Fermi National Accelerator Laboratory

TM-1072
0819.000

Helium to Neon Modification for a Dupont 120SSA or 24-120 Leak Detector

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When helium leak detecting is hindered by a system or atmosphere saturated with helium, leak checking can be continued by modifying the DuPont 120SSA/24-120 Mass Spectrometer Leak Detector to detect neon. Although DuPont markets a three gas leak detector (helium, neon and argon), the DuPont 120SSA/24-120 is convertible to neon by simply changing the magnet and retuning for neon peak. The sensitivity 2 x 10^{-9} Atm/cc/sec/division neon. If an increase in sensitivity is desired, use a speed choke (TM 1233).

Neon is chosen as an alternative trace gas since it has similar desirable characteristics as does helium, as shown in the following comparison table.

I Safe(inert)
II Trace quantities in the atmosphere (ppm)
III Rate of Diffusion
IV Available(Fermi stockroom)
V Leak Detector
VI Conversion necessary

COMPARISON TABLE

	I	II	III	IV	V	VI
H^3	NO	0.5	$\frac{2}{\sqrt{2}}$	$6.00/200ft^3	DuPont	NO
					Veeco	YES
He	YES	5	1	$12.22/200ft^3	DuPont	NO
					Veeco	NO
Ne	YES	18	$\frac{2}{\sqrt{20}}$	90%Ne-10%He $95.00/200ft^3	DuPont	YES
					Veeco	YES
N_2	YES	780,000	$\frac{2}{\sqrt{28}}$	$2.54/200ft^3	Varian Smart Gauge	NO
Ar	YES	9,300	$\frac{2}{\sqrt{40}}$	14.85/200ft^3	DuPont 3 Gas	NO

The helium to neon modification requires a dual magnet hanger and a new magnet. See attached print for magnet hanger. The new magnet hanger, when installed, gives the operator the option to change from helium to neon leak detecting without interrupting the internal vacuum. The new magnet for neon leak detecting is a 3900 gauss magnet (Hitachi MA 69-1) and can be purchased from Hatachi, Neff Plaza South, Edmore , Michigan 48829, phone (517) 427-5151, ask for John Olsen.

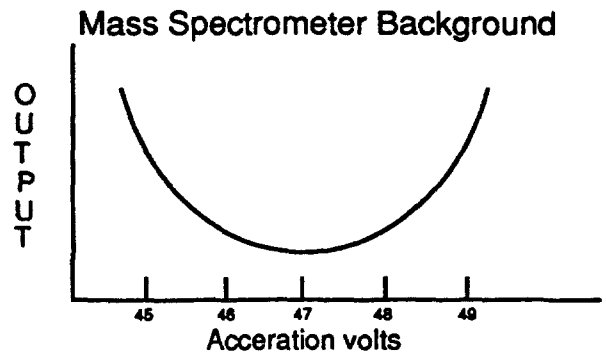
Installation of the dual magnet hanger can be accomplished by removing the diatron envelope, removing the existing hanger and replacing with the dual hanger. Install existing magnet (MA-192-1) for detecting helium with shelf in the up position and tune leak detector for helium per DuPont's instructions. This insures that the emissions regulating circuit and amplifier are in good working condition.

Magnet Change Procedure:

1) Turn filament off
2) Remove F101 fuse
3) Remove MA 192-1 magnet
4) Lower shelf to bottom position
5) Install MA 69-1 magnet
6) Install F101 fuse
7) Turn filament on

Neon Tuning Procedure:

1) Turn Multiplier switch to on scale (X10, X50)
2) Switch to Ionizing current
3) Adjust Ionizing current to half midscale
4) Switch to Accelerator voltage
5) Adjust accelerator voltage to approximately 47 volts, check output meter



6) Attach neon standard leak and check sensitivity.

I have provided a graph with neon, argon oxygen and nitrogen output vs. acceleration voltage. This will aid in tuning for the neon peak.

