

HELICOPTERS APPLIED TO LOCAL AIR SERVICE OPERATION - AMERICAN PLAN

Exactly two years ago, I had the honor of presenting a paper here in New York whose title was "OPERATION WHIRLWIND - PAST, PRESENT AND FUTURE". In this day when most of our vernacular is tuned either to atomic or super-sonic happenings, it would make no sense for me to repeat the past and present aspects of that paper. Indeed the helicopter has since, I am happy to say, moved ahead so fast that not only has everything that I predicted happened or been surpassed, but the helicopter commands its own exciting following, which to my thinking needs no apology. Therefore, except for looking over my shoulder now and then, I shall address myself only to the future.

During the pre-Korean days, when a few of us were running around the country grasping at every opportunity to keep the reputation of the helicopter from lagging, a few factories had scarcely enough business on the books to keep their doors open. Now suddenly the astronomical figures we read daily may mean that we are seeing a sober rebirth of the early forties when there were upwards of seventy-five different hopefuls trying to design and build and even go into operating this new found device.

In the United States, thanks to the far sighted authors of the Civil Aeronautics Act, the Civil Air Transport system is a triple headed device. I don't intend to discuss the many ramifications of the law, except to the extent which it has and I hope will continue to influence the helicopter industry. The transport of mail, upon which our entire business economy relies is one of these functions. Secondly, the transport of passengers and cargo, and finally as an auxiliary to the National Defense. Therefore, when I refer to Helicopters Applied to Local Air Service Operation, I must of necessity take into account these three factors.

Los Angeles Airways, as you undoubtedly know, is the world's first scheduled commercial helicopter operation. Since October 1, 1947 its five Sikorsky S-51 helicopters have flown approximately 20,000 hours and expedited

approximately
/13,000,000 pounds of airmail, attaining an overall efficiency of approximately
96%. This period may well be looked upon as a teeth cutting and diaper era,
because it has been beset with many unpredictable happenings and certainly its
share of trials and tribulations. Nevertheless, the child has maintained a
pretty robust degree of health and I believe if a comparison were made between
these 3½ years and the same relative period of the so called frozen wing ele-
ment of the industry, it would stand out quite highly so far as the helicopter
is concerned.

Estimates have been made by postal officials as well as our company
that we expedite the mail from sixteen to thirty six hours depending on the
day of week and the city involved. It doesn't take too much imagination to
see how much a letter is expedited since the mail carriers have been reduced
to only one a day in the residential areas. For example, a letter arriving
early Saturday morning in Los Angeles from the east in time to catch our first
round of flights, to any of the cities shown on our schedule, makes home del-
ivery Saturday morning before noon. If it misses the helicopter, delivery
is not made until Monday morning. The same is true of every other day in
the week, except that it is advanced then only twenty four hours instead of
forty eight. We have quite a reservoir of information about the details of
how the helicopter treats mail at large metropolitan areas like Los Angeles.
We haven't done a great deal of bragging about it yet, simply because [we
don't have all of the tools necessary to do the kind of job we know can and
will be done. [For example, [we do not have necessary aids to do an all weather
job of operation. Our company recognized after it had been in operation only
a week, that it would have to find some way to lick the weather problem.
Therefore, we initiated a full scale instrument flight and navigation pro-
ject. I can tell you that we have made material progress in this activity
and in 1950 we received the first Type Certificate for helicopters to operate
under limited IFR conditions. Now we need the counterpart facility in the
form of ground aids. Along this vein, we are also greatly encouraged by the
many attempts being made to devise automatic pilots and procedures for heli-
copters.]

The main thing as I see it, which the helicopter has accomplished
over the past four years, is the confidence it now enjoys in the public mind.

