**SOVIETS GAIN ON U.S. AIRPOWER LEAD**

Women In Aviation

Gain In Numbers

When Mrs. C. J. S. Miller finally decided to become an air traveller, she really started something. On August 11, 1906, she became the first woman in the United States to fly in an aircraft.

Since then, the ladies have invaded aviation in force. Today, there are more than 164,000 women engaged in some phase of the aviation industry in the United States. About 122,000 of these women are engaged in the actual manufacture of aircraft. This represents about 16 per cent of all aircraft manufacturing employees. Another 20,000 women, representing 10 per cent of all airline industry employees, are employed by the scheduled airlines. Thousands more (complete statistics are not available) are employed in various federal aviation agencies.

The Civil Aeronautics Administration reports that there are 11,564 active licensed women pilots, of which 14 hold helicopter ratings. The Civil Air Patrol, a volunteer auxiliary of the Air Force, boasts 14,300 lady members (admitting only that they’re over 18), and the Armed Forces inculcate pride that nearly 10,000 girls are serving in military aviation.

The day has arrived when women have achieved practical equality with men in aviation. Besides building aircraft, they are officials of aircraft firms; they monopolize the sales counters of the airlines; they decorate the giant airliners as stewardesses; they inhabit the nation’s airports in their own planes, and even hold races in which they allow no man to compete.

If that were not enough, the National Aeronautic Association has just recently decided that all air records should be lumped into one category. No longer are there to be special records for women pilots.

But to top it all off, some scientists are predicting that it is highly probable that a woman will be the pilot of the first rocket ship to the moon because of her better physical and mental ability to withstand the special stresses and strains of such a trip.

Men have got to look to their mettle, if they expect to keep ahead of the ladies.

**Grim Race Begins Nation Warned**

The United States, who has long since conceded to Russia the race for quantities of aircraft, today is seriously challenged by the Soviets in the superior quality of air weapons.

Government officials and military leaders of the nation have stated their belief that the U.S. still possesses superiority in the quality of aircraft, aircraft engines and firepower, but at best the margin is narrow.

The Russian atomic potential is growing rapidly. Their combat aircraft, as demonstrated over Moscow last May Day, are excellent. There is ample reason to believe that they have made long strides in guided missiles. They are showing signs of progress in transports and other types of aircraft.

So there is no room for boasting or for complacency. We spotted the Russians five years ago, and quickly took steps to ensure our position. Today, the U.S. aircraft industry during the last five years speaks for itself—a record of tremendous accomplishments.

Today, the U.S. has 127 Air Force wings and powerful new Navy air groups, with a large percentage well equipped with the most advanced aircraft, guided missiles and supporting material. It is a far cry from 1950, when the Air Force had only 42 wings, with relatively few modern aircraft and no guided missiles, and the Navy was proportionately weak in the air. Against our total of 9,000 combat aircraft, reliable sources of information estimated that the Russians had 20,000 first-line planes, with 20,000 additional in reserve.

There was no mystery about this state of affairs, for while American citizens were getting ready to enjoy

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**AIRCRAFT PRODUCTION DOLLARS**

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35 major U.S. aircraft manufacturers, including airframe, aircraft engine and major component manufacturers, spend 54 cents of each contracting dollar in sub-contracting and supply. These companies purchase materials directly from 50,000 business firms in every state of the union.

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**Telephone Communication Needed To Run Largest Wing-Building Machine Tool**

One of the 30,000 tools used in the manufacture of a giant new four piston-engined airliner is so big that production line employees using it have to communicate by telephone; yet its own manufacture was so precise that watchmaker’s tools were used.

Looking like a huge bridge structure, the tool is called a jig, and is used to build complete one-piece aircraft wings. It cost $100,000, and thirteen other precision tools which are needed to make it a complete unit, cost another $750,000.

Wings produced on the device measure 150 feet from tip to tip and have a total area of 1,580 square feet—bigger than the floor space of most homes. Despite the mammoth size of the tool, workmen can detect and correct a thousandth of an inch variation in the basic structure itself or in the wing in manufacture. For example, minute expansion or contraction of different metals, caused by temperature changes, such as occur between morning and afternoon, can be detected and compensated for.

