TIMBRE DISPLAY SYSTEM

The Timbre Display System (TDS) integrates the visual power of a computer terminal into the Synclavier® II system. Through state-of-the-art display technology, you see all Synclavier® II timbre settings in real-time in four different numerical formats or in sharp, high resolution graphics. And you can get a permanent record on a printer. The serious synthesist will find that the visual display greatly facilitates the programming of new timbres.

The TDS is easy to use—Simply load from a TDS operating system diskette and operate the Synclavier® II exactly as before. To select a particular display format, you type a single character on the terminal keyboard. The only other difference is that the TDS provides less notes in the memory recorder than does the standard operating system.

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Computer memory

There are two versions of the Timbre Display Operating System: the Alphanumeric TDS and the Graphical TDS. The Alphanumeric TDS requires at least 40K words of computer memory. The Graphical TDS requires 56K words of computer memory.

Printer port option

An auxiliary printer port option is available. With this option, both a CRT terminal and a hard-copy printer may be connected to the system at the same time.

NOTE: When a hard-copy printer is attached to the printer port, we refer to it as a *printer*. When it is connected to the terminal port, we refer to it as a *hard-copy terminal*.

Terminal options

Many CRT terminals can be used with the TDS: With any CRT terminal, all changes in Synclavier® II settings made with the knob will be immediately displayed on the terminal screen. However, only a special graphics terminal, can provide the graphical displays.

A hard-copy terminal, such as the DECwriter, may also be used as the terminal; hard-copy terminals provide a permanent record of timbre parameters on paper.

Complete instructions for connecting a computer terminal or printer to the Synclavier® II system and for adding computer memory are located in the Options Setup Manual.

Using the TDS is easy.

1. Turn on the terminal; turn on the computer.
2. Insert the Synclavier® II/Timbre Display Operating System diskette in the left-hand disk drive.
3. Press LOAD.

   Synclavier® II is now operating. At this time, you don't have to use the terminal; it doesn't even have to be on. You do have fewer notes available in the memory recorder than provided by the standard Synclavier® II operating system.

   You will see the following sign-on message on the terminal:

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   Synclavier® II
   (release date, March 13, 1981)

   Press RETURN

   If this *complete* message does not appear, see the "Problem Solving" section in this manual.
4. Press the RETURN key on the terminal.

   A menu of display options will appear on the terminal. Only those display options possible with the terminal or printer connected to the system should appear. (If this menu does not correspond to the equipment actually connected to your system, see "Diskette Configuration" in the Options Setup Manual.)

   Figure 1 shows a copy of the complete menu as listed on a graphics terminal with the printer option.

```
                                New England Digital Corp.

                                     Synclavier II
System Ready.

Instructions:

  1. Enter desired display format (see below).
  2. Press RETURN to see graphical presentation. Press RETURN again to return
     alphanumeric display.

Enter
                A       Complete timbre display
                B       Envelope display
                C       Coefficient display
                1       Expanded display of partial timbre #1
                2       Expanded display of partial timbre #2
                3       Expanded display of partial timbre #3
                4       Expanded display of partial timbre #4
                P       Hard copy listing of timbre
?
```

Instruction number 1 will appear for all systems. Number 2 will appear only if a graphics terminal is connected. A, B, C, 1, 2, 3, and 4 will appear whenever a CRT terminal is connected, and P will appear if a hard-copy terminal is connected.

The menu tells you which terminal key to press for each display. After you call up a display, the terminal keys remain active. To switch between displays, press the letter or number of the new display.

If you accidentally press a key which is not on the menu, no harm will be done. The terminal will just "beep". (VT-100 users should avoid the NO SCROLL key; it freezes the screen. If you do press it, unfreeze the screen by pressing it again.)

To switch between numerical and graphical formats, press the RETURN key. To recall the menu press the BREAK key.

THE ALPHANUMERICAL DISPLAYS

The Envelope Display

Figure 2 shows the envelope display which appears on a terminal screen when you press the B key. The same information appears at the top of the hard-copy listing.

