DUKE POWER COMPANY
POWER BUILDING
422 SOUTH CHURCH STREET, CHARLOTTE, N. C. 28242

April 30, 1982

WILLIAM O. PARKER, JR.
VICE PRESIDENT
STEAM PRODUCTION

TELEPHONE: AREA 704
373-4083

Mr. Harold R. Denton, Director
Office of Nuclear Reactor Regulation
U. S. Nuclear Regulatory Commission
Washington, D. C. 20555

Attention: Ms. E. G. Adensam, Chief
Licensing Branch No. 4

Re: McGuire Nuclear Station
Docket Nos. 50-369, 50-370

Dear Mr. Denton:

The enclosed material is submitted as additional information to support Duke Power Company's request for operation of McGuire Unit 1 at power levels up to 75% for 30 days. The justification was submitted on April 28, 1982 and discussed with the NRC Staff in a meeting on April 29, 1982. As stated in this meeting, Westinghouse supports the proposed operating plan.

The following material is enclosed:

(1) Five (5) copies of overhead slides used by Duke Power in the April 29, 1982 meeting

(2) Five (5) copies "McGuire 75% Power Level Steam Generator Tube Wear Estimates", (Proprietary)

(3) Five (5) copies "McGuire 75% Power Level Steam Generator Tube Wear Estimates", (Non-Proprietary)

(4) Westinghouse letter approving use of proprietary information CAW-82-23, April 29, 1982 (Non-Proprietary)

B021
1/1 L Encl.
Change: L 1 NP
PDR 1 NP
LPDR 1 NP
NSIC 1 NP
NTIS 1 NP

Enclosure 2 is proprietary to Westinghouse. It contains information proprietary to Westinghouse Electric Corporation and it is supported by an affidavit signed by Westinghouse, the owners of the information. The affidavit sets forth the basis on which the information may be withheld from public disclosure by the Commission and addresses with specificity the considerations listed in paragraph (b) (4) of Section 2.790 of the Commission's regulations.

Accordingly, it is respectfully requested that the information which is proprietary to Westinghouse be withheld from public disclosure in accordance

Copies Advanced to:
C. Cheng
J. Rajan
K. Wichman
R. Birkel

with 10CFR Section 2.790 of the Commission's regulations. Correspondence with respect to the proprietary aspects of this application for withholding or the supporting Westinghouse affidavit should reference CAW-82-23 and should be addressed to R. A. Wiesemann, Manager, Regulatory and Legislative Affairs, Westinghouse Electric Corporation, P. O. Box 355, Pittsburgh, Pennsylvania 15230.

Very truly yours,

William O. Parker, Jr. by GAC

William O. Parker, Jr.

GAC/jfw

cc: Mr. P. R. Bemis
Senior Resident Inspector
McGuire Nuclear Station

Mr. James P. O'Reilly, Regional Administrator
U. S. Nuclear Regulatory Commission
Region II
101 Marietta Street, Suite 3100
Atlanta, Georgia 30303

ENCLOSURE 1

DUKE POWER COMPANY

MCGUIRE NUCLEAR STATION - UNIT 1

DUKE-NRC-W MEETING

APRIL 29, 1982

INTRODUCTION

REVIEW OF MCGUIRE OPERATING HISTORY

SUMMARY OF PROPOSED OPERATING PLAN

JUSTIFICATION FOR PROPOSED OPERATING PLAN

- SIZE OF EXISTING DEFECTS (VOLUME/DEPTH)
- MAXIMUM ALLOWABLE DEFECT SIZE
- ACCELEROMETER RESULTS

ASSESSMENT OF EFFECTS OF PROPOSED OPERATING PLAN

- WEAR CONSIDERATIONS
- SAFETY CONSIDERATIONS

OPERATING OBJECTIVES PRIOR TO MODIFICATION

OPERATING/LICENSING SUMMARY

OCTOBER 30, 1981	DUKE INFORMED NRC OF RINGHALS TUBE LEAK
NOVEMBER 16, 1981	McGUIRE - SHUTDOWN FOR ECT NO INDICATIONS 'A' S/G (MAX. POWER 50%)
NOVEMBER 20, 1981	DUKE - NRC - W MEETING DISCUSS PLANS FOR McGUIRE
DECEMBER 2, 1981	MNS - SHUTDOWN FOR ECT NO INDICATIONS 'A' S/G (MAX. POWER 75%)
DECEMBER 29, 1981	DUKE DESCRIBED PLANS FOR OPERATION OF McGUIRE (OPERATION FOR SHORT PERIOD UP TO 100% POWER)
JANUARY 2, 1982	McGUIRE RETURNS TO POWER
JANUARY 15, 1982	TELECON DUKE - NRC - W UPDATED NRC ON STATUS
JANUARY 26, 1982	DUKE PROVIDED BASIS FOR OPERATION AT 50% TO 2/15/82
JANUARY 29, 1982	SUBMITTAL OF UPDATE ON OVERALL PROGRAM
FEBRUARY 12, 1982 FEBRUARY 18, 1982	DUKE REQUESTED EXTENSION TO OPERATE UNTIL 2/26/82

OPERATING/LICENSING SUMMARY

FEBRUARY 22, 1982	NRC AUTHORIZATION TO OPERATE UNTIL 2/26/82
FEBRUARY 26, 1982	McGUIRE SHUTDOWN FOR ECT
MARCH 4, 1982	MEETING AT McGUIRE TO REVIEW PLANS FOR INSTRUMENTATION AND ECT
MARCH 6, 1982	ECT OF ALL 4 S/Gs 4 INDICATIONS IN 'C' S/G NOTED
MARCH 12, 1982	VISIT TO WESTINGHOUSE FACILITIES BY NRC - REVIEWED VARIOUS R&D PROJECTS
MARCH 16, 1982	DUKE JUSTIFICATION SUBMITTED FOR CONTINUED OPERATION AT 50% AND 75%
MARCH 19, 1982	McGUIRE RETURNED TO 50% POWER
APRIL 1, 1982	NRC EVALUATION OF DUKE PROPOSAL - 1500 HOURS AT 50%
APRIL 29, 1982	MEETING TO DISCUSS EXTENDING OPERATION / 75% OPERATION

Power History (Hours - 4/29/82)

Unit	≥ 50%	≥ 75%	≥ 90%	≥ 95%
McGuire 1	2400 (3180)	324 (1044)	72	23
Ringhals 3	3760	2180	1640	1375
Almaraz 1	3588	1551	1456	537

McGuire 1 - Currently operating at 50% power

- NRC COMMENTS ON MARCH 16, 1982, SUBMITTAL IDENTIFIED FOUR MAJOR CONCERNS:

  - UNCERTAINTY IN THE ESTIMATE OF THE VOLUME OF LARGEST EXISTING DEFECT

  - INSUFFICIENT JUSTIFICATION FOR UPPER BOUND OF OF ALLOWABLE WEAR

  - RESULTS OF DATA ANALYSIS FROM NEW TUBE VIBRATION MEASURING INSTRUMENTS

  - UNCERTAINTY IN TUBE WEAR RATES FOR POWER LEVELS ABOVE 50 PERCENT

ADDITIONAL DATA TO SUPPORT PREVIOUS POSITION IS NOW AVAILABLE

  - TWO MORE REMOVED TUBES HAVE BEEN EXAMINED

  - DATA FROM TUBE VIBRATION MONITORING INSTRUMENTS HAS BEEN ANALYZED

  - WEAR RATE ESTIMATES HAVE BEEN REEVALUATED

  - ALMARAZ UNIT HAS RECEIVED A NEW STEAM GENERATOR INSPECTION

ESTIMATE OF MAXIMUM EXISTING DEFECT SIZE

- PREVIOUS INSPECTION OF McGUIRE LOCATED FOUR TUBE WEAR DEFECTS

- LARGEST OF THESE DEFECTS IS MUCH TOO SMALL TO SIZE ACCURATELY

- SEVERAL METHODS USED TO ESTIMATE DEFECT VOLUME:

  - COMPARISON WITH EDDY CURRENT SIGNALS FROM LABORATORY PRODUCED DEFECTS

  - COMPARISON WITH EDDY CURRENT SIGNALS FROM FIELD DEFECTS

  - MEASUREMENT OF DEFECT GEOMETRY AND COMPARISON WITH REMOVED TUBES

UPPER BOUND ON EXISTING LARGEST DEFECT:

VOLUME = 4.0×10^{-4} CUBIC INCHES

BEST ESTIMATE OF DEFECT VOLUME IS LESS THAN 1.5×10^{-4} CUBIC INCHES

MAXIMUM ALLOWABLE DEFECT SIZE

GOAL IS TO ESTABLISH ALLOWABLE ADDITIONAL WEAR BETWEEN STEAM GENERATOR INSPECTIONS

- PREDICTABLE RELATIONSHIP BETWEEN VOLUME AND DEPTH OF WEAR (SEE FIGURE 1)
- LARGE INCREASE IN VOLUME REQUIRED TO CREATE SIGNIFICANT DEPTH INCREASE
- VOLUMETRIC WEAR IS PROPORTIONAL TO TIME
- RECENT EDDY CURRENT EXAMINATION OF ALMARAZ INDICATES AVERAGE STEAM GENERATOR WEAR MUCH LOWER THAN PREVIOUSLY ESTIMATED

MAXIMUM ALLOWABLE DEFECT DEPTH ESTABLISHED AS 10 MILS, OR 23 PER CENT THROUGH WALL.

- NO LONG TERM EFFECT ON STEAM GENERATOR INTEGRITY
- CONSERVATIVE UPPER BOUND - ACTUAL WEAR EXPECTED TO BE MUCH LOWER

TUBE VIBRATION MEASUREMENT PROGRAM

- DURING MARCH, 1982, ACCELEROMETERS INSTALLED IN TWO FRONT ROW TUBES AT McGUIRE (FIGURES 2 AND 3)

- TUBE VIBRATION MEASURED AT VARIOUS POWER LEVELS FROM ZERO TO 75 PERCENT

- NO EVIDENCE OF FLUIDELASTIC INSTABILITY

- NO EVIDENCE OF LARGE AMPLITUDE DISPLACEMENT OR HIGH ACCELERATION

- TUBES APPEAR TO BE BUFFETED BY FLUID TURBULENT FORCES

BENEFITS OF PROPOSED McGUIRE PROGRAM

- MAXIMIZE OPERATING POWER LEVEL FOR UNMODIFIED STEAM GENERATORS WHILE PREVENTING SIGNIFICANT TUBE DAMAGE

- DETERMINE RELATIONSHIP BETWEEN OPERATING POWER LEVEL, TUBE VIBRATION, AND TUBE WEAR

    - REDUCE COMPLEXITY OF REQUIRED MODIFICATION

    - INCREASE CONFIDENCE IN ABILITY OF INSTALLED INSTRUMENTATION TO DETECT DAMAGING TUBE VIBRATION

    - PROVIDE A BASIS FOR EVALUATING EFFECTIVENESS OF MODIFICATION USING INSTALLED TUBE VIBRATION INSTRUMENTATION

BENEFITS OF INFORMATION TO BE GAINED OUTWEIGH RISK OF SMALL AMOUNT OF ADDITIONAL TUBE WEAR.

