

LW 360 (S1 version)

DIGITAL TUNER MEASURING SYSTEM

ADDENDUM INSTRUCTION MANUAL
(For firmware version 2.4 and later)

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1. INTRODUCTION

This manual describes the features that have been added LW 360 firmware version 2.4 and the specifications of the LW 360 (S1).

For information about other features, see the LW 360 Instruction Manual.

2. New Firmware Features

2.1 Additional Tuner Model Settings

The number of tuner model settings that can be stored in the internal memory and memory card has been increased from 20 to 40.

To view the available tuner model settings, press F1 File in the Wave screen.

Ver 2.4

The screenshot shows the 'File Selection' window with 'File Type' set to 'Tuner Model File (*.tmd)'. It is divided into two main sections: 'Memory Card' and 'Flash Rom'. The 'Memory Card' section has a 'Directory' tab selected, showing a list of directories ('sample_1', 'sample_2') and a table of tuner model settings (No. 01-40, Name, Date). The 'Flash Rom' section shows a table of 'FIXED ITEM full' settings (No. 01-40, Name, Date). A red box highlights the tuner model settings table in the Memory Card section.

| No. | Name | Date |
|-----|------|------|
| 01 | | |
| 02 | | |
| 03 | | |
| 04 | | |
| 05 | | |
| 06 | | |
| 07 | | |
| 08 | | |
| 09 | | |
| 10 | | |
| 11 | | |
| 12 | | |
| 13 | | |
| 14 | | |
| 15 | | |
| 16 | | |
| 17 | | |
| 18 | | |
| 19 | | |
| 20 | | |
| 21 | | |
| 22 | | |
| 23 | | |
| 24 | | |
| 25 | | |
| 26 | | |
| 27 | | |
| 28 | | |
| 29 | | |
| 30 | | |
| 31 | | |
| 32 | | |
| 33 | | |
| 34 | | |
| 35 | | |
| 36 | | |
| 37 | | |
| 38 | | |
| 39 | | |
| 40 | | |

Version 2.3 or earlier

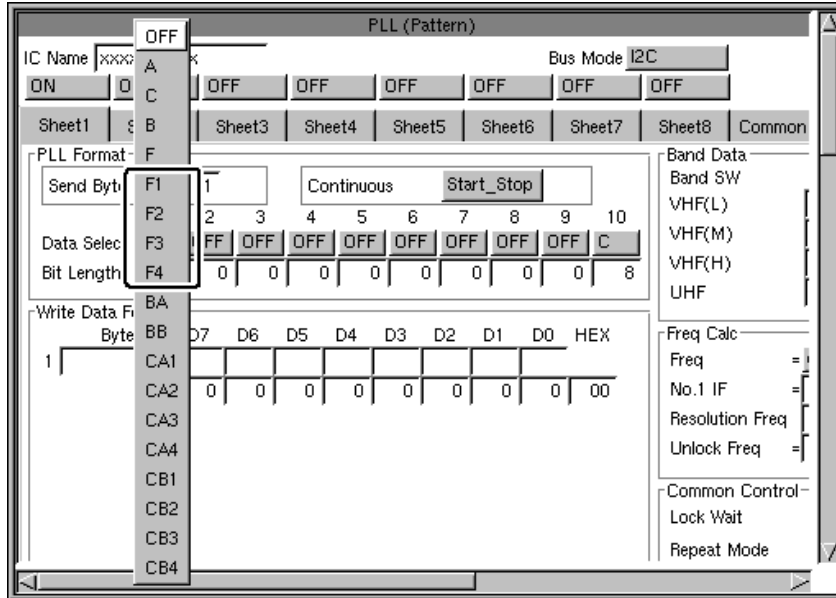
The screenshot shows the 'File Selection' window for Version 2.3 or earlier. It is divided into two main sections: 'Memory Card' and 'Flash Rom'. The 'Memory Card' section has a 'Directory' tab selected, showing a list of directories ('sample_1', 'sample_2') and a table of tuner model settings (No. 01-20, Name, Date). The 'Flash Rom' section shows a table of 'FIXED ITEM full' settings (No. 01-20, Name, Date). The tuner model settings table in the Memory Card section only contains 20 entries.

