LUCHTVAART INFORMATIES

MINISTERIE VAN OORLOG
LUCHTMACHTSTAF

SECTIE L 2.

LUCHTVAART INFORMATIE'S NR. 37

INHOUD

		blz
I	RED SHADOWS OVER THE RISING SUN	1
II	V.T.O. AND "JET-LIFT"	7
III	---AND NOW THE THERMAL BARRIER	14
IV	HOW GOOD ARE NONSTOP FIGHTER TACTICS?	17
V	TERROR WEAPON THAT FAILED	19
VI	WHERE COMMUNISTS ARE BUSY NOW	24
VII	I BELIEVE IN FLYING SAUCERS	28
VIII	A MISSILE TEST	30
IX	NEW A4D DESIGNED TO OUTPERFORM MIG-15	31
X	AIRCRAFT ARMAMENT	34

DIVERSE BERICHTEN

1	Jet pilots helped by Televisionmap	13
2	Fire-fighting discovery for airfield crashes	"
3	V.S.: Vernieuwing van de Luchtmacht	18
4	U.S. Supersonic bomber	33
5	Blueprint for World Revolution	37
6	2 Mph in 175 Years	38
7	New U.S. Lightweight	39
8	N.A.T.O. Infrastructure	"
9	Bows and arrows in modern war?	"
10	Ter leering ende vermaeck	40

Voor de volledige betrouwbaarheid van de in deze artikelen verstrekte gegevens wordt niet ingestaan.

Augustus 1954.

Why We Are Defending Japan

RED SHADOWS OVER THE RISING SUN

By Earl H. Voss.

Geography favors a Communist air attack on Japan, juicy industrial target for Red raiders from Asian bases.

Jimmy Doolittle and the hundreds of World War II pilots who followed him over Japan to drop everything from leaflets to atom bombs will feel a twinge of irony when they hear this:

The United States is presently providing Japan with an excellent air defense.

Some very recent alumni from the Japan Air Defense Force are the source of this claim, and there is no reason to discount it.

Certainly, the air defense of Japan is better than that of almost any other country in the world with the possible exception of Soviet Russia, which has an infinitely longer border to patrol.

But how good is any air defense? How safe from air assault is the second best, possibly the best, defended country in the world? Is it much less vulnerable than other countries?

The American commander of the Japan Air Defense Force, Maj. Gen. Roy H. Lynn, put it this way in an article in Army-Navy-Air Force Journal: "A realistic appraisal of JADF's fighter strength and over-all air defense capability indicates that JADF can cope with the threat of potential Communist agression".

General Lynn undoubtedly was looking on the bright side. But he added qualifiers: "that is not to say JADF has ALL the personnel, ALL the air power, needed to perfect Japan's defenses. A commander rarely feels he ever has enough to completely satisfy the magnitude of his assignment. But in purely physical terms of what is currently available and that which JADF is capable of absorbing in event of all-out war, prospects of succesfully repelling airborne aggressors are more heartening than at any time in the past."

Looking closely, it develops that the general did not say he could defeat anything the Communists throw at him. He merely said he could "cope" with it. What does this mean?

From talks with defense officials while in Japan recently, and from general postwar experience with the caliber of United States intelligence about the Soviet Union's military capabilities, this correspondent is ready to conclude that General Lynn probably had no intention of claiming that he could stop any Red air attack on Japan.

The question of Japan's air defense involves four principal questions:

What does Japan have that we want to defend?

What is the nature and strength of the threat to Japan?

What defense does the United States Air Force provide?

When and how can the Japanese take over their own air defense.

There is no blinking the fact that Japan is important to the West. She has strategic position and productive power.

Japan, of course, is the workshop of Asia. Her industries are far and away the most highly developed in the Far East. Red China and India have at least a decade to go before they can

hope to approach the Japanese level of productive capacity. Mao Tse-tung would, first of all, prefer to capture this prize intact. Failing this, he would try to deprive the free world of using it against him in an all-out war.

General Lynn classifies the island empire's target areas into three geographical regions.

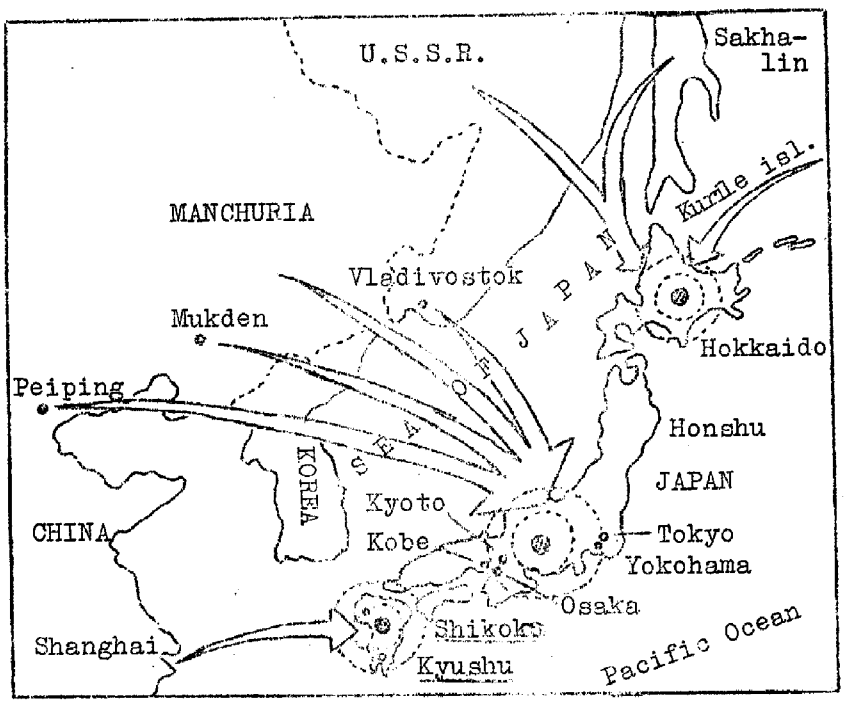
First there is Hokkaido. From the Japanese standpoint, this northern-most island is menaced by the Russian-held semi-circle formed by Sakhalin and the Kurile Islands. From the Soviet Union's point of view, however, Hokkaido with its U.S. Army and Air Force installations is a dagger pointed at the eastern fastnesses of the Soviet empire.

Hokkaido, of course, is not a large industrial area. Its importance is primarily strategic. It is a potential base for counterattack and for warning of air attack. It also would be a logical site for Red invasion, possibly by paratroops, if things ever get to that stage.

The central plains area of Honshu, on the other hand, would be the prime objective of any enemy bent on destroying Japan's capacity to wage or support war. The Tokyo-Yokohama and Osaka-Kobe-Kyoto areas today contain:

55 percent of the nation's steel production.
27.7 percent of the iron.
75 percent of the heavy industry.
90 percent of Japan's automotive works.
52 percent of her precision manufacturing.
72 percent of the country's total exports.

General Lynn put the case for defending the Honshu industrial complexes very convincingly recently when he said, "No area of comparable size in the entire Far East can match the industrial potential of Japan's central sector."



PRIME TARGET AREAS in the Japanese islands are Hokkaido, closest to Soviet territory; the industrial complexes on Honshu, including the Tokyo-Yokohama manufacturing centers; and Kyushu, guarding the southern approaches.

The southern Japanese island of Kyushu is the third geographical region of Japan being defended by JADF. It has several vital ports and the large industrial city of Nagasaki. Besides, it forms the southern approach for attacking aircraft headed for the central plains.

As with the Ruhr area of Western Europe, the United States is probably as much interested in keeping the Japanese productive potential out of the hands of the enemy as in using its output in prosecuting any war that might come. Japanese output is still small when compared to that of the U.S. But one need only recall the showing Japan made against the West in World War II to emphasize how much trouble she could make if her factories fell into hostile hands and their output were put into war-disciplined distribution.

So much for the need for defending Japan.

A few minutes' study of the accompanying map shows how geography favors a Communist air attack on Japan. The country is literally hemmed in. On the west there is almost nothing but Communist country and on the east, the Pacific.

The big question, of course, is what the Russians, North Koreans, and Chinese have handy for the attack. Roughly, the Red arsenal breaks down into two parts - aircraft and explosives.

When you pin down our intelligence people, you find that it's hard to learn much about what the Russians have in the Far East. The Iron Curtain is just as effective in the Orient as it is in Europe. The principal sources of information are air reconnaissance, whose limitations are obvious, and Japanese repatriates, who aren't always reliable.

Recent Far East Air Forces intelligence reports which have been cleared for publication indicate that there are now 700 new IL-28 jet bombers and about 2,500 MIG fighters based in the Far East. Here is a partial breakdown of their dispersal over some thirty fields, most of them within range of South Korea and Japan.

In Red China. Some 125 to 150 IL-28 jet bombers are disposed strategically up and down the China coast. Some are based opposite Formosa. But most are in the Shanghai, Tientsin, and Peiping areas.

In Manchuria: There are fifty IL-28s. If the war in Korea were resumed, these undoubtedly would come into play to knock out South Korean airfields and other military installations. There is no indication that they could not reach Japan, too, if occasion warranted. Their principal purpose, however, seems to be as reserves for the jet bombers in North Korea.

In North Korea. The Reds have stationed about 100 of their IL-28 bombers and 200 to 300 of their MIG-15s here. Of course, these, too, are available for offensive operations either in South Korea or Japan.

In Siberia. Intelligence reports released by FEAF group Sakhalin and the Kuriles with Siberia. They estimate that the Russians have between 350 and 400 of their IL-28s and some 1,200 to 1,500 MIGs in these areas. Many of these are based on Sakhalin and in the Kuriles, just a few miles from Japan's northern island.

What this geographical proximity has come to mean in the jet age is already well-known. Secretary of State John Foster Dulles has warned repeatedly of Japan's extremely vulnerable position. Even piston-engined planes could be over Hokkaido only a few minutes after take-off from Sakhalin and the Kurile Islands bases. Vladivostok is about an hour away for jets.

What kind of payload the jet bombers from Communist bases would carry is, of course, just about as important as the swiftness of the carrier. We have to assume that any invasion of Japan's air with explosives would be made with the full realization that World War III was there with underway. Japan might well be one of the first targets to be hit in coordinated strikes at

U.S. production centers. American overseas air bases, and West Germany.

Under such circumstances the Communists could be expected to use atomic bombs on Japan in the hope of dealing a knockout blow. If the Reds have A-bombs to drop, the Japanese defense would have to be nearly perfect to avoid extensive damage. For it would take only a few bombers to get through into the Tokyo-Yokohama and Osaka-Kobe-Kyoto areas and do heavy damage. Industry is concentrated in the port areas.

There is also a psychological aspect. Japan, it will be remembered, is the only country of the world that knows the terror of the atom bomb first-hand.

How the Japanese populace might react to the news that A-bombs were dropping on their cities again is not hard to imagine. Large numbers of them in all the major cities rushed to the hills and mountains in August 1945 to hide from the American "barbarians".

One bomb dropped almost anywhere probably would disrupt Japanese production nationwide.

How can Japan and the United States prevent this catastrophe?

As already indicated, the command responsible for defending the island empire is the Japan Air Defense Force, headed by General Lynn.

Under him are three air divisions, the 39th, the 41st, and 43d, in northern, central, and southern Japan. The northern base is at Misawa on Hokkaido Island. The central base is located near Tokyo, and the southern base is at Itazuki air base, on Kyushy Island. Headquarters are in Nagoya, about 150 miles south of Tokyo.

Actually, Japan is such a small place that interceptors would have to get out over the sea to meet the aggressors if their defense were to be effective. Jet pilots who have flown long hours there point out that the Japanese islands are "only about thirty minutes" wide at their widest. Once over the islands, invaders would be hard to stop.

The JADF system is comprised of four elements: a radar warning net, a high-speed communications system, fighter-bomber and interceptor units, and anti-aircraft artillery.

The radar warning net is constantly being improved. Locations of the scanners are being changed to take advantage of the most strategic locations. More modern equipment is coming in constantly. Airborne radar probably is being used in vigilance missions, too.

But even if the system works up to the high standards its designers hope for, there are two grim limitations, one of them common to all known radar warning systems, one unique in Japan:

Radar is "blind" to low-flying aircraft, skimming over the top of the watery approaches to Japan.

Even if radar detects the attackers, there will be only a few minutes' warning.

Radar operators are being trained not to dawdle over bogeys. Identification thus is likely to be less positive before alarms are sounded. But under present conditions the efficient traffic control centers manned by FEAF personnel usually can prevent scrambles for routine friendly approaches.

At present American airmen run the communications net, using the latest American electronic equipment for transmitting radar warnings of defense squadrons. Some of the equipment JADF uses is Japanese, of course. The Nipponese communications system is oneeof the best in the world, and far better than other Oriental nets. Equipment is now being modernized and with Japanese technicians and operators already "breaking in" on American gear, prospects are that this phase of the air defense system may be the first to be turned over to the Japanese completely.

Japanese who speak English are being allowed to take over

some of the ground-to-air communications, as well. With the Japanese coming back into commercial air business, the need for bilingual communications personnel will increase, and the Japanese technicians are already hard at work mastering English.

As for aircraft, JADF has an all-jet force of Lockheed F-94 Starfires, North American F-86 Sabrejets, and Republic F-84 Thunderjets, all kept at the peak of readiness. However, there is some skepticism that these planes could operate at the high altitudes they might be called on to chase IL-28s.

