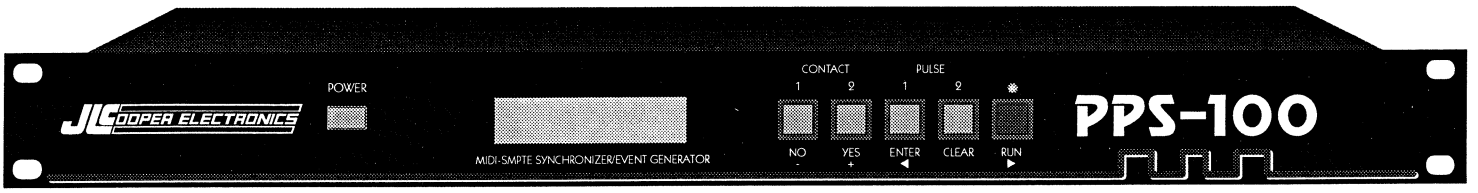
PPS-100

MIDI-SMPTE SYNCHRONIZER / EVENT GENERATOR
Owners Manual
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JLCOOPER ELECTRONICS

Greetings

Thank you for purchasing the PPS-100, the world's first affordable SMPTE/EBU to MIDI Synchronizer and Event Generator. The PPS-100 will allow you to lock virtually any MIDI sequencer or drum machine to SMPTE. The Event Generator can be programmed to send out any kind of MIDI commands at any time. In addition, the Event Generator may also automatically turn on and off switch and pulse operated equipment, at any user-programmed time. Alternately, the PPS-100's internal switches may be used to provide two channels of automated audio muting. All of these features allow you to use SMPTE in very creative ways to add a new dimension of control to your studio.

With the optional PPS-100Q™ software, 'tempo maps" and "event cues" may be programmed and edited from a computer (Macintosh, Atari ST, or Windows) , and then downloaded into the PPS-100.

The PPS-100 has been designed for quick and intuitive operation. For most operations, the LCD will simply prompt you to answer "yes" or "no", and to enter a time. (That is, Do you want this to happen? Do you not want this to happen? When do you want it to happen?)

Once you are reasonably familiar with operating procedures presented in this manual, you will then only need to occasionally refer to the Menu Diagrams to quickly locate the function you are interested in. Please fill out the enclosed registration card and mail it in soon, so we can keep you informed of related products and software updates.

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The Front Panel

LCD prompts you to select the displayed function.

CURSOR Indicates the number or function affected by NO or YES key.

NO (-) key causes the display to go "page-down" to the next function choice. This key will also decrement the value of the number above the cursor.

YES (+) key selects the currently displayed function, and calls up the menus associated with that function. This key will also increment the value of the number above the cursor.

ENTER key loads a value into memory, advances the cursor, and initiates some functions. After you have entered the last digit of a number, pressing the Enter key will cause the display to go "page down" to the next function.

CLEAR key generally exits the currently displayed function, and returns you to the top of the menu. For certain functions, the **CLEAR** key returns you to the previously displayed function, "page-up". The PPS-100 has a built-in input select switcher to save you from having to reconfigure your system to do bulk data transfers. Use the **CLEAR** key to toggle the SYSEX INPUT on and off.

RUN key is used to initiate the FREE RUN MODE, or to manually terminate striping SMPTE. The RUN key also moves the cursor back to facilitate entering and editing values. For certain functions, the **RUN** key returns you to the previously displayed function, "page-up".

(In **REAL-TIME RECORD** mode, the first four keys can be used to program **CONTACT 1, CONTACT 2, PULSE 1**, and **PULSE 2**, respectively. This will be covered in detail in Chapter 6)
RUN LED is on when striping SMPTE, receiving SMPTE, or when FREE RUN MODE is initiated.

Turn to the Main Menu diagram in the appendix, and begin to familiarize yourself with the front panel and the operation of the keys.

If you accidentally skip over the desired function, use the RUN key to go "page up" to the previously displayed function.

The Rear Panel

1) **SYSEX INPUT** and **OUT**
This is an auxiliary set of MIDI connectors provided for your convenience.
The **INPUT** specifically intended for hookup to either an Atari or Macintosh computer for using the PPS-Cue™ software option. Alternately, you would use this extra set of MIDI connectors to hookup the PPS-100 to a computer running a sysex librarian program.
The **OUT** would go to the input of the computer. Actually, the PPS-100's two MIDI **OUTs** are identical, there is nothing "special" about this output, so it may be simply used as an extra MIDI output like the one described below.
2) **MIDI IN** accepts MIDI data for real-time recording. Any data coming into this input may also be merged with MIDI output data.
3) **MIDI OUT** sends out previously recorded MIDI events from the Event Generator, and also MIDI timing messages. These messages can be either MIDI Sync with Song Position Pointer, MTC or DTL. This output data may also contain merged data from the input if the MERGE function has been enabled.
4) **DIN SYNC** outputs 24 P.P.Q.N. (Pulses per Quarter Note) sync with a run/stop signal for driving earlier Roland equipment.
5) **CONTACT 1** and **2** are the programmable relay contacts. The relay is a single-pole, single-throw type wired across the tip and sleeve of the 1/4" jack. There is no ground connection on this jack. When the contact is closed, the relay is on. That is, the tip is shorted to the sleeve. The contacts are rated at 250ma @100 VDC, so do not exceed these ratings.
6) **PULSE 1** and **2** are the programmable +5 volt pulse outputs. PULSE 1 may be either a voltage pulse or a P.P.Q.N. (Pulses per Quarter Note) clock output at 24, 48, or 96 pulses per quarter note. PULSE 2 may be either a voltage pulse or an audio click output.

7) The **POWER** jack accepts the plug from an external 500ma 9VDC transformer.

Hookup

Refer to figure 1.
To stripe tape with SMPTE, connect the SYNC OUT of the PPS-100 to an input of a mixing console, and route that input to your tape recorder. SMPTE is usually recorded on an outside track. (That is, track eight on an eight track.)

To read SMPTE from tape or some other source, connect the output of that tape track or other source to the SYNC IN of the PPS-100.

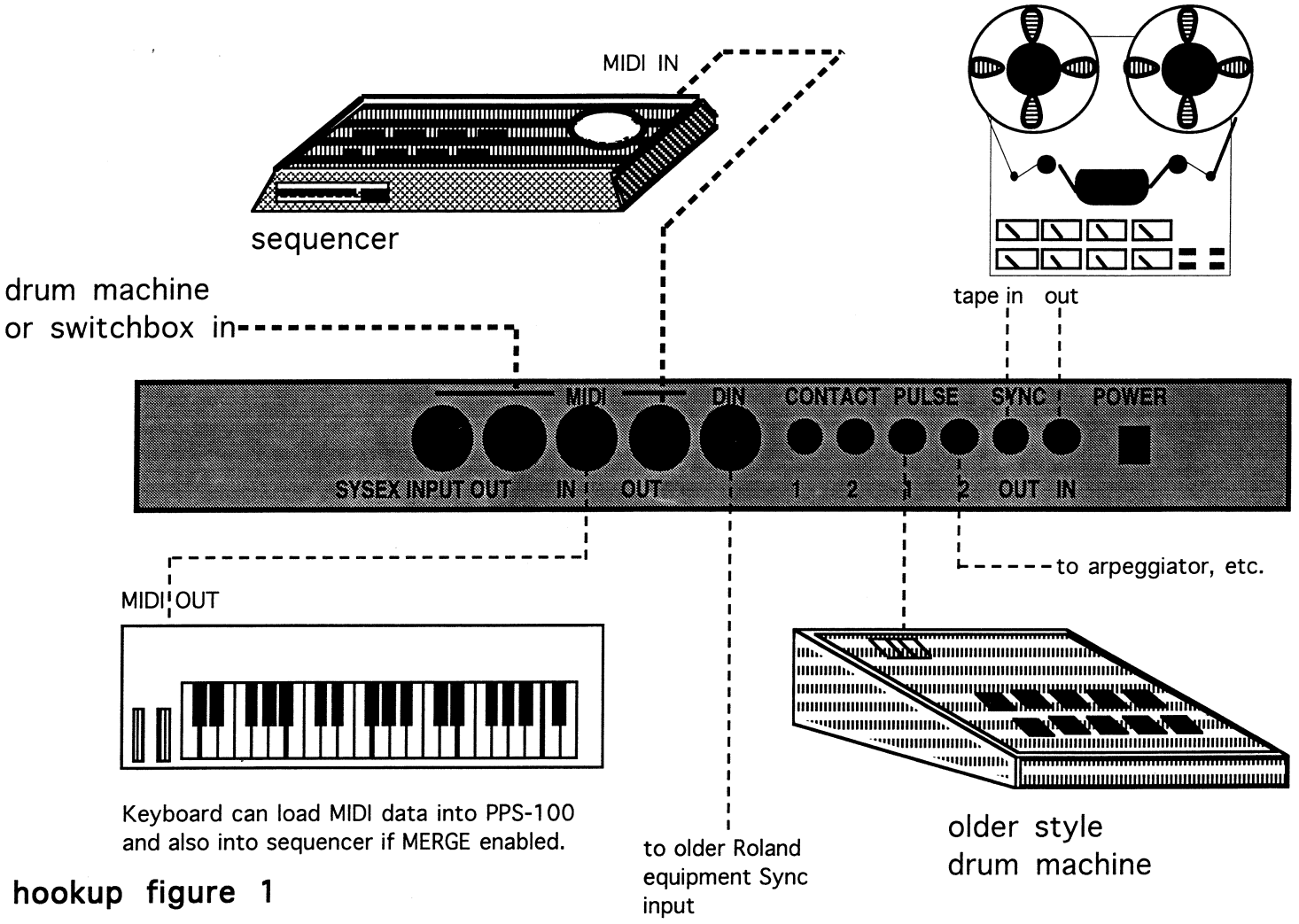
Hookup the MIDI OUT to the input of a MIDI sequencer, computer sequencer, or drum machine to lock that device to SMPTE. Both MIDI OUTs are identical. If you are not using the first OUT for SYSEX bulk data transfers, you may connect it to an additional drum machine or sequencer.

