PPS-1

VERSION THREE
Owner's Manual

Third Edition- September 1988

PPS-1 OWNERS MANUAL

GREETINGS

Thank you for purchasing the **PPS-1**. This product represents a revolutionary price breakthrough in pro audio/MIDI synchronization. The **PPS-1** allows MIDI sequencers and drum machines to sync to tape and gives them the ability to "chase tape". This feature resembles SMPTE in that the tape can be started anywhere in the song. Conventional sync boxes require that you always start at the beginning of the song. Also, typical SMPTE synchronizers cost in excess of $1000 and can be very complicated to set up and use.

The **PPS-1** operates in either one of two distinct modes, depending on your application.

In **"smart" FSK** mode, use the **PPS-1** between any multi-track tape transport and any sequencer or drum machine that recognizes MIDI SONG POSITION POINTER. Sequencer tracks (or Drum Machine parts) are recorded first, then the **PPS-1** is used to "lay down" a special FSK sync tone, also known as "striping" the tape. Alternately, if your sequencer allows the setting up of varying tempo patterns, you can program them first, then just "play back" the tempo out of the sequencer into the **PPS-1**, and the "stripe" will follow that perfectly. The **PPS-1** will read that FSK sync tone during tape playback/overdubs/mixdown and generate a MIDI SONG POSITION POINTER, causing the MIDI device to "chase" to the appropriate point in the song. Then the **PPS-1** will generate MIDI SYNC clocks, so that the MIDI device stays in perfect sync.

In **SMPTE mode**, the **PPS-1** has the ability to read TRUE SMPTE. While reading SMPTE, the **PPS-1** will put out **either** MIDI Time Code (MTC) or Direct Time Lock (DTL). MTC, a recent addition to the MIDI Spec, is a way of sending SMPTE frame messages on a MIDI cable. It is used to drive software packages such as Q-Sheet™ by DigiDesign, Auricle II™ by Auricle Control Systems, and CUE™ by OpCode. You may also be seeing some sequencers or drum machines in the near future that can take advantage of this feature. DTL is used by Mark of the Unicorn's Performer program. Thus the **PPS-1** will allow you to lock Performer to SMPTE. The **PPS-1** will also stripe SMPTE in this mode.

PPS-1 FEATURES

- **Smart FSK with Song Pointer**
- **Slow or Fast Chasing**
- **Auto Merging Input**
- **Stripes SMPTE**
- **Generates MTC**
- **Generates DTL**

CONTENTS

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Chapter 1- "Smart" FSK Mode
Complete Operation Procedure in Brief

This section provides a general overview of the operation of the **PPS-1** in FSK mode**.** The following sections will present the specifics. Once you have familiarized yourself with the operation of the **PPS-1**, you may refer back to this section as a quick guide to operation.

Slide the mode switch up to the FSK position.

To Stripe the Tape

(1) Have basic sequencer (or drum) tracks loaded.

(2) Hook up **MIDI OUT** of the sequencer / drum machine to **MIDI IN** of the **PPS-1** . Hook up **TO TAPE** output jack of **PPS-1** to tape input (See section 2.) Typically, sync tones are recorded on the last track.
(3) Disable EQ and Noise Reduction, if any, on that track, and set levels (See section 3.)
(4) Set sequencer / drum machine to internal sync. Set the **PPS-1** switch **TO TAPE**.
(5) Start tape transport in RECORD on the sync track. After a little pre-roll time, start the sequencer or drum machine.
(6) **LOCK LED** will come on, indicating that tape is being striped with a special sync tone that conveys the number of clocks that have been received by the **PPS-1** since the start of the song.
(7) Stop the tape transport at end of the song.

To Sync Sequencer / Drum Machine to Tape

(1) Hook up tape output to the **FROM TAPE** input jack of the **PPS-1** . Hook up the **MIDI OUT (s)** of the **PPS-1** to sequencer and/or drum machine.
(2) **Disconnect MIDI OUT of sequencer from MIDI IN of PPS-1. This is necessary to prevent a "MIDI loop" from forming. This is because the PPS-1 "merges" its MIDI IN data along with its own sync data.**
(3) Check to make sure that there is no EQ or NR on sync track.
(4) Set sequencer and/or drum machine to receive external MIDI SYNC. Depending on the make of sequencer or drum machine you are using, slide the **PPS-1** switch to one of the **FROM TAPE** positions. (select "SLOW" or "FAST")
(5) Start tape transport playing either at the beginning or anywhere within the song.
(6) As soon as the **PPS-1** receives the sync tone, the **LOCK LED** will come on and a MIDI SONG POSITION POINTER will be sent. This will be followed by a CONTINUE command and by MIDI CLOCKS. The sequencer / drum machine will "chase" and lock (See section 4.)

