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***Estes Body Tube/Kit Reference***

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**Revision: 3.1**

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## Record of Revisions

Revision	Date	Description
1.0	December 29, 2005	Initial Release
1.1a	January 8, 2006	Foreword edit; corrected various typos.
2.0	December 26, 2006	<ul style="list-style-type: none"><li>- Added entries for new kits: #2121 Liquidator, #2123 Eggscaliber, #2146 Rock-Ir, #2168 Metalizer, #2169 Dragonite.</li><li>- Added entry to Appendix I, Section 4.0, regarding P/N conflicts in #2169, Dragonite.</li><li>- Corrected tube designation entries for #2048, Saturn 1b.</li><li>- Added entry to Appendix I, Section 4.0, to highlight the gloss wrap covering found on the main HBT-1000 tubes used for #2147, Star Destroyer.</li><li>- Updated entry for #2109 Renegade regarding the use of P/N 030408 BT-20J to include #2123, Eggscaliber.</li><li>- Corrected P/N typo for BT-70 found in K-21, Gemini Titan.</li><li>- Corrected typo, length of BT-55V, for K-26, ARCAS.</li><li>- Corrected P/N typo for PST-50S found in K-46, Shrike.</li><li>- Corrected P/N typo for BT-20 found in #0865 Mini-Mean Machine.</li><li>- Corrected typo, length of P/N 030406 BT-60, Blue Ninja in Note 17, Appendix I, Section 4.</li><li>- Added comments concerning P/N 030407 BT-60 to Note 17, Appendix I, Section 4.</li><li>- Corrected parts designation typo for P/N 030336 BT-20N, found in #0895 Solar Warrior.</li><li>- Added notes, Appendix I, Section 4, for #1287 LTV Scout and #1918 Titan II to highlight kit instruction listing errors regarding the length of P/N 030415 BT-60KC.</li><li>- Added a note to Appendix I, Section 4, regarding the conflicting use of several part numbers in #2001 Saturn V.</li><li>- Added a note to Appendix I, Section 4, regarding the conflicting use of P/N 030329 in #0835, Nike Arrow.</li><li>- Updated the note in Appendix I, Section 4, for #2048 Saturn 1b.</li><li>- Updated entry for kit #2071 CATO to reflect that the BT-60 tube is pre-finished Orange.</li><li>- Updated entries in Appendix I, Section 4, for #2109 Renegade and #2110 Outlander.</li><li>- Updated tube entries for #2125 AIM-9 Sidewinder.</li><li>- Added note on #2126 Tech-Pak, Appendix I, Section 4</li><li>- Added notes regarding BT-30 and BT-40, and updated the BT-52 section in Appendix I, Section 3.</li><li>- General update to Appendix II to incorporate various new tubes.</li><li>- Added Record of Revisions page.</li></ul>
3.0	February 9, 2008	<ul style="list-style-type: none"><li>- Updated notes concerning early Estes Body Tubes in Appendix II, Section 3.</li><li>- Added notes to Appendix I, Section 3, for BT-46, BT-67 and JT-80C</li><li>- Added entries for new kits: #2029 Converter &amp; #2145 Porta-Pot Shot.</li><li>- Added entries for new kits: #2027 Pop Fly, #2037 D-Region Tomahawk, #1250 Interceptor (re-release) &amp; #1350 Interceptor E.</li><li>- Corrected length of BT-30K, kit #K-15, Sprite, based on information discussed in the Old Rockets Newsgroup in early 2007.</li><li>- Added note to Appendix I, Section 4, concerning #0860 Star Dart.</li><li>- Added entries for #2142 R2-D2 and #2163 Exo-Skell</li><li>- Added notes to Appendix I, Section 4, concerning #0651 Der Red Max (re-release).</li><li>- Updated Appendix II to incorporate new tubes.</li></ul>

## Record of Revisions

<b>Revision</b>	<b>Date</b>	<b>Description</b>
3.1	February 21, 2008	<ul style="list-style-type: none"><li>- Added kit #2157, Saturn V, to the list of kits incorporating the older JT-80C, Appendix I, Section 3.5.</li><li>- Updated the text with minor edits.</li></ul>

## Foreword

It is the intent of this document to provide a comprehensive listing and characterization of all known body tubes in the Estes Industries kit line. Only kits have been considered; no starter sets, cold power models, or RTFs have been included.

For the purpose of this listing, a body tube is defined as a structural tube component that provides form and/or shape for the model; we have also included motor mount tubes. Body tube couplers and engine hook sleeves have not been included except in those cases where this type of part has been incorporated into the form of the model (e.g.: JT-80C, used as the tail rings in #2010, Star Rider).

The Body Tube Reference has been organized by kit number, rather than by part number, unlike its companion reference the Estes Nose Cone/Kit Reference List. The reason for this goes to the opposite way in which the two lists tend to be used: the Nose Cone reference is most often used to find a late model kit that can be scavenged for its nose to hopefully clone an older model. The Body Tube list is organized to tell the modeler the type, length and quantity of tubes comprising a particular model. This is also consistent with the general observation that while the majority of the kits tend to have only one nose cone, the opposite tends to be true for body tubes.

This document also includes two appendices, which provide further detailed information for the modeler. Appendix I clarifies tube use and other specific kit information; Appendix II expands the 1974 Custom Parts Catalog by identifying the "new" body tubes and associated part numbers created since its release.

In closing, I would like to extend a very special thank you to Bill Eichelberger, whose input to this activity helped confirm a significant amount of the research. I would also like to thank the many other "Old Rockets" rocketeers who offered input on the Newsgroup in support of this compilation. This data has been very helpful while cross-checking and confirming my own measurements and assessments, and is greatly appreciated.

December 2005

John Brohm

# Estes Body Tube/Kit Reference List

## Legend

- The Body Tube Reference List provides the part number, type and quantity of each tube type included in the listed kit. Quantity is indicated by a number in parentheses; an absence of parentheses is an indication of a single tube. Pre-colored body tubes also have their color attribute indicated in parentheses as applicable.
- Most kit entries have been contained in a single line; an entry that requires more than one line is grouped in a box to avoid confusion between lines.
- Many of the later model kit instructions do not include body tube part numbers; where possible, these have been added using the 1974 Custom Parts Catalog as the reference. No available or known part number is indicated by the entry "??????".
- To the maximum extent possible, tube lengths have been confirmed by direct measurement. Certain tube types were found to have a variation in length, so in these cases, the generic length from the 1974 Custom Parts Catalog was used as the entry. This topic is covered more fully in Appendix I.
- In later model kits, Estes sometimes varied the prefix for "Body Tube" in the part designation. Instead of the more familiar "BT", some kit instructions might show "#" or perhaps no prefix at all. Heavy walled tubes have been observed to have their prefix vary between "HBT" and "HD". For the sake of uniformity in the listing, we have adopted "BT" and "HBT" as the designation prefixes.

Certain early kits contained "special" body tubes, and these were designated "SBT". Again, for the sake of uniformity, this special tube designation method was preserved in this listing as applicable.

- Clarifying notes pertaining to certain kits are provided in Appendix I. Kits so affected are annotated in the Kit Name column with a reference to Appendix I.
- The kit listing essentially tracks the main Estes kit stream; ARFs, Starters, and special re-packaged series like the "Launchables" are not included here. For a complete listing of all Estes kits, please visit [http://www.rocketshoppe.com/kit\\_lists.htm](http://www.rocketshoppe.com/kit_lists.htm)

## Estes Body Tube/Kit Reference List

Kit Number	Kit Name	P/N	Designation	Length	P/N	Designation	Length	P/N	Designation	Length
K-1/1201	Scout	030340	BT-30A	3.5"						
K-2	Mark	030342	BT-30B	6.125"						
K-3	Space Plane	030344	BT-30C	5.5"						
K-4/1204	Streak	030314	BT-10H	3.062"						
K-5/1205	Apogee II	030322	BT-20D	6.50"	030324	BT-20G	3.5"	030604	PST-20J	2.75"
K-6	Ranger	030406	BT-60D	11.00"	030414	BT-60K	7.00"	030326	BT-20J (3)	2.75"
K-7	Phantom	030602	PST-20	8.00"						
K-7B	Phantom (Appendix 1)	030620	PST-50FJ	6.00"	030604	PST-20J	2.75"			
K-8/1208	Sky Hook	030346	BT-30F	7.00"						
K-9	Spaceman	030412	BT-60J	2.75"						
K-10/1210	Cobra	030406	BT-60D	11.00"	030368	BT-50S	4.00"	030326	BT-20J (3)	2.75"
K-11/1211	WAC Corporal	030320	BT-20B	8.65"						
K-12/1212	Farside (Appendix 1)	030360	BT-50H	7.75"	030362	BT-50J (2)	2.75"	030326	BT-20J	2.75"
		030368	BT-50S	4.00"				030334	BT-20M (2)	2.25"
K-12X	Farside X	030360	BT-50H	7.75"	030362	BT-50J (2)	2.75"	030326	BT-20J	2.75"
		030418	BT-60R	5.00"				030334	BT-20M (2)	2.25"
K-13/1213	Falcon	030326	BT-20J	2.75"						
K-14/1214	Drifter	030360	BT-50H	7.75"	030326	BT-20J	2.75"			
K-15	Sprite (Appendix 1)	030350	BT-30K	2.75"	030172	RT-70	0.688"			
K-16	Delta	030360	BT-50H	7.75"	030326	BT-20J	2.75"	030334	BT-20M	2.25"
		030362	BT-50J	2.75"						
K-17/1217	Aerobee 300	030306	BT-5P	5.1"	030366	BT-50L	12.7"	030326	BT-20J	2.75"
K-18/1218	X-Ray	030320	BT-20B	8.65"	030608	PST-50S	4.00"			
K-19	Invader	030326	BT-20J	2.75"						

## Estes Body Tube/Kit Reference List

Kit Number	Kit Name	P/N	Designation	Length	P/N	Designation	Length	P/N	Designation	Length	
K-20	Mars Snooper	030360	BT-50H	7.75"	030322	BT-20D	6.5"	030308	BT-5T (3)	1.5"	
					030326	BT-20J	2.75"				
K-21	Gemini Titan	030424	BT-70	17.5"	030414	BT-60K	7.00"	030320	BT-20B	8.65"	
								030324	BT-20G (2)	3.5"	
K-22/1222	V-2	030390	BT-55S	4.00"	030324	BT-20G	3.5"				
K-23/1223	Big Bertha	030396	BT-60	18.00"	030320	BT-20B	8.65"				
K-24/1224	Gyroc	030322	BT-20D	6.5"							
K-25/1225	Alpha	030360	BT-50H	7.75"	030326	BT-20J	2.75"				
EK-25/1419	Alpha II	030360	BT-50H	7.75"	030324	BT-20G	3.5"				
K-26/1226	ARCAS	030392	BT-55V	16.35"	030326	BT-20J	2.75"				
K-27/1227	Honest John	030372	BT-50W	9.5"	030326	BT-20J	2.75"				
K-28	Thor-Agena B	030414	BT-60K	7.00"	030380	BT-52S	3.938"	030326	BT-20J	2.75"	
K-29/1229	Saturn 1b	030442	BT-101T	2.78"	030430	BT-70V	10.6"	030376	BT-51N (8)	12.42"	
			030436	BT-100Z	10.89"	030422	BT-63Y (2)	1.34"	030352	BT-50	18.00"
							030326	BT-20J (4)	2.75"		
K-30	Little Joe II	030428	BT-70H	7.15"	030326	BT-20J	2.75"				
K-31	Star Blazer	030322	BT-20D	6.5"	030334	BT-20M	2.25"				
K-32	Starlight	030366	BT-50L	12.7"	030172	RT-70 (2)	0.688"	030326	BT-20J	2.75"	
K-33/1233	Trident	030372	BT-50W	9.5"	030326	BT-20J	2.75"	030302	BT-5 (3)	18.00"	
			030368	BT-50S							4.00"
K-34/1234	Nighthawk	030320	BT-20B	8.65"							
K-35/1235	Constellation	030360	BT-50H	7.75"	030608	PST-50S	4.00"	030326	BT-20J	2.75"	

## Estes Body Tube/Kit Reference List

Kit Number	Kit Name	P/N	Designation	Length	P/N	Designation	Length	P/N	Designation	Length
K-36/1236	Saturn V	030438	BT-101	16.5"	030420	BT-63CJ	3.00"	030364	BT-50KE	15.00"
		030440	BT-101K	7.59"	030412	BT-60J	2.75"	030360	BT-50H	7.75"
		030432	BT-80	7.6"	030394	BT-58	12.75"	030326	BT-20J (3)	2.75"
K-37/1237	Scrambler	030406	BT-60D	11.00"	030616	PST-65R	5.00"	030326	BT-20J (3)	2.75"
K-38	Avenger (Appendix 1)	030392	BT-55V	16.35"	030360	BT-50H	7.75"	030326	BT-20J	2.75"
		030386	BT-55J	2.75"				030334	BT-20M	2.25"
K-39/1239	Semi-Scale Saturn V	030402	BT-60AJ	10.00"	030378	BT-52AG	2.1"	030326	BT-20J	2.75"
		030268	JT-60P	1.5"						
K-40	Midget	030368	BT-50S	4.00"	030334	BT-20M	2.25"	030318	BT-20AE	1.5"
K-41/1241	Semi-Scale Mercury Redstone	030416	BT-60KF	16.1"	030326	BT-20J	2.75"			
K-42/1242	Orbital Transport	030352	BT-50	18.00"	030322	BT-20D	6.5"	030308	BT-5T (4)	1.5"
					030326	BT-20J	2.75"			
K-43	Mars Lander	030434	BT-100CE	3.50"	030408	BT-60FG	6.7"	030332	BT-20DJ	4.00"
		030174	RT-99D	0.391"						
K-44/TK-44	Birdie	030326	BT-20J	2.75"	(Motor mount only)					
K-45	Beta	030320	BT-20B	8.65"	030318	BT-20AE	1.5"			
K-46/1246	Shrike	030352	BT-50	18.00"	030356	BT-50AH	1.875"	030326	BT-20J (2)	2.75"
		030608	PST-50S	4.00"						
K-47	Cherokee-D	030392	BT-55V	16.35"	030362	BT-50J	2.75"			
K-48/1248	Bandit (Appendix 1)	030392	BT-55V	16.35"	030374	BT-51CI	3.875"	?????	PBT-20B	8.65"
		030390	BT-55S	4.00"	?????	PBT-50H	7.75"			

## Estes Body Tube/Kit Reference List

Kit Number	Kit Name	P/N	Designation	Length	P/N	Designation	Length	P/N	Designation	Length
K-49/1249	Sprint	030372	BT-50W	9.5"	030326	BT-20J	2.75"			
K-50/1250	Interceptor	030382	BT-55	18.00"	030326	BT-20J	2.75"			
K-51/1251	Semi-Scale Sandhawk	030388	BT-55KG	16.69"	030360	BT-50H	7.75"			
K-52/1200P	Omega	030398	BT-60AD	14.00"	030360	BT-50H	7.75"	030368	BT-50S	4.00"
		030418	BT-60R (2)	5.00"						
K-53	Stinger	030320	BT-20B	8.65"						
K-54/1254	SAROS	030360	BT-50H	7.75"	030322	BT-20D	6.5"	030334	BT-20M	2.25"
K-55/1255	Goblin	030384	BT-55IJ	9.00"	030362	BT-50J	2.75"			
K-56/1256	Alpha III	030357	WBT-50EE	5.5"	030326	BT-20J	2.75"			
K-57/1257	Sky Dart	030366	BT-50L	12.7"	??????	PBT-20KB				
K-58/1258	Demon	030382	BT-55	18.00"	030390	BT-55S	4.00"	030362	BT-50J	2.75"
K-59	SPEV	030428	BT-70H	7.15"	030380	BT-52S	3.938"	030326	BT-20J	2.75"
		030408	BT-60FG	6.7"						
TK-1/0801	Mosquito	030304	BT-5BJ	2.00"						
TK-2/0802	Screamer	030306	BT-5P	5.1"						
TK-3/0803	Mini-Bertha	030320	BT-20B	8.65"	030308	BT-5T	1.5"			
TK-4/0804	Hornet	030344	BT-30C	5.5"	030348	BT-30J	2.75"	030308	BT-5T	1.5"
TK-31/0831	Star Blazer	030322	BT-20D	6.5"	030334	BT-20M	2.25"	030308	BT-5T	1.5"
TK-40	Midget	030332	BT-20DJ	4.00"	030304	BT-5BJ	2.00"	030308	BT-5T	1.5"
TK-45/0845	Beta	030320	BT-20B	8.65"	030318	BT-20AE	1.5"	030308	BT-5T (2)	1.5"
0650/KC-1	Quasar	030360	BT-50H	7.75"	030326	BT-20J	2.75"			
0651/KC-2	Der Red Max	030410	BT-60HE	8.5"	030324	BT-20G	3.5"			
0651	Der Red Max (Re-release) A1	031716	BT-60HE	8.5"	030324	BT-20G	3.5"			

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Kit Number	Kit Name	P/N	Designation	Length	P/N	Designation	Length	P/N	Designation	Length
0652/KC-3	Patriot	030396	BT-60	18.00"	030320	BT-20B	8.65"			
0653/KC-4	Starship Vega	030366	BT-50L	12.7"	030324	BT-20G	3.5"	030308	BT-5T (3)	1.5"
0654/KC-5	BOMARC	030382	BT-55	18.00"	??????	PBT-20	18.00"	??????	BT-50 (2)	6.375"
0657	BOMARC	030382	BT-55	18.00"	030359	BT-50FE (2)	6.5"	030326	BT-20J	2.75"
0802	Quark (Appendix 1)	030304	BT-5	1.75"						
0803	Bandito (Appendix 1)	030333	BT-20 (Black)	7.5"	030309	BT-5	1.625"			
0804	Firehawk	031763	BT-20 (Silver)	7.00"						
0805	Mini BOMARC	030320	BT-20B	8.65"	030310	BT-5CJ (2)	3.00"	030304	BT-5BJ	2.00"
0806	Pegasus	030320	BT-20B	8.65"	030304	BT-5BJ	2.00"			
0806	Firestreak SST (Appendix 1)	060618	(Plastic)	6.469"	030306	BT-5	6.5"			
0807	Condor	030366	BT-50L	12.7"	030304	BT-5BJ	2.00"			
0807	Lucky Seven (Appendix 1)	030468	BT-5	1.375"	(BT-5 = motor mount; main body is injection molded plastic)					
0809	Gauchito	030466	BT-58	6.125"	030290	BT-5	1.75"			
0810	220 Swift	030290	BT-5	1.75"						
0815	Javelin	030306	BT-5P (2)	5.1"						
	Super Flea	030310	BT-5CJ	3.00"	030304	BT-5BJ	2.00"			
0816	Wolverine	030360	BT-50H	7.75"	030304	BT-5BJ	2.00"			
0817	Aero-Hi	030320	BT-20B	8.65"	030304	BT-5BJ	2.00"			
0818	Rogue	030320	BT-20B	8.65"	030304	BT-5BJ	2.00"			
0819	Little John	030372	BT-50W	9.50"	030304	BT-5BJ	2.00"			
0820	EAC Viper	030372	BT-50W	9.50"	030304	BT-5BJ	2.00"			
0821	Firecat	030372	BT-50W	9.50"	030351	BT-48BE	2.5"	030326	BT-20J	2.75"
0834	X-Ray	030291	BT-5 (Black)	8.00"	030604	PST-20J	2.75"			
0835	Nike-Arrow	030329	BT-20	5.00"	030292	BT-5 (Silver)	9.00"	030304	BT-5BJ	2.00"
0846	Eclipse (Appendix 1)	030320	BT-20B	8.65"	030304	BT-5BJ	2.00"			
0850	Star Snoop	030418	BT-60R	5.00"	030304	BT-5BJ	2.00"			
0851	Cloud Hopper	030418	BT-60R	5.00"	030304	BT-5BJ	2.00"			

## Estes Body Tube/Kit Reference List

Kit Number	Kit Name	P/N	Designation	Length	P/N	Designation	Length	P/N	Designation	Length
0852	Galaxy Guppy	030418	BT-60R	5.00"	030304	BT-5BJ	2.00"			
0853	Zoom Broom	030418	BT-60R	5.00"	030304	BT-5BJ	2.00"			
0854	Missile Toe	030418	BT-60R	5.00"	030386	BT-55J	2.75"	030304	BT-5BJ	2.00"
0855	Sky Shriek	030418	BT-60R	5.00"	030304	BT-5BJ	2.00"			
0860	Star Dart (Appendix 1)	030310	BT-5CJ (2)	3.00"						
0861	SARK	030306	BT-5P (2)	5.1"						
0862	A.S.P.	030316	BT-20	18.00"	030304	BT-5BJ	2.00"			
0863	Estes Star Liner	030320	BT-20B	8.65"	030310	BT-5CJ	3.00"			
0864	Spartan	030372	BT-50W	9.50"	030304	BT-5BJ	2.00"			
0865	Mini Mean Machine	030316	BT-20 (2)	18.00"	030304	BT-5BJ	2.00"			
0866	Mini Tri-Pak	030303	BT-5	6.00"	030305	BT-5 (2)	4.00"	030304	BT-5BJ	2.00"
0867	Airborne Surveillance Missile	030359	BT-50FE	6.5"	030306	BT-5P	5.1"			
0868	Big Yank	030330	BT-20L (2)	12.00"	030304	BT-5BJ	2.00"			
0870	Pulsar	??????	BT-5	5.00"						
0871	Vector	??????	BT-5	5.00"						
0872	Sparrow	030305	BT-5 (2)	4.00"						
0873	Hawkeye (Appendix 1)	030303	BT-5	6.00"	030172	JT-5C (2)	0.75"			
0874	Mini Scale Combo Pak	??????	BT-5 (2)	5.00"	030310	BT-5CJ (2)	3.00"			
0875	Dragonfly	??????	BT-5	5.00"						
0876	Micron (Appendix 1)	030332	BT-20DJ	4.00"	030290	BT-5	1.75"			
0877	Meanie	030368	BT-50S	4.00"	030290	BT-5	1.75"			
0878	Scout III	030340	BT-30A	3.5"						
0880	Skinny Mini	??????	BT-5 (3)	9.00"						
0881	Mini Mars Lander	??????	BT-60	1.56"	??????	BT-5	1.56"			
0882	Ninja	030323	BT-20E	7.75"	030304	BT-5BJ	2.00"			
0885	Sprite	??????	BT-5	9.00"						
0886	Gnome (White)	030301	WBT-5	8.00"						
0886	Gnome (Silver)	??????	BT-5	8.00"						
0887	Leprechaun	030301	WBT-5	8.00"						
0889	X-15	030414	BT-60K	7.00"	030304	BT-5BJ	2.00"			
0890	Jammin'	030306	BT-5P	5.1"	030305	BT-5	4.00"			
0891	Prime Number Explorer	??????	BT-55	13.625"	??????	BT-5	9.00"			

