

CHAPTER 4 MAINTENANCE

4.1 TABLE OF MAINTENANCE CHECKS

Item	Weekly	Monthly	Biannually	Annually	Increased check frequency	Remarks
Resolution adjust	○				○	Sect. 3.4
Cleaning top of magnet console					○	Sect. 4.2.3
Sample tube cleaning					○	Sect. 4.2.4
Probe cleaning			○		○	Sect. 4.2.5
Exchanging air filters				○		Sect. 4.2.6
Recorder pen cleaning		○			○	Sect. 4.2.7
Recording panel cleaning		○			○	Sect. 4.3
Sweep width correction					○	Sect. 4.5
Check of hose clamp between compressor and magnet console					○	

4.2 PARTS TO BE CLEANED

4.2.1 CONSOLE COVER

Wipe the surface of the cover with a soft cloth, such as gauze, soaked in soapy water. Do not, however, use alcohol, acetone, thinner or carbon tetrachloride for this purpose, since either will peel the paint from the surface. In case of severe contamination, gently wipe the surface with a 50% alcohol/water solvent.

4.2.2 PANEL

Wipe the panel with gauze soaked in soapy water.

4.2.3 TOP OF MAGNET CONSOLE

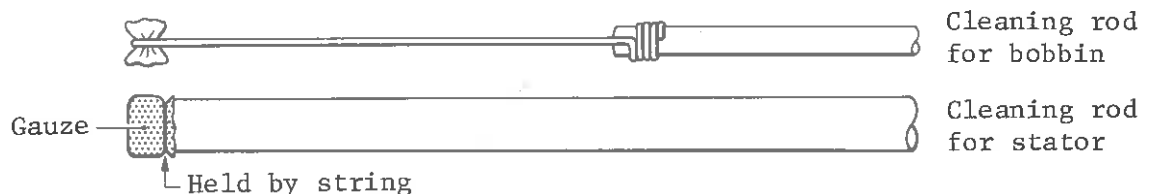
Keep the top clean of dust and grime. Dirt on top of the magnet may enter the probe, adversely affecting spinning.

4.2.4 SAMPLE TUBE AND ROTOR

Especially care should be taken to ensure that the sample tube and rotor are kept free from contamination. A piece of gauze should be used for this purpose. But in cases of severe contamination, use gauze soaked in carbon tetrachloride to clean the outer walls. If this step is neglected, dust and oil adhering to the walls may lead to a generation of abnormal signals, a deterioration of resolution, and rotation problems.

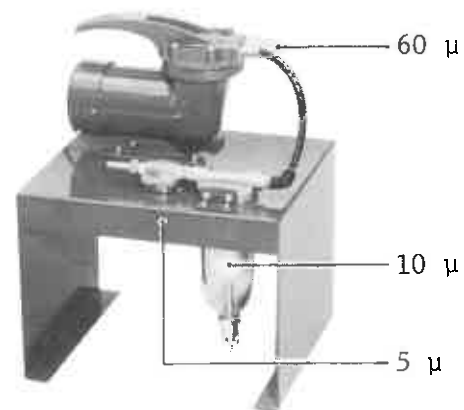
4.2.5 PROBE

Since probe contamination may result in a deterioration of resolution and rotation problems, wrap a piece of gauze around the tip of the cleaning rod, soak it in clean carbon tetrachloride, insert it through the sample tube inlet and wipe the inside of the probe. The probe is equipped with two cleaning rods, one of which is used to clean the bobbin. Always verify that the tip of the cleaning rod touches the bottom of the probe. Then wipe the bobbin. The other cleaning rod is used to clean the stator. When the top of the stator turns black with contamination, cover the tip of the cleaning rod with a piece of gauze, secure it with a piece of string, soak in tetrachloride and proceed to wipe the stator.



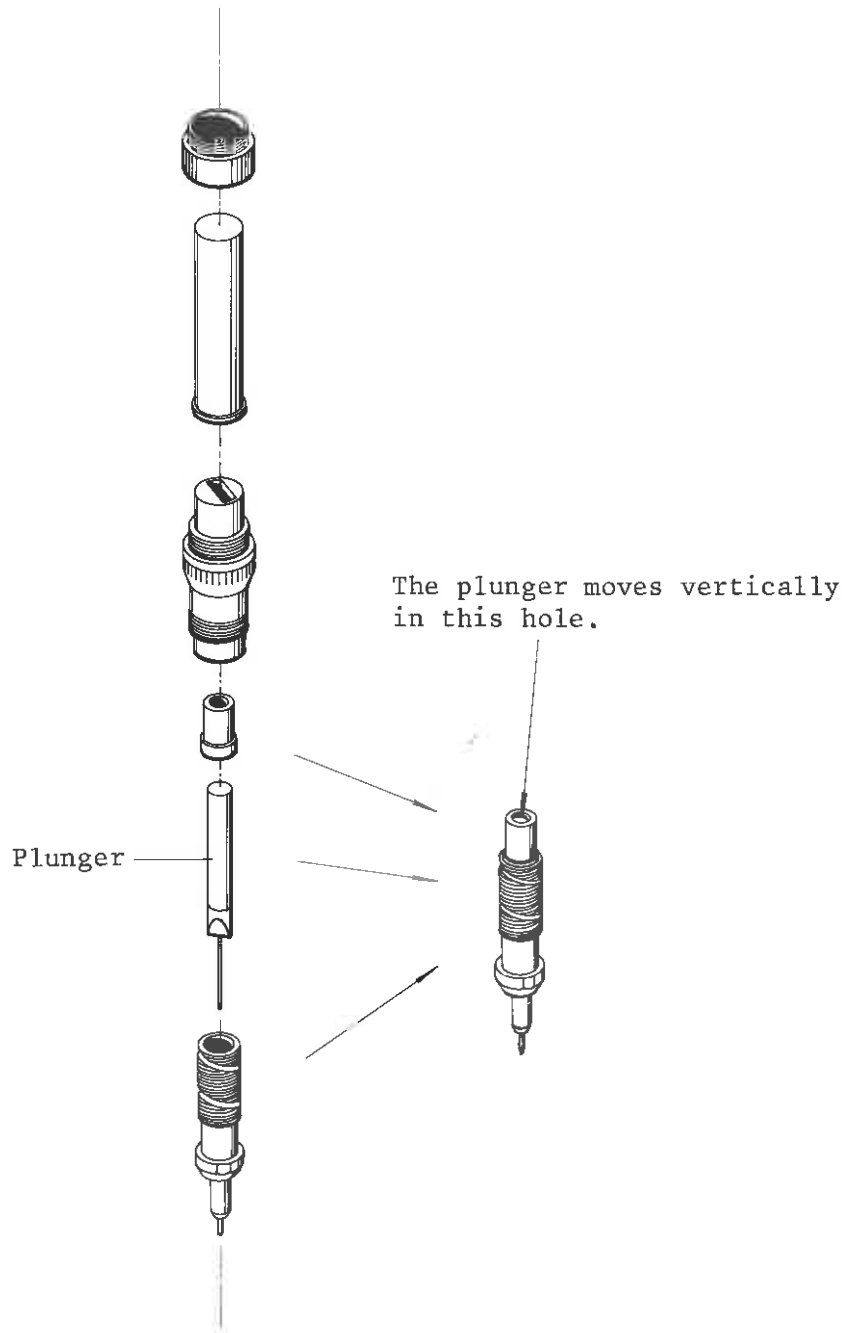
4.2.6 AIR FILTERS

The filters are to be replaced whenever they become black or if they have not been replaced for a year. The 60 μ air filter is located at the inlet of the air compressor and the other two, the 10 μ and 5 μ filters, on the rear of the air compressor.



4.2.7 RECORDER CARTRIDGE PEN

At the end of each day, remove the pen from the recorder and put the cap on. Before mounting the pen on the recorder, shake it vertically. The movement of the plunger should be felt. If it is not felt, it is plugged with ink, necessitating a cleaning. (The plunger should move freely.) Take great care when disassembling it and washing it with cold or warm water.