JADF squadrons fly regular patrols over the Japanese islands, sometimes mixing practice dogfights with their vigilance missions. Heavy weather over Japan's mountainous islands - much of it coming off the Siberian wastelands to the northwest - provides excellent training conditions for all-weather squadrons. In contrast to the situation reported from Korea, pilots get just about all the time in the air they think they need, according to a squadron commander recently returned.

Desk men at the heavily populated FEAF headquarters in the Meiji Building of Tokyo and in JADF headquarters in Nagoya are still limited to their 100 hours, of course. But most of them take this sentence philosophically.

One of them pointed out, however, that it doesn't take so long for the chair corps to get back into the swing of things. He estimates that seventy-five percent of the aces in the Korean war were converted desk men. If a new war comes these men would be right back hunting bogeys again. If they are provided planes and equipment that can cope with what the Communists have, they undoubtedly will more than hold their own in the air battles as they have in the past.

American pilots in tactical outfits now stationed in Japan train in instrument flying, gunnery, air-to-air interception, and weather flying. Recently, some of the squadrons have been training in air-to-air refueling. A flight of F-84G's flew nonstop from Japan to Bangkok not long ago using the air-refueling technique. Since F-84G's are known to be capable of carrying "baby" A-bombs, this increases the strength of the U.S. retaliatory force in the Far East.

Dependence on seaborne fuel appears to be a weak point in the JADF set-up. Japan has little home-produced petroleum. If the Communists could spare enough submarines to blockade Japan, they probably could keep the jets on the ground for lack of fuel. How long enemy sub forces could operate in Japanese waters if the new American sub-chasing forces were sicked on them is, of course, a subject the Defense Department is not discussing.

Tokyo naval sources say the Russians have posted about one-third of their submarine force, some 125 vessels, in the Far East. There were reports in mid-February that one of the Russian subs had been sunk off Hainan Island, presumably by an American submarine. The Soviet subs are said to have been beating a regular path through the Straits of Formosa. From time to time Japanese fishermen also have reported seeing unidentified subs surface in the Sea of Japan.

American anti-aircraft is the last line of defense against enemy attack. But in spite of its modern radar gun-laying equipment and longer-range guns, the chances of AA stopping bombing runs once the raiders get through the jet squadrons' defenses are not rated very high.

Even if Japan should have the best air defense in the world, then, the degree of safety she enjoys is not impressive. More alarming from the Japanese standpoint, things will probably get worse before they get better.

There is already talk about the U.S. pulling its security forces out of Japan. There is strong political support for this inside Japan among Progressives (conservatives not now in power) and Socialists. The Communists are fanning the spark, hoping it

will build into a flame.

This combination of left and right is making it hard for the Liberal (conservative) government of Prime Minister Shigeru Yoshida to meet any kind of a self-help schedule.

The root problem is that the Japanese - once looked on as such a war-like breed - are not in any hurry at all to re-arm themselves now. American occupation authorities did too good a job of selling them General MacArthur's "Switzerland of the Pacific" theory.

Prime Minister Yoshida is going ever so slowly in nudging public opinion along the rearmament path. Even so he is on extremely shaky ground. Right now he is on the point of risking his premiership to push through a very modest defense program in the Diet, the Japanese Congress. The U.S. has made its new military aid program for Japan contingent upon Nippon's doing something to build her own defenses.

To support even a small force the Japanese will have to brace themselves for an austerity drive. Their government leaders are gingerly mentioning the prospect and ducking for cover while the opposition howls about Japanese foreign policy being written in the American embassy in Tokyo.

Thus the gloomy picture for Japan's air defense: While there is talk that United States might pull out, the Japanese are lagging hopelessly behind in taking up the slack.

Meanwhile, the Communist threat isn't getting any smaller. Red air units in the Far East are not only getting more numerous, they're getting more modern. And the Communists are definitely interested in what goes on in Japan. Red reconnaissance planes have appeared over Japan too often for comfort.

As a result Japan issued the stern January 1953 warning, obviously aimed at the Soviet Union, that "violations of our territorial air over Hokkaido by foreign military planes" had become "increasingly frequent" and would be prevented in the future by Japan "with the cooperation of the American security forces stationed in Japan". Gen. Mark Clark, then U.S. commander in Tokyo, backed up the announcement.

In the face of this obvious threat, the Japanese are hoping lamely that America will not leave her naked of air defense while they go slowly about building their own. They are betting, in effect, that Uncle Sam will continue to pick up the check after 1958-59, recently mentioned as the possible departure date for all American forces in Japan.

Even if American forces stay, however, it is likely that Communist airpower could inflict some heavy blows on Japan if the Reds were willing to expend the effort. The nightmare Nippon faces is the squadron of low-flying IL-28s- or quite possibly supersonic guided missiles - equipped with atom bombs. And in the event of all-out war, Japan might well find herself as vulnerable to submarine blockade as she was in World War II, when the U.S. was on the blockading rather than the supplying side. - END.

Earl Voss got acquainted with the Far East during World War II and in a 5½-year stint in General MacArthur's public relations set-up. Since 1951 he's been with the Washington "Evening Star", revisited Japan recently.

-.-.-.-

V.T.O. AND "JET-LIFT"

The future of vertical or near-vertical take-off has been revived by the announcement of the two U.S. Navy V.T.O. types, the Convair XFY-1 and the Lockheed XFV-1. JAMES HAY STEVENS raises here the question of whether there is really any point in these and similar "contraptions".

There is, of course, nothing new about vertical take-off; it is achieved when effective upward thrust exceeds weight at the start. In fact the first take-off was vertical - when the upward thrust of the hot air in the Montgolfière balloon exceeded its weight. Ignoring the early, almost uncontrolled, helicopters, it was in 1933 that Don Juan de la Cierva achieved practical V.T.O. with a heavier-than-air machine. This was the "jump-start" autogiro in which sufficient energy was stored in the rotor by reviving it up at low incidence (pitch), to achieve an initial leap when the engine clutch was disengaged and incidence increased.

With the arrival of the controllable helicopters, the Focke-Achgelis and Sikorsky, vertical take-off became an established fact. But, what had been gained at the low-speed end of the scale had been lost at the other.

The engine power of the helicopter is harnessed to a rotating wing system that provides the necessary vertical lift at the expense of horizontal propulsive efficiency. Whether one regards a helicopter rotor as a large variable-pitch airscrew or as a whirling wing, it achieves lift by creating artificial air speed through spinning aerofoils about its head as it were. In other words, although the aircraft rises vertically, lift is achieved translationally at the cost of some structural and mechanical complexity - a complexity that prevents the helicopter, as we know it today, from competing with the aeroplane in its main selling point - speed.

The antithesis of this method of vertical take-off is the rocket - the power unit of the world's fastest vehicles, the guided missiles. The rocket can be immensely powerful and is always very, very extravagant on fuel. It can, however, provide an initial thrust greatly in excess of the weight of the aircraft, and it does so without any aerodynamic or mechanical devices. If you like, it achieves V.T.O. by brute force alone.

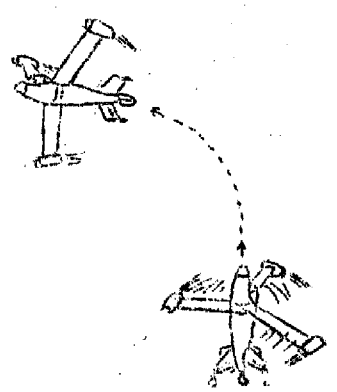


Fig. 1. The Focke-Wulf convertiplane project with ram-jet rotor-tip propulsion - the first time such a system was mooted.

The rocket vertical take-off is extravagant, but it is acceptable because the missile is to be accellerated to high supersonic speeds and the best results are obtained by accelerating as rapidly as possible from the beginning. Usually booster rockets are used at the start in order to achieve a good excess of thrust over weight, which means rapid acceleration, so reducing the "dead" period when the aircraft has left its launching support and before its speed is sufficient for the control surfaces to "BITE".

Anyone who has seen the German V-2 films will recall how slowly the huge rocket rose off its base, appearing to hover on its jet of flame and smoke before it rose quicker and quicker into the sky. Some of the films also showed how the rockets toppled in this early stage - fortunately for us in Southern England a very frequent occurrence.

The "Convertiplane".

Returning to the aero-mechanical lift device, the "convertiplane" makes an effort to combine the virtues of the helicopter with those of the aeroplane. This is a compromise that may well end by having to subsidise the vices of both very heavily from payload.

One of the first, and most ambitious, V.T.O. schemes was a Focke-Wulf fighter helicopter project of 1944. This was a streamlined fuselage with the pilot in the nose, and the rotor was to have been mounted in the middle of the fuselage (in the plane of a normal propeller) and driven by large ram-jets at the blade tips. This queer aircraft had tail surfaces, but no wings. It was to have sat on its tail and then the ram-jets would have accelerated the rotor, in low incidence, with little torque, and the take-off would have been much like that of a normal helicopter. Once at altitude the aircraft would have been nosed over until the fuselage was horizontal and at the same time the rotor would have increased incidence and slowed down till it was simply idling and the ram jets were thrusting almost due aft. The slowly revolving rotor would have given all the lift needed at the 600 m.p.h. operating speed of this project. Control about all axes was to have been from the tail surfaces.

This scheme was intended to overcome the brake upon speed inherent in the helicopter formula, that is to say, the huge aerodynamic problems, the shock waves, drag, turbulence and consequent stresses set up by the high resultant airspeed when the rotational and forward speeds of a helicopter are combined in the rotor.

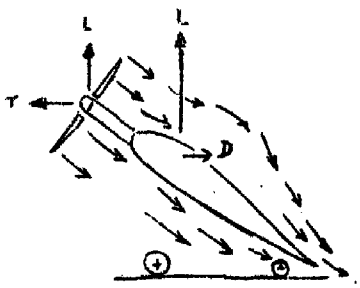


Fig. 2. Diagram of the lifting Vought V-173. With high incidence the airscrews contribute a direct vertical lift component, while the slipstream enveloping the low-aspect ratio wing induces lift from the wing. A little forward speed is all that is needed to make the total lift exceed the weight.

Fantastic as this scheme appeared ten years ago, it is not so very different from some of today's projects. For example, the half-joking transport helicopter with the passengers in gymbal seats propounded by Dr. Raoul Hafner of Bristols recently.

The Fairey Rotodyne, the forty-passenger inter-city rotor-

craft ordered by the Ministry of Supply, is an application of the convertiplane principle, of which the newly re-constituted Gyrodyne is a working model. At take-off, power from two turbo-props is diverted to supply compressed air to the rotor tip-jets for combustion. This energy provides aerodynamic lift by whirling the rotor, exactly as in a helicopter. After altitude has been gained the whole engine power goes into driving air-screws for forward propulsion, the tip-jets being stopped, and lift is obtained from the auto-rotating rotor and stub wings. This lightening of the loads on the rotor allows a forward speed of 200 m.p.h. to be safely reached - it is hoped.

Here a step has been made toward improving the speed range.

Those curious emanations from Burbank and San Diego, the XFV-1 and XFY-1, are in somewhat the same class. In the Roto-dyne vertical take-off is to be achieved while retaining some-thing of the characteristics of a transport aeroplane. In the Lockheed XFV-1 and the Convair XFY-1, built to meet U.S. Navy requirements, an attempt is made to convert relatively conven-tional aeroplanes so that they will take off and alight like helicopters.

One is in no position to comprehend the inner secrets of the U.S. naval authorities - and if one were disclosure would be impossible - so it is difficult to see why these expensive contraptions were built. There has been sufficient knowledge for ten years to make something very like them: the basic mechanical requirements are a light and powerful engine, coupled to a large contra-rotating airscrew. With a power loading of about 4 lb./h.p. the engine can lift the aeroplane through the intermediary of the airscrew in very fine pitch - the counter rotation eliminating torque reaction.

Once airborne and at a safe altitude these aeroplanes will tip over into horizontal flight (as models have done in a N.A.C.A. free-flight tunnel), the one tricky period being at the stalling incidence when the conditions of flight change to wing-supported. Here the low-aspect ratio helps, particularly the delta Convair, because this form of wing is more adaptable to lifting at high incidence.

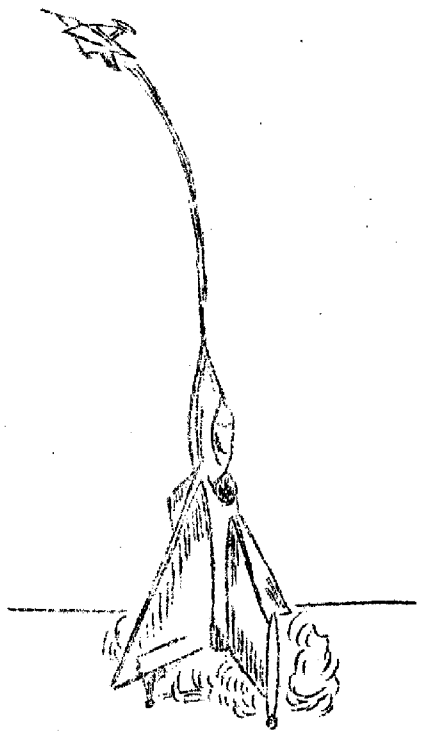


Fig. 3. The Polish 02-2B vertical take-off jet and rocket experimental delta. A sketch based on smuggled data and believed to be substantially correct.

Alighting is a case of letting down backward on reduced power, the pilot having to judge his approach and touch-down by looking over his shoulder. This is bound to be tricky in the extreme: not only because of difficult piloting judgement, but also because of the effect of wind on the large surfaces, since there will not be the lateral control of a helicopter. In case of engine failure, there is a parachute in the spinner which, it is hoped, will let the aeroplane down gently enough to save the pilot. To alight on a heaving deck with these aeroplanes seems unduly hazardous.