## Estes Body Tube/Kit Reference List

Kit Number	Kit Name	P/N	Designation	Length	P/N	Designation	Length	P/N	Designation	Length
0892	Little Joe II	??????	BT-58	5.375"	030304	BT-5BJ	2.00"			
0893	Red Alert	030303	BT-5	6.00"	030304	BT-5BJ	2.00"			
0895	Solar Warrior (Appendix 1)	030336	BT-20N	9.75"	030319	BT-20	1.50"	030304	BT-5BJ	2.00"
0896	Mini Patriot	??????	BT-20	5.69"	??????	BT-20	1.25"	030290	BT-5	1.75"
0897	Lumina	030306	BT-5P	5.1"	030305	BT-5	4.00"			
0898	Mini-Cobra	030305	BT-5	4.00"	030304	BT-5BJ (2)	2.00"			
1202	Mark II	030340	BT-30A	3.50"	030348	BT-30J	2.75"			
1202	Mini Meanie	031174	BT-5	1.434"		Motor mount tube				
1203	Freaky Flyer	031174	BT-5	1.434"		Motor mount tube				
1207	Phantom	030608	PST-50S	4.00"	030604	PST-20J	2.75"			
1220	Mars Snooper II	030372	BT-50W	9.5"	030322	BT-20D	6.5"	030304	BT-5BJ (3)	2.00"
					030326	BT-20J	2.75"			
1238	Avenger	030382	BT-55	18.00"	030360	BT-50H	7.75"	030326	BT-20J	2.75"
		030386	BT-55J	2.75"				030334	BT-20M	2.25"
1247	Cherokee-D	030382	BT-55	18.00"	030362	BT-50J	2.75"			
1250	Interceptor (Re-release) Apx 1	030382	BT-55	18.00"	030408	BT-20	2.75"			
1256	Alpha III	030357	WBT-50EE	5.5"	030326	BT-20J	2.75"			
1258	Alpha III (Appendix 1)	030380	BT-50EE (Red)	5.5"	030326	BT-20J	2.75"			
1259	Orbital Transport (Re-release) (Appendix 1)	030352	BT-50	18.00"	030317	BT-20D	6.50"	031174	BT-5 (4)	1.438"
					030326	BT-20J	2.75"			
1260	No.2 Sky Writer	030349	BT-50 (Yellow)	9.50"	060158	BT-50 (Printed)	9.50"	030326	BT-20J	2.75"
1261	Baby Bertha (Appendix 1)	030400	BT-60	7.50"	030326	BT-20J	2.75"			
1262	Cosmic Cobra	031660	BT-56 (Yellow)	10.25"						
1265	Scissor Wing Transport	030352	BT-50	18.00"	030362	BT-50J	2.75"	030330	BT-20L	12.00"

## Estes Body Tube/Kit Reference List

Kit Number	Kit Name	P/N	Designation	Length	P/N	Designation	Length	P/N	Designation	Length
1265	Scissor Wing Transport ('05)	030352	BT-50	18.00"	030362	BT-50J	2.75"	030451	BT-20	12.00"
1266	Camroc Carrier	030614	PST-60R	5.00"	030372	BT-50W	9.50"	030326	BT-20J	2.75"
1267	Maxi V-2	030441	BT-101KJ	10.5"	030364	BT-50KE	15.00"			
1268	Pershing 1-A	030445	BT-101LA	21.4"	030366	BT-50L	12.70"			
1269	Maxi Honest John	030433	BT-80KD	14.2"	030366	BT-50L	12.70"			
1270	Nike-X	030382	BT-55	18.00"	030320	BT-20B	8.65"			
1271	Renegade	030396	BT-60	18.00"	030410	BT-60HE	8.5"	030364	BT-50KE	15.00"
1272	Vostok	030382	BT-55	18.00"	030326	BT-20J	2.75"			
1273	Andromeda	030360	BT-50H	7.75"	030368	BT-50S	4.00"	030316	BT-20 (2)	18.00"
					030356	BT-50AH (2)	1.875"			
1274	Klingon Battle Cruiser	030359	BT-50FE	6.50"	030326	BT-20J	2.75"	030306	BT-5P	5.1"
								030298	BT-2CB (2)	3.25"
1275	Starship Enterprise	030174	RT-99D	0.391"	030366	BT-50L	12.70"	030316	BT-20	18.00"
					030360	BT-50H (2)	7.75"	030332	BT-20DJ	4.00"
1276	Antares	030372	BT-50W	9.50"	030326	BT-20J	2.75"			
1277	Icarus	030366	BT-50L	12.70"	030608	PST-50S	4.00"	030326	BT-20J	2.75"
1278	Vigilante	030382	BT-55	18.00"	030386	BT-55J	2.75"	030326	BT-20J	2.75"
								030334	BT-20M	2.25"
1279	Nike Ajax	030387	BT-55KA	10.625"	030352	BT-50	18.00"	030326	BT-20J	2.75"
1280	Firefly	No Tubes								
1281	Alien Invader	030366	BT-50L	12.70"	030362	BT-50J (2)	2.75"	030326	BT-20J	2.75"
1282	Photon Disruptor	030372	BT-50W	9.50"	030322	BT-20D	6.5"			
1283	U.S.S. Atlantis	030352	BT-50	18.00"	030322	BT-20D (2)	6.5"	030326	BT-20J	2.75"

## Estes Body Tube/Kit Reference List

Kit Number	Kit Name	P/N	Designation	Length	P/N	Designation	Length	P/N	Designation	Length
1284	Space Shuttle	??????	BT-67GI	7.906"	??????	BT-46HI (2)	9.00"	?????? 030332	ST-76 (2) BT-20DJ	6.50" 4.00"
1285	Teros	030372	BT-50W	9.50"	030326	BT-20J	2.75"			
1286	Scamp	030372	BT-50W	9.50"	030326	BT-20J	2.75"			
1287	LTV Scout (Appendix 1)	030415	BT-60KC	12.875"	030488 030447	SBT-139BJ SBT-127GC	2.00" 7.26"	030446 030322	SBT-123BE BT-20D	2.50" 6.5"
1288	Starlab	030449	SBT-394AJ	1.00"	030372 030362	BT-50W BT-50J	9.50" 2.75"	030316 030320	BT-20 BT-20B	18.00" 8.65"
1289	Odyssey	030384	BT-55IJ	9.00"	030358	BT-50EE	5.5"	030332	BT-20DJ	4.00"
1290	Sky Raider	030382	BT-55	18.00"	030384	BT-55IJ	9.00"	030362	BT-50J	2.75"
1291	Maxi Alpha	030433	BT-80KD	14.2"	030432	BT-80	7.6"	030366	BT-50L	12.70"
1292	Wizard	030320	BT-20B	8.65"						
1293	Black Brant III	030367	BT-50N	14.00"	030326	BT-20J	2.75"			
1294	Cobra-1500	030382	BT-55 (3)	18.00"	030326	BT-20J	2.75"			
1295	Mean Machine	030396	BT-60 (4)	18.00"	030362	BT-50J	2.75"			
1296	Satellite Interceptor	030370	BT-50V	16.5"	030326	BT-20J	2.75"	030304	BT-5BJ (2)	2.00"
1297	Solar Sailer	030352	BT-50	18.00"	030359	BT-50FE	6.50"	030330	BT-20L (2)	12.00"
1298	X-Wing Fighter	030335	BT-20XW	8.00"	030311	BT-5XW (4)	1.375"	030301	BT-3XW (4)	1.5"
1299	T.I.E. Fighter	030369	BT-50TF	16.00"	030332	BT-20DJ	4.00"			
1300	Blue Ninja (Appendix 1)	030407	BT-60 (Blue)	8.00"	030406	BT-60 (Blue)	12.00"	030463	HBT-1000	4.00"
1301	R2-D2	030435	BT-100D	4.093"	030326	BT-20J	2.75"			
1301	Storm Caster (Appendix 1)	031189	RT-60 (Slot)	12.00"	030397	BT-60	12.00"	030373	BT-50	9.50"

## Estes Body Tube/Kit Reference List

Kit Number	Kit Name	P/N	Designation	Length	P/N	Designation	Length	P/N	Designation	Length
1302	Maxi X-Wing Fighter	030419	BT-60XW (4)	3.00"	030362	BT-50J (4)	2.75"	030300	BT-3H (4)	3.00"
		030371	BT-50XW	15.5"	030347	BT-30XW (4)	3.00"	030299	BT-2XW (4)	2.313"
1302	CC Express (Appendix 1)	030382	BT-55	18.00"	030387	BT-55	3.50"	030368	BT-50S	4.00"
								030362	BT-50J	2.75"
1310	Colonial Viper	030372	BT-50W	9.50"	030380	BT-52S (3)	3.938"	030326	BT-20J	2.75"
1311	Laser Torpedo	030360	BT-50H	7.75"	030322	BT-20D	6.5"			
1320	Starship Vega	030366	BT-50L	12.70"	030326	BT-20J	2.75"	030310	BT-5CJ (3)	3.00"
1321	Maxi Alpha III	030429	WBT-80A (2)	9.00"	030431	WBT-80MA	3.22"	030366	BT-50L	12.70"
1322	Delta Star	030366	BT-50L	12.70"	030368	BT-50S	4.00"	030326	BT-20J	2.75"
					030362	BT-50J	2.75"	030334	BT-20M	2.25"
1323	Stiletto	030369	BT-50TF	16.00"	030326	BT-20J	2.75"			
1324	Polaris	030372	BT-50W	9.50"	030368	BT-50S	4.00"	030326	BT-20J	2.75"
1325	Gamma	030372	BT-50W	9.50"	030358	BT-50EE	5.5"	030326	BT-20J	2.75"
1326	Colossus (MMT info provided by Mike Maurer)	030429	WBT-80A (4)	9.00"	030431	WBT-80MA	3.22"	030352	BT-50	18.00"
								030366	BT-50L	12.7"
1327	AstroCam 110	031606	WBT-1312	12.00"	030326	BT-20J	2.75"			
1328	Kadet	030373	WBT-50W	9.50"	030326	BT-20J	2.75"			
1329	Multi Roc	030366	BT-50L	12.70"	030358	BT-50EE	5.5"	030326	BT-20J	2.75"
					030362	BT-50J	2.75"	030334	BT-20M	2.25"
1330	Challenger-II	030393	WBT-56	18.00"	030362	BT-50J	2.75"			
1331	Maxi Icarus	030396	BT-60	18.00"	030614	PST-60R	5.00"	030378	BT-52AG	2.1"
								030362	BT-50J	2.75"

## Estes Body Tube/Kit Reference List

Kit Number	Kit Name	P/N	Designation	Length	P/N	Designation	Length	P/N	Designation	Length
1332	Sea Strike "D"	030382	BT-55	18.00"	030386	BT-55J	2.75"	030362	BT-50J (2)	2.75"
		030390	BT-55S	4.00"						
1333	Scorpion	030352	BT-50	18.00"	030354	BT-50AE	1.5"	030326	BT-20J (2)	2.75"
1334	Skybolt	030392	BT-55V	16.35"	030362	BT-50J	2.75"			
1335	Blue Bird Zero	030382	BT-55 (2)	18.00"	030326	BT-20J	2.75"			
1336	Boeing ALCM	031135	ST-106	6.25"	031038	ST-73	3.00"			
1337	NASA Space Shuttle	030365	BT-50P	11.00"	030326	BT-20J	2.75"			
1338	Space Transporter America	030396	BT-60	18.00"	030322	BT-20D	6.50"			
1339	Patrol Cruiser Excalibur	030420	BT-63CJ	3.00"	030322	BT-20D	6.5"	030301	BT-3XW (9)	1.5"
		030406	BT-60D	11.00"	030318	BT-20AE	1.5"			
1340	SS-1C SCUD-B	030404	BT-60AE	14.25"	030322	BT-20D	6.5"			
1341	World Federation Star Probe	030427	BT-80S	4.50"	030366	BT-50L (2)	12.70"	030326	BT-20J	2.75"
1342	Starblazer X-20	030372	BT-50W	9.5"	030322	BT-20D	6.5"			
1343	Orion Starfighter	030364	BT-50KE	15.00"	030324	BT-20G	3.5"	030326	BT-20J	2.75"
	Torellian Invader	030364	BT-50KE	15.00"	030324	BT-20G (6)	3.5"			
1344	NOMAD	030352	BT-50	18.00"	030316	BT-20	18.00"	030326	BT-20J (2)	2.75"
1345	Dragon Ship 7	030407	BT-60DS	12.5"	030322	BT-20D	6.5"	030301	BT-3XW (9)	1.5"
					030318	BT-20AE	1.5"			
1350	Black Hole Space Probe	030352	BT-50	18.00"	030326	BT-20J	2.75"			
1350	Interceptor E	030615	HBT-2000	14.563"	030617	HBT-2000 (SL)	14.563"	060616	HBT-1000	17.5"
1355	Spin Fin	030320	BT-20B	8.65"						
1356	Astro Bee	030372	BT-50W	9.5"	030326	BT-20J	2.75"			
1357	SAM-4	030366	BT-50L	12.70"	030326	BT-20J	2.75"			
1358	F-61 Starfighter	030372	BT-50W	9.50"	030322	BT-20D	6.5"	031017	ST-41 (2)	1.25"
1359	Orbital Interceptor	030366	BT-50L	12.70"	030326	BT-20J	2.75"			

## Estes Body Tube/Kit Reference List

Kit Number	Kit Name	P/N	Designation	Length	P/N	Designation	Length	P/N	Designation	Length
1360	Tartar	030382	BT-55	18.00"	030326	BT-20J	2.75"			
1361	Skytracer	030360	BT-50H	7.75"	030326	BT-20J	2.75"	030308	BT-5T (2)	1.5"
					030318	BT-20AE (2)	1.5"			
1362	The Bat	030366	BT-50L	12.70"	030326	BT-20J	2.75"			
1363	Rigel 3	030387	BT-55KA	10.625"	030390	BT-55S	4.00"	030332	BT-20DJ	4.00"
								030326	BT-20J	2.75"
1364	Falcon Commander	030366	BT-50L	12.70"	030326	BT-20J	2.75"			
1365	Sky-Hi	030352	BT-50	18.00"	030362	BT-50J	2.75"	030326	BT-20J	2.75"
								030334	BT-20M	2.25"
1366	Star Speeder	030386	BT-55J	2.75"	030330	BT-20L	12.00"			
1367	Vindicator	030382	BT-55	18.00"	030326	BT-20J	2.75"			
1368	Comet	030382	BT-55	18.00"	030326	BT-20J	2.75"			
1369	S.S. Cassiopeia	030449	SBT-394AJ	1.00"	030360	BT-50H	7.75"	030316	BT-20	18.00"
		030372	BT-50W	9.50"	030362	BT-50J	2.75"			
1370	Meteor	030366	BT-50L	12.70"	030326	BT-20J	2.75"			
1371	Starship Nova	030412	BT-60J	2.75"	030364	BT-50KE	15.00"	030326	BT-20J	2.75"
					030377	BT-50F	5.00"			
1372	Alien Explorer	030360	BT-50H	7.75"	030356	BT-50AH (2)	1.875"	030316	BT-20	18.00"
		030368	BT-50S (2)	4.00"						
1373	Soaring Eagle	030352	BT-50	18.00"	030320	BT-20B	8.65"	030375	BT-51 (2)	2.00"
1374	Attack Craft Orion	030360	BT-50H	7.75"	030326	BT-20J	2.75"			

## Estes Body Tube/Kit Reference List

Kit Number	Kit Name	P/N	Designation	Length	P/N	Designation	Length	P/N	Designation	Length
1375	Scorpius	030366	BT-50L	12.70"	030326	BT-20J	2.75"	030308	BT-5T (4)	1.5"
					030318	BT-20AE (4)	1.5"			
1376	Pegasus	030383	BT-55C	14.00"	030359	BT-50FE	6.5"	030326	BT-20J	2.75"
1377	Hercules	030372	BT-50W	9.5"	030362	BT-50J	2.75"	030326	BT-20J (2)	2.75"
		030608	PST-50S	4.00"						
1378	Firecat	031140	ST-1010	10.50"	031038	ST-73	3.00"			
1379	Mach-2	030396	BT-60	18.00"	030362	BT-50J	2.75"			
1380	Phoenix (Appendix 1)	030433	BT-80KD	14.2"	030432	BT-80	7.6"	030360	BT-50H	7.75"
1380	Phoenix (Re-release)	030437	BT-80 (2)	11.00"	031278	HBT-1000	8.00"			
1381	Yankee	030320	BT-20B	8.65"						
1382	Comanche-3	030352	BT-50	18.00"	030362	BT-50J (2)	2.75"	030326	BT-20J	2.75"
		030366	BT-50L	12.70"				030334	BT-20M	2.25"
1383	Hyperion	030449	SBT-394AJ	1.00"	030405	BT-60C	1.00"	030326	BT-20J	2.75"
		030274	JT-80C	1.00"	030352	BT-50	18.00"			
1385	Space Shuttle Columbia	030414	BT-60K	7.00"	030326	BT-20J	2.75"			
1386	Asteroid Explorer	030372	BT-50W	9.50"	030326	BT-20J	2.75"			
1387	Maxi Streak	030408	BT-60FG	6.7"	030362	BT-50J	2.75"			
1388	Apache-2	030366	BT-50L	12.70"	030362	BT-50J	2.75"	030326	BT-20J	2.75"
								030334	BT-20M	2.25"
1389	Sandpiper	030360	BT-50H	7.75"	030324	BT-20G	3.50"			
1390	Aero Fin	030320	BT-20B	8.65"						
1391	Mini Shuttle	030418	BT-60R	5.00"	030326	BT-20J	2.75"			
1392	Nova Scout Ship	030372	BT-50W	9.50"	030324	BT-20G	3.50"	030326	BT-20J	2.75"
1398	X-Wing Fighter (Boxed)									

## Estes Body Tube/Kit Reference List

Kit Number	Kit Name	P/N	Designation	Length	P/N	Designation	Length	P/N	Designation	Length
1399	T.I.E. Fighter (Boxed)									
1901	Sea Dart (Appendix 1)	030384	BT-55IJ	9.00"	030354	BT-50AE	1.5"			
1902	Space Station Aquarius	030412	BT-60J	2.75"	030381	BT-55E	2.1"	030366	BT-50L	12.7"
								030326	BT-20J (7)	2.75"
1903	Xarconian Destroyer	030387	BT-55KA	10.625"	030326	BT-20J	2.75"			
1903	Maxi Alpha III (Re-release)	030429	WBT-80A (2)	9.00"	030431	WBT-80MA	3.22"	030366	BT-50L	12.70"
1904	Maverick	030372	BT-50W	9.50"	030326	BT-20J	2.75"			
1904	V-2	030432	BT-80	7.6"	030360	BT-50H	7.75"			
1905	Stinger	030360	BT-50H	7.75"	030326	BT-20J	2.75"			
1906	Sizzler	030352	BT-50	18.00"	030326	BT-20J	2.75"			
1907	Cyclone	031190	ST-1312	12.00"	030326	BT-20J	2.75"			
1908	Scrambler-2	030418	BT-60R	5.00"	030383	BT-55C	14.00"	030362	BT-50J	2.75"
1909	U.S.S.F. Fireflash	030379	BT-50B	10.25"	030326	BT-20J	2.75"			
1910	USS Pleiades	030387	BT-55KA	10.625"	030326	BT-20J (2)	2.75"	030334	BT-20M (3)	2.25"
1911	Courier	030336	BT-20N	9.75"						
1913	Advanced Target Drone	030365	BT-50P	11.00"	030326	BT-20J	2.75"			
1914	Galactic Taxi	030379	BT-50B	10.25"						
1915	Harpoon	030372	BT-50W	9.50"	030326	BT-20J	2.75"			
1916	MX Missile	030406	BT-60D	11.00"	030334	BT-20M	2.25"			
1917	Zinger	030323	BT-20E	7.75"						
1918	Titan II (Appendix 1)	030415	BT-60KC	12.875"	030334	BT-20M	2.25"			
1919	Honest John	030387	BT-55KA	10.625"	030326	BT-20J	2.75"			
1920	Starship Excalibur	030366	BT-50L	12.70"	030326	BT-20J	2.75"			
1921	Mercury Redstone	031274	ST-2010 (2)	9.75"	030326	BT-20J	2.75"			
1922	Marauder	030412	BT-60J	2.75"	030387	BT-55KA	10.625"	030326	BT-20J	2.75"
1923	Cougar	030366	BT-50L	12.70"	030326	BT-20J	2.75"			
1924	Defender	030382	BT-55	18.00"	030362	BT-50J	2.75"			

