

The success of welding and staking of plastics or inserting metal into plastic depends upon the proper amplitude of the horn tip. Since it may be impossible to design the correct amplitude into the horn initially because of its shape, booster horns are necessary to either increase or decrease the amplitude to produce the proper degree of melt or flow in the plastic part. The choice of plastic, the shape of the part, and the nature of the work to be performed all determines what the optimum horn amplitude should be.

Six amplitude-modifying booster horns are available: three for increasing amplitude and three for decreasing amplitude. Each horn is anodized with the coded color for easy identification.

Amplitude Increasing Ratio	Color	Coupling Bar* Ratio	Color	Amplitude Decreasing Ratio	Color
1 to 1.5	Gold	1 to 1	Green	1 to .6	Purple
1 to 2.0	Silver			1 to .5	Blue
1 to 2.5	Black			1 to .4	Red

Higher ratio boosters are available on special order but require approval for purchase from our engineering department. It should be noted that each horn has a limit to which its amplitude can be increased without fracturing the horn.

Figure 1 is a graph showing how the amplitude of a typical horn can be changed by using booster horns.

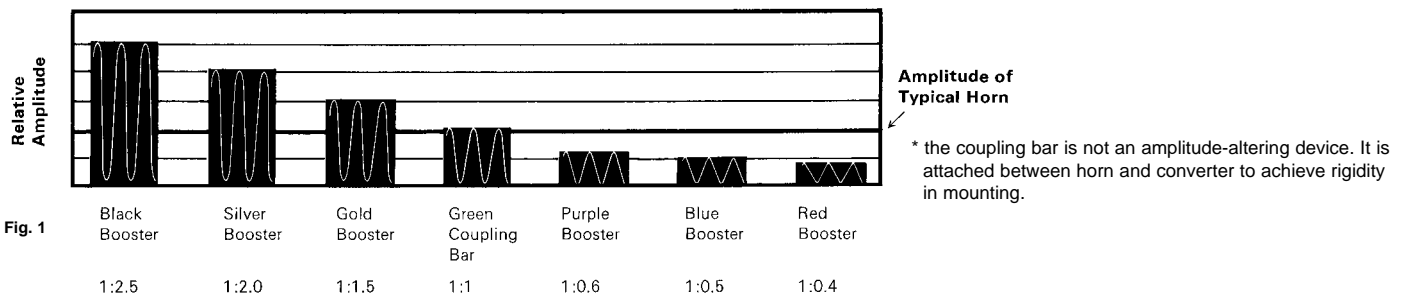
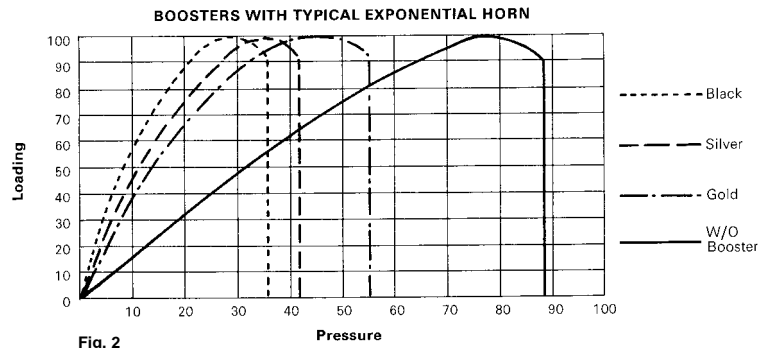


Figure 2 further illustrates how a set of three amplitude-increasing boosters can change the pressure requirements of a typical exponential horn and power supply combination. With lower amplitude there is a greater force capability. For purpose of illustration, a high-amplitude horn might be compared to third gear in a car which produces higher speed and low torque. Conversely a low-amplitude horn — similar to first gear which produces low speed and high torque — has tremendous force capabilities and will vibrate under hundreds of pounds of load. It is relatively easy to “stall” a high-amplitude horn by operating it under high pressure conditions, just as it would be easy to stall a car motor starting up a steep hill in third gear. Each horn-booster combination must be tailored to the specific application for optimum performance.



The conditions which suggest the need for altering the amplitude of a horn are listed below.

**Increase Amplitude When:**

1. There is difficulty getting energy to joint resulting in a poor or slow weld.
2. Energy is passing through joint (vibration can be felt in nested part; part may show marking from nest).
3. There is difficulty getting proper loading, or pressure required is beyond range of stand.
4. Diaphragming occurs. (Burnout of circular parts.)
5. If staking, melting occurs at base of stud instead of at surface.
6. Marking of parts occurs because of excessively long weld times.

**Decrease Amplitude When:**

1. System will not start or starts with difficulty.
2. System stalls with low pressure.
3. Excessive no load readings occur on power supply.
4. Going from solid to tapped horn.
5. Marking of parts occurs. High pressure provides better coupling of vibration into plastic.
6. Plastic parts are shattered or metal inserts fracture.
7. Excessive heat builds up near nodal area in horn.
8. Diaphragming occurs.