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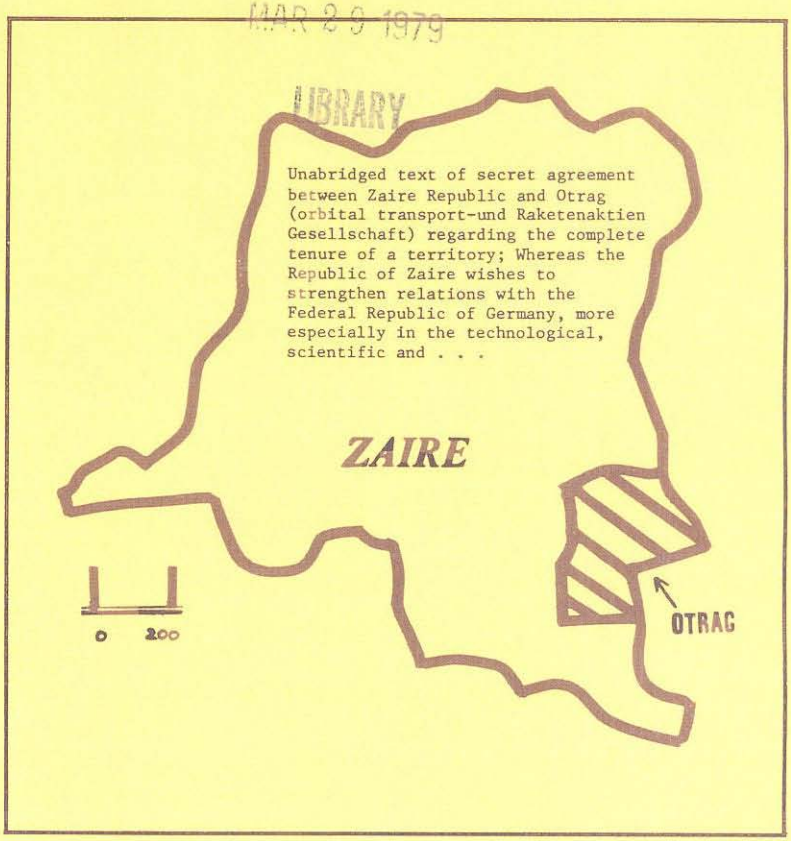

What's Going Up in Zaire?
OTRAG's Rocket Base in Shaba

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Cover illustration: Area in Zaire covered by OTRAG contract

WHAT'S GOING UP IN ZAÏRE?
OTRAG'S ROCKET BASE IN SHABA

Stanley Cohn

The West German corporation known as Orbital Transport und Raketen Actiengesellschaft (OTRAG) has undertaken an almost unbelievable venture in renting a huge portion of Zaïre for use as a rocket site. In a secret agreement signed in March 1976, the corporation was granted rental of a large part of Shaba Province by the government of Zaïre and was given almost exclusive rights over it.

TERMS OF THE AGREEMENT

The agreement contains the following basic points:[1]

Article I defines the territorial boundaries of the OTRAG lease and the corporation's rights in the land. These include the right to set off any type of space vehicle, the right to use the land for any kind of excavation or building, and the right to set up whatever installations may be needed for OTRAG's operation.

Article II gives OTRAG "the right of taking all steps it may deem necessary in exercising the entire use of the territory, so long as these shall not interfere with the country's security." Expressly, it gives OTRAG the right to use any access to the land to transport anything needed without special permission. The territory is also deemed to be duty free, and all OTRAG employees and their families are exempt from taxes and are granted diplomatic immunity. OTRAG is granted exclusive right of air space over the property, and all rights of landing on it.

Article III gives OTRAG the right to decide which people will be permitted on the property. The corporation can request and obtain evacuation of any non-OTRAG personnel from the premises at any time. OTRAG is also given the right to have special protection

from Zaïre for any persons or facilities in order to ensure security. No type of observation, through photography or otherwise, may be done without OTRAG's direct permission.

Article IV states that OTRAG must hire and train as many Zaïrian citizens as possible. OTRAG assumes responsibility for the safety and security of the people in the area in the operation of sending off carrier rockets. It does not assume responsibility for any harmful environmental effects that might be caused by the manufacture and conveyance of space vehicles. However, the corporation agrees to undertake insurance coverage against damage to human health and life and damage to property.

Article V states that OTRAG shall pay Zaïre 25 million Zaïres (50 million dollars) annually until the end of the year that OTRAG launches its first satellite for a customer. Zaïre and OTRAG shall then decide on a new rate of payment. OTRAG also agrees to launch one experimental satellite for Zaïre free of charge and to launch a telecommunication satellite for Zaïre at 20 percent less than the normal compensation for launching such a satellite.

Article VI gives OTRAG exclusive right to the territory until the year 2000, after which the agreement will be renewable every ten years. If the agreement should be terminated through "regular action" (presumably by mutual consent), the land will be restored to Zaïre, which will then pay OTRAG for any and all installations that have been built on the property at current market value.

Article VII states that the validity of the contract as a whole is not to be affected in the event that specific provisions are for any reason declared null or that other provisions are added. Legal relations between Zaïre and OTRAG will comply with the laws of Zaïre and the Supreme Court of Justice of that country will adjudicate any litigation.

AREA OF THE LEASED SITE

The contract seems therefore to give virtually unlimited rights to OTRAG over the leased land. The property in question lies along the southeastern border of Zaïre. In several sources[2] its area is quoted as being 100,000 square miles. To emphasize this point, one of them[3] described the area as being one-tenth the size of Zaïre (Zaïre is about 900,000 square miles), or approximately the size of Colorado. Most other references report the OTRAG area as being 39,000 square miles, or about 100,000 square kilometers. But even the 39,000 square mile figure cannot be trusted. An article in the New York Times[4] cites the location of the OTRAG facility as being in a "39,000-square-mile territory in northern Shaba Province -- an area a tenth the size of Zaïre." This would put Zaïre's area at about 400,000 square miles, or less than half of its actual size. However, none of these figures coincide with the area as I have measured it using the borders as defined in the agreement.

