SEQUENCER REFERENCE

WHAT IS A SEQUENCER?

Having worked through the sequencer recording and playback examples in the OPERATION BASICS section and listened to the demonstration songs, you undoubtedly have a good idea of the creative possibilities of the TQ5's sequencer. This section will now take you further in your exploration and introduce you to all of the advanced features of the sequencer.

The sequencer built into the TQ5 is much like a multi-track tape recorder, with the important difference that instead of recording sound, it records a sequence of events; each note you play, each voice number you select, each press of the sustain pedal is stored in memory as data. In other words, instead of recording the **sound**, you are recording the **performance**.

When you play back a sequence, this data makes the TQ5's tone generating circuits produce sound.

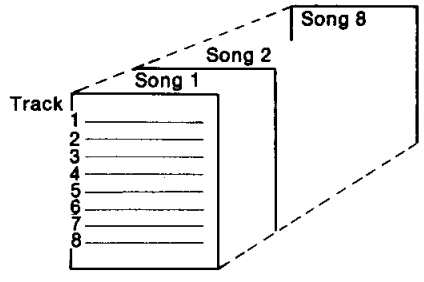
Sequence recording (as opposed to sound recording) has many advantages. For example, you can change sounds during playback. ("Maybe that Clarinet solo would be better played by an Oboe," etc.) The tempo can be changed without affecting the pitch, meaning that you can record a difficult passage at a slow tempo and play it back faster. To record especially complex parts, you can even enter notes one by one (this is called Step Recording). If you make a mistake, you can use Step Recording to re-record just that single wrong note.

TRACKS, VOICES AND SONGS

Most musical compositions are played by two or more instruments, each playing their own part. The TQ5's sequencer has 8 **tracks**. Each track is an independent part (up to 999 measures long) and controls a different instrument. A track can contain voice changes, meaning that (for example) the same track could play a Sax voice, then a Trumpet, then a Horn.

The TQ5 can sound up to eight different voices at once, so by using a sequencer track for each voice, it is possible to create very complex songs.

Data for these 8 tracks can be given a name and tempo, and stored as a **Song**. The TQ5 can remember 8 different songs you create. Your songs can also be stored on a data cartridge.



SEQUENCER FUNCTIONS

Before we explain the operational details of the TQ5 sequencer, here's an overview of how it is organized and what it can do. (The Sequence Functions reference card included with this manual has a similar chart for your convenient reference.)

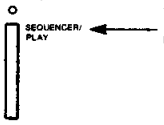
Important:

- To enter the Sequencer mode, press SEQ/PLAY. The LED will light (red), indicating that the sequencer is now active, and that **all buttons will now perform the functions printed in black**. For example, the Easy Edit button marked EG (with TR1 printed in black) will turn track 1 on and off. When explaining the Sequencer mode, we will be using these names for the buttons.
- To return to Synthesizer mode, press EXIT.

The two main Sequencer mode functions are to **play** a song and to **record** tracks to make a song.

PLAY A SONG

```
PLAY SONG) Voice          Measure    Tempo
1:FUNKY    P01:A.PIANO    001        120
```

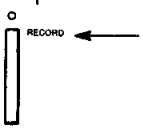


Press SEQ/PLAY to enter Sequence mode ("Play" mode). Details on page 67.

Select a song. You can change the voice and tempo, and begin playing from any measure.

RECORD A SONG

```
NORMAL REC)   Beat     Measure     Tempo
P01:Piano      4/4       001        120
```



Press RECORD to enter "Record" mode. (Normal, Punch or Step recording is selected in JOB, below.) Details on page 68.

You can change the voice, beat (time signature), and tempo of the song, and begin recording from any measure.

There are two other functions in Sequencer mode; Job (various editing and control functions) and Voice (select the voices used in the song).

JOB SELECT

Press **JOB**, then press one of the **+/− SELECTOR** buttons to select a job. Details on page 79.

```
SEQUENCER JOB SELECT)   Select one!
Song Qntz  Cnd Edit Mix Card   Rec Efct
```

Song: Set song name and tempo, store or clear a song
Qntz: "Tighten up" timing of a track
Cnd: Select sync and specify recording conditions
Edit: Erase or Copy tracks, Delete or Insert measures
Mix: Combine two tracks into one track
Card: Save/Load data to card or MIDI
Rec: Set record mode and receive channel
Efct: Select an effect (Reverb, etc.)

VOICE SELECT

Repeatedly press **VOICE** to access "Voice Select", "Max Notes", or "MIDI Transmit Channel". Details on page 87.

Select the voice (sound) played by each track.

```
VOICE SELECT)     Voice name = Piano 1
 P07  ---  ---  ---  ---  ---  ---  ---
```

The 8-note sound producing capability of the TQ5 must be distributed among the 8 instruments.

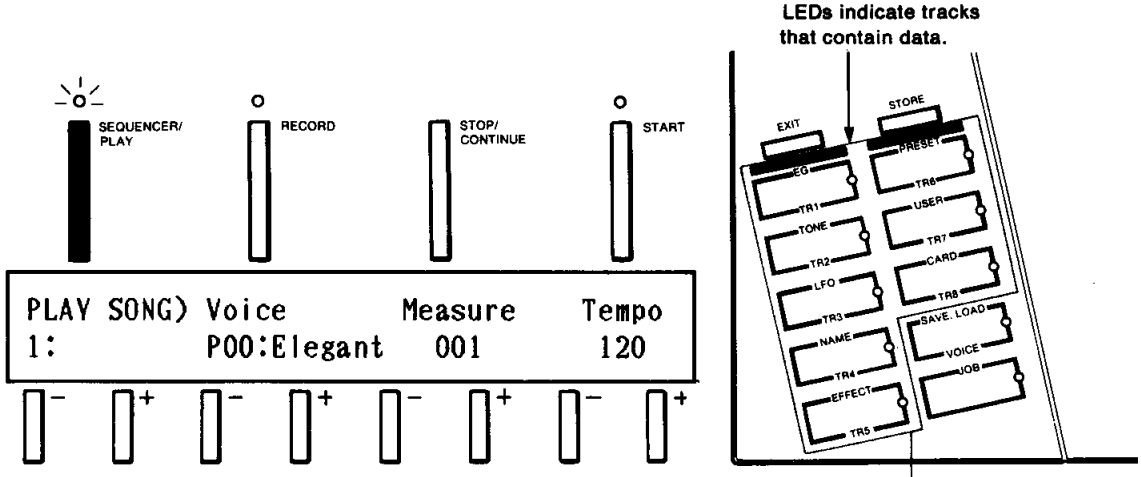
```
MAX NOTES)
   1    5    1    1    0    0    0    0
```

Each sequencer track can transmit data from MIDI OUT to control other synthesizers.

```
MIDI TRANSMIT CHANNEL)
 01   02   03   04   05   06   07   08
```

PLAY

This is where you play back a song. When you press SEQ/PLAY, the LED will light (red) indicating that you are in Sequencer mode. The display will be as follows. Use the −/+ buttons below the LCD to select Song, Voice, Measure and Tempo.



PLAY SONG: Select a song (1 — 8) to playback. If the song has a name it will be displayed.

Voice: Initially, the voice used in the first track will be displayed. You can play this voice from the keyboard, or select a different voice (00 — 99) if desired. (See note below.)

Measure: Select the measure from which to begin playback. (You will not be able to select a measure beyond the actual end of the song.) Playback from the selected measure is started by pressing STOP/CONTINUE. (Pressing START begins playback from the first measure.)

Tempo: Initially, this will be the Tempo you set when you Stored the song (see Store, page 50) but you can set a new Tempo of 60 — 180 quarter notes per minute.

Before starting playback, you can press a Track Select button to mute the track so that it will not be heard. (Blinking green = muted.) Pressing a Track Select button will reset the selected Measure to 001.

To begin playback from measure 1 press START. To playback from the location specified in "Measure" press STOP/CONTINUE. While playing, the SEQ/PLAY LED will blink to indicate the tempo of the song. To stop playback, press STOP/CONTINUE.

- Playing the connected keyboard will sound the voice indicated in "Voice", but remember that the voice will be limited by the Max Notes setting for that track.
- Before starting playback, you can press a track select button to mute/unmute a track.
- In addition to using the second pair of −/+ **SELECTOR** keys, you can also enter voice numbers directly from the numeric keypad. To select Preset, Cartridge or User voices, press VOICE and then PRESET, USER, or CARTRIDGE. See the detailed explanation of VOICE SELECT, page 87.
- In addition to the measure number indication in the display there is also a unique stop watch feature. The stop watch runs automatically when recording or playback begins and can be displayed either in recording or playback. It also stops automatically when recording or playback is stopped. The total time of the song is indicated in minutes, seconds and 1/10 seconds.
  Use the cursor right key to switch between display of the measure number or the stop watch. Use the cursor left key to reset the stop watch to zero.
  The stop watch time is cumulative; in other words, it continues to run from the point at which it was last stopped, even if the song plays to its conclusion once and is played back again. For example, if your song is 32 seconds in length, playing

it back twice will result in a stop watch reading of 64 seconds.
You can reset the stop watch to zero at any time (even while it is running) by pressing the cursor left key on the numeric keypad.

RECORD

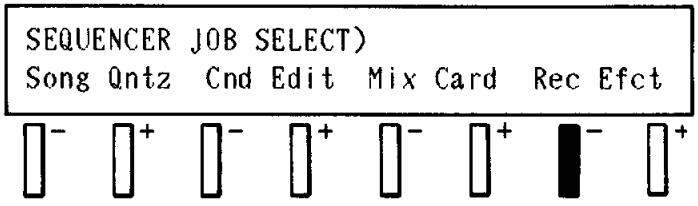
This is where you record tracks. A song contains 1 — 8 tracks, and each track is recorded separately. The TQ5 sequencer gives you three ways to record;

Normal Recording: Your keyboard playing will be recorded just as you hear it.

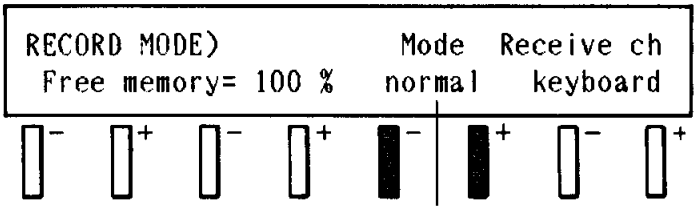
Punch Recording: The same as Normal recording except that recording takes place only during the measures you specify. For example you can re-record over a mistake and keep the rest of a track.

Step Recording: Enter individual notes one by one from the keyboard. This allows you to create very complex passages that would be difficult to actually play.

Initially, "Normal" recording mode is selected. If you need to change the recording mode, press JOB to get the following display.



Next press the + / − **SELECTOR** button that selects "Rec" to get the following display.



Use −/+ **SELECTOR** keys to select normal, step or punch

Use the − / + keys for "Mode" to select "normal", "step" or "punch". (This is explained in detail in the Job section, page 79.)

Finally, press RECORD (the LED lights red) to enter Record mode. (If the LED lights green and the LCD shows "PART TYPE", press RECORD again to make it light red.) Each recording mode (Normal, Punch and Step) will be explained separately in the following sections.

While playback is stopped, you can press a track select button (TR1 — TR8) to see (and change) the voice used in each track 1 — 8. If the track is playing an instrument that is set to Max Notes = 0, the display will show "---".

Note:

The TQ5 sequencer has a capacity of about 10,000 notes. If you run out of memory while recording in real time, the LCD will show "Memory Full", and ALL the data in the track being recorded will be lost. It is a good idea to check the "Free Memory" display (Record Mode job) before recording.

MULTI-TRACK RECORDING PROCEDURE

If you have ever used a multi-track tape recorder, operating the TQ5 sequencer will be a familiar experience. The basic idea of multi-track recording is to record a part, then record another part while listening to the first part. For example, you might first record a Piano part on track 1.

Track 1 [recording] Piano (recording)
Track 2
Track 3

Next you would record the Bass part on track 2 while listening to the Piano (track 1).

Track 1 [recording] Piano
Track 2 [recording] Bass (recording)
Track 3

Finally you would record a Sax part on track 3 while listening to the Piano and Bass (tracks 1 and 2).

Track 1 [recording] Piano
Track 2 [recording] Bass
Track 3 [recording] Sax (recording)

In this way, you can sound like an entire ensemble all by yourself!

Important:

Before you begin recording, you should set the TQ5 synthesizer to a combination of instruments (an "ensemble") appropriate to the song you will record, as explained in the next section, Part Type.

PART TYPE

The TQ5 sequencer has 8 tracks, and the TQ5 synthesizer can produce up to 8 parts simultaneously. However, since a maximum of only 8 simultaneous notes can be sounding at once, these 8 available notes must be distributed among the 8 voices. Thus, if you need to play chords of 2 or more notes with a single voice, one or more of the other voices need to be set to Max Notes = 0. (This has already been explained in the Synthesizer section. See Multi Mode, Max Notes on page 57.)

There are two ways to set up a combination of parts, i.e., an "ensemble".

1. Use a preset Part Type (see the following section).
2. Use the Sequencer mode VOICE function.

However, setting the keyboard range for each part can be done only in Synthesizer mode, Multi Mode. You may have to go back to Multi Mode to change keyboard "splits" if necessary.

Here is a typical five-part "ensemble" of Harp, Violin, Cello, Flute and Oboe, each part played by a different track of the sequencer. Notice that the total number of simultaneous notes for all voices equals 8.

Track	Instrument	Voice	Maximum notes
Track 1	1	Harp	3
Track 2	2	Violin	2
Track 3	3	Cello	1
Track 4	4	Flute	1
Track 5	5	Oboe	1
Track 6	6	—	0
Track 7	7	—	0
Track 8	8	—	0

Total simultaneous notes for all voices is = 8 (max)

Sequencer tracks 1 — 5 will play the corresponding instrument. In the above example only five tracks are needed, and tracks 6 — 8 will not play a TQ5 instrument. (However these tracks can be used to play an **external** synthesizer via MIDI. See MIDI Transmit Channel, page 88.)

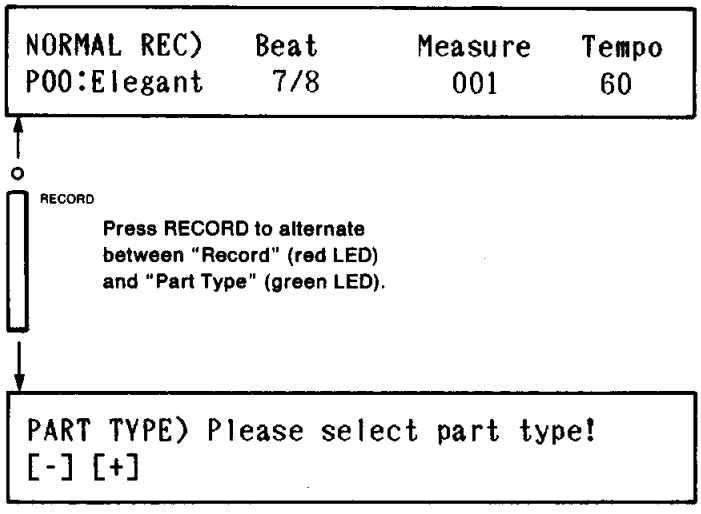
Each sequencer track can record up to 8 simultaneous notes. However, when recording a track, you should remember not to exceed the simultaneous note capacity for each instrument. For example, track 1 should contain chords of no more than 3 simultaneous notes. If track 1 contained chords of 4 or more notes, notes over the limit would make the previously played notes cut off unnaturally. Keep in mind that instruments like Cello and Oboe are usually played monophonically (one note at a time), and make the best of your 8 simultaneous notes.

PRESET PART TYPES

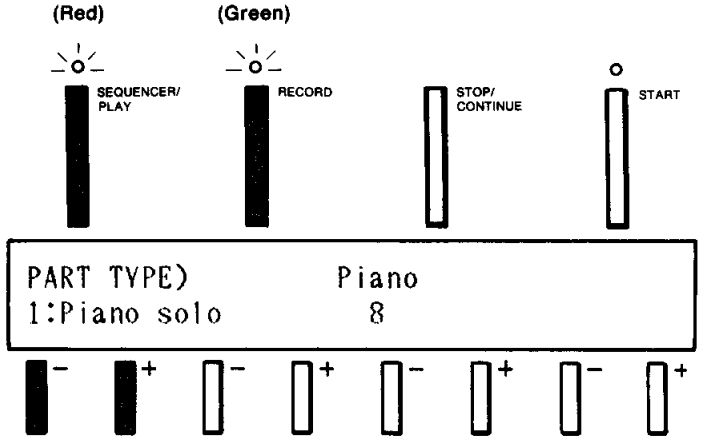
Seven different Part Types ("ensembles") are preset for your convenience.

For example by selecting preset Part Type "2:Pops", you instantly have available a four-member band of Bass, Piano, Strings and Vibe, with the Piano able to produce up to 5 notes simultaneously. This saves you the trouble of making settings in Sequencer Voice mode, page 86.

If you do **not** select one of the preset Part Types, the Synthesizer Multi Mode settings you made for Voice Select and Max Notes will be used. This allows you to use your very own ensemble combination.



To select a Part Type, press −/+ to see the 7 choices below.