## Estes Body Tube/Kit Reference List

Kit Number	Kit Name	P/N	Designation	Length	P/N	Designation	Length	P/N	Designation	Length
1925	Exocet MM 38 Aerospatiale	030382	BT-55	18.00"	030326	BT-20J	2.75"			
1926	V-2	030432	BT-80	7.6"	030360	BT-50H	7.75"			
1927	Aries SST	030360	BT-50H	7.75"	030326	BT-20J	2.75"			
1928	Manta Bomber	030274	JT-80C (2)	1.00"	030306	BT-5P (2)	5.1"	030326	BT-20J	2.75"
		030359	BT-50FE	6.50"				030318	BT-20AE (2)	1.5"
1929	Stealth	030372	BT-50W	9.50"	030326	BT-20J	2.75"			
1930	Wasp	030391	BT-55W	12.00"	030362	BT-50J	2.75"			
1931	Delta Wedge	030333	BT-20P	13.75"						
1933	X-16	030365	BT-50P	11.00"	030326	BT-20J	2.75"			
1935	Neptune	030383	BT-55C	14.00"	030326	BT-20J	2.75"			
1936	Sunbird	030336	BT-20N	9.75"						
1937	Astro	030320	BT-20B	8.65"						
1938	Laser	030320	BT-20B	8.65"						
1939	Nebulon Warrior	030386	BT-55J	2.75"	030330	BT-20L	12.00"	030332	BT-20DJ (2)	4.00"
1940	Marte MK 2	030330	BT-20L	12.00"	030362	BT-50J (2)	2.75"			
1941	Fox Fire	030336	BT-20N	9.75"						
1942	SR-71 Blackbird	030366	BT-50L	12.70"	030359	BT-50FE (2)	6.5"	030326	BT-20J	2.75"
1943	Magician	030384	BT-55IJ	9.00"	030362	BT-50J	2.75"			
1944	D-Region Tomahawk	030396	BT-60	18.00"	030407	BT-60DS	12.5"	030362	BT-50J	2.75"
1945	Searcher	030330	BT-20L	12.00"	030306	BT-5P	5.1"			
1946	Starhawk	030366	BT-50L	12.70"	030326	BT-20J	2.75"			
1947	Flying Saucer	No Tubes								
1948	Big Bertha	030396	BT-60	18.00"	030320	BT-20B	8.65"			
1949	Viking	030320	BT-20B	8.65"						
1950	Echo	030323	BT-20E	7.75"						
1950	Eliminator	031300	BT-56 (2)	12.00"	030463	HBT-1000	4.00"			
1951	Mighty Moe	030336	BT-20N	9.75"						
1951	Executioner	031180	BT-80 (Slotted)	14.2"	030433	BT-80KD	14.2"	030366	BT-50L	12.7"
1952	Halley's Tail	030366	BT-50L	12.70"	030326	BT-20J	2.75"			
1952	V-2 (Re-release)	030441	BT-101KJ	10.50"	030364	BT-50KE	15.00"			

## Estes Body Tube/Kit Reference List

Kit Number	Kit Name	P/N	Designation	Length	P/N	Designation	Length	P/N	Designation	Length
1953	FireAero	030366	BT-50L	12.70"	030326	BT-20J	2.75"			
1954	Starbird	030366	BT-50L	12.70"	030326	BT-20J	2.75"			
1955	Ranger	030382	BT-55	18.00"	030362	BT-50J	2.75"			
1956	Blazer	030320	BT-20B	8.65"						
1957	Nike-Apache	030387	BT-55KA	10.625"	??????	BT-5	9.00"	030326	BT-20J	2.75"
1958	Black Brant II	??????	BT-55	13.625"	??????	BT-55	1.906"	030362	BT-50J	2.75"
					??????	BT-55	1.875"			
1959	Scout II	030340	BT-30A	3.5"						
1960	Nova Payloader	030366	BT-50L	12.70"	030608	PST-50S	4.00"	030326	BT-20J	2.75"
1960	Nova Payloader (Re-release)	030366	BT-50	12.70"	030608	PST-50S	4.00"	030408	BT-20	2.75"
1961	Crusader Swing Wing	030407	BT-60DS	12.50"	030330	BT-20L	12.00"			
1970	Der V-3	030433	BT-80KD	14.2"	030360	BT-50H	7.75"			
1971	Nimbus	030366	BT-50L	12.70"	030326	BT-20J	2.75"			
1972/7000	Bull Pup 12D	030384	BT-55IJ	9.00"	030324	BT-20G	3.5"			
1973	Interceptor II	030382	BT-55	18.00"	030326	BT-20J	2.75"			
1974	Explorer	030407	BT-60DS	12.50"	030326	BT-20J	2.75"			
1976	Jupiter-C	??????	ST-20	16.00"	030326	BT-20J	2.75"			
1977	Der Big Red Max	030396	BT-60	18.00"	030320	BT-20B	8.65"			
1977	Geo Sat LV	030614	PST-60R	5.00"	030382	BT-55	18.00"	030326	BT-20J	2.75"
					030372	BT-50W (2)	9.50"			
1978	Gemini-Titan	030407	BT-60DS	12.50"	030326	BT-20J	2.75"			
1979	Clipper	030369	BT-50TF	16.00"	030362	BT-50J	2.75"	030326	BT-20J (2)	2.75"
1980	Long Shot	030352	BT-50 (2)	18.00"	030326	BT-20J	2.75"			
1981	D.A.R.T.	030414	BT-60K	7.00"	030326	BT-20J	2.75"			
1982	Transtar Carrier	030412	BT-60J	2.75"	030387	BT-55KA	10.625"	030326	BT-20J	2.75"
1983	Arrow	030407	BT-60DS	12.50"	030324	BT-20G	3.50"			
1984	Phaser	030336	BT-20N	9.75"						
1986	Reliant	030320	BT-20B	8.65"						

## Estes Body Tube/Kit Reference List

Kit Number	Kit Name	P/N	Designation	Length	P/N	Designation	Length	P/N	Designation	Length
1987	Sentinel	030396	BT-60	18.00"	030326	BT-20J	2.75"			
1988	Argosy	030366	BT-50L	12.70"	030326	BT-20J	2.75"			
1989	Liberty	030372	BT-50W	9.50"	030326	BT-20J	2.75"			
1991	Zipper	030320	BT-20B	8.65"						
1991	Blue Star	030320	BT-20B	8.65"						
1992	Dasher	030366	BT-50L	12.70"	030326	BT-20J	2.75"			
1993	Lancer	030366	BT-50L	12.70"	030326	BT-20J	2.75"			
1994	Ram Jet	??????	BT-55 (2)	5.313"	030330	BT-20L	12.00"			
1995	Helio Copter	030393	WBT-56	18.00"	030326	BT-20J	2.75"			
1996	Eggspres	??????	ST-20	2.00"	030391	BT-55W	12.00"	030326	BT-20J	2.75"
1997	Pathfinder	030396	BT-60	18.00"	030382	BT-55	18.00"	030362	BT-50J	2.75"
1998	Mega Sizz'	030396	BT-60	18.00"	030414	BT-60K	7.00"	030362	BT-50J	2.75"
1999	Corsair	030362	BT-50J	2.75"	030336	BT-20N	9.75"			
2000	Voyager II	030387	BT-55KA	10.625"	030326	BT-20J	2.75"			
2001	Saturn V (Appendix 1)	030449	BT-101SV	24.625"	030434	BT-80SV	8.81"	030466	BT-58SV	6.125"
								030370	BT-50SV	16.25"
2002	Thunderhawk	030352	BT-50	18.00"	030326	BT-20J	2.75"			
2003	SDI Satellite	??????	BT-55	6.50"	030326	BT-20J	2.75"	030334	BT-20M (8)	2.25"
2004	Tornado	030332	BT-20DJ	4.00"	030319	BT-20	1.50"			
2005	Javelin	030320	BT-20B	8.65"						
2006	Calypso	030372	BT-50W	9.50"	030324	BT-20G	3.50"			
2007	IRIS	030359	BT-50FE (2)	6.50"	030326	BT-20J	2.75"			
2008	Yellow Jacket	030366	BT-50L	12.70"	030326	BT-20J	2.75"			
2009	Rain Maker	030384	BT-55IJ	9.00"	??????	BT-5	12.25"	030326	BT-20J	2.75"
2010	Star Rider	030366	BT-50L	12.70"	030274	JT-80C (2)	1.00"	030326	BT-20J	2.75"

## Estes Body Tube/Kit Reference List

Kit Number	Kit Name	P/N	Designation	Length	P/N	Designation	Length	P/N	Designation	Length
2011	Super Nova	030369	BT-50TF	16.00"	030608	PST-50S	4.00"	030326	BT-20J (2)	2.75"
		030362	BT-50J	2.75"						
2013	Recruiter	030407	BT-60DS	12.5"	?????	BT-55	5.313"	030324	BT-20G	3.5"
2014	Firehawk	030396	BT-60	18.00"	030326	BT-20J	2.75"			
2015	Strike Fighter	030384	BT-55IJ	9.00"	??????	BT-5 (2)	5.00"	030326	BT-20J	2.75"
		030362	BT-50J (2)	2.75"						
2016	Explorer Aquarius	030382	BT-55	18.00"	030362	BT-50J	2.75"	030320	BT-20B (6)	8.65"
								030332	BT-20DJ (12)	4.00"
2017	S.W.A.T.	030396	BT-60	18.00"	030414	BT-60K	7.00"	030326	BT-20J (3)	2.75"
2018	Super Big Bertha	030433	BT-80KD (2)	14.2"	030352	BT-50	18.00"			
2019	Titan IIIE	??????	BT-70	6.25"	030368	BT-50S (2)	4.00"	??????	BT-950 (2)	6.25"
		??????	BT-60	13.313"	030362	BT-50J	2.75"	??????	BT-5 (2)	3.75"
		??????	BT-60 (2)	10.375"						
2021	Rascal	030414	BT-60K	7.00"	030326	BT-20J	2.75"			
2022	Warp II (Appendix 1)	030614	PST-60R	5.00"	030384	BT-55IJ	9.00"	030326	BT-20J (2)	2.75"
					??????	BT-55	3.25"			
2024	ATA-31	030366	BT-50L	12.70"	030326	BT-20J	2.75"			
2025	Meteor	030384	BT-55IJ	9.00"	030326	BT-20J	2.75"			
2026	Athena	030373	WBT-50W	9.50"	030326	BT-20J	2.75"			
2027	Silver Streak	030366	BT-50L	12.70"	030326	BT-20J	2.75"			
2027	Pop Fly (Appendix 1)	031707	BT-1005	8.00"	031703	BT-20	10.719"			
2028	Cajun	030366	BT-50L	12.70"	030326	BT-20J	2.75"			
2029	Raven	030396	BT-60	18.00"	030326	BT-20J	2.75"			
2029	Converter	031665	BT-56 (Black)	8.25"	031710	BT-56 (Blk) (3)	6.00"			

## Estes Body Tube/Kit Reference List

Kit Number	Kit Name	P/N	Designation	Length	P/N	Designation	Length	P/N	Designation	Length
2030	Hornet	?????	BT-50	13.625"	030326	BT-20J	2.75"			
2031	Army Hawk	030396	BT-60	18.00"	030326	BT-20J	2.75"			
2032	Magnum	030396	BT-60	18.00"	030412	BT-60J	2.75"	030362	BT-50J	2.75"
		030614	PST-60R	5.00"						
2033	Trident II	030372	BT-50W	9.50"	030316	BT-20 (2)	18.00"	030326	BT-20J	2.75"
		030358	BT-50EE	5.50"						
2034	Deep Space Transport	030382	BT-55	18.00"	030360	BT-50H (2)	7.75"	030326	BT-20J	2.75"
2035	Optima	030433	BT-80KD (2)	14.2"	030437	BT-80	11.00"	??????	BT-50	13.625"
								030362	BT-50J	2.75"
2036	Super Vega	030396	BT-60	18.00"	030358	BT-50EE (3)	5.50"	??????	BT-50	3.375"
		030414	BT-60K	7.00"						
2037	National Aero Space Plane	030396	BT-60	18.00"	030411	BT-60	2.00"	030326	BT-20J	2.75"
2037	D-Region Tomahawk (Apx 1)	030367	HBT-1800 (2)	11.625"	030365	HBT-1000	17.75"			
2038	Alien Space Probe	??????	BT-80	9.50"	030326	BT-20J	2.75"			
2039	Space Racer	030325	BT-20	9.00"						
2040	Stinger	030320	BT-20B	8.65"						
2041	Menace	?????	BT-50	13.625"	030326	BT-20J	2.75"			
2042	America	030373	WBT-50W	9.50"	030326	BT-20J	2.75"			
2043	Photon Probe	030382	BT-55	18.00"	030326	BT-20J	2.75"			
2044	Solar Sailer II	030366	BT-50L	12.70"	030359	BT-50FE	6.50"	030316	BT-20	18.00"
2045	Dark Star	030396	BT-60	18.00"	030324	BT-20G	3.5"			
2046	Surveyor	030323	BT-20E	7.75"	??????	BT-5	5.00"	030290	BT-5 (2)	1.75"
2048	Saturn 1b (Appendix 1)	030438	SBT-267	1.375"	030397	BT-58	6.375"	030329	SBT-705 (8)	7.813"
		030436	SBT-262	7.625"	030379	SBT-116	11.00"	030362	BT-50J	2.75"

## Estes Body Tube/Kit Reference List

Kit Number	Kit Name	P/N	Designation	Length	P/N	Designation	Length	P/N	Designation	Length
2050	Super Neon	030352	BT-50	18.00"	??????	BT-50 (6)	3.125"	030326	BT-20J	2.75"
2050	Super Neon (Re-release) A1	030352	BT-50	18.00"	030357	BT-50 (6)	3.50"	030408	BT-20	2.75"
2051	Solar Probe	030418	BT-60R	5.00"	??????	BT-50	15.75"	030326	BT-20J	2.75"
2052	Photon Disruptor II (Apx 1)	??????	BT-55	13.563"	030360	BT-50H	7.75"	030326	BT-20J	2.75"
2053	Blackhawk	030353	BT-50 (2)	8.25"	030326	BT-20J	2.75"	030334	BT-20M	2.25"
2053	GBU-24 Paveway III (Apx 1)	030374	BT-55	10.75"	030329	BT-20 (2)	5.00"			
2054	Beta Launch Vehicle (Apx 1)	030400	BT-60	13.25"	030392	BT-55	3.25"	030334	BT-20M	2.25"
2054	Python 4 (Appendix 1)	030374	BT-55	10.75"	030375	BT-55	8.65"	030327	BT-20	6.00"
2055	White Tiger	030352	BT-50	18.00"	030326	BT-20J	2.75"			
2055	BLU-97B	030413	BT-70	10.00"	030329	BT-20	5.00"			
2056	Patriot (Appendix 1)	030408	BT-60	13.25"	030409	BT-60 (Yellow)	3.25"	030326	BT-20J	2.75"
2056	Patriot (Re-release)	030414	BT-60 (2)	6.656"	030426	BT-60 (Yellow)	3.25"	030326	BT-20J	2.75"
2060	Bandit	085860	HBT-1090 (Bk)	11.00"	030331	BT-20	2.5"			
2061	Rampage	??????	HBT-1090 (O)	11.00"	??????	HBT-1090 (Bk)	3.00"	030331	BT-20	2.5"
2062	Dagger	??????	HBT-1090 (P)	11.00"	??????	HBT-1090 (C)	6.00"	030331	BT-20	2.5"
2063	Mars Snooper	030360	BT-50H	7.75"	030322	BT-20D	6.5"	030308	BT-5T (3)	1.5"
					030326	BT-20J	2.75"			
2064	Impulse	??????	BT-25 (NCR)	18.00"	??????	BT-25 (NCR)	6.50"	??????	HBT-1000 (2)	4.50"
2065	Maxi-Force	??????	BT-25 (NCR)	18.00"	??????	BT-25 (NCR)	6.50"	??????	HBT-1000 (3)	4.50"
		??????	BT-25 (NCR)	15.50"						
2066	Patriot									
2067	Delta Clipper	??????	HBT-1090	13.25"	??????	HBT-1090	3.188"	??????	BT-50	3.188"
		??????	HBT-1090	4.75"				030362	BT-50J	2.75"
2068	Greyhawk	030384	BT-55IJ	9.00"	030368	BT-50S (2)	4.00"	030326	BT-20J	2.75"
								030318	BT-20AE (2)	1.50"

## Estes Body Tube/Kit Reference List

Kit Number	Kit Name	P/N	Designation	Length	P/N	Designation	Length	P/N	Designation	Length
2070	Bail-Out!	030396	BT-60	18.00"	030334	BT-20M	2.25"			
2071	CATO	??????	BT-60 (Orng)	10.00"	??????	BT-20	6.906"			
2072	Scrambler (Appendix 1)	030340	BT-56	12.00"	??????	ST-20	2.00"	030326	BT-20J	2.75"
2073	Astro-Blaster	030362	BT-50J	2.75"	Motor mount tube					
2075	A.R.V. Condor	030353	BT-50	8.25"	030326	BT-20J	2.75"	030305	BT-5 (2)	4.00"
		??????	BT-50	6.00"						
2076	Pegasus	??????	BT-50 (Red)	9.50"	030326	BT-20J	2.75"			
2077	Sky Winder	031217	HBT-20	9.25"	030295	BT-5	1.375"			
2078	Omloid	??????	BT-236 (Blue)	0.50"	??????	BT-56 (Blue)	7.00"	??????	BT-56 (Blue)	4.00"
2083	Terrier/Sandhawk	031181	BT-1835	15.313"	030388	BT-55KG	16.69"	030360	BT-50H	7.75"
								??????	BT-50	3.875"
2085	Jayhawk	??????	BT-25 (NCR)	13.00"	??????	HBT-1000	8.50"			
2086	Tomcat (Appendix 1)	??????	BT-60	12.50"	??????	BT-50 (2)	12.7"	030326	BT-20J	2.75"
2090	Strato Blaster									
2091	Maniac	??????	BT-56 (Yel/2)	12.00"	030463	HBT-1000	4.00"			
2092	Mongoose (Appendix 1)	030355	BT-50 (Yellow)	18.00"	030356	BT-50 (Yellow)	1.875"	030326	BT-20J	2.75"
2093	Broad Sword	030433	BT-80KD (2)	14.2"	030352	BT-50	18.00"			
2094	Shadow	030433	BT-80KD (2)	14.2"	030437	BT-80	11.00"	??????	HBT-1000 (2)	13.625"
								031281	HBT-1000	2.75"
2096	Turbo Copter	??????	BT-20 (White)	11.00"						
2097	Manta	??????	BT-50 (Black)	11.00"	030326	BT-20J	2.75"			

## Estes Body Tube/Kit Reference List

Kit Number	Kit Name	P/N	Designation	Length	P/N	Designation	Length	P/N	Designation	Length
2102	TIE Fighter	030369	BT-50TF	16.00"	030326	BT-20J	2.75"			
2103	X-Wing Fighter	030335	BT-20XW	8.00"	030311	BT-5XW (4)	1.375"	030301	BT-3XW (4)	1.5"
2104	R2-D2	030435	BT-100D	4.093"	030326	BT-20J	2.75"			
2105	Hijax (Appendix 1)	085877	HBT-1090	11.00"	031205	PST-1090	6.00"	085870	BT-20	2.5"
2107	Firestreak	085878	HBT-1090	11.00"	030326	BT-20J	2.75"			
2109	Renegade (Appendix 1)	030401	BT-60	18.00"	030415	BT-50 (2)	5.00"	030408	BT-20 (2)	2.75"
		030404	BT-60	3.25"				030409	BT-5 (2)	0.75"
2110	Outlander (Appendix 1)	030402	BT-60	5.688"	030412	BT-50 (4)	3.00"	030310	BT-20	5.00"
		030411	BT-60	2.00"				030319	BT-20 (8)	1.50"
2111	Mercury Atlas (Appendix 1)	??????	BT-344	18.00"	??????	HBT-1000	9.50"	??????	HBT-950 (2)	5.25"
					??????	HBT-1000 (2)	3.625"			
2112	Transwing Super Glider	031291	HBT-50 (2)	9.00"	030326	BT-20J	2.75"			
2113	Starbase Starcruiser		BT-60	18.00"			2.25"			
2114	Corkscrew	085878	HBT-1090 (Slit)	11.00"	031212	HBT-1090	4.75"	030326	BT-20J	2.75"
2115	SR-X (Appendix 1)	030383	BT-55	14.50"	031701	HBT-760	14.50"			
2116	Sweet Vee	031222	HBT-1000	4.00"	Motor mount only; info provided by James Gartrell.					
2117	Screaming Eagle	031682	BT-50	10.75"	030408	BT-20J	2.75"			
2119	36 D Squared	030413	BT-70	10.00"	031681	BT-60	8.00"	030364	BT-50KE (2)	15.00"
		031680	BT-70	4.50"						
2120	Venus Probe	031140	BT-1750	0.75"	030403	BT-55	12.50"	031701	HBT-760	14.50"
					031166	BT-55 (Slotted)	4.00"			
2121	Liquidator	031713	BT-60 (Blk) (2)	7.5"	030463	HBT-1000	4.00"			
2122	Invader	??????	HBT-5	1.688"	Motor mount tube					
2123	Raider	??????	HBT-5	1.688"	Motor mount tube					
2123	Eggscaliber	030485	HBT-1000	15.00"	030408	BT-20J	2.75"			

