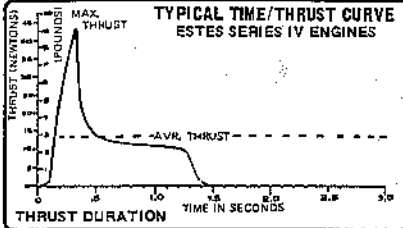


ESTES "D" POWER

FOR THE ADVANCED
ROCKETEER



FOR HIGH ALTITUDE PERFORMANCE

FOR LARGE PAYLOAD CAPACITY

Now a single engine gives you performance previously available only from clusters. The big "D" provides twice the power of the largest Series I engine—with the same quality and reliability which have made over 20 million Estes-Powered launches successful. For notes on building and flying "D" power birds, see the back side of this sheet.

TOTAL IMPULSE:	4.48 pound seconds 20.00 newton seconds
MAXIMUM THRUST:	9 pounds
PROPELLANT WEIGHT:	0.05496 pounds 24.93 grams
LENGTH:	2.75 in.
DIAMETER:	0.945 in.
SHIPPING WEIGHT:	2-1/3 oz. per engine

Cat. No. and Engine Type	Prices		Recommended Use	Time Delay (±15%)	Maximum Lift-Off Weights w/engines	Thrust Duration	Initial Weight	
	ea.	3 For					oz.	gr.
D13-0	\$.75	\$2.00	BOOSTER ENGINE	NONE	13 OZ.	1.48 SEC.	1.44	40.9
D13-3	\$.75	\$2.00	SINGLE STAGE	3 SEC.	13 OZ.	1.50 SEC.	1.49	42.2
D13-5	\$.75	\$2.00	SINGLE STAGE	5 SEC.	10 OZ.	1.50 SEC.	1.52	43.1
D13-7	\$.75	\$2.00	SINGLE OR UPPER	7 SEC.	8 OZ.	1.50 SEC.	1.55	44.0

Astron CHEROKEE-D

PARACHUTE RECOVERY
HIGH PERFORMANCE
QUICK-CHANGE
ENGINE MOUNT
FLY FROM ROD
OR RAIL
DIE CUT FINS
CUSTOM DECAL

SPECIFICATIONS

Length: 16.6 in. (41.4 cm)
Body Dia: 1.325 in. (33.7mm)
Weight: 2.75 oz. (78 gm)

ONLY
\$2.75



The perfect model for getting started on the high performance world of Estes "D" power. Your Cherokee-D will roar to amazing altitudes—parachute recovery brings it back safe so you can launch it again and again. Sleek design and low weight combine to give the Cherokee exceptional flight characteristics. Other kit features include die-cut fins, quick change engine mount, colorful decal and heavy duty construction. With all this, it's the perfect bird to start your "D" fleet. Shipping weight: 11 oz.

MODEL ROCKETRY
ESTES
Industries Incorporated
Box 227
Penrose, Colo. 81240
SCIENTIFIC SPACE AGE HOBBY

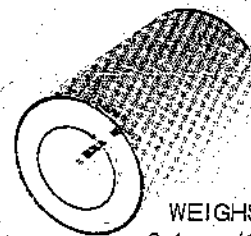
Cat. No. 694-K-47 Price \$2.75

CENTERING RINGS

Easy to use for mounting a BT-50 tube in a BT-55 body tube. Extra strong for "D" engine mounts.



Weight: 0.062 oz. ea. Shipping Weight 2 oz.
Cat. No. 694-AR-5055 4 for \$2.25



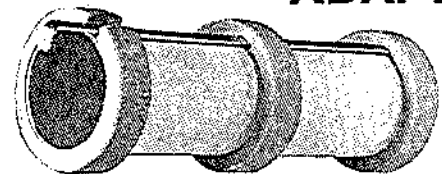
"D" POWER
FOR
ESTES
SATURN-V

WEIGHS ONLY
0.4 oz. (11.3 grams) **50¢**

Launch your Saturn V the easy way—use a single D13-3. Complete adapter kit fits your Saturn's present engine mounting system, holds the "D" engine securely in place. Shipping weight: 5 oz.

Cat. No. 694-EM-5063 \$.50 each

EM-2050 ENGINE MOUNT ADAPTER



FLY YOUR SERIES IV (D) BIRD WITH A SERIES I OR II ENGINE

Featuring quick-change engine mounting and heavy-duty construction, this adapter weighs only 0.19 oz. (5.3 grams). Shipping weight: 5 oz.

Cat. No. 694-EM-2050 \$.35 each

BUILDING "D" POWERED MODELS

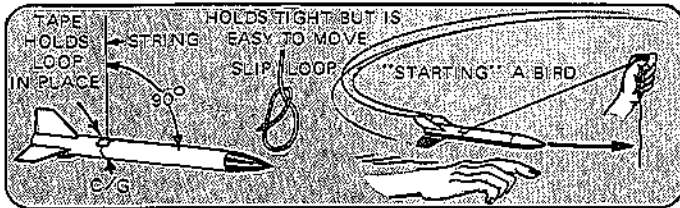
Estes "D" engines open a whole new world of performance to the model rocketeer. Its greater total impulse and higher initial thrust make it easy to fly larger, more advanced designs.

Although most conventional model rocket building and flying techniques can be used, there are a few important differences to remember when building models for "D" power. Special attention is important in three areas — stability, engine mounting and multi-staging.

