LA-5050-PR

PROGRESS REPORT

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Electroexplosives Safety Qualifications

July 1 through August 31, 1972

LOS ALAMOS NATIONAL LABORATORY
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los alamos
scientific laboratory
of the University of California
LOS ALAMOS, NEW MEXICO 87544

UNITED STATES
ATOMIC ENERGY COMMISSION
CONTRACT W-7405-ENG. 36

R&D CONTRACT STATUS REPORT

FOR

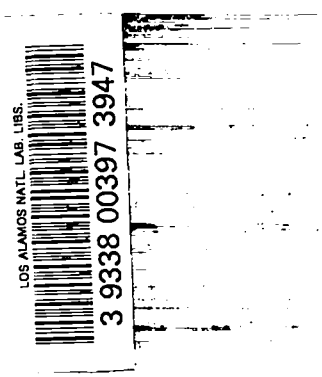
EVALUATION OF ELECTROEXPLOSIVE DEVICE (EED) RESPONSE TO ELECTROMAGNETIC RADIATION (EMR)

Project 5610

Task 01

Period 1 July through 31 August 1972

Los Alamos Scientific Laboratory
Under AEC Contract W-7405-ENG-36



for

Department of the Air Force
Air Force Systems Command
Aeronautical Systems Division

PROJECT 5610, TASK 01

This project report is for the period 1 July through 31 August 1972. Activity for this period was primarily in the following general areas:

1. Addition of thermal time constant and EMR susceptibility/status columns to the EED listings. The most current listing, in three formats, is included as Attachment I to this report. Also included are photographs of additional EEDs which were not included in the March-April progress report.
2. RF firing test data.
3. RF field measurement instrumentation.
4. Antenna modeling.
5. Miscellaneous activities.

These various activities are reviewed in detail in the following sections of this report.

There has been some reorganization at LASL, but the conduct of Project 5610, Task 01 will not be affected. Correspondence on the project, however, should be addressed to WX-7 (formerly GMX-7).

I. ADDITIONS TO EED LISTING

As mentioned in the May-June 1972 progress report, thermal time constants of several EEDs have been measured at approximately the dc no-fire current level using an electrothermal bridge circuit.* While not extremely accurate in some cases, and considering that the thermal time constant changes with current levels, these data are, nevertheless, considered to be of sufficient importance to be included in the electrical characteristics of EEDs. A column for this information has been provided in the electrical characteristics format, giving the thermal time constant in seconds.

*NASA TR 32-1494, "Nondestructive Testing of Insensitive Electroexplosive Devices by Transient Techniques", JPL, July 1970.

Rosenthal, L. A., "Electroexplosive Devices", IEEE Transactions on Instrumentation and Measurement, June 1965.

An attempt has been made to classify EED EMR susceptibility/ status of EEDs in the inventory. Inasmuch as EED RF sensitivity to date has been found to correlate with the dc sensitivity, the following classifications, based on dc no-fire current ratings, have been given:

dc No-fire Current	Rating
0.1 ampere or less	very sensitive
0.5 ampere or less	not recommended
1.0 ampere or greater	recommended
0.5 to 1.0 ampere	no statement
unknown	unknown characteristics
experimental	under development

Particular mention was made of the Mk 71 detonator sensitivity in the May-June report. Further contact with the Naval Weapons Laboratory, Dahlgren, Virginia has disclosed no EMR hazard problems with this detonator, primarily because it is part of a mechanically rotated safe-arm unit suitably shielded within a weapons system. Its low firing energy is required by system constraints. Courtesy of NWL, several of the LASL-tested EEDs and the systems in which they appear are listed below:

Mk 71 Detonator

- Sidewinder (AIM-9)
- Chaparral
- Sparrow (AIM-7)
- Shrike (AGM-45)
- NATO Seasparrow
- Basic Point Defense
- Standard Arm (AGM-78)
- Standard Missile
- Phoenix (AIM-54)
- Mk 52 Mine
- Mk 57 Mine
- Bullpup (AGM-12)

Mk 1 Squib

- 2.75 in. FFAR
- Zuni
- Sidewinder-1C (AIM-9C)
- Mk 44 Torpedo

Mk 2 Squib

- Mk 23 JATO
- ASROC (RUR-5)
- Bullpup (AGM-12)

The GG20D3 gas generator has also been found to be quite sensitive, but the only known USAF application is one in which parallel squib operation reduces the sensitivity. The GG20D3 is found in the AGM-28B M5B1 thermal battery (part number 019-NA-01 or GAP 4019-7, FSN 6135-483-4629 or 1336-650-0801). Average minimum all-fire current for a single GG20D3 gas generator is 0.160 ampere. Average firing

current (obtained from test-firings of out-of-date batteries supplied by SAAMA) was 0.476 ampere for the GAP 4019-7 batteries. Per T.O. 11N-C5013-2, three squibs are wired in parallel for battery activation. As a matter of general interest, the battery activation times (from squib firing to 28 volt constant terminal voltage) are on the order of 300 milliseconds. Under a constant 1.1-ampere load the 28 volt terminal voltage is maintained for one hour, thus indicating a nominal 1-ampere-hour capacity. Peak currents in excess of 100 amperes have been obtained from the batteries for times exceeding one second.

A similar squibs-in-parallel installation appears in the AGM-28B Explosive Switch Box where twelve OM351C (FSN 1336-515-5492) explosive switches are wired in parallel. Testing results of the characteristics of individual switches will be given in a later report. Preliminary indications are that 25 kV electrostatic (pin-to-pin and pin-to-case) and dc firing characteristics are satisfactory.

Four carbon bridge EEDs appear in the current data listing. Carbon bridge devices are normally not recommended because of the ease with which relatively high voltages can be developed (because of the characteristic high bridge resistance).

System	Nominal Bridge Resistance (ohms)
1336-776-6731 M52 Fuze pistol AIM-4F/G	1,000 - 10,000
1336-152-3304 Fuze AIM-9/B/E/J	2,000 - 5,000
P/N 779658 Detonator AIM-9/B/E/J	700 - 15,000
M52-A-3B1 Primer, electric 20 mm	1,000 - 12,000

II. RF FIRING TEST DATA

In testing for RF susceptibility, we have previously used ten EEDs exposed to an RF power level equal to that of the dc mean. In no case were firings observed, thus allowing a conclusion (with 5.5% risk) that the RF mean was higher than the dc mean. It is, however, highly desirable to obtain data on the actual level at which firings occur. The problem is that a sufficient number of EEDs are usually not available to permit statistically precise data for the various frequencies and various firing modes (Consider, for example, four frequencies and pin-to-pin and pin-to-case modes; at 30 samples, for a Bruceton test,

240 EEDs would be required.). We have examined other statistical methods which might be applicable for small samples without much success.* It appears that a method wherein the stimulus (power level) is continuously applied and gradually increased until firing occurs offers about the only alternative. The data sheets presented in the following pages were obtained in this manner. Ten samples of each device were used for each mode; the maximum power level, minimum power level, and average firing levels are plotted. These data are being examined for statistical properties (standard deviation, confidence level, etc.) in comparison with dc Bruceton test data for the same devices.

III. RF FIELD MEASUREMENT INSTRUMENTATION

As mentioned in the May-June 1972 progress report, firings in a "free-field" RF environment have been induced, but instrumentation to determine the exact electric field intensity has given widely varied results. Although this "free-field" radiation was not directly a part of the original statement-of-work, it is considered an important supplement to the direct-drive RF firings and network analyzer facets of the program, and is therefore being continued. The discovery that a full-wavelength antenna was the most susceptible lead configuration (at the MSR frequency) is a significant example of the benefits derivable from experiments performed in a free-field RF environment.