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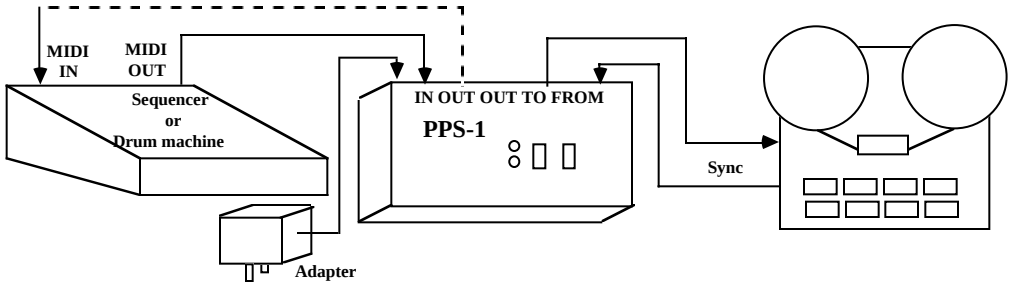
Section 2- Hook Up

The basic idea here is to feed the sequencer or drum machine MIDI OUT to the **PPS-1**'s MIDI IN for striping. The MIDI OUT of the PPS-1goes to the MIDI IN of the sequencer during playback. The TO TAPE output goes to an audio input that will arrive at the selected tape track, whether directly or via a mixing console to control the level.

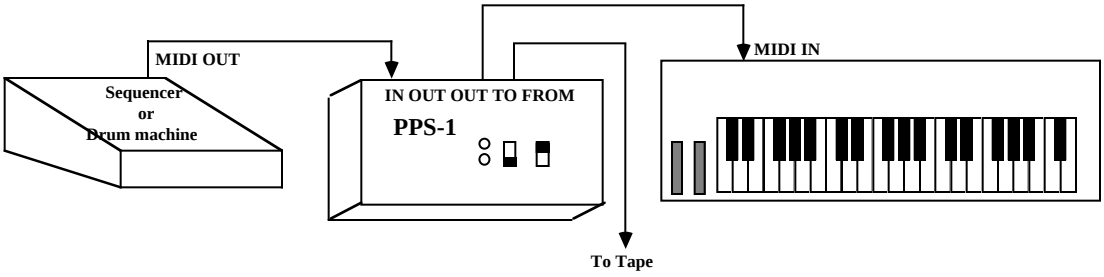
Power comes from the supplied 9VDC 500 ma. adapter. (The center conductor is positive, keep this in mind if you ever need a replacement.)



Specific Hook Up Examples

Striping the Tape

While monitoring the playback of a single MIDI



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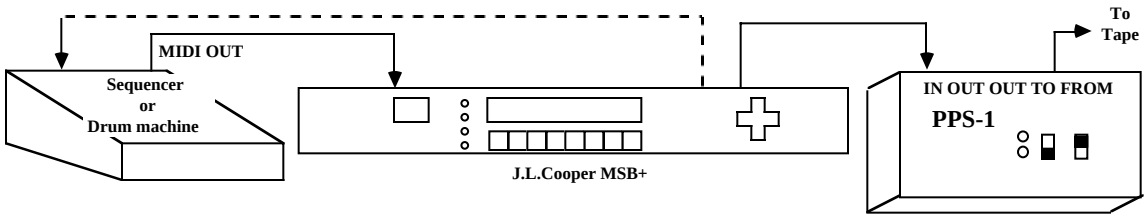
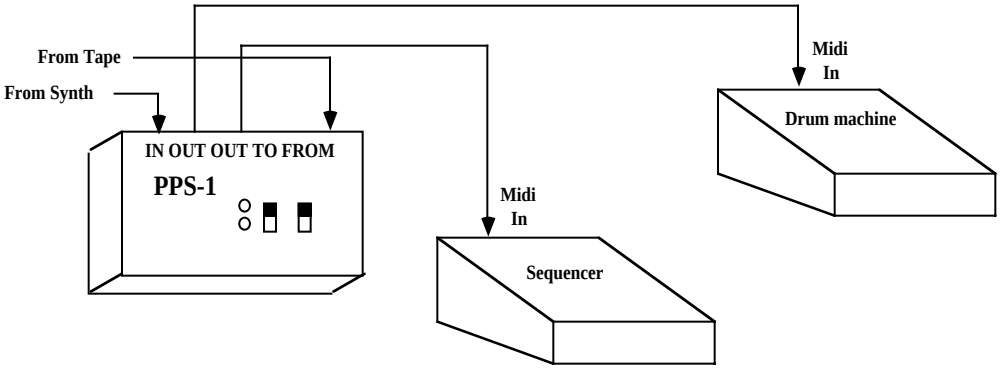
Section 2- Hook Up Continued

