

**OPERATOR'S MANUAL
MODEL LS110
MINI-PBX SIMULATOR**

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All requests for repairs should be directed to the factory .

This instrument is warranted against defective workmanship and materials for a period of six months. There will be no warranty when the instrument is misused, or when the factory seal on the instrument is broken.

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Specification and price change privileges are reserved.

SECTION 1

INTRODUCTION

The Micro Seven Model LS110 Mini-PBX Simulator contains four independent simulated telephone lines with features of programmable telephone numbers, call progress tones, simulated PBX mode, stutter dial tone, programmable disconnect signal, programmable network response delay, and distinctive ringing features. They are still specially designed to let engineers and technicians test modems and fax machines without obtaining extra in-house telephone lines.

Each line may be assigned a single-digit telephone number, corresponding to its line number, or programmable telephone number. Both rotary pulse and DTMF (tone) dialing are accepted for dialing. Features include dial tone, ring-back tone, and busy tone at the calling station. The ring signal is generated at the called line. A line connection is established between two stations when a call is answered. Indicators are included for POWER ON and OH/BUSY for all four lines.

Model LS110 contains multi-line DTMF dialers, which accept DTMF dialing from all lines simultaneously. Also model LS110 contains all-line dual frequency call progress tones where unique call progress tone is generated at each line.

SECTION 2

SPECIFICATIONS

After powering up the instrument, programming by dialing "0" is disabled. But when dialing "#####" enables programming by dial until power is turned off.

The procedure to program a telephone number starting "0" is as follows:

1. Dial #####, and hang up. (to enable programming)
2. Dial "0224365870921" and hang up. (to program 345678901+(line number) for secondary telephone number mode)
3. Dial "044" to select secondary telephone number mode
4. Turn off LS110 power for five seconds and turn back on to disable programming
5. To test programmed condition, dial 3456789012 at line 1 to ring line 2.

Dialing:

Note: LS110 contains multi-line dtmf dialer feature which allows all lines can dial in DTMF simultaneously.

Telephone numbers:

1. Primary telephone number: A single-digit telephone number, which is equal to a line number of a called line. It may also be selected by dialing 043 or line1 or 2 as a factory default.
 2. Secondary telephone number: selected by dialing 044.
- DTMF dialing signal power: -13dBm to +5dBm per a frequency with no more than 4dB difference between frequencies.

DTMF dialing detection time: 45 ms

Pulse dialing: Break period: 45 to 75 ms (60 ms nominal), Make period: 30 to 60 ms (40 ms nominal)

Programming secondary telephone number: 022 (telephone number in special sequence) 0224365870921 for programming for dialing 345678901+(line number)
The factory default condition is 123456789+(line number).

Telephone number digit: 0 #178 * n n n *, where nnn forms a 3-digit decimal number.
The default value is 10 digit. The maximum number is 18.

Simulated PBX Mode:

By dialing "9", dial tone returns when the Simulated PBX Mode was selected. Dialing "0#175*004*" for Simulated PBX Mode with dual frequency call progress tone or 0#175*012* for Simulated PBX Mode with secondary call progress tone. Note that the regular dialing methods work as well here. For example, if the secondary dialing method with a telephone number of 3456789012 and the PBX mode are enabled, dialing of 3456789012 or 93456789012 would ring the other line. To return to non-PBX mode, dial 0#175*000* with dual frequency call progress tone or dial 0#175*008* with secondary call progress tone.

Line Characteristics:

Input impedance at 1 k Hz: 600 ohms +/- 5%

Signal Bandwidth: 150 HZ to 5 k HZ without high-frequency option, 150 HZ to 150 k HZ with high-frequency option

Battery-feed voltage (loop voltage) and loop current: -21 volts and 25 mA

Ring Signal:

30 +/- 2% Hz square wave. Normally 2 sec on 4 sec off with exception of distinctive ringing features programmed.

