

## Team America Rocketry Challenge

### 2017 Engineering Notebook Competition Rubric

Team Reviewed: Submission #:	
Organization/Presentation (20%)	Total:/20
<ul> <li>Does the engineering notebook comply with the specified format criteria?</li> <li>Is the content clear, legible and easy to understand?</li> <li>Are organizational aids, including page numbers, a table of contents and section headings effectively used to help the reader locate relevant information?</li> </ul>	/10 /5 /5
Content (40%)	Total:/40
• Does the content follow the team's engineering process from beginning to end?	/5
<ul> <li>Does the engineering notebook clearly explain the team's design considerations and the reasoning for their ultimate decisions?</li> <li>Would the notebook enable someone familiar with TARC and rocketry to reproduce a copy of their rocket and flight procedures at any stage in t design cycle?</li> </ul>	/15 /15
<ul> <li>Does the notebook contain drawings, photos or other data/schematics, as necessary to accomplish the above goals?</li> </ul>	/5
Data and Analysis (20%)	Total:/30
<ul> <li>Does the engineering notebook contain results data for flights?</li> <li>Does the engineering notebook clearly explain how and why the rocket was adjusted in response to the gathered data?</li> </ul>	/10 /10
<ul> <li>Does the team use results data to make performance converge towards the stated mission parameters?</li> </ul>	/10
Creativity (10%)	Total:/10
• Does the team propose and/or execute innovative or unique solutions to address design or performance concerns?	/10
Comments:	Total:/100







## Detailed Engineering Notebook Evaluation Rubric by Category







# Organization/Presentation (20%) Total: \_\_/20 • Does the engineering notebook comply with the specified format criteria? \_\_/10 • Is the content clear, legible and easy to understand? \_\_/5 • Are organizational aids, including page numbers, a table of contents and section headings effectively used to help the reader locate relevant information? \_\_/5

	1-5	6-7	8-9	10
Does the engineering notebook comply with the specified format criteria?	The notebook fails to comply with many of the specified format criteria. Deviations are more frequent than not and generally detract from the reader's understanding of the notebook or the document's integrity.	The notebook complies with the most of the specified format criteria. Deviations are common and sometimes detract from the reader's understanding of the notebook, or the document's integrity.	The notebook complies with the majority of specified format criteria. Deviations are occasional and only rarely detract from the reader's understanding of the notebook, or the document's integrity.	The notebook complies with all, or virtually all of the specified format criteria. Deviations are rare or non- existent and do not detract from the reader's understanding of the notebook, or the document's integrity.

	1	2	3	4	5
Is the	The notebook	Significant	Limited	The notebook	All writing
content	is almost	portions of	sections of	is generally	and content is
clear, legible,	entirely	the notebook	the notebook	legible and	eminently
and easy to	illegible or	are illegible	are illegible	easy to	clear and
understand?	impossible to	or difficult to	or difficult to	understand.	easily legible.
	understand.	understand.	understand.		







	1	2	3	4	5
Are	The notebook	The notebook	The notebook	The notebook	The
organization	is extremely	lacks clear	is organized	is generally	document's
al aides,	disorganized,	organization,	in parts and	well	content is
including	which makes	which at	disorganized	organized.	organized in a
page	it difficult to	times makes	in others.		way that
numbers, a	follow the	it difficult to		Organization	actively
table of	team's	follow the	Organization	al aids are	enhances
contents and	engineering	team's	al aids are	consistently	clarity and
section	design	engineering	used to help	employed to	makes it easy
headings	process.	design	the reader	help the	to
effectively		process.	locate	reader locate	understand.
used to help	Organization		relevant	relevant	
the reader	al aids are not	Organization	information,	information.	Organization
locate	employed or	al aids are	but		al aids are
relevant	employed so	rarely	implemented		uniformly
information?	ineffectively	employed	inconsistently		employed to
	that the	and only			help the
	reader is	seldom assist			reader
	unable to use	the reader in			effortlessly
	them to local	locating			locate
	relevant	relevant			relevant
	information.	information.			information.