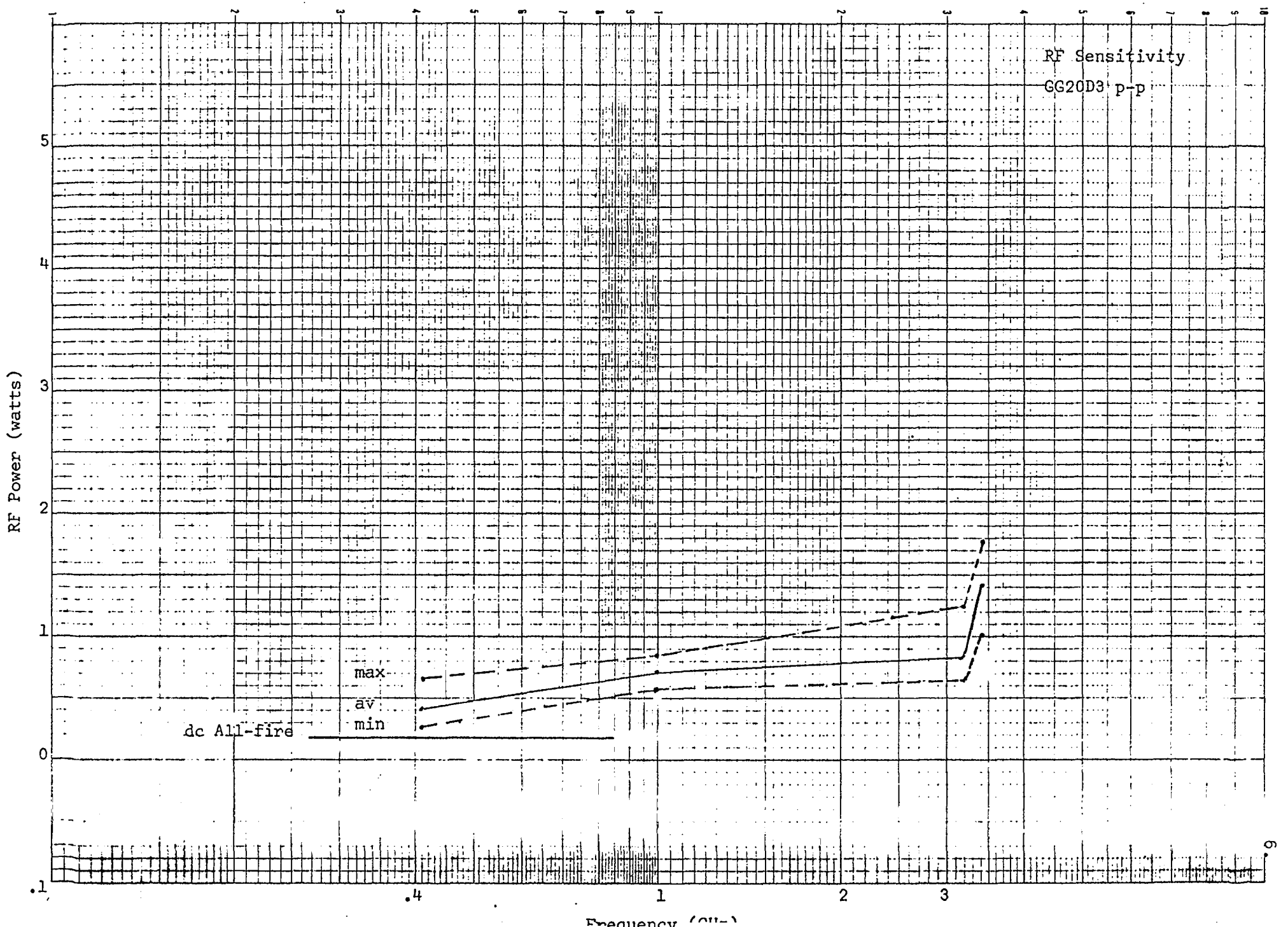
Using a Sandia Laboratories development** as a start, a diode-detector unit more suited to high intensity E-fields, together with a dipole power-meter probe, are being calibrated at various frequencies in a parallel plate transmission line facility similar to that used by Sandia. Calibration results to date appear promising, and reasonable correlation of peak and average field intensities with firings is anticipated by the next report.

*A Reliability Test Method for "One-Shot" Items, Aeronutronic Publication, No. U-1792, August 10, 1972.

**Sandia Report, SC-DR-71 0219, "Radio Frequency E-Field Sensor", J. C. Barnes, July 1971.

GRAPH PAPER

SEMI-LOGARITHMIC 2 CYCLES X 70 DIVISIONS AD 0833-60



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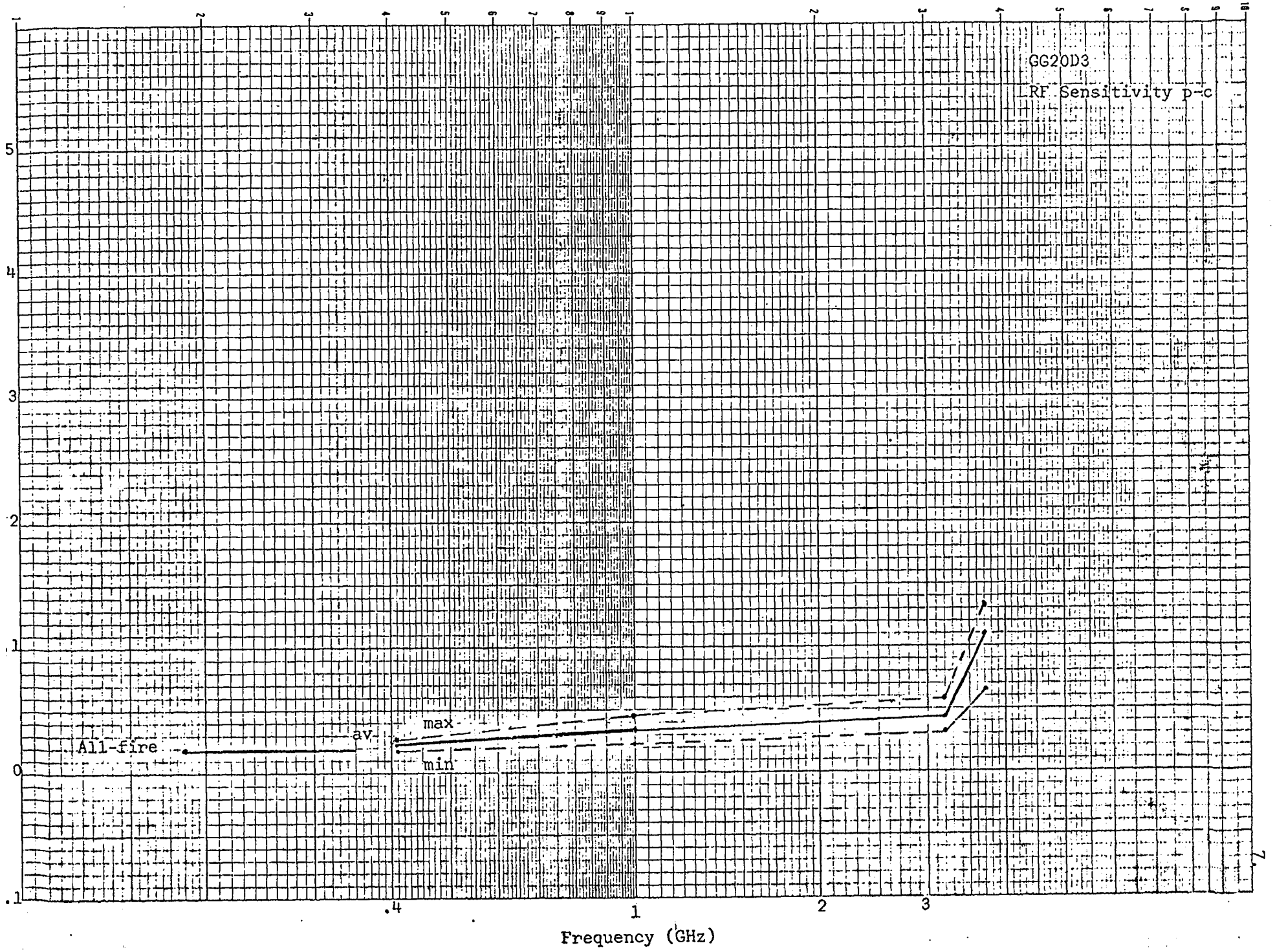