Note the following conventions which are used on all of the displays:

1. Data for all four partial timbres is shown at once (except in the single partial timbre displays).
2. The number fields are left blank for any inactive partial timbre (that is, any partial timbre with zero VE PEAK and zero VE SUSTAIN levels).
3. Number fields are labeled and appear in the same order as the buttons on the Synclavier® II control panel.

```
Timbre 4-5                (Envelope Display)
                         --------------------Volume Envelope-----------------------
                           0 ms.      97 ms.    145 ms.    2913 ms.   100.0      37.6
Partial Timbre #1        delay     attack      decay     release       peak    sustain
                           0 ms.     607 ms.    821 ms.    1990 ms.    150       119
                         -------------------Harmonic Envelope---------------------
                         --------------------Volume Envelope-----------------------
                           0 ms.      97 ms.    145 ms.    2913 ms.   100.0      37.6
Partial Timbre #2        delay     attack      decay     release       peak    sustain
                           0 ms.     607 ms.    821 ms.    1990 ms.    131       100
                         -------------------Harmonic Envelope---------------------
                         --------------------Volume Envelope-----------------------
                           0 ms.      97 ms.    231 ms.     653 ms.   100.0      37.6
Partial Timbre #3        delay     attack      decay     release       peak    sustain
                         691 ms.     231 ms.    145 ms.     790 ms.     46         0
                         -------------------Harmonic Envelope---------------------
                         --------------------Volume Envelope-----------------------
                             ms.         ms.        ms.         ms.
Partial Timbre #4        delay     attack      decay     release       peak    sustain
                             ms.         ms.        ms.         ms.
                         -------------------Harmonic Envelope---------------------
```

The Spectral Coefficient Display

Figure 3 shows the spectral coefficient display which appears on a terminal screen when you press the C key. The same information appears in the second section of the hard-copy listing. All 24 harmonic coefficients for all four partial timbres are listed left to right, six to a line in four lines.

```
Timbre 4-5                (Spectral Coefficient Display)
                         ---------------Coefficients--------------------
                         100.0     22.6    9.9     .4     .0     .0
Partial Timbre #1           .0       .0     .0     .0     .0     .0
                            .0       .0     .0     .0     .0     .0
                            .0       .0     .0     .0     .0     .0
                         ---------------Coefficients--------------------
                         100.0     42.7   14.3    1.3     .5     .0
Partial Timbre #2           .0       .0     .0     .0     .0     .0
                            .0       .0     .0     .0     .0     .0
                            .0       .0     .0     .0     .0     .0
                         ---------------Coefficients--------------------
                         100.0     21.2     .0   10.9     .0     .0
Partial Timbre #3           .0     61.9     .0     .0     .0     .0
                            .0       .0     .0     .0     .0     .0
                            .0       .0     .0     .0     .0     .0
                         ---------------Coefficients--------------------

Partial Timbre #4
```

The Complete Timbre Display

Figure 4 shows the complete timbre display, which appears on the terminal screen when you press the A key. It presents all timbre information on the screen at the same time. Since the data is densely packed, we will explain it section by section.

```
          Timbre 4-5          (complete)
      ------------Envelopes--------------
V 1.     0    97  145  2913  100.0   37.6
H        0   607  821  1990  150     119

V 2.     0    97  145  2913  100.0   37.6
H        0   607  821  1990  131     100

V 3.     0   231  145   653  100.0   37.6
H      691   231  145   760   46      0

V 4.
H

        Tunings   FmRatios   Decays
  1.     220.0      1.000     .000
  2.     440.0       .500     .000
  3.     220.0      2.000     .000
  4.
      ------Vibratos------ Portamentos
  1. Tri2  5.69   .08   0      1.000
  2. Tri2  5.15   .08   0      1.000
  3. Tri2  5.80   .08   0      1.000
  4.
```

```
--------------Coefficients---------------
1.  100.0  22.6   9.9    .4    .0    .0
      .0    .0    .0    .0    .0    .0
      .0    .0    .0    .0    .0    .0
      .0    .0    .0    .0    .0    .0

2.  100.0  42.7  14.3   1.3    .5    .0
      .0    .0    .0    .0    .0    .0
      .0    .0    .0    .0    .0    .0
      .0    .0    .0    .0    .0    .0

3.  100.0  21.2    .0  10.9    .0    .0
      .0  61.9    .0    .0    .0    .0
      .0    .0    .0    .0    .0    .0
      .0    .0    .0    .0    .0    .0

4.
```

```
---------------Overall-----------------------
Chorus: 1.004                Rate: 5.00
Notes: 16  Rte P1 P2 P3 P4
```

At the top left is the envelope display; at the top right is the spectral coefficient display.