Content (40%)	Total:/40
• Does the content follow the team's engineering process from beginning to end?	/5
<ul> <li>Does the engineering notebook clearly explain the team's design considerations and the reasoning for their ultimate decisions?</li> </ul>	/15
<ul> <li>Would the notebook enable someone familiar with TARC and rocketry to reproduce a copy of their rocket and flight procedures at any stage in their design cycle?</li> </ul>	/15
<ul> <li>Does the notebook contain drawings, photos or other data/schematics, as necessary to accomplish the above goals?</li> </ul>	/5

	1	2	3	4	5
Does the	The	The notebook	The notebook	The notebook	The notebook
content	notebook	omits	describes the	describes the	exhaustively
follow the	omits large	occasional,	team's entire	team's entire	describes the
team's	sections of	but	engineering	engineering	team's entire
engineering	the team's	substantial	design	design	engineering
process from	engineering	sections of	process, but	process, and	design
beginning to	design cycle.	the team's	may cover	does so with	process, from
end?		engineering	some sections	sufficient	defining
	Large	design cycle.	with	depth.	mission
	portions of		insufficient		requirements
	content may	Considerable	detail.	All content	through
	have been	sections are		was added as	completion of
	added after	described	All content	developments	qualification
	the fact,	with	was added as	occurred,	flights.
	rather than	insufficient	developments	rather than	
	as they	detail.	occurred,	retroactively.	All content
	occurred.		rather than		was added as
		Most content	retroactively.		developments
		was added as			occurrea,
		developments			rather than
		occurred,			retroactively.
		rather than			
		retroactively.			







