

GHOST IN THE MACHINE, PART 1

Hidden deep within your instrument are test routines that can help you diagnose problems and may even save you a trip to the repair shop.

By Mark Davis



As an electronic musical instrument technician, authorized by several different manufacturers, I often see a synth, drum machine, or other MIDI device come in for repair because the machine is acting oddly or "locks up" after a few moments. In almost all of these cases the problem is not hardware, but software, and the unit simply requires a software reset and/or reinitialization. Why does this happen? Now and then an occasional bit of data ends up in the wrong place, or the wrong button gets pressed at the wrong time, causing a unit to lock up or seemingly lose data. For example, I have had several DX7s come to my bench with the complaint that the pitch wheel or some other con-

troller function quit working. By simply saving the voice data to some other medium (disk, cartridge, etc.) and running the DX7's self-test, I've always been able to bring the unit back to fully functional status (assuming there's no real hardware problem, like a crushed part or cat food stuffed into the works).

We'll begin by covering Yamaha equipment, then move on to other manufacturers. But before initiating *any* of these procedures, make sure you follow the first rule of electronic musicianship:

Thou shalt back up thy data!

Several of the following procedures will delete all or some of the data that is stored in the machine, so save before you reinitialize or run any tests.

YAMAHA DX SERIES

■ **DX7:** When you press buttons 16 and 32 simultaneously and then press the Function button, the unit will ask you if you want to proceed with the test mode. Pressing Yes will begin the tests. To proceed with each test, the Yes button will increment to the next test; No will decrement. Note that some of the tests require a RAM cartridge or the performance pedals; the Yes button can skip those tests for which you may not have the necessary hardware. Voice data should not be affected.

■ **DX7II:** Only those models with software Version 1.6 and later possess the test procedures for this unit. To check your DX7II's version, press voice buttons 16 and 32 simultaneously while holding down the Edit button. While you are pressing these, the display will show the software revision number. If it's less than 1.6, the synth will return to the mode it was in prior to checking the software revision, since there is no self-test procedure. If you have version 1.6 or above, you will be queried whether or not you want to continue. The first of a long series of tests will check the RAM, initializing *all* Performance, Voice A, Voice B, and System Setup memory and causing a loss of all data (remember, back up first). If the RAM is good, press the Yes button again to proceed to the battery check test. At this point, you can power the unit down and reload your Voice and Performance data. The remainder of the tests are of little use to the consumer.

■ **DX7 with E! board:** This upgrade can be confusing to the operator, and it is even more so to someone who has used a DX7 but not seen an E! board menu. It is very important to know what you're doing; otherwise, it may seem that the unit is operating erratically or not at all.

The following set of procedures will completely reinitialize a DX7 with an E!

board. If you don't want to clear the Voice banks, skip sections A and B.

A. Choose a RAM bank.

1. Press Internal Memory Select;
2. Move the data entry slider to choose a bank number;
3. Choose a voice to activate that bank.

B. Erase that bank. Press:

1. The Function button;
2. The Operator Select button twice;
3. Button 19 three times (answer Yes to Bank Erase).

Remember to do the above steps to all voice banks.

C. To initialize without erasing voices, do the above procedure, but answer Yes only to Patch Map Erase and Keyboard Preset Erase. (Button 19 toggles between three parameters while in the Function/Operator mode: Bank, Patch Map, and Keyboard Preset Erase.)

D. Enter the Function Page to clear and set the global function data. Note that some buttons have more than one function, so to set each parameter for these buttons, simply press the button repeatedly until the screen displays the proper function. Press:

1. The Function button;
2. Button 2 (set to Poly);
3. Button 3 (set pitch bend range to 12);
4. Button 4 (set pitch bend step to 0);
5. Button 5 (set portamento mode to Retain);
6. Button 6 (set port/gliss to off);
7. Button 7 (set portamento time to 0);
8. Button 8 (MIDI volume=7, DX volume=7);
9. Button 9 (aux patch=000, main patch=000);
10. Button 10 (MIDI curve=Lin1, DX curve=Lin1);
11. Button 11 (MIDI high=127, MIDI low=16, DX high=127, DX low=000);
12. Button 12 (MIDI shift=000, DX shift=000);
13. Button 13 (keymode=norm, random detune=0);
14. Button 14 (MIDI transpose=00, timbre=63);
15. Button 15 (MIDI high=127, MIDI low=000, DX high=127, DX low=000);
16. Button 16 (MIDI out channel=01).