4.3 RECORDER MAINTENANCE

1. Since the recorder is extremely susceptible to dust keep it covered with the vinyl dust cover when not in use.
2. Use clean gauze to remove dirt from the surface of the recording panel. In this case, work the gauze so that the dirt is brought towards the center. Take care not to allow any dirt to drop onto the X-axis potentiometer. If the recording panel is heavily contaminated, use a neutral detergent (Do not use organic solvent.)
3. Do not perform pen up/down operations when there is no chart paper on the recording panel. Otherwise, the electrostatic gripping action may be lost.
4. Insufficient gain and/or potentiometer contamination can be considered in cases where the pen does not move smoothly. To correct the problem, call your JEOL service station.

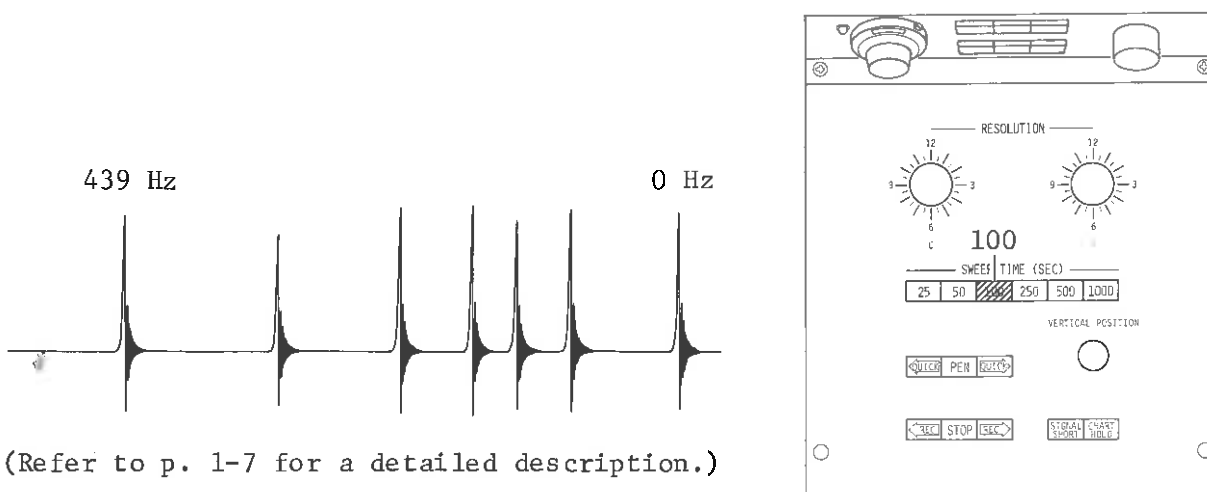
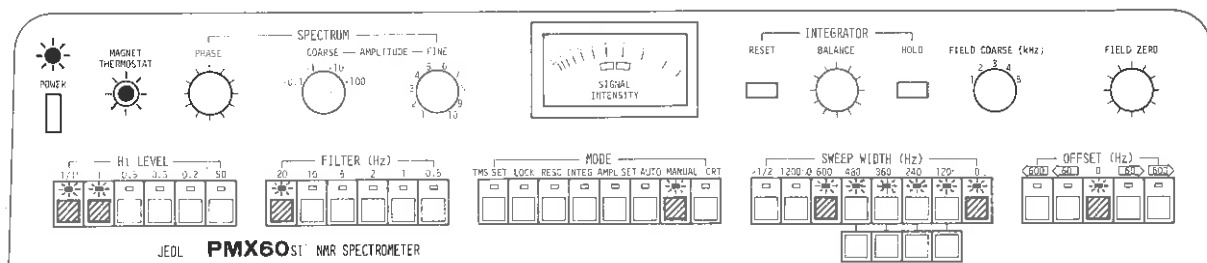
Note: For a detailed description of recorder maintenance, refer to the separate X-Y recorder instruction manual.

4.4 INSTALLATION ROOM CLEANLINESS

Since the PMX60SI causes background signals, it is highly sensitive to dust. Therefore, the installation room must be kept clean at all times.

4.5 SWEEP WIDTH CORRECTION

Make the correction where horizontal axis (signal) drift is negligible. Use a mixed sample and push the following keys.



The rating must be within 439 Hz $\pm$ 1 Hz. Adjust resistor VR22 (on spectrometer printed board) when this value is exceeded.



CHAPTER 5 TROUBLESHOOTING AND COUNTERMEASURES

5.1 ABSENCE OF SIGNALS

- (a) Confirm that all steps in Sect. 3.3 have been carried out.
- (b) Does the noise decrease and increase when the AMPLITUDE COARSE knob is turned left and right? Check this on both the recorder and oscilloscope.
- (c) Has the POWER switch been on for at least three days?
- (d) Was there a power failure of 1 ~ 2 days?
- (e) Is the lamp in the sample tube inlet on?
- (f) Touch the motor cover, which is located on the lower left of the magnet console, so as to check for vibration.

Verify the above and contact JEOL.

5.2 DETERIORATION OF RESOLUTION

- (a) Confirm that all steps in Sect. 3.4 have been carried out.
- (b) Confirm that the sample tube is rotating smoothly. Is it spinning too fast? 30 to 40 Hz is optimum (see Sect. 3.5).
- (c) Are the RESOLUTION Y and C knobs turned fully clockwise or counter-clockwise? If so, set them to the intermediate position, lift the cover of the resolution control unit and adjust the coarse RESOLUTION CONTROL Y and C knobs. Finally, raise the resolution with the RESOLUTION Y and C knobs.
- (d) Since the detection coil may be dirty, clean it in accordance with Sub-sect. 4.2.4.

5.3 LARGE SPINNING SIDEBANDS

- (a) Check the steps given in Sect. 3.6.
- (b) If the RESOLUTION CONTROL unit Z, X and YZ knobs are at the 0 or 10 position, contact JEOL.

5.4 POOR SIGNAL REPRODUCIBILITY (HORIZONTAL DRIFT)

5.4.1 SINGLE DIRECTION DRIFT

- (a) Has the POWER switch been on for at least three days?
- (b) Was there a power failure of 1 ~ 2 days?
- (c) Touch the motor cover, which is located on the lower left of the magnet console. Can vibration be discerned?
- (d) Is the instrument directly exposed to the sun's rays?
- (e) Is there a pronounced change in the room temperature over a 24-hr. period? (With an increase in temperature, the signal drifts to the right. When it decreases, the shift is to the left.)
- (f) Has the sample tube been pre-heated in the SAMPLE STORAGE bin for at least 5 min?
- (g) When there is drift to the left, confirm that at least 20 min. have elapsed following compressor switch-on.

5.4.2 RANDOM DRIFT

- (a) Does fluctuation of the 100 V power supply exceed $\pm 10\%$?
- (b) Are there any mobile magnetic objects (elevators, autos, trains) near the instrument? Or is a magnetic field being generated by an electric magnet, a mass spectrometer or an ESR instrument?

JEOL (Europe) S.A.

