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United States Air Force Aero Club Management by Break-even Analysis

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BY BREAK-EVEN ANALYSIS

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BY

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BY BREAK-EVEN ANALYSIS

This thesis is approved as a creditable and independent investigation by a candidate for the degree, Master of Science, and is acceptable as meeting the research paper requirements for this degree, without implying that the conclusions reached by the candidate are necessarily the conclusions of the major department.

Research Paper Advisor　　　　Date

Head, Economics Department　　　　Date

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Chapter 1

UNITED STATES AIR FORCE AERO CLUBS

The Department of the Air Force recognizes the need to create and maintain the morale of its military and civilian personnel and their dependents to achieve maximum effectiveness in the performance of their military duties.[1] It is further understood that Air Force personnel, being so closely associated with military flying, often have a desire to engage in recreational flying.[2] The combination of these factors contributed to the development of Aero Clubs in the United States Air Force.[3]

Air Force Aero Clubs are nonappropriated sundry fund activities which are established by the Major Air Commands within the United States Air Force. As such, they are established as instrumentalities of the United States.[4] Aero Clubs are individually chartered with rules and regulations adopted by their members and Advisory Boards.[5] The

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[1]Air Force Regulation 176-1, Nonappropriated Funds; Basic Responsibilities, Policies, and Practices, (Washington: Department of the Air Force, 1968), p. 2.

[2]Air Force Manual 215-4, Recreation: Air Force Aero Club Manual, (Washington: Department of the Air Force, 1965), p. 1.

[3]Ibid.

[4]Air Force Regulation 215-2, Recreation: Air Force Aero Clubs, (Washington: Department of the Air Force, 1965), p. 2.

[5]AFR 176, op. cit., p. 3.

The rules and regulations of the clubs are required to be approved by the local commanders and/or the respective Major Air Command.[6] Finances for sustaining each club are derived from the income gained through the participation of the membership in the aero club.[7]

Purpose and Organization of Aero Clubs

Aero Clubs, by directive, are organized as recreational activities and are operated to provide Air Force personnel, their families, and other specially authorized personnel an opportunity to develop skills in aeronautics. These skills include pilotage, navigation, mechanics, and other related aero sciences.[8] Aero Club members have an opportunity to develop an awareness and appreciation of aviation requirements and techniques. The clubs are to provide a facility designed for low cost, safe, light plane operations, as well as a social program for furthering club activities and Air Force morale.[9]

The general organization of aero clubs is portrayed in Figure 1.[10] The organization of aero club advisory boards is similar to that of an Air Force aircraft wing. Thus, each member of the board has a counterpart in the aircraft wing to whom the board member may go for advice and assistance in solving specific flying problems of the aero club. The officers in the aircraft wing holding counterpart positions are encouraged by base commanders, whether members of the aero club or

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[6] Ibid. [7] Ibid. [8] AFR 215-2, op. cit., p. 1. [9] Ibid.

[10] AFR 215-4, p. 46.

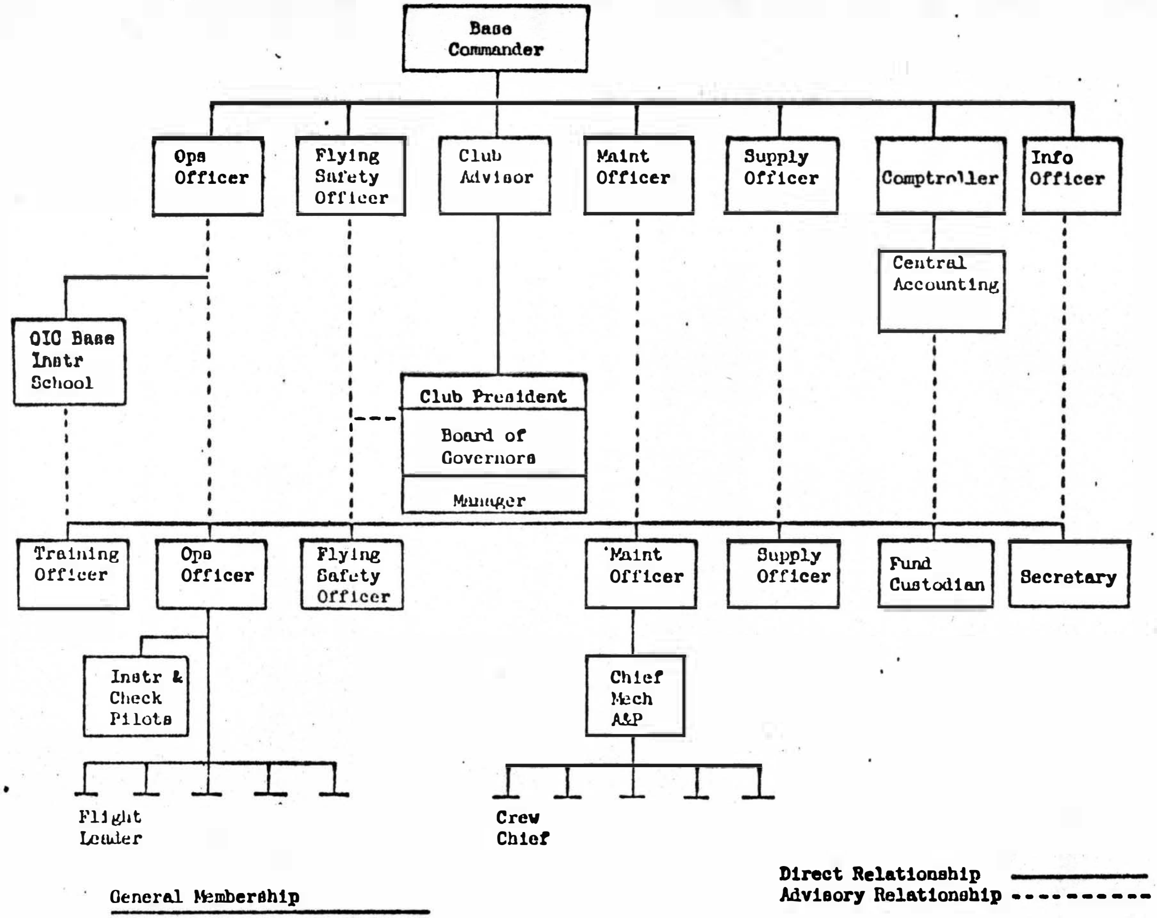

Figure 1

General Organization Chart

not, to support and assist the aero club in the areas related to their job specialty.

History and Development

The Aero Club program in the Air Force started in the early 1950's, and General Curtis LeMay (then Air Force Chief of Staff) strongly supported the program through its early development.[11] By 1958, Air Force Aero Clubs claimed 12,00 members and a combined inventory of 750 aircraft. This early period of growth has been referred to as the "Heyday" period of the Aero Clubs.[12]

Although a "heyday" period, the rapid growth of the program apparently exceeded the capabilities of existing managerial controls as serious problems were encountered in aero club operation during this time. In 1958, there were 145 accidents and 21 fatalities reported by aero clubs. Thus, senior commanders of United States Air Force installations could well argue that aero clubs were "killing themselves off."[13] In addition, clubs were often loaned Air Force training aircraft in order to get their clubs started. Unfortunately, these aircraft consumed a comparatively large amount of fuel and were complicated to fly, especially for beginning pilots. Thus, early clubs tended to operate with high accident rates and uneconomical aircraft.

In 1960, to eliminate these problems, work was begun to develop regulations to insure that aero clubs would operate on a safe and

[11] Air Force Times (Washington), April 1, 1970, p. 12, col. 3.

[12] Ibid.,p. 15. [13] Ibid., p. 18

economical basis. Flying enthusiasts at the time predicted that the new regulations would be interpreted by aero club members as restrictions and result in dampening participation in the program. The trends in aero club operation shown in Figure 2 for the mid-1960's support this prediction. For example, membership dropped to 9,300 by 1965 and by 1969 still had not attained the maximum membership level of 12,000 reported in 1958.[14] In addition, total aircraft operated by all United States Air Force aero clubs had decreased from the 1958 level of 750 to 424 in 1969.[15]

Although these reforms have been the cause for a decrease in number and size of aero clubs, they have also been a contributing factor to better operation. Accident rates have decreased substantially. A total of 265,439 hours were flown in 1969, for an accident rate of 10.2 (number of accidents per 100,000 hours flown). The fatality rate for the same period was only .75 (number of fatalities per 100,000 hours flown). This record is markedly better than that of general aviation for the same period, wherein the non-commercial or private flying segment of civilian aviation sustained an accident rate of 19.8 and a fatality rate of 2.6 during the same time span.

Uneconomical aircraft and aircraft which are difficult to fly have also been eliminated. Although the number of aero club aircraft has dropped from a 1958 level of 750, only 75 of the 432 aircraft owned

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[14] Air Force Times (Washington), April 1, 1970. p. 13, col. 1.

[15] Op. cit., col. 3.

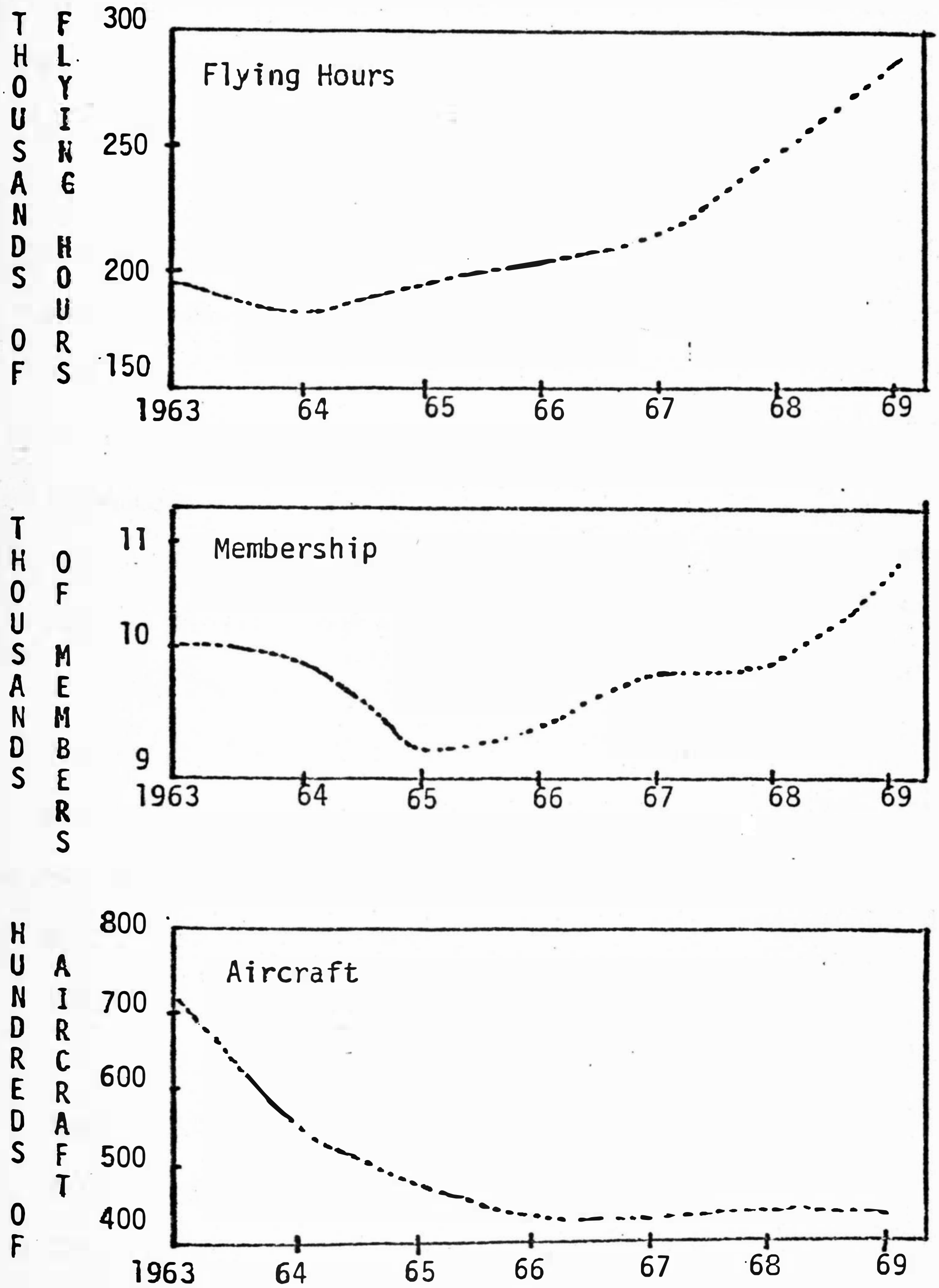

Figure 2

Effect of Aero Club Regulations on Club
Flying Hours, Membership and Aircraft

in 1968 were military trainers. By 1969, only 59 out of 424 aircraft were military trainers. Thus, more economical and easier-to-fly aircraft form the inventories of most aero clubs today.