## Estes Body Tube/Kit Reference List

Kit Number	Kit Name	P/N	Designation	Length	P/N	Designation	Length	P/N	Designation	Length
2124	F-22 Air Superiority Fighter	031174	BT-55 (Slotted)	10.625"	030387	BT-55KA	10.625"	030326	BT-20J	2.75"
2125	AIM-9 Sidewinder (Apdx. 1)	031172	BT-55 (Slotted)	11.25"	031173	BT-55 (Slotted)	3.75"	030318	BT-20	5.688"
		030381	BT-55	11.19"				030322	BT-20	2.813"
2126	Tech-Pak (Appendix 1)	030326	BT-20J	2.75"						
2127	Sizzler	031175	BT-60WH	18.00"	030386	BT-55G	16.75"	031700	HBT-760	10.75"
2128	Long Shot (Appendix 1)	030340	BT-56 (3)	12.00"	030341	BT-56	3.75"	031281	HBT-1000	2.75"
								031760	HBT-760	2.75"
2129	Python	031181	BT-1835	15.313"	031762	BT-1835	11.00"	030360	BT-50H	7.75"
2130	Mach-12 (Appendix 1)	030342	BT-56 (Yellow)	7.00"	030343	BT-56 (Yellow)	4.00"			
2131	Mk-109 Stingray	031176	HBT-1090	12.00"	030331	BT-20	2.5"			
2132	Banshee	085860	BT-1090 (Blk)	11.00"	030331	BT-20	2.5"			
2133	AstroSat LSX (Appendix 1)	030346	BT-56 (White)	8.00"	030347	BT-56 (White)	4.00"			
2136	Gemini DC (Appendix 1)	031177	BT-50WH	18.00"	030330	BT-20 (2)	6.00"	030326	BT-20J	2.75"
2137	Flash	085860	HBT-1090 (Bk)	11.00"	031206	HBT-1090 (H)	11.00"	030331	BT-20	2.5"
2138	Firebird	031178	BT-55	18.00"	030326	BT-20J	2.75"			
2139	Fat Boy	031179	BT-80WH	8.00"	030326	BT-20J	2.75"			
2140	Venom	031180	BT-50WH	11.00"	030326	BT-20J	2.75"			
2141	Silver Comet	030435	BT-80T	11.00"	030360	BT-50H	7.75"			
2142	R2-D2	030391	BT-55	4.313"	030461	HBT-760	4.00"			
2143	Death Star	031183	HBT-1000 (Slit)	7.375"	031184	HBT-1000	7.375"	030326	BT-20J	2.75"
2144	TIE Fighter	030462	HBT-1000 (2)	9.00"	030461	HBT-760	4.00"	Main tubes are black.		
2145	Porta-Pot Shot	031683	HBT-1000	4.938"	030326	BT-20J	2.75"			
2146	Rock-It	030433	BT-80KD	14.2"	030463	HBT-1000	4.00"			
2147	Star Destroyer (Appendix 1)	031227	HBT-1000	15.00"	031226	HBT-1000	12.00"	031225	HBT-1000	2.813"
2149	SM-3 Seahawk	031181	BT-1835	15.313"	031188	BT-55 (Slotted)	13.75"	030391	BT-55	4.313"
								030360	BT-50H	7.75"

## Estes Body Tube/Kit Reference List

Kit Number	Kit Name	P/N	Designation	Length	P/N	Designation	Length	P/N	Designation	Length
2150	Rattler-7 (Appendix 1)	030357	BT-50 (Beige)	5.50"	030307	BT-5 (Beige)	5.50"	030326	BT-20J	2.75"
2151	Big Dawg	031167	BT-55	7.5"	030326	BT-20J	2.75"			
2153	AIM 120 AMRAAM	031191	BT-55 (2)	11.00"	030326	BT-20J	2.75"			
2154	Wildfire	031168	BT-50	9.50"	030326	BT-20J	2.75"			
2155	Super Nova Payloader (Ap 1)	030398	BT-60 (Blue/2)	12.00"	030612	PST-55	12.00"	030463	BT-1000	4.00"
2156	Prowler	031189	BT-60 (Slotted)	12.00"	030397	BT-60 (2)	12.00"	030329	BT-20	5.00"
2157	Saturn V	030449	BT-101SV	24.625"	030434	BT-80SV	8.81"	030466	BT-58SV6	6.125"
								030370	BT-50SV	16.25"
2158	AGM-57X Heat Seeker	031186	HBT-1090	11.00"	031208	HBT-1090	2.875"	030331	BT-20	2.5"
2159	Fireflash (Appendix 1)	030372	BT-50 (Gray)	9.00"	030326	BT-20J	2.75"	030293	BT-5 (2) Blk	9.00"
		030351	BT-50 (Black)	9.00"						
2162	Big Daddy	031751	BT-30 (NCR)	10.00"	030368	BT-50S	4.00"			
2163	Exo-Skell (Appendix 1)	030376	BT-55 (Green)	6.875"	031229	HBT-1000 (G)	8.313"			
2165	Super Big Bertha (Re-release)	030433	BT-80KD (2)	14.2"	030352	BT-50	18.00"			
2166	Maxi Honest John	030433	BT-80KD	14.2"	030366	BT-50L	12.7"			
2167	Mercury Redstone Liberty Bell	031169	ST-20	10.00"	031170	ST-20 (Slotted)	9.375"	030326	BT-20J	2.75"
2168	Metalizer	060003	BT-56	12.00"		Chrome foil covering				
2169	Dragonite (Appendix 1)	030336	BT-1090 (Blk)	8.219"	030335	BT-20	2.5"			
2170	Star Dart (Appendix 1)	030314	BT-20	9.00"						
2171	Sizzler	030323	BT-20E	7.75"						
2172	Monarch	030366	BT-50L	12.70"	030326	BT-20J	2.75"			
2173	Menace	030395	BT-60	14.7"	030326	BT-20J	2.75"			
2174	Polaris	030381	BT-50	11.25"	030362	BT-50J	2.75"	030326	BT-20J	2.75"
2175	Nemesis	030366	BT-50L	12.70"	030326	BT-20J	2.75"			
2176	Echostar (Appendix 1)	031188	BT-55	13.75"	030362	BT-50J	2.75"	030317	BT-20D	6.5"
		030392	BT-55	3.25"	030608	PST-50S	4.00"	030326	BT-20J	2.75"

## Estes Body Tube/Kit Reference List

Kit Number	Kit Name	P/N	Designation	Length	P/N	Designation	Length	P/N	Designation	Length
2177	Night Wing	030366	BT-50L	12.70"	030326	BT-20J	2.75"			
2178	Hi-Flier	030314	BT-20	9.00"						
2179	Guardian	030381	BT-55	11.19"	030362	BT-50J	2.75"	030326	BT-20J	2.75"
2180	Chrome Dome (Silver)	060370	BT-56 (Blue)	8.50"						
2181	Chrome Dome (Gold)	060371	BT-56 (Red)	8.50"						
2182	Wacky Wiggler	031674	BT-1090 (Slit)	3.563"	031676	BT-1090	2.00"	031675	BT-1090 (5)	1.25"
								030331	BT-20	2.50"
2183	Shuttle Xpress	060174	BT-55 (Print)	4.625"	060368	BT-55 (Print)	4.25"			
2184	Meteor Masher	030379	BT-55	9.00"	030383	BT-50	2.5"	030328	BT-20	12.00"
		030380	BT-55	5.625"						
2185	Screamin' Mimi (Appendix 1)	030396	BT-60	18.00"	030325	BT-20	4.00"	030362	BT-50J	2.75"
2186	Eagle Boosted Glider	030452	BT-20 (Print)	12.00"						
2187	Oracle	060865	BT-60 (Lower)	15.56"	060974	BT-60 (Upper)	12.00"			
2188	Canadian Arrow	030458	BT-80	12.00"	030360	BT-50H	7.75"			
2189	Rubicon	030457	BT-321	6.00"	030366	BT-50L	12.70"	030456	BT-50A (6)	10.00"
2190	Cosmos Mariner	030470	BT-55	14.125"	030471	HBT-1000	13.438"			
2191	Space Ship One (Appendix 1)	030469	BT-200	3.75"	030408	BT-20J	2.75"			
2192	Thunderstar	030455	BT-60P	16.00"	030332	BT-20DJ	4.00"			
2193	Vanguard Eagle	030453	BT-60V	4.313"	030454	BT-55V	7.00"	030408	BT-20J	2.75"
2196	Space Ship One (Appendix 1)	030400	BT-60	7.50"	030456	BT-50A	10.00"			

## Appendix I: Comments & Observations

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### 1.0 General

In 1974, Estes published its Custom Parts Catalog, providing the modeler with a comprehensive list of the parts comprising the Estes line at that time. Originally intended to facilitate the purchase of spare parts and scratch-building supplies, the 1974 Custom Parts Catalog has, over time, become the Rosetta Stone for anyone conducting a forensic examination of the older Estes kits.

Unfortunately, the Parts Catalog has not been maintained, at least not in the public domain, and since 1974 Estes has introduced new parts for which little in the way of specific product information has been made available. Further compounding this problem was the change that occurred in Estes' kit parts lists, as found in many of the kits released from the mid-eighties to the late nineties: the instruction sets included in many of these kits often illustrated the parts, but seldom provided any descriptive part data. For a Cloner, this lack of specific data makes it very difficult to know the actual type and length of the body tubes needed to re-create models from this era unless the modeler happens to have access to an original kit.

Additional confusing examples can be found where only part numbers are provided in the instructions. Relying on part numbers would be an acceptable practice if Estes were to ensure a consistent use of its parts nomenclature from kit to kit, but there are plenty of examples where part numbers were, and are, re-used to designate completely different parts.

A classic example is kit #2022, Warp-II, a very fine two-stage payload model and arguably a reasonable cloning candidate. A quick look at the instruction set (which can be found at <http://www.oldrocketplans.com/estes/est2022/est2022.htm>) shows that only a part number is provided to identify each body tube. Checking the 1974 Custom Parts Catalog, one finds that the part numbers for the booster and sustainer body tubes exist, but denote tubes different than those identified by the instructions. If a modeler were to re-create the Warp-II using only this information, the end result would be very different from the actual, original model.

Fortunately these problems affect a relatively small subset of the Estes kit line, and many of the subjects that most modelers would care to clone consist of parts well documented in the 1974 Custom Parts Catalog. Nevertheless, the most interesting cases are invariably the exceptions, so we provide the following commentary to discuss various anomalies and issues observed while compiling this reference list.

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### 2.0 Tube Length Variations

While compiling this list, we found several tube types that were cut with varying degrees of precision. Some kits contained exact length body tubes, yet a number of other kits contained tubes whose length could vary as much as  $\pm 1/8$ " relative to the dimensions provided in the 1974 Custom Parts Catalog.

The tube types exhibiting this kind of variation tended to be the most commonly used tube types, and so for the purpose of the Reference Listing, we've used the generic length Estes provided in the Custom Parts Catalog. For the benefit of the modeler, we provide the following commentary on the key findings as follows:

- P/N 030306, BT-5P: 5.1"

The following is an observation that affects a number of the kits in the 08xx series. Many of the earlier (pre-80's) kits have this tube exactly  $5-3/32$ " (5.093", or 5.1" according to the Parts Catalog) in length, while many of the later model kits have a BT-5 tube that is exactly 5.00" in length. Our hesitation in simply declaring the 5.00" tube a variant of the BT-5P, even though the variance is within the tolerance mentioned earlier, stems from the observation that we found no intermediate measurements, suggesting that the 5.00" part might be a new tube.

The question is further complicated by the fact that many late model kit instructions do not provide a parts designation or part number for the 5.00" tube, so it is not clear whether Estes actually created a new part (the 5.00" version) or changed the tolerance on the older, BT-5P, part.

Estes' own information does little to clarify this; for example the instruction set for the Manta Bomber (#1928) lists the BT-5P as 5" long (which could be just another instruction error, as seen in so many other examples), while the actual part in the kit examined measured  $5-1/8$ ", totally consistent with the expected length for a BT-5P. We found other examples where Estes' kit instructions listed tube lengths in variance with the Parts Catalog information, so this by itself is not strong evidence that the 5.00" tube is meant to be a BT-5P.

While circumstantially it is very compelling to declare the newer tube a BT-5P, we have nevertheless chosen to show the 5.00" part in the list without a known part number. Perhaps in time data will be found that will definitively resolve this question.

- P/N 030320, BT-20B: 8.65"

Most of the examples of this type were found to be  $8-5/8$ " (8.625") long.

- P/N 030366, BT-50L: 12.7"

We found this tube varying substantially (with a few examples as long as 12.75"), with most examples having a nominal length of  $12-11/16$ " (12.6875").

- P/N 030378, BT-52AG: 2.1"

Most examples of this type were found to be  $2-3/32$ " (2.093") long.

- P/N 030433, BT-80KD: 14.2"

Most examples of this type were found to be  $14-3/16$ " (14.188") long.

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- P/N 030437, BT-80: 11.00"

Many examples of this type were found to be 10-7/8" (10.875") long.

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### 3.0 Discontinued Body Tubes

Estes Industries began its model rocketry mail order business in 1960 with just a pair of body tubes: the BT-1A and the BT-2. While it was motor production that gave Estes its start, it was the early body tubes and associated parts that gave Estes its model business. From this rather inauspicious beginning, Estes eventually grew to become the industry's leader.

With the impetus of those early days, Estes went on to create a diversity of tube types that would eventually accommodate a broad range of sport and scale models. But as the product line matured, several of the very early tube types were discontinued, and have since been lost to the general modeling community.

Accordingly, the following section examines those very early body tubes, and attempts to shed some light on their characteristics and origin. The accompanying analysis is based in part from information provided in the Estes interview (Sport Rocketry, May/June 2007), from correspondence with Carl McLawhorn (Semroc Astronautics Corporation), from Terry Dean's excellent chronology of the early days of model rocketry, and from the author's own research. The author is especially indebted to fellow Old Rocketeers Doug Sams, for his critical review of the mathematical body tube analysis, and to Scott D. Hansen and James Gartrell, for their insightful review of the text.

### 3.1 The Early Estes Body Tubes

An important piece of model rocketry lore is the well known and well told story of how, in the early days, Gleda Estes was responsible for hand rolling a number of the tubes that Estes Industries offered to its customers. What seems less certain is which tube or tubes Mrs. Estes actually rolled: when Estes Industries began its mail order business in 1960, its catalog sheet listed only two tube types – the BT-1A and the BT-2. BT-3 wouldn't show up for another year, and by 1962, the exponential growth of the business would require Estes Industries to outsource the manufacturing of its body tubes. 1962 would also see the Estes acquisition of the remaining tube inventory from MMI (Model Missiles Inc.), as one of the conclusions flowing from the MMI shutdown.

So: did Mrs. Estes take the time to make all of Estes' body tubes right from the very beginning, or did she become involved in tube rolling at a later time, rolling only certain types, when Estes took the pivotal decision to branch out on its own kit business? If the latter, then from where were the tubes in the 1960 catalog sheet sourced?

#### 3.1.1 What the References Say

Part of the answer can be gleaned from the cover notes that Vern Estes wrote in 1987 to authenticate a copy of the company's first 1960 catalog sheet:

<http://www.ninfinger.org/~sven/rockets/catalogs/estes60/60estcat.html>

As Vern remarked,

***“Some of the parts listed in this ‘catalog’ were acquired from the failing pioneer company, Model Missiles, Inc. and the body tubes were hand rolled (manufactured) by Mrs. Estes using a slotted aluminum mandrel.”***

This rather compact sentence ties several events together, and warrants some analysis.

The 1960 catalog sheet was released in mid-1960, and in addition to the initial motor offering, the catalog sheet also included various parts for scratch-building several model rockets from plans.

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Vern makes it clear that “some” of the offered parts were acquired from MMI. These most certainly would have included the plastic nose cone and fin can parts that were listed in the sheet, but it’s also plausible that some of the acquired parts could have been the compatible body tubes as well.

From Terry Dean’s excellent model rocketry chronology (OldRockets Yahoo Newsgroup, message #29897), we know that control of MMI passed from G. Harry Stine to Richard Keller in July 1959. MMI would not close down until 1962, but one can imagine that by mid-1960, the new MMI leadership would have been anxious about sales. Therefore, while we don’t have direct evidence of a purchase or re-sale agreement, it seems certain that MMI (especially with its new leadership) would have welcomed the opportunity to use Estes Industries as an additional channel to market for its product. The fact that Estes didn’t offer MMI kits in its 1960 catalog sheet also suggests that Estes had already decided by that time that they would move into their own kit business.

The inferred conclusion drawn from the above is that not all of the tubes offered in the 1960 catalog sheet were rolled by hand; certainly some doubt is cast upon the BT-1A. Yet we know from various statements by the Estes that at some point, some tubes were, in fact, hand rolled.

We know from the Estes’ interview in the 2007 May/June issue of Sport Rocketry that Gleda used “the throw away heavy paper backing from the wet-bath copier” as her tube stock; during a related discussion with the Estes during NARAM-49, Carl McLawhorn noted that

***“Gleda couldn’t recall the type of wet photo copier they got the paper backing from. It was not their [the Estes] machine, but one that someone else used and saved the “negatives” [from], as I understand it. The tubes that Gleda rolled had the negative image [from the printing machine] rolled to the inside of the tubes. She used a brass mandrel instead of aluminum, but is still not sure about the diameter.”***

Setting aside the contrary recollection concerning the rolling mandrel material, there are a couple of clear facts: we know that Mrs. Estes did roll some tubes by hand, and we know that the tube stock was the backing material from the master sheets of a wet-bath copier.

It is most likely that the heavy paper backing sheets came from standard size masters - 8.5”x11” (letter) and/or 8.5”x14” (legal). These would have been the predominant paper sizes used in Mimeograph and Ditto Machine reproduction at the time. Armed with these clues, and with the help of a little math, we can deduce with some certainty the tube types Mrs. Estes most likely rolled, as we will now show.

### 3.1.2 A Little Math

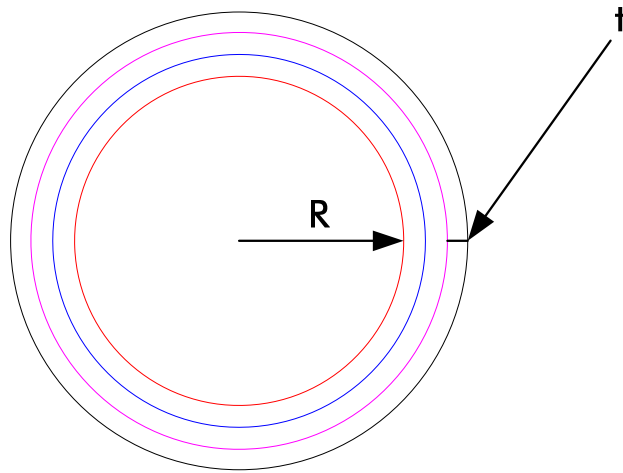
We know that Estes Industries’ first paper tubes were convolute, or parallel, wound. We also know with some certainty the paper sheet sizes that Mrs. Estes had at her disposal. What we don’t know is the thickness or the length of the paper strip she used for rolling. However, we can estimate these parameters by analyzing the published radial dimensions of the early tubes.

In her Sport Rocketry interview, Mrs. Estes said that she used a mandrel for rolling the paper strip into a tube. In our analysis, we will assume that the thickness of the paper strip was very thin so that we can approximate the solution with a series of concentric layers about the mandrel. The error introduced in the calculation as a result of ignoring the overlap that occurs layer to layer in a continuous winding is minor, so long as the paper is very thin compared to the overall diameter of the tube.

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Let's imagine a tube built up as discussed; as seen from its end, we would have a tube of concentric rings, as shown by the following figure:



**The Built Up Tube**

Where:

- the **Red** (innermost) tube is the mandrel, of Radius R
- t = the paper thickness

We can quickly see that as each layer of paper is placed on the tube, the circumference of the tube grows.

