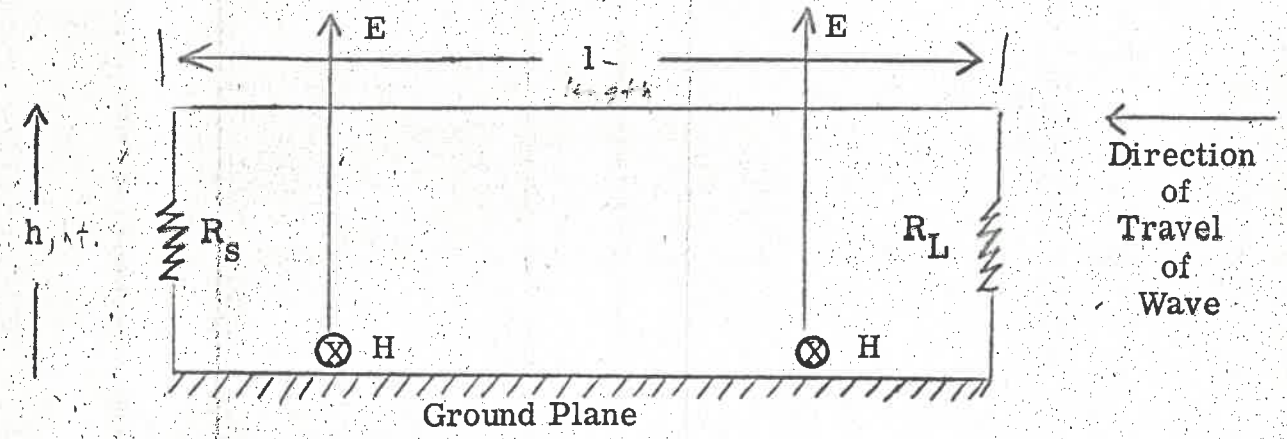
# VERY HIGH FREQUENCY RADIATED SUSCEPTIBILITY

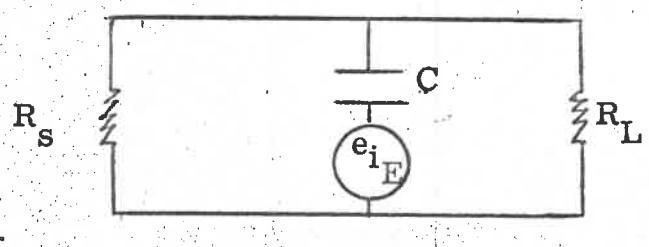
RS-03 (25 MHz to approximately 1 GHz only)



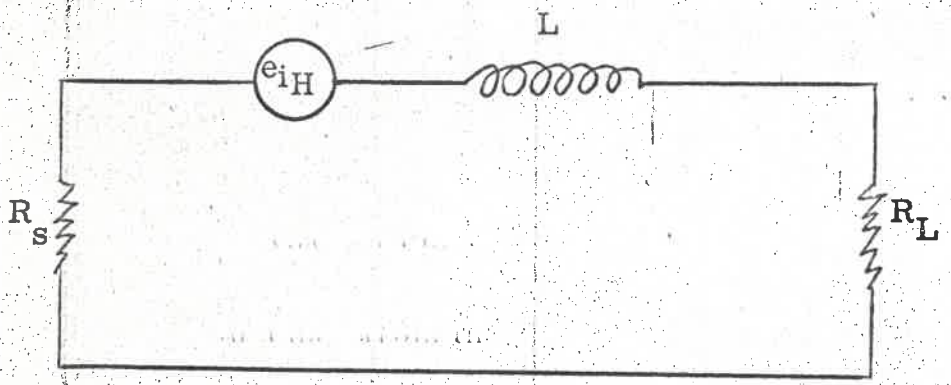

At a 1 meter distance from the source

$$\frac{E}{H} \doteq 120\ \Pi\ .$$

The approximate equivalent circuit in the electric field is:




The approximate equivalent circuit in the magnetic field is:



It is assumed herein that l and h are $< \frac{\lambda}{8}$.

$$e_{i_H} = \frac{A\omega E}{3 \cdot 10^8}$$

and

$$e_{i_E} = h \ E$$

where

$A = lh$ = area of loop in meters$^2$

l = length of wire in meters

h = height of wire in meters

E = field intensity in volts/meter

$\omega = 2\pi f$

and

f = f in Hz

$R_S$ = source resistance of circuit

$R_L$ = load resistance of circuit

L, the total inductance of the loop, can be determined from Graph 2 of "Interference Coupling - Attack it Early" by R. J. Mohr, EDN; July 1, 1969 (See "Wire Coupling", this handbook).

C, the total capacitance of the wire, can be determined from the figure on the next page.

For the worst case use the largest drop (due to $e_{i_H}$ or $e_{i_E}$) across $R_L$ (or $R_S$).

Reference: "The Radio Frequency Interference Meter," NAVSHIPS 94180, July 1962, Bureau of Ships, Navy Department, Washington, D. C., Pages 38 through 41.

# LF, MF & HF RADIATED SUSCEPTIBILITY
(RS03)

From 14 KHz to 25 MHz use the paper "Radiated Interference and Susceptibility Characteristics of Unshielded Lines" by R. J. Mohr. This paper relates the voltage applied to the rod antenna to the voltage appearing in the susceptible circuit. The following curve shows the voltage that must be applied to the rod antenna to establish a one volt per meter field at the susceptible circuit.

The referenced paper is in the section, "Radiated Interference", of this reference book.

# VERY LOW FREQUENCY RADIATED SUSCEPTIBILITY

(RS-01)

The voltage, $e_i$, induced in a loop by a sinusoidal field, B, is

$$e_1 = AB\omega$$

where

A = area of loop in meters$^2$,

B = flux density in Teslas,

$\omega = 2\pi f$ and

f = frequency in Hz.

Reference: "The Radio Frequency Interference Meter," NAVSHIPS 94180, July 1962, Bureau of Ships, Navy Department, Washington, D. C., Pages 38 through 41.

1-77
L.E.

# RELAY TRANSIENT SUSCEPTIBILITY

Susceptibility Source:

MS25271 self actuated (chattering) unsuppressed relay operating from a 28V DC source

Two turns of #22 AWG unshielded wire, wrapped around 6 foot victim for a length of one meter and 2 inches above ground plane. Loop wires kept at least 14 inches apart.

The coupling length was increased to 2 meters and the twisted pair cable length was increased to 9 feet and one test was repeated with 100 ohm terminating resistors.