Svc. A.I.D. 1/2

PARC TECHNOLOGIQUE CLAUDE MONET
Allée de Giverny - Bâtiment D
78290 CROISSY SUR SEINE (FRANCE)

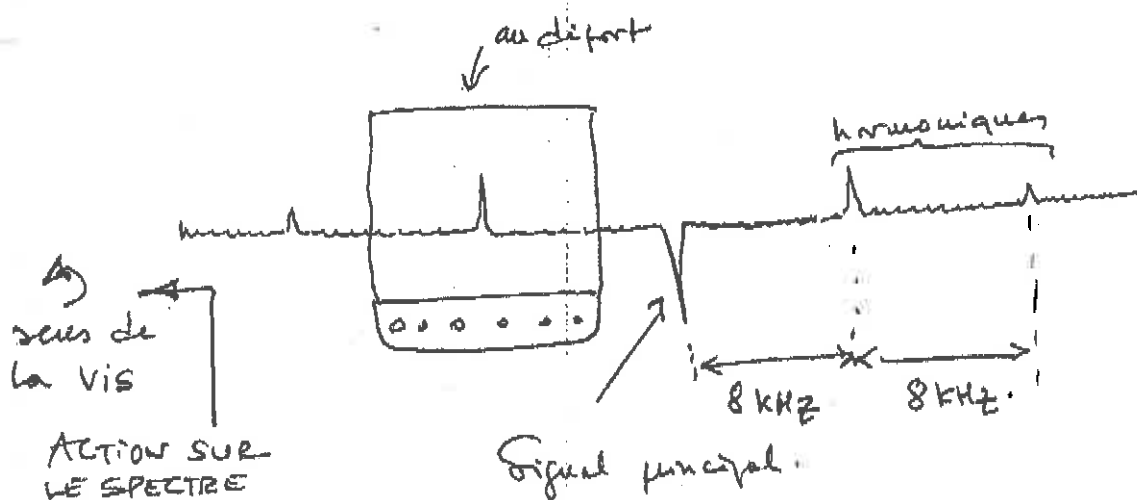
L. DE LUCA
O. SEGUIN
H. KUSHII
Fax:

(33) 01 30 15 37 32
01 30 15 37 33
01 30 15 37 34
01 30 15 37 27

DATE: 18 JUN 99.	TOTAL PAGE: 1 (including cover sheet) + 1.
TO: Mr LE GUANTON UCO ANGERS	FROM: L. DE LUCA E-mail: deluca@jeoleuro.com
YOUR REF:	OUR REF:
SUBJECT: Champ Magnétique sur Rux 602 (RHN)	

la Page suivante vous donne la marche à suivre.
N'hésitez pas à me appeler au 06 08 47 21 00.

Ce que vous verrez sur l'oscilloscope:
(hypothèse du paragraphe 8-).



A bientôt,

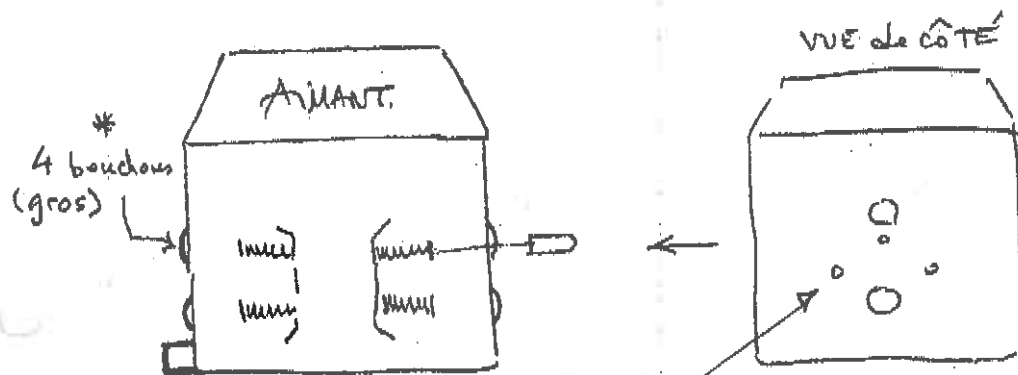
QD-L

2/2

COMMENT RECENTRER LE CHAMP MAGNETIQUE SUR LE PMX60si

- 1- METTRE UN ECHANTILLON D'EAU PURE DANS LA SONDE. Faire tourner.
- 2- SE PLACER EN POSITION SWEEP 0-1200.
- 3- ALLUMER L'OSCILLOSCOPE ET LANCER CRT.
- 4- CENTRER LE SIGNAL A L'AIDE DE FIELD FINE. BIEN PHASER.
- 5- ENLEVER LE BOUCHON PLASTIQUE CORRESPONDANT A LA VIS QUE L'ON VEUT DEPLACER (CHOISIR CELLE QUI VOUS PERMET DE VOIR LE MIEUX LE SIGNAL SUR L'OSCILLOSCOPE).
- 6- INTRODUIRE UN TOURNEVIS PLAT (longueur 20cm environ) ET L'ENGAGER DANS LA VIS (vous rencontrerez peut-être un obstacle en cours d'introduction ; c'est un caoutchouc de protection. Si vous avez des difficultés, choisissez une autre vis). BIEN REPERER SUR LE TOURNEVIS (par une marque) DE COMBIEN IL EST ENFONCE DANS LE TROU (afin de revenir à la position initiale si besoin).
- 7- REGARDEZ BIEN LE SIGNAL SUR L'OSCILLOSCOPE.
- 8- SI VOUS TOURNEZ LA VIS VERS LA GAUCHE, LE SIGNAL SE DEPLACE VERS LA GAUCHE. COMMENCEZ PAR CETTE DIRECTION :
SI LE SIGNAL PRINCIPAL (le plus intense) EST DANS CETTE ZONE, IL APPARAÎTRA A L'ENVERS. SI UN AUTRE SIGNAL de même phase et plus petit que celui de départ APPARAÎT, VOUS ETES DANS LA MAUVAISE DIRECTION. REVENEZ EN ARRIERE.
- 9- ET FAITES COMME EN 8- DANS L'AUTRE SENS.
- 10- LORSQUE LE SIGNAL PRINCIPAL APPARAÎT, CONTINUEZ A CENTRER LE SIGNAL AVEC LA VIS EN METTANT LE BOUTON FIELD COARSE SUR UNE POSITION MOYENNE (2 ou 3) AFIN DE GARDER UNE MARGE DE REGLAGE QUAND VOUS UTILISEREZ LE SPECTROMETRE.
- 11- SI LE SIGNAL PRINCIPAL N'APPARAÎT PAS, REVENEZ AU POINT DE DEPART (6-). ET APPELEZ MOI.

N'OUBLIEZ PAS QU'UN TRES PETIT DEPLACEMENT DE LA VIS CORRESPOND A UN GRAND DEPLACEMENT DU CHAMP.
(1 TOUR COMPLET DE LA VIS CORRESPOND A ENVIRON 8 KHz, QUI EST LA DISTANCE ENTRE DEUX HARMONIQUES).



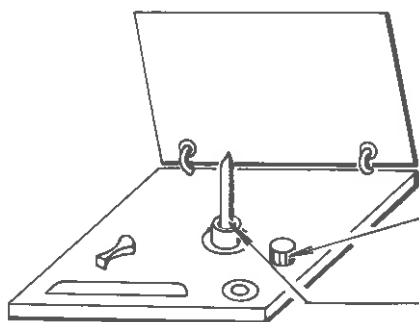
* Ne pas toucher aux ³ Petites bouchons (les trapezoides)

CHAPTER 6 PERFORMANCE TESTS

6.1 RESOLUTION TEST

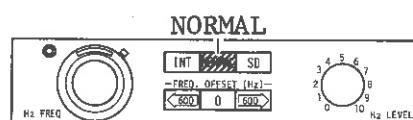
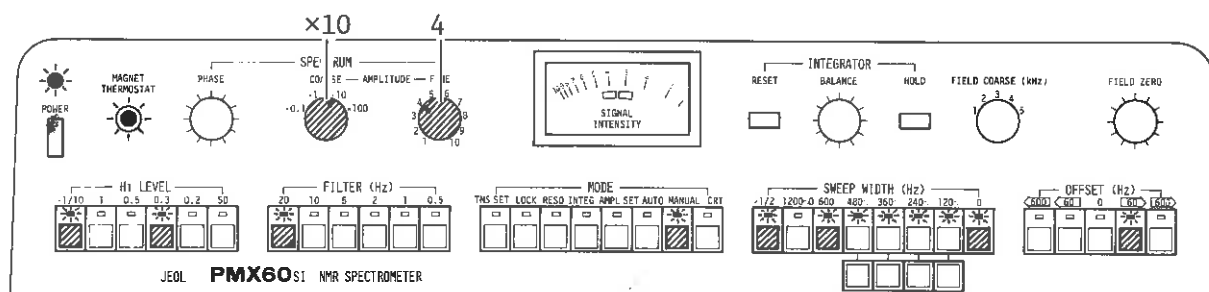
This test is used to show signal separation. Adjust the RESOLUTION CONTROL knobs under stable room temperature conditions.