For example, the outer circumference of the first paper layer will be:

$$C_1 = 2\pi(R + t)$$

For the 2<sup>nd</sup> layer, the outer circumference will be:

$$C_2 = 2\pi(R + 2t)$$

And for the 3<sup>rd</sup>:

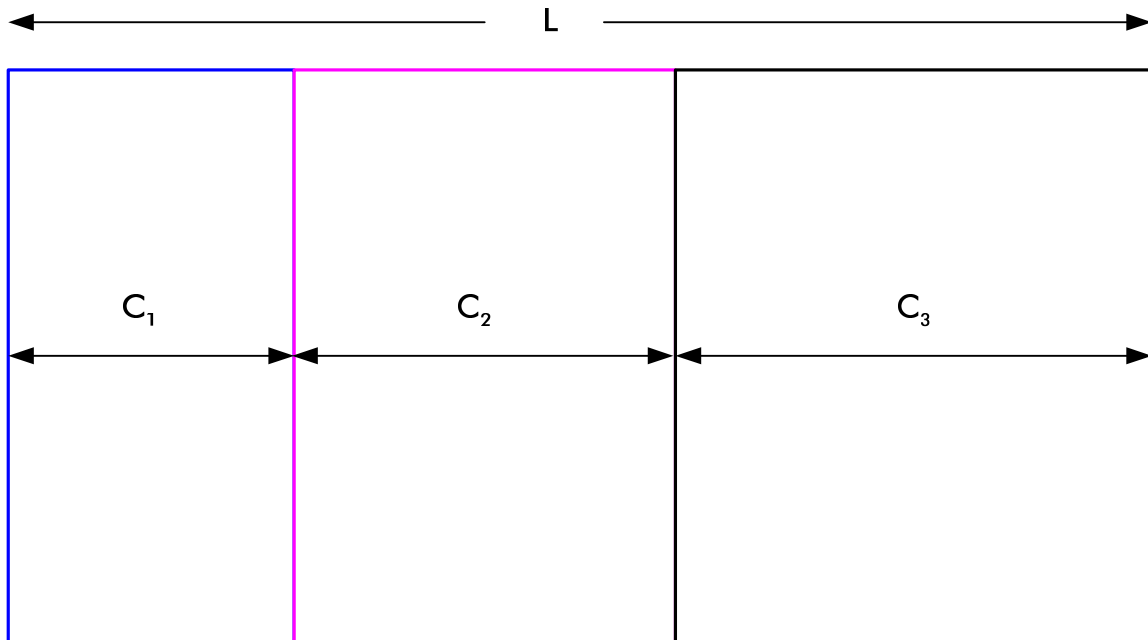
$$C_3 = 2\pi(R + 3t)$$

and so on, until we have built up the tube to the desired outside diameter.

If we imagine that we are rolling this tube from a continuous piece of paper, then the length of the strip needed to make the tube will be the sum of the circumferences of the individual layers. The following illustration (not to scale) makes the point:

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### Layer Circumferences laid End-to-End

Here, we can see that the length of the paper strip is  $L = C_1 + C_2 + C_3$ . We can generalize the expression for this as follows:

$$L = \sum_{\alpha=1}^n C_{\alpha} = \sum_{\alpha=1}^n 2\pi(R + \alpha t)$$

where  $n$  = the number of layers, or windings.

We can reduce this expression by re-arranging, as follows:

$$L = 2\pi \left( nR + t \sum_{\alpha=1}^n \alpha \right)$$

### Let's Start with BT-2

The 1960 catalog sheet describes BT-2 as ID = 0.720"; its OD can be found on Plan #3, the Orange Bullet, included in Estes' publication "Model Rocketry":

[http://www.ninfinger.org/~sven/rockets/catalogs/estes\\_techman/esttech.html](http://www.ninfinger.org/~sven/rockets/catalogs/estes_techman/esttech.html)

There the OD is described as "approximately 0.770". The 1960 catalog sheet also specifies the length of the BT-2 as 2.5" (although curiously, the Orange Bullet plan shows the length as being 2-3/8"). Let's use these radial numbers.

$$\text{The wall thickness of the tube is } W_T = \frac{0.770 - 0.720}{2} = 0.025"$$

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The number of windings comprising the tube can be determined from the wall thickness of the tube and the thickness of paper strip. Understanding this, we can re-express the formula for Wall Thickness as follows:

$$W_T = \frac{OD - ID}{2} = nt$$

where  $n$  = the number of windings, and  $t$  = the thickness of the paper strip.

To start, let's say our paper is .005" thick; then by the expression above,  $n=5$ .

Using the formula we found earlier for the length of the paper strip, we find that  $L = 11.78$ "; therefore it would certainly be possible to roll a BT-2 tube from one paper strip so long as the paper was 0.005" thick, and so long as the strip was cut lengthwise from a legal size sheet of paper.

Suppose we want to be more economical and not exceed a strip length of 8.5"? Then strips could be cut from either letter size or legal size paper. With this constraint, what thickness would the paper have to be?

Let's start by figuring out how many windings can fit in 8.5". From the expression for  $L$ , we can see that  $L \cong 2\pi nR$ , since the sum term multiplied by  $t$  (thousands of an inch) is negligible for this approximation. We know that the finished OD is supposed to be 0.770", so there could not be much more than  $n = \frac{8.5"}{\pi(0.770")} \cong 3.5$  windings in the strip.

If we use  $n=3$ , then from the expression for Wall Thickness we find that  $t=0.0083$ "; using these two values in the formula for  $L$  gives a paper strip length of 7.1". Even though the paper thickness is rather heavy (perhaps too heavy), the length is well within our 8.5".

Suppose the tube is wound from a strip cut from the 11" side of a letter size sheet of paper? In this case there could not be much more than  $n = \frac{11"}{\pi(0.770")} \cong 4.5$  windings.

Using  $n=4$  in the Wall Thickness formula returns a sheet thickness of 0.0063", a value closer to the thickness of a modern heavyweight inkjet paper. Running the calculation for  $L$  gives us a strip length of 9.44", well within the 11" length of the strip. What these calculations therefore suggest is, depending on the actual thickness of Mrs. Estes' "heavy paper backing from the wet-bath copier", that it was entirely possible that the BT-2 could have been hand rolled from strips cut from a letter size sheet of paper, and certainly possible from a legal size sheet. However, there are other ramifications for the BT-2 that flow from these parameters, and we'll come back to this point momentarily.

### BT-3

BT-3 was first introduced as an orderable part in the 1961 catalog; there it is characterized with radial dimensions of 0.725" x 0.765"; it's also listed as having a length of 9.25". The length implies that this tube would have been rolled from the long side of a letter or legal size sheet of paper. It also means that the number of windings had to fit inside 8.5", unless a second sheet was added to the roll.

The radial dimensions for BT-3 are not so different than the BT-2. This in turn suggests that if we're to use one sheet of paper to wind our BT-3, it will result in about the same number of windings. If

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we assume about 3 windings again, then the thickness of our paper has to be  $t = \frac{OD - ID}{2n} \cong 0.0067''$ , not so very different than the result we calculated for the BT-2.

### 3.1.3 Some Conclusions so far

At this point, we've shown it's possible to hand roll convolute tubes of the size we're interested in from standard sheets of paper. Another observation we can make is that while the calculated paper thickness is similar between the two cases, it's not the same.

Taking the premise that Mrs. Estes was rolling both BT-2 and early BT-3 tubes from the "heavy paper backing" from Ditto Machine masters, we can reasonably assume that the paper stock used was likely the same in each case; therefore the backing paper thickness had to be the same. So something else needs to account for the difference in calculated thickness. Some of the factors that could account for this difference are:

- The amount of glue used between layers of paper. What we've calculated so far is actually the combined thickness of paper + glue per layer. Some allowance has to be made for that glue.
- Perhaps the OD of the BT-2 wasn't exactly 0.770"; the only reference to the BT-2 OD is in the plan for the Orange Bullet, where it is characterized as "approximately 0.770".

Let's assume that the "heavy backing paper" that Gleda Estes referred to as the source for her hand rolled tubes had the thickness similar to a medium weight printer paper; 24 lb inkjet printer paper has a thickness of about 0.004" – let's round this up to an even 0.005". Further, let's say that the glue accounted for a measure of thickness, so that the combined paper + glue layer was in the vicinity of the value we calculated for the BT-3, or about 0.0067" thick (we'll also give Gleda the benefit of the doubt, and assume that she found a method to hand-roll the tubes with a consistent amount of glue). Let's recalculate on this basis.

For BT-2:

- For a tube of at least 3 windings (wound from an 8.5" long strip), the wall thickness would be 0.020". This would make the BT-2 OD 0.760" instead of 0.770", if rolled from a single strip of paper. The paper strip length needed to make this tube would be least 7.038" long. This could be easily cut from a standard width of paper, and would leave a tailing 1.462" long, or about 0.61C of the final tube OD, after 3 windings.
- For a tube of at least 4 windings (wound from an 11" long strip), the wall thickness would be 0.027". This would make the BT-2 OD 0.774" instead of 0.770", if rolled from a single strip of paper. The paper strip length needed to make this tube would be least 9.47" long. This could be easily cut from a standard length of letter-size paper, and would leave a tailing 1.53" long, or about 0.63C of the final tube OD, after 4 windings.

Even though the 4 windings scheme seems to come closer to the listed OD, it's doubtful that this was the case (assuming the BT-2 was hand rolled), as four 2.5" wide strips can be cut from the 11" side of the paper sheet, while only three can be cut from the 8.5" side; therefore, in the interest of economy, it's more likely the BT-2 was a 3+ wind tube rolled from an 8.5" long strip, directly leading to the conclusion that the OD for the BT-2 was more likely in the vicinity of 0.760", not 0.770", if in fact it was hand rolled.

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For BT-3:

- For a tube of at least 3 windings (wound with the 11" side of the sheet interfacing with the mandrel, which would make a tube 11" long), the wall thickness would be 0.020". This would make the BT-3 OD 0.765", as listed in the catalog. The paper strip length needed to make this tube would be least 7.086" long. This would leave a tailing 1.414" long, or about 0.59C, after 3 windings.

Thus we can draw the conclusion that it is entirely possible to meet the listed dimensions for the BT-3 tube by hand rolling a medium weight paper (0.005"; 0.0067" including glue. Note that 0.0067" is about 0.007", which divides into 0.021" 3 times; 0.021" is a very familiar tube wall thickness.). As we know that Mrs. Estes did in fact roll some type of tube or tubes, we can accept with some certainty that at least the BT-3 was one of these hand rolled tube types.

Concerning the BT-2, the analysis suggests that the actual BT-2 OD was probably closer to 0.760", if in fact it was a hand rolled tube made from a medium weight paper, and from a single paper strip.

### **Why the difference in radial size between BT-2 and BT-3?**

If we accept the results of the analysis as plausible, then we find that the radial dimensions of BT-2 and BT-3 are very close. Close, but not the same.

If we imagine that the BT-2 was a hand rolled tube, and we consider that it was only available for one year (1960), then the difference in radial size might possibly have been due to a change in mandrel. But Estes would have no reason to change the mandrel unless the original was lost or was destroyed. We don't know that either was the case.

Perhaps the published radial dimensions for the BT-2 in the 1960 catalog sheet were in error and that in fact the BT-2 and the BT-3 were the same, differing only in length. In the absence of extant samples, this speculation cannot be verified.

There is the alternative possibility that the BT-2 was some kind of externally sourced tube (perhaps a fireworks tube?) that Estes used as a model rocket airframe to help kick start the parts business. However as Estes was planning to move into the kit business, the BT-2's short, fixed, length would severely limit the kit range that Estes could generate from this one tube. This limitation might help explain why Estes would drop the BT-2 after only one year in favor of the new and longer BT-3.

All of this, plus the tube analysis, suggests that Mrs. Estes could have rolled some BT-2 tubes, but we can't know for sure. It is, however, most certain that she did roll the early BT-3. We're about to rule out the BT-1A altogether, as will be seen.

### **What about the BT-1A?**

BT-1A is listed in the 1960 catalog sheet as having radial dimensions 0.750" x 0.840", and a length of 13.75". Let's see how these values play out if we make the assumption that this was also a hand rolled tube made from paper strips of the same thickness as calculated for the other tubes. Note that in order to realize the 13.75" tube length, the long side of the legal sheet had to be used for the tube cylinder, which means the number of windings must fit within the 8.5" width, unless a second sheet is added to the roll.

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With the stated radial dimensions, the wall thickness would have been 0.045"; this means that there had to be at least 6 windings if we assume the same combined paper + glue thickness of 0.0067". Running the numbers, we find that the length of the paper strip needed to roll a tube of these radial dimensions would have had to have been at least 15.02" long; this clearly exceeds the width of either a letter or legal size sheet of paper.

If we assume that the tube was rolled with a single legal sheet, then we can calculate what the paper + glue thickness had to be. In this case, there could not be much more than  $n = \frac{8.5"}{\pi(0.840")} \cong 3.2$  windings, if a single sheet was used.

Setting  $n=3$ , we find that  $t = \frac{OD-ID}{2n} \cong 0.015"$ , clearly much, much, thicker than what we found plausible for the BT-2 and BT-3 tubes, and perhaps too thick to be practically or easily rolled into tubes by hand. A thinner layer thickness can be assumed, but if hand rolled it means that Mrs. Estes had to have used more than one sheet to make a tube of the listed dimensions.

### An Empirical Cross Check

The approximate mathematical convolute tube model we've developed provides an indication of what the parameters might have been for tubes rolled from a heavy paper stock. But how does all of this play out in real life?

As part of his role in this research, Carl McClawhorn created a precision rolling mandrel for a BT-3/BT-30 size tube, and has successfully produced a number of hand rolled tubes using the techniques described by Gleda Estes. In a recent conversation with the Estes, Carl noted the following:

***I called [the Estes] to get more details about rolling BT-30's. I am able to roll 32# glossy stock with glue around a 0.725" mandrel and consistently get 0.767" OD with the full 11" of paper. She was fairly certain that the stock was 8.5" x 11" that she wound and it was trimmed to size after it dried. She said it was a glossy photo type paper in the 32# range. That means the 9" long would have been made commercially.***

Carl went on to describe further details of the hand rolling exercise:

***The thickness of the paper [32#] is 0.004", almost exactly. Ten sheets are 0.040". They were rolled 8.5" wide with the 11" side winding around the mandrel about 4.7 times. The total thickness of glue is about 0.002"+/-.***

Besides confirming the tenets of the earlier mathematical analysis, Carl's empirical results also raise a question about the 1961 catalog listing for the BT-3: given that Carl rolled the tubes from a letter size sheet, and that the side interfacing with the mandrel was the 8.5" side, then the actual length of the finished tube could not have been more than 8.5". If Gleda rolled her BT-3 the same way, then this means that the initial listed length of 9.25" for the early BT-3 was in error; it also means, as Carl rightly concludes, that the subsequently offered 9" tubes would have been sourced externally.

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In Carl's latest discussion with the Estes, he also discovered that:

***Gleda does remember that she was pregnant with her last daughter at the time she rolled them [the tubes], so it would have been late 1960 and early 1961 [that she was involved with rolling tubes].***

The significance of this statement is that it essentially closes the door on the possibility that the BT-2 was an in-house, hand rolled tube. As Vern states himself in 1987, the 1960 catalog sheet was published in mid-1960; this catalog sheet already listed the BT-2, which implies that it was already available at that time. If Gleda began rolling tubes in late 1960 or early 1961, then this would have occurred after the BT-2 was offered. Therefore, it is highly likely that the BT-2 was externally sourced, and that the early BT-3 was the only tube produced in house.

### **3.1.4 Final Conclusions**

None of us can know with absolute certainty which of the early tube types were rolled by Mrs. Estes during those embryonic days of the company; after the passage of so much time, not even the Estes can reliably recall. Nor can we be absolutely sure about the weight and thickness of the type of paper that Gleda used.

What we can be sure of is that Gleda did roll some tubes by hand, and that most likely the early BT-3 was the only tube holding this distinction.

As for the BT-1A, we know that Estes acquired "some parts" from MMI by mid-1960 to support their mail order business; the remaining parts stock, including tubes, would be acquired from MMI somewhere in mid to late 1962 as part of the MMI shutdown. By 1963, those MMI tubes would be re-designated BT-40, and would never be used in an Estes-produced kit, nor replenished in inventory.

The foregoing analysis suggests that if the BT-1A was hand rolled by Gleda, then it was either rolled from more than one sheet of paper, or its radial dimensions were listed incorrectly. If Gleda rolled this tube, it's doubtful she would have used more than one sheet of paper; otherwise the labor per tube would have been prohibitive. Therefore it's most likely, given Vern's statement in 1987 and the tube analysis above, that Estes sourced their BT-1A from MMI. It does not, however, explain the curious fact that the earlier version of the tube was designated BT-1A, and the later version BT-1.

This fact, that the tube designation changed from BT-1A to BT-1, and also that the tube's listed radial dimensions changed from 1960 to 1961, raises the speculation that perhaps the two tubes were different, and that perhaps Gleda could have rolled the BT-1 version (the later version). This still leaves us with the dimensional problem noted earlier, and is nevertheless unlikely, for several reasons.

First, there is no evidence that the characteristics of the associated plastic parts (nose cones, fin cans) ever changed or that they were sourced from any other supplier than MMI; the parts that Estes offered in 1960 for the Arrow-C and the Sky Bird were the same parts offered until the entire BT/PNC-40 family disappeared from the catalogs after 1966. It wouldn't have made sense to roll tubes that didn't fit the plastic parts properly.

Next, there is the evidence that the dimensions for the MMI tube were only approximated by G. Harry Stine for publication purposes, as follows:

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We make our missile out of wood and paper! Aerobee-Hi has a body made from a rolled paper tube  $\frac{3}{4}$ " in diameter with walls  $\frac{1}{32}$ " thick. This tube is exceptionally strong and light. You can glue things to it and paint it easily.

**American Modeler, May 1958**

*Aerobee-Hi specifications: Length: 14 inches; Body diameter:  $\frac{3}{4}$  inch; Weight (loaded): 1.6 ounces.*

**American Modeler, September 1958**

The following parts are required: 1 vinyl nose cone (Model Missiles #MM-001-14 or Estes #160-PNC-2), about 50 cents including nose insert; 1 paper body tube, 0.75" i.d. x 0.84" o.d. x  $9\frac{1}{4}$ " long (Model Missiles #MM-001-2 or Estes #160-BT-1), about 50 cents; 1 set of plastic fins (Estes #160-PF-1), 50 cents; 12 inches of  $\frac{1}{8}$ " contest rubber; 1 piece of hard plastic tubing  $\frac{5}{32}$ " i.d. x  $\frac{9}{32}$ " o.d. x 2" long.

**American Modeler, February 1962**

Finally, we must keep in mind that Vern Estes stated that all of the BT-40 stock came from the MMI inventory acquisition. If we accept that Estes acquired some tubes from MMI in 1960, and the balance of the MMI inventory in 1962, and that the MMI part and the Estes part were characterized as the same by G. Harry Stine himself in later years (as indicated in the 1962 American Modeler reference, above), then it had to have been the listed dimensions that changed year to year, not the part. What this means is that in their haste to get the 1960 catalog sheet published, Estes simply published the radial dimensions that MMI provided to them. This would be corrected in subsequent catalogs, once the actual dimensions were measured. In short, the BT-1A and the BT-1 were the same tube, and neither was ever rolled in-house. Why the tube designation changed from BT-1A in 1960 to BT-1 in 1961 remains unclear.

As mentioned earlier, with the passage of so much time, it's unlikely that these points of minutiae will ever be fully resolved. In the absence of conclusive data and extant samples, we can only make a few educated guesses at best. Even then, there remain sufficient loose ends that many of the speculations presented here could easily be overturned with some late breaking find of old records or data from the period. It's unlikely we'll ever know all the details for sure.

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So having said all this, and in consideration of the foregoing analysis, we contend that the following summary best fits the available data:

- That the BT-1A listed in the 1960 catalog sheet was sourced from MMI, and was not rolled in house.
- That the BT-1A and the BT-1 were the same tube.
- That the radial dimensions listed for the BT-1A in the 1960 catalog sheet were in error, subsequently corrected in the 1961 edition (the tube designation was also changed to BT-1 in 1961, but the reason for the designation change is not clear).
- That it is plausible that the BT-2 could have been rolled in-house, but this is unlikely.
- That if the BT-2 was rolled in-house, it most likely had an OD closer to 0.760", instead of 0.770".
- That most certainly the early BT-3 was rolled in-house.
- That it's possible that the length of the early BT-3 was 8.5" (or less, depending on how it was trimmed), and not 9.25". If true, this would be a dramatic catalog error.
- Finally, it is most likely that the early BT-3 was the only tube type Mrs. Estes rolled by hand.

### **3.2 BT-1A/BT-1/BT-40**

The BT-1A/BT-1/BT-40 was a convolute (parallel wound) tube. While Estes offered BT-1 in its early catalogs, no Estes kit was ever developed or offered that incorporated the BT-1 or its concomitant parts (although several early MRN plans, e.g.: the Bug-A-Bye, the Dirty Bird, etc, did specify these components).

By 1963, the part designation had changed to BT-40 as part of Estes' general change to its new tube series nomenclature. BT-40 was last made available by catalog in 1966; the stock was never replenished, nor was an Estes' equivalent tube ever manufactured. It is important to note that in a recent conversation with Carl McLawhorn, Vern Estes confirmed that all of the BT-40 ever sold by Estes Industries came from the stock acquired from MMI.

#### **Dimensions:**

Table A1-1 shows how the listed dimensions for the BT-1/BT-40 progressed over the life of its catalog appearance. Considering the period of time that the part was made available, and knowing that Estes never replenished the inventory, Estes would have offered the part until either the inventory was eliminated, or at least until the inventory reached a level where the remaining quantities would have had nothing more than scrap value. All of this, plus the foregoing discussion, implies that most likely it was the listed catalog dimensions that changed over the years, not the actual part. This then means that the initial dimensions listed in 1960 were likely approximate, and that the dimensions listed from 1961 onwards were the more "correct" ones.