E. Now clear the other miscellaneous registers. Press:

1. The Operator Select button;
2. Button 7 (cont=off, seq=off, key=off);
3. The Operator Select button three times;
4. Button 13 (set the LED brightness to a comfortable level). Your Elquipped DX7 should now be properly initialized.

■ **DX21/27:** Enter test mode by pressing voice buttons 1 and 2 while turning on the power. This will display the ROM version and date. Before proceeding to the next test, make the following connections: cassette out to the input of an amp, the amp out to the cassette in (set for 10 dB gain), and connect MIDI in to MIDI out. Pressing the Yes button will begin the RAM, MIDI, and I/O test. A missing or bad connection will cause an error message. You can reboot at this point; RAM will be initialized.

■ **DX11:** Press and hold the Edit switch and press voice switches 16 and 32, then press Yes to initiate the RAM check. If the RAM check is okay, you can power down and start with the reinitialized voice-edit buffer, controllers, and performance parameters.

YAMAHA TX SERIES

■ **TX2/816:** Press and hold the three TF1 switches while powering up. Press the Yes/+1 switch three times to access the RAM check test; a green light indicates "okay." Power down to exit the test. No voice data should be affected.

■ **TX81Z:** Press and hold the Master Volume (left) and Cursor buttons while powering up. Then press the Inc (yes) button to initialize the MIDI parameters and load RAM with factory preset Voices and Performance setups. Power down to start fresh.

■ **TX802:** Press and hold buttons 8 and 9 while powering up, then press the Enter switch. Next, increment through the test numbers to test 56 and press and hold Enter, then +1. This will initialize the system memory buffers. Power down to restart.

■ **TX7:** Press and hold Data Yes and Mode switches while powering up, then press Yes to run through a few simple tests. This will initialize the unit, leaving all the voice data intact.

■ **FB-01:** Press and hold Sys Setup, Inst Select, and Data Entry No while powering up, then increment voice to initial-

● **GHOST**

ize the factory setup. If you have custom voices in RAM, they will be lost.

YAMAHA RX SERIES

■ **RX15:** Powering up initializes this unit without affecting data. Consult your owner's manual for clearing pattern and song data. This is sometimes required to eliminate bad data that may affect the performance of the unit.

■ **RX11:** Press and hold the Tempo and Stop/Continue switches while powering up. The RAM will automatically be checked upon starting this test. Note that all data will be lost. You may then power down to start fresh, or continue to play with the rest of the tests.

■ **RX21:** Press and hold the 3 and Stop/Continue switches while powering up. This will check ROM, RAM, and the LCD (display). All data will be lost. Power down to start fresh.

■ **RX5:** Press and hold the 7 and 9 switches while powering up, then press the +1/Yes switch. This will begin the test procedure with a system ROM and RAM check. If you want simply to reinitialize the RAM, press 1, 8, and then Start to jump directly to that point. Then press +1/Yes to initialize RAM to factory preset data. The unit will then return to normal operation.

■ **RX7:** This uses the same procedure as the RX5.

YAMAHA QX SERIES

■ **QX3 and QX7:** These units do not retain RAM data, so they automatically reinitialize on power off.

■ **QX5:** Press and hold Shift, Display, and F2 while powering up. Pressing Start initializes the RAM and returns the unit to normal operating mode. Data will be lost.

■ **QX21:** With power on, press B, Reset, TR1, and Start together. Increment to test 23 by pressing the Data +1 switch several times. Press the Track 2, Data +1, and Stop switches together to initialize the memory. Power down to start fresh.

