

SPECIFICATIONS (Revised 20050318)

LOW POWER ANECHOIC CHAMBER

TARGET SYSTEM DESIGN

PLOTTER SPECIFICATIONS

	x-y plotter
position data	position data
el&az accuracy	0.004"
el&az	0.0025"
el&az repeatability	0.0004"
rate data	rate data
el&az range	0-314"/sec
el&az accuracy	2.5"/sec
el&az resolution	.01"
acceleration	acceleration
	Shortest move .07 in:
	average speed 210 in/sec
el&az acceleration	average

TABLE 1

MOTION

The horn motion can best be described as initially very slow, slowly increasing (linearly) with an exponential conclusion in its last few seconds before a scenario ends.

Home or point to point input for motion is at moderate speed. At no time does the motion go from zero to max in its minimum increment.

PLOTTER INSTALATION

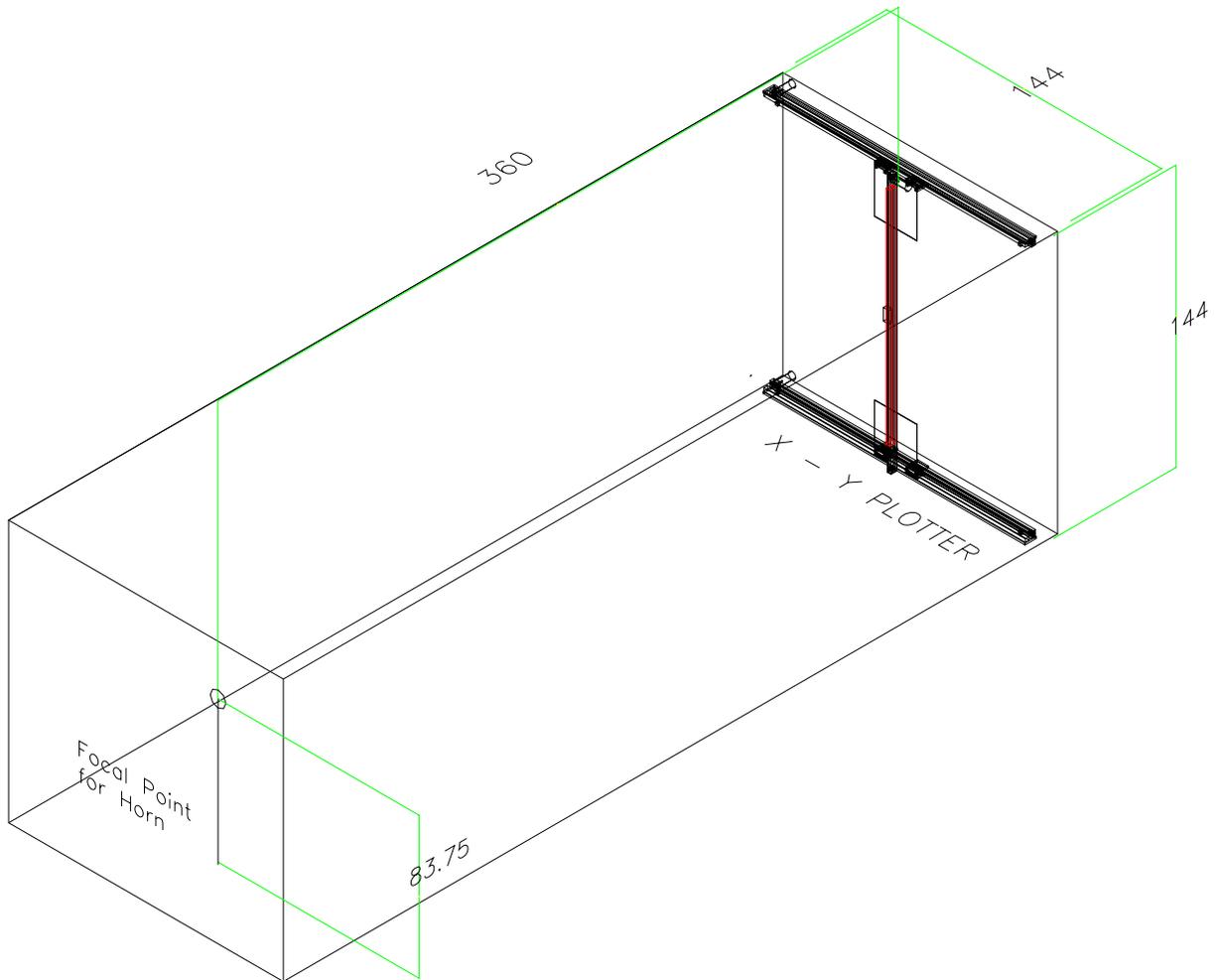


FIGURE I
ANECHOIC CHAMBER