These borders encompass an area of about 55,000 square miles -- about the size of Wisconsin, not Colorado.

If even the area of the leased land is in question, it seems that the accuracy of other information concerning it must be treated with a little skepticism too. Fairly clear, however, is the background of the corporation that is involved in this unique operation, a Third-World satellite launching facility.

BACKGROUND OF OTRAG

OTRAG's boss is Lutz Kayser, a thirty-nine-year-old former student of Eugen Sänger. He is a close friend of Wolfgang Pilz and Kurt Debus, who, together with Sänger and Werner von Braun, were the team responsible for Germany's wartime rocketry.[5]

At the end of World War II, many countries attempted to attract the men behind Germany's missiles. Debus and von Braun ended up in the United States, working for NASA; Debus became the director of the John F. Kennedy Space Center, a post he filled until 1974. Pilz and Sänger went to France, where they continued to do research, using a mixture of kerosene and nitric acid to fuel the first French rocket. Sänger returned to Germany in 1954, but shortly thereafter he and Pilz were enticed to Egypt by President Nasser, who offered them $100,000 to develop an anti-aircraft rocket.[6] Sänger left Egypt to accept a chair at Berlin's Technical University. Pilz continued research in Egypt until after the Six-Day War, when he too returned to Germany.

In 1970, Lutz Kayser set up his own company in West Germany, Technology Research, Inc., which worked on projects ranging from rockets to deep-sea research. In 1971 Kayser's company was handed a million-dollar government contract to develop a rocket. Wolfgang Pilz was called in as a consultant, and recommended use of the kerosene-nitric acid fuel, a suggestion which Kayser quickly adopted.

In 1974 Kayser established OTRAG, a corporation designed to make rocket-launching profitable. He persuaded Kurt Debus, who had returned to Germany after his retirement from NASA, to head the Board of Directors. As for the financial backing, Werner Will, head of the airplane manufacturing company Atlantis, and Kayser each put up half of the starting capital of $425,000 needed to launch the new company.[7] However, Will has since been bought out by Kayser for five times the amount he invested, or more than one million dollars. In addition, Will gets 20 percent of all future OTRAG earnings.

Fred Weymar, an international financier, was also brought in at the start. Weymar had close connections with President Mobutu Sese Seko of Zaïre, one of the richest men in Black Africa, with personal holdings said to be on the order of 100 million dollars.[8] Weymar introduced Kayser to President Mobutu on November 30, 1975, and Mobutu was immediately in favor of the idea of building a

satellite launching facility in Zaïre. He wanted to have the first "Cape Kennedy" in Africa.[9] Within six days the preliminary negotiations took place, and on March 26, 1976, the document was signed.

OTRAG has shown itself to be far from idle in the interval since the treaty was signed. Three test firings of the "Kayser rocket" have already been held. The launchings took place on March 17, 1977, March 20, 1978, and June 5, 1978. The first two flights were successful; the last was not, as the rocket refused to come out of a planned turn.[10] The OTRAG officials aren't greatly concerned with the one failure, however. As Frank Wukasch, an OTRAG executive puts it, "It wasn't so disappointing. It proves we can steer the vehicle and it proves that the vehicle flies in all possible attitudes, even nose down."[11] Even with this optimism, it would seem that the rockets will have to be a little more reliable if customers are to be willing to spend the money to use OTRAG rockets to launch satellites into space. Kayser estimates that OTRAG will be selling a Thor-Delta class vehicle for about $7 million (1975 dollars), an Atlas-Centaur class vehicle for about $12 million, and Titan 3C launches for about $15 million.[12] The production costs on the rockets are supposed to be about half of those prices.

DESIGN OF THE KAYSER ROCKET

The "Kayser rocket" is about as basic as you can get. Using the NASA Space Shuttle to launch satellites, Frank Wukasch claims, is like "transporting bags of cement in a Rolls Royce. To carry cement you ought to use a truck, and that's what we are building -- a space truck."[13]

The term "space truck" seems to be an apt description. The basic single-stage OTRAG rocket consists of four tanks, two containing nitric acid and the other two containing kerosene. Attached to them are four engines with variable throttle control which can deliver 3 metric tons or 6600 pounds of thrust each.[14] The tanks that hold the fuel are made from specially processed stainless steel. Normal stainless steel is put through a cold-spinning process to derive the special high-strength steel. Each tank is about 12 inches in diameter and about 21 feet long. When rockets larger than the basic four-engine type are made, the tanks can be stacked one on top of another in order to make larger fuel tanks.

Extensive testing was done before OTRAG was able to come up with thrust chambers that could handle the heat but were still simple and inexpensive. The engineers finally settled on a design that has chambers lined with asbestos and phenolic plastic resin. All the other parts are equally simple and cheap. The motors that control the fuel valves are actually windshield wiper motors made by the Bosch company for use in cars and trucks.[15] The fuel valves themselves are also commercially available. Complicated guidance systems were avoided by installing a throttling system in each

engine by means of which the engine can be signaled to be full open, half open, or closed. Thus the direction of the rocket can be controlled by telling each engine how hard it should push.

So that the engines will know how much to throttle, there is an inertial sensor in the payload section that sends signals to a small computer in each engine unit, telling it how much throttle should be used. Each computer has its own power supply, consisting of a nickel-cadmium battery. In this way the electrical system for the rocket is decentralized, and hence much less prone to electrical failure.

