

MIL-P-26367A
11 FEBRUARY 1966

Superseding
MIL-P-26367(USAF)
4 December 1958

MILITARY SPECIFICATION

PROPELLER SYSTEMS, AIRCRAFT, MODEL SPECIFICATION FOR (OUTLINE AND INSTRUCTIONS FOR PREPARATION)

This specification is mandatory for use by all Departments and Agencies of the Department of Defense.

01. SCOPE

01.1 This specification establishes the form to be used by manufacturers in the preparation of specifications for aircraft propeller system models.

0.2 APPLICABLE DOCUMENTS

02.1 The following specification, of the issue listed in ANA Bulletin No, 343 as specified in the propeller model specification, forms a part of this specification except as modified herein:

SPECIFICATIONS

Military

MIL-P-26366 Propeller Systems, Aircraft, General Specification for

(Copies or specifications, standards, drawings, and publications required by suppliers in connection with specific procurement functions should be obtained from the procuring activity or as directed by the contracting officer.)

03. APPLICATION

03.1 A propeller system specification conforming to the outline and instructions for preparation as specified herein shall be prepared for each specific propeller system model. New propeller system model designations will be assigned by the propeller manufacturer in accordance with a system acceptable to the procuring activity. When a new model designation is assigned, a new propeller system model specification shall be prepared with a new specification number assigned thereto by the propeller system manufacturer. It is desired that no new propeller system model designation be implemented by appendixes or variants to an existing model specification, and in no case shall amendments be used for this purpose. No changes to a propeller system model specification shall be submitted to the procuring activity by means of amendments prior to approval of the propeller system model specification and its incorporation in a contract. Revisions, by amendment form, to an approved propeller system model specification which forms a part of a contract shall not be used unless specifically authorized by the procuring activity. If authorized, amendments shall include and supersede the previous amendment. Revision pages shall not be used.

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03.2 The headings and numbering of sections and paragraphs of the model specification as indicated herein shall correspond to those of MIL-P-26366. Those paragraphs which need not be included in the model specification have been omitted from the outline. Failure to reference in the contractor's model specification a particular requirement of MIL-P-26366 shall indicate the contractor's complete compliance therewith. When departures from the requirements of this specification and of MIL-P-26366 are necessary, the details of such departures shall be stated as specific requirements bearing the same paragraph heading and numbering as in MIL-P-26366 with additional subparagraph numbers and headings as indicated herein.

03.3 Parenthetical sentences, phrases, and words are included herein for the guidance of the propeller manufacturer in connection with the preparation of the model specification. Parenthetical statements shall not be copied in the model specification.

03.4 The specification number shall be the number assigned by the propeller system manufacturer. When revisions are made, they shall be designated by the use of a dash and a letter following the number, with a revision date therefor, which shall be shown on page 1 only. Only the specification number and the revision suffix letter, if applicable, shall be shown on subsequent pages.

03.5 For purposes of permitting preliminary evaluation of a proposed propeller system design, or for release of approved propeller performance characteristics in connection with and airplane design competition, the propeller manufacturer may submit a preliminary model specification. However, a complete approved model specification will be required for a contract.

03.5.3 The preliminary model specification shall be prepared in accordance with the requirements stipulated herein, except that, at the option of the manufacturer, the information required in paragraph numbers preceded by an asterisk (*) may be omitted.

04. MODEL SPECIFICATION

04.1 The format and instructions for the preparation of the model specification follow.

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(Number and title.- The number and title shall be shown as follows:)

(Specification No.) _____
 (Date) _____
 (a) Revised _____ (Date)
 (b) Revised. _____ (Date)

MODEL SPECIFICATION

PROPELLER SYSTEM, AIRCRAFT _____

(Insert model designation)

(NAME OF CONTRACTOR)

(CONTRACTOR'S MODEL DESIGNATION)

1. SCOPE

1.1 Scope.- This specification covers the requirements for the _____
 (insert model designation) aircraft propeller system.

1.2 Classification.- The _____ (insert model) propeller is a _____
 (insert briefly the description of the salient features of this model propeller system.)

2. APPLICABLE DOCUMENTS

2.1 The following specification forms a part of this specification except as modified herein:

SPECIFICATIONSMilitary

MIL-P-26366 Propeller Systems, Aircraft, General Specification for

2.2 The applicable publications listed in the following bulletin form a part of this specification:

PUBLICATIONS

ANA Bulletin No. 343 _____ ((insert revision and amendment designation) designation)
 dated _____ (insert date) entitled "Specifications
 and Standards Applicable to Aircraft Engines and
 Propellers, Use of"

3. REQUIREMENTS

3.1.1 Propeller System.- The propeller system shall consist of the following:

- (a) (List propeller components.)
- (b) (List propeller accessories.)

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3.4 Performance characteristics.- The aerodynamic performance ratings and curves shown are based on the terms and standards defined herein and are determined on the use of a _____ (insert system or combination of systems, as applicable) power system. These data indicate performance when applied to _____ (insert type and model designation of engine) engine operating under standard conditions and on the _____ aircraft.