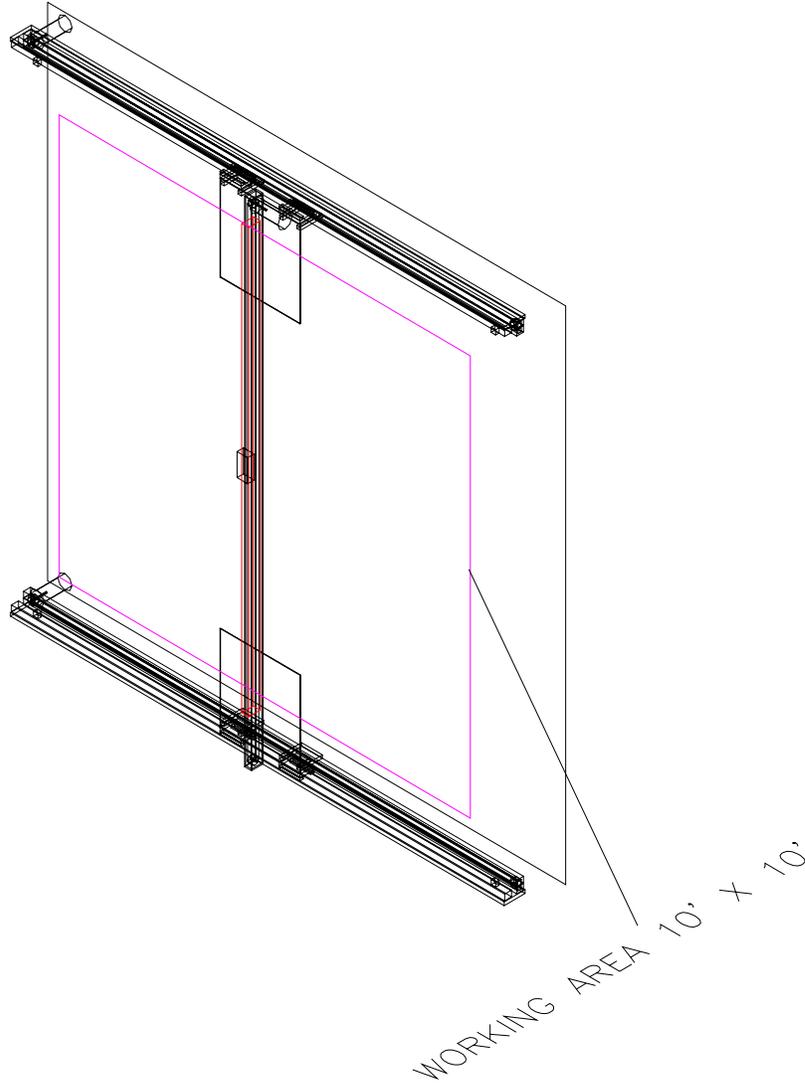


FIGURE 2
X-Y PLOTTER

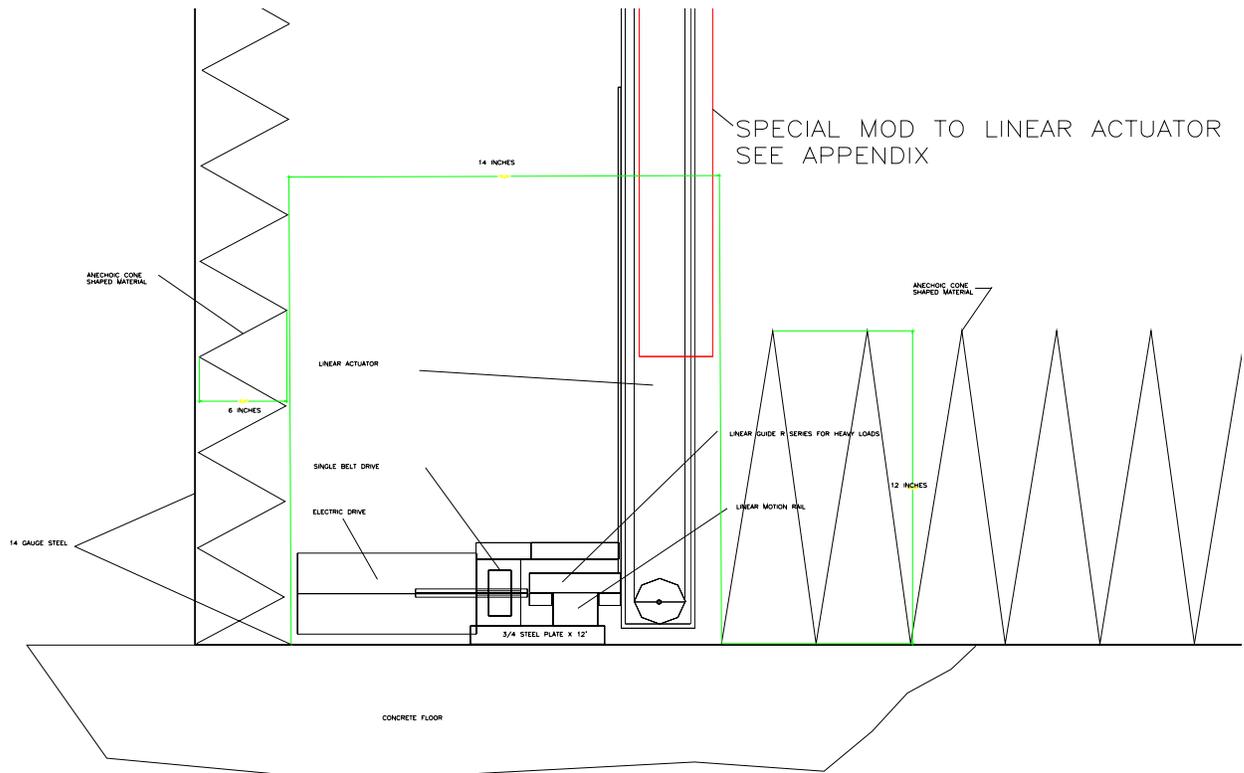


FIGURE 3

DETAIL OF CONSTRUCTION

Stops: The motion and stopping of the slide and horn is to be done programmatically via the drive and brake system. However, if that fails we wish two fail safes, an electronic cutoff switch to the drives and then a mechanical hard stop as shown in Figure 4.