To record MIDI data into the PPS-100, or to record MIDI data into your sequencer while it is still hooked up to the PPS-100, connect the MIDI output of your keyboard to the MIDI input of the PPS-100.

To drive early Roland equipment with DIN sync (24p.p.q.n.), hook up a 5-pin DIN cable from this output to the sync input of the Roland device. Note: Many MIDI cables will not work for this application because Roland DIN sync uses pins 1, 2, and 3, but MIDI cables use only pins 2, 4, and 5, and may leave the other pins unconnected. If in doubt, and if you don't have access to a cable continuity tester of some sort, be sure to buy a cable labeled "5-pin DIN" from an electronics parts store instead of a music store. Also, Roland manufactures cables labeled "MIDI/SYNC" which will work just fine because all of the pins are hooked up.

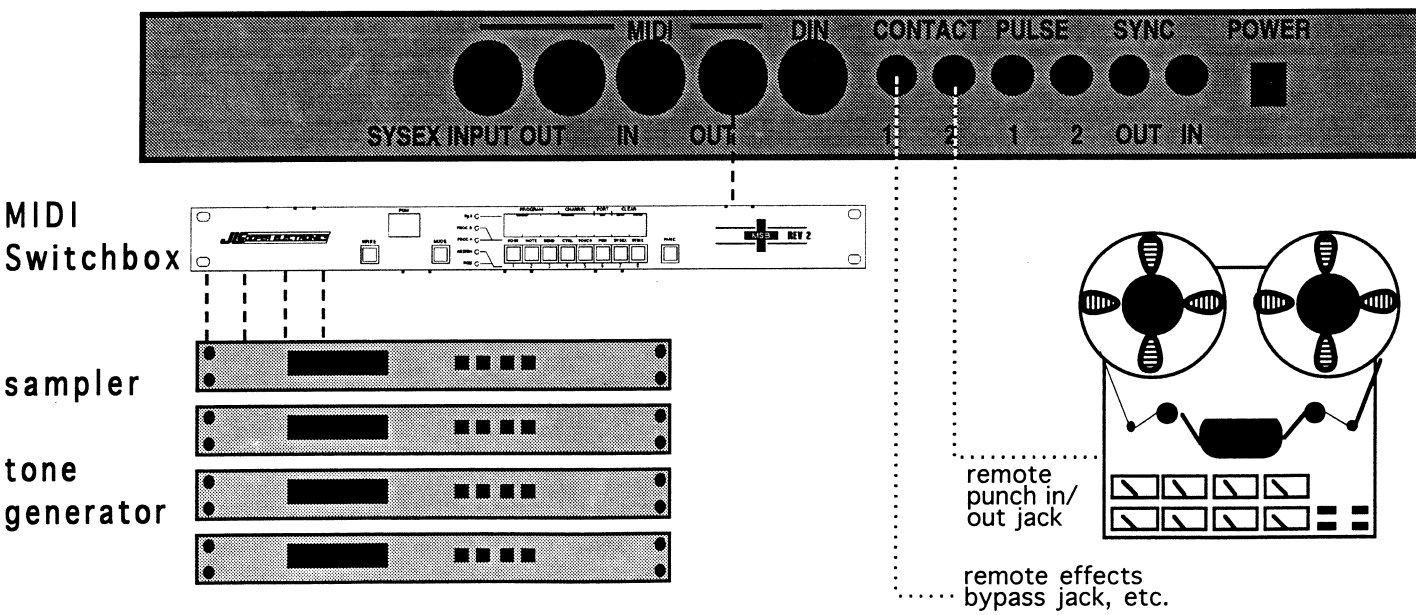
Hookup PULSE 1 output to the clock input of older drum machines such as the Linn Drum™, Oberheim DMX™, and the Emu Drumulator™ (Use a 1/4" to RCA adapter.)

Pulse 2 may be used as a click output, and could drive some early model "one pulse per beat" arpeggiators.



hookup figure 1

hookup figure 2



Refer to figure 2.
Alternately the MIDI OUT may be hooked up to a MIDI switchbox or "thru-box" and then routed to a number of different MIDI devices. This would be a typical Event Generator hook up.

Contacts 1 and 2 may be connected to the remote punch in/out jack on many tape recorders. Some tape recorders also have a play/locate remote jack. Virtually anything operated by a switch contact can be hooked up to these jacks, provided that the voltage/currant ratings are not exceeded. (The Appendix in the back of this manual will show you how to wire a cable to use the contacts as an audio mute.)

Definitions of Terms

Here is a brief glossary of the sync terms that will be used in this manual. (Read this if you need to.)

DIN SYNC

This is the synchronization method employed by Roland Corp. on their earlier drum machines and sequencers. DIN Sync consists of a 24 clock-per-quarter note pulse on pin three of a 5-pin DIN connector. On pin one of the connector is a "run/stop" signal that is normally "low" (0 Volts), but goes "high" (5 volts) to inform a slaved device to start playing.

DIRECT TIME LOCK (DTL)

This is a proprietary MIDI timing scheme invented by Mark of the Unicorn for use exclusively with their sequencing program, Performer™. It is not really part of the MIDI Specification. While reading SMPTE, the PPS-100 can generate DTL to drive Performer™.

MIDI CLOCK with Song Position Pointer

MIDI Clock is a "real time" MIDI message sent out by the PPS-100 synchronizer at 24 clocks-per quarter note. A MIDI device set to receive MIDI Clock will "slave" its tempo to the device sending MIDI Clock. Song Position Pointer is a message that indicates how many sixteenth notes have elapsed since the beginning of a song.
When the PPS-100 sends out a Song Position Pointer message, a "slaved" device that recognizes that message can internally prepare to playback at any location within the song.

MIDI Song Position Pointer message is sent out only ONCE when the PPS-100 synchronizer is started at some location other than the beginning of the song. (It is never sent continually.)

MIDI TIME CODE (MTC)

MTC is a way of sending SMPTE time on a MIDI cable. While reading SMPTE, the PPS-100 can directly convert the hour, minute, second, frame data into MTC. MTC is recognized by many software sequencers, digital audio workstations and hard disk recorders.

PPQN

Although the term PPQN means Pulses Per Quarter Note, PPQN usually refers specifically to a +5V clock pulse sent and received by pre-MIDI drum machines and sequencers. (Technically speaking, MIDI Clock and FSK schemes could also be referred to as PPQN-based systems.) The PPS-100 can put out 24, 48, or 96 PPQN while locked to SMPTE.

SMPTE

SMPTE was developed in the 1960's as a way to uniquely number each frame of a video tape for the purposes of editing. On audio tape SMPTE consists of an audio tone that shifts its phase in a special way called "bi-phase" to encode binary data. This tone is a continuous,"up-counting" data stream representing hours, minutes, seconds, and frames. Each frame is further divided into 80 bits.

The frame rate may be either 24 frames per second (used for 35mm film), 25 frames per second (European and Australian video), 30 frames per second (general purpose tape sync), or 29.97 frames per second (U.S. video) or 30 "drop-frame" (a method of approximating 29.97).

Tempo Map

There is no natural correlation between SMPTE time and tempo. That is, the time of day has nothing to do with how fast or how slow a song should play. To "convert" SMPTE to MIDI Clock with Song Position Pointer requires specifying a relationship between the two. That is, at what time does the sequence begin? At what meter and tempo? At what beat does the tempo change? All of this information must be provided by the user in order for a SMPTE-to-MIDI Clock device to operate. A collection of tempo changes entered into the PPS-100 is called a Tempo Map.

If, however, one is using MIDI Time Code instead of MIDI Clock, no such Tempo Map is programmed into the PPS-100. In this case, the PPS-100 is set up to output MTC. A Tempo Map is programmed into the sequencer itself.

Generating SMPTE Time Code

The PPS-100 can generate all formats of SMPTE time code, starting at any user-selected time. This feature can be used for either striping a tape or directly driving some other SMPTE based device.

To stripe a tape with SMPTE, first hookup the SYNC OUT of the PPS-100 to an input of your mixing console, and route the signal to one track of your tape recorder.