Dr. Duncan Rannie, Robert H. Goddard Professor of Jet Propulsion at the California Institute of Technology, comments on the rocket design as follows:

> The most critical heating problem is at the throat of the nozzle where the combination of heating and erosion has greatest effect. The rocket chamber itself is not so critical.
>
> Ablative lining of the type mentioned is standard in solid propellant rockets, which generally have shorter burning times and higher thrust (and acceleration) than liquid propellant rockets have. Liquid propellant rockets are almost always cooled regeneratively by passing fuel through tubes that make up the walls of the chamber and nozzle. The rocket motor thus has low weight, and since the tanks for fuel and oxidizer are also very light weight, the rocket cannot tolerate very high acceleration. These almost opposite trends for the liquid and solid propellant rockets results from optimization for the two types. The liquid propellant rocket is preferred for better payload/weight ratio and presumably for lower cost, the solid propellant rocket for immediate readiness and simplicity.
>
> The OTRAG rocket uses liquid propellants with the heavy tanks and ablative nozzle and rocket chamber appropriate to solid propellants. It probably requires short burning time and high acceleration. It may be cheap, but that a payload/weight ratio comparable to modern large rockets is attainable seems unlikely. The payload/weight ratio of solid and liquid rockets improves with size, whereas for the OTRAG rocket the payload/weight ratio will at best stay the same, and will more probably decrease, by combining large numbers of individual rockets.
>
> To put a satellite of reasonable size into orbit requires almost every refinement of modern rocketry unless one is willing to start with an enormous first stage. From all indications the OTRAG system would end up being very expensive from sheer size, even if the rest of the system worked satisfactorily.

WILL IT WORK?

In short, the rocket may not be a model of elegance and sophistication, but it is certainly inexpensive to build. However, the question is still whether such a cheap system will really work. The first launch -- on May 17, 1977 -- was of a basic four-fuel-tank rocket. The rocket reached an altitude of about 20 kilometers (65,600 feet) and landed only a short distance from the launch pad.[16] The second launch also worked, but, as mentioned above, the third test failed. One wonders about the chances of a rocket whose weight per payload weight is twice that of existing launchers. The question certainly must be of interest to space agencies such as NASA.

Kayser says that top officials at NASA have been briefed and are aware of OTRAG's philosophy. The official statement from NASA seems to have a tone of disdain: "NASA has no interest in the OTRAG launcher. . . . The viability of the system is not accepted by all engineers."[17] Nevertheless, NASA and European Space Agency (ESA) officials are looking carefully at the OTRAG endeavor. Many people from the two agencies do not believe that the method of putting together more and more of the two-tank/two-engine blocks to form a larger rocket will work, especially in the larger sizes. If the idea does work, both agencies have cause for some concern. But they are not the only ones who are skeptical.

West German industry, involved in both the space shuttle and the Ariane rocket for ESA, seems to be quite set against the OTRAG idea. As one ESA official observed, "There is obviously some kind of phobia against this thing by German industry. . . . And Bonn authorities who have spent money on research in this field are not convinced this is a viable concept."[18]

One of the experts at the space-engineering firm of Messerschmitt-Bolkow-Blohm (MBB) also is not convinced. He claims that "Herr Kayser wants to master the future with concepts of the past; an economically and technologically hopeless venture."[19] Meanwhile, Professor Heinz Koelle, a space scientist in Berlin, says, "In principle you can launch anything with rockets, even barn doors."[20]

The people at OTRAG, naturally, are optimistic. They feel that everything will work out fine, and are proceeding on schedule with their plans. These include the testing of a larger rocket with about 36 fuel-tank/engine units in mid-1979 and the launching of a satellite into orbit by 1981. For the actual satellite launching a rocket will be constructed that will contain about 600 fuel tanks bundled together. At present, OTRAG is bundling their rockets together in square configurations, though hexagonal forms may also be tested. Instead of the normal rocket design in which one stage is on top of another, the OTRAG design goes from the inside to the outside. In other words, as the first stage, the outer one, burns out, the next inner layer ignites, and so on until the core stage is reached. In fact, the 1979 test rocket may be a three-stage one with 48-60 engines in the first stage, 12 in the second stage,

and 4 in the third stage. The OTRAG launcher that would be in the performance category of the Atlas-Centaur would be about 40 meters high and 8 meters wide, with as many as eight concentric stages.

The design does indeed give the system versatility. As an OTRAG executive puts it, "The big advantage of our system is its adaptability. We can add or reduce clusters as necessary. We can also offer an extremely wide payload diameter -- up to 25 ft."[21] The system is simple, but it is just what some people want.

POTENTIAL CUSTOMERS

OTRAG already has customers waiting for the launching system if it turns out to be viable. The Arab League wants to purchase the first OTRAG launcher in order to orbit an Arcomsat (Arab Communication Satellite).[22] Negotiations are also under way with many Third World nations for the launching of telecommunications satellites. According to Kayser, five states -- in South America, Africa, and East Asia -- have shown interest.[23]

OTRAG is not worried about competition with NASA. Kayser claims that the OTRAG launcher will not be particularly competitive with the space shuttle because there would be only about a 20 percent overlap in shuttle and OTRAG missions. "OTRAG," he says, "will launch reconnaissance and earth resources satellites and others too dangerous or politically sensitive for shuttle launch."[24] A satellite for the People's Republic of China may be in the latter category.