Now that we've covered resets and initializations for most Yamaha synths and drum machines, let's move on to reinitializing units from Kawai, Korg, and Ensoniq. Not all devices will have a reset or initialization procedure; most sequencers and samplers, for instance, are reset when turned on (as are several analog synths). Always remember to back up your data before initializing (this can't be stressed enough).

KAWAI INSTRUMENTS

■ **K1:** While holding down the System button, turn on the power. This will reset all of the voices to factory standard.

■ **K3:** While holding the first three keys (C, C#, D), turn on the power. This resets all of the voices to factory standard.

■ **K3m:** While holding the first three parameter buttons (1, 2, and 3), turn on the power. As with the K3, this will reset all of the voices to factory standard.

■ **K5 and K5m:** There are no reset functions available for either unit.

■ **M-8000:** Pressing and holding button 9 while powering up will reset this unit to the factory settings.

■ **MK-10/20:** While holding the two leftmost black keys, turn the power on. This resets the factory settings and clears out the sequencer.

■ **Q-80:** Hold the red Select button while turning on the power to reset the factory sequences and parameters.

■ **R-50:** This unit, like the R-100, has two levels of reset. The "soft" reset leaves the user's data intact and resets the parameters only; the "hard" reset reinstalls *all* the factory data. To initiate a soft reset, hold the Erase button and turn on the power. To initiate a hard reset, with the power already on, hold the Accent button and press Erase. The display window will query, "Erase All?" Now press the Enter button. The display window will then ask, "Sure?" Press the Enter button again to completely reinitialize the unit.

■ **R-100:** The soft reset procedure is the same as the R-50. To initiate a hard reset, with the power already on, hold the lower half of the first function button and press Erase. Press the Enter button twice to reinstall all the factory data.

KORG INSTRUMENTS

■ **M1:** Press and hold the two top leftmost buttons and turn on the power. This will completely reset the unit, erasing all sequence data and voices. The only way to restore the factory data is with the factory cards or via a computer system-exclusive transfer.

■ **DSS-1:** Press and hold the Data Entry up and down switches while powering up. In one or two seconds, the display will indicate that you are in test mode and will show the ROM version number. Then you will be queried whether you want to continue with the floppy disk drive test. If you press Yes at this point, you will need to have a blank, formatted disk in the drive to continue. If you press

No, you will go right to the RAM test. Pressing Yes for the RAM check will cause the CPU to write zeros to the RAM and then read them back. If all is okay, you'll be able to follow the few remaining instructions to complete the self-test.

■ **DSM-1:** Holding both Cursor buttons while powering up will cause the LCD to display the test-mode message, the ROM version number, and a function selection choice of 01 through 17. To start a particular test, you can enter the number (01 through 17), then press the Yes button. Here is a listing of what each function tests:

- 01 Switches and LEDs;
- 02 Footswitch (footswitch required);
- 03 LCD;
- 04 LCD;
- 05 Data entry encoder (rotary dial);
- 06 Input level indicator;
- 07 Individual output levels; (These last two tests require a knowledge of audio test equipment, and I recommend that these tests be left to a technician.)
- 08 MIDI ports (plug a MIDI cable from MIDI in to MIDI out);
- 09 There is no test 09.
- 10 Disk drive (requires a blank, formatted disk);
- 11 RAM.

Tests 12-17 are specifically for technicians, not for consumer use.

■ **DW-8000:** To display the ROM version number and reset the CPU alone, press buttons 1 and 2 while powering up. This will also set the write-protect attribute on versions 07 and later. To wipe out *all* voice data and clear the RAM, press buttons 5 and 8 while powering up. Remember to back up your data before you do this, as the synth will no longer make any sound until new voices are reinstalled.

■ **DDD-1:** Pressing and holding the Yes (+1) and No (-1) buttons while powering up will reset this unit to factory installed data, erasing everything input by the user. Remember to save your data.

■ **SQD-8:** With no disk in the unit, press the Measure Memory button while powering up. You must hold the Measure Memory button until the unit buzzes before the unit enters its check mode. This will test the RAM; if good, the Tempo LED will turn green.