PPS-100's stripe output level is approximately -10 db. You will be setting your record level to somewhere between -7 and -3. The higher the level, the less vulnerable you will be to "drop out". However, on decks with poor track separation, you may opt for a lower level to avoid hearing the sync tone "spill" over into an adjacent track. If the track separation is very poor, you may need to leave a blank "guard track". (As an example, on a 24 track, you would leave track 23 blank and stripe the time code on track 24.)

You should not in any way alter the tone, or you will corrupt the timing information encoded within it. If possible, noise reduction should be defeated during record and playback of the SMPTE tone. Fortunately, many multi-tracks with built-in noise reduction include a single track defeat option. Dolby C™ and dbx™ shouldn't cause any problem. Also, since you are routing the SMPTE signal through a mixing console channel, BE SURE THAT EQ IS BYPASSED.

frame rate selection

To select start time and frame rate, do the following. Press CLEAR to return to the top of the Main Menu. (The LCD says **JLCooper PPS-100**.) Then press NO three times until the display says **STRIPE TAPE?** Press YES, and the display will show **FRAME RATE 30**. If you wish to select some other frame rate, simply press NO until the desired frame rate is displayed. Then press either YES or ENTER, and the display will show

START 00:00:00:00 (hours:minutes:seconds:frames).

To enter start time, use the ENTER key to advance the cursor, use the RUN key to move the cursor back, and use the + and - keys to change the number above the cursor. After entering the last frame number, start your tape recorder and press ENTER once more to initiate code generation.

Alternately, code generation can be initiated immediately from the top of the Main Menu by simply pressing RUN. Be sure to monitor the tape input level.

Always stripe SMPTE the length of the whole tape, as it is impossible to go back later and add "a little extra" stripe. At the end of the tape, stop SMPTE generation by pressing any key on the PPS-100.

Locking a MIDI Sequencer, Drum Machine, or Cue-list program to SMPTE.

The PPS-100 will synchronize MIDI devices to SMPTE in one of three different ways:
(1) MIDI Clock with Song Position Pointer: This is the most common application for the PPS-100, since almost every MIDI sequencer and drum machine can recognize these commands. The PPS-100, upon receipt of SMPTE, will calculate song position and tempo based on the "tempo map" you have programmed. Then it will send out a MIDI Song Position Pointer message, followed by MIDI Continue and Clock messages.

The PPS-100 must be at least be programmed with a "Start Cue", which consists of a Start Time, Meter, and Tempo. The PPS-100 can hold only one of these at a time, and must be re-programmed for each song.

(2) MIDI TIME CODE (MTC): This timing command is recognized by most software-based sequencers, digital audio workstations, and hard disk recorders. This function is selected from the Setup Menu. Upon receipt of SMPTE, the PPS-100 will directly convert the time-code stream into the MTC format. There is nothing else that must be programmed into the PPS-100. The Start time is entered *on the sequencer.* It is usually called the Offset Time (again, on the sequencer, not on the PPS-100.)

(3) DIRECT TIME LOCK (DTL):
This can be used only with Mark of the Unicorn's Performer™ sequencing program for the Macintosh computer. (That program also works very well with MIDI Clock and Song Position Pointer. You may chose not to use DTL if you are planning on simultaneously locking Performer™ and another sequencer or drum machine.)

Determine which one of these three kinds of MIDI timing messages you want the PPS-100 to send out while receiving SMPTE.

To select MIDI Clock with Song Position Pointer (also called MIDI Clock), MTC or DTL, select **SETUP ?** from the Main Menu. (From the top of the Main Menu, press NO four times.) Answer YES.
Then press ENTER or YES two more times to display the current SMPTE to MIDI function. If you agree, press either YES or ENTER. If you disagree, press NO.

If **M.Clock ON** is displayed, and you press NO, the display becomes **MTC ON.** Press YES or ENTER to enable MTC. If you press NO again, the display reads **DTL ON.** Press YES or ENTER to enable DTL.

FAST SPP vs. SLOW SPP

If you answer YES to **M.Clock ON**, the display then gives you the option of either **FAST SPP** or **SLOW SPP.**

When the PPS-100 is set for M.Clock ON, **FAST SPP**, MIDI clock commands are sent out very soon after a Song Position Pointer (SPP). Nearly all sequencers and drum machines chase and lock almost instantaneously. However, a few machines (most notably the Korg DDD-1) have sluggish chase times. The PPS-100 accommodates these devices with **SLOW SPP.** When **SLOW SPP** is selected, the PPS-100 waits a few seconds after sending out the SPP to allow time for the slaved device to chase. Then MIDI continue and clock commands are sent out as usual.

The result is that the "slow" device will still locate and lock, but you will have to allow a little "pre-roll" time. That is, instead of fast winding tape to the exact location that you want a sequencer to locate, you would wind the tape to a point a few seconds before the desired location to allow everything time to lock up.

After making your selection, press CLEAR to return to the top of the Main Menu.

Locking a MIDI Sequencer or Drum Machine to SMPTE using MIDI Clock and Song Positon Pointer.

IMPORTANT
Before doing any synchronizer programming, the PPS-100 must be told what SMPTE frame rate to expect. The frame rate may be selected either manually or automatically.

- **To select frame rate automatically, simply send a short sample of the code that you intend to use into the PPS-100.**

- **To select frame rate manually, follow the instructions for striping tape, allowing a second of code generation.**

- **If you have just completed a stripe operation, you may ignore this because you have already selected a frame rate.**

You will need to program into the PPS-100 a starting time, meter, tempo, every tempo change, and a stop time. (Remember, you have to tell the PPS-100 exactly what you want it to do with incoming SMPTE time code, since there is no inherent quality in SMPTE time that has any relationship to how fast or slow a sequence should run.) If the sequence has no tempo changes, you will need to enter at least a Start Time, Meter, and Tempo. The tempo range is from 24 to 250 B.P.M.

Here is a very simple example of how to program this into the PPS-100:

Say that you have a song recorded on a sequencer that you want to start playing when the PPS-100 receives SMPTE time 00:05:30:00. (That is , five minutes and thirty seconds.) The tempo of the song is 173 beats per measure, in 4/4 time.

From the Main Menu (JLCooper PPS-100), press any key to call up the **SET CUE ?** Menu. Answer YES, then press NO four times until **START ?** is displayed. (See Menu diagram in appendix) Answer YES. **TIME 00:00:00:00** is displayed. Use the ENTER key to move the cursor to the right.

When the cursor is under the minute digit, press "+" five times.

TIME 00:05:00:00

In a similar manner, move the cursor to the right and press "+" three times.

TIME 00:05:30:00.

If you make a mistake, remember that you can move the cursor back by pressing RUN. And you can decrement a number by pressing "-". Repeat pressing ENTER until the cursor is all the way to the right, and then press one more time to go "page down": **TIME SIG 00/00.** Use the "+", "-", and ENTER keys as before to enter **TIME SIG 04/04.** Press ENTER to go "page down" to **TEMPO=000 BPM.** Use the "+", "-", and ENTER keys as before,entering **TEMPO=173 BPM.** Note that to enter the number "7", you could press "-" three times instead of pressing "+" seven times. Press ENTER to go "page down" to **STOP ?**

For this example we will not enter a stop time, because the sequencer will stop by itself at the end of the song. Press **CLEAR** to return to the top of the main menu. (If you are interested in trying out this example right now, be sure that you have a MIDI cable hooked up from the MIDI OUT of the PPS-100 to the MIDI IN of your sequencer, and that the sequencer is set to receive MIDI Clock.

You may wish for a sequence to stop automatically before the sequence itself has finished playing.

To enter a stop time, simply respond to the prompt **STOP ?** by answering YES. This may be done either after entering a start time, or you may skip over the **START ?** prompt by answering NO to that prompt. Use the cursor keys (ENTER and RUN) and the +/- keys in the usual manner, pressing ENTER after all digits are entered.

Return to the top of the Main Menu by pressing CLEAR.

It is not necessary to enter a STOP cue unless you want to force the sequence to stop before it reaches the end of the song.

IMPORTANT
You can only program one Start Cue at a time. When using MIDI Clock, the PPS-100 can only be programmed to synchronize*one* song.

A **STOP** command may also be entered at a particular **BAR** and **BEAT**, instead of a SMPTE time. In that case it would be treated like a tempo change and entered into the tempo map. See next section.
To change a START or STOP time, simply change the value from the SET CUE menu.

Tempo Maps

A collection of tempo changes stored in memory is called a Tempo Map. To program tempo changes, select **TEMPO MAP ENTRY?** from the Main Menu. (From the top of the Main Menu, press NO six times.)
Answer YES. The display will prompt you with the first time signature:

TIME SIG 04/04.

To enter a time signature for the first tempo change, use the cursor keys (ENTER and RUN) and the +/- keys to change the currently displayed value. Press ENTER after all digits are entered. The display then changes to

BAR/BEAT 001/01.

In a like manner, enter the bar and beat at which the tempo change should occur. The display then changes to
TEMPO=120 BPM. Enter the new tempo.

As soon as you press ENTER, the display returns to the time signature prompt again to allow you to continue to enter multiple tempo changes. **If you only want to enter one tempo change, press CLEAR to exit.** For multiple tempo changes, continue to enter time signature, bar/beat, and tempo for each change.