OTRAG seems to be definitely interested in launching a satellite for China. The Chinese have been unable to lift their own satellites into orbit, and Kayser has confirmed that OTRAG has been negotiating the sale of a "spy satellite" to them if the Shaba tests turn out to be successful.[25] When Frank Wukasch was questioned about it, he replied, "I don't want to confirm it. There is interest." He did say, however, that OTRAG has sold two launches and optioned four other for 1980-1981 to unnamed customers.[26] South Africa is not likely to be one of these.

OTRAG has repeatedly stated that it will launch satellites for any country except South Africa. A spokesman for OTRAG was emphatic: "We have never been in contact with South Africa and we shall not change this policy."[27] Wukasch was also explicit: "OTRAG will launch for countries all over the world -- following certain limitations. We would not carry something for South Africa. That would be bad management. We would lose twenty customers to get that one."[28]

CHOICE OF ZAÏRE AS THE SITE

One might wonder why Zaïre was chosen as a site for such a business venture. It is an area that could hardly be called politically stable. Kayser has an explanation that is about

as simple as the rocket. He says the site was chosen because of the low population density and because the spin of the earth at the equator gives the rockets that extra energy that makes them easier to place into orbit. This is an important advantage to a low-cost launching operation.[29] OTRAG officials had talked to government representatives in Indonesia, Brazil, and elsewhere, but "General Mobutu was the fastest to react, and to decide, that he wanted the Cape Canaveral of Africa."[30] The choice of Zaïre as a site seems to have solved other problems as well.

Several complicating factors kept OTRAG from setting up a base in Germany. The first is the United Nations Space Treaty, which specifies that all rockets fired in international air space must bear the insignia of the country of origin. This means that any individual or private firm needs the sponsorship of a government in order to fire rockets. But at the same time there is the 1954 Treaty of Brussels, which places limits on German rearmament by prohibiting the manufacture of nuclear, chemical, or biological weapons. It also forbids the production of long-range missiles and guided missiles on German territory. Zaïre, on the other hand, has no qualms about letting OTRAG use Zairian insignia on its rockets, and permits OTRAG to develop its rocketry without any limitations.

That would explain why OTRAG would want Zaïre. But why would Zaïre want OTRAG? For one thing, although Mobutu may be the wealthiest man in Black Africa, his country is on the brink of bankruptcy. The economy of Zaïre has experienced negative growth rates for the past three years and is expected to have a sharp fall when the 1978 figures are released.[31] Mobutu was in the mood to look for money anywhere he could find it. As Tad Szulc has put it, "Zaïre has been tottering for years on the edge of virtual bankruptcy and political collapse. . . . This state of affairs, plus West German and U.S. pressures, have resulted in Mobutu's agreement . . . to turn over roughly one-tenth of his territory to the West Germans. . . ."[32] Commenting on how much Zaïre will receive from the deal, Kayser says, "Zaïre gets the prestige, and will be paid for the rental of 100,000 sq. km. of range, but payments are deferred until 1980. Zaïre also gets 5% of our sales revenues."[33]

President Mobutu has demonstrated his interest in the project. He showed up personally for the third launching, on June 5, 1978. He and his advisers gathered around the test site to watch the rocket launch. However, not really knowing what to expect from the rocket, the whole entourage cheered and applauded when the rocket crashed.[34] After the test Mobutu spoke to reporters, saying that his country would benefit from the OTRAG venture because the project was employing 200 Zaïrian citizens and because Zaïre would receive royalties from future rocket sales.[35] In fact, the main OTRAG staff is composed of 40 Germans and 100 Zaïrians.[36]

OTRAG, then, is an example of a corporation moving into areas that no government or government agency can move into without red tape. As Gary Hudson of the Foundation Institute says, "OTRAG has challenged both the Soviets' implacable opposition to private enterprise in space, as well as the entrenched government monopolies

like NASA and ESA. The true capitalist is a threat to both totalitarian regimes and government agencies."[37] One would think that the best thing the governments concerned could do is to take a wait-and-see attitude. Unfortunately, this has not been the case.

ALLEGATIONS OF MILITARY USE

Claims have been made against OTRAG from every direction. A Belgian entrepreneur, for example, thinks that the project is a cover to search for gold, and one black African diplomat thinks the plan is to construct airfields and a communications network in preparation for a superpower war in southern Africa.[38] Most of the claims, however, are much more straightforward, namely, that OTRAG is out to build military weapons.

Some of the assailants, such as Jean Damu, claim imperialist intervation. Damu states, "On the military front the imperialists were no less blatant in their intervention in Zaïre. During the 1977 Shaba rebellion the Mobutu government signed a sensational contract with the West German corporation OTRAG. . . . The real meaning of such a move by Zaïre and West Germany is obvious. The establishment of such a facility gives the Western powers a jumping-off place for the encirclement of progressive countries and movements in all of Africa, and Zaïre . . . is located in just the right spot to make such a strategy feasible."[39]

Many other people are pointing the finger at OTRAG. The Soviet Union has initiated a major propaganda campaign. During a luncheon of welcome for President Neto of Angola, Soviet President Leonid Breznev accused the West of underhanded methods to sow conflict among the countries of Africa.[40] He condemned the West for establishing "military strongholds . . . such as the missile testing center in Zaïre . . . to strengthen the last bastions of racism and colonialism."[41] When asked to comment on Zaïre, one Soviet spokesman said, "Nobody can verify what's going on in that territory. The Zaïrian and German Governments pretend it's a straightforward contract, but we believe it has secret clauses."[42]

Colin Legum, writing in The Observer (London), believes there are two reasons for the Soviets' concern. The first is the previously mentioned sale of a spy satellite to China, since the Russians would like to keep China from having this capability for as long as possible. The second is that Russia has been lobbying hard to get an amendment to the United Nations Space Treaty which would stop the proliferation of spy satellites, basically solidifying the Soviet-American duopoly in this field.[43]

Tad Szulc, said by the London Times to be "a usually reliable American diplomatic correspondent,"[44] makes the most far-reaching of all the accusations. Szulc claims that the base in Zaïre is actually an operation for building cruise missiles to rearm Germany. He claims, on the basis of "information obtained in private discussions with highly reliable sources," that "the work going on

today in Zaïre is obviously designed to equip West Germany with the most sophisticated delivery systems for missiles with conventional or nuclear warheads."[45] He asserts that since West Germany cannot rearm directly, because of the Brussels Treaty, the Germans are using the base in Zaïre to develop cruise missiles and intermediate-range ballistic missiles (IRBM's) to rearm themselves in a "back-door" approach.

