

James Cord

**THE PROBLEMS
OF AIR POWER**



W O R K B O O K



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PREFACE

The exercises and activities prescribed in this workbook will help you attain the purposes of each lesson. These purposes will be brought to your attention by your instructor. No exercise is to be attempted until your reading assignment has been completed. Do not attempt the exercises until you have made preparation after planning with the instructor and paying heed to his presentation at the first lesson session. Do not hesitate to use every method at your command in order to obtain essential information. Observe, read, ask questions of your instructor and the resource people that visit your classroom. You will note that lessons are numbered in accordance with a natural sequence and not with reference to a particular workbook; for example, the first lesson of the workbook: Aircraft in Flight is Lesson VII; that of the workbook: Power for Flight is Lesson XIV. This procedure is also used to identify the lesson plans of the several booklets of the Instructor Guide series.

By means of a key your instructor will help you correct Exercises 1, 2, and 3 of each lesson. Since it has not been possible to key the responses to Exercise 4, the quality of these should be appraised during discussion by students and instructor.

HAROLD E. MEHRENS, Editor

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PROBLEMS OF AIR POWER

Lesson XXXVI

EXERCISE NO. 1

(You have 5 minutes to complete this exercise.)

1. Place a *T* in the blank space preceding a true statement; place an *F* in the blank space preceding a false statement.
 - a. *F* Air power is to be thought of only in terms of military aviation.
 - b. *T* Air power is our modern method of preserving the peace.
 - c. *F* The stabilization of our aircraft manufacturing industry has no relation to the strength of our air power.
 - d. *T* Many air power problems have international implication.
 - e. *F* The aviation operations of the Army are only indirectly related to the nation's air power.
 - f. *T* Rapid technological change makes the concentrated production of military aircraft unwise.
 - g. *T* In view of rapid technological changes taking place in aviation, the concentrated production of a particular military aircraft model appears wasteful.
 - h. *T* Research is the key to the production of superior quality aircraft.
 - i. *F* A strong civil air transport system includes all aircraft operations excepting utility aviation.
 - j. *T* Air power begins and ends with a strong national economy.

EXERCISE NO. 2

(You have 10 minutes to complete this exercise.)

1. Fill in the blank spaces with the word, or words, that properly complete the statement.
 - a. The prime essential of our defense preparations is *time*
national defense
 - b. Many of the complex problems that accompany the social advance of air power remain *undone, unshared*

- c. About one million people are employed in the labor force of Civil aviation.
- d. The federal government plays a leading part in safety regulations.
- e. An essential ingredient of both civil and military aviation is aircraft production skill personal strengthened quoting guilty.
- f. Although our national leaders recognize that strengthened quoting guilty of air power is important, current emphasis is placed upon its economy.
- g. Peacetime military preparedness demands continued high taxes research.
- h. Aviation is so important to national defense that every branch of the military services makes use of it.
- i. It is not uncommon for a aircraft introduction to become obsolete before production orders are filled.
- j. In the interest of national defense, our aircraft must be kept secret morden.

EXERCISE NO. 3

(You have 5 minutes to complete this exercise.)

1. Draw a circle around the number preceding the phrase which is best to make the statement a correct expression.

a. The problems of national and international aviation are predominantly:

1. Military 2. Utility 3. Civil and military 4. Civil

b. A strong air force requires that the following procedures be put into operation:

1. Principal preparedness efforts be devoted to achieving superiority of weapons.
2. Taxes be reduced in the interest of a strong economy.
3. All air strength be concentrated within the air force.
4. Construction of more naval aircraft carriers.

c. Military aviation includes no aviation operations by the:

1. Army. 2. Marines. 3. ATA. 4. NASAO.

d. Air power begins and ends with:

1. Legislative appropriations. 3. Expanding manufacturing.
2. A strong national economy. 4. A skilled labor force.

e. In a time of emergency the air force would NOT expect the following support from the civil air transport system.

1. A reserve of aircraft. 3. Combat pilots.
2. Air transport crews. 4. A communications system.

EXERCISE NO. 4

(You have 15 minutes to complete this exercise.)