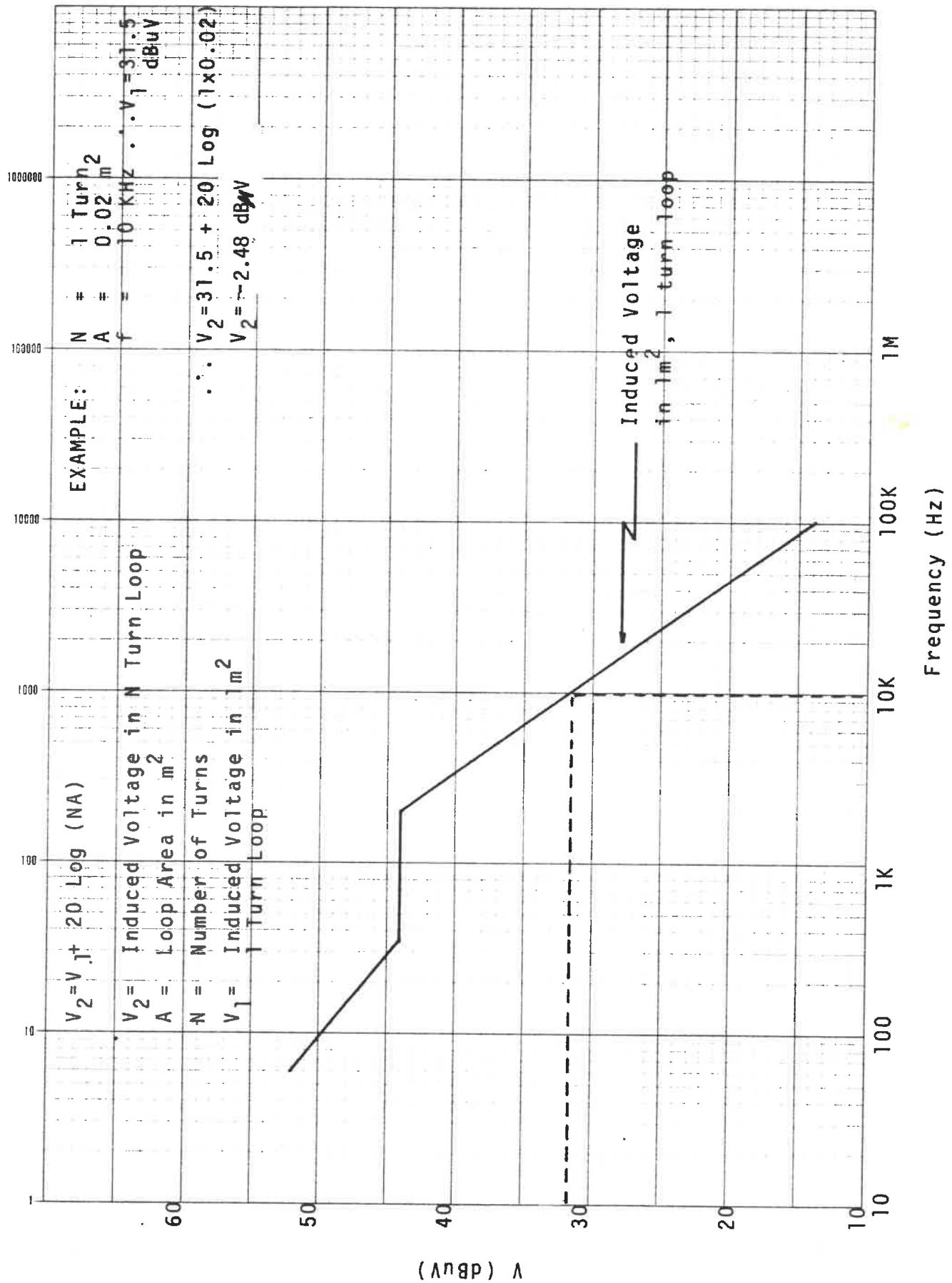
NOTES:
1) Loads connected differentially on twisted pairs
2) "Peak Induced Voltage" measured differentially on twisted pairs
3) Approximately 130V peak was measured across the injection loop and 600V peak was measured across the relay coil

