_____ 5. Investigations
_____ 6. Traffic Citations
_____ 7. Warnings
_____ 8. Renders Assistance
____ A. To Citizen
____ B. Other Agency
____ C. Other Unit
_____ 9. Pursuit
_____ 10. Apprehension
_____ 11. Illuminates

Comments: _____

Effects

1. Arrests
___ A. Felony
___ B. Misdemeanor
___ C. Traffic
___ D. Other (Explain)

2. Arrests Assisted
___ A. Felony
___ B. Misdemeanors
___ C. Other (Explain)

3. Recoveries
___ A. Stolen Vehicles
___ B. Other Vehicles
___ C. Missing Persons
___ D. Other (Explain)

4. Discoveries
___ A. Stolen Vehicles
___ B. Abandoned Vehicles
___ C. Missing Person
___ D. Fire
___ E. Traffic Accidents
___ F. Disabled Motorists/Boat
___ G. Criminal Activity
___ H. Suspicious Circumstances/Objects
___ I. Other (Explain)

FIG. 1–5

PUBLIC SAFETY DEPARTMENT
UNIFORM BUREAU

ACTIVITY REPORT

OFFICER ______________________ NO. ______ ZONE ______ VEH. NO. ______ DAY ________ DATE ________ 19 ____
(Opr.)
OFFICER ______________________ NO. ______ MILEAGE START ________ MILEAGE FINISH ________ SHIFT ______ M to ______ M
(Driver)

SIGNAL	TIME RECEIVED	ARRIVAL TIME	IN SERVICE	CASE NUMBER	ADDRESS	ACTIVITIES: Names, Arrests, References, Citations, Etc.

114.20–25

FIG. 1–6

DETAILED SUMMARY

SUPERVISION

To be completed by Sergeants and Lieutenants only. Do not include roll call.

Number of supervisory contacts _____

TIME ANALYSIS

Indicate number of minutes spent in each activity. Items marked (*) must be described in detail on separate sheet. Total "Time on Duty" must be accounted for in separate items.

PATROL	MEALS AND PERSONAL
ACC. INV.	PRISONER TRANSPORT
COURT	SPECIAL DETAIL*
COURIER	ESCORT*
SURVEILLANCE	MOTOR POOL
BACK–UP	OVERTIME
INVESTIGATION TIME	TRAFFIC ENFORCEMENT
TOTAL TIME ON DUTY	OTHER ENFORCEMENT
	TELEPHONE & TELETYPE

NUMBER OF INCIDENTS

State the number in each category handled during total time on duty.

Citations	**Miscellaneous Activity**
Juvenile	Stolen Cars Recovered
Metro Code	Other Msg Apprehensions
Traffic HM	Warrants Served
Traffic NHM	Vehicles Impounded
Parking & NM	Warnings: Traffic
TOTAL CITATIONS	Other
Arrests	Routine Checks
DWI	**Assistance Rendered**
R.D.	Other Police Agencies
Other Traffic	Other PSD Div (Specify)
Public Drunk	First Aid Cases
Vagrancy	Motorist
Resisting Arrest	**Accidents**
Vice (Define)	Investigated
Larceny	Assisted
A & B	**Other Incidents** (Specify)
Other Arrests	
TOTAL ARRESTS	TOTAL REPORTS

MOTOR VEHICLE INVENTORY

Indicated a (✓) mark opposite each in satisfactory condition. Specify when unsatisfactory.

	Inspection Certificate
Total Miles Driven	Bumpers
Radio or Radios	Tires on Ground
Siren & Red Light	Tire (Spare)
All Veh Lights	Weapons
Windows & Wipers	Equipment Box
Horn	First Aid Kit
Brakes	Fire Extinguisher
Body & Fenders	Damaged Car Release (if damaged)

OVERTIME _____ SIGNATURE _____ Reviewed & Approved By: _____
Signature Rank Date

FIG. 1–7

G. **PATROL PROCEDURES** (EXCERPT TAKEN FROM THE DADE COUNTY PUBLIC SAFETY DEPARTMENT'S AVIATION SECTION AIRCRAFT OPERATIONAL MANUAL)

Aviation Section personnel will respond to requests for aerial assistance from Public Safety Department communications or other Law Enforcement Agencies. Response to other Police calls may be initiated by the patrol team where their service may be of value.

The aircraft is primarily an observation platform and should be used as such to provide the observer the proper positioning above the scene, allowing for constant observation. Ground units will be advised of 360° turns to the right, around the scene, at an altitude considered by the patrol team as best suited for constant surveillance. The helicopter crew may find this atlitude to vary from a few feet up to a 1,000 feet. The STOL altitude may vary from 1,000 feet minimum in most cases to 3,500 feet.

PROCEDURES

Patrol - Aerial patrol in the helicopter will be performed as desired by the patrol team, but generally at an altitude of 300 feet and an airspeed

CONTINUED

1 OF 3

of 65 miles per hours. Aerial patrol in the STOL will be performed at approximately 1,000 feet with airspeed as desired by the pilot or required by the circumstances.

Vehicle Pursuit - The Aviation Section personnel will proceed directly to the area of vehicle pursuits obtaining the necessary description and information required to intercept the suspect vehicle. Ground units will be directed to, and advised of, the direction of travel of the vehicle. The aircraft will be maneuvered to maintain a constant observance of the fleeing vehicle.

Aerial Surveillance - When the suspect is not aware of the omnipresence of being observed it is referred as a passive surveillance. This type of surveillance is most helpful during narcotics, vice, robbery and riot type investigations. Altitude will vary to suit the individual requirements. Most passive surveillance will be performed at an altitude of 1,000 feet or above, maintaining a position for constant observation. Night observation becomes more difficult than during light hours and particularized techniques should be developed. The "Night Sun" or search lights may be used in cases where the omnipresence of the aircraft is necessary or circumstances dictate.

Search - Description and pertinent information should be obtained prior to arriving on the scene if possible. The search will be coordinated with the unit requesting air aerial assistance. The aircraft will be maneuvered at an altitude and airspeed to provide for the most effective search. Searches will vary from a missing child at night to boat reported overdue but the Police Communications Command Center will be kept aware of the progress of the search.

Searches for suspects or vehicles are more effective by good descriptions and information. An officer on the scene who last saw the suspect may be more effective in the aircraft as an observer or dual observer if feasible.

Selective Enforcement - The patrol team will maneuver their aircraft to be most effective in deterring crime and apprehending suspects. Respective areas will be patrolled depending upon enforcement required.

EXAMPLES:

Robbery - Patrol Known areas of past robberies

School Disturbances - Patrol troubled school areas

Boating Violations - Patrol areas of known violations.

Vice - Patrol as directed by requesting units or as dictated by past experience.

Grove Vandalism and Larcenies - Patrol grove and farm areas as required.

Landing - Aircraft should avoid landing at other than approved areas, unless a landing is necessary and can be performed with complete safety to the aircraft, crew, the general public and property.

H. **AERIAL SAFETY** (Excerpt from the Dade County Public Safety Department's Aviation Section Aircraft Operational Manual)

The following rules for safety shall be strictly adhered to during Flight Operations of the Aircraft:

Landing lights will be displayed when landing at night to alert ground units and persons adjacent to the landing area.

The pilot will maintain constant alert for all other aircraft in or near their flight path.

Federal and State air regulations shall be followed by pilot.

Standard firearms regulations will be followed.

Aircraft will not be flown into clouds (unless IFR) and routine day operations will be discontinued if horizontal visibility falls below weather minimum.

I. Flight Zones

DIVISION AND EXPLANATION

For Ground Patrol Units, the County is divided into a grid system with each grid (of which there are 2,899) covering approximately ten (10) square blocks each. (The Aerial Patrol tried to use the existing grid system as a basis for reporting their activities, but found that it was not practical due to the small area each grid covered.)

It was anticipated that neither individual or combinations of grids or the fluid zone deployment utilized by ground patrol elements would be satisfactory either for aircraft deployment or for identifying areas covered by routine or specialized air-borne patrol.

Accordingly, the county was divided into nine (9) Aerial Patrol Zones, and into 35 subzones. These subzones differ in area but each was designed to encompass a similar land or water area in terms of land use and criminal or other police-related activities. i.e., a degree of homogeneity within each Area Patrol Zone or Sub-Zone was sought.

DADE COUNTY PUBLIC SAFETY DEPARTMENT

FLIGHT ZONE AREAS

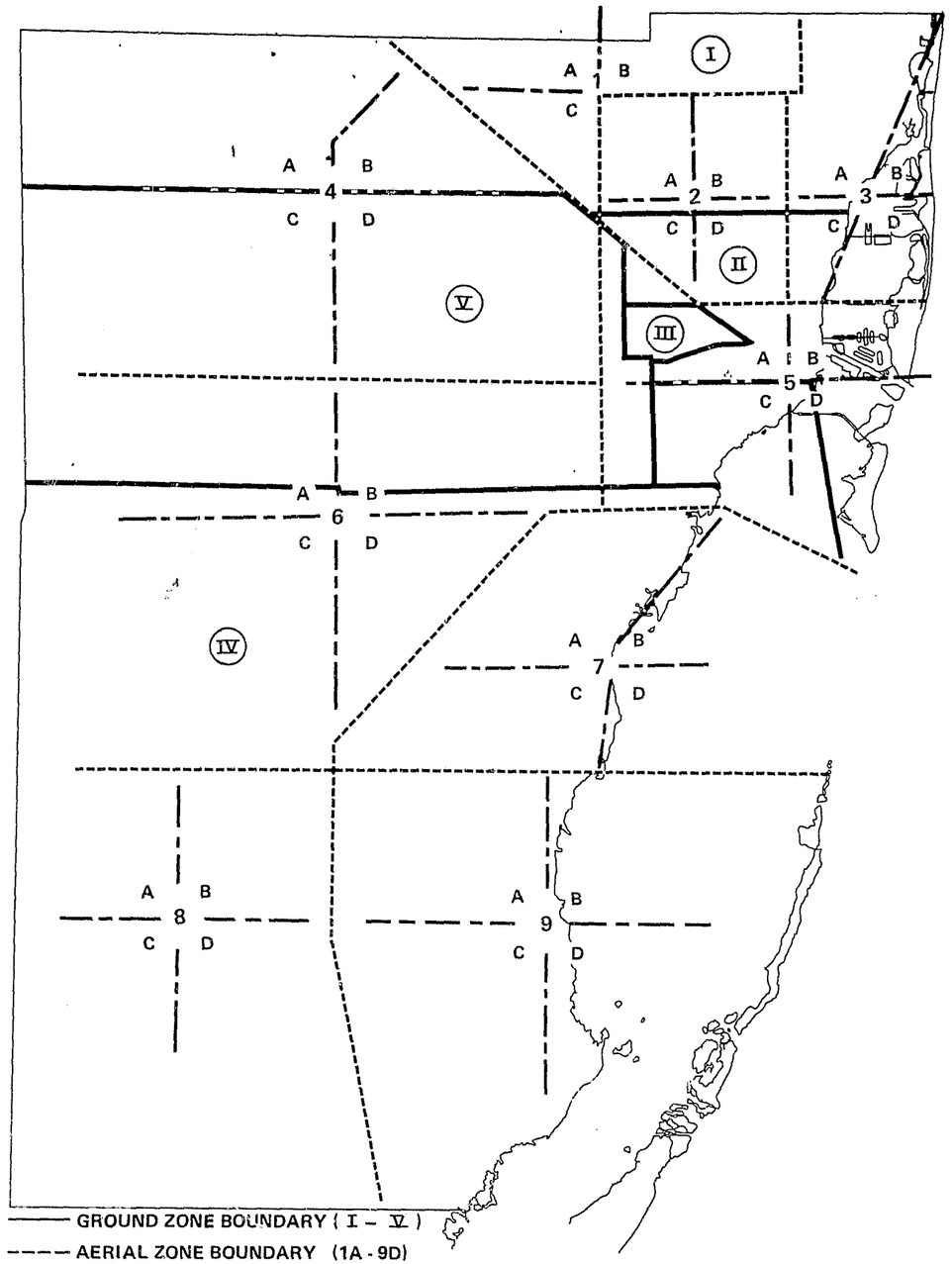
(SQUARE MILES)

ZONE	SUBZONE	AREA	TOTAL	ZONE	SUBZONE	AREA	TOTAL
1	A	15		2	A	15	
	B	22			B	15	
	C	15	52		C	12	
					D	15	57
3	A	31		4	A	152	
	B	6			B	23	
	C	10			C	180	
	D	13	60		D	76	431
5	A	28		6	A	132	
	B	15			B	51	
	C	42			C	240	
	D	31	116		D	36	459
7	A	38		8	A	113	
	B	37			B	31	
	C	36			C	263	
	D	38	149		D	89	496
9	A	48					
	B	66					
	C	83					
	D	71	268				

Total Flight Area *2,088 square miles

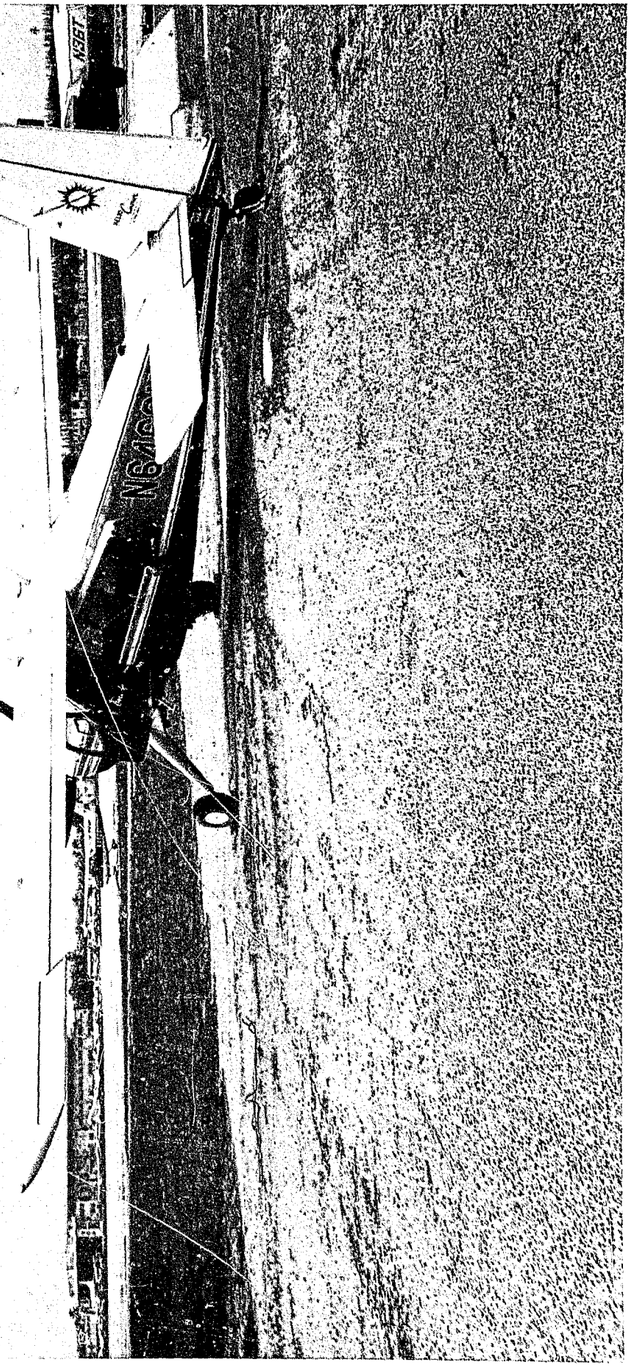
*Total Flight Area was estimated

FIG. 1–8



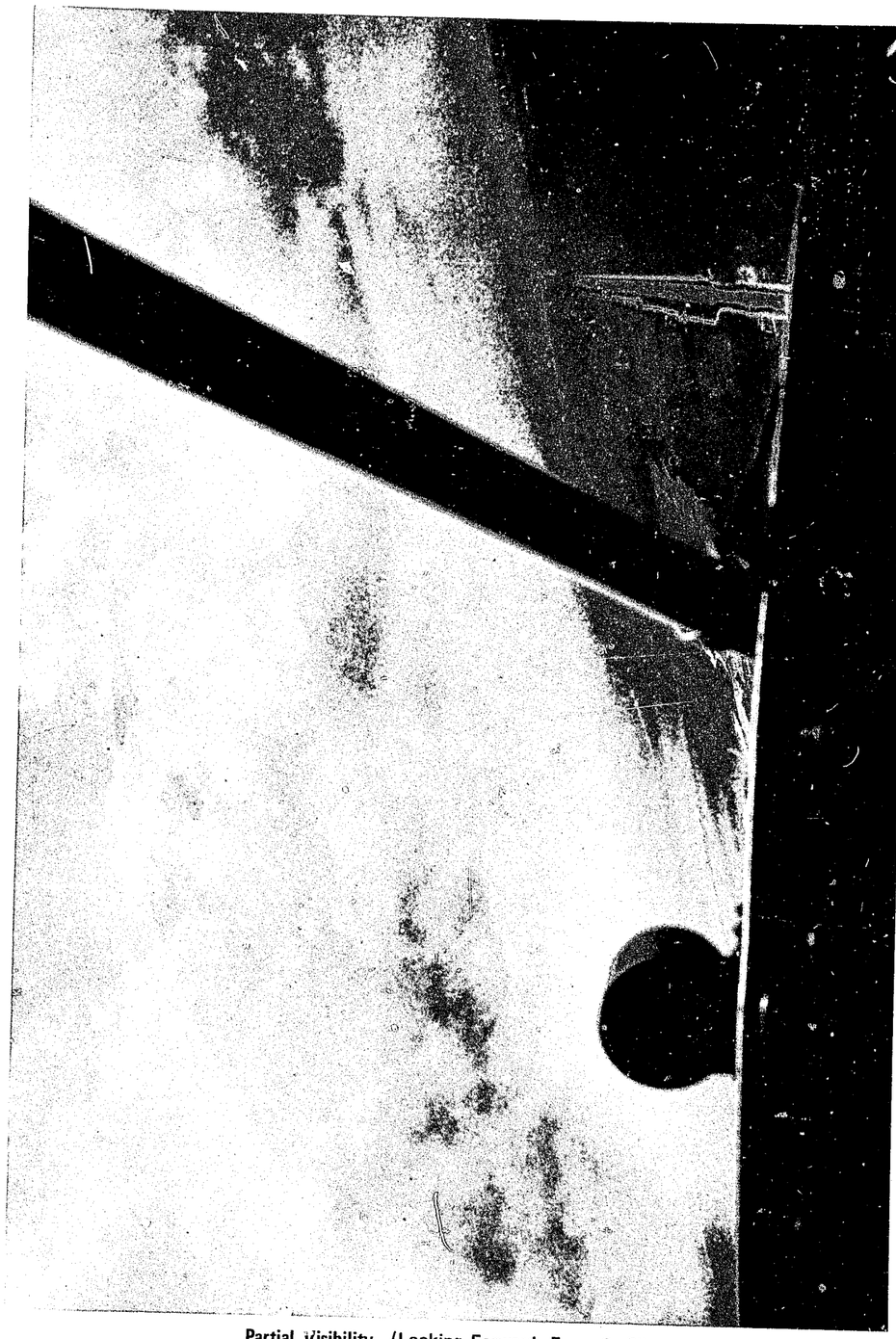
GROUND AND AERIAL PATROL ZONES, DADE COUNTY, FLORIDA
POLICE AIR MOBILITY PHASE I FINAL REPORT

FIG. 3-9



STOL – Ground View

FIG. 1–10



Partial Visibility (Looking Forward, From Co-Pilot Seat)
Note Brace as part of the 15 G Cage.

FIG. 1–11

CHAPTER IV

1. STOL AIRCRAFT DAMAGE REPORT

On Thursday, August 13, 1970, the STOL was returning from a search mission in the south end of the county, the Opa Locka Control Tower was contacted and clearance was given to land on runway 9, center; wind was 7 knots from 160° (which represented a quartering right headwind). At this time the STOL began a five (5) mile final approach. Normal approach was made and the pre-landing checklist was completed. A normal three point touchdown was completed and roll out began. Almost immediately, the STOL started a sharp right turn, braking action failed to bring the aircraft under control and it continued to turn, coming to rest 270° from the center of the runway. During the turn, the left axle broke causing damage to the fuselage primary structure, engine mount, engine cowling, firewall and landing gear.

As a result of the accident the STOL was out of service for a total of one hundred days (August 13 - November 25).

The cause of the inadvertent loss of directional control (Ground Loop) has been attributed to the malfunction of the across-wind landing gear mechanism. For further information of the cross-wind landing gear, refer to the "Equipment" section of this report.

Total damages to the aircraft were $9,500. Of this amount, the Dade County Public Safety Department incurred expenses as part of the Insurance Deductable requirements. This 1,000 deductable, has not been incorporated into the indirect operating costs of the

STOL, and this should not be so considered in the operational cost analysis or the Costs per Effect analysis (see page 125).

2. EQUIPMENT

Pages 75,76 and 77 itemize the standard equipment delivered with the STOL Aircraft and pages 58 and 59 the optional equipment the Dade County Public Safety Department elected to have delivered with the STOL.

A. Optional Equipment

The advantages and disadvantages of each major piece of potional equipment are reviewed and recommendations given where applicable or appropriate.

1. Police Siren
2. Aerial Flood Light
3. Controls, Dual Flight and Brakes
4. Cross-wind Landing Gear, Goodyear, Incl. Gear Lock
5. Fuel system, Long Range, two 30 gal. Aux. Wing tanks, 120 gal. total fuel
6. Light, Beacon, Crimes Rotating
7. Light, Beacon, White Strobe
8. Lights, Landing, two permanently focused nose mounted
9. Ventilating system, Airline type, six overhead controlled outlets

10. Narco Mark 16, (360 Channel) COMM Transeiver, 100 channel NAV receiver
11. Narco VOA-9 VOR/LOC/GLS Converter - Indicator incl. UGR-2 Glide Slope Receiver
12. Narco VOA-40 VOR/LOC Converter - Indicator
13. Narco MBT Three-Light Marker Beacon Receiver
14. Narco UAT-1 ATC Transponder with Self Test (Remote Control)
15. Radio cabin speaker (Overhead)

1. **Police Siren/P.A. System**

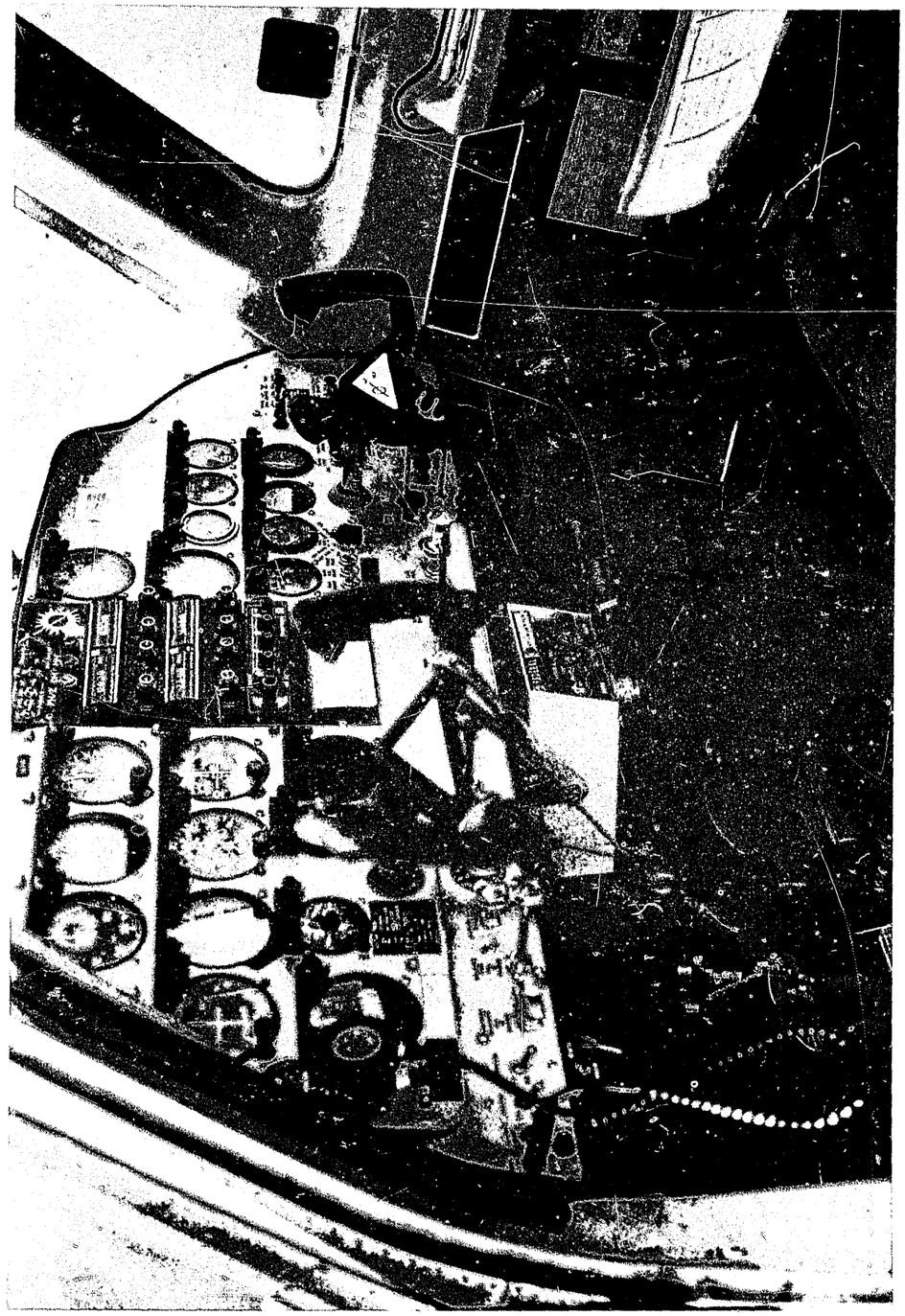
The system, as mounted on the STOL, has proved to be ineffective, due to the following:

A. The Aircraft's minimum height limitation

B. The position in which the system is mounted (See page 61, Figure 1-14).

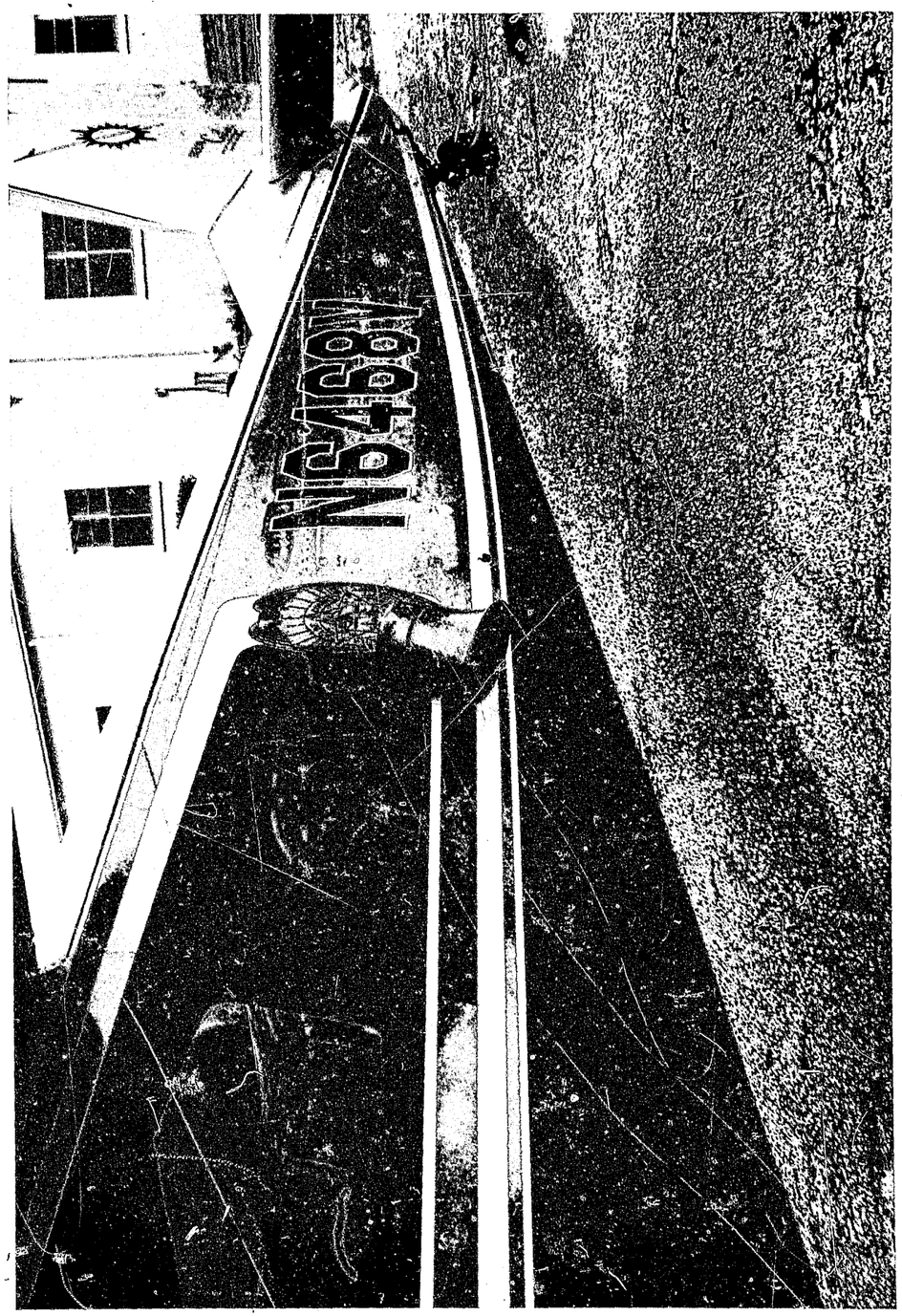
C. Maximum range of the system (i.e., one quarter mile at maximum wattage, which range is under optimum conditions.