Fig. 4. A typical Griffith suction aerofoil in which the boundary layer is sucked in at the point where drag-producing turbulence would start. In effect the ineffective rear part of the wing, shown dotted, has been discarded.

But it is not at slow speed that one has most doubt. These fighters simply have not the shape to achieve modern operational speeds. In other words, they appear to have no practical purpose, even if they work.

They are, undoubtedly, only part of a large, and typically lavish, American V.T.O. programme. Obviously jet propulsion alone can achieve modern speeds, so these propeller-driven types must be a dead-end experiment, since control and stability without slipstream cannot but be quite different.

Polish V.T.O.

Very similar to the American aeroplanes is a machine that is understood to be under development in Poland, the CZ-2B. This is a delta with three very large fins, in the tips of which are both rockets and landing supports. The idea here is to use the main jet engines for all flight and the rockets as boosters for take-off only. To overcome the problem of guidance without slipstream the three fin-tip rocket throttles are under control from the stick.

An aeroplane like this ought to be able to achieve operational performance, but the use of rocket and jet thrust directly for lift is very extravagant in fuel - the airscrew and the wing are far more efficient converters of thrust into lift - so we are back to the V-2 again.

Vertical alighting a more difficult problem, is achieved with the CZ-2B as with the American aeroplanes. It lets down backward as thrust is reduced and a drogue parachute is released from the nose to give stability.

Is there a future in V.T.O.?

Broad hints have been dropped by Sir Frederick Handley Page and others that the world will shortly witness an aeronautical refolution. This change will be brought about by the integration of thrust and lift - or briefly, "jet-lift".

This term means the use of a propulsive air stream to generate lift by direct action on the wings.

One example of this was the vought V-173, the flying pancake of Charles H. Zimmerman. This was a "square" flying wing with two large-diameter, oppositely-rotating propellers near each wingtip. Square wings, tilted to an angle of 45 deg., resemble a kite in action, and develop lift in the same way. An ordinary wing of conventional-aspect ratio would of course be hopelessly stalled at such an angle. Like the current V.T.O.'s, the V-173 had airscrews with very fine pitch and when these accelerated

large masses of air over the wing the aeroplane moved forward only a few yards before it generated enough lift to fly steeply upward at an air speed of about 25 m.p.h.

Alighting was relatively simple because there was no reversal condition as with the other types described, which come down tail first.

A jet-engined version was projected which, it was announced, would have flown at zero forward speed - after which there was silence. One does not know whether the whole scheme was dropped - or whether a flying saucer has taken off!

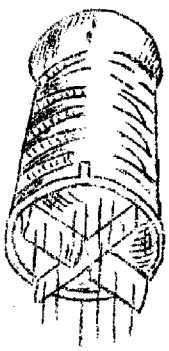


Fig. 5. The N.A.C.A.'s self-lifting ducted fan model. Counter rotating propellers working in the duct are efficient and produce a jet that will lift the whole device. Control is by vanes in the jet stream. The external ribbing is purely structural for this elementary model.

In embryo the V-173 expresses the idea of jet-lift.

A possible jet form would have nozzles along most of the trailing edge, which would be tilted downward for vertical flight. With the wing already at high incidence induced air flow over the curved upper surface of the wing would act much like the slipstream in generating lift.

There is, however, another factor. It is a well-known precept that in aerodynamics the boundary layer is the nigger in the woodpile. Without the sluggish envelope of air around a moving body the stall would be delayed and drag reduced to very small proportions. In other words, the work of the engines in lifting and propelling would be greatly reduced.

Many experiments have been made with sucking and blowing away the boundary layer. Under laboratory conditions, in wind tunnels that is, these have been most promising, but flight trials have revealed disappointingly low percentages of the theoretical gains. Rather large quantities of air have to be removed to be effective and, in the past, this has been a problem. Today, however, there is the air-thirsty turbojet and its even greedier cousins, the ducted fan and by-pass engines.

The N.A.C.A. has actually flown, and controlled, a simple ducted fan which took off vertically. Here indeed is an obviously practical device suited to vertical and horizontal flight at both high speed and no speed. Lift should be derived fairly economically, too. On the other hand, it presents manifest disadvantages in regard to stowage space for crew and fuel.

Fig. 6. It might work! Cascades, or multiple slots, can generate considerable lifting force and it might be possible to divert a jet stream through such a system. The cascades could be made to close up as a normal aerofoil after take-off, when lift would be generated by the air flow over the whole due to forward motion.

Another method would be to have a variable wing - something like the Brèguet scheme - which would be a cascade, or venetian blind, of small aerofoils at low speed. By diverting air downward through such a "screen" very high lift can be generated at very low speed. For fast flight the slats would be closed up to form a conventional aerofoil. This is really a multiple elaboration of the slot and it has been mooted many times. Although the closely-spaced slats do make a form of "natural" boundary-layer control that is effective, the mechanical difficulties of such a device appear excessive.

Dr. A.A. Griffith, one of the earliest jet-propulsion experimenters at the R.A.E., who is now with Rolls-Royce, evolved some remarkable aerofoils a few years ago. These were the queer tadpole-shaped and so-called cusp sections.

Originally, experiments were directed at removing the boundary layer from more or less conventional laminar-flow aerofoils, so that laminar conditions would continue farther aft than the usual 30 or 40 per cent. It was found that by cutting away the wing behind the suction slot, turbulence could be virtually eliminated and drag reduced to very small proportions. Once drag is drastically cut, the lift-drag ratio rises, engine power is used mainly for lift and an entrancing vista is opened up.

The jet and by-pass engines need air, and at comparatively small cost in duct losses, some of this air can be drawn from the suction slots. Hold the aerofoil at high-lift incidence and, like the V-173, lift will be generated almost immediately - just a short run, then up. The effect will depend upon the relationship of engine power to weight, as well as the efficiency of the lift-inducers.

To obtain adequate control at zero, or very low, air speeds jet deflection is the obvious solution. It is used in the N.A.C.A. self-lifting ducted fan, and was to have been used for the control of the Fairey FD-1. Control can be maintained by deflecting the engine exhaust internally to different outlets, or by mounting deflector plates just behind the nozzle. In either case the heat-resisting metallurgical problems are even more acute than those of the adjustable afterburner nozzle.

It is likely that low-level supersonic aeroplanes will have thrusts about equal to their weight. Once static thrust exceeds a ratio of 1.0, vertical take-off is possible. With some form of jet deflection over lifting surfaces, or of boundary-layer suction, efficiency improves and the take-off should be both sprightly and controllable. The return also should be practical - although the results of engine failure might be immediately catastrophic.

With high-altitude supersonic aircraft there will be rather less power and the likelihood of static thrust actually exceeding weight is small. In this case booster rockets might be needed to obtain truly vertical take-off, rather than over-elaboration of engine ducting and suction slotting, etc.

Aircraft are always very much machines of compromise, any advantage in one direction must invariably be paid for in full. vertical take-off by the helicopter is achieved at the cost of payload, speed, and ceiling compared with aeroplanes of the same power. The supersonic dive of the Swift is gained at the price of a high stalling speed. The integration of thrust and lift will improve efficiency and probably achieve the desired result in the end, but the way will be hard, requiring much research and experiment with both models and full-scale - and the price will have to be paid in some way.

Is it necessary?

At the present time the runway problem is acute. Not only fighters and bombers, but air liners also require two miles of

concrete. Such a position is manifestly ridiculous. If the money spent on the manufacture - and the not inconsiderable maintenance - of the runways of the world since the war had been spent upon research into reducing stalling speeds, the runways would not be needed!

Let us hope that research is going in this direction now and that, when more money is required it will come from the "concrete funds", since we hope that they are obsolescent.

V.T.O., pure vertical take-off, may not be necessary; in fact one would feel quite happy with reliable take-off and landing in five hundred yards.

An aeroplane that can operate from such an area, particularly if it does not need concrete, can be deployed almost anywhere in the world. If it is military it will not be immobolised by bombed runways, if it is commercial it will be cheaper and safer to operate.

Accepting jet-lift, or integrated thrust and lift, as the new concept in aerodynamics - at present a concept deeply shrouded in the veil of security - it is possible to foresee that just as the aeroplane of today is adapted to particular duties, so that of the future will vary in its take-off behaviour from vertical to a few hundred yards.

-.-.-.-

AIR POWER Summer 1954.

THE SOCIETY OF BRITISH AIRCRAFT CONSTRUCTORS (NEWS ITEMS)

Jet Pilots Helped by Television Map.

The Royal Air Force is installing a "television map" system at its traffic-control centres. The system has been especially designed to enable controllers to see at a glance the position of jet aircraft in distress.

The Royal Navy and Royal Netherlands Air Force are also installing this new equipment, and civil aviation authorities are interested as well. The system has been developed by Standard Telephones & Cables Ltd.

The system works in the following way. Radio signals from the aircraft which are picked up on an airfield direction-finding set and converted to bearings, are fed by landline to the control centre. Here, bearings from two or more of these stations in different parts of the country are shown on the television map, and the controller knows that the aircraft's position is at the intersection of the bearings. The controller can see at a glance where the aircraft is, and then direct it to appropriate airfield.

Fire-fighting Discovery for Airfield Crashes.

Airfield fire-fighting crews are to use a new British device which will revolutionize rescue work on planes which are forced to crash-land. A special chemical is used which, when sprayed on to a fire, puts it out in a matter of seconds, and drastically reduces the temperatures, so greatly improving the chances of saving people trapped in a red-hot wreckage.

The equipment has already been ordered by the United States Air Force in Europe, and after exhaustive tests it is now to be used by the Royal Air Force.

The chemical used is chlorobromomethane, generally known as C.B., and developed by General Fire Appliances Co. Ltd., of London. It is sprayed through hoses fitted with specially designed applicators, which control the droplet size.

-.-.-.-

...AND NOW THE THERMAL BARRIER

Without air-conditioning the temperature inside a pilot's cockpit, at 1,000 m.p.h., would be enough to cook him alive! That, and its associated problems, is confronting the aircraft designers today.

While the housewife is bemoaning the fact that her plastic dish has just become soft as it sat near the hotplate, the aircraft designer has bad dreams of wings doing likewise at supersonic speeds.

The designer, forever trying to make his 'planes fly faster, is continually exploring the unknown, refuting the arguments of the prewar scientists. Ten years ago the scientists told us that flight beyond the speed of sound (760 m.p.h. at sea level) would be impossible. All indications at that time tended to back up their predictions. The power required to travel a few miles per hour faster was out of all proportion to the difference in speed. Propellers became less and less efficient at very high speeds, and the piston engines to drive them were becoming enormous.

Then came the jet era. The designer was given new power to play with. Airplane speeds took an immediate sweep upward. The old "Vampires", "Meteors", and "Shooting Stars" started diving at speeds hitherto unknown to mankind. Miles per hour gave way to Mach Number, the ratio of speed of the aircraft to the speed of sound. They set their sights on Mach One, the maximum speed they would ever fly at, according to the scientists.

The pilots fought their way through to Mach One. It was an experience that few of them will cherish - high in the sky, beads of perspiration on their faces, and trying, often in vain, to counter the violent pitching and buffeting as Mach One approached.

It was only after several years of arduous effort, intensive research, and with the loss of several fine test pilots, that Mach One was eventually reached. They flew on into the more stable atmosphere of the supersonic realm, and chuckled at the thought of the scientists and their predictions. The sonic barrier was real enough, and it was no easy matter to prove the scientists wrong. It was jet-propulsion that did the trick, and today we have engines being tested with four times the power of those that first broke through the barrier. The net result is that next year's airplanes will have no trouble surpassing Mach One.

This new, and much-sought-after, power, has given the designer a breathing spell, but not for long. He calculates, for instance, that his 'plane will break through the speed of sound with ease, and has the power to fly at 1,000 m.p.h. This is fine, he says, and then along come the aerodynamicists to disillusion him, and set him off exploring the unknown once more.

They ask him if he realizes that at 1,000 m.p.h. the skins of his airplane will be subjected to a temperature of something like 250 degrees Fahrenheit.

To keep this in perspective it should be noted that the temperature of boiling water is 212 degrees Fahrenheit.

The reason behind this skin temperature can be explained fairly easily. Air passing over any body, such as an airplane, is slowed down by friction in the immediate vicinity of the surface. The small particles of air immediately touching the surface have no velocity, they are, in effect, stuck to the surface by friction. The particles of air a few thousandths of an inch away from the surface are moving very slowly, their progress being impeded by those stuck there. Then, as the air passes farther and farther away from the surface it travels faster and faster until, at a short distance away it is

unimpeded. The distance between the surface and the freely moving air, known as the boundary layer, may be anything from a fraction of an inch to several inches.

Now, as the air is slowed down by skin friction, the energy of the air (kinetic energy) is converted to heat energy, so the faster the airplane flies the more the heat.

One other factor entering into the problem is that temperature rise doesn't vary linearly with speed. It increases as the square of the speed. In other words, the temperature at 1,000 m.p.h. is not 10 times that at 100 m.p.h., it is actually 10 times 10 - 100 times as much. So the magnitude of this problem becomes obvious as we reach for higher and higher speeds.