3.4.1 Lubrication.- The propeller system shall include provisions for lubrication and the lubricant(s) shall be in accordance with military specification(s) _____ grade(s) _____

3.4.2 Ratings.- The aerodynamic performance ratings shall be as listed in table I.

TABLE I. Performance ratings at standard sea level static conditions

Condition	Power (shp)	Propeller (rpm)	Minimum thrust or efficiency
Takeoff			
Military			
Normal			
Reverse			

3.4.3 Estimates.- Estimated minimum aerodynamic performance curves prepared as shown on figures 1 to _____ inclusive, constitute part of this specification. (The following estimated minimum performance curves, prepared in accordance with the instructions and data specified herein, shall illustrate the performance obtainable and shall be consistent with the rated performance. Points of rated performance shall be indicated and shall fall on the applicable performance curves. The contractor shall furnish a list of symbols defined in Bulletin ANC-9 and MIL-P-26366, together with a diagrammatic sketch indicating station subscripts, and instructions on the use of the curves, including sample calculations.) Estimated aerodynamic performance for specific aircraft operating conditions is as specified in table II.

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TABLE II. Estimated aerodynamic performance

Airplane attitude	Airplane speed, knots true	Engine (shp)	Propeller (rpm)	Altitude	Ambient temp.	Efficiency or thrust
Climb						
Takeoff						
Cruise						
Max. level flt.						
Takeoff (climb)						
Final approach						

3.4.3.1 General presentation of performance curves. - Curves showing propeller performance, including altitude effects (pressure level and Reynolds' number) where applicable, at each 10,000-foot increment in altitudes between sea level and 30,000 feet, at each 5,000-foot increment from 35,000 feet to 45,000 feet up to the absolute altitude of the engine specified herein shall be as shown on figures _____ to _____ inclusive. Each curve shows the variation of the net propeller thrust with flight Mach number for the maximum, military, normal, 90 percent normal, 75 percent normal, 60 percent normal, and idle thru condition. (These curves shall be drawn in accordance with figures 1 and 2. Additional curves may be used when required for clarity.)

3.4.4 Altitude-temperature limits for unfeathering and operation. - The estimated propeller unfeathering and operating limits shall be as shown on figure _____. (The diagram shall be furnished in accordance with figure 1 titled "Temperature range vs. altitude" of MIL-P-26366.)

3.4.6.1 Airspeed and altitude. - The propeller system shall operate satisfactorily in accordance with this specification within the ambient altitude air temperature ranges specified in 3.4.4 throughout the following airspeed ranges:

(a) Airspeed _____ knots

3.4.7 Reverse thrust.- The propeller system shall operate satisfactorily in the reverse thrust condition up to _____ lbs.

3.4.8 Static thrust.- The minimum allowable measured static thrust generated by the propeller shall be not less than _____ lbs.

* 3.4.9 Power transients.- Characteristics of the propeller system which define response under power transient conditions shall be furnished as curves basically in accordance with the fore, shown on figure 3.

3.4.10 Rotational speed.- The rotational speed of the propeller shall be as follow:

<u>Power conditions</u>	Rpm
Ground idle	_____ ± _____
Flight idle	_____ ± _____
Takeoff	_____ ± _____
Normal	_____ ± _____
Cruise	_____ ± _____