D. With the system mounted externally, a drag is induced, slowing the aircraft.



Panel, STOL

FIG. 1–13



Installation of Public Address System Speakers

FIG. 1–14

Recommendations:

A. A higher wattage system should give increased range.

B. Mounting the System internally or mounting externally and rotation of the speakers aft approximately 45° clockwise from the existing mounting angle.
(as mounted, the speakers collect air, which increases the drag and muffles the emitted sounds)

A comprehensive test program would allow for an evaluation of the foregoing and one should be initiated prior to further utilization of this system.

2. Aerial Flood Light

(Night Sun) This unit provides the aircraft with night vision capability which is among the foremost capabilities the aircraft possesses and effective night operations could not have been produced without this unit. The drag, compared to the effective capabilities of the unit, is, however, of appreciable concern.

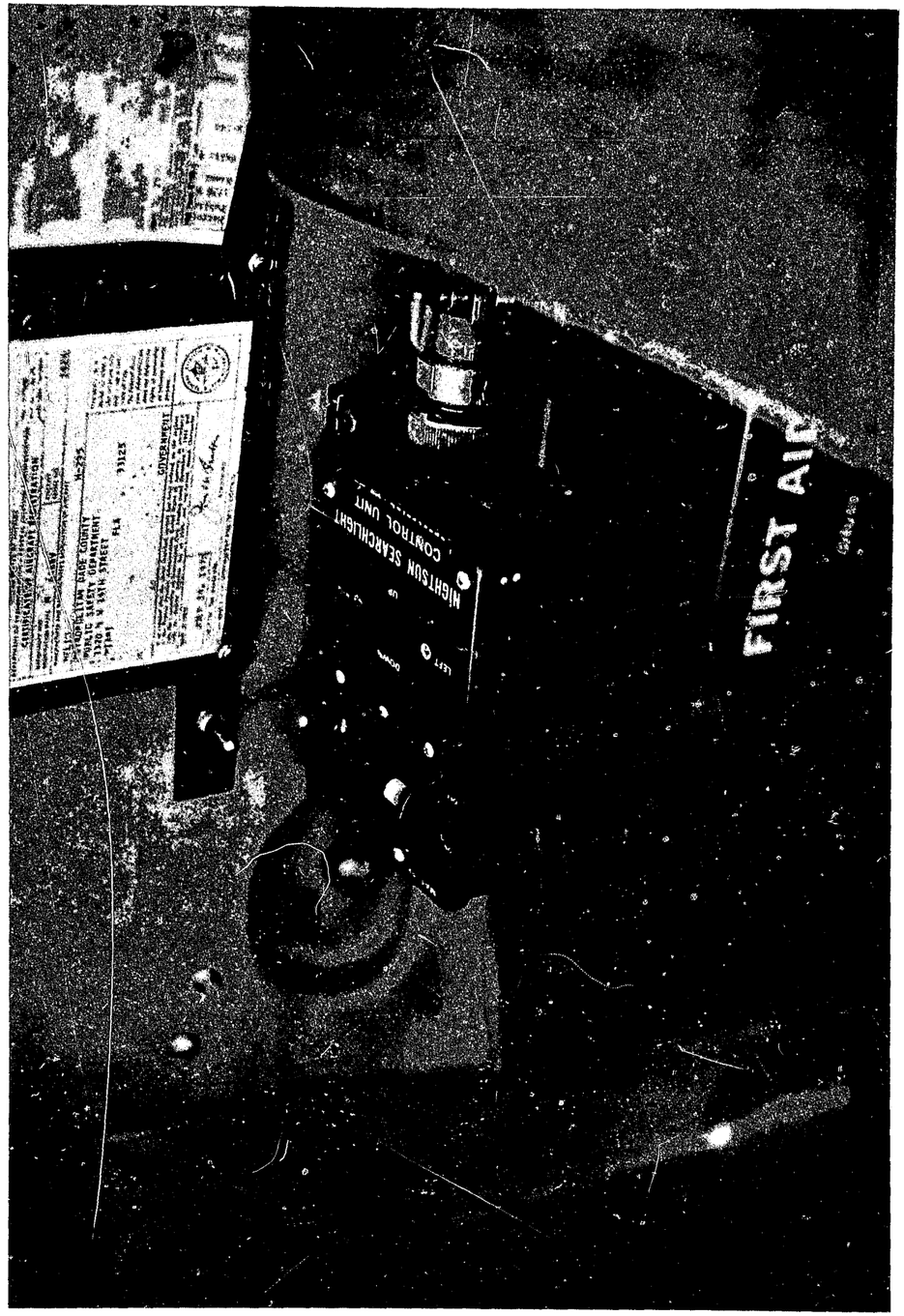
The physical mounting of the unit causes further concern, because as mounted (See page 66 Figure 1-16) the unit blocks the vision approximately 30° of

azimuth and approximately 20° of elevation. As stated before, in a congested area, observance of other aircraft is vital to the operation and must be given prime consideration.

One problem that is inherent with the "As Mounted" position, is the fact that the intense luminous effect can cause temporary loss of night vision. Built in stops prevent full rotation, but the possibility of a malfunction still exists.

At present, in all illuminations, the Night Sun is operational positioned downward approximately twenty (20) degrees from horizontal and at a right angle to the fuselage. The STOL is then put in a steep right bank and a series of 360° right turns are executed for observation purposes.

With the installation of the Night Sun, the normal flight characteristics of the aircraft were affected. Consequently, trim tabs located on the right aeliron and rudder were used to compensate for these affects.



NIGHT SUN CONTROL UNIT

FIG. 1–15

If the Night Sun unit is to be employed and an effective patrol inititated, a second or back-up lamp should be considered. Further considerations could be given to utilizing the back-up unit[1] with an accessory filter in conjunction with infra-red equipment to provide for covert observation in total darkness. With this additional capability, the element of observation without detection should prove to be a valuable tool.

3. Dual Flight and Brake Control

As this report has placed the emphasis on the observer being a pilot, the additional control package should be included as a safety measure where this will be the case. On long duration flights, fatigue is of primary consideration and with the dual flight and brake controls the opportunity for a rest period is affored each pilot.

4. Cross-Wind Landing Gear

With the landing characteristics typical of "Tail-Dragger" aircraft, the cross wind landing gear allows for a maximum of twenty (20) degrees crab angle. Although mechanical difficulties were encountered with the system, all pilots agreed that this is a very desirable feature. Figure 1-19 depicts the cross-wind landing gear after the STOL has made a 90° left turn.

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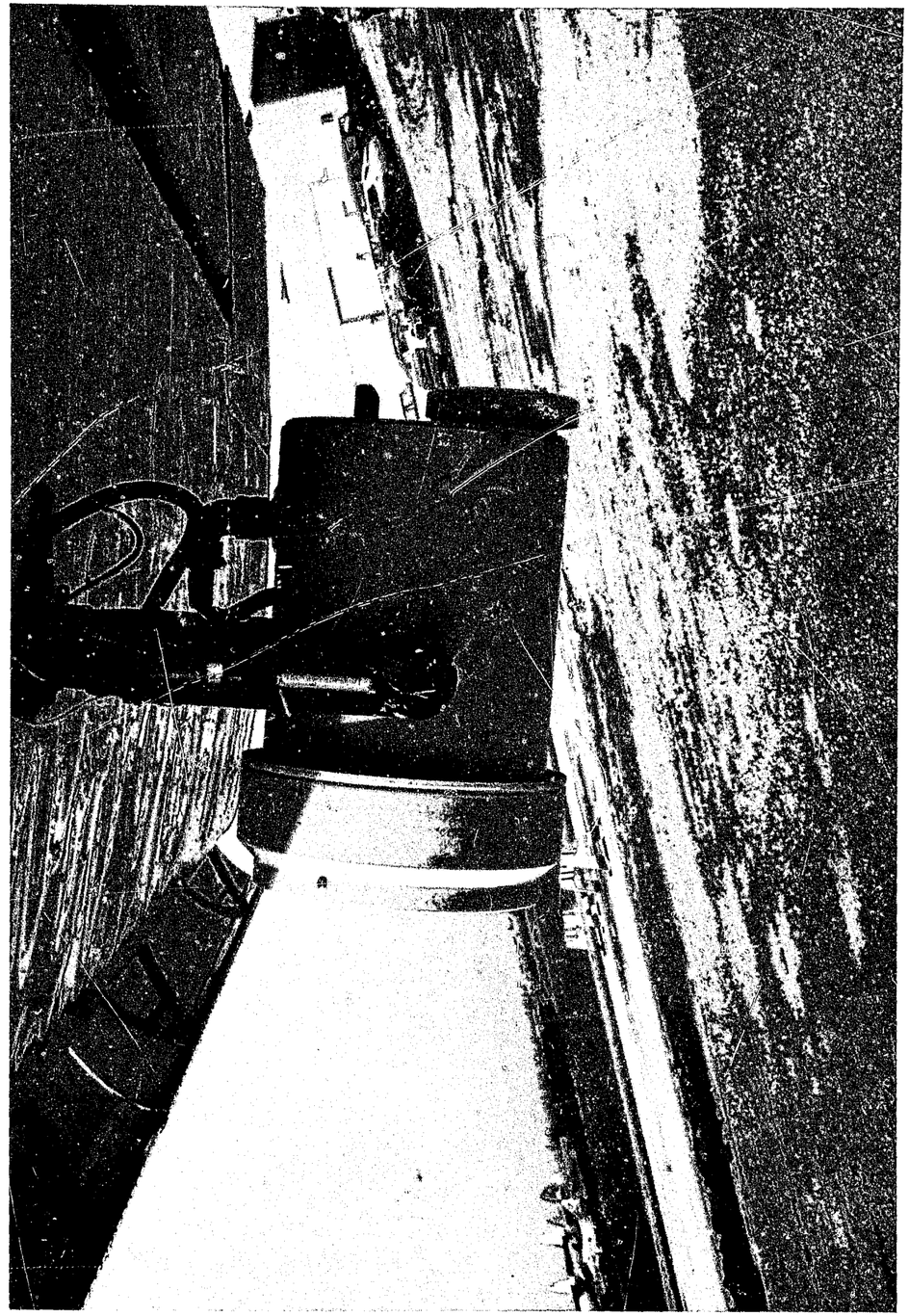
[1]Basic electrical requirements of one unit is approximately 70 amperes maximum at 27.5 VDC "from spectrolab specifications"



NIGHT SUN MOUNTING

FIG. 1–16

TABLE II

LEADING PARTICULARS FOR NIGHTSUN SEARCHLIGHT EQUIPMENT MODEL SX-16

ILLUMINATION CHARACTERISTICS

SEARCHLIGHT UNIT

LIGHT SOURCE	XENON ARC LAMP
BEAM SPREAD	6.50 in "Search" Mode, adjustable to 10 in "Flood" Mode. Focus continuously adjustable by remote control unit.

BEAM INTENSITY:

"SEARCH" MODE	30 foot candles at 300 foot range 2.5 foot candles at 1,000 foot range
"FLOOD" MODE	12 foot candles at 300 foot range 1 foot candle at 1,000 foot range.
PEAK BEAM CANDLEPOWER	3,800,000.

NOTE: See Charts, Figures 1-7 and 1-8

MECHANICAL CONFIGURATION

OVERALL DIMENSIONS	Cylindrical, 11 IN. OD x 18 IN. Long
WEIGHT	25 Pounds Maximum
MOUNTING PROVISIONS	Axial trunnion screws, centrally located near searchlight front CG.
COOLING PROVISIONS	Internal vane axial blower with replaceable air intake filter and exhaust at searchlight front face.

REMOTE CONTROL UNIT

CONTROLS	Unit includes master power on-off switch, lamp start switch, lamp focus control, and 4-way beam directional control.
OVERALL DIMENSIONS	7 inches high by 4½ inches wide by 4 inches deep.
WEIGHT	2.5 pounds approximately.

GIMBAL MOUNTING ASSEMBLY MOTOR OPERATED, REMOTELY CONTROLLED

*MOVEMENT CAPABILITY	.350 Azimuth, 10 Elevation, 70 Down (Computed from a stationary platform)

*NOTE: The full movement capability of the searchlight system cannot be utilized on all helicopters. See Installation for particulars.

PERFORMANCE	When actuated by 4-way switch in remote control unit, mount shall allow searchlight to be pointed to any position from directly forward to 110 aft, and from 10 above to 70 below the aircraft horizontal centerline.
OVERALL DIMENSIONS	Approximately 15 inches wide by 18 inches long.
WEIGHT	11.00 pounds

COMPLETE SYSTEM: ELECTRICAL

INPUT POWER	28 Volts DC, 60 Amperes
SAFETY PROVISIONS	All high voltage lamp starting circuitry enclosed in searchlight housing. Input primary power protected by circuit breakers. Searchlight automatically deactivated if malfunction occurs. Front face of searchlight covered with tempered glass plate.

TOTAL INSTALLED

SYSTEM WEIGHT	50 pounds Maximum.

FIG. 1–17

NIGHTSUN SX-16 SEARCHLIGHT
BEAM SIZE vs. INTENSITY

FIG. 1–18

5. Auxiliary Fuel System

Standard equipment fuel system consists of two (2) thirty (30) gallon fuel tanks mounted in the wings. Two additional thirty (30) gallon wind tanks were ordered as optional equipment. With a total capacity of one hundred twenty (120) gallons, the STOL has a total flight time of approximately ten hours. (Based on 23 inches of manifold pressure and 2600 RPM at 1000 feet, and a consumption ratio of 12 gallons per hour).

6. Auxiliary Lights (Rotating Beacon, White Strobe, Fixed Landing)

These lights are a necessity for day and night flying.

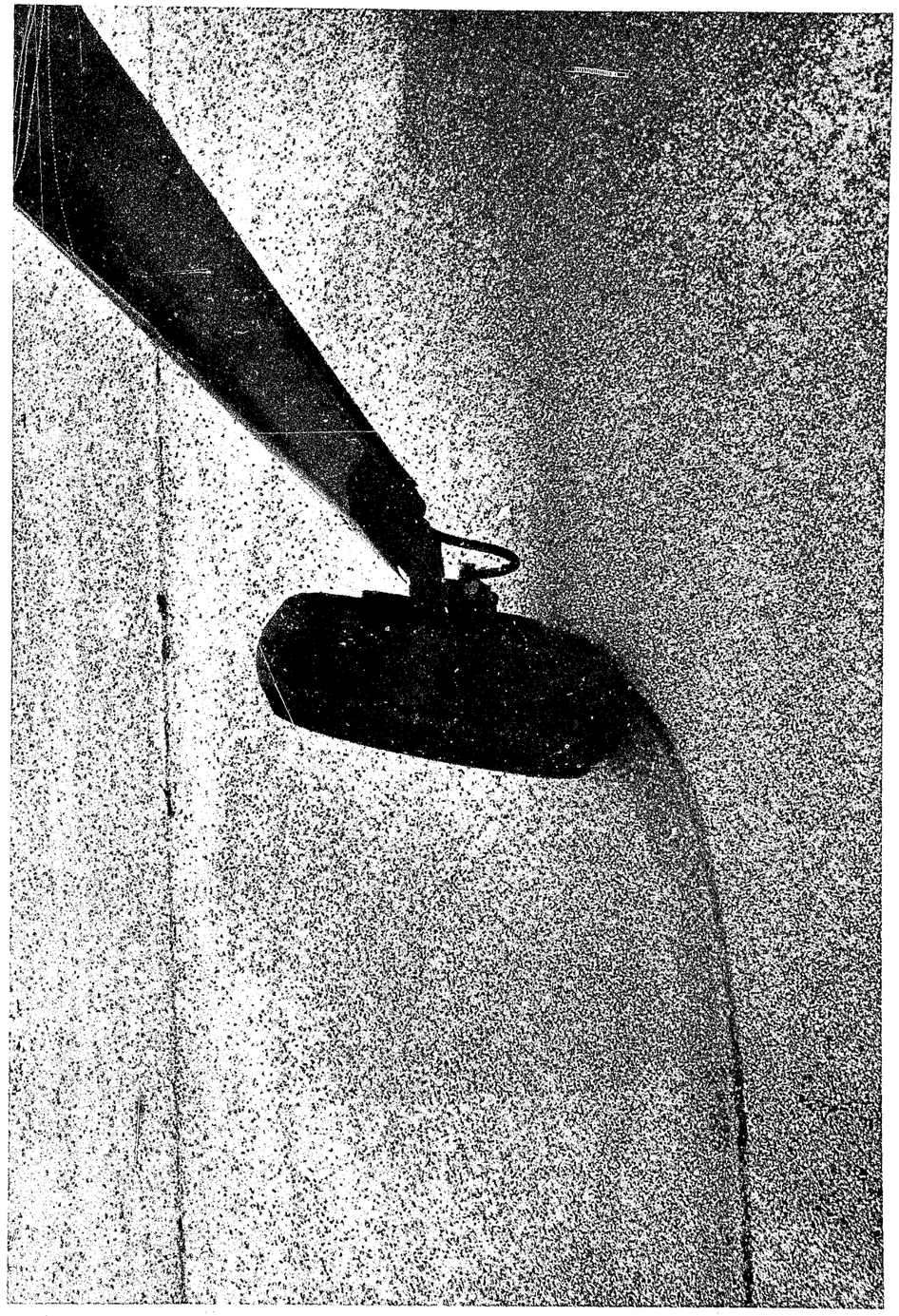


FIG. 1–19

7. **Ventilation System, Fresh Air**

This system proved to be inadequate for occupant comfort for our climatical conditions coupled with the specific type of flying employed.[1] At higher atlitudes and with greater speeds the system proved to be sufficient.

8. **Transponder**

With heavy air traffic, this unit becomes a necessity as it transmitts at a continous frequency allowing the control tower to identify and track the aircraft. Only through having this particular unit, could certain missions be performed in and around airport control zones.

9. **Radios (Communications, VHF)**

The STOL was delievered with (1) Narco Mark 16, 360 channel NAV/COM receiver. This unit is an absolute necessity and, in fact, this department found it necessary to install a second unit. As discussed previously, Dade County has many flight control zones and on many occasions our operations required us to be between two (2) of these control zones. With one (1) radio, only one

---

[1]Over ninety (90) per cent of the flights are made at 60-70-MPH and 1000 feet altitudes.

control zone could be monitored, which produced a dangerous situation when the adjacent control zone tower would try to contact the aircraft and could not do so. With two (2) radio units, both zone towers could be monitored and the possibility of these dangerous situations were eliminated.

10. **Police Radios**

There were no provisions made with the STOL manufacturers to have an appropriate police type radio installed prior to delivery of the aircraft.

It is recommended that a portion of the aircraft's panel be allotted for the installation of a police radio. It is unknown at the time of this report if presently manufactured radios are designed or can be adapted to the space requirements of the aircraft's panel.

Being without a radio in the STOL, a portable radio (hand held walkie-talkie) with telescoping antenna and a maximum output of three (3) watts, was used. Tests were made at various altitudes but the limited power output coupled

with the noise level of the aircraft gave unsatisfactory results. A subsequent installation using the same radio with an outside antenna and an ear plug provided only marginal results.

A second portable radio was specifically purchased for the STOL. This unit was of the constant recharging type using the aforementioned external antenna. This unit did not produce enough power for the type of operations undertaken and was replaced with a third radio.

The third radio which is presently being used was originally designed for use on motorcycles. This system has ample power for effective communications from any area of the county, however, the way the sytem was mounted (the power supply being mounted under the rear seat with the control head mounted on the floor under the front seats utilizing existing seat track mounting bolts) was somewhat less than desirable. To reach the control head, it is necessary to lean forward approximately 90° from the vertical sitting position, but the dash limits the body travel to approximately 45°, consequently, the radio cannot be readily reached, unless bodily contortions are used which are detrimental to the aircraft's operation.

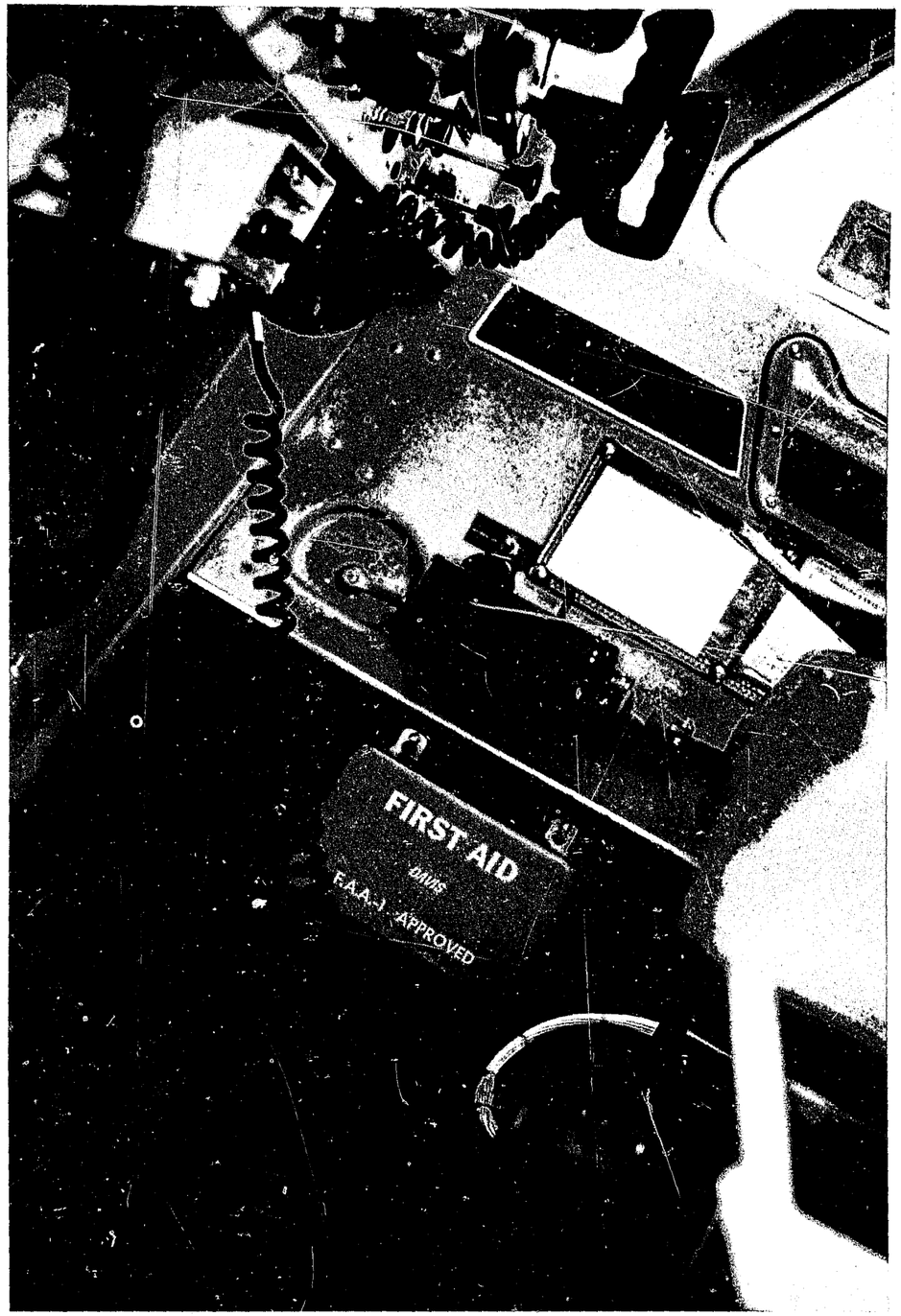


FIG. 1–20

With the program requirement that police communication channels be changed as the aircraft passes into a new district and with the acoustics dominating the radio's volume, ease of operation should be given primary consideration.