Striping the Tape
While monitoring the playback of many slaves. This would call for some sort of MIDI distribution device (i.e. Switchbox, splitter, or thrubox



Slaving to Tape While Recording a Sequencer Track
A sequencer and a drum machine to tape at the same time. Notice that the MIDI IN is connected to a synth. The synth output is auto merged with the clocks to go to the sequencer.



IMPORTANT: During playback, disconnect (either manually or with a switchbox) the MIDI OUT of the sequencer from the MIDI IN of the PPS-1 to prevent a MIDI loop from forming. During playback, the PPS-1 merges any MIDI data coming into its MIDI IN with timing data and sends both to the PPS-1 MIDI OUTS.
If you are recording on the sequencer while synced to tape, you would have the MIDI IN of the PPS-1 connected to the keyboard.
If you are not recording on the sequencer while synced to tape, then leave this MIDI IN disconnected.

Section 3 Striping

First hook up the **PPS-1** according to the previous directions. Typically, the last track available is used for sync tones (e.g, if you are using an 8-Track, record the sync tone on track 8.) Be sure to defeat noise reduction and E.Q. from this track. This is especially easy to overlook if you are routing your signal through a mixing console to set levels, but may interfere with the recording of a usable sync tone.

<u>After</u> recording your sequencer tracks (or drum machine tracks,) leave your sequencer set for internal sync. On the PPS-1 , slide the left switch to the STRIPE position.

Also be certain that your sequencer is set up to transmit MIDI clocks.

You should set record level to somewhere between -10 and -3 dB. The higher the level, the less vulnerable you will be to "drop out". However, on decks with poor track separation, you may opt for the lower level to avoid hearing the sync tone "spill" into an adjacent track.

Start the tape transport in RECORD. After 15 or so seconds of "leader" tone, start the sequencer or drum machine playing. It will send out a START and CLOCK commands to the **PPS-1**, which will in turn light the LOCK LED. The **PPS-1** will start sending the special sync tone to the tape that conveys the number of clocks since the reception of the START command (i.e. since the start of the song.)

A few seconds after the sequence stops, stop the tape.

Section 4 - Slaving

This is the proceedure you will use for overdubs, playback, and mixdown. First, set up your console for the recording and monitoring of your tape tracks. Also, check to see that your MIDI system is hooked up so that you will be able to monitor the audio outputs of your sequencer-driven slaves. Check to make sure that there is no E.Q. or Noise Reduction on the sync track being fed to the **PPS-1**'s FROM TAPE input.

When slaved to tape, the **PPS-1** will automatically merge data coming into the MIDI IN with the clock/SONG POSITION POINTER information. This is useful if your sequencer allows for overdubs while it is externally synced. In that case, (that is, playing back the tape while recording a new part on the sequencer,) you would hook up the MIDI OUT of your keyboard to the MIDI IN of the **PPS-1**. Now the MIDI OUT of the **PPS-1** will feed keyboard data and sync data at the same time to the sequencer.

Because of this feature, it is very important that you disconnect the MIDI OUT of the sequencer from the MIDI IN of the PPS-1 while slaving to prevent a "MIDI loop" from forming. This would result in the sequencer's data from feeding back into itself.

Set your sequencer and drum machine to "External Midi Sync".Slide the left switch on the PPS-1 to one of the slave positions, either SLOW or FAST.

Most sequencers and drum machines chase and lock almost instantaneously. For these devices set the switch for FAST.

Other sequences and drum machines have relatively long chase times and actually ignore the clock commands that come in during the chase. Some machines will abort a chase if the Song Pointer command is immediately followed by continue and clock messages. For these machines set the PPS-1 switch to the SLOW position.

The SLOW position puts a small waiting period between the Song Position Pointer and the Continue/Clocks. This will have no adverse effect on the operation of the system, it just means you'll have to allow for a few seconds of preroll. (That is, instead of fast-winding your tape to the exact part of the song you want to start from, you will wind the tape to a point a few seconds before the part.