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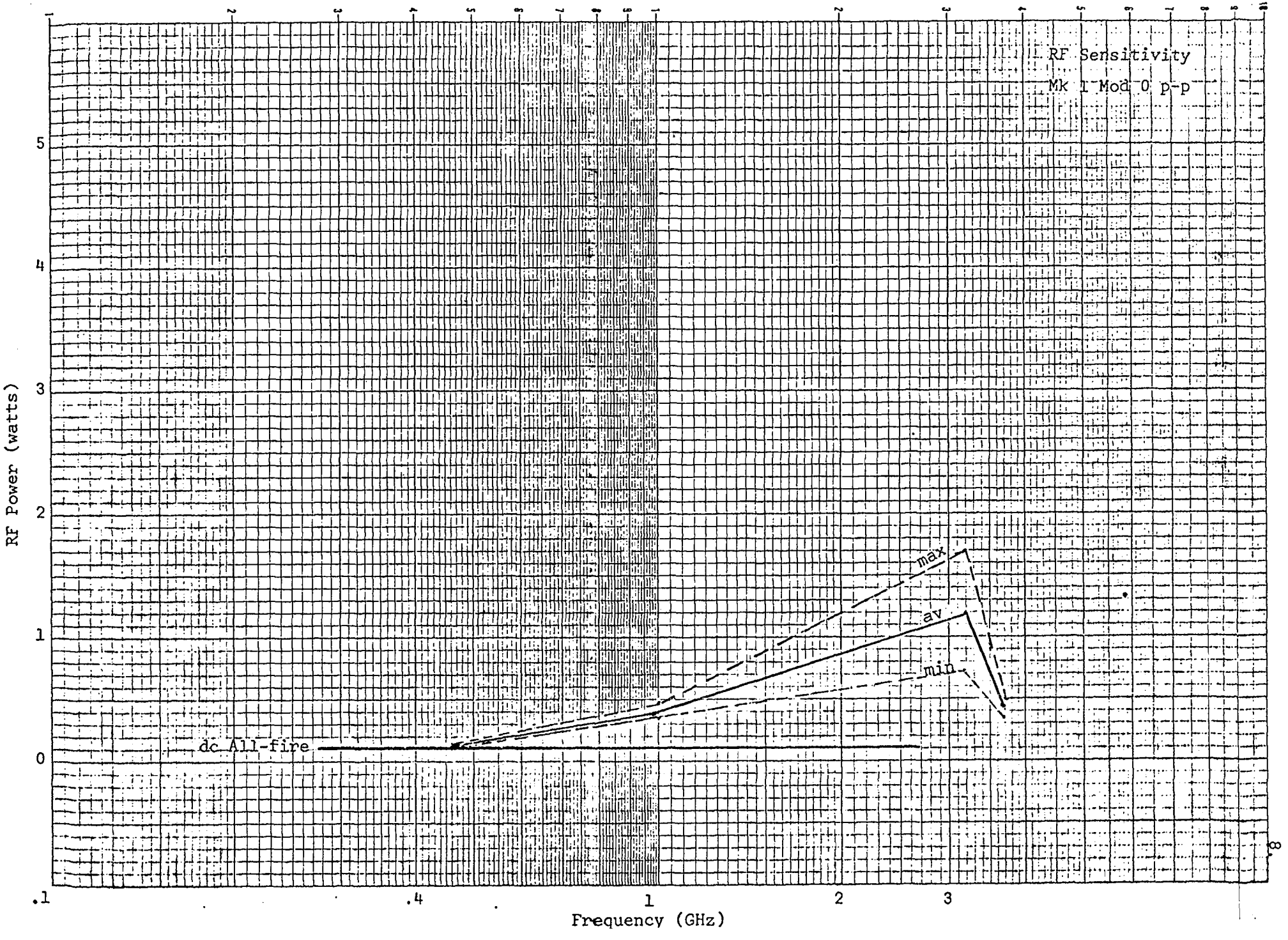

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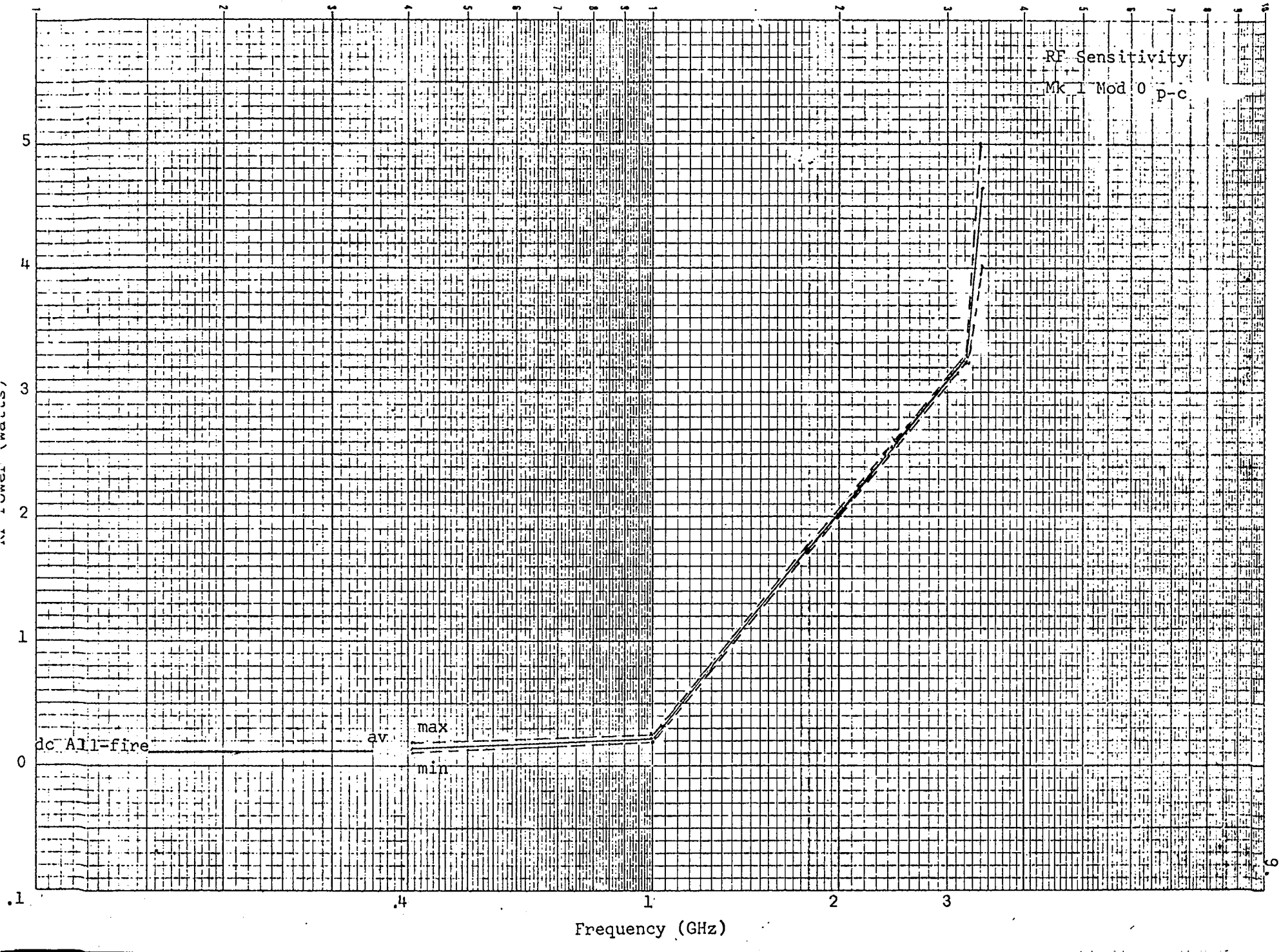