Unfortunately, there is little direct proof of all this, since information that comes from "reliable sources" in Europe and in the United States is difficult to check.

Charges similar to Szulc's have apparently appeared in the French magazine Afrique-Asie, although I have been unable to obtain a copy of the relevant issue. The Swedish newspaper Dagens Nyheter also reported such a claim, stating that the West German aerospace company Dornier is working on a cruise missile, and that one of its subsidiaries is headed by Manfred Kayser, brother of the OTRAG president Lutz Kayser.[46]

DENIALS OF MILITARY USE

OTRAG's responses to these claims have been emphatic and clear. Kayser flatly denies any military intention. He asserts that Brezhnev's claims are ridiculous, commenting, "He ought to be better informed about the project. We frequently see Soviet MIG-23 reconnaissance jets over our testing grounds."[47] Dr. Otto Schreiber, OTRAG's chief consultant, is also firm. "There is no C.I.A. or Bundes Nachrichtendienst or cruise missiles. It's a purely scientific program to transport commercial satellites."[48]

The OTRAG people have been adamant about this position. When Kurt Debus was quoted in the French financial daily, Nouveau Journal, as saying, "We are capable of launching powerful rockets for civilian or military use for countries of any political tendency,"[49] OTRAG went into an uproar, and issued a statement that OTRAG was unwilling to undertake launching for military purposes. One spokesman said, "We are expressly forbidden by West German law to do this. Our operations are strictly non-military."[50]

West Germany is equally as adamant in claiming that the OTRAG facility is completely non-military. The West German Defense Ministry dismissed Szulc's claims of cruise missiles and IRBM's as "pure nonsense" and said there was no truth to the assertion that OTRAG was being supported from the West Germany military budget.[51] The West Germans likewise denied the Russian charges that the Zaïre facility was for testing military missiles.[52] When Angolan President Neto appeared concerned over the OTRAG base, West German Foreign Minister Hans-Dietrich Genscher wrote to him, assuring him that the project is non-military.[53]

WEST GERMANY'S POSITION

Indeed, it seems that West Germany would rather have nothing at all to do with the OTRAG facility. At a press conference at the end of his recent African tour, West German Chancellor Helmut Schmidt said that the presence of a West German firm's missile site in Zaïre was "an embarrassment."[54] To help ease international anxieties, and to appease Brezhnev before his visit to Bonn, Schmidt signed a law requiring an export license for every rocket or rocket component shipped out of West Germany. OTRAG had previously been exempt from import or export duties in West Germany, as well as from an export license, since it was a West German firm exporting to itself in a foreign country. In addition, Schmidt and his Cabinet are looking for ways to stop OTRAG by drafting a law that permits a total ban on any business activity that "seriously disturbs" the foreign policy interests of West Germany.[55]

In personal correspondence with Dr. Werner Menden, Counselor of Scientific and Technological Affairs at the West German embassy in Washington, I was sent a copy of the official German policy regarding OTRAG. It was sent with a note which commented that according to their information OTRAG "will not be able to send up sophisticated communications satellites due to weight limitations." A translation of the policy statement follows.[56]

1. The Federal Government is disturbed by the reports made by different parties which portray the association between the Government and the space Agency OTRAG in Zaïre to be a military operation. It would appear that, in part, these reports from interested parties are really part of a long-standing slander campaign which has been constructed in order to discredit the Federal Government's African Policy.

2. The Federal Government, however, does not disregard that this campaign has devisively led to actual worry that the legitimate security interests of the African states might be injured. The Federal Government places the greatest stress upon clearing up these suspicions, which are based upon a warped knowledge of the situation, through an encompassing and unreserved explanation.

3. The facts are as follows:

   -OTRAG is a private German undertaking, which will attempt to be a launching system for the transport of civilian cargo for commercial use into space.

   -Neither the Federal Government, nor any official government agency, has any intention of participating. That intention would not be promoted by the Government. The assertion that there might be a cooperative effort between OTRAG and the German military establishment is totally wrong.

-Careful investigations have discovered that the OTRAG rocket, still in development, is not suitable for military use due to its structural design. If someone talks about cruise missiles or intermediate range rockets, it testifies either to maliciousness or to total technical incompetence. Just as absurd is the occasionally stated connection with nuclear development.

-The Federal Government is thus convinced that the enterprise does not touch the safety interests of the African States.

-The peaceful use of space, as OTRAG envisions, does not go against the international law and its limitations, which the Federal Government of Germany feels itself subject to.

-The Federal Government is fully using all means of control. The export of weapons is subject to control at all times, whereby the strongest measures are used to investigate. In addition, taking into account the worries over the OTRAG rocket, the Federal Government has put the exports under further control.

-The Zaïrian Government has confirmed several times that the OTRAG facilities are there only for peaceful purposes, and other interested parties are welcome to cooperate. At the request of the Federal Government, the Zaïre Government has provided a written statement that the rockets shipped from the Federal Republic of Germany to Zaïre are to be used only for peaceful purposes, that careful controls have been instituted, and that no transfer of rockets to a third party will occur.