It is our recommendation that a professional radio service facility, experienced in aircraft operation, be utilized in future radio installations.

Figure 1-20 (see page 74) reflects the present installation of the police radio.

B. Standard Equipment

1. Nitrided Cylinder Barrels
2. Electric Auxiliary Fuel Pump
3. Two 30 Gallon Wing Tanks
4. Cowl Flaps
5. Heavy Duty Carburetor Air Filter
6. Shielded Engine Ignition Harness
7. Recording Tachometer
8. Manifold Pressure Gauge
9. Engine Gauges:

    Oil Temperature

    Oil Pressure

    Fuel Pressure

    Fuel Quantity

    Cylinder Head Temperature

10. Outside Air Temperture Gauge
11. Generator Warning Light
12. Shock Mounted Instrument Panel
13. Electric Turn and Bank Indictor
14. Sensitive Altimeter
15. Magnetic Compass
16. Airspeed Indicator
17. Wing Flap Position Indicator
18. Full Swivel, Lockable Tail Wheel, Cockpit Controlled
19. Extra Heavy Duty Landing Gear Fairings
20. Extra Heavy Main Landing Gear Trunnions
21. Structural Modifications and Fittings for Floats
22. Steel Control Cables
23. Retractable Ground Handling Bars
24. Full Cantilever Wing
25. Leading Edge Automatic Wing Slats
26. Slat Interceptors for Slow-Speed Lateral Control
27. Electrically Operated Ultra High Lift Slotted Flaps
28. Oleo-Pneumatic Landing Gear
29. 15-G Steel Tube Cabin Structure
30. 15-G Seat and Shoulder Harnesses
31. Cabin Heater
32. Cabin Ventilator

33. Four arm rests and ash trays
34. Overhead passenger light
35. Front and rear door locks
36. Floor Carpeting
37. Baggage area in rear of cabin
38. Two individually adjustable front seats with reclining backs.
39. Two-place rear seat (two reclining middle seats optional)
40. Heavy Duty fiberglass insulation and soundproofing
41. Extra quality durable interior furnishings
42. Pilot's openable clearview side window
43. Ball bearing controls
44. Hydraulic brakes
45. Hand operated parking brake
46. Adjustable instrument panel lights
47. Navigation lights
48. Aircraft tie down rings (2)
49. Easy access gascolator with quick drain.

3. FLIGHT PROBLEMS

One hazard that was immediately recognized arose from the many local restricted and precautionary flight areas, although Dade County may be a unique area in this regard in that approximately fifty (50) percent of the county lies within these boundaries.

In relation to the patrol districts, each has these particular problem areas as noted below.

THE SOUTH DISTRICT has Homestead Air Force Base, Homestead General Aviation, New Tamiami Airport and numerous private strips, including crop dusting and parachute drop zones.

THE CENTRAL AND WEST DISTRICTS are controlled by Miami International Airport, Seaplane-Coast Guard Operations, Miami Helicopter, Dade-Collier Jet Terminal facilities, and the Presidential White House prohibited area at Key Biscayne.

THE NORTH DISTRICT has Opa Locka Airport, North Perry Airport, and the Opa Locka West Training facility for student pilots. Other hazards include radio and television antenna fields of which some structures are over a thousand feet tall.

Since the STOL is limited in its minimum altitude, it is place in a situation such that it cannot fly low enough to avoid these congested zones. The Helicopter can fly below these zones, but some of the advantage is lost due to the additional attention that must be given to low level flying.

Again the question of observers comes to focus, i.e., should the observer be a pilot or should he be a non-pilot Police Officer trained for aerial observance.

All Dade County Public Safety Department pilots agreed that in a congested area, such as Dade County, it behooves the operation to have the observer be a qualified pilot.


N6774D
POLICE
METROPOLITAN DADE COUNTY
PUBLIC SAFETY DEPT.

FIG. 1–22

4. PERFORMANCE DATA CHART

STOL
HELIO SUPER COURIER H-295

NUMBER OF SEATS	6	2
ENGINE TYPE	RECIPROCATING LYCOMING 295 BHP	LYCOMING 260 BHP
GROSS WEIGHTS (LBS)	3,400	2,450
EMPTY WEIGHT (LBS)	2,080	2,450
USEFUL LOAD (LBS)	1,320	750
MAXIMUM SPEED (MPH)	150 WITH NIGHT SUN	80 (WITH FLOATS)
CRUISE SPEED (MPH)		
MINIMUM SPEED (MPH)	30 (FULLY MANEUVERABLE)	HOVER
RANGE (MILES)	660 (STANDARD TANKS) 1380 (OPTIONAL TANKS)	120 (MAXIMUM)
RATE OF CLIMB (FPM)	1,150	700
SERVICE CEILING	20,500	17,000

FIG. 1–23

TAKE-OFF DISTANCE 50' OBSTACLE (FT)	610	N/A
LANDING DISTANCE 50' OBSTACLE (FT)	520	N/A
HOGE CEILING AT GR. WT. STD. DAY	N/A	1,000/2,000
HIGE CEILING AT GR. WT. STD. DAY ±20° c	N/A	6,000

FIG. 1–23(contd.)

5. SELECTIVE ENFORCEMENT PERIOD

During the period the STOL Aircraft was down for repairs, as a result of the previously discussed ground loop, the helicopter participated alone in a Selective Enforcement detail. The purpose was to be airborne during the high crime times, specifically robberies, over the Model Cities area comprised mainly within the Public Safety Department's Central District.

Utilizing the Dade County Public Safety Department's Data Processing Section's printouts, hours, days, dates and locations of robberies occurring during comparable periods were determined. Using these statistics, a helicopter flight profile was derived.

Documentation of the sweeps and concentrations were maintanined along with the times to achieve a basis for comparison with pre- and post-period crime figures. These figures and the previous years' figures were then compared. The apparent significance of the results can be seen in the corresponding graphs which follow (See Pages 87 & 88).

An important aspect in documenting the reduction of particular crimes in a specific area, is to review the surrounding areas to see if the crime was displaced from the area with the concentrated enforcement to the areas where enforcement is normal. In a controlled situation, (i.e., areas that would or could provide statistics in increases or decreases in crime, or areas that would be under the same jurisdiction) it would be possible to document the rate of crime, which might once and for all either prove or disprove the value of aerial omnipresence. Project Sky Knight[1] demonstrated that aerial

patrol, particularly helicopters, could be effectively used in selective enforcement of a particular area, but the study did not examine the effect in adjacent areas, to show the changes, if any, in the crime pattern.

The figures gathered from the Public Safety Department's study do show a rapid decrease from a high of eighty-five (85) Robberies in September to forty-four (44) at the end of the enforcement period. (1 November). In trying to show if the crime did shift to the adjacent municipalities, it was found that the majority of these municipalities could not provide the necessary statistics, as they did not contribute to the national crime reporting system, or there was a breakdown in cooperation with the Dade County Public Safety Department.

A typical example of the effect on robberies is an article that appeared in the Miami Herald, Page 5B September 12, 1970:

COPTER DIRECTS HOLDUP ARREST

Hovering in a helicopter in the area of N. W. 27th Avenue and 46th Street, Metro Air Policemen spotted a car with three juveniles speeding away from Rose's Auto

---

[1]Project Sky Knight: A demonstration in aerial surveillance and Crime Control (Project No. 198 5.022) Office of Law Enforcement Assistance Administration (LEAA), U. S. Department of Justice, Washington, D. C.

Store at 5:05 p.m. Friday. A quick warning to ground patrol units led to a chase north along 27th Avenue and West on 54th Street. Police said the fugitive car got out of control in a parking lot at 24th Place and N. W. 54th Street. The Juveniles tried to escape but two were arrested at gunpoint by patrolman before they could get far. The other was caught by police units a short distance away. The youths had held up and robbed Rose's Auto Store, 4631 N. W. 27th Avenue of about $500.00, most of which was recovered in the trunk of the rented car.

1969
1970
CENTRAL DISTRICT
TOTAL ROBBERIES DURING PERIOD
1970 - - 772
1969 - - 665
ROBBERY COMPARISON, TEN MONTHS
SELECTIVE ENFORCEMENT PERIOD, 8 SEPT. TO 1 NOV.
(NUMBER OF ROBBERIES)
(TIME IN MONTHS)
MAY
JUNE
JULY
AUG.
SEPT.
OCT.
NOV.
DEC.
JAN.
FEB.
MAR.
1970
1971
90
80
70
60
50
40
30
84
75
73
64
44
56
60
64
66
56
73
74
66
40
85
74
83
47
65
58

FIG. 1–24

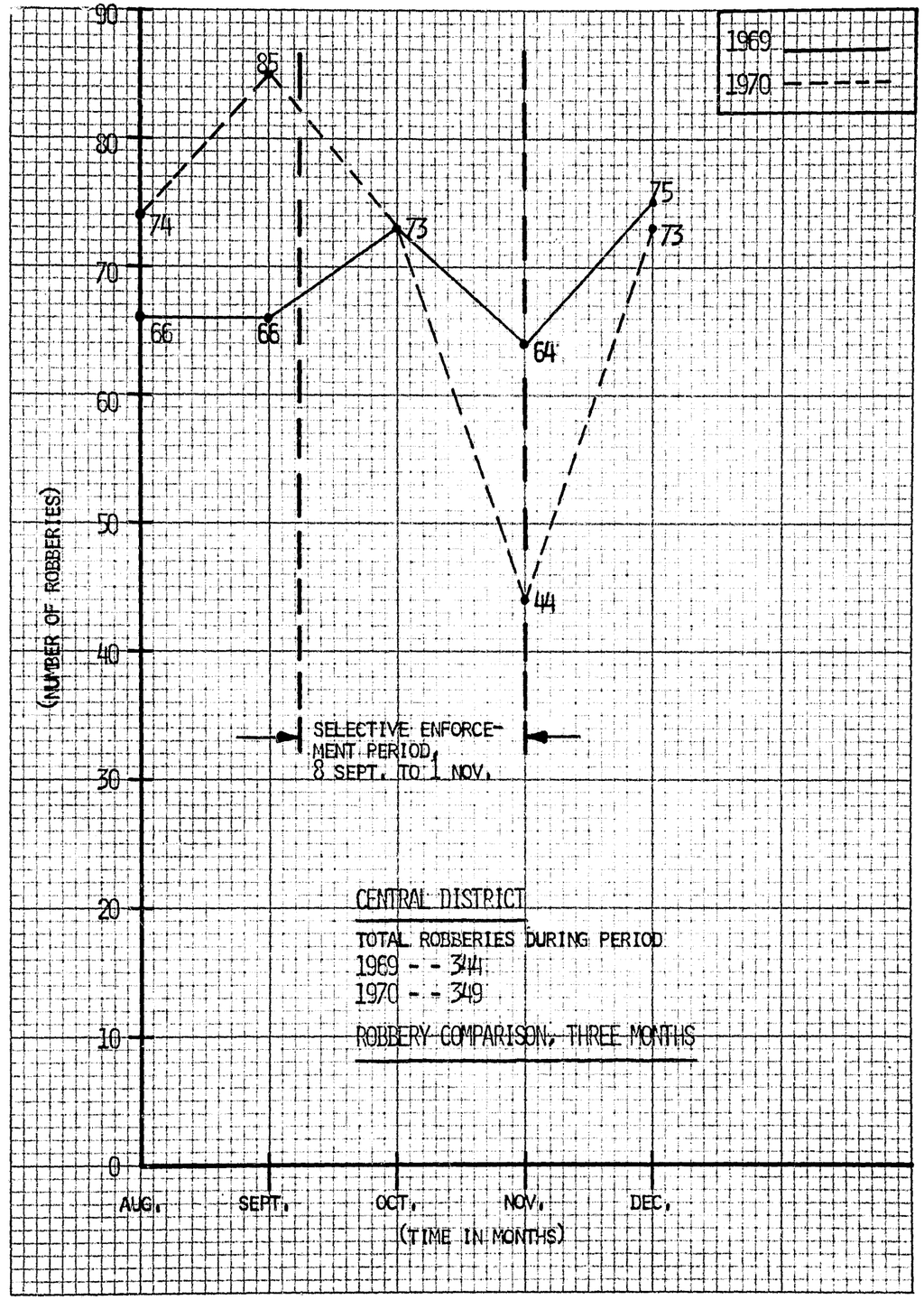

1969
1970
90
80
70
60
50
40
30
20
10
0
85
74
66
66
73
64
75
73
44
(NUMBER OF ROBBERIES)
SELECTIVE ENFORCE-
MENT PERIOD,
8 SEPT. TO 1 NOV.
CENTRAL DISTRICT
TOTAL ROBBERIES DURING PERIOD
1969 - - 344
1970 - - 349
ROBBERY COMPARISON, THREE MONTHS
AUG.
SEPT.
OCT.
NOV.
DEC.
(TIME IN MONTHS)

FIG. 1–25

Figures 1-26 and 1-27 represent aerial photographs of the Dade County Public Safety Department's North District (Sub-Station No. 1). The significance of the two photographs is the height at which the two photographs were taken and the ability to detect various features at these altitudes. Figure 1-26 was taken from a 500 foot altitude using a 50 millimeter lens. This combination is approximately equivalent to unassisted normal human vision at 1,000 feet. Figure 1-27 was taken from a 300 foot altitude using a 50 millimeter lens. This combination is approximately equivalent to unassisted normal human vision at 600 feet.

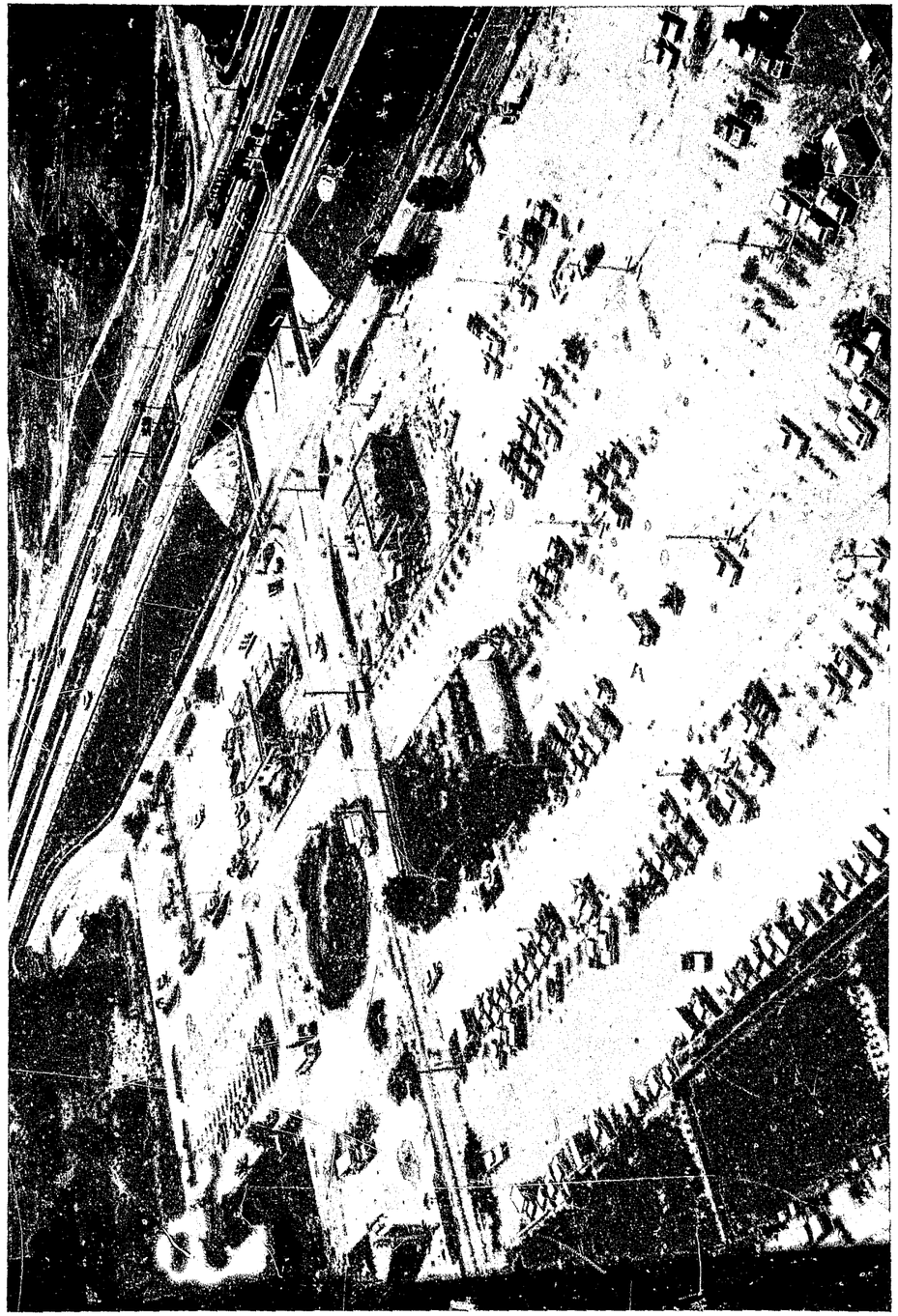


FIG. 1–26

FIG. 1–27

6. Response Times

Although there are many factors which will determine the response time of an aircraft, there are basically two (2) catagories, these are:

A. The response time while the aircraft is one the ground, with regard to the stage of readiness the aircraft and crew are in.

B. The response time while the aircraft is airborne or on routine patrol.

In order to form the basic criteria for comparison, the Dade County Public Safety Department's electronic Data Processing Section provided operational time analysis (OTA) printouts which indicated that the average response times for all five (5) Districts' ground patrol units to be approximately six (6) minutes.

Obviously, the response time when the aircraft is on the ground, cannot compare with the response time when airborne, but these times will be an important factor when determining if the aircraft should be called, and if it is called upon, what can be expected in response time. The gravity of any situation should dominate the request for aerial support and the maximum time which should be expected in requesting aerial support is when the aircraft is secured and the pilots that are on call, are at home, i.e., during other than assigned working hours or schedulized aircraft patrol times.

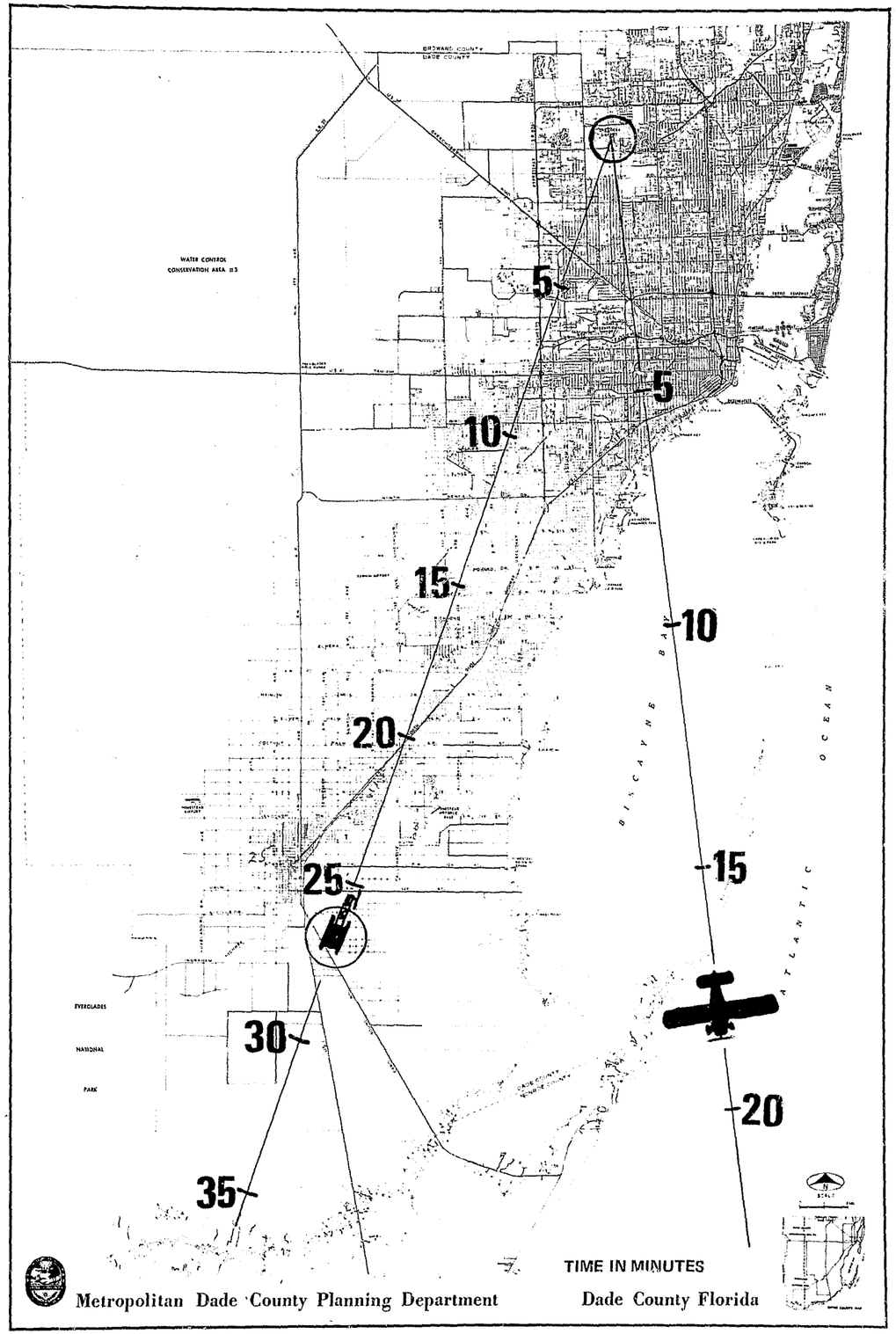

BROWARD COUNTY
DADE COUNTY
WATER CONTROL
CONSERVATION AREA #3
EVERGLADES
NATIONAL
PARK
5
5
10
15
10
20
25
15
30
20
35
BISCAYNE BAY
ATLANTIC OCEAN
TIME IN MINUTES
Metropolitan Dade County Planning Department
Dade County Florida

FIG. 1–28

As shown below there is not a wide margin between the Helicopter and the STOL, as each requires approximately the same time to become airborne. The general factors determing airborne time, are as follows:

(Time in Minutes)

		STOL	HELICOPTER
1.	Average Pilots Travel Time (Home to Airport)	20-25	20-25
2.	General Preflight	15-20	15-20
3.	*Emergency Clearance (Ground Control) includes taxing for STOL	5-8	2-5
	TOTAL	40-53	37-50

*It should be noted that Opa Locka Ground Control is not required to give the Public Safety Department an emergency clearance, but it is normally done as a courtesy.

When the helicopter and the STOL are airborne, the response time for the STOL was found to be less than the helicopter, due to the speed advantage (120 plus versus 75 M.P.H.). Figure 1-28 indicates the airborne response time for the STOL and Helicopter to various locations within the County. The rings indicate an origination point at the Opa Locka Airport, where the aircraft are presently stationed and were, during the project period.

Response time is a most critical aspect in regard to "in-progress" calls, e.g., Robbery, Breaking and Entering, Chases, Auto Theft, as the possibility of apprehension is related to swift arrivals. The STOL is limited to the 1000 foot minimum atlitude, the pilots can only observe and must wait for the ground units to respond. This advantage does provide the necessary element to apprehend subjects which ordinarily would have been missed by ground units. The Helicopter additionally, under certain circumstances has the distinct advantage of landing with the crew taking whatever action appears necessary.

PART II

COST ANALYSIS

CONTINUED

2 OF 3

CHAPTER I

Consideration should be given to some basic factors which lend themselves to having an effect on the operating cost of the Helicopter and the STOL Aircraft.

A. Insurance carried on the two aircraft vary in the respect that due to the age of the Helciopter no Hull Insurance is considered appropriate. This adds approximately $1,500 to the operating (Indirect) costs of the STOL Aircraft.

Both Aircraft carry liability insurance, but the cost of the STOL Liability insurance is proportionally higher due to the method of rating (i.e., the insurance is rated on the number of seats, six (6) for the STOL versus two (2) for the Helicopter).

B. The number of Pilots per aircraft differ in the respect that under the Grant from LEAA, 3.5 Pilots were authorized to participate in the project. It was finally determined that the fifty percent time allocation of one Pilot which should be devoted to the STOL, could not be provided, at the Dade County Public Safety Department had five (5) Pilots and two of these were required for the Helicopter.

In order to be compatiable in the Pilots salary per Aircraft, it was decided to use the base salaries of one (1) Pilot and one (1) observer per eight (8) hour shift. Based on the previous experience of manning a ground patrol unit for an eight (8) hour shift, a figure of 1.73 men has been determined to be the minimum allowable. Factors taken into consideration are Annual and Sick Leave, Holidays, Training

Days and the average number of days required for Court Appearance. The Indirect Operating Cost reflects a Pilots salary of $11,728 and a Police Officer (Observer) salary of $10,212. Both of these figures have been mutiplied by the figure 1.73 and the resultant used as a datum during the test period.

Basic projections can be made for sixteen (16) and twenty-four (24) hour shifts, as the direct operating costs remain the same, the salaries can be multiplied by 3.46 and 5.19 respectively.

C. Other indirect costs such as Office and Tie-down space adds an additional burden to the overall cost.

D. No provisions were made for depreciation of the STOL. The residual value of the STOL is estimated at approximately 50 percent of purchase price at the end of 5 years. Helicopter residual at the end of 5 years will be approximately 30 percent.

To maintain a fair comparison, between the eleven year old Helicopter and the newly acquired STOL, depreciation figures were not included as part of the operating costs, but should be considered as an important aspect in a non comparison basis.

E. STOL Operating costs beyond 600 hours are projected figures and should not be construed as firm operating costs. The Helicopter operating cost is based on the previous eleven (11) years of operating experience. As the Direct Operating Costs remain constant, additional hour usage will reduce the indirect hour costs proportional to the number of hours flown.

tional to the number of hours flown.