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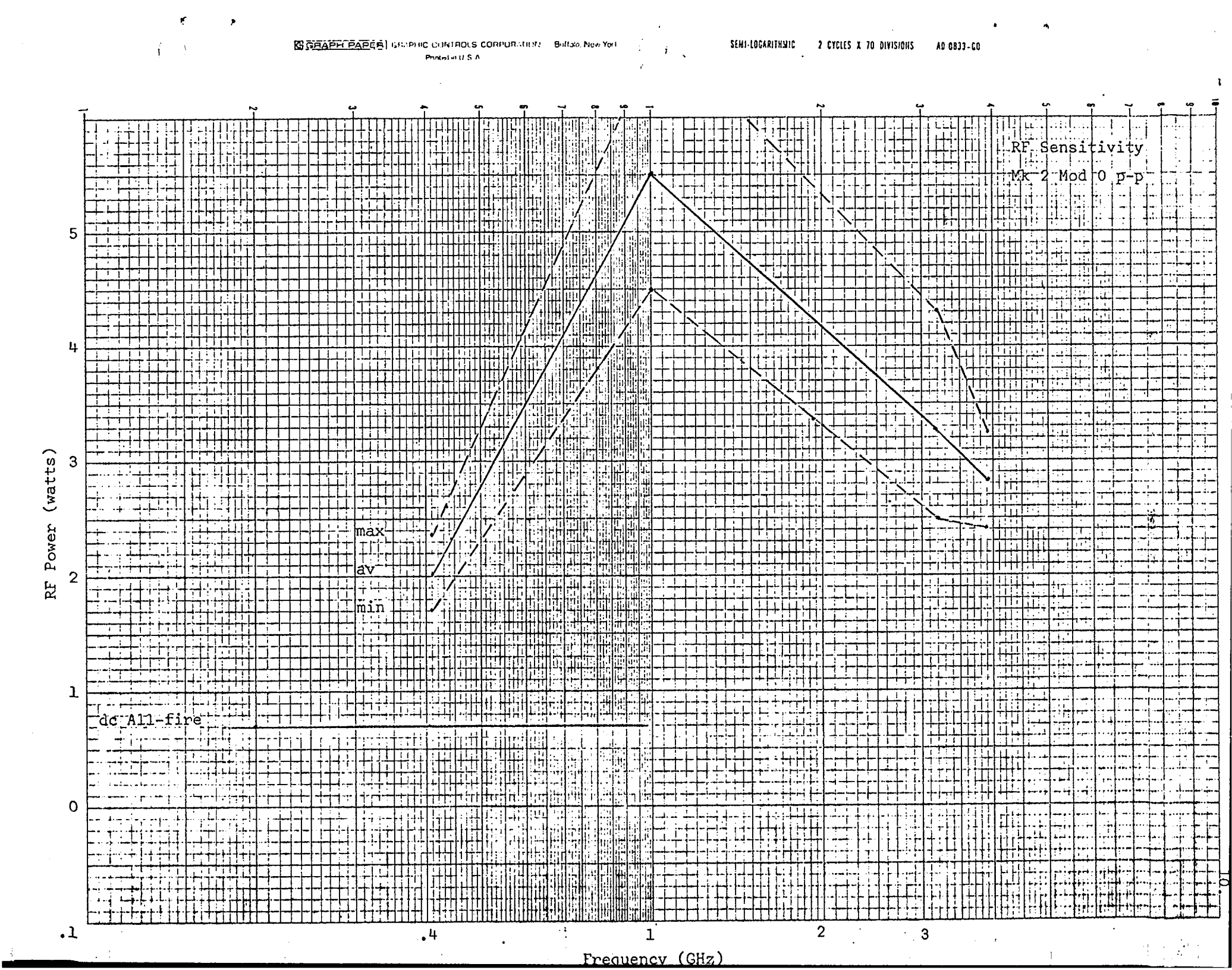

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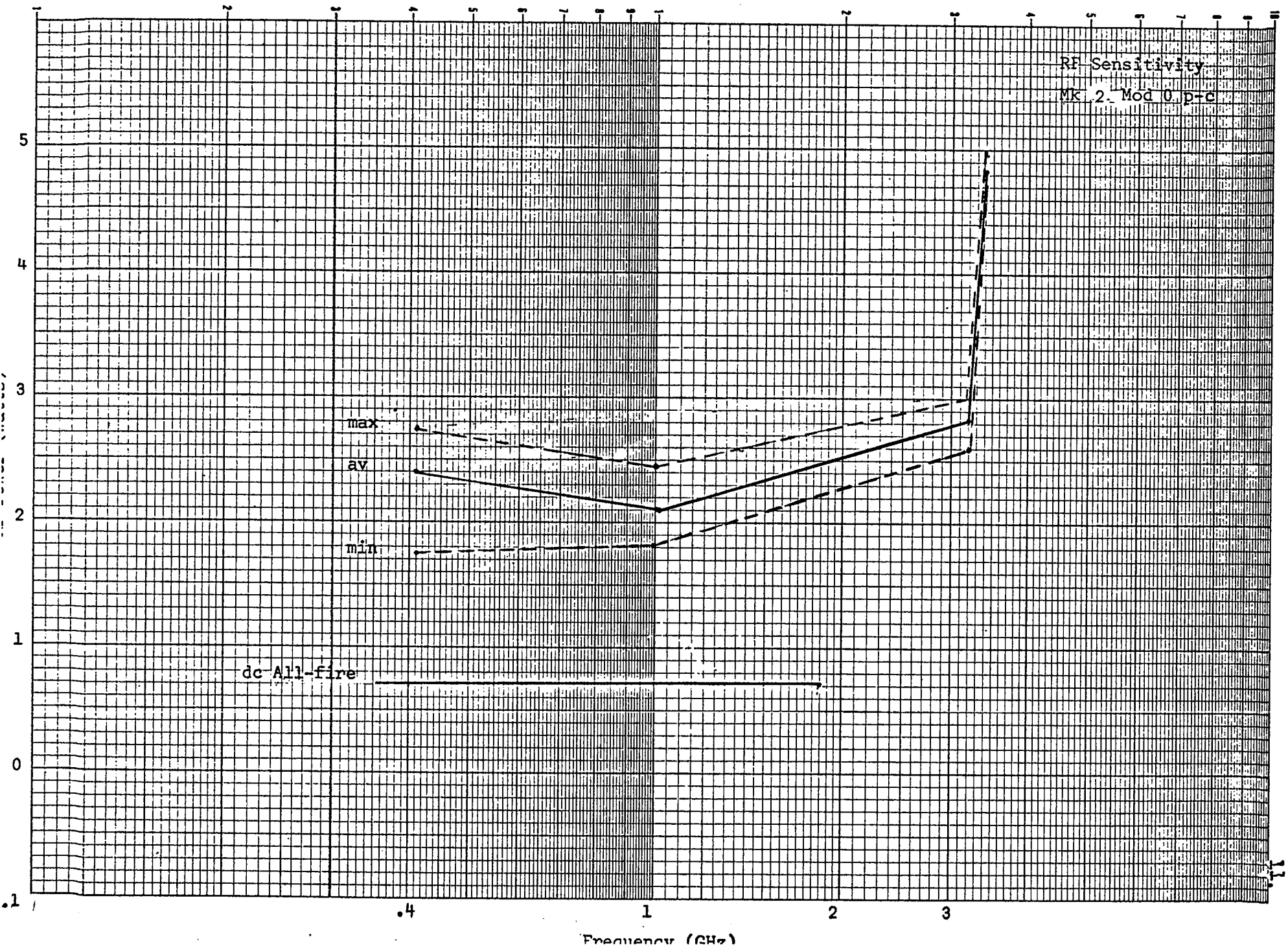