-After examination by the Military Development and Control Agency, WEU, in Paris, the executive council of WEU has recently issued a statement. They are convinced that reports of OTRAG producing missiles or other weapons which would be subject to restrictions by the Brussels Treaty are wrong. The OTRAG rocket is an inexpensive means of transport, used to put civilian cargo into space.

4. The Federal Government appeals to governments of the African states to let themselves be guided by the available and examinable facts in the judgment of the OTRAG enterprise. Good will and mutual trust are the prerequisites for friendly dialogue, which the Federal Government considers to be its contribution toward resolution of problems on the African Continent.

The Federal Republic seems to be trying to keep its hands clean of any OTRAG affairs. OTRAG applied for a grant from the Ministry of Scientific Research and was turned down when ministry experts concluded that the costs would be too high. Kayser

also requested financial assistance from the Ministry of Economics in the form of a federal financial guarantee, but this request fared no better.[57]

EFFECTS OF THE ANGOLAN INVASION OF SHABA

But more things threaten the Zaïrian base than assertions of political improprieties. The testing at OTRAG was stopped temporarily last May when Shaba Province was invaded by Angolan rebels. Colin Legum, writing in the Observer, claims that the invasion was backed by East Germany and the USSR, who have tried to prevent OTRAG from developing its low cost rocketry, though both countries have denied these allegations.[58] The Observer article then goes on to say that the invasion by the Congo National Liberation Front (FNLC) may in fact have served the East German and Russian purpose of possibly putting an end to OTRAG's project: "In view of the uncertainty about security in Shaba, the company will reconsider the future of the project." Pearce Wright, writings in The Times (London), also remarked after the invasion that "Some questions inevitably arise about the future of the rocket project."[59]

There is no doubt that OTRAG is concerned. Its installation represents a large investment, variously estimated to be from $300 million to $500 million. These worries have made OTRAG decide almost certainly to build another base somewhere else. Kayser has been quoted as saying that they will probably establish a second base either in South America or in Asia. "It's good risk management," he stated.[60] At a later interview, Frank Wukasch acknowledged that "The decision [to build a second base] has been made in the interest of our investors."[61]

Although assertions concerning the use of the Zaïre site for military purposes have calmed down a little since a group of journalists went to visit the site and came back to report that everything was legitimate,[62] OTRAG still has many worries. They must be concerned as to whether West Germany will really try and stop the project, whether another invasion will force the facility to stop operations, and whether political pressures will place strict restrictions on them. Fundamentally, however, they must worry about whether the rockets will really work.

NOTES

1. "Unabridged Text of the Secret Agreement between Zaïre and West Germany," (English translation from the French). Copy in the Munger Africana Library.

2. See, for example, Tad Szulc, "Germany Rearms," Penthouse, March 1977, p. 77 seq.; "West Germans Said to be Testing Missiles in Zaïre," The Times (London), December 14, 1977, p. 6.

3. Szulc, op. cit.

4. John Darnton, "Private German Rocket Base in Zaïre Stirring Rumors," New York Times, April 29, 1978, p. 3.

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The author of this study of OTRAG, Stanley Cohn, is an undergraduate major in biochemistry at the California Institute of Technology. His research with Professor Judith Campbell is in the field of DNA replication.

Mr. Cohn is from Denver, Colorado. He was the star of the campus musical production of "Guys and Dolls." Recently, he was elected senior class president. This analysis was originally done for my weekly Africa Seminar.

E.S.M.

APPENDIX

UNABRIDGED TEXT OF THE SECRET AGREEMENT BETWEEN ZAIRE AND WEST GERMANY

CONTRACT ENTERED BETWEEN:
THE ZAIRE REPUBLIC and The O.T.R.A.G. (Orbital Transport - und Raketen - Aktiengesellschaft)
regarding the complete tenure of a territory;

WHEREAS the Zaire Republic wishes to strengthen relations for cooperation with the Federal Republic of Germany, more especially in the technological, scientific and economic fields,

WHEREAS the Republic of Zaire has a care for promoting the development of its country infrastructure,

WHEREAS the O.T.R.A.G. is a German firm which builds and operates carrier rockets meant for transportation of useful loads in space,

WHEREAS the O.T.R.A.G. needs a vast area of operation for the purpose of sending off carrier rockets in the atmosphere and space and carrying on all activities of whatever fields which are connected either directly or indirectly,

The Zaire Republic, hereafter named "The State," here represented by Citizen Bokana Wondangela, Counselor to the Presidence of the Republic,

On the one hand,

And the O.T.R.A.G. Corporation (Orbital Transport - und Raketen - Aktiengesellschaft), New-Isenburg, represented by Ingeneer "Diplom" Lutz T. Kayser, member of its Management and entitled to represent it, hereafter named the "O.T.R.A.G.,"

On the other hand,

have agreed on the following:

ARTICLE I

1- The State grants the O.T.R.A.G. the right of complete use of the following territory:

Bordered on the North by the Lakuga river, located between 26° and 55' of East longitude, going from there on a straight line until the northern point of the Kavala island, in Lake Tanganyika.

From there on a straight line toward the east until the border between Zaire and Tanzania. From there, it continues toward the south along that border until the angle dividing Zaire, Tanzania and Zambia. Then, it follows the border separating Zaire from Zambia until the 10th south parallel. Then, the line follows the 10th south parallel, until the 26° 50' longitude east and it goes up again toward the North on a straight line until the Zaire river at the height of the 8° south parallel. From there, it follows the Zaire river downstream until the mouth of the Lukuga river.

This territory is demarcated in red on the attached map, and is part and parcel of the present contract; it shall be named: "Territory" in all the following articles.