Magnet Hanger

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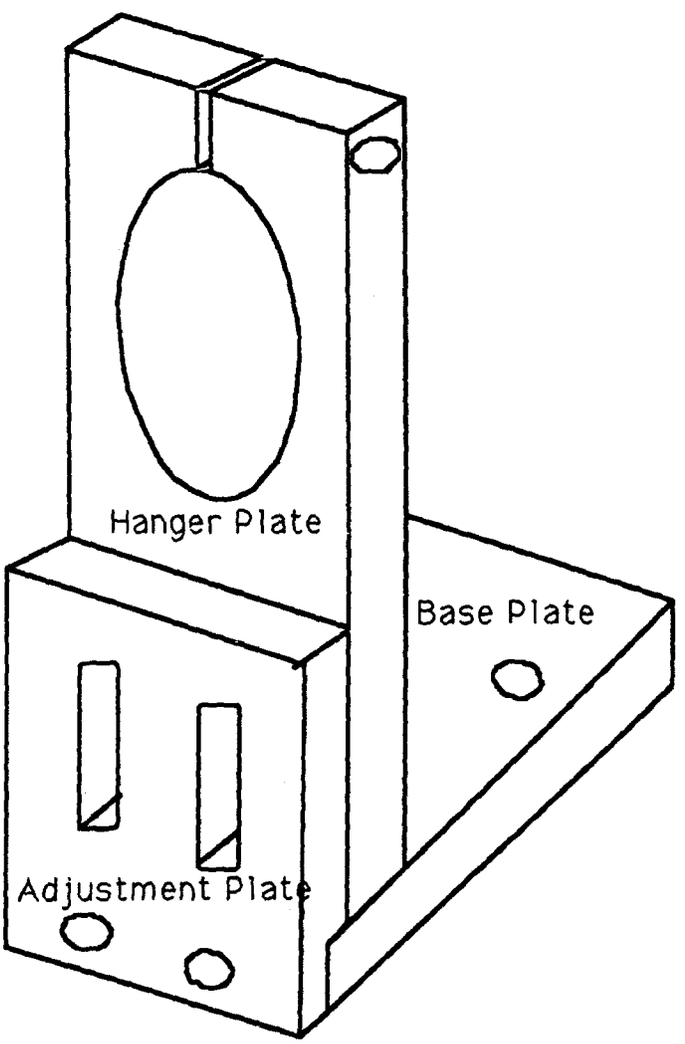