ENSONIQ INSTRUMENTS

■ **ESQ-1 and SQ-80:** With the power already on, hold down the Record button and press the top left "soft" button. The

LCD will ask, "Erase All Memory and Re-initialize?" Press Yes to do so. The ROM version number will appear and initialization will be complete. ROM versions 2.3 and higher will automatically reload the factory sounds and erase all sequencer data. Press any button to continue.

ENSONIQ INSTRUMENTS

■ **ESQ-1 and SQ-80:** With the power already on, hold down the Record button and press the top left "soft" button. The LCD will ask, "Erase All Memory and Re-initialize?" Press Yes to do so. The ROM version number will appear and initialization will be complete. ROM versions 2.3 and higher will automatically reload the factory sounds and erase all sequencer data. Press any button to continue.

ACKNOWLEDGMENTS

In a future article, we'll move on to Roland and Oberheim equipment. Many thanks to Jeff at Yamaha, Mike and Tom at Korg, Mr. and Mrs. Roberts at Kawai, and Steve at Ensoniq. Without their help...well, you know the story.

Mark Davis is an electronic musician and MIDI/keyboard service technician who has successfully dodged electrocution for twelve years. He has been performing synth rescue missions for four years in Greensboro, North Carolina. At home, he hides behind his computer and arsenal of MIDI equipment.

PART II -->

GHOST IN THE MACHINE, PART 2

When your synth locks up, your drum machine crashes, and your sequencer plays the one-note samba, exorcise the ghost in your machine with these service routines.

By Mark Davis



In the May issue we covered initialization and test routines for Yamaha, Kawai, Korg, and Ensoniq equipment. This time, we'll turn our attention to Roland and Oberheim gear.

As we stressed in Part One, *always and without fail* back up your data before reinitializing or testing, as data may be lost in the process.

ROLAND SYNTHESIZERS

First of all, be careful. If your instrument is reinitialized, the Roland factory cannot be responsible for replacing your patches.

Not all of Roland's equipment is covered here because some of their units do not possess a reset function. Each individual Roland synth has its own method

of self-test or reset. If, in any given situation, you cannot smoothly exit a reset or initialization function, it's probable that turning the power off, waiting several seconds, and turning the power back on will restore a machine to its normal state.

■ **JP-8:** To display the ROM version, turn on the power while pressing Patch Number buttons 1 and 3. The following table describes the characteristics of each ROM type. Unfortunately, there is no user-friendly self-test.

Display	Features
07 or 10	12-bit DAC, fixed split, no OC-8 (DCB bus)
21	12-bit DAC, variable split, OC-8 built-in

- 33 or 34 Same as above, but OC-8 is an option
- 31 or 32 14-bit DAC, variable split, no OC-8
- 34 Same as above, but with built-in DCB bus

Note that 12-bit DACs cannot be upgraded to 14-bit DACs.

■ **Juno-60:** Plug a dummy (unconnected) plug into the Patch Shift jack; set the HPF slider to 3, the LFO, DCO, VCF, and VCA switches to their low positions, and the Octave Transpose switch to its mid position. Next, press and hold the Chorus Off and II switches while powering up. This will check the RAM by writing a square wave tone to all banks, which wipes out all existing voices. If successful, you will be able to access the different banks immediately to hear the square wave tone. You can then reload your voices.

■ **JX-10:** To display the ROM version, press and hold the Patch Memory H button. After a few seconds, play mode returns.

■ **GR-700 and GR-700B:** To display the ROM version, press String Select button 4 while powering up. The patch display window will show the version. To reset the factory voices in banks 1 through 4, press and hold the Write button while powering up. There are no factory voices prepared for banks 5 through 8.

■ **HS-80:** This machine might on occasion display a "CHECK BATTERY!!" message. To see if the battery is actually good, in which case the RAM merely requires reinitialization, set the Memory Protect switch to off with the power on. Turn off the power. Then press and hold the Brilliance and Data Trans buttons while powering up. This will initialize the RAM and reload the factory sounds. If the "CHECK BATTERY!!" message returns, the battery may really be bad (or possibly the RAM chip itself is

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the problem). Note that reloading factory sounds into RAM will erase user data by duplicating the ROM into RAM banks.