Select a part type

PART TYPE	Track 1	Track 2	Track 3	Track 4	Track 5	Track 6	Track 7	Track 8
1 Piano solo	Piano 8 voices	x	x	x	x	x	x	x
2 Pops	Bass 1 voice	Piano 5 voices	Strings 1 voice	Vibes 1 voice				
3 Fusion	Bass 1 voice	Piano 5 voices	Brass 1 voice	Flute 1 voice				
4 Rock	Bass 1 voice	Brass 5 voices	Guitar 2 voices					
5 Jazz	Bass 1 voice	Piano 5 voices	Flute 1 voice	Vibes 1 voice				
6 Latin	Steel drum 1 voice	Piano 4 voices	Brass 1 voice	Marimba 1 voice	Percussion 1 voice			
7 Classic	Harp 3 voices	Violin 2 voices	Cello 1 voice	Flute 1 voice	Oboe 1 voice			

After selecting one of these preset Part Types, you can modify the settings by pressing VOICE and changing the settings for Voice Select, Max Notes and MIDI Transmit Channel (see Voice, page 86).

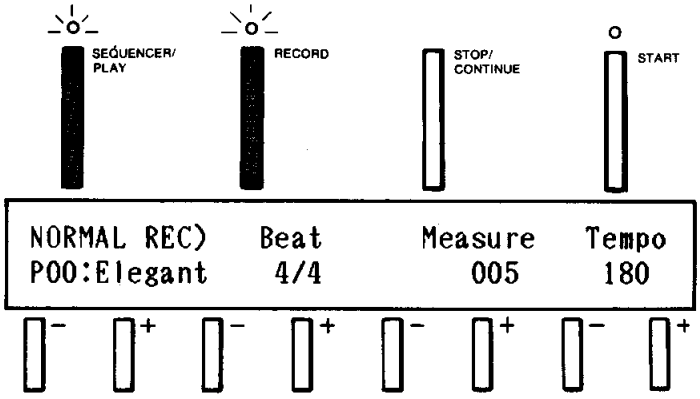
Note:

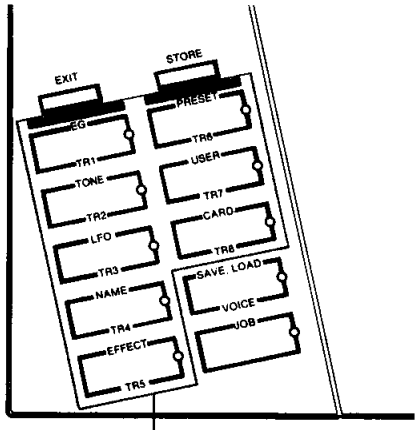
Remember that selecting one of these preset Part Types will replace the Sequencer Voice Mode settings you made for Voice Select and Max Notes. If you want to use the present instrument setup for your recording, **do not select a preset Part Type**.
When you return to Synthesizer mode, your previous Multi Mode settings will be restored.

NORMAL RECORDING

In Normal recording, notes are recorded in the exact timing that you play them. Voice changes and movements of the Pitch and Modulation wheels, etc. (see below) will also be recorded, letting you record an expressive performance.

When you press RECORD, the LED will light (red) and you will get the following display. (If the LED lights green and the LCD shows "PART TYPE", press RECORD again to make it light red. Part Type is explained on page 70.)





A red LED indicates the track being recorded. (Press to select 1 — 8.)

NORMAL REC: You can use the −/+ buttons or the numeric key pad to select a Voice (00—99) for the track you will be recording. (Press TR1 — TR8 to select the track to record.)

Beat: You can set a time signature (1/4 — 4/4, 1/8 — 8/8) for the song **only if all tracks are empty**. Once a track has been recorded, the time signature of the song cannot be changed. (All tracks share the same time signature for the entire song.)

Measure: You can select a measure from which to begin recording when you press STOP/CONTINUE. (You can select any measure 1 — 999 even if existing tracks in the song are not actually that long.)

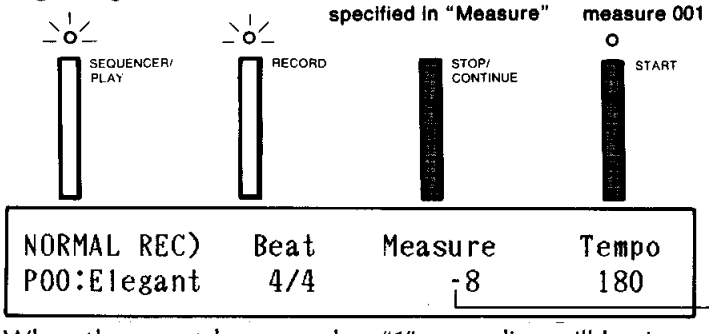
Tempo: You can set the tempo, or the speed at which the song will play or record, over a range of 60 — 180.

After you have selected a preset Part Type or manually set the instrument assignments in the Synthesizer Multi Mode (see page 57) or Sequencer Voice Mode (page 86), you are ready to record. For example to record on track 1, press the track switch TR1 (the LED lights red). You can record only one track at a time.

To begin recording from measure 1, press START. To begin recording from the location you specified in "Measure", press STOP/CONTINUE. There will be a two-measure countdown to give you the tempo. (If you play a note or move a controller before the countdown reaches "1", the note or controller data will be recorded at the very beginning of the track.)

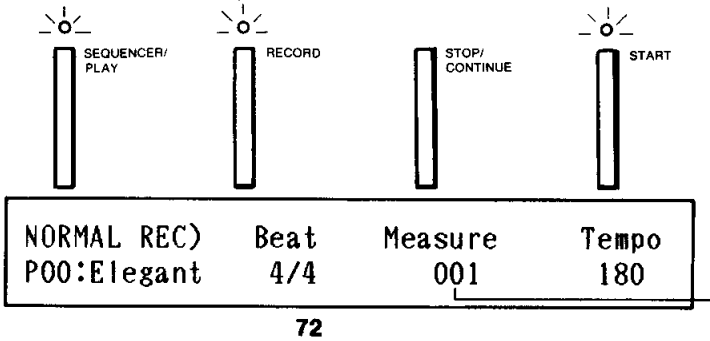
Record from the point specified in "Measure"

Record from measure 001



Countdown (2 measures)

When the countdown reaches "1", recording will begin, and the measure currently being recorded will be displayed. While recording, the SEQ/PLAY LED will blink (red), to indicate the tempo.



Now recording this measure

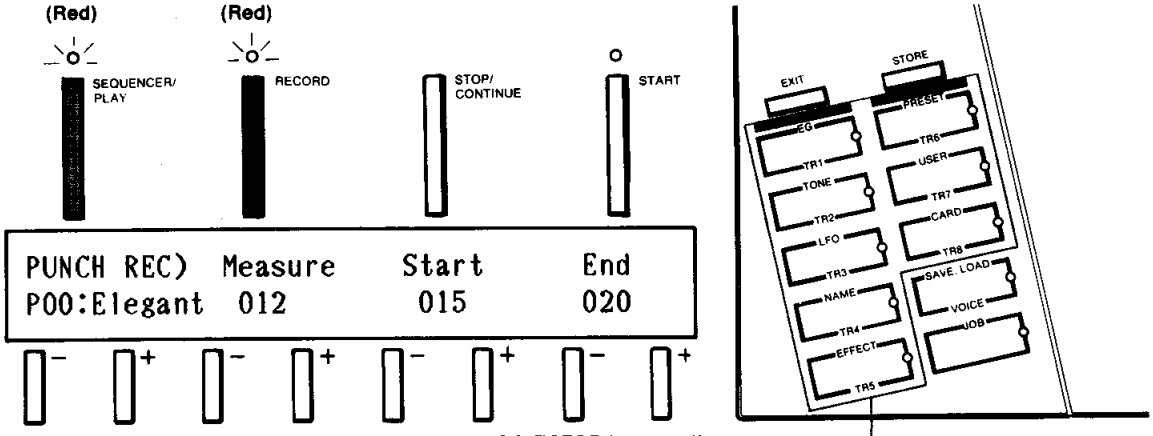
When you have finished recording or want to quit, press STOP/CONT. Recording will end and you will return to PLAY mode. (You can also stop recording by pressing EXIT, but you will then go back to Synthesizer mode.) To record another track, press RECORD, select another track (TR1 — TR8), and record again.

- If you have already recorded other tracks, you will probably want to listen to them while recording the new track. Tracks indicated by a green LED will playback as you record. In PLAY mode you can use the track select buttons TR1 — TR8 to switch a track between Play (green LED) and Mute (blinking green LED). In RECORD mode the track select buttons are used only to select a track for recording.
- In Normal recording if you record on a track that already contains data, the new recording will be **added** to the original data. This means that if you make a mistake, you will have to get rid of it by recording over it using Punch record (which will **erase** the original data), or by using the "Erase" function (page 81).
- During Normal and Punch recording, the TQ5 also records control data such as pitch bend, modulation wheel and breath control, if your connected MIDI keyboard is equipped with these controls. (The PF1500 Electronic Piano is not so equipped.) You can set the effect of modulation wheel and breath control data in the Control function (page 53) in the Synthesizer Job Mode. Voice changes (00 — 99) you make while recording are also memorized. (Use the left-most −/+ **SELECTOR** buttons or the numeric key pad.) However you cannot select a different **type** of voice (preset, user, card) while recording.
- Depending on the settings in the "Condition" job (page 80), Aftertouch and Velocity data can also be recorded. However, remember that the more controller data you record, the faster memory will be used up. (If **only** note data is recorded, the sequencer has a capacity of about 10,000 notes.)

PUNCH RECORDING

Punch In recording is the same as Normal recording with the difference that **only the measures you specify will be recorded**. This is very useful if you have made a mistake in just one section, but want to keep the rest of a track.

When you press RECORD, the LED will light (red) and you will get the following display. (If the LED lights green and the LCD shows "PART TYPE", press RECORD again to make it light red. Part Type is explained on page 70.)



PUNCH REC: You can use the −/+ **SELECTOR** buttons, the cursor left and cursor right keys or the numeric keypad to select a Voice (00 — 99) for the track you will be recording. (Press TR1 — TR8 to select the track to record.)

Measure: You can select a measure from which to begin **playback** when you press STOP/CONTINUE. (This measure must be less than or equal to the "Start" measure.)

Start: Specify the measure to begin recording.

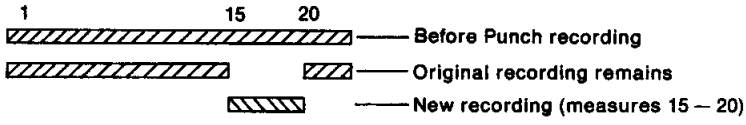
End: Specify the measure to end recording.

A red LED indicates the track being recorded. (Press to select 1 — 8.)

Punch In recording is used mainly when you want to re-record a certain part of a track. Press a track select button to select a track (1 — 8). Then set the start and end of the area to be re-recorded. When you press START, playback will begin from measure 1. (Or press STOP/CONTINUE to begin playback from the point specified in "Measure".) You can play along with the other tracks, but nothing will be recorded until you reach the "Start" point.

When you reach the "Start" point, recording will begin, and your playing will be recorded exactly as in Normal recording (page 71). When you reach the end of the measure specified in "End", recording will stop (but playback will continue).

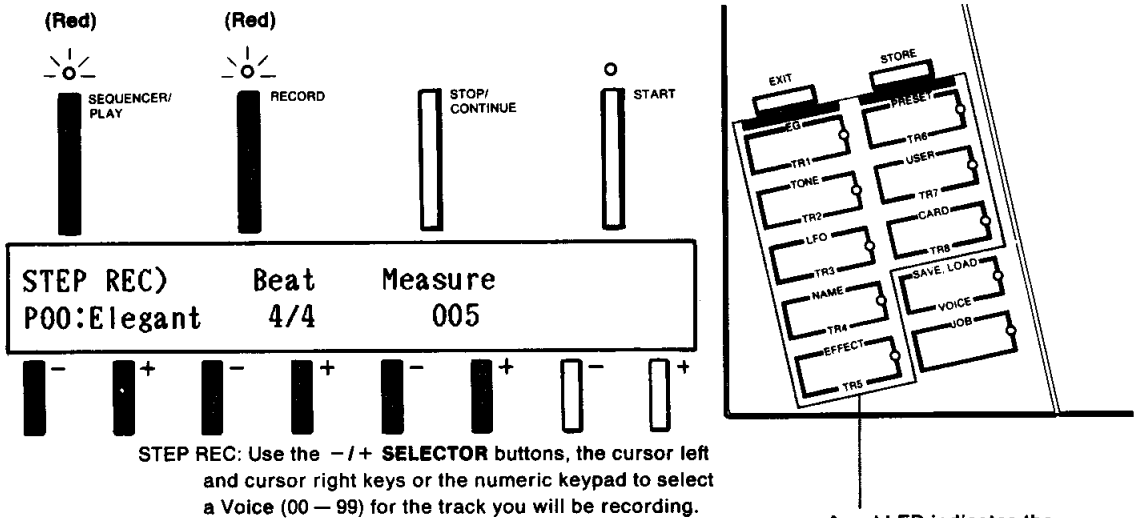
For example if you press START from the LCD shown above, the track would change as shown in the following diagram. Measures 15 — 20 would be replaced by your new recording.



- If you want to quit before the "End" point is reached, press STOP/CONT. Recording will end and you will return to PLAY mode. (You can also stop recording by pressing EXIT, but you will then go back to Synthesizer mode.)
- The original data in the measures between "Start" and "End" **will be erased**. This means that if you don't play anything during Punch recording, this section of the track will be empty.
- Especially when the Punch Recording area is toward the end of a long song, it is convenient to set the "Measure" to a point a few measures before the "Start" and press STOP/CONTINUE to begin playback from "Measure". This way you do not have to wait for a long playback to get to the part you need to re-record.

STEP RECORDING

In Step recording, you can enter individual notes one by one from the keyboard. This allows you to create very complex passages that would be difficult to play by hand. As in Normal recording, if the track you are recording already contains data, the newly recorded data will be **added** to the previous data. For example, you can record a passage using Normal or Punch recording, and than use Step record to add additional notes, insert voice changes, or erase a note or program change.
When you press RECORD, the LED will light (red) and you will get the following display. (If the LED lights green and the LCD shows "PART TYPE", press RECORD again to make it light red. The Part Type function is explained on page 70.)



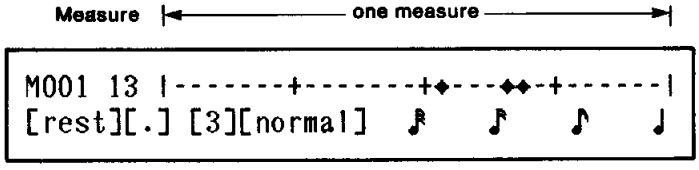
A red LED indicates the track being recorded. (Press to select 1 — 8.)

STEP REC: Use the −/+ **SELECTOR** buttons, the cursor left and cursor right keys or the numeric keypad to select a Voice (00 — 99) for the track you will be recording. (Press TR1 — TR8 to select the track to record.)

Beat: **You can set a time signature (1/4 — 4/4, 1-8 — 8/8) for the song only if all tracks are empty. Once a track has been recorded, the time signature of the song cannot be changed. (All tracks share the same time signature for the entire song.)**

Measure: **You can select a measure from which to begin step recording when you press STOP/CONTINUE. (You can select any measure 1 — 999 regardless of whether or not such a measure is beyond the actual end of the song.)**

As in Normal recording, press START to begin recording from measure 1, or press STOP/CONTINUE to begin recording from the location you specified in "Measure". In Step recording the LCD will graphically show one measure at a time (each division represents a 32nd note), and will look something like the following.

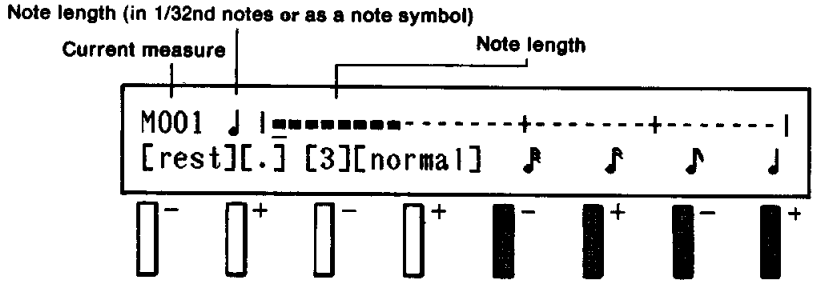


Notes are indicated by a diamond-shaped mark. In the above LCD you can see that the third beat of measure 4 contains three notes. (For details, see below.)
When you have finished recording, press STOP/CONT. Recording will end and you will return to PLAY mode. (You can also stop recording by pressing EXIT, but you will then go back to Synthesizer mode.)

■ *RECORDING NOTES*

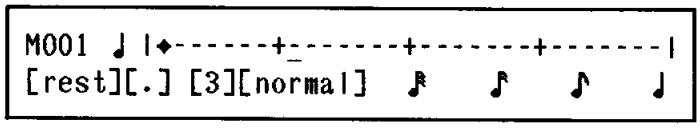
Each time you press and release a note on the connected keyboard, it will be recorded at the current position, and the position will advance. If you press more than one note before releasing the previous note, the notes will be recorded at the same position — i.e., a chord.

In Step Record, the length of each note is determined not by how long you press the key, but by the note length you select, 1/32, 1/16, 1/8 or 1/4 note. Press one of the four right SELECTOR buttons to select a note length. The selected note length will be displayed as a note symbol to the right of the Measure. The LCD will show a bar indicating the note length (in steps of a 1/32nd note), beginning from the current position in the measure. For example if you press the SELECTOR button to select a quarter note (the right-most SELECTOR button), the LCD will look as follows.



Selecting an additional note length will **add** to the note length. For example if you pressed the SELECTOR button again to select another quarter note, the result would be a half note. You can also use the cursor left and cursor right keys below the numeric key pad to adjust the length of the selected note, to make the note shorter or longer in steps of a 32nd note.

From the above LCD, if you press and release a note of the connected keyboard, a quarter note will be entered, and the cursor position will advance. The LCD will look as follows.