1. List the four major elements of a strong modern air force.
2. List the components of our nation's air power.

Lesson XXXVII

EXERCISE NO. 1

(You have 5 minutes to complete this exercise.)

1. Place a T in the blank space preceding a true statement; place an F in the blank space preceding a false statement.

a. F Over two and one half million tons of aerial bombs were dropped on German targets during World War I.

b. T One of today's average nuclear bombs contains about one-fifth destructive power of a combined Allied bomb tonnage dropped on Germany during World War II.

c. T The decisive factor in ending World War II was the atomic bomb.

d. F Today's H bombs are no more powerful than the first hydrogen bomb exploded.

e. F Because of our atomic stock pile, our nation is immune to attack.

f. F The Soviet Union has never conducted a successful hydrogen bomb test.

g. F The research engineers trained in the United States are superior to those trained elsewhere.

h. T Sometimes the loss of allies is more damaging to the national security of a country than would be a military defeat.

i. T It is conceivable that a seemingly trifling local incident might cause a third world war.

j. F Under present world conditions and in the interest of national economy, it appears proper to reduce the nation's military air strength.

EXERCISE NO. 2

(You have 10 minutes to complete this exercise.)

1. Fill in the blank spaces with the word, or words, that properly complete the statement.

a. Russia operates between 18,000 and 22,000 combat airplanes.

b. The explosion of the first ^{hydroxy} atomic bomb blasted a hole in the earth's surface 175 feet deep and mile wide.

c. A fleet of bomber aircraft can fly from Moscow to New York in about seven or eight hours.

d. The slogan "Air Power is Peace Power" already may have prevented a world war three.

e. In 1956 2 dollars out of every sixteen of the federal budget went for the purchase of aircraft.

f. The objective of American air power seeks peace, not war.

g. Potential trouble spots exist throughout the world today in the middle east, the near east, Africa, and Asia. increase

h. The American people appear to have chosen to keep their lead investment in air power.

i. Through bringing about a real peace, air power can open up world channels for international peace and nation improvements. social collateral cultural

j. In 1956 the United States spent 43% as much for military aircraft as it did in 1942, when the country was at war.

EXERCISE NO. 3

(You have 5 minutes to complete this exercise.)

1. Draw a circle around the number preceding the phrase which is best to make the statement a correct expression.

a. During World War II the combined Allied bomb tonnage dropped on German targets:

1. Was under 2,000,000 tons.
2. Contained about as much destructive power as a modern nuclear bomb.
3. Contained about one-fifth as much destructive power of one average nuclear bomb.
4. Equalled the destructive power of a hydrogen bomb.

b. A nation possessing nuclear bombs, the means to deliver them, and supporting armament could control the destiny of the world:

1. If no other nation were so equipped.
2. If she wanted to use them against other nations.
3. Despite world opinion.
4. In the event of a preventive war.

c. The distance from Moscow to many major U. S. cities, translated into flying time is:

1. About 10 hours.
2. About 12 hours.
3. Between 7 and 8 hours.
4. Under 4 hours.

d. The slogan "Air Power is Peace Power" is characterized by the following attribute:

1. It is ineffectual.
2. It is meaningless.
3. It is expensive.
4. It is incorrect.

e. To fill military orders requires aeronautical products in the following amount of the total of such products:

1. Between 15% and 25%.
2. Between 35% and 50%.
3. Between 50% and 60%.
4. Between 85% and 90%.

EXERCISE NO. 4

(You have 15 minutes to complete this exercise.)

1. Prepare an outline for a theme about the "Threat of Military Air Power". Be sure to note down significant facts that should be explained.

2. Write a paragraph in which you justify the fact that such a large part of the products of the aircraft industry is consumed by military needs.

Lesson XXXVIII

EXERCISE NO. 1

(You have 5 minutes to complete this exercise.)