Measurement conditions

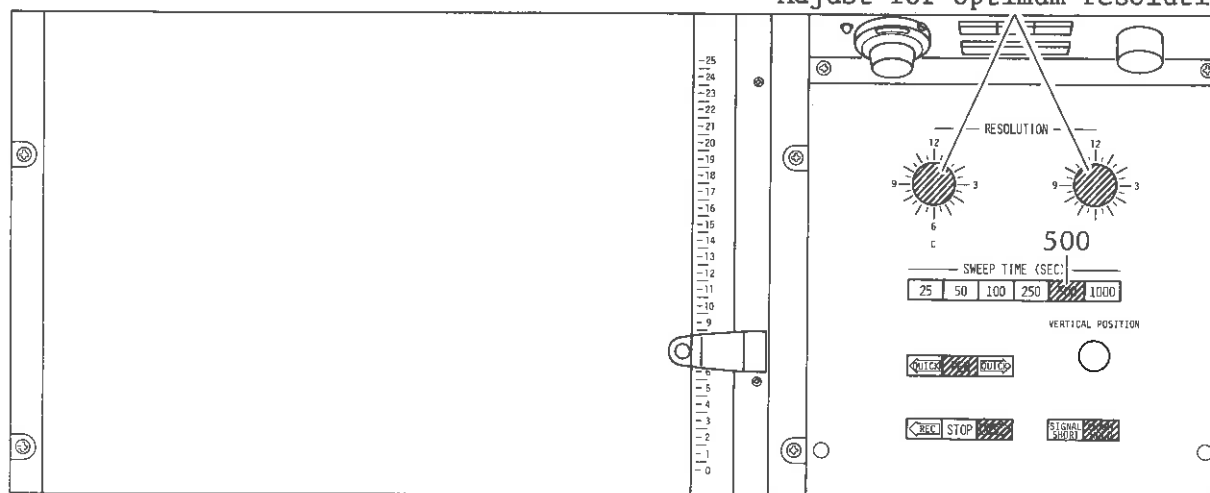


SPINNING CONTROL: 30 ~ 40 Hz

Standard sample: 20% acetaldehyde
(Optional, Parts No. 427000572)

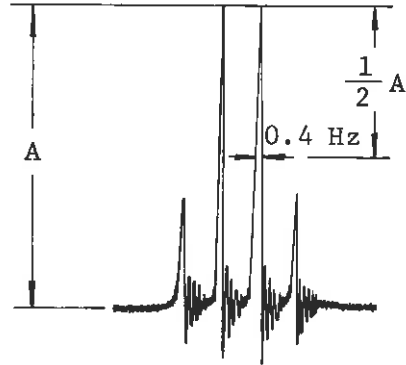


Adjust for optimum resolution.



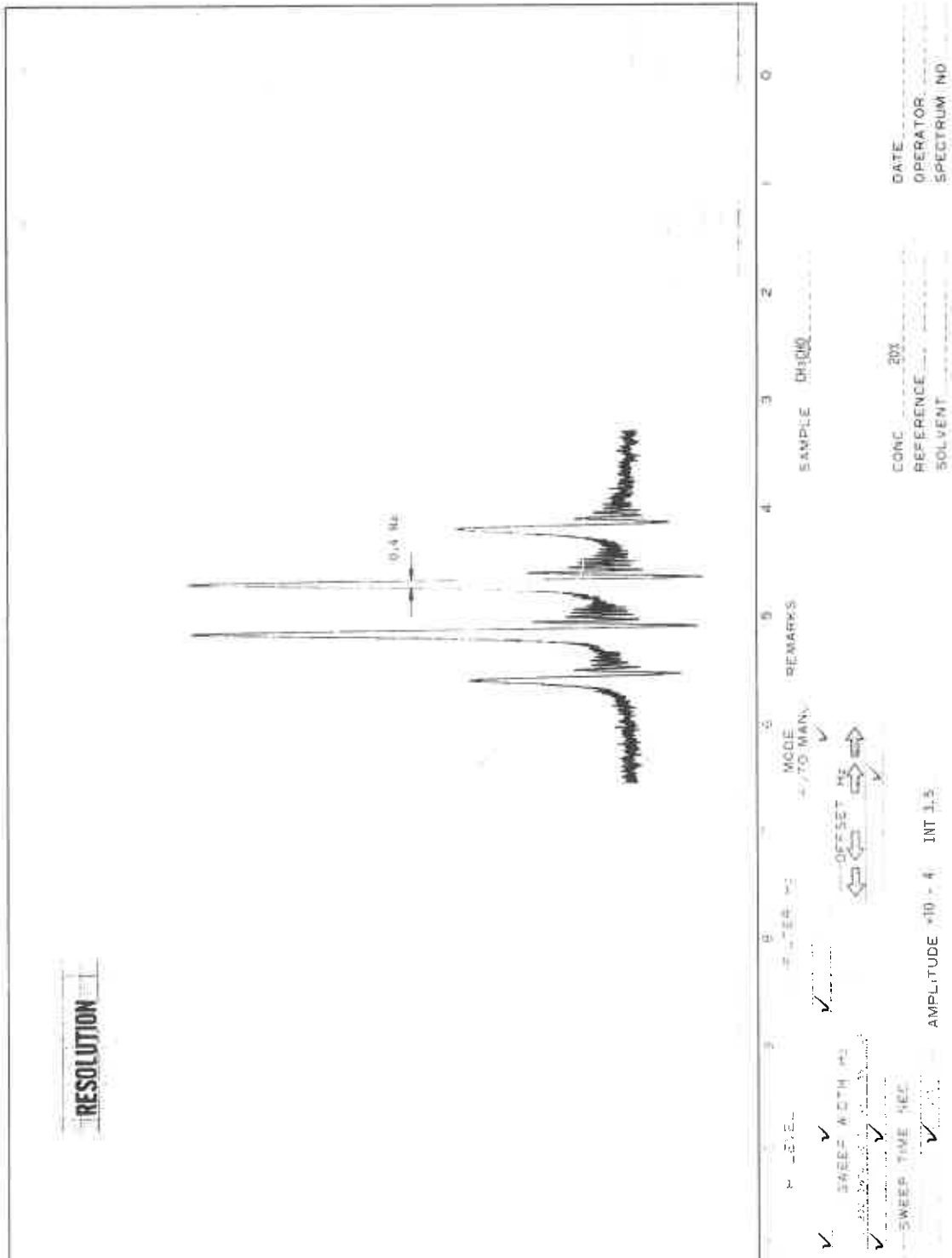
Evaluation

Record the CHO signal. The width of the signal half-way up the highest peak will be less than 0.4 Hz (2 graduations).