Full View

Magnet Hanger

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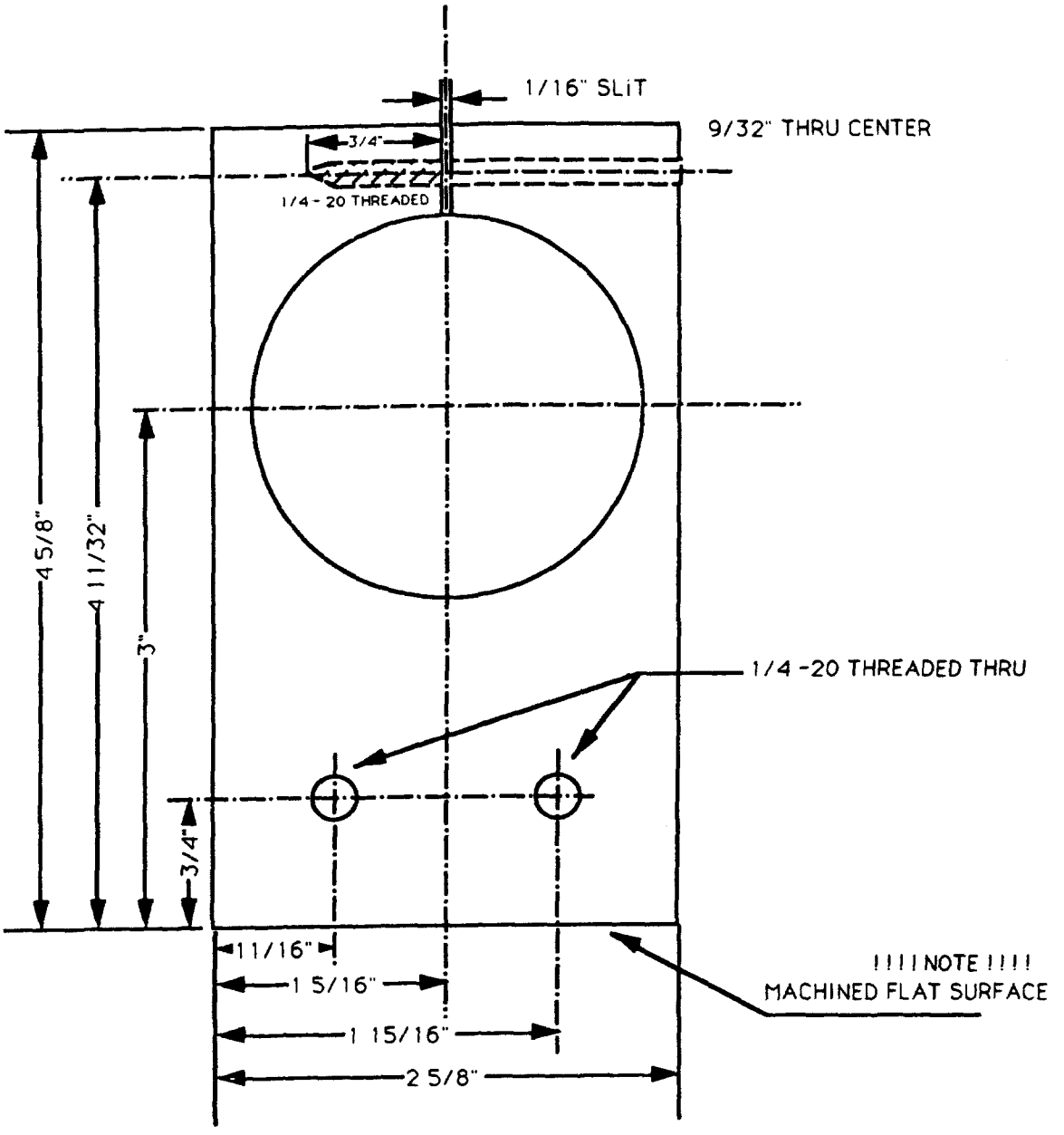
Hanger Plate