The KORG DDD-1 is known to require the **SLOW** position.
Start the tape transport, either from just ahead of the start of the track, or from where ever within the track you desire. As soon as the **PPS-1** receives sync, the LOCK LED will come on. If this is at the very beginning of the track, a MIDI START command, followed by MIDI CLOCKS will be sent from the **PPS-1** to the sequencer or drum machine. If the tape is started anywhere later

than the very start, a MIDI SONG POSITION POINTER will be sent, followed by a MIDI CONTINUE command, and then MIDI CLOCKS. The sequencer/drum machine will "chase" to the appropriate place in the song, assuming that it recognizes the SONG POSITION POINTER. From there, it will stay in perfect sync.

Playback Level:

The **PPS-1** will accept a wide range of playback level. However, it is of course possible to go beyond the range of acceptability. Generally, the signal may be as hot as it is liable to go out of a multi-track or console. If the signal is getting to the **PPS-1** via a console, set the level to be reasonably "hot". If the LOCK LED flickers on and off, try adjusting the fader up or down for a steady ON condition.

If you still experience difficulty in getting a steady lock, see TROUBLESHOOTING, Chapter 4.

Chapter 3 - Theory

FSK

Traditionally, "FSK" type of devices have served as the link between MIDI and tape. In this simple system, either of two audio tones were placed on the tape, varying back and forth at a rate determined by the rate of the MIDI Clocks.

On playback, the circuitry detected these variations of frequency, and sent back clocks. The problem was that, since all of these tone variations "looked" the same, it was impossible to determine just where within a song that the tape was started. It was always necessary to start at the very beginning of the tape each time.

SMPTE has been around for quite a while now, and has a scheme for putting a special sync tone on to tape that indicates exactly where each "frame" of time lies. It uses an hour/minute/second/frame system to uniquely "stamp" each approximately 1/30 of a second worth of tape.

While this is a fine system for locking tape mechanisms together, or referencing tape to film or video images, it doesn't make life easy when trying to tie a (possibly) varying tempo of music to the fixed rate of SMPTE. A "tempo map" must be carefully entered, telling just how many frames at such and such a tempo. In addition to the complexity of this conversion, these device are usually around $1000 or so.

The **PPS-1**, in FSK mode, uses the best of these two technologies to make life simpler for the musician. The MIDI Clocks from the sequencer (which may vary tempo in any fashion) are used to generate a sync tone somewhat like in the first system described. But instead of a simple varying of two tones, a special encoding somewhat like SMPTE is used. Each time the **PPS-1** receives a clock, a unique burst of tones is transfered to tape. It is within these bursts that information describing the number of clocks since the start of the song is held.

Upon playback, the **PPS-1** reads the first burst to go by, and converts it into a SONG POSITION POINTER, and sends it to the slave device. Thereafter, normal MIDI Clocks are sent as encountered on the tape.

All sequencers (and drum machines) have a finite chase time. That is, while they are searching for the location that the Song Position Pointer indicated, a certain amount of tape has rolled by, and a certain number of clocks have been sent to the sequencer while the chase is going on. Most sequencers will "buffer" the clocks, i.e. set them aside.. That way, when the chase is completed, the sequencer can know how much further it must advance to allow for the tape travel during the chase. This is what will go on when the PPS-1 is set for **FAST**: the Song Position Pointer will be immediately followed by Continue/Clock commands.

However, some sequencers (and drum machines) completely ignore Clock and Continue messages that arrive during the chase. Or they may even abort the chase the moment they "see" a Continue command. The **SLOW** position of the **PPS-1** accommodates these machines by putting a short wait period between the SPP and the Continue/Clock commands. The **SLOW** position does this at the expense of having the user allow a few seconds of pre-roll time.

The **SLOW** position should work with ALL machines that accept Song Position Pointer. The **FAST** position will work with MOST machines.

The burst of information contains enough bits to handle over two hours worth of time at a tempo of 120 beats/second.

Chapter 2 - SMPTE Mode

Slide the mode switch up to the SMPTE position. In this mode, the PPS-1 will convert true SMPTE into MIDI Time Code frame messages, or into Performer's Direct Time Lock. The **PPS-1** will also allow the striping of a tape with SMPTE if you have no SMPTE generator. In this function, only 30 non-drop format is used, starting at 00:30:00:00.

NOTICE!

