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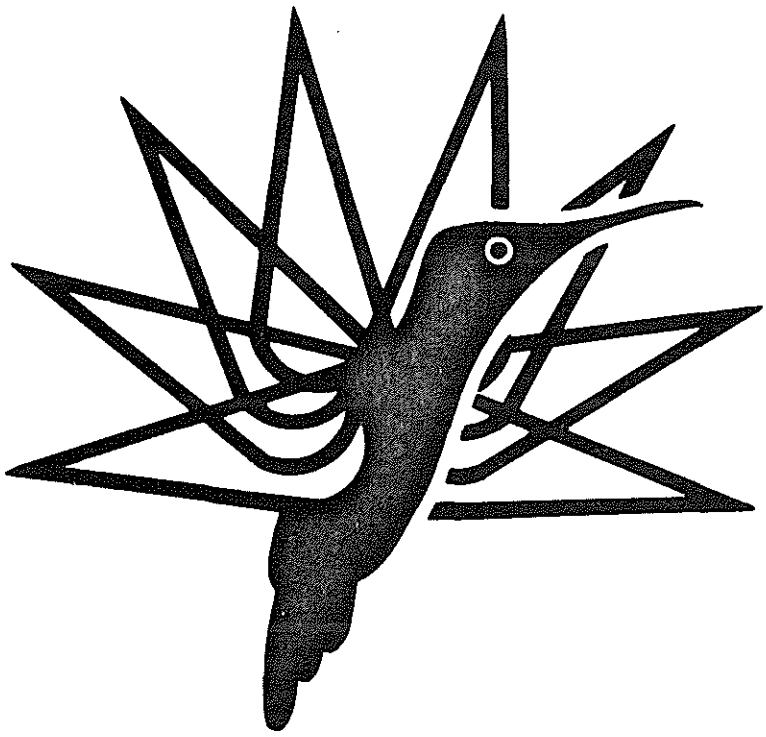

A HELICOPTER FOR THE POLICE FORCE?

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Abstract

The authors belong to the Italian Police Force, a national, state run, non military organization. The functions, duties and structures of the organization and its distribution throughout the country are defined first of all. In the field thus defined, possible uses of the helicopter by the Police Flight Department operating on a Regional airborne unit system are discussed.

The Flight Department carries out its own missions, as well as support missions.

Analysis of requirements inherent to the various types of mission and performances requested from rotorcraft reveals the necessity of different kinds of helicopters according to service requirements.

For obvious reasons, not least technical management, the fleet must be limited to three types of machine, each having a multirole function. The authors have identified these types as being :

a. ultralight helicopters;

b. light helicopters;

c. medium helicopters.

Optimal performance and requirements are to be looked for in each of the above mentioned types. Possibility of service in the defence area.

Equipment requirements are examined from the point of view of navigational systems and specific instrumentation for police and rescue work, particularly as regards optoelectronics and telecommunications.

1. Introduction

We work in the Air Service which is part of the General Affairs Office of State Police Force Staff Headquarters being collocated in the State Department. Our organization is a national, state run, non-military organization charged with the maintenance of internal public security and order; with the protection of life and property; with crime prevention and control and the gathering of evidence in criminal matters and with rescue operations following natural calamities and accidents.

The Carabinieri, the Financial Police, Prison Guards, the Forestry Corps, the Fire Brigade and Municiple Police all have functions similar to ours; whilst the safeguarding of certain property and services comes under the control of the pertinent Civil Service department.

2. The State Police Force

In order to carry out its functions the State Police Force is divided into the following organizations:

a. a Central Agency (State Security Dept), subdivided into Divisions;

b. a provincial territorial organization;

c. regional or interregional divisions reporting directly to the State Security Dept.

The Air Service Division is part of the interregional organization.

3. The Air Service of the State Police Force

3.1 Organization structure

The Air Service is divided into a Head Office under the control of the Central Direction of General Affairs and Flight Departments, currently located in Rome (Pratica di Mare), Milan (Malpensa), Bologna, Palermo, Reggio Calabria, Naples (Capodichino). Other Flight Departments will soon become operative in Sardinia and on the Adriatic coast.