2- The right of use includes the right of using the territory without any restriction, for the purpose of sending off weapons in the atmosphere and space, of any kind or type whatsoever, more especially carrier rockets, and of taking all steps which, on advice of the O.T.R.A.G., may be connected thereof, either directly or indirectly, or in any other manner.

3- The entire use includes for instance:

3.1 Any kind of involvement about the nature of the ground, such as, in particular, excavation and embankment of rising grounds (hills, elevated ground, etc.), works of underground excavations, water designs of any kind, etc.

3.2 The building of airfields and of all similar works.

3.3 The building of surface and underground works, of any nature whatsoever (in particular, inclines for sending up weapons, installations for power supplies, stations of observation and measurements, installations of telecommunications and of radar, establishments of any kind of production.

3.4 The urbanization of a part of the territory, that is, the construction of buildings for housing, for commercial use, of hospitals, of hotels, centers for recreation, etc.

3.5 The building of roads, and of railroad tracks, if necessary.

3.6 Any operation designed for the improvement of infrastructure.

3.7 Any operation designed for the improvement of farming, in accordance with the Article I, paragraph 2, of the present contract (building of farming enterprises and of chemical fertilizers plants and of fodder-plants).

ARTICLE II

1- The State grants the O.T.R.A.G. expressly and without any restriction, the right of taking all steps it may deem necessary in exercizing the entire use of the territory, so long as these shall not interfere with the country's security.

The State shall issue the O.T.R.A.G. all authorizations requested for exercising the right of entire use and shall proceed to the legal steps necessary for

.....

exercising the right of entire use, in particular the special rights stated hereafter:

1- More especially, the State grants the O.T.R.A.G. the following rights:

1.1 The O.T.R.A.G., its officers, the members of its staff and the members of the latter's family, also the persons invited by the O.T.R.A.G. have a right to acceed to the territory by road, lake, river and by air.

All persons above mentioned have the right, among others, to carry by road, maritime vehicles, waterways and by air, on the whole of the national territory of the State and without any special administrative authorization, the property needed by the O.T.R.A.G. for the accomplishment of the missions it had set up.

2.2 The O.T.R.A.G. is given the possibility of getting connected with installations for the supply of power of the enterprises of production and distribution of power of the State.

2.3 The territory is customs duty free zone. This means that personal property may be entered there or exited from there by the O.T.R.A.G. tax exempt.

2.4 The O.T.R.A.G., its officers, the members of its personnel of nationality other than Zairese and the members of the latter's families are exempted from all taxes of the State, whatever be their kind. Is a "member of the personnel," any person defined as such by the O.T.R.A.G.

2.5 The O.T.R.A.G., its officers, the members of its personnel and the members of the latter's families enjoy immunity of any legal prosecution in the State, for actions accomplished by them in the exercise of the functions they may be entrusted by the O.T.R.A.G. during and after their residence.

Such persons enjoy, in the State, the same privileges and immunities as the members of diplomatic missions.

The O.T.R.A.G. may use an exclusive disciplinary power toward all persons who are included as its officers, its personnel or the latter families.

In the event a member of the personnel or a member of the latter's family would transgress the State laws, the O.T.R.A.G. shall expell from the State such member of the personnel or member of the family in the most expeditious manner and shall not hire him ever again in the territory.

2.6 Vehicles meant to be used on roads, means of transportation used on sea, lakes or rivers, aircrafts - more especially carrier rockets put in operation by the O.T.R.A.G., its officers, the members of its personnel and the members of the latter's families, shall, upon the O.T.R.A.G.'s request, be registered and authorized for operation by the State's authorities - if need be, in accordance with the international rules and agreements in effect. The present provision applies for instance to national emblems of the State which, should the occasion arise, may be shown on the weapons.

Driver licenses or other licenses granted the O.T.R.A.G., its officers, the members of its personnel or the members of the latter's families by an authority of another State for the purpose of driving roads, sea, river, lake and air means of transportation, allow the operation of such means of transportation inside the State.

2.7 The State shall prohibit permanently the traffic in the air space included above the territory in such a manner that, only the O.T.R.A.G. its officers, the members of its personnel and the members of the latter's families may without any restriction, fly over the regimented zone. They also may take pictures of the territory from an aircraft. Such provision does not apply to Zaire armed forces.

2.8 The O.T.R.A.G. is granted the right to set up airfields as it chooses on points it will have decided upon and to use them with all the facilities that such use may involve. The O.T.R.A.G. will have all the rights of landing on the territory.

2.9 The O.T.R.A.G. has the right to use telecommunication and radar installations, in particular with the help of telecommunication satellites.

ARTICLE III

1- Only persons expressly authorized to that effect by the O.T.R.A.G. may stay on the territory. It has a right to limit such authorization to staying on specified zones.

2- The State is compelled, should the O.T.R.A.G. so requests, to evacuate from the territory all other persons and keep them out of the territory. Besides, it will be up to the State to take and keep in action all necessary measures for ensuring the safety of the whole territory with regard to its facilities and to the persons who have been admitted thereon by the O.T.R.A.G. The measures to be taken and to be kept in action must be planned in cooperation with the O.T.R.A.G. on condition that the O.T.R.A.G.'s operational needs necessitate such measures.

3- Upon the O.T.R.A.G.'s request, the places and persons it will have specified shall be given special protection.

4- On the territory, no "constation [sic]" -- (note of the translator: incomplete word, probably having the meaning of "verification") -- either through picture, or through writing, shall not be made without the O.T.R.A.G.'s authorization.

ARTICLE IV

1- The O.T.R.A.G. shall carry out all measures which it will have to take on the territory and which will contribute in improving the State infrastructure, in a manner that, in so far the particular situation of the territory may allow, it may, by its nature and character, agree with international tests.

