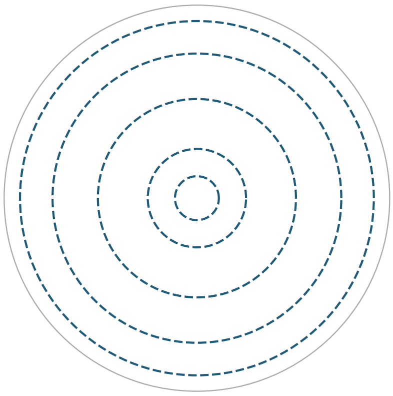
CLAIM-17 PROTOTYPE OPTIONS

Final screening calculation, three prototype choices, and engineering proposal reference

Status: engineering/theoretical screening only. No experimental propulsion result is claimed. The purpose of this document is to define three physically comparable prototype options, disclose the calculation chain, and identify the remaining engineering continuation items.

Top view: five concentric segmented source contours



Source diameter ~ 9.4 m

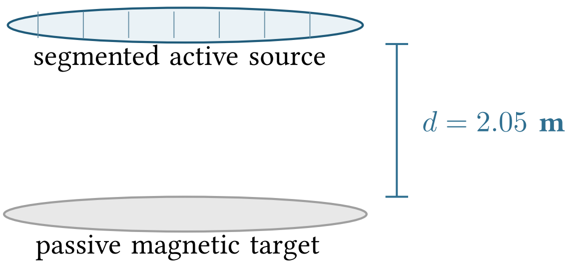
Target diameter ~ 9.6 m

629 local causal segments

Contour signs: + + $-$ $+$ $-$

Common axial spacing $d = 2.05$ m

Side view



Scientific continuity. The force and timing equations use the same reduced model as *Where Does the Opposite Momentum Go? FINAL.* Electromagnetic field momentum and Maxwell stress remain part of the complete accounting; radiation is treated as real power/momentum flux, not substituted for the reduced Lorentz/Laplace timing term.

Proposal decision: stop optimization here for the proposal stage. Use one nominal, moderately optimistic force-weighted distributed-path factor $G = 0.80$, show the broader sensitivity range openly, and leave real target response, final feeds/returns, full-wave conductor detail, structural design and site engineering to the later professional engineering program.

1. Purpose and decision structure

The project now offers three prototype classes. All three test the same Claim-17 timing proposition. Price buys experimental capability, power, force margin and optimization freedom - not a different physical hypothesis.

Option	A - Proof Unit	B - Research Optimizer	C - Development Rig
Fixed target	1 N	30 N	1 kN
Primary role	Decisive YES/NO + impulse	YES/NO + useful optimization	Full development platform
PSU envelope	1 MW	5 MW	30 MW
Engineering philosophy	Minimum rational commitment	Best-value research machine	Premium platform; some elephants deliberately left to engineers

The common geometry is intentionally retained at this proposal stage so the three choices are easy to compare. A professional engineering team may later redesign the lower-force machines more aggressively for cost or size.

Commercial logic: Option A buys the answer. Option B buys the answer and the first optimization program. Option C buys the answer and a serious development platform.

2. Scientific basis - reduced timing model

The following is the same reduced reciprocal timing model used in the reference Momentum study. K > 0 collects fixed coupling and geometry. It is not a new Lorentz force law; it is a reduced timing representation of the current-dependent interaction.

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$$T_d = \frac{d}{c}, \qquad \tau = 2T_d = \frac{2d}{c}$$

The useful target term and delayed return term are written as

$$F_T(t) = KI^2(t - T_d), \qquad F_R(t) = -KI(t)I(t - \tau)$$

$$F_{\text{net}}(t) = K\left[I^2(t - T_d) - I(t)I(t - \tau)\right]$$

Averaging over one electrical period gives

$$\overline{F}_{\text{net}} = \frac{KI_0^2}{2}\,[1 - \cos(\omega\tau)]$$

$$J_{\text{net}} = T\overline{F}_{\text{net}} = \frac{KI_0^2 T}{2}\,[1 - \cos(\omega\tau)]$$

Claim 17 selects

$$f = \frac{c}{4d}, \qquad \omega = 2\pi f, \qquad \tau = \frac{2d}{c}$$

$$\omega\tau = \pi, \qquad \cos(\omega\tau) = -1$$

$$\overline{F}_{17} = KI_0^2, \qquad J_{17} = KI_0^2 T > 0$$

These equations define the screening force used in this document. The physical experiment remains decisive. The real passive-target transfer function H(omega), physical current distribution, Maxwell stress and all ordinary momentum fluxes remain part of the complete apparatus.

