Memorandum

To: FCC Equipment Authorization

From: Johnson Data Telemetry Corporation
299 Johnson Ave.
Waseca, MN 56093-0833

Subject: Equipment Authorization Change

The supplied data is for a request for a Certificated Equipment Change according to Section 2.1043 of the Pike & Fischer Inc., CD ROM revision 9/28/98.

FCC Identifier of Certificated Equipment: NP42423414-001
Granted: January 16, 1998

Description of changes: Adding a 16K0F3E to the Grant of Equipment Authorization to be used in a 25KHz channel. (Authorized BW= 20 KHz).

Power Out: 1-4 Watts continuously variable

Frequency Range: 403-512 MHz

Rule Parts: 90.210

If further information is necessary please contact Mark Christensen at (507)835-6249.

Sincerely,

Allen Frederick

NAME OF TEST: Percentage Modulation Versus Input Voltage
(25 kHz channel)

RULE PART NUMBER: 2.1047 (b)

MINIMUM STANDARD: Shall not exceed 5.0 kHz deviation from 300 Hz to 3000 Hz

TEST RESULTS: Conforms to minimum standards

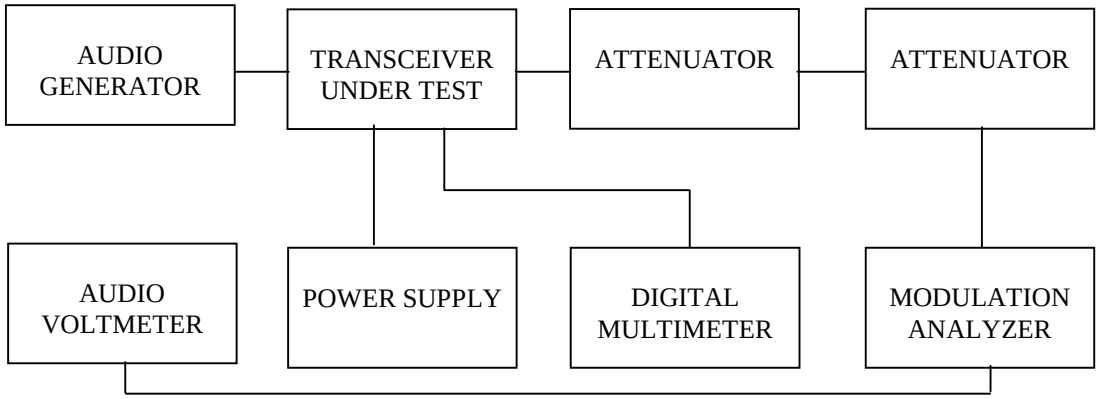
TEST CONDITIONS: Standard Test Conditions, 25 C

TEST PROCEDURE: TIA/EIA - 603, 2.2.3

TEST EQUIPMENT: Attenuator, BIRD Model / 9715 / 50-A-MFN-06 / 6 dB / 50 Watt
Attenuator, BIRD Model / 9716 / 25-A-MFN-20 / 20 dB / 25 Watt
DC Power Source, Model HP6284A
Modulation Analyzer, Model HP8901A
Power Supply, Model HP-6284A
Audio Generator, Model HP8903A
Audio Voltmeter, Model HP8903A

PERFORMED BY: Allen Frederick DATE: 11/3/98

TEST SET-UP:

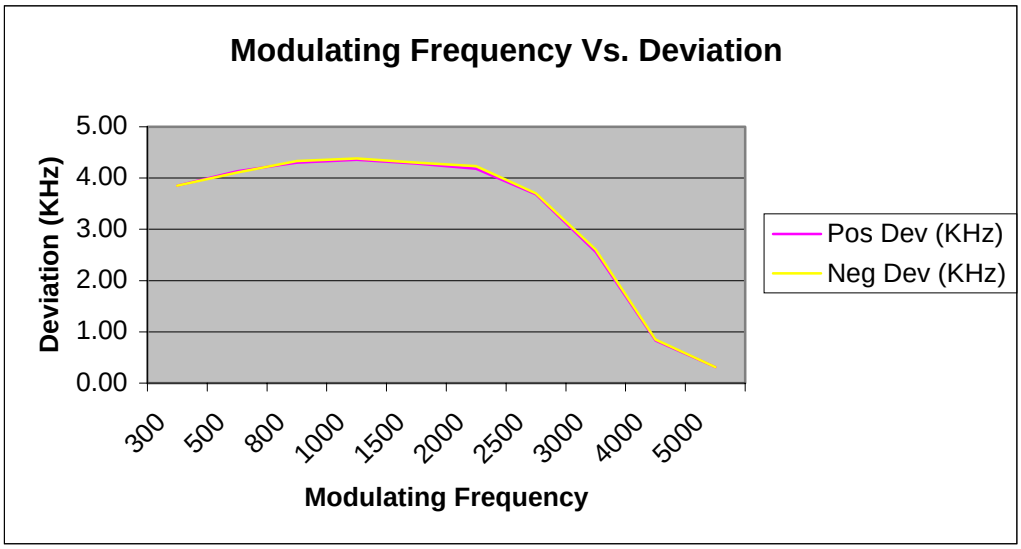


(Test data on next page)

NAME OF TEST: Percentage Modulation Versus Input Voltage
(25 kHz channel, Continued) For 16K0F3E