Since 1963, aero club operations have tended to improve. Membership has increased to a 1969 high of 10,531. The number of clubs has also increased to a total of 75. Along with these improvements, accident rates are much lower (as noted above), and overall utilization rates have improved as fewer aircraft are being used to fly an increasing number of flying hours.

To maintain continued growth, some clubs have sought and gained Federal Aviation Administration (FAA) approval and certification for offering training programs to members for advanced pilot and mechanical ratings by developing acceptable flying programs and achieving required standards. A change in the policies of the Veterans' Administration has stimulated this broadened concept by allowing pilots to use their G. I. Bill benefits to finance the training needed for these advanced certificates.

Veterans' Administration financing for advanced ratings may have acted both as a stimulant to club growth as well as a challenge to club management. A primary benefit of belonging to an aero club is that the cost of flying and instruction often runs as little as one-third of that paid to commercial flying services for the same training. Thus, a member uses far less of his G. I. benefits for advanced instruction as a club member than he would have to spend for the same training given by a commercial flying service. On the other hand, the demands of providing advanced training and meeting Veterans' Administration (V.A.) administrative requirements are burdensome for the management of most aero clubs. In addition, the costs of setting up programs which will be approved and certified by the FAA and the V.A. may possibly be prohibitive. Yet, clubs stand to lose members or potential members if they fail to provide such programs for their members.

Although aero clubs appear to be improving in their operation, the managers of aero clubs are generally finding it more difficult to continue to offer the type of flying desired by members while operating on a self-sustaining basis as required by the major air commands. The reason for the increasing difficulty stems at least in part from three factors. First, clubs must now purchase their aircraft rather than rely on training aircraft provided by the Air Force at no cost. The purchase price of the aircraft must be passed along to members in the form of higher flying costs. A probable result will be a decrease in demand, and, therefore, a decrease in revenue, due to the rising costs of flying time.

Second, increased utilization of available aircraft (i.e., more hours flown on fewer aircraft) complicates maintenance and inspection scheduling. Maintenance must be performed more frequently but at a time when it does not interfere with the members' demands for flying time.

Finally, financial management has become more difficult. Clubs must remain financially solvent yet provide flying at the lowest possible cost. If flight rates per hour are set too low, a club cannot remain solvent. On the other hand, flight rates that are too high will cause a reduction in demand, thus reducing revenue, and creating a tendency toward insolvency. To meet both requirements (i.e., remain solvent and meet demand), clubs must tread a fine line between rates that are too low and those which are too high.

A club can only operate in this narrow corridor by carefully managing costs in a businesslike way and meeting club members' demands. Yet, the members of club advisory boards, those who are ultimately responsible for keeping aero clubs financially solvent, are composed of members who often have little or no experience in managing business enterprises. More often than not, board members are elected for their popularity or willingness to serve rather than their ability as financial managers. Their experience most often lies in the carrying out of combat operations, rather than dealing with financial management per se. Thus, it is not unfair to suggest that the management of aero clubs is carried out by amateurs.

In such a case, the probability of encountering difficulty in managing club operations and possibly becoming insolvent can generally be stated to be fairly high. Only if club management is provided with a simple, easily understood method for managing costs and meeting demands can the management of aero clubs be expected to be effective in remaining solvent while meeting the members' demands for flying time.

Because aero clubs are generally managed by advisory boards made up of personnel who, for the most part, are not professional business managers, one might assume that directives and regulations would be published by administering headquarters (i.e., major command and numbered Air Force) which would simplify the financial management process for the clubs. This need would appear to be doubly important in view of the Air Force assignment process in which it is not uncommon for advisory board members to be permanently or temporarily transferred from their home base during their terms of office. However, financial management practices are not spelled out in command directives to simplify management's activities or reduce the problems created by transfers. In short, command directives provide only very general guidance in financial management of aero clubs.

THE ELLSWORTH AIR FORCE BASE AERO CLUB

The aero club operated at Ellsworth Air Force Base, South Dakota, provides an excellent example of the problems discussed above. Ellsworth had an aero club until the summer of 1971. It was closed at that time by Brigadier General Charles Adams, Commander of the 821st Aerospace Division, who was responsible for all activities occurring on the Base.[16] The Club had been established by Strategic Air Command (SAC) and 15th Air Force Headquarters, March Air Force Base, California, and was[17] supervised by the responsible staff elements at Ellsworth and 15th Air Force in accordance with command directives.[18]

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[16] Rushmore Advocate (Ellsworth Air Force Base), 1 April 1970, p. 7, col. 2.

[17] AFR 215-2, p. 2.

[18] AFR 215-4, Ibid., p. 2.

The Ellsworth Air Force Base aero club positions on the Advisory Board were filled by elected aero club members whose best qualification may have been their interest and/or willingness to serve on the Advisory Board in their free time. The exceptions to the elected positions on the Advisory Board were the Club Senior Advisor, the Safety Officer,[19] and the Funds Custodian,[20] all of whom were appointed by the Base Commander.

The unpredictable assignment system of the Air Force complicated the management function of the Ellsworth Air Force Base aero club and could be expected to complicate the management functions of any Air Force aero club. The turn-over rate of members on the Advisory Board often was frequent and unanticipated due to the reassignment or temporary duty of the members away from Ellsworth Air Force Base. Each new member of the Advisory Board was required to develop his own methods of working within the aero club structure. Temporary replacements were named by the Advisory Board to fill unexpected vacancies until an election could be held. However, finding voluntary replacements among aero club members was often difficult. Members with previous experience on an aero club management team were rare. They often could not be found in time for them to be trained and briefed by the departing advisory board member whom they were replacing. Thus, creating and maintaining an advisory board with aero-club management experience was not possible.

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[19] AFM 215-4, p. 2

[20] AFM 215-4, p. 1.

A review of the flying activities of the members of the Ellsworth aero club indicated that approximately one-third of the membership was doing the majority of the flying. These members were primarily student pilots working on private or advanced FAA aeronautical ratings. The majority of the members were not flying enough to maintain required currency and proficiency levels. These members were valuable to the Club, however, because they paid monthly dues (a share of administrative costs) even when they did not fly.

In 1968, the Ellsworth Air Force Base aero club operated at a loss of $1,290.22.[21] When the Base Central Accounting Office presented an analysis of the Ellsworth aero club's financial operation in September, 1968, it indicated areas of increased expenses and decreasing revenue which were contributing to the net loss of the club's operations. The financial statement of April, 1969 showed the aero club had a year-to-date net loss of $2,611.38.[22] SAC then sent a message to the club management directing the club to improve its financial posture immediately.[23] At this point the club management was faced with the problem of regaining financial stability and then maintaining the club on a self-supporting basis in the future. The club was closed in the summer of 1971 because it was unable to maintain that self-supporting

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[21]Based on Ellsworth Air Force Base Aero Club Statement of Operations and Net Worth, Schedule A, December 31, 1968.

[22]Ibid., April 30, 1969.

[23]Based on Minutes of Advisory Council Meeting of Ellsworth Air force Base Aero Club, May 24, 1969.

financial status. If command guidance had included simple, easily applied methods for managing the financial conditions of clubs, the closing of the Ellsworth club might have been prevented.

STATEMENT OF THE PROBLEM

The problem to be examined in this research effort is whether or not it is possible to provide aero club management with simple, effective, easily applied methods for making financial decisions which will make them self-supporting while meeting the flying demands of their members.

OBJECTIVES

The objectives of the study are:

1. Determine a satisfactory means for determining costs and charging flying rates to maintain aero clubs in a financially solvent status.

2. Determine the types of information needed to assist aero club management in achieving the first objective.

IMPORTANCE OF THE STUDY

The procedures developed and concepts employed for the Ellsworth Club model are adaptable for use by all aero clubs. The available regulations and manuals in print on United States Air Force Aero Club management define goals, and guidelines for accounting procedures for use by aero club administration. Management talents and know-how are assumed to be available through the personnel who are selected to direct each club. If qualified individuals are not available, clubs are in danger of closing. The methods described in this study should provide adequate guidance to assist conscientious managers in making sound decisions.

JUSTIFICATION OF THE STUDY

Given the assumption of the Air Force that individuals associated with flying, as they are in the Air Force, will have a desire to engage in flying activities.[24] The management of aero club resources is an economic activity directed toward the goal of satisfying human wants--that of participating in flying activities. This study will employ economic methods useful to aero club management in choosing types and quantities of flying activities to be produced by each club. It is the proper selection of aircraft, rates, and types of flying that are the basis of aero club activities and, therefore, determine the financial stability of a club and its capability to support itself.

METHODOLOGY

The overall methodology used for accomplishing this study is descriptive analysis. Specifically, the analysis will be carried out in three parts. In the first part, production functions and their applications to aero club operations will be discussed. In the second part, break-even analysis will be described and examined for its

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[24] AFM 215-4, p. 2.

usefulness in managing aero club activities. In the third part, the information needs of operating aero clubs will be considered. Methods for gathering needed information will also be suggested. Conclusions and recommendations will be drawn from the analysis carried out in these three parts. Throughout the study, examples from the Ellsworth Air Force Base Aero Club will be cited when they represent typical aero club operations and problems.

Chapter 2

AERO CLUB PRODUCTION ANALYSIS

Production theory in economics can be used as a means of analysis for resource pricing and employment. One assumption often made in the use of production analysis is that individual firms attempt to maximize output of their product with any given cost outlay.[1]

The goal of an Air Force Aero Club is to provide a stimulant to the morale of United States Air Force members by providing a "product," aeronautical activities, at the lowest possible cost.[2] This goal of aero-club operations is compatable with the above assumption of production theory because aero clubs will strive to maximize product output with any given cost outlay by the way they secure and combine resource inputs.

THE PRODUCT

Generally stated, the product of any United States Air Force aero club is recreational flying,[3] This product can, for convenience, be measured in hours of flying time logged by the club members, However, this definition of the aero club's product is not the only one which

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[1]R. H. Leftwich, The Price System and Resource Allocation, (3d. ed.; New York: Holt, Rinehart and Winston, 1966), p. 98.

[2]Air Force Times (Washington), April 1, 1970, p. 14.

[3]AFR 215-4, p. 1.

might be used. For example, clubs actually produce and/or develop a potential for recreational flying by maintaining aircraft in a "ready-to-fly" status to meet the members' desires for flying. The actual number of flying hours logged, once the aircraft are available to fly, will depend on membership demand and whether or not the weather conditions are suitable to flying. On any given day, aircraft availability, i.e., the potential for recreational flying, could well exceed the actual recreational flying logged by members of an aero club. This is represented by having aircraft ready to fly that are not used. In this case, expenses are incurred by the club, whether or not the aircraft is actually flown.

Specifically, selecting the appropriate product of an aero club for economic purposes is difficult. The definition of an aero-club product as "actual flying logged" by members could be used. If the product of an aero club is defined as potential recreational flying, some estimate of "output" could be made. However, this level of potential recreational flying is not recorded at any of the aero clubs with which the author is familiar. Thus, the product of an aero club is not, for analytical purposes, uniquely definable.

FACTORS OF PRODUCTION

The major resources and/or factors of production for aero clubs used in developing potential flying time are aircraft, instructors, maintenance, and weather. Aircraft are obviously a primary resource to any flying operation. In addition, the administrative elements, maintenance functions and instructional capabilities of an aero club are each a distinctive resource whether producing actual or potential flying. Weather will also be discussed as a resource. Even though weather is not controllable, it has a significant impact on aircraft operations.

