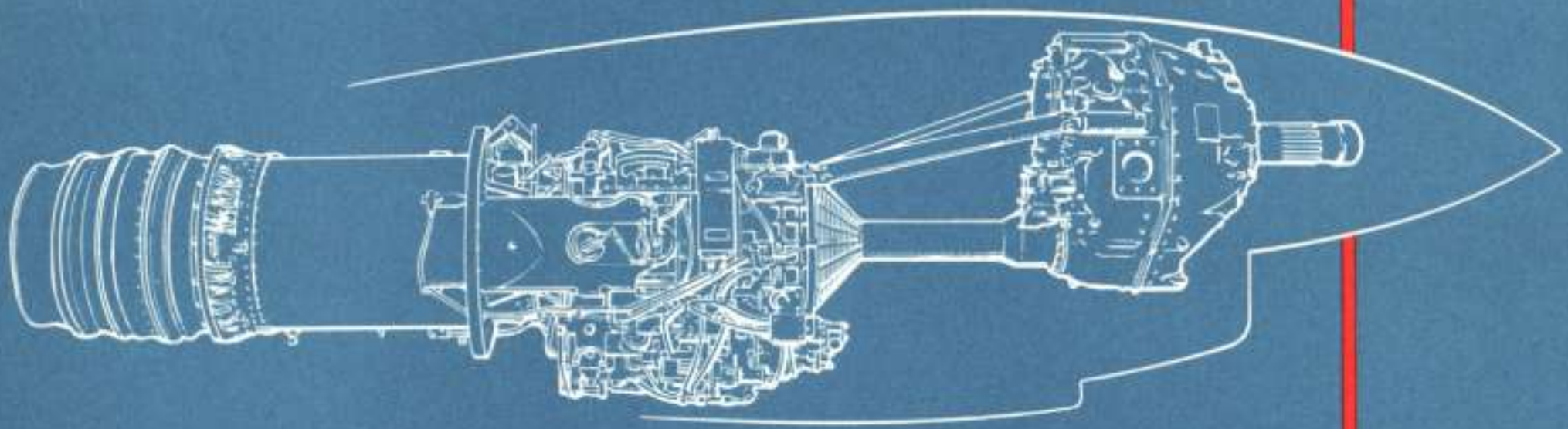
FLIGHT POWER FROM

ALLISON



Turbo-Prop Engines and Propellers

TURBO-PROP ENGINES designed and manufactured by Allison power these modern Military and Commercial aircraft.

Over 6,000,000 operating hours attest to the soundness of design principles—reliability is established!

Lockheed "Hercules" Transport

Lockheed "Orion" P3V—ASW Aircraft

Grumman "Hawkeye" W2F—AEW Aircraft

Allison Prop-Jet Convair

Lockheed "Electra"

EXPERIENCE THAT COUNTS

ALLISON TURBO-PROP ENGINES AND PROPELLERS are in Military and Commercial service throughout the world.

In the United States Air Force—T56 engines power the versatile C-130 Hercules transports which are in operation with the Tactical Air Command and the Military Air Transport Service supporting our many and varied military operations. The C-130A aircraft in TAC service also utilize the Aeroproducts A6341FN-D1A propellers.

T56 powered C-130's are in operation with the Canadian, Australian, and Indonesian Air Forces.

In the United States Navy, Allison engines and propellers provide propulsion for the advanced Grumman W2F surveillance aircraft, and the T56-A-10W powers the Lockheed P3V. These new Navy weapon systems, now in various stages of suitability test programs, will be active in AEW and ASW fleet operations in the near future.

The United States Marine Corps employs the GV-1 Tanker version of the C-130 aircraft with the T56-A-7 engines. The same power package is providing exemplary service with the United States Coast Guard in the SC-130.

In Commercial operation, the 501-D13 engine powered Electra is providing the finest in air transportation for fifteen (15) domestic and foreign airlines around the globe; fourteen of these operators selected the Aeroproducts A6441FN-606 propeller. The engine operating time between overhauls is now approved at 2400 hours, and the propeller overhaul time is 3150 hours.

The Federal Aviation Administration, and many corporation executive fleets, are operating 501-D13 engine and 606A propeller prop-jet 340/440 Convair aircraft.

Cumulative engine operating time, in excess of 6 million hours, increasing at a rate of 180,000 hours per month, provides propulsion system experience where it counts—in the air!