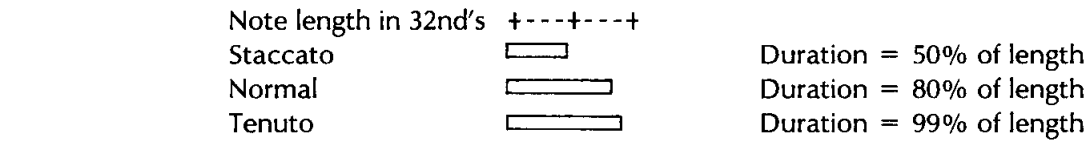


Notice that a diamond mark indicates the note you recorded. You may now press the connected keyboard to record another note of the same length, or select a new note length.

In this way, continue pressing and releasing the keyboard to record notes.

- Use the cursor left and cursor right keys (below the numeric key pad) to make fine adjustments in note length. If you continue pressing the cursor left key, the note length bar will become shorter, and finally disappear. **Now you can use the cursor left and cursor right keys to move to a different position**. (For example to record a note at an earlier location.)
- When you press the third SELECTOR button from left to select [3], the LCD will show "***3***", and note lengths will be reduced to 2/3 of their normal value, letting you enter triplets. For example if you have selected a note length of 1/4 (eight 32nd notes), selecting [3] will make the note length equal six 32nd notes. (If the resulting note value does not divide evenly into 32, the next highest note value will be used.) Pressing the same SELECTOR button again will return to the "[3]" display, and note lengths will be their normal value.
- Selecting [.] (the second SELECTOR button from left) will increase all further note lengths by 50% to produce "dotted" notes. Press the SELECTOR button again to return to normal note lengths.

- Selecting a note duration (normal, stacatto or tenuto) affects the time the note is **held**. (The note length bar in the LCD will not change.) The following diagram shows a quarter note (8 x 1/32) with different note durations.



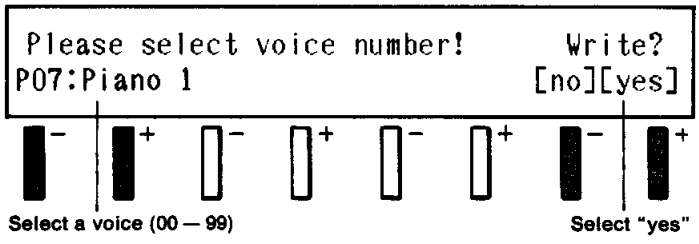
- Pressing the SELECTOR button to select "rest" will advance the position one note length **without entering a note**; i.e., a rest.

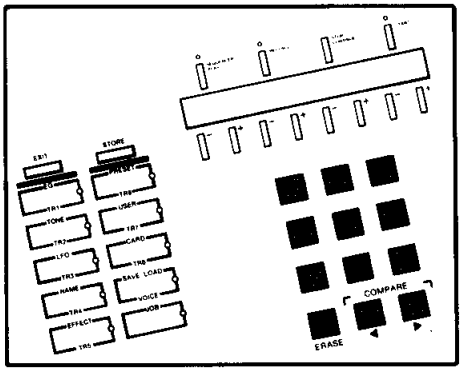
■ *INSERTING A VOICE CHANGE*

As part of the song data, the beginning of each track contains a voice number which will be selected for the track whenever you begin playing the song. (This is the voice number you selected in VOICE, Voice Select, page 87.)

However, you can insert other voice changes at any point in a track. For example, you might want the Piano part to change to an Electric Piano for the chorus, and then change to an Organ for the ending.

To insert a voice change at the current location, press **VOICE**. You cannot change voice memory **types** in the middle of a track. The following LCD will appear.

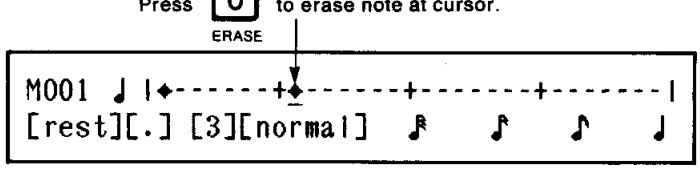




Use the left most +/− **SELECTOR** button pair, the cursor left and cursor right keys or the numeric keypad to select a voice (00-99). When you have selected the voice you want, select "yes" and the voice change will be inserted into the track. (A "p" mark will indicate the location of the program change.) If you change your mind and decide not to insert a voice change, select "no" to go back to recording notes.

■ *ERASING A NOTE OR VOICE CHANGE*

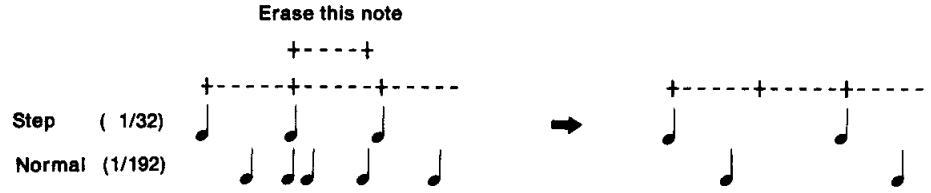
When the note length bar is not displayed, you can use the cursor left and cursor right keys to move the cursor forwards or backwards. With the cursor positioned on the Note or Program Change you wish to erase, press ERASE (the "0" key of the numeric key pad). All notes and program changes within the specified 32th note length will be erased. (Other data such as controller data recorded in Normal or Punch recording modes will remain.)



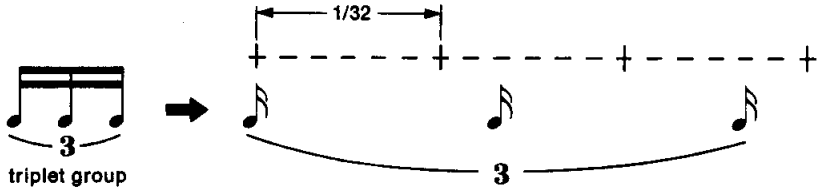
If desired, you can now record a different Note or Program Change to replace the data you just erased.

Note:

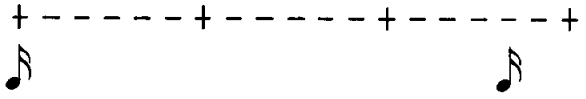
The timing precision in Step record mode is one 32nd note. Erasing data (a note or voice change) actually erases **all** data in the specified 32nd note region. Although Normal or Punch record modes have six times greater timing precision (one 192nd note), these "in-between" notes will be displayed and edited as though they were a single note at 32nd note intervals.
The following diagram illustrates this. The same track contains notes recorded in Step record (1/32 precision) **and** notes recorded in Normal record (1/192 precision). Notice how the track data changes when you erase a note.



Since the maximum timing resolution is 1/32 note, editing of grouped notes that do not separate evenly into 1/32 divisions (such as triplets) will affect more than one note. Notes in the middle or at the end of such beamed groups cannot be edited individually but are edited with the entire note group. Similarly, you should be careful when editing notes of a beamed group, such as triplets. In an eighth-note triplet, for example, the individual notes of the group have a value of 1/24 (1/8 x 1/3), and would occupy the track data according to the following diagram.



If you erase the middle note,

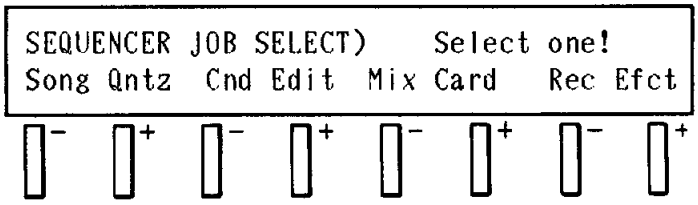


and record another one of the same value in its place,

the new note would be entered at the head of the nearest 1/32 division, thus canceling the triplet feel.
For this reason, always edit triplets from the first note of the group.

SEQUENCER JOB

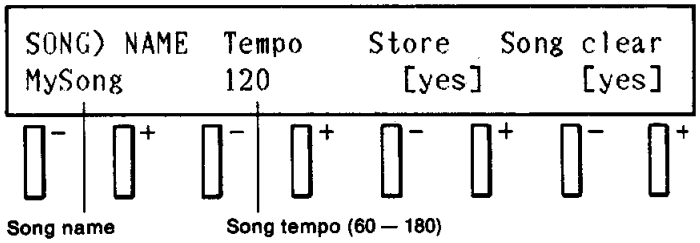
The Sequencer Job mode provides some useful editing and control features. When you press **JOB**, the LED will light (red) and you will get the following display. (You cannot enter Job mode while playing back or recording.) Use the **+/– SELECTOR** buttons below the LCD to select one of 8 jobs.



Song (Song): Set a name and tempo for the song. Store (or clear) a song.
Qntz (Quantize): "Tighten up" the timing of a song.
Cnd (Condition): Specify various recording conditions.
Edit (Edit): Erase or Copy tracks, Delete or Insert measures.
Mix (Mixdown): Combine the data of two tracks into a single track.
Card (Card): Save/load sequence data in card memory.
Also transmit/receive sequence data via MIDI.
Rec (Record mode): Set the record mode and reception channel.
Display the amount of free memory.
Efct (Effect): Select the type of effect (Reverb, Delay, etc.), and make settings.

SONG

Song lets you name and store song data to the currently selected song memory. You can also clear the recorder memory. Press **JOB**, then press the **+/– SELECTOR** button selecting "Song" to get the following display.



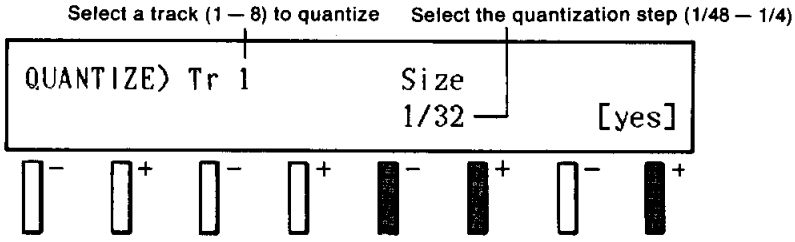
You can enter an 8-character name for your song as explained in Synthesizer mode Easy Edit, NAME (page 19). To call up the naming function, press the leftmost – **SELECTOR** button (directly below the song name in the Song job display shown above). You can use the same naming procedure as you do when naming voices (with an 8-character limit, however). You can also specify a tempo to be selected whenever this song is loaded into memory. When you press the SELECTOR button selecting "Store", the data in recorder memory will be stored in the currently selected song memory (Track 1 — 8). Each Song memory contains the following data:

- 8-character song name.
- Song tempo
- Time signature
- 8 tracks of data, each with a Voice Number, Voice Bank (preset, user or card) and Max Notes setting.
- Effect Number, Effect Time and Effect Balance.

You can also **erase** the currently selected song by pressing the **SELECTOR** button to select "Song clear". The song name will be set to all blanks, and all track data will be erased. Other settings (tempo, time signature, voice numbers, max notes, etc.) will not be affected. This function is useful when you want to redo the entire song.

QUANTIZE

Quantize lets you adjust the timing of all notes in a track to a specified interval. Press **JOB,** then press the **SELECTOR** button selecting "Qntz" to get the following display.



Select a track (1 — 8) by using the track buttons and a quantization "size" or "step" of 1/48, 1/32, 1/24, 1/16, 1/12, 1/8, 1/6 or 1/4 note. When you press the **SELECTOR** button selecting "yes", you will be asked "Sure?". If you are sure you want to Quantize the track, select "yes" again. All notes in the track will be moved to the nearest interval of the "Size" you specify.

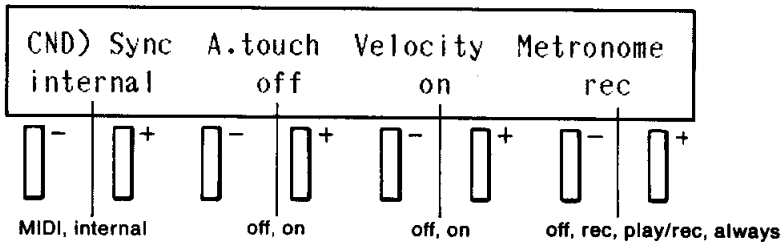
Quantization is often useful for "tightening up" tracks you recorded in Normal or Punch recording. The following diagram shows the effect of quantizing (the rulers in the diagram are divided into units of the quantization "Size").

As shown in the above example, it is possible that notes which were originally played separately may be moved together, causing them to be played as chords.
Be sure to specify a "Size" that is appropriate to the intended musical result. For example if the shortest note value should be a triplet over a quarter note, you would specify a "Size" of 1/12, since 3 × 1/4 = 1/12.

Quantization cannot be undone, and sometimes the results may not be to your liking. Before you Quantize a track, it may be a good idea to copy it to an unused track (use the Edit/Copy job, page 81). If you need to, you can copy the original data back to the first track and re-do the quantization using a different size.

CONDITION

Condition lets you specify how the sequencer will record data. Press **JOB**, then press the **SELECTOR** button selecting "Cnd" to get the following display.



Sync: Normally you will leave this set to "internal", so that the internal clock of the TQ5 controls the tempo of the built-in sequencer and the tempo of all devices connected to the TQ5 MIDI OUT. However if an external sequencer (or rhythm machine) is connected to the TQ5's MIDI IN, and you want the TQ5 sequencer to play or record in synchronization with the external sequencer, you should set this to "MIDI".

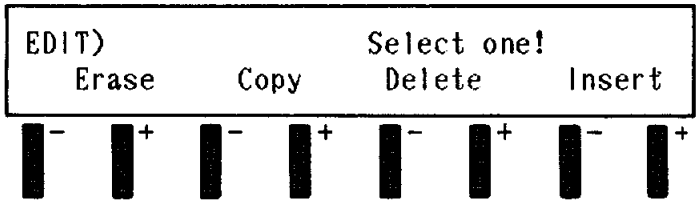
A.touch: When this is "on", Aftertouch data will be recorded whenever you press down on the connected keyboard. Aftertouch can be used for very expressive effects while playing, but it produces a lot of data, which will quickly fill up sequencer memory. If you don't need to record Aftertouch, conserve sequencer memory by setting this to "off".
The effect that Aftertouch will have on each voice is determined by the settings in the "Edit" job of the Synthesizer mode.

Velocity: When this is "on", the force (velocity) with which you play each note will be recorded. This will make your recording more expressive, but if you don't need to record Velocity, you can save a bit of sequencer memory by setting this to "off". (Notes without velocity occupy 25% less data space.)

Metronome: This lets you select when the metronome will be heard. You can choose from "off" (always off), "rec" (on during recording), "play/rec" (on during recording and playback) or "always" (on at all times while you are in Sequencer mode). In most cases, you will need to hear the metronome only when recording.

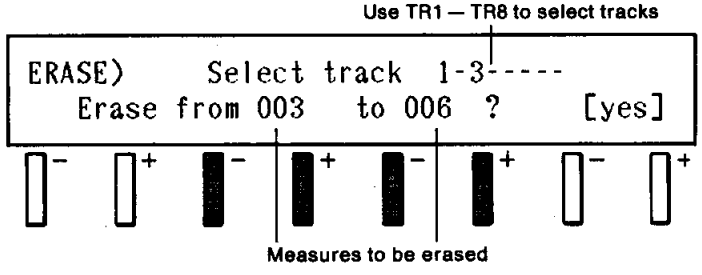
EDIT

Edit gives you four ways to modify the data in a track. Press JOB, then press the + **SELECTOR** button selecting "Edit" to get the following display.



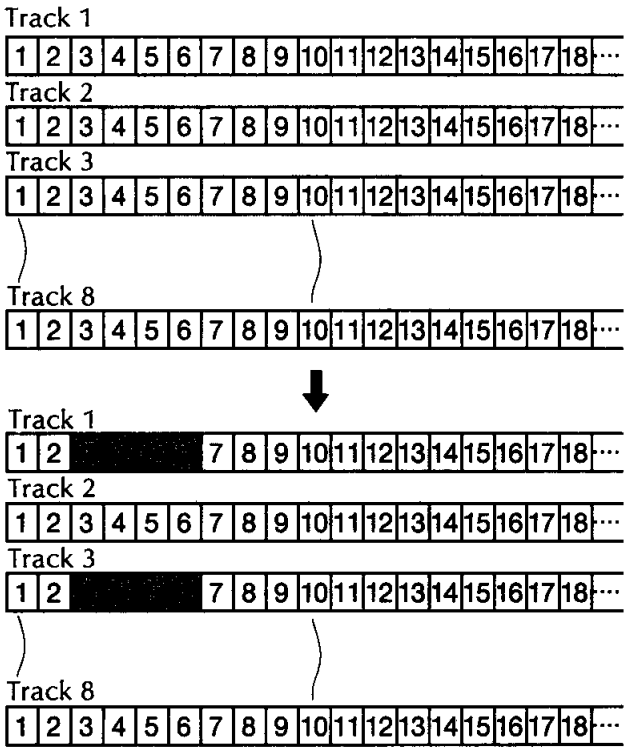
Press a +/− **SELECTOR** button to select the operation you need. After making the desired settings, execute the operation by pressing the button to select "yes". You will be asked "Sure?", so if you are sure you want to execute, select "yes" again.

■ ***ERASE:*** This will erase specified measures of specified tracks. The empty measures will remain in the track.

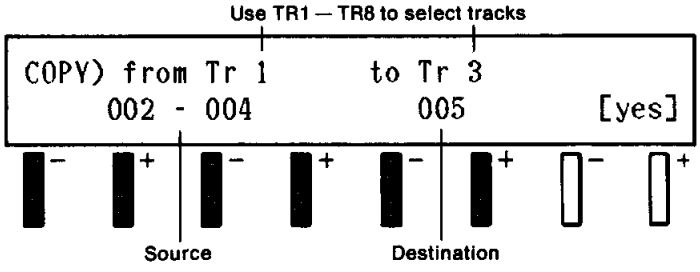


Press a track select button (TR1 — TR8) to select (or un-select) a track.
Use the +/− **SELECTOR** buttons below the LCD to set the beginning and end of the area to be erased. When you press the SELECTOR button to select "yes", all data will be erased from the specified measures of the specified tracks.