The designer then, recently recovered from his onslaught on the sonic barrier, is told that the wing skins of his airplane will be subjected to 250 degrees Fahrenheit at 1,000 m.p.h. At first he doesn't grasp the significance of this. The melting point of aluminum is far above that figure, so why worry? Then he remembers how all metals gradually lose strength with increase in temperature, and a completely new perimeter enters into his strength calculations.
At 250 degrees Fahrenheit the normal strength of aluminum has dropped by 20%, a severe penalty indeed, particularly as the major portion of today's airplanes are made of aluminum.

Steel only loses 3% of its strength at that temperature, but weight and an inborn prejudice against it, preclude the use of steel for airplane skinning.

What then is the answer?

Aluminum, the metal used by designers for many years now, will not generally be used for the skinning of airplanes flying at more than 1,000 m.p.h. Beyond that point the strength of the metal drops quickly, until at 1,500 m.p.h., the strength is only a quarter of its normal strength. A word to the sceptics at this point - 1,500 m.p.h., or approximately Mach Number Two at sea level, is not so far away as one may think, for it is the design speed for aircraft already on the drawing boards.

With aluminum ruled out, we are left with steel and titanium, and at high temperature there seems little to choose between these two metals. The chances are that the designers of tomorrow's fighter aircraft will resort to the so-called wonder metal - titanium. This metal is at present in short supply, and fairly costly, but with the extensive research being carried out on it, the costs and production rates should improve. Even today there is flying the vanguard of this new breed of interceptors - the North American YF-100, a top-secret aircraft, reportedly using titanium on a wide scale.

Apart from the structural and metallurgical considerations, there is the effect of this heat barrier on pilot and equipment.

During the long-drawn-out comparisons between the "Sabre" and the Mig-15, it was often pointed out that the "Sabre" carried an impressive array of air-conditioning equipment. Gadgetry, which the newspapers claimed was there to give the pilot all the comforts of home! There may be a certain amount of truth in it, but one thing is certain, without some efficient form of air-conditioning the cockpit temperatures would be beyond the limit of human endurance. It is absolutely essential that the pilot be supplied with the correct amounts of oxygen, pressure, humidity and temperature. The equipment required to perform all these duties is consequently large, heavy, expensive and costly.

Also affected by the terrific heat are radar and electronic units, and the guidance systems of any missiles carried. All of

these items must be kept within certain temperature limits for correct functioning, so additional equipment is required for this purpose.

Apart from the terrific temperatures developed by high speed flight, there are the effects of atomic bombing to consider. This effect can be very serious, and is apt to be completely forgotten in the design of the airplane. Again it is temperatures that are the cause of the trouble; temperatures due to the atomic explosion. The whole atmosphere in the region of the explosion is heated, even up to 20 miles or more away! For instance, if the airplane is, say, five miles from the explosion, the thermal radiation from the explosion may be 15 times the radiation from the sun! The heat from the first atomic explosion at Alamogordo, New Mexico, was indeed sufficient to fuse the desert sand, and convert it to glass.

So, even though the atomic bombers may not be supersonic, their structure also will have to be designed to withstand terrific heat.

Taking a far off glance into the future, with the prospects of interplanetary flight, the temperature problems become enormous. If the temperature is higher than about 800 degrees Fahrenheit, titanium is useless, so that leaves stainless steel as the only alternative, and even that will have a nice reddish glow at the flight speeds contemplated.

The airplane skin temperature at speeds now being approached, are changing the whole concept of aircraft design. It is a completely new factor to be taken into consideration, and interceptors, already a mass of gadgetry, will become a designer's nightmare in the very near future. The Thermal Barrier may well prove to be a greater headache than its much-vaunted predecessor, the Sonic Barrier.

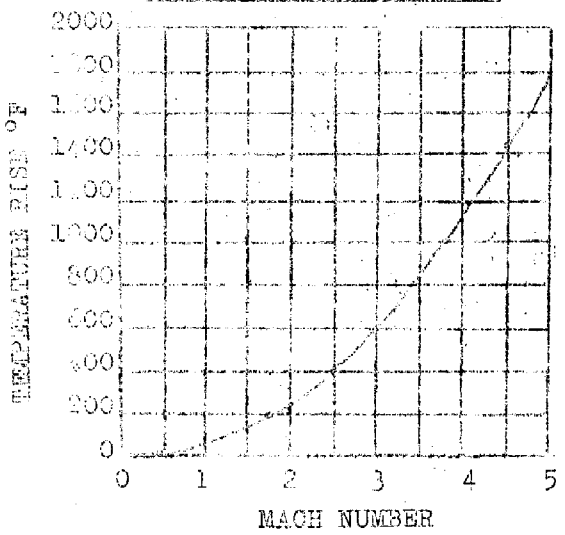
OPMERKING

Bevenstaande grafiek geeft de temperatuursverhoging aan van het oppervlak van 'n vliegtuig bij vergroting van de snelheid.

Uit een 2e grafiek (welke om technische redenen niet werd overgenomen) blijkt dat de sterkte van een aluminium legering boven 250°F (120°C) nagenoeg met de helft terug loopt.

Van meer belang is wellicht de opmerking dat in de uitlaatbuis van de meteorkanonnen temperaturen tot 150°C zijn waargenomen door typische luchtstromingen. De oorzaak van dit verschijnsel is theoretisch nog niet opgehelderd. Men dient er rekening mee te houden dat hierdoor de constructieplaat verzwakt.

VARIATION OF BOUNDARY LAYER TEMPERATURE WITH SPEED.



Red. L2.

HOW GOOD ARE NONSTOP FIGHTER TACTICS?

More work must be done on integrating the pilot and his equipment to maintain combat efficiency.

By WALTER A. KILRAIN.

It is feasible even for fighters to fly 10-15 hours if the situation requires it. However they cannot do this and still maintain their combat efficiency with their present equipment.

The estimate and its qualification come from Harry W. Dorris, Jr., who has been in a position to know. He was in the position for some 14¼ hours, flying a Lockheed F-80 fighter over Korea, during which time he refueled in the air six times and flew eight missions. Since returning to work as an operations development engineer at the Glenn L. Martin Co., he has outlined both the advantages inherent in mid-air refueling as carried out during his experiment and the drawbacks that presently cut combat efficiency.

"During (the) 14 hours, I became intimately familiar with my personal equipment," Dorris observed. "As a matter of fact, my parachute seat strap made a firm impression on my posterior during this flight. I could see the acute need for redesign of cockpits and personal equipment. I could also see the great operational mobility afforded by using inflight refueling tactics."

The mobility that Dorris refers to can be exploited in several ways. With a larger supply of fuel, obtained by means of inflight refueling, the jet fighter can penetrate deeper into enemy territory, remain longer in the target area, or fly at lower altitudes while going to or from the target. These advantages, together with the fact that atomic bombs can be carried by fighter aircraft, constitute reasonable grounds for attempting to iron the bugs out of such marathon operations. "It is," as Dorris points out, "only 8000 miles from Washington across the Arctic and eastern Europe to India, or less than 14 hours in a fighter."

The actual refueling is simple enough. The fighter arrives at its rendezvous with the tanker, moves slowly up until its probe enters and locks inside the drogue of the larger aircraft, waits while fuel is pumped aboard at the rate of 600 gallons per minute, then reduces speed and breaks contact. In three to five minutes the operation is finished. It is done almost as easily at night as in the daytime.

For the pilot however, such a flight has real difficulties, which revolve around the problem of flying, alert for possible enemy action, for long periods, while hung with various items of personal equipment.

LIFE VEST UNBEARABLE.

"I became more and more uncomfortable as the hours passed," says Dorris. "My Mae West life vest became unbearable after five hours, so I took it off and placed it on the floor of the cockpit...it would have been impossible for me to have flown 14 hours with it on... My survival equipment was bulky and uncomfortable.

Prior to the flight I had found out in relatively short flights (four to five hours) that I could not tolerate the survival vest with its contents. I removed the contents and replaced them into a makeshift cushion which I placed on the top of my dinghy to sit on.

"Another irritating item was the back of the P-1 helmet rubbing my neck. Flying alone, I was most concerned about what might be coming up on my tail, so I checked that area frequently. I did not want a MiG to sneak up undetected and shoot me down. To look directly behind you requires a good twist of the neck. This results in your oxygen mask pulling back, your P-1 helmet turning slightly on your head, and as it turns, the back edge rubs your neck.

"Another uncomfortable piece of equipment on a long flight is the main strap of your parachute that fits under your legs, which you sit on as you come down in the parachute. It is a strap about four inches wide and very heavy. This made a firm impression on my posterior during the 14-hour flight."

The answer, says Dorris, is tailor-made personal equipment instead of mass-produced items which may only come close to fitting everybody. "We pay a million dollars for a modern jet fighter so it will go higher and faster, but at the same time we pay a few hundred dollars for equipment which we hang on the pilot as best we can....We must integrate the aircrewman, his personal equipment, his ejection seat, and his cockpit layout (the instruments, handles, levers, knobs to push, pull, and twist) into one entity."

Just how closely Dorris' opinion coincides with current USAF thinking was emphasized during the recent meeting of the Aero Medical Association, when Colonel Don Flickinger, assistant deputy commander for technical operations of the Air Research and Development Command, described the problem as "one with which we are currently grappling on practically a 'do or die' basis.

"Equipment which is reasonably tolerable for a two-hour fighter mission may become so uncomfortable in four to six hours as to cause an unavoidable, unpreventable decrement in performance at a critical point in the mission. This same equipment may be altered sufficiently to allow some degree of functional comfort for a bomber mission of six to eight hours, but with the added capability of several in-flight refuelings, we end up with the same crew sitting in the same work space with the same equipment, but required to remain mission-competent for 18 hours rather than the original six."

Until the resources of the pilot can be coordinated with the resources of the fuel tanks, the tactical advantages of mid-air refueling may remain more or less academic. In Flickinger's words: "Any performance capability researched and engineered into the hardware of a weapon which is over and above the capability of the crew member to use and exploit it is wasted."

-.-.-.-

N.Y. HERALD TRIBUNE July 22, 1954.

VERENIGDE STATEN: Vernieuwing van de Luchtmacht.

De Am. Luchtmacht is bezig met de ontwikkeling en productie van een nieuwe serie straaljagers en straalbommenwerpers, schrijft Talbert in de "N.Y. Her. Tribune".

Schr. noemt hiervan de "super-Sabre" - F 100, de "McDonnell" - F 101, de "Convair"-F 102, de "Republic"-F 103, de "Lockheed" - F 104 en de "Republic" jachtbommenwerper F-105.

Elk van bovengenoemde typen is bestemd voor een speciale taak:

F 100 - Dit toestel zal in de komende jaren Amerika's belangrijkste "Air superiority fighter" zijn;
F 101 - Is bestemd voor escorte bij raids op-lange-afstand;
F 102 en
F 103 - dag-en-nacht-jagers ten dienste van de luchtverdediging;
F 104 - voor locale luchtverdediging;
F 105 - voor tactische atomische bombardementen te velde.

-.-.-.-.-

A TERROR WEAPON THAT FAILED

Japanese Balloons' Principal Function Was Raising of Home Morale.

Since censorship was lifted from the subject in 1946, there has been a lot said and written about the unique invasion of North America by bomb-laden Japanese balloons near the close of the Second World War. They appeared in the United States, Canada, Mexico, Alaska and the Pacific Ocean. Not much of this publicity was focused on the Conadian scene and still less on the fact that personnel of the Royal Canadian Navy had a hand in combatting the menace.

The story behind their appearance is this: According to information obtained from Japanese army officers after the surrender, paper balloons were under development in Japan before the war for meteorological use. When the first bombing attack on Japan occurred in 1942, the effect on morale there was such that all-out efforts were made to devise retaliatory measures.

A revenge attack on North America was conceived, using airplanes, submarines and free balloons. It was first decided to develop a balloon capable of travelling a distance of about 1,800 miles to be released by submarines or warships off the West Coast of the United States. By the summer of 1943 such a balloon had been developed but the Japanese navy had been depleted so much that units necessary to carry out this type of attack were no longer available. To traverse the entire ocean, still larger types had to be fabricated. Much experimental work was necessary, but the first 200 were released in December 1943.

On the basis of a few reports of fires and explosions occurring in "unexpected areas" recorded by monitors of U.S. broadcasts, the initial onslaught was begun, using paper balloons having an inflated diameter of about 33 feet, and carrying a bomb load averaging 50 pounds. The cost of each was a shade over $2,000 once full production got under way. The paper envelopes were spherical, grey white or greenish-blue in colour and had a chandelier slung under them which carried sandbags, high explosive and incendiary bombs. Inflated with hydrogen gas, they were released from the Island of Honshu.

The bags rose to the vicinity of 33,000 feet and the prevailing west-to-east winds whipped them towards North America at speeds of 100 to 150 miles an hour. A barometric device kept them at the desired altitude by releasing gas or dropping sandbags as required. A little over a week later they were over their targets. By this time their loads of sandbags were exhausted and they began dropping the bombs along their overland route with each dip they made.

In all, about 9,000 were launched. It is estimated that only ten per cent ever reached North America. Just 281 seperate recoveries of balloon materials were made, the findings ranging from small pieces of paper to a few almost intact balloons. Thirty-two bombs, or fragments of them, were found and there were 407 reports of the sighting of one or more balloons in the air. Why so few have been found was because they were fitted with self-destroying devices which acted after bombs had been dropped. Sometimes this device did not work, since it was powered by a wet-cell battery which froze in the high altitudes. RCAF pilots on search and rescue missions over western wastes are deceived still by remnants of the snagged balloons in out-of-the-way timber stands. From the air they resemble collapsed parachutes or aircraft wreckage.