| No. | Name | Date |
|-----|------|------|
| 01 | | |
| 02 | | |
| 03 | | |
| 04 | | |
| 05 | | |
| 06 | | |
| 07 | | |
| 08 | | |
| 09 | | |
| 10 | | |
| 11 | | |
| 12 | | |
| 13 | | |
| 14 | | |
| 15 | | |
| 16 | | |
| 17 | | |
| 18 | | |
| 19 | | |
| 20 | | |

2.2 Additional Items for Setting the Frequency

Items F1 to F4 now appear in the Data Select lists under PLL Format in the PLL (Pattern) screen when the PLL output mode is set to PLL Pattern. The frequency can be calculated automatically using the order specified by F1 to F4. Use these items when the byte order across the frequency setting registers and the byte order used in automatic calculation are different.

F only allowed you to specify up to 24 bits, but F1 to F4 allow you to specify up to 32 bits. (Each item from F1 to F4 allows you to set up to 24 bits.)



The way you can use F1 to F4 will be explained using the following PLL IC as an example.

| | Bit 7 | Bit 6 | Bit 5 | Bit 4 | Bit 3 | Bit 2 | Bit 1 | Bit 0 |
|--------|--------------|-------|-------|--------------|-------|-------|-------|-------|
| Byte 1 | Address Byte | | | | | | | |
| Byte 2 | Control Byte | | | | N11 | N10 | N9 | N8 |
| Byte 3 | N7 | N6 | N5 | N4 | N3 | N2 | N1 | N0 |
| Byte 4 | N14 | N13 | N12 | Control Byte | | | | |
| Byte 5 | Band | | | | | | | |
| Byte 6 | Control Byte | | | | | | | |

The bits that are used to automatically calculate the frequency are N14 to N0 (the 15 bits enclosed by a thick frame in the figure), but the PLL IC is designed to send the higher three bits last. The LW 360 generates data in order, starting from the MSB, based on the specified equation to determine the frequency, but with the above PLL IC, the order in which data is generated will be incorrect. In this case, you can set bits N11 through N0 to F2 and bits N14 through N12 to F1 in order to specify the priority of bits for the automatic calculation.

To configure the LW 360 for the PLL IC described on the previous page, follow the procedure below.

Tuner Power screen

Tuner Power

| | MB1 | MB2 | MB3 | MB4 | AGC | AFT | TU SW 1,2,3 | VT L | VT U |
|-----------------|--------------------------|--------------------------|--------------------------|--------------------------|--------------------------|--------------------------|--------------------------|--------------------------|--------------------------|
| Voltage [V] | 0.0 | 5.00 | 5.00 | 1.25 | 4.0 | 3.3 | 12.0 | 0.00 | 30.00 |
| Output | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| P On Delay [ms] | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Short Sense | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |

PLL Output Mode: **PLL_Pattern** (Callout 1)

PLL screen

PLL (Pattern)

IC Name: xxxxxxxxxx Bus Mode: I2C

ON OFF OFF OFF OFF OFF OFF OFF (Callout 2)

Sheet1 Sheet2 Sheet3 Sheet4 Sheet5 Sheet6 Sheet7 Sheet8 Common

PLL Format: Send Byte: 6 (Callout 3) Continuous Start Step

Data Select: A C F2 F1 C B C OFF OFF C (Callout 4)

Bit Length: 8 4 12 3 5 8 8 0 0 0

Write Data Format:

| Byte | D7 | D6 | D5 | D4 | D3 | D2 | D1 | D0 | HEX |
|---------|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| 1 Byte1 | A7 | A6 | A5 | A4 | A3 | MA1 | MA0 | R/W | |
| | 1 | 1 | 0 | 0 | 0 | 0 | 1 | 0 | C2 |
| 2 Byte2 | C16 | C15 | C14 | C13 | N11 | N10 | N9 | N8 | |
| | 0 | 0 | 0 | 0 | - | - | - | - | 00 |
| 3 Byte3 | N7 | N6 | N5 | N4 | N3 | N2 | N1 | N0 | |
| | - | - | - | - | - | - | - | - | 00 |
| 4 Byte4 | N14 | N13 | N12 | C12 | C11 | C10 | C9 | C8 | |
| | - | - | - | 0 | 0 | 0 | 0 | 0 | 00 |
| 5 Byte5 | B57 | B56 | B55 | B54 | B53 | B52 | B51 | B50 | |
| | - | - | - | - | - | - | - | - | 00 |
| 6 Byte6 | C7 | C6 | C5 | C4 | C3 | C2 | C1 | C0 | |
| | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 00 |