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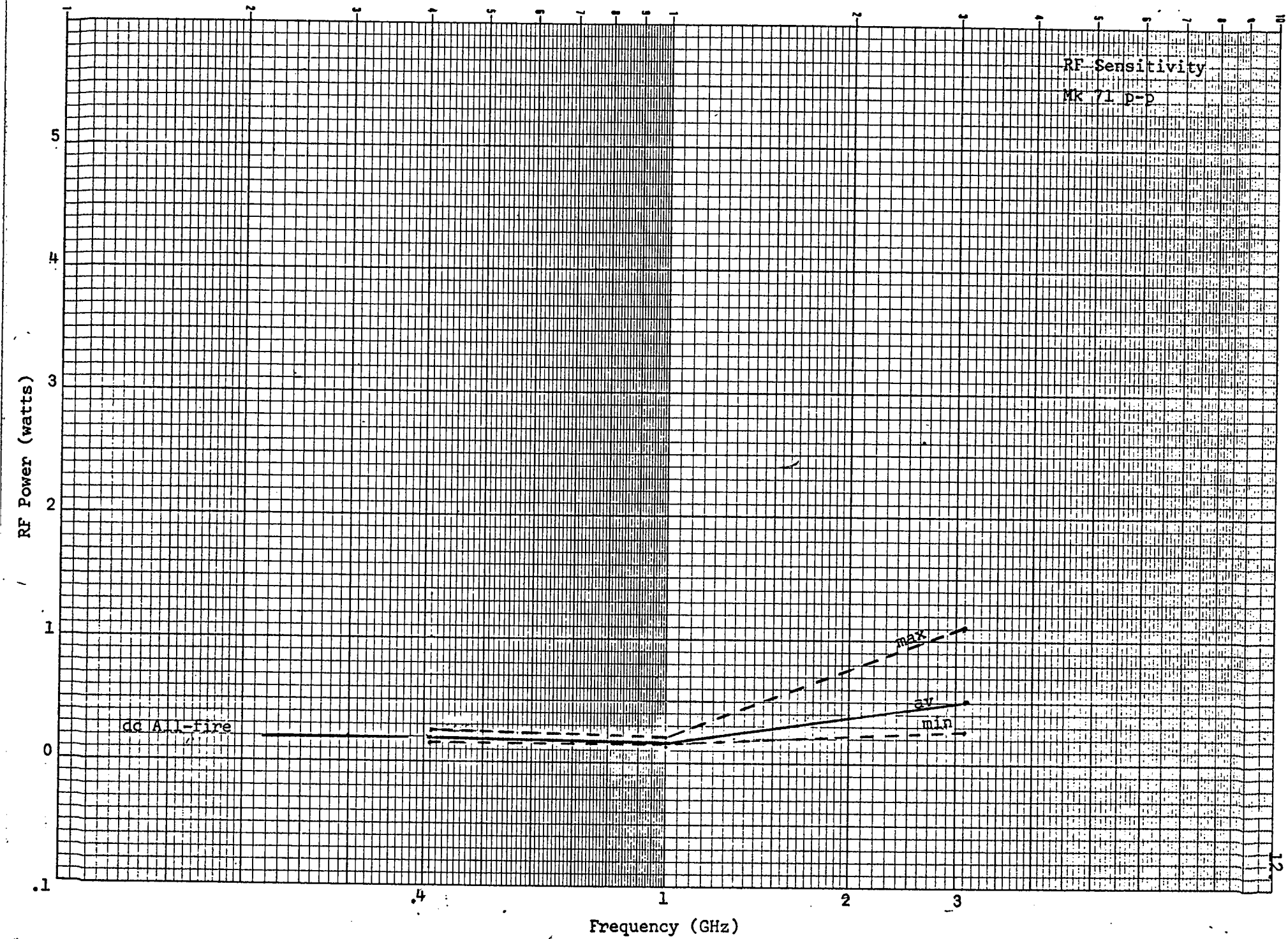

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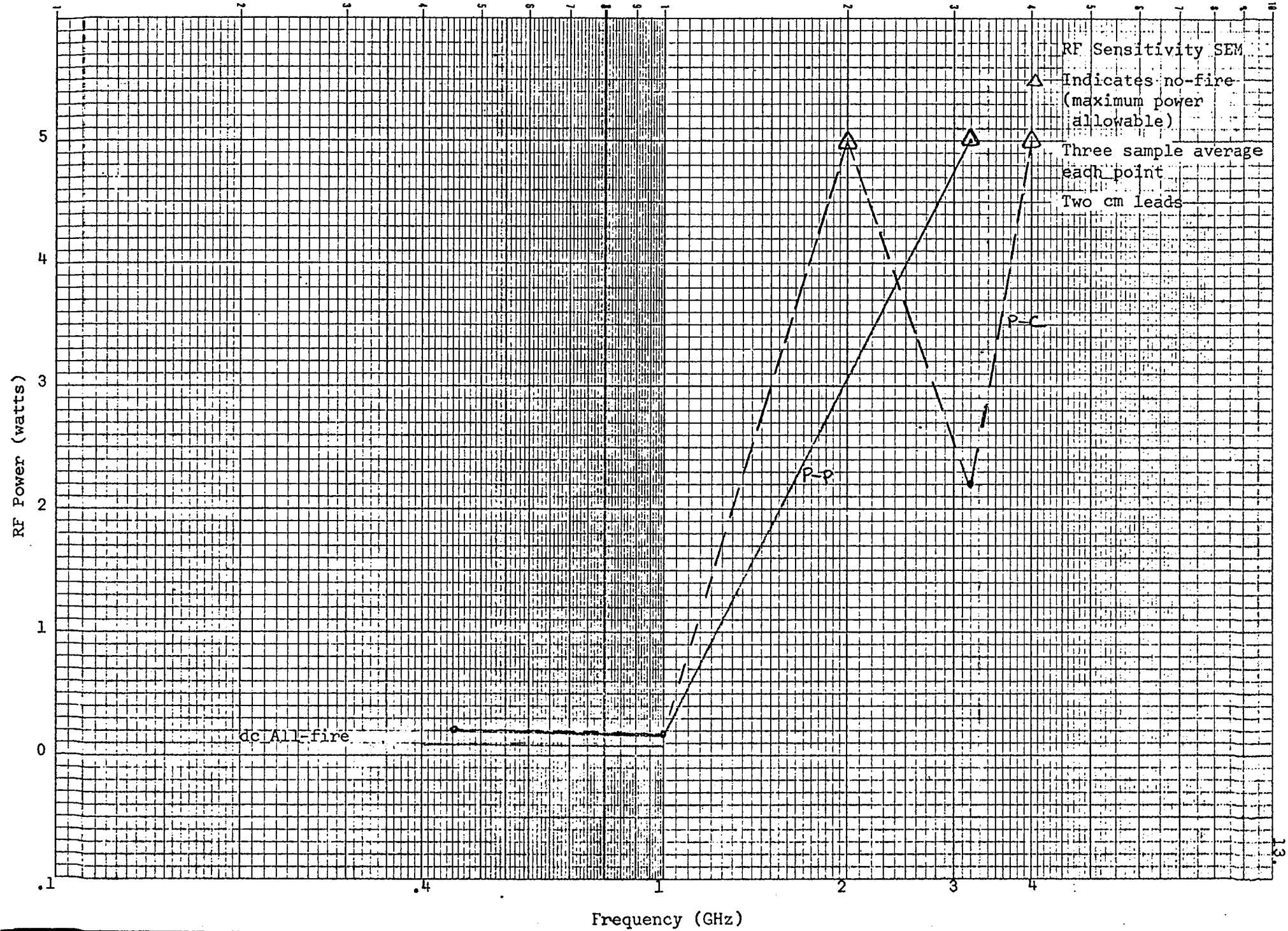