3. Fixed common prototype geometry

The common reference remains inside a nominal 10 m cube and keeps the active-source / passive magnetic-target configuration. The segmented source is used so the macroscopic magnetic aperture does not require one phase-critical transition to propagate around an approximately 28 m outer circumference.

Quantity	Fixed screening value	Calculation / meaning
Axial source-target spacing	$d = 2.05$ m	Chosen compromise between coupling, frequency and segmentation
One-way delay	6.838 ns	$T_d = d/c$
Claim-17 frequency	36.560 MHz	$f = c/(4d)$
Electrical period	27.352 ns	$T = 1/f = 4T_d$
Free-space wavelength	8.20 m	$\lambda = c/f = 4d$
Source diameter	~ 9.4 m	Five concentric current bands
Target diameter	~ 9.6 m	Passive magnetic disk/tiled structure - final material open
Contour radii	0.55, 1.22, 2.47, 3.60, 4.41 m	Present screening geometry
Contour sign family	$++-+-$	Present screening current solution

The current establishment rule is screened as

$$\frac{L_{\text{local}}}{v_{\text{prop}}} \leq 0.1T_d, \qquad v_{\text{prop}} = 0.6c$$

$$L_{\text{local,max}} = 0.1T_d(0.6c) = 0.06d = 0.123 \text{ m}$$

Applying that maximum to each circumference gives the following minimum segment counts:

Contour radius	Circumference	Segments	Approx. segment length
0.55 m	3.46 m	29	11.9 cm
1.22 m	7.67 m	63	12.2 cm
2.47 m	15.52 m	127	12.2 cm
3.60 m	22.62 m	184	12.3 cm
4.41 m	27.71 m	226	12.3 cm
Total		**629**	

Timing reference: 629 is a conservative proposal-stage segment count. A later engineer may reduce it only if the complete feed/return/current-establishment solution explicitly preserves the required local phase state.

4. Final distributed-path calculation before drafting

A 9.6 m target is not a point at exactly d = 2.05 m. To avoid freezing an unrealistically harsh unweighted-path penalty, the final proposal uses a force-weighted distributed-path screen. The goal is not to claim a full-wave material solution; it is to estimate how much of the reference timing factor remains when physically important short paths receive greater weight.

For each sampled source-target path j:

$$R_j = \sqrt{(x_T - x_S)^2 + (y_T - y_S)^2 + d^2}, \qquad \tau_j = \frac{2R_j}{c}$$

The local reference timing factor normalized to its ideal Claim-17 value is

$$g_j = \frac{1 - \cos(\omega\tau_j)}{2} = \sin^2(kR_j), \qquad k = \frac{\omega}{c}$$

A family of force-weighted geometry screens was evaluated as

$$G_q = \frac{\sum_j w_j g_j}{\sum_j w_j}, \qquad w_j \propto \frac{|I_i| r_i}{R_j^q}$$

The exponent q is deliberately treated as a sensitivity parameter, not as a new physical law. Larger q concentrates the weighting toward the nearer/high-coupling paths, which is physically reasonable for magnetic force coupling. The actual answer must ultimately come from the full retarded field plus target material response.

q	G_q	Weighted mean R	Median R	5-95% weighted path band
3	0.622	3.18 m	2.85 m	2.10 - 5.38 m
4	0.692	2.91 m	2.62 m	2.09 - 4.73 m
5	0.755	2.72 m	2.47 m	2.08 - 4.19 m
6	0.807	2.58 m	2.38 m	2.07 - 3.77 m

Reference nominal distributed-path factor: $G = 0.80$. This is the rounded $q = 6$ force-weighted result (0.807). It is intentionally more optimistic than the earlier broad-path/worst-case screen, but it is not the ideal $G = 1$ limit. The $q = 3$ to $q = 6$ sensitivity range, 0.62 to 0.81, remains disclosed.