Band Data: Band SW VHF(L) VHF(M) VHF(H) UHF

Freq Calc: Freq = (Callout A)

No.1 IF = (Callout F2)

Resolution Freq =

Unlock Freq =

Common Control: Lock Wait Repeat Mode Pulse Width

Read Data: Lock Mode Address Bytes Lock Bit 0 (Callout B, Callout C)

Callout C points to the 'C' in the Data Select field.

Callout F1 points to the 'F1' in the Data Select field.

1. Set the PLL output mode

In the Tuner Power screen, set PLL Output Mode to PLL_Pattern.

2. Configure the PLL table

In the PLL screen, set Sheet1 to ON.

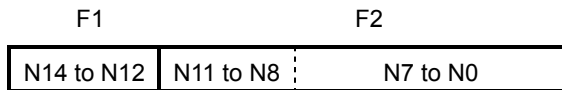
3. Set the number of bytes to send

Set Send Byte.

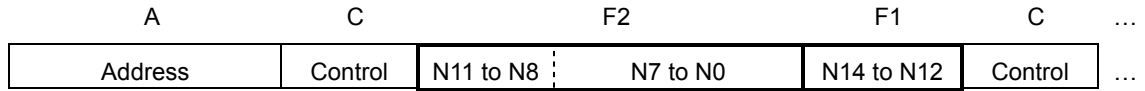
4. Select data types and bit lengths

From the Data Select list, select the appropriate data type, and then set the corresponding bit length.

Set bits N11 through N0 to F2 and bits N14 through N12 to F1. This will cause the LW 360 to automatically calculate the frequency starting with F1 and ending with F2.



The LW 360 sends data in the order specified by Data Select.



2.3 Addition of Level_L% and Level_R%

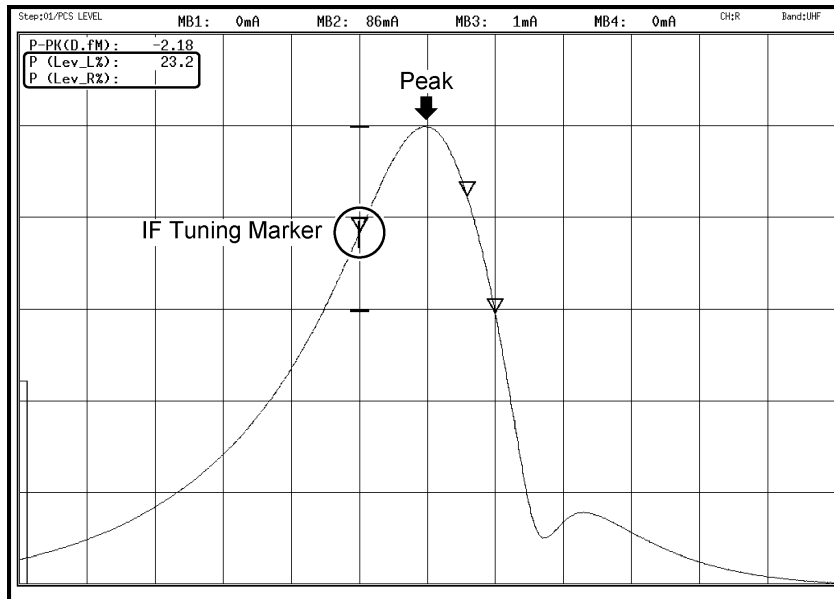
Level_L% and Level_R% have been added to the Measure Mode item in the Judge screen.