In fact, I believe I could add the military mind as well. Because, reports we received from Korea and from pilots based on aircraft carriers certainly parallel those of our general public when they place the helicopter as a top flight moral builder as well as an indispensable utility. Before I take up the future of helicopters in local operations as we see it, I should like to touch just briefly on what local helicopter services already have done for the military. I should like to say at the outset that we do not purport to know more about the business than the military. They have been using helicopters much longer than we have. However, it is well known that commercial operations accumulate time as well as troubles at a very much faster clip than the military do, particularly in peace time. Our operation has been no exception and in order to maintain the high utility factor so necessary from an economics and service view point, we have taken advantage fully of the flexibility a small operation such as ours affords in improvising ways and means toward improving the machine itself as well as procedures and related items. That the modifications listed as "Technical Contributions of the Los Angeles Airways to the Improvement of the Helicopter" have been of material benefit is well recognized throughout the world, and there are those who have gone so far as to say that the actual savings in dollars to the tax payer has exceeded the total cost of the airmail operation.

In effect, the Los Angeles operation has resulted in the world's most comprehensive helicopter service laboratory and this accomplishment has not been without a certain amount of trial and error revamping, re-design, and modification resulting in major improvements to the machine in general and all of its components in particular.

The end product of the service improvements is greater utility, more dependability and lower cost of operation. A further product of this laboratory has been the plowing back to the manufacturers, the national defense, and other operators of helicopters of a vast reservoir of engineering, maintenance, and operation criteria already being put to use by the entire industry in all parts of the world.

SERVICE LIFE AND UTILIZATION COMPARISONS SIKORSKY S-51 HELICOPTER

	Prior to <u>October 1947</u>	<u>October 1949</u>	<u>Anticipation</u>
1. DAILY AVERAGE (Aircraft Utilization)	2:00 (Hrs.)	6:40 (Hrs.)	8:00 (Hrs.)

Service Life and Utilization Comparisons Sikorsky S-51 Helicopter (Continued)

		Prior to October 1947	October 1949	Anticipation
2. MAXIMUM			10:00	12:00
3. HELICOPTER AIRFRAME (LIFE)	3,000		7,500	10,000
4. BLADE (LIFE)	500		2,200	2,500
5. ENGINE	600		1,000	1,200
6. MAIN CLUTCH (OVERHAUL)	200		480	500-600
7. ROTOR HEAD	100		240	300
8. TRANSMISSION	200		480	600
9. TAIL GEAR BOX	400		600	900
10. GENERAL GEAR BOX	100		480	600
11. TAIL ROTOR	200		600	900

		25 (Hrs.) From	To	Anticipation
12. PERIODIC INSPECTION INCREASES	(	25 (Hrs.)	40 (Hrs.)	50 (Hrs.)
	(	50	80	100
	(	25 (75)	Omit	
	(	100	120	150
	(	200	240	300
	(	400	480	600

In our presentation before the Civil Aeronautics Board, we refer to the helicopters place in our commercial air transport system as "The Last Frontier", and if I may indulge in a few quotations, I would repeat verbatim our concept of a high density feeder.

"The Civil Aeronautics Board created the feeder airline program and it is generally recognized that it has lived up to and in most cases surpassed expectations. A reservoir of factual data has been accumulated which did not exist at the time of the so-called Feeder Airline Investigation. Since the advent of the helicopter, another chapter has been added to the overall picture. It could be said that the helicopter is the only new element which has been injected into the pattern.

THE MISSING LINK:

Many pros and cons have been injected into the record as to the feasibility of feeders versus the regional carriers as well as the place the trunks play or should play in the local airline endeavor. It may be that the technical evolution of equipment will be the determining factor in shaping a

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firm and permanent national route structure, each type of route being molded and operated in accordance with equipment which is capable of doing the job as required. It is entirely possible that the helicopter is the missing link.

Early in 1948, Los Angeles Airways, Inc. began analyzing the subject of carrying passengers by helicopter. It had several objectives, but basically they were:

- (1) What, if any, type of traffic existed which would be attracted by the service?
- (2) Would the helicopter as a vehicle, at this date, be attractive and acceptable to the public traveller?

Several thousand persons from all walks of life were subsequently invited to take flights when conditions and loads would so permit. They were then interviewed (informally) to determine their attitude and observations. Without exception, all were enthusiastic and praiseful of their experience. Many requested repeat flights, many others were re-invited to take subsequent flights. To the best of our knowledge, none has ever turned down a repeat invitation.

