

**180 R / 155 R Tug comparison**

CEAPR 09/10/2012

DR400 /180R Engine: O 360-A3A Propeller: 76-58 fixed pitch  
 DR400 /155R Engine: TAE 2.0S Propeller: MTV 6A 187/129 constant speed

**Comparison of engine power vs altitude pressure**

( ref: Lycoming operator's manual May 1996 Fig 3-35,Centurion 2.0S OM-02-02 May 2012 )

Rated power	HP	%	Zp Pressure altitude (feet)												
			0	1000	2000	3000	4000	5000	6000	7000	8000	9000	10000	11000	12000
DR400 /155R	155		155	155	155	155	155	155	155	155	155	151	148	144	140
			100%	100%	100%	100%	100%	100%	100%	100%	100%	98%	95%	93%	90%
DR400 /180R	180		180	175	168	162	156	150	146	140	134	130	124	120	116
			100%	97%	93%	90%	87%	83%	81%	78%	74%	72%	69%	67%	64%
Difference of power (180/155)			25	20	13	7	1	-5	-9	-15	-21	-21	-24	-24	-24
			16%	13%	8%	5%	1%	-3%	-6%	-10%	-14%	-14%	-16%	-17%	-17%

**Fuel flow at full throttle**

( ref: Lycoming operator's manual May 1996 Fig 3-35,Centurion 2.0S OM-02-02 May 2012 )

DR400 /155R 33.6 litre/h 26.88 kg / h  
 DR400 /180R 56 litre/h 40.32 kg / h

**Endurance, 110 liter fuel tank, maximum power**

DR400 /155R 3.3 hours  
 DR400 /180R 2.0 hours

**Take-off distance (50 ft clearance) grass runway (meters)**

Tug weight 840 kg	Glider weight 600 kg	Glider type Marianne
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	T/O dist (50ft) in meters	Zp Pressure altitude (feet)				
		0	1000	2000	3000	4000
DR400 /155R		712	757	803	852	903
DR400 /180R		655	714	778	848	925
Difference 180/155	in metres	57	43	25	3	-22
	%	9%	6%	3%	0%	-2%

Data taken from Glider towing AFM supplement 1002383, 55 m safety factor of CRI O-101 subtracted, 14% increase of ground roll distance  
 Data taken from DR400/180R Flight manual 0089

**Climb rate**

Tug weight 840 kg	Glider weight 600 kg	Glider type Marianne
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		Zp Pressure altitude (feet)		
		0	3000	6000
DR400 /155R	feet/min	490	400	330
	m/s	2.5	2.0	1.7
DR400 /180R	feet/min	551	-	-
	m/s	2.8	-	-

Measured data, see EASA test 120813-0900 DR400-155CDI Issue 1\_Rapport EASA Remorquage

Data taken from DR400/180R Flight manual 0089

**Weight comparison with same equipment (Night VFR)**

	Weight	Empty kg	Fuel kg	Fuel litres	Endurance hours	Pilot kg	Total kg
DR400 /155R		660	40	50	1.5	80	780
DR400 /180R		620	60	84	1.5	80	760

**CONCLUSION**

From 3000 ft pressure altitude, the DR400/155 is superior to DR400/180R in take-off and climb performance (at same compared weight).

Reminder at Z = 1000 ft  
 T° = 30°C (= ISA +17) Zd = 3000 ft

Therefore in normal operating condition  
 - runway altitude above 300 meters  
 - summer time temperature ( ISA +15 )  
 the DR400/155 R tug is superior to the DR 400/180R in performance