After all tempo changes are entered, press CLEAR twice to return to the top of the main menu.

As part of the tempo map you may enter a tempo of 000 BPM and it will be treated as a STOP command. This allows you to enter a bar and beat stopping point, instead of a SMPTE stopping time.

Choose time signatures logically to avoid changing meters within a bar. Suppose that you were to program a bar in 4/4 time, but only allow three beats to pass by before changing the meter to 6/8. There would be little chance of your sequencer's bar/beat indicator agreeing with the PPS-100. It would have made more sense to program a 3/4 bar instead of a 4/4 bar.

Special Note for those who like math and also insist on using **long measures:**
The MIDI specification for Song Position Pointer is limited to 98,304 clocks in a song. PPS-100 allows for a maximum of 999 bars in a song. This indicates that it is not impossible to exceed the capability of MIDI Song Position Pointer, especially if you have programmed a large number of long bars with long beat values.

If you are concerned about this, the formula for determining the total number of MIDI clocks in a song is as follows:
(24 clocks per quarter note) X (number of quarter notes per measure) X (number of measures in the song).

For example, in 4/4 time there are 4 quarter notes per bar. 24 X 4 X 999 = 95,904. Since this number is less than 98,304, MIDI Song Position Pointer will easily accommodate a song of 999 measures in 4/4 time.

Since you don't want the number of clocks to exceed the maximum allowed, we rearrange the equation to solve for the maximum number of measures allowed for a given time signature.
The maximum number of measures in a song equals 98,304 divided by (24 X number of quarter notes in measure)

For example, if the time signature is 16/2, there are now 16 X 2 = 32 quarter notes per measure. (Two quarter notes in a half note multiplied by 16 half notes to the bar.) Calculating the maximum number of measures allowed for a song in 16/2 time: 98304/ (24 X 32) = 128 measures maximum.

Avoid making tempo map entries at measures beyond the maximum allowed for a given tempo. If you do, the Song Position Pointer messages sent out will not be correct when the SMPTE time code is started at some point beyond the last legal measure.

Please remember that these limitations are due to the restrictions of the MIDI Specification, and have nothing to do with the PPS-100. And for most applications, the warnings above should probably be ignored.

Synchronizing non-MIDI Sequencer or Drum Machine to SMPTE.

While the PPS-100 is reading SMPTE and outputting MIDI Clock and Song Position Pointer, it can also put out P.P.Q.N. sync at the same tempo and start/stop times.

The DIN SYNC output sends out only 24 P.P.Q.N. The PULSE 1 output can be setup to put out either 24, 48, or 96 P.P.Q.N. The PULSE 2 output can be setup to put out either 1 or 2 P.P.Q.N. While this is intended to be a click output, it could perhaps be used to drive older 1-clock-per-beat arpeggiators.

To setup PULSE 1 for P.P.Q.N. operation, call up the **SETUP ?** menu. (from the top of the Main Menu press No four times.) When the display reads **SET UP ?**, answer YES. Press ENTER seven times until you arrive at the prompt **PULSE1=NORMAL.** Enter NO, and the display changes to **PULSE1=PPQN CLK.** Answer YES, and the current number of clock pulses per beat is displayed. Use the NO key to to change the selection to 24, 48, or 96 clocks per beat. Pressing either YES or ENTER will load it into memory.

The display will then prompt **PULSE2=NORMAL.** To setup PULSE 2 for click operation, Enter NO, and the display changes to **PULSE2=CLICK.** Answer YES (or ENTER), and the current note value of the click is displayed. Use the NO key to to change the selection from 1/4 note to 1/8 note (that is, one or two clicks per beat). Pressing either YES or ENTER will load it into memory, and cause the PPS-100 to return to the top of the Main Menu.

Make sure that the drum machine or sequencer to be slaved to P.P.Q.N. is set for external clock.

One final obvious comment about P.P.Q.N. syncing--devices that read this type of clock cannot possibly "chase tape"! You must start SMPTE time code at some point before the beginning of the song in order to get a non-MIDI device to play back in sync with the MIDI Clock driven device.

Editing Tempo Maps

There are two ways in which you may edit tempo maps in the PPS-100. You can remove and replace an individual tempo change, or you can clear out all tempo changes.
To remove an individual tempo map entry, select the **REMOVE TEMPO MAP ENTRY ?** prompt. (From the top of the Main Menu, press NO eight times.) Answer YES, and the first BAR/BEAT tempo changes point will be displayed with the question **REMOVE ?**. If that is not the tempo change that you want to remove, answer NO. If it is, answer YES, and like all cheeky machines the display will prompt
ARE YOU SURE ? Answer YES, and then next tempo change will be displayed. You may exit this function by pressing CLEAR twice, or you may continue to step through all the tempo changes by pressing NO. After the last change in memory, the display reads END BUFFER. You can either go right to the top of the Main Menu (press CLEAR or NO), or you can press RUN twice to "climb" back up to the prompt TEMPO MAP ENTRY?

To clear out all tempo changes, select the **SETUP ?** menu. (From the top of the Main Menu, press NO 4 times.)
Answer YES. Press ENTER 6 times until **CLEAR TEMPO MAP?** is displayed, answer YES, and once again you get an impudent argument: **ARE YOU SURE ?** Answer YES to irrevocably remove all tempo changes.

High Resolution Tempo Entry, Frames and Bits per Beat

In the previous examples, the tempo was defined as some number of beats per minute (BPM). The PPS-100 also features a high resolution mode in which the tempo may be defined as some number of frames and bits per beat. Since there are 80 bits in a SMPTE frame, and you can set exactly how many frames and bits will fall between each beat, you have access to a very precise means of entering tempos.

In this mode, tempo is displayed and entered in this form: **TEMPO=00:00 FPB**, where the first two digits are the number of frames, and the second two digits are the number of bits.

The formula to convert beats per minute into frames per beat is rather simple. Multiply your frame rate by 60, then divide the result by the tempo in beats per minute. Remember that an increase in FPB represents a decrease in tempo.

For example, say that you wanted to convert 120 BPM into frames per beat (FPB). Say your frame rate is 30 frames per second, 30 X 60 =1800. 1800 divided by 120 equals 15 frames per beat.

The question might arise, how do you deal with those bits? Since there are 80 bits to a frame, (and 8 is 10% of 80), 8 bits represents a 10% change in tempo. And any fraction left over from the last equation can easily be multiplied by 0.8 to convert it to bits.

Big, ugly example:
Say you have a composed a jingle on your sequencer that turns out to last about 5 seconds too long to fit into a 60 second commercial. Very little math tells you that you need to back off the time (that is, increase the tempo) by 7.69% to get your 65 second jingle down to 60 seconds. The tempo was 120 BPM, so multiply 120 by 1.0769 to get 129.23 BPM. To convert this to FPB, as before, 1800/129.23=13.93. Convert the decimal portion to bits by multiplying 93 x 0.8=74. Thus the tempo that you would enter into the PPS-100 would be **TEMPO=13:74 FPB.**

To setup the PPS-100 to accept tempos in terms of frames and bits, select **SETUP ?** from the Main Menu, answer YES. The first prompt will be TEMPO=BEATS/MIN. Press NO and the display reads **TEMPO=FRAME/BIT.**
Press ENTER. Press CLEAR to return to the top of the Main Menu.

The Event Generator

The PPS-100 Event Generator allows MIDI messages, switch events, and pulse events to be stored into internal memory, and then put out at specific SMPTE times. Both Event Generator and Synchronizer functions operate simultaneously.

Individual events (and the time that they are supposed to happen) are called cues. A list of cues in memory is called a "cue list" Cues may be programmed in either of two ways. From the **SET CUE ?** menu, each cue may be individually programmed into memory to occur at an exact user-selected SMPTE time. In **REAL-TIME RECORD ?** mode, cues are recorded into memory "on the fly", as SMPTE time code is received. Each cue goes into memory "time-stamped" with the current SMPTE time coming in. .

It is possible to combine operations. Thus the Event Generator could play out a mixture of cues, some having been recorded in real-time, and others having been entered from the **SET CUE** menu. In that case, REAL-TIME RECORDING must be done first. Then it is possible to go back and add individual cues with the **SET CUE** menu.

Before describing exactly how cues are programmed, here is a catalogue of available cues with suggested applications:

CONTACT

The two switch contact closure jacks are used to SMPTE automate many switch-operated devices. Tape recorders and audio effects units often have 1/4" jacks for remote operation. In most cases, setup is as easy as connecting a guitar cord between a CONTACT jack and a remote jack. Typical uses include: effects bypass, record punch in/out and play/locate, or even sample triggering. The Appendix shows how to wire a cable to use the CONTACT jacks as audio mutes.

PULSE

These two outputs can be programmed to put out a +5 volt D.C. signal at specific SMPTE times. A pulse output must be setup for NORMAL operation to work this way. (The last chapter dealt with configuring these outputs for P.P.Q.N. and CLICK operation.) A typical application would be to interface these pulses to a "dimmer pack", to fire off lights, motors, etc.