The one-piece wing is built in a vertical position, then separated and fastened in the normal horizontal attitude to an interconnecting section of the fuselage. Before development of the new tool, wings were manufactured in six separate, time consuming and expensive operations. The new manufacturing method makes a much stronger wing.

The built-in safety of this one-piece construction is typical of the constant effort of aircraft manufacturers to insure the quality and superiority of U.S. aircraft.

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**World’s Least Experienced Airline**

Western observers are puzzled by the fact that nothing has been heard of East German Airlines since the ceremonial departure for Moscow of its first flight on September 16, 1955.

The airline is said to be equipped with a single Russian I-14. It is reported that the “fleet is at present stored in a hangar at Schonefeld, East Berlin.”

(See AIR POWER, page 31)
The Dominant Factor

"Today airpower is the dominant factor in war. It may not win a war by itself, alone, but without it no major war can be won."—Admiral Arthur W. Radford, Chairman, Joint Chiefs of Staff

It is vital to the safety and security of the United States that the American public and industry be prepared to meet the challenges posed by the military aviation sector. This preparation is essential to ensure national security and protect against nuclear war.

Fortunately, most of our national leaders view this possibility with alarm and a deep sense of urgency. They recognize that the security and well-being of the nation rests on the capability of the United States aircraft industry to produce aircraft quickly.

In a cold appraisal of the threat of a nuclear stalemate, Air Force Secretary Donald A. Quarles has recently issued a policy statement setting out the plan by which the Air Force expects to ensure that its current and emergency missions are met. It is called "Industrial Production Readiness Policy." By and large, the aircraft industry subscribes to this policy—and has for the last decade.

Continuous technological advancement, along with shifting international political and military power, have dictated radical changes in our national strategy. For the first time in modern history, our nation is faced with a continuing potential threat of devastation at the outset of general war. If, in an emergency, we are to survive and minimize the devastation to our nation, the traditional concept of a prolonged industrial buildup after attack must be replaced with a "readiness" program.

Industrial readiness, Mr. Quarles declares, will accomplish four vital objectives necessary to the national security:

1. Deter war by maintaining a modern Air Force in being that can immediately defend the nation and retaliate in case of attack.
2. Make the aircraft industry capable of rapidly expanding production of aircraft, guided missiles and other appropriate weapons in case of involvement in peripheral conflicts or expansions short of a general nuclear war.
3. Improve industry's ability to maintain or rapidly restore production of critical military and retaliatory weapon systems and related support commodities in case of general war involving severe industrial damage.
4. Maintain the health of the aircraft industry as necessary to fulfill the needs of the Air Force.

Industrial readiness will be achieved only when this nation's aircraft industry can respond immediately to the vital demands placed upon it in an emergency. To achieve this state of readiness, the Air Force Secretary declares, will require a long-term Air Force-Aircraft Industry program.

The plans, then, for the defense of this nation, must be inevitably geared to a healthy, vigorous aircraft industry. Both the aircraft industry and the military know that the size and impetus of aircraft research, development and production programs cannot be adjusted up or down in accordance with what the Communists may or may not be doing.

Increasing complexity in the manufacture of modern military aircraft has brought demands by the aircraft industry for components manufacture across the length and breadth of the nation. Today, more than 100,000 firms, 83 per cent of which are small business firms, are engaged in some phase of aircraft production.

But outside industry, large and small, is necessarily geared to the fortunes of the aircraft industry. In periods of emergency, when extreme demands are placed upon the aircraft manufacturers, it is normal for them to subcontract work to small, specialized industries. When aircraft production is low, it is natural that the prime contractor does less sub-contracting. Much that would be "farmed out" in peak periods must be done by the aircraft industry primes when its heretofore widely fluctuating production assignment dips into the production valley.

Thoughtful congressional consideration will undoubtedly be given to Secretary Quarles' Industrial Production Readiness program in lieu of the "traditional concept" that there will be time for a prolonged industrial buildup after war starts.

