MAX

OPERATION MANUAL

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MAX

MIDI VOICE EXPANDER/ COMPUTER PERIPHERAL

OPERATION MANUAL

By Stanley Jungleib

Sequential
POSTBUS 16
3640 AA Mijdrecht
Netherlands
02979-6211
TELEX: 12721 SQNTL NL

Sequential
3051 North First Street
San Jose, CA 95134-2093
U.S.A.
408/946-5240
TELEX: 4997150 SEQCIR

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Preface

This manual begins with the procedures needed to set-up, play, and create songs with MAX. For quick scanning, control names are in **bold** and instructions are printed all in capitals. Explanatory information is indented under the instructions.

General remarks on the functional design of the MAX follow the instructions (see page 21).

NOTE: For all interfacing and programming information (including Computer Load), see the MAX MIDIGUIDE (MG620).

SET-UP INSTRUCTIONS

WARNING! Switch power off to all equipment in use before connecting or disconnecting anything.

NOTE: See figure on page 5.

1. CONNECT THE AUDIO OUTPUT.

CAUTION! If you are using an external amplifier, switch the amplifier power off.

NOTE: For best fidelity, the amplifier and speakers must have a full frequency range and adequate power ratings.

The MAX has a monaural (mono) audio output available from three jacks on the back panel.

The **Main/Headphone** jack drives a standard mono phone cable used to connect most instrument amplifiers. But you can plug stereo headphones into the **Main/Headphone** jack. Since this jack is a tip-ring-sleeve (TRS) type, it drives both sides of the headphones.

The **A** and **B** "RCA/phono" jacks accept a standard dual cable for driving the L and R "auxiliary" or "monitor" inputs of a component-type stereo amplifier.

2. CONNECT POWER TRANSFORMER.

Connect the transformer cable to the **Power In** jack on the MAX.

Check that the MAX **Power** switch is off.

Plug the transformer into a power outlet of the correct voltage. (The transformer requires no grounding.)

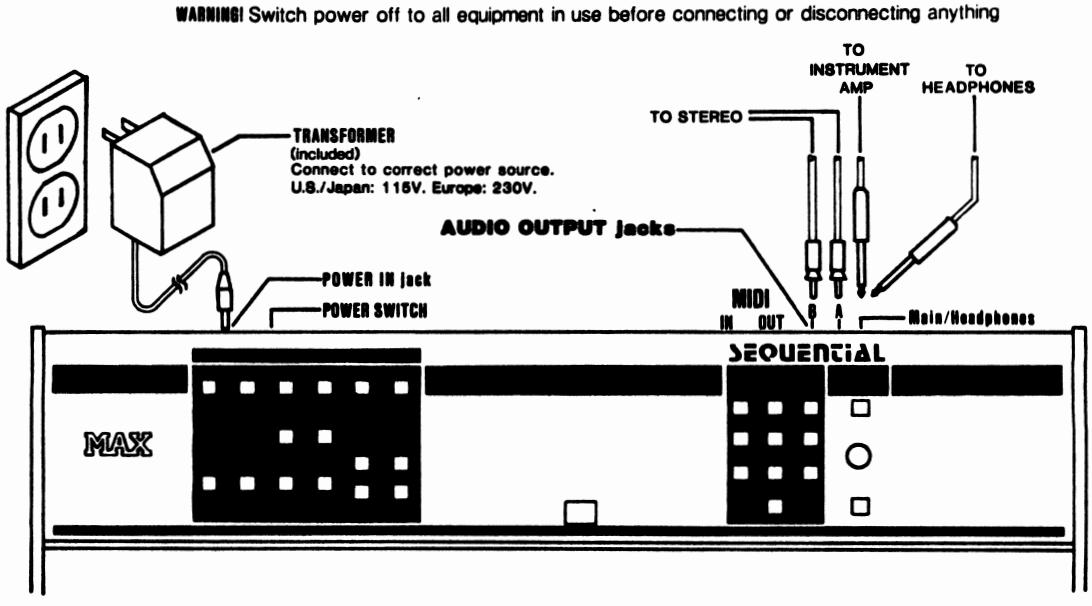
3. SWITCH POWER ON.

Switch the MAX **Power** switch to **On**.

Switch amplifier power on (if used).

(Later, when you are done playing, to prevent a "pop" switch off amplifier power first, then switch off the MAX.)

SET-UP DIAGRAM



4. OBSERVE INITIAL TUNING.

When you apply power, the LEDs for **Tracks 1 - 6** light in sequence as the numbers 1 through 6 appear in the **Sound Selection** display. This indicates that the synthesizer voices are tuning. This takes about 20 seconds. You can't play the MAX and the recorder will not operate during tuning.

When initial tuning is done, 00 appears in the **Sound Selection** display. This indicates that the MAX is ready to play, and that sound number 00 (Full Organ) is selected.

Song 1 and **Stop** are also lit. This means that the multi-track recorder is ready.

5. IF DESIRED TO ADJUST MASTER TUNE, HOLD **Record** AND PRESS THE LOWER OR UPPER **Track Volume** SWITCHES.

The pitch will change very slowly. Use this "hidden function" to tune the MAX to an acoustic piano, for example.

CAUTION! To protect speakers (and ears!), first lower **Master Volume** all the way, then, while playing, gradually raise it to the desired level.

NOTE: For best signal-to-noise ratio when using external amplifiers, raise **Master Volume** and lower the amplifier level.

BASIC PLAYING

1. PLAY THE KEYBOARD.

When you play the keyboard, the MAX should now produce an organ sound, which is sound number 00. At this point all six track voices play this same sound. This is called homophonic (same-sounding) mode.