MIDI Messages

Start and Stop:

These commands for starting and stopping drum machines or sequencers have already been covered in the last chapter.

NOTE ON and NOTE OFF with velocity:

These commands are used to play MIDI samplers, keyboards, tone generators, and drum machines. Individual notes may be sent out for triggering a sound effect on a sampler. Multiple notes may be sent out to play whole chords and short melodic passages on a keyboard or tone generator. Note Off as well as Note On velocity may be independently defined. (Some instruments are capable of taking advantage of this.) These commands can also be used to control any other device that responds to Note commands, such as a JLCooper MIDI MUTE.

NOTE AFTER-TOUCH:

After-touch (a MIDI message related to the pressure applied to a keyboard key) is recognized by many tone generators. It is used to introduce some temporary variation in the sound being played. The variation is entirely dependent on how the receiving instrument has been programmed. (Typical variations can include "filter sweeps", vibrato, cross-mixing an entirely different sound, etc.).
Instruments that can respond to Note After-touch allow each note to to be individually affected by pressure messages.

CHANNEL AFTER-TOUCH:

This is a more commonly recognized pressure message. When sent out, it globally affects all notes on a given MIDI channel.

PITCH BEND:

This message is usually used while a note is sustained (That is, between Note On and Note Off commands) to raise or lower the pitch of the note being played. In certain applications, it can be used as a "brute force" method of effecting a key transposition on the targeted synthesizer.

PROGRAM CHANGE:
This message is sent to cause a program change (or "patch change") on a synthesizer, sampler, or MIDI controlled audio effect. Typical applications include setting up a reverb unit to a different room size, SMPTE-automated to correspond to a scene change on a video.

CONTROLLER:
This is a broad class of MIDI commands used to control synthesizer parameters including volume, modulation, portamento, and "data-entry". Applications include modifying a sound being played on a synthesizer and controlling MIDI attenuators.
Some reverb units and delay units can also respond to these commands. Refer to the owners manual of your MIDI device to find out what kind of Controller messages it is capable of recognizing.

SYSEX:
Systems Exclusive (SYSEX) messages are manufacturer-specific and instrument-specific commands. This is the class of MIDI commands commonly used for transmitting bulk data dumps. All SYSEX messages have a manufacturer's I.D. number built-in, and often have an I.D. number relating to the model of an instrument. At the instrument manufacturer's option, these messages could be setup to control virtually any internal parameter of the device.

Each SYSEX cue in the PPS-100 is entered as a series of hexadecimal numbers, and may be up to16 bytes long. Refer to the Systems Exclusive implementation instructions in the owners manual of your MIDI device to find out what parameters can be controlled by Systems Exclusive messages. The numbers provided by the manufacturer may then be programmed into the PPS-100 to be sent out at a specific SMPTE time. Applications include altering specific parameters within a MIDI synth or reverb, such as envelope generator decay times or number of echoes.

Song Select:
Specifies which song or sequence will be played by a drum machine or sequencer upon receipt of a Start command.

Programming the Event Generator using SET CUE Menu

To program the event generator, call up the **SET CUE ?** menu. Answer YES. As each possible cue selection is displayed, press YES to select. Then use the cursor keys (ENTER and RUN) to move the cursor, and the +/- keys to change the value above the cursor. After entering the last digit of a number, press ENTER once more to lock it into memory and to go "page-down" to the next selection.
Press NO to skip over undesired functions.. Press RUN (the back cursor key) to climb back up the menu.

CONTACT 1 and CONTACT 2

Pressing YES will cause the display to first prompt you to enter a CLOSE time. That is the time that the relay turns ON, and the internal contacts close. When the contacts are closed, the corresponding 1/4" jack tip is shorted to its sleeve. After entering this time, the display prompts you to enter an OPEN time, when the relay turns off. After entering an open time, the display asks if you want to enter additional open and close times for that relay.
If using CONTACTS for Remote switching, keep in mind that different Remote switch jacks have different requirements for activation. Some Remote switch jacks require that the contact stay closed for as long as the function is enabled. But some require a contact to be momentary. In that case the contact should be programmed to close and then open right away to activate the remote function.

PULSE 1 and PULSE 2

Pressing YES will cause the display to first prompt you to enter an ON time. After entering this time, the display prompts you to enter an OFF time. After entering an off time, the display asks you if you if you want to enter additional on and off times for that pulse output. Remember that P.P.Q.N. and Click have priority over these outputs.

START and STOP

These cues are MIDI commands and have already been covered in the last chapter.

MIDI EVENTS
Numerical values for MIDI commands must fall between 0 and 127.

NOTE ON and **NOTE OFF**
Answering YES to either of these questions will call up four successive prompts. Enter a MIDI CHANNEL number between 1 and 16.
Then enter the NOTE name and OCTave of the desired note, then the VELocity of the note, and finally the TIME that you want the PPS-100 to send out that MIDI command.

NOTE AFTER-TOUCH
Answering YES calls up a similar set of prompts, the exception being that a PRESSure value is requested instead of a velocity.

CONTROLLER
Answering YES calls up four successive prompts. Enter a MIDI CHANNEL number between 1 and 16. Then enter the CTRL (controller) number, the VALUE of that controller and lastly the TIME that you want the PPS-100 to send out that MIDI command.

PROGRAM CHANGE
Answering YES calls up three successive prompts. Enter a MIDI CHANNEL number between 1 and 16. Then enter the PRGM (program) number and the TIME that you want the PPS-100 to send out that MIDI command.

CHNL AFTER-TOUCH
Answering YES calls up three successive prompts. Enter a MIDI CHANNEL number between 1 and 16. Then enter the PRESSure value and the TIME that you want the PPS-100 to send out that MIDI command.

PITCH BEND
Answering YES calls up three successive prompts. Enter a MIDI CHANNEL number between 1 and 16. Then enter the amount of pitch BEND as a number between 0 and 127. (64 equals no bend, numbers above bend up, numbers below bend down.) The actual extent of bend is determined by the receiving instrument. Enter the TIME that you want the PPS-100 to send out that MIDI command.

SYSEX

Answering YES displays the first five bytes of a MIDI systems exclusive message. Each byte is a two-digit number in hexidecimal notation. (If you need to convert binary to hexidecimal notation, see table in appendix.)

A single MIDI SYSEX cue may be up to 16 bytes long. The first byte must always be an F0, so this is already provided. The last byte must always be an F7. As you use the ENTER key to move the cursor to the right, the display will "scroll" left to reveal more digits until all 16 bytes have been displayed. Be certain that the last byte is F7, you will get a RANGE ERROR if it is not. After entering the message, enter the TIME that you want the PPS-100 to send out that MIDI Systems Exclusive message.

Programming Event Generator using REAL-TIME RECORD

The REAL-TIME RECORD mode of the PPS-100 allows you to "capture" events into memory as time code is being received. There are many situations where this method of programming is more practical than entering individual cues from the SET CUE menu.

For example, say that you wanted to record a short keyboard part into the PPS-100. It would be much more natural to simply play the part into the PPS-100 via MIDI, rather than painstakingly loading each note and bend command with an associated time. As another example, say that you have configured one of the CONTACT jacks to perform a punch-in on your multitrack tape recorder. You could enter a specific CONTACT CLOSE time from the SET CUE menu. But it might be musically more accurate to let the the tape play, and using your ears as a reference, enter the cue by holding down a certain button at the right time.

Since the PPS-100 functions in this mode as a simple, single-track data recorder, all **REAL-TIME RECORDING must be done starting with a clear memory.**

If you wish to combine real time events with events recorded using the SET CUE ? menu, real-time recording must be done first. Then you can go back and manually ad individual cues using SET CUE ?.

If you have already programmed events in SET CUE, these events will be recorded over in REAL TIME.

Tempo Maps would not be affected. So if you were you to do this accidentally, you would only need to go back to SET CUE to re-enter a START time/meter/tempo.

General information about REAL-TIME RECORDING of CONTACTS and PULSES

For recording CONTACT and PULSE cues, the first four keys on the front panel of the PPS-100 will be used:
NO will activate CONTACT 1
YES will activate CONTACT 2
ENTER will cause PULSE 1 to go high
CLEAR will cause PULSE 2 to go high.

In REAL-TIME RECORD, the switches are not "alternate action" (That is, they are not "push on/push off"). The CONTACT or PULSE will remain active only while the switch is held down.

If you do intend to record a CONTACT cue for auto punch-in, it is strongly recommended that you keep your tape recorder tracks "SAFE" while the PPS-100 is in REAL-TIME RECORD. This is because the CONTACTs will actually be activated when the NO or YES keys are pressed. You wouldn't want to prematurely wipe out a section of tape, especially if you accidentally push a key at the wrong time.

Keep in mind that different Remote switch jacks have different requirements for activation. Some Remote switch jacks require that the contact stay closed for as long as the function is enabled. But some require a contact to be momentary. In that case the contact should be programmed to close and then open right away to activate the remote function.