F. The price of Aviation Gas and Oil will vary from area to area. The price of these items fluctuated during the test period, consequently we choose to set an average for both Aircraft as follows:

1. 100 Octane Gas .40 per gallon
2. 80 Octance Gas .25 per gallon
3. Oil .30 per quart

G. An additional cost factor for the Stol is the 1200 hour engine overhaul and airframe inspection. Estimates given by Helio Courier Corporation and local Certified Aircraft Maintenance Shops place this figure at approximately $6,000.00, or prorated per hour, adds an additional $5.00 per hour direct operating expense.

1. **STOL AIRCRAFT OPERATING COSTS**

A. **Cost During Evaluation**

Direct Operating Cost:

Includes all gas, oil, parts, maintenance and inspections during the project period. Total hours flown were 617.34 and total direct operation costs were $4,725.17 or $7.65 an hour.

Estimated total direct operating cost per hour is $12.65

Annual Fixed Cost (indirect operating cost)

Office and tie-down space (1/2) $2,580.00	$ 1,290.00
Telephone 1/2 @ $900.00	450.00
Office furniture 1/2 @ $600.00	300.00
STOL Insurance Hull and Liability	2,000.00
Pilots and Observer salaries	$37,990.80
Total Fixed Cost	$42,030.80

Total Operational Cost for 617.34 Hours
(May 25, 1970 - May 14, 1971)

Direct Cost	$ 7,809.35
Indirect Cost	42,030.80
TOTAL	$49,840.15

Total Operating Cost Per Flight Hour for 617.34 Hours = $80.73

B. **300 HOURS PER YEAR COST**

Direct Operating Cost @ $12.65 per hour.

Includes Gas, oil, maintenance, inspections, parts, and engine overhaul based on 1200 hours of operation

TOTAL	$ 3,795.00

Annual Fixed Cost. (Indirect Operating Cost)

Office and Tie-down space 1/2 @ $2,580.00	$ 1,290.00
Telephone 1/2 @ $900.00	450.00
Office Furniture 1/2 @ $600.00	300.00
Insurance Hull and Liability	2,000.00
Pilot and Observer salaries	37,990.80
TOTAL ANNUAL FIXED COST	$42,030.80

Total Operational Cost per hour (300 hours)

300 hours annual direct operational cost.	$ 3,795.00
Total - Annual Fixed Cost	42,030.80
Annual STOL Operational Cost	$45,825.80

Cost per hours (300 hour annually) $166.13

FIG. 2–1

C. **600 HOURS PER YEAR COST**

Direct Operating Cost @ $12.65 per hour.

Includes gas, oil, maintenance, inspections, parts, and engine overhaul based on 1200 hours of operation

TOTAL	$ 7,590.00

Annual Fixed Cost. (Indirect Operating Cost)

Office and Tie-down space 1/2 @ $2,580.00	$ 1,290.00
Telephone 1/2 @ $900.00	450.00
Office Furniture 1/2 @ $600.00	300.00
Insurance Hull and Liability	2,000.00
Pilot and Observer salaries	37,990.80
TOTAL ANNUAL FIXED COST	$42,030.80

Total Operational Cost per Hour (600 hours)

600 hours, annual direct operational cost	$ 7,590.00
Total Annual fixed cost	42,030.80
Annual STOL Operational Cost	$49,620.80

Cost per Hour (600 hours annually) $82.70

FIG. 2–2

D. 900 HOURS PER YEAR COST

Direct Operating Cost @ $12.65 per hour.

Includes gas, oil, maintenance, inspections, parts, and engine overhaul based on 1200 hours of operation.

TOTAL	$11,385.00

Annual Fixed Cost (Indirect Operating Cost)

Office and Tie-down space 1/2 @ $2,580.00	$ 1,290.00
Telephone 1/2 @ $900.00	450.00
Office Furniture 1/2 @ $600.00	300.00
Insurance Hull and Liability	2,000.00
Pilot and Observer salaries	37,990.80
TOTAL ANNUAL FIXED COST	$42,030.80

Total Operational cost per hour. (900 hours)

900 hours, Annual Direct Operational Cost	$11,385.00
Total Annual Fixed Cost	42,030.80
Annual STOL Operational Cost	$53,415.80

Cost per hour (900 hours annually) $59.35

FIG. 2–3

E. **1200 HOURS PER YEAR COST**

Direct Operating Cost @ $12.65 per hour.

Includes gas, oil, maintenance, inspections, parts, and engine overhaul bases on 1200 hours of operation.

TOTAL	$15,180.00

Annual Fixed Cost (Indirect Operating Cost)

Office and Tie-down space 1/2 @ $2,580.00	$ 1,290.00
Telephone 1/2 @ $900.00	450.00
Office Furniture 1/2 @ $600.00	300.00
Insurance Hull and Liability	2,000.00
Pilots and Observers salaries	37,990.80
TOTAL ANNUAL FIXED COST	$42,030.80

Total Operational Cost per Hour (1200 Hours)

1200 hours annual direct operational cost	$15,180.00
Total Annual Fixed Cost	42,030.80
Annual STOL Operational Cost	$57,210.80

Cost per hour (1200 hours annually) $47.67

FIG. 2–4

2. **HELICOPTER OPERATING COST**

A. **Cost During Evaluation**

Direct Operating Cost:

Includes all gas, oil, parts, maintenance and inspections during the Project Period. Total Hours flown were 692.45 and total direct operating costs were $11,998.44 or $17.32 per hour.

Total direct operating cost per hour is $17.32

Annual Fixed Cost (indirect operating cost)

Office and tie-down space (1/2 of $2,580.00)	$ 1,290.00
Aviation Section gas truck	900.00
Telephone (1/2 of $900.00)	450.00
Office furniture (1/2 of $600.00)	300.00
Helicopter Insurance (Liability Only)	425.00
Pilots and Observers Salaries	37,990.80
TOTAL FIXED COST	$41,355.80

Total Operational Cost for 692.45 hours
(May 25, 1970 - May 14, 1971)

Direct Cost	$11,998.44
Indirect Cost	41,355.80
Total	$53,354.24

Total Operational Cost Per Flight Hour for 692.45 Hours = $77.06

B. **300 HOURS PER YEAR**

Direct Operating Cost @ $17.32 per hour.

Includes gas, oil, maintenance, inspections, parts, and engine overhaul based on 300 hours of operation.

TOTAL	$ 5,196.55

Annual Fixed Cost. (indirect operating cost)

Office and tie-down space (1/2 of $2,580.00)	$ 1,290.00
Aviation Section gas truck	900.00
Telephone (1/2 of $900.00)	450.00
Office furniture (1/2 of $600.00)	300.00
Insurance (liability only)	425.00
Pilot and observer salaries	39,990.80
TOTAL ANNUAL FIXED COST	$41,355.80

Total Operational Cost per year (300 hours)

300 hours annual direct operational cost.	$ 5,196.55
Total - Annual Fixed Cost	41,355.80
	$46,552.35

Cost per hour (300 hours annually) $155.17

FIG. 2–5

C. **600 HOURS PER YEAR**

Direct Operating Cost @ $17.32 per hour.

Includes gas, oil, maintenance, inspections, parts, and engine overhaul based on 600 hours of operation

TOTAL	$10,393.18

Annual Fixed Cost. (indirect operating cost)

Office and tie-down space (1/2 of $2,580.00)	$ 1,290.00
Aviation Section gas truck	900.00
Telephone (1/2 of $900.00)	450.00
Office furniture (1/2 of $600.00)	300.00
Insurance (liability only)	425.00
Pilot and observer salaries	39,990.80
TOTAL ANNUAL FIXED COST	$41,355.80

Total Operational Cost per year (600 hours)

600 hours annual direct operational cost	$10,393.18
Total - Annual Fixed Cost	41,355.80
	$51,748.98

Cost per hour (600 hours annually) $86.24

FIG. 2–6

D. **900 HOURS PER YEAR**

Direct Operating Cost @ $17.32 per hour.

Includes gas, oil, maintenance, inspections, parts, and engine overhaul based on 900 hours of operation

TOTAL	$15,589.77

Annual Fixed Cost. (indirect operating cost)

Office and tie-down space (1/2 of $2,580.00)	$ 1,290.00
Aviation Section gas truck	900.00
Telephone (1/2 of $900.00)	450.00
Office furniture (1/2 of $600.00)	300.00
Insurance (liability only)	425.00
Pilot and observer salaries	$39,990.80
TOTAL ANNUAL FIXED COST	$41,355.80

Total Operational Cost per year (900 hours)

900 hours annual direct operational cost.	$15,589.77
Total - Annual Fixed Cost	41,355.80
	$56,945.57

Cost per hour (900 hours annually) $63.27

FIG. 2–7

E. **1200 HOURS PER YEAR**

Direct Operating Cost @ $17.32 per hour.

Includes gas, oil, maintenance, inspections, parts, and engine overhaul based on 1200 hours of operation

TOTAL	$20,681.76

Annual Fixed Cost. (indirect operating cost)

Office and tie-down space (1/2 of $2,580.00)	$ 1,290.00
Aviation Section gas truck	900.00
Telephone (1/2 of $900.00)	450.00
Office furniture (1/2 of $600.00)	300.00
Insurance (liability only)	425.00
Pilot and observer salaries	39,990.80
TOTAL ANNUAL FIXED COST	$41,355.80

Total Operational Cost per year (1200 hours)

1200 hours annual direct operational cost.	$20,681.76
Total - Annual Fixed Cost	41,355.80
	$62,037.56

Cost per hour (1200 hours annually) $51.69

FIG. 2–8

PART III

PERFORMANCE ANALYSIS

CHAPTER I

MISSION ANALIZATION

The various operational areas chosen for comparison were the one's that required or allowed for the operation of both aircraft. These areas of comparison were chosen for not only their value to crime deterence but for their values in comparison of the performance characteristics of the two aircraft.

The total number of missions flown by the Helicopter exceeds the number of missions flown by the STOL. These 181 additional missions can be accounted for by two (2) reasons.

1. The helicopter is limited to approximately two (2) hours flying time and then must return for fuel. With this as a basic factor, the helicopter will be utilized for missions that have a short duration, thus allowing for greater availability.

2. The one-hundred (100) days, that the STOL was down, created a lag in regard to the aircraft's operations in all categories.

The total hours flown indicates that the average hours per mission flown by the STOL was higher than those of the Helicopter. This is contributed to the fact that the flight duration for the STOL is longer than that of the Helicopter.

The patrols per district reflect the type of geographical area was patroled in relation to the type of aircraft that was presumed most effective to fly those specific districts.

1. The North District is in the respect of populace and geography is not a highly populated area in any one particular segment. Without a high population density, the STOL was called upon to fly more missions than the helicopter.

2. The Central District is a high density area with a lot of "trouble spots" and has required more "selective enforcement" than any of the other districts. With this District in the Miami International Airport Control Zone coupled with the minimum altitude limitation of the STOL, it was determined that the helicopter would perform better due to its not having the altitude limitations. This area was the District in which the Selective Enforcement period of robberies was conducted.

3. The South District is the least populated and contains the large groves and truck farming areas. The STOL was found to be the most desirable to patrol these large areas. A normal patrol by the helicopter in this area consisted of less than one (1) hour, as over approximately 50% of the airborne time would be utilized for commuting from the base of operations.

The Dade County Public Safety Department's future plans call for a helicopter to be placed in the South end of the County, with its primary function being the

patrol of these grove areas. This will not preclude the use of the STOL, as it will be used as a countywide "back-up" for helicopters and ground patrol units.

The overall concept of the future is to provide aerial patrol on a District basis i.e., a helicopter assigned to each district and based within the same. The helicopter will remain, except in emergency situations, within the limits of its respective district, and will function as a Patrol Vehicle on a regularly assisgned shift basis. As stated before, the STOL will have no boundaries to remain within, rather it will be the "Big Brother" for the entire county. This integrated transitional concept will bestow an aura of the omnipresence projection.

4. The West District, in comparison, is similar to the North District and the flight requirements are compatable.

5. The Airport district consists primarily of the Miami International Airport with a small area of Industrial Parks. Missions in this area have been on a request basis only and normally consisted of searches for missing persons.

The number of observers flown on the STOL Missions was approximately 50 percent greater than on the helicopter. This can be attributed to the six (6) place capacity versus two (2) for the helicopter and due to the fact that larger areas are usually requested to be seen by the observers, (e.g., review of the pollution etc., in Dade County).

Notwithstanding the above, the STOL aircraft played an important role during a Civil Disturbance in the highly populated area of the Central District encompassing 7 square miles. The aircraft, employed as an aerial command post, supplied the ground staff personnel with intelligence data based on aerial observation of spotted ground activity. During an eight hour period extending through the late night, the STOL aircraft and the helicopter were the only units patrolling the disturbance area with the exception of a small ground task force. All other patrol units and men were withdrawn from the immediate affected area and were re-positioned at a command post established in an outlying area.

The STOL aircraft kept a constant vigilance on the community while county and local officials met to discuss a suitable solution to the disturbance problem. The fixed-wing aircraft reported on the locations of suspected snipers, crowd gatherings, looters, fire bombings and motor vehicle accidents. On one occasion, the STOL observed subjects looting a store, the area was illuminated and one subject was apprehended by ground elements of the Task Force.

Aerial crime deterrent surveillance missions are comparable to the ground patrol units, routine patrol. More missions were achieved by the STOL as a result of the "fly-over" concept of aerial patrol throughout the County. During these fly over missions, effects such as the recovery of stolen vehicles were predominant.

As a comparison, the STOL and helicopter recovered a total of 146 vehicles of the

4,335 that were either stolen locally or stolen outside the unincorporated area of Dade County and recovered within the County limits.

Another example of aerial patrol and the response factor was Case 103480-N that occurred on August 28, 1970, when an Army Twin Engine Seminole Aircraft was practicing touch and go landings. One of the engines went out and the plane crashed into a vacant field. The Dade County Public Safety Departments' helicopter was in the area looking for suspects in a recent robbery, and observed the plane crash. The helicopter landed immediately after the crash and its crew pulled the pilot and co-pilot from the cockpit. Both victims were placed in the helicopter's litters and flown to the Air Force Hospital. Doctors stated that only due to the fast reaction of the helicopter was the pilot able to survive. The co-pilot, unfortunately, expired (DOA) due to massive internal injuries.

Both the Police helicopter pilot and the observer were later cited by Governmental and Civic Organizations as Police Officers of the Month in Dade County.

Another example of a specific mission is Case 93134-N. At 12:19 P.M., August 3, 1970, a Be On Look Out (BOLO) was issued on a hijacked 1-1/2 ton white GMC Truck, belonging to a local grocery distrubutor. At the time of the issuance of the BOLO, the STOL aircraft was approximately 12 miles northwest of the reported hi-jacking location, and proceeded to assist ground units assigned. Arriving in the general area, the STOL began looking for the subject vehicle and located it behind an apartment complex where

it was being unloaded. The STOL vectored the ground units the scene, where all subjects were apprehended.

This particular case is indicative of the response time while airborne and the ability to search a wide area in a short period of time.

The value of the Night Sun Search Lamp is demonstrated in Case 152005-N, when on the morning of December 15, 1970, two (2) Dade County Deputy Sheriffs left Homestead Bayfront Park on a fishing excursion. During the day, their boat developed mechanical difficulties and they drifted into the Gult Stream. At 8:00 P.M., their wives contacted the Dade County Public Safety Department Marine Patrol and Aviation Sections and the Coast Guard.

At 2:30 A.M., December 16, 1970, utilizing the "Night Sun" Search Lamp, the STOL aircraft located the disabled boat, drifting in the Atlantic Ocean, several miles from the nearest land. Marine Patrol Units were vectored to the site and rescue accomplished. The area searched in this incident encompassed over 100 square miles of mangrove, bay and ocean.

1. **MISSION PERFORMANCE DURING EVALUATION**

JUNE 1970 THROUGH MAY 1971

	STOL	HELCOPTER	COMBINED
MISSIONS FLOWN			
NIGHT PATROL	89	105	194
DAY PATROL	194	359	553
TOTALS	283	464	747
HOURS FLOWN	617:32	692:45	1,310:17
PATROLS PER DISTRICT			
NORTH	181	147	328
CENTRAL	161	223	384
SOUTH	164	70	234
WEST	126	55	181
AIRPORT	13	6	19
OBSERVERS	116	60	176
TRAINING	40	65	105
PHOTOGRAPHIC	9	57	66
PUBLIC RELATIONS	5	18	23
ASSIST OUTSIDE AGENCIES	33	65	98
AERIAL CRIME DETERRENT SURVEILLANCE	206	146	352
SELECTIVE ENFORCEMENT	4	106	110

FIG. 3–1

RECOVERY OF STOLEN VEHICLES	41	105	146
CIVIL DISTURBANCES	10	18	28
SPECIFIC SEARCHES	36	29	65
ARRESTS			
FELONY	11	17	28
MISDEMEANOR	35	107	142
		TOTAL ARRESTS	170

FIG. 3–1(contd.)

CASE NO. 105544–L

Another example of apprenhension due to quick response time, is the case where the helicopter was approximately six (6) blocks from a house that had been broken into and the subject was reported to still be in the house. The helicopter responded and saw the subject run out of the house and run through the yards of several homes. The co-pilot took this picture prior to the landing of the helicopter, and apprenhension by the helicopter crew.

2. NUMBER OF EFFECTS PER MISSION RATIO (STOL)

1970	NUMBER OF MISSIONS	NUMBER OF EFFECTS*	RATIO
JUNE	39	13	.33
JULY	53	36	.67
AUGUST	19	8	.42
SEPTEMBER	NOTE 1	—	—
OCTOBER	NOTE 1	—	—
NOVEMBER	6	0	0
DECEMBER	20	7	.35
S' TOTAL	137	64	.47
1971			
JANUARY	31	19	.62
FEBRUARY	26	12	.46
MARCH	34	36	1.05
APRIL	39	14	.35
MAY 1-14	16	4	.25
S' TOTAL	146	85	.58
TOTALS	283	149	5.26

*INCLUDES DISCOVERIES, RECOVERIES, ABANDONED VEHICLES, DISABLED BOATS, FIRES, ARREST.

NOTE 1: STOL in repair from August 13 through November 25.

FIG. 3–2

3. NUMBER OF EFFECTS PER MISSION RATIO (HELICOPTER)

1970	NUMBER OF MISSIONS	NUMBER OF EFFECTS*	RATIO
JUNE	58	30	.51
JULY	36	22	.61
AUGUST	35	23	.65
SEPTEMBER	45	16	.35
OCTOBER	54	31	.57
NOVEMBER	25	14	.56
DECEMBER	34	4	.11
S' TOTAL	287	140	.48
1971			
JANUARY	15	65	4.33
FEBRUARY	34	19	.55
MARCH	50	47	.94
APRIL	52	12	.23
MAY 1-14	26	27	1.03
S'TOTAL	177	170	.96
TOTALS	464	310	.66

*INCLUDES DISCOVERIES, RECOVERIES, ABANDONED VEHICLES, DISABLED BOATS, FIRES, ARRESTS.

FIG. 3–3

FIGURE 1-21 INDICATES A STRIPPED VEHICLE. THE PHOTOGRAPH WAS TAKEN AT 500 FEET WITH A 50 MILLIMETER LENS.

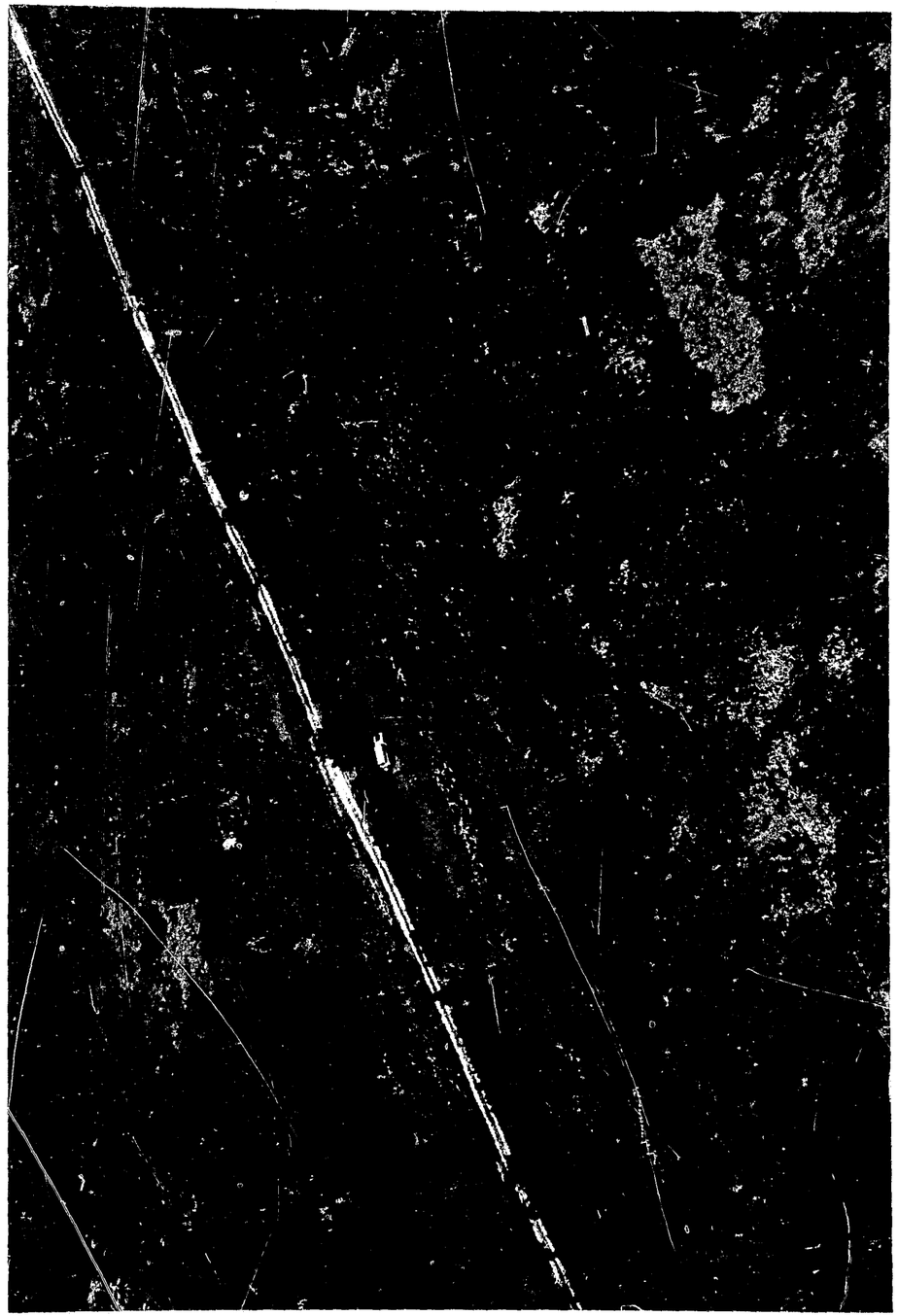


FIG. 1–21

4. NUMBER OF EFFECTS PER FLIGHT HOUR (STOL)

		EFFECTS	FLIGHT HOURS	EFFECTS PER HOUR
1970	JUNE	13	75:20	.17
	JULY	36	106:55	.34
	AUGUST	8	42:35	.18
	SEPTEMBER	DOWN	---	---
	OCTOBER	DOWN	---	---
	NOVEMBER	9	13:25*	NO EFFECTS REPORTED
	DECEMBER	7	39:30	.18
	JANUARY	19	60:16	.31
	FEBRUARY	12	53:35	.22
	MARCH	36	72:20	.49
	APRIL	14	73:10	.19
1971	MAY	4	24:40	.16

* Pirmarily aircraft recertification hours with a pilot refamiliarization program, during which time few "operational" missions were undertaken.

FIG. 3–4

5. NUMBER OF EFFECTS PER FLIGHT HOUR (HELICOPTER)

		EFFECTS	FLIGHT HOURS	EFFECTS PER HOUR
1970	JUNE	30	70:20	.43
	JULY	22	51:50	.43
	AUGUST	23	40:55	.57
	SEPTEMBER	16	78:10	.20
	OCTOBER	31	89:00	.34
	NOVEMBER	14	33:55	.42
	DECEMBER	4	43:50	.09
	JANUARY	65	21:15	3.07
	FEBRUARY	19	54:50	.34
	MARCH	47	80:15	.58
	APRIL	12	79:40	.15
1971	MAY	27	48:45	.56

FIG. 3–5

6. **COST PER EFFECT (HELICOPTER)**

Cost per Flight Hour X Number of Hours = Cost per Effect Total Number of Effects

D Direct Cost $\frac{17.32 \text{ X } 692:45}{313}$ = $38.31

Direct and Indirect Cost $\frac{\$86.24 \text{ X } 692:45}{313}$ = $190.87

7. **COST PER EFFECT (STOL)**

Cost per Flight Hour X Number of Hours = Cost Per Effect Total Number of Effects

Direct Cost $\frac{12.65 \text{ X } 617:34}{149}$ = $52.41

Direct and Indirect Cost $\frac{\$82.70 \text{ X } 617:34}{149}$ = $342.73*

* This figure does not include the $1,000 Insurance deductable which was incurred by the Dade County Public Safety Department (see page 88, STOL Damage Report).

FIG. 3–6 FIG. 3–7

POST TEST PERIOD INCIDENT

CASE 103654–P

One of the most dramatic performances of the STOL aircraft occurred after the evaluation period, but during the assimilation of this report. On Friday, July 16, 1971, a special enforcement squad requested aerial assistance for the purpose of tracking the leader of a well known burglary ring, who has been operating throughout Southeast Florida, and had succeeded in breaking and entering into several hundred residences.

On the day (Thursday) prior to the flight, an informant had given the special enforcement squad an address in a county north of Dade where the ringleader was staying. It was confirmed that evening and arrangements were made to follow subject.

At 8:00 A. M., the STOL left Opa Locka Airport and proceeded to the adjacent county where the subject's vehicle was found parked in front of his house. The STOL maintained a three thousand foot altitude, and began a wide circle over the area. At 10:00 A. M., the subject got in his car and drove south into Dade County. The subject picked up an accomplice and proceeded to the south end of Dade County. During the next 4 hours, the two subjects drove through several residential sections, taking time to pull into the driveways of approximately 50 homes, waiting anywhere from one minute to more than five minutes, then backtracking over the original route.

At 1:50 P. M., the two subjects stopped in front of an upper class residence. The ring-leader broke into the home through the front door, and the other subject drove off. At this time the STOL vectered ground units to the area. The ground units did not molest the two subjects, but went on the roof of a residence located one half a block away, and using a telephoto lens, took pictures of the two subjects loading their car. Still unaware of the surveillance, the two subjects drove north into the adjacent county and went to another residence (later determined as the locale of the "fence" for the gang's stolen goods).