IMPACT OF OPERATING PLAN

- UPPER BOUND FOR ADDITIONAL WEAR IS 8.89×10^{-4} CUBIC INCHES
- UPPER BOUND FOR THROUGH WALL PENETRATION IS 10 MILS (23 PERCENT)
- NO SAFETY CONCERN
- NO TUBE PLUGGING TO BE REQUIRED
- UPPER BOUND DEFECT MUCH SMALLER THAN DEFECTS LEFT IN SERVICE AT ALMARAZ AND RINGHALS 3
- LONG TERM INTEGRITY OF STEAM GENERATOR TUBES NOT ADVERSELY AFFECTED

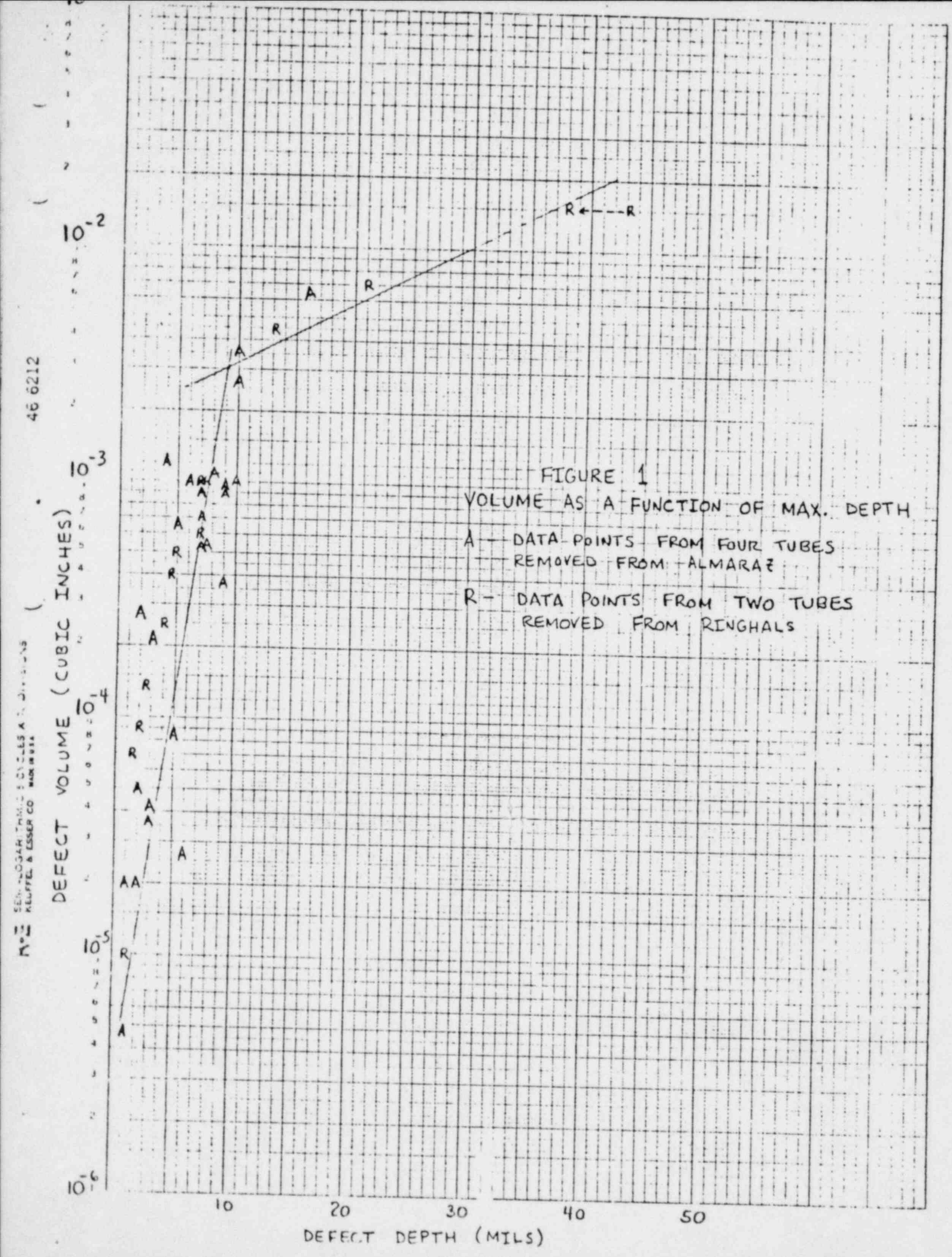
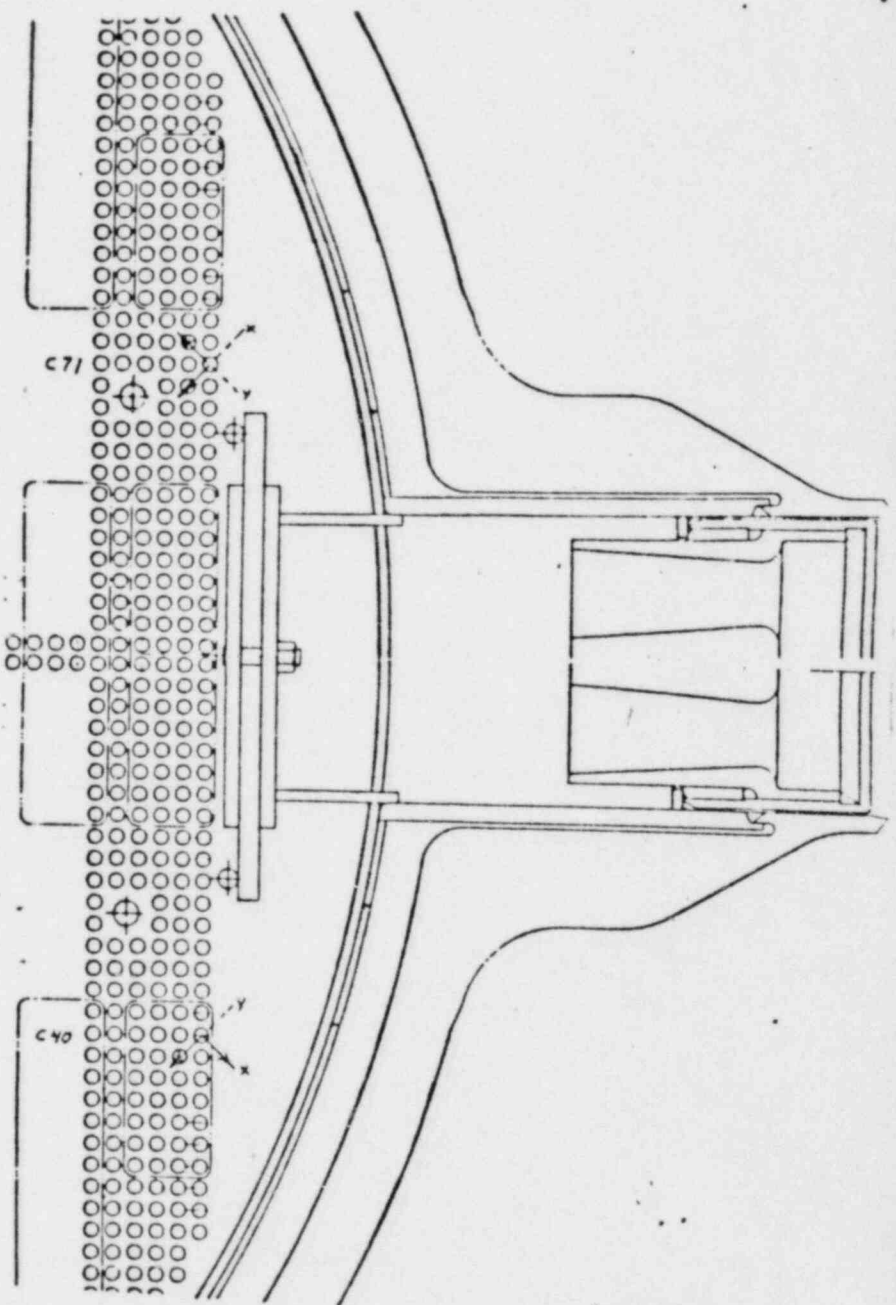
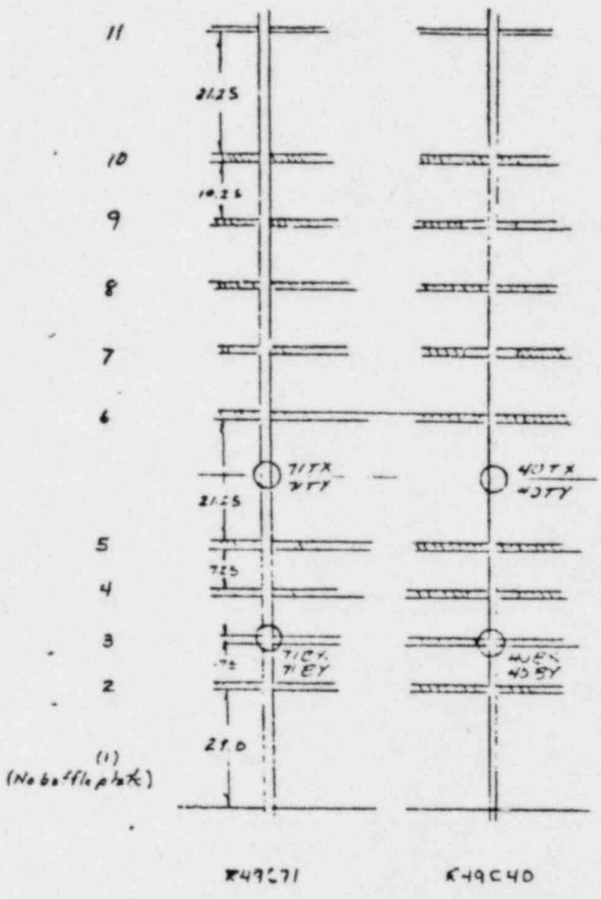