The first real evidence of their incidence in Canada was at Minton, Sask. On January 12, 1945, a partially deflated balloon drifted across a field almost at ground level and tangled in a barbed wire fence. A 15 kg bomb, two cylinders and a celluloid box containing a transparent, frozen liquid fell from the chandelier, while the balloon, freed of this weight, drifted away and was never seen again.

National Defence Headquarters was informed of its whereabouts and the matter was put into the hands of the Canadian Inter-Service Bomb Disposal Centre in Ottawa, under command of the late Ordnance Lieut.-Cdr. Edward Litchfield Borradaile, of Ganges Harbour, B.C.

That night he organized a team hurriedly from instructors at the centre. They assembled some disposal equipment and the next day embarked in an RCAF transport for Saskatchewan. The team was composed of Lieut.-Cdr. Borradaile, Capt. J.L. McIntosh of the Army, CPO G.M.H. Deed and Ldg. Sea. J.C. Smith. When weather conditions permitted them to finish their journey, they started rendering the bombs safe and found them to be an anti-personnel bomb and incendiaries of Japanese make. The celluloid container was sampled for bacterial culture with negative results. The spoils were brought back to the centre in Ottawa. When the United States government was informed, it replied that the American forces had been aware of the situation for several months.

Further reports from various areas from the Northwest Territories to the 49th parallel began to come into Ottawa. Considerable attention was given to this invasion, because no one was at all sure what else besides bombs the balloons might carry. To aid in counter-measures, several assumptions were made as to the enemy's propable use of this novel revenge weapon.

It was considered that they could be used to provide the Japs with (1) weather and atmospheric data for further air aggression; (2) to transport incendiary and high explosives to cause forest fires and human casualties; (3) as carriers of poison gases, bacteria or both against humans, animals and crops; (4) to transport enemy agents to this country or the States; (5) as anti-aircraft devices, and (6) a good propaganda weapon for home consumption and to undermine enemy morale.

Special Japanese balloon co-ordinating committees were set up in each of the four western provinces, since the greatest concentration of the new menace was there, even though one had drifted as far inland as the Great Lakes.

Included in these committees were representatives from the provincial departments of health, the federal Department of Agriculture, the provincial forestry branches, RCMP and, where applicable, provincial police, and the general and medical staffs of the Armed Forces.

The Canadian Inter-Service Bomb Disposal Centre became the focal point for the counter network operating from the Great Lakes to the Pacific, with field investigators and bomb disposal crews composed of forest rangers, provincial police and RCMP, and personnel from the three armed services actively involved. The services were allocated responsibilities in their own domains and they quickly trained bomb disposal personnel for this purpose, as well.

At the Ottawa centre were officers and men of the forces who trained men to deal with every known German and Japanese bomb. When this network was firmly established, the latest discoveries were dismantled and shipped to Ottawa. Once this material had arrived in the Cartier School headquarters of the CISBDC, all weapons aside from bombs were distributed to the departments concerned with chemical or bacteriological warfare.

The centre was able to assemble balloons from these parts so that Lieut.-Cdr. Borradaile, as commanding officer of the unit, was able to provide both the navy and army of the United States

that spring with examples for research and display at their BD and ordnance schools.

Meanwhile the press and radio of Canada and the United States maintained a very complete voluntary security blackout at the request of the official censors and thus denied the Japanese vital information as to the numbers of balloons arriving and the landing points.

All the balloons found carried only bombs or incendiaries or both. A fuller analyses showed that it would be impossible for them to transport agents and they were not at all effective as, nor intended to be, anti-aircraft devices.

Contrary to popular articles in the press, official testimony from high ranking Japanese army authorities stated that it had never been inteded to send biological or chemical weapons in the balloons. They said that one of the main purposes of the balloon was to bolster home morale and for propaganda abroad.

During the war, however, little reference was made to the balloon warfare in Japanese broadcasts and there was apparently no organized exploitation of their propaganda value for foreign consumption. Nor did the enemy expect that the balloons would be effective, and this guess proved to be accurate. The original goal was to make 20,000 of them but only 9,000 were manufactured and released. If hostilities had continued longer, the labour involved in their production would have been diverted into some other aspect of the Nipponese war effort.

Canadian and American authorities concluded that the balloons were of no military consequence, since they could not be aimed at population centres and, since they had to be launched during the winter months when winds were most favourable, negligible damage was caused by the incendiaries. The only casualties resulting were six persons, mostly children, killed in Oregon when they handled a bomb dropped about a month previous. The only fires started were one or two grass fires. A word of mouth campaign was launched to forestall further inexperienced handling of the bombs and the press and radio made only a brief mention of the arrival of the first balloons. Their main danger was the psychological effect on the population, which was promptly curtailed by censorship and other adequate counter measures.

This story has a sequel. Lieut.-Cdr. Borradaile emerged from hostilities unscathed by his war against Japanese bombs. After a brief period in civilian life, he transferred to the RCN on a short service appointment in June 1951 and was appointed to the Ordnance School at HMCS Naden.

A year later he became the tragic victim of a Japanese mine which prematurely exploded while he was trying to render it harmless. On June 11, 1952, on Bonilla Island, 90 miles from Prince Rupert, he died violently in the service of his country while attempting to destroy the beached mine, and an assistant was wounded. His remains were escorted to burial in the naval section of the Veterans' Cemetery in Victoria by 400 officers and men of the Pacific command.- H.C.W.

-.-.-.-

In spite of the fact that air power alone can never be decisive in total war, the air battle must be won. In spite of all the new developments in the field of atomic energy and the various military applications, the airplane continues to be the best method of projecting the power of the atom to the battle field, and to the heart of any large landmass nation.

General Omar N. Bradley.

"STRATEGY FOR THE WEST"

(Former British C.A.S. interviewed)

Question: What do you consider to be the major considerations regarding the nature of the next war and how do these dictate the defense requirements of the West?

Sir John Slessor, Marshal of the Royal Air Force: My view is that the "next war" - if by that you mean World Total War - would be so much a matter of mutual suicide that the primary defense requirement of the West is to prevent it happening. That we can do - and can only do - by being so strong in that decisive arm of atomic and thermonuclear air power that no aggressor will dare risk it.

Q.: Do you feel the next war will start with a major assault, such as an assault on Europe, or will it occur on many fronts further to disperse our forces?

A.: This question assumes that there will be a "next war" - which I don't believe. But if I'm wrong, I don't see how anyone can give a worthwhile answer to that question. The most I can say is that I can't see another total war happening without a major assault on Europe. But I have no doubt that at the same time there would be attacks elsewhere - in Asia for instance, and by air against the United States - to make us disperse our forces.

But the point on which we should be crystal clear - and on which we should allow no doubt to arise in the minds of our potential enemies - is that any major assault on the free world anywhere will instantly bring down upon their heads Mr Dulles' "massive retaliatory power".

Q.: Do you feel that each of the military services, including the army and navy, should have its own air force for unrestricted operations, or should all airpower be concentrated in a single force?

A.: There is no better way of wasting public money than having three or four separate air forces. I think that as long as there are carriers - which won't be very long as these things go - the aircraft that actually go to sea in ships are more conveniently part of the navy. But they should be a very small proportion of the whole.

For the rest: What was wrong with our system in the last war? Our tactical air forces worked admirably with the Army without being commanded by soldiers. Field Marshal Montgomery is one of the strongest advocates of that system. And as for maritime warfare - well, I may be prejudiced, I think our Coastel Command system worked admirably, and our relations with the Royal Navy could not have been closer. Anyway, no one can say we did not deliver the goods in the way of killing U-boats. Admiral Doenitz certainly thought so, and the customer is always right!

Don't Divert Navy.

Q.: Would you comment on the role of the super aircraft-carrier in the event of an atomic war?

A.: I'd like to quote Dr. Vannevar Bush at you on that. In his book "Modern Arms and Free Men" he wrote five years ago: "The primary mission of our Navy in war is to interrupt enemy sea commerce and make it possible for our commerce to move rapidly to supply our allies and our fighting forces overseas. ...Certainly until we have the means fully in hand for discharging the primary mission it would be foolhardy to seek out new tasks for great ships, such as participation in strategic bombing, merely for the sake of having great ships. Their cost is large and their impregnability questionable. On the other hand, if there is an essential aspect of strategic bombing that can be effected only from carriers and if they can be defended with reasonable effort and assurance, by all means build them before it is too late".

Well- I don't think there is an essential aspect of strategic bombing that can be effected only from carriers. And I don't think they can be defended with reasonable effort and assurance. I'd like to see the U.S. Navy sticking to its primary mission and not being "diverted by the sirens of more spectacular fields" to quote Dr. Bush again.

Q.: Would you comment on the major weapons of our next war and the relative importance of each, i.e., intercontinental bombers, the various types of missiles, atomic artillery, etc.?

A.: You use that expression "next war" again. I think the "next war" (and the next after that) will be small wars rather on the Korean model. That, as Mr. Dean Acheson recently said, is the only sort of war we - the world - can afford. As for the relative importance of weapons - well to my mind the first priority must go to the long-range bomber, whether it's the manned bomber of today or the long-range controlled missile that one day will take its place. And the reason is that it is only the long-range bomber that will prevent the next war being World War III and the end of civilization as we know it today.

In these smaller wars the job of the bomber will be the big stick in the background - to keep them small and prevent the relatively minor incident blowing up into atomic Armageddon.

But I think it follows from what I've said before that we must have a sufficiency of the other weapons, like atomic artillery. I see no reason why atomic artillery or the tactical atomic bomb should not be used in these small wars - that's merely a matter of using one gun or one fighter-bomber to do what a thousand were required to do in the old wars. The crux here of course (as it usually is in this sort of matter) is that of priorities, of allocating the right proportion of that part of the gross national product that we are prepared to set aside for armaments, to the various arms. The thing to remember there is that if we try to be 100% strong in every arm we shall be strong enough in no arm. We can't afford many luxuries - certainly not the luxury of sentiment. We must cut back ruthlessly on those parts of the national military establishment - particularly the "frills" and the administrative "tail" - that are not absolutely vital to our survival or to our capacity to defeat an enemy if it comes to hot war.

-.-.-.-

WHERE COMMUNISTS ARE BUSY NOW

Reds Nibble at Mountain Areas North of India

Communists are preparing a "second front" in Asia - this time in the forbidding peaks of the Himalayas.

Agents are busy in Tibet, Nepal, elsewhere. Bases, supply routes are being dug into the world's highest mountains.

It is a direct, growing threat to neutral India. A take-over in the Himalayas would put the Communists on Nehru's doorstep.

NEW DELHI.

The Communists are advancing across Asia with another creeping invasion - in the high Himalayas, one of the strangest, most inaccessible regions on earth. From the roof of the world, the Chinese are moving down on neutral India through the mountain barrier that always has defended that country against attack from Russia and China.

New Communist military bases and roads are being developed in Tibet, the mysterious highland which the Chinese Reds seized three years ago. Other supporting bases and strategic roads are being built in Sinkiang Province of China, at the edge of Russia.

These moves are bringing Communist military power close to the Indian buffer states of Nepal, Kashmir, and the little protectorates ruled by maharajahs toward the eastern end of India's 1,500-mile Himalayan frontier. All these border countries are in danger of waking up some morning to find themselves suddenly made a part of Communist China.

The mountains that dominate the region are the highest in the world - peaks such as Annapurna, K-2 and Mount Everest, which was scaled for the first time last year by a British expedition. But the mountains no longer form the impregnable barrier to invasion from the north that the British and Indians once thought they were.

Developments along his mountain frontier are forcing India's Prime Minister Jawaharlal Nehru to change his ideas about Communist China. Although no formal protests are being made from New Delhi, India is moving to strengthen the China-Tibet frontier. Occasional clashes between Indian and Chinese troops are beginning to look like the forerunner of more serious trouble.

The pattern of the Communists' creeping invasion of India can be pieced together from intelligence reports and from information brought out of the mountain lands by travelers.

These reports show that Communist agents, coming from both Tibet and Sinkiang, are carrying arms and instructions to Nepal and other neighboring areas. Communist fronts are infiltrating shaky governments and stirring up trouble. Official maps of the Chinese Communist Government are being distributed, claiming for China territory that extends far south of the Tibet-Indian border. Indian Communists are stepping up their own activities on the Indian side of the boundary.

It was the take-over of Tibet three years ago by China that set the stage for breaching India's Himalayan defense barrier without firing a shot. That brought the Chinese Communist Army to the borders of India, Nepal and Kashmir, in an area where

frontiers have never been clearly defined.

Since then the Chinese have been working quietly, and with extreme caution, to consolidate their hold on Tibet. Ultimately their aim is to do what Chinese rulers have attempted without success for two centuries - annex Tibet completely to China proper. But for the time being they are moving slowly.

The obvious reason is that the Buddhist religion has a powerful grip on the people of this country on "the roof of the world". Hundreds of monasteries dot the mountainous landscape. The priesthood is one of the most popular professions, and the most influential. The supreme spiritual and temporal ruler still is the young Dalai Lama, who is worshiped as the fourteenth reincarnation of Buddha.

The Chinese are handling the Dalai Lama with the utmost delicacy. No attempt is being made yet to "communize" the country nor to take over direct governmental powers. But, indirectly, the Communists are tightening their hold by infiltrating the ruling council with hand-picked priests who take their orders from Peiping.

The Communists know that, if they move too quickly to strip the Dalai Lama of his power, they might stir up a beehive of trouble. The priests in some of the monasteries are tough fighters with substantial supplies of arms. The Communists aren't strong enough yet to cope with a guerrilla campaign led by Tibetan priests.