■ **JU-1:** To check the RAM without losing data, press and hold the Oct Down and MIDI buttons while powering up. The display should read: "RAM CHECK OK!!" For a complete RAM reinitialization, turn the Memory Protect switch to off with the power on. Turn the power off, press and hold the Portamento and Data Trans buttons, then power up. If the RAM is corrupt, no initialization will take place and the display will say "CHECK BATTERY!!" Turn the power off to return to normal play mode.

■ **JU-2:** This unit reinitializes like the JU-1 but can check a cartridge, too. To check the cartridge RAM, set the Memory Protect switch on the cartridge to off and insert the cartridge into the JU-2 cartridge slot. Press and hold the Oct Down and Parameter Select buttons while powering up. If the cart is good, the display will say "CART CHECK OK!!" The cart data should remain intact. Power off to return to play mode.

■ **MKS-30:** To display the ROM version and program implementation date, set MIDI channel to 1 and set Bank/Patch to 1/1; then, while pressing MIDI Channel, hit the Dynamics button. This will display the date. To display the ROM version, press and hold MIDI Channel and hit the Dynamics button again. The unit should then return to normal mode.

■ **MKS-50:** To check the RAM, press and hold the Patch A-B and Data Transfer buttons while powering up. You should see a "RAM CHECK OK!!" message in the display. User data will remain intact. Oddly enough, to change from MIDI poly mode to MIDI mono mode, factory preset loading seems to be required. To initialize in poly mode, press and hold Number buttons 4 and 8 while powering up. To initialize the unit in mono mode, press and hold Number buttons 3 and 7 while powering up. In both cases, the following will be transferred from ROM to RAM: Tune/MIDI Function, 16 chord memories, 64 tones for the A group, and 128 patches for the A/B groups. Also, the Tone names in group A will be copied to the group A Patch Names.

■ **MKS-70:** To display the ROM version, press and hold the Value button while powering up.

■ **MT-32:** To display the ROM version,

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press and hold the Part 4, Rhythm, and Master Volume buttons while powering up. There are four circuit board types in the MT-32, and the indicated ROM version reflects only the type of circuit board, not any performance-oriented upgrade. After a few seconds, the synth will return to normal play. To check the RAM, connect a MIDI cable from MIDI out to MIDI in, then press and hold the Part 3 and Volume buttons while powering up. The display will indicate if the RAM is okay. There are several more tests beyond this point, so avoid technical confusion—quit by powering down after the RAM check. Power back up to play.

ROLAND "D" SERIES SYNTHESIZERS

"D" series instruments are structured so that the actual voice data is in the form of a modified, basic tone patch. When these instruments are initialized, the hot, thick sounds are returned to their fundamental state, much like an initial voice on a Yamaha DX7 but with more variations between banks. Usually this type of reinitialization is required only when the battery or RAM IC has been changed, but you may want to build a new set of voices from scratch. Once initialized, the only way to restore the full-sounding patch data is to load it back in from a memory card or system exclusive data source (MIDI disk, instrument with sys ex storage capabilities, computer sys ex storage program, etc.).

■ **D-10/20:** To identify the ROM version, press and hold the Edit and Data Transfer buttons while powering up. A few seconds after the version is displayed, the unit will return to normal play mode. To reset the factory preset data (except for the programmable tone data, the unit will become initialized), press and hold the Tune/Function and Write buttons while powering up. To

reload the factory-programmable tone data into memory, you will need to save your data in some sort of sys ex data filer or have a prepared RAM memory card with your data (you can load this data from another D-10/20).

■ **D-110:** To identify the ROM version, press and hold the following three buttons while powering up: Part, Parameter Bank, and Enter. After a few seconds, normal mode returns. To initialize the factory preset Timbre Memory and Rhythm Setup data, press and hold the Write/Copy button while powering up. You will need to save to a sys ex data filer or prepare a RAM memory card with your data to restore the factory tone and patch data.