As you play the keys, the **Track** LEDs show which voices are active. These indicate voice assignment. While you play, the computer continuously assigns the voices to the most recently-played keys. You can play a maximum of six keys at once. If you play more than six keys at the same time, then the computer assigns the voices to only the latest six keys.

For example, play and hold C, D, E, F, G, A. Listen carefully while also pressing B. Notice that the C disappears when you play the B. In other words, the MAX normally operates on a "last-note priority" system: each new note played is assigned to the earliest-used voice. If you strike the same key repeatedly, the computer assigns the same voice.

2. TO SELECT SOUNDS: ENTER TWO DIGITS USING THE **SOUND SELECT** KEYPAD.

The MAX is "ready-to-play," with 80 permanent sounds. These present a wide range of instruments and effects. Most were created by SCI's Product Specialist, John Bowen, with some contributions from other SCI staff. The **SOUNDS** chart on the MAX control panel lists the general categories into which the sounds are organized. A complete list is on the next page.

To select a sound, simply enter the corresponding two digits using the **SOUND SELECT** numerical keypad. The first digit appears in the left place. When you enter the next digit, the sound switches to the new selection.

NOTE: As sound "locations" 80 - 99 are normally empty (unless they have been loaded by an external MIDI device), when you try to enter a number from 80 - 99 the keypad does not respond. For more information on loading these sound locations by computer, see the MAX MIDIGUIDE.

3. PRESS **Tune** OCCASIONALLY.

After you have played for a while, you may notice the voices going out of tune. This occurs because MAX contains analog oscillators which, like all acoustic instruments, are affected by temperature changes. You may need to retune periodically as the MAX warms-up. After 15 to 20 minutes the oscillators stabilize, so retuning won't be required very often.

4. TO TRANSPOSE MAX:

Hold **Transpose**.
Press a key relative to C.
Release **Transpose**. (MAX is transposed up to the selected interval.)
To cancel the transposition, transpose the keyboard to C.
(This affects live playing and song playback.)

SOUND NAMES

Organ
00 - Full Organ
01 - Percussive Organ I
02 - Percussive Organ II
03 - Organ Flutes
04 - Light Leslie
05 - High Organ Flutes
06 - Percussive Organ III
07 - Fast Leslie
08 - Chorale Organ I
09 - Chorale Organ II

Brass
10 - Brass I
11 - Brass II
12 - Brass with slow attack
13 - Cornet
14 - Brassy with vibrato
15 - Punchy high brass
16 - Digi-horn
17 - Concert Brass I
18 - Concert Brass II
19 - Tuba

Strings/Woodwinds
20 - Strings I
21 - Strings II
22 - Strings III
23 - Strings IV
24 - String Swell
25 - Pennywhistle
26 - Clarinet
27 - Woodwind I
28 - Woodwind II
29 - Flute

Keyboards
30 - Piano I
31 - Clavet
32 - Harpsichord
33 - Piano II
34 - Electric Piano
35 - Synth-clav I
36 - Synth-clav II
37 - Acoustic Piano - Part 1
38 - Acoustic Piano - Part 2*
39 - Deep Clav.

*For use with #38 over MIDI.

Bass/Percussion
40 - String Bass I
41 - String Bass II
42 - Res-bass I
43 - Res-bass II
44 - Clav-bass
45 - Synth-bass
46 - Snare Drum
47 - Log Drum
48 - Bass Drum
49 - Syn-Tom

Synthesizer I
50 - Synth. with resonance
51 - Loris
52 - Pulse Width Mod. I
53 - Seraphim
54 - Echo I
55 - Full Synth.
56 - Razor Sharp
57 - Poly Glide
58 - BezMod
59 - Plucky

Synthesizer II
60 - Pleides
61 - Zarene
62 - Harp
63 - Echo II
64 - High Josef
65 - Ariel
66 - Power Pack
67 - Vocalings
68 - Pulse Width Mod. II
69 - Miridium

Special Effects
70 - Wind
71 - Meow
72 - Space Chimes I
73 - Percussive Noise
74 - Chirp Dive
75 - UFO
76 - Square Wave Spacey
77 - Space Chimes II
78 - Alien
79 - Alien Wind

Computer Load
80-99 (see MAX MIDIGUIDE)

SONG PLAYBACK FUNCTIONS

Before trying to record songs, familiarize yourself with the playback functions explained in this section.

NOTE: The MAX does not remember songs nor any song adjustments such as speed or track volume, while power is off. But every time power is switched on, two short demonstration songs are automatically created. You can play these songs to show that the MAX is properly connected and operating correctly. Because they are always available when power goes on, we will use these "demo" songs for examples in the instructions below.

1. TO START PLAYBACK: SELECT DESIRED SONG THEN PRESS **Start**.

a. **Stop** must be lit. Select **Song 1** or **Song 2**.

b. Press **Start**. The selected song starts playing-back.

2. TO STOP PLAYBACK: PRESS Stop.

Songs always repeat continuously until stopped. Each repetition is called a "loop." During playback, those **Track** LEDs light for tracks which are recorded in the song. For example, Demo Song 1 uses all six tracks. While Demo Song 1 plays, all **Track** LEDs are lit. Demo Song 2 also uses all six tracks. (Demo Song 2 is not really a song, but a sound effects piece.) You must stop one song before you can start the other. In other words, to switch songs, **Stop** must be lit.

At the end of each loop, the **Track** LEDs blink.

3. DURING SONG PLAYBACK, IF ANY TRACKS ARE NOT LIT, YOU CAN PLAY THE KEYBOARD "LIVE," USING THE SOUND WHICH IS CURRENTLY SELECTED.

If any track is not lit, this track is available for live accompaniment. Since both demo songs use all tracks, you can't play along with them until you erase a track (see page 11).