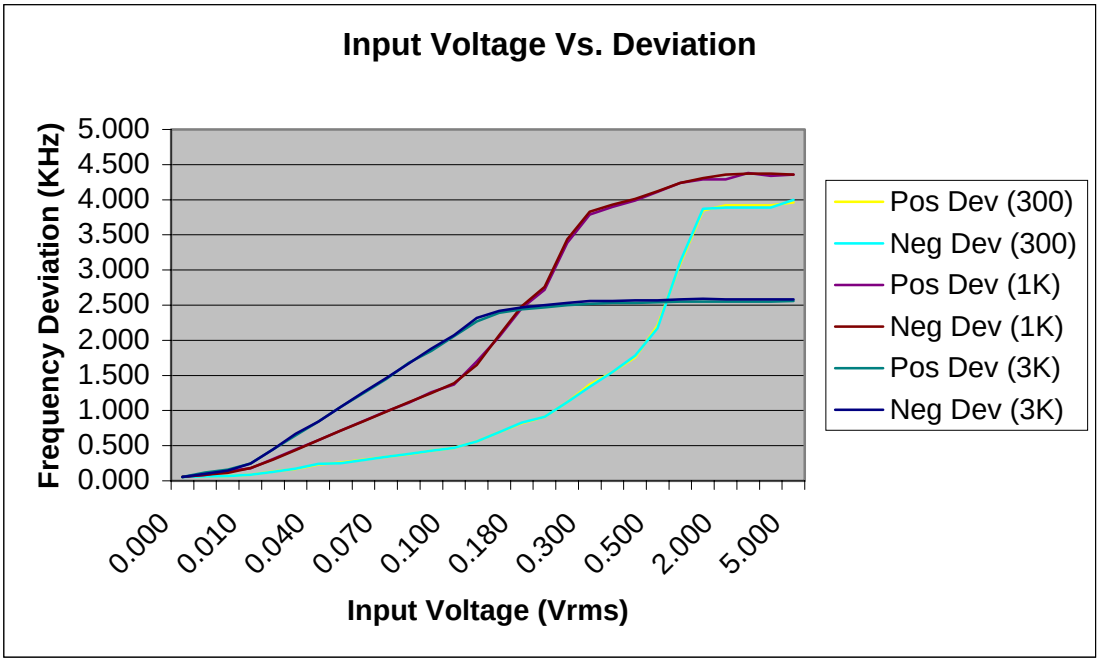
DEVIATION LIMITING WITH INPUT VOLTAGE
20 dB ABOVE 60% RATED DEVIATION AT 1000 Hz

Freq	Pos Dev (KHz)	Neg Dev (KHz)
300	3.85	3.85
500	4.13	4.11
800	4.30	4.33
1000	4.36	4.38
1500	4.28	4.30
2000	4.18	4.23
2500	3.68	3.70
3000	2.56	2.60
4000	0.83	0.85
5000	0.31	0.31



NAME OF TEST: Percentage Modulation Versus Input Voltage
(25 kHz channel, Continued) For 16K0F3E

0.300	1.370	1.340	3.790	3.830	2.520	2.560
0.350	1.550	1.550	3.900	3.930	2.530	2.560
0.400	1.760	1.780	3.990	4.010	2.530	2.570
0.500	2.210	2.170	4.110	4.120	2.540	2.570
0.700	3.090	3.120	4.240	4.240	2.550	2.580
1.000	3.850	3.870	4.290	4.310	2.550	2.590
2.000	3.920	3.890	4.290	4.360	2.550	2.580
3.000	3.920	3.890	4.380	4.370	2.550	2.580
4.000	3.920	3.890	4.340	4.370	2.550	2.580
5.000	3.960	4.000	4.360	4.360	2.560	2.580



NAME OF TEST: Transmitter Occupied Bandwidth
In Support of Emission Designator **16K0F3E**

RULE PART NUMBER: 2.201, 2.202, 2.1049 (c)(1), 90.209 (b)(5), 90.210 (b)

MINIMUM STANDARD: Mask B
Sidebands and Spurious [Rule 90.210 (b), P = 4 Watts]
Authorized Bandwidth = 20 kHz [Rule 90.209(b) (5)]
From Fo to 50% of Authorized BW Removed from Fo, down 0 dB.
From 50% to 100% removed, at least 25 dB.
From 100% to 250% removed, at least 35 dB.
Greater than 250% remove, at least $43 + 10\log_{10}(P)$ dB.

Fo to 10 kHz Attenuation = 0 dB
10 kHz to 20 kHz, Attenuation = 25 dB minimum
20 kHz to 50 kHz, Attenuation = 35 dB minimum
> 50 kHz, Attenuation = 49 dB minimum (4 watts)
> 50 kHz, Attenuation = 43 dB minimum (1 watt)

TEST RESULTS: Meets minimum standard (see data on the following pages)

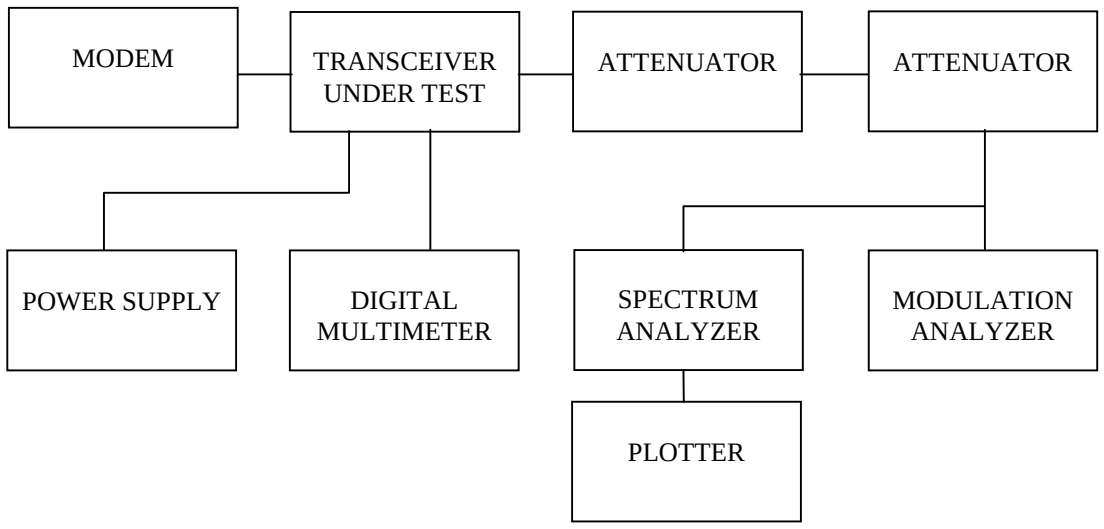
TEST CONDITIONS: Standard Test Conditions, 25 C

TEST EQUIPMENT: Attenuator, BIRD Model / 9715 / 50-A-MFN-06 / 6 dB / 50 Watt
Attenuator, BIRD Model / 9716 / 25-A-MFN-20 / 20 dB / 25 Watt
Digital Voltmeter, Fluke Model 8012A
DC Power Source, Model HP6284A
Modulation Analyzer, Model HP8901A
Spectrum Analyzer, Model HP8563E
Plotter, HP7470A

PERFORMED BY: Allen Frederick DATE: 11/3/98

Allen Frederick

TEST SET-UP:



NAME OF TEST: Transmitter Occupied Bandwidth (continued)
In Support of Emission Designator **16K0F3E**

MODULATION SOURCE DESCRIPTION:

HP-8903A was used to provide modulation at 2.5 KHz. The audio signal was applied to the audio input of the Transceiver.