Description of Aircraft

Aircraft are referred to both by category and model, as well as singularly by identification number. The general category of the aircraft in most aero club fleets is single engine-land. The model of an aircraft is commonly designated by indicating the manufacturer and a model number. Some aircraft models have commercial designations or trade names. All aircraft have individual FAA-assigned identification numbers. The aircraft identified below were owned by Ellsworth Air Force Base aero club and as such are representative of the type and mix found in an aero club.

Cessna 150. The Cessna 150 is a two-seated, fixed-gear, high-wing plane used primarily for training and local flying. The Ellsworth Air Force Base aero club had three Cessna 150 aircraft. Their identification numbers were N22053, N2957J and N6257R.

Cherokee 140. The Piper Cherokee 140 is a heavier, more stable, low-wing aircraft suitable as a trainer for those who can afford a little additional cost. It is very desirable as an instrument procedures trainer because of its stability. However, having only two seats and limited baggage capacity and relatively slow crusing speed, this aircraft was not popular for extended cross-country flying. The Ellsworth Air Force Base aero club had one Piper Cherokee 140. Its FAA identification number was N9652W.

Cherokee 180. The Piper Cherokee "C" or 180, is a four-seated aircraft very similar to the 140 but with higher crusing speed. It is especially suitable for a cross-country family flight. The identification number of the Piper Cherokee 180 owned by the Ellsworth Air Force Base aero club was N7617W.

Cherokee Arrow. The Piper Cherokee Arrow has the characteristics of the other Cherokee aircraft, but also has retractable landing gear and a larger engine. The plane requires an experienced pilot but does permit an increased baggage capacity and crusing speed. Overall, it is a very desirable aircraft for extended cross-country flying. The FAA number of the Ellsworth Air Force Base Cherokee was N4953J.

T-34. A T-34 is a low-wing, retractable-gear, two-place trainer which is excellent for giving training required for advanced ratings. The Ellsworth Air Force Base T-34 was on loan from the Air Force inventory of retired training aircraft and was not club owned. SAC wanted these aircraft turned in as soon as the Club could feasibly do so because the aircraft was getting old.[4] The FAA identification number was 6080C.

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[4] Air Force Times (Washington), April 1, 1970, p. 14. col. 3.

Maintenance and Supply

Two types of maintenance are required for aircraft - periodic and variable. Periodic maintenance is performed at regularly scheduled intervals and is essentially preventive in nature. Most periodic maintenance is based on the number of hours the aircraft has been flown. Thus, this type of maintenance can be scheduled to some extent, but it is still susceptible to fluctuations. For example, aircraft manufacturers strongly recommend that routine engine oil changes be made at the end of each 25 hours of flight. As detailed records are kept for each hour an aircraft is flown, a club manager could easily schedule an aircraft for an oil change on a specific day, knowing that in most cases his prediction of when the aircraft would need the change would be fairly accurate. However, because the change is based on hours flown, any variable which affects demand for flying will affect the periodic maintenance schedule. Unexpected periods of good or bad weather, or of high or low demand for flying would have serious effects on periodic maintenance schedules. Because periodic maintenance is not totally predictable, a certain amount of "downtime" (time when the aircraft cannot be flown) will develop which will interfere with members' demands for flying time.

The most common forms of periodic maintenance are oil changes, 100-hour inspections, and annual inspections. The 100-hour inspections must be performed prior to the 100-hour mark as required by FAA regulations, thus providing little flexibility in scheduling. The Annual inspections are slightly more flexible in that they can also suffice for the 100-hour inspection if the two can be performed simultaneously.

Variable maintenance is required whenever a malfunction occurs in an aircraft. Variable maintenance is far less predictable than periodic maintenance, and, therefore, has a greater impact on available flying time.

Personnel who perform maintenance on aircraft are considered part of the maintenance resource of an aero club. This group includes hired mechanics, members who are qualified mechanics, and members who are earning a mechanical rating and/or experience by performing maintenance.

The function of supplying repair parts for an aero club is very closely related to maintenance work. Supply is essentially the activity that provides maintenance personnel with the parts needed to maintain the aircraft. Very often it is the mechanic who handles the supply workload. A very critical area of responsibility to the flying program is deciding what levels of spare parts inventory should be maintained. An aircraft can easily be "grounded" (not in an airworthy/suitable condition to be flown) because parts are on order rather than on hand when needed. The result can have a serious impact on the club's ability to meet the demand for flying time. It is adequate for the purposes of this paper to identify the area of supply as critical and not easily quantifiable as a resource in an aero club.

Instructors

Certified Flight Instructors are a resource for both students and qualified pilots who fly. Any student in any level of flight training must fly a minimum amount of time with an instructor as a prerequisite to the issuance of private pilot licenses as well as to other advanced ratings, such as commercial and instrument ratings. For non-student members, club regulations require periodic flight checks for safety of operation by a qualified instructor in each aircraft in which a pilot desires to maintain currency. Also, to be checked out in an aircraft, there are proficiency requirements to be met and a check-out flight to be passed. Here again, qualified instructors are needed.

Weather

A major factor affecting aero club production is weather conditions. Weather conditions can have a considerable limiting effect on flying activities. This is emphasized by the fact that both aircraft and pilots have ratings as to the kind of weather in which they can fly. By regulation, winds of specific velocities and relative directions can keep both an aircraft and/or a pilot from flying. Visibility, both in terms of daylight and darkness, fog, haze, and cloud cover are related to the equipment installed in an aircraft and the certified abilities of the pilot.

Classifying weather as a resource could be challenged by strict adherence to an economic definition. However, the weather's impact on a flying operation is too important for it to be omitted.

Defined in terms of specific conditions for flight, weather is limited in quantity. Weather conditions are versatile when applied to a flying situation. Restricting weather conditions can be useful to the training of pilots for advanced ratings or for ground schools and maintenance activity. However, weather cannot be controlled and it cannot be considered as a constant, except in terms of a very short-run type of analysis, which is of little benefit to the goals of this study.

AN AERO CLUB PRODUCTION FUNCTION

The development of a production function for an aero club's capability to provide actual or potential flying time to its members could involve a definition of the relations between aircraft (numbers and types), maintenance capability, instructors (numbers and qualifications), and weather factors. A precise production function cannot be derived for Air Force base aero clubs because the resource variables are not all quantifiable or controllable; e.g., maintenance scheduling and weather. Further, as previously discussed, defining the product is difficult, especially when considering the members' flying desire as a factor.

In attempting to describe a production curve for an aero club, some of the above variables would have to be fixed with assumptions. The best example is weather. Historical data would be most helpful in making weather assumptions. However, neither reliable nor specific data on light plane flying weather is available for the Ellsworth Air Force Base aero club environment. Air Force regulations do not require that data be kept by Base Weather Stations. The best available estimate on suitable flying weather is a "ball park" estimate (expressed by experienced members and management) of twelve hours per day, fifteen days per month, or 180 hours per month of suitable daylight flying weather. Simply stated then, the maximum potential number of hours an aero club could make available would be the number of aircraft owned by the club times the flying hours available, given the weather conditions. Assumptions concerning maintenance capability, instructor-student scheduling and aircraft availability would be more difficult to make than the "ball park" estimate for weather.

Another factor to be considered in estimating actual flying time is the desires of the members. Matching the intangible elements of members' desires to fly to the unpredictable elements of weather is necessary in forecasting an aero club operation. However, this does not readily lend itself to inclusion in production-curve analysis. For example, whether or not the good weather is on a week end makes a difference. Good weather in the late afternoon is more stimulating for flying than when the members are working. The month of the year is also a factor. For example, in December, members' money is more likely to be spent on Christmas presents rather than flying. In the summer months members are on vacation. For some, this means less flying, while for others who are qualified, this means club aircraft can be used for transportation as a part of their vacations.

Scheduled aircraft maintenance is related to weather when production is considered. If the weather is such that every other day is prohibitive to flying, most maintenance can be accomplished without causing any loss of flying time. However, if a periodic inspection on an airplane is due, regardless of the weather, the inspection must be completed before the plane can be permitted to fly another hour. The result can be a loss of flying time due to maintenance.

The above discussion points out the difficulties involved in attempting to define an aero club's output in terms of a defined production function and its curve. That is, the factors of production are either not readily definable or controllable enough to permit sucn analysis. To further illustrate these difficulties and irregularities, Figure 3 presents the flying history of Ellsworth Air Force Base aircraft. In the figure, many inconsistencies are to be found which cannot be explained from existing records. For example, there are no records to explain the erratic flying hours logged on Aircraft 7617W in 1965. Thus, attempts at statistical analysis would be greatly complicated by the sketchiness of the information. The total membership and total flying hours are also shown, but again, many inconsistencies are present which cannot be explained from available records. In addition to the above difficulties, other problems or restrictions are involved. For example, the number of aircraft a club has is limited by the amount of space in its hangar. A change of location would require the approval of the Base Commander, something which is not likely since aero clubs generally have the only available location already. Since regulation discourages it and the additional cost to the members makes it undesirable, clubs do not think in terms of moving off base to expand.