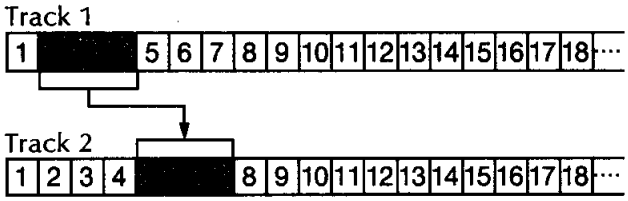
For example if you selected "yes" in the above LCD, tracks 1 — 3 would change as follows.



■ ***COPY:*** This allows you to copy specified measures of a track to another track.

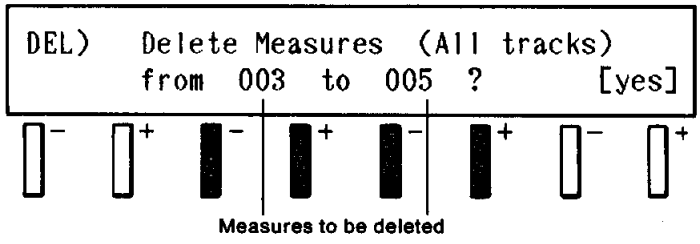


Press two track select buttons (TR1 — TR8) to select a source and destination track. (First press selects the source, second press selects the destination.) Use the −/+ buttons below the LCD to set the beginning and end of the area to be copied, and the destination to which to copy the measures. When you press the + **SELECTOR** button to select "yes", the specified source measures will be copied to the destination, **replacing the original data starting at the destination measure**.
For example if you selected "yes" in the above LCD, the tracks would change as follows.

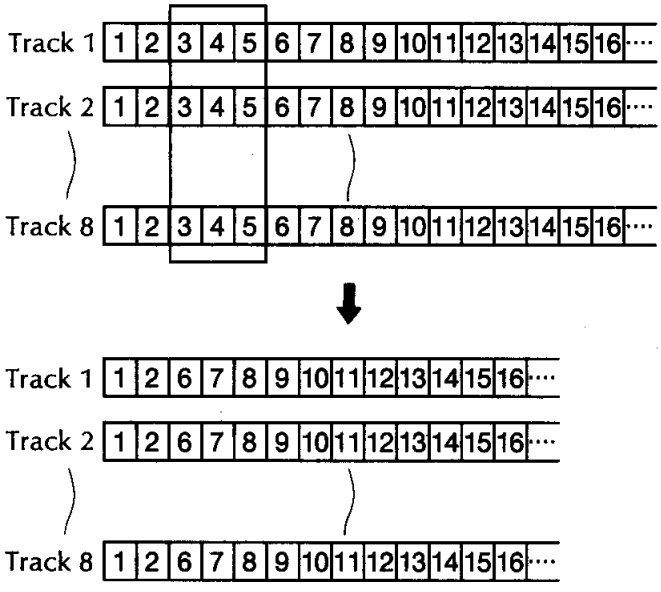


The data originally in measures 5 — 7 of track 3 would be lost.
Of course the source and destination tracks can be the same if desired, letting you copy measures to another point in the same track. You might use this function to copy a rhythm pattern or melodic motif that repeats throughout the song.

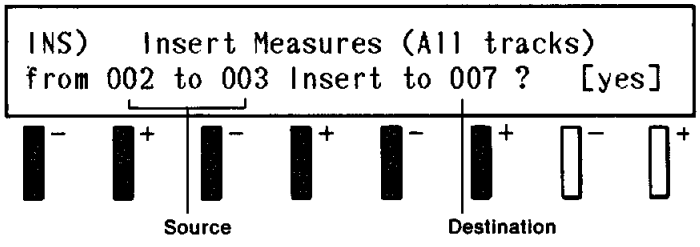
■ ***DELETE:*** This allows you to delete specified measures **from all tracks**. I.e., the entire song (all tracks) will become shorter.



Use the **+/− SELECTOR** buttons below the LCD to set the beginning and end of the area to be deleted. When you press the **+ SELECTOR** button to select "yes", the specified measures will be deleted.
For example if you selected "yes" in the above LCD, all tracks would change as follows.



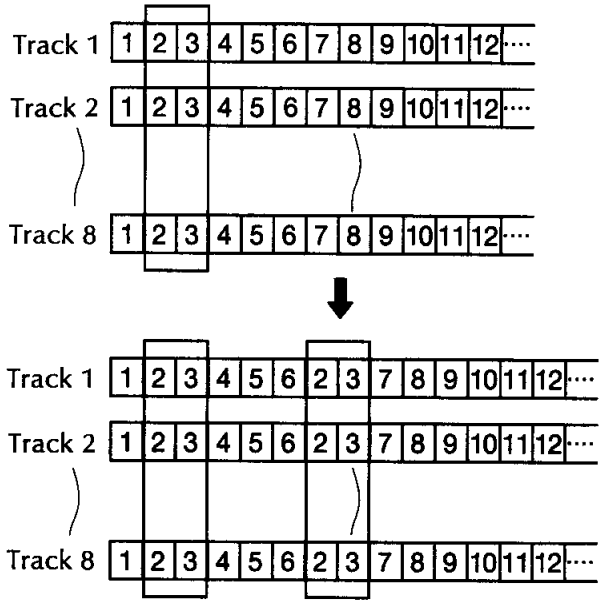
■ ***INSERT:*** This allows you to insert (copy) specified measures **into all tracks**. i.e., the entire song (all tracks) will become longer.



Use the **+/− SELECTOR** buttons below the LCD to set the beginning and end of the area to be inserted (copy source), and the destination to which to copy the measures.
When you press the selector button to select "yes", the specified source measures (of all tracks) will be copied to the destination. Measures beyond the destination

will be pushed back, making all tracks longer by the same amount.

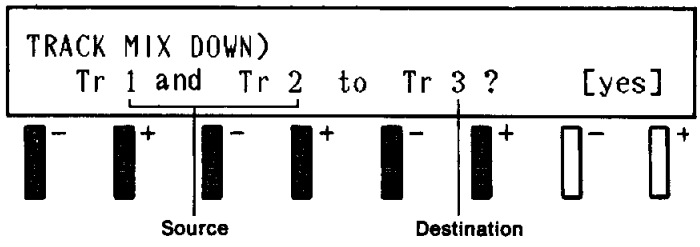
For example if you selected "yes" in the above LCD, all tracks would change as follows.



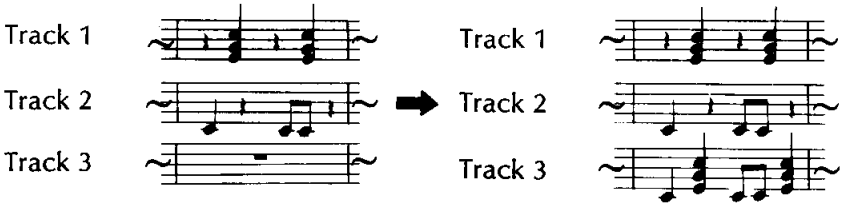
This function might be used to copy an entire chorus (all tracks) to another point in the song, saving the trouble of re-recording it.

TRACK MIX DOWN

Track Mix Down lets you combine the data of two tracks into a single track. Press **JOB**, then press the button selecting "Mix" to get the following display.



Use the **+/− SELECTOR** buttons below the LCD to set the source tracks and the destination track. When you press the **+ SELECTOR** button to select "yes", the two source tracks will be mixed and added to the data in the destination track. The source tracks will retain their original data. For example if you selected "yes" in the above LCD, tracks 1, 2 and 3 would change as follows.



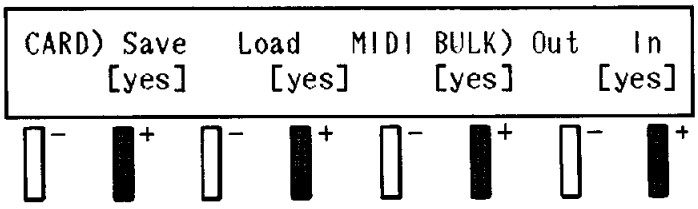
Use this function when you decide that two existing tracks should be played as one part. Each track can play only one voice, as specified in the initial voice number for the track. Even if in the above example, tracks 1 and 2 were playing brass and string parts, all notes in the resulting track 3 would simply play whatever voice was assigned to instrument 3 (see Sequencer VOICE mode, page 86).

Note:

While recording, a chord of up to 8 simultaneous notes can be recorded in each track. However you can exceed this limit by mixing tracks. This can be useful when playing external synthesizers via MIDI, but remember that the TQ5 synthesizer itself has a capacity of 8 simultaneous notes.

CARD

Card is where you save/load song data to a RAM memory card or to/from an external MIDI device. Press **JOB**, then press the button selecting "Card" to get the following display.



This job gives you 4 operations to save/load song data. Press the corresponding **+/− SELECTOR** button below the LCD to execute the operation.

CARD Save: When you select [yes], data for all songs will be saved from TQ5 internal memory to the RAM memory card. (The RAM card must be properly formatted to accept sequence data. If it is not, press EXIT to leave the sequencer mode, then press SAVE/LOAD to access the "Format" function. For details, see the SAVE, LOAD MODE instructions in the SAVE, LOAD AND STORE OPERATIONS section of this manual.)

CARD Load: When you select [yes], data for all songs will be loaded from the card into the TQ5 internal memory.

MIDI BULK Out: When you select [yes], data for the currently selected song will be transmitted from MIDI OUT as "bulk" data in the N-SEQ format. (Do not confuse this data with **playback** data. The whole song is sent as one package of data.) This bulk data can be received by another sequencer (another TQ5, a QX5FD etc.) for later playback. The operation manual of your other sequencer will tell you whether it can receive N-SEQ bulk sequence data.

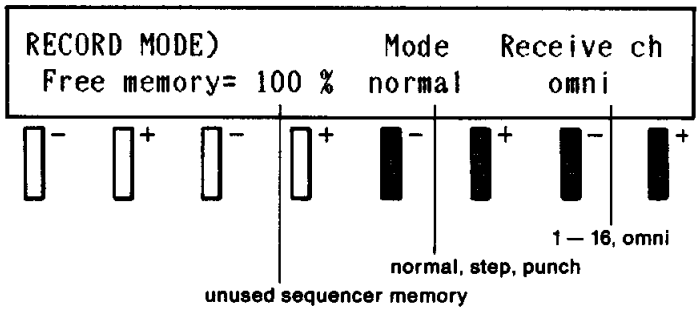
MIDI BULK In: When you select [yes], the currently selected song will be cleared, and the TQ5 will display "waiting", and wait for song bulk data (as explained above) to arrive. When the data begins to arrive, the display will change to "Receiving", and when finished, will show "Completed". (Due to minor data format differences between sequences, the TQ5 will sometimes adjust the measure divisions of the incoming sequence data.)

Note:

Data transmitted in MIDI BULK Out has a "channel number" corresponding to the channel you set in Synthesizer mode Transmit Channel. The device receiving this bulk data must be set to a matching receive channel, or the data will not be received. In the QX5FD, this is called the "device number".

RECORD MODE

Record Mode lets you select how to record; Normal, Punch or Step. Press **JOB**, then press the button selecting "Rec" to get the following display.



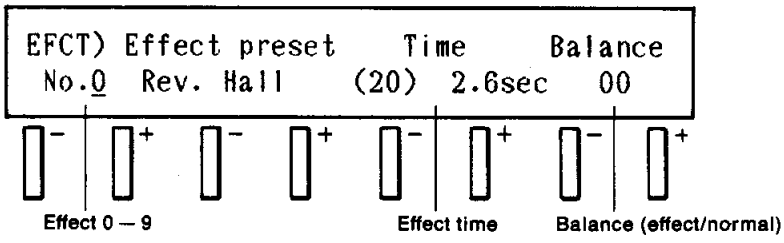
Free memory: This indicates the amount of unused sequencer memory. If nothing has been recorded, 100% will be free.

Mode: Here you can select one of the three ways to record music; normal, step or punch. These recording modes are explained at the beginning of the RECORD section.

Receive Channel: The TQ5 sequencer can record notes played on an external MIDI instrument (keyboard, wind controller, etc.). If you want to record from MIDI, select a channel 1 — 16 to be received, or "omni" to receive all channels. The operation manual for your MIDI instrument will explain how to set its transmit channel.

EFFECT

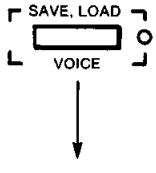
Effect lets you choose one of the ten effects (Reverb, etc.) to use in your song. Press **JOB**, then press the +/− **SELECTOR** button selecting "Efct" to get the following display.



This is exactly the same function as explained in the Synthesizer mode, Effect. It is included here in Sequence JOB so that you can make settings without having to exit Sequence mode.

VOICE

After selecting a preset Part Type you may wish to make minor changes in your "ensemble". Remember that selecting another preset Part Type (or selecting another Song) will replace the Voice Select and Max Notes settings you have made here in Voice mode. (Settings for MIDI Transmit Channel will remain.)
Each press of the VOICE button will step through the following three displays, allowing you to make settings for "Voice Select", "Max Notes", and "MIDI Transmit Channel". The fourth time you press VOICE you will return to "Play Song" mode.



VOICE SELECT
MAX NOTES
MIDI TRANSMIT CHANNEL

(back to PLAY SONG mode)

Important:

It is possible to leave Voice mode and return to Play Song mode by pressing **SEQUENCER/PLAY**. In this case, however, the song currently in song memory will be recalled, along with the initial voice numbers for each track in the song. **This means that any changes you have made in Voice mode will be forgotten.** If you want to keep the changes you made in Voice mode, you must return to Play Song mode by pressing **VOICE** a fourth time. This will enter Play Song mode **without** loading a song from memory.

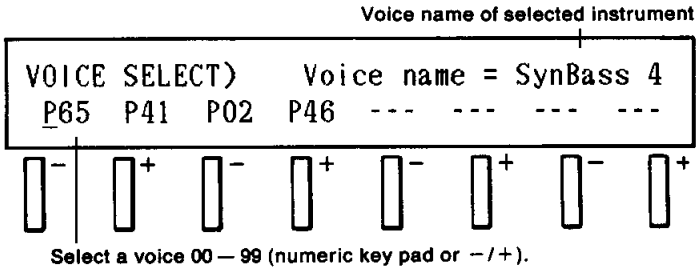
While still in Voice mode, you can store your settings by: 1)pressing **JOB**, 2)selecting SONG, and 3)pressing the **+ SELECTOR** button below STORE two times.

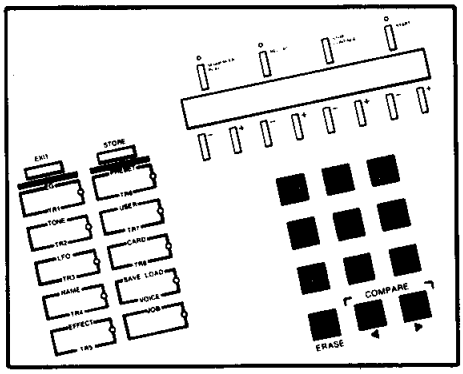
If you have done so, it does not matter how you return to Play Song mode — your settings will be kept.

The examples below show what the LCD would look like if you had just selected preset Part Type "2:Pops".

VOICE SELECT

Select the voice initially used by each instrument.



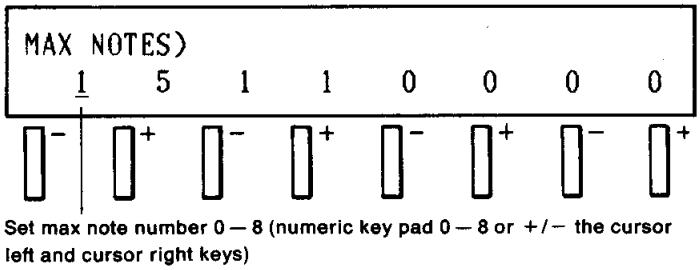


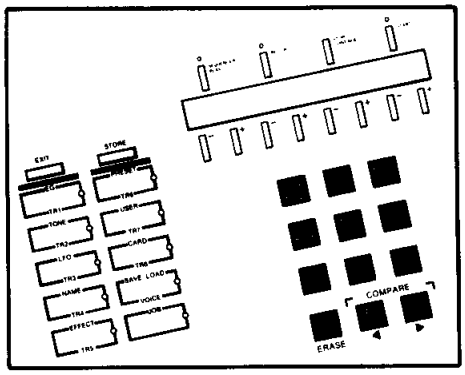
Press a **+/− SELECTOR** button to select an instrument (the selected instrument will be indicated by the underline cursor). The voice name of the selected instrument will be shown in the upper line of the LCD. Use the numeric key pad (or the +/− keys below the numeric key pad) to select a voice (00 — 99). You can also press **PRESET**, **USER** or **CARD** to select the memory type.

The voice numbers you set here will be selected for each track whenever playback begins. A track can contain voice changes (00 — 99) in the middle of a song, but only within the memory **type** selected here. In other words, if a PRESET voice is used to start the song, voice changes in the track will change only to other PRESET voices. As shown in instruments 5 — 8 in the above example, a dash " — " instead of a voice number indicates that the instrument's Max Notes setting is 0.

MAX NOTES

The 8-note sound producing capability of the TQ5 must be distributed among the 8 instruments.