NECESSARY BANDWIDTH (Bn) CALCULATION

Bn = 2M + 2DK

M= 2500 Hz. This is the highest modulating frequency widely recognized by the industry for voice.

D = 5000 Hz. This is the maximum deviation.

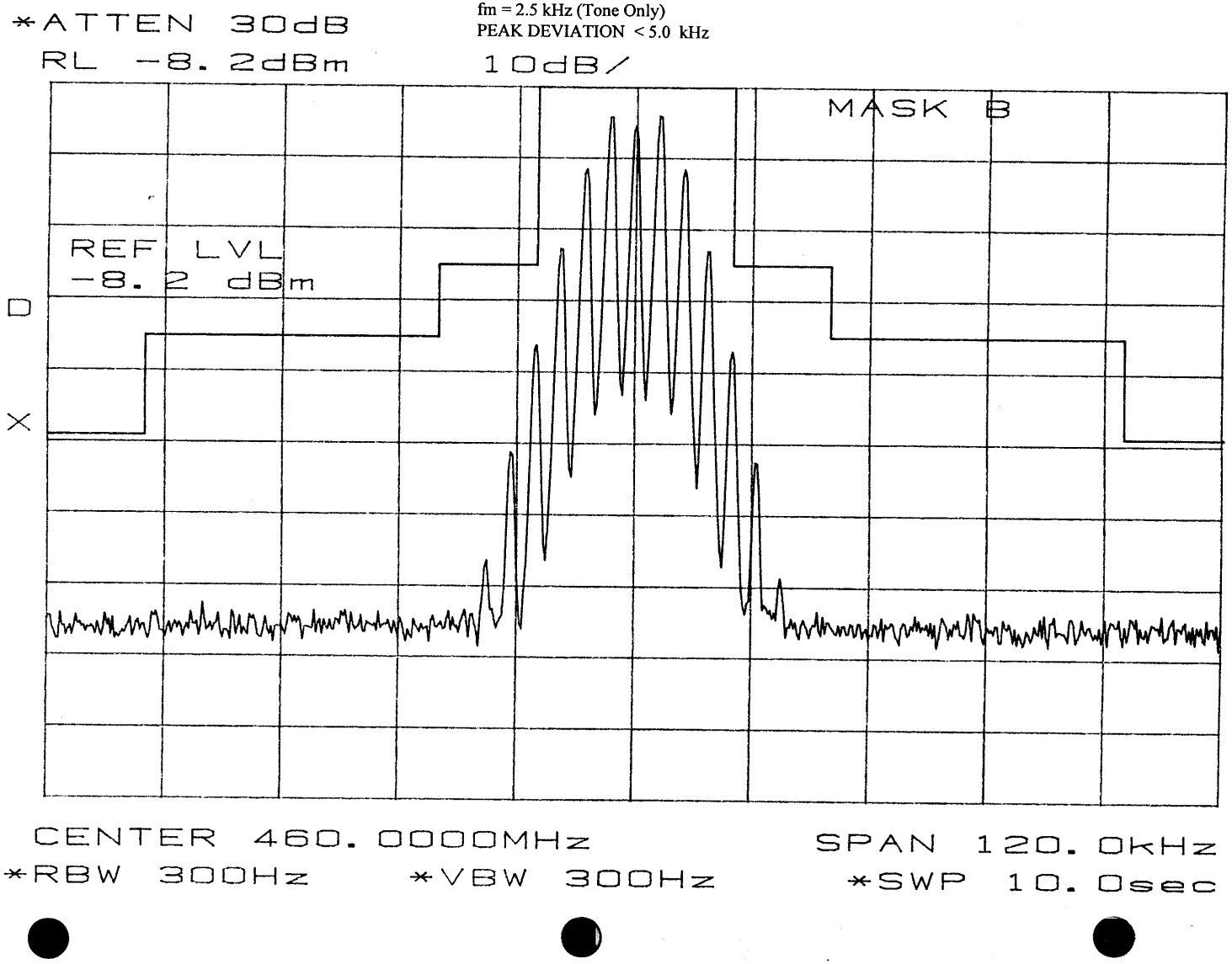
K = 1.0

Bn = 2(2500) + 2(5000)(1.0) = 16,000 Hz.