Material : 3/8" aluminum



Magnet Hanger

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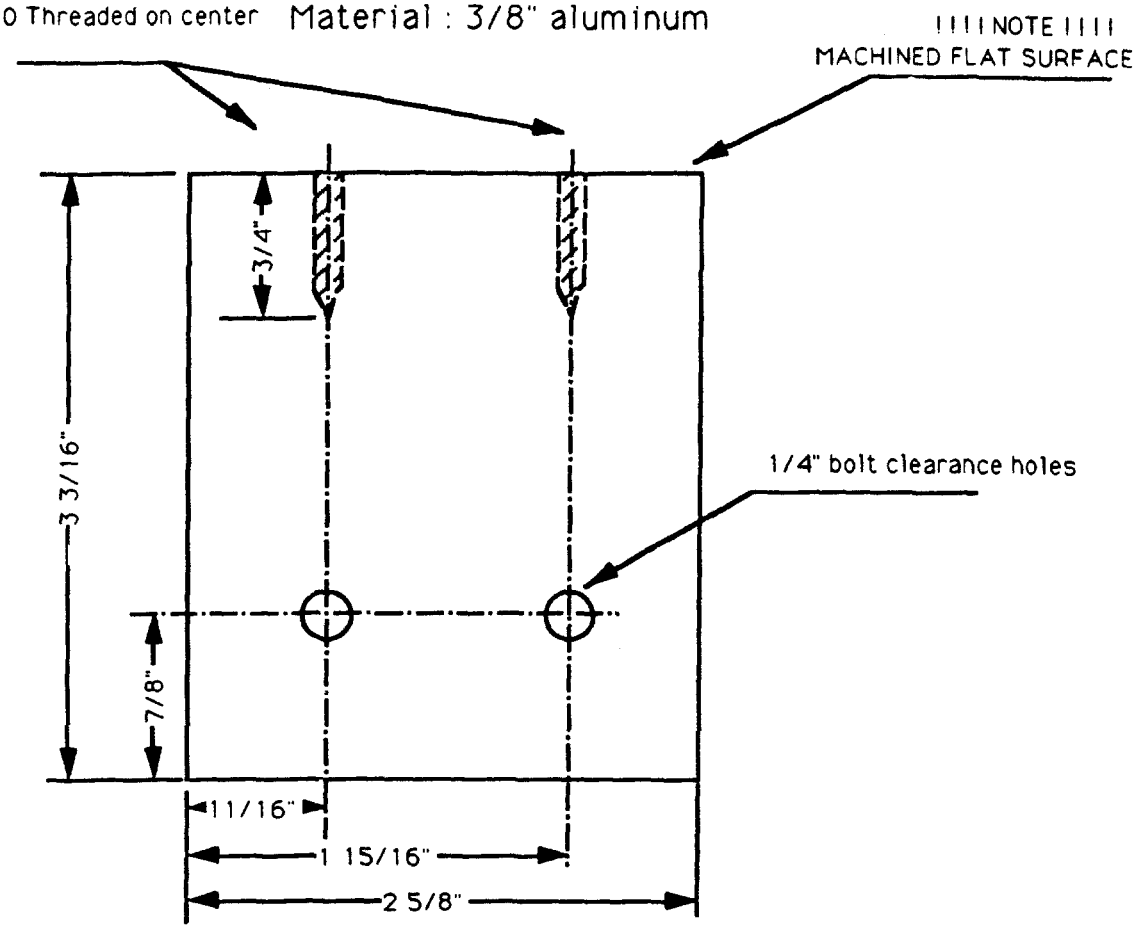
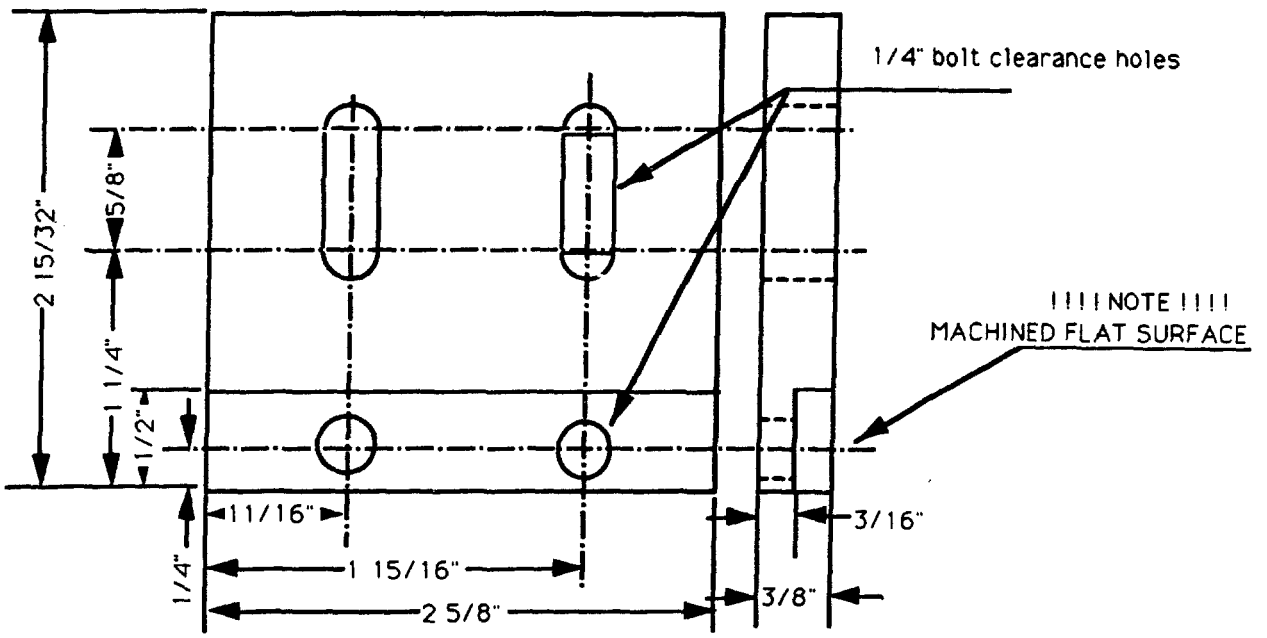
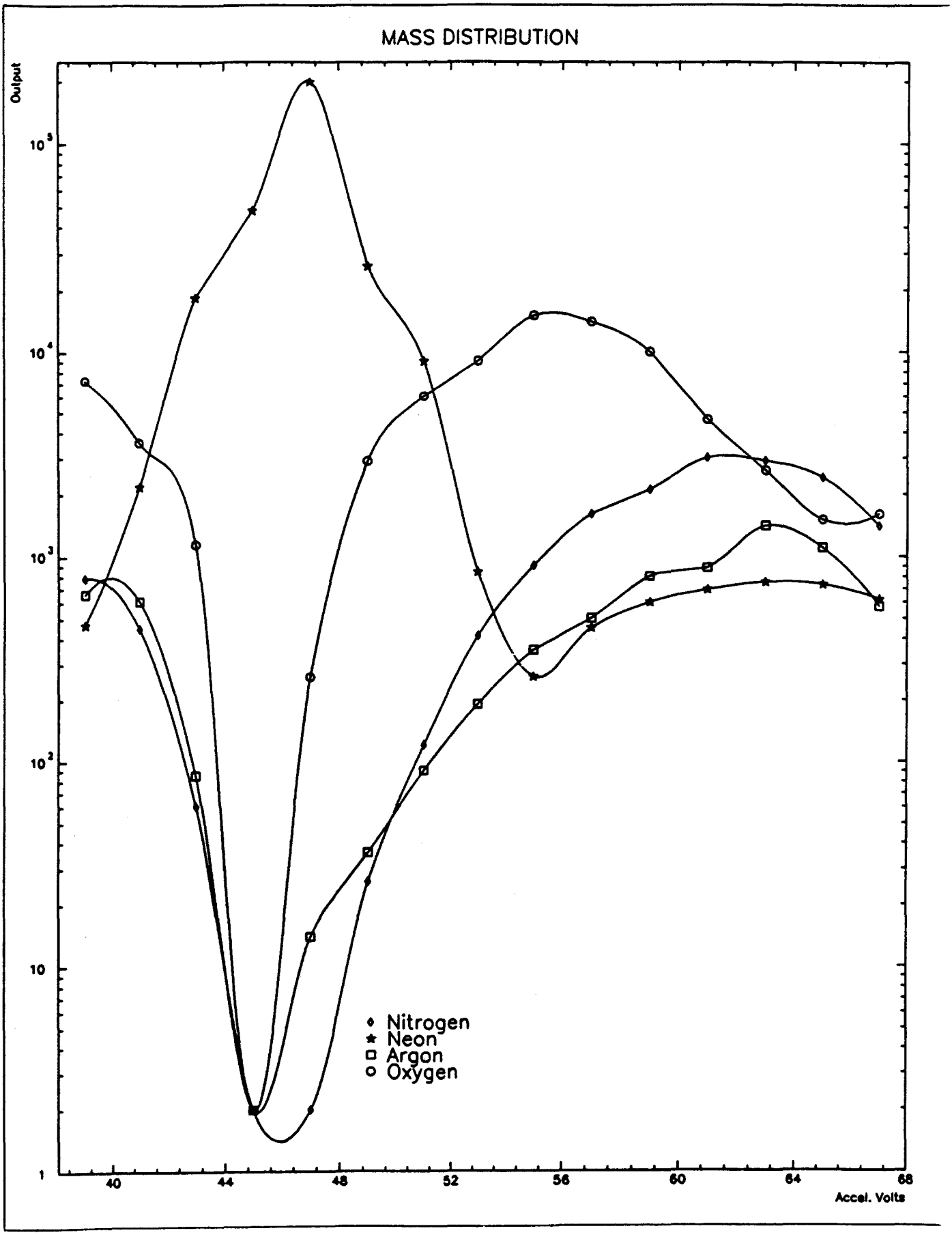
Base Plate

1/4-20 Threaded on center Material : 3/8" aluminum



Adjustment Plate




MASS DISTRIBUTION
Output
10⁵
10⁴
10³
10²
10
1
40
44
48
52
56
60
64
68
Accel. Volts
Nitrogen
Neon
Argon
Oxygen