Roads. For the moment they are concentrating on a road-building program linking Tibet more closely with China as a means of supplying their troops. At least three roads are being built. One is under construction from Kashgar, in Sinkiang Province near the Russian frontier, to Lhasa. When it is completed, it will provide the Russians with a direct overland route into Tibet. Another road is under construction from Tsinghai Province to Lhasa, and a third will link Lhasa with Chengtu in central China.

Military bases in Tibet are being developed by the Communists at points along the two caravan trails from India. Until the roads and communications between Tibet and China are improved, these military outposts will not constitute a serious threat. But, as they become stronger, the Communists can be expected to move more forcefully to take over direct control of Tibet's Government.

The Communist bases also can be used, eventually, to push the Tibetan frontier deeper into the Indian subcontinent. Already there are reports that the bases are headquarters for agents trying to promote revolution in nearby Nepal.

Gradually, the Communists are sealing off the Indian-Tibetan border. The Chinese have established check points near the frontier and Indian traders and pilgrims are thoroughly searched, once they cross over. They are not permitted to carry arms into Tibet. There are many signs that the Communists are moving to isolate Tibet from India and the rest of the world as rapidly as they can do so in safety.

Nepal next? With Tibet on the way to being engulfed by the Communists, signs are increasing that the attention of Red agents is being shifted to Nepal. Communists are intensifying their subversive activities and exploiting the political chaos that has prevailed in that country for months. Gradual take-over of the Nepalese Government now is considered a real danger.

There are persistent reports that Chinese Communists in Tibet are operating a training center for guerrillas near the border of Nepal. Mule trains from Tibet are suspected of carrying arms into the troubled country. Communists are active among the border tribes, and Communist agents, disguised as Buddhist monks, are operating in Nepal's capital city of Katmandy. They are being used to stir up feeling against India.

The Government in Katmandu is weak, and political discord is acute. Poverty is almost universal in this little country that

produces the famous Gurkha soldiers, who fought on the side of the British in two world wars and now serve as mercenaries in both the British and Indian armies. It is a situation that is made to order for the Communists, and a move by them to grab control through a contrived insurrection would come as no great surprise in New Delhi.

To counter the Communist threat, India is attempting to strengthen Nepal's military forces. The Indians are supplying arms and modern equipment to the 40,000 men in uniform. And a huge reservoir of battle-tested veterans is available among the thousands of Gurkhas who fought in World War II. The Indians have just completed the first road connecting India with Katmandu, and economic programs have been started to help the country. The problem is to move fast enough to get strong props under Nepal before the Communists stir up enough internal trouble to topple the Government.

On another front, however, the Communists are building up Sinkiang Province in West China as part of the creeping encroachment on India. The development of communications and industry in Sinkiang Province is clearly designed to backstop the Chinese in Tibet and strengthen China's position on the border with India and Pakistan.

Chinese troops, assisted by Russian advisers, are reported to be building a major military base at Kashgar, near the Pakistan-Kashmir frontiers. The Chinese closed off this area last October, ordered India and Pakistan to close their consulates and barred Indian traders from doing business in the area. A strategic railroad is being built across Sinkiang to connect Soviet Turkestan with Lanchow in Central China.

In Kashmir - flanked by Sinkiang and Tibet - Communist subversion fits into the campaign of pressure on India. The situation there is more serious than the Indian Government admits publicly.

Intelligence reports list three of Kashmir's Cabinet members as being either Communist agents or fellow travelers. The Deputy Premier is identified with a Communist-front organization. So is the Home Minister. Several other Government officials have records of Communist activity.

So far the Communists in Kashmir have been operating quietly but there are persistent reports that they are placing agents in a network that runs through several Government bureaus. Caution probably is forced upon the Communists by the presence of the Indian Army, which probably would move fast to block a Red takeover. The strategy, instead, is to nibble deep into the Government system.

A squeeze play by the Communists against Indian territory and several little border kingdoms that are under the protection of the Indian Government is another maneuver that is causing concern in New Delhi.

The entire border area between India and Tibet is poorly outlined, and, for generations, parts of it have been the subject of disputes. Intelligence agents have discovered Chinese maps showing the frontier of Tibet and China proper extending down to the lower reaches of the Brahmaputra River. If these maps are genuine, that probably means that the Chinese Communists are claiming the two little states of Sikkim and Bhutan, which adjoin Nepal on the Tibetan border, as well as a chunk of Indian territory in Assam.

The main route from India to Tibet passes through Sikkim. Bhutan could be of considerable interest to the Chinese Communists as a possible source of food for their troops stationed in Tibet.

The situation is such that the Nehru Government is taking some deliberate steps to strengthen India's position in that region. Bhutan and Sikkim are so-called "protected states". The Maharajah of Sikkim has concluded an agreement giving India control over his state's foreign policy, communications and defense. This

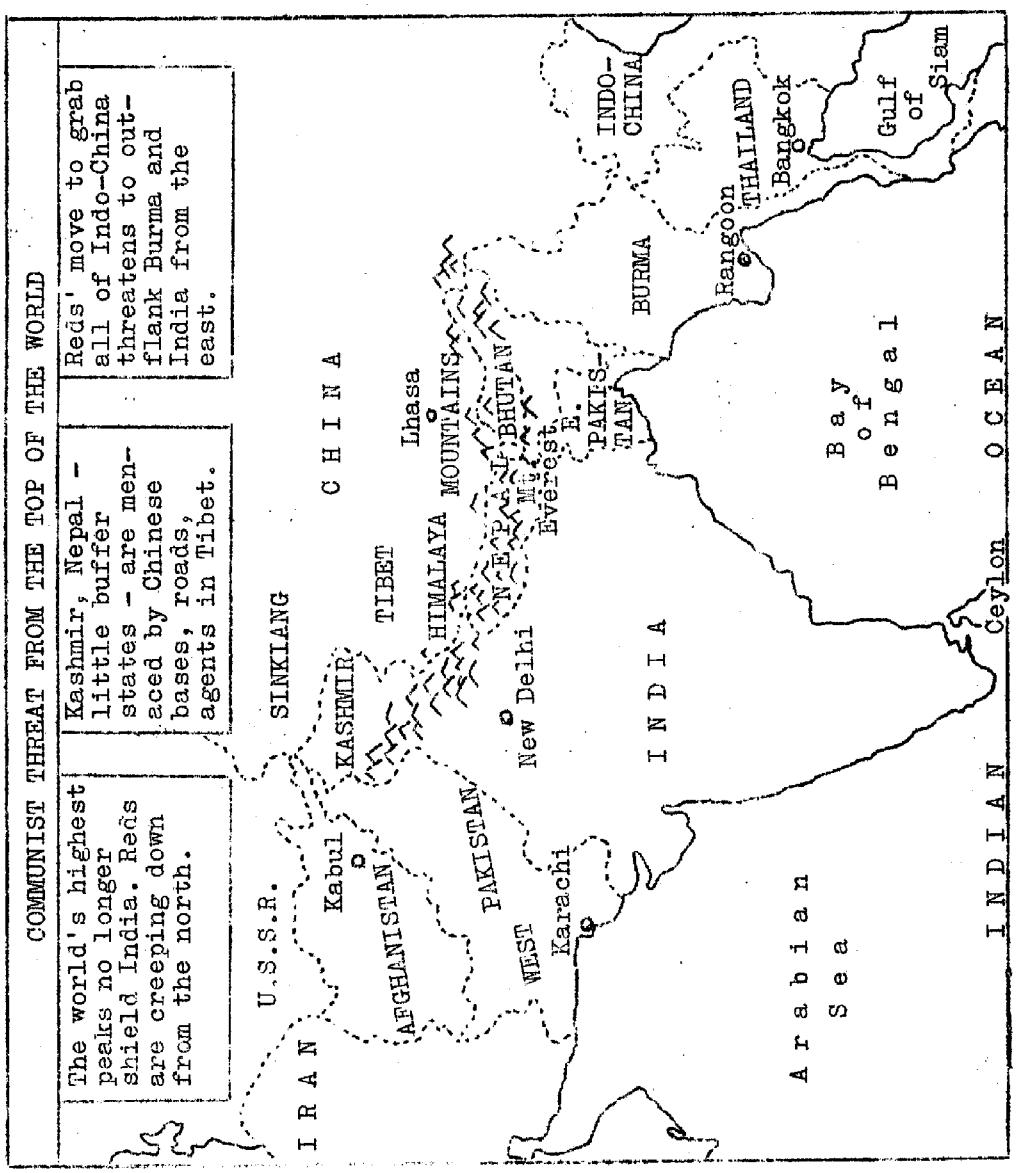
makes it possible for India to defend Sikkim's autonomy politically, and also gives it the right to station Indian troops in the strategic little state.

Nehru is reported to have negotiated with the Maharajah of Bhutan to strengthen the ties between India and Bhutan and to permit India to station troops there.

Special pains are being taken, too, to establish Indian control over the wild region of Assam. Nehru is trying to cultivate the tribal chiefs and to organize an effective administration over this area.

The Communist moves in the mountains are forcing officials in New Delhi to re-examine some of their old notions about Red China. The pressure in the Himalayas and elsewhere coincides with the Communist campaign to seize Indo-China. And Indo-China, in Communist hands, could outflank the Himalayas from the east and nudge both Burma and India from another direction.

As a result, Prime Minister Nehru has been showing signs of becoming less critical of U.S. and less friendly to Communist China and Russia. He isn't likely to rush into any defensive arrangement with the West. But some observers feel there is a real possibility he will moderate his violent opposition to the idea of "collective security" led by U.S. Before too long, he may need some help against the Communists himself.



SUNDAY DISPATCH July 11, 1954

An Article By One Of
Britain's Great War Leaders.

I BELIEVE IN FLYING SAUCERS

by

Air Chief Marshal LORD DOWDING,
Air Officer Commanding-in-Chief,
Fighter Command In The
Battle of Britain.

I have never seen a "Flying Saucer", and yet I believe that they exist. I have never seen Australia, and yet I believe that Australia also exists. My belief in both cases is based upon cumulative evidence in such quantity that, for me at any rate, it brings complete conviction.

More than 10,000 sightings have been reported, the majority of which cannot be accounted for by any "scientific" explanation, e.g., that they are hallucinations, the effects of light refraction, meteors, wheels falling from aeroplanes, and the like.

BEST EVIDENCE

The best available evidence, perhaps, is contained in Major Donald Keyhoe's recent book, "Flying Saucers From Outer Space."

> I say this because most of the incidents which he records have been checked by the Intelligence Branch of the United States Air Force. They endorse the accuracy of the evidence, but they put forward no explanation. The critics who deny the existence of these objects must produce some alternative theory which will account for the observed facts.

In a brief article I cannot deal at length with the suggestion that they are new types of aircraft under development by Russia or the U.S. They have been tracked on radar screens in America - on one occasion by three screens simultaneously - and the observed speeds have been as great as 9,000 miles an hour.

No earthly materials that we know of could be forced through the air at such a speed without getting too hot to allow human occupants to exist. The accelerations which they develop in starting, changing course, and stopping would also make human life as we know it, impossible.

> I say then that I am convinced that these objects do exist and that they are not manufactured by any nation on earth. I can therefore see no alternative to accepting the theory that they come from some extra-terrestrial source.

And why should this be considered to be such a ridiculous idea? In ten years' time we shall probably have shot a rocket to the moon. In a hundred years we may have made the return trip with a manned projectile. In 500 years we may have reached the nearer planets. Are we so arrogant as to maintain that the inhabitants of no planet are as much as 500 years ahead

of us in scientific development?

PRINCIPAL QUESTIONS

Please do not tell me that scientists affirm that life is not possible on other planets. They assume that "life" must necessarily exist in earth-type bodies. But it is only reasonable to suppose that bodies would be conditioned to the physical conditions existing on each planet.

Now that is as far as my "convictions" take me: beyond this my ideas are frankly speculative. The principal questions which arise are: Where do these objects come from? And what are the motives of the occupants in visiting the Earth's atmosphere?

I think that we must resist the tendency to assume that they all come from the same planet, or that they are all actuated by similar motives. It might be that visitors from one planet wished to help us in our evolution from the basis of a higher level to which they had attained.

Another planet might send an expedition to ascertain what have been these terrible explosions which they have observed, and to prevent us from discommoding other people besides ourselves by the new toys with which we are so light-heartedly playing.

Other visitors might have come bent solely on scientific discovery and might regard us with the dispassionate aloofness with which we might regard insects found beneath an upturned stone.

A WARNING

If I say that I believe that the majority of our visitors are actuated by friendly and helpful motives, I cannot produce the same volume of evidence in support of my opinion as I have done for the physical reality of the Saucers; but the fragmentary and uncorroborated evidence which I have is reinforced by the reasonability, if not the probability, of the idea that, if the inhabitants of other planets are so far ahead of us in making use of the (to us) unknown forces of nature, they may well be equally far ahead of us in spiritual evolution, and may have better methods of spreading their wisdom than by killing those who disagree with them.

But this hypothesis is not universally accepted, particularly in the U.S., where fighters sent up to intercept the visitors have sometimes had unpleasant experiences. In the case of Captain Mantell, who was sent to investigate a "huge round glowing object," his machine disintegrated in mid-air and his body was found among the wreckage.

This brings me to the most important thing which I have to say. It is to give a warning against attempts to open fire either with guns or aeroplanes on these objects. Looked at from the purely selfish aspect, such gratuitous folly might well turn neutral curiosity into active hostility, and it may be assumed that those who visit us from outer space can well look after themselves and will have the means of making us sorry that we compelled them to defend themselves.