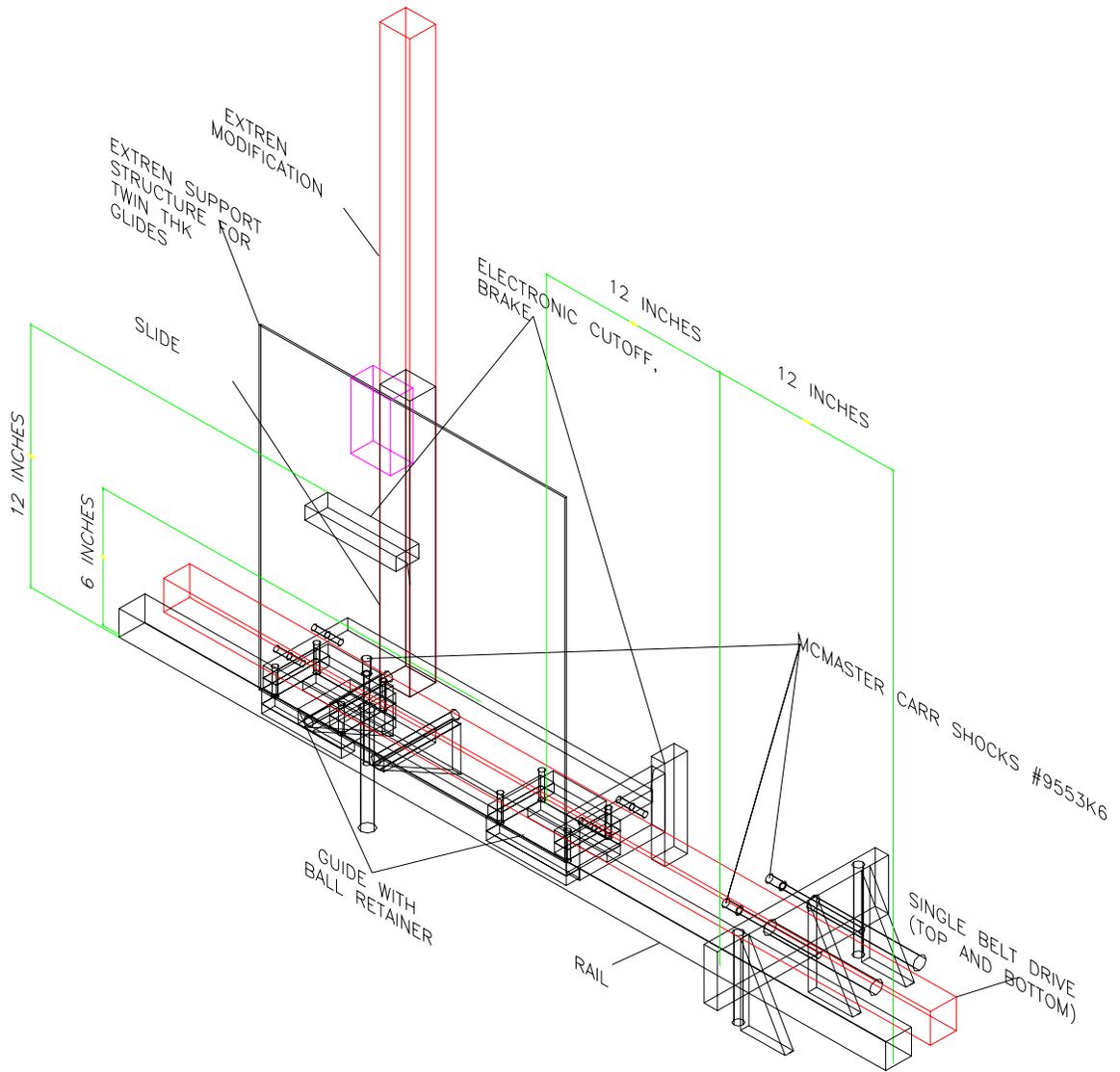


FIGURE 4
FURTHER DESIGN CONSIDERATIONS

The horn rotator: The magenta colored block, shown in Figure 4 on the vertical actuator represents a mechanism which is used to attach the horn antenna to the actuator slide. This mechanism is required to rotate the horn such that it will always point to the center point as shown in Figure 1. This motion must be synchronous with the plotters linear motion. The mechanism is depicted in Figure 5. An example of that which is required is the side view mirror on a contemporary car which rotates up or down and in and out yet is small and light as is our horn.

The horn has a maximum weight of 5 pounds. A light weight rotating system is important to maintain pointing and vertical position because this mechanism is attached directly to the actuator slide. Rotational speed, velocity and accelerations for this device are the “reverse” of those of the positioner, that is the motion of the rotators must be exactly those of the positioner but in the opposite direction. The range of rotation of this special mechanism is approximately 10 degrees in both directions.

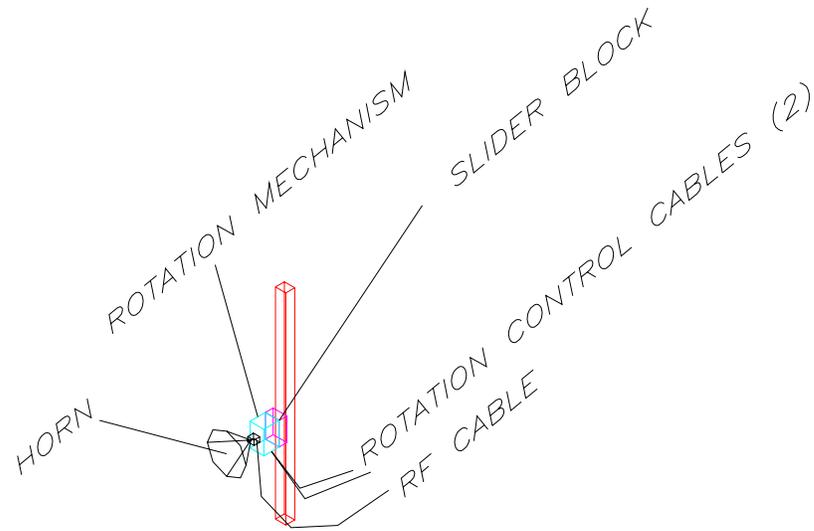


Figure 5 Horn rotator

Components: Motors, encoders, brakes, sensors, etc.: The Figure below is a “mechanical” interpretation of the drive electronics for the system.

