



Rating (Continued)	542-10, 542-10J	542-10K	542-4	542-4K
Weight (dry), lb. (includes all controls, exhaust unit, ignition system, thermocouples, oil tank and fuel pump)	1385	1405	1385	1405
Ignition system	Igniter Box: Rotax NB 38 or AEI Type C34TS	--	--	--
	Igniters: Champion FHE-19-6H (RR Type CR-104), Smith Type LR 104, AC YA-20	--	--	--
NOTES	1 through 12			

**Certification Basis:** CAR 10 and British Civil Airworthiness Requirements Section C, Issue 5 dated July 1, 1962, (BCAR Section C, Issue 5, is equivalent to the applicable parts of CAR Part 13, effective June 15, 1955, and amendments 13-1 through 13-5). Type Certificate No. 297 amended July 16, 1962 for basic Dart 542. Approval of this engine subsequently rescinded as all basic Dart 542 engines converted to Dart 542-10 standard. Dart 542-10J & 10K-4K comply with BCAR Section C, Issue 6 dated June 15, 1966, which is equivalent to Part 33-L. Type Certificate (Import) No. E5EU issued for Dart 542-10, 542-4, October 15, 1965, amended to include 542-10J & 10K on July 15, 1968, and 542-4K on January 7, 1970. Date of Application for Type Certificate July 16, 1962.

The aviation authority for Germany, Luftfahrt-Bundesamt, type certificated this engine certificate. The FAA validated this product under U.S. Type Certificate Number E5EU. Effective September 28, 2003, the European Aviation Safety Agency (EASA) began oversight of this product on behalf of Germany.

**Import Requirements:** To be considered eligible for installation on U.S. registered aircraft, each new engine to be exported to the United States with Luftfahrt-Bundesamt (Germany) or EASA airworthiness approval shall have a Joint Aviation Authorities (JAA) or EASA Form 1, Authorized Release Certificate. The JAA or EASA Form 1 should state that the engine conforms to the type design approved under the U.S. Type Certificate E5EU, is in a condition for safe operation and has undergone a final operational check.

Additional guidance is contained in FAA Advisory Circular 21.23, Airworthiness Certification of Civil Aircraft, Engines, Propellers and Related Products, Imported into the United States.

#### NOTES

**NOTE 1.** Maximum permissible temperatures:

Turbine gas temperatures:	542-10	542-10J, -10K	542-4, -4K
Takeoff (wet) (5 minutes)	(890°C)	940°C	(940°C)
Takeoff (dry)	(865°C)	--	--
Maximum continuous	(905°C)	915°C	(915°C)
Maximum transient (starts)	(930°C)	--	--
Maximum overtemperature (5 second limit)	(1000°C)	(1000°C)	(1000°C)
Oil inlet temperature range	(-15° to 120°C)	--	--

**NOTE 2.** Fuel and oil pressure limits:

Fuel supply pressure at engine fuel inlet, varying with flow per RR curve HK 30017, Issue 3.

Oil pressure varies with oil inlet temperature; normal 14 to 35 p.s.i.g. in flight; with 9 p.s.i.g. minimum in flight.

**NOTE 3.** Engine ratings are based on standard conditions with no air bleed or aircraft accessory power extraction, 60°F, 29.92 in. Hg., and Pw/Po = .01 at sea level within limiting gas temperatures. With dry air, T.O. power is increased less than .5% and M.C. power by 1.3%. Jet thrust is converted to equivalent shaft hp by dividing the thrust value by a factor of 2.5. The output values are the minimum acceptable and are based on the use of Rolls-Royce exhaust cone RK 25226 or RK 21556 and with 12 thermocouples located in the intermediate turbine guide vanes.

**NOTE 4.** Water/methanol injection is optional and is utilized through automatically varied flow to provide a constant level of power output for take-offs. The w/m fluid should be a 63/37 mixture of water and methyl alcohol for all models. (Rolls-Royce

AEP-1W/M Issue 5 or equivalent.) The water used is distilled or contains a maximum of 10. ppm solids, and the methyl alcohol is British D Eng RD 2481 or equivalent. The w/m flow varies up to a maximum of 805 gph (U.S.) for 542-10 series and up to 859 U.S. gph for 542-4. W/m injection should not be used at ambient temperatures lower than -22°F (-30°C). The takeoff power reduces automatically with altitude since the w/m control does not compensate power output for the effects of altitude.

