

# Explorer Post 1010

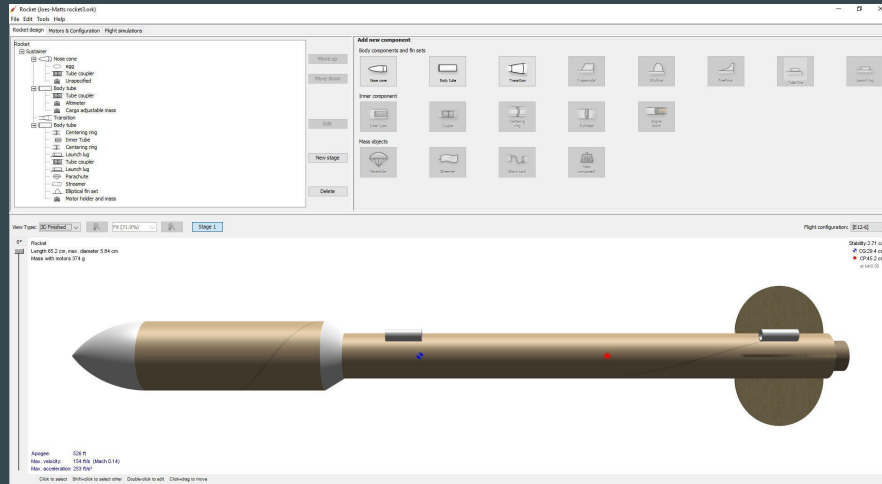
## Rocketry Team 17-2662

Malini Balachandran  
Matthew McCallum  
Mayilan Thanigai  
Vivek Uppoor



# Design and Construction Process

- Requirements for TARC 2017
- Rocket Design Program: OpenRocket
- Material and Motor Selection
- Affordable and Available



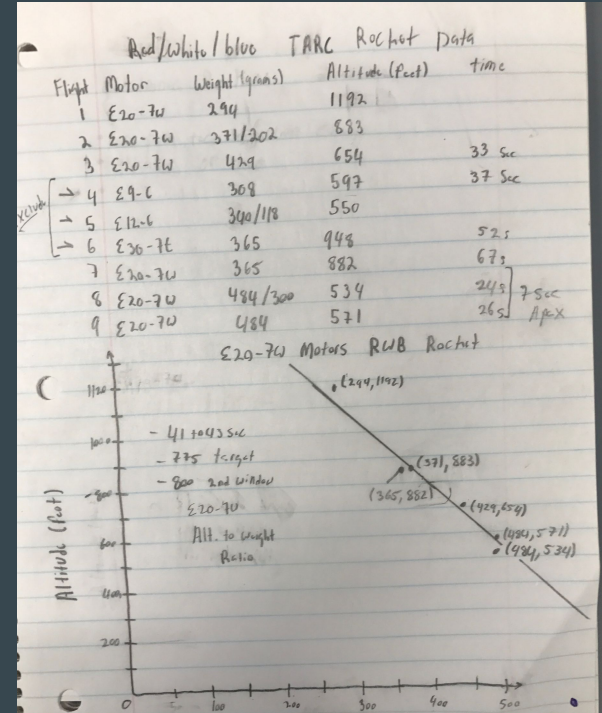


# Cost Breakdown

date	vendor	item	cost	count	total
7-Dec-2014	BRS Hobbies	100# Kevlar Thread - 288" (24 feet) long	\$2.99	2	\$5.98
7-Dec-2014	BRS Hobbies	BT70 x 18.00" Body Tube	\$1.75	4	\$7.00
7-Dec-2014	BRS Hobbies	BT50 (24mm) x 18.00" Body Tube	\$0.99	2	\$1.98
20-Jan-2015	PerfectFlight	TPNUT	\$56.00	1	\$56.00
24-Dec-2015	PerfectFlight	TPNUT	\$48.30	1	\$48.30
3-Mar-2015	Hobbylinc	Aerotech E20-7W 24/70 Single-Use Motor (2)	\$15.19	10	\$151.90
3-Mar-2015	Hobbylinc	Pro Series II (PSII) Model Rocket Recovery Wadding	\$6.99	1	\$6.99
3-Mar-2015	Hobbylinc	First Fire Ignitor Jr. (3)	\$8.69	1	\$8.69
21-May-2016	Discount Rocketry	NC-70 Nose Cone (MR-05007)	\$5.59	3	\$16.77
21-May-2016	Discount Rocketry	Estes BT-60 Body Tube Pack (ES-3089)	\$7.79	2	\$15.58
21-May-2016	Discount Rocketry	BT-60 to BT-70 Transistion (MR-05006)	\$16.77	3	\$50.31
3-Aug-2016	Apogee Components	Conformal Standoff Rail Guide BT60/BT70	\$3.15	4	\$12.60
6-Oct-2016	Apogee Components	Mylar Streamer - 10in Wide (10ft)	\$10.70	1	\$10.70
6-Oct-2016	Apogee Components	Quest Recovery Wadding	\$7.48	1	\$7.48
6-Oct-2016	Apogee Components	Mylar Streamer 4in X 56in	\$6.16	1	\$6.16
6-Oct-2016	Apogee Components	Vac-Formed Transition Kit 41.6/56 (BT60/BT70)	\$7.50	1	\$7.50
6-Oct-2016	Apogee Components	Vertical Single Egg Protector BT-70 SHORT size	\$6.95	3	\$20.85
2-Jan-2017	Apogee Components	Motor Mount Kit 24mm/BT60	\$5.28	1	\$5.28
30-Oct-2016	Red Arrow	E9-6 (3)	\$19.19	2	\$38.38
2-Nov-2016	Hobbylinc	E12-6 Model Rocket Engines (3)	\$16.79	2	\$33.58
2-Nov-2016	Hobbylinc	Solar Model Rocket Igniters	\$3.89	1	\$3.89
2-Nov-2016	Hobbylinc	Pro Series II (PSII) Model Rocket Recovery Wadding	\$6.99	1	\$6.99
20-Dec-2016	Aerotech	E30-7T (3 pak)	\$29.99	2	\$59.98
21-Feb-2017	Top Flight Recovery	Thin Mill Standard Chute: PAR-12TM (size: 12in)	\$6.95	2	\$13.90
19-Mar-2017	Tower Hobbies	Aerotech Single-Use Motor E20-7W 24x70mm (2)	\$15.99	2	\$31.98
17-Apr-2017	Hobbylinc	14 inch Nylon Parachute 6 line	\$9.28	2	\$18.56
		<b>total</b>			<b>\$647.33</b>