The major conclusions which can be drawn from the three year analysis is that in addition to mail and cargo there are several major categories of potential revenue for the Los Angeles area helicopter operation, as follows:

- (a) Scheduled feeder connections with the trunk lines.
- (b) Sightseeing flights - both interline and interarea.
- (c) Commuting between downtown Los Angeles and suburban communities.
- (d) Charter flights - industrial - sports - emergency.
- (e) Intercity flights, both business and social.

In this case the domestic airline system would fall into two distinct groups, complimenting each other, yet affording sufficient competition to keep each on their toes. Roughly these groups would be:

Majors (Transcontinental
 (Regional)

Feeders (Inter-Area-Lineal
 (Area - Radial)

Civil Aeronautics Administration studies have concluded that in excess of 62% of future air traffic will be generated within the so-called "under 200 mile" range. A look at the map of any of the large metropolitan

areas explains why --- and the situation in future years will become worse.

LOW DENSITY PER FLIGHT MILE:

Reduced to a practical formulae it would appear that the conventional feeders can be expected to play a major role in serving the great number of small cities located lineally between large trade centers, provided:

- (1) These cities have usable airports available at reasonable cost, and
- (2) That suitable feeder aircraft become available whenever the present DC-3 types become unserviceable through natural wear and tear.

The following two quotations point to the great traffic potential in the short haul market.

"Nearly 50 percent of all your passengers go less than 400 miles. There are several things that this study shows. One, it shows that it is short haul. Another very striking thing that it shows is that where you should have the bulk of any type of traffic, including air transportation, you have the minimum.

"This bracket of one mile to 99 miles, by any consideration of the distance pattern, should be as much higher than the next bracket as the comparison between these two, and yet it is way down. You gentlemen all know the answer; you don't have an airplane today which competes successfully with surface transportation at one mile to a hundred miles, and yet it lies in that distance to generate any great increase in airline traffic.

"You must have the short haul market, because the market we have today is what it is because we tapped this market, that 100 to 400 miles. So any great increase in number of passengers has to come from tapping that real short haul market.

"In summary, you have a short haul distance pattern, and your mass market can be created if you find an airplane that brings in short haul traffic under 100 miles." (Emphasis added.) Source: Excerpt from an address by D^oARCY HARVEY, Program Officer, Civil Aeronautics Administrator's Planning Staff, Washington, D. C. before the Third Annual Meeting, Airport Operators Council, Cleveland, Ohio, April 24-26, 1950.

"Despite the heavy concentration of passenger traffic at distances between 100 and 300 miles, the table above shows a void in the mileage bracket of 0-99 miles. Only 5.7 percent of airline passengers during September 1946 traveled

less than 100 miles, by contrast with the 20.4 percent who traveled between 100 and 200 miles. This is at variance with the basic transportation fact that the shorter the distance between two points, all other factors being equal, the greater the volume of traffic; it also indicates the lack of advantages, aircraft, airport facilities and service for short-distance travel by air." Source: "Study of Airline-travel Distances" issued by Civil Aeronautics Administration, December, 1948.

HIGH DENSITY PER FLIGHT MILE:

This leaves a complete vacuum so far as the major trade centers themselves are concerned, and it is in this area which the helicopter is bound to be the answer. It is obvious that airport, and convenient flight and procedure schedules, cannot be made to work to the many dozens of large cities which on the four points of the compass make up large metropolitan areas such as Los Angeles, Chicago, New York and others. Even the railroads do not attempt to do this.

Thus the helicopter closes the gap by uniting the millions who live radially within a hundred miles or so of our highly developed financial and industrial hubs. There are several important aspects in the helicopter's advance toward its place as an area carrier, some of which stand out sharply:

- (1) Their effort will be non-competitive with other airliners, (including feeders) as well as surface transportation. The effect therefore is not one of traffic diversion.
- (2) A tremendous amount of new traffic will be generated. "The airport to downtown" initiation is a major industry topic. No one would venture bold enough to say that this situation is a traffic stimulant, nor to deny that when the office, the store door and the home are minutes, instead of hours, from the airport, then more use of the airlines is assured.
- (3) The present showing of the helicopter from a service viewpoint is excellent, but much more can be expected in the future, because -
 - (a) The trunk lines will be capable of very much higher speed.
 - (b) Airports (major terminals) will therefore continue to be located farther and farther from built-up trade and population centers.