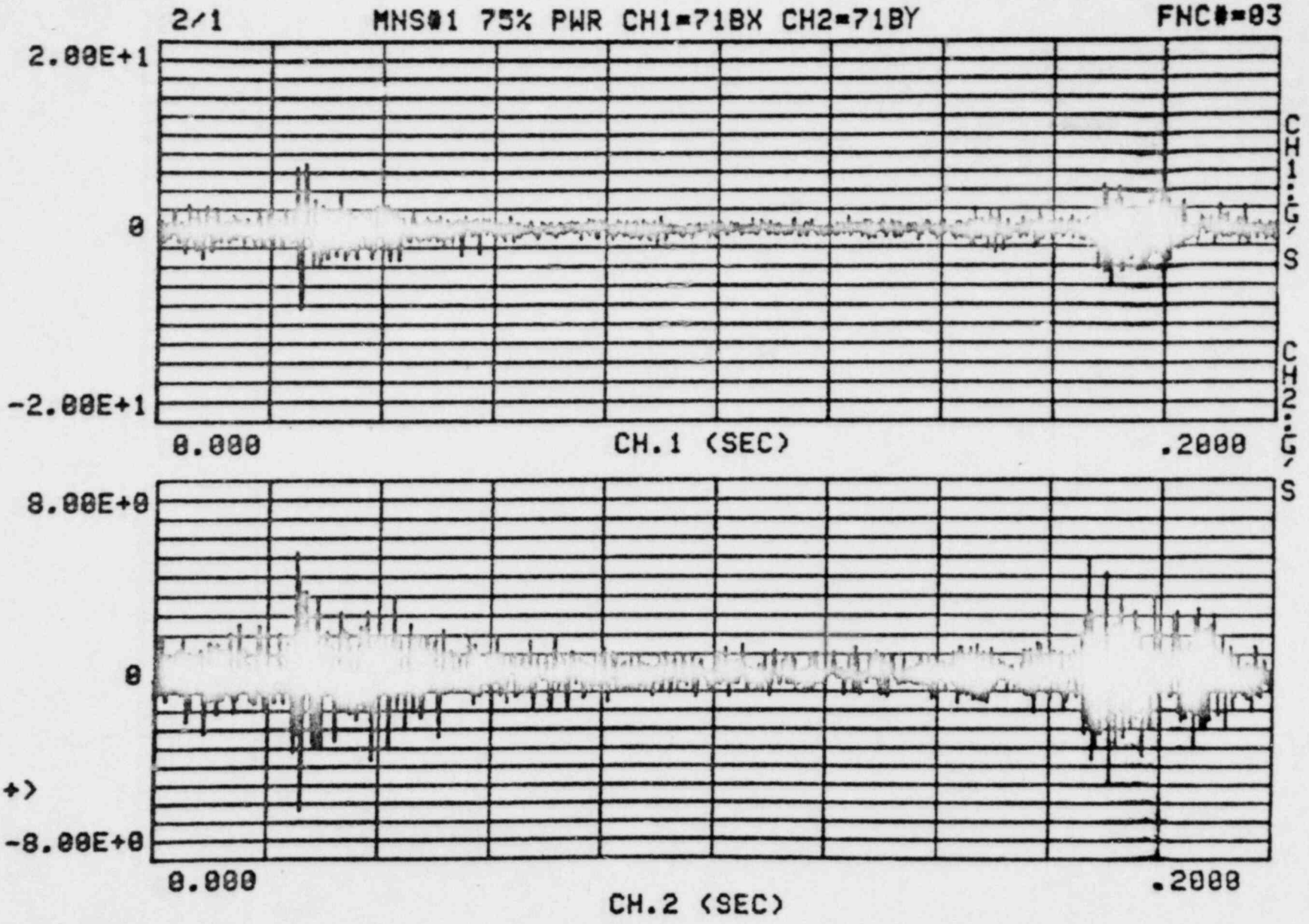
FIGURE 1
VOLUME AS A FUNCTION OF MAX. DEPTH

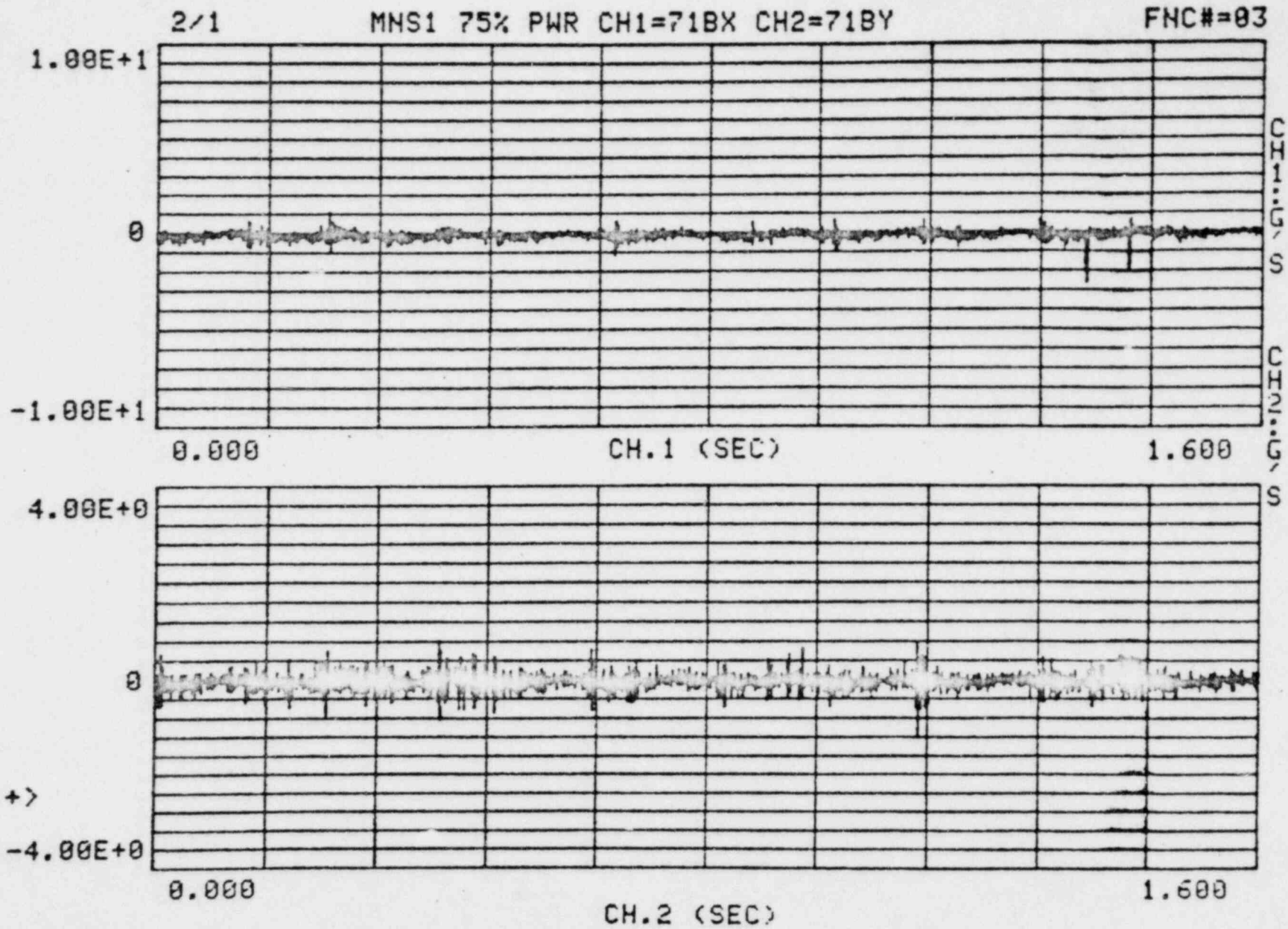


A-1 Gun
Accelerator - Top View
Figure 2

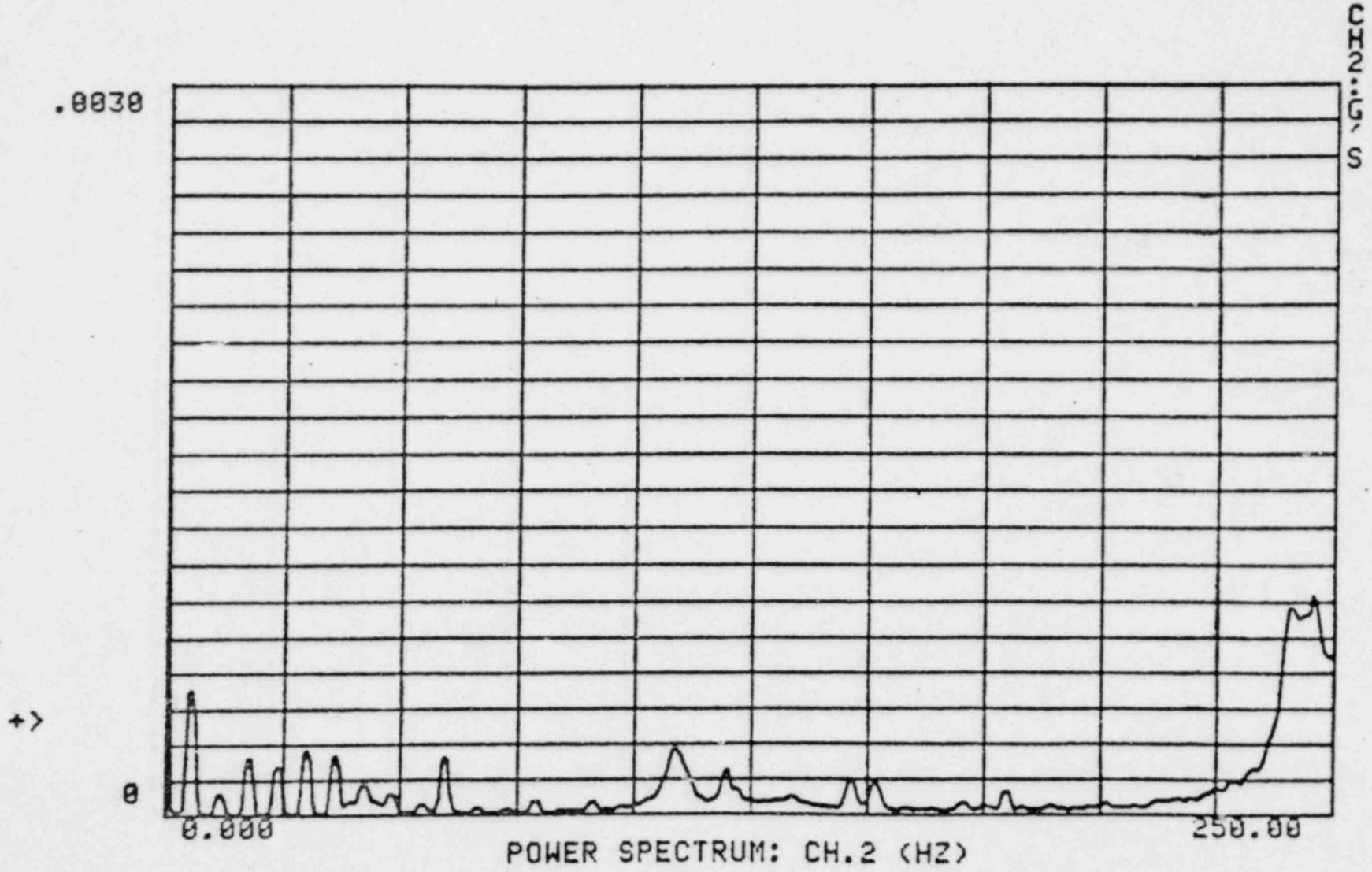


Mezzanine
Accelerometer Locations
Elevation View
Figure 3


2/1
MNS#1 75% PWR CH1=71BX CH2=71BY
FNC#=03
2.00E+1
0
-2.00E+1
CH1..G'S
CH2..G'S
0.000
CH.1 (SEC)
.2000
8.00E+0
0
+)
-8.00E+0
0.000
.2000
CH.2 (SEC)


2/1
MNS1 75% PWR CH1=71BX CH2=71BY
FNC#=03
1.00E+1
0
-1.00E+1
CH1..G'S
CH2..G'S
0.000
CH.1 (SEC)
1.600
4.00E+0
0
+>
-4.00E+0
0.000
1.600
CH.2 (SEC)