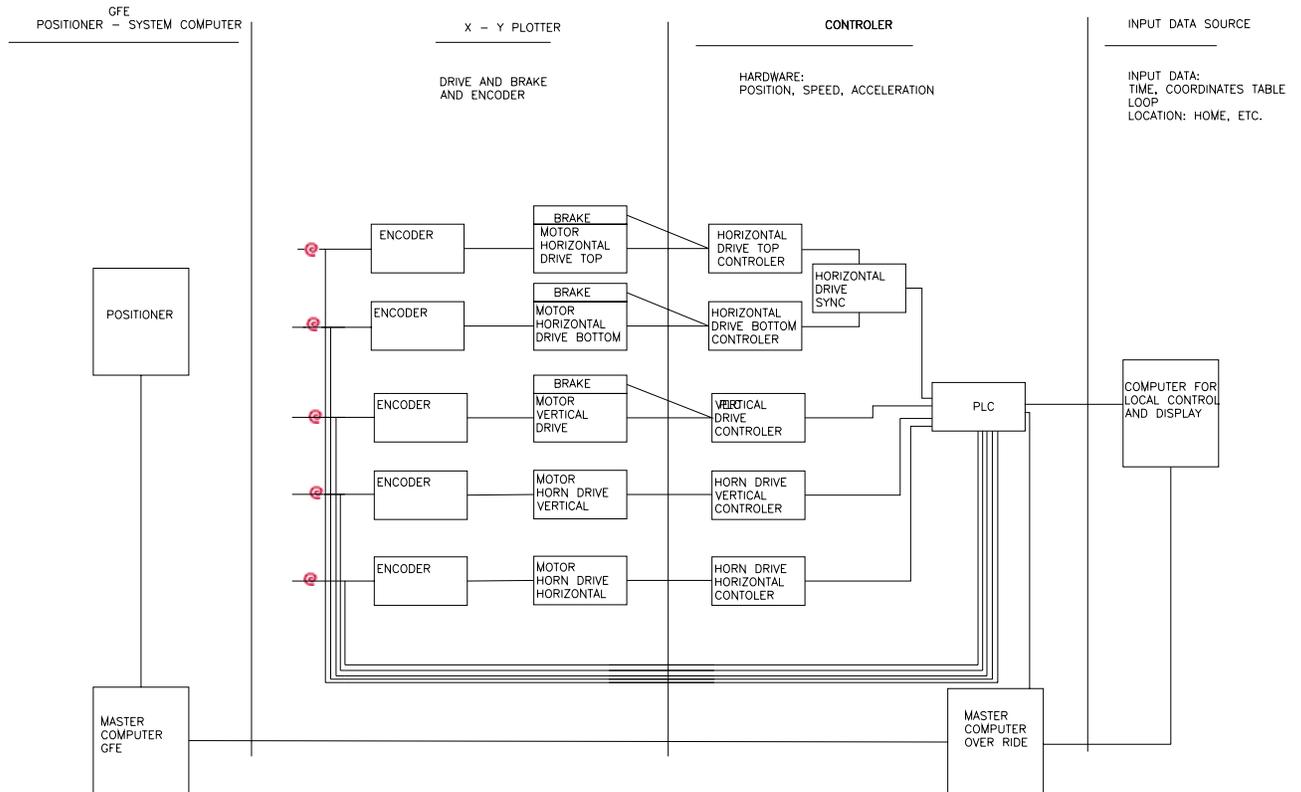


Figure 6
 Control System

Positioner-computer-plotter interface: The master computer up-date rate to the PLC must be one millisecond or less therefore commands within the system must be significantly faster. The data provided from the main frame computer (SYSTRAN DAC) is two analogue voltages, both between +/- 10 volts, one each for the x and y axis. The resolution is 4.88 mill-Volts with an output current of +/- 20 mill-Amps.

The computer and any other system hardware which can be external to the chamber are to be rack mounted in a standard 19" frame provided by the vender.

Factory acceptance test: The vender will test entire system at the factory using a 5 pound weight as the horn. The vender will demonstrate the system capabilities via the computer for local control and separately through the master computer over ride.