PRESENT PRODUCTION ENGINES INCLUDE THESE MODELS

ENGINE MODEL	STD. DAY SEA LEVEL TAKE-OFF POWER			RAM POWER LIMIT	30,000 FT. ALT. 350 KNOTS NORMAL POWER			ENGINE WT.	PROPELLER WT.	INSTALLATION
	ESHP	SHP	ESFC	SHP	ESHP	SHP	ESFC	LBS.	LBS.	
501-D13	3750	3460	.549	3900	2087	1865	.449	1756	1028	Electra and Prop-Jet Convair
T56-A-7	4050	3755	.528	4200	2260	2030	.425	1833	1028	C-130
T56-A-8	4050	3755	.528	4500	2260	2030	.431	1870	1028	W2F
T56-A-10W*	4050	3755	.528	4200	2260	2030	.431	1853	1028	P3V

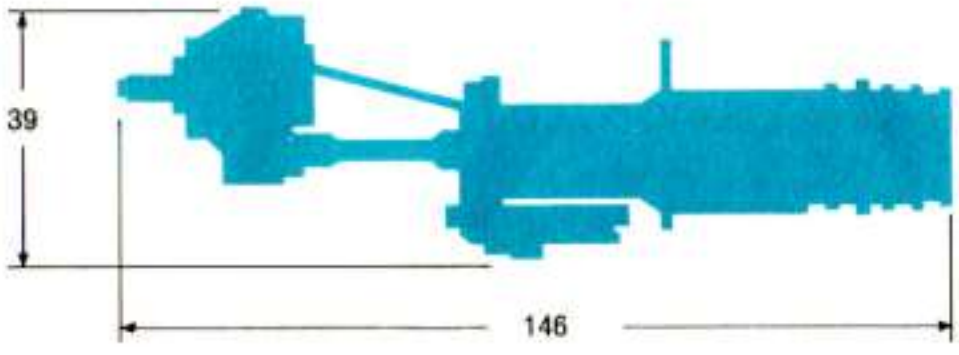
*Water-alcohol augmented—4500 take-off ESHP.
ESFC of engines in this brochure based on fuel with LHV of 18,400 BTU/Lb.

The production engine configuration, briefly described here, will be used as a baseline for comparisons in other sections of this brochure.

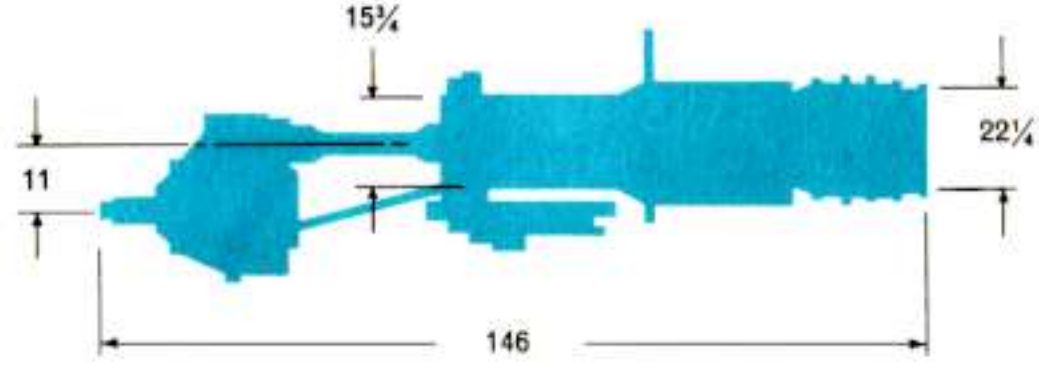
The Power Section and Reduction Gear are connected and aligned by a Torquemeter Assembly, and additional rigidity is provided by two interconnecting struts. The gear box provides a No. 60A Shaft for propeller mounting. The basic rating is 4050 ESHP at standard day conditions with an RPM of 13,820 and a turbine inlet temperature of 1780 °F.

The Compressor is an axial flow fourteen stage unit providing 32.35 lbs./sec. air flow at a pressure ratio of 9.25:1. The turbine is a four stage unit 22¼" in diameter.

The reduction gear assemblies have a spur gear first stage and a planetary second stage. The T56-A-7 and A-10W have an overall ratio of 13.54:1 and the T56-A-8 has a 12.49:1 ratio.



T56-A-7; -A-8



T56-A-10W

TURBO-PROPELLERS

TURBO-PROPELLERS have been designed and developed for each of the T56 and 501 engine models in production today—thus providing the optimum in compatible propulsion units.

ENGINE MODEL	PROPELLER MODEL
T56-A-7	A6341FN-D1A
T56-A-10W	A6441FN-800
T56-A-8	A6441FN-248
501-D13	A6441FN-606

D-1A

—248 —606 —800

GROWTH

GROWTH VERSIONS of Allison turbo-prop engines are being developed for installation in new aircraft and to improve the performance of existing aircraft.

Advanced engine designs are the result of active component development programs conducted concurrently with the production of today's engines.

Foremost among design improvement features offered in these engines are:

Air cooled turbines which permit higher turbine inlet gas temperatures with reduced metal temperatures.