4. TO DISPLAY A TRACK'S CURRENT SOUND NUMBER: PRESS THE DESIRED **Track** SWITCH.

If you have just switched on the MAX, for example, the sound selection is 00. Did you notice that although the MAX displays 00, neither demo song uses this organ sound? This is because the multi-track recorder operates multi-timbrally (as opposed to homophonically). Songs can have different sound selections for each track.

For example, with **Song 1** lit, press **Track 1**. 48 appears. This is the number of the sound (Bass Drum) which **Track 1** uses in Demo Song 1. When you release the **Track** switch, the display returns to 00 (or whatever the current sound selection is).

Press the other **Track** switches and you learn that for Demo Song 1 the tracks have these sounds:

Track	Sound Number	Sound Name
1	48	Bass Drum
2	46	Snare Drum
3	44	Clav Bass
4	07	Fast Leslie
5	07	Fast Leslie
6	64	High Josef

With **Song 2** selected, press the **Track** switches to display the sound assignments in Demo Song 2:

Track	Sound Number	Sound Name
1	77	Space Chimes II
2	79	Alien Wind
3	79	Alien Wind
4	78	Alien
5	70	Wind
6	52	Pulse Width Mod I

If a track has not been recorded, when you press its switch, the display continues to show the current sound selection. This demonstrates that unrecorded tracks (which are available for live playing) use the current sound number.

5. TO ADJUST PLAYBACK SPEED: USE THE SPEED SWITCHES.

a. With the desired song selected (whether started or stopped), hold the upper or lower **Speed** switches. When you press either **Speed** switch, a speed value 01 - 61 is displayed.

b. To raise or lower by one speed increment, tap either **Speed** switch.

The song always plays at the speed to which it was last adjusted (unless you have switched power off).

For example, select **Song 1**. Press the upper **Speed** switch. The display counts up from 04. 04 is the initial speed value of Demo Song 1. If the song is running, it gets faster. To reduce speed, hold the lower **Speed** switch.

Now select Demo Song 2 and adjust its speed. Notice that it has an initial speed value of 06.

6. TO ADJUST A TRACK VOLUME: HOLD DESIRED **Track** SWITCH WHILE TAPPING OR HOLDING EITHER **Track Volume** SWITCH.

a. Start playback.

b. Hold one of the lit **Track** switches.

c. Use the upper or lower **Track Volume** switches. When you press either track volume switch, the MAX displays a volume value 00-15. When you release the **Track Volume** switch, the MAX displays the track's sound number.

d. To raise or lower by one volume increment, tap the **Track Volume** switches.

e. The track always plays at the volume to which it was last adjusted (unless you have switched power off).

During playback you can adjust the "mixture" of the track volumes. For example, start Demo Song 1. Hold **Track 6** (which is lit) and the lower **Track Volume** switch. The volume of the lead line drops as the display counts down from 15. When it reaches 00, you can not hear the track and it is said to be "muted." Now stop Demo Song 1 and start it again. **Track 6** is lit, but you do not hear the lead line. Keep this in mind as a reminder to check the track volume when a track appears to be off. Now raise the volume of track 6 by holding its switch and the upper **Track Volume** switch.

(Each song has independent volumes. In other words, if song 1 volumes are adjusted, song 2 is not affected.)

Adjust the volume of the other tracks in Demo Songs 1 or 2. You can emphasize or demphasize any of the tracks, to make many variations of one song.

7. TO CHANGE A TRACK'S SOUND: SWITCH **Record** ON, SELECT TRACK(S), THEN SELECT NEW SOUND:

a. Select song. **Stop** or **Start** can be lit. Switch **Record** on. It blinks.

b. Press the **Track** switch for the track (or tracks) you want to change. It (or they) blink, too.

If the song is playing, when the current loop ends, the **Record** LED stops blinking. Ignore this. (You will learn more below about this indication.)

c. Enter the two digits for the desired sound (even if the sound number is already displayed). While **Record** is on or the **Track** LEDs are blinking, you can try several sound selections.

d. Switch **Record** off.

e. Start playback. The tracks now have the new sound.

Experiment with changing the track's sounds in the two demo songs. Verify the changes (by simply pressing the **Track** switches).

8. TO TRANSPOSE: START SONG, HOLD TRANSPOSE, THEN PRESS A KEY WHICH IS THE DESIRED TRANSPOSITION RELATIVE TO C.

a. Start the song.

b. Hold **Transpose**.

c. Select the transpose interval by pressing a key in relationship to Middle C. (The transpose range is one octave above the original key.)

> For example, pressing any F transposes up a perfect fourth, while pressing any B-flat transposes up a minor 7th, and so on.

d. The song plays as transposed, until you cancel the transposition (or power goes off). To cancel the transposition, simply transpose the song back to Middle C (hold **Transpose** and press any C).

9. TO ERASE A TRACK FROM A SONG: SWITCH **Erase** ON, THEN PRESS THE **Track** SWITCH.

a. Select song.

b. The song can be running or stopped.

c. Press the **Erase** switch. It blinks.

d. Press the switch for the track you want to erase. If the song was running, it stops.

CAUTION! When **Erase** blinks, do not press any **SOUND SELECT** switches. If you do, you may lose your songs. For more information on MIDI coded functions, see the MAX MIDIGUIDE.

e. To erase another track, repeat from step b.

For example, select Demo Song 1 and erase track 6. You now have an unrecorded track to use for live playing.

When **Erase** is on, be sure to press the correct **Track** switch, or you may accidentally erase a part you wanted to keep.

When you erase the last track of a song, the speed is not erased.

10. TO ERASE A SONG: SWITCH **Erase** ON, THEN PRESS THE SONG SWITCH.

a. Select song you want to erase.

b. Either **Stop** or **Start** can be lit.

c. Press the **Erase** switch. It blinks.

CAUTION! When **Erase** blinks, do not press any **SOUND SELECT** switches.

d. Press the song switch.

e. Press **Start**. Nothing plays, proving that the song is erased.