JEOL

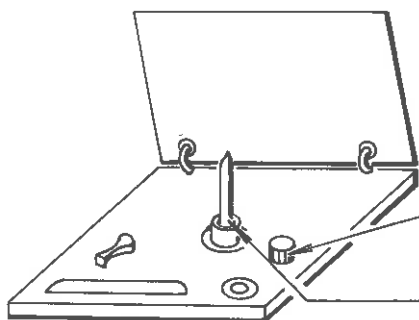
JNM PMX 60 NMR SPECTROMETER



6.2 STABILITY TEST (INTERNAL LOCK)

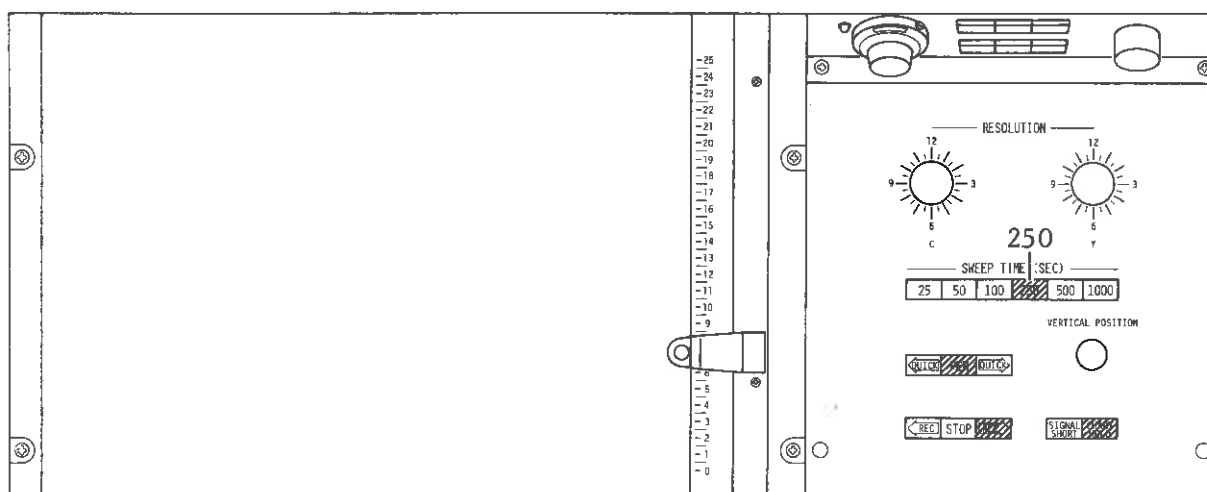
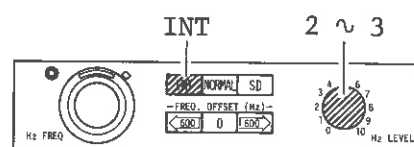
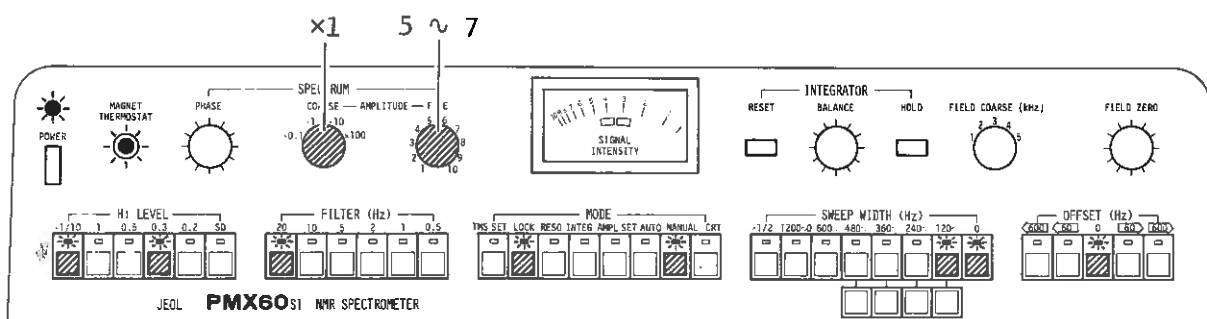
Verify reproducibility by means of this test.

Measurement conditions



SPINNING CONTROL: 30 ~ 40 Hz

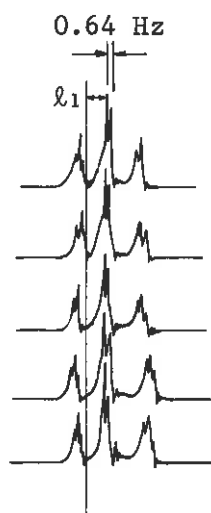
Standard sample: 90% ethylbenzene
(Optional, Parts No. 427000467)



Evaluation

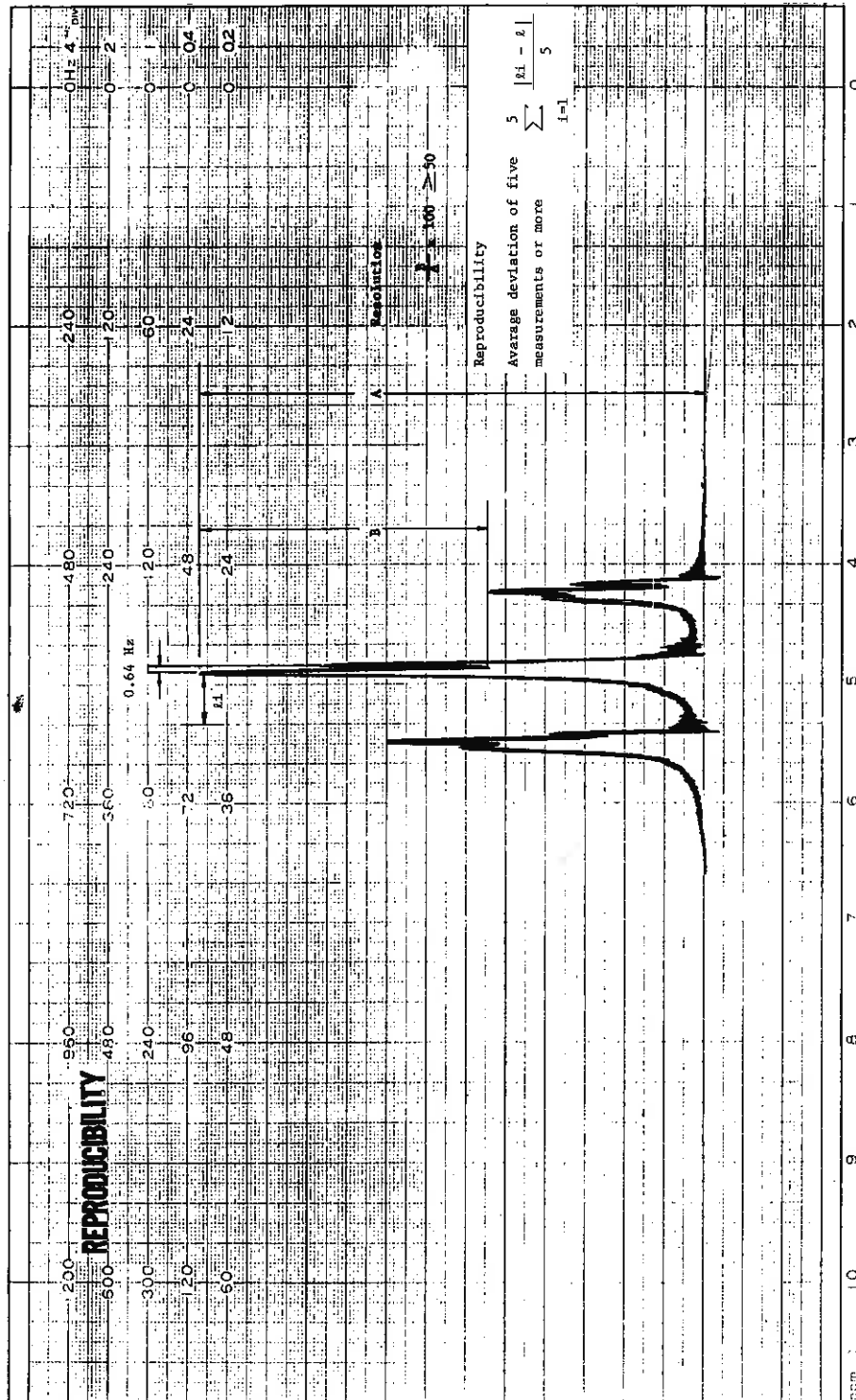
Record the CH₃ signal five times while changing the base line. The mean deviation of the signal recorded five times must satisfy the following formula.

$$\sum_{i=1}^5 \frac{|\ell_i - \bar{\ell}|}{5} \leq 0.2 \text{ Hz (Guaranteed)}$$