Utilization of air cooled turbines and the associated higher operating temperatures results in increased horsepower and improved SFC. Turbine operating conditions are improved as a direct result of decreased blade metal temperatures. Air cooled turbine blade manufacturing techniques have been developed and proven by blade rig testing and full scale engine testing.

Improved compressors with increased air flow.

The new compressors have improved aerodynamic characteristics and increased inlet area to produce 42.0 pounds of air per second at 14,300 RPM.

New reduction gear box designs which permit higher ram power ratings.

Modern reduction gearing with latest state of art features are being designed for ram power ratings up to 7800 SHP with nose mounted propeller provisions.

Versatility—Required Power through Component Selection

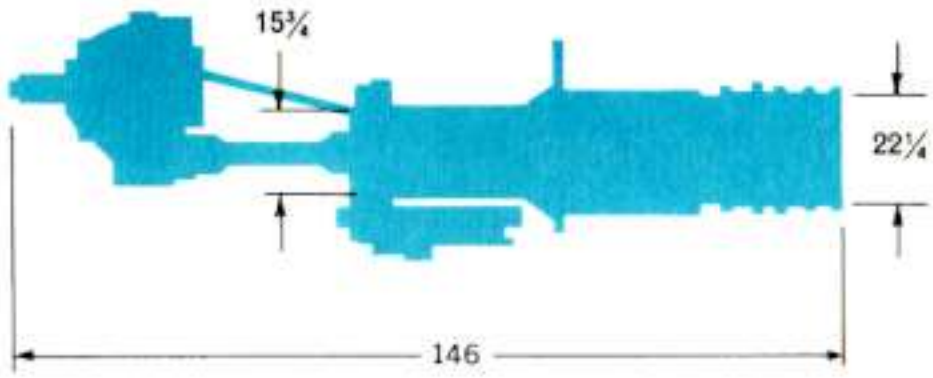
Component design considerations employed by Allison permit the interchange of compressor and turbine units, torquemeters and reduction gear assemblies within the family of growth engines. The growth engine rating table presents only a representative grouping of advanced engine models and does not detail all of the possible combinations afforded by the component matching flexibility. Permissible variations in operating temperatures, component combinations and accessory arrangements result in take-off ratings from 3750 ESHP to 6500 ESHP.

GROWTH ENGINE INSTALLATION AND PERFORMANCE DATA

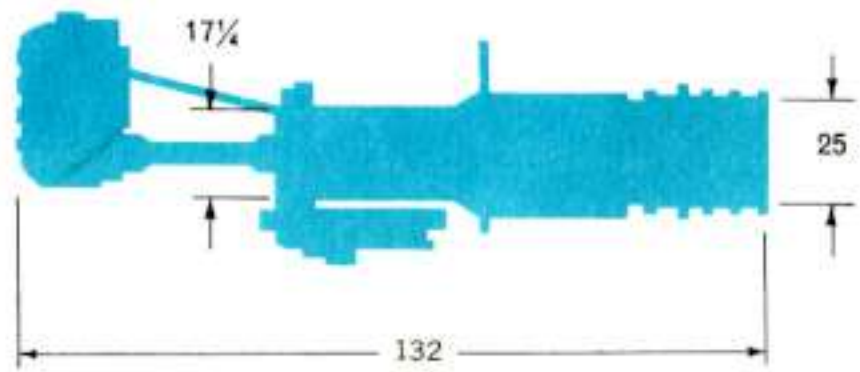
ENGINE MODEL	SEA LEVEL TAKE-OFF POWER			RAM POWER LIMIT	30,000 FT. ALT. 350 KNOTS NORMAL POWER			EST. ENGINE WT.	EST. PROP. WT.	ENGINE AVAILABILITY	BASIC DIFFERENCE FROM T56
	ESHP	SHP	ESFC		ESHP	SHP	ESFC	LBS.	LBS.	MFGA	
501-M7	4816	4500	.503	4500	2572	2309	.426	1833	1028	18	Present production T56-A-7; A-8 and A-10 engines modified with air cooled turbines, permitting increased turbine inlet temperature and improved performance in the same installation package.
501-M11	4910	4591	.500	5000	2572	2309	.426	1873	1028	18	
501-M10	4910	4591	.500	5000	2572	2309	.426	1873	1028	18	
501-M3	6500	6072	.500	7800	3645	3265	.400	2045	1415	27	Increased turbine size (25" max. dia.) and turbine inlet temperature of 2060°F.
501-M4	6500	6072	.500	7800	3645	3265	.400	1625	1415	36	Light weight version of 501-M3.
501-M8*	5250	4955	.518	5000	2910	2700	.423	1870	1028	21	Increased turbine size (23.5" max. dia.)