NOTE: As discussed in the next section, every time you switch power on, you must first erase the two demo songs before you can create your own songs. Otherwise you will only be making an overdub over the demo songs.

Erase both demo songs. Switch power off, then back on. The demo songs are back!

Erase both demo songs again. Now press the lower **Speed** switch. This displays a speed setting of 32. Unlike erasing a song's last track, erasing a song sets the speed to 33.

MAKING SONGS

Having covered the playback functions, we now turn to recording and overdubbing.

NOTE: Remember that whenever you switch power off, all song information in the MAX is erased. Therefore you may want to use an external MIDI device for song storage. (For more information, see the MIDIGUIDE.) It may be a good idea to at least audio-record any song into which you've put a lot of work. If you a) trust someone to not accidentally disconnect it, and b) trust your power source to remain uninterrupted, leaving your MAX on keeps the songs in memory. This costs about two cents per day.

1. THE MAX STORES A MAXIMUM OF 500 NOTES. WHEN CAPACITY IS REACHED, RECORD MODE SWITCHES OFF AUTOMATICALLY.

You can create more space by erasing undesired tracks in either song, or by erasing the other song entirely.

2. TO RECORD A NEW SONG: FIRST ERASE CURRENT SONG.

Because the demo songs are created each time you switch power on, you have to specifically erase them before you can make a song. (For instructions, see the previous page.)

Whenever you erase a song, the speed is initially set to 33 (medium). (All track volumes are set to the value of the voice volume parameter of the selected sound. For more information on sound parameters, see the MIDIGUIDE.)

3. IF DESIRED, ADJUST SPEED CONTROL.

If you leave the recording speed set to 33 (the "default" value), you may not have enough speed control range to allow the song to play really quickly. So if you know that you are going to want to significantly increase the speed, preset the speed to about 10 or 20. Then you will have ample range to speed things up.

4. TO RECORD BASIC TRACK:

The basic track or tracks are the first recorded in a song. They determine the song length. Therefore you usually use the basic tracks for the rhythmic or bass foundations of a song, but of course you can record anything you want.

a. Select and erase **Song 1** or **Song 2**.

b. Select sound desired for this first track or tracks.

c. Switch **Record** on. It blinks. **Track 1** blinks.

d. One track can only play one note at a time. If you need more than one voice for the basic track, switch on additional Track switches (2, 3, etc.).

e. If you decide to not record, you can switch **Record** off now.

f. To begin recording, press **Start**. **Record** lights solidly, indicating record mode. But actual recording has not yet started.

g. Play the notes for the basic track(s). Recording starts automatically with the first note you play.

i. To stop recording, in time with the desired ending, either:
1. Press **Record**, switching it off. The track(s) play back.
or, 2. Press **Stop**. The tracks do not playback. (If desired, press **Start**.)

NOTE: If the ending of the song was not recorded correctly, the song will not loop in correct time. To correct, erase the track and re-record. (It may take a little practice to get used to ending a song at the correct time.)

5. TO OVERDUB TRACKS:

You can overdub either while the song is in playback (Method 1), or exactly from the beginning, when it is stopped (Method 2):

Method 1

a. Select and start song.

b. Adjust playback speed to desired rate.

c. If desired, adjust volumes of track(s) which are playing back.

d. Select the sound desired for this overdub. (You can try various sounds by playing live on the keyboard.)

e. Switch **Record** on. It blinks.

f. Switch on desired overdub tracks.

Note: **Record** and these **Track** switches now blink, but only until the end of the current loop. During this first loop, while **Record** blinks, anything played on the keyboard is ignored.

g. While **Record** blinks, hold keys for any notes which you want to record exactly at the start of the song.

h. When this loop ends, **Record** lights and recording begins when you play.

i. Play the overdubbed part through the current loop. When the loop ends, the overdubbed tracks play back with the others.

j. To overdub more tracks, repeat from step b.

Method 2

a. Select the song.

b. Switch **Record** on.

c. Switch on tracks to be recorded.

d. Hold key(s) for downbeat note(s) (if any).

e. Press **Start**.

Note that is possible to overdub notes on a track which you have already already recorded. (For more practical information on overdubbing, see the example which follows.)

SONG EXAMPLE

This section shows how to multi-track record a complete song, "MAXimum Blues," to demonstrate the various techniques used--whether you want to work on Bach or rock. We choose a 12-bar blues in F, because a wide cross-section of players are familiar with this form.

Before attempting to record the song, you may want to practice the parts at least one voice at a time (see page 16).

NOTE: For instructions on synchronous MIDI operation with the Drumtraks, see the MAX MIDIGUIDE.

1. DECIDE THE BASIC ARRANGEMENT AND SOUNDS.

As you know from reading the playback instructions, you can change a track's sound at any time. Yet it is best to record using the desired sound, because of the interaction between the characteristics of the sound and the exact way that you play it.

We choose the following sounds:

Track 1	42	Res-bass I
Track 2	07	Fast Leslie
Track 3	07	Fast Leslie
Track 4	07	Fast Leslie
Track 5	60	Pleides
Track 6	11	Brass II

2. ESTIMATE THE NUMBER OF NOTES.

You do not need an exact count, just enough information to tell you that what you have in mind won't exceed 500 notes. Looking at track 1 of the score, we find four notes per bar, for a total of 48. Tracks 2, 3, and 4 each have fifteen notes, making a total of 93 (48+45). Track 5 has 30. This makes 123 total notes--well under the limit and with enough extra for anything you may want to record under track 6, or as a second song

3. ERASE SONG.

We are going to use song 2. With **Stop** lit, press **Song 2.** Switch **Erase** on. It blinks. This means "Warning." Press **Song 2. Erase** turns off. To verify that song 2 is empty, press **Start**--nothing happens.

