

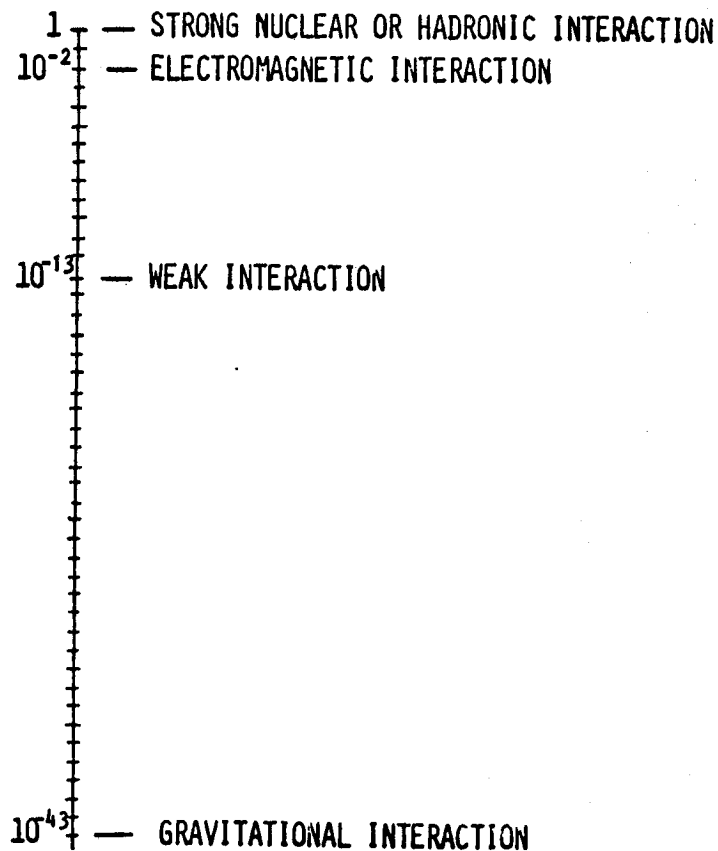
ADVANCED CONCEPTS

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INTERACTIONS TO ENABLE
PROPULSIVE FORCES

- o STRONG NUCLEAR OR HADRONIC INTERACTIONS
- o ELECTROMAGNETIC INTERACTIONS
- o WEAK INTERACTIONS
- o GRAVITATIONAL INTERACTIONS