*501-M8 type engine also available with new reduction gear assembly having ram power rating of 6650 SHP and provision for nose mounted propeller.

A 501-M3 engine, recently tested at 2060°F. turbine inlet temperature produced 6770 ESHP with an ESFC of .486.



TYPICAL OF
501-M7, M10 & M11



TYPICAL OF
501-M3, M4

TURBO-PROP ENGINES WITH AUXILIARY AIR SUPPLY COMPRESSORS

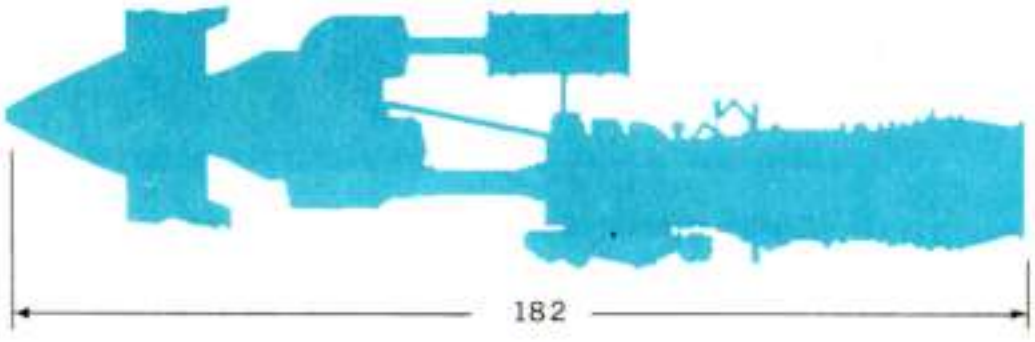
ENGINE MODEL	SEA LEVEL TAKE-OFF POWER			G/B RAM POWER LIMIT	30,000 FT. ALT. 350 KNOTS NORMAL POWER			EST. ENGINE WT.	EST. PROP. WT.	ENGINE & PROP. AVAILABILITY	BASIC DIFFERENCES FROM T56
	ESHP	SHP	ESFC	SHP	ESHP	SHP	ESFC	LBS.	LBS.	MFGA	
501-M5 TAKE-OFF ASC OFF	5980	5600	.539.	5600	3575	3265	.430	2280	1282	27	Increased airflow compressor. Increased diameter air-cooled turbine; increased TIT, reduction gear for nose mounted propeller plus power drive for auxiliary air supply compressor. The RG used on this engine has a future capability of 7200 SHP at 1100 PRPM.
T.O. WITH* ASC ENGAGED	4596	4200	.760	5600							
501-M9 TAKE-OFF ASC OFF	4850	4500	.566	5000	3575	3265	.430	2175	1062	27	Same as the 501-M5 except the reduction gear has a No. 60A propeller shaft.
T.O. WITH* ASC ENGAGED	4596	4200	.760	5000							

*The air supply compressor planned for these engines produces 20 lbs./sec. air flow at a 4.0:1 compression ratio. The power requirement is approximately 2000 horsepower, available from the rear of the gear box, as shown in illustrations.

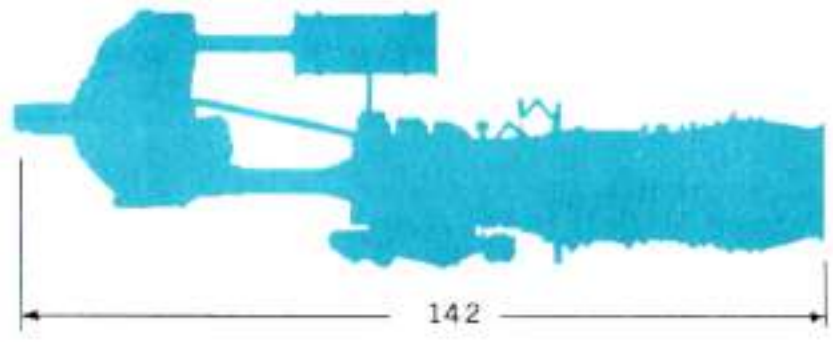
Engine weights include 55 lbs. for the auxiliary compressor drive and clutch, plus 175 lbs. for the auxiliary compressor.

Additional auxiliary air supply compressor designs can be made available to meet specific requirements.

Air supply compressors can be adapted to other engines shown in this brochure.