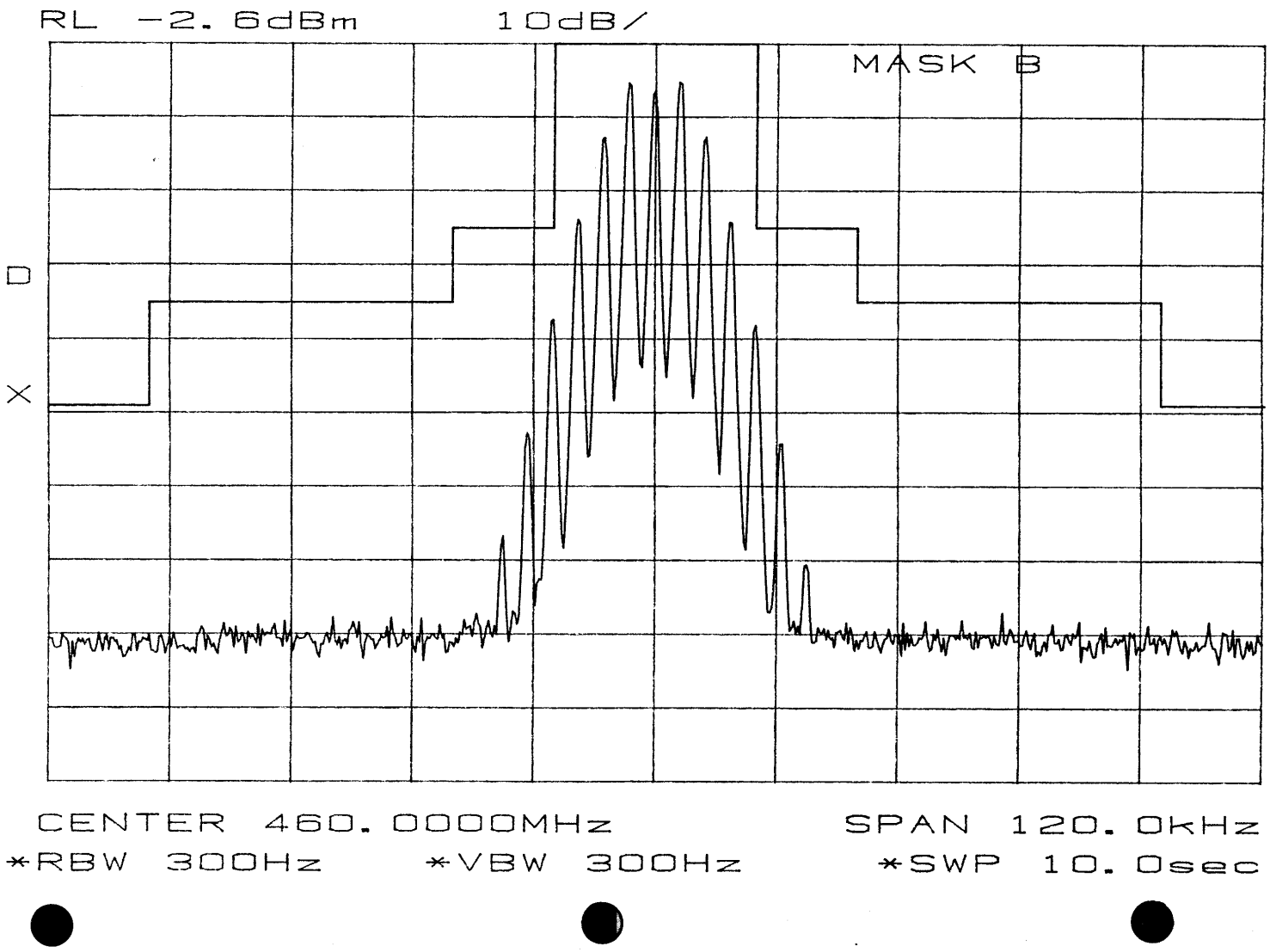
The corresponding emission designator prefix for necessary bandwidth = **16K0.**

TEST DATA: Refer to the following graphs:

GRAPH:16K0F3E
SPECTRUM FOR EMISSION 16K0F3E
OUTPUT POWER: 1 Watt
fm = 2.5 kHz (Tone Only)
PEAK DEVIATION < 5.0 kHz



GRAPH:16K0F3E
SPECTRUM FOR EMISSION 16K0F3E
OUTPUT POWER: 4 Watts
fm = 2.5 kHz (Tone Only)
PEAK DEVIATION < 5.0 kHz



NAME OF TEST: Transient Frequency Behavior

RULE PART NUMBER: 90.214

TEST CONDITIONS: The transient test was performed with the transmitter transmitting just a carrier tone. Also supplied is a transient test which was conducted with the transmitter modulated with a 1KHz tone at 3 KHz deviation .

MINIMUM STANDARD: **25 kHz channel** (used worst case numbers from 403 to 512 MHz)

TIME INTERVAL	**MAX FREQ DIFFERENCE (kHz)**	**MAX FREQ DIFFERENCE (kHz)**	**TIME (ms)**
	12.5KHz CH	25 kHz CH	
T1	+/- 12.5	+/- 25	10
T2	+/- 6.25	+/- 12.5	25
T3	+/- 12.5	+/- 25	10