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**Table A1-1: BT-40 Listed Catalog Dimensions – Length 13.75"**

Year	Designation	ID	OD	WT
1960	BT-1A	0.750	0.840	0.045
1961	BT-1	0.765	0.825	0.030
1963	BT-40	0.765	0.821	0.028
1964	BT-40	0.765	0.821	0.028
1966	BT-40	0.765	0.821	0.028

**Note:** The yellow highlighted table entries are derived values calculated from the data listed in the catalogs.

At this time, only Semroc Astronautics Corporation offers a BT-40 equivalent tube; this tube has been manufactured in accordance with the 1961 BT-1 specification. Carl McClawhorn has indicated that the 1961 BT-1 dimensions correspond to measurements taken from an early MMI Aerobee model.

### 3.2.2 BT-2

BT-2 was listed for only one year, in the 1960 catalog sheet. The tube was supplied for a rocket called the Orange Bullet, which was offered as a plan in a new plans book (#160-P-1). The 1960 catalog sheet specified the BT-2 as having a length of 2.5" and ID of 0.720", but failed to list the OD. This can be found in the plans for the Orange Bullet, as provided in the Model Rocketry handbook noted above. There, one finds the OD listed as "approximately 0.770". Our analysis shows that the BT-2 OD was more likely 0.760", if it was a hand rolled tube, although the latent evidence would suggest that the BT-2 was sourced externally.

By 1961, the BT-2 was gone, replaced by a new tube, the BT-3.

### 3.2.3 BT-3/BT-30

The early BT-3 was a hand rolled tube and was listed with a length of 9.25", although Carl McClawhorn's recent rolling experiments suggest that its actual length could have been 8.5" or less, depending on how the tube was trimmed. James Gartrell has postulated that the tube was rolled with the long side of the sheet interfacing to the rolling mandrel, and that perhaps the mandrel happened to be 9"+, so that the trimmed length of the tube was 9.25". James' argument for this is that the listed catalog length of 9.25" would be a gross error if in fact the tube was really only 8.5" long. Perhaps he's right; in the absence of an extant sample (in our present time, an extant sample would be more like a relic), it's not possible to be definitive. The earlier mathematical analysis supports both lengths, and we are left with the empirical example offered by Carl McClawhorn.

Apart from its length, the BT-3 radial dimensions were set at 0.725" x 0.765", and these dimensions would be preserved in the eventual BT-30. The tube length was changed to an even 9.00" once Estes began to outsource the manufacturing of their tubes. In later plan updates, the Orange Bullet was re-specified around the BT-30 tube, since the BT-2 was offered for only one year.

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By 1963, the BT-3 was re-designated BT-30, when Estes changed its tube designations to the current series scheme.

Like the BT-1/BT-40, the BT-3/BT-30 was convolute (parallel) wound. Eventually, the BT-30 was changed to the same spiral wound manufacture as the other new tubes in the Estes lineup, as clearly evidenced by various extant BT-30 based kits; however the BT-30 continued to be listed as a parallel wound tube until disappearing from the catalogs following the 1977 issue.

The BT-30 played a central role in the early kit line up, it being the basis for the initial Estes kit releases. The last production kits incorporating the BT-30 were the Sky Hook (#1208, last listed in 1988), and the Scout III (#0878, last listed in 1992).

### **Dimensions:**

As introduced in 1961, BT-30 was characterized as 0.725" ID x 0.765" OD (for a wall thickness of 0.020"). From 1963 to 1971, BT-30 was consistently listed in the body tube charts as 0.725" ID x 0.767" OD, with a wall thickness of 0.021"; yet curiously, any of the BT-30 based kits were described in the same catalogs as having an OD of 0.765".

From 1972 until its final catalog year, 1977, BT-30 was listed with the mathematically inconsistent dimensions of 0.725" ID x 0.765" OD x 0.021" WT. On the kit side, the Scout III, the last kit incorporating BT-30, was listed in the 1990 – 1992 catalogs (and also on the kit face card) as having the anomalous OD of 0.763".

It is important to note that with the exception of the 1961 catalog, the BT-30 wall thickness was consistently listed as 0.021" over its entire life. This characteristic is also consistent with Estes' ubiquitous use of this wall thickness for all of its standard heavy walled tubes (allowing exceptions for special tubes, of course). This fact, plus the consistent characterization of the ID as 0.725", would suggest that the actual BT-30 OD was to have been 0.767". This result is also consistent with Carl McClawhorn's hand rolled BT-30 experiments.

BT-30, and the earlier BT-40, would be Estes' heavy walled airframe tubing until the appearance of the BT-60 in 1962/1963, first used in kit K-6, Ranger (BT-55 would show up later in 1965/1966, in kit K-22, V-2).

### **3.2.4 Estes Engine Mailing Tubes**

When purchased by mail order, model rocket engines were shipped to the modeler in heavy duty mailing tubes. Estes soon made a corresponding balsa nose cone so that modelers could re-use the mailing tube as a rocket airframe. The mailing tube nose cone was first listed in the 1963 catalog, and was assigned the designation BNC-MT-1. The following year, the nose cone was re-designated BNC-MTD. The nose cone was last listed in the 1971 catalog. The Mailing Tube was never made available as a separate catalog item.

### **Dimensions:**

The mailing tube was sized as follows: 0.937" ID x 1.002" OD.

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### 3.3 BT-52

One of the more enigmatic body tube types was the BT-52, and because of the controversy surrounding its listed dimensions, and its importance to at least a couple of the coveted classic kits (the Thor-Agena B and the SPEV), we have elected to include a discussion of this tube type here.

One of the earliest tube types created by Estes was the BT-50, a near 1" tube that has enjoyed a prolific appearance in the Estes kit line, either as an airframe component or as a motor mount tube. As Estes expanded its kit offering, there arose a need to create two new tube types, initially intended as the stock for certain scale parts. These were the BT-51, a +1" tube used to represent the Redstone tanks found in the Saturn 1b (K-29), and the BT-52, another +1" tube used to represent the Agena upper stage in the Thor-Agena B model (K-28). Since all three tubes were fairly close in diameter, Estes adopted the practice of marking the interior of the two newer tubes with a colored spiral stripe so that the different types could be easily distinguished. The BT-51 was marked with an interior black spiral stripe, and the BT-52 was marked with an interior green spiral stripe. The following photo provides a direct comparison of these three tube types:



**From Left to Right: BT-50, BT-51 and BT-52**

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BT-52 was used as an airframe part in only a handful of kits, as follows:

- K-28: Thor-Agena B (BT-52S Agena upper stage)
- K-39/1239: Semi-Scale Saturn V (BT-52AG S-IVB section)
- K-59: SPEV (BT-52AG payload section)
- 1310: Colonial Viper (BT-52S outboard engine sections)

Thereafter, BT-52 found use as an engine hook retainer sleeve (its ID being a slip fit over BT-50) and it is in this capacity that most present day modelers will have seen the type. For this purpose, BT-52AG was included in the following kits:

- K-52/1200P, Omega
- 1267, Maxi V-2
- 1268, Pershing
- 1302, Maxi X-Wing Fighter
- 1321, Maxi Alpha III
- 1331, Maxi Icarus
- 1379, Mach-2
- 1926, V-2
- 1970, Der V-3
- 2001, Saturn V
- 2035, Optima
- 2036, Super Vega

The longer BT-52S was also used as an engine hook retainer sleeve and was found in the following kits:

- 1269, Maxi Honest John
- 1291, Maxi Alpha
- 2018, Super Big Bertha

The re-released Maxi Honest John (#2166) was issued with an updated version of the BT-52S as the retainer sleeve, the outside of the tube having a rough black paper wrap instead of the former glassine wrap. Shorter versions of this same black tube can be found in a number of the late model kits.

### **Dimensions:**

The 1974 Custom Parts Catalog lists BT-52 as having an OD of 1.114", and an ID of 0.988", for a wall thickness of 0.063". However, the evidence clearly shows that this entry is wrong, as all of the extant BT-52 specimens found in the kits examined for this listing have an OD of 1.014", and a wall thickness of 0.013". Even the Custom Parts Catalog itself leaves a few clues that call its own BT-52 tube listing into question. One only needs to check the diameters listed for balsa nose cones #36 and #37 on page 9 of the Custom Parts Catalog; here, #36 is BNC-52AG, the nose for kit K-39, the Semi-Scale Saturn V, and shows its outside diameter as 1.014". Immediately following is #37, BNC-52G, the nose for the Thor-Agena B, showing the shoulder diameter of 0.988" (which is the correct dimension for the shoulder, but is incorrectly listed in the place of the OD).

In recent times, Estes changed the engine hook sleeve to a very thick walled tube, yet retained the practice of designating this part as BT-52 (typically BT-52AG, 2.1" long, just like the Custom Parts Catalog suggests). This fact has been pointed out by fellow Old Rocketeer Doug Sams in previous

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group discussions concerning BT-52. An example of a late model kit that incorporates this thick walled part, and identifies it as BT-52AG (P/N 030450), is the re-released Maxi V-2, #1952.

We measured this “new” BT-52AG, taken from the re-released V-2 (#1952), and curiously, it was found to have an OD of 1.118” and an ID of 0.984”, very close to the dimensions listed in the 1974 Custom Parts Catalog. These findings suggest that perhaps the “new” part was specified with the erroneous 1974 Custom Parts Catalog dimensions, and not from an extant sample.

In summary, it is very evident that the original BT-52 had an OD of 1.014”, a wall thickness of 0.013”, and that the 1974 Custom Parts Catalog entry for this tube type is wrong. As of this update, Cloners can purchase an exact reproduction BT-52 tube of the correct dimensions from Semroc Astronautics Corporation.

### **3.4 BT-46 & BT-67**

These two tube designations are found in only one kit, #1284, Space Shuttle. Introduced in 1976, the Space Shuttle was advertised as a 1/162 scale kit; in reality, the scale was either 1/161 or 1/163.2, depending on the tube used as the reference. Perhaps Estes split the difference for advertising purposes.

BT-46 was the kit designation for Centuri ST-8, a 9.00” piece being used to represent the SRB tanks on the Shuttle. BT-67 was the kit designation for ST-20, and a section 7.906” (7-29/32”) long was used to represent the External Tank. It is interesting to note, however, that Estes did not supplant the Centuri designations in all cases; for example, in the same kit, ST-76 designates the tubes used as part of the guide fins for the model; and in kit #1921, Mercury Redstone, Estes used the ST-20 designation for the airframe instead of BT-67.

For additional examples where Centuri tube designations were used in Estes’ kits, see also #1378, Firecat, and #1907, Cyclone, amongst others.

### **3.5 JT-80C**

While definitely not a body tube, we include a discussion here about this old part because it has been used at times as a ring fin; moreover, because of its surface characteristics and its sometimes use in non-coupler applications, as well as the fact that it has been replaced since with what modern modelers would consider to be a “real” coupler, the part has been confused at times as just as short piece of BT-80. This is not the case.

The original JT-80C was listed in the 1974 Custom Parts Catalog with P/N 030274, and was characterized as having an OD of 2.55”, and an ID of 2.50”. The part was exactly 1.00” long, and had the somewhat unusual feature (for a coupler) of being glassine covered.

The part first appeared in kit K-36, Saturn V, where it was used as a lightweight coupler to interface the LM adapter section to the BT-80 based S-IVB stage. Thereafter, the JT-80C popped up in a variety of BT-80 based kits as a simple Joiner Tube, or coupler – these kits included #1291 Maxi Alpha, #1321 Maxi Alpha III, #1326 Colossus, #2018 Super Big Bertha, #2157 Saturn V, and finally #2165 Super Big Bertha (re-release). The part was eventually superseded by the now more familiar (and considerably longer) JT-80, starting with #2035 Optima.

Its application as a ring fin began with kit #1383, Hyperion, later appearing in #1928, Manta Bomber, and finally in #2010, Star Rider. It has been in this capacity that the part is often mistaken as a short piece of BT-80, especially deceptive given its glassine covering.

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Following are several photos of an extant JT-80C, clearly demonstrating its various properties. The sample was taken from a Super Big Bertha kit.

The first photo shows the JT-80C placed on top of the same part in a Manta Bomber kit. While not so evident from the photo, it does match exactly with the part in the kit:



**JT-80C: It's a Ring Fin...**

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The next photo shows that the part is exactly 1" long:



**JT-80C: It's 1" long...**

The next photo demonstrates that the very same part functions perfectly as a coupler – it slid into the section of BT-80 very nicely.



**JT-80C: It's a coupler...**

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### 4.0 Kit Commentary

As mentioned, a number of the body tube part numbers have been re-used over time to designate new body tube parts; this less than rigorous configuration management system can therefore cause confusion to the modeler as to the actual part used in a particular kit. The following commentary highlights the cases where this kind of confusion was observed. Note that the data in the 1974 Custom Parts Catalog is taken as the reference point for each commentary.

#### 1) K-7B/1207 Phantom

The instruction set for kit K-7B lists the clear body tube as P/N 030620, PST-50FJ, 6.00" long. We did not have the opportunity to examine an original K-7B but did have a couple of 1207 kits on hand. The body tube in #1207 is different than the one listed in the instructions for K-7B; the #1207 body tube is described as P/N 030608, PST-50S, 4.00" long. Accordingly, we show separate entries in the Reference Listing for kits K-7B and 1207.

#### 2) K-12/1212 Farside

The kit instructions list the BT-50H as 7-1/2" long; this is clearly an error as this information is not consistent with the Parts Catalog listing or the actual measurement taken of the kit part.

#### 3) K-15 Sprite

The 1974 Custom Parts Catalog lists the length of the BT-30K, the airframe for the Sprite, as 2.34". Yet in Step 1 of the Sprite instruction sheet, the length of the tube is shown as 2.75". Several modelers have since confirmed from actual measurements that the Sprite airframe is indeed 2.75" long.

We speculate that the error in the 1974 Custom Parts Catalog is most likely due to someone transcribing the 2-3/4" length into a 2.34" decimal entry - this would not be the first error that crept into the Custom Parts Catalog.

Considering the correction, it means that the only difference between the BT-30J and the BT-30K was the exhaust hole punched near one end of the BT-30K.

We extend a special thanks to Mark Hawkins of Hawks Hobby for flagging the error concerning the length of the BT-30K.

#### 4) K-38 Avenger

The instructions for the K-version have the illustrations for Part D (BT-20J) and Part E (BT-20M) reversed; BT-20J was the longer part at 2.75", while the BT-20M was 2.25" long.

#### 5) K-48/1248 Bandit

PBT-50H is the same as BT-50H, only the tube has been factory punched to enable the venting scheme incorporated into this kit. The same comment applies to the PBT-20B (i.e.: it's the same as BT-20B, but for the punched hole). No part numbers have been found for these two punched BT parts.

#### 6) 0651 Der Red Max (Re-release)

This 2007 nostalgic kit re-release correctly designates the airframe as BT-60HE (8.5" long), but is assigned new part number 031716; this replaces the older part number 030410. The motor mount part number and designation remains the same: P/N 030324, BT-20G, 3.5" long.

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7) 0802 Quark

This body tube has been assigned P/N 030304, which conflicts with Parts Catalog 030304 BT-5BJ, 2.00" long.

8) 0803 Bandito

This black pre-colored BT-20 part has been assigned P/N 030333, 7.50" long; this conflicts with BT-20P (13.75" long) as found in the earlier #1931, Delta Wedge.

9) 0806 Firestreak SST

The motor mount tube has been assigned P/N 030306, BT-5, and is 6.50" long; this conflicts with the Parts Catalog entry P/N 030306, BT-5P, 5.1" long.

10) 0807 Lucky Seven

The motor mount tube has been assigned P/N 030468, BT-5, 1.375" long; this duplicates the older P/N 030311, BT-5XW, found in #1298, X-Wing Fighter.

11) 0835 Nike Arrow

The aft body tube has been assigned P/N 030329 BT-20, 5.00" long; this conflicts with the older use of this part number for SBT-705, as found in #2048, Saturn 1b.

12) 0846 Eclipse

The instructions for this kit appear to have a parts designation typo. The motor mount is listed as P/N 030304, BT-5J, when in fact the part supplied in the kit is the BT-5BJ, 2.00" long; the actual part is consistent with the part number.

13) 0860 Star Dart

The tubes listed in the Star Dart entry characterize the early version of this model. The Star Dart was produced in this format until its last year (1987), when it lost the BNC-5AW nose cone in favor of the PNC-5A (same nose as, for example, #0871 Vector). It also had its fins changed at this time as well.

The early version of the kit included a 1/16" piece of fin stock, the builder being required to trace the Star Dart fins from a template and then cut them out. Estes replaced the fin stock with the 1/16" die cut fin sheet from the Vector, which apart from the Star Dart livery (which Estes maintained), made the Star Dart a virtual clone of the Vector in its last year. Of note, Estes never updated the artwork in the 1987 catalog, making the changes to the Star Dart unnoticeable unless one was to have the last year kit on hand.

We extend a special thanks to Craig McGraw and Al Swackhammer, who raised the question of the evolving Star Dart.

14) 0873 Hawkeye

The body tube in this kit has been assigned P/N 030305, BT-5, and is 6.00" long. We perceive the part number to be in error for the following reasons:

- This assignment conflicts with 030305, BT-5, 4.00" in kit #0890, Jammin'
- Kit #0893, Red Alert, assigns P/N 030303 to BT-5, 6.00".

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Accordingly, for this listing we use 030305 = BT-5/4.00", and we use 030303 = BT-5/6.00". The entry for the Hawkeye has been adjusted to reflect this.

Additionally, the kit instructions identify the JT-5C couplers, used to represent the outboard engine nacelles, as P/N 030172; the Parts Catalog lists this part as P/N 030252.

15) 0876 Micron

The plan provided at the Ye Olde Rocket Shoppe (YORP) Plans website shows the motor mount tube as BT-5T (1.5"). This is in error, as the part measures out at 1.75" long. The Gauchito (#0809) assigns P/N 030290 to BT-5, 1.75" long; this is the designation used in the Reference Listing for this part.

16) 0895 Solar Warrior

This kit contains two outboard tubes intended to represent engine nacelles on the model. These tubes have been assigned P/N 030319, BT-20, and are 1.50" long. It is not understood why Estes did not re-use the existing Parts Catalog part number for this tube, P/N 030318, BT-20AE.

Also note that the same new part numbering occurs in kit #2004, Tornado, and in kit #2110, Outlander.

17) 1250 Interceptor (Re-release)

A fine re-release of the older, ultimate classic Estes kit. The airframe is correctly listed with P/N 030382 BT-55 (18.00" long); the motor mount is listed with the newer P/N 030408, replacing the original 030326 BT-20J.

18) 1258 Alpha III 40<sup>th</sup> Anniversary

The instructions show this Red Prismatic body tube as having P/N 030380, BT-50EE; this conflicts with Parts Catalog P/N 030380, BT-52S.

19) 1259 Orbital Transport (Re-release)

The Orbiter body tube is shown as PN 030317, BT-20D, 6.50"; the Parts Catalog listing (and the K-42 listing) for the same part is PN 030322. The difference could be explained by the fact that the new tube is wrapped in a white paper, except that there are many other late model examples where Estes assigns old part numbers to new white tubes of the same size.

Also note that Estes has changed the Scramjet tubes from the BT-5T (1.5") tubes (as used in kit K-42) to the newer, and shorter, P/N 031174 BT-5 1.438" tubes.

20) 1261 Baby Bertha

The body tube in this kit is assigned P/N 030400, BT-60, and is 7.50" long. This conflicts with the earlier use of this part number in kit #2054, Beta Launch Vehicle, where the body tube is BT-60, 13.25" long.

21) 1265 Scissor Wing Transport (Re-release)

This kit assigns P/N 030451 to a section of BT-20, 12.00". The original issue used the traditional P/N 030330, BT-20L, 12.00" long.

## **Appendix I: Comments & Observations**

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22) 1287 LTV Scout

The kit instructions list the length of P/N 030415 BT-60KC as 12.84"; the actual measured length was 12.875", the same length was also found for the same part in #1918, Titan II (see also note 26, #1918 Titan II, below). The Reference List shows the actual measured length for this part.

23) 1300 Blue Ninja

The longer Blue Prismatic tube in this kit has been assigned P/N 030406, BT-60, 12.00" long; this conflicts with the Parts Catalog entry P/N 030406, BT-60D, 11.00" long. It's evident that the older tube was/is a plain brown, glassine wrapped, body tube.

The shorter Blue Prismatic tube has been assigned P/N 030407, 8.00" long; this assignment conflicts with the older BT-60DS, 12.50".

24) 1301 Storm Caster

This kit is peculiar for its inconsistent collection of part numbers. For some reason, Estes has used the prefix "RT" for the aft, slotted body tube. Normally "RT" was used to designate "Ring" tubes, as can be found in the Parts Catalog. This same part was used in #2156 Prowler under the designation BT-60.

The upper white body tube section has been assigned P/N 030397, BT-60, 12.00" long; this conflicts with the earlier use of this part number in kit #2048, Saturn 1b, where this part number is assigned to the BT-58 body tube.

Finally, the motor mount tube, which is a white BT-50 tube, has been correctly assigned P/N 030373, which represents a white BT-50, 9.50" long. This part number was first used in kit #1328, Kadet, and was given the part designation WBT-50W.

25) 1302 CC Express

The booster section in this kit has been assigned P/N 030387, BT-55, and is 3.50" long; this conflicts with the earlier use of this part number in kit #1279, Nike Ajax, where the part number represents BT-55KA, 10.625" long.

26) 1380 Phoenix

The Reference listing includes an entry for the older version of the kit as well as the re-release.