Overview

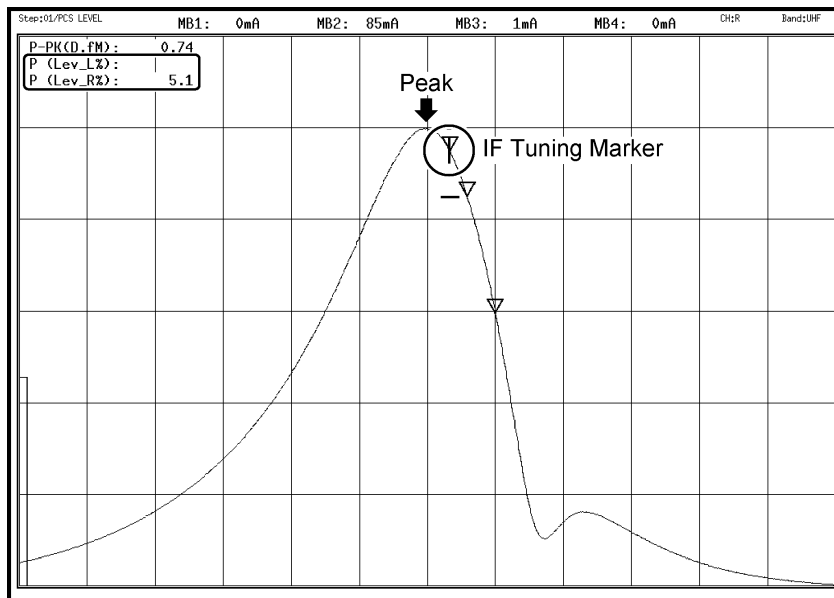
| Measure Mode | Setting | | | Judge value range Measure Mode description |
|--------------|---------|--------|------|---|
| | REF | Target | Line | |
| Level_L% | - | Yes | Yes | 0.0 to 100.0 % Measures the specified marker level as a percentage with the waveform peak level assumed to be 0%. The LW 360 only measures this level when the IF Tuning marker (No. 12) is on the left side of the waveform peak. Use Level_L% and Level_R% as a pair. You can set different Judge values depending on whether the IF Tuning marker is on the left side or the right side of the peak. Set Peak Overlap f in the Sweep/Marker screen. Set Log/Lin to Linear in the Tuner/Sweep screen. |
| Level_R% | - | Yes | Yes | 0.0 to 100.0 % The LW 360 only measures this level when the IF Tuning marker (No. 12) is on the right side of the waveform peak. For other details, see the above description for Level_L%. |

Measurement screen

When the IF Tuning marker (No. 12) is on the left side of the waveform peak, the LW 360 measures the level using Level_L%. No value is displayed for Level_R%.



When the IF Tuning marker (No. 12) is on the right side of the waveform peak, the LW 360 measures the level using Level_R%. No value is displayed for Level_L%.



Setting

In the Judge screen, select Level_L% and Level_R% from the Mode list, and then set the corresponding Target and Judge values.

| Judge | | | | | | | | | | | | | | | | | |
|---------|------|---|---|---|----------|--------------|-----|--------|-----|-------|-----|-------|----------|------|-----|-----|-----|
| Measure | | | | | | REF | | Target | | Judge | | | | | | | |
| No | Step | L | M | R | Mode | Name | AVE | SWP | MKR | SWP | MKR | Lower | Upper | Line | POS | RNG | DFS |
| 1 | | | | | D.fMHz | P-PK(D.fMHz) | 1 | A | 0 | A | 12 | -4.50 | 1.00 MHz | OFF | | | |
| 2 | | | | | Level_L% | P (Lev_L%) | 1 | | | A | 12 | 0.0 | 40.0 % | L/U | | | |
| 3 | | | | | Level_R% | P (Lev_R%) | 1 | | | A | 12 | 0.0 | 15.0 % | L/U | | | |
| 4 | | | | | | | | | | | | | | | | | |
| 5 | | | | | | | | | | | | | | | | | |
| 6 | | | | | | | | | | | | | | | | | |