Does the engineering notebookTheTheTheThe notebookTheengineering notebooknotebooknotebooknotebookdescribesnotebookdescribesnotebooknotebookdescribes thedescribesdescribesdescribesmost majorclearlyclearly explain the team'steam's rocketthe team'ssome majordesigndescribes allthe team'sdesign, butrocketdesigndecisions.major designdesign tails tofails todesign anddecisions.decisionsdecisionsconsiderations and the reasoning for their ultimateselectedThe teamclearlymodificationsreasoning for their ultimateled to thebut rarelygenerallyidentifiesmade to thedecisions?design.theirobjectiveseach designinitialdecisionmakingwith eachand maywhen new		1-3	4-6	7-9	10-12	13-15
engineering notebooknotebooknotebooknotebookdescribes the describes the describes the describesnotebookdescribesmost majorclearlyclearly explain the team'steam's rocketthe team's design, butthe team'ssome major designdesigndescribes all designthe team's designdesign, but fails torocketdesign design and decisions.decisions.major design decisionsconsiderations and the reasoning for their ultimateexplain the but rarelyselectedThe team(including modificationstheir ultimate decisions?selectedexplainsidentifies the objectivesobjectives of each designrocket after initialdecisions?design.theirobjectives associatedconsideration, fabrication or ymakingfabrication or with each	Does the	The	The	The	The notebook	The
notebook clearly explain the team's rocketdescribes the team'smost major designclearly designthe team's design, but fails tothe team's rocketsome major designdesign decisions.design designdescribes all decisions.design considerations and the reasoning for their ultimatefails todesign and selecteddecisions.major design decisions.reasoning for their ultimateled to thebut rarely explainsgenerallyidentifies identifies the objectivesmade to the rocket afterdecisions?design.theirobjectives associatedconsideration, considerationsfabrication or process thatdecisions?makingwith eachand maywhen new	engineering	notebook	notebook	notebook	describes	notebook
clearly explain the team'steam's rocketthe team'ssome majordesigndesigndescribes allthe team's designdesign, but fails torocketdesigndesigndecisions.major designdesign considerationsfails todesign and selecteddecisions.The teamdecisionsand the reasoning for their ultimateprocess that selectedsolutions,The teamclearly generallymodificationstheir ultimate decisions?selectedexplainsidentifies the objectivesobjectives of each designrocket after initialdecisions?design.their makingobjectiveseach designinitial fabrication or when new	notebook	describes the	describes	describes	most major	clearly
the team's designdesign, but fails torocket design and design and selecteddesign decisions.decisions.major design decisions decisionsconsiderations and the reasoning for their ultimate decisions?explain the selectedselectedThe team clearly(including modificationstheir ultimate decisions?process that selectedsolutions, but rarely explainsThe team identifies the objectivesclearly modificationsdecisions?led to the selectedbut rarely explainsgenerally identifies the objectivesobjectives of each designrocket after initialdecisions?design.their makingobjectives with eachconsideration, and mayfabrication or when new	clearly explain	team's rocket	the team's	some major	design	describes all
design considerationsfails to explain the process thatdesign and selecteddecisions.The team (including modificationsand the reasoning for their ultimate decisions?process that led to thesolutions, but rarely explainsThe team generallyclearly identifiesmodifications made to the objectives of each designdecisions?explains design.identifies the theirobjectives associatedobjectives of consideration, fabrication or with each	the team's	design, but	rocket	design	decisions.	major design
considerations and the reasoning for their ultimate decisions?explain the selectedselected solutions,The team the team generally(including modificationstheir ultimate decisions?led to the selectedbut rarely explainsgenerally identifies the objectivesclearly modificationsmodificationsdecisions?selected decisionexplains theiridentifies the objectivesobjectives of each designrocket after initialDesignmakingwith eachand maywhen new	design	fails to	design and	decisions.		decisions
and the reasoning for their ultimate decisions?process that solutions, but rarely explainsThe team generallyclearly identifiesmodifications made to the objectives of each designand the reasoning for their ultimate decisions?process that but rarely explainssolutions, but rarely explainsThe team generallyclearly identifiesmodifications made to the objectives of each designdecisions?design.their decisionobjectives associatedeach design consideration, fabrication or when new	considerations	explain the	selected		The team	(including
reasoning for their ultimate decisions?led to the selected design.but rarely explains their decisiongenerally identifies the objectives associated with eachidentifies objectives of each design initial consideration, and maymade to the rocket after fabrication or when new	and the	process that	solutions,	The team	clearly	modifications
their ultimate decisions?selected (design.explains (their) decisionidentifies the (objectives)objectives of (each design)rocket after (initial)decision Designdecision (making)associated (with each)consideration, (and may)fabrication or (when new)	reasoning for	led to the	but rarely	generally	identifies	made to the
decisions?design.theirobjectiveseach designinitialdecisionassociatedconsideration,fabrication orDesignmakingwith eachand maywhen new	their ultimate	selected	explains	identifies the	objectives of	rocket after
decisionassociatedconsideration,fabrication orDesignmakingwith eachand maywhen new	decisions?	design.	their	objectives	each design	initial
Design   making   with each   and may   when new			decision	associated	consideration,	fabrication or
		Design	making	with each	and may	when new
decisions are process. design consider one flight		decisions are	process.	design	consider one	flight
seldom consideration or two vehicles were		seldom		consideration	or two	vehicles were
explained, Alternative and explains alternatives. constructed).		explained,	Alternative	and explains	alternatives.	constructed).
and are may design the team's		and are may	design	the team's	<b></b> , .	
be solutions are selected The team The team		be	solutions are	selected	The team	The team
characterized rarely or solution. offers lucidly		characterized	rarely or	solution.	offers	
by random never plausible identifies		by random	never	-	plausible	identifies
trial and considered. The team reasoning for objectives of		trial and	considered.	The team	reasoning for	objectives of
error rather may fail to its selected each design		error rather	<b>–</b> 1 11	may fail to	its selected	each design
than Explanations fully consider solutions. consideration		than	Explanations	fully consider	solutions.	consideration
disciplined are alternatives, and		aiscipiinea	are	alternatives,		and
testing. Infrequent and only establishes a		testing.	Infrequent	and only		establishes a
and when sometimes decision			and when	sometimes		decision
present may offers space of			present may	offers		space of
be unclear or justifications potential			be unclear or	JUSTIFICATIONS		potential
lilogical. for its solutions.			illogical.	for its		solutions.
decision.				decision.		Theteem
						evaluates all
notential						notential
solutions and						solutions and
Solutions and						offers clear
						and logical
						reasoning for
its selected						its salacted
solution						solution