Distinctive ring signal features:

The following distinctive ringing pattern is enabled instead of standard 2 sec on/ 4 sec off ringing pattern:

- (a). Dialing 0 * 1 + (line number): 2 sec on/ 4 sec off (default condition)
- (b). Dialing 0 * 2 + (line number): 0.8 sec on, 0.4 sec off, 0.8 sec on, 4 sec off
- (c). Dialing 0 * 3 + (line number): 0.4 sec on, 0.2 sec off, 0.4 sec on, 0.2 sec off, 0.8 sec on, 4 sec off
- (d). Dialing 0 * 4 + (line number): 0.3 sec on, 0.2 sec off, 1 sec on, 0.2 sec off, 0.3 sec on, 4 sec off

Off-hook impedance requirement: 400 ohms maximum DC, 600 ohms nominal AC

Call Progress Tones:

Note: *LS110 contains all-line dual frequency call progress tone feature for producing unique dual frequency call progress tone for each line.*

1. Dual-frequency call progress tones
 Signal power: nominal -20 dBm.
 Dial Tone: 350 Hz + 440 Hz, continuous unless programmed for stutter dial tone
 Ring-back Tone: 440 Hz + 480 Hz, 2 sec ON/4 sec OFF.
 Busy Tone: 480 Hz + 620 Hz, 0.5 sec ON/0.5 sec OFF.
 Accuracy in frequency component: +/- 1%.
2. Secondary Call Progress Tones
 Frequency: 480 Hz +/- 1%
 Dialing 07 enables the secondary call progress tones. Instead of generating dual frequency call progress tones, single-frequency tone of 480 Hz is produced . Dialing 07 switches back to the dual frequency call progress tones.
Note: The secondary call progress tone is a factory-default condition.

Stutter dial tone:

Dialing 046 enables stutter dial tone with three of 0.1 seconds on/off period following with continuous dial tone. Dialing 045 disables the stutter dial tone. It is a factory default condition.

Line Input Jacks: USOC-RJ11-C, standard modular phone jacks

Power Switch: on rear panel

Network response delay:

Time delay between the end of dialing and ring-signal application is programmable by dialing: 0#170*nnn*, where nnn is a 3-digit decimal number between 1 and 255. The time delay is determined by $8.6 \text{ ms} \times (\text{nnn}-1)$. The number, nnn, must be non-zero. The factory default is 0 seconds.

Forced called-party disconnect:

When two lines are connected and one line hangs up, disconnect signal is generated to both lines.

Programmable disconnect signal:

The disconnect signal, which is interruption of loop current at the end of call when one line hangs up is programmable by the following dialing: 0#169*nnn*, where nnn is a 3-digit decimal number between 1 and 255. The time delay is determined by $8.6 \text{ ms} \times (\text{nnn})$. The number, nnn, should not be zero. The factory default is 320 ms.

Power Requirements:

12VDC input by provided 117V AC/DC adapter, 800mA maximum

Fuse:

1A SLO-BLO fuse internal

Dimensions:

7 in Wide x 3 in High x 6 in Long.

Line Status Display: red LED for each line to indicate off-hook status (continuous on) or ringing status (blinking)

Calibration: not required

Power On Indicator: green LED display

Weight: 1 lbs.

Environmental: Operating temperature: 0 to 35 degree C, Humidity: 85% RH at 35 degree C

Warranty/Service: 6 months limited warranty. No warranty if any factory seal is broken. Service is performed at the factory, usually within 5 working days.

Programmable parameters:

Programmable parameters are restored in non-volatile memory.

Caution: The maximum number of changing programmable parameters is limited; therefore, continuous changes of programmable parameters should be avoided.

The restoration of factory default is done by dialing 04#:

The factory default conditions are as follows:

- primary (short) dialing method (single digit).
- Continuous dial tone, not stutter dial tone.
- Secondary telephone number is set for 123456789+(line number), ten digits.
- No network response delay

- Disconnect signal of 320 ms
- Secondary call progress tone instead of dual frequency call progress tones

SECTION 3

OPERATION

Warning: To preclude the possibility of electrical shock, do not remove the instrument cover. If a factory seal is broken, there is no warranty.