Month / Year	1 5662 L	2 6746 E	3 0061 I	4 4993 U	5 6609 F	6 2152 J	7 N 2205	7156 W	7612 U	8662 W	4951	1008	[illegible]	Total [illegible]	Total [illegible]
65	31:15	41:25	60:05	---	---	---	---	14:[illegible]	43:50	---	---	[illegible]	[illegible]	[illegible]	[illegible]
J 66	---	---	37:00	[illegible]:55	51:10	---	---	7:25	26:05	---	---	---	[illegible]	[illegible]	[illegible]
A 67	---	---	---	92:30	78:30	91:20	---	42:15	[illegible]:25	---	---	---	[illegible]	41,[illegible]	[illegible]
N 68	---	---	---	5:10	41:10	29:05	---	11:15	[illegible]:20	27:25	---	---	[illegible]	[illegible]	[illegible]
69	---	---	---	---	[illegible]	54:[illegible]	---	---	---	41:35	[illegible]	---	---	[illegible]	111
65	25:25	31:25	[illegible]	---	---	---	---	29:45	[illegible]	---	---	[illegible]	11:[illegible]	[illegible]	[illegible]
F 66	---	---	50:10	67:40	69:15	---	---	23:45	10:05	---	---	---	[illegible]	[illegible]	112
E 67	---	---	---	66:25	63:05	84:50	44:50	16:[illegible]	21:40	---	---	---	[illegible]	[illegible]	[illegible]
B 68	---	---	---	---	43:50	65:10	---	12:[illegible]	10:50	10:55	---	---	[illegible]	26,[illegible]	112
69	---	---	---	---	42:20	43:2[illegible]	---	---	---	32:15	7:20	---	---	[illegible]	103
65	20:20	16:25	3[illegible]:25	---	---	---	---	[illegible]	[illegible]	---	---	[illegible]	[illegible]	[illegible]	[illegible]
M 65	---	---	54:10	9:20	40:55	---	---	1[illegible]	[illegible]:15	---	---	---	[illegible]	[illegible]	[illegible]
A 67	---	---	---	33:25	[illegible]:10	[illegible]	31:2[illegible]	23:15	41:05	---	---	---	[illegible]	[illegible]	[illegible]
R 68	---	---	---	---	70:30	74:15	---	[illegible]:50	8:05	31:40	---	---	[illegible]	[illegible]	11[illegible]
69	---	---	---	---	58:55	49:40	---	---	20:01	58:00	20:31	---	---	15,[illegible]	11[illegible]
65	21:45	20:00	42:12	---	---	---	---	[illegible]	27:[illegible]	---	---	[illegible]	[illegible]	1[illegible],1[illegible]	1[illegible]7
A 66	---	---	2:25	44:50	31:05	---	---	23:35	33:00	---	---	---	[illegible]	[illegible]	[illegible]
P 67	---	---	---	31:20	52:40	62:35	---	22:35	51:00	---	---	---	[illegible]:00	[illegible],410	1[illegible]7
R 68	---	---	---	---	42:20	83:15	66:[illegible]	---	24:50	59:35	---	---	[illegible]:05	[illegible],[illegible]45	[illegible]
69	---	---	---	---	33:40	19:45	22:55	---	---	42:40	10:30	---	---	1[illegible]	114
65	27:10	36:25	77:10	---	---	---	---	[illegible]	[illegible]	---	---		[illegible]	[illegible]	11[illegible]
M 66	---	---	41:25	71:40	66:30	---	---	[illegible]3:20	56:10	---	---		[illegible]:15	[illegible],520	91
A 67	---	---	---	91:40	91:20	77:50	---	30:30	53:35	---	---		72:45	40,[illegible]	107
Y 68	---	---	---	---	43:14	75:15	62:35	---	27:30	54:20	12:40		4:30	29,225	1[illegible]
69	---	---	---	---	55:40	47:30	24:2[illegible]	---	---	42:05	32:10		---	[illegible],170	1[illegible]3
65	21:50	28:50	1[illegible]:30	[illegible]	[illegible]	---	---	[illegible]	31:[illegible]	---	---		2[illegible]	[illegible]	1[illegible]1
J 66	---	---	45:55	69:00	75:25	---	---	[illegible]:20	41:05	---	---		45:25	[illegible]	1[illegible]7
U 67	---	---	---	121:50	[illegible]:30	91:[illegible]	---	[illegible]5:[illegible]	1[illegible]:45	15:40	---		24:20	1[illegible],[illegible]	1[illegible]4
N 68	---	---	---	---	65:45	111:50	29:10	---	2[illegible]:25	74:10	60:05		16:05	[illegible],5[illegible]	112
69	---	---	---	---	63:25	[illegible]:30	27:[illegible]	---	---	29:55	22:00		---	[illegible]	1[illegible]
65	---	---	1[illegible]	[illegible]	42:[illegible]	---	---	[illegible]:20	42:40	---	---		42:15	43,[illegible]	1[illegible]6
J 66			24:50	27:30	54:25	---	---	1[illegible]:15	---	---	---		4[illegible]:15	16,[illegible]	[illegible]
U 67			---	40:10	4[illegible]:25	10[illegible]:2[illegible]	---	[illegible]:30	44:20	93:40	---		[illegible]	[illegible],[illegible]15	1[illegible]
L 68			---	---	80:15	92:35	---	---	37:50	110:40	56:55		4[illegible]:35	[illegible]	11[illegible]
69			---	---	45:10	71:[illegible]5	29:40	---	---	27:45	70:30		---	14,410	1[illegible]
65			83:30	[illegible]:40	76:[illegible]5	---	---	12:[illegible]	2[illegible]:20	---	---		2[illegible]:10	30,520	1[illegible]
A 66			---	23:25	1[illegible]:35	---	---	[illegible]:25	1:15	---	---		7:[illegible]	7,[illegible]15	[illegible]
U 67			---	133:05	92:45	62:45	---	75:40	47:[illegible]	74:10	---		34:05	57,[illegible]10	1[illegible]6
G 68			---	---	77:00	79:20	---	---	36:35	100:25	36:30		4[illegible]	[illegible]	1[illegible]
69			---	---	60:20	56:00	57:20	---	---	10:05	53:20		---	2[illegible],705	[illegible]
65			40:50	55:[illegible]	64:40	---	---	15:35	[illegible]:15	---	---		1[illegible]	[illegible],[illegible]25	1[illegible]2
S 66			---	23:25	13:35	---	---	30:25	1:15	---	---		7:3[illegible]	7,[illegible]	1[illegible]
E 67			---	84:40	89:20	70:15	---	50:15	24:10	64:15	---		59:0[illegible]	44,1[illegible]	1[illegible]
P 68			---	---	78:35	22:55	---	---	15:30	66:00	43:25		42:05	[illegible],830	130
69			---	---	34:15	50:05	24:25	---	---	26:35	1:10		---	14,[illegible]	[illegible]
65			74:15	78:05	35:40	---	---	[illegible]:35	27:45	---	---		11:[illegible]	23,[illegible]	112
O 66			---	95:25	70:00	---	---	15:25	55:40	---	---		[illegible]:50	27,1[illegible]	137
C 67			---	71:25	85:00	62:35	---	19:10	58:35	49:10	---		20:50	[illegible]	1[illegible]
T 68			---	---	65:25	34:[illegible]	---	---	9:40	56:20	23:45		9:10	[illegible]	11[illegible]
69			---	---	29:45	30:50	22:00	---	---	25:45	---		---	10,[illegible]70	75
65			52:25	[illegible]	[illegible]	---	---	[illegible]	34:00	---	---		[illegible]:45	[illegible]	1[illegible]
N 66			---	105:55	56:20	---	---	29:10	25:10	---	---		41:40	30,115	1[illegible]
O 67			---	64:50	73:45	6[illegible]:05	---	[illegible]:[illegible]5	30:05	72:45	---		20:1[illegible]	[illegible],030	172
V 68			---	---	25:40	33:25	---	---	8:15	33:45	20:45		3[illegible]:35	1[illegible]	1[illegible]
69			---	---	25:30	46:13	44:00	---	---	8:40	---		---	1[illegible]	[illegible]
65			50:20	67:[illegible]	[illegible]:25	---	---	[illegible]:25	2[illegible]:40	---	---		27:1[illegible]	[illegible]	1[illegible]
D 66			---	112:30	11:15	71:55	---	40:50	54:05	---	---		31:1[illegible]	[illegible]	11[illegible]
E 67			---	40:50	36:25	3[illegible]:05	---	1[illegible]:25	17:3[illegible]	3[illegible]:55	---		[illegible]:00	20,910	1[illegible]1
C 68			---	---	33:25	54:45	---	---	7:35	22:55	10:35		:40	1[illegible]	120
69			---	---	21:20	20:00	29:35	---	---	---	---		---	7,0[illegible]	74

Figure 3

Flying Summary of Ellsworth Air Force Base Aero Club beyond their present hangar facilities.

AERO CLUB COSTS OF PRODUCTION

Aero clubs gather revenues primarily from initiation fees, monthly dues and charges for aircraft rentals. These charges are determined by the board of governors of each club. For accurate development of charges the board must know the cost of its club's operation.

Air Force Manual 215-4 requires that a monthly financial report be published for the aero club by the Base Central Accounting Office (CAO). The Ellsworth Air Force Base Aero Club Board of Governors relied on this financial statement for vital information on club costs. The reports are also used to monitor the club operation by the Base Commander and higher headquarters. A financial statement is a report of expenses--the explicit cost of activities. Various tests and ratios of an accounting nature are performed on the information given in the financial statement. These tests indicate the degree of financial stability under which a club is operating when compared to fixed Air Force standards. An important point to be made is that the cost information in the financial statement alone is not adequate for management to determine suitable rates to charge for flying because they are often averages for all aircraft. An average of this type is acceptable for accounting purposes but handicaps price determination on a user benefit basis.

It is necessary to make several assumptions clear before continuing. The club is operated to provide flying activity to increase the morale of Air Force personnel. Thus, it can be assumed (as is consistent with utility theory) that an increase in the price of flying to membership will decrease their usage of aircraft and also their pleasure in flying. Therefore, there will be a lowered contribution to morale. That is, the member will not be able to fly as much as he could before the price was increased, or he will have to sacrifice other goods and services to fly. It might be said that aero clubs, in a non-competitive environment, need not be as precise about pricing as other firms that are in competitive environment; but, the need to keep the price to members as low as possible and to be financially stable and self-supporting makes the establishment of proper rates and prices by the aero club management an important factor in successful club operation.

SUMMARY

The application of classical micro-economic production function analysis to an aero club's operation is not possible because aero club resources are not specifically definable, data are not available, or the resources are not controllable. However, the guidance for pricing that is given through production analysis would be valuable to the club's management. Fulfilling the combined requirement for providing an aero club to contribute to members' morale and maintain a self-supporting operation is a difficult task for perhaps inexperienced untrained managers. This does not then leave a large margin for error. Guidance in this area would be most helpful.

The problem of operating an aero club on a self-supporting basis is an economic one. Experience or training in economic management is more relevant to the problem than flying proficiency. However, this inexperience or lack of training could be supplemented with adequate and proper guidance so that individuals with an average education and desire could operate an aero club on a financially stable basis.

Chapter 3

BREAK-EVEN ANALYSIS

Break-even analysis is a tool for management decision making. It involves profit planning,[1] and deals fundamentally with the relationship between total revenue and total cost.[2] Revenue, volume/output, variable costs, and fixed costs are four distinct categories involved in break-even analysis.[3] When computed properly, the effects of changes in any of the variables on the profits of the organization is determinable. Further, break-even analysis can be simply charted for presentation to management.

The Need

Aero clubs are required to be self-supporting, financially stable, and operated in a businesslike manner.[4] If they are not, they will be closed. Such was the case of the Ellsworth Air Force Base Aero Club. The senior installation commander directed in June, 1971 that the Ellsworth Air Force Base Aero Club close because of its deteriorating

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[1]R. I. Levin and C. A. Kirkpatrick, Quantitative Approaches to Management, (New York: McGraw-Hill Book Company, Inc., 1965), p. 36.

[2]Ibid., p. 18 [3]Op cit., p. 24.

[4]Department of the Air Force, Air Force Regulation 215-2, Recreation, Air Force Aero Clubs, (Washington: Department of the Air Force, 1965), p. 3.

financial position.[5]

The responsibility for an Air Force Base aero club rests with the base commander. The actual performance of the club depends on the manager's and advisory board's guidance. These key people are primarily from United States Air Force resources at the base where the club is located. Provision for hiring a civilian manager is made in the regulations governing club operation and, in fact, is encouraged.[6] However, the salary for a fully qualified manager is usually prohibitive. Further, it is very difficult to find and attract a manager with a thorough understanding of flying operations and complimentary business management experience. People attracted to aero clubs as members and managers are more often flying enthusiasts than business managers. The careers of Air Force personnel seldom include development of economic management skills. Yet, the economic management of an aero club is challenging enough for the experienced, let alone for the inexperienced.

Management can overcome at least a part of its inexperience by using available Air Force publications, Air Force Manuals and Regulations governing non-appropriated sundry fund operations, including aero clubs, specify the following as guidelines for managers:

1. All income must be used to finance the activity.[7]
2. Dividends cannot be paid.[8]
3. Fincial reports must be prepared using prescribed

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[5]Rushmore Advocate, op. cit. [6]AFR 215-2, op. cit., p. 3.

[7]AFR 176-1, op. cit., p. 3. [8]Ibid.

procedures and presented in standard formats.[9]

4. One aircraft should be purchased for every 22-25 members.[10]

5. Rates for initiation fees and monthly dues are suggested.[11]

All of these guides are helpful and considered reasonable. However, their impact on club management is primarily to define the boundaries/limitations of aero club management's authority and control, and are of little assistance in solving the problem of keeping a club self-supporting.

The following guidelines include a method of determining break-even costs of flying.[12]

> Estimating Hourly Cost of Aircraft Operation. In establishing the hourly cost of operation of aircraft, the goal is to provide the best kind of flying to the most people at the least cost to the individual. Therefore, it is necessary to consider selecting the proper airplane and setting realistic rates. The hourly rates must consider how many members can afford to pay for them as well as how many will utilize them. User fees must support any particular aircraft. There are two kinds of expenses connected with any airplane operation, fixed costs and variable costs:
>
> a. Fixed costs occur regardless of the number of hours flown. Such expenses consist of depreciation or mortgage and interest payments, protection against aircraft hull damage and public liability claims, cost of hangar or tie-down, salaries and other miscellaneous operating costs--such as utility bills, stationery, etc.
>
> b. Variable costs are those expenses that result entirely

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[9]AFM 215-4, op. cit., p. 14

[10]Ibid.

[11]Ibid., p. 4.

[12]Ibid., p. 14.

from the actual cost of flying. These expenses consist of cost of engine overhaul, cost of periodic inspection, and cost of fuel and oil. The following method of determining the breakeven cost of flying is suggested. From the annual fixed costs subtract the amount of annual dues the club may expect to collect from the membership. Divide this amount by the total number of hours that aircraft can be conservatively forecast to fly during the same period. To this, add the variable cost to fly the aircraft one hour. If other reserves are to be created, a factor must be added to this figure.

Many points relevant to the problem of keeping an aero club self-supporting are made in the above-quoted guidance to aero clubs. These suggestions will be examined individually.