501-M5

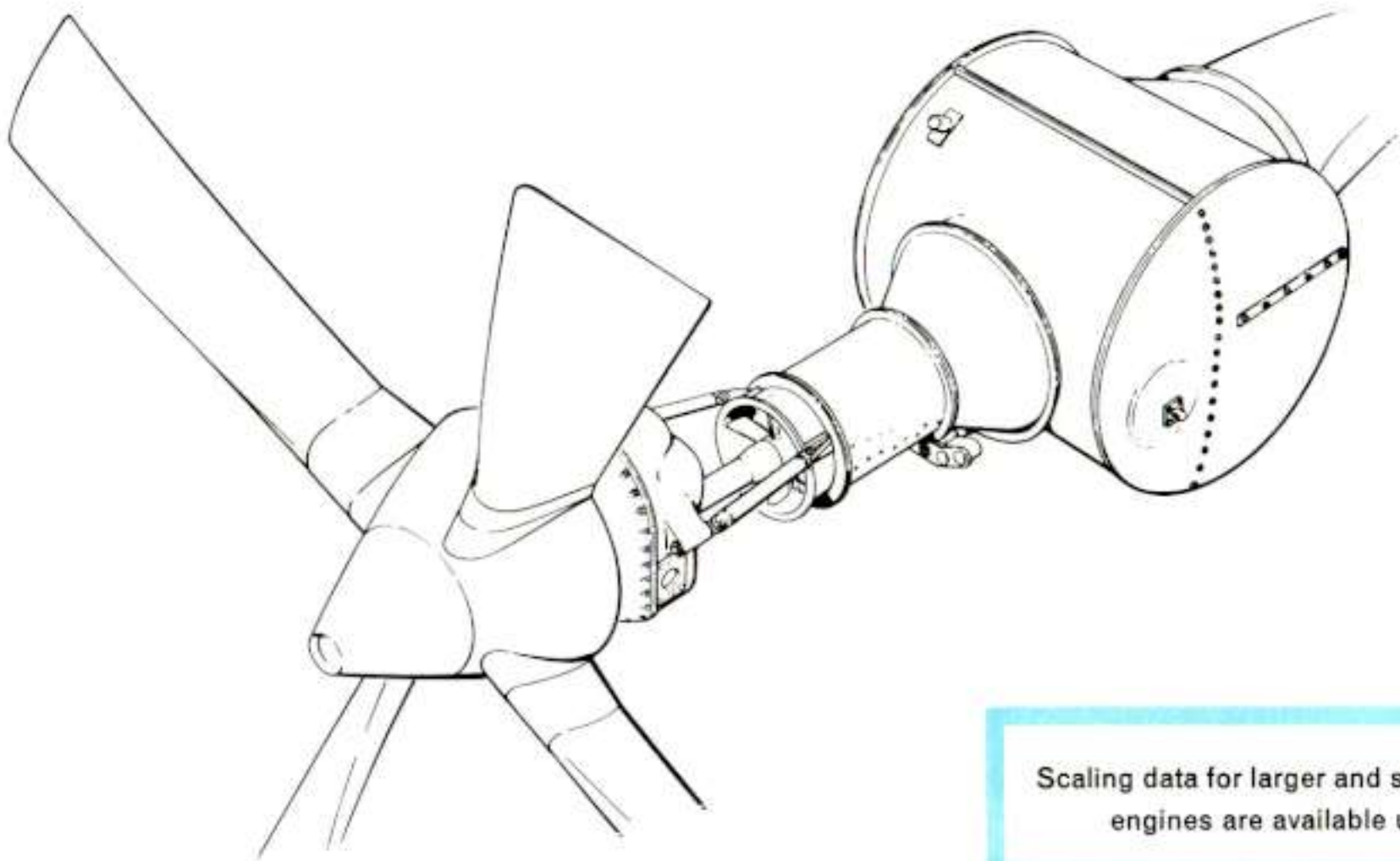


501-M9

REGENERATIVE CYCLE TURBO-PROP ENGINE

REGENERATIVE ENGINES with high effectiveness matrices (heat transfer elements) provide major improvement in SFC. The SFC is maintained essentially constant at all power levels at a given altitude.