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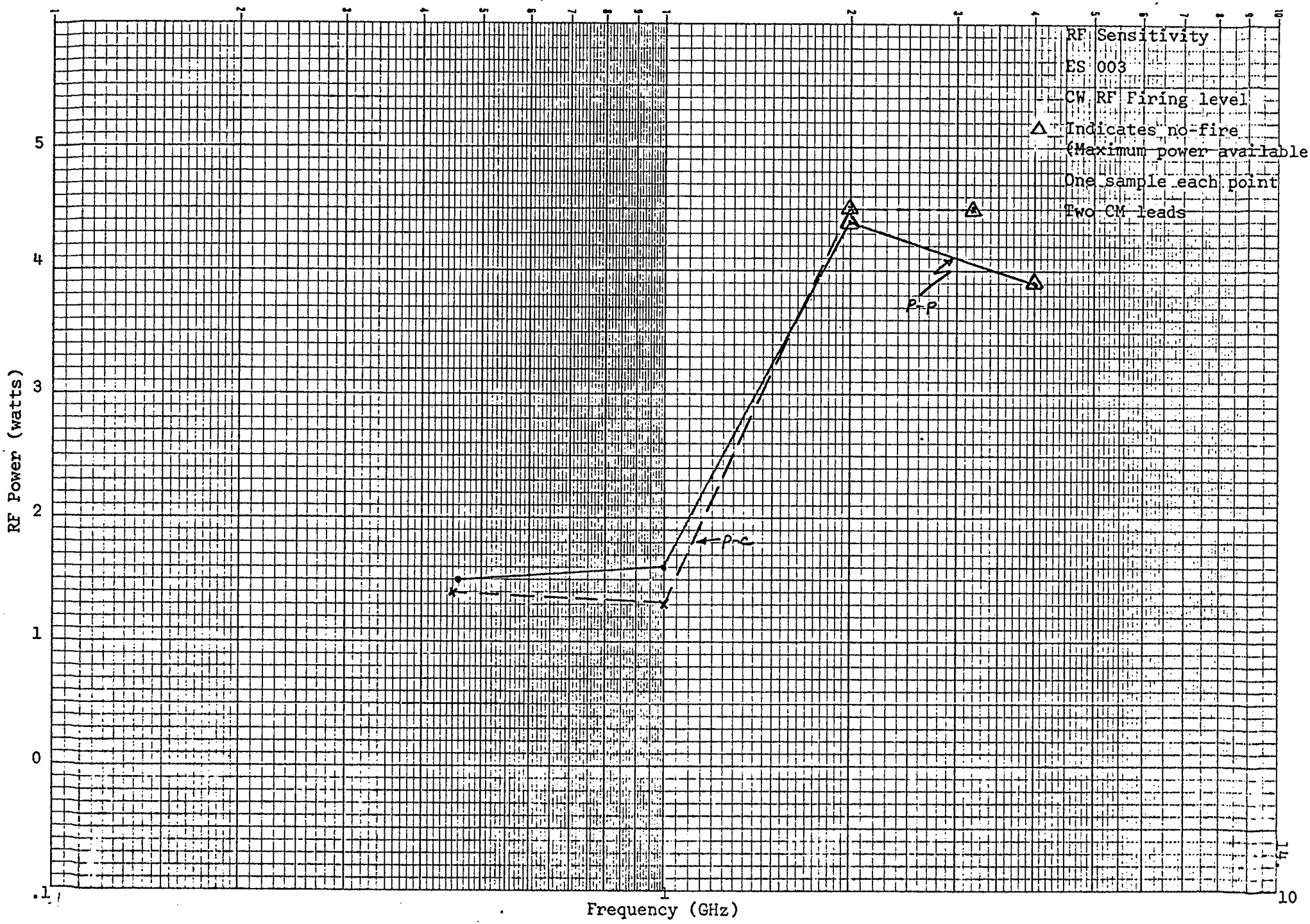
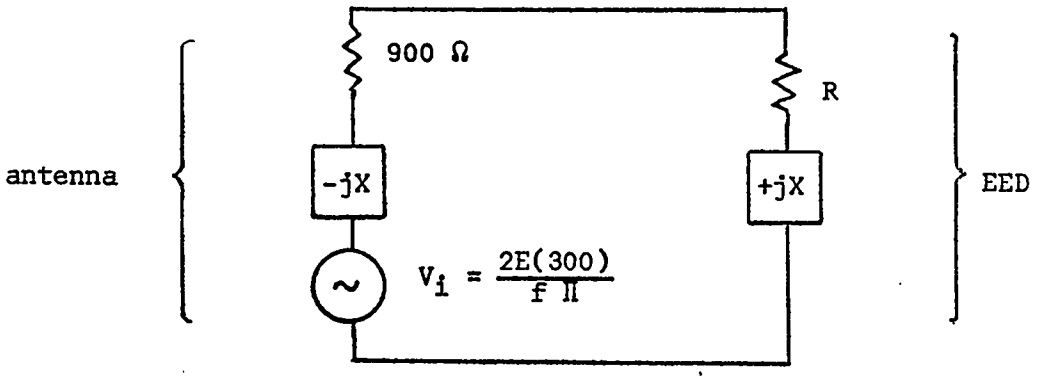


IV. ANTENNA MODELING

A mathematical model of a full-wavelength antenna is currently being exercised with previous EED RF impedance data (see March-April progress report, p. 4). A full-wavelength antenna was shown (by free-field experiments at the MSR frequency) to be the most susceptible configuration. The radiation resistance for such an antenna is high, depending upon length-to-diameter ratios*, and the reactance changes from highly inductive to highly capacitive at the full-wavelength frequency. Using typical 24 or 26 gage leads (such as appear on Mk 1, Mk 2, Mk 71, GG20D3 EEDs), a radiation resistance of about 900 ohms was calculated. The reactance characteristics are such that a complex conjugate match may be easily achieved and is therefore assumed. The induced voltage is approximately twice that of a halfwave dipole. The new model is then:



Power delivered to the resistive part of the EED, when the antenna is placed in an electric field of E volts/meter (at a frequency of f MHz) may then be calculated.

V. MISCELLANEOUS ACTIVITIES

a. As mentioned in past reports, we will attempt to measure the dielectric constant of some primary explosives, as a function of frequency, using the HP 8542A Automatic Network Analyzer. Additional fixtures for the HP 8542A have been received and have been forwarded to the Mason & Hanger - Silas Mason Company, AEC Plant, Burlington for loading with lead styphnate, lead azide, and a titanium potassium perchlorate compound.

*See, for example, Jasik, H., "Antenna Engineering Handbook", McGraw-Hill, 1961, pp., 3-4, 3-5.

b. Undesirable electrical characteristics of the hot-wire type of EED (i.e., low energy pin-case firing, electrostatic firing, etc.) are caused principally by three factors:

1. inherent sensitivity of primary explosives
2. undesirable properties of metal additives in explosives (higher electrical conductivity, lowered dielectric strength)
3. physical (geometric) properties of the bridgewire arrangement such that high voltage arcs propagate directly through the explosive.

All of these undesirable properties could be eliminated by the use of secondary explosives only, combined with judicious header design (such as that of the Mk 101 illustrated on Page 12 of the January-February 1972 progress report). The difficulty is that secondary explosives are not easily initiated by a hot bridgewire. Most EBW (exploding bridgewire) detonators use only secondary explosives because the firing pulse and subsequent sharp bridgewire decomposition provide adequate thermal and mechanical shock to initiate the secondary explosive.

Hot wire EEDs, using only secondary explosives, may be feasible if a bimetallic bridgewire composite is used. Typical of such bridgewire materials are palladium and aluminum, platinum-aluminum, or ruthenium-palladium alloy and aluminum. (Pyrofuze, a registered trademark of the Sigmund-Cohn Company, is one of the bimetallic bridgewire composites commercially available.) Bridgewires, such as Pyrofuze, when heated to 660°C, react by alloying violently and exothermically, resulting in deflagration without support of oxygen. The reaction reaches temperatures on the order of 2800°C, and the bridgewire is always consumed. It is believed that such a reaction may be sufficient to initiate secondary explosives and therefore serve as the basis for a far less vulnerable EED. Principal disadvantages of Pyrofuze bridgewire devices are their relative slowness (millisecond firing times) and high power requirements (when compared with EBWs). We believe such disadvantages are not

applicable to the typical aircraft application where firing times need not be precise and where 28 volt - 10 ampere firing energies are in common use with present EEDs.

We have obtained Pyrofuze wire samples of 0.020, 0.015, 0.010, and 0.003 in. diameters. These will be mounted on test detonator heads with bridgewire lengths of 0.090, 0.060, 0.040, and 0.030 in. Electrical characteristics of these assemblies will be measured and trial initiation of various suitable secondary explosives will be examined. This effort is intended only as a rapid feasibility investigation at this time.

ATTACHMENT I

LISTING OF KNOWN

USAF

ELECTROEXPLOSIVE DEVICES

EXPLANATION OF TERMS:

Electrical Characteristics:

Low resistance	:	Lower limit, nominal bridgewire resistance.
High resistance	:	Upper limit, nominal bridgewire resistance.
No-fire current	:	-5 σ current value in amperes (usually calculated from Bruceton test data, which accurately determines the mean firing current value and an estimate of standard deviation σ).
All-fire current	:	+5 σ current value in amperes (determined as described above).
Normal use	:	Recommended firing current (usually greater than the all-fire current).
Continuity test	:	Maximum allowable current recommended for bridgewire continuity checks; this value is typically limited to one-tenth the no-fire current value or less).
Thermal time constant	:	A value (in seconds) determined experimentally (at approximately the no-fire current value) which is equal to the ratio of the equivalent heat capacity C_p to the heat loss factor γ; i.e., $\tau = C_p/\gamma$. The rate at which the bridgewire temperature climbs, observed as a transient change, is directly related to e^{τ} of the system. The method used to determine τ is described in Jet Propulsion Laboratory Technical Report 32-1494, "Nondestructive Testing of Insensitive Electroexplosive Devices by Transient Techniques", July 15, 1970. See also Rosenthal, L. A., "Electrothermal Measurements of Bridgewires Used in Electroexplosive Devices", IEEE Transactions on Instrumentation and Measurement, Vol. IM-12, No. 1, pp. 17-21, June 1963.