TEST RESULTS: Meets minimum standards, see data on following pages

TEST CONDITIONS: RF Power Level = 4 Watts, 1 Watt
Standard Test Conditions, 25 C

TEST PROCEDURE: TIA/EIA - 603, 2.2.19

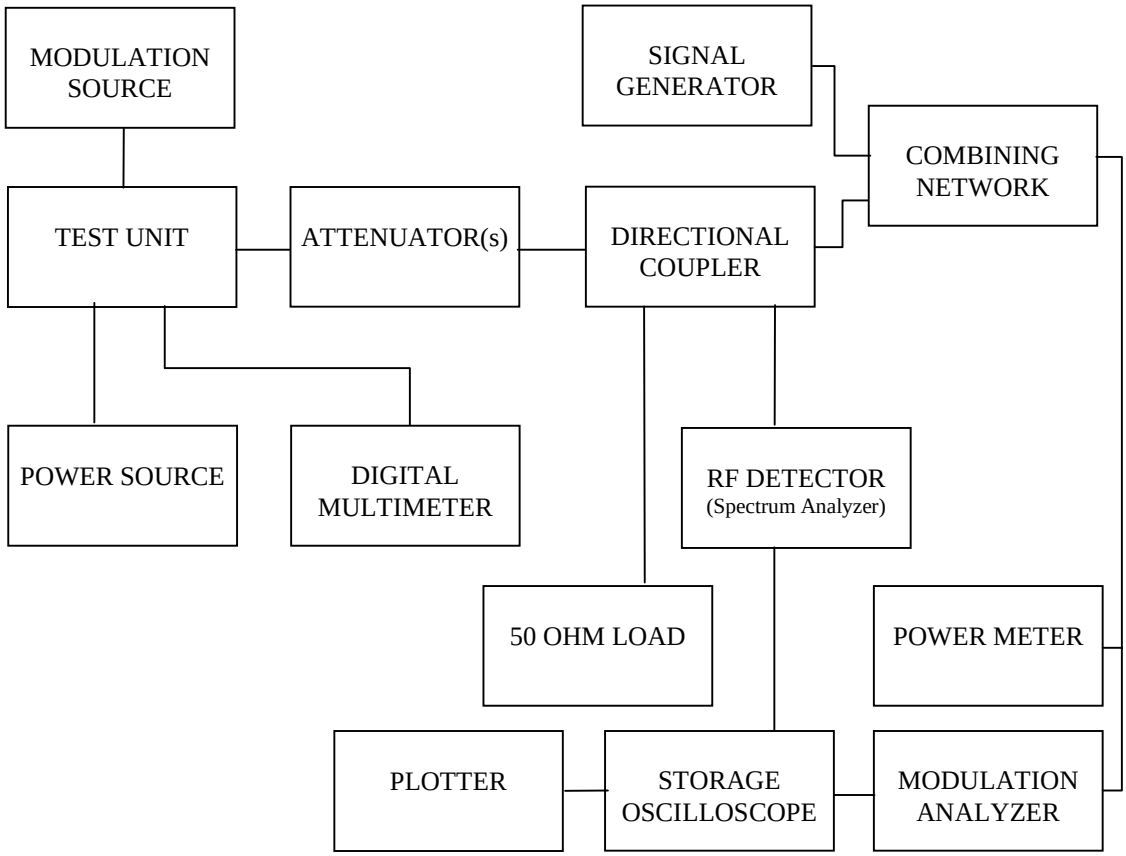
TEST EQUIPMENT: Attenuator, BIRD Model / 9716 / 25-A-MFN-20 / 20 dB / 25 Watt
Digital Voltmeter, Fluke Model 8012A
DC Power Source, Model HP6284A
Modulation Analyzer, Model HP8901A
RF Detector (Spectrum Analyzer), Model HP8563E
Plotter, Model HP2671G
Reference Generator, Fluke Model 6071A
Power Meter, Model HP436A
Power Combiner, Model MCL ZFSC-4-1
Oscilloscope, Model HP54503A
Directional Coupler, Model HP778D

PERFORMED BY: Allen Frederick Date: 11/06/98

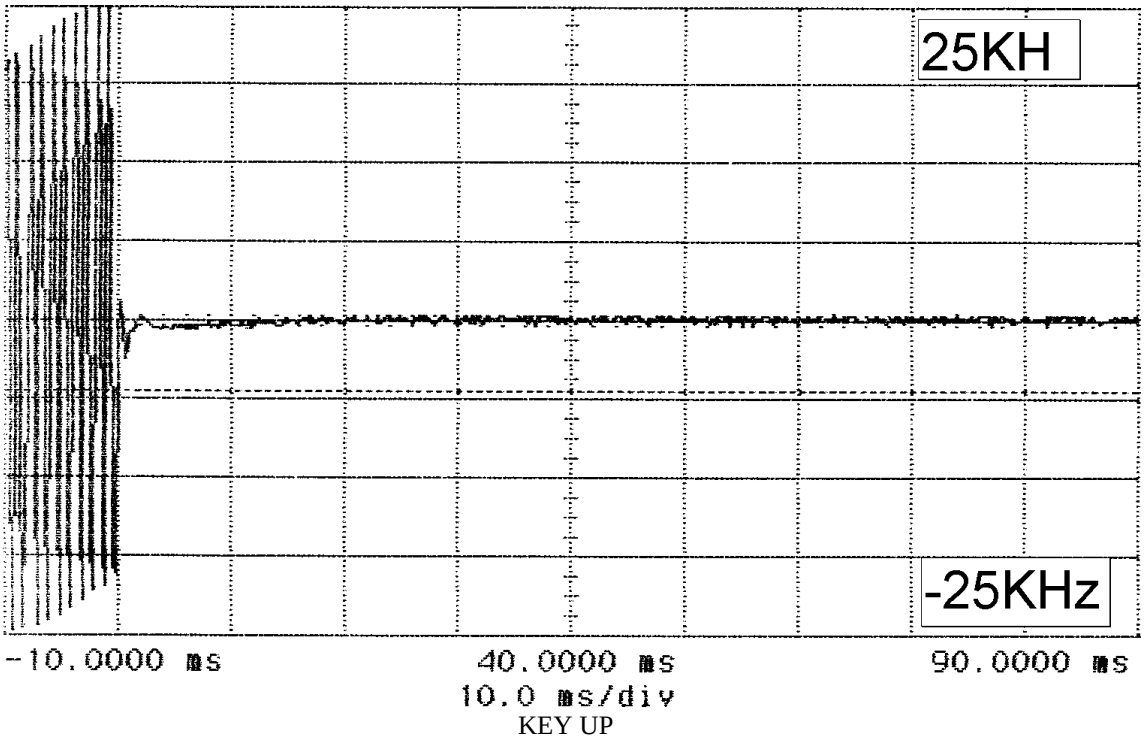
Allen Frederick

NAME OF TEST: Transient Frequency Behavior (Continued)

TEST SET-UP:



TRANSIENT FREQUENCY RESPONSE
4 Watts, Unmodulated Carrier



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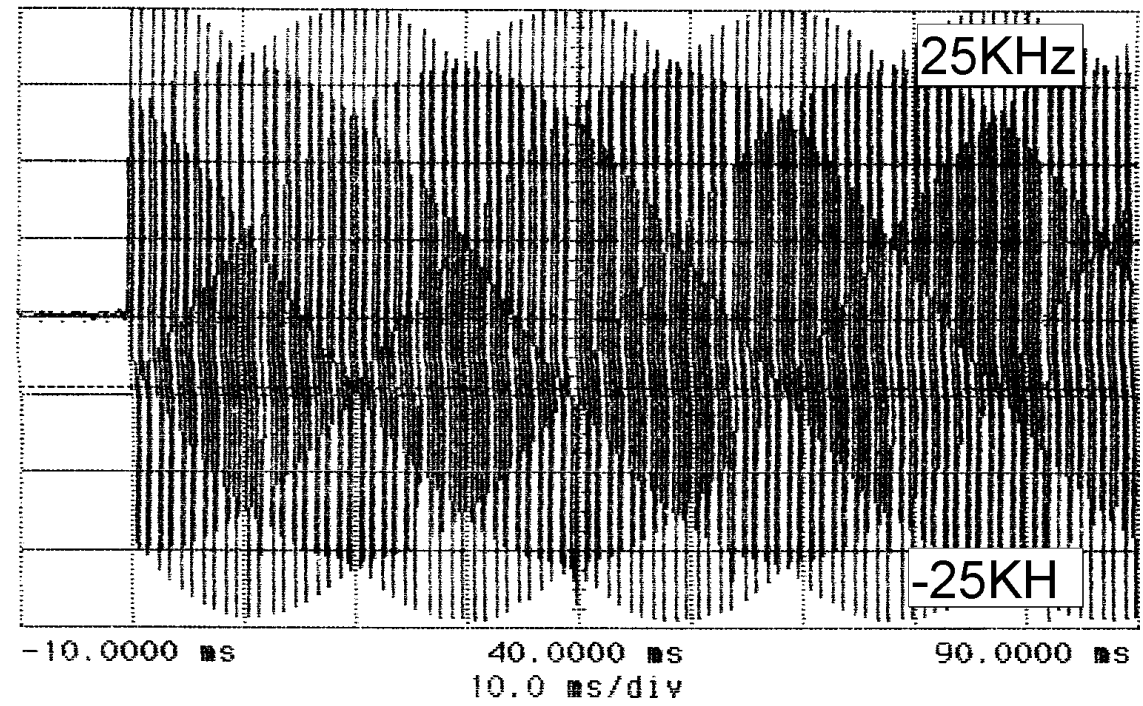

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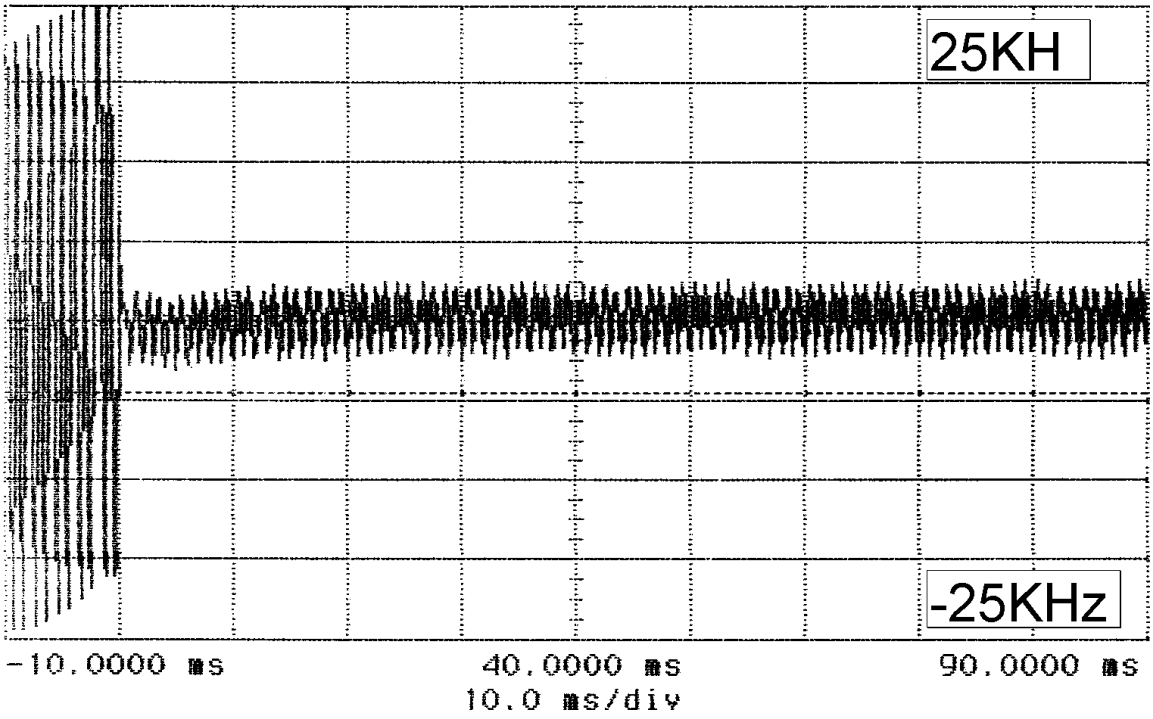
TRANSIENT FREQUENCY RESPONSE
4 Watts, 3 KHz Deviation, 1KHz Tone



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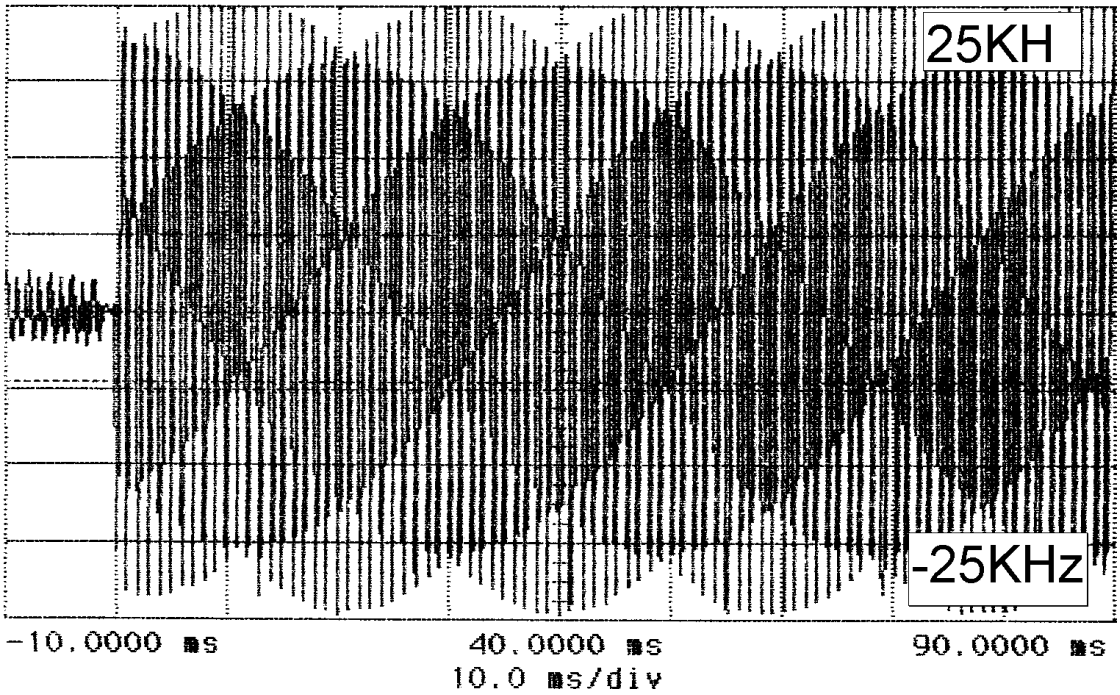