4. SET SPEED TO 15.

Of course a main benefit of using the recorder is that you can record at a much slower, error-free speed, then raise the speed for playback (without any pitch-change as there is with audio tape).

To increase the maximum playback speed of the song, record it with a low initial speed value. For this example, press the lower **Speed** switch to decrease the value from 33 to 15.

5. TUNE UP.

Don't forget to press **Tune** occasionally.

6. SELECT SOUND 42.

This bass sound is used for recording the basic track on track 1.

7. SWITCH **Record** ON.

Record and **Track** 1 both blink. If you decide to not record, you can switch **Record** back off at this point.

8. START YOUR METRONOME.

Especially when laying down a bass line such as this track it is important to play at a steady rate. If you vary the timing of this part, it may sound nice by itself but unless you remember exactly what you've done it may be impossible to later synchronize the other tracks to it.

9. PRESS **Start**.

Record goes solid.

10. PLAY THE BASS LINE.

Because this sound is very low, you should play it on the keyboard one octave higher than written. Recording starts with the first note you play. Concentrate on placing the notes directly on each beat. When you get to measure 10, prepare to press the **Record** switch.

11. PRESS **Record** EXACTLY ON WHAT WILL BE THE FIRST BEAT OF THE NEXT LOOP. THE BASS LINE PLAYS BACK.

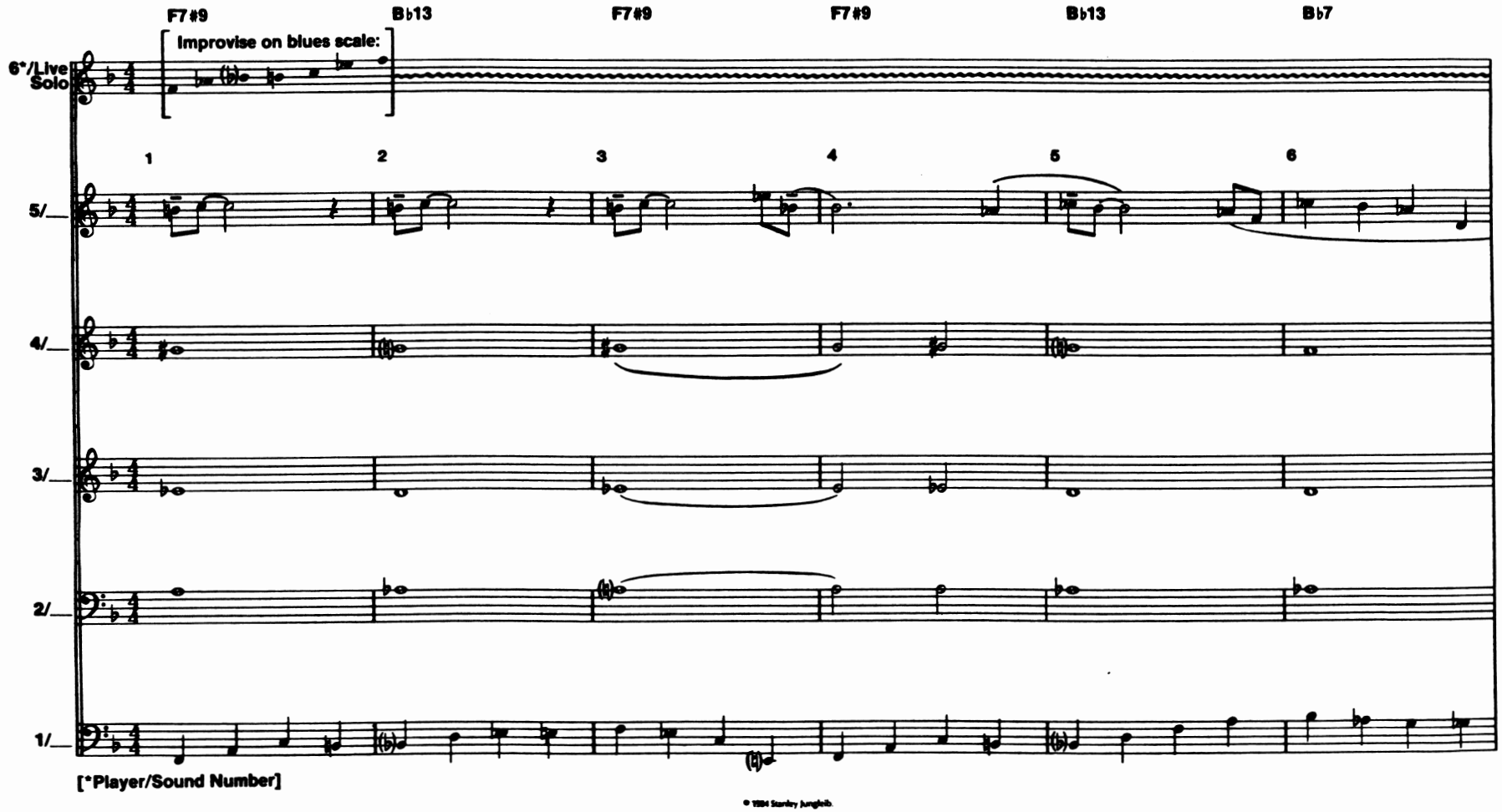
Recording the ending is very important to making a loop that repeats accurately. It is easy to do but may take a little practice. All you have to do is, after counting 1, 2, 3, 4 for measure 12, press **Record** on beat 1 of measure 13 (which becomes the first beat of measure 1).

During playback you may hear that some notes have an initial "pluck," while others do not. This results from playing two keys at once. When recording one track, if you press two keys at the same time, however briefly, the MAX only records the last key played. To ensure that each note receives its proper articulation, you have to be careful to play very cleanly--not staccato, but not too legato, either.