JEOL

JNM-PMX 60 NMR SPECTROMETER



SAMPLE CH₃ in Ethylbenzene

REMARKS

MODE AUTO, MANU

OFFSET Hz

FILTER Hz

SWEEP WIDTH Hz

SWEEP TIME SEC

AMPLITUDE x1 - 7 INT 3

DATE

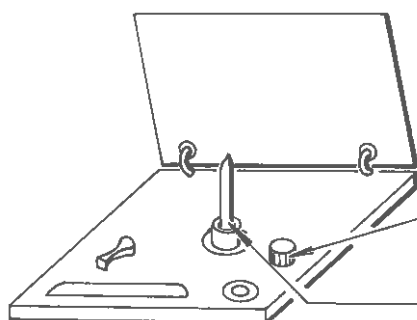
OPERATOR

SPECTRUM NO

6.3 SENSITIVITY TEST

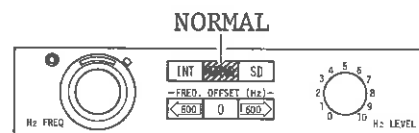
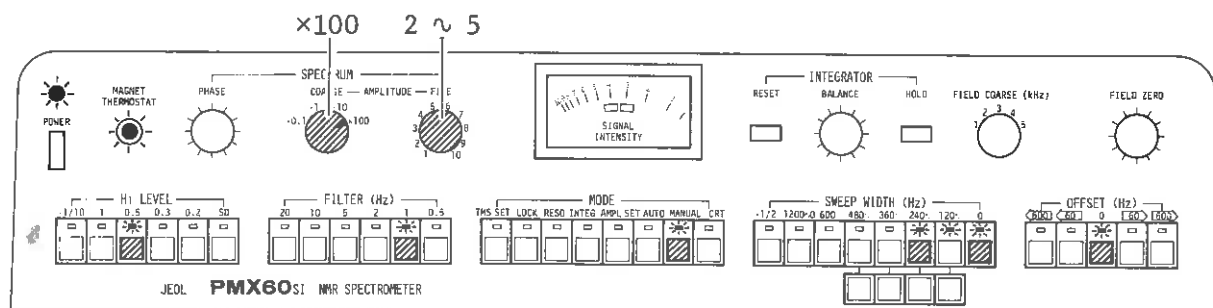
Sensitivity is determined by S/N. Adjust the RESOLUTION CONTROL knobs for optimum settings.

Measurement conditions

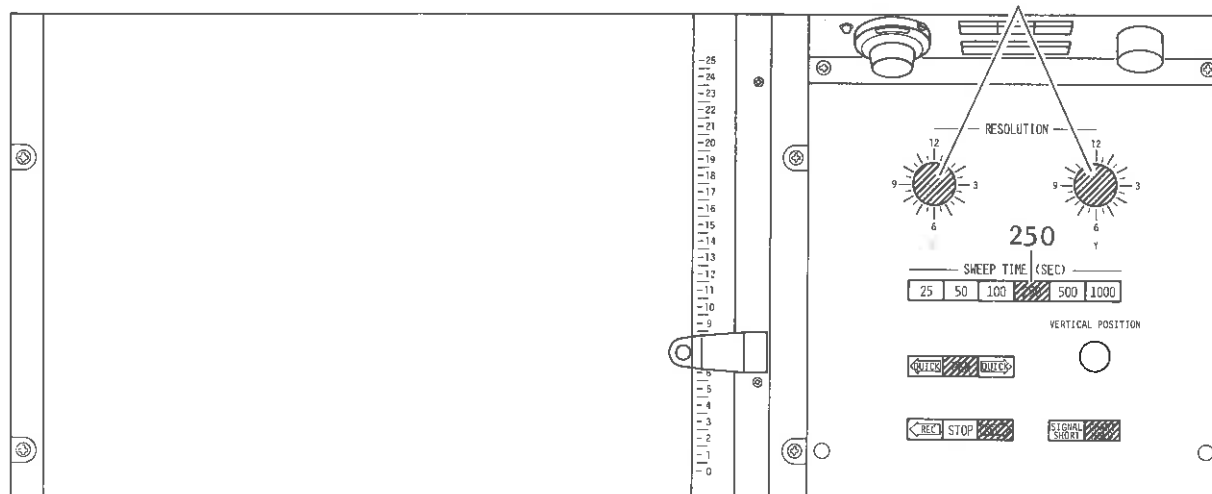


SPINNING CONTROL: 30 ~ 40 Hz

Standard sample: 1% ethylbenzene
(Optional, Parts No. 427000491)



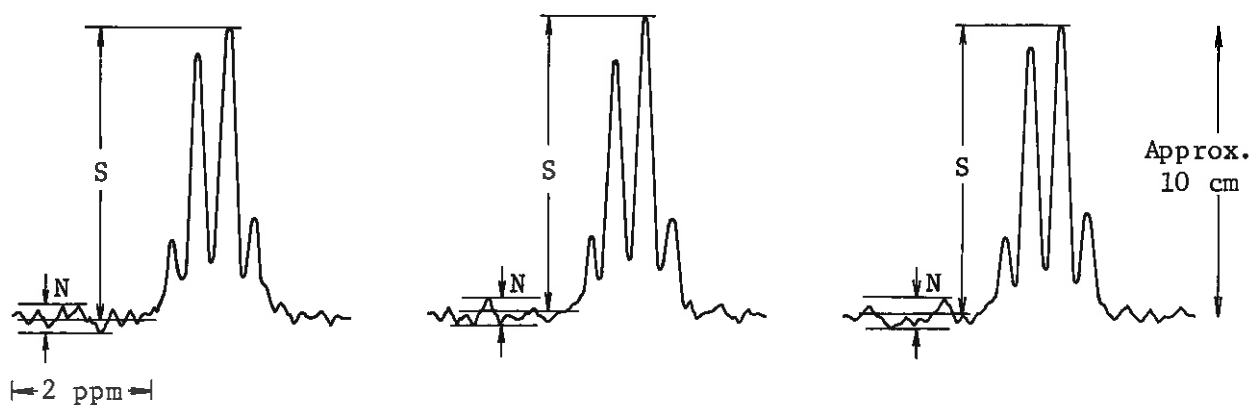
Adjust for optimum resolution.



Evaluation

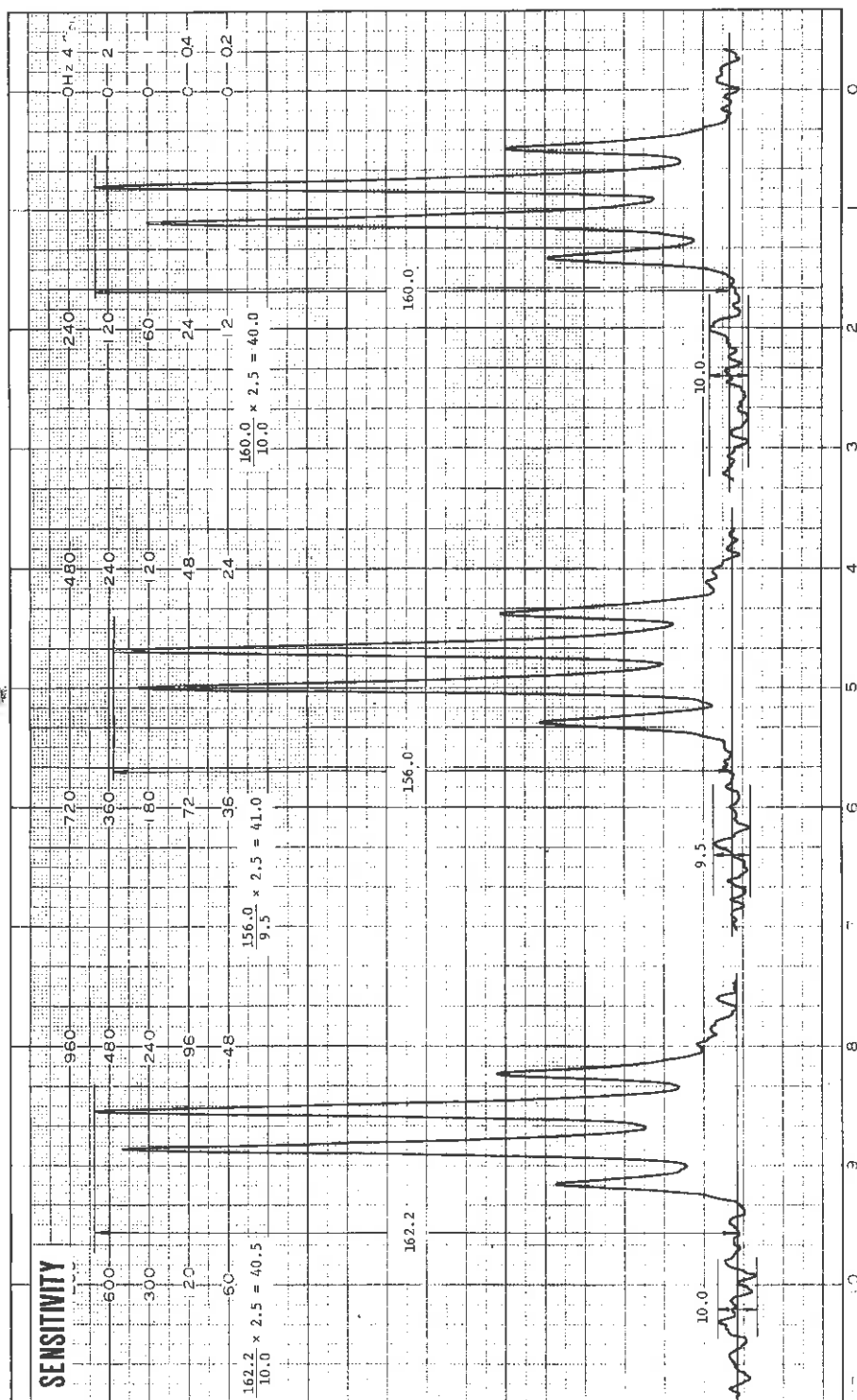
Adjust the AMPLITUDE FINE knob until the signal becomes approximately 10 cm. Record the CH₂ signal three times (see drawing). Measure the dimensions from the center of the noise to the highest peak using an average of three peaks. Then measure the three noise peaks and average them.