Set Log/Lin to Linear in the Tuner/Sweep screen.

| Tuner / Sweep | | | | | | | | | |
|----------------------|--------------|-----|-------------|------------|---|-----------|---|---|--|
| Step Name: PCS LEVEL | | | | Ch.Mode: R | | Band: UHF | | | |
| Max Sweep | | 1 | | L | | M | | R | |
| Ch.Comment | | | | | | | | | |
| No. | Setting Item | swp | Common Data | Step Data | | | | | |
| | | | | All | L | M | R | | |
| 01 | Sweep Wait | A | 10 | | | | | | |
| 02 | Log/Lin | A | Linear | | | | | | |
| 03 | PLL TU Mode | A | Band | CH_Cont | | | | | |

Set Peak Overlap f in the Sweep/Marker screen.

Peak Overlap f adds tolerance to the detection of the waveform peak to make the switching between Level_L% and Level_R% smooth (see section 5.3.6, "Operations and Settings on the Sweep/Marker Screen" in the LW 360 Instruction Manual).

| Sweep / Marker | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
|----------------------------|-----|------|-----------|--|---|--|--|--|--|------|-----|------|-----------|--------|----|---|--------|----|---|--------|----|---|---------|--------|----|--|-------|----|-----|--------|----|--|-------|--------|----|---|---------|----|----|---------|----|-----|---------|-----|----|-----|---------|----|----|---------|----|----|---------|
| Sweep | | | | | Marker(RF) | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Ch.Mode: R | | | | | Ch Group: USA | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| RF Output | | | | | Band Data Table | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Sweep Width[MHz]: 27.000 | | | | | <table border="1"> <thead> <tr> <th>Band</th> <th>No.</th> <th>Name</th> <th>Freq[MHz]</th> </tr> </thead> <tbody> <tr> <td rowspan="3">VHF(L)</td> <td>1L</td> <td>2</td> <td>55.250</td> </tr> <tr> <td>1M</td> <td>6</td> <td>83.250</td> </tr> <tr> <td>1R</td> <td>B</td> <td>127.250</td> </tr> <tr> <td rowspan="3">VHF(M)</td> <td>1L</td> <td></td> <td>0.000</td> </tr> <tr> <td>1M</td> <td>A-5</td> <td>91.250</td> </tr> <tr> <td>1R</td> <td></td> <td>0.000</td> </tr> <tr> <td rowspan="3">VHF(H)</td> <td>1L</td> <td>C</td> <td>133.250</td> </tr> <tr> <td>1M</td> <td>11</td> <td>199.250</td> </tr> <tr> <td>1R</td> <td>W11</td> <td>361.250</td> </tr> <tr> <td rowspan="3">UHF</td> <td>1L</td> <td>W12</td> <td>367.250</td> </tr> <tr> <td>1M</td> <td>14</td> <td>471.250</td> </tr> <tr> <td>1R</td> <td>69</td> <td>801.250</td> </tr> </tbody> </table> | | | | | Band | No. | Name | Freq[MHz] | VHF(L) | 1L | 2 | 55.250 | 1M | 6 | 83.250 | 1R | B | 127.250 | VHF(M) | 1L | | 0.000 | 1M | A-5 | 91.250 | 1R | | 0.000 | VHF(H) | 1L | C | 133.250 | 1M | 11 | 199.250 | 1R | W11 | 361.250 | UHF | 1L | W12 | 367.250 | 1M | 14 | 471.250 | 1R | 69 | 801.250 |
| Band | No. | Name | Freq[MHz] | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| VHF(L) | 1L | 2 | 55.250 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | 1M | 6 | 83.250 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | 1R | B | 127.250 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| VHF(M) | 1L | | 0.000 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | 1M | A-5 | 91.250 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | 1R | | 0.000 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| VHF(H) | 1L | C | 133.250 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | 1M | 11 | 199.250 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | 1R | W11 | 361.250 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| UHF | 1L | W12 | 367.250 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | 1M | 14 | 471.250 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | 1R | 69 | 801.250 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Sweep Time[ms]: 6.4 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| RF ATT(Wave)[dB]: 40 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| RF ATT(IF Auto)[dB]: 40 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| IF Input | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| IF ATT[dB]: 30 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| IF Mode: Upper | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| DET In: Int_IF_Det | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| DET Polarity: + | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| LIN Range: Auto | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| ARC IND Range: 6 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Peak Overlap f[MHz]: 0.100 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |

2.4 Software Modifications

- Previously, when a short circuit was detected and an All Scan data output request (AS0) or an All Scan judgment output request (AS1) was received through the RS232C or LAN interface, the judgment result was “Pass” (because the LW 360 made no measurements or judgments). This has been changed so that the judgment result is “NG.”

