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AERONAUTICAL RECOMMENDED PRACTICE

ARP 693

LANDING AND TAXIING LIGHTS- DESIGN CRITERIA FOR INSTALLATION

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Revised

1. INTRODUCTION:

1.1 The recommendations setforth are the results of the combined efforts of engineers associated with the manufacture of lamps, equipment and airframes, as well as engineers from the air transportation field and interested government agencies.

1.2 This ARP purposely does not include recommendation for specific equipment. Specific hardware requirements will be included in SAE Aeronautical Standards to be issued at a later date.

2. PURPOSE:

2.1 The purpose of this ARP is to recommend certain basic considerations and criteria for the design of landing and taxiing light systems.

3. SCOPE:

3.1 This ARP includes requirements for installations of adequate landing and taxiing lighting systems of aircraft of the following categories:

1. Single engine personal and/or liaison type.
2. Light twin engine.
3. Large multi-engine propeller.
4. Large multi-engine turbo-jet.
5. Military high performance fighter and attack.
6. Helicopter.

4. RECOMMENDATIONS:

4.1 Landing lights are used primarily to provide ground reference information during final approach and flareout and during take-off, and also to illuminate any major obstructions in the approach area or on the runway. Landing lights should be installed so that they are as far away laterally from the pilot as practicable. The wide lateral separation of the lights will also aid in lighting the full width of the runway. Particular care should be excercised so that there is no direct or reflected light in the cockpit area. The lights should be aimed along the flight path for normal approach attitude. It should be pointed out that this "normal approach" attitude may change for a particular aircraft dependent upon speed, flap conditions, etc. Retractable lights may be adjusted in the vertical to compensate for this. It should also be mentioned that the landing attitude of the aircraft and taxiing attitude may not be the same, so that it may be necessary to reaim the landing lights, once the aircraft is on the ground, if they are used for taxiing.

4.1.1 Single Engine Personal and/or Liaison Type Aircraft: It is recommended that aircraft of this type be equipped with at least two landing lights. The recommended location is either one fixed light in the leading edge of each wing or one retractable light on the under surface of each wing. The installation of landing lights in the nose should be avoided if possible since this creates a more serious halation and back scatter effect when haze or fog is present.

4.1.2 Light Twin Engine Aircraft: It is recommended that aircraft of this type be equipped with at least one landing light in each wing. These should normally be of the retractable type.

4.1.3 Large Multi-engine Propeller Aircraft: It is recommended that aircraft of this type be equipped with at least one retractable landing light in each wing. A third landing light installed on the nose wheel gear or similar location is frequently used.

4.1.4 Large Multi-engine Turbo-jet Aircraft: It is recommended that aircraft of this type be equipped with at least two landing lights in each wing. Present practice is to install one fixed landing light in the inboard leading edge and one retractable light farther outboard in each wing. In some instances the fixed landing lights are located on the nose gear. The wing leading edge location is recommended so the landing lights may be operated for signalling purposes without lowering landing gear.

4.1.4.1 The retractable landing lights should be so controlled that they can be aimed to any position between fully extended and fully retracted for use as terrain clearance lights on take-off.

4.1.4.2 It is recommended that aircraft equipped with a cross wind landing gear have at least one landing light located on the forward gear, and aimed so that its beam will be projected in the direction of the aircraft movement.

4.1.4.3 Aim: Figure 1 indicates location and aim of a landing light installation for a large multi-engine turbo-jet aircraft which has proved to be very satisfactory in service.

4.1.5 Military High Performance Fighter and Attack Aircraft: It is recommended that aircraft of these types be equipped with one retractable landing light in each wing.

4.1.6 Helicopters: It is recommended that each aircraft of this type be equipped with a retractable light assembly and a controllable searchlight. Both lights should be located beneath the aircraft as far forward as practicable in order to reduce interference with the light beam when the aircraft is in a nose down attitude.

4.1.6.1 The retractable light shall be so installed that when fully retracted the beam is projected in the forward direction at approximately 20° above the horizontal when the aircraft is in normal flight. This will permit light directly forward when the helicopter assumes a nose down attitude when accelerating in a forward direction after take-off. The light shall open downward from this position.

4.1.6.2 The controllable searchlight shall be so installed that when the light is fully stowed the beam is aimed downward. It shall be capable of being extended not less than 120°. In some installations it may be necessary to incorporate interlock limit switches in the lamp circuit so that it is impossible for the light to be aimed directly into the cockpit.

4.1.7 Lamps for Landing Service:

LAMP NO.	WATTS	VOLTS	BULB	APPROX. HOURS LIFE	APPROX. INITIAL MAX. BEAM C.P.	APPROX. SPREAD TO 10% MAX. (DEGREES) HORIZ.	VERT.	APPLICATION CATEGORY SEE PARAGRAPH 3.1
4509	100	13	PAR-36	25	110,000	11	6	1
4591	100	28	PAR-36	25	90,000	12	6	1
4537	100	13	PAR-46	25	200,000	11	6	1
4553	250	28	PAR-46	25	250,000	11	12	1,2
4581 (1)	450	28	PAR-46	10	400,000	13	14	2,5,6
4552	250	28	PAR-64	25	400,000	7	9	2
4559	600	28	PAR-64	25	600,000	11	12	3,4,6
4556 (1)	1,000	28	PAR-64	25	800,000	12	13	3,4

(1) CONSULT LAMP MANUFACTURER BEFORE USING.

4.2 Taxiing Lights are used to maneuver the aircraft on the ground. They should provide sufficient intensity and beam spread to aid the pilot in locating and following taxiways and to permit the pilot to see any obstructions which might contact any part of the airplane. Since landing lights are normally high intensity narrow beam lights it is usually necessary to provide a separate taxiing light system using lights of wider beams. Also, many airplanes require a different aim between the landing and taxiing light beam.

4.2.1 On many small airplanes, taxi lights are not required. When required, a single lamp in the nose or on the nose wheel strut is usually sufficient.

4.2.2 On large airplanes, at least two taxiing lights are required. Figure 2 indicates location and aim of a taxiing light installation for a large multi-engine turbo-jet aircraft which has proved to be very satisfactory in service.

4.2.3 Wing clearance lights are lights sometimes installed in wing-tips of airline type aircraft. These lights provide a line of light directly under the wing-tip and forward to permit the pilot to accurately locate the position of the wing-tips with regard to obstructions around the gates.

4.2.4 Helicopters, when equipped with a controllable searchlight, will not ordinarily require a separate taxiing light.

4.2.5 Lamps for Taxiing Service:

LAMP NO.	WATTS	VOLTS	BULB	APPROX. HOURS LIFE	APPROX. INITIAL MAX. BEAM C.P.	APPROX. SPREAD TO 10% OF MAX. (DEGREES) HORIZ.	VERT.	APPLICATION CATEGORY SEE PARAGRAPH 3.1
4503	40	14	PAR-36	400	10,000	40	6	1
4502	50	28	PAR-36	400	10,000	40	7	1
4570	150	28	PAR-46	300	32,000	50	9	2,3
4551	250	28	PAR-46	25	75,000	50	10	3,4,5
4554 (1)	450	28	PAR-46	25	90,000	50	16	3,5

(1) CONSULT LAMP MANUFACTURER BEFORE USING.

4.3 Controls:

4.3.1 Landing Lights: It is recommended that each retractable light be controlled by a separate switch. It should be possible to turn the lamp on or off without altering the position of the light fixture.

4.3.2 Taxiing Lights: It is recommended that the taxiing light system be operated independently from the landing light system.

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