Installation: The vender will install the x-y plotter in the anechoic chamber at NRL.

APPENDIX

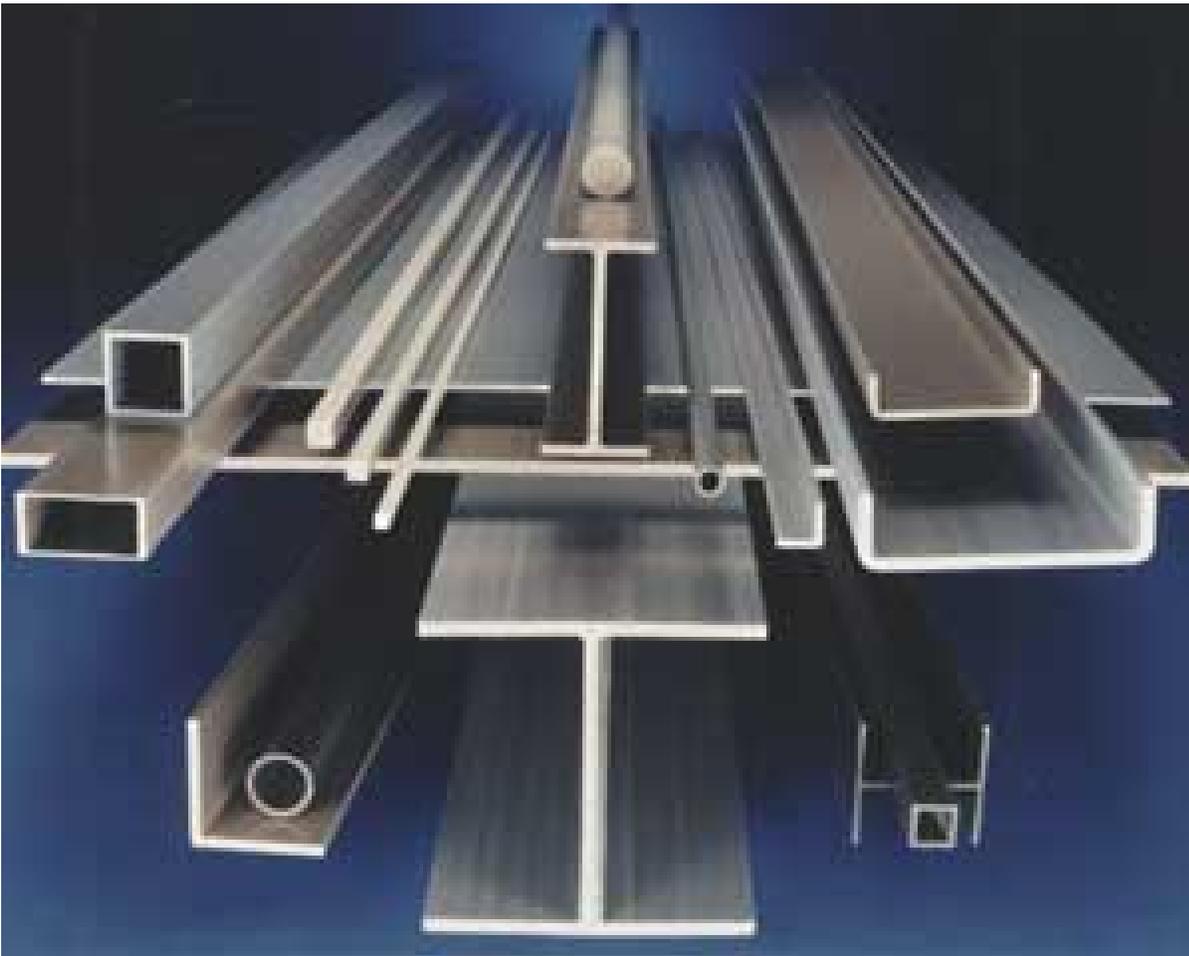
Many slides use extrusions. Their cross section can be duplicated in a non-metallic.

In EXTREN, the function, strength and inertia of this cross section of the actuator must be duplicated though the shape is not critical except that it must attach to the slide extrusion at either end to complete the replacement of the visible metal center portion of the slide and allow the attachment of the rotational mechanism and horn. The strength and inertia equivalency will then allow the vertical brace to have the same rigidity and support as the metallic form shown above which will permit the same horizontally motion. The shape is not critical because aerodynamics is a secondary effect especially since we are driving from both the top and bottom of the EXTREN assembly.