It is recommended that the D-110 ROM version be upgraded to a 1.10 version if you're using an editor/librarian. This new ROM will actually slow down the sys ex timing interval; therefore, it will not necessarily improve performance if you are not using an editor/librarian.

■ **D-50:** To identify the ROM version, press and hold the 0 and Increment buttons while powering up. There are two CPU types for the D-50: for type 1, the latest ROM version is 1.10; for type 2, the latest version is 2.10. (Type 1 is not compatible with type 2, and type 2 is no more advanced than type 1.) Only the last two numbers specify the actual ROM version. After a few seconds, normal play returns. To initialize the factory Tune/Function and MIDI data, press and hold the 0 and Data Transfer buttons while powering up. Patch and Reverb Type data must be reloaded from either a RAM card or pre-saved MIDI sys ex data.

■ **D-550:** Press and hold Patch Bank 6, Patch Number 6, and Exit while powering up to display the ROM version. Note that there are currently no ROM version upgrades for the D-550. Normal play mode follows. To recover factory Tune/Function and MIDI data, press and hold the Patch Bank 2, Patch Number 6, and Enter buttons while powering up. Patch and Reverb Type data must be reloaded from either a RAM card or pre-saved MIDI sys ex data.

ROLAND SAMPLERS

■ **S-50:** Determining the ROM version requires a monitor. With the system disk loaded, press, in order, Func, P1, and Shift (Menu 11 "Master" selected); next, press 1 and then Enter. The monitor will display the installed disk and ROM ver-

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sions, respectively. Currently, there are no ROM revisions for the S-50, but the current software version is 2.0. An easier way to display the software version is to watch the screen while booting.

■ **S-550:** To determine the software version, with the monitor off, press and hold the 1 button while powering up; continue to hold the 1 button until the display says "PLEASE INSERT SYSTEM DISK." Then insert the utilities disk supplied with the unit; the display will show the software version number. However, it's easier just to watch the screen while booting to discover your software version. The current software version is 1.12. Turn off the machine and boot up normally after this, since not all of the test programs are complete.

■ **S-330:** To display the software version, insert the system or utility disk and press Mode, the Down button (three times), Execute, the Down button, Execute, Menu, and Dec/No (twice). Again, it's easier just to watch the screen while booting to discover your software version. In either case, you power down and reboot normally to play.

ROLAND DRUMS AND SUCH

■ **TR-505:** Currently there are no ROM revisions. If you simply want to reload the factory data, press and hold the Mode and Pattern Group A buttons while powering up. However, this will erase all user programs.

■ **TR-626:** To reinitialize and reload the factory preset data, press and hold the MIDI and Track 1 buttons while powering up. User data will be lost.

■ **TR-707/727:** To reload the factory presets, press and hold the Track Mode and Track 1 buttons while powering up. User data will be lost. Occasionally, TR-707s will lock up in MIDI omni mode due to errant sequencing information, and the user cannot escape from this mode. The way to remedy this situation is to save patterns to tape, take the batteries out, leave them out over night, reinstall the batteries the next day, and reload your patterns.

■ **TR-909:** To reload the factory presets, press and hold the Track 1 and Pattern 1 buttons while powering up. This will load Bank 1, Track 1. User patterns will be erased.

■ **CR-1000:** To reload the factory data, press and hold the Variation and Hand Clap buttons while powering up. User patterns will be erased.

ROLAND SEQUENCERS

■ **MC-500:** Currently there are no ROM revisions. When booting up a Roland MC-300, MC-500, or MC-500 MkII, the software version will always read 1.0. To check the actual version, hit the Available Memory button and let go. Then press and hold the following buttons: Track R, Track 4, Reset, and Microscope. While holding all these buttons simultaneously, press Enter. The display will now read "CHECK SONG DATA." Release all buttons and hit Mode to read your current software version.