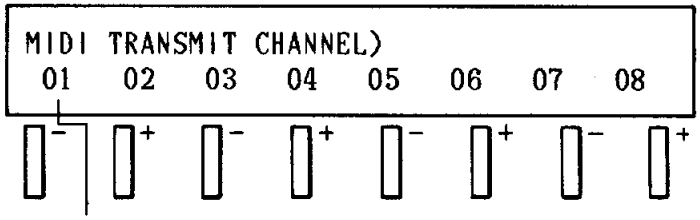




Press a +/− **SELECTOR** button to select an instrument (the selected instrument will be indicated by the underline cursor), and use the numeric key pad 0 — 8 (or the −/+ keys below the numeric key pad) to set a Max Notes number 0 — 8 for each instrument. These instruments will not sound, nor can a Voice number be set for them until they are given a value other than 0.
Remember that Max Notes for all instruments must total 8 or less. For example in the LCD shown above, if you want to use instrument 6 (currently set to Max Notes = 0), you must first **decrease** the Max Notes setting of another instrument.

MIDI TRANSMIT CHANNEL

In addition to controlling the eight synthesizer voices inside the TQ5, the eight tracks of the sequencer will transmit data from the MIDI OUT terminal to control other synthesizers. If you have another synthesizer (DX11, etc.) or tone generator (TX81Z, etc.) connected to the TQ5's MIDI OUT, the TQ5 sequencer will play this external device **in addition to** playing the TQ5's own sounds.



Set MIDI Transmit Channel (1 — 16 or "off") for each track (Use numeric key pad or −/+)

Press a SELECTOR button to select an instrument (the selected instrument will be indicated by the underline cursor), and use the numeric key pad (or the cursor left and cursor right keys below the numeric key pad) to set a MIDI Transmit Channel (1 — 16 or "off") for each instrument. Entering "0" will set the Transmit Channel to "off". When "off" is selected, that sequencer track will not transmit MIDI data. (Of course it will still play the TQ5's internal instrument.)

Note:

These MIDI Transmit Channel settings are meaningful only when other devices are connected to the TQ5's MIDI OUT terminal.

APPENDICES

FM SYNTHESIS

This section explains how the TQ5 produces sounds using a method called FM Synthesis. It is not absolutely necessary that you read this section to be able to use the TQ5, but understanding the "inner workings" of FM synthesis will help you use the Easy Edit functions to modify sounds to your liking.

INTERESTING SOUNDS AND BORING SOUNDS

The buzzing and beeping sounds used in early electronic music were very easy for a computer to make, but boring for humans to listen to. These boring sounds had a very simple "waveform" (sound wave). Sounds of real instruments (sax, piano, voice, etc.) are more interesting to listen to, but have a much more complex waveform. The following diagram shows a simple sound wave and a complex sound wave. (Of course these waveforms are not visible to the eye — they are just graphs of the sound wave that reaches our ear.)

Simple Sound Wave
(boring, "electronic-sounding")

Complex Sound Wave
(interesting, "natural-sounding")

The **FM Synthesis** used in the TQ5 synthesizer is an easy, yet powerful way to create the complex sounds that make real instruments sound so good.

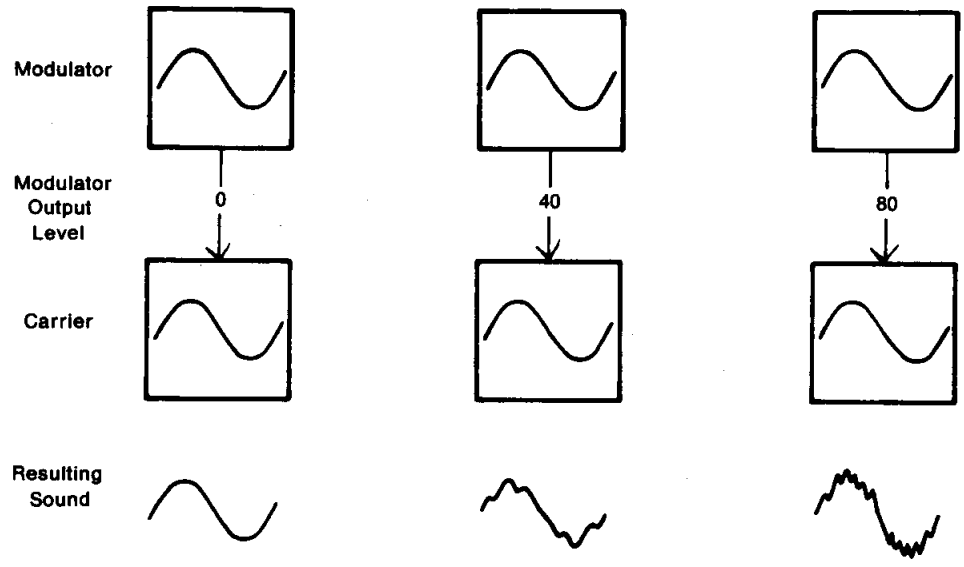
CARRIER AND MODULATOR

FM synthesis is very simple, but very versatile. It uses two simple sound waves, and **frequency modulates** one wave with the other. ("FM" stands for Frequency Modulation, just like in FM radio.)

Frequency Modulation is just another name for Vibrato, or continuous change in pitch. Musical vibrato (the type found in the TQ5 Easy Edit LFO parameter) is relatively slow — usually no faster than ten cycles of pitch change every second. However the frequency modulation or "vibrato" in FM synthesis is so fast, that it results not in a changing pitch, but in a **more complex sound**.

You can probably guess that the greater the modulation, the more complex the resulting sound will be. (The harder you step on a cat's tail, the louder it complains!) The following diagram shows the effect of three different amounts of modulation. (The TQ5 Easy Edit TONE Brilliance parameter determines the amount of modulation.)

To help you understand what is happening, the two sound waves in the diagram are labeled **Modulator** (the wave that modulates) and **Carrier** (the wave that is being modulated, or "carries" the modulation).



From left to right, the diagrams show the effect of increasing modulation to produce an increasingly complex sound. If the Modulator output is increased even more, the resulting sound will become more and more complex, until it finally becomes just noise — a rasping or buzzing sound. On the other hand, if we change the output level of the Carrier (the sound wave **being** modulated), only the **volume** of the resulting sound will be affected. We can summarize this in the following two rules; 1. **The modulator output level determines the tone**, and 2. **the carrier output level determines the volume**.

Another way to change the resulting sound is to change the frequency (pitch) of the Modulator (this is what the TQ5 Easy Edit TONE Wave parameter does). The frequency of the Modulator determines the **intervals** at which overtones (the individual pitches or harmonics that combine to make a single "tone") are produced, and affects the basic character of the resulting sound. In general, positive settings of the Wave parameter will make more widely-spaced overtones (higher overtones), resulting in a more sparkling sound.

Some settings of the TONE Wave parameter can produce metallic or gritty sounds. In most instrumental sounds, overtones are at regular multiples of the fundamental pitch. However if the Modulator frequency is an irregular multiple of the Carrier frequency, the overtones will be at irregular multiples of the fundamental pitch (the first harmonic), resulting in a dissonant sound.

SOUNDS THAT CHANGE IN TIME

Most sounds in the real world change (in both volume and tone) as time goes by. For example, a piano note begins loud and bright-sounding, and decays to a quieter volume and a softer tone. An organ note stays at the same volume and tone as long as a key is pressed. In technical terms, this "shape in time" is called the **Envelope**.

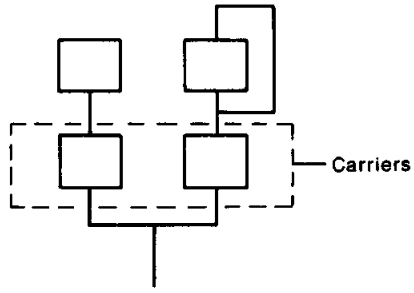
The component inside a synthesizer that produces this change is called the **Envelope Generator** (EG for short). Each Modulator and Carrier in the TQ5 has its own EG. Since the Modulator output level determines the tone, the EG of the Modulator will determines the change in **tone** over time. Since the Carrier output level determines the volume, the EG of the Carrier determines the change in **volume** over time.

The Easy Edit EG parameters let you independently adjust the envelopes for "volume" (the EG of the Carrier), or "tone" (the EG of the Modulator), or "both" (the EG of both Carrier and Modulator).

FOUR OPERATORS

Whether it is being used as a Modulator or Carrier, each sound source in Yamaha FM synthesizers is called an **operator**. Each operator in the TQ5 has its own output level, frequency and EG.

For simple FM synthesis only two operators are necessary, but the TQ5 has **four**, providing a wide variety of possibilities. These four operators can be connected in eight different ways. Each combination of the four operators is known as an **algorithm**, and every TQ5 sound uses one of these algorithms. For example, the algorithm shown below connects the four operators to make **two** independent Modulator/Carrier pairs, for even more complex, interesting sounds.



Other algorithms use one Modulator to modulate three Carriers, or three Modulators all modulating a single Carrier. Obviously, the role of each of the four operators will be different depending on whether it is used as a Carrier or Modulator. (However, the TQ5 Easy Edit functions do not allow you to see or change the algorithm of the four operators.)

Each operator is able to produce one of eight different sound waves; the simple sound wave shown in the first diagram, or a more complex sound wave. The Easy Edit TONE Input-4Nos! parameter lets you specify a sound wave 0 — 7 for each operator. Of course, if a complex Carrier is modulated, or if the Modulator itself is complex, the result will be an even more complex sound wave. This allows the TONE Input-4Nos! parameter to produce major changes in tone quality.

FEEDBACK

FM synthesis requires a Modulator and a Carrier, but it is possible for a single operator to **modulate itself**! This is called Feedback. In each combination of operators, one of the operators is able to modulate itself. (In the above diagram in "Four Operators", this is indicated by the line connecting the upper right operator with itself.)

The Synthesizer Job VOICE EDIT Feedback parameter allows you to adjust this Feedback level from 0 — 7. Increasing the Feedback has the same type of effect as increasing Modulator output level — a more complex, brighter sound.

MIDI AND MIDI APPLICATIONS

The Musical Instrument Digital Interface (MIDI), first brought out in 1982, has proved to be one of the most important developments in electronic music. By applying the power of MIDI to your TQ5, you can carry out an unlimited number of previously impossible performance operations, including the following:

- Play the voices of the TQ5 from any MIDI controller: MIDI pianos, MIDI guitars, rhythm machines, sequencers or even MIDI wind instruments.
- Set effects devices such as digital delay and digital reverberation units to change their effects programs along with voice program changes, to complement and add to the effects section of the TQ5.
- Control digital drum machines with the sequencer of the TQ5 for a perfectly synchronized performance.
- Use the sequencer of the TQ5 to play back sounds on other synthesizers and tone generators (as well as samplers and rhythm machines) for a complete multi-instrumental MIDI performance.
- Use a Tape Sync signal recorded onto one channel of a multitrack tape deck, to perfectly synchronize MIDI sequencers and drum machines with a vocal or acoustic performance recorded on tape. In this way, the seemingly opposed worlds of traditional acoustic music and state-of-the-art digital music can be blended and merged, providing enormous creative potential.

As you can see, MIDI is a very powerful musical tool. However, you won't need a course in computer science to use your TQ5 effectively with other MIDI instruments. All you need to know is what MIDI devices can do, and how you can control them with your TQ5. After that, MIDI does all the work for you.

In every MIDI setup there is a master and a slave. The master can be a keyboard or sequencer and the slave (a sound-generating instrument such as the TQ5) is played by it.

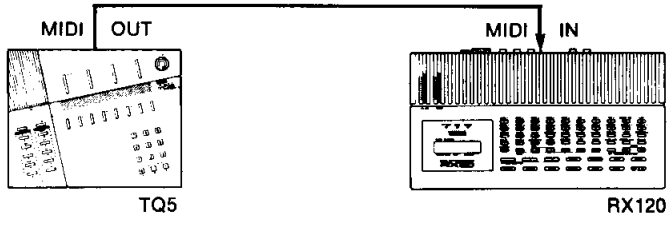
In essence, MIDI is extremely simple: it simply reduces all musical data to numbers, which can easily be sent from one instrument to another (hence the term "Digital Interface"). In practice, MIDI is unbelievably versatile, which is as it should be, for it is designed to fulfill the demands of professional musicians. Indeed, new uses of MIDI are being discovered at an extraordinary rate, both by MIDI engineers, and by musicians like yourself, experimenting and refining the art of digital music on stages and in studios around the world.

To illustrate some of the possibilities of MIDI and perhaps to trigger some ideas of your own, here are a few applications of the TQ5.

Note:

You should know how the MIDI messages transmitted by your connected MIDI keyboard affect the sound of the slave (i.e., your TQ5) and how you can program your TQ5 to respond to these messages. For that information, please refer to the sections on the control MIDI Synthesizer Jobs and the MIDI TRANSMIT CHANNEL Sequencer Job in the SYNTHESIZER REFERENCE chapter. The basic procedure is to match the MIDI Transmit and Receive channels on the respective instruments. Also be sure to consult the owner's manuals of the particular MIDI instruments you are using.

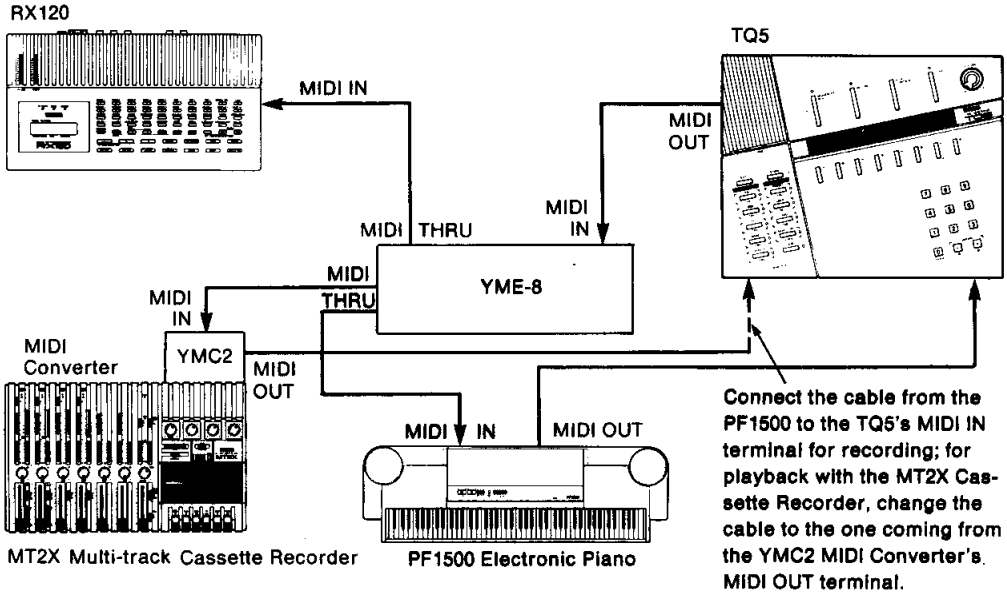
1. TQ5 PLUS RX120 DIGITAL RHYTHM PROGRAMMER



In this simple setup, the TQ5 is used to play the authentic drum and percussion sounds of the RX120 Digital Rhythm Programmer. Since each of the RX120's sounds is assigned to a different note, the TQ5's sequencer can be used to play the actual drum sounds of the RX120 along with the instrument voices of the TQ5. Rhythm patterns on the RX120 can also be played in perfect synchronization with sequencer

songs on the TQ5; simply set the Sync parameter of the Sequencer Cnd (condition) Job to "MIDI," and you're ready to go.

2. TQ5 AS A CONTROL CENTER FOR THE COMPLETE MIDI STUDIO



The comprehensive sequencing and sound generating capabilities of the TQ5 are taken to the limit as it functions as the control center for this full-blown MIDI studio system. This advanced MIDI system provides an example of the awesome power of digital music. It utilizes the following Yamaha digital equipment:

- PF1500 Electronic Piano. As described throughout the manual, you can use this MIDI keyboard to record notes to the sequencer of the TQ5. As the TQ5 plays back songs, it can also play the voices of this instrument for a fuller, ensemble effect.
- The RX120 Digital Rhythm Programmer allows you to add realistic drum and percussion sounds to your MIDI music performance. Up to 20 different "songs" (percussion parts programmed in as many as 500 rhythm patterns to make up a complete song) can be recorded, using any of the RX's 38 realistic sampled sounds. Start and stop of playback can be controlled automatically from the TQ5, and of course the RX120 will play in perfect synchronization with the music data recorded in the TQ5.
- YME-8 MIDI Expander. With two MIDI IN and eight MIDI THRU terminals, this device allows you to control up to four different MIDI instruments simultaneously. In this case, the YME-8 is needed in order to send recorded MIDI data from the TQ5's sequencer to both the RX120 and the PF1500.
- MT2X Multitrack Cassette Recorder (with YMC2 MIDI Converter). This pair rounds out our studio system by giving you the chance to combine three tracks of tape recorded music with the eight tracks of music recorded on the TQ5, plus the rhythm track played by the RX120. For example, your eight track synthesizer composition (with voices played on both the TQ5 and the PF1500) can be accompanied by the actual drum sounds of the RX120, plus guitar, piano, and vocals recorded on the MT2X. And everything plays back in perfect syncronization.

In this system, the YMC2 converts the MIDI timing signals from the TQ5's sequencer into signals which can be recorded on track 4 of the tape. When recording these MIDI timing signals, set the Sync parameter of the Sequencer Cnd (condition) to "internal". On playback, reset the TQ5's Sync parameter to "MIDI." These signals ensure that the tape recorded music will always stay in time with the recorded sequencer tracks.