At 3:30 P. M., the STOL vectered the ground units to the location where five arrests were made and where the items taken (valued at approximately $10,000) along with items from other recent breaking and enterings were recovered.

The significance of this particular case are:

1. The STOL was airborne for a total of 7-1/2 hours. (The helicopters maximum flight time would have been 2 hours).
2. The STOL maintained an altitude of 3,000 feet which would have been beyond the reasonable capabilities of the 47G2.
3. Ground surveillance would not have been successful as the probabilities of detection were too high.
4. The subjects were unaware of the STOL's presence. (They were looking for the Police Helicopter)*

The pilots stated that the long flight was exhausting, but that the results were more than worth the effort.

* This fact was established during subsequent interrogation of subjects.

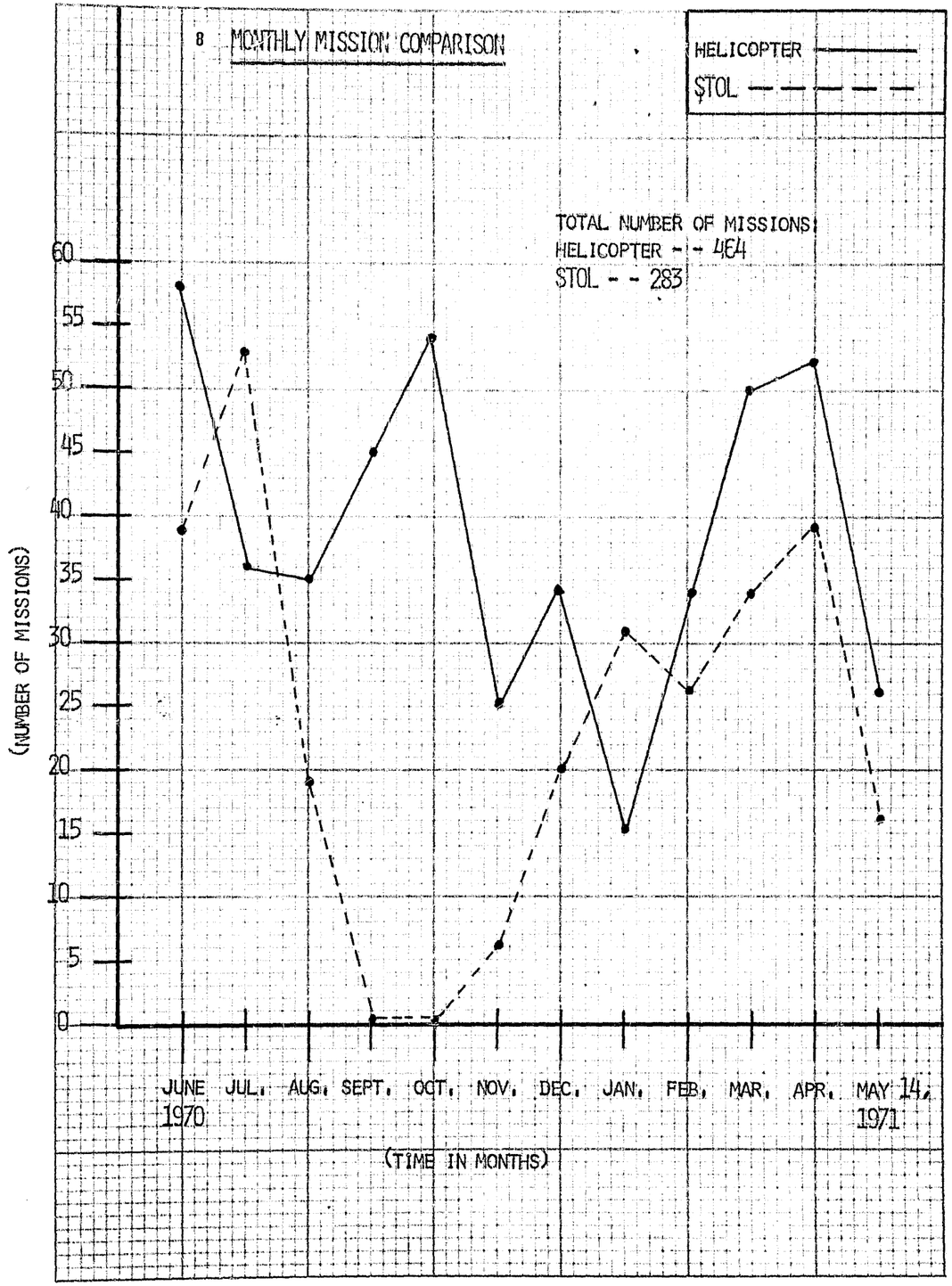

8 MONTHLY MISSION COMPARISON
HELICOPTER
STOL
TOTAL NUMBER OF MISSIONS:
HELICOPTER - - 464
STOL - - 283
(NUMBER OF MISSIONS)
60
55
50
45
40
35
30
25
20
15
10
5
0
JUNE 1970
JUL.
AUG.
SEPT.
OCT.
NOV.
DEC.
JAN.
FEB.
MAR.
APR.
MAY 14, 1971
(TIME IN MONTHS)

FIG. 3–8

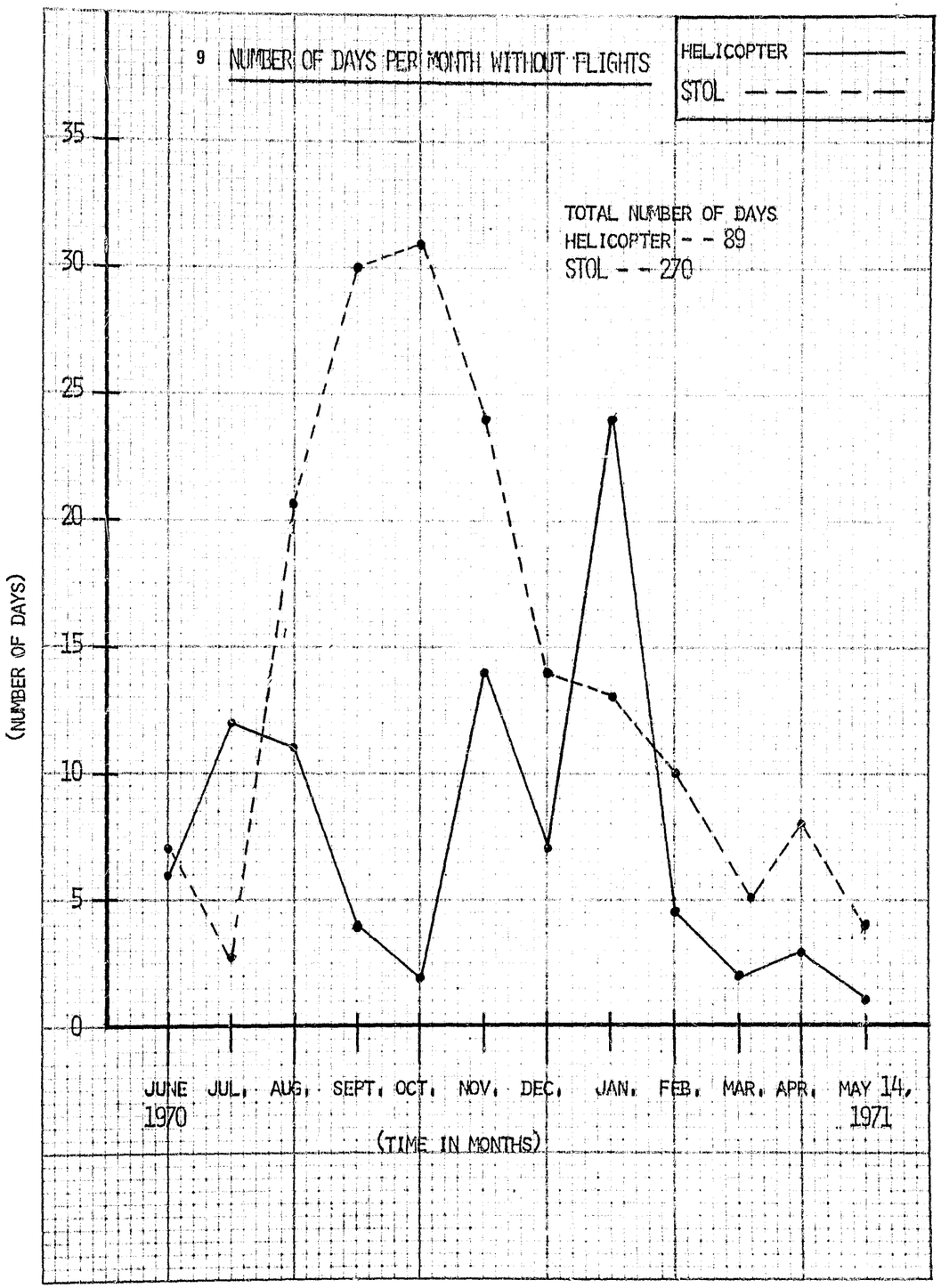

9 NUMBER OF DAYS PER MONTH WITHOUT FLIGHTS
HELICOPTER
STOL
TOTAL NUMBER OF DAYS
HELICOPTER - - 89
STOL - - 270
(NUMBER OF DAYS)
35
30
25
20
15
10
5
0
JUNE 1970
JUL.
AUG.
SEPT.
OCT.
NOV.
DEC.
JAN.
FEB.
MAR.
APR.
MAY 14, 1971
(TIME IN MONTHS)

FIG. 3–9

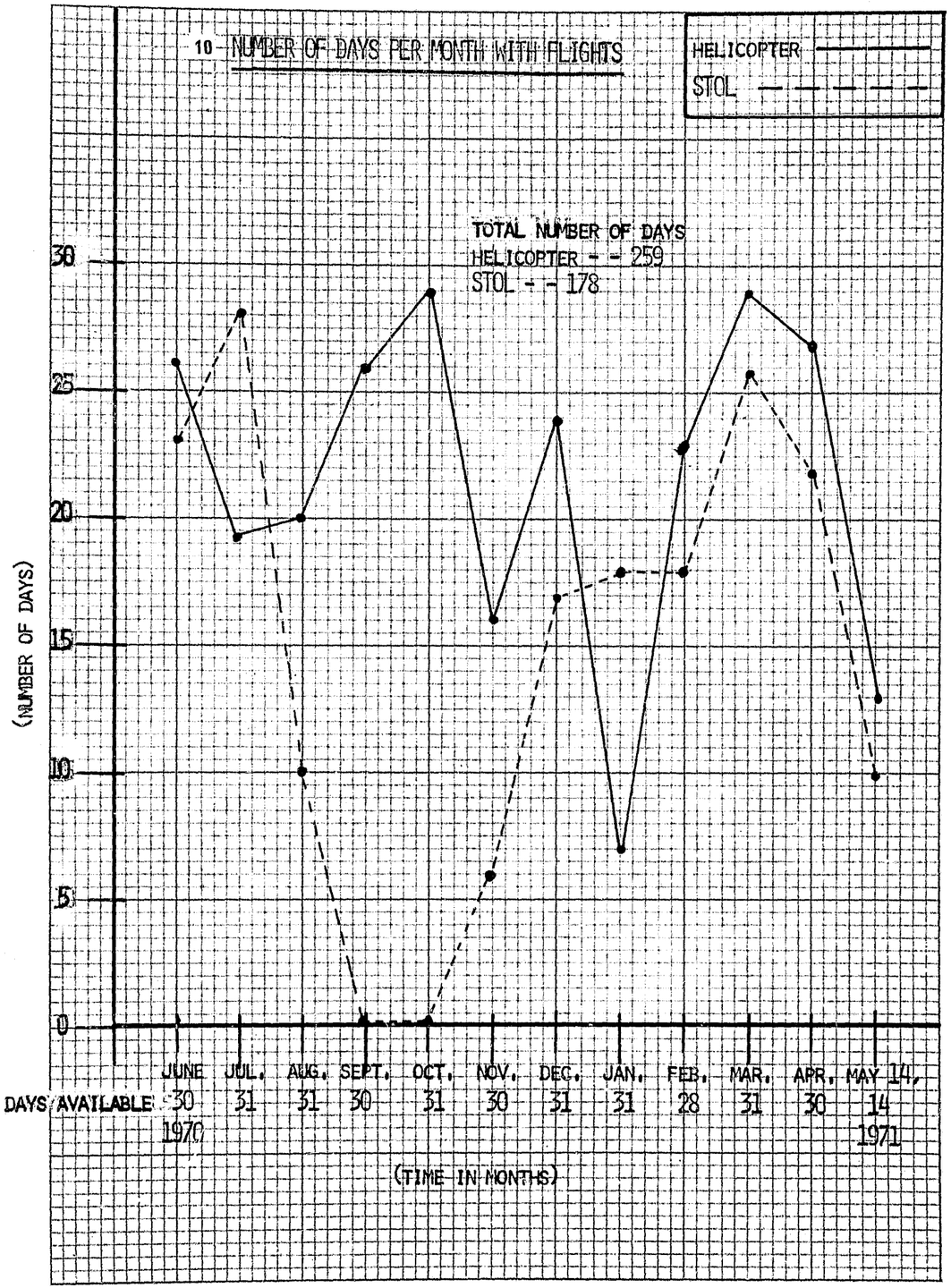

10 NUMBER OF DAYS PER MONTH WITH FLIGHTS
HELICOPTER
STOL
TOTAL NUMBER OF DAYS
HELICOPTER - - 259
STOL - - 178
(NUMBER OF DAYS)
30
25
20
15
10
5
0
JUNE JUL. AUG. SEPT. OCT. NOV. DEC. JAN. FEB. MAR. APR. MAY 14,
DAYS AVAILABLE 30 31 31 30 31 30 31 31 28 31 30 14
1970
1971
(TIME IN MONTHS)

FIG. 3–10

MONTHS	HELICOPTER	STOL
JUNE	2.23	1.70
JUL.	1.89	1.89
AUG.	1.75	1.90
SEPT.	1.73	0
OCT.	1.86	0
NOV.	1.56	1.00
DEC.	1.42	1.18
JAN.	2.14	1.72
FEB.	1.48	1.44
MAR.	1.72	1.38
APR.	1.93	1.77
MAY 14	2.00	1.60

HELICOPTER ——

STOL — — — —

11 AVERAGE NUMBER OF MISSIONS PER MONTH
(BASED ON ACTUAL DAYS FLOWN)

TOTAL MISSIONS AVERAGE
HELICOPTER - - 1.81
STOL - - 1.56

NOTE: THE DAYS FLOWN AND MISSIONS FLOWN PER DAY ARE COMPUTED INTO THE MONTHLY AVERAGE

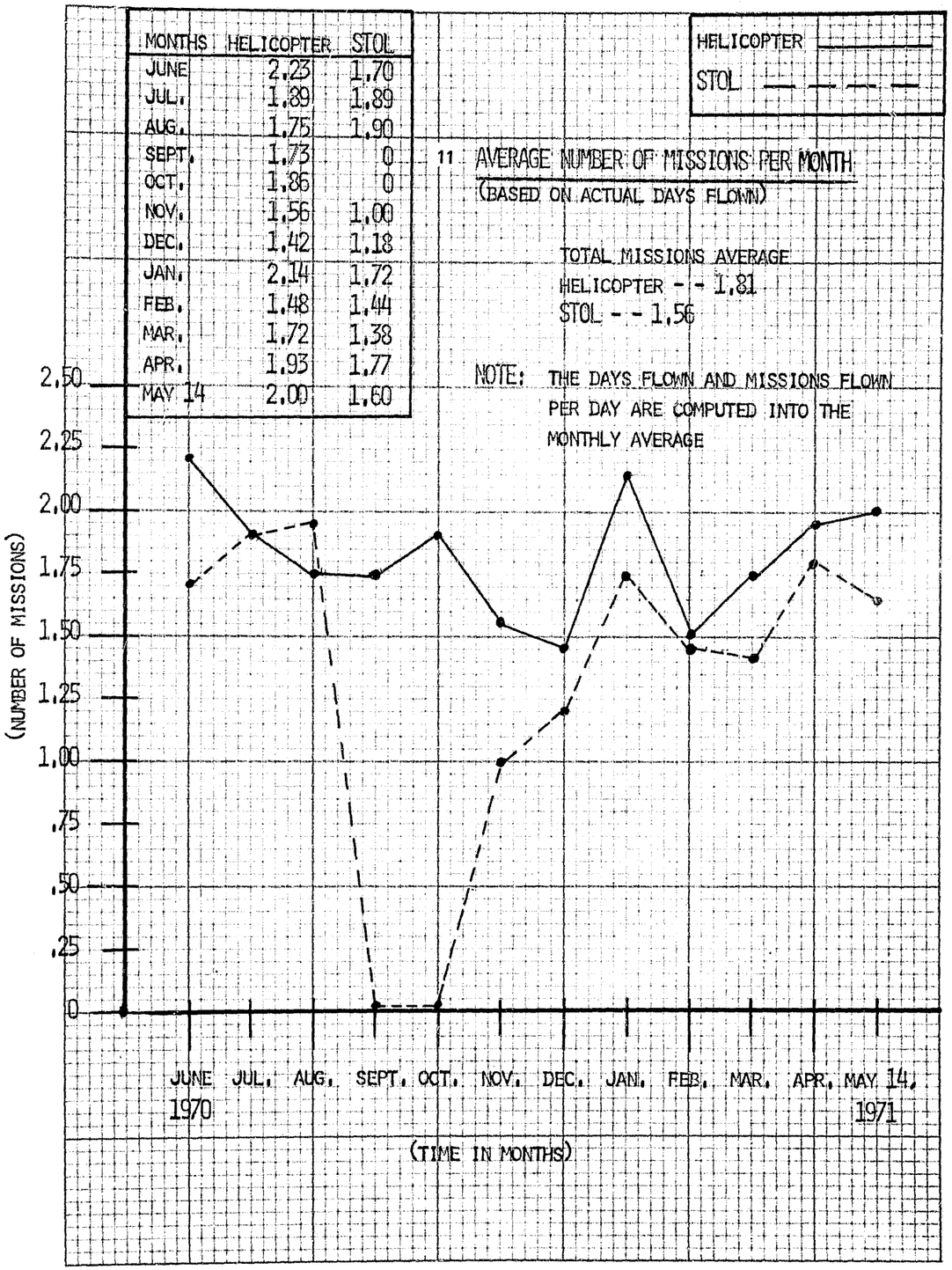


FIG. 3–11

MONTHS	HELICOPTER	STOL
JUNE	1,93	1,30
JUL.	1,16	1,71
AUG.	1,13	,61
SEPT.	1,50	0
OCT.	1,74	0
NOV.	,83	,20
DEC.	1,10	,65
JAN.	,48	1,00
FEB.	1,22	,93
MAR.	1,61	1,10
APR.	1,73	1,30
MAY 14	,84	,52

HELICOPTER ——
STOL — — — —

12 AVERAGE NUMBER OF MISSIONS PER MONTH
(BASED ON TOTAL DAYS AVAILABLE IN MONTH)

TOTAL MISSIONS AVERAGE
(BASED ON 348 DAYS)
HELICOPTER - - 1,27
STOL - - ,78

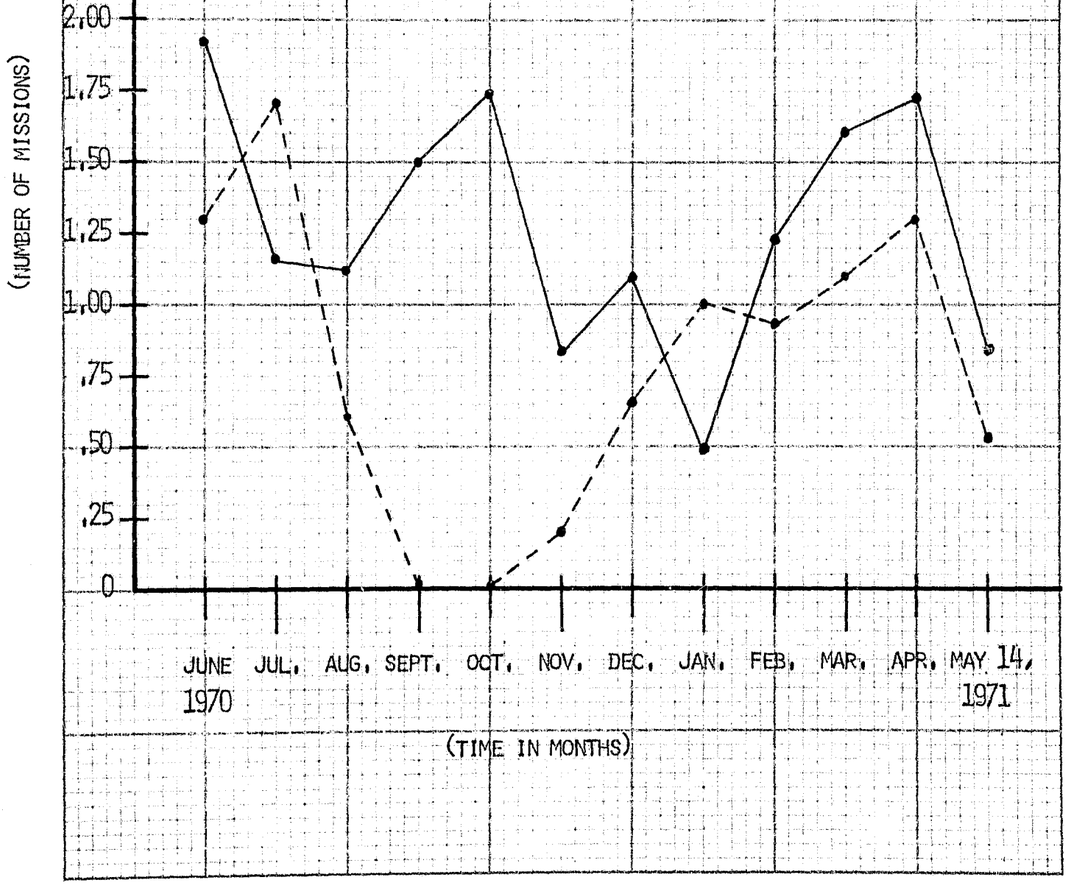


FIG. 3–12

MONTHS	HELICOTER	STOL
JUNE	2:42	3:17
JUL.	2:44	3:49
AUG.	2:03	4:16
SEPT.	3:12	0
OCT.	3:04	0
NOV.	2:07	2:14
DEC.	1:50	2:19
JAN.	3:02	3:21
FEB.	2:23	2:59
MAR.	2:46	2:47
APR.	2:57	3:20
MAY 14	3:45	2:28