At the lower left appears other partial timbre data, as follows:

Tunings:	partial tunings in Hertz
FmRatios:	FM RATIO settings for each partial timbre
Decays:	DECAY ADJUST settings for each partial timbre
Vibratos:	WAVE, RATE, DEPTH, ATTACK settings for each partial timbre

The following symbols are used to present vibrato wave shape:

WAVE	SYMBOL	CARRIER	FM MODULATOR
1	SIN	Sine	None
2	TRI	Triangle	None
3	RAM	Ramp	None
4	INV	Inverted ramp	None
5	SQR	Square	None
6	SIN2	Sine	Sine
7	TRI2	Triangle	Triangle
8	RAM2	Ramp	Ramp
9	INV2	Inverted ramp	Inverted ramp
10	SQR2	Square	Square

Remember, if the vibrato depth, or rate, is .00, there is no vibrato. The other vibrato parameters then have no effect on the sound (as in partial timbre 2).

Portamento: Type and rate of portamento. If portamento is "on," either "Log" or "Lin" will appear before the rate. The portamento RATE number will always appear but will have no effect on the sound if not preceded by "Log" or "Lin".

At the lower right is displayed timbre parameters which affect all four partial timbres. The following symbols are used:

Chorus: "Chorus" is followed by the chorus ratio. (Chorus is active if the chorus ratio is not equal to 1.000.)

Repeat: "Repeat" appears if the REPEAT button is on.

Arpeg: "Arpeg" appears if the ARPEGGIATE button is on.

Rate: The repeat and arpeggiate RATE is always listed; it has no effect on the sound unless the REPEAT or ARPEGGIATE button is on.

Notes: "Notes" is followed by keyboard polyphony control setting.

Rte: "Rte" means that real time effects have been patched into the timbre.

P1, P2, P3, P4: These symbols indicate which partial timbres are affected by real-time effects.

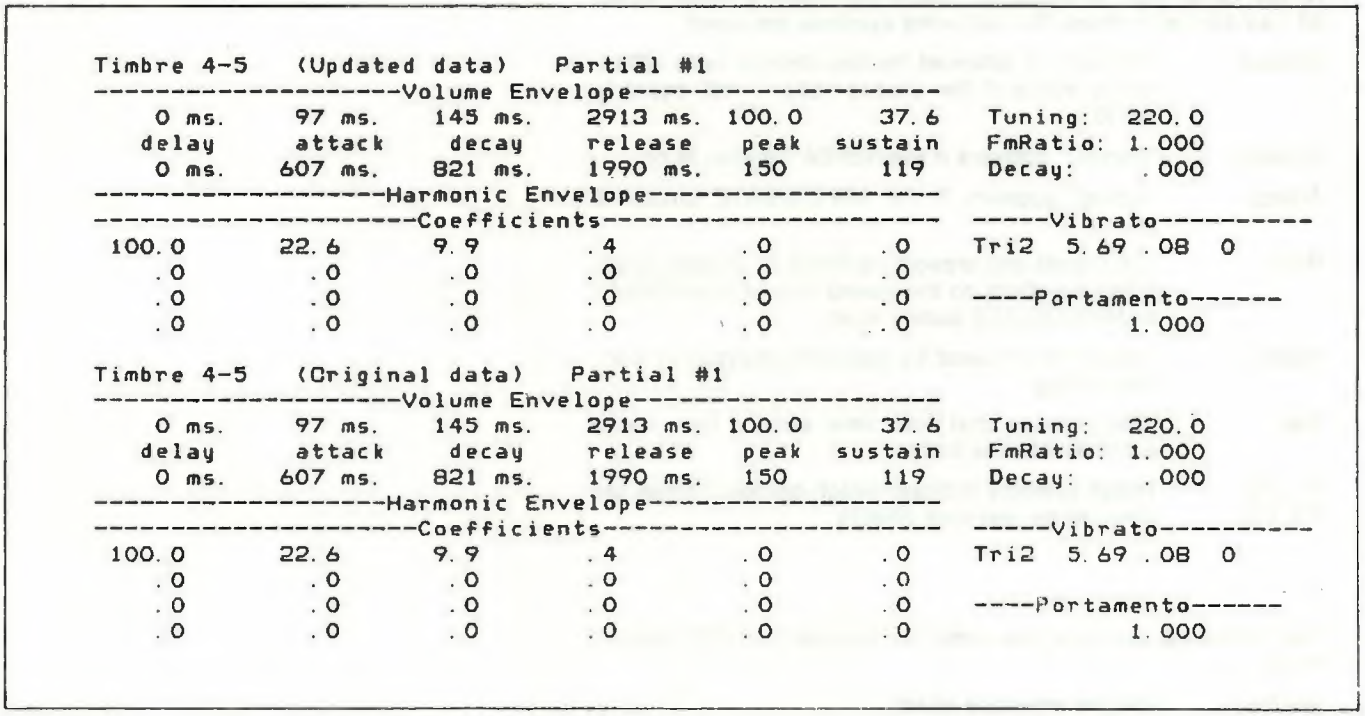
The following symbols are used to indicate the RTE parameters:

Veattack	Volume envelope attack
Vedecay	Volume envelope decay
Vepeak	Volume envelope peak and sustain
Heattack	Harmonic envelope attack
Hedecay	Harmonic envelope decay
Hepeak	Harmonic envelope peak
Hesustain	Harmonic envelope sustain
Prate	Portamento rate

\+ The plus sign indicates that real-time effects are active on more parameters than can fit in the space on the screen.

The Single Partial Timbre Display

Figure 5 shows the single partial timbre display which appears on the terminal screen when you press the number key (1, 2, 3, or 4) corresponding to the partial timbre you wish to display.

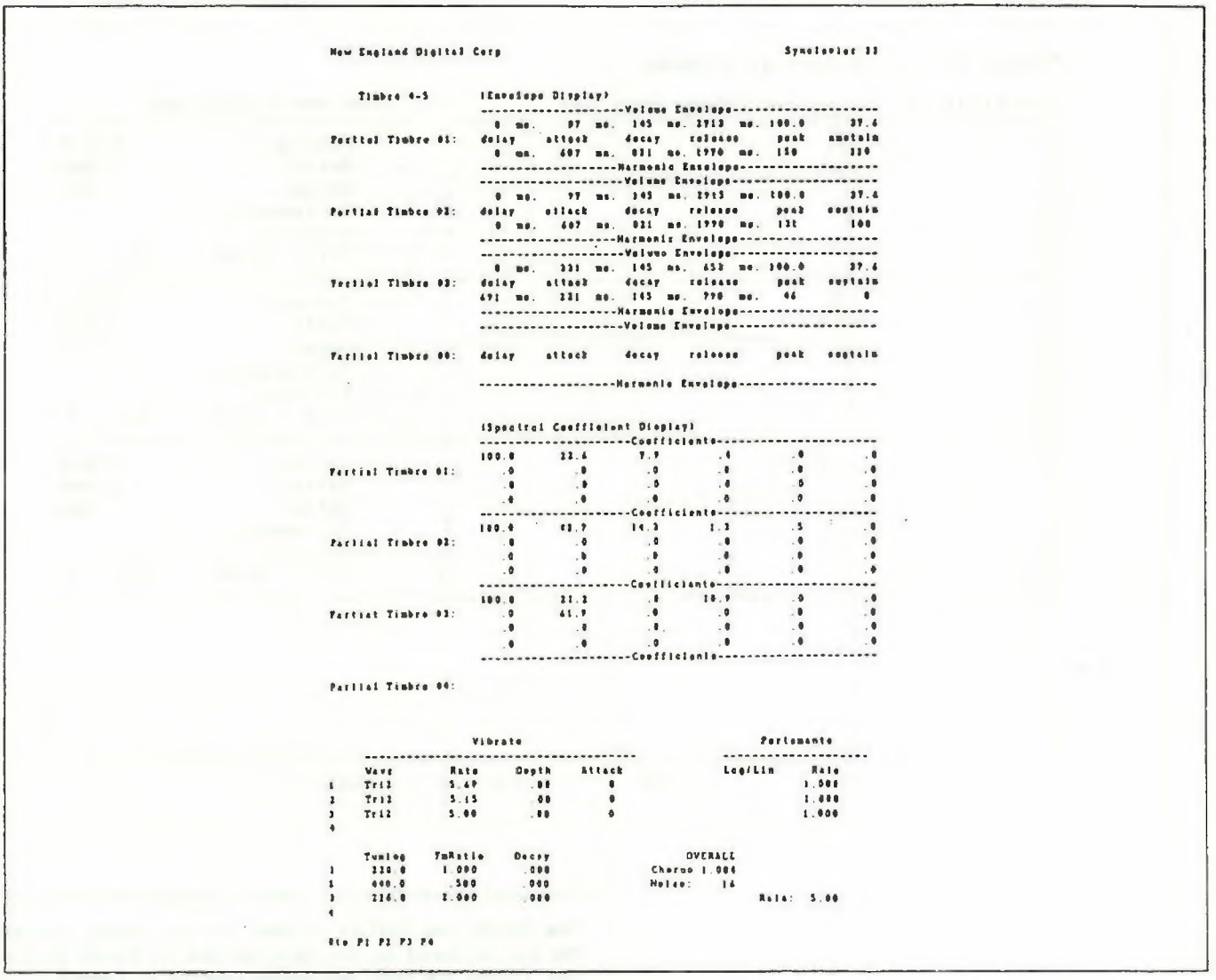


```
Timbre 4-5   (Updated data)   Partial #1
--------------------Volume Envelope--------------------
    0 ms.     97 ms.    145 ms.    2913 ms.  100.0     37.6   Tuning:   220.0
   delay      attack     decay     release    peak    sustain  FmRatio:  1.000
    0 ms.    607 ms.    821 ms.    1990 ms.   150       119    Decay:     .000
------------------Harmonic Envelope------------------
---------------------Coefficients---------------------  -----Vibrato----------
 100.0       22.6       9.9         .4         .0        .0   Tri2  5.69 .08  0
    .0         .0         .0         .0         .0        .0
    .0         .0         .0         .0         .0        .0   ----Portamento------
    .0         .0         .0         .0         .0        .0             1.000

Timbre 4-5   (Original data)   Partial #1
--------------------Volume Envelope--------------------
    0 ms.     97 ms.    145 ms.    2913 ms.  100.0     37.6   Tuning:   220.0
   delay      attack     decay     release    peak    sustain  FmRatio:  1.000
    0 ms.    607 ms.    821 ms.    1990 ms.   150       119    Decay:     .000
------------------Harmonic Envelope------------------
---------------------Coefficients---------------------  -----Vibrato----------
 100.0       22.6       9.9         .4         .0        .0   Tri2  5.69 .08  0
    .0         .0         .0         .0         .0        .0
    .0         .0         .0         .0         .0        .0   ----Portamento------
    .0         .0         .0         .0         .0        .0             1.000
```