GLOSSARY

If the TQ5 happens to be the very first synthesizer you've ever owned or played, chances are that a few of the words in this manual are unfamiliar to you.

Let's say you're reading through a few pages of the manual, and the words "parameter," "polyphonic," and "pitch bend" shoot by in rapid succession. If your heart catches in fear or your brain suddenly shuts down at this point, then this section of the manual is for you!

The GLOSSARY will take you on a short guided tour of some of the TQ5's main functions and, at the same time, explain briefly and simply some synthesizer jargon.

Be sure to also take a look at the FM SYNTHESIS and MIDI AND MIDI APPLICATIONS sections, for more information and ideas.

USING THE SOUNDS OF THE TQ5

To play a synthesizer such as the TQ5, the first thing you need are sounds. The TQ5 is capable of making a wealth of sounds and sound effects, and we call each of these sounds **voices**. Expert sound engineers have designed hundreds of voices for the TQ5, and you can choose any one of them at any time because they are kept permanently (or temporarily, in some cases) in voice memory.

There are two main groups of voice memory:

Internal memory keeps voices within the synthesizer itself. Voices in internal memory can be selected any time you play the TQ5.

External memory keeps voices on devices outside the synthesizer. An example of external memory is the voice card, which allows you to, for example, play the same voices on your friend's TQ5 that you play on your own.

The internal memory of the TQ5 has two types: **Preset** and **User**.

Preset memory cannot be erased or changed; it is permanent.

User memory CAN be erased or changed. You can keep the voices that you create yourself in user memory.

External memory for the TQ5 is in the form of cards and also comes in two types: **ROM** cards and **RAM** cards.

ROM cards, just like Preset memory, are permanent and cannot be erased or changed.

RAM cards (MCD32 memory card, sold separately) are like User memory because you can change and erase voices on them.

SAVE, STORE, and LOAD

Save, Store, and **Load** are memory operations. You use these when you want to move voices between different memory types.

The **Save** operation (**SAVE, LOAD** button) is used to move a group of voices (100 voices per group) from internal memory to external memory. For example, when you have filled up the User memory with 100 of your own original voices and need more space, you can save those 100 voices to RAM card instantly by using the Save operation.

The **Store** operation (**STORE** button) is used to move only one voice between memory locations. Unlike Save above, you can move the voice within memory types as well as between them. You use this operation mainly to keep voices to User or Card memory just after editing them. You could also use this operation to change the order of User or Card voices.

The **Load** operation (**SAVE, LOAD** button) is the opposite of Save. It is used to move a group of voices (100 voices per group) from external memory to internal memory.

Use this when you want to put a new group of voices in the User memory.

PLAYING THE TQ5

The TQ5 is loaded with performance features that help you get the most out of its expressive synthesizer voices. Most MIDI devices can take advantage of these features through built-in **real-time controllers**, so-called because they can be used to control the sound while you are playing. (See the CONTROL Job in the SYNTHESIZER REFERENCE chapter for more about controllers.)
The TQ5 is not equipped itself with any real-time controllers (except for the VOLUME control), but it responds to a wide variety of controllers commonly found on MIDI keyboards and other devices.

Two very expressive real-time controllers that can be used with the TQ5 are the **pitch bend wheel** and the **modualtion wheel**.

The pitch bend wheel allows you to raise or lower the pitch of the instrument as you play it.

The modulation wheel allows you to control the amount of **modulation** (vibrato, tremolo, or wowwow effect) on a voice in real time. (**Vibrato** creates a wavering of the pitch of a sound, **Tremolo** creates a wavering of the volume, and **Wowwow** creates a wavering of the tone or brightness. These effects, by the way, are created by the **LFO** section of the TQ5. You can learn more about the LFO in the CHANGING THE LFO SETTINGS OF A VOICE section of the OPERATION BASICS chapter.)

Here are some other performance controllers you can use:

Breath Control — With the use of a properly equipped MIDI keyboard (including a breath controller) or a MIDI wind instrument (such as the WX7 Wind MIDI Controller), you can control the volume or the amount of LFO modulation by blowing into the mouthpiece.

Key Velocity — With this feature, the volume of the TQ5 changes depending on how hard or soft you play the connected keyboard, just as an acoustic piano does. This is also known as **Touch Sensitivity**.

Sustain Pedal — Holding the sustain pedal down as you play and release notes causes the notes to remain sounding as if you didn't release them.

After Touch — By pressing down on the connected keyboard after you play a note, you can make changes in the tone of the sound or in the amount of LFO modulation. The harder you press, the greater the change.

Each voice of the TQ5 can sound up to eight notes at a time. The eight simultaneous notes of the TQ5 can be played either **Polyphonically** or **Monophonically**. Polyphonic (or **Poly**) means that if eight notes are being played at once, all eight will be heard. This is the usual mode when playing piano or organ sounds. Monophonic (or Mono) play means that only the last played note will sound. This can be more realistic when playing sounds that are naturally monophonic, such as solo wind or brass instruments, since only one note will be heard at a time.

EDITING VOICES

Do you remember what we told you about User and Preset memory? That you CAN'T change Preset memory voices, and that you CAN change User memory voices? Well, that's not true. Not technically, that is.

The fact is, any voice — Preset or User — can be changed, but not within its memory location. To change the sound of a voice, you have to bring it to a special memory location in the TQ5 by selecting the voice, change it there, and then store it to User memory or RAM card. (Remember, you can't keep a new voice in preset memory or ROM; the voices kept there are permanent.)

When you do this, you are **editing** a voice. Making edits in a voice can involve anything from changing its name to changing its LFO setting.

When you edit a voice, you can only change one thing at a time. For example, if you edit the LFO setting, there are actually three parts of LFO you can change: Speed, Vibrato, and Tremolo. Each of these is called a **parameter**. A parameter is the a part or aspect of a voice that can be edited, and each voice has at least a dozen parameters.

And when you edit a parameter — the Speed parameter, for instance — you're changing the number that indicates the speed or, in other words, you're editing the **value** of the parameter.

VOICE AND SEQUENCER EDITING MODES AND PARAMETERS

All of the editing functions of the TQ5 are covered in clear explanations in both the OPERATION BASICS, SYNTHESIZER REFERENCE and SEQUENCER REFERENCE chapters, so please refer to those sections for information on specific modes and parameters.

ERROR MESSAGES

The TQ5 will display one of the following messages to indicate an unexpected event or an aborted operation. Make changes as suggested here and repeat the operation.

- All error messages appear on the bottom row of the display.

VOICE LOADING AND SAVING MESSAGES

```
*ERROR* Verify NG!-----Please try again!
```

This appears if a mistake was made during saving or loading. Removing a card while in the saving or loading process will result in this message. Try to save or load again.

```
*ERROR* Protect!---Reset memory protect!
```

This appears when internal memory protect or write protect switch of RAM is on when executing a saving or loading operation. This message will also result when MIDI data (including voice data) is received while internal memory protect is on. When memory protect (or write protect) is on, data cannot be saved or received. Set the memory protect (or write protect) to off and attempt the operation again. The exception to this is when receiving single voices from other MIDI instruments; in this case the voice is sent whether the memory protect is on or off and no error message will result.

- See CARD OPERATIONS in the OPERATION BASICS section and SAVE, LOAD AND STORE OPERATIONS in the SYNTHESIZER REFERENCE section for more information.

```
*ERROR* Format!------Please format card!
```

This message will appear when trying to save from or load to an unformatted card. This will also result when a card formatted to a system other than the TQ5 is used. Re-format the card for the TQ5.

- See CARD OPERATIONS in the OPERATION BASICS section and SAVE, LOAD AND STORE OPERATIONS in the SYNTHESIZER REFERENCE section for more information.

```
*ERROR* Not ready!---Please insert card!
```

This message will appear if a card has not been inserted properly when card voices are selected or when save, load or store operations are attempted. Insert the card securely into the slot.

MIDI RECEPTION AND TRANSMISSION MESSAGES

```
*ERROR* Check sum NG!--Please try again!
```

```
*ERROR* MIDI data error!------try again!
```

This will appear when MIDI data has not been received during a transfer operation. Try the operation again.

```
*ERROR* MIDI buffer full!-----try again!
```

This will appear when MIDI data has been received more quickly than can be handled. Try the operation again.

```
*ERROR* MIDI ch!-Please set Transmit ch!
```

This will appear when voice data is transmitted when the MIDI transmit channel is off. Set the MIDI transmit channel to a value other than OFF. (See MIDI CHANNEL in the SYNTHESIZER REFERENCE section.)

```
*ATTENTION* Pan data was ignored!
```

This message will appear if an effect setting is adjusted for a voice while that voice or any other in the Multi Mode arrangement has a pan setting. The pan setting(s) will be ignored in the Multi Mode when effects are used. (See EFFECT MODE in the SYNTHESIZER REFERENCE section.)

```
*ATTENTION* Effect data was ignored!
```

This message will appear if a pan setting of left or right is adjusted for a voice while that voice or any other in the Multi Mode arrangement has an effect setting. The effect setting(s) will be ignored in the Multi Mode when pan is used. (See PAN of the MULTI MODE FUNCTIONS in the SYNTHESIZER REFERENCE section.)

SPECIFICATIONS

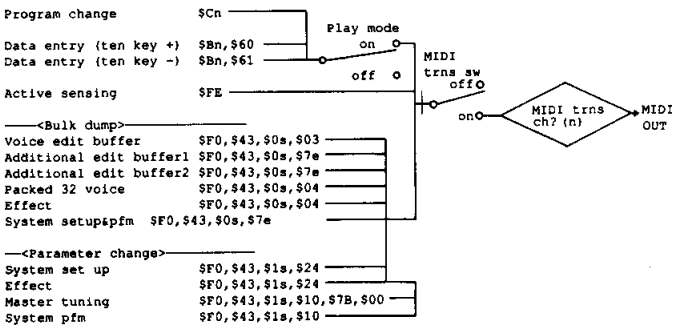
Sound Source:	FM (4-operator/8-algorithm), simultaneous 8 notes output
Internal Program RAM:	100 voice programs
Internal Program ROM:	100 voice programs
External Memory:	RAM/ROM card (32 kBytes), for programs (100 programs × 1 bank), for sequencer (to save 1 song bank to internal memory)
Display:	LCD: 40 characters × 2 lines
Controls:	Rotary Volume
Rear Panel Terminals:	Output × 2 (L/MONO, R) Phones × 1 MIDI IN × 1 MIDI OUT × 1 MIDI THRU × 1 DC15V IN
Dimensions (W × D × H):	280 × 235 × 70 mm (11-1/8" × 9-1/4" × 2-3/4")
Weight:	1.5 kg (3 lbs 5 oz)
Included Accessory:	PA-1505 adaptor (15V)

INDEX

MIDI DATA FORMAT

1. SYNTHESIZER

(1) Transmitting Conditions



(2) Transmitting Conditions

Transmits when the transmit channel is set to a value other than OFF.

2-1 Channel Information

(1) Channel Voice Message

1)CONTROL CHANGE

STATUS	1011nnnn	(Bn)	n=channel number
CONTROL No.	0ccccccc		
DATA	0vvvvvvv		

—— CONTROL NUMBER ——

C=96 Data entry switch inc v=127:on (play mode only)
C=97 Data entry switch dec v=127:on (play mode only)

2)PROGRAM CHANGE (play mode only)

STATUS	1100nnnn	(Cn)	n=channel number
PROGRAM No.	0ppppppp		p=0~99

2-2 System Information

(1) System Common Messages

Not transmitted.

(2) System Realtime Messages

ACTIVE SENSING CLOCK

STATUS	11111110	(FE)

(3) System Exclusive Messages

1)PARAMETER CHANGE

STATUS	11110000	(F0)	
ID No.	01000011	(43)	
SUB STATUS	0001ssss	(1s)	s=Transmit channel
GROUP NUMBER	0ggggghh		g=Group number h=Sub group number
PARAMETER No.	0ppppppp		
DATA	0ddddddd		
DATA	0ddddddd		
EOX	11110111	(F7)	

This is a list of the parameter group numbers and parameter numbers of the 4 types.

Type	g	h	p	Data bit number
SYSTEM SET UP	9	0	1~3,7	1
SYSTEM PFM	4	0	0~95	1
EFFECT	9	0	88~90	1
MASTER TUNING	4	0	123	2

2)BULK DUMP

STATUS	11110000	(F0)	
ID No.	01000011	(43)	
SUB STATUS	0000ssss	(0s)	s=Transmit channel
GROUP NUMBER	0fffffff		f=Format number
BYTE COUNT(MSB)	0bbbbbbb		
BYTE COUNT(LSB)	0bbbbbbb		
DATA	0ddddddd		
	0ddddddd		
CHECK SUM	0eeeeeee		
EOX	11110111	(F7)	

This is a list of the format numbers of the 2 types.

Type	f	Byte count
VOICE EDIT BUFFER	3	93
PACKED 32 VOICE	4	4096

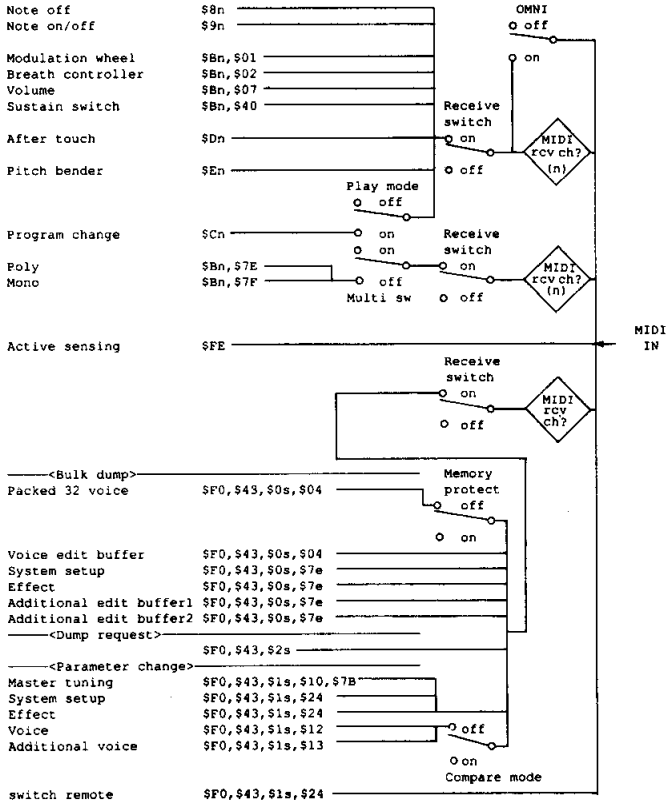
3)UNIVERSAL BULK DUMP

STATUS	11110000	(F0)	
ID No.	01000011	(43)	
SUB STATUS	0000ssss	(0s)	s=Transmit channel
GROUP NUMBER	01111110	(7E)	
BYTE COUNT(MSB)	0bbbbbbb		
BYTE COUNT(LSB)	0bbbbbbb		
CLASIFICATION-NAME	0aaaaaaa	ASCII'L	
	0aaaaaaa	ASCII'M	
	0aaaaaaa	ASCII'_	
	0aaaaaaa	ASCII'_	
DATA FORMAT-NAME	0mmmmmmm	ASCII	
	0mmmmmmm		
DATA	0ddddddd		
	0ddddddd		
CHECK SUM	0eeeeeee		
EOX	11110111	(F7)	

This is a list of the formats of 4 type.

Type	b	a	m
SYSTEM SETUP & PFM	100	LM_ _	8036S_
EFFECT	3	LM_ _	EFEDS_
Additional Edit Buffer1	23	LM_ _	8976AE
Additional Edit Buffer2	10	LM_ _	8023AE

(3) Receiving Condition



(4) Reception Data

4-1 Channel Information

There are 8 MIDI reception channels, from INST 1 to INST 8, when MULTI is ON.

(1) Channel Voice Messages

1)KEY OFF

STATUS	1000nnnn	(8n)	n=channel number
NOTE No.	0kkkkkkk		k=0(C-2)~127(G8)
VELOCITY	0vvvvvvv		v is ignored

2)KEY ON/OFF

STATUS	1001nnnn	(9n)	n=channel number
NOTE No.	0kkkkkkk		k=0(C-2)~127(G8)
VELOCITY	0vvvvvvv	(v=0)	KEY ON
	00000000	(v=0)	KEY OFF

3)CONTROL CHANGE

STATUS	1011nnnn	(Bn)	n=channel number
CONTROL No.	0ccccccc		
CONTROL VALUE	0vvvvvvv		

—— CONTROL NUMBER ————

C=1	Modulation wheel	v=~127
C=2	Breath controller	v=~127
C=7	Volume	v=~127
C=64	Sustain switch	v=0:off,127:on

4)PROGRAM CHANGE (play mode only)

STATUS	1100nnnn	(Cn)	n=channel number
PROGRAM No.	0ppppppp		p=0~127

Selection of CARD/PRESET/USER can be done only from the front panel switches.
p=100~127 are received as 0~27.

5)AFTER TOUCH

STATUS	1101nnnn	(Dn)	n=channel number
VALUE	0vvvvvvv		v=0~127

6)PITCH BENDER

STATUS	1110nnnn	(En)	n=channel number
VALUE (LSB)	0uuuuuuu		
VALUE (MSB)	0vvvvvvv		

Only data of the MSB side are active.

Resolution: 7bit

MSB	
0000 0000 (00)	minimum value
0100 0000 (40)	middle value
0111 1111 (7F)	maximum value

(2) Channel Mode Messages
Not received when MULTI is ON.
OMNI switch is not available.