RELATIVE STRENGTHS
OF INTERACTIVE FORCES

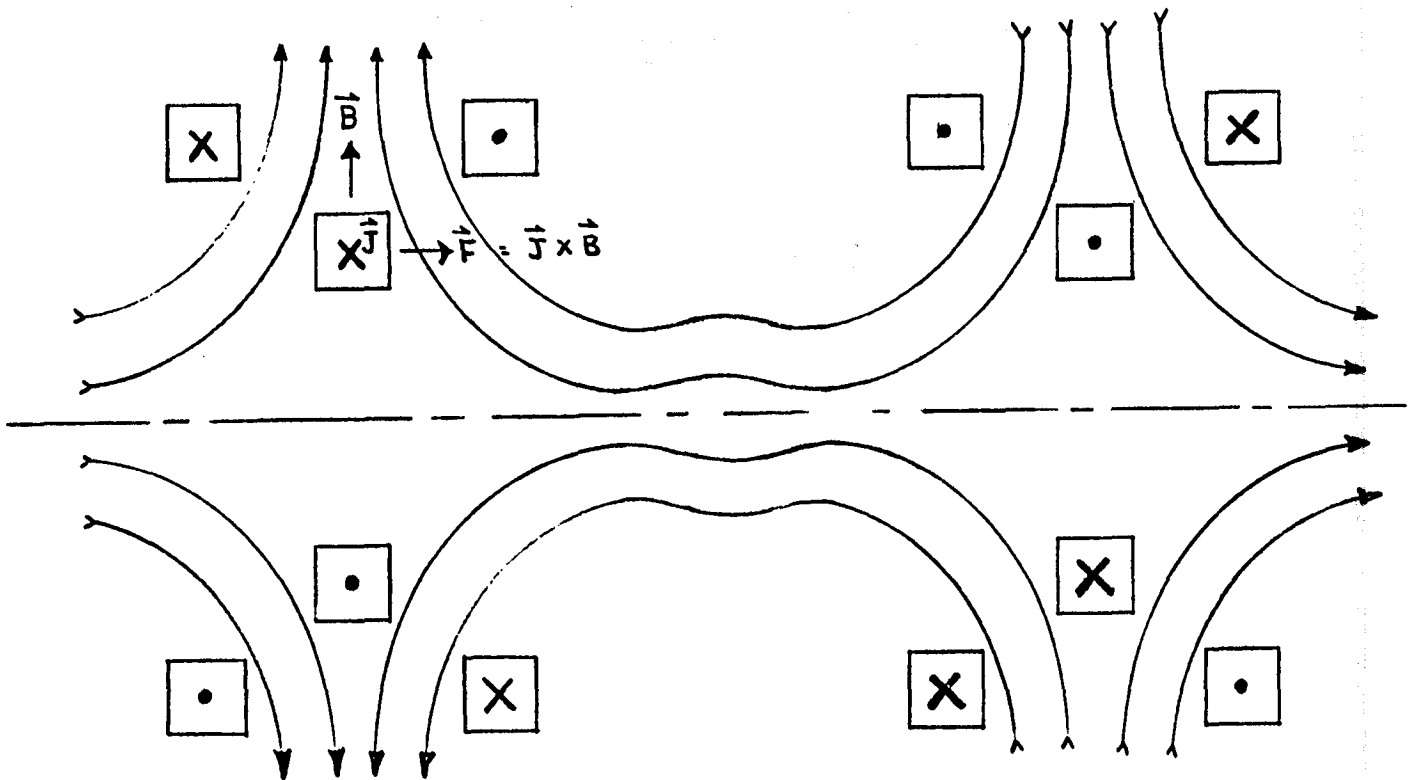


SPECIFIC IMPULSE

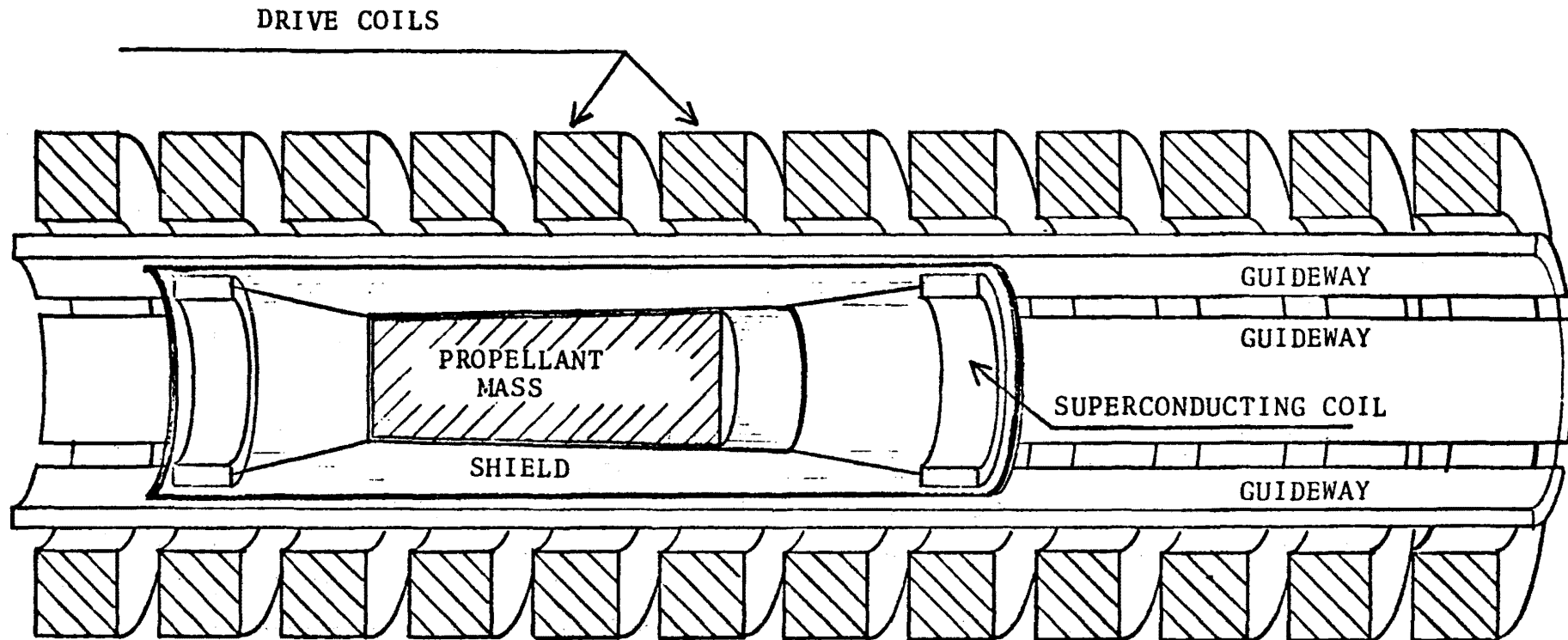
PROPELLANT

3×10^7	.....	PHOTONS AND PARTICAL/ANTIPARTICLE ANNIHILATION
2900	.....	He/He
2400	.....	He/H
2129	.....	H/H
974	.....	CH/CH
834	.....	N/N
577	.....	H ₂ /O ₃
567	.....	O/O
523	.....	H ₂ /O ₂
446	.....	H ₂ /O ₂ (CENTAUR)