OBERHEIM SYNTHESIZERS AND PROMMER

■ **Xpander:** To check certain functions, you must have the power on and the memory protect off. Then press the following buttons, in order, to get to the Service page (all of the tests described here will be accessed from the Service page): Master Page, Page 2, then Service.

1. Main processor ROM and RAM test: Press MEM. If all is well, you should see the following successive messages: "RAM 0 OK, RAM 1 OK, RAM 2 OK, ROM 0 OK, ROM 1 OK, ROM 2 OK, ROM 3 OK."

2. Voice processor RAM and ROM test: Press VMEM. After about twenty seconds, you should see the message "CA MEM OK."

3. LED test: Press LED. First, all sixteen LEDs will light for two seconds, then each will light in sequence.

4. Fluorescent display test: Press DISP. First, all segments of all digits will light, then all segments of one digit at a time, then one segment at a time for all digits of displays 1, 1 and 2, and 1, 2, and 3.

5. DAC Monotonicity test: Press DAC MONO with the Xpander connected to an audio amp and listen; you should hear no beep, or rarely hear one.

6. Untune: You can cancel all of the automatic correction (VCO, PW, Res, and VCF) tuning by pressing UNTUNE. All of the correction parameters will be set to 0. (This may be useful if, for example, you need to learn how much apart the resonance control of two VCFs might be, check the linearity of a sample and hold, etc.)

To find out the software version, press VERSION from the Service page. To reset the software, hold down the Clear button while powering up, then select YES under display 3. Selecting NO will cancel the reset. The patch memory will be unaffected by this operation.

■ **Matrix-6:** To reset the processor and initialize the unit, press and hold the Store button while powering up. When you release Store, the display should go blank for a few seconds; when the display resets, it will recall patch 00. Although the display reads 00, the patch will be that of an initialized voice.

■ **Prommer:** Press and hold the Play and Record buttons while powering up to enter the test mode. The display should read "TEST PROGRAMS" as long as the two buttons are held after powering up, and then will show the first test. To skip over or go on to the next test, press the Stop button. Press the Execute button to begin a test. The available tests are:

1. Display intensity: Use the arrow buttons to adjust the display's intensity. The brightness will remain at this level until an Erase All or power-on erase command resets all memory.

2. Memory test: Press the Execute button to begin this nondestructive RAM test. The display should show "OK."

3. Display test: Press the Execute button to begin. The letters A through Z will be displayed until you press Stop.

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before testing.

4. Sine wave test: Pressing the Execute button will cause the Prommer to produce a 440 Hz sine wave at the line output. You can hear this with an audio amp or check it with a scope. The output should be about seven volts peak-to-peak.

5. V_{cc} supply test: You will need a good digital multimeter for this test. With no EPROM in the socket, press the Execute button to begin. Measure the voltage between EPROM socket pin 14 (ground) and pin 28 (V_{cc}). Use the arrow buttons to adjust the voltage for 0 volts DC (0 in display), 5 volts DC (4992 in display), and 6 volts DC (6016 in display). The Clear button sets the voltage to 0 and the 9 button sets the voltage to the maximum value. Zero volts should be within ± 0.5 volts, five volts should be within ± 0.25 volts, and six volts should be within ± 0.30 volts.

6. V_{pp} voltage test: Measuring at

EPROM socket pins 14 (ground) and 1 (V_{pp}), adjust the voltages in the same manner as the previous test, but note that the voltages will be different. You should check for 0 volts DC ± 0.5 volts (Clear button, 0 in display), 12 volts DC ± 0.5 volts (use the arrow buttons to adjust, 11978 in display), 25 volts DC ± 1.0 volts (9 button, 25016 in display).

7. Relay test: This turns the internal relays on and off in a steady rhythm; you should be able to hear the three relays clicking. If necessary, use an oscilloscope or signature analyzer to verify. Pressing Stop after this test restores the Prommer to normal operation.

Acknowledgment: Many thanks to John White, Craig Sibley, and Marty Frasu at Roland, and Tom Dunn, Dave Hampton, and Jonathan Collins at Oberheim.