For the proposal calculations the distributed screening force is therefore

$$\overline{F}_{17,\text{dist}} = GKI_0^2, \qquad G = 0.80$$

The real passive-target transfer function H(omega) and complete physical feeds/returns are not given arbitrary penalty multipliers here. They are listed openly as engineering continuation items rather than silently forcing the proposal into a near-worst-case result.

5. Scaling laws used for all three options

The previously calculated ideal 1 kN screening reference is used only as a normalization point. Its largest contour current was 566 kA RMS, copper loss 13.43 MW with 1,280 equivalent parallel copper surfaces, radiation 7.35 MW, active copper mass 18.5 t, target-center field about 27 mT and whole-target RMS field about 4.9 mT.

With the fixed distributed factor $G = 0.80$, the current-squared scaling required for a requested proposal force F is

$$s_I^2 = \frac{F}{(1000\ \mathrm{N})G}, \qquad s_I = \sqrt{\frac{F}{(1000\ \mathrm{N})G}}$$

Currents, fields, radiation and copper loss then scale as

$$I = s_I I_{\mathrm{ref}}, \qquad B = s_I B_{\mathrm{ref}}, \qquad P_{\mathrm{rad}} = s_I^2 P_{\mathrm{rad,ref}}$$

$$P_{\mathrm{Cu}} = s_I^2 P_{\mathrm{Cu,ref}} \left(\frac{1280}{N_{\mathrm{Cu}}} \right)$$

The last expression is a proposal-stage equivalent-surface model. It assumes comparable RF surface utilization; full proximity/current-sharing analysis remains an engineering task.

$$P_{\mathrm{total}} = P_{\mathrm{rad}} + P_{\mathrm{Cu}} + P_{\mathrm{target}} + P_{\mathrm{electronics}} + P_{\mathrm{feeds}} + P_{\mathrm{aux}}$$

Radiation is therefore always real power in the PSU ledger, but it is not used as the Claim-17 force mechanism. The direct radiation-recoil upper bound remains

$$F_{\mathrm{rad,max}} = \frac{P_{\mathrm{rad}}}{c}$$

6. Reference three-option numerical summary

Quantity	A - 1 N	B - 30 N	C - 1 kN
Nominal reduced force	1 N	30 N	1000 N
PSU envelope	1 MW	5 MW	30 MW
Equivalent Cu surfaces	32	192	1280
Largest contour current RMS	20.0 kA	109.6 kA	632.8 kA
Largest current / Cu surface	625 A	571 A	494 A
Active Cu screening mass	0.46 t	2.77 t	18.50 t
Copper real loss	0.671 MW	3.357 MW	16.788 MW
Radiation real loss	0.009 MW	0.276 MW	9.188 MW
Known real power	0.681 MW	3.633 MW	25.975 MW
Unallocated PSU margin	0.319 MW	1.367 MW	4.025 MW
Target center B RMS	0.95 mT	5.23 mT	30.19 mT
Whole-target B RMS	0.173 mT	0.949 mT	5.478 mT
Stored magnetic-energy screen	0.87-1.88 kJ	26.25-56.25 kJ	0.875-1.875 MJ
Crude internal-load scale	0.375 kN	11.250 kN	375.000 kN
100 ms impulse	0.1 N s	3 N s	100 N s
100 ms energy at PSU ceiling	0.100 MJ	0.500 MJ	3.000 MJ
Direct radiation recoil bound	30.6 μN	919.4 μN	0.0306 N
Bulk Cu rise in 100 ms	0.38 C	0.31 C	0.24 C

The table is intentionally proposal-grade, not manufacturing-grade. The values are internally consistent with the same fixed geometry, $G = 0.80$ and the same scaling equations.

7.1 Option A - YES/NO Proof Unit (REF_MULTI-PROOF-1N)

Role: Minimum-cost decisive experiment **Force/current scaling:**

$$s_I = \sqrt{\frac{1}{1000 \times 0.80}} = 0.035355$$

$$I_{\text{max}} = 566 \text{ kA} \times 0.035355 = 20.0 \text{ kA RMS}$$

Fixed five-contour RMS current vector, inner to outer: **[+20.01, +18.42, -14.14, +6.65, -1.71] kA** .