HELICOPTER ——————
STOL — — — — — —

13 AVERAGE HOURS FLOWN EACH FLIGHT DAY

TOTAL HOURS AVERAGE
HELICOPTER - - 2:42
STOL - - 3:05

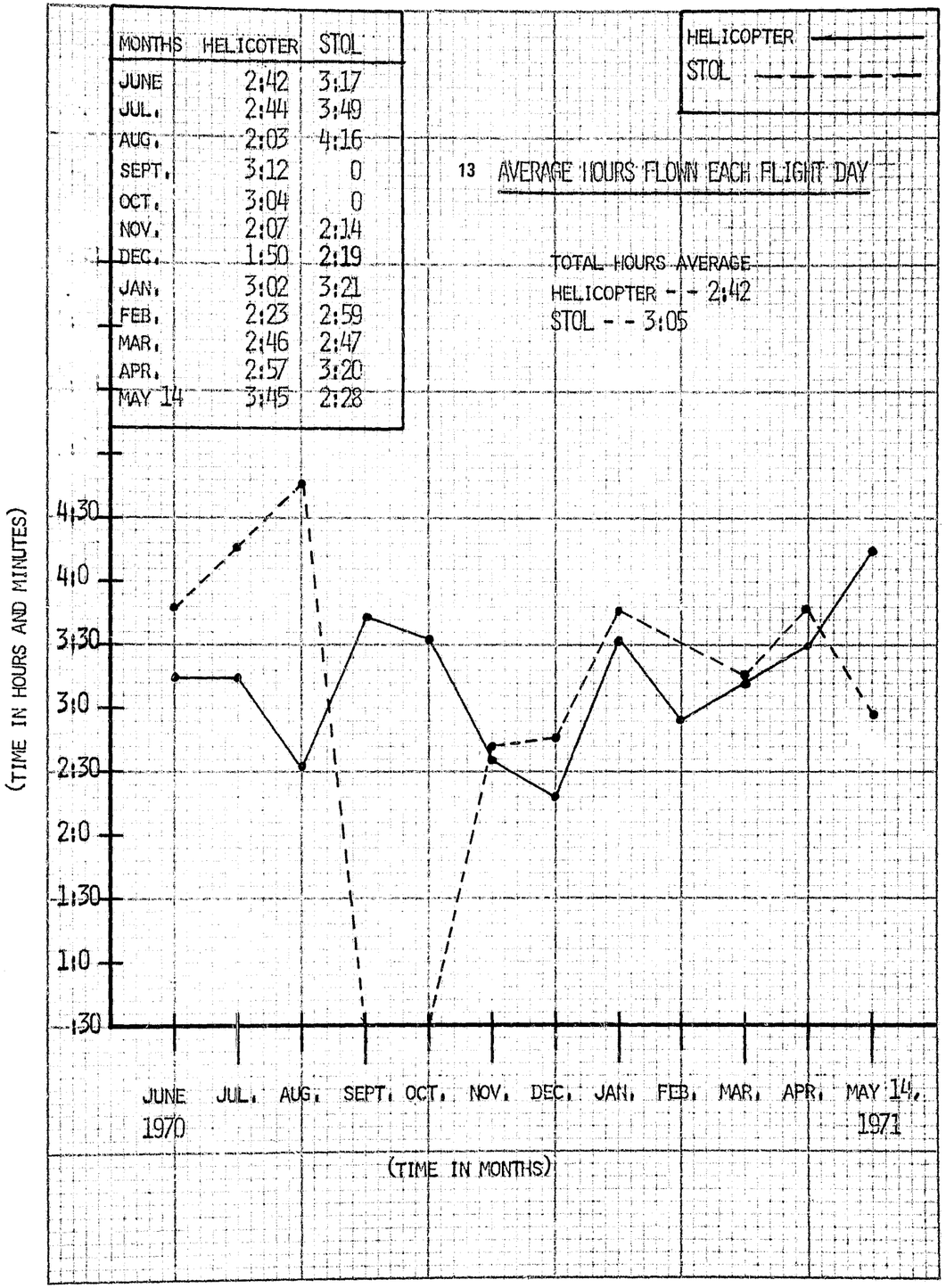


FIG. 3–13

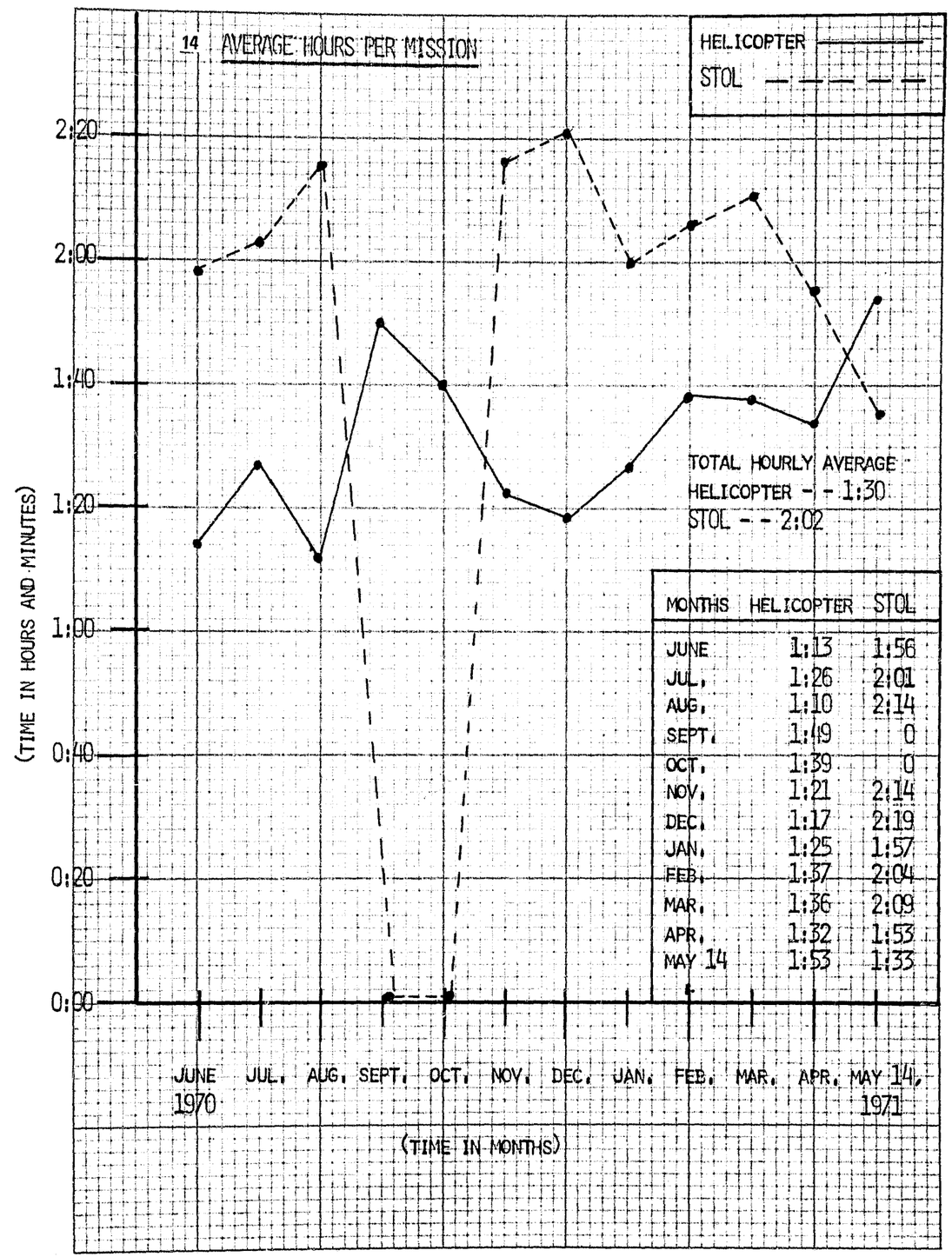

14 AVERAGE HOURS PER MISSION
HELICOPTER
STOL
2:20
2:00
1:40
1:20
1:00
0:40
0:20
0:00
(TIME IN HOURS AND MINUTES)
TOTAL HOURLY AVERAGE
HELICOPTER - - 1:30
STOL - - 2:02
MONTHS HELICOPTER STOL
JUNE 1:13 1:56
JUL. 1:26 2:01
AUG. 1:10 2:14
SEPT. 1:49 0
OCT. 1:39 0
NOV. 1:21 2:14
DEC. 1:17 2:19
JAN. 1:25 1:57
FEB. 1:37 2:04
MAR. 1:36 2:09
APR. 1:32 1:53
MAY 14 1:53 1:33
JUNE JUL. AUG. SEPT. OCT. NOV. DEC. JAN. FEB. MAR. APR. MAY 14,
1970
1971
(TIME IN MONTHS)

FIG. 3–14

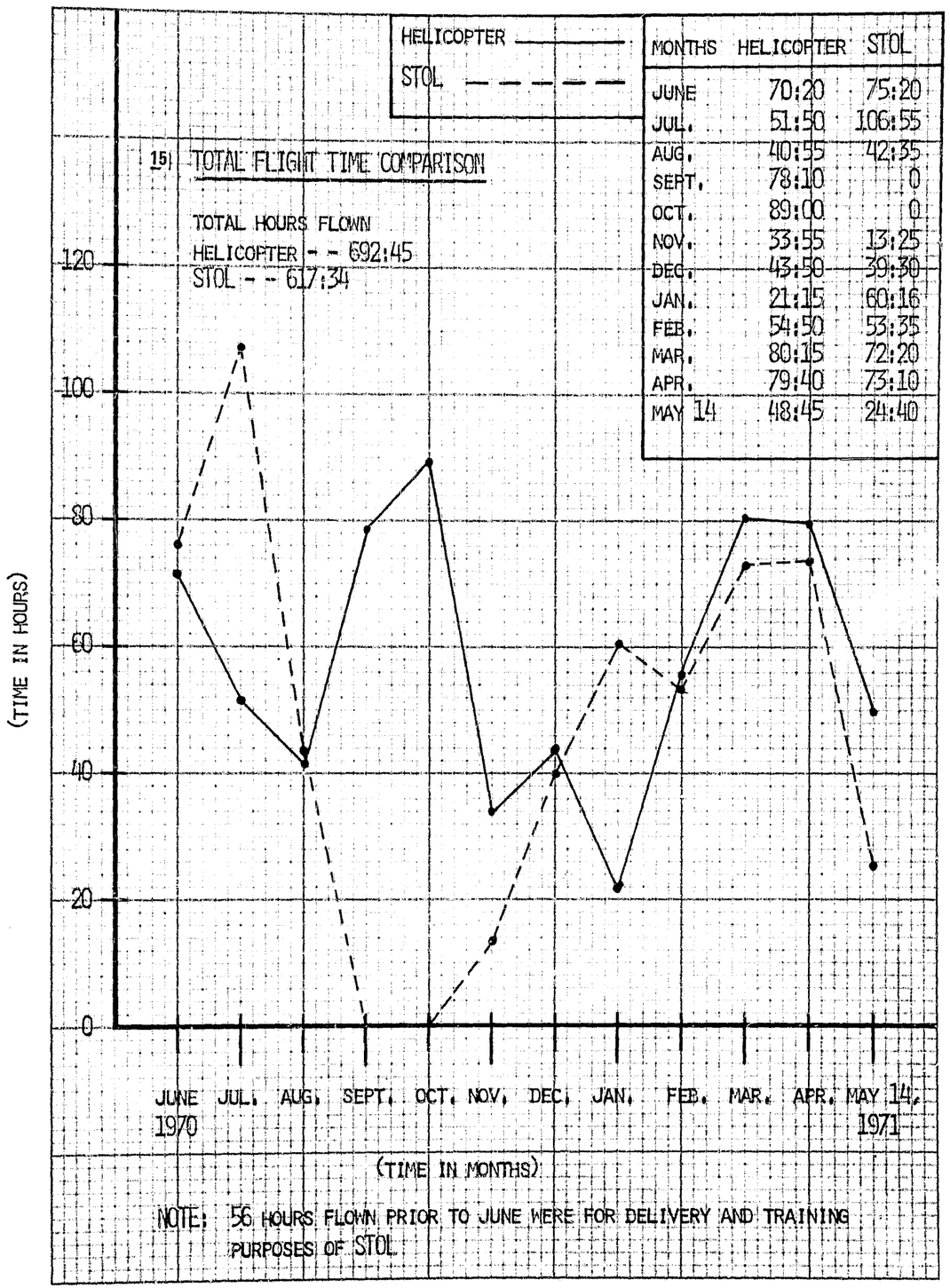

HELICOPTER
STOL
15) TOTAL FLIGHT TIME COMPARISON
TOTAL HOURS FLOWN
HELICOPTER - - 692:45
STOL - - 617:34
MONTHS HELICOPTER STOL
JUNE 70:20 75:20
JUL. 51:50 106:55
AUG. 40:55 42:35
SEPT. 78:10 0
OCT. 89:00 0
NOV. 33:55 13:25
DEC. 43:50 39:30
JAN. 21:15 60:16
FEB. 54:50 53:35
MAR. 80:15 72:20
APR. 79:40 73:10
MAY 14 48:45 24:40
(TIME IN HOURS)
120
100
80
60
40
20
0
JUNE 1970
JUL.
AUG.
SEPT.
OCT.
NOV.
DEC.
JAN.
FEB.
MAR.
APR.
MAY 14, 1971
(TIME IN MONTHS)
NOTE: 56 HOURS FLOWN PRIOR TO JUNE WERE FOR DELIVERY AND TRAINING PURPOSES OF STOL

FIG. 3–15

PART IV

SUMMARY AND APPENDIXES

1. SUMMARY

Under the auspicies of the United States Department of Justice, Office of Law Enforcement Assistance Administration, (LEAA), the Dade County Public Safety Department conducted a one year evaluation of the Helio Super Courier, Model H-295 Short Takeoff and Landing (STOL) Aircraft. The primary purpose of this evaluation was to determine the relative capabilities of using a STOL type aircraft in a police oriented environment.

The methodology of the evaluation was to use the known performance characteristics of a Bell Helicopter, Model 47G2, which the Dade County Public Safety Department has been utilizing for the previous 11 years. Consultants of Cornell Aeronautical Laboratory, Inc. (CAL) prepared Phase I of the STOL evaluation under LEAA Grants No. NI-70-006 and NI-71-038. The Phase I evaluation surveyed the current use of helicopters in police air mobility and set forth the guidelines for making a comparative analysis using the helicopter as a control vehicle.

The primary constraint of utilizing the STOL aircraft in helicopter designed mission was the Federal Aviation Regulation, Paragraph 91.796 "Minimum safe altitudes over congested areas" which limits the STOL to a minimum altitude of 1,000 feet. Practical aerial safety dominates the STOL as well as the helicopter, i.e., in a densely congested area, the helicopter will maintain enough altitude (400-600 feet) so that a safe autorotational landing can be initiated. Even though this constraint is specifically written for fixed wing aircraft, helicopters, from the practical aspect are also controlled by the unwritten or

self-initiated safety rules.

The flight characteristics of the Helio Courier STOL in comparison with other fixed wing aircraft does offer distinct advantages in the area of slow speed flying. The wing design which includes the use of leading edge slats, large flaps and interceptors, coupled with a fully movable horizontal tail surface, offers a high lift capability and exceptional degree of control in the slow speed configuration. Effective use of the Night Sun Search Lamp is directly related to the aforementioned flight characteristics of the STOL aircraft. The short landing ability enhances aerial safety, as the STOL can safely be put down in areas where other fixed wing aircraft could not land.

The geographical location of Dade County is conducive to the utilization of the STOL aircraft. Wide area patrols require extended flight time coupled with the ability to respond at the greatest speed. A mission that could have only been successfully accomplished by the STOL, occurred after the one year test period and during the assimilation of this report (see pages 128-130). The STOL was called upon to track the leader of a burglary ring who had been operating throughout southeast Florida and had succeeded in breaking and entering into several hundred residences.

The Significance of this particular case is:

A. The STOL was airborne, continously for 7½ hours, which precluded the use

of the helicopter with its approximate two hour flight time.

B. The subjects admitted during subsequent interrogation that they were looking for the police helicopter and would have aborted their plans if it were observed.

Other areas of consideration in which the STOL has proven to be an effective tool, have been in the tragic situations of civil distrubances. Utilizing the STOL as an aerial command post, and flying in both day and night operations precluded the necessity of having to saturate the disturbance area with ground forces. The STOL's ability for long duration flights and the effective utilization of the Night Sun Search Lamp also avoided random contact by ground forces with the disidents.

The STOL can routinely investigate large areas and generally provide a better aerial coverage than the helicopter. This can again be attributed to the STOL's speed and endurance capabilities. Documented records reveal that light aircraft have been, during recent periods, illegally transporting narcotics into South Florida from Latin American countries and either airdropping the contraband and/or landing their craft in deserted or camouflaged airstrips. Also case reports document the sighting of large cultivated mariuana fields in these desolate areas.

During the STOL evaluation testing period, an aerial grove patrol was instituted. A review of records indicates that theft and vandalism of farm products and equipment have been

significantly reduced due to this type of patrol. In large geographic areas of patrol, consideration should be given to the use of the STOL over the helicopter.

As the helicopter is limited in its flight time (two hours and 20 minutes maximum), consideration must be given to its base of operations (usually must be based in close proximity of the problem area). However, the STOL aircraft, because of its speed and flight duration capabilities (10-12 hours versus 2:20 minutes), can be based in any vicinity applicable to every day problematical, routine and planned missions.

In previous police oriented air mobility studies, particularly those evolving from the use of helicopters, a problematic decisiveness exists as to whether there should be an observer in the aircraft, and if so, should the observer be a pilot. In the majority of all missions flown by either the helicopter or STOL, it is recommended that the observer be a pilot. This determination is predicated upon many factors as each aircraft has unique requirements. Common to both aircraft is basic aerial safety, and two pilots do promote the safety aspects. The aforementioned 7½ hour mission performed by the STOL, would not have been practical without two pilots as fatigue entered as a dominating factor. As there are many restricted and precautionary flight areas in Dade County, the observer has to be able to immediately recognize any danger from other aircraft. Night operations with concentrated usage of the Night Sun Search Lamp and performing a series of 360 turns, enhances the possibility of vertigo. This phenomenon is decreased through the utilization of two pilots.

The direct operating cost of the STOL ($12.65 per hour) is less expensive then that of the helicopter ($17.32 per hour). Consideration should be given to some basic factors which lend themselves to having an effect on the total operating cost of each aircraft.

A. Both aircraft carry liability insurance, but the cost of the STOL's is more due to the method of rating (i.e., six seat capacity for the STOL and two for the helicopter).

B. The residual value for the STOL is estimated at approximately 50 percent and the helicopter at 30 percent, both at the end of five years.

The total operational cost of the STOL is in line with the operational cost of light helicopters.

The effectiveness of the STOL aircraft was measured during the evaluation and it was found to be consistent to the performance record of the helicopter. A factor which gives the STOL an advantage in the crime detection and apprehension missions, is the reality that the criminal element does not presently associate, with the police, a fixed wing aircraft flying at higher than normal (helicopter altitudes) patrol altitudes. The helicopter does promote the omnipresent projection by both sight and sound, either by day or night operations. A basic hypothesis would be the omnipresent projection of using the STOL aircraft at night, in conjunction with the Night Sun Search Lamp, wherein, the criminal element would be aware of possible detection. It is not paradoxical to assume that the

STOL can perform covert missions during daylight hours, and until, if ever, the criminal element can recognize this fact, the STOL will offer a true advantage over the helicopter.

Considering that other large metropolitan police departments throughout the United States use helicopters, the addition of a STOL aircraft could add a supplementary alternative to their air mobility capabilities. The determination of using either a helicopter or STOL , or both, should be based upon the geographical locations, mission pre-determination, and the availability of supplemental units. Other considerations are:

A. The direct operational costs which are perhaps not significantly different to determine which is more practical.

B. The STOL's capabilities of high speed and slow speed under controlled conditions, i.e., can perform long missions, up to 10 - 12 hours.

C. The STOL had disadvantages in some instances of being restricted to the 1,000 foot minimum altitude.

D. The helicopter is basically unrestricted to low altitudes, however, it can hover, and can usually land on target or in close proximity of the problem area.

It is hoped that his report has in some measure contributed to the resolution of certain questions regarding police air mobility. It is suggested that the STOL project reflects only one area of law enforcement operations where historical dogma need not form an uncompromising limitation on improvement.

CONTINUED

3 OF 3

APPENDIX A

MONTHLY ACTIVITY REPORTS

STOL

AND

HELICOPTER

The following monthly activity reports for the STOL and helicopter represents all the activities performed by the respective aircraft during the Evaluation period. It should be noted that STOL was down during the months of September and October, therefore no activites were reported. Some of the major items of consideration are shown graphically in the mission performance chapter.

STOL – June 1970

Number of Flight Mission	39
Total Flight Time	75:20
Number of Days With Flights	23
Number of Days Without Flights	7
Flight Time – Days	61:05
Flight Time – Nights	14:15
Number of Day Missions	33
Number of Night Missions	6

MISSION TYPES	NUMBER MISSIONS	TOTAL
Disorders/Riots	8	15:20
Maintenance	1	:20
Search	2	4:55
Routine Patrol	27	53:30
Assists (All)	2	1:15

TOTAL DISTRICTS PATROLLED

North	24
Central	22
South	17
West	15
Marine	7
Grove Patrol	2

TOTAL DISTRICTS ASSISTED

North	4
Central	39
South	6
West	2

ASSIST PSD BUREAUS, SECTIONS & UNITS

Vice	1
Auto Theft	1
Uniform Car	81
Robbery	2

ASSIST OUTSIDE AGENCIES

Florida Highway Patrol	2
Dade County Schools	1

ASSIST TO MUNICIPALITIES

Miami	1

EFFECTS	FELONIES	MISDEMEANORS
Total Arrests	2	
Robberies	2	

RECOVERIES

Stolen Vehicles	4
Other Vehicles (boat)	1

DISCOVERIES

Routine Checks	4

Total Number of Non-Police Aviation Section Observers - 19

STOL – July 1970

Number of Flight Missions	53
Total Flight Time	106:55
Number of Days With Flights	28
Number of Days Without Flights	3
Flight Time – Days	63:40
Flight Time –Nights	43:15
Number of Day Missions	30
Number of Night Missions	23

MISSION TYPES	NUMBER MISSIONS	TOTAL
Disorder/Riots	1	1:50
Photo	1	1:30
Search	5	8:25
Routine Patrol	47	92:20
Selective Enforcement (Robbery)	1	2:50

TOTAL DISTRICTS PATROLLED		TOTAL DISTRICTS ASSISTED	
North	40	North	13
Central	41	Central	13
South	45	South	9
West	40	West	1
Marine	29	Marine	2

ASSIST PSD BUREAUS, SECTIONS & UNITS		ASSIST OUTSIDE AGENCIES	
Auto Theft	1	Florida Highway Patrol	1
Crime Lab	1	Coast Guard	1
Detective Bureau	1		
Fire Department	1		
Marine Patrol	2		
Homicide	1		
Uniform Car	47		
Robbery	7		

EFFECTS		FELONIES	MISDEMEANORS
Total Arrests	5		4
Robberies	8		
Burglaries	3	1	
Homicide	2		

RECOVERIES		DISCORVERIES	
Stolen Vehicles	7	Abandoned Vehicles	6
Other Vehicles (boat)	1	Routine Checks	2
		Drownings	1

Total Number of Non-Police Aviation Sections Observers - 20

STOL – August 1970

Number of Flight Missions	19
Total Flight Time	42:35
Number of Days With Flights	10
Number of Days Without Flights	21
Flight Time –Days	24:00
Flight Time –Nights	18:35
Number of Day Missions	11
Number of Night Missions	8

MISSION TYPES	NUMBER MISSIONS	TOTAL
Search	7	16:10
Surveillance	1	1:40
Routine Patrol	8	16:30
Criminal Acitivity	1	3:45
Selective Enforcement (Robbery)	2	4:30

TOTAL DISTRICTS PATROLLED		TOTAL DISTRICTS ASSISTED	
North	10	Central	4
Central	10	South	4
Airport	3		

ASSIST PSD BUREAUS, SECTIONS & UNITS

Auto Theft	1
Detective Bureau	3
Uniform Car	7
Robbery	4

EFFECTS	FELONIES	MISDEMEANORS
Total Arrests	4	
Robberies	3	
Burglaries	1	

Total Number of Non-Aviation Section Observers - 15

STOL – November 1970

Number of Flight Missions	6
Total Flight Time	13:25
Number of Days With Flights	6
Number of Days Without Flights	24
Flight Time –Days	13:25
Flight Time – Nights	––
Number of Day Missions	6
Number of Night Missions	––

MISSION TYPES	NUMBER MISSIONS	TOTAL
Routine Patrol	2	4:30
Training	4	8:55

TOTAL DISTRICTS PATROLLED

North	2
Central	3
South	5
West	3

Total Number of Non-Police Aviation Section Observers - 4

STOL – December 1970

Number of Flight Missions	20
Total Flight Time	39:30
Number Days of With Flights	17
Number Day of Without Flights	14
Flight Time –Days	29:40
Flight Time – Nights	9:50
Number of Day Missions	16
Number of Night Missions	4

MISSION TYPES	NUMBER MISSIONS	TOTAL
Disorder/Riots	1	1:00
Photo	2	2:05
Training	1	2:10
Search	1	2:45
Surveillance	3	6:40
Routine Patrol	11	22:20
Selective Enforcement (Robbery)	1	2:30

TOTAL DISTRICTS PATROLLED		TOTAL DISTRICTS ASSISTED	
North	14	North	4
Central	12	South	4
South	12	Marine	1
West	11		
Marine	3		

ASSIST PSD BUREAUS, SECTIONS & UNITS		RECOVERIES	
Crime Lab	2	Stolen Vehicles	1
Organized Crime Bureau	4		
Uniform Car	7		
Robbery	1		

EFFECTS	FELONIES	MISDEMEANORS
Total Arrests	3	
Robberies	2	
Burglaries	1	

Total Number of Non-Police Aviation Observers - 1

STOL – January 1971

Number of Flight Missions	31
Total Flight Time	60:16
Number of Days With Flights	18
Number of Days Without Flights	10
Flight Time – Days	60:06
Flight Time – Nights	:10
Number of Day Missions	29
Number of Night Missions	2

MISSION TYPES	NUMBER MISSIONS	TOTAL TIME
Surveillances	4	10:15
Maintenance	1	2:00
Photo	1	:30
Routine Patrol	20	40:47
Searches	4	5:19
Training	1	1:05
Public Relations	1	:20

DISTRICTS PATROLLED	
North	16
Central	12
Airport	5
South	15
West	12
Marine	10

DISTRICTS ASSISTED	
North	8
South	4
West	1
Marine	1

ASSIST PSD BUREAUS, SECTIONS & UNITS	
Crime Lab	1
Fire Department	6
Organized Crime Bureau	1

ASSIST OUTSIDE AGENCIES	
Florida Conservation	1

EFFECTS	FELONIES	MISDEMEANORS
Total Arrests		
Burglary	1	

RECOVERIES

Stolen Vehicles	1
Missing Person & Airboat	1

DISCOVERIES

Abandoned Vehicles	5
Suspicious Circumstances	4
Disabled Boat	1
Stolen Vehicles	1
Fires	3
Routine Checks	1
Other (Marijuna Fields)	1

Number of Non-Police
Aviation Observers - 11

STOL – February 1971

Number of Flight Missions	26
Total Flight Time	53:35
Number of Days With Flights	18
Number of Days Without Flights	10
Flight Time – Days	34:35
Flight Time – Nights	19:00
Number of Day Missions	15
Number of Night Missions	11

MISSION TYPES	NUMBER MISSIONS	TOTAL TIME
Surveillances	3	4:35
Maintenance	1	---
Photo	1	1:05
Patrol	15	39:25
Searches	5	8:40

DISTRICTS PATROLLED

North	16
Central	14
Airport	5
South	16
West	9
Marine	6

DISTRICTS ASSISTED

North	1
Central	2
South	3
West	1
Marine	2

ASSIST PSD BUREAUS, SECTIONS & UNITS

Crime Lab	1
Organized Crime Bureau	1

ASSIST OUTSIDE AGENCIES

F. A. A.	1

ASSIST TO MUNICIPALITIES

Hialeah Gardens	1
South Miami	1

EFFECTS	FELONIES	MISDEMEANORS
Total Arrests	3	
Robberies	2	
Burglaries	1	

RECOVERIES

Stolen Vehicles	5

DISCOVERIES

Routine Checks	1

Number of Non-Police Aviation Observers - 2

STOL – March 1971

Number of Flight Missions	34
Total Flight Time	72:20
Number of Days With Flights	26
Number of Days Without Flights	5
Flight Time – Days	44:20
Flight Time – Nights	28:00
Number of Day Missions	22
Number of Night Missions	12

MISSION TYPES	NUMBER MISSIONS	TOTAL TIME
Maintenance	1	1:00
Photo	3	4:05
Patrol	19	47:20
Selective Enforcement	1	:35
Searches	8	15:55
Surveillances	1	1:15
Training	1	2:00

TOTAL DISTRICTS PATROLLED	
North	19
Central	13
South	18
West	18
Marine	11

TOTAL DISTRICTS ASSISTED	
North	5
Central	4
South	5
West	3
Marine	2

ASSIST PSD BUREAUS, SECTIONS & UNITS	
Auto Theft	2
Detective Bureau	1
Fire Department	1
Homicide	1
Marine Patrol	3
Organized Crime Bureau	1
Uniform Car	54

ASSIST OUTSIDE AGENCIES	
State Beverage Comm.	2

ASSIST MUNICIPALITIES	
Opa Locka	1
Miami	1

EFFECTS		FELONIES	MISDEMEANORS
Total Arrests	26		
burglaries	3		

RECOVERIES

Stolen Vehicles	2

DISCOVERIES

Routine Checks	5

Total Number of Non-Police Aviation Section Observers - 5

STOL – April 1971

Number of Flight Missions	39
Total Flight Time	73:10
Number of Days With Flights	22
Number of Days Without Flights	8
Flight Time – Days	31:25
Flight Time – Nights	41:45
Number of Day Missions	18
Number of Night Missions	21

MISSION TYPES	MISSION NUMBERS	TOTAL
Administrative	1	1:15
Search	4	6:10
Routine Patrol	32	61:55
Pilot Training	9	3:10
Surveillance	2	1:50
Grove Patrol	2	2:00