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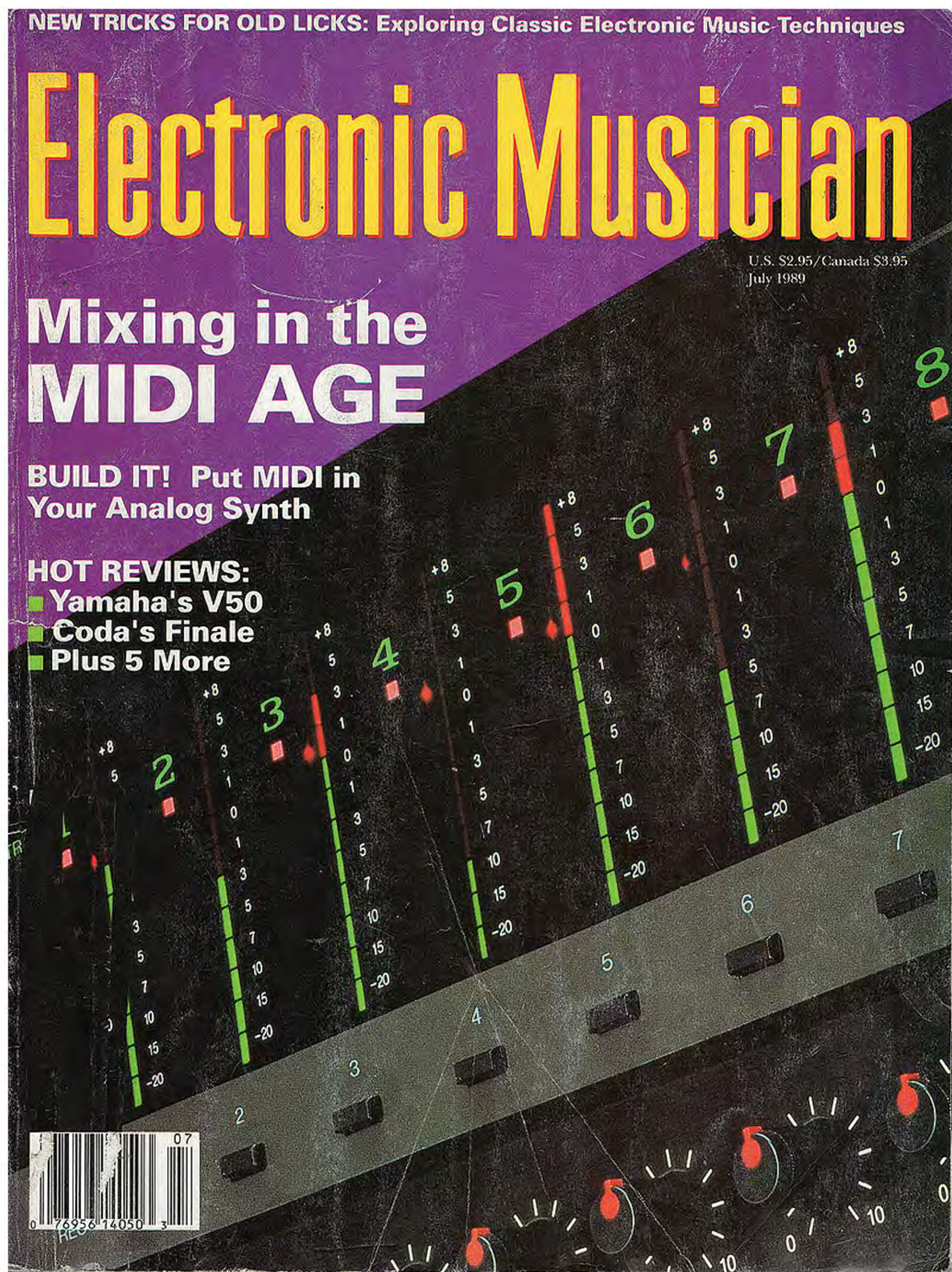
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