The Luxury Liners, United States and America, Could Be Placed Side by Side on the Flight Deck of Navy's Aircraft Carrier Forrestal.

The Wings of a New U.S. Supersonic Jet Fighter Are Proportionately Thinner Than a Double-Edged Razor Blade. So Sharp Are Its Wing Leading Edges That They Must Be Covered with Rubber "Gloves" to Prevent Ground Crews from Cutting Themselves While the Plane Is Being Serviced.

Plane Medics' Give Bomber Physicals

Stethoscopes are the only stock in trade of some of the employees of a major aircraft manufacturer. And although these people probably couldn't tell a lung ailment from a heart attack, they're mighty important in safeguarding the crews of the fast jet bombers who fly miles above the earth.

These men "working under pressure" as a matter of course, go about their business with the care and exactness of physicians, because lives depend upon their stethoscope readings.

Their job is to make certain that the pressurized crew compartments function properly. Their special hearing aids will detect and catch even the most minute air fizzle leaking from an improperly sealed compartment joint, as quickly as they could detect a heart flutter.

These aircraft medics work inside the pressurized compartments. Leaks, however slight, must be pinpointed at their source. They know that leakage in a pressurized cabin at extreme altitude could mean trouble. Their contribution to the quality and superiority of bombers manufactured by the United States aircraft industry is to see that it doesn't happen.

The U.S. Air Force is considering the use of mothballs on military airport runways near seacoasts. Protection against seagulls. Plane collisions with the big birds have, on occasion, caused severe damage to planes and pilots. Air Force borrowed the idea from Great Britain's RAF which has had some success with mothballs subling as scarecrows (scaregulls?) for seagulls!
Russian Aeronautical Progress

Threatens To Outstrip Ours

(Continued from page 1)

the blessing of world peace, through large-scale demobilization, the Russians maintained a high level of both research and development and production.

Our industry-military team are doing a herculean task in their efforts to maintain at least a marginal lead in airpower superiority over the Soviets.

Unfortunately, today we cannot even be compared to our qualitative losses. Recently enumerated Soviet accomplishments during the past year are:

• Six new types of aircraft which imply six new types of engines, all of an advanced jet or turbo-prop design. These have been revealed in substantial quantities, indicative of advanced production know-how.

• Advanced radar capability implying a "sat states" of advancement in this field.

• Advancement in electronics and radiation by the Soviets was corroborated by the quantity and quality of data which they discussed at the Geneva Conference.

• Continued substantial growth in nuclear weaponry as revealed by tests. Their most recent test in current series was in the megaton (million-ton) range.

• Development of advanced commercial aircraft, continuing enthusiasm for development of guided missiles, you can judge for yourselves the importance of these advanced areas of technology as scientific satellites.

The sudden demands made on the American aircraft industry in 1950 came as no surprise. Historically, it has been allowed to deteriorate in peace and expected to produce miracles in emergency and war. So in 1950, when the military called upon the industry to expand its facilities, employment and mass-producing the response followed an old pattern. How well that job has been done only time can tell in years, you can judge for yourselves.

In only two years, the aircraft production rate was tripled, the plant floor space was doubled, the work force was increased two and a half times and continued to increase in the two following years. This production rate was not achieved by the war expedient of freezing models and mass-producing them. Nothing was frozen. Nothing was standard. Models were improvised almost overnight. Changes were the rule; not the exception. New types were constantly being introduced as research and development programs quickened. Engine power was growing steadily. New equipment was being brought forward to increase the efficiency of our airpower. The development of the aircraft—to be able to see the vision of the needs take over some of the responsibilities of control at higher altitude and ever-faster speeds, and to make plans suitable under these extreme conditions.

The combat airplane became one of the most complex mechanisms known. Engines had to produce more and more power without great increase in size or weight. Electronics and other delicate components came into such profusion that mar- velous feats of miniaturization had to be performed to find space for them in their craft.

To achieve these things, the industry had to change its manpower and training practices. New skills for new and exacting standards and new machines had to be produced. Where engineers had comprised about 1 per cent of the typical aircraft company's total employment in World War II, the proportion of engineering employees has grown to more than 20 per cent of the total force— involving most of the classifications of the engineering profession. Presently, the aircraft industry employs over 750,000 people—the second largest industrial employment in the country.