This display offers the additional feature of comparing current values of the parameters with the values existing when the partial timbre was first displayed. The "original data" table does not change when you turn the control knob or when you switch back and forth between numerical and graphical formats. When you press terminal keys 1, 2, 3, 4, A, B, or C to display a different partial timbre or the complete timbre, the updated information will replace the data in the original data table.

The Hard-Copy Listing

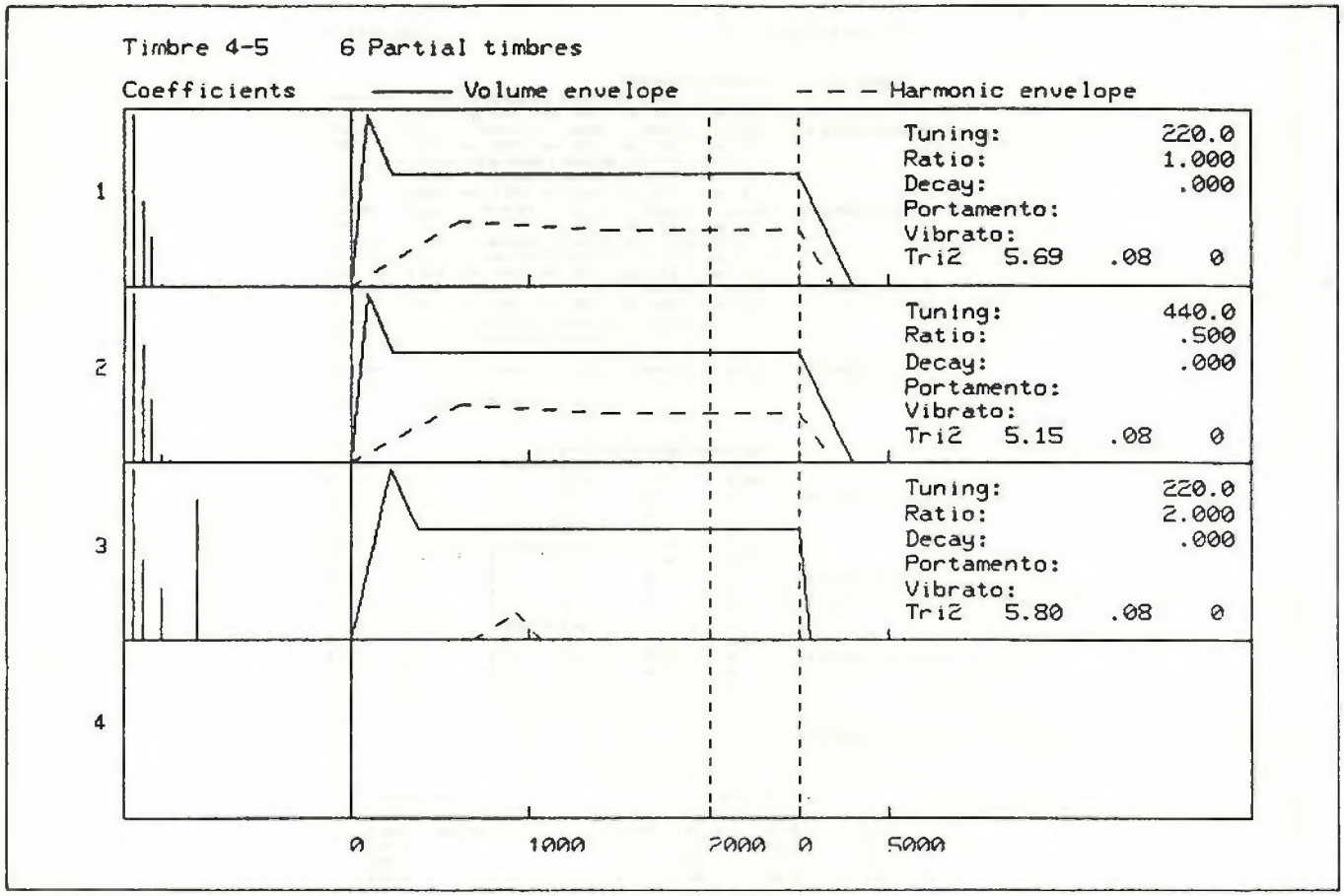
Figure 6 shows the hard-copy listing of the same timbre. The permanent record of all timbre parameters is produced, if you have a hard-copy terminal or printer, when you press the P key. Pressing P also clears the terminal screen. When printing is completed, the CRT display will reappear.



```
New England Digital Corp                                    Synclavier II

    Timbre 4-5      (Envelope Display)
                    --------------------Volume Envelope--------------------
                      0  ms.    97  ms.  145  ms. 2713  ms. 100.0      37.4
Partial Timbre 01:  delay    attack     decay    release     peak    sustain
                      0  ms.   607  ms.  831  ms. 1970  ms.  110       110
                    -------------------Harmonic Envelope-------------------
                    --------------------Volume Envelope--------------------
                      0  ms.    97  ms.  145  ms. 2713  ms. 100.0      37.4
Partial Timbre 02:  delay    attack     decay    release     peak    sustain
                      0  ms.   607  ms.  831  ms. 1970  ms.  131       100
                    -------------------Harmonic Envelope-------------------
                    --------------------Volume Envelope--------------------
                      0  ms.   331  ms.  145  ms.  653  ms. 100.0      37.4
Partial Timbre 03:  delay    attack     decay    release     peak    sustain
                    491  ms.   331  ms.  145  ms.  798  ms.   46          0
                    -------------------Harmonic Envelope-------------------
                    --------------------Volume Envelope--------------------