4-11-85
C.A. Brown

MODEL

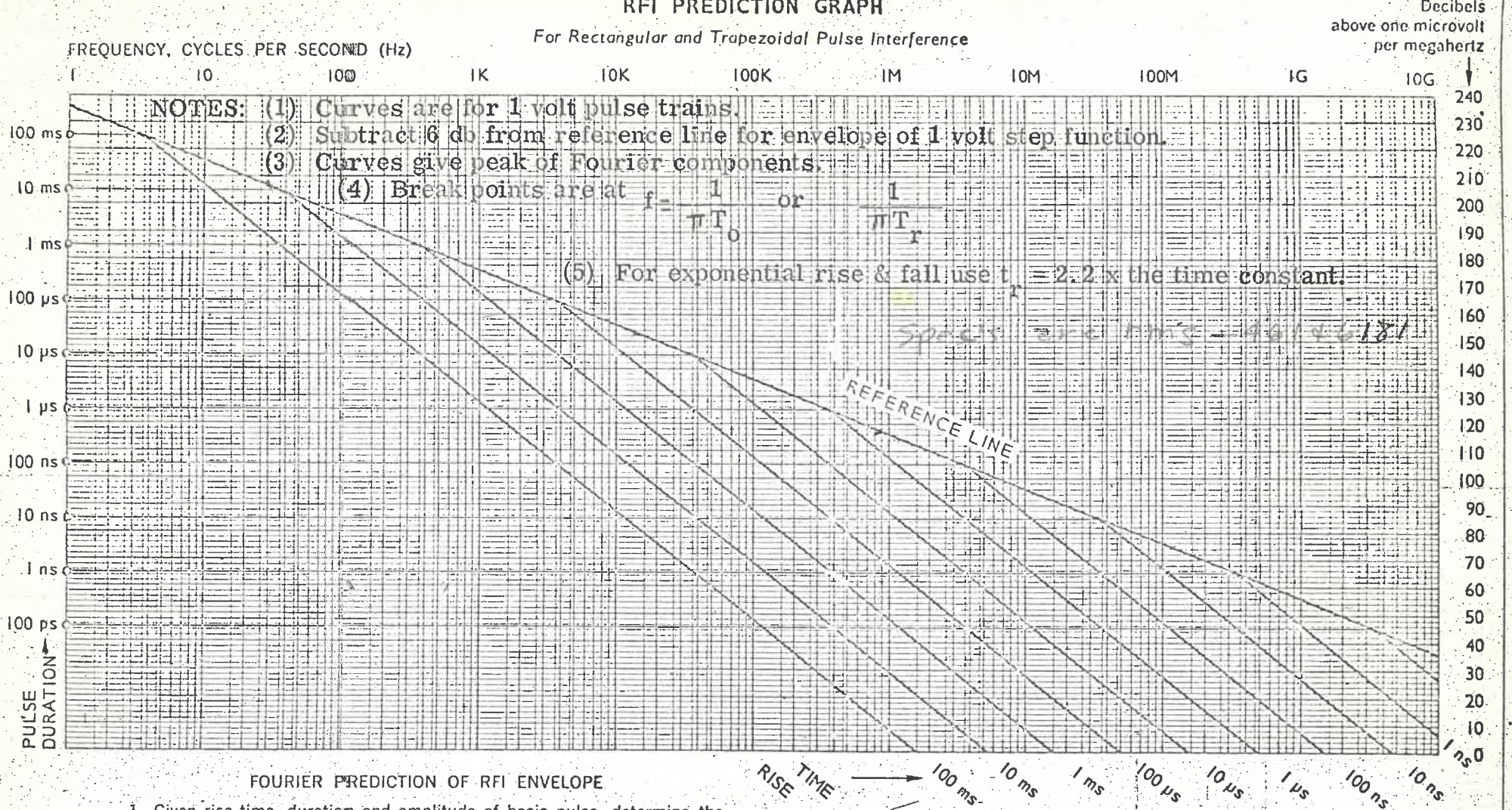
DATE

# MIL-STD-461B, CS09 INDUCED VOLTAGE



# RFI PREDICTION GRAPH

*For Rectangular and Trapezoidal Pulse Interference*




## FOURIER PREDICTION OF RFI ENVELOPE

1. Given rise time, duration and amplitude of basic pulse, determine the envelope of RFI voltages measured at RFI meter input as follows:
2. Work from right to left. Find the sloping line which represents rise time and follow it up to intersect with the basic reference line. Follow the reference line up to intersect with the horizontal line representing the duration of the pulse. Follow the horizontal line to the left to the lowest frequency of interest.
3. For transient or "worst case" when pulse information is not available, use the basic reference line to define the RFI envelope.
4. For interference levels [redacted], read the right edge for decibels above one microvolt per megahertz bandwidth.
5. For voltages other than one volt, find the number of db equivalent to 20 times the log of the new voltage. Add this number of db to the right-hand scale.
6. For radiated levels at one foot distance in the absence of any shield, subtract 30 db from all points on the envelope found in step 5. Subtract 42 db for 3 feet or one meter antenna distance.

$T_o$ = pulse duration - average

$T_r$ = rise time

4-23-69

# Voltage Induced Into Cables in Radiated Field

## Broadside Incidence