1. Place a T in the blank space preceding a true statement; place an F in the blank space preceding a false statement.

a. T The chief problem of the aircraft manufacturing industry is how to keep itself strong and ready enough to cope with an emergency.

b. F In peacetime, the aircraft manufacturing industry has been the most neglected of our major industries.

c. F At the outbreak of the Korean War, the aircraft industry was equipped to produce all the aircraft necessary to wage a successful military operation.

d. T The modern aircraft manufacturing operations are so complex that it takes several companies to produce all the parts an aircraft needs.

e. T About eight years lead time is necessary to produce an aircraft.

f. T Aircraft manufacturing plants make good military targets.

g. F There is little relationship between progress made in the field of electronics and efforts made to solve aviation's problems.

h. T The development of the transistor will save about \$50,000 in the construction and operating costs for one jet bomber.

i. F In 1956 the decline in orders for military aircraft was accompanied by a decline in orders for guided missiles.

j. F Recently, changes in the nation's international policies have caused a reduction in the number of military aircraft ordered.

EXERCISE NO. 2

(You have 10 minutes to complete this exercise.)

1. Fill in the blank spaces with the word, or words, that properly complete the statement.

a. Wartime industrial aviation represented 35 per cent of the country's total defense effort during World War II.

b. During World War II over 1 1/2 million people worked in airplane factories.

c. Between the years 1941 and 1945, aircraft manufacturers turned out approximately 300,000 military planes.

d. When the Korean War broke out, our entire military aircraft production rate was about 2,500 planes per year.

e. North American Aviation went from a profit of 14 million dollars in 1945 to a loss of 612 million dollars in 1947.

f. A long-range aircraft procurement program will permit the nation to buy its air power 25 per cent cheaper than it has been able to do in the past.

g. The time that it takes to develop a new combat plane from the drawing board to production is called lead time.

h. About 50 per cent of the cost of producing military aircraft in 1950 was paid to 50,000 small businesses.

i. It is estimated that (in 1956) 4.43 billion dollars will be spent for civil air transport to be delivered by 1956.

j. Since 1950 the nation has spent 82.25 billion dollars for military aircraft.

EXERCISE NO. 3

(You have 5 minutes to complete this exercise.)

1. Draw a circle around the number preceding the phrase which is best to make the statement a correct expression.

a. Since its earliest beginnings the history of the aircraft manufacturing industry has been characterized by a:

1. Steady continuous growth.
2. Periods either of feast or famine.
3. Marked success.
4. Need for engineers.

b. From a production of 2,195 military aircraft in the year 1939, United States production by 1944 had reached a peak production of:

1. 24,000 planes.
2. 56,000 planes.
3. 96,000 planes.
4. 104,000 planes.

c. During World War II, of the country's total defense effort, industrial aviation accounted for:

1. 10%.
2. 28%.
3. 35%.
4. 50%.

d. Because of the fact that our aircraft manufacturing industry was allowed to deteriorate following World War II, the following occurred:

1. Tax payers were saved large sums of money.
2. Aircraft used in Korea were inferior to the Russian "Migs."
3. It cost \$3,530,000,000 to get back into production.
4. A guided missile program was begun.

e. It has been estimated that a stable aircraft manufacturing industry and a long range aircraft procurement program will make it possible for the nation to save the following percentage on its purchases of military aircraft:

1. 25%.
2. 35%.
3. 50%.
4. 65%.

EXERCISE NO. 4

(You have 15 minutes to complete this exercise.)

1. From information in Chapter II, *The Problems of Air Power*, chart the growth of the aircraft industry from 1939 to 1956. Explain the decline in 1946 and 1947.

2. What is the major problem facing the aircraft manufacturing industry? Suggest solutions.

Lesson XXXIX

EXERCISE NO. 1

(You have 5 minutes to complete this exercise.)

1. Place a T in the blank space preceding a true statement; place an F in the blank space preceding a false statement.

a. T The Kelly Bill made it possible to award mail contracts to airlines.

b. F Today we have 20 times as many miles of air routes over the United States as we had in 1926.

c. F The McNary-Watres Bill required airlines to carry passengers.

d. F After the Air Commerce Act of 1926, federal control of aviation became entirely effective.

e. T Air commerce in the United States is regulated under authority which is granted to the federal government by the Constitution.

f. T In 1956 only about 50 per cent more cities were served by the airlines than were served in 1938.

g. T During World War II a tremendous international air transport system came into being.

h. F A task force known as CRAF is an auxiliary of the USAF.

i. T In 1947 the air transport industry operated at a loss of \$22,000,000.

j. T In some countries civil airline operation is a part of the military aviation program.