Additionally, the industry has used more than 50,000 sub-contractors and suppliers in every state of the Union, paying them $4.7 billion in 1954, or 2.2 per cent of the total disbursement of this, 43 per cent went to small businesses.

The results of this feverish activity have been phenomenal by any measure. At the time of the Chinese Communist attack upon Korea in 1950, the U.S. Air Force, Fighter Wings and Navy carriers were equipped with 400-mile-an-hour piston-aircraft. Today, all Air Force and Navy jet planes are faster than the earlier jet aircraft.

Several new types in operational service are supersonic and are effective at altitudes higher than 50,000 feet. In 1950, there were no medium or heavy jet bombers in U.S. military inventory. Now, every medium bomb is carried by a jet-engine jet aircraft, and our first heavy bomber wing is equipped with eight-engine jet aircraft.

Jet combat transport has been equally spectacular, and all of the military services are using them in many ways—the Army in evacuation of wounded, deployment of troops and materials, observation and a hundred special services; the Navy in rescue, in inter-ship and ship-to-shore communication, anti-submarine warfare, and many other uses, and the Air Force in numerous ways. Lightplane output not only performs many fine services for the Army, Air Force, but the civilian fleet is regarded as an extremely valuable reserve potential for patrol, courier and disaster-relief service.

A particularly noteworthy achievement of the five years of build-up has been engine development and production. In 1950, a production of delivering 4,000 to 5,000 pounds of thrust were the order of the day, and models in development were in the 7,000-pound-thrust range. Now, more than 2,500 engines of more than 10,000 pounds thrust are in service, and great increases in power in the industry.
Airline Jet Plane Orders Top Billion

The nation's scheduled airline operators, backed up their belief in the superiority of American manufactured equipment with more than $1,309,600,000 worth of jet, turboprop and piston-engine transport plane orders in 1955.

This unprecedented flood of firm orders placed by U.S. scheduled airlines does not include orders for hundreds more piston, turboprop and jet-engine airliners placed by foreign flag airlines.

It was a big year for commercial airline operators and airline passengers. Air travel again in 1955 soared to unprecedented heights with an estimated 42 million passengers traveling on domestic and international routes for more than 24,409,470,000 passenger miles. U.S. airline passenger travel, in 1955, topped by more than 20 percent of 1954's record year when the airlines carried some

35,000,000 passengers more than 20 billion passenger miles.

Biggest purchases made by the scheduled airlines during 1955 were the more than 761,300,000 in firm orders for 1,575 jet airliners. Another flood of orders for 75 turboprop-powered transports totaled $265,000,000. In addition, the airlines also placed orders for 55 big new piston-engine transports at a total cost of more than $137,300,000.

U.S. airline industry backlog for all types of civilian transports by year-end 1954 totaled only $270,000,000, and both U.S. aircraft manufacturers and airplane operators were more than a little alarmed at the apparent inroads in airline travel being made by the British airlines.

The British aircraft industry had jumped the gun on the United States in turboprop and turboprop-powered commercial transport while this nation's manufacturers concluded their research, development and testing of various jet applications to airline transport.

But by December 1955, the U.S. aircraft industry backlog for these luxurious jet powered giants had skyrocketed to more than $1,309,600,000, setting an all-time high in civil aircraft manufacturing history.

Thus, the nation's plane makers gained a decided lead in their race with Great Britain's aircraft industry attempt to capture world airline turboprop and turboprop transport market. It also reaffirmed the U.S. airline industry reliance on the quality and economy of U.S. manufactured aircraft and engines.

'Scarlet Bags' for Radar

America's busy air terminals may soon borrow an idea from the American housewife, with a low-cost "carrot bag" type plastic covering for weatherproofing the antenna system used in instrument landings.

Designed to keep out moisture and snow off the sensitive antenna array which directs the pilot's approach to the runway, the "carrot bag" made of New York's La Guardia Airport under near-emergency conditions when, during the hurricane season, the wooden shelter housing the antenna system was badly damaged by rising water.