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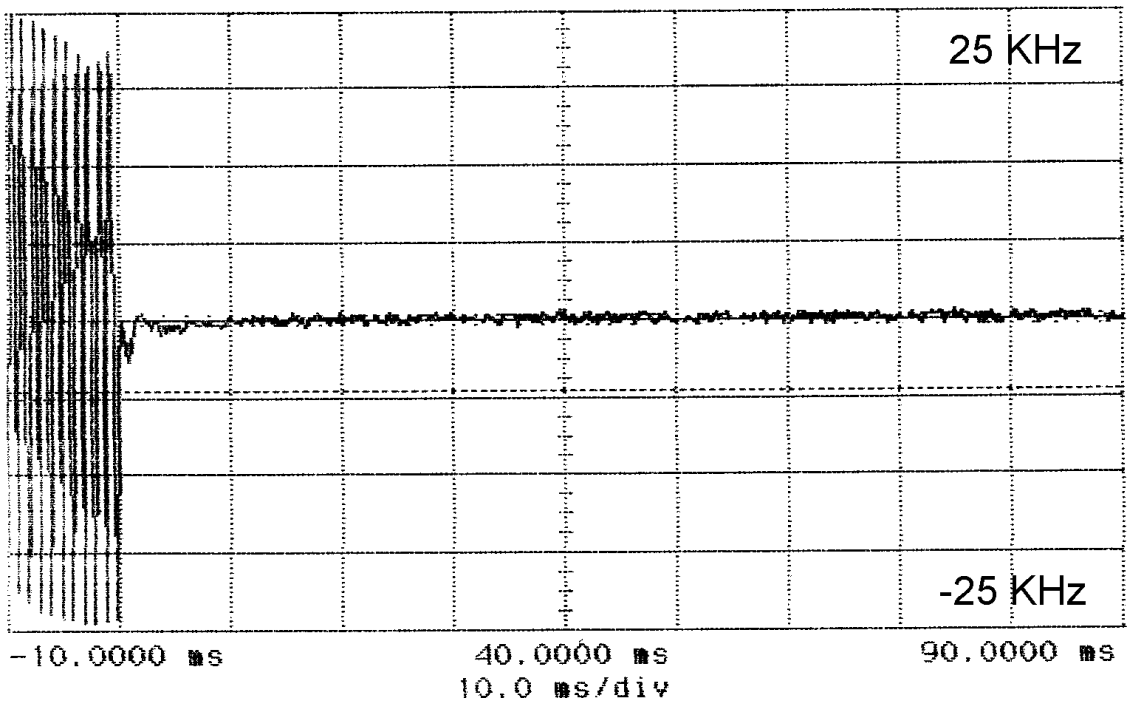
TRANSIENT FREQUENCY BEHAVIOR
1 Watt, Unmodulated Carrier



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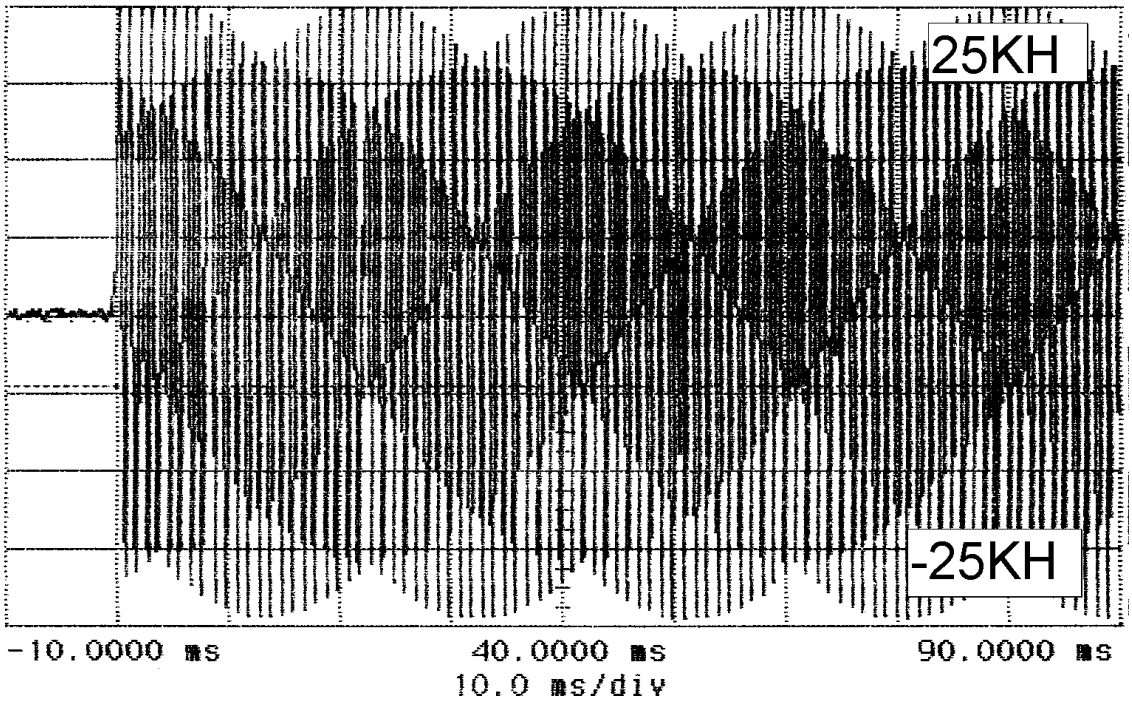