3.1 Operating Voltage

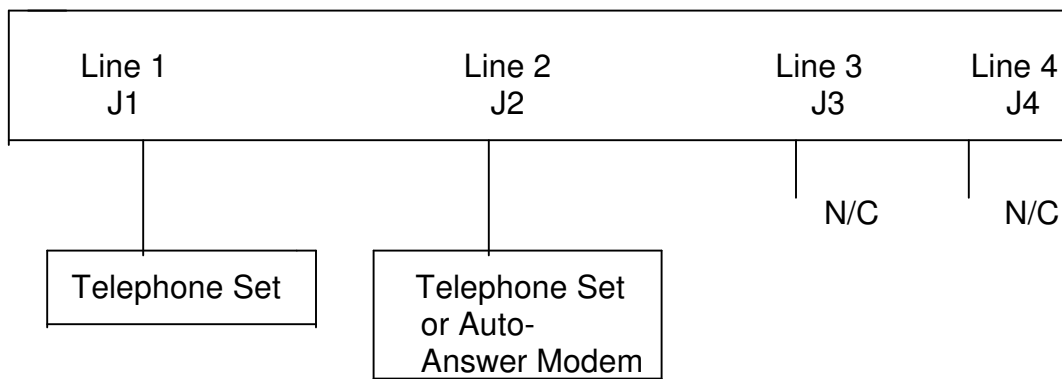
This instrument will operate only from provided AC/DC power adapter which provides 12VDC @800mA. International AC/DC power adapter provides operation of 90-250VAC input power with four different power plugs for US/Japan, Europe, UK and Australia.

3.2 Safety Information

Warning: This instrument generates high voltage ring signal at telephone jacks and inside LS110.

3.3 First-Time Operation

Use this procedure when turning the instrument on for the first time. The procedure will also serve to explain the operation of the instrument.



Connection the first time operation

First, connect the instrument to the correct input power source, then turn the **POWER** switch to **ON**. Observe that the front panel **POWER** indicator LED comes on. With nothing connected to any of the line input jacks, the **OH/BUSY** lights for all lines should be off.

Connect a standard telephone set, either rotary or tone, to J1. Connect an auto-answer modem or another telephone set to J2. Check that the **OH/BUSY** lights are still off. If any light is on, check to see if the telephone is off-hook, or the modem is in its off-hook condition.

Lift the Line 1 telephone receiver; the Line 1 **OH/BUSY** light should come on the one-frequency dial tone should be audible at the Line 1 receiver. Dial a rotary pulse or DTMF "2" at the Line 1

set; after completing the dialing, the ring-back tone should be audible. The high-voltage ring signal is generated at the J2 connection. If a second telephone is connected to Line 2 instead of an auto-answer modem, sound may be produced on the telephone set at Line 2. If the phone has a bell-type ringer, little sound may be produced, because most bells are sensitive to a lower ringing frequency.

When the call from Line 1 is answered at Line 2 by closing relay contact in the modem or lifting the receiver, the ring-back tone at Line 1 and the high-voltage ring signal at Line 2 will be turned off. Observe also that the **OH/BUSY** light for Line 2 is now on. Signal paths between Line 1 and Line 2 are established. When an auto-answer modem is used at Line 2, it generally waits 2 to 3 seconds before generating a continuous 2.2 kHz answer tone.

3.4 Checking Busy Tone

The busy tone is generated whenever the called line is off-hook or connected to another line, or an invalid number is called. The busy tone can be checked as follows:

1. Connect a telephone set to Line 1, with no other lines connected
2. Dial "9" at Line 1; since there is no Line 9, the busy tone should be heard at the Line 1 receiver. Caution: the instrument must be in the factory default condition where PBX mode is disabled.
3. Leave the set at Line 1 off-hook and connect another telephone set or an auto-answer modem at Line 2. Dial a "1" at Line 2; this should generate a busy tone at Line 2.

3.5 simultaneous DTMF dialing is supported.

Simultaneous dialing from multiple lines is available with independent DTMF receiver for each line.

3.6 Dual-Frequency and Secondary Call Progress Tones

Independent dual frequency call progress tone is provided for each line.

