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Sigma Star

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Escape Vehicle Using Thor and Vanguard  
Components.

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The last two stages of Vanguard are responsible for adding about 21,500 ft/sec. to the total Vanguard velocity (when fired on a polar orbit). The total weight of those two stages is 4770 lbs which includes 4286 lbs for the second stage Vanguard and 484 lbs for the third stage Vanguard, the latter figure including a 21.5 payload.

When the Thor is fired with a control system but no guidance, and when the nose cone is replaced by the second and third stage Vanguard the Thor stages can achieve a burnout velocity of 14,700 ft/sec on a non-rotating earth. The total velocity at burnout for the three stage missile would be 39,200 ft/sec. with respect to a non-rotating earth. Certain factors which have been ignored (e.g. different grav. loss) tend to make this estimate conservative. When fired eastward from Cape Canaveral this missile would achieve a velocity of 57,500 ft/sec. with respect to an inertial frame of reference and this is about 1000 ft/sec. more than is required to get to Mars or Venus.

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By Authority of P. Dergarabedian  
By BC Duke Date 14 Feb. 1958

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