But it is not on this note that I wish to finish. It seems possible that for the first time in recorded history intelligible communication on the physical level may become possible between the earth and other planets of the solar system.

Such a prospect is epoch-making in the literal sense of the word, and we should be guilty of criminal folly if we were to do anything to hinder a contact which may well bring untold blessings to a distraught humanity.

-.-.-.-.-

A MISSILE TEST

USAF to launch Matador
near the Iron Curtain.

Trial will simulate attack
against Russian forces.

By William J. Coughlin.

Cocoa, Fla.- U.S. soon will fire guided missiles in Europe for the first time, simulating atomic attack against Russian ground forces.

These will be the USAF B-61 Matador surface-to-surface bombardment missile manufactured by the Glenn L. Martin Co. Initial unit to do the firing will be the 1st Pilotless Bomber Squadron of the Tactical Air Command, transferred to Bitburg, Germany, from the U.S. Mar. 9, 1954.

Bitburg is about 300 mi. from the Iron Curtain boundary.

More Squadrons - A second guided missile unit, the 69th Pilotless Bomber Squadrons is scheduled to move to Europe later this year. It now is stationed here at Patric AFB for training.

A pilotless bomber squadron consists of 53 officers and 543 airmen. Number of B-61s assigned to each squadron is classified.

These are the first operational units of their kind in the Air Force.

Firings of the B-61, which can carry an atomic warhead, will simulate the tactical use to which the Matador would be put in event of a Russian attack against NATO forces in Europe.

Range to 600 Mi. - The Martin missile is designed for close air support of the type now provided by piloted fighter-bombers. It thus fits into the U.S. military pattern of employing NATO ground troops to force superior Russian manpower to mass at points where it can be hit with tactical atomic weapons.

Range of the B-61A is about that of a fighter-bomber, in the neighborhood of 500-600 mi. Tactical units probably will be equipped with the refined B-61B.

Although firings of the Matador in the U.S. have been only on carefully instrumented guided missile ranges, Maj. Gen. William L. Richardson, commanding officer of the Air Force Missile Test Center at Patrick AFB, reports that elaborate instrumentation of the type used at this missile center is not required for safe practice firings in Europe. They can be fired over water or over clear land areas, he says.

Controlled Flights - Practice missions within a limited area in Europe should present no insurmountable problems for the tactical squadrons. Prior to testing on the Long Cape Canaveral Range near here, first flights of the Matador took place at Holloman Air Force Base, N.M., where they were restricted by the size of the range. The missiles were flown in figure eights and circles to stay within range limits.

Presumably, safety precautions similar to those taken here to protect U.S. cities along the Florida coast from runaway missiles will be enforced in Europe. These include:

An armed chase plane which can shoot down missile if control is lost.

Ground-controlled radio circuits which can destroy the missile in the air if it strays off course.

Self-contained "suicide" circuit which will cause the missile to destroy itself if radio contact is lost for more than a few seconds.

Matador, similar in appearance to a conventional aircraft, has a wingspan of 28.6 ft. and a length of 39.5 ft. Powered by a modified Allison J33 turbojet engine, it is launched from a zero-length launcher with the aid of a Rato (rocket-assisted takeoff) unit.

First Showing - Due to the expendable nature of the missile, its modified J33 includes features designed to reduce costs.

"Less critical materials are utilized, inspection tolerances are not quite so close, inspection is not required after the initial run on the test stand, and the number of accessories is reduced considerably", Allison explains.

First public demonstration of a B-61 firing was before members of the Aviation Writers Assn. June 10 at Cape Canaveral, the auxiliary Air Force base 18 mi. from Patric AFB.

The pilotless bomber squadrons will be completely mobile in tactical use, Gen. Richardson reports. Operating from trucks, a squadron could set up for firing within 90 minutes, he says.

Range Extension - Range of the Matador is greater than the present range of its initial ground control station. This presents no problem at Cape Canaveral where control may be passed along to down range island stations, but requires a slightly different technique for tactical use.

Range could be extended by placing the firing base in a rear area near a port or other logistic supply source and placing the control unit near the front, perhaps 100 mi. away.

Although the missile is on autopilot for some seconds after launching before the ground controller takes over, the B-61 at present does not have an autopilot system which could be set to dive it into the target after it passes beyond the range of the ground controller.

Other Techniques - It would be possible, however, for an accompanying "mother" plane to take over control of the missile once it was airborne and direct it onto targets many miles beyond control range.

Newsmen also saw a demonstration here of how this might work. Director planes were used to fly both QF-80 and a QB-17 during remote-control flights, taking over the radio control after the planes had been airborne under the direction of a ground station. Similar techniques could be used to direct a missile to its target, a further refinement of the tactic used during the Korean war in which AT-6 spotter aircraft directed fighter-bomber strikes onto close support targets.

Although the B-61 can dive onto a target at supersonic speed, it is subsonic in level flight.

-.-.-.-

AVIATION WEEK June 14, 1954.

NEW A4D DESIGNED TO OUTPERFORM MIG-15

El Segundo - The Navy last week unveiled the smallest and lightest U.S. jet combat plane yet revealed - the Douglas A4D Skyhawk.

The single-place triangular-wing midget atomic bomber is so small it will fit within the folded wingspan of a traditional Navy carrier-based plane.

Yet, it has been designed to fly non-stop across the continent and will have a speed greater than Russian MiG-15 fighters.

The skyhawk in its simplicity of design, light weight and low cost is the end product of the philosophy of its chief designer, Ed Heinemann, and Douglas Aircraft Co.

Although security regulations would not permit disclosure of detailed specifications or performance, Heinemann told newsmen the bantam bomber is a little less than half the weight of many current operational jet fighters which weigh in at about 30,000 lb., has a wingspan between 26 and 28 ft., and is approximately 35 ft. long. Powerplant is a single Wright J65-W-2 turbojet rated at more than 7,200 lb thrust.

"Under our program of design simplification," he said, "the A4D gained 20% more in speed and a third more in range than was at first thought possible."

Subsonic Speed - Its speed is designed to be subsonic in level flight, the El Segundo Division chief engineer said, but it will be tested at supersonic speeds in dive.

An announcement cleared by Navy disclosed:

It will fly faster over greater distances with a more powerful striking load than any airplane of its type. Construction is of aluminum alloy.

It has a combat radius greater than present propeller-driven attack airplanes.

It has been designed to operate from all sizes of Navy carriers and from short landing fields.

More Skyhawks can be stored in an aircraft carrier than folded-wing planes.

It is capable of carrying atom bombs or rockets, machineguns missiles and other weapons to suit the wide variety of missions of attack-type airplanes.

The tiny bomber, nicknamed the Heinemann "Hot Rod", rolled out of the Douglas plant only 19 months after it was conceived, Heinemann said. It is due to make its maiden flight later this week.

The chief engineer said he had long felt there was a need for a smaller, low-cost airplane to carry the modern A-bomb and enough electronic gear to operate under all-weather conditions.

"The A4D is believed to be a major step in designing an airplane on a completely functional basis, making each requirement stand on its own feet rather than by doing things because they have been done that way in the past," he said.

Equipment Simplified - To realize such an airplane, Heinemann said, weight savings had to be achieved through emphasis upon simplification. Given a free hand by the Navy, he has fought against excess weight on every subcontracted article in the plane.

Packaging communications equipment including IFF equipment into one compact aluminum case saves approximately 105 lb. on this item alone.

Bombsight, which weighs 18 lb. in other aircraft, has been cut to only 6 lb.

New ejection seat weighs approximately 30 lb. as compared with about 70 lb., weight of the lightest one now being used. It is made up of only 80 parts, whereas current models contain 240, Heinemann said.

Air conditioning system is said to be one-third the weight of the type formerly used.

Heinemann paid tribute to Navy's BuAer for assistance in redesigning equipment components to make the Skyhawk's simplification program possible. "Revolutionary techniques" in engineering, tooling and production have permitted A4D line production to start immediately. An undisclosed number for service test is now on order, the company discloses, and can be produced in the time normally required to build one experimental airplane.

Tailored Cockpit - Test pilot Bob Rahn said when he saw the first mock-up of the small plane he immediately hopped into the cockpit "to see if I would fit". Actually, there was plenty of room. They've tailored the cockpit without sacrificing comfort and convenience of the pilot, he said.

Navy said the lightweight design philosophy incorporated in the A4D should open a new era of high-performance jet attack airplanes not thought possible a few years ago.

-.-.-.-

Aviation Week, 1-7-54.

U.S. SUPERSONIC BOMBER: The U.S.A.F. has reached a top-level decision to give high priority to the acceleration of its supersonic bomber development programme after nearly a year of Air Staff debate over it. The new bomber is the Convair XB-58, also known as the Hustler. It is a deltawing design, aimed at operating in the supersonic speed range of about 1.000 m.p.h., and undoubtedly will be armed with atomic or hydrogen bombs. The Hustler is schedeled to be powered by an extremely high-powered turbojet still under development, such as the General Electric J79 which is aimed at producing about 15,000 lb. thrust. The Hustler project is being handled by Convair's Ft. Worth Division where the B-58 is schedeled to succeed the B-36 on the production line of the giant government-owned plant. The Hustler development programme also was geared to development of a new type of gas-turbine-powered tanker of unusual range and fuel capacity. This phase of the programme has been assigned by U.S.A.F. to Douglas Aircraft Co., Inc., for development of the C-132 tanker transport, to be powered by four Pratt & Whitney T57 turboprops. Pentagon experts concede that the Hustler development programme, both technically and financially, is one of the most formidable that U.S.A.F. has ever tackled. Technical hurdles that must be surmounted by the programme include:

Radical airframe design features that will enable the Hustler to operate at supersonic speeds.

Development of new techniques for faster aerial fuel transfer.
Development of the 100.000-lb.-payload-tanker-transport.
Development of two completely new powerplants-the G.E. J79 turbojet and the P. & W.A. T57 turboprop.

AIRCRAFT ARMAMENT

New guns, rockets, and bombs are being developed to help solve the pressing problems of firepower and accuracy under the supersonic conditions of today's high-altitude aërial warfare.

Col. Robert T Fincke, U.S.A.F.

Colonel Fincke is chief, Air Munitions Division, in the Directorate of Development, Air Research and Development Command, Baltimore, Md. This article is taken from an address given by Colonel Fincke at the Thirty-sixth Annual Meeting of the American Ordnance Association, Fort Worth, Tex., May 6, 1954.

The extensive publicity recently given the atomic and thermonuclear weapons has apparently left the impression with many that the Air Force has practically eliminated its program in other weapons. This is definitely not the case. Since the Second World War the Air Force has conducted a vigorous research and development program to obtain improved guns, rockets, and bombs, and, although we are placing a high priority on attaining a capability in atomic weapons, we are continuing to support the development and improvement of conventional weapons which complement the "new look".

During the past fifteen years majorstrides have been made in aircraft performance.Our aircraft are flying higher than 45.000 feet and faster than Mach 1.0 in level flight.

These altitudes and speeds were not considered possible when some of our present weapons were first conceived Consequently, the development of air weapons has been sorely pushed to keep abreast of these rapid advances in aircraft performance

The Pressure to phase weapons into specific aircraft has meant starting production, in some instances, prior to full development and testing. If we are to have an adequately tested weapon available for future aircraft, it is mandatory that our technical program explore new ideas and develop prototypes in anticipation of these future needs.

We cannot wait until an airframe is selected to begin work on a new weapon and expect the two to meet in production.

The first step in obtaining a proper research and development program is to determine what is needed and to express this need in the form of military requirements. To accomplish this, the Air Force has established the Directorate of Requirements in Headquarters, U.S.A.F. This group consults with the planners, the developers, the producers, and the users before determining the Air Force requirements.

The military characteristics for a given aërial weapon which would satisfy a requirement are a compromise of what is technically feasible, what is logistically supportable, and what is acceptable to the users.

It is obvious, but not always appreciated, that these characteristics change as the operational framework changes and as the feasibility of new components changes.

In order to tap all available ideas, persons at each echelon of the Air Force are encouraged to forward recommendations for military requirements to the Headquarters. These channels are always open.

The second step in our research and development program is to decide how the requirements can best be met. This decision is the responsibility of the Air Research and Development Command working with the other services and with industry's research and development people.

The Air Force is cast in the rôle of customer in its relationship with industry, This repationship is a contrast with that of the Army and Navy which are more in the rôle partners because of their internal capability to develop and produce ordnance end items.

We do not intend to duplicate this "in-house" capability of our sister services but will continue to use their facilities and organizations to the greatest extent possible.

It is also Air Force policy to encourage and support the broad participation of industry in the research and development of air armament equipment. Only by joining the technical knowhow of both the military and industrial agencies can we find easier, simpler ways to meet our needs.

Those of you who have accepted con tracts for development of air ordnance appreciate that we always consider the complete system. It is the system which determines the outcome of aërial combat rather than the caliber or rate of fire of the guns.

The measure of a gun, rocket, or bomb to satisfy a requirement cannot be evaluated independently of its effect on the airframe, engines, or other equipment. Nor can it be separated from the aërodynamic forces which make up its environment.

An illustration of this is the caliber .50 machine gun which served us throughout World War II and again in Korea. In 1946 after extensive calculations, the developers concluded that the caliber .50 gun was superior to the 15-mm. and 20-mm. cannon then available.