Power calculation:

$$P_{\text{rad}} = 7.35 \text{ MW} \times 0.001250 = 0.009187 \text{ MW}$$

$$P_{\text{Cu}} = 13.43 \text{ MW} \times 0.001250 \times \frac{1280}{32} = 0.6715 \text{ MW}$$

$$P_{\text{known}} = P_{\text{rad}} + P_{\text{Cu}} = 0.6807 \text{ MW}$$

$$P_{\text{reserve}} = 1 - 0.6807 = 0.3193 \text{ MW}$$

Short-pulse and measurement calculation:

$$J_{100\,\text{ms}} = F\Delta t = 1 \times 0.1 = 0.1 \text{ N s}$$

$$E_{\text{PSU,100ms}} = 1 \text{ MW} \times 0.1 \text{ s} = 0.100 \text{ MJ}$$

At the fixed conductor count, the largest equivalent RF surface carries about **625 A RMS** . The bulk-copper heat-capacity sanity check gives only about **0.38 C** average rise in a 100 ms shot. Local RF hot spots, joints and proximity effect remain separate engineering checks.

> **Why 1 N and not 0.1 N?** The 629-segment timing architecture, remote controls, target and force balance do not become ten times cheaper when force is reduced tenfold. One newton is already about 102 gram-force and provides a large measurement margin.

7.2 Option B - Research Optimizer (REF _MULTI-RESEARCH-30N)

Role: YES/NO plus useful optimization capability **Force/current scaling:**

$$s_I = \sqrt{\frac{30}{1000 \times 0.80}} = 0.193649$$

$$I_{\max} = 566 \text{ kA} \times 0.193649 = 109.6 \text{ kA RMS}$$

Fixed five-contour RMS current vector, inner to outer: **[+109.61, +100.89, -77.46, +36.41, -9.39] kA**. **Power calculation:**

$$P_{\text{rad}} = 7.35 \text{ MW} \times 0.037500 = 0.275625 \text{ MW}$$

$$P_{\text{Cu}} = 13.43 \text{ MW} \times 0.037500 \times \frac{1280}{192} = 3.3575 \text{ MW}$$

$$P_{\text{known}} = P_{\text{rad}} + P_{\text{Cu}} = 3.6331 \text{ MW}$$

$$P_{\text{reserve}} = 5 - 3.6331 = 1.3669 \text{ MW}$$

Short-pulse and measurement calculation:

$$J_{100\,\text{ms}} = F\Delta t = 30 \times 0.1 = 3 \text{ N s}$$

$$E_{\text{PSU,100ms}} = 5 \text{ MW} \times 0.1 \text{ s} = 0.500 \text{ MJ}$$

At the fixed conductor count, the largest equivalent RF surface carries about **571 A RMS**. The bulk-copper heat-capacity sanity check gives only about **0.31 C** average rise in a 100 ms shot. Local RF hot spots, joints and proximity effect remain separate engineering checks.

> **Best-value role:** after the first positive shot, this machine can sweep separation, frequency, current, target material, phase family and segment implementation without immediately requiring a new facility-scale build.

7.3 Option C - Full Development Rig (REF _MULTI-DEVELOPMENT-1KN)

Role: Premium development platform; unresolved engineering continuation accepted **Force/current scaling:**

$$s_I = \sqrt{\frac{1000}{1000 \times 0.80}} = 1.118034$$

$$I_{\text{max}} = 566 \text{ kA} \times 1.118034 = 632.8 \text{ kA RMS}$$

Fixed five-contour RMS current vector, inner to outer: **[+632.81, +582.50, -447.21, +210.19, -54.22] kA**. **Power calculation:**

$$P_{\text{rad}} = 7.35 \text{ MW} \times 1.250000 = 9.187500 \text{ MW}$$

$$P_{\text{Cu}} = 13.43 \text{ MW} \times 1.250000 \times \frac{1280}{1280} = 16.7875 \text{ MW}$$