The goal of an aero club is clearly defined as being "to provide the best kind of flying to the most people at the least cost to the individual." Further, "careful consideration must be given to selecting an airplane and setting its rates." Selecting the proper aircraft is a matter of demand analysis. Setting the proper rate depends on cost identification and utilization of the aircraft after it is purchased. The guidance is specific in stating "user fees must support any particular aircraft."

The method suggested to determine the break-even cost of flying is not directed toward meeting the goals of the aero clubs, nor is it consistent with the previously specified guideline. For example, the formula given for determining break-even cost of flying for a period of a year is:

$$\frac{\text{All Fixed Costs - Anticipated Dues}}{\text{Forecasted Flying Hours}} + \text{Aircraft Variable Cost per Flying Hour.}$$

All aircraft and administrative fixed costs are lumped together in this formula. Consequently, each member's monthly dues contribute equally to these fixed costs. However, the fixed costs of aircraft varied considerably among the Ellsworth Air Force Base aero club aircraft. The training aircraft had much lower fixed costs than the larger cross-country type aircraft. The range was from approximately $0.00 to $350.00 per month.[13]

Variable costs at the Ellsworth club also varied in a range from approximately $3.75 to $6.50 per hour. Data on costs are included in Table 1, listed individually for each aircraft in the Ellsworth Air Force aero club. The result of these divergent costs for the various aircraft is that each type has its own specific hourly rate. Again, as shown in Table 1, these rates ranged from $6.50 to $15.00 per hour.

Equally significant to the problem of divergent costs is that of variable utilization rates. The cross-country aircraft usually can be expected to fly fewer hours per month than a training aircraft. For example, the Ellsworth Air Force Base aero club rules required only an average of two hours per day be flown when an aircraft was being used for a cross-country flight. Since cross country aircraft also have higher fixed costs, the hourly rental rate must be higher than for other types of aircraft if, as directed, each aircraft is to be supported by user fees. Thus, the use of break-even analysis as described does not provide a workable solution for aero club problems. A more specialized use of the tool is necessary.

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[13] The T-34 is listed as having no fixed costs. This is a special case because it is a United States Air Force aircraft on loan to aero clubs. Therefore, it had no loan payment, insurance or depreciation cost. This United States Air Force practice has since been discontinued and T-34 aircraft have been recalled.

Table 1

Ellsworth Air Force Base Aero Club Aircraft
Monthly Fixed Costs and Hourly
Variable Costs

Aircraft (Type and Number)	Costs	
	Monthly,Fixed	Hourly, Variable
Cessna 150		
N 6209 R	$ 182.86	$ 3.75
N 2957 J	144.58	3.75
N 22053	160.00	3.75
Piper PA 28		
N 9652 W	238.00	4.09
N 9617 W	209.64	4.02
N 4953 J	359.50	6.32
USAF T-34		
6060 C	0	3.50

The Approach

Break-even analysis can be applied to the aero club management problem of maintaining a self-supporting operation if it is used to determine the rate to be charged for each individual aircraft. The need is to determine that rental rate per hour for each aircraft which will sustain it as self supporting.

One method which can be used to determine the break-even rental rate (BERR) for an aircraft would be to divide its fixed cost over a given period (FC_p) by the utilization rate (UR_p) estimate for the same period and then add to that the variable cost of operation per hour (VC/hr), i.e.,

$$BERR = \frac{FC_p}{UR_p} + VC_{per\ hr.}$$

For example, Ellsworth Air Force Base Aero Club N 6709 R, a Cessna 150, had a fixed cost of $182.86 per month, an estimated utilization rate of 66 flying hours per month, and a variable cost per hour of $3.75. Thus, the break-even rental rate (BERR) would be $6.50, i.e.,

$$BERR = \frac{\$182.86}{66} + 3.75 = \$6.50$$

A break-even analysis of each aircraft separately is most meaningful to management decisions, especially in those areas related to financial stability. The analysis of each product (an aircraft ready to fly) separately most clearly brings out the impact of changing resource costs on revenue.[13] This approach is consistent with the

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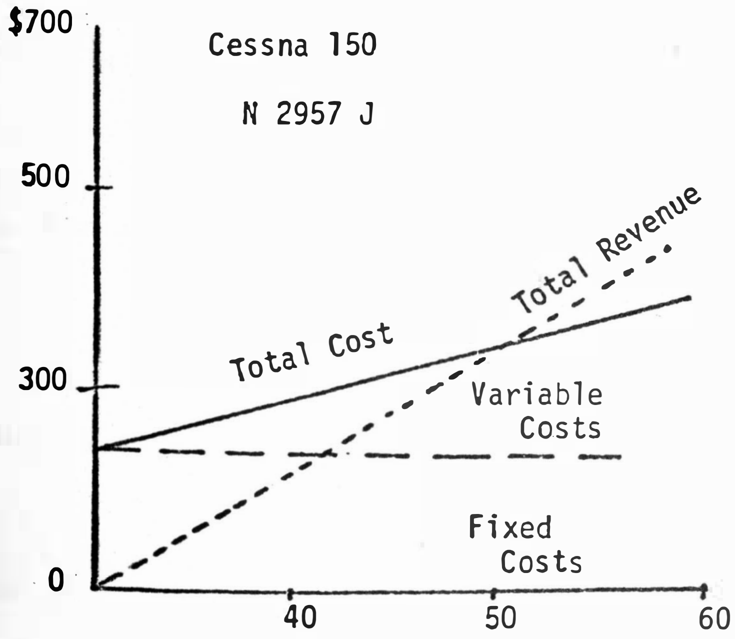
[13] R. I. Levin, and C. A. Kirkpatrick. Quantitative Approaches to Management, (New York: McGraw-Hill Book Company, Inc., 1965), p. 18.

directive that the hourly rate should be based on a particular aircraft in its given environment. From a reliable information system (to be presented in the following chapter), the fixed and variable costs of each aircraft can be determined.

Break-even analysis can be presented graphically, as in Figure 4, to aero club management in a single picture of the effects of differing levels of fixed and variable costs and utilization rates. The two aircraft represented in Figure 4 are the two extremes that were operating in the Ellsworth Air Force Base aero club. The Cessna 150 is one of three of the type aircraft used primarily for training flights. It is comparatively economical because its costs are low and utilization is high. The Piper PA 28 is a much larger aircraft with a bigger engine and more sophisticated equipment which made it ideal for cross-country operation. However, coupled with its higher costs was a lower utilization rate; aircraft taken on cross-country flights are required only to average two flying hours per day while gone with time for bad weather exempt. Therefore, charges for that aircraft were figured on a utilization rate of forty hours per month.

The method used to determine the break-even points for the graphs is straight-forward and easy to use. The break-even point (BEP) in units of production (P) (flying hours) equals the total fixed cost (TFC) divided by the price (P) of each unit of production (aircraft rental rate) minus the variable cost (v), i.e.,

$$BEP = \frac{TFC}{P-V}$$



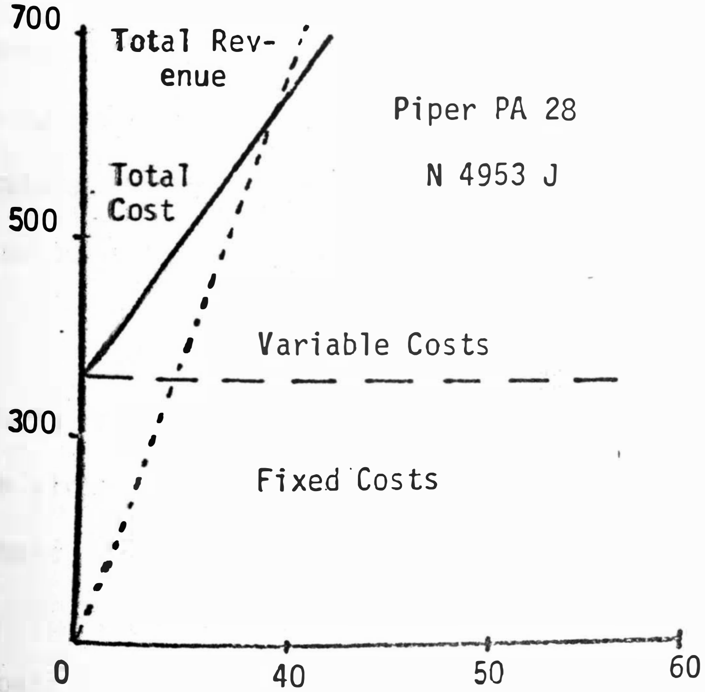


Figure 4

Impact of Aircraft Costs and Utilization on Rental Rates

For example, the Cessna 150, N 2957 J, used in the figure had a TFC of $144.58, the price was $6.50 per hour and the variable cost $3.75.

$$\text{BEP} = \frac{\$144.58}{\$6.50 - \$3.75} + 52.8 \text{ hours}$$

To determine BEP ($), in terms of revenue:

$$\text{BEP (\$)} \doteq \frac{\text{TFC}}{1 - V/p}$$

Working through the BEP ($) using data for the Piper PA 28 in Figure 4:

$$\text{BEP (\$)} \frac{359.50}{1 - \frac{6.23}{15.00}} \doteq \$630.18$$

Application of Break-Even Analysis

As a tool of management, BEA is helpful in decision making, particularly in the area of profit planning.[14] Product planning can be further broken down into decisions of product planning, pricing, and equipment selection and replacement, all of which are inherent in aero club operations.[15]

Pricing. Once an aircraft is purchased by an aero club, the hourly rates are based on the cost of operation and the utilization of the aircraft. Most of the factors influencing changes in cost and demand are beyond the control of the club.

The fixed and variable cost fluctuations of aircraft have an impact on the hourly rate charged for aircraft rental. Fixed costs are

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[14] Levin and Kirkpatrick, op. cit. [15] Ibid., p. 24.

determined in accordance with Air Force regulations, which set schedules for depreciation, loan payments and insurance premiums. However, the variable costs do change. The prices of gasoline, oil, and parts vary. In addition, these price changes are not very predictable. Management must learn to anticipate these price fluctuations and estimate the effect these changes make on the club's operation.

Changes in fixed cost have a different impact than changes in variable costs. For example, if the fixed cost of a Cessna 150 increased from \$150.00 to \$175.00 per month, the price per hour (all other factors remaining constant) would have to increase \$ .50, given a utilization rate of 50 hours per month, i. e.,

$$BER = \frac{FCC - \$25.00}{50} + VC = \$\ .50$$

In contrast, changes in variable cost cause a direct and equal off-setting change in price.

A real problem for management is estimating the utilization of aircraft. This is very dependent on weather influences and member demand. Price depends on both cost and utilization. The cost can be readily identified by a management information system to be presented in Chapter 4. The utilization of aircraft would have to be closely monitored on a daily basis by the club manager. He can identify the reasons that aircraft do not fly and guide the Advisory Board in their determination of rental rates.

Product Planning. There are two guidelines given by Air Force directives for aero club fee composition: (1) there should be approximately one aircraft for every 22-25 members, and (2) the aircraft should be standardized as much as possible.

Break-even analysis can aid management in making more precise determination of aircraft mix. The price per hour will decrease as flying time is increased. However, not all hours of available flying time have the same value. For example, flying hours during the weekend are more desirable than those during the week. Management must first analyze the demand, then decide if the demand is sufficient to support another aircraft. The board members as well as the members can be shown through break-even analysis, how demand fixes rates in the manner previously presented in Figure 4. Each aircraft is required to support itself, and the impact of owning an aircraft which is not utilized can upset a club's delicate economic structure, especially when the club is striving to operate at a point of least cost to members. Members must honestly evaluate their demand and not mislead the management into buying aircraft which will not be flown.