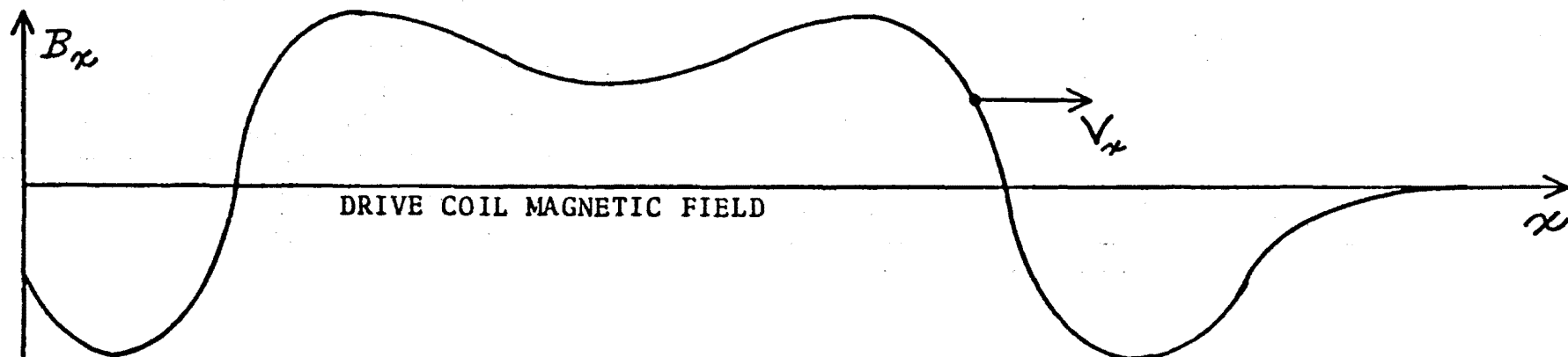
MASS DRIVER
LINEAR SYNCHRONOUS MOTOR

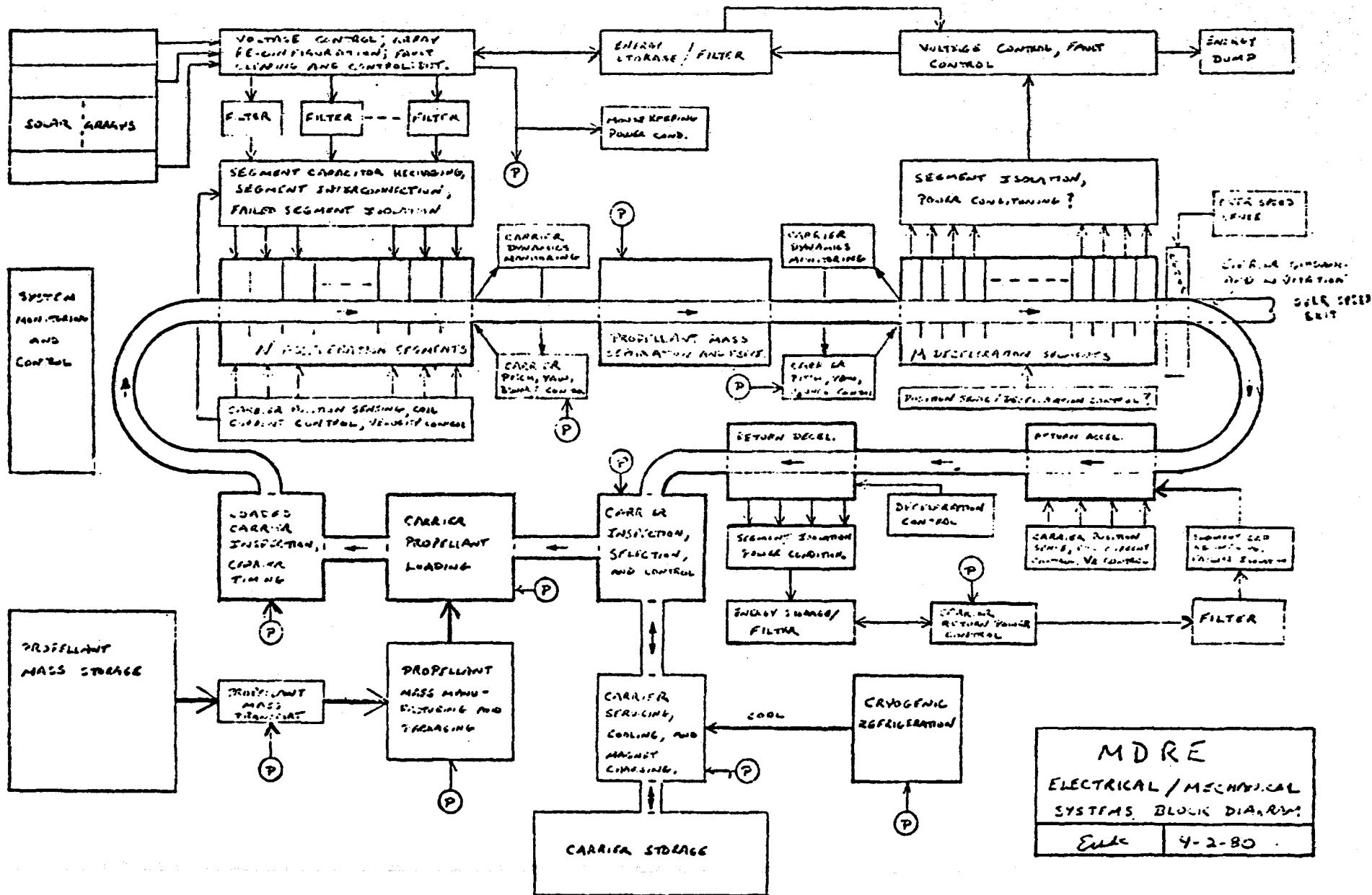


MASS DRIVER
LINEAR SYNCHRONOUS MOTOR



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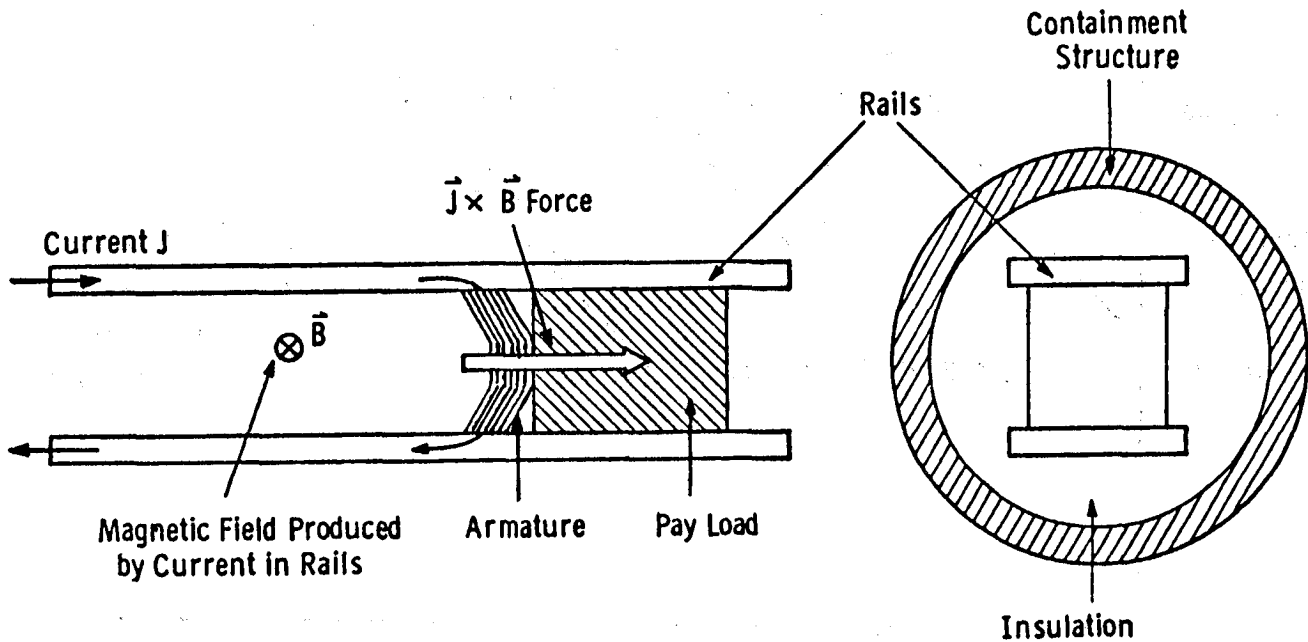


MDRE
 ELECTRICAL / MECHANICAL
 SYSTEMS BLOCK DIAGRAM
 EMLC 4-2-80

**MASS DRIVER
LINEAR SYNCHRONOUS MOTOR
CHARACTERISTICS**

INPUT POWER	$5 \times 10^7 - 7 \times 10^8$ WATTS
ASSUMED EFFICIENCY	70 - 95%
INSTANTANEOUS THRUST	10000N
THRUST TO POWER	200 MN/KW
FIRING FREQUENCY	1 - 10 Hz
SPECIFIC IMPULSE	1000 SEC
PROPELLANT ACCELERATION	1000 g's
PROPELLANT MASS	1 KG
LENGTH OF SYSTEM	8000 M
CALIBER (DRIVE COIL DIAM.)	20 CM

PRINCIPLE OF DIRECT CURRENT ELECTROMAGNETIC LAUNCHER



$$F = \frac{1}{2} L' I^2 = M \frac{dU}{dt}$$

RAIL GUN CHARACTERISTICS

INPUT POWER	30 kW
ASSUMED EFFICIENCY	50 %
INSTANTANEOUS THRUST	96,000 N
THRUST TO POWER	102 MN/kW
FIRING FREQUENCY	.032 Hz
SPECIFIC IMPULSE	1000 SEC
PROPELLANT ACCELERATION	10^6 g's
PROPELLANT MASS	10 GRAMS
LENGTH OF SYSTEM	4.9 M