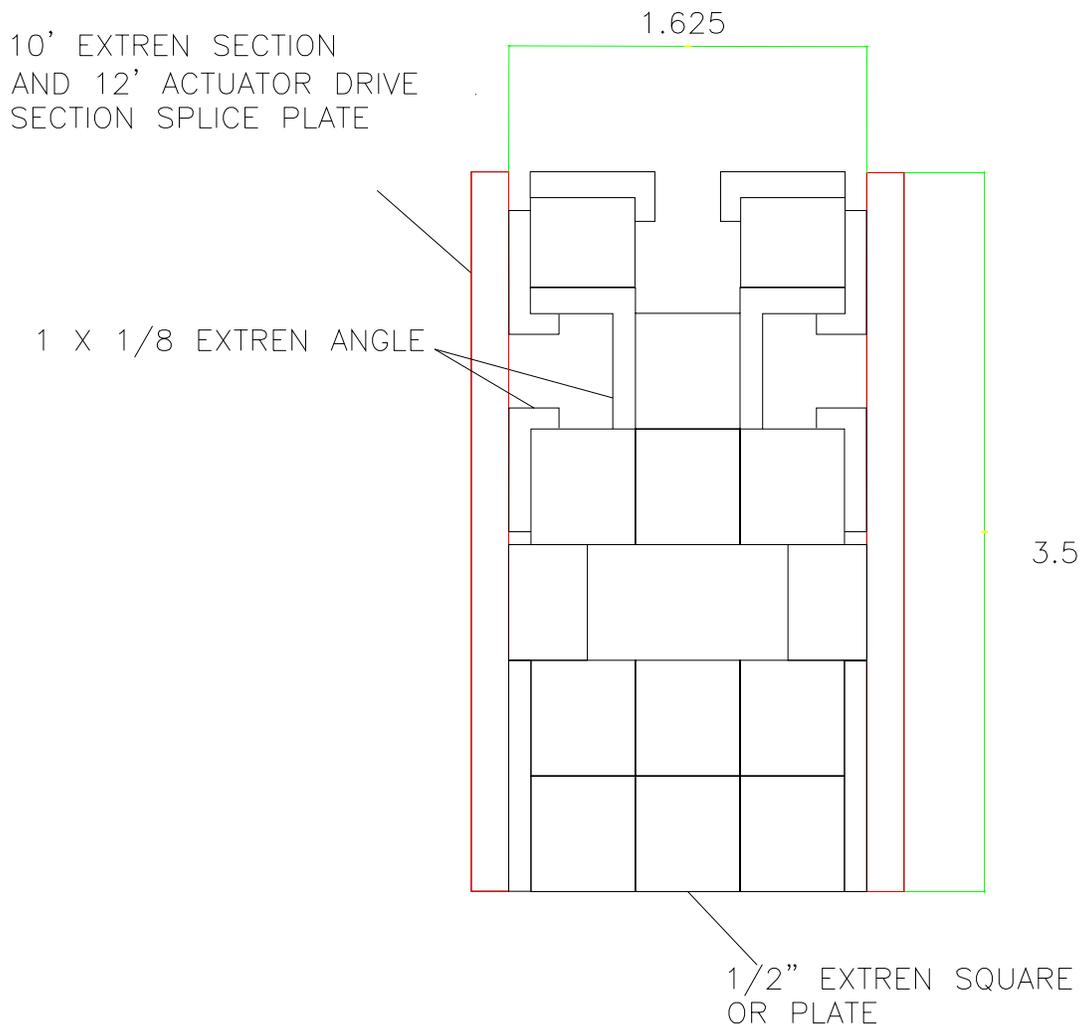
EXTREN shapes are shown below.

EXTREN comes in a variety of sizes and shapes which can be found on the internet at the address below.

<http://www.strongwell.com/PDFfiles/Extren/Extren%20Brochure%200804.pdf>



Using a few of the EXTREN shapes shown above a typical cross section is displayed below but other combinations of sections may work better, be stronger or guide better. The final configuration will be determined by the vender.



As an example, using other EXTREN shapes one can develop another cross section as shown below.