3.2 Operating assignments of the Air Service

The primary and fundamental distinction made, enables us to pin point two classes of operating assignment :

a. assignments directly for the Air Service;

b. assignments for other Police Departments.

More specifically, point a. comprises : training; direct intervention; territorial patrolling operations.

Point b. on the other hand, comprises surveillance and coordination with ground units; escort duties; transport of special search squads; support for helicopter disembarcation; search and rescue and various duties for Civil Protection.

4. The Helicopters of the Air Service

From the discussion of operating assignments it can be seen that one type of helicopter alone cannot cover all service requirements.

The table that has been prepared shows that three basic types of helicopter are necessary :

- ultralight
- light — see appendix.
- medium

This table is to be used basically to identify a fleet of helicopters for the Air Service; operating requirements could also lead to occasional multirole assignments for the three types of helicopter in service.

4.1 Ultralight helicopter

The Ultralight helicopter should be considered really and truly as a dragon fly on Police service and it should have a wide territorial diffusion. As this rotorcraft will, among its other assignments, be used for basic and general training purposes, it will have to be a two seater monoturbine with an excellent weight to power ratio. Maximum gross weight at take off must be about 1000 Kg.

The most important performance requirements are :

- long periods in hovering out of ground effect, as lengthy patrol duties are part of the assignments foreseen for this craft;
- high rate of climb and very steep approach modes, as service is also foreseen in medium density urban areas (city outskirts), consequently the autorotation performance must be excellent for safety reasons;
- the engine and propulsion block must not only guarantee two/three hours autonomy but must be able to run on alternative fuels to the JP series, as service over such a wide spread network as is foreseen for this craft would make refuelling from normal petrol stations an inevitable requirement;
- for the same reason the ultralight helicopter must be designed for easy maintenance, with modular substitution of rotor assemblies;
- the high weight to power ratio must ensure that, in addition to the two crew members, cargo loadings up to 100Kg can be made when required. Such extra loads could be : optoelectronic equipment (discussed in more detail further along), or various kinds of mobile equipment (light weaponry; bullet proof vests; etc); or other kinds of installations, for example auxiliary fuel tanks ;
- the landing gear must be fixed, very rugged and being fitted with very strong shock absorbers;
- the ultralight craft must be towable by road, bearing in mind that Italian road traffic regulations ban towing of objects more than four m high;
- service assignments foreseen for the ultralight rotorcraft show that the most important requirement is high manoeuvrability.

4.2 Light helicopter

The requirement here is for a bi-turbine helicopter carrying four/five pax; maximum gross weight on take off shall be about 2500Kg.

- As service requirements foreseen for this craft refer to assignments covering considerable distances, in very short periods of time, it must not only have a three hour flight duration and a 500Km range but also a high cruising speed. Furthermore, it must be highly manoeuvrable and be equipped with various kinds of kit which shall be rapidly interchangeable according to individual mission requirements : a pay load of about 350Kg to be utilized for four/five pax; or for the installation of auxiliary fuel tanks, or for host of other applications, is held to be absolutely essential;

- equipment for flight in IFR and a HF band two way radio are indispensible on board equipment;

- types of optoelectronic systems mounted, which will be discussed later, must be easy to repair, as this rotorcraft will see a lot of service out of urban areas and far from repair shop centres;

- a very strong landing gear assembly is required, possibly rather high off the ground for heavy work and landings on rough, broken ground.

4.3 Medium weight helicopter

This craft must have more than one engine, possibly a biturbine for maximum gross weight take offs around 5000Kg.

- The cabin must accomodate twelve/thirteen pax. and in this service mode is intended for transport of special duty squads and search and rescue missions. For this type of mission the medium weight craft must be equipped with a good stabilizer system associated with automatic hovering modes which, together with suitable navigational instrumentation, will be locked into a high precision Flight Director.

This helicopter is really a multirole craft with modular equiment systems used for : direct intervention (hoists, lift hooks etc) (litters), or telecommunications (with real time image transmission etc) and optoelectronics; for all these service requirements I wish to underline the necessity of modular equipment systems.