2- The O.T.R.A.G. shall train as much as possible Zairese citizens in the matters related to its activities.

3- It shall be up to the O.T.R.A.G. to see to it that, during the operation of sending off in the atmosphere and space weapons, in particular, carrier rockets, the necessary actions be taken to ensure the safety of persons, and, should the occasion arise, of crowded centers located on the territory. To this effect, the O.T.R.A.G. has the right to set up its own security teams and its own personnel of fight against risks of fire.

4- The O.T.R.A.G. does not assume responsibility for the harmful effects brought to the environment by the manufacture and the conveyance of weapons in the atmosphere and space. The O.T.R.A.G. binds itself to take an insurance for civil responsibility able to cover the possibility of incurring damages to human health and life, also to any damage to property.

AN ANNUAL PAYMENT OF 25,000,000 zaires . . .
PAYABLE WHEN FOREIGN CUSTOMERS HAVE PAID
UP THEIR DEBTS

ARTICLE V

1- Until the end of the year during which, after the first launching of a carrier rocket from the territory, the O.T.R.A.G. will have received from a customer its full compensation in a currency other than the State's, the rental amount for use shall be:

Z. 25,000,000 (Twenty-five million Zaires)

(At the official rate of exchange, one Zaire equals two dollars or ten French francs) per year, payable on the last day of each year to the banking establishment that has been designated by the State.

2- In the year during which, after the launching of a carrier rocket from the territory, the O.T.R.A.G. shall have received full payment in a currency other than the State's, the latter and the O.T.R.A.G. shall decide, on common agreement, upon the new rate of the rent for the right of use and its adjustment to change occurred in the economic situation.

3- The State declares, by the present, its agreement to grant, without interests, time for the payment of the rent for right of use, that will end at the end of the year during which, after the first launching of a carrier rocket from the territory, the O.T.R.A.G. will have received from its customer full compensation in a currency other than the State's.

The O.T.R.A.G. shall send the State a written request in order to receive time for payment, such request being sent four weeks before each due date of the installment for the rent for the right of use.

4- At the end of the time allowed, the State and the O.T.R.A.G. shall decide, on common agreement, upon a payment plan for the total amount of rent incurred until such date.

5- The O.T.R.A.G. binds itself to carry free of charge in the space on the State's account, an experimental satellite for supervision.

6- Moreover, the O.T.R.A.G. binds itself to carry a telecommunication satellite in space by means of an operational carrier rocket should the State so requests, and with the reservation that the State put, at its own expense, this satellite at its disposal on the territory. The compensation for such launching shall equal to the compensation the O.T.R.A.G. will invoice at that time its other customers less 20% (twenty percent). It may be paid in the State's currency.

ARTICLE VI

1- The exclusive right of the territory shall belong to the O.T.R.A.G. until the end of the year 2000. It shall not be denounced by the State, for any legal reason whatsoever, before such date. From such date, the exclusive right of use shall be renewed every ten years, except for termination by one of the parties before the expiration of the right. Such termination shall be given by communication written by one of the parties to the other.

2- Should the exclusive right of use end through regular action, the O.T.R.A.G. shall return to the State the territory as is on the right of use expiration. The O.T.R.A.G. shall not have to assume any responsibility because of the condition of the territory and the installations located thereon.

3- Should the right of use end for any reason, the State shall compensate the O.T.R.A.G. for all installations it will have built in connection with its use of the territory, at its market value. Such value shall be determined by three appraisers designated on common agreement by the State and the O.T.R.A.G.

4- In the event that, at the time of the termination of the right of use, for any legal reason whatsoever, the O.T.R.A.G. had not paid the State all the installments of the right of use which would have been due at that date, the O.T.R.A.G. shall have the right to deduct the amount due to them as a compensation from such installments due to the State.

ARTICLE VII

1- In the event one or several provisons of the present contract were null, the validity of such contract would not be affected therefrom. Any null or abstruse provision shall be replaced or interpreted in such a manner that the economic result it aimed at would be obtained. The same shall apply when it will be a question of filling gaps in the contract.

2- Legal relations between parties shall be settled by the Law of Zaire.

3- Litigations resulting from the present contract or occurring in connection with it shall meet the competence of the Zaire Supreme Court of Justice.

ARTICLE VIII

1- The present contract shall come in force, with a retroactive effect, on December 6, 1975 and repeals the one signed on December 6, 1973, with the exception of the attached card which becomes part and parcel of the present contract.

2- The German and French versions of the present contract are both Bona Fide and have legal force of interpretation.

Kinhasa, March 26, 1976
For the Republic of Zaire by Delegation
Bokana Wondangela
Counselor to the Presidence of the Republic
For the O.T.R.A.G.
Representative of the management
Lutz T. Kayser

O. T. R. A. G.

Orbital Transport - und Raketen - Gesellschaft
6078 New-Isenburg Herzogstrasse 61

List of the administrative personnel in Category I (Management) of the O.T.R.A.G. which require a special visa.

Names and First Names	Function
Kayser Lutz T.	President of the O.T.R.A.G.
Dr. Otto Schreiber	Director - Financial Counselor
Walter Ziegler	Director - Manager of Program
Richard Gompertz	Director in charge of Projects
Klaus Piekatz	Financial Director, Representative of the O.T.R.A.G. in Lubumbashi
Victor Loebermann	Technical Director
Rainer Klett	Programmer
Gerhard Brunner	Assistant Director

The other members of the O.T.R.A.G. personnel who belong to Categories II and III shall obtain an ordinary visa.

Signed:

Sendwe K. Ilunga

Dr. O. Screiber

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