The original kit release used the post-1974 created P/N 030433 BT-80KD (14.2") as the lower tube and the Catalog-listed 030432 BT-80 (7.6") as the upper body tube.

The re-release used two newer tubes, each P/N 030437 BT-80 (11.00"), the newer tubes being white.

Other differences between the two kits consist of the upgraded motor mount tube (the older BT-50H being replaced with the newer heavy walled HBT-1000 tubing), and the replacement of the waterslide decals with the self-adhesive type.

27) 1901 Sea Dart

The aft body tube section in the kit is identified on the kit instructions as P/N 030354, BT-50AE; in the Parts Catalog, this tube is 1.50" long. The tube found in the kit was BT-50, but only 1.0" long.

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Not having a second kit on hand to examine, we've chosen to show the kit instruction information in the Reference Listing but note that this could be an error, subject to further confirmation.

28) 1918 Titan II

The kit instructions list the length of P/N 030415 BT-60KC as 12.75"; the actual measured length was 12.875", the same as found for the same part in #1287, LTV Scout. The Reference List shows the actual measured length.

29) 2001 Saturn V

The tube used to represent the S-1C and S-II stages of the rocket has been assigned P/N 030449 BT-101SV, 24.625" long; this conflicts with the earlier use of this part number for SBT-394AJ, 1.00" long, as found in #1288 Starlab, #1383 Hyperion, and others.

The tube used to represent the S-IVB stage of the rocket has been assigned P/N 030434 T-80SV, 8.81" long; this conflicts with the earlier use of this part number for BT-100CE, as found in K-43, Mars Lander.

Finally, the kit incorporates P/N 030370 BT-50SV, 16.25" long; this conflicts with the earlier P/N 030370 BT-50V, 16.5" long, as found in #1296 Satellite Interceptor.

30) 2022 Warp II

The kit instructions indicate that the two body tubes comprising this model are P/N 030384, Booster, and P/N 030392, Sustainer. According to the 1974 parts Catalog, these tubes would be BT-55IJ, 9.00", and BT-55V, 16.35", respectively; using such tubes would create a much longer Warp-II and would render the staging less reliable.

There are two errors in play here: first, the sustainer should have been assigned the part number given to the booster – the sustainer tube measures exactly 9.00" long and is clearly meant to be P/N 030384 BT-55IJ. The part number initially assigned to the sustainer (and presumably was incorrectly reversed with the booster) is clearly wrong, as the booster measures 3.35" long – the correct part number has not been identified yet, even though the 3.25" BT-55 (and the re-used 030392) is used in later model kits.

We have shown the corrected information in the Reference Listing to avoid any confusion.

31) 2027 Pop Fly

Best described as a novelty kit, the Pop Fly incorporates a number of plastic and foam parts. It also includes a new, rough (non-glassine covered), black paper tube P/N 031707, 8.00" long. While the illustrated parts section fails to provide a designation for the tube, we nevertheless find one buried in Step 4: Estes has chosen to designate the tube as a BT-1000 black body tube. We measured this new tube and found an ID = 0.955" (slightly larger than the ID of a BT-50), and an OD of 1.005" (again, ever so slightly larger than the HBT-1000 motor mount tube).

32) 2037 D-Region Tomahawk

This new (2007) scale kit release introduces a brand new body tube for Estes. Designated the HBT-1800, this heavy walled tube measures out to 1.800" diameter, and should not be confused with the older BT-1835 (1.835"), as found in the older Python and Terrier-Sandhawk kits.

For packaging reasons, Estes divided the airframe into two 11.625" sections; unfortunately this will require the modeler to fill a mid-airframe seam once the model is constructed. The part number

## **Appendix I: Comments & Observations**

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for the new airframe tube (030367) conflicts with the older BT-50N, found in #1293 Black Brant III. The model also includes a long 17.75" length of HBT-1000 for the motor mount; the part number (030365) for this tube conflicts with the older BT-50P, as found in #1337 NASA Space Shuttle. Note that the kit number is also the same as the older National Aero Space Plane. Apart from these documentation infractions, the D-Region Tomahawk is a nice builder's kit, and elevates Estes' kit quality.

### 33) 2048 Saturn 1b

The 1/100<sup>th</sup> Saturn 1b is one of Estes' most sought after kits, arguably surpassed only by the much older 1/70<sup>th</sup> Saturn 1b. In order to meet the scale requirements of the model, Estes introduced several new body tubes special to this kit; unfortunately, these new tubes are distinguished in the kit instructions only by part numbers.

For the purpose of the Reference Listing we have added a part designation for these tubes; this starts with an "SBT" prefix, in keeping with the nomenclature Estes used to use in the past (e.g.: the Scout LTV). The first three significant digits of the measured outer diameters of these tubes make up the remainder of the tube designation. Since several of these new tubes are of large diameter, it was too difficult to directly measure the diameter reliably; consequently, we used the circumference measurement technique to make this measurement as accurate as possible.

P/N 030438 has been assigned to the aft body tube (the engine section skirt); this conflicts with Parts Catalog entry P/N 030438, BT-101, 16.5" long.

P/N 030436 has been assigned to the S-IVB body tube section; this conflicts with Parts Catalog entry P/N 030436, BT-100Z, 10.89" long.

P/N 030379 has been assigned to the interior core tube; this assignment conflicts with the older BT-50B, 10.25" long, as found in #1909 U.S.S.F Fireflash.

### 34) 2050 Super Neon (Re-release)

The airframe in this re-release kit has the airframe correctly characterized as P/N 030352 BT-50, 18.00" long. The tube fins are new, designated as P/N 030357 BT-50, and are 3.50" long; in the original kit, the tube fins had a length of 3.125". The motor mount tube is the newer tube, P/N 030408 BT-20, 2.75" long, replacing the older P/N 030326 BT-20J.

### 35) 2052 Photon Disruptor II

The main body tube has been assigned P/N 030388; in the Parts Catalog this part number corresponds to BT-55KG, 16.69" long. However, the tube found in two samples of the kit is BT-55, 13-9/16". We show an unknown part number and the correct length for this tube in the Reference Listing.

### 36) 2053 GBU-24 Paveway III

The BT-55 section (10.75") provided in this kit has been assigned P/N 030374; this conflicts with Parts Catalog entry 030374, BT-51CI, 3.875" long.

### 37) 2054 Beta Launch Vehicle

The short length (3.25") of BT-55 provided in this kit has been assigned P/N 030392; this conflicts with Parts Catalog entry 030392, BT-55V, 16.35" long.

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38) 2054 Python 4

The main body tube is listed as P/N 030374, BT-55, 10.75" long; this conflicts with the Parts Catalog entry, P/N 030374, BT-51CI, 3.875" long.

39) 2056 Patriot

The original issue of this kit supplied the main body tube as one piece, P/N 030408, BT-60, 13.25" long. This assignment conflicts with Parts Catalog entry P/N 030408, BT-60FG, 6.7" long.

The re-issue was re-packaged in a smaller bag, making it necessary to break the single piece body tube into two tubes; these were assigned P/N 030414, BT-60, 6.656" long. Rather than designating these tubes BT-60FG (which would have been correct), Estes instead assigned a part number that conflicted with Parts Catalog Entry 030414, BT-60K, 7.00" long.

In each case, the kit represented the upper instrument section with a pre-colored yellow tube, BT-60, 3.25" long. This same part was assigned two different part numbers: 030409 for the original kit, and 030426 for the re-release. P/N 030409 would later be assigned to the BT-5 pod sections (0.75" long) in the Renegade, #2109.

40) 2072 Scrambler

The main body tube is a BT-56, 12.00" long; this part would be designated later as P/N 030340 in kit #2128 Long Shot. The part number conflicts with the older assignment to BT-30A, 3.5" long, as found in kit K-1 Scout.

41) 2086 Tomcat

Even though the tubes identified in the Reference Listing correspond to known body tube types (BT-60DS and BT-50L), we have chosen not to use the associated part numbers as these tubes include factory punched holes and slots, which would change the part numbers. The actual part numbers are not known.

42) 2092 Mongoose

The pre-colored yellow booster section of this model is assigned P/N 030356, BT-50, 1.875" long. Even though the part is different (having a pre-finished outer covering), the size and type information does correlate directly to the Parts Catalog, where P/N 030356 is a BT-50AH, 1.875" long.

43) 2105 Hijax (and 2107, Firestreak)

Even though the main tubes in these two models are the same type, length and finish, their part numbers are different due to the fact that the Hijax makes use of plastic launch lugs and a plastic shock cord attachment, causing the Hijax tube to have a different factory punching.

44) 2109 Renegade

There are several part-numbering problems with this kit.

Starting with the upper stage body tube, this part has been assigned P/N 030401, BT-60, 18.00"; Estes could have re-used the original part number 030396.

The booster body tube has been assigned P/N 030404 BT-60, 3.25" long; this assignment conflicts with the older BT-60AE, 14.25" long, as found in #1340, SCUD-B.

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The engine mount tubes are assigned P/N 030408, BT-20, 2.75" long; not only could the original part number have been re-used for this part (030326) but this new assignment conflicts with Parts Catalog entry 030408, BT-60FG, 6.7" long. This new part number assignment for the venerable BT-20J motor mount re-appears later in #2117 Screaming Eagle, #2123 Eggscaliber, and in #2193 Vanguard Eagle.

The fin pod tubes have been assigned P/N 030409, BT-5, 0.75" long; this assignment conflicts with the earlier use of this part number in kit #2056, Patriot, where this part number was assigned to the 3.25", pre-colored yellow, BT-60 section.

Finally, the booster pod tubes have been assigned P/N 030415 BT-50, 5.00" long; this assignment conflicts with the older BT-60KC, 12.875" long, as found in #1287 LTV Scout.

45) 2110           Outlander

The main body tube is assigned P/N 030402, BT-60, 5.688" long; this conflicts with Parts Catalog entry P/N 030402, BT-60AJ, 10.00", as found in K-39 Semi-scale Saturn V.

The four BT-50 tanks are assigned P/N 030412, BT-50, 3.00" long; this conflicts with Parts Catalog entry P/N 030412, BT-60J, 2.75" long, as found in K-9 Spaceman.

The motor mount tube is assigned P/N 030310, BT-20, 5.00" long; this conflicts with Parts Catalog entry P/N 030310, BT-5CJ, 3.00" long, as found in 0805 Mini-BOMARC.

Finally, the storage tanks have been assigned P/N 030319 BT-20 1.50" long; while this is a consistent re-use of the same part and part number as found in 2004 Tornado, it is nevertheless a duplicate of the older P/N 030318 BT-20AE, as found in K-40 Midget.

46) 2111           Mercury Atlas

The main body tube is listed as 18-7/8" long; the tube found in the kit measured 18.00" long.

47) 2115           SR-X

The main body tube is assigned P/N 030383, BT-55, 14.50" long. This assignment conflicts with the earlier use of this part number in kit #1376, Pegasus, where this part number was assigned to BT-55C, 14.00" long.

48) 2125           AIM-9 Sidewinder

The motor mount tube is assigned P/N 030318 and, in the kit examined, measured 5-11/16" long. The assigned part number conflicts with Parts Catalog entry P/N 030318, BT-20AE, 1.5" long.

The kit also includes a short piece of BT-20, used as the anchor for the TTW tabs on the canard fins applied to the nose assembly. This part has been assigned P/N 030322, and in the kit examined, measured 2-13/16". It's possible that this part could be P/N 030326, BT-20J, given the variance in cutting precision noted earlier. In any event, the assigned part number conflicts with Parts Catalog entry P/N 030322, BT-20D, 6.5" long.

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49) 2126 Tech-Pak

The main body tube in this kit is actually created from a 3" roll of paper. As an educational kit, the modeler is required to roll the body tube by wrapping the supplied paper around an included mandrel tube. The mandrel tube is an odd size; assigned P/N 030410, the mandrel tube is 12.00" long and has a measured OD of 0.951".

50) 2128 Long Shot

The main body tubes are assigned P/N 030340, BT-56, 12.00" long; this conflicts with Parts Catalog entry P/N 030340, BT-30A, 3.50" long. See earlier note on kit #2072, Scrambler.

51) 2133 AstroSat LSX

The nose cone used in this kit is P/N 072054, PNC-55IR, also found in kits #1972, Interceptor II, #2068, Greyhawk, and #2183, Shuttle Xpress. BT-55 and BT-56 have ODs that are very close, and Estes has taken advantage of this fact by re-using a PNC-55 part in a BT-56 kit rather than tooling a new part.

The shorter 4" BT-56 airframe piece has been assigned P/N 030347; this conflicts with the older BT-30XW, found in #1302 Maxi X-Wing Fighter.

52) 2130 Mach 12

The longer body tube is assigned P/N 030342, BT-56 (Yellow), 7.00"; this conflicts with Parts Catalog entry P/N 030342, BT-30B, 6.125" long.

53) 2136 Gemini DC

The side pod tubes are assigned P/N 030330, BT-20, 6.00"; this conflicts with Parts Catalog entry P/N 030330, BT-20L, 12.00" long. This part was later re-numbered P/N 030327 BT-20, 6.00" long, in #2054 Python 4.

54) 2142 R2-D2

The motor mount assembly in this largely plastic kit includes two paper tubes. The Inner Tube has been assigned P/N 030391, BT-55 (4.313" long); this part number conflicts with the older BT-55W (12.00" long), found in kit #1930, Wasp. The new 4.313" BT-55 would be re-used later in kit #2149, SM-3 Seahawk.

The second tube is P/N 030461, HBT-760 (4.00" long). This is a heavy walled engine mount tube and is also found in kit #2144, T.I.E. Fighter.

55) 2147 Star Destroyer

The two main HBT-1000 tubes supplied in this kit (P/N 031227 (15.00") and P/N 031226 (12.00")) are covered with a gloss white wrap. Other than the wrap, the 15" part is identical to the 15" HBT-1000 (P/N 030485) found in #2123 Eggscaliber.

56) 2150 Rattler-7

The main body tube is assigned P/N 030357, BT-50 (Beige), 5.50" long; this assignment conflicts with the earlier use of P/N 030357, WBT-50EE, 5.50" long, found in kit #K-56/1256, Alpha III.

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57) 2155 Super Nova Payloader

The two main body tubes are assigned P/N 030398, BT-60 (Blue), 12.00" long; this conflicts with Parts Catalog entry P/N 030398, BT-60AD, 14.00".

58) 2159 Fireflash

The gray lower body tube is assigned P/N 030372, BT-50 (Gray), 9.00" long; this conflicts with Parts Catalog entry P/N 030372, BT-50W, 9.50" long.

The black BT-50 body tube has been assigned P/N 030351; this conflicts with the older BT-48BE 2.5" long, as found in #0821 Firecat.

59) 2163 Exo-Skell

Essentially a plastic novelty rocket, the Exo-Skell does include two green pre-finished body tubes as shown in the listing. The upper BT-55 body tube has been assigned P/N 030376, which conflicts with the older BT-51N, as found in K-29 Saturn 1b.

60) 2169 Dragonite

The airframe is a pre-finished Black HBT-1090 tube and is listed as 8.234" long. The sample measured in the review kit was found to be 8.219" long (8-7/32"). The airframe is assigned P/N 030336; this assignment conflicts with the older 9.75" long BT-20N, found in #1911, Courier.

The 2.5" long motor mount tube has been assigned P/N 030335; this assignment conflicts with the older 8.00" long BT-20XW, found in #1298, X-Wing Fighter.

61) 2170 Star Dart

The body tube is assigned P/N 030314, BT-20, 9.00" long; this assignment conflicts with the older BT-10H. Estes should have assigned P/N 030325, BT-20, 9.00", as used in kit #2039, Space Racer.

62) 2176 Echostar

The booster section is listed as P/N 030392, BT-55, 3.25"; this conflicts with the Parts Catalog entry P/N 030392, BT-55V, 16.35" long.

The longer motor mount tube is identified as P/N 030317, BT-20, 6.5" rather than the traditional part number P/N 030322, BT-20D, 6.5" long.

63) 2185 Screamin' Mimi

The four whistle tubes are assigned P/N 030325, BT-20, 4.00" long; this conflicts with the earlier use of this part number for BT-20, 9.00" long, as found in kit #2039, Space Racer.

64) 2191 Space Ship One

The motor mount tube has been assigned P/N 030408, BT-20J, 2.75" long; this conflicts with the traditional part number for this tube, P/N 030326.

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65) 2196            Space Ship One (E-engine)

The main body tube has been assigned P/N 030400, BT-60, 7.50" long; this conflicts with the earlier use of this part number, P/N 030400, BT-60, 13.25" long, as found in kit #2054, Beta Launch Vehicle. It is, however, consistent with the usage in the late model kit #1261, Baby Bertha.

## Appendix II: New Body Tubes

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The following lists the new body tubes identified since the issuance of the 1974 Custom Parts Catalog. Only those body tubes for which known part numbers could be found are listed, and to the greatest extent possible, we have tried to identify the kit where the new tube was first found.

### BT-2 Body Tubes

P/N	Designation	Length	Comments
030298	BT-2CB	3.25"	Found in #1274, Klingon Battle Cruiser.
030299	BT-2XW	2.313"	Found in #1302, Maxi X-Wing Fighter.

### BT-3 Body Tubes

P/N	Designation	Length	Comments
030300	BT-3H	3.00"	Found in #1302, Maxi X-Wing Fighter.
030301	BT-3XW	1.5"	Found in #1298, X-Wing Fighter. P/N would be re-used for WBT-5 as found in the original #0886, Gnome; see below.

### BT-5 Body Tubes

P/N	Designation	Length	Comments
030290	BT-5	1.75"	Found in #0810, 220 Swift.
030291	BT-5 (Black)	8.00"	Found in #0834, X-Ray.
030292	BT-5 (Silver)	9.00"	Found in #0835, Nike-Arrow.
030293	BT-5 (Black)	9.00"	Found in #2159, Fireflash.
030295	BT-5	1.375"	Found in #2077, Sky Winder. P/N duplicates the older 030311 BT-5XW, below.
030301	WBT-5	8.00"	White BT-5 found in the original #0886, Gnome. P/N conflicts with the older BT-3XW, above.

## Appendix II: New Body Tubes

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### BT-5 Body Tubes, Continued;

P/N	Designation	Length	Comments
030303	BT-5	6.00"	Found in #0866, Mini Tri-Pak.
030304	BT-5	1.75"	Found in #0802, Quark. P/N conflicts with the older BT-5BJ, 2.00" long. Should use 030290, above.
030305	BT-5	4.00"	Found in #0866, Mini Tri-Pak.
030306	BT-5	6.50"	Found in #0806, Firestreak SST. P/N conflicts with the older 030306 BT-5P, 5.1" long.
030307	BT-5 (Beige)	5.50"	Pre-finished Beige; found in #2150, Rattler-7.
030309	BT-5	1.625"	Found in #0803, Bandito.
030311	BT-5XW	1.375"	Found in #1298, X-Wing Fighter. Later duplicated by P/N 030468 BT-5, below.
030409	BT-5	0.75"	Found in #2109, Renegade. P/N conflicts with the older BT-60 (Yellow), in #2056, Patriot.
030468	BT-5	1.375"	Found in #0807, Lucky Seven. Should have re-used the older 030311 BT-5XW, above.
031174	BT-5	1.438"	Found in #1259, Orbital Transport (Re-release). P/N conflicts with the BT-55 found in the older #2124, F-22 ASF.

### BT-20 Body Tubes

P/N	Designation	Length	Comments
030310	BT-20	5.00"	Found in #2110, Outlander. P/N conflicts with the older BT-5CJ, 3.00" long.
030314	BT-20	9.00"	Found in #2170, Star Dart. P/N conflicts with the older BT-10H. Should have used 030325, below.
030317	BT-20D	6.50"	Found in #1259, Orbital Transport (Re-release). Should have re-used the older 030322.
030318	BT-20	5.688"	Found in #2125, AIM-9 Sidewinder. P/N conflicts with the older BT-20AE.
030319	BT-20	1.50"	Found in #2004, Tornado. Should have re-used the older 030318 BT-20AE.
030322	BT-20	2.813"	Found in #2125, AIM-9 Sidewinder. P/N conflicts with the older BT-20D.
030323	BT-20E	7.75"	Found in #1917, Zinger.
030325	BT-20	9.00"	Found in #2039, Space Racer.
030325	BT-20	4.00"	Found in #2185, Screamin' Mimi. Should have used 030332 BT-20DJ.
030327	BT-20	6.00"	Found in #2054, Python 4.
030328	BT-20	12.00"	Found in #2184, Meteor Masher. Should have used 030330 BT-20L.
030329	BT-20	5.00"	Found in #0835, Nike-Arrow. P/N conflicts with the older SBT-705, found in #2048, Saturn 1b.

## Appendix II: New Body Tubes

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### BT-20 Body Tubes, Continued;

P/N	Designation	Length	Comments
030330	BT-20	6.00"	Found in #2136, Gemini DC. P/N conflicts with the older BT-20L, 12.00" long. Should have re-used 030327, above.
030331	BT-20	2.50"	Found in #2060, Bandit.
030333	BT-20P	13.75"	Found in #1931, Delta Wedge.
030333	BT-20 (Black)	7.50"	Found in #0803, Bandito. P/N conflicts with the older BT-20P, as found in #1931, Delta Wedge, above.
030335	BT-20XW	8.00"	Found in #1298, X-Wing Fighter.
030335	BT-20	2.5"	Found in #2169, Dragonite. P/N conflicts with the older BT-20XW, above.
030336	BT-20N	9.75"	Found in #1911, Courier.
030408	BT-20	2.75"	Found in #2109, Renegade. P/N conflicts with the older BT-60FG; should have used 030326 BT-20J.
030451	BT-20	12.00"	Found in #1265, Scissor Wing Transport (Re-release). Should have re-used the older 030330, BT-20L.
030452	BT-20 (Black)	12.00"	Found in #2186, Eagle Boosted Glider.
031763	BT-20 (Silver)	7.00"	Found in #0804, Firehawk.
085870	BT-20 (Punched)	2.50"	Found in #2105, Hijax.