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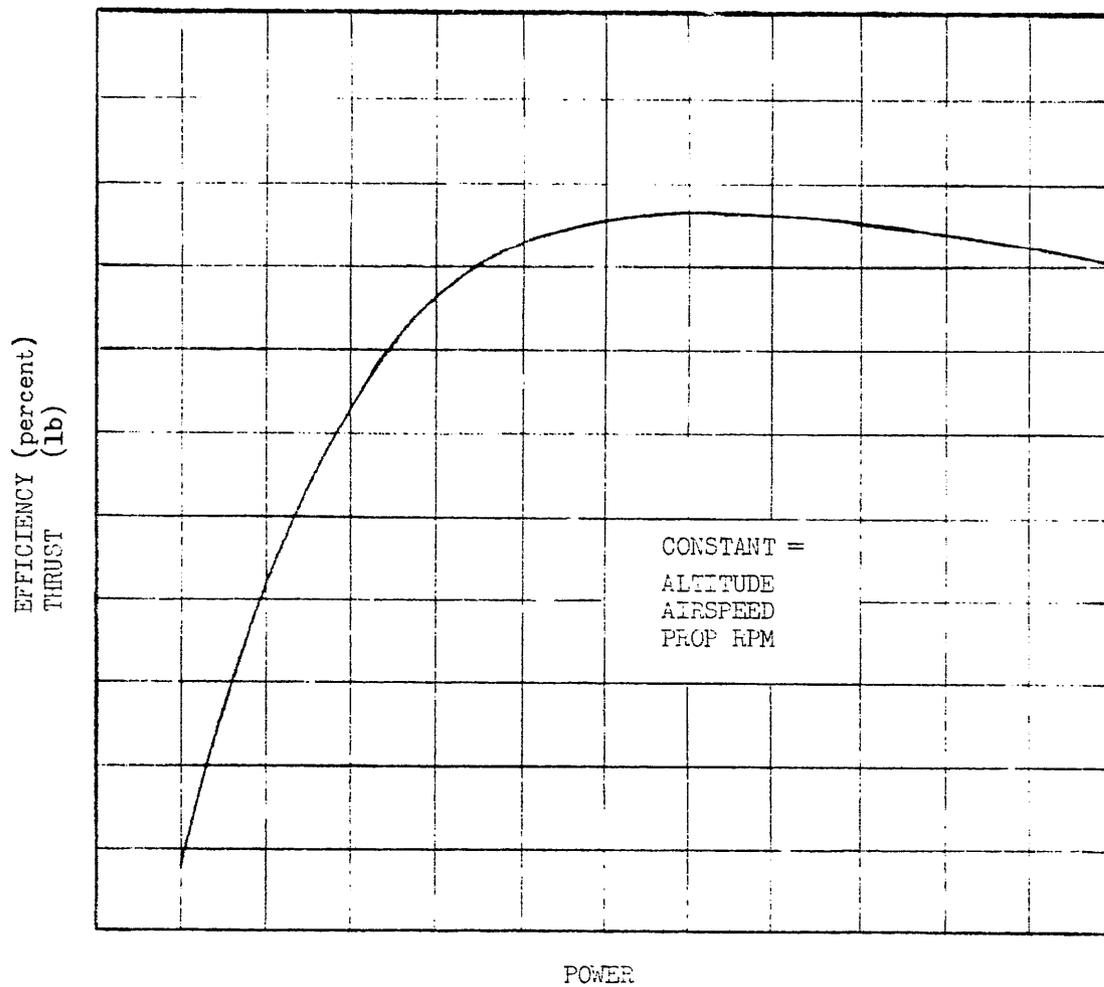