# Flight Testing Process

- Weight of Rocket and additional components
- Parachute (15", 12", 14") and streamer
- Motor type (E20, E9, E12, E30)
- Ground rocket preparation (time and quality)
- Launch rail preparation
- Protection for Egg



# Launch Data (23 Launches)

Date	Team	Rocket	Flight	Motor	Weight	Alt	Recovery	Altitude	Time	Comment
161003	2662	Red	1	E20-7W	294g	10	15", 6x60"	1192ft	61sec	A little wiggle in ascent
161003	2662	Red	2	E20-7W	371/202g	10	15", 6x60"	883ft	65sec	Nice flight
161029	2662	Red	1	E20-7W	429g	10	15", 6x60"	654ft	33sec	unstable, angled off
161029	2662	Red	2	E9-6	308g	10	15", 6x60"	597ft	37sec	underpowered
161210	2662	Red	1	E12-6	340/118g	10	15", 6x60"	550ft	39sec	ducked into the high wind
170102	2662	Red	1	E30-7T	365g	10	15", 6x60"	948ft	52sec	chute/streamer tangled, too high
170102	2662	Red	2	E20-7W	365g	10	15", 6x60"	882ft	67sec	way too long descent
170121	2662	Red	1	E20-7W	484/300g	10	12", 6x60"	534ft	24sec	Too low, ignition issue, overweight
170121	2662	Red	2	E20-7W	484g	10	12", 6x60"	571ft	26sec	Too low, ignition issue, overweight
170211	2662	Red	1	E20-7W	388g	10	12", 6x60"	818ft	43sec	Good fight, score=43
170211	2662	Red	2	E20-7W	400g	10	12", 6x60"	786ft	38sec	Nice fight, score=23
170220	2662	Red	1	E20-7W	403g	10	12", 6x60"	684ft	33sec	Squirrely, off to side
170220	2662	Red	2	E20-7W	400g	10	12", 6x60"	774ft	36sec	Straighter, descent too fast
170312	2662	Red	1	E20-7W	399g	10	14", 4x40"	837ft	51sec	Nice flight, little too high
170312	2662	Red	2	E20-7W	423g	10	14", 4x40"	782ft	36sec	Nice flight, descent too fast
170312	2662	Red	3	E20-7W	426g	10	14", 4x40"	768ft	27.65sec	Qualification 1, stutter ignition, chute/streamer snagged, landed in tree Score 60.38
170318	2662	Red	1	E20-7W	411g/216g	10	14", 6x60"	792ft	38sec	Nice flight
170318	2662	Red	2	E20-7W	417g	10	14", 6x60"	660ft	29sec	Way too low, launch rail issue
170318	2662	Red	3	E20-7W	420g	10	14", 6x60"	777ft	27sec	Tangled chute/streamer
170318	2662	Red	4	E20-7W	421g	10	14", 6x60"	782ft	39.65sec	Qualification 2, nice flight Score12.60
170402	2662	Red	1	E20-7W	417g	10	14", 6x60"	715ft	37sec	Low, into wind over cars
170402	2662	Red	2	E20-7W	418g	10	14", 6x60"	765ft	39sec	Nice flight, angled tower
170402	2662	Red	3	E20-7W	416g	10	14", 6x60"	761ft	40.32sec	Qualification 3, OK flight Score 16.72



# Teamwork

- Training New Members
- Basic Handling and Safety of Rocket and Materials
- Brainstorm and Compromise
- Transportation and Commitment
- Outreach to schools and at festivals



# Lessons Learned

- Three C's
  - Cooperation, Communication and Contribution
- Data Tracking and Checklist
- Igniters
- Parachute Packing and Decent Times
- Potential Launch Sites
- Future Changes
  - 3D Printing Fin/Motor Mount
  - Altitude Dependent Parachute Deployment