2/1 MNS #1 65% PWR. 71BY 3/19/82 #AVGS=150 FNC#=24



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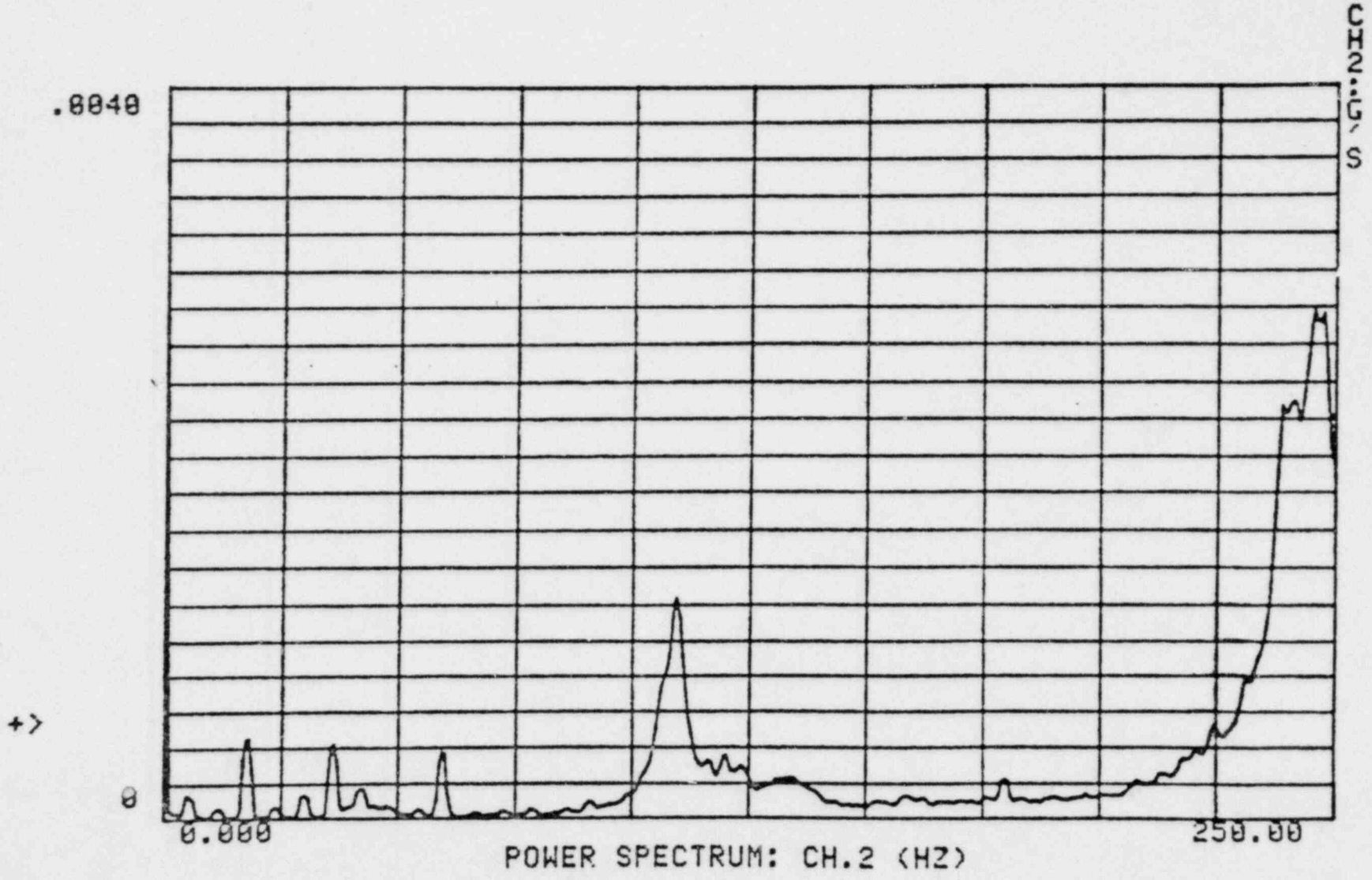
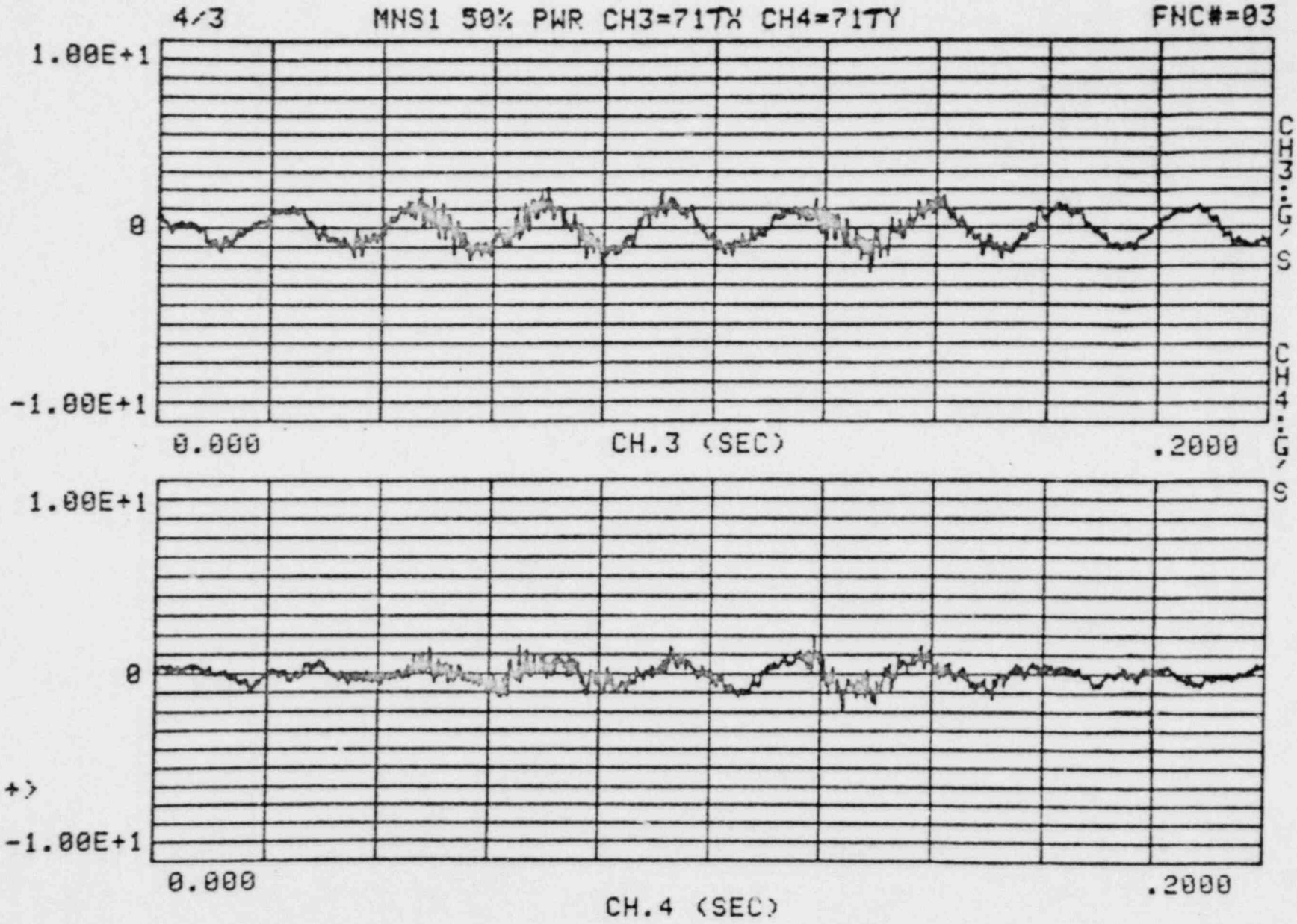
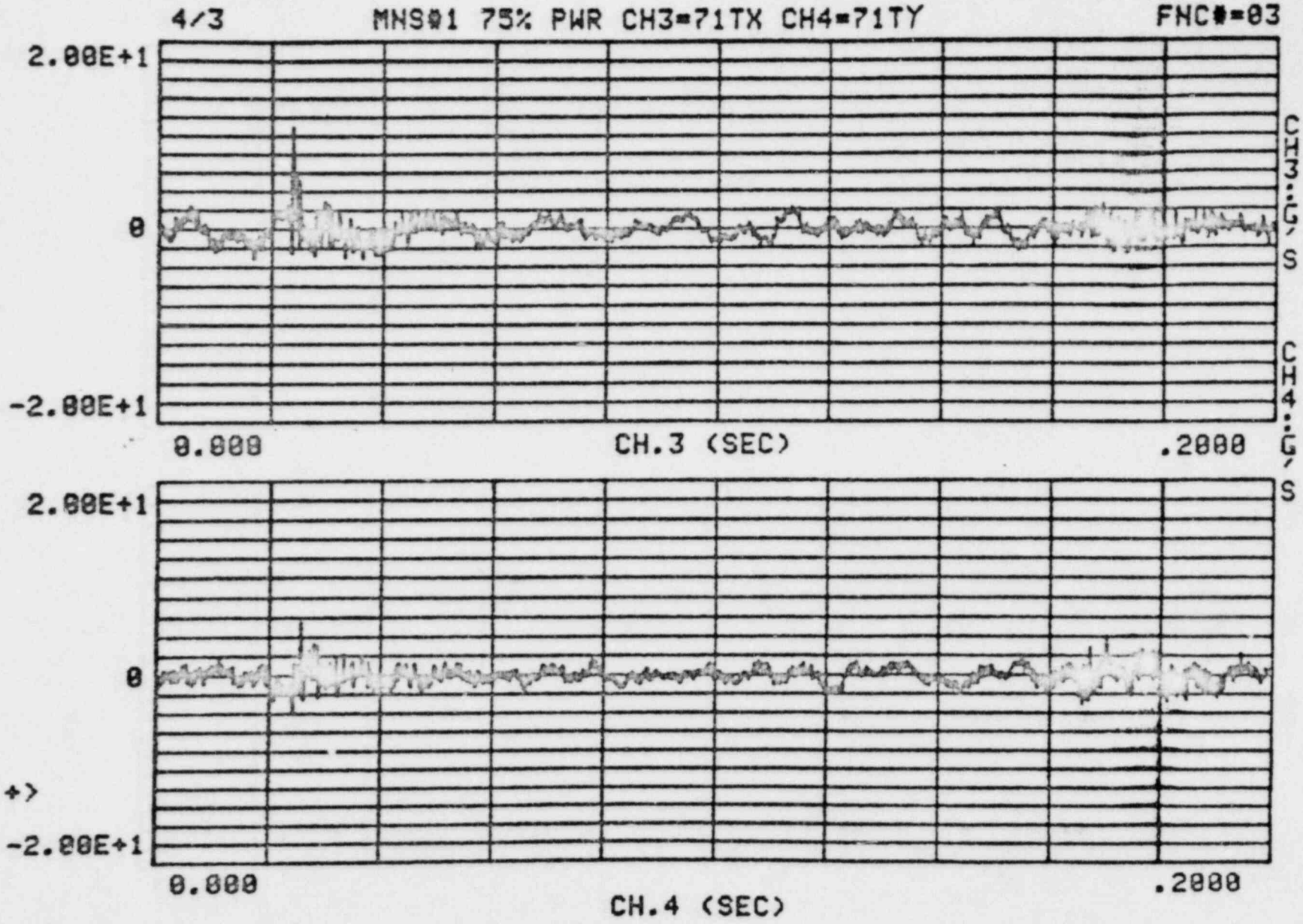
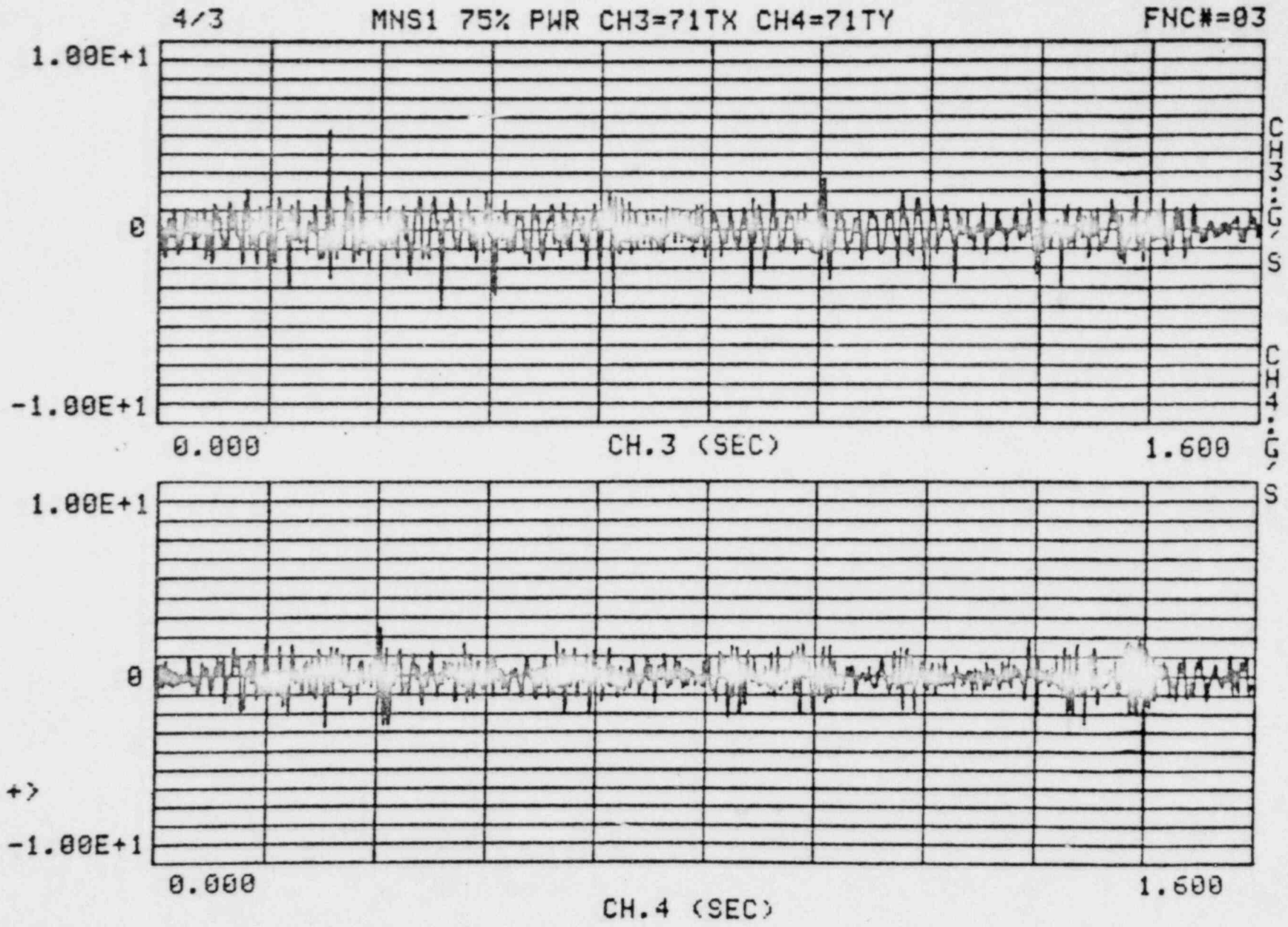
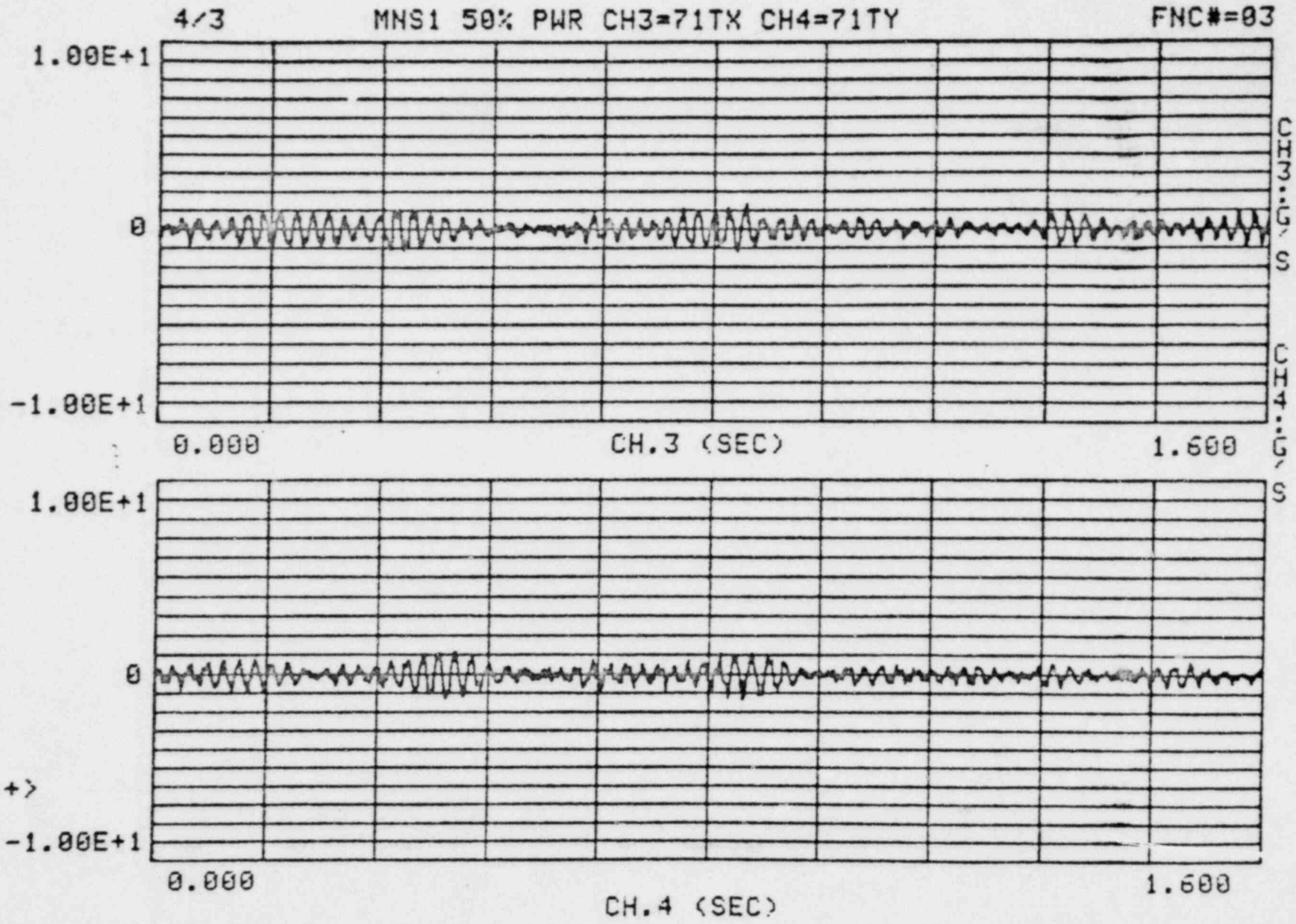