FIGURE 3. Thrust variation with power

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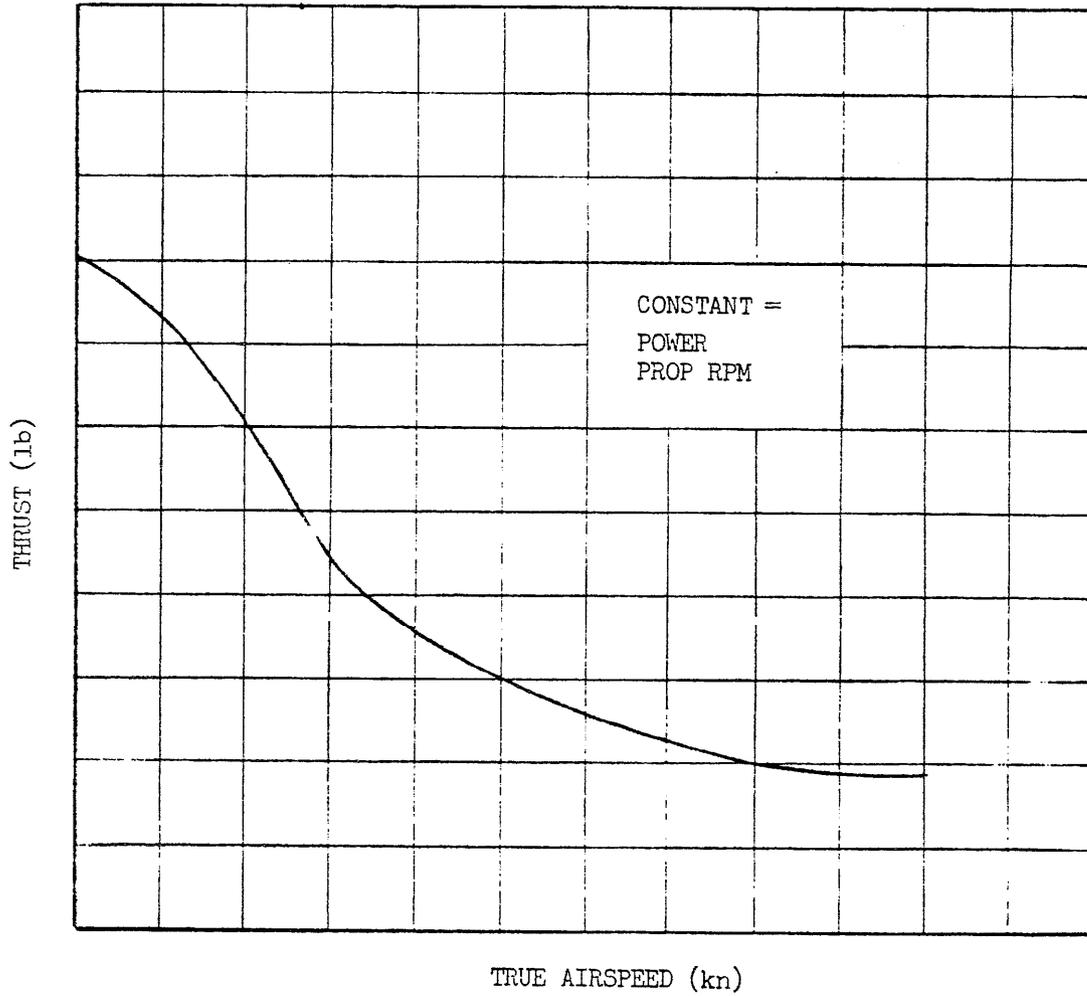
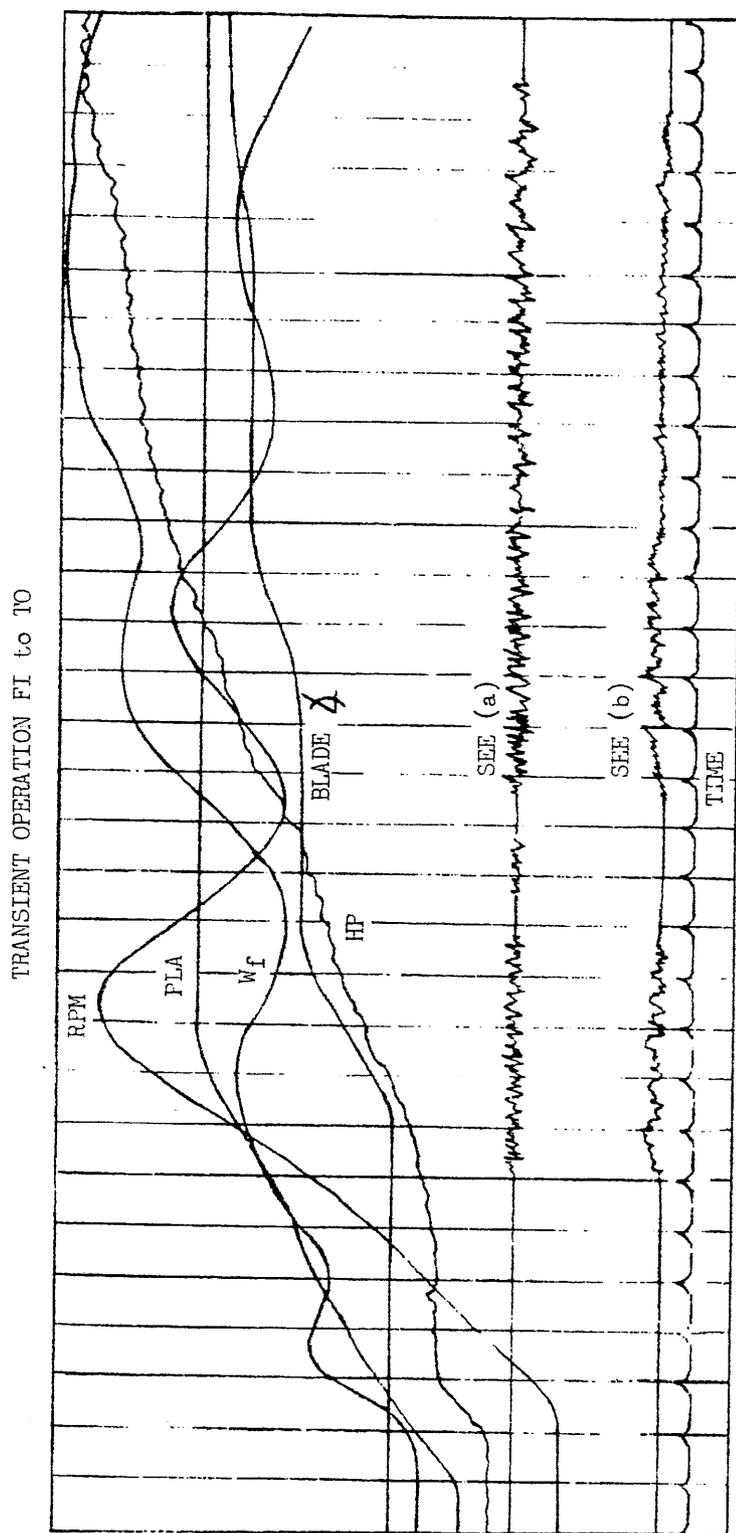


FIGURE 2. Thrust variation during takeoff



(a) TRACES OF THIS TYPE ILLUSTRATE OPERATION OF THE PROPELLER PITCH CHANGE MECHANISM (I.E., INCREASE AND DECREASE PITCH) AND ASSOCIATED PRESSURE, ELECTRICAL OR MECHANICAL PARAMETERS.
(b) INSTRUMENTATION OF OTHER PARAMETERS PERTINENT TO ANALYSIS OF PROPELLER CONTROL SYSTEM WILL BE COORDINATED WITH THE OCCURRING ACTIVITY.