1)MONO/ALL NOTE OFF

STATUS	1011nnnn	(Bn)	n=channel number
CONTROL No.	01111111	(7E)	
CONTROL VALUE	0mmmmmmm		Only m=1 is recognized and sets MONO MODE.
			Ignored when m=1

2)POLY/ALL NOTE OFF

STATUS	1011nnnn	(Bn)	n=channel number
CONTROL No.	01111110	(7F)	
CONTROL	00000000		

4-2 System Information
(1) System Common Messages
Not transmitted.

(2) System Realtime Messages

ACTIVE SENSING CLOCK

STATUS	11111110	(FE)

Sensing starts once this code is received. When neither status nor data are detected for longer than 300 msec., the MIDI receiving buffer will be cleared and all currently sounding voices and sustain switch data will be set to OFF. Also after touch, foot volume, modulation wheel and pitch bend data will be initialized.

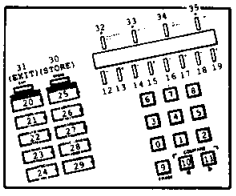
(3) System Exclusive Messages

INST 1 channel receives when MULTI is ON.

1)PARAMETER CHANGE SWITCH REMOTE

STATUS	11110000	(F0)
ID No.	01000011	(43)
SUB STATUS	0001ssss	(1s)
GROUP NUMBER		(24)
PARAMETER No.	0ppppppp	p=switch number+91(91~127)
DATA	0ddddddd	d=0:off,d=127:on
EOX	11110111	(F7)

This is received regardless of the Receive sw/channel setting.
Switch numbers correspond to the positions indicated on the chart below.
p=127 is power on reset.



The following messages are received when Receive channels match.

3)PARAMETER CHANGE

STATUS	11110000	(F0)	
ID No.	01000011	(43)	
SUB STATUS	0001ssss	(1s)	s=Receive channel
GROUP NUMBER	0ggggghh		g=Group number h=sub group number
PARAMETER No.	0ppppppp		
DATA	0ddddddd		
DATA	0ddddddd		
EOX	11110111	(F7)	

This is a list of the parameter group numbers and parameter numbers of the 6 types.

Type	g	h	p	Data byte number
VOICE	4	2	0~93	1
ADDITIONAL VOICE	4	3	0~26	1
EFFECT	9	0	4~6	1
SYSTEM SET UP	9	0	1~3,7	1
SYSTEM PFM	4	0	0~95	1
MASTER TUNING	4	0	123	2

4)BULK DUMP
Same as transmission.

5)UNIVERSAL BULK DUMP
Same as transmission.

6)DUMP REQUEST

VOICE EDIT BUFFER		(f=3)	┐
PACKED 32VOICE		(f=4)	
NSEQ SEQUENCE		(f=A)	┘
STATUS	11110000	(F0)	
ID No.	01000011	(43)	
SUB STATUS	0010ssss	(2s)	s=Receive channel
GROUP NUMBER	0fffffff		f=FormatNo.(3,4,10)
EOX	11110111	(F7)	

7)UNIVERSAL BULK DUMP REQUEST

STATUS	11110000	(F0)	
ID No.	01000011	(43)	
SUB STATUS	0010ssss	(2s)	s=Receive channel
GROUP NUMBER	01111110	(7E)	
CLASIFICATION-NAME	0aaaaaaa	ASCII'L	
	0aaaaaaa	ASCII'M	
	0aaaaaaa	ASCII'_	
	0aaaaaaa	ASCII'_	
DATA FORMAT-NAME	0mmmmmmm 0mmmmmmm	ASCII	
EOX	11110111	(F7)	

This is a list of the formats of 4 types.

Type	a	m
ACED + VCED	LM__	8976AE
ACED2 + ACED +VCED	LM__	8023AE
EFEDS + ACED2 + ACED +VCED	LM__	8036EF
EFEDS + SYSTEM SETUP	LM__	8036S_

< Attached list 1 >

Parameters indicated as %%% in the list are of common format with the DX11, but they do not function with TQ5.

Parameter list of parameter change and bulk

*** VCED *** 93 byte voice edit parameter (1 bulk edit format)
para. cng g=4, h=2

VCED address (para.cng)		b7	b6	b5	b4	b3	b2	b1	b0		
edit	0	0	0	0	——	AR	——			1-31	
	1	0	0	0	——	D1R	——			0-31	
	2	0	0	0	——	D2R	——			0-31	
	3	0	0	0	0	——	RR	——		1-15	
	4	0	0	0	0	——	D1L	——		0-15	
	5	0	——	——	LS	——	——	——		0-99	
	6	0	0	0	0	0	0	-RS—		0-3	OP.4
	7	0	0	0	0	0	——	EBS—		0-7	
	8	0	0	0	0	0	0	0	AME	0-1	
	9	0	0	0	0	0	—	KVS—		0-7	
	10	0	——	——	OUT	——	——	——		0-99	
	11	0	0	——	——	CRS	——	——		0-63	(RATIO)
		0	0	—	CRS	——	x	x		0-63	(FIX)
	12	0	0	0	0	0	—DET	—		0-6	(center=3)
	13										
	.										OP.2
	.										
	26										
	.										OP.3
	.										
	39										
	.										OP.1
	.										

```
*                  52    0  0  0  0  0 --ALG--    0-7                    *
*                  53    0  0  0  0  0 --FBL--    0-7                    *
*                  54    0 ------ LFS ------     0-99                   *
*                  55    0 --  LFD  ----------   0-99                   *
*                  56    0 --  PMD  ----------   0-99                   *
*                  57    0 --  AMD  ----------   0-99                   *
*                  58    0  0  0  0  0  0  0 SY  0-1  LFO SYNC          *
*                  59    0  0  0  0  0  0 -LFW-  0-3                    *
*                  60    0  0  0  0  0 --PMS--   0-7                    *
*                  61    0  0  0  0  0  0 -AMS-  0-3                    *
*                  62    0  0 ------ TRPS ------  0-48   (center=24)    *
*                                                                       *
*                                                                       *
*      function    63    0  0  0  0  0  0  0 MO  : MONO                 *
*                  64    0  0  0  0 ------ PBR --  0-12                 *
*                  65    0  0  0  0  0  0  0 PM  : PORMOD               *
*            %%%   66    0 ---------- PORT ----------  0-99             *
*                  67    0 ---------- FC VOL ------    0-99             *
*            %%%   68    0  0  0  0  0  0  0 SU  0-1 sus.(F.SW)         *
*            %%%   69    0  0  0  0  0  0  0 PO  0-1 por.(F.SW)         *
*            %%%   70    0  0  0  0  0  0  0 CH  0-1 chorus  set 0      *
*                  71    0 ------ MW PITCH ------    0-99               *
*                  72    0 ------ MW AMPLI ------    0-99               *
*                  73    0 ------ BC PITCH ------    0-99               *
*                  74    0 ------ BC AMPLI ------    0-99               *
*                  75    0 ------ BC P BIAS ------   0-100  (center0=50) *
*                  76    0 ------ BC E BIAS ------   0-99               *
*                  77    0 ---- VOICE NAME  1 ----   32-127             *
*                  78    0 ---- VOICE NAME  2 ----                      *
*                  79    0 ---- VOICE NAME  3 ----                      *
*                  80    0 ---- VOICE NAME  4 ----                      *
*                  81    0 ---- VOICE NAME  5 ----                      *
*                  82    0 ---- VOICE NAME  6 ----                      *
*                  83    0 ---- VOICE NAME  7 ----                      *
*                  84    0 ---- VOICE NAME  8 ----                      *
*                  85    0 ---- VOICE NAME  9 ----                      *
*                  86    0 ---- VOICE NAME 10 ----                      *
*                                                                       *
*            %%%   87    0 ---------- PR1 ----------  0-99  PEG         *
*            %%%   88    0 ---------- PR2 ----------  0-99               *
*            %%%   89    0 ---------- PR3 ----------  0-99               *
*            %%%   90    0 ---------- PL1 ----------  0-99   (center=50) *
*            %%%   91    0 ---------- PL2 ----------  0-99               *
*            %%%   92    0 ---------- PL3 ----------  0-99               *
*                                                                       *
```

*** parameter change only ***

nn (para.no)	b7	b6	b5	b4	b3	b2	b1	b0	dd (value)	comment
93	0	0	0	0	OP1	OP2	OP3	OP4	0-1	op. on(1)/off(0)

*** ACED *** 23 byte additional parameters (1 bulk edit format)
para. cng g=4, h=3

NO.	(para)	b7	b6	b5	b4	b3	b2	b1	b0	Data	note
0	0	0	0	0	0	0	0	0	FIX	0-1	OP.4
1	1	0	0	0	0	0	FIXRG			0-7	0(255Hz)-7(32KHz)
2	2	0	0	0	0	FINE				0-15	(7:F=0-3)
3	3	0	0	0	0	0	OSW			0-7	
4	4	0	0	0	0	0	0	EGSFT		0-3	0(off)-3(12dB)
5	5										OP.2
10	10										OP.3
15	15										OP.1
19	19								0(off)		
20	20	0	0	0	0	0	REV			0-7	0(off),7(first)
21	21	0	FC PITCH							0-99	
22	22	0	FC AMPLI							0-99	

*** ACED2 *** 10 byte additional parameter 2 for V2
para. cng g=4, h=3

NO.	para.No	b7	b6	b5	b4	b3	b2	b1	b0	Data	note
0	23	0	AT PITCH							0-99	
1	24	0	AT AMPLI							0-99	
2	25	0	AT P.BIAS							0-100	center 0 = 50
3	26	0	AT EG BIAS							0-99	
4	27	0	reserved								
5	28	0	reserved								
6	29	0	reserved								
7	30	0	reserved								
8	31	0	reserved								
9	32	0	reserved								

*** EFEDS *** 3 byte effect parameter for YS
para. cng g=9, h=0

NO.	para.No	b7	b6	b5	b4	b3	b2	b1	b0	Data	note
0	4	0	0	0	0	EFFECT PRESET No.				0-10	
1	5	0	0	EFFECT TIME						0-40	
2	6	0	EFFECT BALANCE							0-99	

*** remote switch ***
para. cng g=9, h=0

g	h	p	switch
9	0	91	ten key 1
		92	ten key 2
		93	ten key 3
		94	ten key 4
		95	ten key 5
		96	ten key 6
		97	ten key 7
		98	ten key 8
		99	ten key 9
		100	ten key 0
		101	ten key -
		102	ten key +
		103	left -
		104	left +
		105	left center -
		106	left center +
		107	right center -
		108	right center +
		109	right -
		110	right +
		111	eg
		112	tone
		113	lfo
		114	effect
		115	name
		116	card
		117	user
		118	preset
		119	sv,ld
		120	job
		121	store
		122	exit
		123	seq/play
		124	rec
		125	stop/cont.
		126	start
		127	power on reset

<Attached list 2 >

Detail of Bulk Dump Format

★ VCED
f = 3
data size = 93 ($005D)
data format = 7bit binary
total bulk size = 93+8 = 101

f0,43,0n,03,00,5D,<VCED data>,sum,f7

★ VMEM
f = 4
data size = 128x32 = 4096 ($1000)
data format = 7bit binary
total bulk size = 4096+8 = 4104

f0,43,0n,04,20,00,<VMEM data>,sum,f7

★ ACED
f = 126 LM__8976AE
data size = 23+10 = 33 ($0021)
data format = 7bit binary
total bulk size = 33+8 = 41

f0,43,0n,7e,00,21,LM__8976AE,<ACED data>,sum,f7

★ ACED2
f = 126 LM__8023AE
data size = 10+10 = 20 ($0014)
data format = 7bit binary
total bulk size = 20+8 = 28

f0,43,0n,7e,00,14,LM__8023AE,<ACED2 data>,sum,f7

★ EFEDS
f = 126 LM__8036EF
data size = 3+10 = 13 ($000D)
data format = 7bit binary
total bulk size = 13+8 = 21

f0,43,0n,7e,00,0D,LM__8036EF,<EFEDS data>,sum,f7

★ SYSTEM SETUP + PFM
f = 126 LM__8036S_

data size = 10+100 = 110 ($006E)
data format = 7bit binary
total data size = 110+8 = 118

f0,43,0n,7e,00,62,LM__8036S_,<system data>,sum,f7

<Attached list 3 >

*** VMEM *** 128 byte (91 byte is used) voice data (memory format)

	adrress	b7	b6	b5	b4	b3	b2	b1	b0	dd (value)	comment
	0	0	0	0	———	AR	———			1-31	
	1	0	0	0	———	D1R	———			0-31	
	2	0	0	0	———	D2R	———			0-31	
	3	0	0	0	0	———	RR	———		1-15	
	4	0	0	0	0	———	D1L	———		0-15	OP.4
	5	0	———	———	———	LS	———	———		0-99	
	6	0	AME	———	EBS	———	———	KVS	———	0-1,0-7,0-7	
	7	0	———	———	———	OUT	———	———		0-99	
	8	0	0	———	———	CRS	———	———		0-63 (RATIO)	
		0	0	———	CRS	———	x	x		0-63 (FIX)	
	9	0	0	0	———	RS	———	DET	———	0-3,0-6	
	10										
	.										OP.2
	.										
	20										
	.										OP.3
	.										
	30										
	.										OP.1
	.										
	40	0	SY	———	FBL	———	———	ALG	———	0-1,0-7,0-7	
	41	0	———	———	———	LFS	———	———		0-99	
	42	0	———	———	———	LFD	———	———		0-99	
	43	0	———	———	———	PMD	———	———		0-99	
	44	0	———	———	———	AMD	———	———		0-99	
	45	0	———	PMS	———	-AMS	———	-LFW	———	0-7,0-3,0-3	
	46	0	0	———	———	TRPS	———	———		0-48	
	47	0	0	0	0	———	PBR	———		0-12	
	48	0	0	0	CH	MO	SU	PO	PM	0-1,0-1,0-1,0-1,0-1	
***	49	0	———	———	———	PORT	———	———		0-99	
	50	0	———	———	———	FC VOL	———	———		0-99	
	51	0	———	———	———	MW PITCH	———	———		0-99	
	52	0	———	———	———	MW AMPLI	———	———		0-99	
	53	0	———	———	———	BC PITCH	———	———		0-99	
	54	0	———	———	———	BC AMPLI	———	———		0-99	
	55	0	———	———	———	BC P BIAS	———	———		0-100	
	56	0	———	———	———	BC E BIAS	———	———		0-99	
	57	0	———	VOICE	NAME	1	———	———		32-127	
	58	0	———	VOICE	NAME	2	———	———			
	59	0	———	VOICE	NAME	3	———	———			
	60	0	———	VOICE	NAME	4	———	———			
	61	0	———	VOICE	NAME	5	———	———			
	62	0	———	VOICE	NAME	6	———	———			
	63	0	———	VOICE	NAME	7	———	———			
	64	0	———	VOICE	NAME	8	———	———			
	65	0	———	VOICE	NAME	9	———	———			
	66	0	———	VOICE	NAME	10	———	———			
***	67	0	———	———	———	PR1	———	———		0-99	
***	68	0	———	———	———	PR2	———	———		0-99	
***	69	0	———	———	———	PR3	———	———		0-99	
***	70	0	———	———	———	PL1	———	———		0-99	
***	71	0	———	———	———	PL2	———	———		0-99	
***	72	0	———	———	———	PL3	———	———		0-99	

*** VMEM ***

No.	b7	b6	b5	b4	b3	b2	b1	b0	Data	note
0 . . . 67	same as DX21 VMEM									
	PEG PR1									
. 72	. PEG PL3									
73	0	0	-EGSFT-		FIX	———	FIXRG	———		OP.4
74	0	———	OSW	———	———	———	FINE	———		
75										OP.2
77										OP.3
79										OP.1
81	0	0	0	0	0	———	REV	———		FUNCTION
82	0	———	———	———	FC PITCH	———	———			
83	0	———	———	———	FC AMPLI	———	———			

*** VMEM for V2 ***

No.	b7	b6	b5	b4	b3	b2	b1	b0	Data	note
84	0	———	———	———	AT PITCH	———	———			
85	0	———	———	———	AT AMPLI	———	———			
86	0	———	———	———	AT P.BIAS	———	———			center=0
87	0	———	———	———	AT EG BIAS	———	———			
88-90	0	0	0	0	0	0	0	0		

*** VMEM for Y5 ***

No.	b7	b6	b5	b4	b3	b2	b1	b0	Data	note
91	0	0	0	0	EFFECT PRESET No.				0-10	
92	0	0	———	———	EFFECT TIME	———	———		0-40	
93	0	———	EFFECT BALANCE	———	———				0-99	
94-127	0	0	0	0	0	0	0	0		

note) AT P.BIAS data 0,,,,,,49,50,51,,,,,,100
LCD -50,,,,-1, 0,+1,,,,,,+50
MIDI 51,,,,,100,0,+1,,,,,,+50