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(c) Helicopter facilities will continue to improve in relation to traffic sources, so that ultimately in the employment of multiple rooftops it will be the practice to "Deliver the goods" "fast and to the point."

I am also including a few figures in support of our concensus. These figures represent a spot check on three airlines serving our area. "The three airlines which made this information available to Los Angeles Airways, Inc. were American Airlines, Trans World Airlines and United Air Lines.

This analysis covers departures only during the week of June 4th through June 10th, 1950.

The airline passenger's origination has been determined by area, through the means of home or business telephone exchanges given on the reservation or flight departure lists.

In cases where the Downtown Los Angeles business phone was the only phone listed the passenger was credited as originating from Downtown Los Angeles. For this reason and the fact that approximately 20% of the total passengers in this analysis gave no telephone contact, and also that this analysis covers only three of the seven certificated airlines operating from the Los Angeles International Airport, it is reasonable to assume that the total passengers as shown from each area would be substantially increased. The total arrivals to these areas shown on Page 2 for the week of June 4th would be approximately equal the number of departures.

Also included in the analysis below is the number of passengers who requested limousine service from either Downtown Los Angeles or Hollywood to the Los Angeles International Airport.

LOS ANGELES AIRWAYS, INC.

Origination of Passengers departing from the Los Angeles International Airport on three of the major trunkline air carriers during the week June 4th thru June 10th, 1950.

<u>ZONES</u>	<u>PASSENGERS</u>	<u>Limousine Service Ordered</u>	
		<u>DOWNTOWN L. A.</u>	<u>HOLLYWOOD</u>
PASADENA	555	61	4
Cities of Pasadena	Arcadia		
South Pasadena	Temple City		
San Gabriel	La Canada		
San Marino	Sierra Madre		
Monrovia	Eagle Rock (Partial)		
Highland Park (Partial)			

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ZONES	PASSENGERS	Limousine Service Ordered	
		DOWNTOWN L. A.	HOLLYWOOD
POMONA Cities of: Pomona Claremont Glendora Bladwin Park Azusa San Dimas Covina West Covina	49	4	---
RIVERSIDE Cities of: Riverside La Sierra Corona Casa Blanca Arlington	42	---	---
SAN BERNARDINO Cities of: San Bernardino Colton Rialto Bloomington Fontana Muscoy	58	3	---
SANTA ANA Cities of: Santa Ana Costa Mesa Orange Newport Beach Fullerton Garden Grove Anaheim	52	2	---
DOWNTOWN LOS ANGELES Immediate Downtown Area	1,808	778	---
ALL OTHER AREAS All other Cities on Rt. AM-84 not listed above	4,516	---	339
UNKNOWN (No telephone listed)	1,794	---	---
TOTAL PASSENGERS	<u>8,874</u>	<u>848</u>	<u>343</u> #

It should be noted that the potential of the downtown Los Angeles is very heavy on the basis of our estimates it would appear that over a thousand passengers per day originate and depart therefrom. If we estimate that 25% of them would be interested in using helicopter service, this would mean twenty five schedules per day of ten passengers each. If we assume a twelve place multi-engine helicopter with a load factor of ten, this gives us on the basis of present taxi cab rates roughly \$25.00 each way and if we assume a 120 mile per hour cruising speed over the ten miles, this would result in a five minute schedule. With proper procedure for loading and unloading, it would appear reasonable to anticipate about four round trips per hour, totaling a potential income of \$200.00 per hour. I am injecting these schematic economics into the picture because somewhere along the line there will have to be a reconciliation of the economics as well as the operational aspects of helicopters.