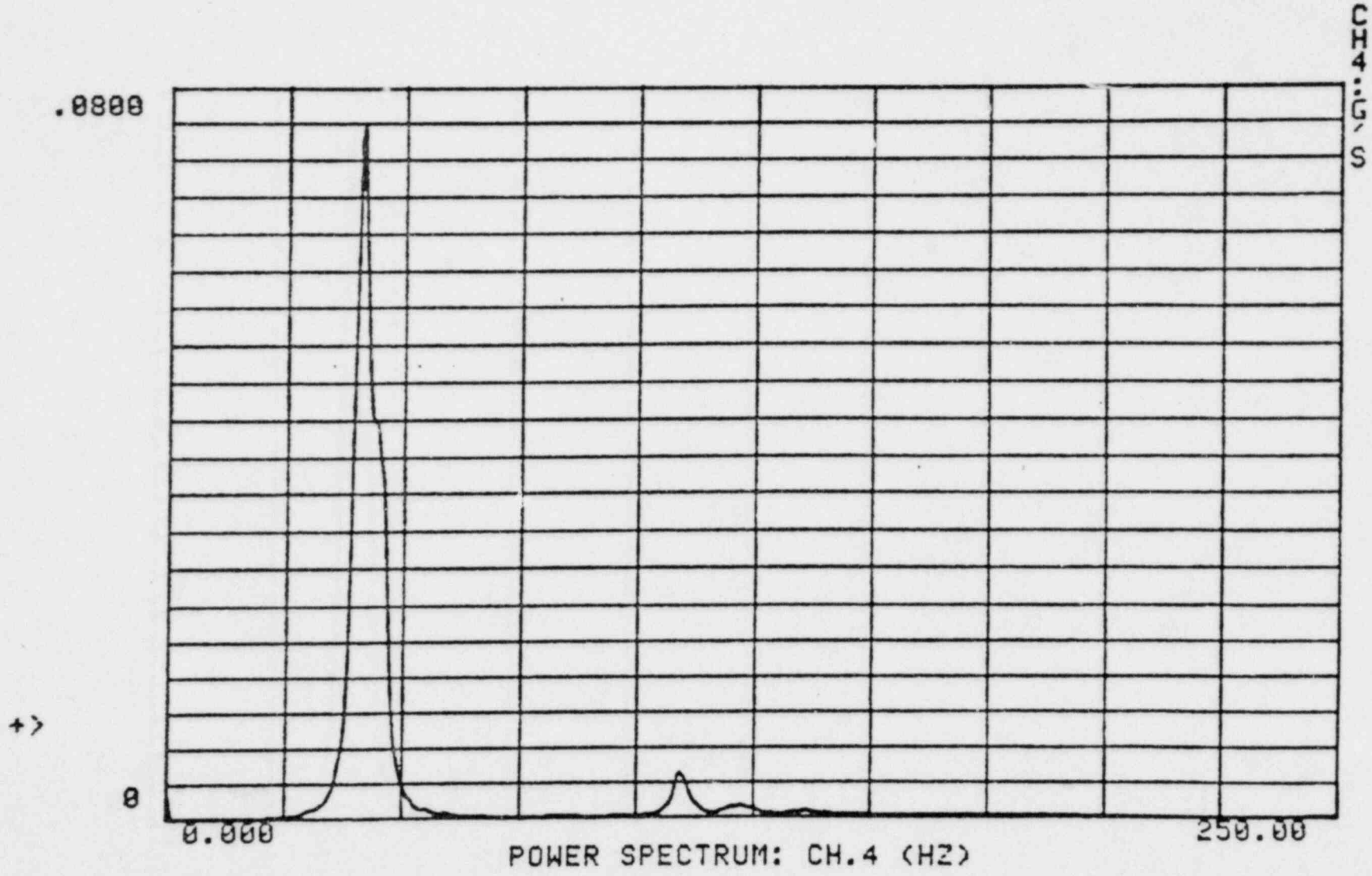

4/3
MNS1 50% PWR CH3=71TX CH4=71TY
FNC#=03
1.00E+1
0
-1.00E+1
0.000
CH.3 (SEC)
.2000
CH3:G'S
CH4:G'S
1.00E+1
0
+)
-1.00E+1
0.000
.2000
CH.4 (SEC)


4/3
MNS01 75% PWR CH3=71TX CH4=71TY
FNC#=03
2.00E+1
0
-2.00E+1
0.000
CH.3 (SEC)
.2000
CH3:G'S
CH4:G'S
2.00E+1
0
+>
-2.00E+1
0.000
CH.4 (SEC)
.2000


4/3
MNS1 75% PWR CH3=71TX CH4=71TY
FNC#=03
1.00E+1
0
-1.00E+1
0.000
CH.3 (SEC)
1.600
CH3..G'S
CH4..G'S
1.00E+1
0
+>
-1.00E+1
0.000
CH.4 (SEC)
1.600


4/3
MNS1 50% PWR CH3=71TX CH4=71TY
FNC#=03
1.00E+1
0
-1.00E+1
0.000
CH.3 (SEC)
1.600
CH3..G'S
CH4..G'S
1.00E+1
0
+>
-1.00E+1
0.000
1.600
CH.4 (SEC)