2.5 Software Fixes

- Previously, repeating the All Scan operation made the operation performance time longer, but this problem has been fixed.
- Previously, selecting the Calibration (F9) menu disabled the Quit (F12) command, but this problem has been fixed.

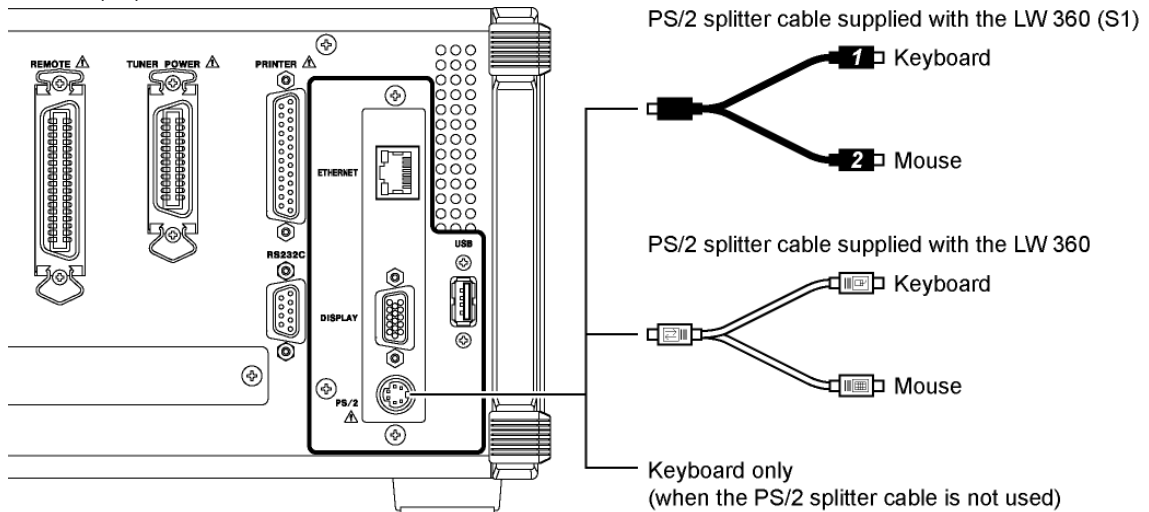
3. Description of the LW 360 (S1)

3.1 Rear Panel Modifications

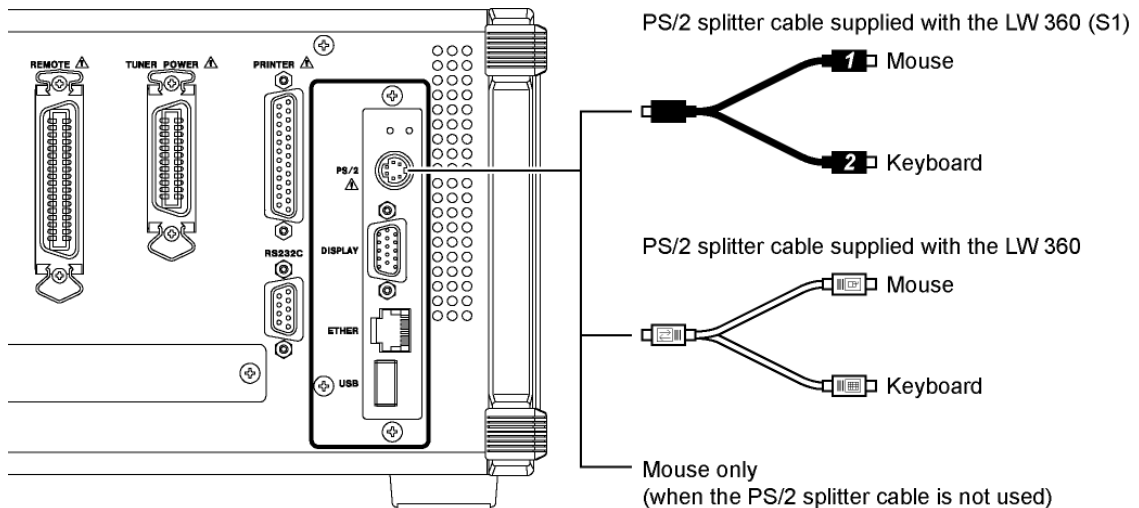
The positions of the following connectors on the rear panel have been changed: Ethernet, Monitor, PS/2, and USB. In addition, the PS/2 connector specifications and the PS/2 distribution cable that is supplied with the LW 360 have been changed. The connectable devices have been changed as shown in the following figure.