FIGURE 3. Power transients

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3.4.11 Range and rates of pitch change. -

* 3.4.11.1 Flight and ground operation. - (Curves shall be supplied showing the range of blade angle travel available, range at applicable step settings, range of pitch change as a function of blade angle, rpm, and pressure or voltage, as applicable.)

3.4.12 Maximum diameter.- The maximum diameter of the propeller(s) shall not exceed _____ feet _____ inches.

3.4.13 Position. - The propeller is designed for a _____ (insert tractor or pusher) installation.

3.4.14 Rotation. - The direction of propeller rotation, when viewed from the rear of the aircraft, shall be as follows:

<u>Type of drive</u>	<u>Direction of rotation</u>
Single	
Dual	
Front	
Rear	

(Insert direction of rotation right hand or left hand as applicable, The front propeller of a dual rotation assembly is the furthestmost propeller from the engine or gearbox.)

3.4.15 Number of blades. - The number of blades of the propeller shall be as follows:

<u>Configuration</u>	<u>No. of blades</u>
Fixed blades	
Removable blades	

(In cases of dual rotation propellers, indicate dual.)

3.4.16 Design Aq. - The estimated maximum design Aq versus speed curves, including the determining information shall be as shown on figure _____. (The data and curves shall be furnished in accordance with figure 4.)

3.4.17 Blade activity factor. - The propeller blade activity factor shall be _____ AF (nondimensional).

* 3.4.18 Polar moment of inertia. - The propeller polar moment of inertia shall be _____ slug-ft².

3.7 Drawing and diagrams. - The following (insert manufacturer's corporate name) drawings and diagram form a part of this specification: (Designate applicable drawings and diagrams, including a propeller intallation drawing, as specified in MIL-P-26366.)

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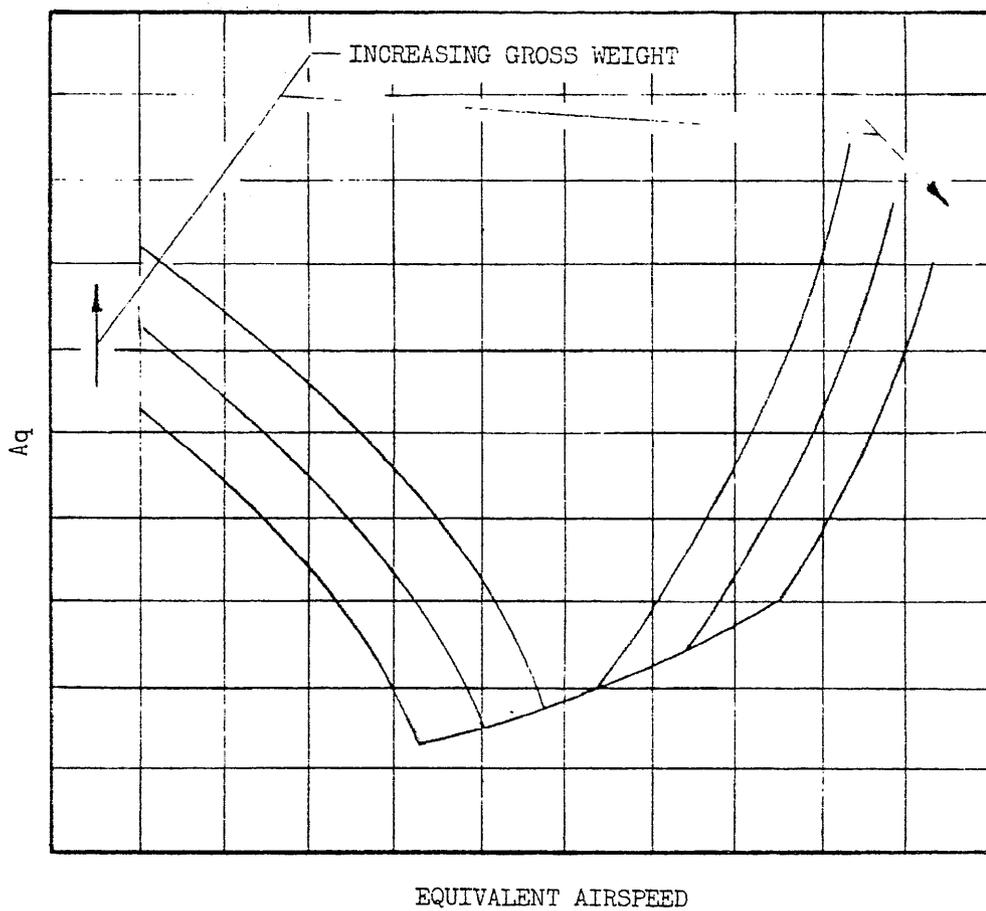


FIGURE 4. Design Aq

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3.11 Accessibility. - (List items requiring routine service checking, adjustment, or replacement and the times (man-hours) required for all routine inspection, maintenance, and replacement actions.)

