Restructuring of advanced instruction and training programs in order to increase the number of flight hours for military pilots. Part II

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***Abstract**: Converting the DC school jet aircraft into SC advanced training aircraft - and use them for the combat training of military pilots from the operational units, has become a necessity due to the budget cuts for Air Force, with direct implications on reducing the number of hours of flight assigned to operating personnel for preparing and training.*

The purpose of adopting such a program is to reduce the number of flight hours allocated annually for preparing and training in advanced stages of instruction, for every pilot, by more intensive use of this type of aircraft, which has the advantage of lower flight hour costs as compared to a supersonic combat plane.

***Key Words:** reorganization of flight programs*

1. RESTRUCTURING OF ADVANCED INSTRUCTION AND TRAINING PROGRAMS IN ORDER TO INCREASE THE NUMBER OF FLIGHT HOURS FOR MILITARY PILOTS

Currently, the increase of the oil price together with the financial crisis have dramatically influenced the economies of most countries on all continents affecting some industries including the military aviation whose funds for instruction and combat training were drastically reduced as compared to the period 1970-1980.

The reduction of these funds has led to a decrease in the number of flight hours for each pilot especially of those who usually fly supersonic combat aircrafts from the operational units. (Fig. 9)

In order to avoid reducing the flight hours compensatory solutions where sought, within the limits of the allocated funds, in order not to reduce them but if possible even to increase them.

The solution was found within the system and consisted in the development of programs and action plans which essentially proposes actions on two directions:

a) From a strategic viewpoint, improving the methodology for the implementation of pilots training programs, through which to get back as much as possible the number of flight hours allocated to them during the years 1970-1980
b) From a technical viewpoint, funds were allocated to develop and improve the characteristics of the aircraft engines, especially in terms of reducing the specific fuel consumption, aiming at the same time to increase the traction force, and also to upgrade both subsonic and supersonic existing aircraft.

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Also, funds were allocated for the replacement of engines TURBO-JET with low power and relatively high specific fuel consumption installed on advanced training subsonic aircraft by engines TURBOFAN with high power output and reduced consumption, as is the case for airplanes of the current generation.

The most important decision was the allocation of funds for design and manufacture of new types of subsonic advanced training aircraft and also for conversion of dual control aircraft into simple control aircraft that are characterized by features and performance closer to those of the supersonic fighters but at a much lower cost of the flight hour.

The action plan which has lead in many countries to the increase of the number of flight hours per year for each pilot consisted in changing the methodology of preparation and training of the pilots.

The main provision of that plan was to utilize school and training aircraft and supersonic combat aircrafts alternatively.

This provision referred to two aspects, namely:

- Decrease of the number of flight hours for the pilots training on supersonic combat aircraft with high costs of flight hour (including the costs of corresponding logistics) thus saving important financial resources.
- Use of saved financial resources in order to provide a greater number of hours of flight, for training on school and advanced subsonic aircraft, double or simple command, having lower costs of flight hour and of related logistics.

The purpose was to maintain the number of the flight hours allocated to training and instruction phases at the level of years 1970-1980 and if possible to increase it, as follows:

If in the 1980's a pilot flew supersonic fighters during 125-130 hours on average, at present, considering that the ratio between the cost of flight hour for a supersonic and the subsonic aircraft is 1 to 2, 5 - 3.5 and also having in view the financial difficulties arose after 1970-1980 it became necessary to reduce the number of flight hours on the supersonic combat aircraft by 30% on average.

This reduction led to a decrease of about 30-40 hours, so that a pilot flies supersonic fighters for about 90-100 hours or less (50-60 hours), instead of 125-130 hours as planned before 1980.

To recover the hours that were cut off a method was adopted that we call the "Alternative Flights Method" (AFM), both for supersonic aircraft and subsonic trainer aircraft.

This method requires using an amount from the total funds allocated for those about 90 flight hours for pilots training on supersonic fighters in order to cover the costs of the additional flight hours on subsonic training aircraft.