Also note that there is no way to capture the status of the CONTACTs or PULSEs before SMPTE is received. This is worth noting if you intend to use a CONTACT as an effects bypass control, or as an audio mute . You may want to have the effect bypassed (or the channel muted) before a sequenced song begins. In REAL-TIME RECORD it would be necessary to start the SMPTE time code at a point several seconds before you intend to have a MIDI START cue. Then use the keys to turn the CONTACT ON so it is in the desired status before a sequenced song should start. You may then go back to the SET CUE menu to enter a START command so that the sequencer starts at a time just after the contact has been turned on.

General information about REAL-TIME RECORDING of MIDI Data

To record MIDI data in real-time, connect a MIDI cable from the MIDI output of a keyboard to the MIDI input of the PPS-100.
There are certain commands that will not be accepted in REAL-TIME RECORD. MIDI sync, MTC, DTL, and any MIDI message with a status byte hex value above $F1 will be ignored.

Keep in mind that this is still an event generator and NOT a MIDI sequencer. The resolution is FRAME accurate, so if you attempt to record a melodic keyboard passage, you may end up with somewhat unsatisfactory results due to quantization. Also, unlike a sequencer, the PPS-100 has no way of monitoring what data it is putting out at any given time. Thus if you terminate playback in the "middle" of a Note command (that is, before a corresponding Note Off command), you will end up with a stuck note on the destination synth.

How to Record.

Select **REAL-TIME RECORD ?** from the Main Menu. (From the top of the Main Menu, press NO five times.) Answer YES, and the display changes to **RECORDING....**
No recording of events will take place until SMPTE is received. When SMPTE is received, the RUN LED turns on and the display indicates the time. While code is being received, you may send MIDI data into the PPS-100's MIDI input, and use the first four keys to enter CONTACT and PULSE cues.

Reviewing and Removing Cues

All cues can be individually reviewed and removed using the REMOVE CUE menu.
(START and STOP times can be altered by simply re-entering new times in the SET CUE menu.)

To remove a cue, call up **REMOVE CUE ?** from the Main Menu. (From the top of the Main Menu, press NO seven times). Answer, YES.

The display will prompt you with each type of cue. Press NO to skip over that cue type, Press YES if that is the type of cue that you wish to remove.

For cues other than those classified as MIDI EVENTS, the display will then prompt you with each time that the cue occurs. Press NO to skip over that cue and go on to the next occurrence. Press YES if that is the cue that you wish to remove, and the display will ask you **ARE YOU SURE ?** just in case you didn't really mean it. Press YES again if you are sure.

For MIDI EVENTS, the display will prompt you with each type of MIDI cue. Press NO to skip over that cue type, Press YES if that is the type of cue that you wish to remove.

If you answer YES, you are asked to enter a MIDI channel number. This special feature allows you to review or remove only those MIDI events on the channel that you are interested in. The PPS-100 can then step through all occurrences of that cue type on that MIDI channel. Press NO to skip over a cue and go on to the next occurrence. Press YES if that is the cue that you wish to remove, and the display will ask you ARE YOU SURE ?. Press YES to remove.

After you have stepped through all of the events, (or all MIDI EVENTS for a given channel number), END OF BUFFER will be displayed.

Once you have removed cues, you may go back and enter new cues from the **SET CUE ?** Menu.

clearing cue list

To clear out all cues, select the **SETUP ?** menu. (From the top of the Main Menu, press NO 4 times.)
Answer YES. Press ENTER 5 times until **CLEAR CUE LIST ?** is displayed, answer YES, and once again you get an impudent argument: **ARE YOU SURE ?** Answer YES to irrevocably remove all cues from memory.

Running Synchronizer and Event Generator

The PPS-100 Synchronizer and Event Generator can operate while locked to an external source of SMPTE, or while referenced to an internal clock in FREE RUN MODE. When the PPS-100 sees a SMPTE time corresponding to a MIDI start time, the display changes to show the present bar/beat and tempo:

```
000/00     T=120
00:00:30:00_
```

As each tempo map entry is automatically recalled from memory, the display changes to indicate the new meter and tempo.

FREE RUN MODE

FREE RUN MODE allows you to use the PPS-100 "stand-alone", without any tape rolling. For example, the PPS-100 could be used in a theatrical environment, to automate props and effects. Or use the PPS-100 live on stage as a master synchronizer to drive some number of different devices.

To initiate FREE RUN MODE, from the top of the Main Menu press the RUN key. The LED will light and the display will show the SMPTE time. FREE RUN starts at the same time and frame rate selected when setting up to stripe tape (See Chapter 4).

flywheel

Magnetic tape is vulnerable to "drop-out" caused by contamination or missing oxide particles. Thus a SMPTE tone on tape can occasionally have missing frames. When the PPS-100 encounters very short periods of bad time code, it can continue to generate MIDI sync and P.P.Q.N. sync. This feature is known as "flywheeling", and is vital to prevent a sequencer from stopping during a recording session or mixdown. The PPS-100 can flywheel through 6 bad frames of time code. If a drop-out lasts any longer, the PPS-100 behaves just as if incoming SMPTE has been stopped. As soon as good code is received, a new Song Position Pointer, followed by Continue and Clock commands are sent out. MTC and DTL cannot be generated during flywheel because these are directly related to incoming SMPTE.

offset

The PPS-100 provides for offsetting Tempo Maps and Cue Lists with respect to incoming SMPTE.

This is extremely useful if you have been provided with a pre-striped master tape that you want your sequenced parts to lock to. Or say that you have programmed an elaborate series of events relatively spaced in time with great precision. But you then discover that the whole cue list must begin at a different time. The OFFSET feature allows you to enter a time (in hours : minutes : seconds : frames I bits) that will be added to or subtracted from the incoming SMPTE time. The new "off set" time will be used for Tempo Map and Event Generator playback.

The offset time does not affect MTC or DTL output, nor does it affect the display. In REAL-TIME RECORD, all events are time stamped with the real time coming in, and you may later offset the events on playback. The offset will apply to FREE RUN MODE.

To set an offset time, call up SET OFFSET ? from the Main Menu. (From the top of the Main Menu, press NO twice.) Answer YES and the display will prompt:

±00:00:00:00I00

Use the +/- keys and the cursor keys (ENTER and RUN) to enter an offset time. Remember that there are 80-bits to a frame. After entering the last digit, press ENTER once more to lock it into memory.

Special Setup Functions

The SETUP menu has a few special functions that have not been mentioned earlier but are none the less quite useful.

merge function

There may be times when you need to record a new track on your MIDI sequencer while it is locked to SMPTE with the PPS-100. But you will notice that you probably only have one MIDI input on your sequencer, and that input is presently occupied by the MIDI cable carrying timing info from your PPS-100. The PPS-100 solves this problem with the MERGE function. When MERGE is turned on, any MIDI data coming into the PPS-100's MIDI in is merged with the SMPTE-referenced timing commands and both are sent to the PPS-100's MIDI output.
To enable this function, select SETUP from the Main Menu. Answer YES. After the TEMPO prompt, press ENTER and the display will read either MERGE=ON or MERGE= OFF. Use the NO key to toggle the merger on or off, then press ENTER to lock in this setting. Return to the top of the Main Menu by pressing CLEAR.

Hook up a MIDI cable from the MIDI output of your keyboard to the MIDI input of the PPS-100.
Now the one cable that carries either MIDI Sync and Song Pointer or MTC or DTL to your sequencer will also carry your keyboard data.
Please note that not every sequencer can take advantage of this feature. Some sequencers do not "know how" to accept a Song Position Pointer message while in record mode. Check with individual sequencer manufacturer's recommendations if you are not sure.

DUMP MEMORY

The PPS-100 can dump its entire memory to an external storage device via MIDI Systems Exclusive. Typically this is used to save Tempo Maps and Cue Lists to disk on a computer that is running some sort of patch librarian program.

To dump data, first hookup either one of the two MIDI outputs to a MIDI input of the storage device. Initiate the dump by calling up **DUMP MEMORY ?** from the SETUP menu. (Select SETUP, YES, and press ENTER three times.) Then press YES. This operation does not clear the PPS-100's memory.

receiving sysex bulk data

To load data back into the memory of the PPS-100, first hookup a cable from the MIDI output of the storage device to the **SYSEX INPUT** of the PPS-100. To turn on the SYSEX INPUT, press CLEAR once from the top of the Main Menu. The PPS-100 can now receive a MIDI Systems Exclusive bulk data dump. This incoming data will completely overwrite (i.e. "wipe-out") any Tempo Map and Cue List entries in memory.

Memory Protect To protect Tempo Maps and Cue Lists from being removed, altered, or overwritten, turn Memory Protect on. Call up SETUP ?, Answer YES, and then press ENTER four times. The display will show:

MEM. PROTECT = OFF

Use the NO key to toggle Memory Protect on or off, then press YES or ENTER to lock it in. Return to the top of the Main Menu by pressing CLEAR.

Troubleshooting and Service

If you have followed the directions, but things still are not going quite as you expected, take a few minutes to do some troubleshooting. The key to frustration-free troubleshooting is threefold:

(1) Check the obvious first.
(2) Be painstakingly systematic, change only one variable at a time.
(3) Stay calm, it is only your livelihood at stake.

Here are some clues to solve common problems.