MTC and DTL have NO relationship to Song Position Pointer. The SMPTE Mode of the PPS-1 will only do something useful if it is used in conjunction with a MIDI Time Code-driven software or hardware package, or with Mark of the Unicorn's Performer. As of this writing, software products that either use, or will soon implement, MIDI Time Code include Q-Sheet by DigiDesign, Auricle II, by Auricle Control Systems, and CUE by OpCode.

If you don't own one of these systems (or know that your system can use MIDI Time Code specifically), then this chapter does not apply to you.

Striping

First hook up the **PPS-1** TO TAPE output to the intended input on your tape recorder. Typically, the last track available is used for sync tones (e.g, if you are using an 8-Track, record the sync tone on track 8.) Be sure to defeat noise reduction and E.Q. from this track. This is especially easy to overlook if you are routing your signal through a mixing console to set levels, but may interfere with the recording of a usable sync tone.

You should set record level to somewhere between -10 and -3 dB. The higher the level, the less vulnerable you will be to "drop out". However, on decks with poor track separation, you may opt for the lower level to avoid hearing the sync tone "spill" into an adjacent track.

To initiate a SMPTE stripe, slide the left switch to the STRIPE position, with the right switch set to SMPTE

It is common practice to stripe the whole length of tape.

SLAVING

First hook up the tape output to the FROM TAPE jack of the PPS-1

MTC

Hook up either MIDI output of the PPS-1 to the MIDI input of your computer or other MTC-driven device. Slide the left switch to the MTC position. As soon as the PPS-1 receives SMPTE, the green lock LED will come on and MTC will be generated. Refer to your specific software-manufacturer's recommendations for using MTC.

DTL

Hook up either MIDI output of the PPS-1 to the MIDI input of your computer. Slide the left switch to the DTL position. As soon as the PPS-1 receives SMPTE, the green lock LED will come on and DTL will be generated . Refer to the specific instructions in your Performer owners manual for using Direct Time Lock.

Chapter 4 - 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 LOCK LED does not come on when attempting to stripe FSK.
Check that the sequencer or drum machine is really set up to put out MIDI sync. A surprising number of devices need to be "told" to do this. The MIDI cable should go from the MIDI out of the sequencer to the MIDI in of the PPS-1, and the switches should be set to STRIPE and FSK.

The LOCK LED does not come on when attempting to slave to FSK or SMPTE.
Check that the tone is really on tape by monitoring (listening to) the sync track AT A LOW LEVEL. It should not be a steady tone, rather it should sound sort of garbled or warbling. Check that you are set to slave to the same type of sync that the tape is striped with.

The LOCK LED does not stay on steadily.
E.Q. and noise reduction should be defeated during record and playback. The tone level should optimally be around -10 to -3 dB. If the LOCK 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 hi-hat or sparkling funk bass 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.

No chase or irregular tempo with FSK.
First verify that the sequencer or drum machine is indeed set to external MIDI SYNC. (If you have inadvertently left the sequencer or drum machine set to internal sync, it may still give the illusion of locking to MIDI sync. But it will not chase or lock properly.) If the sequencer will start from the beginning and lock, but will not chase, it may be that SLOW CHASE must be enabled.

If the sequence plays back at about **half tempo**, check that the tempo of the sequence during the stripe operation did not exceed 240 B.P.M. If the sequence plays back at **double tempo**, be sure that you have not inadvertently caused a MIDI loop. If the MIDI OUT of your sequencer or drum machine is hooked up to the MIDI IN of PPS-1while slaving, a MIDI sync "feed-back loop" will occur.

If none of the switches do anything, and none of the LEDs are on, check power hook up first. If the LEDs 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 next page.

At J.L.Cooper Electronics, we pride ourselves on our consistency of conscientious workmanship. We use solid metal enclosures, and highest quality epoxy glass printed circuit boards. Despite its uncanny resemblance to a lead ingot, the **PPS-1** is actually a precision micro processor-based instrument. Please transport it tucked away in one of your road cases.

If you experience any operational difficulties, let us reassure you that <u>every</u> unit is 100% factory

tested. It worked when it left the factory, otherwise it wouldn't have been shipped. The 2nd most common cause of problems is a "noisy" AC outlet. We recommend the use of a AC 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-1** . For warranty service in the event of a malfunction, call the factory to obtain a Return Authorization before sending the unit back.

The 1st most common reason that products get returned to the factory is, sadly, failure of the customer to read his owner's manual. We don't mean to get cocky because occasionally there will be failures, but please, read the manual and debug your system before calling. We can't find your bad cable 1,500 miles away.