3.12.1 Electrical power. - The magnitude of the propeller system control limitations caused by loss of externally supplied electrical power shall result in _____.

3.12.1.1 External electrical power. - The electrical load diagram(s), figure(s) _____ defines the estimated electrical power from external sources required by the propeller system under each condition of operation. (Include voltage, current, phase, and frequency.)

3.13.1 Hydraulic power. - The magnitude of the propeller control limitations caused by loss of externally supplied self-contained, or external hydraulic power shall result in _____.

3.13.1.1 Self-contained hydraulic system. - The capacity of the self-contained hydraulic system shall be _____.

3.13.1.2 External hydraulic power. - The maximum estimated hydraulic power from external sources under each condition of operation is _____.

3.13.1.3 Fluids. - The hydraulic system operating fluid(s) shall be in accordance with Specification _____, grade or type _____.

3.13.1.3.1 Fluid contamination. - (Where filters are required, specify the filter inspection periods.)

3.14 Dry weight of propeller system. - The dry weight of the propeller system shall not exceed _____ pounds. Propeller components included in the propeller dry weight which are airframe or engine mounted shall be as follows: Component _____ Maximum weight _____. The weight of the fluid(s) is _____ pounds. (When additional equipment is furnished with the propeller, such items, their maximum weight, and a reference as to whether contractor or Government furnished, shall be listed in tabular form. These item weights shall be included within the propeller dry weight.)

3.14.1 Weight of residual fluids. - The estimated weight of residual fluids remaining in the propeller after operation and drainage while the propeller is in its normal attitude shall be _____ lbs.

3.18.1 Vibration. - (Restrictions in propeller operating conditions shall be listed.)

* 3.19 Propeller accessory limiting temperatures. - (Each propeller component, having a limiting temperature shall be listed in tabular form, Maximum temperatures of the environment and the accessories, heat rejection rate, maximum endurance times, and maximum temperatures after shutdown, as applicable, shall be listed.)

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3.20 Ice control system. - The propeller shall incorporate provisions for (insert applicable propeller components) ice control and shall be a method of system or combinations of methods) ice control system. (In case where two or more components are controlled by separate methods, so state, by additional paragraphs for each specific condition.)

3.20.1 Type of ice control.- The ice control system. provision, shall operate (non) continuously. (If noncontinuous, specify manual or automatic control. Requirements for indication of the operation of the ice control system, if applicable, shall be specified.)

3.20.2 Electrical ice control system. - (Briefly describe and list each unit of the system furnished, method of actuation, and applicable protective devices.)

3.20.2.3 Bonding material. - (Cements, adhesives, or brazing used to bend blade, spinner, or cuff electrical heating elements shall be specified. Bonding processes which cause a reduction in physical properties of the item to which the element is bonded shall also be specified.)

3.20.2.9 Power requirements. - The electrical load diagram(s), figure(s) _____, defines the estimated electrical power from _____ (insert internal or external) source required by the ice control system under each condition of operation. The type of phase loading, overload, and open circuit sensing devices utilized shall be specified.) The total power requirements of the ice control system shall be _____ watts maximum.

3.20.2.10 Cyclic heating controls. - (List in tabular form the cyclic sequence and the period of time-off and time-on operation required for each propeller.)

3.20.3 Fluid ice control system. - (Briefly describe and list each unit of the system furnished, method of actuation, and flow pattern coverage of the blade in percent, of area.)

3.20.3.2 Fluid. - The ice control system fluid, flow rate, and pressure shall be as follows: (List pertinent information.)

3.20.4.1 Compounds. - The ice control system compound(s) shall be in accordance with Specification(s) _____, grade or type _____.

3.2.3.5 Gas ice control system.- (Briefly describe and list each unit of the system furnished method of actuation, and applicable protective devices. Protective devices supplied as part of the propeller system or required of the airframe manufacturer shall be specified.)

3.20.5.2 Heat requirements. - The energy and heat supply for the ice control system shall be provided by an _____ (insert internal or external) source having a (non) continuous flow of heated _____ (insert type and mixture, flow, temperature, and pressure, as applicable). A schematic drawing of the distribution system shall be provided.

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3.22 Support. - The support of the propeller shall be of a _____ (insert type of shaft(s) or routing) type incorporating a _____ (insert bolt circle diameter and number of mounting bolts, if applicable) bolt circle in accordance with Standard _____ . (Insert applicable standard and size designation number.)

3.23 Blade. - (Describe the blade configuration, construction, and retention.) The blade characteristics are shown on figure _____ . (These curves shall be drawn in accordance with figure 5. Additional figures and curves may be used when required for clarity.)

3.23.2 Blade track. - Corresponding points adjacent to the tips of the blades of the propeller shall be in the same plane perpendicular to the axis of rotation within a tolerance of _____ .

3.23.3 Blade vent hole. - A blade vent hole shall (not) be provided. (If provided, describe configuration and location.)

3.23.5 Standard blade shank ends. - Ground adjustable blade shank ends shall be in accordance with _____ design standard. (Insert applicable standard number and size.)