Partial Timbre 00:  delay    attack     decay    release     peak    sustain

                    -------------------Harmonic Envelope-------------------


                    (Spectral Coefficient Display)
                    ---------------------Coefficients----------------------
                    100.0      23.6       7.9        .4        .0        .0
Partial Timbre 01:    .0         .0         .0        .0        .0        .0
                      .0         .0         .5        .0        .5        .0
                      .4         .0         .0        .0        .0        .0
                    ---------------------Coefficients----------------------
                    100.0      63.7       14.3       1.3        .5        .0
Partial Timbre 02:    .0         .0         .0        .0        .0        .0
                      .0         .0         .0        .0        .0        .0
                      .0         .0         .0        .0        .0        .0
                    ---------------------Coefficients----------------------
                    100.0      21.3         .0       18.9        .0        .0
Partial Timbre 03:    .0       41.9         .0         .0        .0        .0
                      .0         .0         .0         .0        .0        .0
                      .0         .0         .0         .0        .0        .0
                    ---------------------Coefficients----------------------

Partial Timbre 04:


                          Vibrato                              Portamento
                    ------------------------------------    --------------------
                    Wave        Rate      Depth     Attack    Log/Lin      Rate
1                   Tri3        5.49       .08          0                 1.000
2                   Tri3        5.15       .08          0                 1.000
3                   Tri2        5.00       .08          0                 1.000
4

                    Tuning    TmRatio     Decay              OVERALL
1                    330.0      1.000      .000          Chorus 1.004
2                    440.0       .500      .000          Noise:   14
3                    220.0      2.000      .000                      Rate:  5.00
4

Esc F1 F2 F3 F4
```