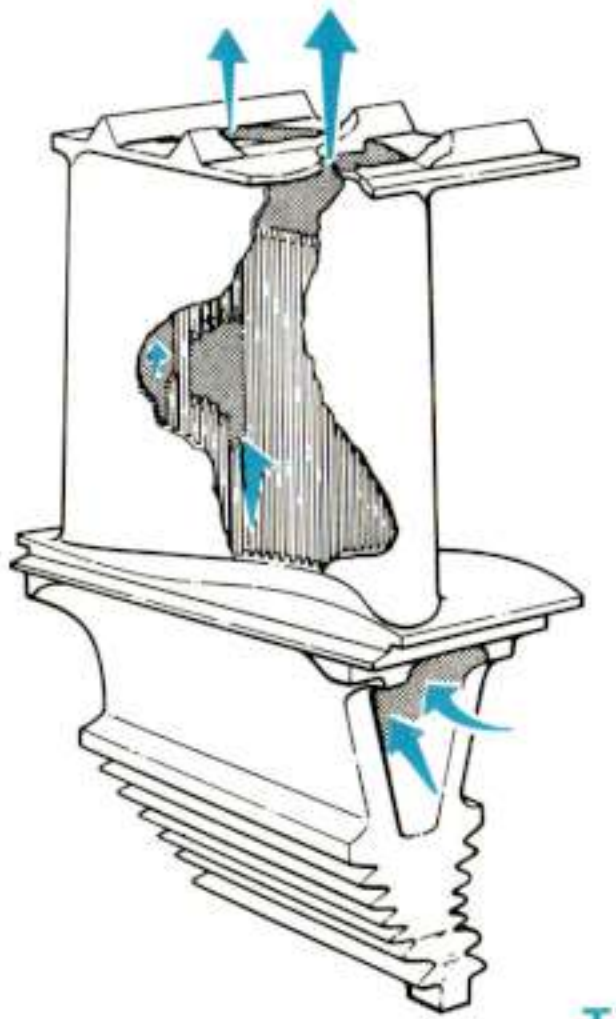
Allison is actively engaged in regenerative work applicable to engines in the 3500 to 5000 SHP power range, with specific fuel consumption less than 0.4 lbs./HpHr. Full scale regenerator components for this power range are on test.

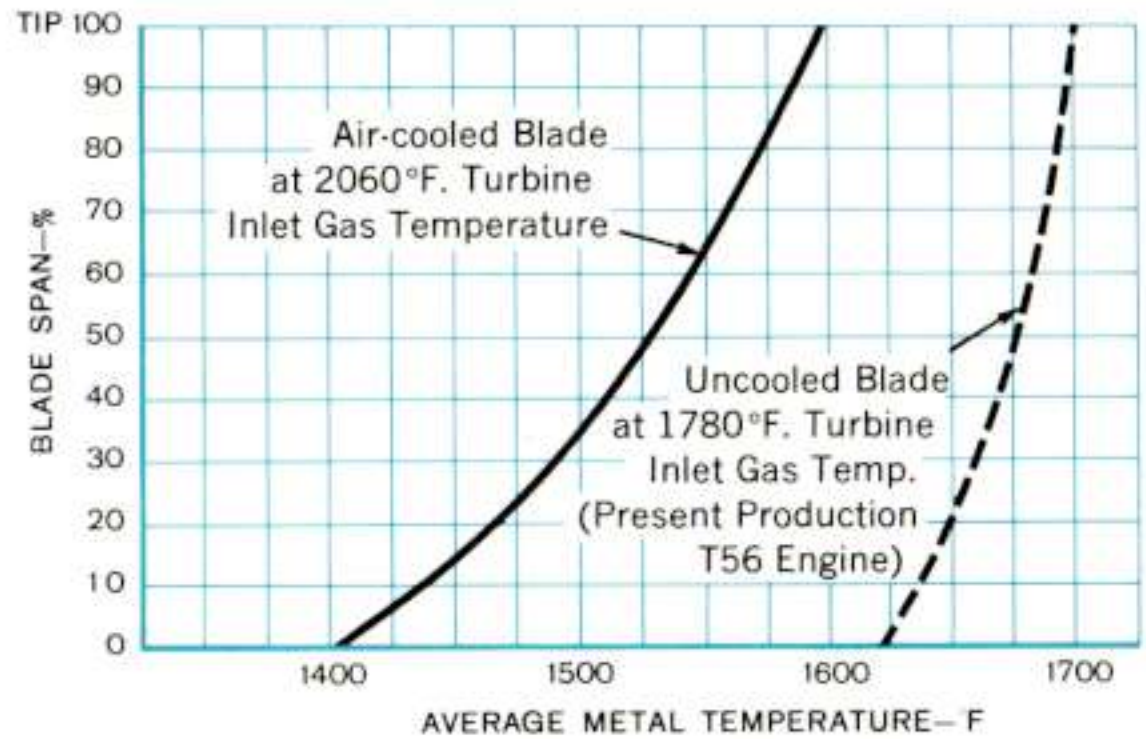


Scaling data for larger and smaller regenerative engines are available upon request.

THE HEART OF THESE advanced engines is the internally air-cooled turbine blade which permits higher operating temperatures with resultant improved engine performance. Allison and the Central Foundry Divisions of General Motors have collaborated to design and develop air-cooled turbine blades and the techniques to manufacture blades economically in production quantities. This development, which dates back to 1955, has culminated in the following achievements.