The total amount depends on the number of the hours that were cut off and on the cost of the flight hour on supersonic aircraft in service at the respective operational unit.

$$S_{T(saving)Av(SS)} = N_{(oours)saving.} \cdot C_{(cost)}/h_{Av.(SS)}$$

As mentioned above, the average cost of a flight hour on a multi-role supersonic aircraft, (which also includes a package of services offered by the supplier), is about 5,000 dollars, according to. (3).

If 30 hours are reduced from the 90 hours planned for a pilot per year, it results a saving of:

$$ST_{(econ)\ Av\ (SS)} = 30 \text{ x } 5.000 = 150.000 \text{ USD / year / pilot.}$$

The savings represent the additional amount that can be allocated for a pilot training on a subsonic aircraft, in order to increase the overall number of hours flown by that pilot in a year.

The higher the cost of flight hour on supersonic combat aircraft, the higher the savings gained covering a greater number of flight hours on advanced training subsonic aircraft.

$$N_{(hours)Av.Ss.} = \frac{S_{T(saving)Av.(SS)}}{C_{(cost)} / h_{(Av.Ss.)}};$$

Notations:

$N_{(hours)\ Av.Ss.}$ - Number of flight training hours on subsonic aircraft that can be covered from the savings due to reducing the number of flight hours on supersonic aircraft.

$S_{T(saving)Av.(SS)}$ - The total amount of savings due to reduction in hours of flight on supersonic aircraft.

$C_{(cost.)}/h_{(Av.Ss)}$ - Cost of a flight hour on a subsonic aircraft

The cost of the flight hour on a subsonic training aircraft, under the same conditions, was previously assessed at about 2000-2500 USD (based on the difference between the nominal and the real U.S. dollar value in the year 1987, brought to that corresponding to the year 2009) according to point (2) and to the graph in Fig. 8.

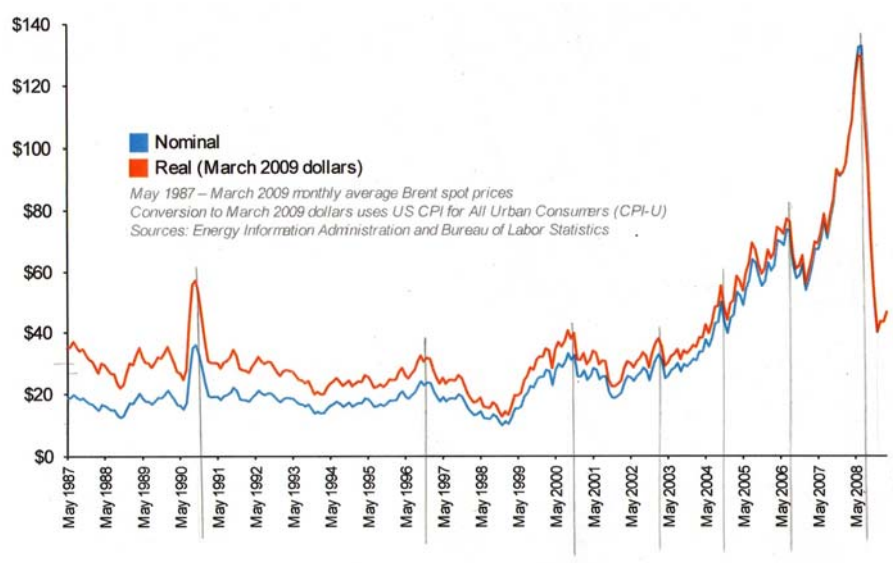

Fig. 8 Evolution of oil prices in May 1987 - March 2009 and
the difference between the nominal and the real value of the U.S. dollar

It follows:

$N_{(hours)Av.Ss.} = \frac{150.000}{2.000} \cong 75\ hours;$ it represents the average hours recovered, within the same limit value allocated in USD.

Consequently, instead of flying 90 hours per year, a pilot will fly 60 hours by supersonic aircraft and 75 hours by subsonic training aircraft, therefore he will fly a total of:

$N_{T(hours)/per\ year}$ = 60 + 75 = 135 total of flight hours per year/ pilot

In other words, a pilot will fly per year, within the same allocated fund, 45 hours more than planned, see fig. (9).