3.7 Simulated PBX Mode

The Simulated PBX Mode generates dial tone again after receiving dialing of "9" as dialing "9" is required to access an outside line. To enable this Simulated PBX Mode, DTMF dialing of "0#175*004*" for dual frequency call progress tones or dialing of "0#175*012*" for the secondary call progress tones. Note that dialing "9" is not required to complete dialing; for example, dialing "92" or "2" at the Line 1 will ring the Line 2. To return to non Simulated-PBX Mode, dial "0#175*000*" for dual frequency call progress tones or "0#175*008*" for secondary call progress tones. Also note that dialing "9" as a primary telephone number in non-Simulated-PBX mode will generate busy signal.

3.8 Stutter Dial-Tone

By dialing "046", the stutter dial-tone is enabled. By dialing "045", it is switched back to non-stutter dial-tone.

3.9 Network Response Delay

The network response delay, that is between the end of dialing and start of ring signal application and ring-back tone generation, may be implemented by dialing "0#170nnn*" where "nnn" forms a 3-digit decimal number. The delay is determined by 8.64 ms multiplied by a number, "nnn".

For example, by dialing "0#170*255*", the network response delay of 2.2 seconds is obtained.

3.10 Forced Called-Party Disconnect and Programming Disconnect Signal

When two lines are connected and one line hangs up, disconnect signal, which is interruption of loop current, is generated at two lines for 320 ms.

The disconnect signal duration is programmable by dialing "0#169*nnn*", where "nnn" forms a 3-digit decimal number. The duration is determined by 8.64 ms multiplied by a number, "nnn".

3.11 Distinctive Ring Signal

Instead of the normal ringing interval of 2 sec on / 4 sec off, the following three different ringing patterns are provided:

Caution: The ringing pattern must be set for each dialing sequence.

Pattern 1: 2 sec on, 4 sec off

Dial 0 * 1 + (Line Number), default condition

Pattern 2: .8 sec on, .4 sec off, .8 sec on, and 4 sec off

Dial 0 * 2 + (Line Number)

Pattern 3: .4 sec on, .2 sec off, .4 sec on, .2 sec off, .8 sec on, and 4 sec off

Dial 0 * 3 + (Line Number)

Pattern 4: .3 sec on, .2 sec off, 1 sec on, .2 sec off, .3 sec on, and 4 sec off

0 * 4 + (Line Number)

3.12 Telephone Number Programming

Secondary telephone number, programmable telephone number, may be programmed by dialing the following:

022 + telephone number

Example: to program 503-987-654+(line number) dial 0220593785643, and hang up.

Factory-default condition of calling numbers: 123456789+(line number)

3.13 Programming telephone number length

Programming for length of secondary telephone number is obtained by dialing: 0#178*nnn*, where “nnn” is a 3-digit decimal number between 0 and 18. The maximum telephone number is eighteen digits. The factory default is set at 10 digits.

3.14 Restoring Factory Default Condition

After dialing *****, hang up the telephone at any line, dial “04#” to restore factory default conditions that are listed in the specifications.

SECTION 4

FCC RULES, PART-15

Warning

This equipment generates, uses, and can radiate radio frequency energy, and if not installed and used in accordance with the instruction manual, may cause interference to radio communications. It has been tested and found to comply with the limits for a Class A computing device pursuant to Sub-part J of Part 15 of FCC Rules, which are designed to provide reasonable protection against such interference when operated in a commercial environment. Operation of this equipment in a residential area is likely to cause interference, in which cases the user at his own expense will be required to take whatever measures may be required to correct the interference.

APPENDIX A

PROGRAMMING SUMMARY

Note: "nnn" is a 3-digit decimal number. It must be 3 digit long.

Primary Telephone Number: 043 (factory default)

Secondary Telephone Number: 044

The telephone number length: 0#178*nnn*, 10 digits default

Distinctive Ringing : 0*n where n=1-4 (Note: the ringing pattern must be programmed for each dialing sequence.)

045: disable stutter dial tone (default)

046: enable stutter dial tone

04#: restore programmed parameters to the factory default conditions

07: switch between dual frequency call progress tone and the secondary call progress tone(factory default)

0#169*nnn*: disconnect signal programming

0#170*nnn*: network response delay

0#175*004* or 0#175*012* (with secondary dial tone): PBX mode

0#175*000* or 0#175*008* (with secondary dial tone): no PBX mode (factory default)