STABILITY

A "D" engine weighs about twice as much as a conventional Series I or II engine. This results in a rearward concentration of weight in a rocket that must be allowed for in designing the model to make sure it will be stable.

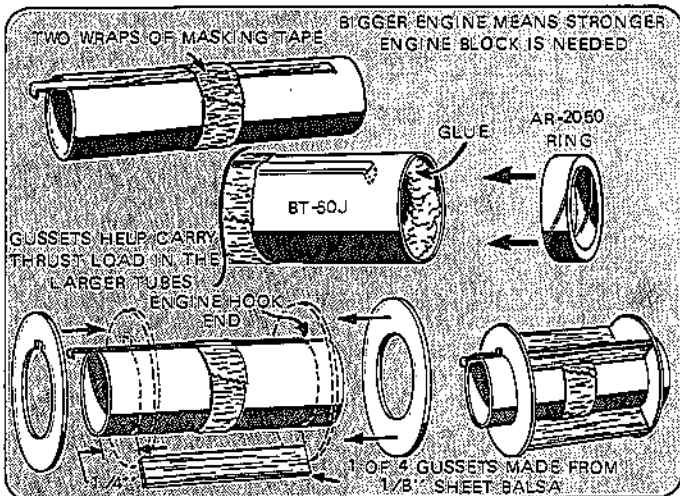
Don't just stick a "D" engine mount in a standard model and expect it to fly. Always string test your model before flying it (see the technical section of your Estes catalog). If necessary, add nose cone weights or enlarge the fins until it does pass the string test.



Fins for a "D" bird should be made extra strong to withstand the higher acceleration and speed the model will encounter. One-eighth inch thick balsa sheet is generally the best fin stock to use.

ENGINE MOUNTING

A Series IV (D) engine will mount inside a BT-50 body tube much the same as a standard engine fits a BT-20. However, the engine mount in a "D" bird must be made extra strong. For best results use an EH-2 engine holder to retain the engine and use an AR-2050 ring as an engine block.

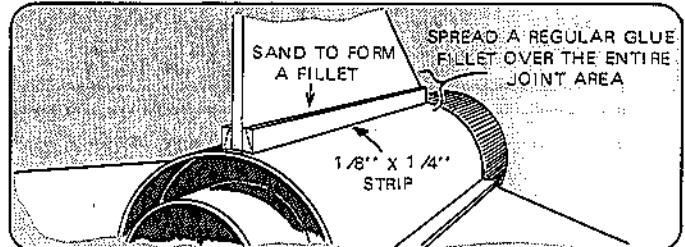


If this assembly in turn goes into a larger body tube, the adapter system must be extra strong. For a BT-55 size rocket the AR-5055 rings should be used. In larger tube sizes the rings should be reinforced with gussets as shown. Always use plenty of glue and let it dry completely.

MULTI-STAGING

The greatest difficulty in multi-staging with "D" engines comes in keeping the fins on booster stages. The problem arises when booster and upper stages separate — the booster starts to tumble at high speed, causing extremely high forces on the fins. The result is that the fins will break off at staging unless they are attached very strongly.

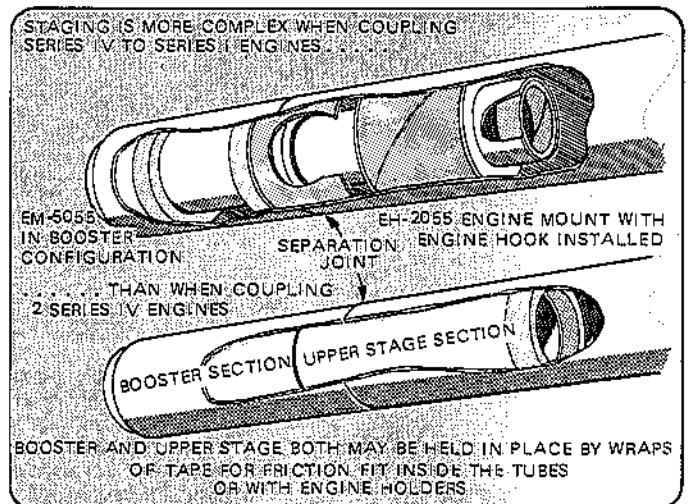
Booster fin material must be strong. One-eighth inch thick balsa is best. Don't make the fins excessively large. Generally, booster fins on D birds shouldn't need to be more than 1-1/2 times the size of upper stage fins. Attach the fins securely. One method of reinforcing the



fin root is shown; the inventive rocketeer should be able to come up with other, equally good methods.

It isn't necessary to tape "D" engines together when multi-staging. However, the rocket must be built so that the stages slide apart in a straight line when they separate. The engines must be positioned so the nozzle of the upper stage engine is directly in line with the top of the booster engine.

If a Series I, II, or III upper stage engine is used it should be positioned so its nozzle end touches the top end of the booster engine. Again, it is not necessary to tape the engines together, but it is necessary to make sure that the stages will slide apart in a straight line.



Regardless of the size of the upper stage engine, the stage coupling should be designed so the stages slide apart in a straight line for at least 3/4" before they separate. This helps the upper stage continue a straight flight and makes ignition more reliable.

Whether your "D" bird is a single or multi-stage model, fly it on a calm day when there's good visibility so you don't lose it. Always follow the safety code — you'll find it makes rocketry more enjoyable, too.