TOTAL DISTRICTS PATROLLED

North	30
Central	24
South	26
West	10
Marine	11

TOTAL DISTRICTS ASSISTED

North	2
Central	5
South	6
Marine	1

ASSIST PSD BUREAUS, SECTION & UNITS

Auto Theft	1
Fire Department	0
Marine Patrol	0
Uniform Car	18
Robbery	4
Burglary	2
Detective Bureau	5

ASSIST OUTSIDE AGENCIES

US Customs	1
Dade County Parks	1

EFFECTS		FELONIES	MISDEMEANORS
Arrests		2	0
Robberies	4		
Burglaries	2		

RECOVERIES

Stolen Vehicle	1

DISCOVERIES

Routine Checks	1
Verbal Warning	1
Other (Narcotic)	3

Total Number of Non-Police Aviation Section Observers - 9

STOL

May 1, through May 14, 1971

Number of Flight Missions	16
Total Flight Time	24:40
Number of Days With Flights	10
Number of Days Without Flights	4
Flight Time – Days	21:40
Flight Time – Nights	3:00
Number of Day Missions	14
Number of Night Missions	2

MISSION TYPES	MISSION NUMBERS	TOTAL
Administrative	1	1:20
Photo	1	1:00
Patrol	11	19:10
Assist (All)	2	1:55

TOTAL DISTRICTS PATROLLED

North	10
Central	10
South	10
West	8
Marine	6

TOTAL DISTRICTS ASSISTED

Central	1
South	2
Marine	1

ASSIST PSD BUREAUS, SECTIONS & UNITS

Fire Department	1

ASSIST OUTSIDE AGENCIES

Coast Guard	1
Traffic & Eng.	1
State Beverage Dept.	1

ASSIST MUNICIPALITIES

Hialeah	1

EFFECTS	FELONIES	MISDEMEANORS
Robberies (Hi-Jacks)	1	
Burglaries	2	

RECOVERIES

DISCOVERIES

Routine Checks	1

Total Number of Non-Police Aviation Section Observers - 5

HELICOPTER – JUNE 1970

Number of Flight Missions	58
Total Flight Time	70:20
Number of Days With Flights	26
Number of Days Without Flights	4
Flight Time – Days	57:55
Flight Time – Nights	12:25
Number of Day Missions	51
Number of Night Missions	7

MISSION TYPES	MISSION NUMBER	TOTAL
Disorders/Riots	9	14:35
Administrative	3	1:25
Photo	9	6:55
Maintenance	7	1:45
Training	1	1:05
Community Relations	1	1:30
Search	1	1:55
Routine Patrol	20	36:25
Assists (All)	7	4:45

TOTAL DISTRICTS PATROLLED

North	18
Central	31
South	11
West	10
Marine	9

TOTAL DISTRICTS ASSISTED

North	2
Central	1
South	2
Marine	1

ASSIST PSD BUREAUS, SECTIONS & UNITS

Auto Theft	6
Fire Department	11
Marine Patrol	2
Uniform Car	12
Robbery	1

ASSIST OUTSIDE AGENCIES

Traffic & Engineering	1
FAA	1

ASSIST TO MUNICIPALITIES

Miami	1
North Bay Village	1

EFFECTS		FELONIES	MISDEMEANORS
Total Arrests	2		
Robberies	2		
RECOVERIES			
Stolen Vehicles	12		
DISCOVERIES			
Routine Checks	13		
Drowning	1		
Verbla Warning	1		
Other (Narcotics)	1		

Total Number of Non-Police Aviation Observers - 11

HELICOPTER – JULY 1970

Number of Flight Missions	36
Total Flight Time	51:50
Number of Days With Flights	19
Number of Days Without Flights	12
Flight Time – Days	27:20
Flight Time – Nights	24:30
Number of Day Missions	20
Number of Night Missions	16

MISSION TYPES	NUMBER MISSIONS	TOTAL
Photo	6	5:55
Training	1	:40
Community Relations	1	:20
Search	1	1:00
Routine Patrol	23	39:45
Selective Enforcement (Robbery)	2	3:05
Assists (All)	2	1:05

TOTAL DISTRICTS PATROLLED

North	15
Central	17
South	8
West	8
Marine	3

TOTAL DISTRICTS ASSISTED

North	9
Central	2
South	3
Marine	2

ASSIST TO MUNICIPALITIES

Miami
Miami Beach

ASSIST OUTSIDE AGENCIES

Pollution Control	1

ASSIST PSD BUREAUS, SECTIONS & UNITS

Crime Lab	1
Fire Department	2
Uniform Car	7

RECOVERIES

Stolen Vehicles	11
Other Vehicles (Boat)	1

DISCOVERIES

Routine Checks	5
Drowning	1

EFFECTS	FELONIES	MISDEMEANORS
Total Arrests	4	
Burglaries	1	
Narcotics	3	

Total Number of Non-Police Aviation Section Observers - 16

HELICOPTER – AUGUST 1970

Number of Flight Missions	35
Total Flight Time	40:55
Number of Days With Flights	20
Number of Days Without Flights	11
Flight Time – Days	37:00
Flight Time – Nights	3:55
Number of Day Missions	30
Number of Night Missions	5

MISSION TYPES	NUMBER MISSIONS	TOTAL
Administrative	1	:50
Photo	5	3:05
Maintenance	1	:10
Search	4	4:00
Routine Patrol	13	21:35
Surveillance	1	1:30
Selective Enforcement (Robbery)	11	9:20
Criminal Activity	1	:25

TOTAL DISTRICTS PATROLLED

North	11
Central	8
South	3
West	3
Marine	6

TOTAL DISTRICTS ASSISTED

North	1
Central	7
South	3

ASSIST TO MUNICIPALITIES

Miami	1

ASSIST TO PSD BUREAUS, SECTIONS & UNITS

Crime Lab	1
Marine Patrol	1
Uniform Car	14
Robbery	3

ASSIST TO OUTSIDE AGENCIES

Secret Service	1
Communications	2
U. S. Air Force	1

EFFECTS	FELONIES	MISDEMEANORS
Total Arrests	9	
Robberies	5	
Burglaries	4	
RECOVERIES		
Stolen Vehicles	9	
Other Vehicles (Boat)	1	
DISCOVERIES		
Routine Checks	4	

Total Number of Non-Police Aviation Section Observers - 9

HELICOPTER – SEPTEMBER 1970

Number of Flight Missions	45
Total Flight Time	78:10
Number of Days With Flights	26
Number of Days Without Flights	4
Flight Time – Days	44:55
Flight Time – Nights	33:15
Number of Day Missions	30
Number of Night Missions	15

MISSION TYPES	NUMBER MISSIONS	TOTAL
Disorder/Riots	1	:55
Photo	5	5:05
Maintenance	3	2:00
Search	3	2:30
Routine Patrol	6	17:15
Selective Enforcement (Robbery)	24	46:35
Assists (All)	2	1:20
Criminal Activity	2	2:35

TOTAL DISTRICTS PATROLLED	
North	9
Central	30
South	5
Marine	6

TOTAL DISTRICTS ASSISTED	
North	2
Central	14
South	2

ASSIST PSD BUREAUS, SECTIONS & UNITS	
Auto Theft	1
Crime Lab	1
Uniform Car	18
Robbery	7

ASSIST OUTSIDE AGENCIES	
Florida Highway Patrol	1

ASSIST TO MUNICIPALITIES	
Opa Locka	1

EFFECTS	FELONIES	MISDEMEANORS
Total Arrests	10	
Robberies	3	
Burglaries	3	
Vandalism	4	

RECOVERIES		
Stolen Vehicles	5	5
Other Vehicles (Boat)	1	

Total Number of Non-Police Aviation Section Observers - 6

HELICOPTER – OCTOBER 1970

Number of Flight Missions	54
Total Flight Time	89:00
Number of Days With Flights	29
Number of Days Without Flights	2
Flight Time – Days	52:50
Flight Time – Nights	36:10
Number of Day Missions	36
Number of Night Missions	18

MISSION TYPES	NUMBER MISSIONS	TOTAL
Disorders/Riots	1	:35
Administrative	1	:25
Photo	4	4:45
Maintenance	2	:55
Community Relations	1	:15
Search	7	12:25
Surveillance	3	4:00
Routine Patrol	1	2:05
Criminal Activity	1	2:00
Selective Enforcement (Robbery)	33	61:35

TOTAL DISTRICTS PATROLLED

North	9
Central	34
Airport	1
South	1
West	1
Marine	1

TOTAL DISTRICTS ASSISTED

North	3
Central	13
South	1
West	4
Marine	1

ASSIST PSD BUREAUS, SECTIONS & UNITS

Vice	1
Crime Lab	3
Marine Patrol	1
Organized Crime Bureau	2
Uniform Car	79
Robbery	5

ASSIST OUTSIDE AGENCIES

Florida Highway Patrol	1
Dade County Parks	2
Secret Service	1
Traffic & Engineering	1

EFFECTS	FELONIES	MISDEMEANORS
Total Arrests	14	
Robberies	11	
Burglaries	2	

RECOVERIES		DISCOVERIES	
Stolen Vehicles	8	Routine Checks	7
Other Vehicles	1	Other (Narcotics)	1

Total Number of Non-Police Aviation Section Observers - 0

HELICOPTER – NOVEMBER 1970

Number of Flight Missions	34
Total Flight Time	33:55
Number of Days With Flights	16
Number of Days Without Flights	14
Flight Time – Days	16:45
Flight Time – Nights	17:10
Number of Day Missions	15
Number of Night Missions	10

MISSION TYPES	NUMBER MISSIONS	TOTAL
Administrative	1	:30
Photo	4	7:00
Maintenance	3	1:10
Search	3	2:30
Routine Patrol	1	:35
Selective Enforcement (Robbery)	12	20:00
Assist (All)	2	2:10

TOTAL DISTRICTS PATROLLED

North	4
Central	11
South	2
Marine	1

TOTAL DISTRICTS ASSISTED

North	3
Central	8
West	1

ASSIST PSD BUREAUS, SECTIONS & UNITS

Crime Lab	5
Uniform Car	11

ASSIST OUTSIDE AGENCIES

Coast Guard	2
Traffic & Eng.	1
Public Works	1

ASSIST TO MUNICIPALITIES

Coral Gables	1

DISCOVERIES

Routine Checks	5
Drownings	3

EFFECTS	FELONIES	MISDEMEANORS
Total Arrests	6	
Burglaries	1	
Robberies	5	

Total Number of Non-Police Aviation Section Observers - 2

HELICOPTER – DECEMBER 1970

Number of Flight Missions	36
Total Flight Time	43:50
Number of Days With Flights	24
Number of Days Without Flights	7
Flight Time – Days	28:20
Flight Time – Nights	15:30
Number of Day Missions	23
Number of Night Missions	11

MISSION TYPES	NUMBER MISSIONS	TOTAL
Disorder/Riot	2	3:00
Photo	3	2:30
Maintenance	8	2:55
Community Relations	1	:45
Search	1	2:15
Routine Patrol	3	5:25
Selective Enforcement (Robbery)	16	26:50

TOTAL DISTRICTS PATROLLED

North	2
Central	15
South	2

TOTAL DISTRICTS ASSISTED

North	1
Central	3
South	1

ASSIST PSD BUREAUS, SECTIONS & UNITS

Vice	1
Crime Lab	1
Detective Bureau	1
Unifrom Car	11
Robbery	1

ASSIST OUTSIDE AGENCIES

Traffic & Eng.	1

RECOVERIES

Stolen Vehicles	2

DISCOVERIES

Stolen Vehicles	2

Total Number of Non-Police Aviation Section Observers - 0

HELICOPTER – JANUARY 1971

Number of Flight Missions	15
Total Flight Time	21:15
Number of Days With Flights	7
Number of Days Without Flights	24
Flight Time – Days	20:15
Flight Time – Nights	1:00
Number of Day Mission	14
Number of Night Mission	1

MISSION TYPES	NUMBER MISSIONS	TOTAL TIME
Robberies (Selective Enf.)	8	12:55
Maintenance	2	:35
Training	1	1:10
Photo	2	:50
Searches	1	4:25
Surveillances	1	1:20

DISTRICTS PATROLLED		DISTRICTS ASSISTED	
North	6	North	1
Central	4	Central	1
Airport	1	South	1
South	1		
West	3		
Marine	2		

ASSIST PSD BUREAUS, SECTIONS & UNITS		ASSIST OUTSIDE AGENCIES	
Crime Lab	2	Florida Highway Patrol	1
Marine Patrol	1		

ASSIST TO MUNICIPALITIES

Hialeah Gardens	1

EFFECTS	FELONIES	MISDEMEANORS
Total Arrest		60
Robberies	1	
Burglaries	1	

RECOVERIES

Stolen Vehicles 1

DISCOVERIES

Abandoned Vehicles 2

Number of Police Aviation Section Observers - 3

HELICOPTER – FEBRUARY 1971

Number of Flight Missions	34
Total Flight Time	54:50
Number of Days With Flights	23
Number of Days Without Flights	5
Flight Time –-Days	52:50
Flight Time – Nights	2:00
Number of Day Missions	33
Number of Night Missions	1

MISSION TYPES	NUMBER MISSIONS	TOTAL TIME
Administrative	3	1:05
Surveillances	1	2:00
Robbery	2	:55
Maintenance	4	3:30
Photo	6	6:35
Patrol	15	30:45
Searches	2	6:35
Selective Enforcement	2	3:35

DISTRICTS PATROLLED

North	15
Central	14
Airport	2
South	9
West	3
Marine	6

DISTRICTS ASSISTED

North	–
Central	3
Airport	1
South	4
West	–
Marine	3

ASSIST PSD BUREAUS, SECTIONS & UNITS

Auto Theft	1
Crime Lab	4
Detective Bureau	1
Fire Department	1
Marine Patrol	1
Organized Crime Bureau	1

ASSIST OUTSIDE AGENCIES

Florida Highway Patrol	1
Traffic & Eng.	1
F. A. A.	1

ASSIST TO MUNICIPALITIES

Miami	1
South MIami	1

EFFECTS	FELONIES	MISDEMEANORS
Total Arrests	4	—
Robberies	4	—

RECOVERIES	
Stolen Vehicles	5
Boat Trailer	1

DISCOVERIES	
Drowning	1
Illegal Shooting	3
Routine Checks	5

Assisted Burglaries	3

HELICOPTER – MARCH 1971

Number of Flight Missions	50
Total Flight Time	80:15
Number of Days With Flights	29
Number of Days Without Flights	2
Flight Time – Days	62:15
Flight Time – Nights	18:00
Number of Days Missions	41
Number of Days Missions	9

MISSION TYPES	NUMBER MISSIONS	TOTAL TIME
Administrative	2	1:40
Disorders/Riots	5	6:35
Maintenance	5	2:25
Photo	4	5:30
Patrol	8	31:30
Selective Enforcement	3	6:40
Searches	6	12:55
Surveillances	5	12:55
Training	2	1:45

TOTAL DISTRICTS PATROLLED

North	24
Central	20
South	5
West	5
Marine	7

TOTAL DISTRICTS ASSISTED

North	10
Central	19
South	5
West	16
Marine	9

ASSIST PSD BUREAUS, SECTIONS & UNITS

Auto Theft	2
Crime Lab	1
Detective Bureau	2
Fire Department	2
Homicide	1
Marine Patrol	4
Organized Crime Bureau	1
Uniform Car	83

ASSIST OUTSIDE AGENCIES

Secret Service	1
Traffic & Eng.	3
Florida Beverage Comm.	1

ASSIST MUNICIPALITIES

Opa Locka	5

EFFECTS	FELONIES	MISDEMEANORS
Total Arrests	1	
Burglaries	3	

RECOVERIES		DISCOVERIES	
Stolen Vehicles	1	Abandoned Vehicles	9
		Stolen Vehicles	13
		Routine Checks	21

Total Number of Non-Police Aviation Section Observers - 0

HELICOPTER – APRIL 1971

Number of Flight Missions	52
Total Flight Time	79:40
Number of Days with Flights	27
Number of Days without Flights	3
Flight Time - Days	75:35
Flight Time - Nights	4:05
Number of Day Missions	50
Number of Night Missions	2

MISSION TYPES	NUMBER MISSIONS	TOTAL TIME
Administrative	2 FAA Check Ride	1:10
Surveillances	3	7:50
Robberies	1	1:20
Maintenance	3	:30
Photo	9	6:35
Patrol	25	47:50
Selective Enforcement	2	2:05
Training (Pilot)	19	34:15
Assist (All)	4	6:15
Marine Training	2	3:30

TOTAL DISTRICTS PATROLLED

North	19
Central	27
Airport	2
South	9
West	8
Marine	18

TOTAL DISTRICTS ASSISTED

North	1
Central	4
South	5
West	3
Marine	6
Air Ambulance	1

ASSIST PSD BUREAUS, SECTIONS & UNITS

Burglaries	1	O.C.B.	1
Crime Lab	5	Robbery	1
Detective Bureau	2	Training	1
Fire Department	2	Uniform Car	41
Homicide	2	Vice	2
Marine Patrol	1		

ASSIST OUTSIDE AGENCIES

Traffic & Engineering	3
FAA	2

ASSIST MUNICIPALITIES

Miami	1
Hialeah	1

EFFECTS		FELONIES	MISDEMEANORS
Burglaries	4	4	
Narcotics	1		

RECOVERIES

Stolen Vehicle 1

DISCOVERIES

Disabled Boat 1
Routine Checks 5

Total Number of Non Police Aviation Section Observers - 4

HELICOPTER
May 1, through May 14, 1971

Number of Flight Missions	26
Total Flight Time	48:45
Number of Days With Flights	13
Number of Days Without Flights	4
Flight Time – Days	29:15
Flight Time – Nights	19:30
Number of Day Missions	16
Number of Night Missions	10

MISSION TYPES	NUMBERS MISSION	TOTAL
Assist (All)	5	5:35
Surveillances	1	2:50
Maintenance	2	:25
Patrol	16	34:45
Pilot Training	6	15:40
Community Relations	1	:30
Grove Patrol	1	

TOTAL DISTRICTS PATROLLED

North	15
Central	12
South	14
West	14
Marine	15

TOTAL DISTRICTS ASSISTED

North	2
Central	2
South	2
West	1
Marine	4

ASSIST PSD BUREAUS, SECTIONS & UNITS

Robbery	2
Auto Theft	1
Homicide	1
Fire Dept.	3
Uniform Car	11

ASSIST OUTSIDE AGENCIES

State Fire Dept.	1
Coast Guard	1
Traffic & Eng. q	1

ASSIST MUNICIPALITIES

EFFECTS	FELONIES	MISDEMEANORS
Arrest	5	
Robberies 3		
Homicide 1		

RECOVERIES		DISCOVERIES	
Stolen Vehicles	2	Routine Checks	3
Abandoned Vehicles	13	Boats Assisted	3
		Assault	1

Total Number of Non-Police Aviation Section Observers - 2

APPENDIX B

Excerpt taken from Helio Aircraft Corporation owners manual (General Description of Aircraft and Flight Operation Instructions)

APPENDIX B

EXCERPT TAKEN FROM THE DADE COUNTY PUBLIC SAFETY DEPARTMENTS' AVIATION SECTION AIRCRAFT OPERATIONAL MANUAL. HELIO AIRCRAFT CORPORATIONS OWNERS MANUAL, MODEL 295.

1. GENERAL DESCRIPTION OF AIRCRAFT

The H-295 is a high wing monoplane. The wing is fully cantilever and of all metal construction. The fuselage cabin section is a metal covered tublar structure and the aft section is an metal semi-monocoque. The tail surface are of all metal construction. Power is supplied as follows:

Model H-295

Engine - Lycoming (295 HP) GO-480G1D6

Propeller - Hartzell Constant speed 96" dia.

The Model H-295 is a six place plane. The occupants are seated in two individual adjustable front seats, two individual middle seats with two reclining positions and a two place rear seat. Entrance to the front seat is through a left door. Entrance to the two middle and rear seats is through a rear right door, the sill of which is at floor level height for easy loading and unloading. Surface control is by conventional wheel and rudder pedals. Provisions are made for wheel, rudder pedals and brakes on the right side. Toe Brakes are provided on the left side. (Brakes for the right side are optional) The flaps are actuated by a hand crank on the 1200 series and by an electric motor on the 1400 series. Longitudinal trim is by an elevator trim tab actuated by a hand crank on 1200 series and

by an electric motor on the 1400 series. The Airplane is equipped with long span slotted flaps and full span leading edge slats for high lift operation. Lateral control is obtained by short span frieze operated in conjunction with leading edge interceptors. The latte are provided for low-speed control. Pitch change is obtained with an all-moving horizontal tail. Directional control is obtained with a conventional type rudder. The engine section is composed of the engine installation, oil cooler, carburetor, ram air filter screen, oil system piping, electrical system, cowl flap system and the necessary mechanical control units. The engine section is competely enclosed by aluminum wrap-around cowls and noseend of the fuselage. The engine is suspended on the engine mount by four vibration isolators. The firewall is of stainless steel.

The main landing gear is located exceptionally far forward to reduce nose-over hazards on soft terrain, and is, in fact, located immediately ahead of the firewall. Cross-wind landing gear is optional equipment. The H-295 is completely modified for float installation except for fairings, stops and other auxilliary parts and hardware.

DESCRIPTION OF STRUCTURE

Wing Panel - The wing is a two-panel fullcantilever unit of all metal construction. Ribs are formed 2024 alclad members. The main spar consists of 2024 alclads web and 2024

extruded angle capstrips. The rear spar is 2024 alclad formed channel. The wings are attached to the fuselage through a welded steel truss.

Ailerons and Interceptors - The Ailerons are of the frieze type, of 2024 alclad diagonal rib truss structure, fabric covered. They are hinged at both ends and operated by a push-pull tube at the center. The interceptors consist of heavy aluminum alloy curved plates (inboard and forward of each alleron). They emerge from the wings in conjunction with the ailerons.

Flaps - The Flaps are of single spar all-metal construction. They are supported to the wing structure by three flap tracks and are actuated by push-pull tubes at the center and out-board tracks.

Tail Group - The Tail Group is composed of a vertical fin and rudder and an all movable horizontal surface equipped with an anti-balance and trim tab. All Tail surface are of aluminum alloy construction.

Fin - Two spar construction

Rudder - Single spar construction

Stabilator - Single spar construction

Fuselage - The forward fuselage structure is a welded steel tube truss. It is covered with an alclad sheet in the cabin section; the remaining portion is semi-monocoque. The two forward seats of welded steel tube construction are stressed for deceleration of 15 g's.

Landing Gear - The main landing gear is a heat treated steel box section. Each strut is individually sprung with an air-oil shock strut. Exceptional stroke is provided to reduce the landing load factor.

Specifications

Gross Weight - 3400 lbs. - Fuel capacity (useable) 58.2 gals.

Empty Weight (average) - 2023 lbs.

Wing span - 39 ft.

Wing chord - 72 in.

Wing Area (Slats retracted) - 231 sq. ft.

Overall length - 30 ft. 4 in.

Aileron Area (each surface) - 10.35 sq. ft.

Flap area (each surface) - 19.05 sq. ft.

Slat span (each wing) - 203.93 in.

Stabilator area - 37.50 sq. ft.

Rudder and fin area - 24.40 sq. ft.

Wheel tread - 108.00 in.

Octane rating - 100 (minimum)

Oil capacity - 12 qts. (maximum) 10 qts. (desired)

Power plant - GO-480G106

Take-off Horsepower - 295

Normal rated horse power - 280

2. FLIGHT AND OPERATING INSTRUCTIONS

Flight Controls - The H-295 incorporates flight control devices to insure safe flight at slow air speeds without detriment to highspeed flight. The cockpit controls, however, are conventional and their operation is the same as in any other fixed-wing airplane. An exceptional degree of control is obtained by the use of leading edge slats, large flaps, interceptors and a fully movable horizontal tail surface with its anti-balance tab. Each control is described in detail in the following discussions.

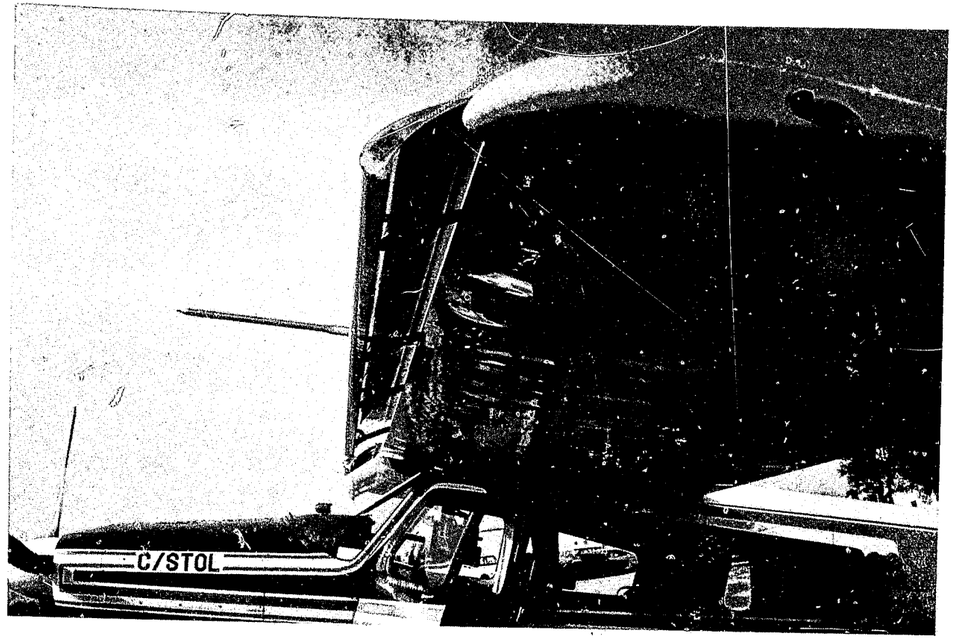
Ailerons - The ailerons are operated in a conventional manner by either of the dual control wheels. In addition to the ailerons, the control wheels actuate interceptor blades which extend through the upper surface of the wing directly behind the outboard slats. The ailerons are conventional and they provide the normal corrective forces at high speeds. The interceptors provide extremely positive lateral control at the slowest speeds obtainable. This control is so effective that it is possible to overcome the effect of full rudder in a stall by use of the aileron-interceptor control and roll into a turn in the opposite direction. The aileron-interceptor combination produces a very high rate of roll at all airspeeds.

Rudder - The rudder controls are conventional. Toe brakes are provided on the left hand pair of pedals (right side optional).