We have made some reasonably definite plans for the inauguration of passenger service both to the downtown and so called vertical area, as well as our perimeters. Present plans call for a limited passenger service sometime late this year, using S-51s to a few selected points. In the meantime, we expect to take delivery of our first S-55 sometime late this year so that sometime in 1952 we will step up our passenger capacity by the inclusion of eight passengers plus 400 lbs. of mail. Finally, we have a third or ultimate stage of service. This calls for a combined passenger, mail and express service over the entire system, utilizing multi-engine aircraft. In order to serve downtown Los Angeles properly, we expect at that time to have completed our rooftop facility on top of the Pacific Mutual Life Insurance Building. This is a most novel and fascinating proposition. Indeed, it may well be the forerunner of a trend which would virtually place all helicopter local operations astride the rooftops of our cities. On the basis of our experience, there is no doubt that the major distinction between a helicopter and other forms of transportation irrespective of their nature, is that it adapts itself advantageously to rooftops. Not only does such a trend have tremendous implications in the future design of buildings as well as the planning of cities, but it has profound economic aspects as well.

No discussion or paper would be in style unless it contains both some operating and economic statistics as well as some predictions and perhaps even some advice. Therefore, I shall serve a small dose of each hoping at least to provoke some discussion. Our statistics are highly complimentary to the helicopter and I refer to the utilization as well as the direct operating costs. While the figures which I will supply are taken from our records, I am sure that any other company could do equally as well. That is what I mean by being complimentary to the helicopter as a device. For example, in a little more than three years of experience we experienced no difficulties in achieving a daily utilization equal to that of the National Feeder Average. In many instances, over extended periods, we have exceeded ten hours per day per unit and it is not uncommon to pile up 170 hours per month for a given unit. I don't know how many years it took the fixed wing industry to achieve this sort of utilization, but I remember back only a few years when we thought we were doing pretty well in getting an average of four hours per day. This high util-

ization makes it possible for our own company to operate four routes with three aircraft and having the fourth being in standby and the fifth in major overhaul or experimental and research. It also has a bearing on low operating costs, because in the present embryonic period of the art a lot of trial and error effort must be absorbed in current costs and by keeping the total number of units to a minimum, depreciation and other fixed costs are particularly affected downward.

If you will refer to your Graph marked Table I, you will find that the cost of expediting a letter has dropped in some proportion to the quantity carried. During the year 1947 and early in 1948 these costs fluctuated violently until they reached approximately a cost of four mills per letter. From this point out the downward trend is stable. Nevertheless, it is definitely downward so that today it has, despite a general increase in all costs, settled down to somewhere between two and three mills per letter. Now it is highly important to recognize two factors in this cost figure. The first being that, it represents the gross operating cost to the Government. I should like to add that while it does not include heliport messengers, which is not a large item, this is offset by the fact that there are no hidden expenses such as Government airway facilities or services of any kind.

Equally important, it does not reflect a very considerable amount of additional revenue which the helicopter service is developing. The stabilization in per mile operating costs, which are shown on Table II, averages out to $\$1.20$ per mile. The main difficulty, as I see it, with respect to the future on costs, is the necessity to reduce fixed overhead charges because helicopter operations at least in the present state do not involve a very great number of aircraft flight miles over which to spread these costs. In fact, the major fluctuation in our costs appear to be the relationship between fixed overhead and our performance factor.

The goal of every helicopter operator will therefore be to step up his monthly mileage units so that his fixed costs either will go down, or allow him to hire some extra vice presidents. It is difficult to perceive exactly where the helicopter eventually finds itself, in the face of competition of feeder airlines on one quarter, and of surface carriers, such as taxi cabs and limousines, on the other. With this in mind, I have on previous occasions encouraged the belief that helicopter operations are just

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as much a different category of business enterprise as they are a new category of transportation. In support of this contention we have for example, found it impossible to fit ourselves into any conventional organization, body or regulatory formulae, and perhaps this is just as well because it has given many the notion that perhaps we should develop our own concepts of doing a job all the way. This was so ably put before the Civil Aeronautics Board recently, on behalf of helicopter service in New York, by Mr. LaRoe, counsel for the Port of New York Authority, "We regard this case as an exceedingly important one from the standpoint of the future of aviation to and from New York, if not the future of aviation in the United States. I need hardly argue to this Honorable Board that the most unsatisfactory feature of aviation today from a public convenience and necessity standpoint is the terminal part of the journey before and after flight".... which takes me to my bit of advice.