No changes have been made to the specifications of the USB connector and the front-panel PS/2 connector. You can connect a keyboard or mouse to the USB connector, and you can connect a keyboard to the front-panel PS/2 connector.

LW 360 (S1)



LW 360



3.2 Additional IF ATT Settings

To support digital tuners with high dynamic ranges, 40 and 50 dB settings have been added to the IF ATT item (0, 10, 20, and 30 dB settings were available previously).

You can set the IF ATT value in the Sweep/Marker screen for the Common settings and in the Tuner/Sweep screen for the Step settings. You cannot select the 40 and 50 dB settings on the standard LW 360.

IF ATT setting screens

Sweep/Marker screen

The screenshot shows the 'Sweep / Marker' screen with two main sections: 'Sweep' and 'Marker(RF)'.

Sweep Section:

- Ch. Mode: R
- RF Output:
 - Sweep Width[MHz]: 27.000
 - Sweep Time[ms]: 6.4
 - RF ATT(Wave)[dB]: 40
 - RF ATT(IF Auto)[dB]: 40
- IF Input:
 - IF ATT[dB]: 30
 - IF Mode: 20
 - DET In: 10 F_Det
 - DET Polarity: 0
 - LIN Range: 40
 - ARC IND Range: 50
 - Peak Overlap f[MHz]: 0.100

Marker(RF) Section:

- Ch Group: USA
- Band Data Table:

| Band | No. | Name | Freq[MHz] |
|--------|-----|------|-----------|
| VHF(L) | 1L | 2 | 55.250 |
| | 1M | 6 | 83.250 |
| | 1R | B | 127.250 |
| VHF(M) | 1L | | 0.000 |
| | 1M | A-5 | 91.250 |
| | 1R | | 0.000 |
| VHF(H) | 1L | C | 133.250 |
| | 1M | 11 | 199.250 |
| | 1R | W11 | 361.250 |
| UHF | 1L | W12 | 367.250 |
| | 1M | 14 | 471.250 |
| | 1R | 69 | 801.250 |

Tuner/Sweep screen

The screenshot shows the 'Tuner / Sweep' screen with the following settings:

- Step Name: PCS LEVEL
- Ch. Mode: R
- Band: UHF
- Max. Sweep: 1 L M R
- Ch. Comment:

Table: Setting Item, swp, Common Data, Step Data

| No. | Setting Item | swp | Common Data | Step Data | | | |
|-----|--------------|-----|-------------|-----------|------------|------------|------------|
| | | | | All | L | M | R |
| 01 | Sweep Wait | A | | 30dB | 10 | | |
| 02 | Log/Lin | A | | 20dB | | | |
| 03 | LEV SWP | A | | 10dB | | | |
| 04 | VT Mode | A | LCH_VR | 40dB | LCH_VR_Fix | MCH_VR_Fix | RCH_VR_Fix |
| 05 | IF ATT | A | 30dB | 50dB | | | |