3.23.6 Finishing wood blades. - (Briefly describe the external finish applied to the blade and list material specification(s).)

3.24 Hub. - (Describe the propeller hub configuration and construction.)

3.25 Spinner. - A spinner shall (not) be provided. (Describe the propeller spinner configuration, construction, and retention.)

3.25.2 Balance provisions. - (Describe provisions for correcting static or dynamic unbalance conditions.)

3.26 Blade cuff. - Blade cuffs shall (not) be provided. (If provided, briefly describe the process used where the cuffs are not attached by mechanical means.)

3.27.1 Pitch-changing. - (Briefly describe the pitch-changing system, include type and source of power, and list major units, as applicable.)

3.28.2 Provisions. - (Briefly describe and list each feature of the propeller control system.)

3.28.3 Speed synchronization. - Speed synchronization shall (not) be provided. (Briefly describe the type and principle of operation, including electrical power requirements, such as voltage, amperes, etc.)

3.28.4 Governing. - (Briefly describe the principle of operation.)

3.28.4.1 Governors. - The governor shall have limit settings as follows:

Limit stop conditions	Propeller rpm
High	
Low	
Any special conditions (such as feather, reverse, etc.)	

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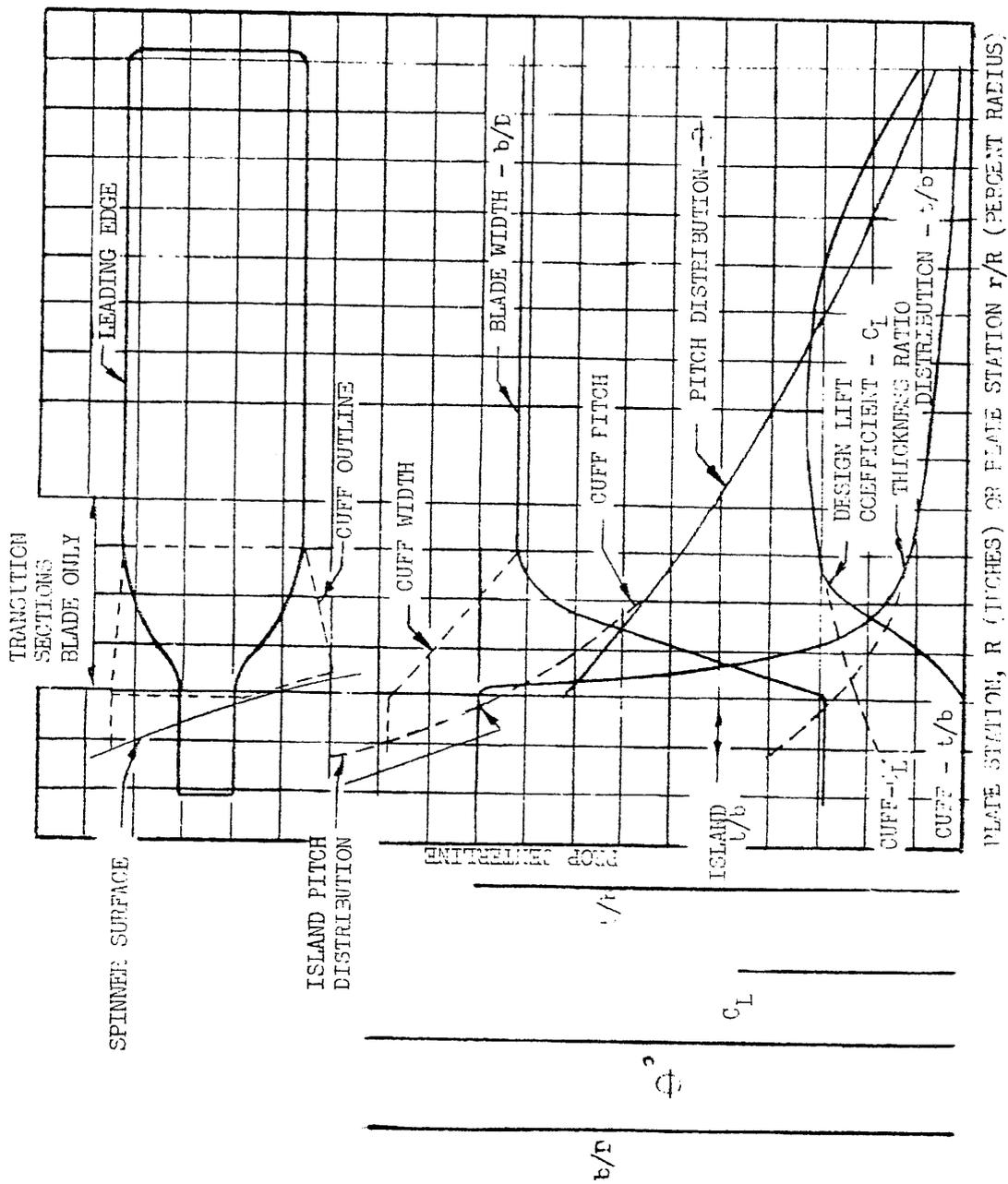


FIGURE 5. Blade characteristics

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3.28.5.1 Input mechanism travel. - The estimated propeller input mechanism schedule is shown on figure(s) _____. (Include curve(s) of position versus rpm.)