EMR Susceptibility/Status:

Not recommended	:	dc no-fire current is .1 to .5 ampere.
Very sensitive	:	dc no-fire current is .1 ampere or less.
Recommended	:	dc no-fire current is 1 ampere or greater.
Unknown characteristics	:	Electrical characteristics (no-fire current) unknown.
Experimental	:	This device still under development.
Removed from inventory	:	This device no longer stocked in USAF supply system.

Note that EEDs with no-fire currents between .5 ampere and 1 ampere bear no EMR status designation unless the device has been found to be particularly RF sensitive. As a general rule, RF sensitivities follow dc sensitivities as indicated by no-fire current level.

Part number	:	Manufacturer's part number.
Federal stock number	:	Federal stock number of the EED (if available as an issue item) or of the subassembly of which the EED is a part.
System designation	:	Weapons system designation (e.g., C-5A) with which the EED is uniquely identified; in some cases (e.g., AERO-27/A) the EED is used with a particular ejection rack which may fit several aircraft.

SUPPLEMENTARY INFORMATION ON IMPULSE CARTRIDGES

The following text from T.O. 11-1-34 is provided for information:

1. Present. The explosive devices that are presently in the inventory and the preferred item for jettisoning applicable store.
2. Substitute. The explosive devices that are authorized substitutes for the applicable preferred item for each application.
3. Interim. Explosive devices now under development that are intended to replace the applicable present devices as the preferred item in the inventory (see paragraph 15-86).
4. Goal. Explosive devices not under development that are intended to be the ultimate replacement as the preferred item.

15-86. "INTERIM" CARTRIDGES. The Mk 124 Mod 0 and Mk 125 Mod 0 impulse cartridges, listed as "interim" devices, are under development. First procurement, which is expected in FY69, is dependent upon development of an approved data package. The Mk 124 Mod 0 is designed to replace the ARD 446-1 and Mk 9 Mod 0 impulse cartridges, and the Mk 1 Mod 3 in some applications. The Mk 125 Mod 0 is designed to replace the ARD 863-1 and Mk 2 Mod 1 impulse cartridges. Complete replacement in all applications will depend upon results of the testing program.

15-87. "GOAL" CARTRIDGES. The CCU-9/B (MLU-34/B) and CCU-10/B (MLU-35/B) are under development and are expected to be ready for procurement in FY70. These cartridges are specifically being developed for high temperatures, e.g., F-111 aircraft application. The CCU-9/B is being designed to be interchangeable with the ARD 446-1 and Mk 9 Mod 0, or the Mk 124 Mod 0 impulse cartridges. The CCU-10/B will be interchangeable with the ARD 863-1 and Mk 2 Mod 1, or the Mk 125 Mod 0 impulse cartridges. Replacement of the above "present" and "interim" cartridges in all applications with the CCU-9/B and CCU-10/B will depend upon cost and demonstrated performance of the present and interim cartridges.

The following text from T. O. 11A16-1-7 is provided for information:

2-36. IMPULSE CARTRIDGE INTERCHANGEABILITY DATA:

2-37. The Mk 2 Mod 1 and ARD 863-1 cartridges are interchangeable in multiple ejector rack (MER) and triple ejector rack (TER) applications on all applicable aircraft.

2-38. The Mk 2 Mod 1 and ARD 863-1 cartridges are interchangeable in F-105 pylon stores ejector rack.

2-39. The Mk 8 Mod 0 and Mk 1 Mod 3 cartridges are interchangeable in all applicable aircraft applications except refueling hose guillotine cutters.

2-40. Two each CCU-1/B cartridges are interchangeable with one each ARD 446-1 cartridge and one each ARD 863-1 cartridge in MAU-12 pylon ejector rack application for F-111 and FB-111 Aircraft.

IMPULSE CARTRIDGE APPLICATIONS

(Ref. T.O. 11-1-34, AFATL TR 68-58)

Rack	Cartridges
A/A 37B-1 Rack Bomb Ejector (MBR-1)(Navy)	Mk 17
BRU-3/A Rack Bomb Ejector (MER-100)	ARD-863, Mk 2, Mk 125
MAU-41/A Rack (MER 1-6)	ARD-863, Mk 125
MAU-42/A Rack Bomb Ejector (MER-1-4L) MAU-43/A " " " (MER-1-4R)	ARD-863, Mk 125, Mk 2
MAU-60/A Rack Bomb Ejector (TER-3)	ARD-863, Mk 2, Mk 125
MAU-61/A Bomb Ejector (MER-3 R & L)	ARD-863, Mk 2, Mk 125
MAU-63/A Bomb Ejector (MBR-3)	Mk 17
MAU-73/A Bomb Ejector (MER-3C)	ARD-863, Mk 2, Mk 125
Rack Bomb Ejector Aircraft (MER-9)	ARD-863, Mk 2, Mk 125
Rack Bomb Ejector Aircraft (MER-10)	ARD-863, Mk 2, Mk 125
Rack Bomb Ejector Aircraft (MER 10/A)	ARD-863, Mk 2, Mk 125
Rack Bomb Ejector Aircraft (TER-9)	ARD-863, Mk 2, Mk 125
Rack Bomb Ejector Aircraft (TER-9A)	ARD-863, Mk 2, Mk 125
Rack Bomb Ejector Aircraft (TER-15)	ARD-863, Mk 2, Mk 125
MAU-12 B/A Bomb Ejector	ARD-446, ARD-863, Mk 124, Mk 125, CCU-1/
MAU-40/A Bomb Ejector	ARD-446, ARD-863, Mk 124, Mk 125
MAU-46/A Bomb Ejector	ARD-863, Mk 2, Mk 125
MAU-50/A Bomb Ejector	ARD-446, ARD-863, Mk 124, Mk 125
AERO-3/A Bomb Ejector	Mk 1, Mk 2
AERO-7/A Bomb Ejector	Mk 1, Mk 2, Mk 8, Mk 10, Mk 51
AERO-27/A Bomb Ejector	Mk 1, Mk 2, Mk 124, Mk 125
AERO-15/C-1 Bomb Ejector	Mk 13 Mod 0
Wing Tank Pylon (outboard F-4C)	Mk 9 Mod 0
MAU-12 B/A Ejector	ARD-446-1
Pylon, Type Series (Mod 0, Mod R)	ARD-446-1
30" Special Purpose	EX-107 Mod 5
Wing Pylon	Mk 2 Mod 1
Fuselage Centerline Pylon	ARD-446-1, ARD-863-1
Fuselage Multiple Ejector Rack Pylon	ARD-446-1, ARD-863-1

Rack	Cartridge
Pylon, Type Series, I, II, III, IIIA, VII, VIII, IX, X	ARD-446-1
Wing Tip Launcher/Red Dog	Mk 1 Mod 3
Centerline Multiple Weapon Pylon	ARD-446-1, ARD-863-1
Inboard Multiple Weapon Pylon	ARD-446-1, ARD-863-1
Inboard Universal Pylon	ARD-446-1, ARD-863-1
Outboard Universal Pylon	ARD-446-1, ARD-863-1