$$P_{\text{known}} = P_{\text{rad}} + P_{\text{Cu}} = 25.9750 \text{ MW}$$

$$P_{\text{reserve}} = 30 - 25.9750 = 4.0250 \text{ MW}$$

Short-pulse and measurement calculation:

$$J_{100\,\text{ms}} = F\Delta t = 1000 \times 0.1 = 100 \text{ N s}$$

$$E_{\text{PSU,100ms}} = 30 \text{ MW} \times 0.1 \text{ s} = 3.000 \text{ MJ}$$

At the fixed conductor count, the largest equivalent RF surface carries about **494 A RMS**. The bulk-copper heat-capacity sanity check gives only about **0.24 C** average rise in a 100 ms shot. Local RF hot spots, joints and proximity effect remain separate engineering checks.

> **Premium role:** this is intentionally allowed to carry unresolved engineering continuation items. Its purpose is not to pretend construction engineering is finished; it is to show that a several-hundred-newton to 1 kN-class development platform remains compatible with a data-center-class power objective at the screening level.

8. Impulse testing - a major bonus, not merely a backup

Short-pulse operation naturally enables two independent observables: force while RF is present, and mechanical momentum after the RF pulse has ended. This is valuable because the post-pulse motion can be observed when the strongest RF interference has disappeared.

$$J = \int F(t)\,dt \approx F\Delta t, \qquad \Delta v = \frac{J}{M}$$

For a 100 ms nominal pulse the fixed impulses are 0.1 N s, 3 N s and 100 N s for A, B and C respectively. Example only: if the complete suspended test article were 500 kg, Option A would give

$$⊠\, v = \frac{0.1}{500} = 2 \times 10^{-4}\ \mathrm{m/s} = 0.2\ \mathrm{mm/s}$$

A force pendulum, torsional balance, flexure stage or other engineer-selected system can therefore use both direct force and integrated mechanical impulse. The exact suspension is deliberately not fixed here.

Required control logic: timing ON versus timing disabled, detuned frequency, orientation reversal where appropriate, no-power mechanical run, magnetic/environment survey, vibration monitoring and electrically quiet post-pulse readout.

9. Radiation, field momentum and reduced force kept distinct

Radiation is a real loss and a test-site safety issue. The P_rad/c line below is a freely propagating radiation-recoil benchmark, not a substitute for the reduced Claim-17 force or complete Maxwell field/stress accounting.

Option	P_{rad}	P_{rad}/c	Nominal force	Radiation recoil / nominal
A	0.0092 MW	30.6 μN	1 N	3.06×10^{-5}
B	0.2756 MW	919.4 μN	30 N	3.06×10^{-5}
C	9.1875 MW	0.0306 N	1000 N	3.06×10^{-5}

The much larger issue is environmental coupling of RF to nearby structures, reflections, induced currents and instrumentation. For that reason the proposal assumes a remote site and optical isolation where practical. The exact exclusion zone and shielding are not fixed; they require an RF safety/EMC survey for the selected option.

Reactive energy is also kept distinct from real power. The screening stored magnetic-energy ranges are approximately 0.875-1.875 kJ (A), 26-56 kJ (B), and 0.875-1.875 MJ (C). This energy can circulate resonantly; it does not equal continuous thermal dissipation, but it sets component current/voltage/stress requirements.

10. Open sensitivity - not hidden, not used to force a worst case

The fixed nominal calculations use $G = 0.80$. The distributed-path screen itself gave a range from about 0.62 to 0.81 depending on how strongly the physically important nearer paths are weighted. With the currents fixed at the $G = 0.80$ design values, the force varies linearly with the actual geometry factor:

$$F(G) = F_{\text{nominal}} \frac{G}{0.80}$$

Assumed G	A	B	C	Interpretation
0.62	0.78 N	23.3 N	775 N	Broad-path sensitivity case
0.80	1.00 N	30.0 N	1,000 N	Fixed proposal nominal
1.00	1.25 N	37.5 N	1,250 N	Ideal point-pair timing limit

This sensitivity table intentionally isolates only the distributed-path timing factor. It does not pretend to know the final H(omega), conductor proximity loss, return topology or structural coupling. Those quantities are precisely why the next stage belongs to RF, magnetic-material, structural and instrumentation engineers.