Textile Industry—Glass Plastics Join To Aid Plane Production

The textile industry, science and the aircraft industry teamed recently in the unending battle for airplane weight reduction, with the development of fiberglass air storage spheres.

 Hollow steel spheres used for compressed air storage reservoirs to actuate any number of pneumatic devices on U.S. fighters, bombers and transports, have long plagued aircraft designers because of their necessarily heavy weight-to-strength ratio. One of the most common models, for example, weighs 20.5 pounds.

 Engineers of an aircraft components manufacturer, after an eight-year battle, figured out a way to make the sphere inexpensively of glassfiber, which would weigh almost eight and one-half pounds less—yet be as strong as the heavy steel tank.

 The first stage of the newly developed process is the manufacture of a low-melting-point metal alloy sphere—or mandril, to those who know the textile industry. The mandril is then covered with a rubber coat, soon to become the inside of the air tank.

 Next, bobbins of fiberglass yarn are mounted on a creel of vertical bars on a weaving machine device. Then the ends are collected together, passed through a resin bath and secured to the metal mandril. A flip of a switch starts the weaving machine into action, and the fiber-glass is spun onto the metal ball in much the same manner that an ordinary home sewing machine bobbin is loaded with thread. When the correct amount of fiberglass yarn has been wound around the mandril, the sphere is transferred to an oven for heat-hardening.

 Finally steel is injected into the sphere. The metal melts and is run off, leaving only the porous-proof rubber lining. The end product is a strong air storage tank, weighing eight and one-half pounds lighter than its steel counterpart.

 To the aircraft designer this means a saving of approximately 82 pounds of aircraft design weight. (Each pound of equipment adds ten pounds to gross weight—heavier structure, etc., plus fuel to carry the added weight.) This one weight saving at the standard rule of thumb measure of airplane cost of $50 per pound, saved the American taxpayer $4,100 in the total manufacturing cost of the military plane using the air storage sphere.

Military Air Travel

The U.S. Military Air Transport Service, during 1955, established an all-time safety record, flew farther and carried more patients, passengers and cargo for the armed forces than at any other time in its history.

The 1,500 aircraft comprising MATS, according to a year-end report, logged 1,389,000 flight hours, carried 733,400 passengers and 139,000 tons of high priority cargo during the last twelve months.

MATS officials figure that 33 military passengers and 16 tons of cargo were airlifted every hour of the year. A regularly scheduled or Special Air Missions plane of the global military transport service made an Atlantic or Pacific crossing every 32 minutes of the year.

The combination of luxury, safety, economy, speed and time saved, has made air travel first choice of Americans everywhere. During 1955, domestic scheduled airlines flew more than 19.9 billion passenger miles, topping for the first time by nearly 16 per cent the 17.2 billion passenger miles traveled by inter-city buses. Total domestic airline passenger-mile travel increased 22 per cent in 1955, while comparable railroad passenger miles dropped 3.5 per cent under 1954 levels.

Wire Spinning Device Out-Spins Spider

A new precision coil winder which spins strands of spider-web thin wire in loops less than one-thirty-fifth of a hair's breadth apart has been developed for the aircraft industry.

The coils it manufactures are tiny electrical devices whose signals operate electronic autopilots and other automatic controls of today's sleekly lethal U.S. fighters and guided missiles.

The precision that goes into manufacture of components such as this inevitably means that aircraft production costs are far higher than plane costs of the World War II era. But the precision manufacture of these complex parts and components assures world superiority of today's U.S. supersonic jet fighters and guided missiles.

The machine, electronically controlled by a human operator, can achieve a theoretical accuracy of 0.00000000001, engineers say, but it is limited by microscopic flaws in the wire itself.

So delicate is the control of the machine that the winder "feels" slight changes in wire tension and automatically signals the operator to correct them. The human operator can instantly start or stop the machine, even when it is operating at 1,500 revolutions per minute, without snapping the fragile wire.

The machine, performing the first production operation of its kind, is mounted on a desk-like cabinet. By means of a microscope the operator can check visually the entire winding operation.