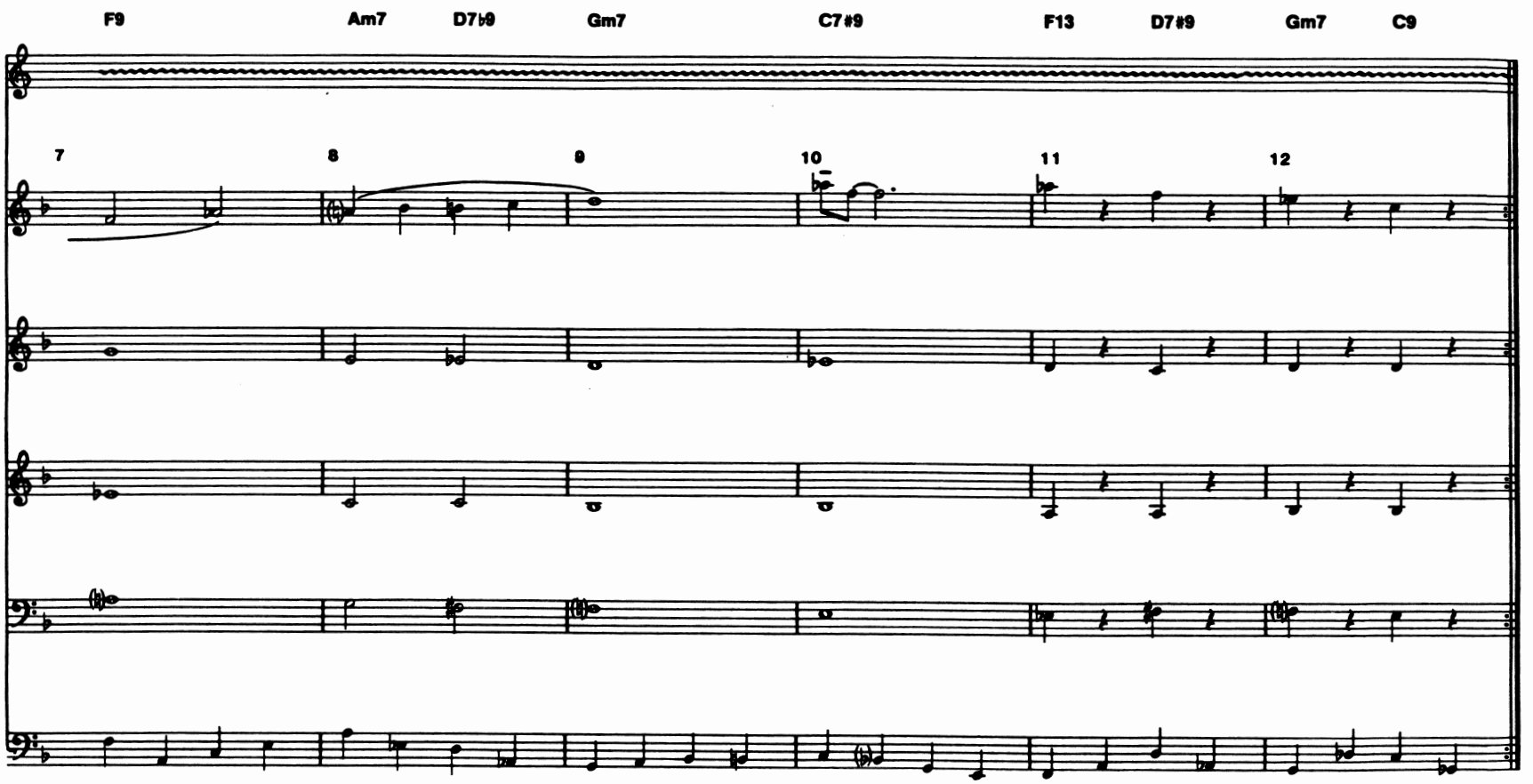
MAXIMUM BLUES

By Stanley Jungleib

Blues — Any Tempo



[*Player/Sound Number]


F9
Am7
D7♭9
Gm7
C7#9
F13
D7#9
Gm7
C9
7
8
9
10
11
12

12. IF THE BASIC TRACK IS NOT CORRECT, ERASE THE TRACK, THEN RE-RECORD.

The only way to correct an ending is to erase the track then re-record the track. It is worth it to be patient and take the time to get the basic track just right.

If you erase just track 1, the speed remains set to 15. But if you erase the song, speed is initialized to 33.

13. IF THE BASIC TRACK IS CORRECT, SELECT SOUND NUMBER 07 (FOR OVERDUBBING TRACK 2).

To make a clean opening, you should record overdubs with start-correction. There are two ways to do this: either with the song running, or with it stopped. We will record track 2 with the song running (Method 1), then record tracks 3 and 4 from a stop (Method 2).

14. JUST AFTER THE LOOP STARTS, SWITCH **Record** ON.

At this point the song is in playback.

15. SWITCH **Track 2** ON. IT BLINKS, TOO.

After you press **Track 2, Record** continues to blink only through the end of the current loop. The recorder plays through the loop to give you time to get ready to record. If you hit the keyboard while the LEDs are blinking, nothing is recorded. But if you play or hold any keys at the end of this loop, they are automatically recorded exactly on the first beat on the new recording loop. (This autocorrect downbeat recording is only possible on the first loop after you activate **Record**. On following loops, be sure to play overdub notes just after the start of the song.)

16. WHILE **Record** IS BLINKING, HOLD THE OPENING NOTE FOR TRACK 2 (WHICH IS AN "A"). WHEN THE BEGINNING OF THE SONG COMES AROUND, RECORDING STARTS. PLAY THROUGH TO THE END.