The savings due to the reduction of 30 hours in the flight program on a supersonic aircraft will lead to a substantial increase of the overall number of hours per year to be allocated for the training of each pilot: applying such a program will allow returning to the number of flight hours allocated in the 1980's.

The more flight hours reduced from a pilot's training program on supersonic aircraft, the more the saved sums and based on these sums the number of the flight hours on advanced training subsonic aircraft.

Increasing the annual number of flight hours for a pilot of an operative unit (in any weather condition, day and night) will improve his combat training and will lead thus to a higher level of training of the unit he belongs.

A leading cause in the reduction of the number of supersonic aircraft flight hours is the aircraft price along with the total resource cost (in flight hours).

Under the present circumstances number of states that have had or currently have economic difficulties cannot afford to buy a large number of supersonic combat aircraft because of their very high cost price ranging between 68 and 86 million of USD.

Countries that recently bought supersonic fighters such as the GRIPEN or F16 were limited to a number between 12 and 24 aircraft, as is the case of Hungary, the Czech Republic, Croatia, Slovakia and others.

The small number of supersonic aircraft purchased as compared to the number of pilots led to a rapid depletion of the total resource in flight hours, which for this type of aircraft ranges between 2000-2500 hours (with reduced possibilities to increase this number) depending on the type of aircraft, its equipment and mission.

For instance if we consider a hypothetical case in which an operative unit has 36 pilots and 24 fighter jet, with a total resource of 2,500 hours each, for which an annual budget was assigned providing for every pilot a total of 90 hours of flight, it follows that:

$N_{T.\ (hours)Av.\ (SS)}$ -total number of flight hours assigned to the unit for a year

$$N_{T.(hours)Av.(SS)} = No._{(pil)} \times N_{(hours)\ assigned}$$
$$N_{T.(hours)Av.(SS)} = 36 \times 90 = 3.240 \text{ hours}$$

– $R_{T(ours)Av.(SS)}$ – total resource, in flight hours of the 24 supersonic aircraft of the unit

$$R_{T.(hours)Av.(SS)} = Nr._{(Av.)SS} \times R_{(hours)\ Av.SS}$$
$$R_{T.(hours)Av.(SS)} = 24 \times 2.500 = 60.000 \text{ hours / per year}$$

– $N_{T.(years\ of\ oper.(Av.SS)}$ - total years of operation of the 24 supersonic aircraft

$$N_{T(years)oper.(Av.SS.)} = \frac{R_{T(hours)Av.SS}}{N_{T(hours)Av.SS}}$$

$$N_{T(years)oper.(Av.SS.)} = \frac{60.000}{3.240} \cong 18,5\ years$$

Currently, states that are facing financial problems, no longer can afford to buy 24 supersonic combat aircraft, within an interval of about 19 years because the amount of the transaction (taking into account the average price of a supersonic combat aircraft) would be, roughly, of around 2 billion dollars.

This amount is for some countries a financial effort far too high and therefore they searched for solutions to save both the financial resources to cover the purchase price of the aircraft, as well as those intended to cover the operating costs that, because the price of the flight hours, are as expensive as the first ones.

The solution was found and consists of changing the combat training programs for military pilots; in essence, it states to reduce to a minimum the number of supersonic aircraft flight hours, and thus to save the funds and utilize them to increase the number of flight hours on subsonic training aircraft.

This method (Alternative Flights Method" (AFM)), which applies ever since the 90s in some states in the West in order to increase the total number of hours of training, gave excellent results, everywhere where it has been applied.

The decrease of the annual number of flight hours assigned to the pilots in operational units had over the years a downward trend: from 130 hours in 1980, dropped to 90-100 hours in the 90's then starting with the 2000's to 50-70 hours. (see Fig. 9).

A specific case presented in specialized media, is the Croatian state, which provided for the annual training of a pilot on a supersonic aircraft such as GRIPEN or F.16, a total of 50 flight hours annually.

The same article revealed that Croatia intends to buy only 12 supersonic aircraft, which confirms the above assumptions.