- As regards defence systems, the following are necessary :

  a fixed rapid fire arms system, grenade launchers, smoke bomb launchers;

- crash survival equipment requirement (self sealing fuel tanks; impact absorbing seats etc);

- in terms of performance a three hour flight duration is indispensable together with a maximum range of about 500km;

- needless to say a helicopter of this type will be fitted an extremely strong landing gear assembly.

5. Telecommunications and optoelectronic equipment

5.1 Telecommunications

Besides normal ground/air/ground apparatus installed for GAG transmissions with ATS units and Police Stations in operations zones, for the light and medium crafts the following equipment is also required :

- an HF system for long distance coordination with home base or other centres operating on an interregional basis;
- a system of the 'electronic terminal' type, permitting direct radio access to data banks.

5.2 Optoelectronic systems

In consideration of the highly specific operational requirements postulated for helicopters on Police service, and considering restrictions thereby deriving from Italian Air Traffic regulations regarding ICAO norms, (night flying, VFR daytime flying outside controlled air space etc) we feel we can limit the systems in question to two types :

a. low light level telecameras on all three types of helicopter; and, for the light and medium craft, installation of a remote display and recording system which could constitute evidence of a juridical nature (in the case of criminal events);

b. day television - not requiring remote display or recording systems on the ultralight model.

The best installation for both systems would be in a subventral cupola on a stabilized platform. Obviously easy maintenance would be appreciated.

APPENDIX 1

ULTRALIGHT HELICOPTER: REQUIREMENTS

1. TWO SEAT
2. MAXIMUM GROSS WEIGHT/ CIRCA 1.00 Kg.
3. RUGGED
4. HIGHLY MANEUVRABLE
5. EASY MAINTENANCE
6. SINGLE TURBO ENGINE WITH AN ECCELLENT WEIGHT/POWER RATIO
7. HIGH PERFORMANCE LEVELS DURING TAKE-OFF and LANDING
8. HIGH PERFORMANCE LEVELS in AUTOROTATION
9. POSSIBILITY of PROLUNGED HOOVERING out of GROUND EFFECT
10. POSSIBILITY of USING ALTERNATIVE FUEL
11. AUTONOMY: 2 or 3 HOURS
12. CARGO LOADING: CIRCA 100 Kg.
13. LANDING GEAR:.....

APPENDIX 2

LIGHT HELICOPTER: REQUIREMENTS

1. TWIN ENGINE; FOUR or FIVE SEATS
2. MAXIMUM GROSS WEIGHT: CIRCA 2.500 Kg.
3. MANEUVRABLE
4. CRUISING SPEED: HIGH
5. MAXIMUM DURATION: CIRCA 3 HOURS
6. MAXIMUM RANGE: CIRCA 500 Km.
7. EQUIPPED for I.F.R. FLIGHT
8. EQUIPPED with SUITABLE TELECOMUNICATIONS and OPTOELECTONIC SYSTEM
9. RAPID CHANGE OVE KITS FOR DIFFERENT TYPES of MISSIONS FORESEEN
10. LANDING GEAR.....

APPENDIX 3

MEDIUM HELICOPTER: REQUIREMENTS

1. MULTIENGINED, POSSIBLY TWIN ENGINE
2. CIRCA 12 or 13 SEAT
3. MAXIMUM GROSS WEIGHT:CIRCA 5.000 Kg.
4. MAXIMUM DURATION: CIRCA 3 HOURS
5. RANGE: CIRCA 500 Km.
6. EQUIPPED WITH A GOOD STABILIZED SYSTEM (WITH AUTOMATIC HOOVERING MODES)
7. MULTIROLE CONFIGURATION WITH POSSIBILITY of RAPID MODULAR EQUIPMENT CHANGE OVER
8. SUITABLE TELECOMUNICATIONS and OPTOELETTRONICS EQUIPMENT
9. DEFENCE SYSTEM
10. POSSIBILITY of CRASH SURVIVAL
11. EXTREMELY RUGGED LANDING GEAR