4/1 MNS #1 50% PWR. 71TY 3/19/82 #AVGS=150 FNC#=24



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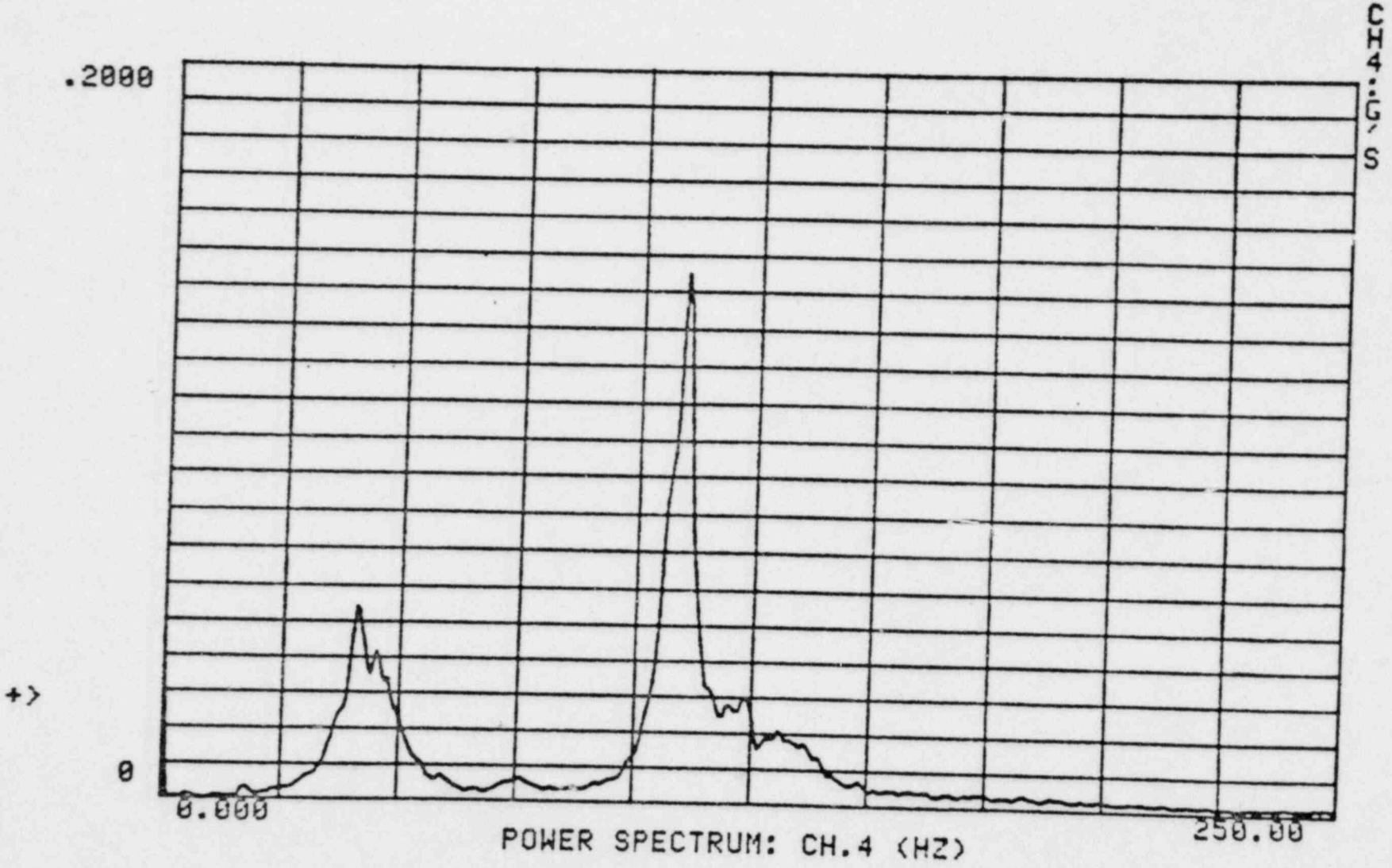

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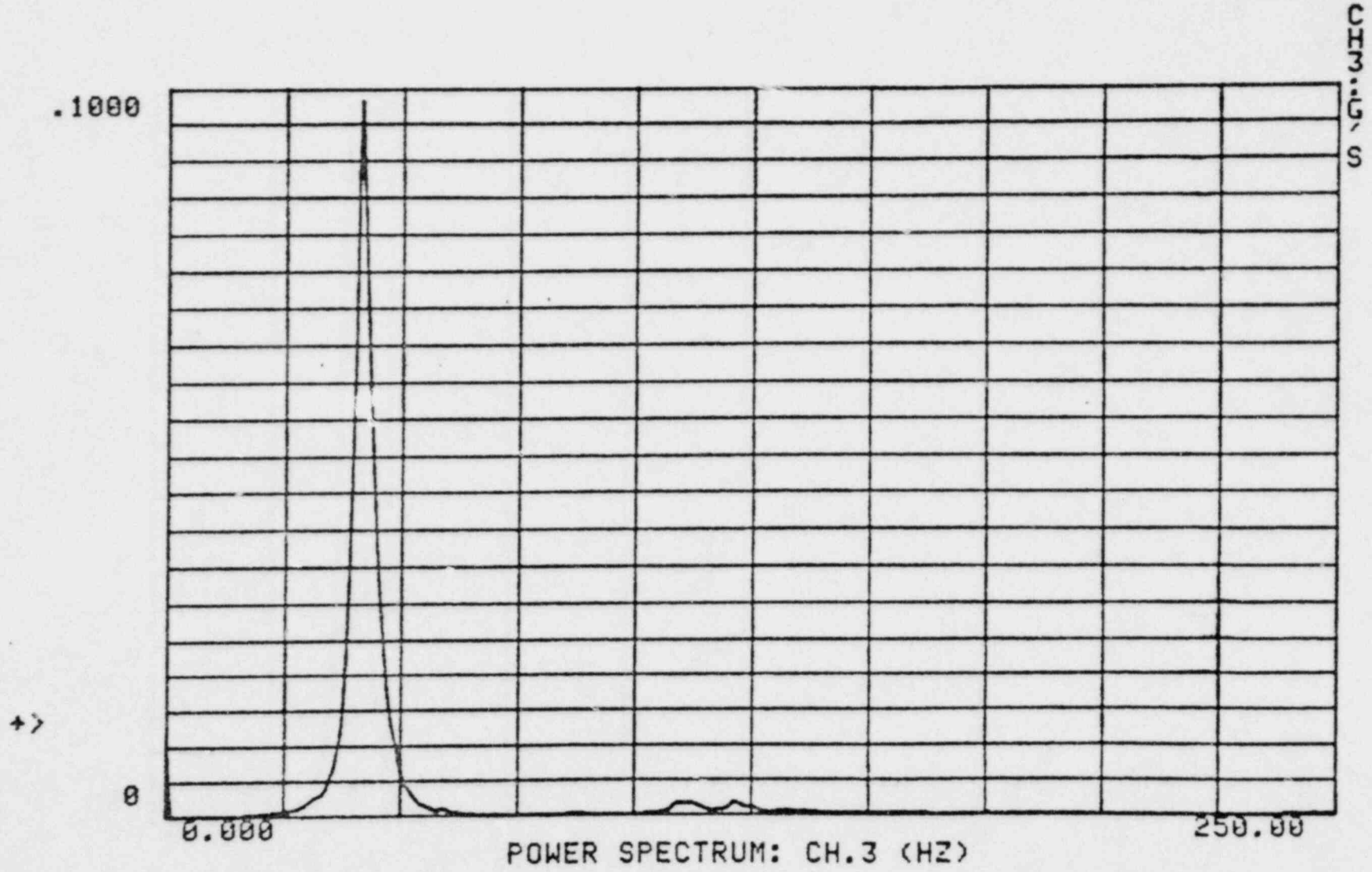
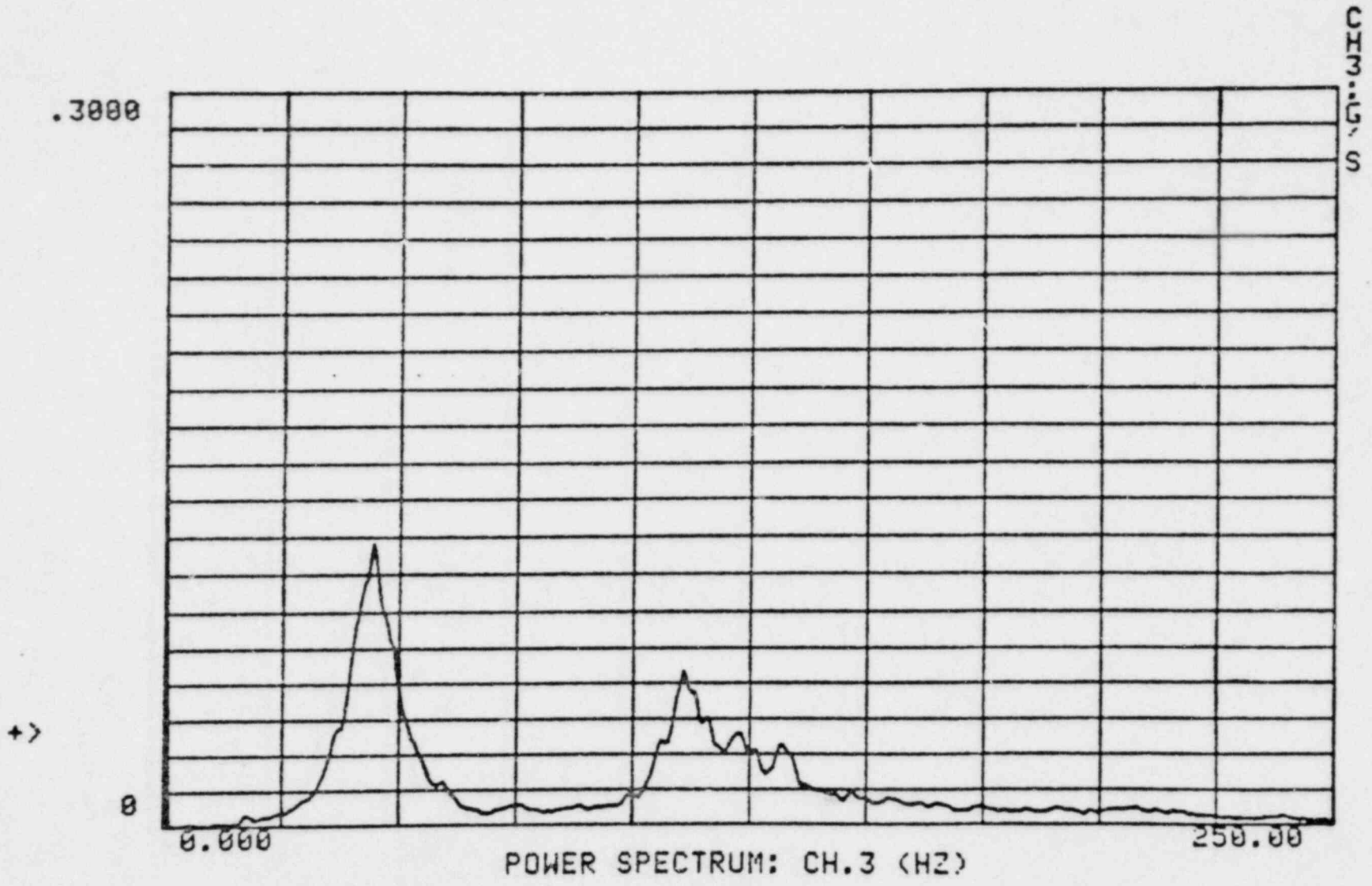