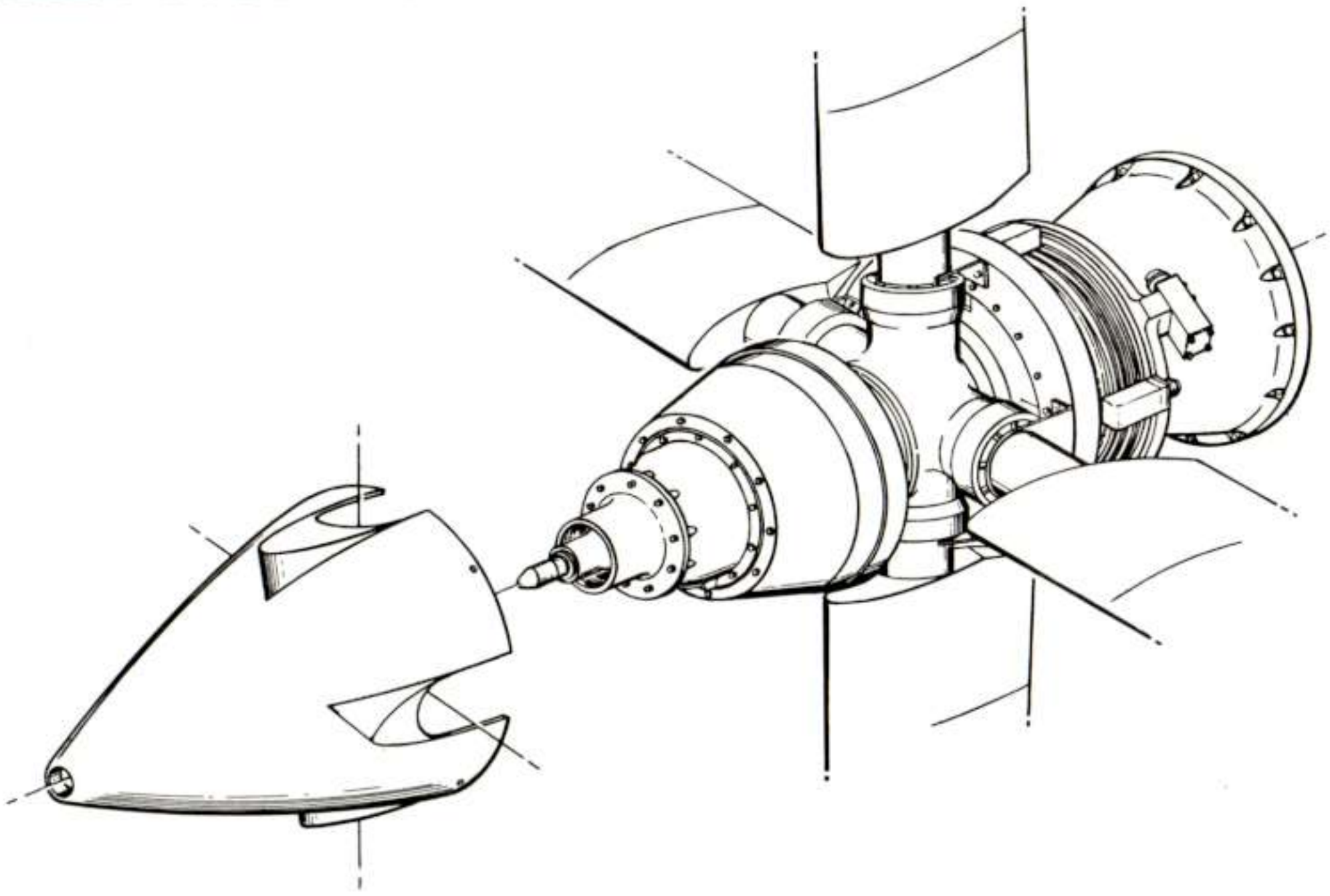
1. Engine demonstration tests of air-cooled turbine blades and vanes at gas temperatures up to 2250°F.
2. Satisfactory completion of a 50-hour PFRT test at a rated temperature of 2060°F. including five hours of continuous operation at 2060°F.
3. Advanced burner rig testing of air-cooled turbine blades at gas temperatures to 2700°F. soon to be 3000°F.