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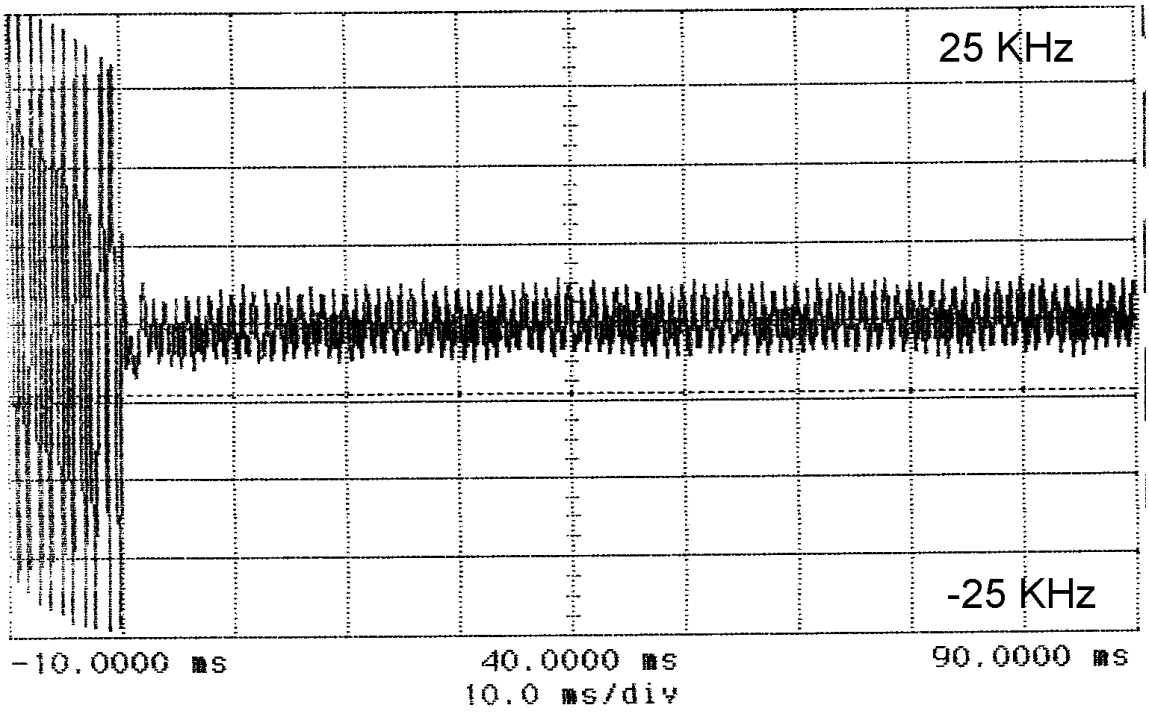
TRANSIENT FREQUENCY RESPONSE
1 Watts, 3 KHz Deviation, 1KHz Tone



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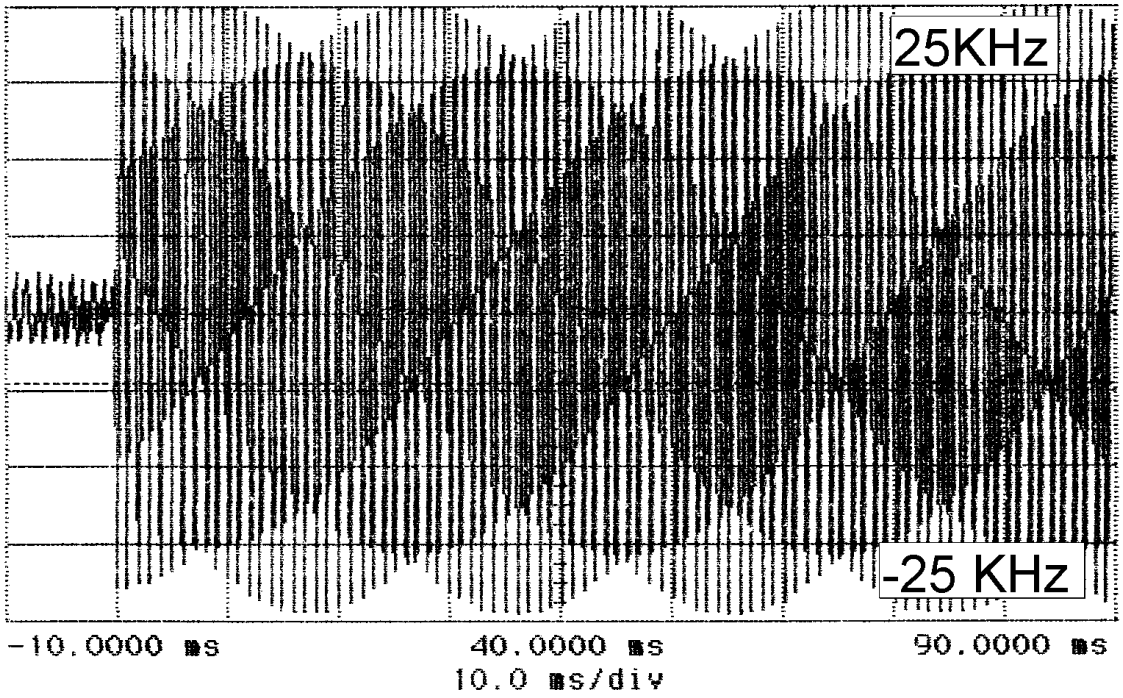

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