	1-3	4-6	7-9	10-12	13-15
Would the	The notebook	The notebook	The notebook	The notebook	The notebook
notebook	omits	omits some	contains	contains	contains full
enable	significant	significant	design,	design,	design,
someone	and critical	information.	dimension	dimension	dimension
familiar with	information.		and materials	and materials	and materials
TARC and		A skilled	information,	information.	information.
rocketry to	A skilled	individual	but be may	Where	Where
reproduce a	individual	would have	missing	needed,	needed,
copy of their	would	to ask	information	component	component
rocket and	require	numerous	necessary to	fabrication	fabrication
flight	extensive	questions to	replicate all	and/or	and/or
procedures	additional	replicate a	functions of	sourcing	sourcing
at any stage	information	team's rocket	the rocket.	instructions	instructions
in their	to replicate	and may be		are included.	are clear and
design cycle?	the team's	confused	At points, the	Portions of	unambiguous.
	ultimate	about what	team may	this	
	rocket.	constitutes	omit full	information	Using only
	Earlier stages	each revision	details of a	may be	the
	in the team's	over the	rocket	ambiguous or	information
	engineering	course of the	revision.	unclear.	contained in
	design cycle	design.	<b>.</b>		the
	may be		Still, a skilled	Lach	engineering
	omitted or		Individual	significant	notebook, a
	covered with		would	modification	skilled
	such		generally be	to the team's	Individual
	superficiality		able to	rocket is	would be able
	that changes		replicate the	clearly	to confidently
	made to the		team's rocket	identified and	replicate the
	rocket over		design at		team's rocket
	the course of		most points	Individual	and launch
	the season		during the	would be able	procedures at
	are unclear.		design cycle.	to confidently	any arbitrary
				build and	point during
				iaunch a	the team s
				similar rocket	engineering
				at dily arbitrary	design cycle.
				ai biti ai y	
				point during	
				the team's	







			engineering design cycle.	
--	--	--	------------------------------	--

	1	2	3	4	5
Does the	Graphics	Graphics	Graphics	Graphics	The notebook
notebook	and data are	and data are	and data are	and data are	contains
contain	either	included,	included	included	drawings,
drawings,	missing, or	but provide	and help	and help	photos and
photos or other	not helpful	only limited	explain the	explain the	other
data/schematics,	to	help to	team's	team's	data/schematics
as necessary to	understand	understand	engineering	engineering	as necessary to
accomplish the	the team's	the team's	design	design	clearly illustrate
above goals?	engineering	engineering	process.	process.	the team's
	design	design			engineering
	process.	process.	However,	Graphics	design process.
			some	and data are	
	This may	Graphics	sections	clear, but	Graphics and
	because	may be only	may lack	sometimes	data are clear,
	diagrams	partially	units or	repeat	well labeled and
	lack units,	related to	otherwise	rather than	enhance the
	aretoo	the content	be	augment	clarity and
	general or	of the	ambiguous.	the text of	effectiveness of
	do not	notebook or	Some areas	the	the notebook.
	correspond	too	of the	notebook.	
	to the	superficial.	notebook		
	content		might be		
	discussed in		served by		
	the .		additional		
	engineering		graphics or		
	notebook.		schematics.		







#### Data and Analysis (20%)

Total: \_\_\_/30

•	Does the engineering notebook contain results data for flights?	/10
•	Does the engineering notebook clearly explain how and why the rocket	/10
	was adjusted in response to the gathered data?	
•	Does the team use results data to make performance converge	/10

• Does the team use results data to make performance converge \_\_\_\_\_, towards the stated mission parameters?

	1-2	3-4	5-6	7-8	9-10
Does the	The team	The team	Results are	Results are	Results are
engineering	does not	includes data	included for all	included for	included for
notebook	include	for qualifying	test flights, but	all test flights	all test flights
contain	flight data,	flights, but	lack	and include	and include
results data	or enough	may include	information	all	all
for flights?	of the	less data for	beyond basic	information	information
	required	practice flights	flight	specified in	specified in
	information	or entirely	performance	the	the
	is missing as	omit them. For	characteristics.	engineering	engineering
	to render	qualifying		notebook	notebook
	the data of	flights, the		contest	contest
	limited use.	team only		specifications.	specifications.
		includes basic		The team	The team
		flight		collects only	demonstrates
		performance		the required	good
		characteristics.		data, but does	judgement in
				not note	Including
				anomalies or	additional
				other	night
				noteworthy	condition
				data points.	mormation
					as necessary
					anu omphacizing
					relevant or
					anomalous
					anomalous
					flight test
					data.