### BT-30 Body Tubes

P/N	Designation	Length	Comments
030347	BT-30XW	3.00"	Found in #1302, Maxi X-Wing Fighter.

### BT-46 Body Tubes

P/N	Designation	Length	Comments
??????	BT-46HI	9.00"	Found in #1284, Space Shuttle

## Appendix II: New Body Tubes

### BT-50 Body Tubes

P/N	Designation	Length	Comments
030349	BT-50 (Yellow)	9.50"	Yellow pre-finished, found in #1260, No. 2 Sky Writer.
030351	BT-50 (Black)	9.00"	Pre-finished black; found in #2159, Fireflash. P/N conflicts with the older BT-48BE.
030353	BT-50	8.25"	Found in #2053, Blackhawk.
030355	BT-50 (Yellow)	18.00"	Yellow pre-finished, found in #2092, Mongoose.
030356	BT-50 (Yellow)	1.875"	Yellow pre-finished, found in #2092, Mongoose. P/N conflicts with the older BT-50AE.
030357	WBT-50EE	5.50"	White body tube, as found in the older #1256, Alpha III.
030357	BT-50 (Beige)	5.50"	Pre-finished Beige; found in #2150, Rattler-7. P/N conflicts with the older WBT-50EE, above.
030357	BT-50	3.50"	Found in #2050 Super Neon (Re-release). Conflicts with the older entries, above.
030365	BT-50P	11.00"	Found in #1337, NASA Space Shuttle.
030367	BT-50N	14.00"	Found in #1293, Black Brant III.
030369	BT-50TF	16.00"	Found in #1299, TIE Fighter.
030370	BT-50SV	16.25"	Found in #2001, Saturn V. P/N conflicts with the older BT-50V.
030371	BT-50XW	15.5"	Found in #1302, Maxi X-Wing Fighter.
030372	BT-50 (Gray)	9.00"	Pre-finished gray; found in #2159 Fireflash. P/N conflicts with the older BT-50W, 9.50" long.
030373	WBT-50W	9.50"	White body tube, as found in #1328, Kadet.
030377	BT-50F	5.00"	Found in #1371, Starship Nova.
030379	BT-50B	10.25"	Found in #1909, U.S.S.F. Fireflash. P/N later re-used for special tube in #2048, Saturn 1b.
030380	BT-50EE (Red)	5.50"	Red Prismatic body tube, found in #1258, 40th Anniversary Alpha III. P/N conflicts with the older BT-52S.
030381	BT-50	11.25"	Found in #2174, Polaris. P/N conflicts with the older BT-55E, 2.1" long; see below.
030383	BT-50	2.5"	Found in #2184, Meteor Masher. P/N conflicts with the older 030383 BT-55C.
030412	BT-50	3.00"	Found in #2110, Outlander. P/N conflicts with the older BT-60J, 2.75" long.
030415	BT-50	5.00"	Found in #2109, Renegade. P/N conflicts with the older BT-50F, above, and BT-60KC, below. Should have used 030377 BT-50F.
030456	BT-50A	10.00"	Found in #2188, Canadian Arrow.
031168	BT-50 (Slotted)	9.50"	Found in #2154, Wildfire.
031177	BT-50WH	18.00"	Slotted, found in #2136, Gemini DC
031180	BT-50WH	11.00"	Slotted, found in #2140, Venom.
031682	BT-50	10.75"	Found in #2117, Screaming Eagle.

## Appendix II: New Body Tubes

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### BT-50 Body Tubes, Continued;

P/N	Designation	Length	Comments
060158	BT-50 (Printed)	9.50"	Found in #1260, No. 2 Sky Writer.

### BT-51 Body Tubes

P/N	Designation	Length	Comments
030375	BT-51	2.00"	Found in #1373, Soaring Eagle.

### BT-55 Body Tubes

P/N	Designation	Length	Comments
030374	BT-55	10.75"	Found in #2053, GBU-24 Paveway III. P/N conflicts with the older BT-51Cl.
030375	BT-55	8.65"	Found #2054, Python 4. P/N conflicts with the older BT-51, above.
030376	BT-55 (Green)	6.875"	Found in #2163, Exo-Skell. P/N conflicts with the older BT-51N.
030379	BT-55	9.00"	Found in #2184, Meteor Masher. Conflicts with the older BT-50B, above. Should have re-used 030384 BT-55Ij.
030380	BT-55	5.625"	Found in #2184, Meteor Masher. Conflicts with the older BT-52S.
030381	BT-55E	2.1"	Found #1902, Space Station Aquarius.
030381	BT-55	11.19"	Found in #2125, Sidewinder. P/N conflicts with the older BT-55E, above.
030383	BT-55C	14.00"	Found in #1376, Pegasus.
030383	BT-55	14.50"	Found in #2115, SR-X. P/N conflicts with the older BT-55C, above.
030386	BT-55G	16.75"	Found in #2127, Sizzler. Conflicts with the older BT-55J.
030387	BT-55KA	10.625"	Found in #1279, Nike-Ajax.
030387	BT-55	3.50"	Found in #1302, CC Express. P/N conflicts with the older BT-55KA, above.
030388	BT-55	13.563"	Found in #2052, Photon Disruptor. Conflicts with the older BT-55KG.

## Appendix II: New Body Tubes

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### BT-55 Body Tubes, Continued;

P/N	Designation	Length	Comments
030391	BT-55W	12.00"	Found in #1930, Wasp.
030391	BT-55	4.313"	Found in #2142, R2-D2. Conflicts with BT-55W, above.
030392	BT-55	3.25"	Found in #2022, Warp-II. P/N conflicts with the older BT-55V, 16.35" long.
030403	BT-55	12.50"	Found in #2120, Venus Probe.
030454	BT-55V	7.00"	Found in #2193, Vanguard Eagle. Designation conflicts with the older 030392 BT-55V, 16.35" long.
030470	BT-55	14.125"	Found in #2190, Cosmos Mariner.
031166	BT-55 (Slotted)	4.00"	Found in #2120, Venus Probe.
031167	BT-55 (Slotted)	7.50"	Found in #2151, Big Dawg.
031172	BT-55 (Slotted)	11.25"	Found in #2125, Sidewinder.
031173	BT-55 (Slotted)	3.75"	Found in #2125, Sidewinder.
031174	BT-55 (Slotted)	10.625"	Found in #2124, F-22 Air Superiority Fighter.
031178	BT-55 (Slotted)	18.00"	Found in #2138, Firebird.
031188	BT-55 (Slotted)	13.75"	Found in #2149, SM-3 Seahawk.
031191	BT-55 (Slotted)	11.00"	Found in #2153, AIM 120 AMRAAM.

### BT-56 Body Tubes

P/N	Designation	Length	Comments
030340	BT-56	12.00"	Found in #2128, Long Shot. P/N conflicts with the older BT-30A, 3.5" long.
030341	BT-56	3.75"	Found in #2128, Long Shot.
030342	BT-56 (Yellow)	7.00"	Pre-finished Yellow, found in #2130, Mach 12. P/N conflicts with the older BT-30B, 6.125" long.
030343	BT-56 (Yellow)	4.00"	Pre-finished Yellow, found in #2130, Mach 12.
030347	BT-56	4.00"	Found in #2133, AstroSat LSX. P/N conflicts with the older BT-30XW, above.
030393	WBT-56	18.00"	White body Tube, as found in #1330, Challenger-II.
031300	BT-56 (Purple)	12.00"	Pre-finished Purple, found in #1950, Eliminator.
031660	BT-56 (Yellow)	10.25"	Pre-finished Yellow, found in #1262, Cosmic Cobra.
031665	BT-56 (Black)	8.25"	Pre-finished Black with factory installed launch lug, found in #2029, Converter.

## Appendix II: New Body Tubes

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### BT-56 Body Tubes, Continued;

P/N	Designation	Length	Comments
031710	BT-56 (Black)	6.00"	Pre-finished Black, found in #2029, Converter.
060003	BT-56 (Chrome)	12.00"	Pre-finished Chrome, found in #2168, Metalizer.
060370	BT-56 (Blue)	8.50"	Blue prismatic; found in #2180, Chrome Dome (Silver).
060371	BT-56 (Red)	8.50"	Red prismatic; found in #2181, Chrome Dome (Gold).

### BT-58 Body Tubes

P/N	Designation	Length	Comments
030397	BT-58	6.375"	Found in #2048, Saturn 1b.
030466	BT-58SV	6.125"	Found in #2001, Saturn V; later used in the #0809, Gauchito.

### BT-60 Body Tubes

P/N	Designation	Length	Comments
030395	BT-60	14.7"	Found in #2173, Menace.
030397	BT-60	12.00"	Found in #1301, Storm Caster. P/N conflicts with the older BT-58, 6.375" long, as found in #2048, Saturn 1b. Would be later re-used in #2156, Prowler.
030398	BT-60 (Blue)	12.00"	Pre-finished solid blue; found in #2155, Super Nova Payloader. P/N conflicts with the older BT-60AD, 14.00" long.
030400	BT-60	13.25"	Found in #2054, Beta Launch Vehicle. P/N later re-used in #1261, Baby Bertha; see below.
030400	BT-60	7.50"	Found in #1261, Baby Bertha. P/N conflicts with the older BT-60, found in #2054, BLV, above.
030401	BT-60	18.00"	Found in #2109, Renegade. Duplicates the older 030396 BT-60.
030402	BT-60	5.688"	Found in #2110, Outlander. P/N conflicts with the older BT-60AJ, 10.00" long.
030404	BT-60AE	14.25"	Found in #1340, SS-1C SCUD-B

## Appendix II: New Body Tubes

### BT-60 Body Tubes, Continued;

P/N	Designation	Length	Comments
030404	BT-60	3.25"	Found in #2109, Renegade. Conflicts with the older BT-60AE, above.
030405	BT-60C	1.00"	Found in #1383, Hyperion.
030406	BT-60 (Blue)	12.00"	Blue Prismatic tube, as found in #1300, Blue Ninja. P/N conflicts with older BT-60D, 11.00" long.
030407	BT-60DS	12.50"	Found in #1345, Dragon Ship 7. P/N would later be re-used in #1300, Blue Ninja; see below.
030407	BT-60 (Blue)	8.00"	Blue Prismatic tube, as found in #1300, Blue Ninja. P/N conflicts with older BT-60DS, above.
030408	BT-60	13.25"	Found in the original #2056, Patriot. P/N conflicts with the older BT-60FG, 6.7" long.
030409	BT-60 (Yellow)	3.25"	Found in the original #2056, Patriot. P/N later changed to 030426 in the re-release; see below.
030411	BT-60	2.00"	Found in #2037 NASP.
030414	BT-60	6.656"	Found in #2056, Patriot (Re-release). P/N conflicts with the older BT-60K, 7.00" long. Should have been P/N 030408 BT-60FG; see 1974 Parts Catalog.
030415	BT-60KC	12.84"	Found in #1287, LTV Scout.
030419	BT-60XW	3.00"	Found in #1302, Maxi X-Wing Fighter.
030426	BT-60 (Yellow)	3.25"	Found in #2056, Patriot (Re-release).
030453	BT-60V	4.313"	Found in #2193, Vanguard Eagle.
030455	BT-60P	16.00"	Found in #2192, Thunderstar.
031175	BT-60WH	18.00"	Found in #2127, Sizzler.
031189	RT-60 (Slotted)	12.00"	Found in #1301, Storm Caster. Tube slotted for fins; odd designation, as usually "RT" means "Ring Tube". Re-designated "BT-60" in #2156, Prowler.
031681	BT-60	8.00"	Found in #2119, 36 D Squared.
031716	BT-60HE	8.50"	Found in #0651, Der Red Max (re-release, 2007)
060865	BT-60 (Printed)	15.56"	Found in #2187, Oracle.
060974	BT-60 (Printed)	12.00"	Found in #2187, Oracle.

### BT-67 Body Tubes

P/N	Designation	Length	Comments
??????	BT-67GI	7.938"	Found in #1284, Space Shuttle

## Appendix II: New Body Tubes

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### BT-70 Body Tubes

P/N	Designation	Length	Comments
030413	BT-70	10.00"	Found in #2055, BLU-97B.
031680	BT-70	4.50"	Found in #2119, 36 D Squared.

### BT-80 Body Tubes

P/N	Designation	Length	Comments
030427	BT-80S	4.50"	Found in #1341, World Federation Star Probe.
030429	WBT-80A	9.00"	White body tube, as found in #1321, Maxi Alpha III.
030431	WBT-80MA	3.22"	White body tube, as found in #1321, Maxi Alpha III.
030433	BT-80KD	14.2"	Found in #1269, Maxi Honest John.
030434	BT-80SV	8.81"	Found in #2001, Saturn V.
030435	BT-80T	11.00"	Found in #2141, Silver Comet. Brown tube; 030437, below, is White. P/N conflicts with the older BT-100D.
030437	BT-80	11.00"	Found in #1380, Phoenix (Re-release)
030458	BT-80	12.00"	Found in #2188, Canadian Arrow.
031179	BT-80WH	8.00"	Slotted, found in #2139, Fat Boy
031180	BT-80 (Slotted)	14.2"	Found in #1951, Executioner. P/N conflicts with the older BT-50WH, above.

### BT-100 Body Tubes

P/N	Designation	Length	Comments
030435	BT-100D	4.093"	Found in #1301, R2-D2.

## Appendix II: New Body Tubes

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### BT-101 Body Tubes

P/N	Designation	Length	Comments
030441	BT-101KJ	10.50"	Found in #1267, Maxi V-2.
030445	BT-101LA	21.4"	Found in #1268, Pershing 1-A
030449	BT-101SV	24.625"	Found in #2001, Saturn V.

### BT-200 Body Tubes

P/N	Designation	Length	Comments
030469	BT-200	3.75"	Found in #2191, Space Ship One.

### BT-321 Body Tubes

P/N	Designation	Length	Comments
030457	BT-321	6.00"	Found in #2189, Rubicon.

### BT-1000 Body Tubes

P/N	Designation	Length	Comments
031707	BT-1005	8.00"	Found in #2027, Pop Fly. The tube is black, with no glassine covering.

## Appendix II: New Body Tubes

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### BT-1750 Body Tubes

P/N	Designation	Length	Comments
031140	BT-1750	0.75"	Found in #2120, Venus Probe. P/N conflicts with the older ST-1010, found in #1378 Firecat.

### BT-1835 Body Tubes

P/N	Designation	Length	Comments
031181	BT-1835	15.313"	Found in #2083, Terrier-Sandhawk. Tube is slotted, and used for the Terrier Booster.
031762	BT-1835	11.00"	Found in #2129, Python.

### BT-30 (NCR) Body Tubes

P/N	Designation	Length	Comments
031751	BT-30 (NCR)	10.00"	Slotted; found in #2162, Big Daddy.

### HBT-20 Body Tubes

P/N	Designation	Length	Comments
031217	HBT-20	9.25"	Found in #2077, Sky Winder.

## Appendix II: New Body Tubes

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### HBT-50 Body Tubes

P/N	Designation	Length	Comments
031291	HBT-50	9.00"	Found in #2112, Transwing Super Glider.

### HBT-760 Body Tubes

P/N	Designation	Length	Comments
030461	HBT-760	4.00"	Found in #2142, R2-D2.
031700	HBT-760	10.75"	Found in #2127, Sizzler.
031701	HBT-760	14.50"	Found in #2115, SR-X.
031760	HBT-760	2.75"	Found in #2128, Long Shot.

### HBT-1000 Body Tubes

P/N	Designation	Length	Comments
030365	HBT-1000	17.75"	Found in #2037, D-Region Tomahawk. P/N conflicts with the older BT-50P, found in #1337 NASA Space Shuttle.
030462	HBT-1000 (Black)	9.00"	Black pre-finished, found in #2144, T.I.E. Fighter.
030463	HBT-1000	4.00"	Found in #2091, Maniac.
030471	HBT-1000	13.438"	Found in #2190, Cosmos Mariner.
030485	HBT-1000	15.00"	Found in #2123, Eggscaliber.
031183	HBT-1000 (Slotted)	7.375"	Found in #2143, Death Star.
031184	HBT-1000	7.375"	Found in #2143, Death Star.
031225	HBT-1000	2.813"	Found in #2147, Star Destroyer.
031226	HBT-1000	12.00"	Found in #2147, Star Destroyer. Gloss white wrap.
031227	HBT-1000	15.00"	Found in #2147, Star Destroyer. Gloss white wrap.

## Appendix II: New Body Tubes

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### HBT-1000 Body Tubes, Continued;

P/N	Designation	Length	Comments
031229	HBT-1000 (Green)	8.313"	Found in #2163, Exo-Skell.
031278	HBT-1000	8.00"	Found in #1380, Phoenix (Re-release).
031281	HBT-1000	2.75"	Found in #2128, Long Shot.
031683	HBT-1000	4.938"	Found in #2145, Porta-Pot Shot
060616	HBT-1000	16.50"	Found in #1350, Interceptor-E.

### HBT-1090 Body Tubes

P/N	Designation	Length	Comments
030336	HBT-1090 (Blk)	8.219"	Found in #2169, Dragonite. P/N conflicts with BT-20N found in #1911 Courier, above.
031176	HBT-1090	12.00"	Found in #Mk-109 Stingray.
031186	HBT-1090 (Red)	11.00"	Pre-finished red; found in #2158.
031206	HBT-1090 (Holo)	11.00"	Holographic covering, found in #2137, Flash.
031208	HBT-1090 (White)	2.875"	Pre-finished white; found in #2158.
031674	HBT-1090 (Green)	3.563"	Green prismatic; found in #2182, Wacky Wiggler.
031675	HBT-1090 (Green)	1.25"	Green prismatic; found in #2182, Wacky Wiggler.
031676	HBT-1090 (Green)	2.00"	Green prismatic; found in #2182, Wacky Wiggler.
085860	HBT-1090 (Black)	11.00"	Black pre-finished, found in #2060, Bandit.
085877	HBT-1090	11.00"	Found in #2105, Hijax.
085878	HBT-1090	11.00"	Found in #2107, Firestreak.

## Appendix II: New Body Tubes

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### HBT-1800 Body Tubes

P/N	Designation	Length	Comments
030367	HBT-1800	11.625"	Found in #2037, D-Region Tomahawk. P/N conflicts with the older BT-BT-50N, found in #1293 Black Brant III.

### HBT-2000 Body Tubes

P/N	Designation	Length	Comments
030615	HBT-2000	13.531"	Found in #1350, Interceptor-E
030617	HBT-2000 (Slotted)	13.531"	Found in #1350, Interceptor-E

### "PST" Body Tubes (Clear Plastic Payload tubes)

P/N	Designation	Length	Comments
030612	PST-55	12.00"	Found in #2155, Super Nova Payloader.
031205	PST-1090	6.00"	Found in #2105, Hijax.

### ST-4 Body Tubes

P/N	Designation	Length	Comments
031017	ST-41	1.25"	Found in #1358, F-61 Starfighter.

## Appendix II: New Body Tubes

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### ST-7 Body Tubes

P/N	Designation	Length	Comments
031038	ST-73	3.00"	Found in #1378, Firecat.

### ST-10 Body Tubes

P/N	Designation	Length	Comments
031135	ST-106	6.25"	Found in #1336, Boeing ALCM.
031140	ST-1010	10.50"	Found in #1378, Firecat.

### ST-13 Body Tubes

P/N	Designation	Length	Comments
031190	ST-1312	12.00"	Found in #1907, Cyclone (brown tube).
031606	WBT-1312	12.00"	White body tube, as found in the original #1327, AstroCam 110.

### ST-20 Body Tubes

P/N	Designation	Length	Comments
031169	ST-20	10.00"	Found in #2167, Mercury Redstone Liberty Bell.
031170	ST-20 (Slotted)	9.375"	Found in #2167, Mercury Redstone Liberty Bell.
031274	ST-2010	9.75"	Found in #1921, Mercury Redstone.

## Appendix II: New Body Tubes

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### "SBT" Body Tubes

P/N	Designation	Length	Comments
030329	SBT-705	7.813"	Found in #2048, Saturn 1b.
030379	SBT-116	11.00"	Found in #2048, Saturn 1b. P/N conflicts with the older BT-50B, found in #1909, U.S.S.F. Fireflash.
030436	SBT-261	7.625"	Found in #2048, Saturn 1b. P/N conflicts with the older BT-100Z, 10.89" long.
030438	SBT-267	1.375"	Found in #2048, Saturn 1b. P/N conflicts with the older BT-101, 16.5" long.
030446	SBT-123BE	2.50"	Found in #1287, LTV Scout. 1.23" in diameter.
030447	SBT-127GC	7.26"	Found in #1287, LTV Scout. 1.27" in diameter.
030449	SBT-394AJ	1.00"	Found in #1288, Starlab. 3.94" in diameter. Thick walled (0.042"); same OD as BT-101.
030488	SBT-139BJ	2.00"	Found in #1287, LTV Scout. 1.39" in diameter.

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