*** SYSTEM SETUP *** 100 byte sytem set up
para. cng g=4, h=0

No.	para	b7	b6	b5	b4	b3	b2	b1	b0	Data	note
0	123,0	0	———	———	———	TUNE	———	———	———	0-127	master tune center=64

para. cng g=9, h=0

1	1	0	0	0	———	MIDBCH	———			0-16	basic rcv ch 16:omni,17:off
2	2	0	0	0	0	———	MIDTCH	———		0-15	trans ch,16:off
3	3	0	0	0	0	0	0	0	MLOCK	0-1	mem. protect

para. cng g=4, h=0

4	0	0	0	0	0	———	NUM of NOTE	———		0-8	INST1
5	1	0	0	0	0	0	0	Mem type		0-2	0:preset,1:user,2:card
6	2	0	———	———	Voice Number	———	———			0-99	
7	3	0	0	0	———	Recv. ch	———			0-16	16(omni)
8	4	0	———	———	———	LIMIT/L	———	———		0-127	0(C-2)-127(G8)
9	5	0	———	———	———	LIMIT/H	———	———		0-127	
10	6	0	0	0	0	———	DETUNE	———		0-14	7(center)
11	7	0	0	———	NOTE SHIFT	———	———			0-48	24 (center)
12	8	0	———	———	VOLUME	———	———			0-99	
13	9	0	0	0	0	0	0	OUT_ASGN		0-3	0(off),1(I),2(II),3(I II)
14	10	0	0	0	0	0	0	LFO SEL		0-3	0(off),1(I),2(II),3(vib)
15	11	0	0	0	0	0	0	0	0	0	reserved
16	12										INST2
.											
28	24										INST3
.											
40	36										INST4
.											
52	48										INST5
.											
64	60										INST6
.											
76	72										INST7
.											
88	84										INST8
.											
99	95										

para. cng (only)g=9, h=0

7	0	0	0	0	0	0	bulk block	0-4	midi bulk block

<Attached list 4 >

Dump Request Messages

★ VCED f0,43,2n,03,f7

★ VMEM f0,43,2n,04,f7

★ ACED + VCED f0,43,2n,7e,LM__8976AE,f7

★ ACED2 + ACED + VCED f0,43,2n,7e,LM__8023AE,f7

★ EFEDS + ACED2 + ACED + VCED f0,43,2n,7e,LM__8036EF,f7

★ EFEDS + system setup f0,43,2n,7e,LM__8036S_,f7

note) Ascii number HEX

★ LM__8976AE 4c,4d,20,20,38,39,37,36,41,45

★ LM__8023AE 4c,4d,20,20,38,30,32,33,41,45

★ LM__8036EF 4c,4d,20,20,38,30,33,36,45,46

★ LM__8036S_ 4c,4d,20,20,38,30,33,36,53,20

<Attached list 5 >

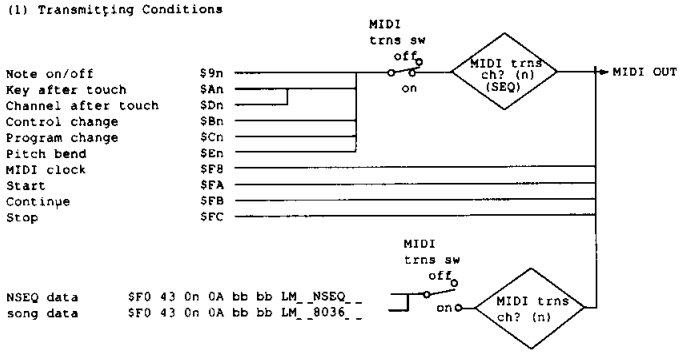
parameter change No. List

<<< $F0,$43,$1n,... >>>

VCED	$12(g=4,h=2),p=0-92,93
ACED	$13(g=4,h=3),p=0-22
ACED2(V2)	$13(g=4,h=3),p=23-33
SYS(sw remote)	$24(g=9,h=0),p=91-127
SYS(setup)	$24(g=9,h=0),p=0-7
SYS(pfm)	$10(g=4,h=0),p=0-95
MASTER TUNING	$10(g=4,h=0),p=123

2. SEQUENCER

(1) Transmitting Conditions



(2)Transmission Data

2-1 Channel Information
Data is trnasmitted only during play and overdubbing.

(1) Channel Voice Messages

(1.1)KEY ON/OFF

STATUS	1001nnnn	(9n)	n=channel number
NOTE No.	0kkkkkkk		k=1(C#-2)~111(D#7)
VELOCITY	0vvvvvvv	(v≠0)	KEY ON
VALUE	00000000	(v=0)	KEY OFF

(1.2)POLYPHONIC AFTER TOUCH

STATUS	1010nnnn	(An)	n=channel number
NOTE No.	0kkkkkkk		k=1(C#-2)~127(G8)
VALUE	0vvvvvvv		v=0~127

(1.3)CONTROL CHANGE

STATUS	1011nnnn	(Bn)	n=channel number
CONTROL No.	0ccccccc		c=0~121
CONTROL VALUE	0vvvvvvv		

(1.4)PROGRAM CHANGE

STATUS	1100nnnn	(Cn)	n=channel number
PROGRAM No.	0ppppppp		p=0~99

(1.5)AFTER TOUCH

STATUS	1101nnnn	(Dn)	n=channel number
VALUE	0vvvvvvv		v=0~127

(1.6)PITCH BENDER

STATUS	1110nnnn	(En)	n=channel number
VALUE (LSB)	0uuuuuuu		
VALUE (MSB)	0vvvvvvv		

2-2 System Information

(1) System Realtime Messages

(1.1)TIMING CLOCK

STATUS	11111000	(F8)

(1.2)START

STATUS	11111001	(F9)

(1.3)CONTINUE

STATUS	11111010	(FA)

(1.4)STOP

STATUS	11111011	(FB)

(2) System Exclusive Messages

(2.1)SEQUENCE DUMP

STATUS	11110000	(F0)	
ID No.	01000011	(43)	
SUB STATUS	0000ssss	(0s)	s=Transmit channel
GROUP NUMBER	00001010	(0A)	
BYTE COUNT(MSB)	0bbbbbbb		
BYTE COUNT(LSB)	0bbbbbbb		
CLASIFICATION-	01001100	ASCII'L	
NAME	01001101	ASCII'M	
	00100000	ASCII'_	
	00100000	ASCII'_	
DATA FORMAT-	01001110	ASCII'N	
NAME	01010011	ASCII'S	
	01000101	ASCII'E	
	01010001	ASCII'Q	
	00100000	ASCII'_	
	00100000	ASCII'_	
DATA	0ddddddd		
	0ddddddd		
CHECK SUM	0eeeeeee		
EOX	11110111	(F7)	

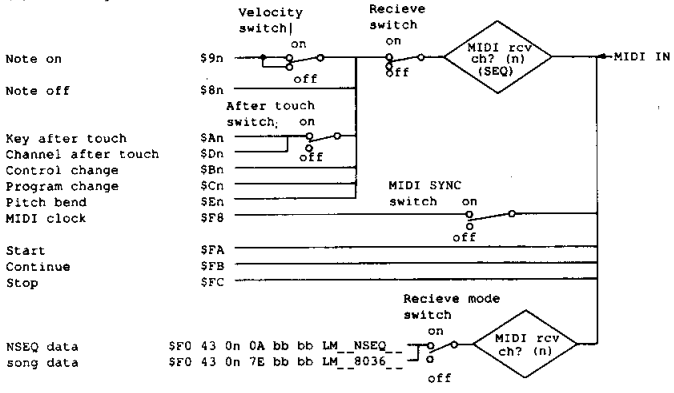
Transmitted on the transmission channel of synthesizer mode.
Transmitted when MIDI BULK "OUT" is executed in sequencer mode.

(2.2)UNIVERSAL BULK DUMP (Song data)

STATUS	11110000	(F0)	
ID No.	01000011	(43)	
SUB STATUS	0000ssss	(0s)	s=Transmit channel
GROUP NUMBER	01111110	(7E)	
BYTE COUNT(MSB)	0bbbbbbb		
BYTE COUNT(LSB)	0bbbbbbb		
CLASIFICATION-	0aaaaaaa	ASCII'L	
NAME	0aaaaaaa	ASCII'M	
	0aaaaaaa	ASCII'_	
	0aaaaaaa	ASCII'_	
DATA FORMAT-	00111000	ASCII'8	
NAME	00110000	ASCII'0	
	00110011	ASCII'3	
	00110110	ASCII'6	
	00100000	ASCII'_	
	00100000	ASCII'_	
DATA	0ddddddd		
	0ddddddd	38 bytes	
CHECK SUM	0eeeeeee		
EOX	11110111	(F7)	

Transmitted on the transmission channel of synthesizer mode.
Transmitted when MIDI BULK "OUT" is executed in sequencer mode.

(3) Receiving Condition



(4) Reception Data

4-1 Channel Information
Data is received only during recording.

(1) Channel Voice Messages

(1.1)KEY ON/OFF

STATUS	1001nnnn	(9n)	n=channel number
NOTE No.	0kkkkkkk		k=1(C#-2)~111(D#7)
VELOCITY	0vvvvvvv	(v≠0)	KEY ON
VALUE	00000000	(v=0)	KEY OFF

(1.2)POLYPHONIC AFTER TOUCH

STATUS	1010nnnn	(An)	n=channel number
NOTE No.	0kkkkkkk		k=1(C#-2)~127(G8)
VALUE	0vvvvvvv		v=0~127

(1.3)CONTROL CHANGE

STATUS	1011nnnn	(Bn)	n=channel number
CONTROL No.	0ccccccc		c=0~121
CONTROL VALUE	0vvvvvvv		

(1.4)PROGRAM CHANGE

STATUS	1100nnnn	(Cn)	n=channel number
PROGRAM No.	0ppppppp		p=0~99

(1.5)AFTER TOUCH

STATUS	1101nnnn	(Dn)	n=channel number
VALUE	0vvvvvvv		v=0~127

(1.6)PITCH BENDER

STATUS	1110nnnn	(En)	n=channel number
VALUE (LSB)	0uuuuuuu		
VALUE (MSB)	0vvvvvvv		

4-2 System Information

(1) System Realtime Messages

(1.1) TIMING CLOCK

STATUS	11111000	(F8)

(1.2) START

STATUS	11111001	(F9)

(1.3) CONTINUE

STATUS	11111010	(FA)

(1.4) STOP

STATUS	11111011	(FB)

(2) system Exclusive Messages

(2.1) SEQUENCE DUMP

STATUS	11110000	(F0)	
ID No.	01000011	(43)	
SUB STATUS	0000ssss	(0s)	s=Receive channel
GROUP NUMBER	00001010	(0A)	
BYTE COUNT(MSB)	0bbbbbbb		
BYTE COUNT(LSB)	0bbbbbbb		
CLASIFICATION-	01001100	ASCII'L	
NAME	01001101	ASCII'M	
	00100000	ASCII'_	
	00100000	ASCII'_	
DATA FORMAT-	01001110	ASCII'N	
NAME	01010011	ASCII'S	
	01000101	ASCII'E	
	01010001	ASCII'Q	
	00100000	ASCII'_	
	00100000	ASCII'_	
DATA	0ddddddd		
	0ddddddd		
CHECK SUM	0eeeeeee		
EOX	11110111	(F7)	

Received on the reception channel of synthesizer mode.
Received only when MIDI BULK "IN" is executed in sequencer mode.

(2.2) UNIVERSAL BULK DUMP (Song data)

STATUS	11110000	(F0)	
ID No.	01000011	(43)	
SUB STATUS	0000ssss	(0s)	s=Receive channel
GROUP NUMBER	01111110	(7E)	
BYTE COUNT(MSB)	0bbbbbbb		
BYTE COUNT(LSB)	0bbbbbbb		
CLASIFICATION-	0aaaaaaa	ASCII'L	
NAME	0aaaaaaa	ASCII'M	
	0aaaaaaa	ASCII'_	
	0aaaaaaa	ASCII'_	
DATA FORMAT-	00111000	ASCII'8	
NAME	00110000	ASCII'0	
	00110011	ASCII'3	
	00110110	ASCII'6	
	00100000	ASCII'_	
	00100000	ASCII'_	
DATA	0ddddddd		
	0ddddddd	38 bytes	
CHECK SUM	0eeeeeee		
EOX	11110111	(F7)	

Received on the reception channel of synthesizer mode.
Received only when MIDI BULK "IN" is executed in sequencer mode.

< Attached list 1 >

• NSEQ DATA FORMAT

NSEQ data for one song consists of multiple tracks, each track beginning with F0h (on) (N=track number), and ending with F2h. If a track is empty, that track is not included. Between the F0h and F2h are time/event/control data bytes as follows.

hex	description
F0	top of track #1
00	
--	time/event/control data
--	
F2	end of record
--	
--	track #2 ~ #7 data
--	
F0	top of track #8
07	
--	time/event/control data
--	
F2	end of record

NSEQ time/event/control data format (binary)

short time	0ttttttt	(length in 384th notes)
long time	0ttttttt 0ttttttt	(in order of MS byte, LS byte)
short note	10dddddd 0kkkkkkk 0vvvvvvv	
long note	110ddddd 0ddddddd 0kkkkkkk 0vvvvvvv	
short note	10dddddd 1kkkkkkk	(when velocity=$40)
long note	110ddddd 0ddddddd 1kkkkkkk	(when velocity=$40)

ddd = duration (length in 96th notes)
kkk = MIDI note number
vvv = MIDI velocity

measure mark	11110101	(measure mark)
no operation	11111000	(does nothing)

(Except for MSB, the following are the same format as MIDI)

poly a.touch	11111010 0kkkkkkk 0vvvvvvv	
control change	11111011 0ccccccc 0vvvvvvv	
program change	11111100 0ppppppp	
channel a.touch	11111101 0vvvvvvv	
pitch bend	11111110 0vvvvvvv 0vvvvvvv	

<Attached list 2 >

• SONG DATA FORMAT

Song data consists of max notes, voice bank, voice select, and tempo, effect, beat (time signature) and song name, in the following format.

count	hex	description		
0	00	max notes	of tr1	(0~7)
1	01	voice bank	of tr1	(0~2)
2	02	voice select	of tr1	(0~99)
3	03	max notes	of tr2	
4	04	voice bank	of tr2	
5	05	voice select	of tr2	
6	06	max notes	of tr3	
7	07	voice bank	of tr3	
8	08	voice select	of tr3	
9	09	max notes	of tr4	
10	0A	voice bank	of tr4	
11	0B	voice select	of tr4	
12	0C	max notes	of tr5	
13	0D	voice bank	of tr5	
14	0E	voice select	of tr5	
15	0F	max notes	of tr6	
16	10	voice bank	of tr6	
17	11	voice select	of tr6	
18	12	max notes	of tr7	
19	13	voice bank	of tr7	
20	14	voice select	of tr7	
21	15	max notes	of tr8	
22	16	voice bank	of tr8	
23	17	voice select	of tr8	
24	18	effect number		(1~10)
25	19	effect time		
26	1A	effect balance		
27	1B	song name 1		(ASCII)
28	1C	song name 2		
29	1D	song name 3		
30	1E	song name 4		
31	1F	song name 5		
32	20	song name 6		
33	21	song name 7		
34	22	song name 8		
35	23	tempo		(60~180)
36	24	time signature		(0=1/4,1=2/4,2=3/4,,,10=7/8,11=8/8)
37	25	(reserved)		

total 38 ($26) bytes

YAMAHA [Tone generator---synthesizer part] Date : 10/08, 1988
Model TQ5 MIDI Implementation Chart Version : 1.0

Function ...		Transmitted	Recognized	Remarks
Basic	Default	1 - 16	1 - 16	memorized
Channel	Changed	1 - 16	1 - 16	
Mode	Default		1, 2, 3, 4	memorized
	Messages	x	POLY, MONO(M=1)	single mode only
	Altered	**********	x	
Note Number		x	0 - 127	
	True voice	**********	12 - 107	
Velocity	Note ON	x	o v=1-127	
	Note OFF	x	x	
After Touch	Key's	x	x	
	Ch's	x	o	
Pitch Bender		x	o 0-12 semi	7 bit resolution
Control Change	1	x	o	Modulation wheel
	2	x	o	Breath control
	7	x	o	Volume
	64	x	o	Sustain
	96	o	x	Data entry +1
	97	o	x	Data entry -1 (Play mode only)
Prog Change	True #	o 0 - 99 **********	o 0 - 127 *1 0 - 99	
System Exclusive		o	o	Voice parameters
System Common	Song Pos	x	x	
	Song Sel	x	x	
	Tune	x	x	
System Real Time	Clock	x	x	
	Commands	x	x	
Aux Mes- sages	Local ON/OFF	x	x	
	All Notes OFF	x	o (126,127)	single mode only
	Active Sense	o	o	
	Reset	x	x	

Notes: *1 = play mode only

Mode 1 : OMNI ON, POLY Mode 2 : OMNI ON, MONO o : Yes
Mode 3 : OMNI OFF, POLY Mode 4 : OMNI OFF, MONO x : No

YAMAHA [Tone generator---sequencer part] Date : 10/08, 1988
Model TQ5 MIDI Implementation Chart Version : 1.0

Function ...		Transmitted	Recognized	Remarks
Basic	Default	1 - 16	1 - 16	memorized
Channel	Changed	1 - 16	1 - 16	
Mode	Default	x	x	
	Messages	x	x	
	Altered	**********	x	
Note Number		1 - 111	1 - 111	
	True voice	**********		
Velocity	Note ON	o 9nH,v=1-127	o v=1-127 *1	
	Note OFF	x 9nH,v=0	x	
After Touch	Key's	o	o *2	
	Ch's	o	o *2	
Pitch Bender		o	o	
Control Change	0 - 121	o	o	
Prog Change		o 0 - 99	o 0 - 99	
	True #	**********		
System Exclusive		o	o *3	Song data
System Common	Song Pos	x	x	
	Song Sel	x	x	
	Tune	x	x	
System Real Time	Clock	o	o *4	
	Commands	o	o	
Aux Mes- sages	Local ON/OFF	x	x	
	All Notes OFF	x	x	
	Active Sense	x	x	
	Reset	x	x	

Notes: *1 = receive if velocity switch is on. (if switch is off, velocity is fixed to 64.)
*2 = receive if after touch switch is on.
*3 = receive when bulk data receive function is set.
*4 = receive in MIDI sync mode.

Mode 1 : OMNI ON, POLY Mode 2 : OMNI ON, MONO o : Yes
Mode 3 : OMNI OFF, POLY Mode 4 : OMNI OFF, MONO x : No

YAMAHA

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YAMAHA CORPORATION
P.O.Box 1, Hamamatsu, Japan