Equipment Selection and Replacement

The decision to buy an aircraft of the same type as one already owned would be dealt with differently than buying a different type aircraft. This is because when calculating the break-even price, all aircraft of the same type could be combined. The need for an additional aircraft occurs when the demand for an aircraft is exceeded by the availability of similar aircraft already owned. There are two limitations to aircraft availability: (1) the aircraft is being flown, or (2) the aircraft is in maintenance. The management of a club must learn through demand analysis how much the members will fly an aircraft and at what price. If an aircraft rate is set and demand increases beyond the break-even utilization rate, the aircraft will be producing a profit. The tenets of aero club management direct that a least-cost-to-members operation be conducted which would mean that the price could be lowered. However, the same tenet of operation also includes the phrase "the best kind of flying to the most people," which implies that a second aircraft at a slight cost increase may be satisfactory. Management must then estimate the total utilization that could be achieved from both aircraft, as well as costs, and fix a rental rate equal for both to break even. One caution is required at this point. Newer model aircraft have greater appeal. Thus, when seeking an additional aircraft, management should consider the alternatives of purchasing a used aircraft or trading in an old airplane and buying two new ones so that the aircraft have the same appeal to the people who will fly them.

Replacement of aircraft is necessary when the membership demand is not adequate to support the cost of the aircraft's operation. The natural tendency is for the price to be raised by management as the utilization by members decreases. This naturally does not encourage more flying for that aircraft. Management should recognize this situation as it arises and not create a stalemate by continuing to raise prices. Management must immediately take steps to sell the aircraft, if warranted, and at the same time keep the aircraft flying at any price which is greater than the variable cost. This will enable the aircraft to pay part of the fixed costs which continue until the aircraft is sold.

LIMITATIONS TO BREAK-EVEN ANALYSIS

Specific underlying assumptions and possible pitfalls are listed by several authors for using break-even analysis. These will be presented and discussed in terms of the application of break-even analysis by aero-club management as previously presented.

Assumptions

The following assumptions are given as underlying any use of break-even analysis:[15]

1. Sales price will remain constant.
2. Sales mix will remain constant.
3. Production will reasonably follow sales patterns.
4. Costs can be easily classified into fixed and variable elements.
5. Variable costs will vary in a constant ratio.
6. Fixed costs will remain constant.
7. Direct labor and machine efficiency will remain relatively constant.

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[15] B. C. Lemke and J. D. Edwards (ed.). Administrative Control and Executive Action (Columbus: Charles E. Merrill Book, Inc., 1961), p. 629.

Sales price will remain constant. The prime purpose of BEA in an aero club is to insure that each aircraft will at least break even at the established rates and thus contribute to the self-supporting goal of each aero club. Fluctuation of variable costs and seasonal changes in utilization should be anticipated so that sales prices, if properly set, can remain constant during a year's accounting period. Finally, the point of the assumption is that if sales price is changed, then a new BEA must be established.

Sales mix will remain constant. This assumption can be met in an aero club by having the BEA computed for each class of aircraft separately (i.e., Cessna 150, T-34, Piper Cherokee 140, etc.). The assumption adds further justification for computing break-even rates for each individual aircraft rather than for each class (except in special circumstances as described earlier). This is because costs for aircraft in the same class may vary significantly because of age and differing maintenance requirements. When this occurs, flying ratios would not remain constant between like aircraft from month to month. Thus, individual break-even analysis for each aircraft would make it easier for aero club management to make accurate decisions within the narrow parameters within which they are required to operate.

Production will reasonably follow the sales pattern. In an aero club situation production equals sales. An hour of flying time produced is an hour sold. The pilot is the buyer, but he is also part of the production process as well as being the buyer.

Costs can be easily classified into fixed and variable elements. This will be handled extensively in Chapter 4. Aircraft costs are readily definable into fixed costs (loan payment and depreciation) and variable costs (from hourly operation such as gas, oil and maintenance).

Variable cost will vary in a constant ratio. The variable costs per hour of flying of an aircraft are constant. For example, the rate of fuel and oil consumed remains the same and the maintenance costs are equally prorated for each flying hour. If the average life of a generator, for example, is estimated at one hundred hours, then 1/100th of its cost is included as part of the variable cost per hour.

Fixed cost will remain constant. The elements of the aircraft's fixed costs are established by AF Manual 215-4, Air Force Aero Club manual. Changes to the Depreciation, insurance, and loan schedules are rare. If they were to change, then it must be recognized that the BEA would have to be recomputed.

Direct labor and machine efficiency will remain relatively constant. The maintenance labor expends on aircraft is primarily of the nature of "remove and replace" or "disassemble and inspect." Hand tools are most commonly used. Labor efficiency can vary among aircraft, but again, this difficulty is avoided when a separate analysis is made for each aircraft.

Possible Pitfalls

The assumptions favoring the basis of BEA are generally valid in their application to aero clubs. However, limitations of break-even analysis must still be examined. Levin and Kirkpatrick lists the following eight possible pitfalls to BEA use:

1. Cost accounting system should provide valid figures.

2. The application should be over a narrow range of output to insure the cost-revenue-volume relationship is linear.

3. Using straight-line total revenue curves is perhaps a misrepresentation of demand schedules.

4. Break-even analysis should be restricted to stay within the budget period, which is usually one year.

5. Limit the area of analysis. Too many products are contrary to performance picture.

6. Getting specific cost information by product can be difficult.

7. Break-even analysis is a static device. It is helpful in relatively stable and slow-moving situations.

8. Break-even analysis is an extremely simplified picture of cost-revenue-volume relationships. It should be a guide to decision making, not a substitute for judgment.[16]

A discussion of each of these cautions regarding the application of break-even analysis in the aero club is presented to insure the validity of this application.

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[16] Levin and Kirkpatrick, Quantitative Approaches to Management, op. cit., pp. 42-43.

Valid cost accounting. The need for valid cost accounting is acknowledged as important to providing accurate figures as a firm basis for break-even analysis. Chapter 4 of this study is devoted to the goal of developing a system for this purpose. The impact of variable costs on the break-even point is particularly significant.

Misrepresentation and distortion. Misrepresenting cost-revenue-volume functions as linear is minimized by applying BEA only over a narrow range of flying hours. The weather restrictions to flying plus maintenance requirements limit aircraft operation to sixty hours or less per month. Greater utilization makes a second aircraft feasible. On the other hand, the demand by the membership must be greater than forty hours a month in order to break even at a price below that normally charged by commercial aircraft rental agencies. So the range of consideration is at output levels of from 40-60 flying hours per month. This is deemed to be a narrow enough range to minimize errors due to non-linearity. There are no economies of scale, in the traditional sense, as the volume of flying hours increases. Each flying hour adds the same increment of variable costs - gasoline, oil, and maintenance cost contribution.

Problems of demand analysis. Demand analysis of aero club members is beyond the scope of this study. Aero clubs do not need to monitor demand and decisions on buying and selling aircraft are a direct reflection of management's demand appraisal. Unlike commercial businesses, the United States Air Force aero clubs will search for the lowest cost and price of providing flying to its membership. As demand decreases, the price per hour will increase. If the increase is significant to the membership, it may well cause further reductions in flying by members. Eventually, the aircraft will have to be sold. The use of demand schedule analysis by aero clubs is generally minimal because of insufficient data for analysis. It is further debatable whether or not actual changes in price would be significant. For example, a ten-hour-per-month drop in demand would require approximately a fifty-cent-per-hour increase in price. An active pilot flys approximately four hours per month at a cost of $30 to $50 per month. Therefore, the percentage change is small (in this example 4 to 6 percent) and perhaps not significant.

Limit to budget period. This study suggests that as any changes in costs take place, the break-even point should be recalculated, so that the analysis is always accurate. This is an easy but vital task. The Board of Advisors meets monthly to review the club's operation and it should have accurate performance data at that time. In this manner, the break-even analysis will be used only in a short-run situation.

Limit scope. As previously emphasized, each aircraft will be analyzed separately for its break-even point. The loss of product performance information (i.e., the relationship between output, revenue, and costs, when too many products are lumped together) is avoided.

Specific cost information. Obtaining specific cost information by product can be difficult because most of the aircraft's variable costs are a contribution to be held for future maintenance. A conservative approach based on current parts and labor costs, is all that can be recommended. That is, forecast costs of replacement parts and replacement dates must be done pessimistically and then management should buy frugally.

Static device limitation. Break-even analysis is best suited to static situations. United States Air Force aero clubs are such organizations. Fixed costs are regulated by Air Force directives. These are rarely changed and never without warning. Accidents, though rare, are the greatest threat to stability.

Use as a guide. Break-even analysis as presented in this paper is a means which can be used by untrained and inexperienced management personnel in aero clubs to better understand basic relationships between costs and revenue. The Advisory Board must evaluate the validity of the information available and reach decisions based on their own judgment.

SUMMARY

Break-even analysis is proposed as an adequate tool for management of aero clubs to use for setting aircraft rental rates in lieu of developing production functions for aircraft useage. The use of production functions was discussed in Chapter 2 and was found to be impractical for aero club use. Aero clubs must operate on a self-supporting basis and are further directed to provide aircraft to their members at the least cost possible.

The environment of an aero club is well suited to break-even analysis because it is a stable operation with easily identified resources which operate within a limited range of control. The remaining factor - can costs be readily identified and separated into fixed and variable components - is the subject of Chapter 4.

Chapter 4

MANAGEMENT INFORMATION SYSTEM

In the previous chapter, break-even analysis techniques were identified and adapted to the aero club situation to provide the management of aero clubs a guide and tool for decision making. Break-even analysis was shown to be a method which could be used by aero club advisory boards and managers to provide their members with least-cost flying while remaining financially solvent. As in all organizations, however, aero club decision makers require information relevant to their problems to make decisions. Without a system for providing management with the necessary information, break-even analysis is of no use to aero clubs.

C. A. Stone has developed the following six steps as being necessary for creating and utilizing a management information system. They are used as a guide in the formulation of the management information system described later in this chapter for use by aero clubs.[1]

1. Determine what information must be known
2. Establish a data gathering instrument
3. Develop "massage" procedures
4. Analyze the information

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[1] C. A. Stone., Applied Management-Maintenance, (Wright-Patterson Air Force Base: Logistics Command, 1967), p. 4.

5. Take action on the information received
6. Evaluate the results.

In considering what information it must know, management must try to eliminate all information from the system which is not absolutely essential to its decision making purpose. Information that is gathered because it is "nice to know" or because it might be important later must be eliminated. Once the basic information needs of management have been agreed upon, a data gathering instrument must be developed. Three steps are required to develop this instrument. First, the data required to inform management of what it needs to know must be identified. Second, the original source of the data must be identified. Third, a tool for gathering the data must be agreed upon. Most often, this tool is a paper or mechanized data form, although other types of data gathering instruments can be developed.

Once the data have been collected, a "massage" procedure must be developed. This phase consists of manipulating the data as necessary to provide management with the required information in a useable format so it can be used for decision making. From this point on, the management information system has performed its functions. Management must then perform the last steps of analyzing the information provided, taking necessary action based on the information received, and evaluating the results of actions taken.