**NOTE 5.** Accessory provisions on engine: (Oil cooler and air inlet are engine mounted)

Drive	<u>Rotation (facing drive)</u> (C-clockwise) (CC-counter clockwise)	Speed Ratio to Turbine	Continuous <u>Torque*</u> (in. - lb.)	Static <u>Torque**</u> (in. - lb.)	Maximum <u>Overhang</u> (in. - lb.)
Power takeoff (175 hp max.)	CC	0.345	2100	6350 to 6890	128
Propeller governor: CU 97	CC	0.188	138	1380	190
Starter: Rotax 14203	CC	2.0	272	1000	84
Fuel pump: Lucas GB242/9/BV	CC	0.188	110	780	34

\* Continuous torque values are based on takeoff power at sea level

\*\*Maximum torque of weak link without permanent set, or the clutch setting for the starter.

**NOTE 6.** Fuels to the following specifications, or others shown in the approved Operating Instructions F-Da10YS and F-Da10C are eligible for these engines:

British D.Eng. R.D. - 2494, 2486, 2498, 2453, 2454.  
 Canadian - 3-GP-23<sub>g</sub>, 3-GP-24<sub>f</sub>, 3-GP-22<sub>g</sub>.  
 American - ASTM D1655-72 JET A or A-1 or JET B. MIL-T-5624H Grade JP5, MIL-T-5624H Grade JP4.  
 IATA - Kerosene Type Fuel (1969) and JP4 Type (1969).  
 French - AIR 3405/C, AIR 3404/B, AIR 3407/B.

The following departures from Specification D.Eng.RD 2494 are acceptable:- Flash point, maximum 70°F, Mercapton Sulphur maximum 0.016 percent by weight.

The mixing of approved fuels is permitted without restriction. No adjustment of the engine controls is necessary and no loss of performance occurs.

The only optional additives which may be used in approved fuels are as follows:-

1. Anti-static additive Shell ASA 3 in concentrations not exceeding 1.0 p.p.m.
2. Anti-icing additive to specification D.Eng.R.D. 2451 or MIL-I-27686E in concentrations not exceeding 0.15% volume.
3. HITEC E515 (formerly Santolene C) anti-corrosion/lubricity additive up to a concentration of 5 lbs per 42000 U.S. gallons.
4. TOLAD 245 anti-corrosion additive up to a concentration of 12 lbs per 42000 U.S. gallons.
5. Biobor J.F. biocide on an intermittent or non-continuous basis at a concentration not exceeding 270 p.p.m. (total Boron content not to exceed 20 p.p.m.). The treated fuel may be burnt off in the engine provided it is not contaminated by microbiological debris.

For continuous treatment Biobor J.F. biocide additive may be used in accordance with the appropriate Rolls-Royce instructions in concentrations not exceeding 135 p.p.m.

**NOTE 7.** These engines meet FAA requirements for icing protection, for adequate turbine disc integrity, for rotor blade containment, and do not require external armoring.

**NOTE 8.** Propellers used with this engine must have functioning characteristics which are compatible with the engine and its control system.

**NOTE 9.** Maximum air bleed for aircraft services is 1.5% of no-bleed mass flow.

**NOTE 10.** Maximum overspeed limit is 16500 r.p.m. for 20 seconds. When this limit is exceeded the engine requires inspection as detailed in the Rolls-Royce Maintenance Manual.

**NOTE 11.** The maximum allowable horsepower cleared for the engine to cover operation at low ambient air temperature and/or ram conditions is 3000 shp.

**NOTE 12.** The above models incorporate the following general characteristics:

<u>Model</u>	<u>Characteristics</u>
Dart 542	Original basic model for use in Prototype Japanese YS-11 aircraft - superseded by 542-10.
Dart 542-10	Production standard for YS-11 aircraft (Japan) used with 14' -6" Dowty Rotol propeller. Approved October 15, 1965.
Dart 542-10J	Variant for YS-11 aircraft with improved turbine blading and higher TGT limits.
Dart 542-10K	Variant for YS-11 aircraft. As 542-10J but with strengthened reduction gear.
Dart 542-4	Model for installation in CONVAIR 240D, 340D and 440D aircraft. Minor installation changes from 542-10 model and with an increased max. continuous TGT limitation. Approved October 15, 1965.
Dart 542-4K	Variant CONVAIR 600 and 640 aircraft. As 542-4 but with strengthened reduction gear.

**NOTE 13.** Each of the documents listed below must state that it is approved by the European Aviation Safety Agency (EASA) or, for approvals made before September 28, 2003 by Luftfahrt-Bundesamt (Germany) or CAA (UK). Any such documents including those approved under a delegated authority, are accepted by the FAA and are considered FAA approved.

- Service bulletins,
- Structural repair manuals,
- Vendor manuals,
- Aircraft flight manuals, and
- Overhaul and maintenance manuals.
- Technical Variances

These approvals pertain to the type design only.

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