Operation Check

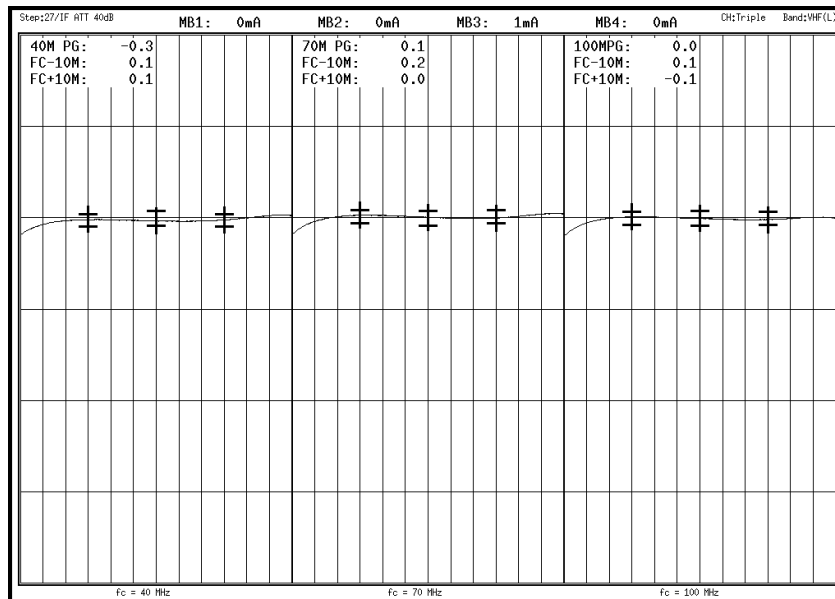
To accommodate the new IF ATT settings, two new steps, 27 and 28, have been added to the operation check.

Operation check refers to the program used to check the LW 360 operation. By factory default, this program is in tuner model setting number 20.

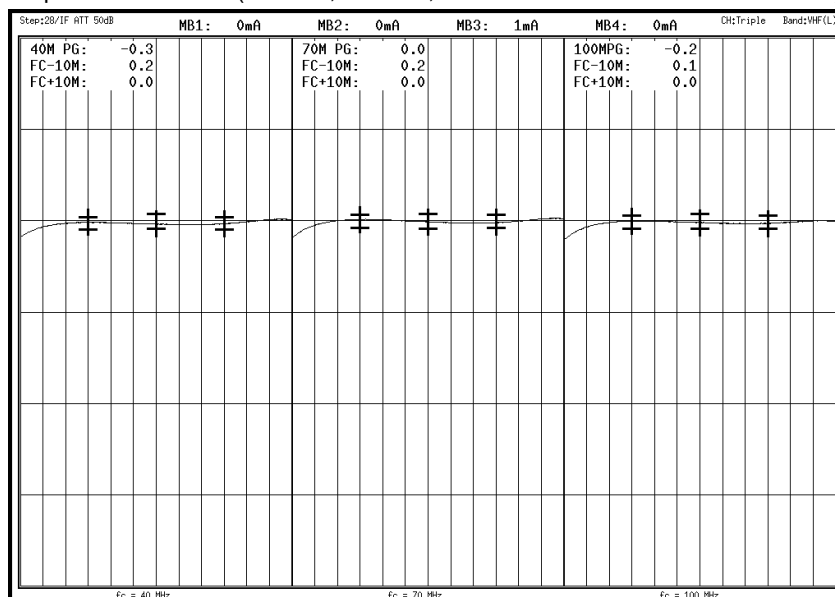
On the standard LW 360, measurements for steps 27 and 28 are invalid. To perform All Scan, clear the Scan check boxes for steps 27 and 28 in the Step All screen.

The step screens that have been added are shown below. To check the LW 360 operation, connect IF IN to RF OUT using a 50-cm 3C2W coaxial cable.

Step:27/IF ATT 40dB (40M PG, 70M PG, 100MPG: ± 0.8 dB. FC ± 10 M: ± 0.7 dB)



Step:28/IF ATT 50dB (40M PG, 70M PG, 100MPG: ± 0.8 dB. FC ± 10 M: ± 0.7 dB)



LEADER

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