As long as the Ellsworth Air Force Base Aero Club was in operation, its Advisory Board used a financial statement published monthly by the Base Central Accounting Office (CAO) as its primary source of

ELLSWORTH AIR FORCE BASE AERO CLUB
FINANCIAL STATEMENT
31 December 1968

ASSETS

CURRENT ASSETS			
Cash in Bank	$4,011.76	$	$
Petty Cash	20.00		
Accounts Receivable			
Members Dues (Sch A-2)	742.00		
Members - Flying	758.16		
Members - Others	811.50	6,343.42	
INVENTORIES			
Fuel & Oil	243.25		
Parts	2,358.12		
Soft Drinks	13.96		
Charts & Logs	1,246.47	3,861.80	
PREPAYMENTS			
Dep. on Cont.	9.63		
CAO	130.00		
Maintenance	524.40		
Supplies	26.25	690.28	
TOTAL CURRENT ASSETS			10,895.50
OTHER ASSETS			
Aircraft in Renovation	990.00		
Less Depreciation	(49.50)	940.50	
Aircraft	61,466.50		
Less Depreciation	(14,680.13)	46,786.37	
Furniture & Equip.	8,867.76		
Less Depreciation	(2,309.31)	6,558.45	
Ground School		290.87	
Misc. Tools		261.64	
TOTAL OTHER ASSETS			54,837.83

LIABILITIES AND NET WORTH

CURRENT LIABILITIES			
Accounts Payable	$ 20.08		
Loans Payable (SAC)	6,312.00		
Advance Flying	341.01		
Withholding Tax Pay.	89.10		
FICA Tax Pay.	82.86		
Reserve for Repair	2,651.86		
TOTAL CURRENT LIABILITIES		9,496.91	
OTHER LIABILITIES			
Loan Payable (SAC)	25,762.00		
Less Amt Inc. Current Liabilities	(6,312.00)		
TOTAL OTHER LIABILITIES		19,450.00	
TOTAL LIABILITIES			28,946.91
NET WORTH			
Fund Equity 30 November 1968		37,120.03	
Net Loss for December 1968		(333.61)	
TOTAL NET WORTH			36,786.42

Figure 5

Ellsworth Air Force Base Aero Club
Financial Statement
31 December 1968

ELLSWORTH AIR FORCE BASE AERO CLUB
STATEMENT OF OPERATIONS AND NET WORTH SCHEDULE A
31 December 1968

	YEAR TO DATE	TOTAL MONTHLY	1968 N4953J PA 28R	1967 9652W PA 28	1967 2957J Cessna 150	1965 6209R Cessna 150	1964 7617W PA 28	1952 6080C T-34	CLUB GENERAL
FLYING HOURS									
Non-Revenue	126:19								
Revenue	3274:45	129:55	10:35	22:55	54:45	33:25	7:35	:40	
INCOME									
Dues	6,039.51	600.00							600.00
Initiation Fees	950.00	60.00							60.00
Flying Activities	18,960.55	756.55	84.66	137.50	297.79	183.79	48.14	4.67	
Soft Drinks	23.35	.40							.40
Charts and Logs	262.94	34.00							34.00
Ground School	380.00	270.00							270.00
Instructor Fee Income	6,074.11	370.64							370.64
Vending Machine	3.90	-0-							
GROSS OPERATING PROFIT	32,694.36	2,091.59	84.66	137.50	297.79	183.79	48.14	4.67	1,335.04
OPERATING [illegible]									
Fuel & Oil	4,351.50	167.97	18.48	30.23	65.51	40.31	10.08	3.36	
Maint & Repair	2,808.53	230.93	28.75	13.54	15.70	92.36	13.54	41.98	25.06
CAO Expense	1,183.61	74.01							74.01
Salaries and Wages	13,724.00	808.64	9.31	9.31	9.31	9.31	9.31	9.31	752.78
Fica Expense	521.81	41.56							41.56
Insurance	3,272.83	296.75	88.73	54.31	28.49	39.47	48.08		37.67
Office Expense	182.58	7.00							7.00
Freight	77.45	-0-							
Supplies	63.86	-0-							
Entertainment	268.32	42.00							42.00
Loss on Cont.	1.26	.24							.24
Subscriptions	1.10	-0-							
Advertising	16.18	-0-							
Tel & Telegraph	358.12	37.90							37.90
Travel	140.00	-0-							
Miscellaneous Exp.	456.58	27.50							27.50
Depreciation	6,732.94	690.70	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		[illegible]

Figure 6

Ellsworth Air Force Base Aero Club Statement of Operations and Net Worth Schedule A 31 December 1968

ELLSWORTH AIR FORCE BASE AERO CLUB
SCHEDULES
31 December 1968

SCHEDULE A-1

MEMBERSHIP	NUMBER	MONTHLY DUES	INITIATION FEES
Active	108	5.00	10.00
Associate	11	5.00	10.00
Introductory	1	5.00	

SCHEDULE A-2

ACCOUNTS RECEIVABLE	DUES	FLYING	OTHERS
Current	732.00	758.16	785.97
30-60 Days	10.00	-0-	25.53
60-90 Days	-0-	-0-	-0-
Over 90 Days	-0-	-0-	-0-
Total	742.00	758.16	811.50

SCHEDULE A-3

LOANS PAYABLE Lender, Date & Amounts of Initial Loan		Term	Monthly Payable	Balance
SAC Aero Club Fund	15 January 1968	5 years	$526.00	$25,762.00

CAPITAL EXPENDITURES

Balance 30 November 1968 Furniture, Equipment and Aircraft Account	71,324.26
Purchases: None	-0-
Disposals: None	-0-
Balance 31 December 1968	71,324.26

Furniture, equipment and other property were last inventoried and reconciled with property records by a disinterested inventory team on 31 March 1968.

INVENTORY AS OF CLOSE OF BUSINESS
31 December 1968

PREPAID SUPPLIES PARTS	
General Ledger	2,439.39
Actual Inventory	2,358.12
Supplies Difference	81.27

ACTIVITY INVENTORIES	
Fuel & Oil	243.25
Soft Drinks	13.96
Charts & Logs	1,246.47
Misc. Tools	261.64

14 January 1969 Ralph L. Cornell
Assistant for Non-Appropriated Funds, CAO

14 January 1969 Joseph H. Carmena, Jr. 17/COC
Custodian, Ellsworth Air Force Base Aero Club PRESIDENT

Figure 7

Ellsworth Air Force Base Aero Club Schedules
31 December 1968

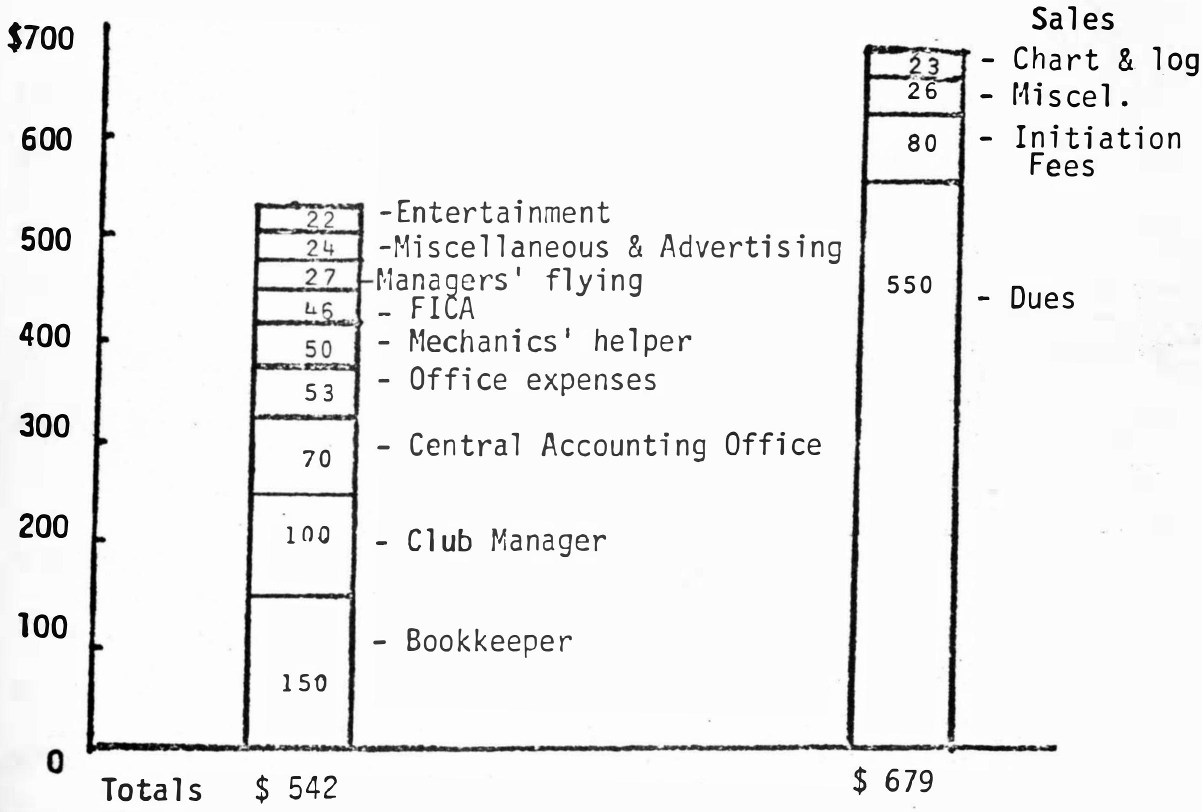

Figure 8

Typical Monthly Expenses and Income of the Ellsworth Air Force Base Aero Club 1969 information about the cost of resources and production in the club. The report was prepared for submission to higher headquarters where it was used to, with similar reports from other clubs, monitor aero club activities throughout the command. (The complete Financial Statement published for the month of December, 1968 is shown in Figure 5, as an example of the information available to club management.) Because the report is an accounting document, it is not designed to provide cost identification by product. Thus, it does not provide aero club managers with Stone's first requirement, the information which must be known to employ break-even analysis.

There are several reasons why financial statements do not provide managers with the information necessary for using break-even analysix. The costs common to several resources are not specifically stated by resource but rather are represented as an average cost. Also in this type of report, other costs may be offset for a given period or only partially identified for several months. These decisions are up to the discretion of the accountant compiling the report and can easily escape the attention of aero club management. In addition, a member of the Central Accounting Office is not required to be present for the monthly meeting of the Advisory Board. Thus, the members present may not understand how the financial statement is prepared or how the figures are presented.

Since the costs per aircraft included on the financial statement are inadequate for the previously stated specific needs of break-even analysis, some means must be developed in an aero club to meet these needs for information. Accurate identification of fixed and variable costs by resource and product must be available. In addition, some means of forecasting flying hours is necessary to the process. Thie forecast must be based on previous experience, flying records for aircraft as interpreted by Advisory Board members, and an analysis of members' demand for flying.

The latter step, forecasting flying hours, is essentially an art which must be developed by the advisory board. Thus, it is not considered in the development of the aero club information system. The system described is useful only for the collection and presentation of fixed and variable costs.

AERO CLUB MANAGEMENT INFORMATION SYSTEM

Aero clubs can be conveniently divided into two cost areas. The first is administration and the second is operations-maintenance. The cost information for each area is discussed separately.

Administrative Cost Information

An aero club has specific fixed costs of operation which are incurred through providing administrative and management functions. The largest costs in this category are for a manager and a secretary/bookkeeper who are at the club regularly to handle scheduling and accounting work. Other fixed expenses often include the fee paid monthly to the CAO for accounting services, the cost of administrative supplies, labor which is used even when aircraft are not flown, FICA for employees, and minor miscellaneous expenses which are experienced each month.

In general, the members all share equally in the costs of administration of their club. So a system of mutual and equal support for these costs is appropriate. The level of monthly dues for each member should, therefore, be based on the total of these administrative costs divided by the total membership. A representation of the balance between monthly dues, income and administrative cost is presented in Figure 5.

In terms of developing a management information system, the data needed by management for administrative costs can come from the monthly financial statement prepared by the Base Central Accounting Office. Although the data is available from this source, the information is scattered throughout the statement. The information should, therefore, be presented (or "massaged") more clearly to the Advisory Board (as is done in Figure 8), so board members can see that these costs are in balance with dues income. The advisory board must analyze each cost element to determine that it is, in fact, providing equal service to all members. The board must also take action whenever these costs change in order to maintain this balance. Finally, the board must evaluate administrative costs for overall efficiency and benefit to members.

A result of the Ellsworth Air Force Base Advisory Board's evaluation of their administrative costs was that student pilots flying with instructor pilots generated more administrative work load than did non-instructor accompanied flights. For this reason, an additional dollar per hour was added to instructor fees to help offset the student flying generated work. It was felt that the system was fairer to membership so that non-students would not be paying for benefits not received.

Operations and Maintenance Cost Information

Both fixed and variable costs are associated with the operation and maintenance of aero-club aircraft. As noted earlier, the fixed costs associated with the aircraft are depreciation, hull insurance, and annual inspection fees. These fees are well established and easily documented. Therefore, their collection is not included in the following discussion.

The variable costs encountered in aero club operations are directly associated with the maintenance performed on club aircraft. As noted in Chapter 2, two types of maintenance are performed, periodic and variable.

The aero club's maintenance planning begins with the aircraft manufacturers' recommendations and Federal Aviation Agency requirements for periodic maintenance. These periodic maintenance requirements should be conveniently displayed on a wall chart similar to that in Figure 6, to assist scheduling and planning. With the exception of annual inspections, all inspections are levied against engine/air frame hours. They are required at least every one hundred hours of flight. The annual inspection also fulfills the requirements of a 100-hour inspection. Thus, if aircraft flying scheduling is handled so that a 100-hour inspection is due at the time of annual inspection, the result is a financial savings for the club.