11. Engineering continuation items - the elephants we deliberately leave visible

The proposal is not a construction package. The following items are not treated as reasons to postpone the proposal; they are the explicit work program for the engineering team:

Continuation item	What engineers must close
Real passive-target H(omega)	Measure complex permeability, target loss and phase in the 30-45 MHz tuning region; select segmented ferrite/composite/tiled geometry.
Complete feed/return topology	Demonstrate that local current closure preserves the macroscopic magnetic contour instead of degenerating into tiny local loops.
Full-wave RF conductor solution	Replace the equivalent-surface copper model with skin/proximity/current-sharing, joints, dielectric and resonator analysis.
Reactive-component stress	Determine capacitor voltage, circulating current, local E-field, insulation, corona/arcing and stored-energy protection.
Structural/internal loads	Design the frame and target support for ordinary internal electromagnetic loads without converting them into force-balance artifacts.
Site/EMC/RF safety	Choose remote range, optical isolation, protected electronics and exclusion zones from measured E/H fields and real radiation patterns.
Force metrology	Choose primary and independent secondary force/impulse methods; pre-register timing-on/off and artifact controls.

Stop rule: do not reopen numerical optimization before drafting unless a clear arithmetic error or fundamental inconsistency is found. The remaining items are professional engineering continuation, especially for Option C.

12. Experimental decision rule

The first machine is not built to persuade by appearance. It is built to produce a binary scientific result with enough margin that ordinary radiation recoil and instrumentation resolution cannot plausibly explain the nominal signal.

Timing-enabled run: operate near the Claim-17 condition while measuring actual contour currents, phase, field, RF power and mechanical response.

Timing-disabled control: use the reference long-timescale / conventional control logic so the distinguishing timing contribution approaches zero.

$$F_T = KI_C^2, \qquad F_R = -KI_C^2, \qquad F_{\text{net}} = 0$$

$$J_{\text{plateau}} = \int F_{\text{net}}\, dt = 0$$

For a deliberately slow control waveform:

$$\omega_C = \frac{2\pi}{T_C}, \qquad \omega_C \tau \ll 1$$

$$1 - \cos x = \frac{x^2}{2} + O(x^4)$$

$$\overline{F}_C = \frac{KI_0^2}{4}(\omega_C\tau)^2 + O\left[(\omega_C\tau)^4\right] \longrightarrow 0$$

YES: a reproducible mechanical force/impulse correlated with the prescribed timing, surviving controls and greatly exceeding ordinary radiation recoil and identified artifacts.
NO: a properly functioning, timing-verified apparatus produces no excess mechanical response within the pre-declared measurement uncertainty.

13. FINAL REFERENCE VALUES

The prototype proposal stage is now fixed at the following values:

Reference item	Value / decision
Common geometry	$d = 2.05$ m; source ~ 9.4 m; target ~ 9.6 m; five contours; 629 conservative local segments
Frequency	36.560 MHz nominal; practical source should allow a tuning band around the ideal point, approximately 30-45 MHz
Distributed timing factor	$G = 0.80$ nominal; 0.62-0.81 distributed-path sensitivity disclosed; $G = 1$ is ideal limit only
Option A	1 N nominal, 1 MW PSU envelope, ~ 0.46 t Cu, YES/NO + impulse
Option B	30 N nominal, 5 MW PSU envelope, ~ 2.78 t Cu, research optimization platform
Option C	1 kN nominal screening target, 30 MW PSU envelope, ~ 18.5 t Cu, full development platform with open engineering continuation
Radiation	Always included in real-power total; never substituted for reduced Lorentz/Laplace timing force
Scientific status	Screening/theoretical model only until controlled experiment measures the complete apparatus

Reference proposal statement: all three options test the same physics. Option A minimizes financial and engineering commitment. Option B is the best-value characterization machine. Option C is the premium development platform. Further optimization is intentionally deferred to the engineering team.

Reference scientific document: *Where Does the Opposite Momentum Go? FINAL* - A Maxwell-Lorentz Study of Causal Electromagnetic Momentum Transfer and Patent Claims 16-17, September 2026.