The conclusion of over-all effectiveness is based on an analysis-type equation which relates effectiviness to:(a) hit probability,(b) rate of fire, (c) destruction per hit, and (d) weight of the complete system. The increased destruction per hit of the cannon was nullified by its slower rate of fire,

As aircraft speeds increase, the time on target continues to be reduced. In aërial combat the target may be in range for only a fraction of a second at a time and a hit may have to be made during only one pass.

As a consequence, the increase in rate of fire and the increase in lethality of the projectile by enlarging its caliber become more critical. These changes require more and heavier rounds,in turn increasing the weight of the system which penalizes the performance of the airplane.

We can satisfactorily compensate for this increase in weight as illustrated by the M39 gun which was recently standardized. This is a 20-mm. automatic gun employing the revolving-chamber principle and firing an explosive shell at a rate greater than the caliber .50 gun which has been built up to 1,200 rounds a minute.

A few of the M39 guns were tested in Korea and are reported to have accounted for six MIG's destroyed, three probable destroyed and twelve damaged. This gun was developed for the Air Force by the Army Ordnance Corps in coöperation wich industry.

Now that satisfactory larger caliber guns are becoming available, special emphasis is being placed on reliability of their performances, problems associated with aircraft shock and vibriation, and the effect of aërodynamic forces on the trajectory of bullets fired at high yaw angles during subsonic and supersonic speeds.

The fundamental problem of reduced time on target has called for a duckhunter's approach to increase the probability of a hit. We have therefore adopted the shotgun principle of a simultaneous burst of many pellets on the target.

The modern version is a burst of small unguided rockets. These are selfpropelled warheads and can be made in almost any size from one to several inches in diameter and with an explosive head weighing from several ounces to several pounds.

Rockets have a built-in reliability. The failure of one round to fire does not cause a stoppage of the weapon. Since each round is carried in a separate tube, only the one faulty round is lost from the total available.

Because the propelling forces act only on the motor walls, there is little recoil and accompanying stress on the firing aircraft. Thus, both the rockets and the launcher installation can be light in weight and relatively simple in design.

This appears to be an ideal weapon with many of our criticisms of the gun mechanism eliminated. But it, too, is not without its problems and shortcomings. The burning time of the propellants is directly related to the ambient temperature, and this variation changes the ballistic path with a resulting reduction in accuracy.

All three of the services are devoting considerable effort to developing rocket fuels which are less affected by temperature. A rocket which is fast at low altitudes will be faster at higher altitudes, but in the thinner atmosphere the fin-stabilized rocket loses stability. Under these conditions a spin-stabilized rocket may offer a solution.

The Mighty Mouse, a new rocket developed by the Navy, is now being stockpiled for both the Navy and the Air Force. It is 2.75 inches in diameter and about 4 feet long. It is stabilized by folding fins which do not increase its over-all diameter when clustered. Our ability to fire large number of these rockets at the same time has made this a superior weapon, and it is being installed in Air Force intereceptor aircraft.

Twenthy-four can be carried in a retractable launcher in the belly of the North American F-86D Sabre; in the Lockheed F-94C Starfire, twenthy-four can be nested around the radar nose. Additional rounds cab be carried in separate wing pods.

Smaller rockets with warheads equivalent to that of the 2.75, as well as larger rockets, are under development and will give our interceptors even greater lethality against enemy bombers.

So far it is in the rôle of high-explesive bombs that atomic weapons have had their greatest influence on air Ordnance. But there is still a need for conventional bombs, and have a continuing program in this area.

This program is aimed primarily at developing bomb shapes compatible with new aircraft designs and capabilities and optimizing the effectiveness of the bomb against specialized targets such vehicular traffic or troop concentrations.

Increased speeds may produce serious turbulence within open bomb bays, and bombs released at these speeds have been observed to float in the bomb bay before falling away. This not only destroys bombing accuracy but extremely hazardous. Jettisoning of external stores at high speeds likewise presents new and greater problems.

During the past several years the Air Force has developed a new series of bombs designed for release at high speeds.

They are longer and sleeker than the old bombs and have stronger and longer tails to withstand the greater dynamic forces.

More improvement is required, however, and we are looking at shapes entirely different from the conventional ones in order to stabilize bombs as they enter the turbulence of the slip streams

In conclusion, may I again stress that it is the effectiveness of the system which pays off, not the individual superiority of any one component.

Because aircraft are continuing to fly higher and faster, we must continue a vigorous research and development program in air ordnance. We are relying on the Industry-Ordnance Team to find the best solution to our military requirements.

-o-o-O-o-o-

BLUEPRINT FOR WORLD REVOLUTION

by Pachydermus.

Some times ago the Soviet Press reacted angrily to the U.S. statements on Soviet aid to North Korea and the Viet Minh. On June 3rd Pravda again accused the U.S. authorities of having produced documents "falsified from beginning to end".

This time Pravda's Geneva correspondends Yuri Zhukov and Ivan Plyshevsky, voiced their indignation over Senator Knowlands's revelations to the U.S. Congress" - meaning a memorandum Mao Tse-tung is said to have sent Stalin in February 1953 by Chou En-lai. It can be summarised as follows.

MAO's PLAN

France should be allowed to retire from Indo-China by a "face saving" formal armistice. After this, Indo-China could be gradually liberated by propaganda and common front politics, culminating in a coup d'état two years later.

"Liberated Indo-China" would serve as a base from which the Communist domination of Burma, Siam and Indonesia could be achieved by 1960.

If China and the U.S.S.R. demonstrated their strength, Japan would capitulate.

India should be conquered by peaceful means, such as alliances, common fronts and Asiatic coalitions, which, by 1969, would include the Philippines and the Arab States. Britain would have to withdraw from "encircled Malaya".

In the next stage, revolution would have to be stirred up in Africa, to expel the "colonialist imperialists".

Once Asia and Africa were freed from Western domination, Europe would face economic catastrophy, followed by political capitulation. Canada and South America would also find themselves in a defenceless situation. In twenthy years (1973) the world revolution would have become a fact.

In liberated East and South-East Asia, a huge army of 25 million men would be kept in readiness to force the capitalist states to bankrupt themselves by excessive defence expenditure. One by one, the ruling capitalist-imperialist cliques would have to capitulate.

Open war should be avoided because, for the time being, the capitalist world was better prepared than the Soviet bloc, and Communist victory was no certainty.

Most important: the U.S.A. had to be isolated, while Great Britain had to be placated.

MILITARY PLANS STILL SECRET

Thus far the highlights of the memorandum, which also contains a military outline-so far not released. Together, they form part of a larger and highly instructive document, picked up "somewhere" by U.S. Intelligence. Some people believe that Chiang Kai-chek's Intelligence secured the memorandum, others that Soviet Captain Yuri Rastovorov brought it over when, after Beria's death, he defected to the west.

Despite Pravda's efforts to prove that these documents were fakes, their contents ring true. The Soviet and the international Communist Press have, for years, campaigned in favour of all the points enumerated in it. Since 1944, every Communist move in the Far East fits in with it.

As a rule, Communist régimes base their actions on long range plans, even if tactical necessities force temporary changes. Because of this, sometimes it is easier to forecast their "general line" than their short term tactics. The value of the text presented by Senator Knowland to Congress lies in the fact that it ties into a logical whole the developments we have observed at various points of the vast front between the capitalist and the Communist worlds. Whether or not this memorandum was drafted by Mao-Tse-tung as a new plan for world revolution, does not affect its validity. Genuine or apocryphal, it spells out the background to Communist policy.

It is important that the western public should look further than the tactical field of immediate events, and realise that it is far more important to build up a longrange programme for counteraction than to prepare for "peaceful competition" between the two worlds.

The final issues will not be decided today, but in several years' time. Shortsighted policy never makes history.

-o-o-O-o-o-

AMERICAN AVIATION 21-6-'54

2 MPH IN 175 YEARS.

ADMIRAL CHARLES F. HORNE (USN, Ret.), manager of Convair's guided missile plant at Pomona, Calif., delivered a bang-up speech recently on logistics. Here are some of this telling points:

In the Revolutionary War the logistical task of getting gunpowder on its way by horse-drawn transportation after being requisitioned by horseback averaged the phenomenal speed of one and one-third miles per hour.

In World War II, based on official records, the average speed from time of requisition to delivery of the needed item was about three and one-half miles per hour.

"So-in the past 175 years-with all the advantages of modern communication and transportation, with radio that circles the globe in the jerk of a saddle cinch and planes that fly 100 miles in the time required to hitch a team, with all this, we have increased the speed of getting supplies to the front by only two miles per hour.

"Plainly, in the field of logistics, we have failed miserable to keep pace with our technological progress".

In World War II, he points out, we depended upon a vast stockpilling system, something that future wars will not permit. The problems are known, but so little is being done. Logistics is probably the greatest single blind spot in Pentagon thinking and planning today, yet it is one of the most crucial of all items.

Thanks to Admiral Horne (a former administrator of CAA, incidentally), for pointing up the issues again.

-o-o-O-o-o-

AVIATION WEEK, 12-7-54.

NEW U.S. LIGHTWEIGHT: The Lockheed Aircraft Corporation announced recently that its prototype XF-104 is going through flight tests at Edwards A.F.B. in its bid for the U.S.A.F.'s first lightweight fighter contract. Although the company was restricted by the Defense Department to a brief four-paragraph test announcement that skirted performance figures informed observers believe the new U.S.A.F. day fighter has a speed well over Mach 1,a ceiling in the neighbourhood of 60.000 ft., plus better range and more armament than U.S. combat planes used in Korea. Powered by a Curtiss-Wright J65 with afterburner, the XF-104 has a very thin straight wing with a span of approximately 27 ft., four in. less than the A4D, Douglas Aircraft Co.'s Navy entry in the lightweight field. The new fighter wing area is less than that of Lockheed's F-80. The XF-104 is the sixth military aircraft to use Curtiss-Wright's J65 turbojet rated at more than 7,220 lb. thrust without afterburner. Fighting weight is estimated at 15.000 lb., about half that of North American Aviation's F-100, and slightly more than the A4D's 13,500. The XF-104 has a low-aspect ratio for highspeed flight, giving it a steep, nose-high descent during final landing approaches, Flight tests have shown that its stalling characteristics, while unusual. are not considered vicious.

N.A.T.O. INFRASTRUCTURE: A jet fuel network in Western Europe, involving 4.600 mi. of pipeline and storage facilities for 400m. gallons, is schedule for completion by July, 1957. The network, designed to provide for flexibility in the deployment of N.A.T.O. jet aircraft, extends from above the Arctic Circle to eastern Turkey. July, 1955, is set for completion of 30 per cent. of the pipeline and 50 per cent, of the storage space. By July, 1956, 80 per cent. of the pipeline and 75 per cent. of the storage space is schedule for completion, leaving 20 per cent. of the pipeline and 25 per cent. of the storage for completion the following year.

AIR POWER, SUMMER '54.

BOWS AND ARROWS IN MODERN WAR?

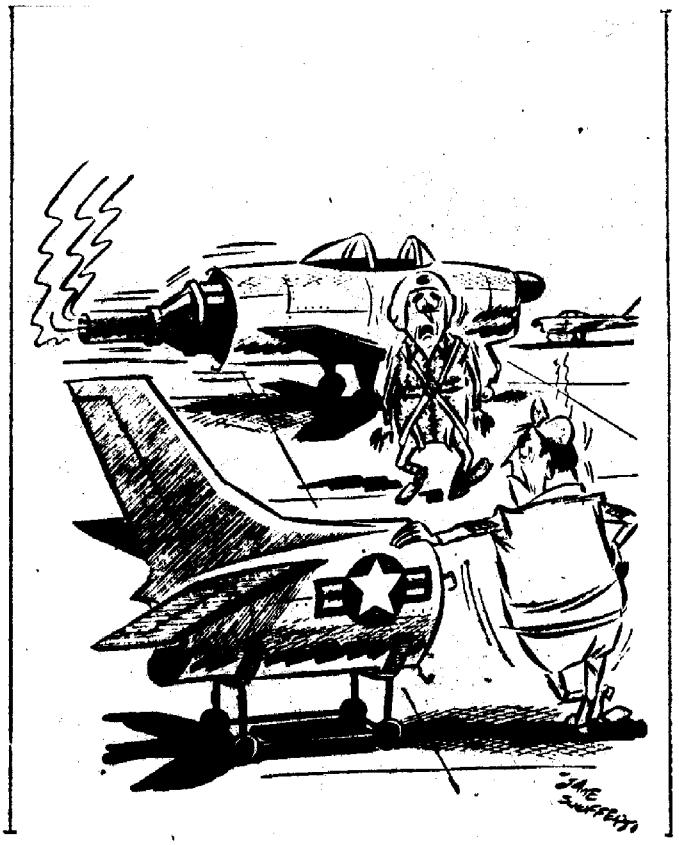
The following appeared in the Press recently under the heading "Darts as Weapons":

"The U.S.A.F. yesterday made public details of a weapon (The Lazy Dog), a half-ounce steel dart, just over an inch and a half long. A shower of the darts dropped by a plane or exploded in a bomb had the same effect as a gigantic shot-gun charge. and could knock out non-armoured vehicles, a spokesman said."

This reminds us of one day in 1915 when from the ancient "Vickers-Gunbus" aircraft an experiment with similar darts, called "Flechettes". was carried out. A sackful of them was dropped on a target (which must remain unnamed to avoid repercussions); the result was that "the old so-and-so" continued to graze without even looking up, and afterwards was found to be unscathed. The experiments were discontinued.

-o-o-O-o-o-

Ter Leering ende vermaeck:



"Better check her control wires again, Sanderaw, she's still a little sluggish in the turns!"