17. WHEN THE END (OF THE BASIC TRACK) APPEARS, TRACK 2 PLAYS-BACK AUTOMATICALLY.

18. IF TRACK 2 IS NOT CORRECT, ERASE IT AND RE-RECORD.

You can play the keyboard now, using voices (tracks) 3 - 6, without anything being recorded.

19. WHEN TRACK 2 IS RECORDED, LOWER ITS VOLUME TO A VALUE OF 8.

This makes it easier to hear the bass line when overdubbing tracks 3 and 4.

20. STOP THE SONG. PREPARE TO RECORD TRACKS 3 AND 4.

The advantage of recording more than one track at a time is that by playing simultaneously you can add rhythmic nuances which may be more difficult to create one track at a time.

Note that since tracks 1 and 2 were recorded on different loops, you know exactly which notes each track plays. If you erase track 2, for example, this has no effect on the bass line. But when two tracks are recorded at the same time, they may exchange parts, depending on exactly how you play the keyboard. So if you make an error in one part, you may have to erase both tracks and start over (because you can't always predict which track records which note.)

If this point is unclear now, with a little more practice you will learn how to best apply your own keyboard technique. The best way to make sure that you record notes on one track "in sync" with another track is to play them all in the same loop. If necessary, you can later change the track's sound.

21. THE SOUND SELECTION IS STILL 07.

If you wish to change the sound, you can do it now.

22. SWITCH **Record** ON.

Tracks 1 and 2 light because they have already been recorded.

23. SWITCH TRACKS 3 AND 4 ON.

They blink because they are ready to record.

24. HOLD THE OPENING NOTES FOR TRACKS 3 (E-FLAT) and 4 (G-SHARP).

Although you play the keyboard, nothing is heard. But be prepared, because recording starts when you press **Start**.

Recording from stop in this way starts all opening notes exactly on the first beat, without your needing to listen to the entire song loop.

25. PRESS **Start**. RECORDING STARTS IMMEDIATELY. PLAY PARTS 3 AND 4 THROUGH TO THE END.

Again, when the end of the song occurs, all recorded tracks play back.

26. FOR BETTER BALANCE, ADJUST VOLUMES OF TRACKS 3 AND 4 DOWN TO ABOUT 8.

27. SELECT SOUND NUMBER 60, FOR TRACK 5.

28. RECORD THE MELODY FOR TRACK 5, USING EITHER THE RUNNING OR STOPPED METHOD.

29. AFTER RECORDING, ADJUST VOLUME OF TRACK 5.

You can turn it all the way down, to give you a version of the song without the melody.

30. WITH THE SONG PLAYING, SELECT SOUND 11 (OR ANYTHING ELSE YOU WANT TO TRY), AND PLAY ALONG LIVE WITH THE SONG.

Or, of course, you can record track 6, too. Possibilities for this track might include percussion, an alternate bass line, an alternate melody, or even more harmonic density.

31. IF DESIRED, TRANSPOSE THE SONG,

Now you can have a blues version in any key.

32. FOR PRACTICE, TRY THE FOLLOWING:

Erase the song and do it all again.
Change the sounds for any track.
Try recording tracks 2, 3, and 4 all at once--inserting rhythm and syncopation instead of the held chords.
Record your own harmonies and melodies over the bass line.

TROUBLE?

Power
If the MAX is receiving power, it displays sound numbers. If no LEDs are lit, either the MAX is not switched on, or power is not reaching the unit. Check the power source by plugging in other equipment. Examine the transformer cable for damage. There is no fuse to check.

Audio
If the **Sound Selection** display lights but no sound is heard, check that **Master Volume** is turned up. Check that track volumes are not set too low. Test the synth by simply connecting stereo headphones directly to the output. Try substituting the audio output cable with one known to be good. Check your amplifier by trying a high-level audio input such as another synthesizer or tape deck.

Control
If the keyboard or controls "lock up," check that you are not making an operational error. If necessary, reset the computer by switching power off, then, after a few moments, back on. Note that this erases any song information in memory.

If the recorder does not work, check that the MIDI clock has not accidentally been enabled. If the MIDI clock has been enabled, pressing either Speed switch displays a speed of 00. To disable MIDI clock (and restore the internal clock), hold **Record** and press the lower **Speed** switch.

If the keyboard does not play and you want to try to save songs, press **Erase** then enter 31. This enables "local control" if it has somehow been turned off.

(For more information, see the MIDIGUIDE.)

GENERAL DESCRIPTION

A compact, affordable musical tool, the MAX contains functions until now provided only by a synthesizer in combination with a multi-track tape recorder. The block diagram (next page) shows the main sub-sections: keyboard, recorder, sound memory, voices, and MIDI. Using this as a basis for discussion, we trace backwards from the audio output, to see how the sub-sections work together.

The audio output comes from the six independent synthesizer voices. In contrast to homophonic synthesizers, which program each voice with the same sound, each of the MAX's voices can have a different sound. Each voice has a multi-waveform oscillator (or noise) as the principal sound source. The oscillator drives a resonant low-pass filter which contours the timbre, and an amplifier which contours the dynamics. There are three attack-decay-sustain-release (ADSR) envelope generators: for oscillator frequency, filter cutoff frequency, and amplifier gain. (The polarity of the first two can be inverted.) A triangle- or square-wave low frequency oscillator (LFO) can modulate oscillator frequency, pulse width, or filter frequency. A second modulation route runs from the oscillator triangle output to the filter frequency, for frequency modulation (FM). Frequency glide ("portamento") and voice volume are programmable.