Sample information has been filled in on Figure 9, beginning in November, 1968, to illustrate how the wall chart may be used. Primarily, it functions as a basis for coordination between operation and maintenance scheduling for all aircraft in the fleet.[2] The information posted is required to be only the latest available at the time. Often the data is no more than a "best guess" without having any empirical backing. The writer believes, however, that even in this state, it is valuable to know because it emphasizes in peoples' minds what they don't know and makes them aware of what they "need to know" and its significance. For example, on the chart for February, 1969, "best guess data" concluded that two aircraft would require major overhaul (MOHL). This would cost a forecasted $2,200 that month. These are facts the manager and mechanic might be aware of but might not otherwise have put together in terms of total impact of man-hours and costs. When data is continued and presented visually, it often forces action to be taken. The farther ahead in time planning is extended, the more opportunity management has to fine-tune their actions through evaluation. For aircraft, forecasting by time and cost should be carried out through the next MOHL or the date the aircraft is to be sold (whichever is first), including all inspection and maintenance requirements.

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[2]As with all such charts, the information on it must be kept up to date. No information system will work for management if the basic data required is not collected on a timely basis.

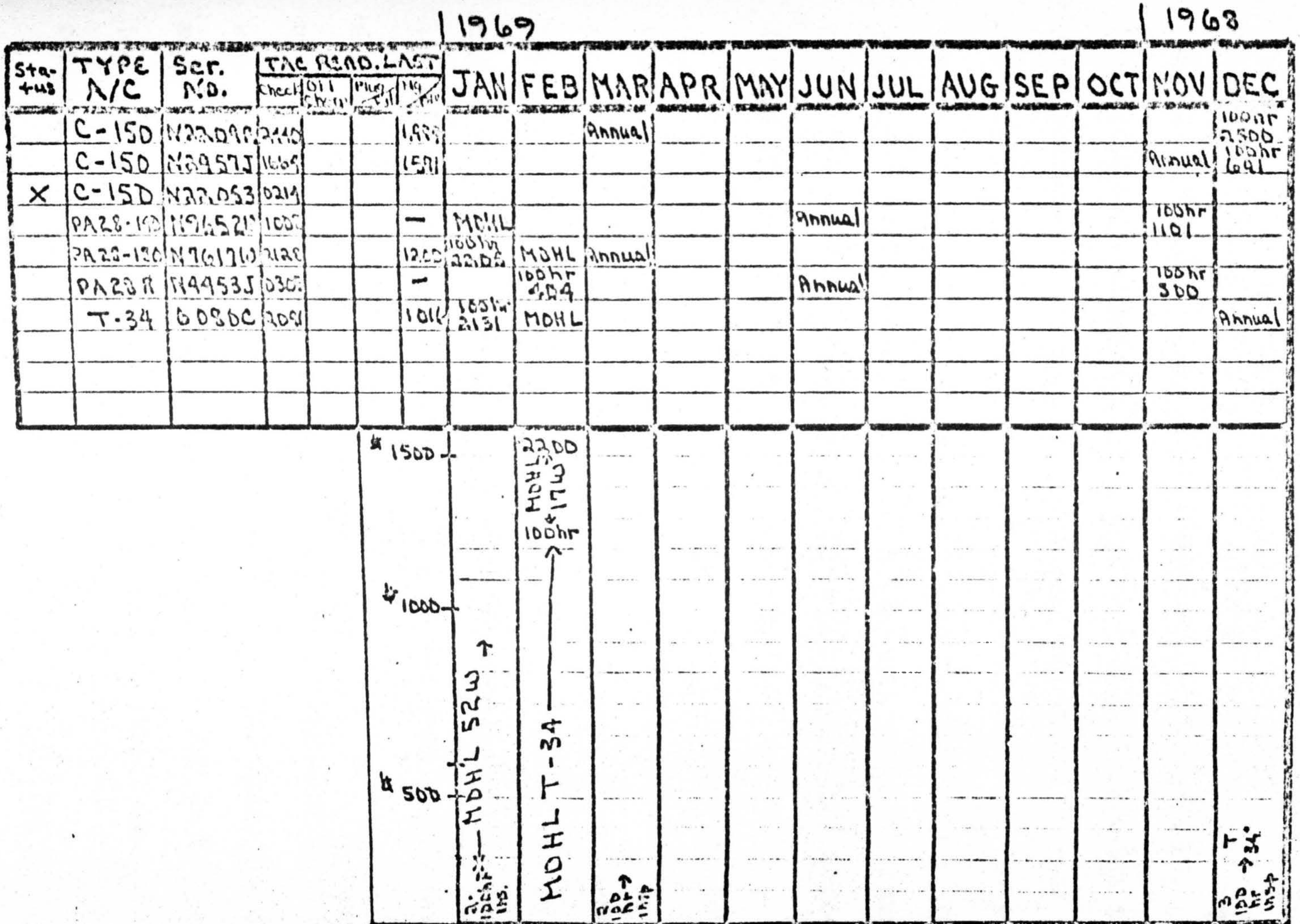

Figure 9

Maintenance Scheduling and Costing Chart

Maintenance is also generated by pilot's write-ups (variable maintenance). The AFTO Form 781Z, a Maintenance Discrepancy/Work Record, is a standard aircraft form. All clubs require that a pre-flight inspection be documented by the pilot on AFTO 781A at which time any discrepancies are noted. The pilots make additional entries as further problems are discovered during any flight each day. At the end of the flying day, the aircraft crew chief inspects each aircraft, records the tachometer reading, posts it on the Maintenance Scheduling and Costing Chart, (Figure 9), and initiates a Maintenance Data Collection Record, (Figure 10), by completing blocks 1, 4, 6, 8, 9, and 12.

The Maintenance Data Collection Records are on-the job working papers and cost collection documents. The data gathered are used to support the fixed and variable costs for each aircraft as presented in Table 2. The data that the crew chief fills in can be copied from aircraft instruments on the USAF Maintenance Discrepancy forms. He must interpret the problems documented by the pilot into actual maintenance discrepancies to be fixed. For example, a pilot might write up static on a radio, which the crew chief/mechanic will document as a loose wire that he retaped in ten minutes. On the other hand, the discrepancy may be an item which cannot be fixed immediately due to a delay awaiting expensive parts. Each repair will have an impact on variable costs.

As the mechanic completes each job, he must fill out the Maintenance Data Collection Record. The completed form must then be reviewed by the maintenance officer and filed according to aircraft

MAINTENANCE DATA COLLECTION RECORD

1. A/C TAC Reading	2.Engine Reading	3.A/C Type	4.A/C Number

5.Work Order #	6.Date Discovered	7.Date Corrected	8.Symbol(-/X)

9.Remarks:	10. Type Mx.	11. Time
	ROUTINE	
	INSPECTION	
	DISCREPANCY	
	OTHER	

12.Discrepancy:	13.Repair	14. Unit
	TOTAL COST	

PARTS

Qnty.	Item	Number	Cost

Figure 10

Maintenance Data Collection Record

Table 2

Aircraft Fixed and Variable Costs

Variable Cost per Hour	Cessna 150's 6209 R	2957 J	PA - 28's 9652 W	4953 J	T-34 6080 C
Variable Cost per Hour	$ 3.75	$ 3.75	$ 4.09	$ 6.23	$ 5.40
Direct Costs:					
Gasoline	1.70	1.20	1.60	2.00	2.00
Oil	.10	.10	.12	.12	.17
Indirect Costs					
Inspections					
100-hour					
Wages	.40	.40	.30	1.50	.44
Parts	.02	.02	.02	.05	.03
1,000-hour					
Wages					
Engine/prop	.60	.60	.	1.50	1.90
Parts/1,000-hrs.					
Voltage Reg.	.01	.01	.01	.02	.03
Battery	.03	..03	.05	.09	.05
Magnito	.09	.09	.09	.13	.18
Plugs	.10	.10	.13	.06	.28
Tires	.18	.18	.13	.15	.22
Radios	1.02	1.02	1.10	.66	.10
Fixed Costs Per Month	182.86	144.58	238.00	359.50	40.00
Depreciation	93.36	67.87	129.00	210.00	0.00
Insurance	49.50	38.71	69.00	112.00	0.00
Annual Inspection	40.00	40.00	40.00	37.50	40.00

repaired. This information is maintained along with the aircraft inspection reports.

The aero club maintenance officer should perform a monthly review of the file on each aircraft. From the information available, he should have no difficulty in breaking down the costs for each aircraft (as shown in Table 2). When several of the same type aircraft are in use, their costs should not be averaged at this point, if at all. Costs should be maintained separately so a break-even analysis can be prepared for each aircraft.

Mention should be made here that after thorough consideration, if loss of flying time results from maintenance activities, the chief mechanic, the club manager (dispatcher), or maintenance officer should describe the reasons for the lost time in the remarks section of the Maintenance Data Collection report for future reference.

It should be the assumed responsibility of the maintenance officer to provide the Advisory Board with a report of maintenance costs at each monthly meeting. The report should be brief and in two parts. The first part should be a review of the past month's costs which were an exception to forecasted costs. This report defines the financial position of maintenance operations. The second part of the report should cover a forecast of required funds for the coming month. This report should be general and in summary form, not divided by specific aircraft. However, if requested by the Board, the maintenance officer should have the specific information available.

A representation of the detail required for Break-even Analysis as described in Chapter 3 is in Table 1. The cost elements are basically common to all aircraft, and they are limited and simple to compute.

SUMMARY

The variable and fixed costs necessary for break-even analysis are found in the administrative and operation-maintenance activities of aero clubs. Through the use of proper bookkeeping procedures, maintenance planning, and the use of specified forms for documenting maintenance actions, all the costs generated by the club can be made available to management for break-even analysis. The system for collecting and developing that data is a management information system for aero club operations.

Chapter 5

SUMMARY AND CONCLUSIONS

Summary

United States Air Force Aero Clubs developed from a rather loose federation of Air Force personnel banded together to enjoy light-plane flying. The clubs grew rapidly during this period, but many of them had high accident rates and others experienced financial problems, as a result, the Major Air Commands imposed stricter safety controls and centralized accounting procedures on club operations. Safety records improved with tighter controls, but the potential for financial difficulty still exists.

The potential financial difficulty which clubs may encounter (essentially a management problem) stems from a basic policy governing club operations. The clubs are directed to be self-supporting but encouraged to do so by selling their resources only at a least cost price. This position leaves little room for error. There is no profit margin to act as a buffer to poor planning. The membership of an aero club consists primarily of military people, and the Advisory Board has a majority of its membership elected by the members. Generally, these people are not experienced business managers. In addition, the economic problems inherent in aero club management are not necessarily found in the United States Air Force. The result is that the people who are responsible for managing the clubs are attempting to do something for which often they are not trained and for which they may not have experience.

A traditional micro-economic approach to aero club management would be too complex for the members of aero club advisory boards to understand. It would involve a multi-factor production function based on variables that are beyond the club's control and for which inadequate records for analysis purposes are kept.

Break-even analysis offers a satisfactory method for United States Aero Club managers to use as a guide for cost analysis and rate determination. It is an uncomplicated tool which can be graphically displayed for comprehensive analysis by a group. It relies on data readily available in an aero club and the aero clubs' stable environment is suitable for its use. Break-even analysis deals with the primary problem of least cost operations, i.e., how much of a product must be sold at a given price to meet all costs.

To use break-even analysis and carry out its management function, the advisory board must have adequate information. The monthly financial statement prepared for all aero clubs contains cost information required for managing club operations. However, much of this information is either not broken down into useable cost categories or is not presented in a format useful for decision making. As a result, clubs must develop specialized management information systems to collect the data they require. As described in Chapter 4, a single, easy-to-use system can be developed for aero club use.

Conclusion

United States Air Force Aero Clubs need specific guidance on cost analysis and pricing to meet the desired goals of their organizations. The methods currently outlined in Air Force publications are too general to meet these needs. A revision to the Air Force manual on financial management of aero clubs to include the techniques discussed in this paper for cost determination and pricing would guide aero club managers in maintaining their clubs in a self-supporting manner so that they can continue to operate and provide the stimulation to United States Air Force morale for which they were conceived.

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