$$\frac{S}{N} = \frac{\text{Signal average}}{\text{Peak-to-peak noise average}} \times 2.5 \geq 40 \text{ (Guaranteed value)}$$



703P

JNM PMX 60 NMR SPECTROMETER



SAMPLE_E CH2 in Ethylbenzene

REMARKS:

MODE
AUTO MANU

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(u)

2.

DATE
OPER
SPECT

1% CC2

W
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CON
REF
50L

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Table 1

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12. E

2

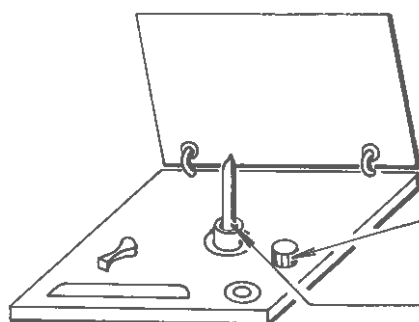
S.M.S.

1000

6.4 INTEGRATION TEST

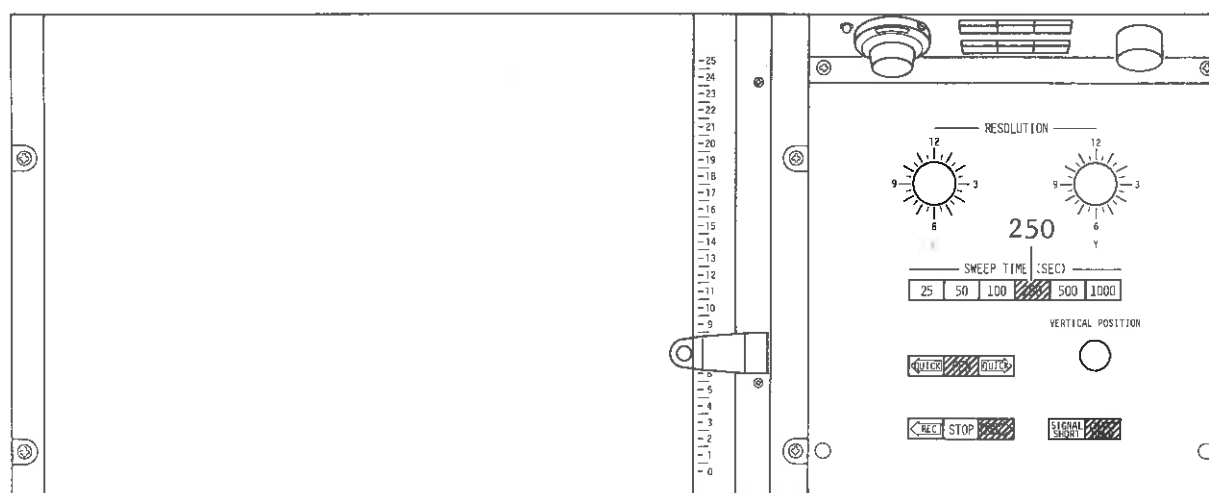
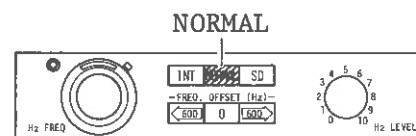
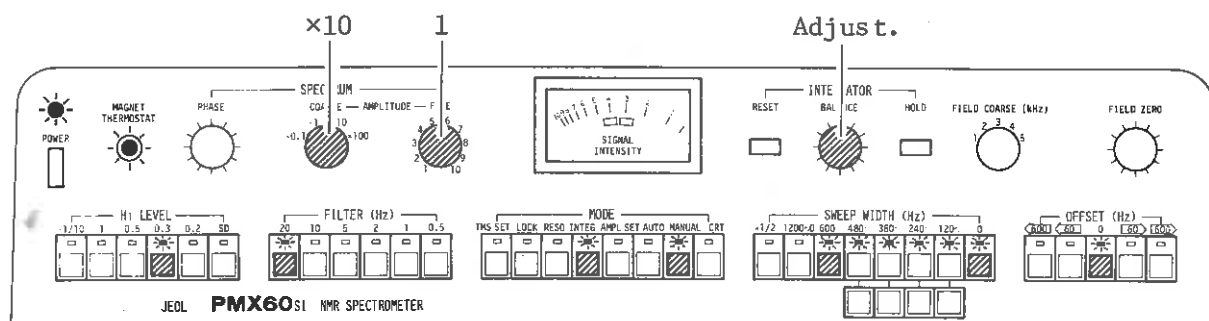
To carry out this test, verify the accuracy of the integrator built into the PMX60SI.

Measurement conditions



SPINNING CONTROL: 30 ~ 40 Hz

Standard sample: 5% ethylbenzene
(Optional, Parts No. 427000521)

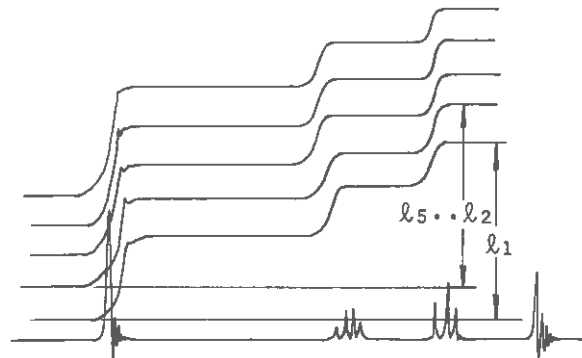


Evaluation

First, record the original signal. Then adjust BALANCE, and record the integration signal five times.