The PPS-100 does not respond to incoming SMPTE.
E.Q. should be defeated during record **and** playback. Although SMPTE shouldn't be adversely affected by most noise reduction systems, try restriping without it. The tone level should optimally be around -10 to -3 dB. If the RUN LED always goes out at the same place in the song, suspect either tape drop-out or adjacent track cross-talk. On smaller tape decks, channel separation can be poor. A tape track with a lot of high energy content (such as a "scratch" mix) alongside a sync track can cause problems if the audio signal bleeds into the sync. Also, anything that can degrade audio can degrade sync as well. Be sure that the transport is well maintained with clean and demagnitized heads.

MIDI Sequencer or drum machine does not start.
MIDI Sequencer or drum machine does not chase and lock.
First verify that the sequencer or drum machine is indeed set to external MIDI Clock. (If you have inadvertently left the sequencer or drum machine set to internal sync, it may still give the illusion of locking to MIDI Clock. But it will not chase or lock properly.)
Also, a few sequencing programs need to be "told" to accept Song Position Pointer in addition to MIDI Clock.

MTC or DTL sequencer always "skips" first few bars of the song

The offset time *on the sequencer* is set too early, forcing the sequencer to chase the moment that the tape is started. Be sure that the offset time that you have entered in the sequencer falls after the time that the stripe starts on tape. For example, you may have a tape which is striped with SMPTE starting at 00:00:00:00. Then the offset time that you program into your sequencer must be later than this, say 00:00:30:00. That allows some leader before the sequencer starts.

Older drum machine not locking to P.P.Q.N.

Be sure that you have hooked up the PULSE output to CLOCK input (not the tape sync input) of your drum machine, and that the drum machine is set for external clock. P.P.Q.N. devices are often sensitive to variations in cable capacitance. Sometimes swapping the cable carrying P.P.Q.N. actually improves sync accuracy on the slaved device. Electrical interference (RFI and surges) can also cause sync to drift.

Tone Generator or Sampler does not play a cue.

Be sure that the tone generator or sampler is set to receive on the same MIDI channel as the cue. Also, if the synthesized sound has a long attack time, perhaps you need to allow more time between a Note On and a Note Off command.

No Response

If none of the switches do anything, and the LCD isn't on, check power hookup first. If some sections of the LCD just stay on, this would indicate that the internal microprocessor is not running. Perhaps the unit has received an AC surge. Turn the power off and on once to see if the unit returns to life. If you still have no luck, see below.

If you have experienced any operational difficulties, let us reassure you that every unit is 100% factory tested.

Try reinitializing the unit if you do not get the expected results. Instructions for reinitializing are found in the appendix.

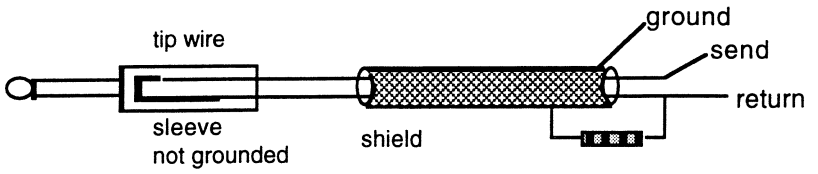
A "noisy" AC outlet is a typical cause of intermittant problems. We recommend the use of an AC surge suppressor **and** line filter with all computer-related equipment. These can be purchased at any hardware or computer store, and many music stores also now carry them.

As usual, there are no "user-serviceable" parts inside the PPS-100. For warranty service in the U.S. in the event of a malfunction, call the factory to obtain a Return Authorization prior to sending the unit back.

Appendix

audio mute cable

To use a PPS-100 CONTACT as an audio mute, wire a cable to send audio into the CONTACT jack (either terminal of 1/4" plug). Return audio on the remaining terminal. Do not "ground" either terminal of the plug. Solder a 1 meg ohm 1/4 watt resistor from the return wire to the cable shield.



to PPS-100

to channel insert

binary to hex for sysex

To enter a SYSEX cue into the PPS-100, the MIDI data is entered in hexidecimal ("hex") notation. However, the MIDI Implementation Charts in the owners manuals of some instruments may be written in the less-convenient binary form. Use this table to convert binary notation into hexidecimal notation. (Remember that hex numbers are usually written preceded by a dollar sign, or followed by an "h", as in $F7 or F7h.)

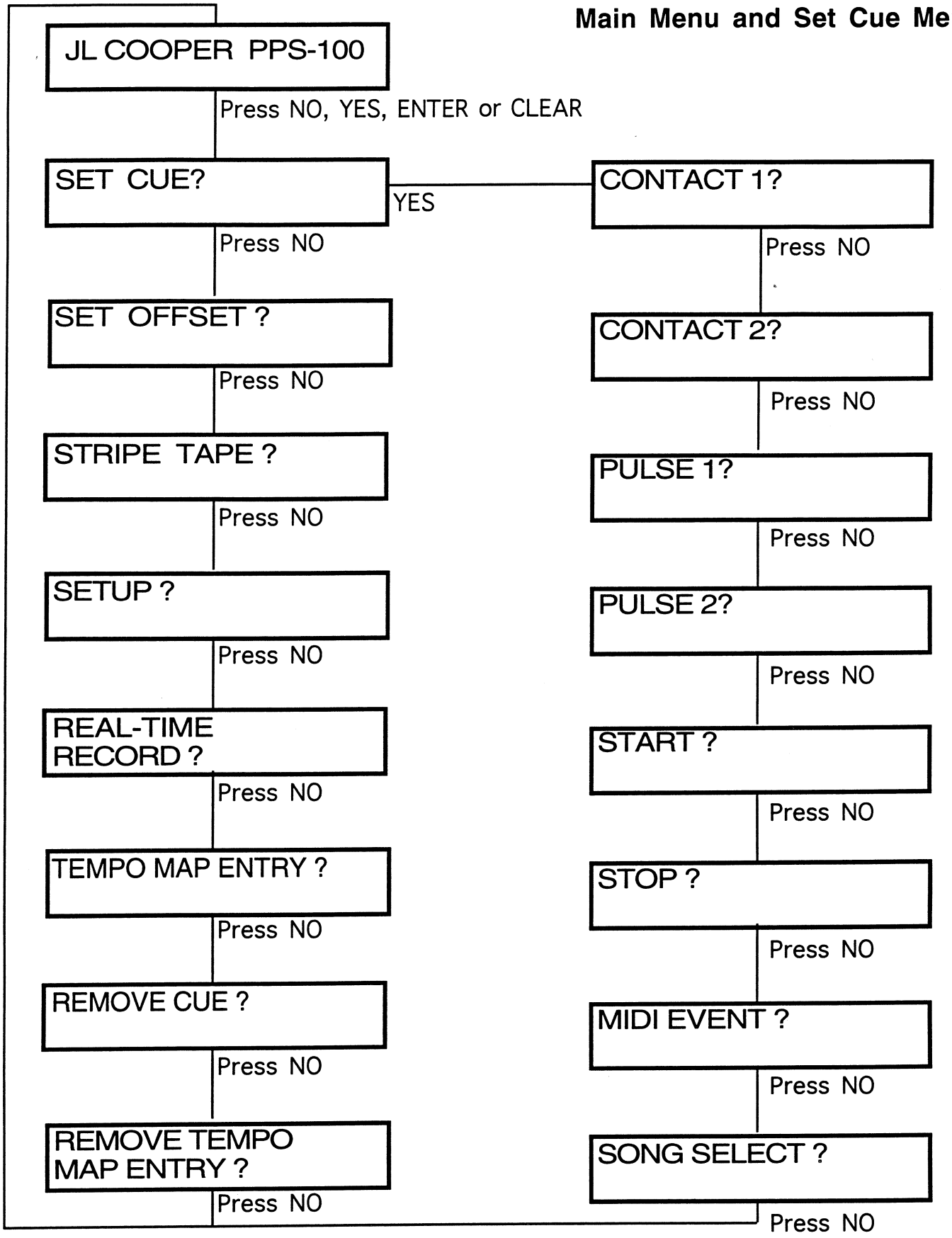
Binary	Hex
0000	$0
0001	$1
0010	$2
0011	$3
0100	$4
0101	$5
0110	$6
0111	$7
1000	$8
1001	$9
1010	$A
1011	$B
1100	$C
1101	$D
1110	$E
1111	$F

Example:
Say that you wanted the PPS-100 to change some internal parameter of a reverb at a specific SMPTE time. You look in the owners manual of the reverb, and it tells you that the only way to change that parameter is with a MIDI SYSEX message. Say that the manual tells you to send this message:

11110000, 00010101, 00111011, 11110111.

Look at the first byte. Break into two "nibbles". The first 1111 equals $F, the next 0000 is $0.
So the first byte in hex is $F0. Convert the remaining bytes and the whole message reads:
$FO, 15, 3B, F7. That is the hex number you would enter into the PPS-100. Remember that all sysex messages begin with FO and end with F7.