The Complete Display

Figure 7 shows the graphical display of the demonstration timbre. One four-timbre graphical display corresponds to to numerical displays listed by pressing keys A, B, or C. Press the RETURN key to switch back and forth between the numerical and graphical display formats.



The followed conventions are used in the graphical display:

1. The BANK and ENTRY number for the timbre appears at the top, followed by the total number of partial timbres in use. (There are only two partial timbres in Timbre 6–7, but the chorus effect is active, thus doubling the number of partial timbres.)
2. Windows displaying the four possible partial timbres are arranged above each other.
3. Both envelope and coefficient data of all four partial timbres are presented graphically.
4. The vertical axis represents spectral coefficient amplitude in the left windows and envelope level in the right windows. The data is scaled by a modified logarithmic function so that both small and large values can be observed on the graph. Note that changes in height correspond approximately to changes in perceived loudness. 100 percent level is reached just below the top of the box.
5. Other timbre parameters are listed in the right hand boxes.
6. If a partial timbre is inactive, its display window is left blank.

Spectral Graph

The bars in the left hand windows represent spectral coefficients of the wave table. The horizontal axis represents coefficient index number. There is space for twenty-four bars, one for each coefficient. The bars are not numbered.

Envelope Graph

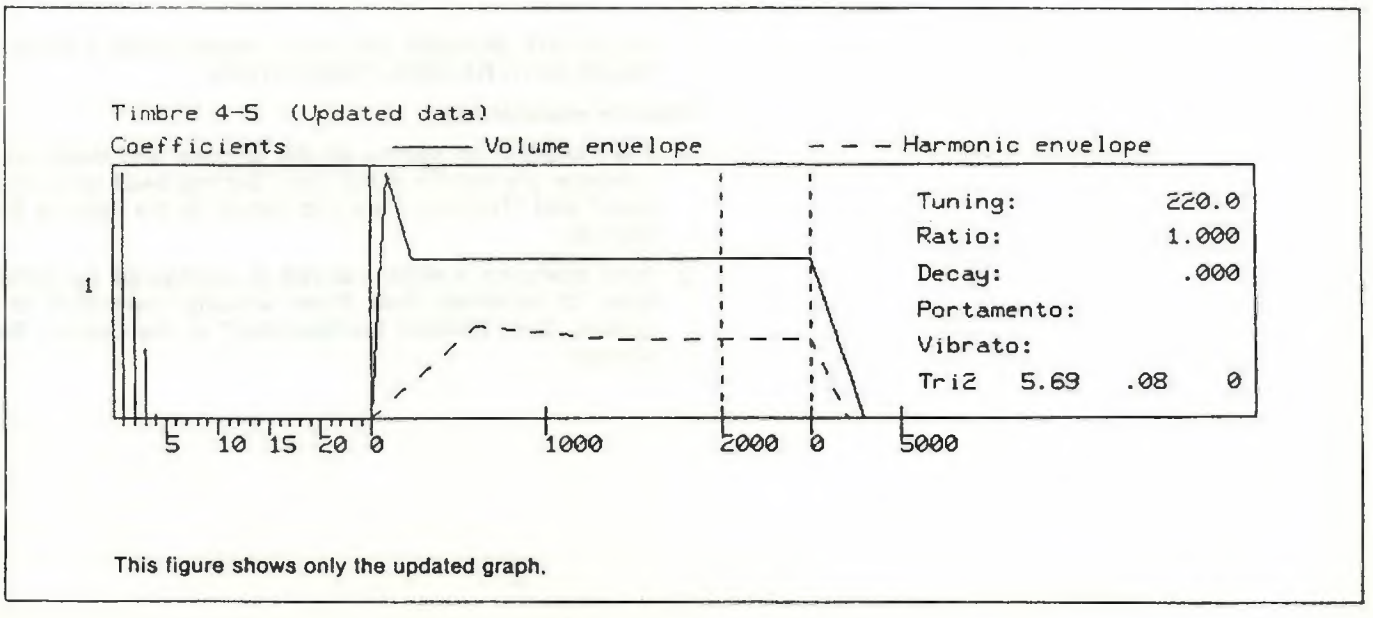
In the right hand windows are plotted volume and harmonic envelope levels as a function of time. The volume envelope is represented by a solid line; the harmonic envelope by a dashed line. The time scale is automatically chosen by the TDS system; the identical scale is used for all four partial timbres.