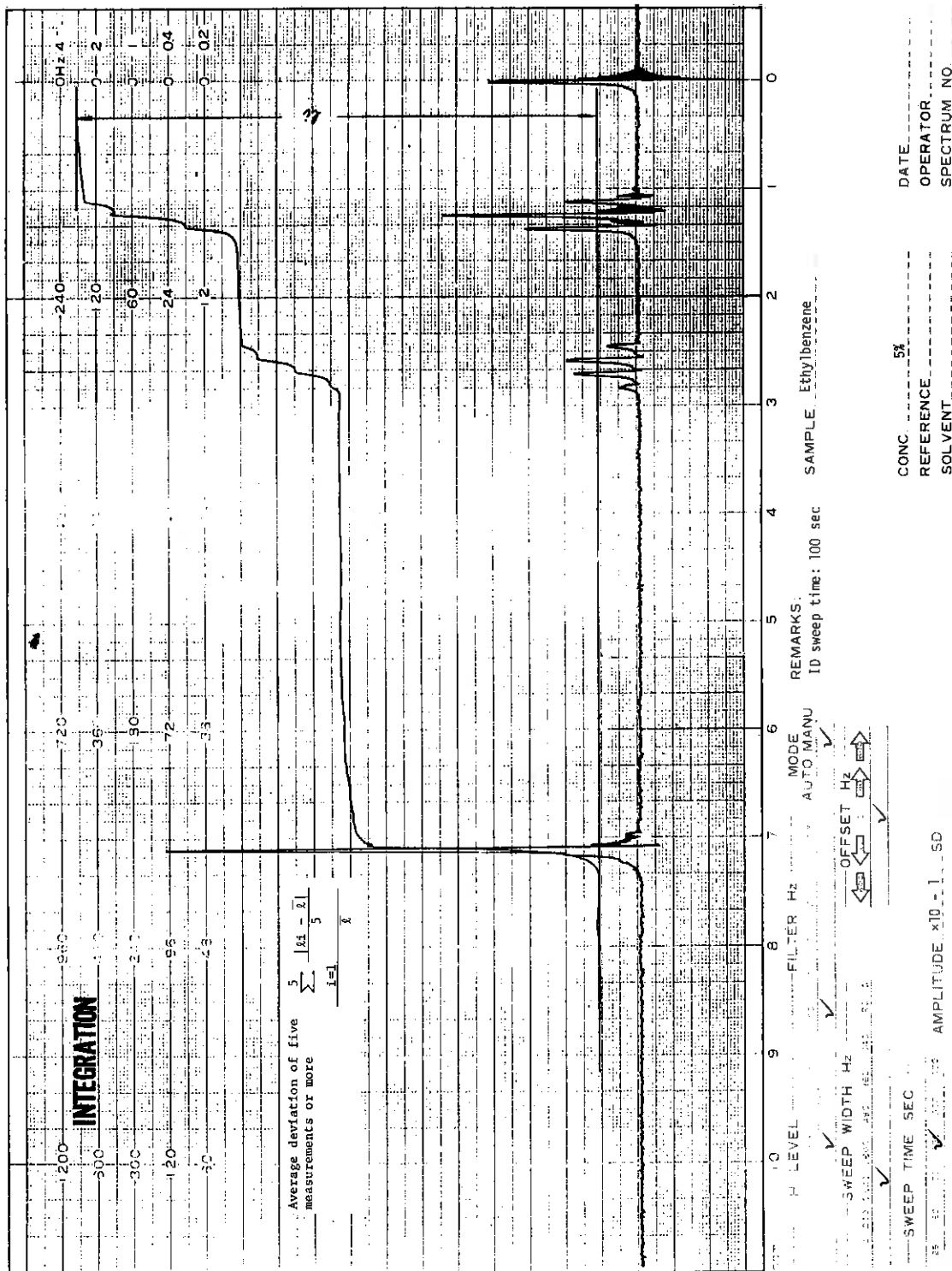
Deviation of repeated (5 times) integration:

$$\frac{\sum_{i=1}^5 \frac{|\ell_i - \bar{\ell}|}{5}}{\bar{\ell}} \leq 2\% \text{ (Guaranteed value)}$$



JEOL

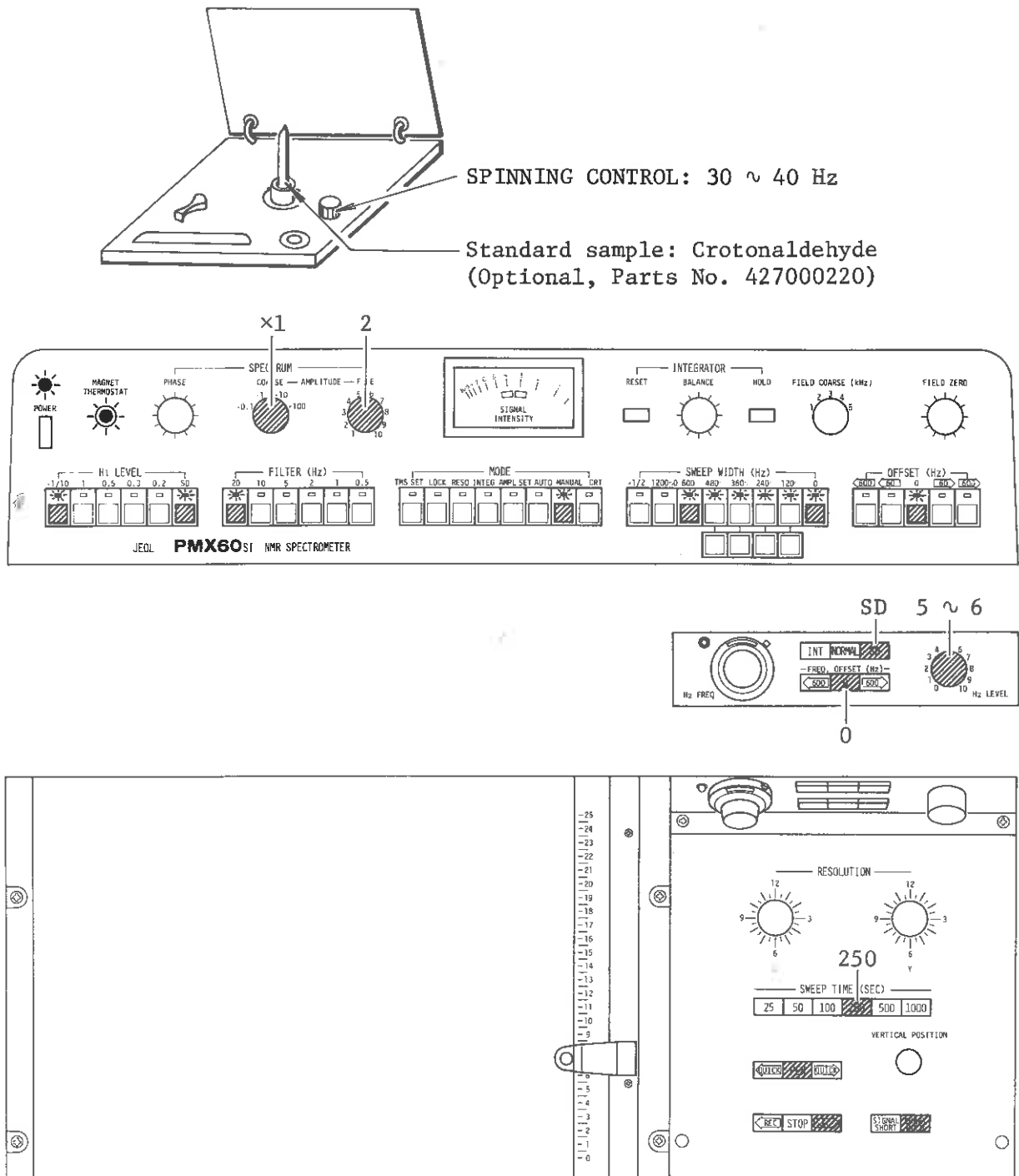
JNM-PMX 60 NMR SPECTROMETER



6.5 SPIN DECOUPLING TEST

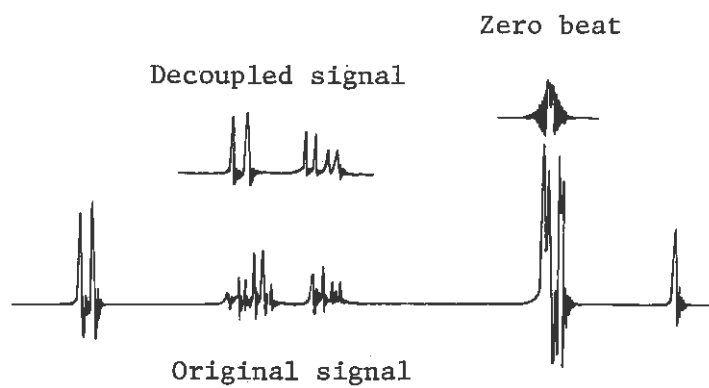
Verify spin decoupling performance between hydrogen nuclei.

Measurement conditions



Evaluation

Record the original signal and the decoupled signal.



I-E061

6-15