A voice has two types of inputs. First are the sound parameters from the sound memory. These operate on the synthesizer voices to define the track's timbre--in other words, the instrumental sound. The parameter memory contains 80 permanent sounds (in ROM). You can't change these sounds. But the RAM area of memory accepts up to 20 sounds which can be loaded from an external MIDI device. For example, you can use the SCI Model 610 Six-Trak to develop custom sound programs, then send them to the MAX over MIDI. (For more information on programming sounds, please see the MAX MIDIGUIDE.) The MAX sounds can be selected either with the keypad or by a MIDI sound selection command.

The second type of input to a voice are the notes. Notes tell the voice when to play and what pitch to play. A voice can be played by notes coming from three sources: the keyboard, the recorder, and MIDI.

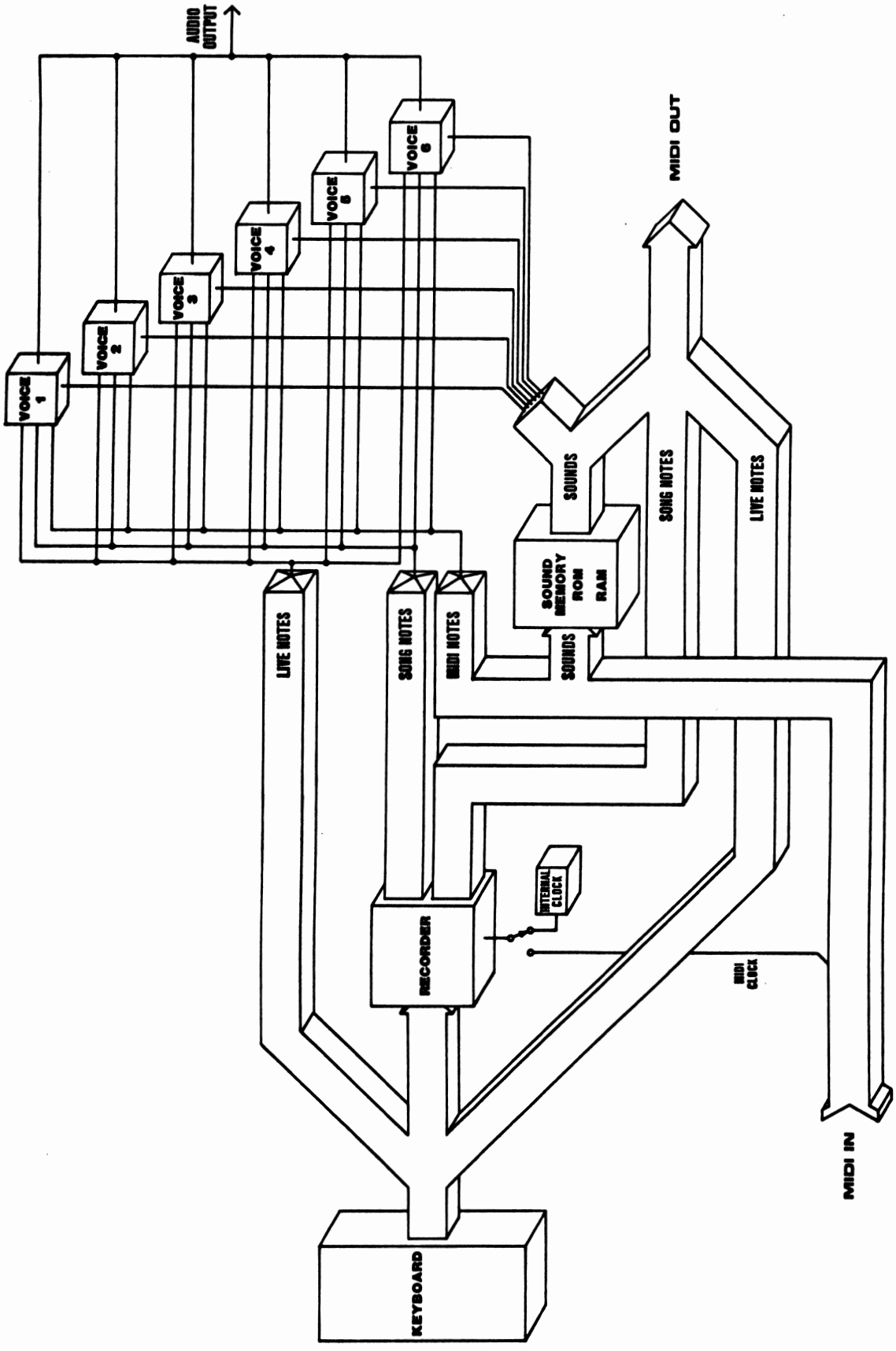
When playing the MAX keyboard "live," the six voices are each programmed with the same sound (homophonic mode). Live multi-timbres are not possible because the MAX cannot know which keystrokes you intend for which timbres.

But the recorder can record whatever you play on the keyboard as a separate track using its own voice. So each track can be overdubbed with a different sound. The recorder allows overdubbing and editing without re-recording, splicing, or accumulating noise and distortion by "mixing-down" and "bouncing" audio tape tracks.

Lastly, the voices can also play notes coming in from MIDI, which may be from another synthesizer or external sequencer.

Both the sound RAM and the song memory are volatile--they lose memory when you switch power off. To save songs permanently, you can "dump" them to the external MIDI recorder. The MAX can send live notes, recorded notes, or sounds out to MIDI. For example, SCI's Model 64 Sequencer for the Commodore 64 and associated software offers increased recorder storage (up to 4000 notes), sound program storage on cassette or disc, song transposition, and alternate keyboard modes, as well as forthcoming music display and editing functions. Finally, if you use a MIDI rhythm unit (such as the SCI Model 400 Drumtraks), it sends a MIDI clock to the MAX recorder, which synchronizes the MAX song to the drum song (or pattern).

For more information on the synthesizer voice parameters and MIDI applications, please see the MAX MIDIGUIDE.



MAX BLOCK DIAGRAM