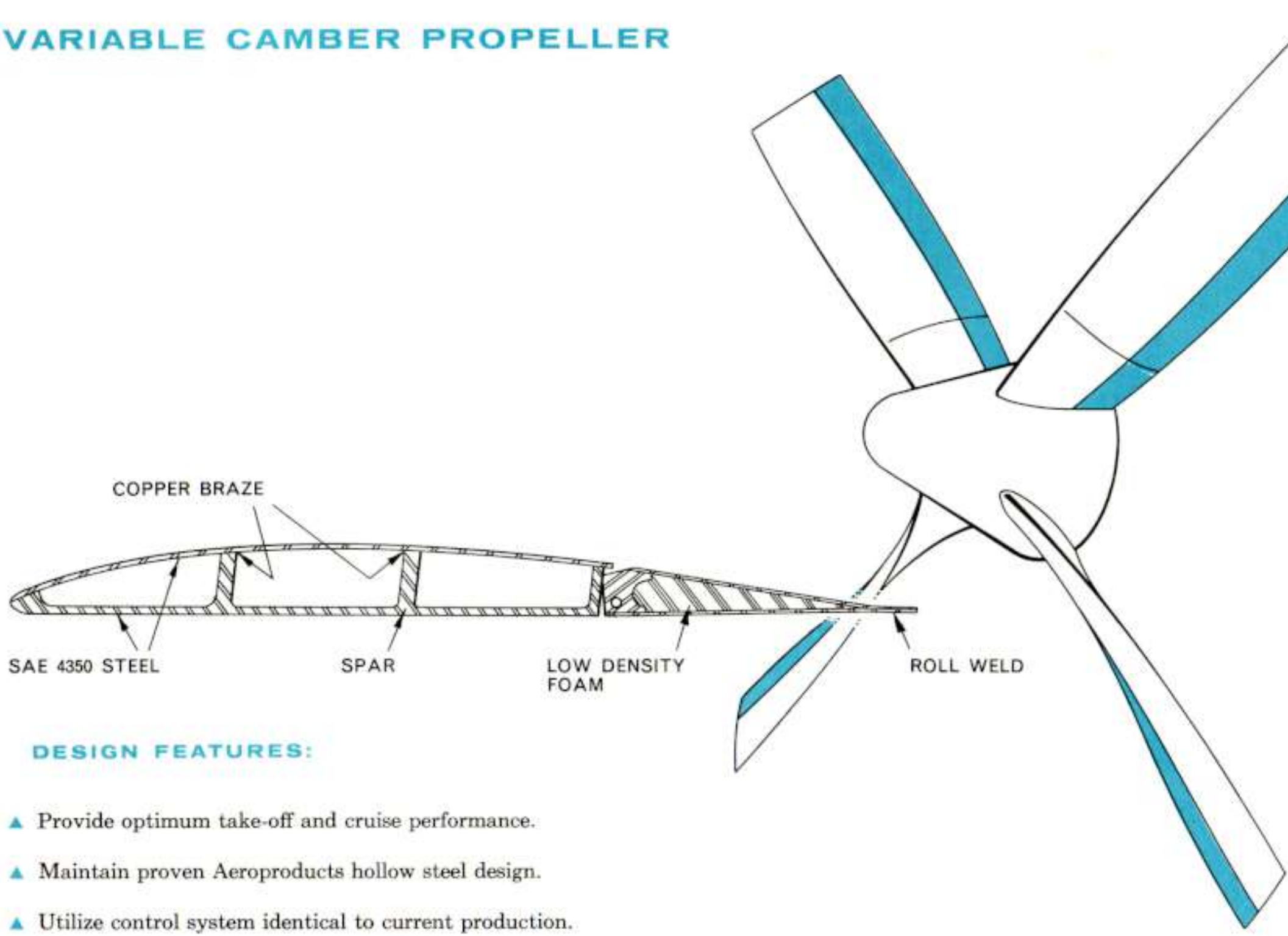
TYPICAL AIR-COOLED TURBINE BLADE

ADVANCED NOSE-MOUNTED PROPELLERS



- Horsepower potential 5000-7500 SHP.
- Enable propeller shaft bending loads to be transferred directly to engine reduction gear housing instead of through rotating elements of power train.
- Front-mounted regulator provides easy accessibility and maintenance.

VARIABLE CAMBER PROPELLER



DESIGN FEATURES:

- Provide optimum take-off and cruise performance.
- Maintain proven Aeroproducts hollow steel design.
- Utilize control system identical to current production.
- Provide positive control of trailing edge flap relative to blade angle position.
- Provide the flexibility of varying design lift coefficients.

ALLISON DIVISION, a major manufacturer in the aircraft gas turbine industry since the beginning of the jet age, has established an excellent record as a leader in high-quality, low-cost production.

Allison offers continuing improvements in the field of turbo-prop engine and propeller flight propulsion systems. Detailed information concerning advanced turbo-prop engines and propellers is readily available.

Should you require additional information concerning the products presented by this brochure, your requests will receive prompt attention. Please direct inquiries to:

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General Motors Corporation
Indianapolis 6, Indiana

Attention: MR. E. M. DECKMAN, *Director*
Sales, Service & Contracts—AEO

GM

TURBINE POWER

ALLISON DIVISION OF GENERAL MOTORS CORPORATION
INDIANAPOLIS, INDIANA, U.S.A.

LITHO IN U.S.A.