Considering the situation, applying the "Alternative Method Flights" explained above, represents the solution to increase the total number of flight hours for training and to save the total resource (in flight hours) of the 12 supersonic aircraft purchased.

If 10 hours are reduced from the 50 fours allocated annually for the pilots training, it results the following changes:

- For the supersonic aircraft flight a total of 40 hours is provided;
- For the subsonic training aircraft flight the savings due to the difference between the costs of the flight hour of the two categories of aircraft are allocated.

Considering that the cost of flight hour on a supersonic aircraft such as GRIPEN or F.16, as seen in Fig. (5) is as follows:

- for GRIPEN -4.500 USD
- for F16- 5.500 USD,

It results that the total savings for an average cost of 5000USD are:

$$S_{T(saving)Av.(SS)} = 10 \text{ x } 5.000 = 50.000 \text{ USD/year/ pilot}$$

It results the following number of flight hours allocated for training on subsonic aircraft:

$$\text{No.}_{\text{(hours)/year}} = [50 – (0, 30 \text{ x } 50) + 37] = 72 \text{ hours/ year/ pilot}$$

In this case, an Air Force pilot who had planned 50 hours of flight will fly each year, a total number of hours, as follows:

- 40 hours on supersonic combat aircraft
- 25 hours on subsonic advanced training aircraft

Therefore instead of flying 50 hours per year, he will fly 65 hours with an additional 15 hours, which are very important to prepare a military pilot.

Currently, the annual number of hours planned for a pilot in some states on average amounts to about 50-70 hours and, sometimes, below that number; in that case, reducing the number of flight hours must take into account the degree of readiness of each pilot and, as the case may be, the number of flight hours can be reduced by a percentage greater than the above.

In that case, the funds saved lead to higher growth in the total number of flight hours, as follows:

Let's consider the case with a number of scheduled hours of 50, which are reduced by 30%; replacing the above relations, we obtain:

$$S_{T.\,(saving)\,Av.\,(SS)} = (0,30 \times 50) \times 5.000 = 75.000 \text{ \$ SUA}$$

$$Nr._{(hours)Av.(Ss.)} = \frac{75.000}{2.000} \cong 37 \; hours / year / pilot$$

It follows:

No. (Hours) / Year = [50 – (0, 30 x 50) + 37] = 72 $hours / year / pilot$

In conclusion, even if the flying hours of a pilot were reduced by 30%, their number increases the pilot's benefit because instead of flying 50 hours in total he will fly 72 hours, which results in an additional 22 hours of flight as compared to the initial planned flight hours number, (see Fig. 9).