EXERCISE NO. 2

(You have 10 minutes to complete this exercise.)

1. Fill in the blank spaces with the word, or words, that properly complete the statement.

a. The first commercial aviation service was transporting the mail.

b. In 1925 much of the flying activity through the United States was centered around (airmail) shows.

c. After the year 1930, air mail contractors began to purchase passenger carrying aircraft.

d. By the year 1932, the airlines were becoming self-sufficient.

e. On February 9, 1934, the government cancelled all air mail contracts.

f. The function of the civil aeronautics act of 1938 was not only to regulate the airlines but to stimulate their growth.

g. In 1956 the number of scheduled airlines had grown from 22 to 53.

h. The Air Transport Command helped change the pattern of world aviation.

i. The Civil Reserve Air Fleet is made up of approximately 325 aircraft.

j. In 1953 it was decided to separate mail pay from subsidy.

EXERCISE NO. 3

(You have 5 minutes to complete this exercise.)

1. Draw a circle around the number preceding the phrase which is best to make the statement a correct expression.

a. Civil aviation got its start in this country with the passage of:

1. The Kelly Bill.
2. The Airmail Act of 1925.
3. The Air Commerce Act of 1926.
4. The Civil Aeronautics Act, 1938.

b. On December 7, 1941, the military air transportation service of the United States was:

1. Adequate.
2. Very weak.
3. Quite strong.
4. Operated by Pan American Airways.

c. After World War II the Air Transport Command gave to civil air transportation a mass of data on airlift performance and proficiency accumulated in 3½ years of intense experience. During peace time its accumulation would have required a period of:

1. 10 years. 2. 15 years. 3. 20 years. 4. 25 years.

d. In 1947 operating losses of the air transport industry approximated:

1. \$12,000,000. 2. \$17,000,000. 3. \$19,000,000. 4. \$22,000,000.

e. Subsidy, or revenue authorized by Congress and received by industries performing a public service is limited to:

1. No industrial group. 2. The airlines. 3. Railways. 4. Shipping.

EXERCISE NO. 4

(You have 15 minutes to complete this exercise.)

1. List the benefits to the air transportation industry which resulted from the passage of the Air Commerce Act of 1926; from the passage of the Civil Aeronautics Act of 1938.

2. Defend the practice of government subsidy designed to promote the development of certain industries.

Lesson XL

EXERCISE NO. 1

(You have 5 minutes to complete this exercise.)

1. Place a T in the blank space preceding a true statement; place an F in the blank space preceding a false statement.

a. F Adequate airports are not related to the nation's system of defense.

b. T As aircraft characteristics change, airport changes to accommodate these must be made.

c. F There are no airports in the United States which have kept pace with aviation's development.

d. F None of our existing airports lack adequate traffic control facilities.

e. T To solve the airport system development problem requires the appropriation of millions of dollars not currently available.

f. T As a general rule, the greater the elevation of an airport the longer should be the runway length.

g. T In instrument weather, an airport does well to handle 30 landings and take-offs in an hour.

h. F Operating traffic control aids is a function of commercial airlines.

i. T Failure of community leaders to provide funds to match government appropriations explains the present inadequacies of the nation's airport system.

j. F Airport problems of metropolitan centers are no different from those of smaller municipalities.

EXERCISE NO. 2

(You have 10 minutes to complete this exercise.)

1. Fill in the blank spaces with the word, or words, that properly complete the statement.

a. As aircraft designs characteristics change, airport characteristics must change.

b. According to a recent report, the volume of airline passenger traffic will reach 70 million by 1965.

c. Jet powered air transports will go into commercial service by 1958.

d. Departing intercontinental air transports will need take-off runways 10,000 feet long.

e. Jet operations in intercontinental flight require runways 10,000 the length of those used for domestic airline jet operations.

f. The effective length of the longest runway at New York's Idlewild International Airport is 9,422. However, its actual length is 8,724 feet.

g. On July 1, 1956 a 40 million dollar program for installing new traffic control aids was begun.

h. Airport construction requirements, of themselves, add to the economy of a community.

i. Among the metropolitan airport problems the need for specialized airports is an obvious one.

j. In August of 1955 the Airport Act of 1946 was amended to make available an additional 252 million dollars.