3/1 MNS 1 75% PWR. 71TX 3/19/82 #AVGS=150 FNC#=24



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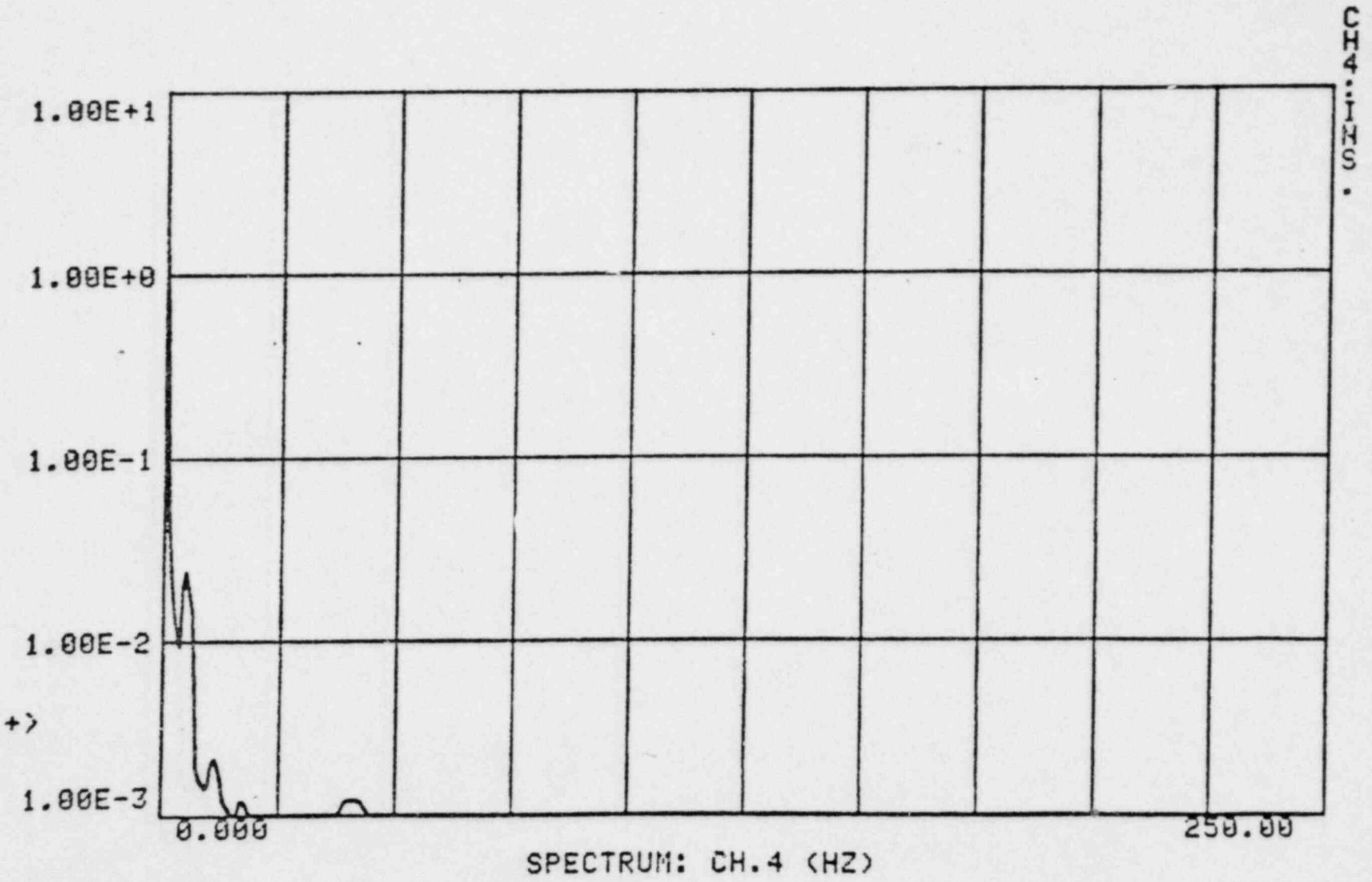
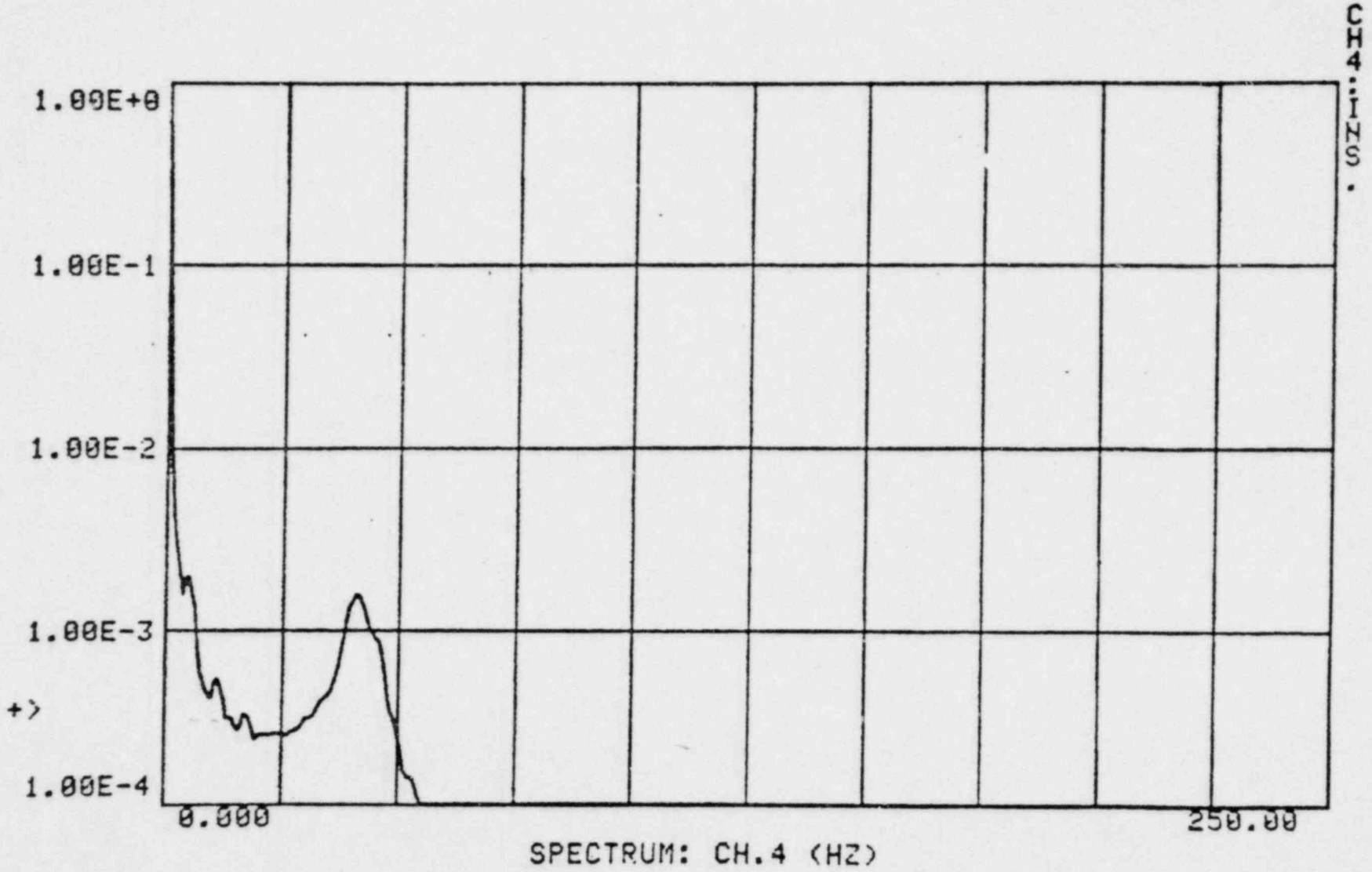
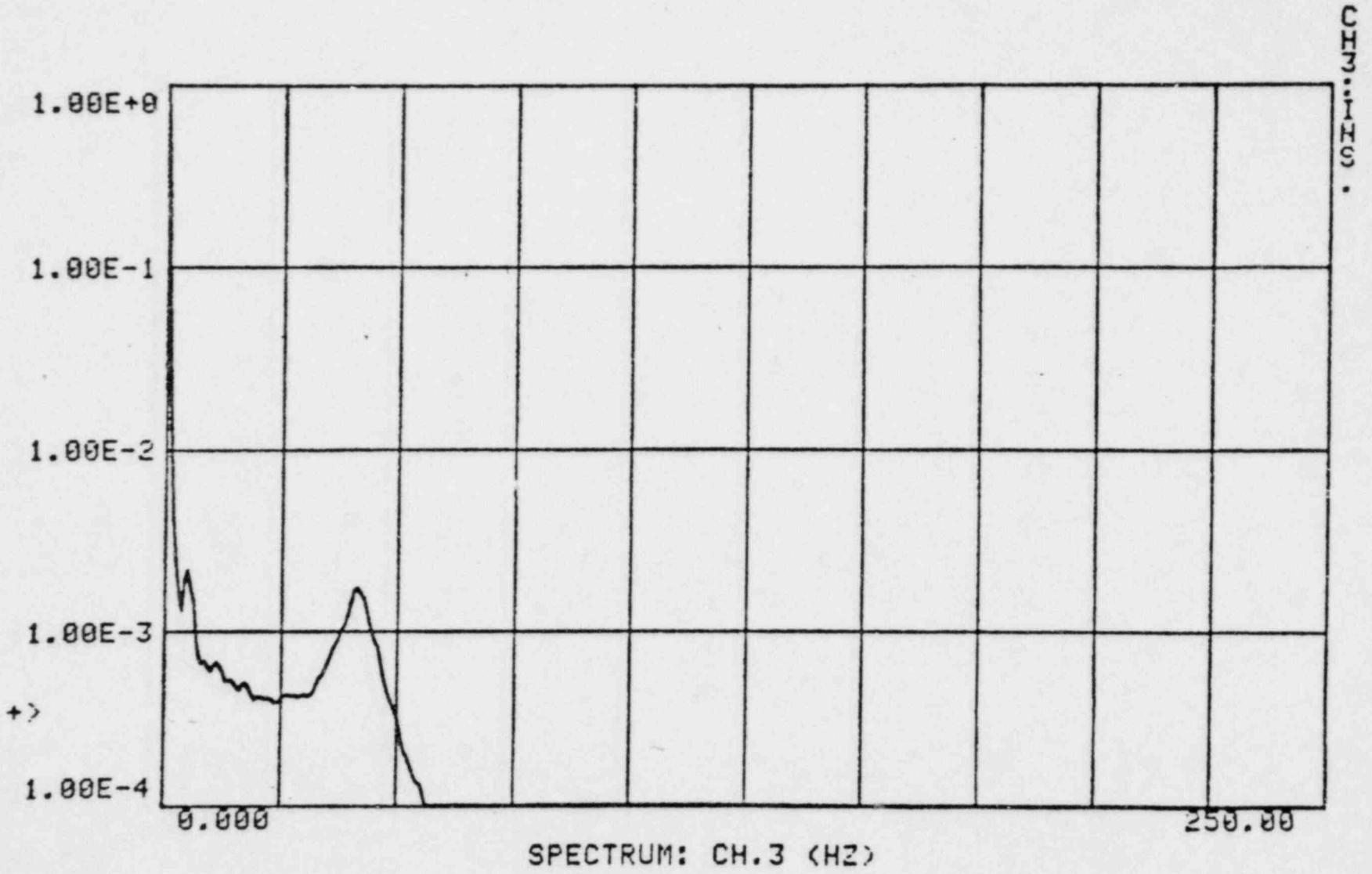