Stabilator - The horizontal tail surface, or stabilator, is a single movable surface instead of the usual elevator and horizontal stabilizer. The control operation is conventional and control feel and reaction in the cockpit are the same as in other aircraft. There are two tabs attached to the horizontal surface, a trim tab and an anti-balance tab. The right hand surface has the anti-balance tab attached to it. It is an anti-balance tab because it moves in the same direction as the surface, thus providing a force which always returns the surface to the trim position. The actuating arm and pivot point for this tab, which is mounted on the fuselage directly under the fin, should be inspected as a part of the daily pre-flight inspection. The trim tab is located on the left hand surface. It is of the conventional type with a trim tab position indicator located overhead.

Slats - The leading edge wing slats operate fully automatically based on the air-loads on them. Their use allows for the very slow speeds possible with this airplane. All slats are fully visible from the cockpit and they should normally be "open" on the final approach. If it appears that any of the four slats have stuck, it is advisable to land about 10 mph faster than the minimum landing speed. It should be noted that the lateral and directional control is so effective that through their normal use, it is possible to overcome the effects of both slats remaining closed on one side.

Flaps - Eighteen turns on the hand crank lower the flaps 40° on Aircraft equipped with manual flap control. Eighteen turns on the crank provides approximately 30° of flap. All 1400 series have electric powered flaps as a standard piece of equipment with a flap



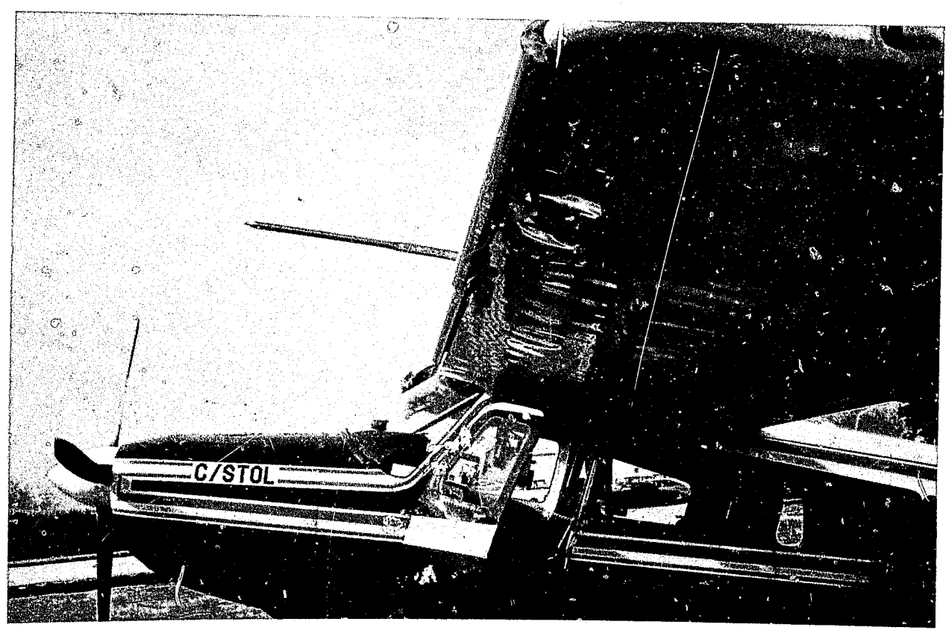


FIG. 1–12

position indication on the instrument panel.(Full flaps can be used for landing under all normal wind conditions, are performed with 20° flaps, although 30° will give a better rate of climb once the airplane is airborne and provides better take-off at higher altitudes, or with maximum gross loads).

Pre-Flight Inspection

Pull propeller through several revolutions and inspect blades for nicks and cracks.

Open Engine cowl: Check oil level and inspect fuel and oil lines for leaks. Give engine compartment a complete visual check.

Check oleo shock struts and tires for proper inflation.

Drain sediment bowl (accessible through small door under the forward window on right side fuselage). Fuel shut-off valve should be opened prior to draining.

Check fuel load and make certain that the fuel caps are firmly secured on the filler-necks.

Check slat operation for freedom of movement and any unusual play.

Move all control surfaces and check security of all hinge bolts and push-pull tubes.

Check security of anti-balance tab on horizontal tail and its pivot point on the fuse-lage.

Remove cover if installed on pitot tube and make sure it is free from dirt or other obstructions. Also make sure that static pressure vents on the sides of the fuselage aft of rear window are free of dirt.

CAUTION! When cleaning or waxing airplane, do not allow wax or cleaner to plug static vent holes.

After entering the aircraft and before starting engine:

Adjust and fasten the combination seat and shoulder straps.

Check all controls for freedom of movement and proper direction.

Insure that all cargo is secured and that the load is properly located.

Check position of electrical and ignition switches.

Open cowl flaps.

Engine Starting

The following operating procedures are taken from the Lycoming Operators Manual.

Lock the wheels by either wheel brakes or chocks.

Set the propeller control level all the way forward in increase rpm position.

Be sure fuel valve is "on"

Set throttle to 1/10 open position.

Place mixture control in the "idle cutoff" position.

Turn on auxiliary fuel pump and check pressure.

Prime - 4 strokes for cold weather; 2 strokes for hot weather.

Turn ignition switch to extreme right and push.

When the engine begins to fire, immediately put mixture control in "normal" position (Full in) and allow ignition switch to return to both mag position. On cold starts, additional priming may be necessary.

Fuel selector valve is "on"

Parking brake control is in "off" position.

If cross-wind gear are installed: unlock tailwheel, if cross-wind gear is unlocked. Lock tailwheel if crossing gear is locked.

Auxiliary boost pump "on"

As soon as possible after take-off, reduce rpm to the maximum continous setting (3000 rpm) and retract the flaps. Take-off power may be used for a maximum of 5 minutes, but it is advisable to reduce power as soon as possible. The best rate of climb is obtained at 65 mph, Indicated Airspeed flaps down and 90 mph IAS flaps up. A cylinder head temperature gauge is provided as standard equipment and power, cowl flaps and speed settings should be selected to maintain the cyclinder head temperature somewhat less than 475° F. The maximum permissible is 450° F at cruise power. For take-off and normal rated power, the limit is 475° F.

Landing

Close the cowl flaps so that the engine does not cool to rapidly.

Open throttle occasionally to clear out engine and keep warm prior to turning into the base leg in the landing approach.

Auxiliary boost pump should be "on".

Extend the flaps to the desired position (maximum flap speed is 80 mph).

Set the propeller control to 3000 rpm.

Taxi

Retract flap.

Open cowl flaps.

Auxiliary boost pump "on".

GENERAL OPERATING INSTRUCTIONS AND LIMITATIONS

This airplane is licensed in the normal category and no aerobatic maneuvers, including spins are approved.

A. Propeller Limitations (None)

Avoid high engine speed (2800 rpm or higher) in combination with low manifold pressure operation (under 15"). Avoid rapid closing or opening of the throttle (especially in a high rpm and mainfold pressure conditions).

B. Stalls and Spins

The leading edge slats and the restricted motion of the stabilizer make it impossible to fully stall the wing on the H-295. As the minimum speed obtainable is approached with the yoke full back. A center section separation causes tail buffeting. A slight aileron nibble is also noticed as the minimum speed is approached. Minimum speed power-off with the flaps down is approximately 40 mph indicated air speed (IAS). This varies with the load and the Center of Gravity (C.G.) condition, Voluntary spins are prohibited.

Although the airplane can be forced, under certain conditions into autorotation - which is technically a spin - this maneuver is not the same as the well known "tailspin" in that it cannot occur accidentally and contrary to the pilots movement of the control wheel is requred for recovery. Recovery is effected by the normal use of either the aileron or rudder control.

C. Speed Limitations

The "never exceed speed" for the H-295 is 200 mph. A red line appears on the

airspeed instrument at this speed. Maximum flap speed is 80 mph. The white range on the airspeed indicator indicates the flap range. Cruising range is marked on the airspeed indicator by a green arc, which extends to the maximum structural cruising speed, 160 mph. In very gusty and bumpy air, the speed should be reduced to 103 mph, flaps up. This speed is known as the "maneuvering" speed.

D. Fuel System

The carburetor should be operated at 11 to 15 psi in accordance with manufacturers recommendations.

E. Engine Operation

Complete operating instructions covering the care and use of the Lycoming engine are provided with each airplane and should be use as a guide in selecting power settings.

F. Fuel

Use fuel with 100/130 octane rating. With standard wing tanks (60 gallons) available usable fuel is 58.2 gallons.

CONTINUED

1 OF 2

PART II

3. Ammeter - Check
4. Fuel and Oil pressures - check
5. Oil and Cylinder Head Temperatures - check
6. Vacuum Gauge - check
7. Propeller - set 2200 rpm and excercise several time (should decrease to 1275 rpm 50 rpm).
8. Propeller - Set 2600 rpm and check both mags (maximum drop 175 rpm).
9. Power Check - 3400 rpm at 28" HG at sea level

NOTE: Normal Cruise

1. Throttle - 23" Manifold Pressure
2. Propeller - 2600 rpm.
3. Cowl Flaps - as required

C. **Before Take-Off**

1. Flight Controls - free, full travel
2. Flight Instruments - set
3. Engine Instruments - checked
4. Trim Tab - set
5. Wing Flaps - 20° to 30° as desired
6. Propeller - full increase rpm
7. Mixture - rich
8. Carburetor Air - cold
9. Seat and Shoulder Strpas - Tighten
10. Cowl Flaps - Open
11. Auxiliary Fuel Pump - On

B. **Engine Failure or Fire* During Flight**

1. Throttle - closed
2. *Propeller - full decrease rpm (out)
3. Maximum Glide distance airspeed - attain 80 mph, with flaps up. Use the excess in airspeed over 80 mph to attain altitude, if desired. (See page 26)
4. *Mixture - Idle cut-off
5. *Fuel selectors - off
6. *Ignition switch - off
7. Radio call - accomplish
8. Master switch - off
9. Generator switch - off
10. Flaps - as required

C. **Propeller Failure in Flight**

1. Propeller overspeed
   - A. Throttle - retard
   - B. Airspeed - reduce
   - C. Propeller - attempt to decrease rpm with propeller control
   - D. If propeller governor regains control, maintain 2500 rpm and 70 mph, and land at nearest airfield. If not, use an altitude, airspeed and power combination to attempt to keep the rpm below 3400. Land at nearest safe landing area.

TAKE–OFF, CRUISE AND LANDING TECHNIQUES

A. Take-Off

It is suggested that 30° flaps or less be used for all take-offs. When taking off into the wind, first align the aircraft along the intended take-off track and then lock the tail-wheel. Release brakes and apply power smoothly. Hold the tail down on the initial roll to maintain directional control. As the aircraft accelerates, raise the tail by applying gentle forward pressure on controls until tail is slightly raised - that is, about half-way up to the full tail-high position customarily used for take-off with more conventional aircraft. Coordinate controls so as to become airborne in this attitude at approximately 40 mph.

When airborne, reduce to 3000 rpm and maintain full throttle. While continuing to climb, allow airspeed to increase to minimum of 60 mph, then raise flaps slowly to prevent level-off or settling. After flaps are raised, reduce to 2750 rpm and maintain full throttle while allowing airspeed to increase to 90 mph. Full throttle is recommended at 2750 rpm for climb-out to insure adequate engine cooling due to enriching features.

Check fuel pressure and turn off fuel boost-pump. Re-adjust cowl flaps as required. For maximum rate of climb, use 3000 rpm at 65 mph, 30° flaps, or 90 mph, flaps up. Maximum permissible cylinder head temperature is 475° for climb and 450° F for cruise power.

Most pilots new to the STOL tend to raise the tail too high and let the aircraft run too long before pulling it off the ground. However, the new pilot quickly learns from experience how soon the ship may be lifted off.

B. Cruise Flight

Throttle - Set (approximately 24" HG)

Propeller - Set at 2600 rpm

Cowl Flaps - as required

Carburetor Heat - as required

C. Power-Off and Power-On Landings

Since the STOL in the 20° flap (half-flap) configuration, has conventional or normal landings during the first hour of familiarization. Even though the STOL with half-flaps, handles almost like other conventional aircraft, it still has outstanding short-field characteristics.

For half-flap landings, an approach speed of 65 to 70 miles an hour is usually desirable when instructing a pilot, new to the aircraft. As the pilots' proficiency increases, approach speeds with half-flaps can be reduced to 60 mph, though use of some power then becomes advisable. When approaching for landing at this speed, the pilot should be reminded that the slats will pop out just as he begins his flare-out and that they will have no effect upon the controlability or balance of the airplane. With half-flaps at 60 mph, however, the plane has little "float" and should be flared or rotated out farily close to the gound so that it will not develop too much rate of sink before touching down.

The best techniques for slowing the airplane down in the approach is first to extend the flaps to 20° starting at 80 mph or less. Then, when the airplane has slowed to about 65 mph in half-flap condition, the flaps can be brought into full-down position

and a landing made by the suggested method of full three-point position. One approach to the full-flap landing is to have the pilot pop out the slats by slowing the airplane down to 50 mph while still several hundred feet in the air and then to compensate for the increased rate of sink by maintaining partial power until touch-down.

As we proceed to the full-flap landings, it is well to realize the fact that when the lift of any normal wing is doubled by the use of a flap, the drag is increased four-fold. This high drag at the full-flap position not only produces a very steep rate of descent but also means that the airplane will have very little float once the nose is raised for flare-out. Consequently, in a full-flap, no power landing, the airplane should be held in a nose-down glide until about ten feet from the ground if the gliding speed is approximately 60 mph. If the gliding speed is higher or lower, the altitude for beginning the flare-out should be higher or lower accordingly.

As an example, if the plane is brought in at the relatively comfortable gliding speed of 60 mph power off and a flare out is begun at the customary approximate thirty foot altitude, speed will be lost very rapidly and a high rate of sink could develop with the resulting impact possibly quite hard. No matter how high the pilot levels out, the automatic slats eliminate all risk of rolling off into an uncontrolled stall or spin, although high rates of descent can occur if sufficient power is not used.

The best technique for full-flap landings involves the maintenance of a little power-on, just sufficient to offset the added drag of the flaps and to produce a relatively normal glide angle. This is done by maintaining approximately ten to fifteen inches manifold

pressure, depending upon the load and air condition, the aircraft is then flared out and landed in a conventional manner, much the same as with half-flaps. The approach speed, however, is closer to 50 mph than to 60 mph.

When using the lower speed landing technique, the throttle should not be closed completely until the wheels make contact with the ground at which time the yoke should be held full back. An advnatage of the partial power approach is the ease of glide path control by slight increases or reductions in the amount of power. This approach is similar to that taught Navy Pilots for aircraft carrier operations. Nose-up carrier type approaches are neither advantageous nor recommended, however, due to impairment of vision, as well as the greatly increased skill requirement.

The full-flap no power landing, while not difficult, is usually desirable only as an emergency procedure and instruction in this type of landing is necessary. In order to make smooth landings under such circumstances a different technique is required with which STOL pilots should be familiar. For full-flap, no-power landings, it is advisable that the Pilot keep the approach speed at 60 to 65 mph, but not below 60 mph, maintaining this speed until the airplane is just off the deck. With power-off, the flare out should not be started until within 10 to 15 feet off the ground so that the nose barely comes up to the full landing position just as the airplane sinks down to ground level.

This is no "float" in this typeof full-flap, no-power landings, which is a safety feature in emergency or forced landing situations. Consequently, a slightly high flare-out will quickly result in a relatively high rate of descent, i.e. a hard landing! Use of full-flaps without power is normally done only in emergency landings. Normal STOL approaches

will full-flaps are best accomplished with partial power as to maintain essentially the same flight path angle at about 55 mph as results from 70 mph at half-flaps and no power. The throttle then becomes the approach control device.

D. STOL Take-Off and Landings

The shortest ground run take-off under standard conditions at 3000 lbs. or less can usually be accomplished with full-flaps. The use of 30° or less, depending on load and pressure altitude, is recommended for normal take-offs.

Align aircraft along intended take-off track. Apply full power in a steady manner. Do not "jam" throttle forward. Release brake as power is applied. Holding brakes on while full power is being applied is not necessary, avoid the application of the foot brakes unless required to maintain directional control. After the air speed reaches approximately 15 to 20 mph during the take-off roll, apply forward pressure on the control yoke just enough to lift the tail about 12 to 18 inches off the ground, i.e. to about half of the conventional full tail-up position. At approximately 35 mph, apply back pressure on the yoke in a positive manner but not so fast that the tail-wheel strikes ground. If the tail-wheel is allowed to strike the ground, the ground-run distance will be longer. When the aircraft breaks ground, allow it to remain just above the ground for approximately 2 or 3 seconds, so that the airspeed will build up to over 50 mph before the airplane starts a full-climb-out. Establish a climb-out speed of 50 to 60 mph as soon as possible. Experience

gained in this type of take-off will enable the pilot to determine the amount of yoke movement and/or rapidity of action necessary to get the aircraft airborne with the minimum of ground run. This type of minimum run take-off is most useful when the ground is rough, bumpy, muddy or where very low obstacles, such as hedges, fences, ditches, etc. are present.

A relatively tail-high take-off technique can also be used to allow airspeed to build up for better directional control before breaking ground. The tail-high take-off is helpful when the take-off area is very narrow and when visibility over the nose may be essentail (safer) than breaking ground sooner in the tail-low attitude. In turbulent, gusty air or on very rough ground, this technique can also eliminate the difficulties that arise from becoming airborne prematurely from the three-point position and striking the ground again with a side-wise drift.

1. Muddy Terrain Take-Off

The Helio Courier (STOL) is an unusually good "mudder", a moderately field presenting no problem. At normal pressure altitude and with loads of 3000 lbs. or less, full-flaps are usually advisable in breaking free from clinging mud. The following procedure is recommended: Apply full power. Hold yoke full back then rock yoke abruptly, using full, but not prolonged, forward position, if necessary, to help break the tail-wheel free. When the aircraft begins to move, the oscillating movements of the stabilator should be reduced so that there is equal "floatation" on all three wheels as the aircraft moves forward. Then when rolling free, use essentially the same technique for the minimum run take-off except that the tail-wheel is usually best held less than a foot off the ground. Since the consistency

and effect of different types and depths of mud vary greatly, no single rule or technique can substitute for experience and judgement on soft and irregular field surfaces.

2. Muddy Landing

A muddy landing or deep snow can usually best be made by using full-flaps and placing the aircraft onto the ground in a nose-high position at minimum speed. Actually touching the tail-wheel first may be advantageous. At this point take all power off and hold the yoke fully back. If the forward speed is thus held low on the touchdown, the weight of the tail, due to the main landing gear being located unusually far forward will tend to prevent a nose-over.

3. Minimum Ground Run Take-Off Over Barrier

Rough ground or other conditions may be a determining factor, where i· of a barrier, the full-flap minimum ground run take-off may be necessary.

It should be re-emphasize here that even when trying to climb out of a small area at too low a speed with the STOL, there is no danger of stalling, losing lateral control, or going into a spin. However, a condition can develop, especially with full-flaps down, when the nose is held too high and the speed is too low after take-off, so that the airplane will actually lose altitude with power full on.

IMPORTANT WARNING

The most common cause of STOL crashes and major damage though never with serious injury to occupant - has been from efforts to pull the airplane off

the ground prematurely at too low a speed and/or concurrently to try to climb out with too low an airspeed with flaps down so that the resulting high-drag exceeds the reduced thrust of the propeller at low forward speeds. Thus, with power full-on, the airplane may either sink back to the ground or fail to clear otherwise easily surmountable obstacles.

It takes considerable experience to recognize the point at which the nose high attitude starts to reduce the rate of sink despite full power. This condition is often referred to as "the back side" of the thrust drag curve, or simply as "the back side" of the power curve. Consequently, a "zoom" after take-off in order to clear a close barrier should be strictly an emergency procedure to be undertaken be well experience pilots. **Climb-out speeds below 50 mph are not recommended.**

4. Shortest Landing Over a Barrier

With wing flaps full-down, cowl flaps open and propeller set at 3000 rpm, maintain a constant airspeed of 50 mph with variation in the throttle setting to alter the flight path. Such procedures will provide an optimum balance between ease of control and minimum landing distance. For absolute minimum distances over the barrier, the more experienced pilot can, if effect, reverse the speed variations used for clearing the barrier for take-off. That is, by judicious use of power, he can bring the airplane over the barrier at speeds as low as 40 to 45 mph. As soon as the barrier has been passed, the nose is dropped sharply: the airplane regains a speed of about 50 mph and is then rotated into three-point landing position, fairly close to the

ground. Miscalculations in this emergency ultra-short technique can of course severely damage the airplane.

5. **Helpful Hints on Over-A-Barrier Landing**

A. The most advisable technique is simple to maintain the recommended 50 to 55 mph approach speed with full flaps throughout the entire sequence up to the point of touchdown, Variations in throttle setting are then used to steepen or flatten the glide angle as needed.

B. In the most advisable technique, the aircraft approach pattern is set up so as to avoid any intentional diviation from a straight line approach over the barrier. Necessary corrections for turbulence or for errors in initial judgment maybe accomplished through changes in the rate-of descent by power adjustments. The attitude of the aircraft remains more or less the same throughout the entire approach. The one and only rotation is the less abrupt round-out just prior to touch-down.

C. It is very important – as well as easy – for the STOL pilot to develop a sensory awareness of high rates of sink. In the importance of this awareness, STOL techniques differ somewhat from the customary techniques with conventional aircraft. A normal, though not necessarily recommended practice with a conventional airplane, when it appears to be sinking a bit fast, is to raise the nose accordingly. With the STOL-type airplane, however, when the flaps are set at or over 20° and when the airspeeds are below the conventional

aircraft minimums, any raising of the nose without compensating power will result in the aircraft sinking rapidly.

The STOL landing is essentially "throttle" flying and the pilot must become throttle conscious. The pilots hand should always be on the throttle during the STOL's final approach and landing. The key to easy positively controlled landings with the STOL then becomes simple even for inexperienced pilots. It lies entirely in the use of small variations in amounts of power during the approach and an awareness of the importance of the throttle to control glide-path, flare-out and touch-down. There is nothing difficult about STOL Operational techniques that any pilot, with proper indoctrination and instruction cannot reasonably expect to master in a few hours.

Until STOL techniques are mastered, however, the use of half-flaps and conventional approaches permit the easiest possible flying with least dependence on piloting skill. After STOL techniques have been mastered, short-field operations that are tough or impossible for conventional aircraft can be easily accomplished as a matter of routine with the STOL.

E. Cross-Wind Take-Off and Landing Techniques

1. Without Cross-Wind Landing Gear

When STOL aircrafts are not equipped with castering cross-wing landing wheels they commonly have free swivel tail-wheels with locks. It is recommended that the tail-wheel lock be engaged to help maintain directional control of the aircraft on all take-offs and landings without cross-wind wheels. However, on a Helio equipped with a steerable tail-wheel, directional control is normally maintained by use of the rudder which in turn steers the tail wheel.

During take-offs, greater attention to directional control is required when the cross-wind is from the left. A left cross-wind amplifies the torque effect of the engine, which will also tends to turn the aircraft to the left.

For example: If a left cross-wind of 10 to 15 mph exists, the following procedures are recommended. Line up the aircraft on the down-wind side of the take-off area facing as closely as possible, into the wind. Lock the tail-wheel and use 20° to 30° flaps (maximum). Hold the yoke fully back, then add partial power to get the aircraft rolling. After the aircraft begins its take-off roll, apply the remainder of power, monitoring the right rudder carefully. Holding the yoke back keeps the locked tail wheel on the ground which in turn is a deterrent to the wind vaning tendency of the aircraft.

When the aircraft begins to get light on the wheels, apply forward elevator pressure and allow the tail to raise slightly less than to a level flight position.

Should a problem still be necountered in maintaining directional control, roll the wheel opposite to the veering tendency: i.e., if veering to the left, roll the wheel to the right. Note that this is the reverse of the customary use of aileron for directional control on the ground. The reason for this difference is that with the STOL, the interceptor on the top of the down-wind (right) wing actually creates a drag which tends to bring the nose to the right.

When landing in a cross-wind, either crab or slip for the existing wind condition as you would with any conventional landing gear airplane on the approach. Just prior to touch-down, align the nose straight with the flight path. Land the aircraft without delay and hold the yoke fully back. When the wheels touch-down, or slightly before, take all power off. Apply both brakes evenly and slow the aircraft down to taxi speed as soon as possible. Move flaps to full-up position, keeping the tail wheel locked until aircraft has almost completely stopped. It, the nose still veers sharply into the wind during the landing roll-out, do not apply power, simple apply maximum opposite brake.

2. With Cross-Wind Landing Gear

There has been a misconception among many pilots that a cross-wind landing gear installation will allow an airplane so equipped to be landed casually in any and all cross-wind conditions. This is not true.

The amount of cross-wind and its velocity can reach a point where the cross-wind gear will not, by itself, assure a good cross-wind landing. The castering action of the cross-wind gear installed on the STOL is 20° to either left or right. If more than 20° of crab angle is required to make a desired ground track, then the automatic correcting action of the cross-wind gear must be implemented by additional use of cross-wind techniques which the pilot should be trained in for fixed gear cross-wind touchdowns. Remove excess crab angle just before touchdown, otherwise a crab angle of more than 20° would exceed the castering limits of the cross-wind gear and tend to initiate a ground loop.

It is recommended for a cross-wind take-off that the aircraft be aligned with the desired take-off track and full power applied. The pilot must keep his eyes on the desired take-off track and disregard the compensating directional swing of the nose. A three-point attitude should be maintained longer than for normal STOL take-offs; this will give the pilot the aid of positive tail wheel steering. This is especially true if the cross-wind is from the left. A three-point lift off is desirable and upon becoming airborne, if circumstances permit, speed should be gained immediately to gain greater rudder control.

If on final approach the crab angle appears excessive and beyond the cross-wind gear 20° castering limits, continue the approach until a point just before rotation or round-out, then land by kicking out some of the crab.

During a cross-wind landing, where wind direction and velocity may require use of a crab angle beyond the castering limits, the following additional procedure is recommended. When the aircraft is on final approach, establish and maintain a straight flight path by slipping into the up-wind side. Maintain the wing-low position as well as the crab so that the crab angle will not exceed 20° Then, just as the aircraft is about to make ground contact, level the wing and remove any excess in the crab angle.

Immediately upon ground contact, use appropirate rudder and braking action as necessary. After touch-down, heavier application on the down-wind brake pedal will be required to prevent the nose from swinging into the wind. Maximum smooth braking action and not use of throttle is recommended for most effective ground control after touch-down.

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