3.28.5.2 Reversing input mechanism. - The estimated reversing input mechanism schedule is shown on figure(s) _____. (Include curve(s) or chart(s) of travel and position.)

* 3.28.5.3 Input mechanism torque. - The estimated input mechanism torque versus lever position is shown on figure _____

3.28.6 Control system adjustment. - The external adjustments shall include the following: (Identify and define each adjustment by numbered subparagraph hereunder, including the allowable adjustment tolerance in percent of the specified value, where applicable.)

3.28.7 Ground handling control. - (Briefly describe the provisions provided and method of accomplishment.)

3.28.9 Reliability. - (Propeller overspeed limits shall be specified.)

3.29.1 Attaching: parts. - The following attaching parts are provided as part of the propeller system:

(Insert here, in tabulated form, the names of the component and type, if applicable, and location, such as engine nose or gearbox.)

3.32 Propeller reverse or beta tel-lights. - The propeller control system for a multiengine aircraft installation shall (not) include signal provisions for propeller _____ tel-lights. (Insert "reverse" or "beta" as applicable to reciprocating or turboprop engines specified herein, respectively.)

3.35 Flutter.- The propeller shall be free from flutter under static conditions up to _____ rpm (insert 120 percent rated engine speed) and _____ horsepower (insert standard day takeoff power rating of the engine, as applicable.)

3.36 Mechanical shock. - The mechanical shock developed within the _____ (insert only the part or component name requiring special attention) during all flight regimes of aircraft operation shall not have a magnitude greater than _____ g within a frequency of _____ cps. (If more than one part or component requires special attention, list in tabular form the requested data.)

3.37 External mechanical power. - The drives of propeller components requiring external mechanical power provided by engine accessory drives shall be as follows:

(Insert here for each component, in tabular form, the engine drive drawing and type number, the accessory flange drawing and type number, and the adapters and gaskets supplied.)

3.44 General additional information. - (The propeller manufacturer may specify as subparagraphs under this number and heading in the propeller model specification any additional information or requirements which are not covered by the required statements of this specification or the deviations from MIL-P-26366.)

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4. QUALITY ASSURANCE PROVISION

4.1 The requirements for acceptance and qualification tests shall be as specified in MIL-P-26366.

4.4 Qualification tests. - Qualification of the _____ (insert type and model designation) propeller shall be predicated on the satisfactory completion of all tests in accordance with MIL-P-26366 and approval of the test report by the procuring activity.

4.8 Acceptance tests. - Acceptance tests shall be conducted on each production propeller and shall consist only of those tests specified in MIL-P-26366.

5. PREPARATION FOR DELIVERY

5.1 The requirements for preparation for delivery shall be as specified in MIL-P-26366.

6. NOTES

Custodians:

Army -MO
Navy - WP
Air Force - (11)

Preparing activity:

Air Force - (11)

Project No. 1610-0073

Reviewer activities:

Army - MO
Navy - WP
Air Force- (11)

SPECIFICATION ANALYSIS SHEET

Form Approved Budget
Bureau No. 119-R004INSTRUCTIONS

This sheet is to be filled out by personnel either Government or contractor, involved in the use of the specification in procurement of products for ultimate use by the Department of Defense. This sheet is provided for obtaining information on the use of this specification which will insure that suitable products can be procured with a minimum amount of delay and at the least cost. Comments and the return of this form will be appreciated. Fold on lines on reverse side, staple in corner, and send to preparing activity.

SPECIFICATION NHL--P-26367A Propeller Systems, NS, Model Spec. for (Outline & Instr. etc.)

ORGANIZATION

CITY AND STATE

CONTRACT NO.

QUANTITY OF ITEMS PROCURED

DOLLAR AMOUNT

\$

MATERIAL PROCURED UNDER A

 Direct Government Contract Subcontract

1. HAS ANY PART OF THE SPECIFICATION CREATED PROBLEMS OR REQUIRED INTERPRETATION IN PROCUREMENT USE?

A. GIVE PARAGRAPH NUMBER AND WORDING

B. RECOMMENDATIONS FOR CORRECTING THE DEFICIENCIES

2. COMMENTS ON ANY SPECIFICATION REQUIREMENT CONSIDERED TOO RIGID

3. IS THE SPECIFICATION RESTRICTIVE?

 YES NO

IF "YES" IN WHAT WAY?

4. REMARKS (Attach any pertinent data which may be of use in improving this specification. If there are additional papers, attach to form and place both in an envelope addressed to preparing activity.)

SUBMITTED BY (Printed or typed name and activity)

DATE