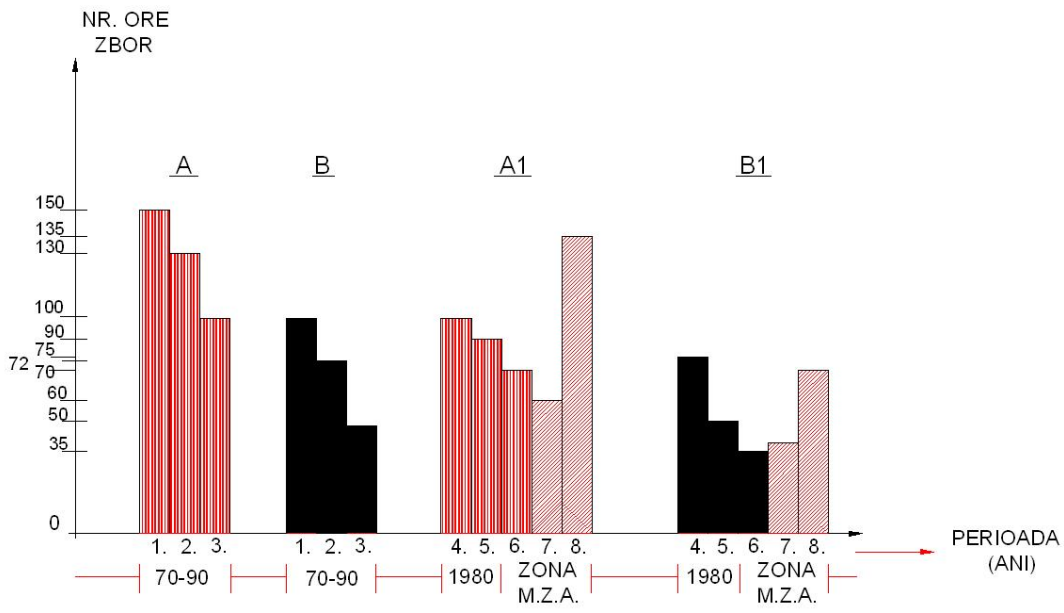

Fig. 9 Planned number of flight hours, between the years 1970 - 2000, before and after applying the AMF method on their total growth

(A) - The number of flight hours, planned on supersonic aircraft (SS), in some developed countries, between the years 1970-1990;

(B) - The number of flight hours planned on supersonic aircraft (SS), in some states experiencing economic problems, over the years 1970-1990;

(A1) - The number of flight hours, planned on supersonic aircraft (SS) and subsonic aircraft (Ss) over the years 1980-2000, after application of the AMF method in the states of (A)type;

(B1) - The number of flight hours, planned on supersonic aircraft (SS) and subsonic aircraft (Ss) over the years 1980-2000, after application of the AMF method in the states of (B) type;

PT. (1-6) - The number of hours planned on supersonic aircraft (SS)

PT. (7) - The number of flight hours planned on subsonic aircraft (Ss)

PT. (8) - The total number of flight hours on aircraft (SS) and (Ss) after application of the AMF method over the years 1980-2000;

PT. (2-3) – Decrease of the number of flight hours, over the years 1990-2000, after the beginning of the oil crisis;

PT. (4-6) – Gradually reduction in the number of flight hours, planned for supersonic aircraft after the emergence of the oil crisis;

PT. (7) - The number of subsonic aircraft flight hours (Ss), following the application of the AMF method ;

PT. (8) – Increase of the total number of flight hours planned for supersonic aircraft (SS) and subsonic aircraft (Ss), following the application of the AMF method ;

This was the reason for which many states have adopted programs through which the training flight in operational units is partially executed based on the “Flight Alternative Method”, according to the level of pilots training, both on advanced training subsonic aircraft (single or double command) and supersonic aircraft considering the initial allocated funds.

From the above it results that the use of the subsonic advanced training aircraft (Ss) single or double command for pilots instruction in operational units, has two advantages, namely:

- First of all the number of flight hours cut off from the pilots training program on the supersonic aircraft (SS), is fully covered from the funds originally allocated and, in addition, it leads to savings that can be additionally used for the pilots training.
- Secondly is that entirely using the savings funds due to the reduced number of flight hours on supersonic aircraft we obtain an increase in total hours of training flight on advanced subsonic aircraft (Ss) single or double command, as compared to the number of supersonic aircraft flight hours; the number of flight hours is mathematically equal to the ratio between the cost of supersonic and the subsonic flight hour, i.e.:

$$N_{(hours)Av.Ss.} = \frac{C_{(\cos t)} / hour_{Av.(SS)}}{C_{(\cos t)} / hour_{Av.(Ss.)}}$$

Using the example in the case presented above, where the amount saved per year for a pilot, was 75,000 dollars, it results:

$$N_{(hours)Av.Ss.} = \frac{75.000}{2.000} \cong 37\ hours / year;$$

Thus more expensive the flight hour of a supersonic multi-role aircraft and smaller the cost of training flight hours on advanced subsonic aircraft, more the savings achieved and therefore the number of training flight hours on advanced subsonic aircraft single or double control. From this point of view, their use for the instruction and combat training of the pilots in operational units becomes a necessity for many countries facing the problem of military pilot combat training on the one hand, and on the other hand, of allocation of funds for Military Air Force.

That is why, most of these states have adopted the new planning methodology for the training flight hours of the military pilots using alternatively the two types of aircraft: subsonic and supersonic and utilizing the Flight Alternative Method FAM, so that the overall hours do not diminish and even if possible increase, as demonstrated above.

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