EXERCISE NO. 3

(You have 5 minutes to complete this exercise.)

1. Draw a circle around the number preceding the phrase which is best to make the statement a correct expression.

a. An adequate national airport program is regarded by the Federal Airport Act of 1946 as the responsibility of:

1. The federal government.
2. Both the federal government and some local sponsoring agency.
3. The state government.
4. The municipal government.

b. The Civil Aeronautics Administration, in cooperation with military agencies, has undertaken a program designed to relieve air traffic congestion. This program calls for the expenditure of:

1. \$40,000,000 over a 5-year period.
2. \$500,000,000 over a 10-year period.
3. \$25,000,000 annually for the next three years.
4. \$15,000,000 in the ensuing year.

c. Of the 6760 airports of the United States active on March 1, 1954, the following number were paved:

1. 718.
2. 6484.
3. 5759.
4. 1291.

d. Among items of air traffic control equipment coming into use during 1956 was:

1. VOR/DME.
2. Airborne radar.
3. Long range radar.
4. Ground control approach.

e. Several airports, each especially equipped to handle only one type of air traffic, such as short-haul, international, and the like are needed by:

1. Every community.
2. Large metropolitan centers.
3. Seaport cities.
4. All ports of entry.

EXERCISE NO. 4

(You have 15 minutes to complete this exercise.)

1. In a paragraph or two, list the arguments for and against a national airport program, citing instance of community animosity or lethargy toward such program.

2. Outline a proposed solution to the airport problem of a major metropolitan area, describing the problem in detail and stating how the solution can be reached.

Lesson XLI

EXERCISE NO. 1

(You have 5 minutes to complete this exercise.)

1. Place a T in the blank space preceding a true statement; place an F in the blank space preceding a false statement.

a. ~~F~~ The achievements of aeronautical research have been chiefly in the areas of power plants and fuel.

b. ~~T~~ Following World War II, hasty demobilization seriously disrupted research projects under way.

c. ~~F~~ All the research efforts currently under way in the United States are operated by the National Advisory Committee for Aeronautics.

d. ~~F~~ Our rapid development in jet powered aircraft has not depended upon a program of research.

e. ~~T~~ It took eight years of research effort to develop the B-52.

f. ~~T~~ Today's experimental aircraft are flying at least three times the speed of sound.

g. ~~T~~ A military device called SAGE is being tested as a possible facility for easing air traffic congestion.

h. ~~F~~ The area rule was tested in a rocket powered Bell X-1 by Captain Charles Yeager.

i. ~~F~~ The first aircraft to exceed the speed of sound was the F-100C Supersabre.

j. ~~T~~ The "thermal barrier" is encountered at aircraft speeds of 2000 mph.

EXERCISE NO. 2

(You have 10 minutes to complete this exercise.)

1. Fill in the blank spaces with the word, or words, that properly complete the statement.

a. At present there are 1800 Air Force research projects under way.

b. Industrial firms administer 1150 of these projects.

c. The USAF Air Research and Development Command operates 10 research centers of its own.

d. The agency established by Congress in 1915 to formulate research programs and coordinate research on the part of other groups is called the M.A.C.A.

e. One of the most, if not the most significant of recent air defense devices produced by research is called SAGE.

f. The Matador is a tactical air-to-air to air-to-air missile.

g. Very high Air Force priority has been given to the ICBM.

h. The application of the area rule principle boosted military aircraft performance 25 per cent.

i. The first aircraft to fly faster than the speed of sound was powered by a rocket engine.

j. By using stubby wings of reduced size, aeroblastic vibrations caused by high-speed flight can be reduced.

EXERCISE NO. 3

(You have 5 minutes to complete this exercise.)