The envelope plot is divided into three regions by vertical dotted lines. Each region has its own scale, labeled at the bottom in milliseconds. The attack portion of the timbre is located to the left of the two dotted lines and the decay portion to the right. Between the dotted lines is the sustain portion of the timbre; since the sustain time depends on how long the key is held down, the time scale between the dotted lines is undefined.

NOTE: If there is no SUSTAIN level for a volume envelope, final decay of the harmonic envelope will not be drawn.

The Partial Timbre Graphical Display

Figure 8 shows the single partial timbre graphical display. You switch from the numerical and the graphical partial timbre displays by pressing the RETURN key. As in the numerical partial timbre display, there are two sets of graphs: one for original data and one for updated. The format is identical to the graphical display of all four partial timbres, except that the spectral coefficients are numbered.



This figure shows only the updated graph.

You have inserted the TDS system diskette and pressed the LOAD button. You run into one of the following problems:

* YOUR SCREEN OR HARD-COPY LISTING IS BLANK; YOUR SYNCLAVIER® II WON'T PLAY.

Possible explanation:

You do not have enough memory in your computer for the TDS. The alphanumeric TDS requires at least 40K words of memory; the graphical TDS requires 56K words of memory.

* THE SIGN-ON MESSAGE DOES NOT SAY "Press RETURN"; YOUR SYNCLAVIER® II WON'T PLAY

Possible explanation:

Your TDS operating system diskette is configured for a printer and you don't have a PRINTER port option installed on your system. See "Diskette Configuration" in the Options Setup Manual for instructions on how to reconfigure your diskette.

Even if your TDS system loads properly, you can still run into a few problems.

* YOUR SCREEN OR HARD-COPY LISTING IS BLANK; YOUR SYNCLAVIER® II WILL PLAY.

Possible explanations:

1. The terminal connector cable is not connected; the terminal is not plugged in or turned on.
2. The computer transmission speed setting does not match that of the terminal. See "Setting Baud on the Computer" and "Terminal Care and Setup" in the Options Setup Manual.

* YOUR CRT SCREEN OR YOUR HARD-COPY LISTING IS FILLED WITH RANDOM CHARACTERS

Possible explanations:

1. The transmission speeds on the terminal and those on the computer are not the same. See "Setting Baud on the Computer" and "Terminal Care and Setup" in the Options Setup Manual.
2. Your operating system diskette is configured for different types of terminals than those actually connected to the system. See "Diskette Configuration" in the Options Setup Manual.

* THIS MESSAGE OCCURS AFTER THE SIGN-ON MESSAGE

  "The type of terminal being used is not known to this Synclavier® II operating system; please use your configuration monitor to set the terminal type for this system."

Explanation:

Your operating system diskette has not been configured. See "Diskette Configuration" in the Options Setup Manual.

* THE DISPLAY ON YOUR CRT SCREEN IS FROZEN

Explanation:

You are a VT-100 or VT-640 user and you have pressed the NO-SCROLL key by mistake. Press it again to unfreeze the screen.

* YOUR TERMINAL IS BEEPING

Explanation:

Any terminal attached to the system will "beep" if a disk error occurs while the computer is accessing the floppy diskette. Use a different diskette.