MANUF. CODE	PART NUMBER	NOMENCLATURE	EMR SUSCEPTIBILITY/STATUS	NO FIRE	FINAL SYSTEM DESIGNATION	FEDERAL STOCK NUMBER	SORT ID
06491	2184100	UNLOCK, FIN	RECOMMENDED USE	1.00	AGM-69A	1336-405-1081	210
98747	69030349	FUSE		.04	AIM-4A D	1336-406-2765	154
15200	66055906-1	INITIATOR	RECOMMENDED USE	1.20	LGM-30	1336-407-9617	134
15266	66050601G6	INITIATOR	UNKNOWN CHARACTERISTICS		LGM-30	1336-420-2981	141
13309	504892-15	SAFE&ARMING DEVICE	RECOMMENDED USE	1.17	LGM-30	1336-420-2985	73
19689	3555-1	CARTRIDGE	RECOMMENDED USE	1.09	LGM-30	1336-422-1853	136
02602	650717	IGNITER		.55	SLV-2	1336-429-2500	251
06331	803135	GENERATOR, GAS-PRESSURE	RECOMMENDED USE	3.V	CIM-10B	1336-445-9456	25E
15226	66C49103P9	CARTRIDGE, IMPULSE	RECOMMENDED USE	2.10	LGM-30	1336-455-7854	142
15226	66C49103P10	CARTRIDGE, IMPULSE	RECOMMENDED USE	2.10	LGM-30	1336-455-7855	143
06473	202-10143	ORDNANCE MODULE	RECOMMENDED USE	1.09	LGM-30	1336-458-5228	135
80070	8447-472120109	VALVE, ISOLATION GAS	RECOMMENDED USE	2.00	LGM-30	1336-497-3633	144
70657	CM351C	SWITCH, SQUIB	VERY SENSITIVE	.10	AGM-28B	1336-515-5452	222
	250016	SQUIB	VERY SENSITIVE	.10	AIM-4A D	1336-554-4666	153
21029	250016	SQUIB	VERY SENSITIVE	.10	AIM-26A/B	1336-554-4666	169
03688	1617-057-02	TRIGGER		3.V	CIM-10B	1336-572-3072	25E
95148	G175-88-03	DESTRUCTOR	VERY SENSITIVE	.05	CQM-10A	1336-628-2890	264
81855	019-NA-01	BATTERY, THERMAL	NOT RECOMMENDED	.10	AGM-28B	1336-650-0801	221
03688	SEV61-TX74A	VALVE,EXPLOSIVE	VERY SENSITIVE	2.00	AGM-28B	1336-653-3013	226
10001	1817498	FUSE	VERY SENSITIVE	.08	AIM-9B/E/J	1336-691-7231	176
22577	256261	IGNITER	RECOMMENDED USE	1.09	AIM-4F/G	1336-709-8321	161
70657	CM353F	SWITCH, SQUIB	VERY SENSITIVE	.10	AGM-28B	1336-712-4979	223
06217	DA-B12-411-6-5	LATCH, ASSEMBLY	NOT RECOMMENDED	.20	SLV-2	1336-729-6567	247
24882	21770	DESTRUCTOR	NOT RECOMMENDED	.50	AGM-28B	1336-731-5357	224

MANUF. CODE	PART NUMBER	NOMENCLATURE	EMR SUSCEPTIBILITY/STATUS	NO FIRE	FINAL SYSTEM DESIGNATION	FEDERAL STOCK NUMBER	SORT ID
05606	887C508G1	SQUIB	RECOMMENDED USE	1.00	LGM-25C	1336-764-4797	51
78731	P064S0336-013	SQUIB	NOT RECOMMENDED	.25	LGM-25C	1336-764-63C5	49
78731	P064S0336-005	SQUIB	RECOMMENDED USE	1.00	LGM-25C	1336-764-63C6	48
02602	650291	IGNITER		.83	SLV-2	1336-766-0428	249
02602	650580	IGNITER	RECOMMENDED USE	1.00	SLV-2	1336-767-1232	25C
10001	1584138	FUSE	UNKNOWN CHARACTERISTICS		AGM-12B	1336-770-6388	19C
82577	213990	FUSE, PISTOL	VERY SENSITIVE	.05	AIM-4F/G	1336-776-6731	162
10001	2226974	FUSE & BOOSTER	VERY SENSITIVE	.08	AGM-45A	1336-797-8845	208
10001	LD521538	SAFE&ARMING DEVICE	VERY SENSITIVE	.08	AIM-7E/E-2	1336-801-7584	184
	66603-107	BATTERY	RECOMMENDED USE	1.47	LGM-30G	1336-819-8074	324
15200	66J55010	TIMER, SEQUENTIAL			LGM-30	1336-825-4909	114
24446	877C827P1	SQUIB,DISCONNECT	NOT RECOMMENDED	.20	SLV-2	1336-825-7349	248
11511	150-10123-1	CARTRIDGE, IMPULSE	RECOMMENDED USE	1.30	LGM-30	1336-827-8481	127
15200	66J55130	SAFE&ARMING DEVICE	UNKNOWN CHARACTERISTICS		LGM-30	1336-829-16C8	111
11511	26-511-2667-1	IGNITER	UNKNOWN CHARACTERISTICS		LGM-30	1336-831-7851	132
21029	MS-2-0-WKTI	SQUIB	RECOMMENDED USE	1.00	LGM-30	1336-831-7897	129
07299	F18059-01	INITIATOR	RECOMMENDED USE	1.00	CIM-10B	1336-854-C884	260
10001	2186301	FUSE	UNKNOWN CHARACTERISTICS		AGM-12C/E	1336-858-4302	198
06202	40058 10F-5	IGNITER	RECOMMENDED USE	1.90	ADM-20C	1336-860-6645	215
15200	66J55742-19	CABLE			LGM-30	1336-861-4189	123
03688	44-570222-1	VALVE, FUEL, SHUTOFF	NOT RECOMMENDED	.15	ADM-20C	1336-868-2010	217
03688	44-580263-301	VALVE, FUEL	NOT RECOMMENDED	.15	ADM-20C	1336-894-5693	216
10001	657275	GENERATOR, GAS-PRESSURE	NOT RECOMMENDED	.50	AIM-9B/E/J	1336-898-6080	173
39015	4051X25	SAFE&ARMING DEVICE	VERY SENSITIVE	.04	SLV-2	1336-900-0742	253

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MANUF. CODE	PART NUMBER	NOMENCLATURE	EMR SUSCEPTIBILITY/STATUS	NO FIRE	FINAL SYSTEM DESIGNATION	FEDERAL STOCK NUMBER	SORT ID
21029	253095	PRIMER, ELECTRIC	VERY SENSITIVE	.10	AIM-4F/G	1336-901-3210	160
06331	PD60S0129-017	CARTRIDGE	RECOMMENDED USE	1.20	LGM-25C	1336-901-6445	59
82577	252061	SQUIB	VERY SENSITIVE	.10	AIM-4D	1336-902-2282	157
82577	252061	SQUIB	VERY SENSITIVE	.10	AIM-4F/G	1336-902-2282	164
12079	995-5251-5	DETONATOR	RECOMMENDED USE	1.00	LGM-30	1336-911-1976	96
14699	322622-1	GENERATOR, GAS-PRESSURE	RECOMMENDED USE	1.00	LGM-30	1336-912-4430	100
06217	003-309				LGM-30	1336-918-2556	618
12079	995-5251-6	DETONATOR	RECOMMENDED USE	1.00	LGM-30	1336-947-5143	97
10640	5394	SQUIB	RECOMMENDED USE	1.00	LGM-30	1336-948-1770	79
82577	244000	SAFE&ARMING DEVICE	VERY SENSITIVE	.55V	AIM-26A/B	1336-972-7232	167
03688	1617-039-01	TRIGGER	NOT RECOMMENDED	.15	CIM-10B	1336-976-0427	257
03688	1617-039-01	TRIGGER	NOT RECOMMENDED	.15	CQM-10A	1336-976-0427	261
06217	003-309	SQUIB	RECOMMENDED USE	1.00	LGM-30	1336-991-4134	107
14699	320007-1	GENERATOR, GAS-PRESSURE	RECOMMENDED USE	1.00	LGM-30	1336-991-9760	99
	GAP4140	BATTERY	RECOMMENDED USE	3.60	LGM-30	1336-994-5020W	340
	200734	BATTERY	RECOMMENDED USE	1.00	LGM-30G	1336-994-5021	341
14720	309086	SQUIB	RECOMMENDED USE	1.00	LGM-30	1336-999-2224	108
06202	66056745-1	IGNITER	RECOMMENDED USE	1.09	LGM-30	1337-NSL	109
95335	66056746-1	IGNITER	RECOMMENDED USE	1.09	LGM-30	1337-NSL	110
10396	01A90081	ROCKET MOTOR	RECOMMENDED USE	1.16	LGM-30	1337-010-5083	106
06202	3388100054	ROCKET MOTOR	RECOMMENDED USE	1.00	LGM-30	1337-078-0750	139
14134	PD50S0003-078	INITIATOR	RECOMMENDED USE	1.00	LGM-25C	1337-084-2110	52
10001	2624255	IGNITER	RECOMMENDED USE	1.50	AIM-7E/E-2	1337-113-0055	182
10001	2624255	IGNITER	RECOMMENDED USE	1.50	AGM-45A	1337-113-0055	206