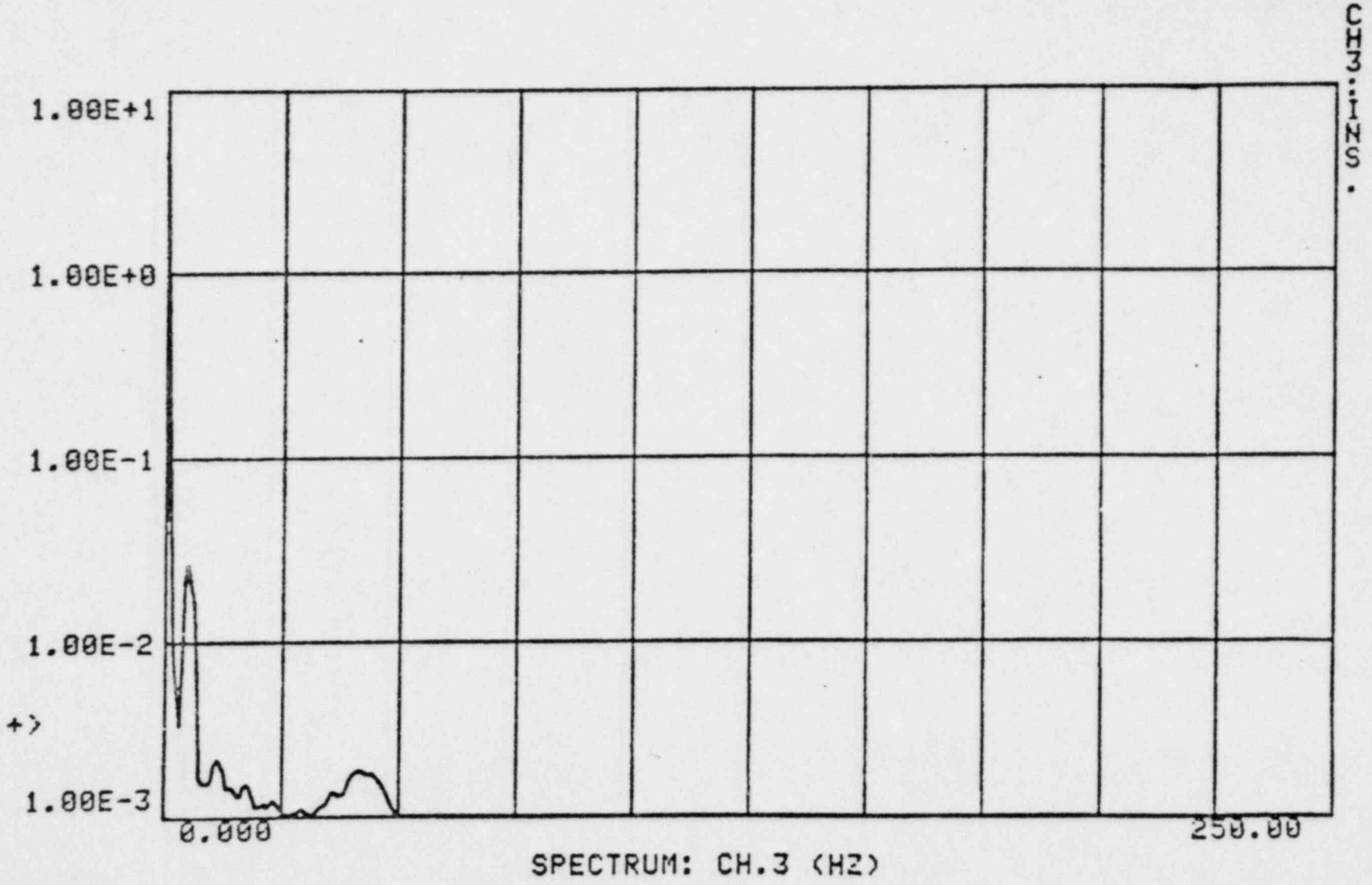
4/3 MNS#1 50% PWR. 71TY 3/19/82 #AVGS=100 FNC#=20



4/3 MNS#1 50% PWR. 71TX 3/19/82 #AVGS=100 FNC#=19



4/3 MNS#1 75% PWR. 71TX 3/19/82 #AVGS=115 FNC#=19



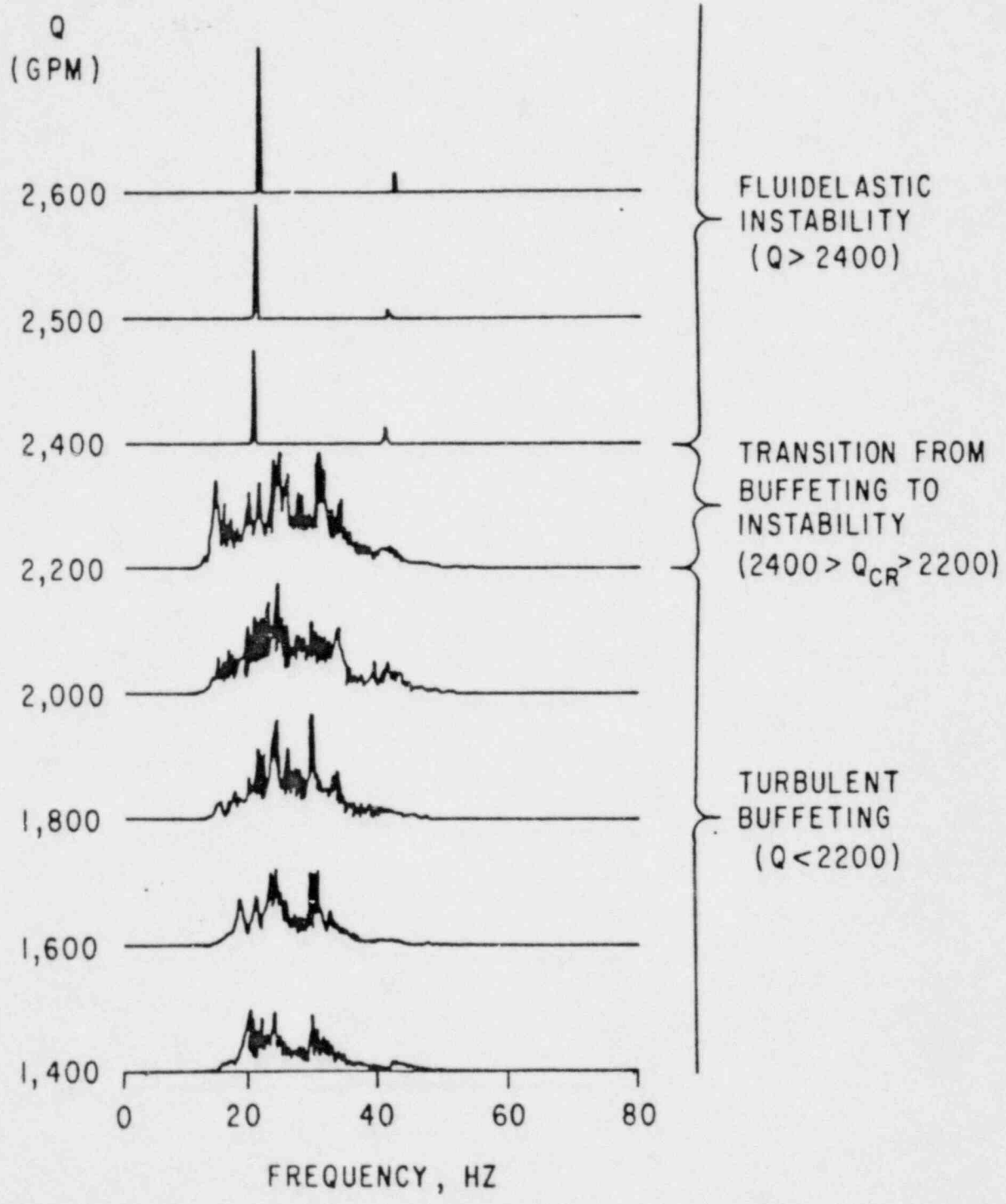


Fig. 5. Tube response PSDs for various shellside flowrates (ordinate not to scale)

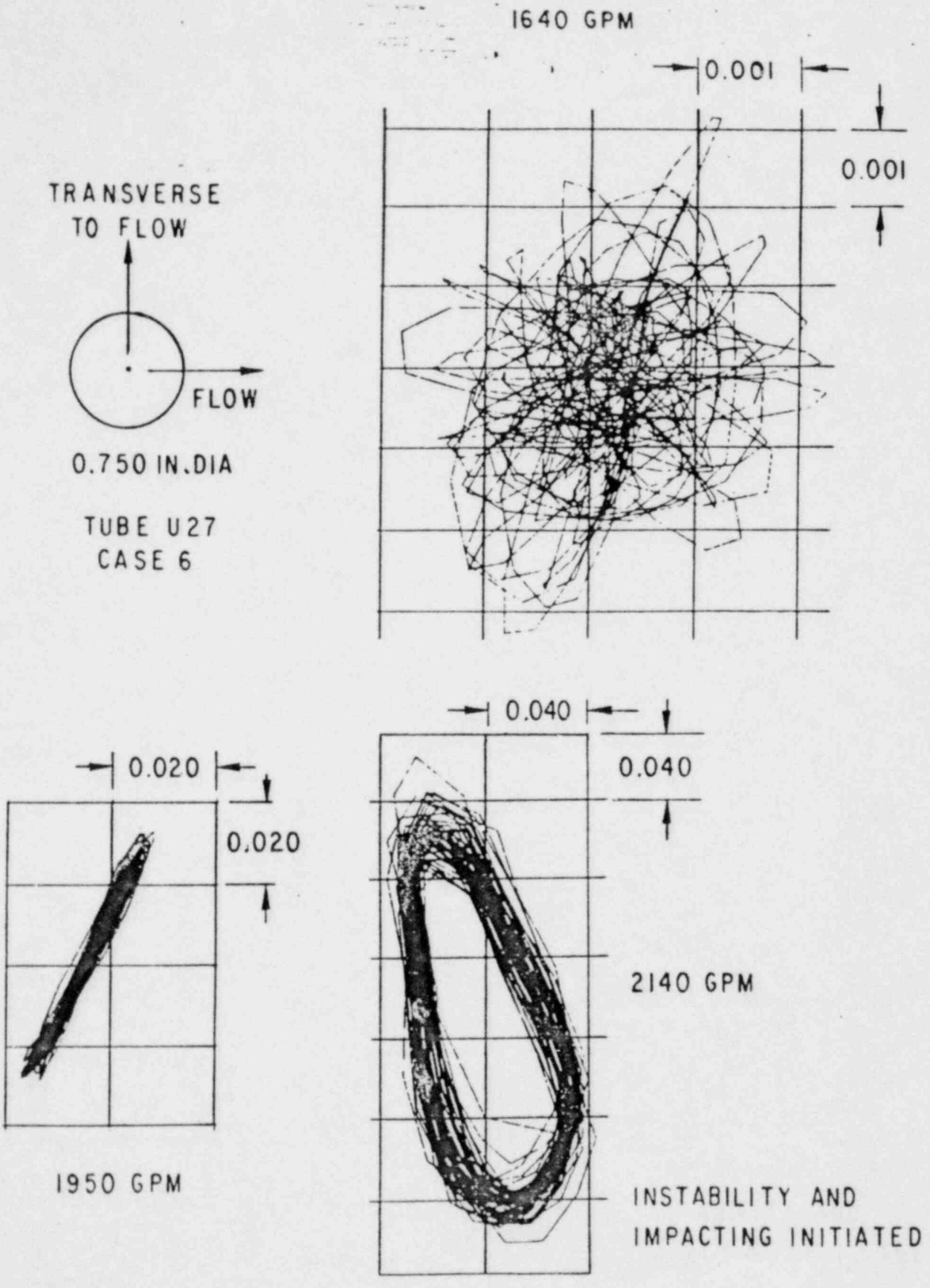


Fig. 13. Tube vibration patterns

CONCLUSIONS

- UPPER BOUND FOR MAXIMUM DEFECT IN McGUIRE IS 4×10^{-4} CUBIC INCHES AFTER 324 OPERATING HOURS AT OR ABOVE 75 PERCENT POWER

- UPPER BOUND ON ADDITIONAL WEAR INCURRED DURING 30 DAYS AT 75 PERCENT RESULTS IN DEFECT DEPTH OF 10 MILS (23 PERCENT)

- NO EVIDENCE OF FLUIDELASTIC INSTABILITY OR LARGE AMPLITUDE VIBRATION AT 75 PERCENT POWER

- TUBE WEAR RATES ARE ZERO OR VERY SMALL AT POWER LEVELS UP TO AND INCLUDING 75 PERCENT

- THERE IS NO SAFETY CONCERN, NOR WILL THERE BE ANY LONG TERM ADVERSE EFFECTS, WITH OPERATION FOR 30 DAYS AT 75 PERCENT POWER

Future Actions

~ May 15, 1982	Increase Power to 75%
June 14, 1982	Reduce power to 50% (720 hrs at 75%)
~ June 18, 1982 (NLT July 4, 1982)	Shutdown - ECT all S/G's
~ Mid July	Return to power (75% for ? hours depending on results of ECT, 50% until ready to shutdown)
-- --	Shutdown, ECT
-- --	Return to power

Continue operate, shutdown, ECT as long as necessary until modification installed.