Already, there are signs that some of the fixed wing air carriers are fearing intrusion into their sacred air by helicopters. In fact some of this may be inspired by our own industry. It may be the particular product of much discussion and little else about combining the virtues of helicopters with airplanes without apparently paying the costs of the fiddler for the extra music. I don't know enough about the mysteries of helicopter designing or even their operation. However, history has shown us that when we deal with mechanics there are certain fundamentals that are always applicable. I believe we will discover that multi-purpose equipment not only becomes costly in disproportion to the multiplicity factor, but invariably it loses some of its advantages in each field.

I should like to point out at this junction that I don't question the feasibility for the use of general high speed and multi-purpose helicopter in the military field, but for many years to come it is my feeling that we should concentrate on the development of a machine that can tap the richest travel market in the world - the short haul air lift. To do this job in large metropolitan areas somewhere in between the fixed wing airlines and surface transportation, will require a machine of extreme simplicity and one that can be operated by a human being of normal aptitude and maintained by an average mechanic, and one which the public regards as just as safe and reliable as a bus. Unless we adhere to this principle, I

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am afraid that we face several real dangers. The first being that our "life line of support" during these early stages, namely the Government, will and justifiably so call us to an accounting. Secondly, if we abandon the unfinished task before us and begin flirting with the long haul picture, we shall run smack into competition with the people whom we should serve as a terminal facility.

I have discussed these economic and promotional aspects of the subject because they relate to the fundamental purposes of the Society of Automotive Engineers. The Society was dedicated to serve a very useful purpose to the automobile industry many decades ago in recognizing the need for higher quality control and more standardization with that industry. The Society unquestionably planted the seed which gave the American producers the edge over the European counterparts, and which has been the controlling factor in its growth to world dominance. Now we have much the same situation with respect to this entire new segment of automotive vehicles. If I were asked for my opinion as to the most impelling individual problem which lies in the pathway of the helicopter industry, I would say quality control. Next, I would point to standardization of components, controls, attachments and mountings. These fall within the purview of this Society and I believe if the same aggressive approach is made towards their solving, as was the case early in the automobile business, that the end product can be the same to the effect that American enterprise will provide the worlds best and cheapest helicopter and consequent bearing on seat mile costs.

TABLE II

LOS ANGELES AIRWAYS, INC.

OPERATING STATISTICS

1950
YEARLY
AV. PAGE

	JAN.	FEB.	MARCH	APRIL	MAY	JUNE	JULY	AUG.	SEPT.	OCT.	NOV.	DEC.	AV. PAGE
PERFORMANCE FACTORS:													
By Mileage (Percent)	93.09	84.38	96.34	97.59	98.00	98.59	99.03	94.60	95.37	94.18	76.99	90.96	93.53%
By Trips (Percent)	92.94	84.72	95.9	96.15	98.11	99.5	98.5	93.04	94.12	92.15	72.59	88.5	92.3 %
OPERATING EXPENSES, PER REVENUE MILES FLOWN:													
Flying Operations	.37	.42	.34	.37	.34	.35	.36	.33	.36	.33	.38	.35	.36
Direct Maintenance-Flight Equipment	.20	.16	.21	.20	.20	.08	.15	.12	.11	.11	.19	.13	.15
Depreciation - Flight Equipment	.29	.35	.26	.29	.26	.27	.28	.26	.29	.19	.18	.15	.26
Ground Operations	.15	.19	.15	.14	.15	.13	.16	.17	.17	.18	.19	.20	.16
Ground & Indirect Maintenance	.10	.13	.09	.11	.11	.09	.09	.08	.12	.08	.11	.09	.10
Advertising & Publicity	-	-	.01	-	.01	.01	-	-	-	.01	-	.01	-
General & Administrative	.16	.21	.16	.14	.16	.14	.16	.13	.15	.13	.16	.15	.16
Depreciation - Ground Equipment	.02	.01	.01	.02	.01	.01	.02	.01	.02	.01	.02	.02	.02
TOTAL	1.29	1.47	1.23	1.27	1.24	1.08	1.22	1.10	1.22	1.04	1.23	1.10	1.20

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