	1-2	3-4	5-6	7-8	9-10
Does the	The team	The team	The	The	The notebook
engineering	does not	describes	notebook	notebook	offers
notebook	describe how	how the	clearly	explains how	particular
clearly	the rocket	rocket and/or	explains	and why the	insight into
explain how	and/or launch	launch	either how or	rocket and/or	how and why
and why the	procedures	procedures	why the	flight	the rocket
rocket was	were	were	rocket and/or	procedures	and/or flight
adjusted in	modified for	modified for	flight	were	procedures
response to	each flight.	some flights,	procedures	adjusted for	were adjusted
the gathered	Instead, the	but omits	were	each flight	before each
data?	notebook	descriptions	adjusted for	based on	flight based
	may simply	for others.	each given	prior flight	on prior flight
	discuss		flight, but	data and or	data and or
	modifications		rarely	new	new
	generally, or		successfully	hypotheses.	hypotheses.
	state the		explains		Explanations
	problems		both.		are clear and
	that				demonstrate a
	modifications				superior
	were				understanding
	intended to				of scientific
	address.				and
					engineering
					principles.

	1-2	3-4	5-6	7-8	9-10
Does the	The team	The team	The team	The team	The team
team use	makes little	makes some	documents	analyzes	analyzes
results data	effort to be	effort to use	divergence	flight	flight
to make	deliberate in	data, but	from the	conditions	conditions
performance	their use of	adjusts	contest's	and rocket	and rocket
converge	data.	parameters	stated targets	design to	design to
towards the	Modifications	incorrectly or	and adjusts	identify	identify
stated	to rocket,	repeatedly	their rocket	reasons for	reasons for
mission	flight	misattributes	accordingly,	divergence	divergence
parameters?	procedures	variance to	but does not	from the	from the
	or selected	erroneous	develop an	contest's	contest's
	launch	causes.	understanding	stated	stated







conditions	of the reasons	targets. The	targets. The
are made	for their	team	team
haphazardly	rockeť s	correctly	correctly
and show no	divergence	adjusts	adjusts
convergence	from the	parameters	parameters
towards	goals.	of their	of their
contest		rocket,	rocket,
objectives		launch	launch
over time.		procedures	procedures
		or launch	or launch
		conditions to	conditions to
		mitigate	mitigate
		these factors,	these factors.
		but does not	Performance
		cause	of the team's
		performance	rocket
		of the team's	converges
		rocket to	towards the
		converge	contest's
		towards the	goals over
		contest's	the course of
		goals over	the team's
		the course of	flights.
		the team's	
		flights.	







Creativity (10%)

Total: \_\_\_/10

\_\_\_/10

Does the team propose and/or execute innovative or unique solutions • to address design or performance concerns?

	1-2	3-4	5-6	7-8	9-10
Does the	The team's	The team's	The team's	The team's	The team
team	solutions to	solutions to	solutions to	solutions to	proposes and
propose	design or	design or	design or	design or	executes
and/or	performance	performance	performance	performance	exceptionally
execute	concerns are	concerns are	concerns are	concerns are	innovative
innovative or	entirely	primarily	may be	generally	and/or
unique	derivative to	repurposing	rooted in	original, but	unique
solutions to	either	of solutions	repurposing	may draw	solutions that
address	another team	proposed by	of solutions	from	address
design or	or exact	others. They	proposed by	standard	relevant
performance	copies of	may make	others.	techniques	design and
concerns?	publically	trivial	Nevertheless,	and solution	performance
	available	modifications	the team	sets rather	concerns.
	specifications.	to suit the	makes	than	
	The team	specifics of	substantial	proposing	As
	demonstrates	their rocket	modifications	truly unique	documented
	little to no	design.	to suit the	and	in the
	original		specifics of	innovative	engineering
	thought.		their rocket	solutions.	notebook,
			design.		these
			Sometimes		solutions
			the team		actively
			develops		advance the
			their own		state of
			novel		knowledge in
			solutions.		the field of
					model
					rocketry