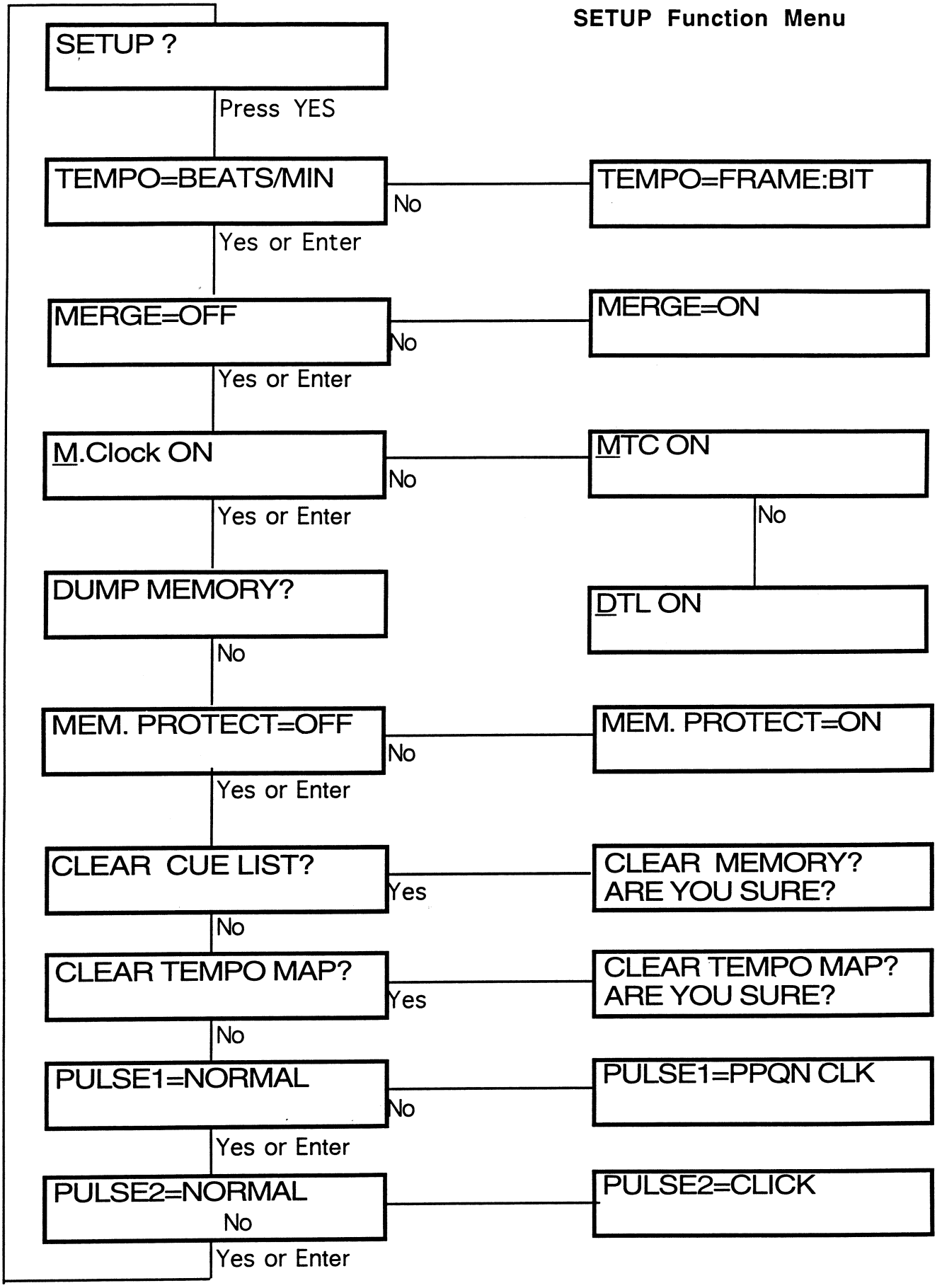
Main Menu and Set Cue Menu



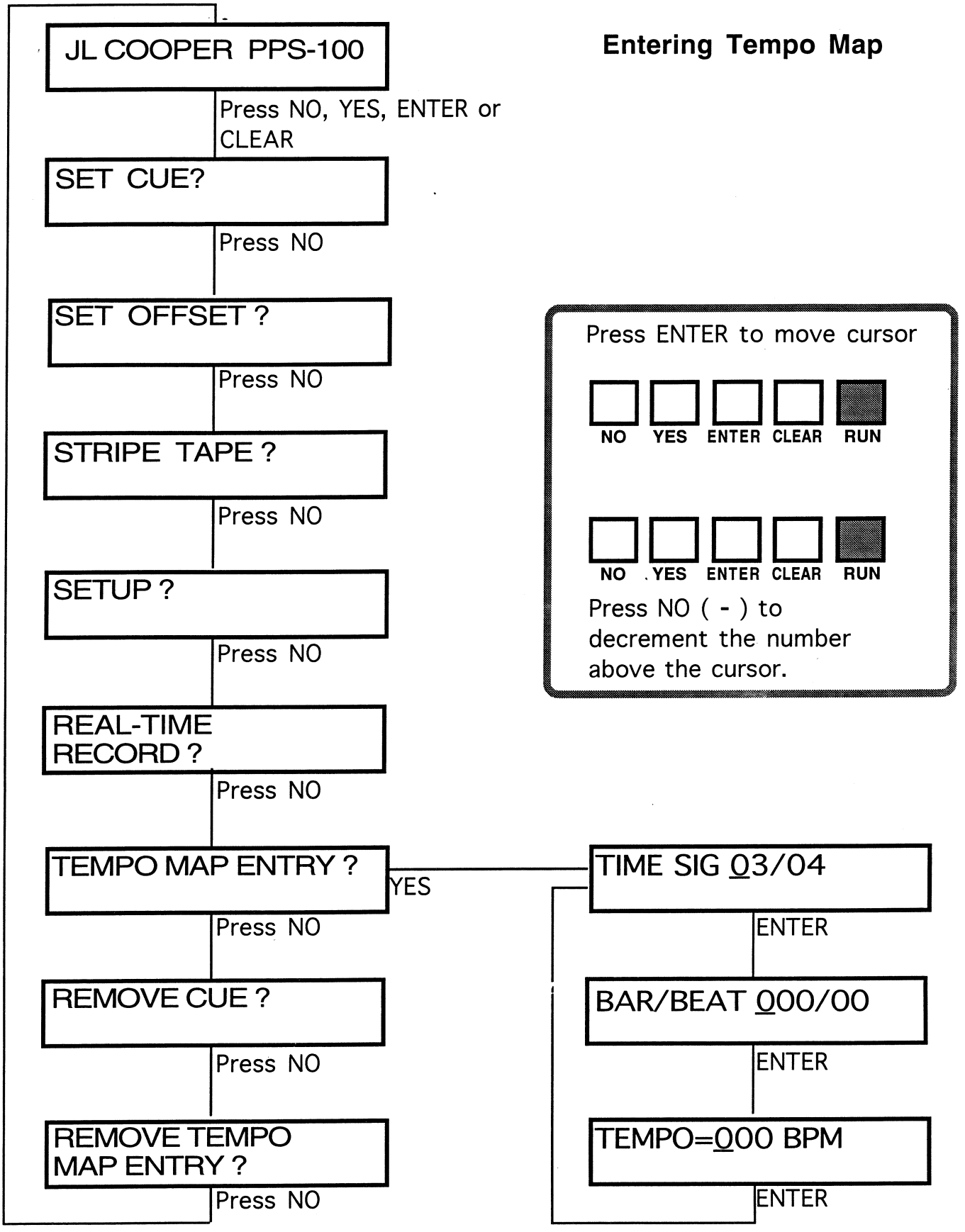
Press CLEAR to return to the top of the Main Menu.

Press RUN to go "page up" to the previous function

SETUP Function Menu



Entering Tempo Map



Press CLEAR to return to Main Menu

PPS-100 Owners Manual Appendix

Tempo Map Entry

A new feature has been implemented to prevent the accidental entry of two tempo changes occurring on the same bar and beat.

A tempo map entry consists of three parameters: TIME SIG, BAR:BEAT, and TEMPO. After entering these parameters, the PPS-100 now displays **ENTRY OK**. Press any key to return to the TEMPO MAP ENTRY? prompt.

Very Important: Do not enter more than one Tempo Map Entry occurring at the same bar and beat. If you accidentally do this, the PPS-100 may ignore all tempo map entries.

If you find that the PPS-100 is ignoring tempo changes, go to the Remove Tempo Map Entry? page and remove any duplicate entries.

Never make a Tempo Map Entry at bar 1, beat 1, since the Start Cue already contains that information.

Initialization

The PPS-100's internal memory may become scrambled if the unit ever receives a power surge. The PPS-100 may also behave incorrectly if it receives time code faster than 15% too fast.

The symptom of this is a scrambled display. If this happens, the PPS-100 can be fixed by initializing the memory.

To initialize, turn off the power, Hold in RUN button and while holding in RUN, turn on the power.

(This puts the PPS-100 into a self test mode. The red LED will flash and some codes will appear in the display, ignore these.) After about a second or so, turn off again.

This procedure completely clears out the memory of the PPS-100, making it like it is new out of the box. Any mysterious symbols will be gone.