1. Draw a circle around the number preceding the phrase which is best to make the statement a correct expression.

a. Aviation has been revolutionized by:

1. The CAA.
2. The Korean War.
3. Research.
4. Atomic power.

b. An organization NOT directly concerned with the national aeronautical research effort is:

1. The NACA.
2. The ARDC.
3. The United States Navy.
4. The NASAO.

c. The Arctic radar warning system is an example of developments in the interest of national security that is:

1. In the planning stage.
2. Far in the future.
3. Now operating.
4. Was put into service in 1950.

d. The Intercontinental Ballistic Missile (ICBM):

1. Has a range of 10,000 miles.
2. Is called ATLAS.
3. Has about 100,000 operating parts.
4. Is the outgrowth of the Manhattan Project.

e. A number of high-speed flight problems not yet solved have to do with:

1. The sonic barrier.
2. The BOMARC.
3. Commercial jet air transportation.
4. The thermal barrier.

EXERCISE NO. 4

(You have 15 minutes to complete this exercise.)

1. Describe the areas in which aeronautical research and development are taking place, citing a few outstanding achievements.

2. List those agencies currently engaged in research and development.

Lesson XLII

EXERCISE NO. 1

(You have 5 minutes to complete this exercise.)

1. Place a T in the blank space preceding a true statement; place an F in the blank space preceding a false statement.

a. T The air age requires an educational program different from that required by any other era.

b. T In order to solve the problems of air power, disciplined intelligence must be brought to bear upon them.

c. F Only the technical area of education is related to the solution of air power problems.

d. F Currently there is an over-supply of high level aeronautical scientists.

e. T The Wright brothers brought the airplane into being; they were not scientifically inclined young men.

f. T Until recently the course of aviation's development was left to chance.

g. T The man power to operate our air power is provided by technical education.

h. T Only skilled operators can master the complexities of a modern aircraft.

i. F Education at the general-education level (aviation education) has no significance in terms of aviation man power problems.

j. T Many of the operational problems of the USAF are similar to those of the airlines; this means that the type of education that will help solve the problems of one will also help solve the problems of the other.

EXERCISE NO. 2

(You have 10 minutes to complete this exercise.)

1. Fill in the blank spaces with the word, or words, that properly complete the statement.

a. The outcome of the struggle for air supremacy depends upon the quality both of our machines and our man.

b. The capabilities of the man who operates aircraft depend upon the education and training they receive.

c. The problems of air education overshadow all other air power problems.

d. The solution of other air power problems depends upon the solution of the problems of education and training appropriate in an air age.

e. All three major areas of education—the preparation, the technical, and the general help solve air power problems.

f. Education at the professional level produces aeronautical scientists and engineers.

g. Man power to operate our air power is provided by education at the technical level.

h. The solution of today's air power problems depends upon the coordinated energy of many trained people.

i. Appropriate aviation attitudes and understandings needed by all air age citizens are developed at the general education level.

j. The need for an air age education concerned with appropriate aviation age attitudes and understandings is reflected in the negative attitude held by some people toward air bases or airport near their communities.

EXERCISE NO. 3

(You have 5 minutes to complete this exercise.)

1. Draw a circle around the number preceding the phrase which is best to make the statement a correct expression.

a. In greatest degree the struggle for air supremacy depends upon the quality of our:

1. Aircraft.
2. Combat pilots.
3. Educational system.
4. Diplomatic services.

b. Aircraft operation and the operation of the facilities that make military and civil operation possible can be successfully operated only by those who are:

1. Intellectually superior.
2. Properly trained.
3. Scientifically selected.
4. Aeronautical engineers.

c. The training of the millions whose skills are required to maintain our air strength can best be done:

1. On the job.
2. In formal programs of education.
3. In a summer school workshop.
4. In professional schools.

d. The federal government regards the air transport industry so important to our national defense and economy that:

1. Federal control is exercised over it.
2. Research and development programs have been financed.
3. It has been allowed to remain in the hands of private business.
4. Major domestic trunk lines no longer receive subsidy.

e. Many of the operational problems of the USAF are similar to those of:

1. Army aviation.
2. The civil airlines.
3. Aircraft manufacturers.
4. Any business organization.

EXERCISE NO. 4

(You have 15 minutes to complete this exercise.)

1. In a brief paragraph show the functional relationship of education to the growing strength of each essential component of air power.

2. At this point, ask questions about any material covered in the previous seven lessons which you do not understand thoroughly.