



**YAMAHA**

**POWER USER**

**AW1600 / MOTIF ES STUDIO**

Music Production

The Setup: Clock and Synchronization Issues/  
MIDI Clock/ MMC & MTC/ TEMPO MAP/  
Recording Automation to MIDI  
START POINT

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## Background

The AW1600 Audio Workstation linked to a Motif ES 6/7/8 Integrated Sampling Workstation is a very powerful combined tool for music production. It is a MIDI-and-Audio marriage that is hard to beat. The combination of tools will make your life easy once you are clear on how the two units best interface. There is not just a single way to connect and work with the two units; you will want to understand how they connect, and why, so that you can best make the units serve your creative ideas. No single guide can cover every possible scenario but we will attempt here to give you a solid plain language explanation of how it works. And what fits where...

The Motif ES is a keyboard workstation that has both MIDI sequencing and digital audio sampling as parts of its toolkit. The AW1600 is a multi-track hard disk recorder with some pad sampling capabilities. Knowing what each is capable of doing will help you in planning your recording. The advantage of sampling in the Motif ES vs. recording in the AW1600 or vice versa is a subject that has to be understood. A 'Sampler' like the Motif ES, typically has a comparatively small amount of total record time (512MB maximum in the Motif ES), while the AW1600 has a record time per Song up to the capacity of a 40GB drive. There are one thousand megabytes in a gigabyte! The amount of record time in the AW1600 is huge in comparison. But this is not a contest of memory length. What is important is knowing when to use the 'tool' we call the *sampler*. A sampler is like working in the microscopic domain. For example, if you need the sound of a finger snap for a song. In a sampler you could record yourself snapping your finger, once. Then use the sequencer's loop function to repeat the playback of that finger snap over the length of the tune. Linear recording uses continuous amounts of memory for storage. As you get to know these tools you will be able to maximize the use of the sampler in each device for its best purpose.

## CLOCK ISSUES

Let's start our discussion with synchronization. You will be linking the two machines together via MIDI to accomplish both the transfer of control data and timing data. You have the following options regarding synchronization:

MTC is MIDI TIME CODE. This is SMPTE<sup>1</sup> Time Code configured to go down a MIDI cable allowing MIDI gear to synchronize with this film industry standard clock. It is divided into "Hours: Minutes:

Seconds: Frames" and is used to clock music/film or just music devices. The AW1600 can be the MTC MASTER (or Slave)<sup>2</sup>, while the Motif ES can *only* slave to MTC. The Motif ES can be a slave to MTC at 30-frames/sec. Therefore, in any scenario where you will be using MTC as your clock the AW1600 should be set to 30 frames per second, and *it must be the MASTER clock*.

**MIDI CLOCK** - The two workstations can be synced via MIDI clock. The AW1600 can generate MIDI clock (but does not receive it) and the Motif ES, of course, can send or receive MIDI clock. Therefore, in any scenario where you will be using MIDI Clock, *the AW1600 will be the MASTER clock*.

What you need to know about selecting a sync mode: When you are synchronizing devices via MTC, you should be in a PLAYBACK mode on the Motif ES, only. MTC does not like other data jamming up the works – it enjoys being the only signal in the cable. For example, you would **not** sync the Motif ES to the AW1600 and attempt to sequence data while the Motif ES is slaved to MTC. (Nor would you want MIDI MIX AUTOMATION data travelling down the wire with MTC clock signal.) When using **MTC sync** the following situations exist:

- The AW1600 is always the MTC Master
- The AW1600 is set to 30 frames
- The Motif ES is set to MIDI SYNC = MTC
- The Motif ES is used in SONG mode (Song mode is the only mode on the Motif ES that can respond to MTC).
- The Motif ES has completed all Song recording and is only going to slave to the AW1600. MTC needs a dedicated cable for clock information.
- The tempo of the Slave (Motif ES) must match the tempo of the Master (AW1600). They can be set independently when MTC is in use – if you want them to reference time to the same tempo you must set them to the same BPM.

While you are still building your composition (tracking in the Motif ES) you will be working with MIDI Clock if you need to run both units together. The Motif ES can slave to MIDI clock and record MIDI events to its sequencer, simultaneously. In many cases you will be building tracks in the Motif ES independent of the AW1600 – you can link up to the AW1600 after you complete your MIDI Motif ES tracks. There is no single way you must work. Sometimes you will need to be building

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<sup>1</sup> Society of Motion Picture and Television Engineers – more significantly an acronym for timing code used in films.

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<sup>2</sup> In other scenarios the AW1600 can be a slave, however when used with the Motif ES MIDI workstation the AW1600 will always be the Master Clock.

tracks while working with both units together. The following situations will exist when using **MIDI sync** to clock the units:

- AW1600 is the MASTER MIDI clock
- Motif ES as the MIDI Clock SLAVE
- The Motif ES can be in Song mode (where Song Position Pointer will apply) or in Pattern mode (where you will have to locate measures manually).
- You can still record data on the Motif ES while in sync to MIDI clock.
- The tempo of the Slave will automatically be set to match the tempo of the Master. They cannot be set independently.

It is the most flexible and will allow you to work with the Motif ES Sequencer (record) while maintaining synchronization with the AW1600, if necessary.

### TEMPO MAP

The AW1600 will let you create a TEMPO MAP, when you setup a Song. As we will see this TEMPO MAP is the control track. It will let us recall all kinds of events during the Song – it will read out in both clock time and in measures/beats. By creating a tempo map prior to recording you can ‘chart’ an outline of the structure of your song, no matter how complex in terms of time signature and tempo. Or you can simply input a time signature (4/4) and select a tempo (120bpm) and go. The AW will generate an audible metronome that follows this Tempo Map, so not only do you have a controlling signal, you have a guide with which to play. It cannot be stated strongly enough, you will want to make a tempo map **prior to recording** any data. If you plan on using MIDI, even if you are not sure you will be using MIDI tracks later, you should setup to record as if you were. All this means is, you should use the AW1600’s built-in Metronome function as a guide. If you do this you will have no problem making the Motif ES’s MIDI sequencer (or any MIDI sequencer) play in synchronization with your audio, if you decide at a later time to add it.

### THE MIDI CONNECTIONS

- Connect the MIDI OUT of the AW1600 to the MIDI IN of the Motif ES.
- Connect the MIDI OUT of the Motif ES to the MIDI IN of the AW1600

### THE AUDIO CONNECTIONS

In considering the audio connections from the Motif ES, it really is your choice and will depend on just what you will be recording. You can plug the STEREO L&R analog outputs to two analog inputs of the AW1600. The Motif ES also has the analog Assignable L&R (AsL&R) outputs. The

AsL&R can be addressed by the Motif ES as a stereo pair or as to mono individual outputs (AsL and AsR). Also available on the standard Motif ES is an optical digital output. You can connect this directly to the AW1600’s optical digital input. The Optical is a digital version of the data that arrives at the analog L&R output. The assignable outputs are “dry” (no effects) while the Stereo Outs (digital and analog) have the Motif ES effects (“wet”). If you expand the Motif ES with the AIEB2, this gives you 6 additional analog outputs, plus another optical connections (both in and out), plus a coaxial digital for good measure. Although the coaxial is not useful in the Motif ES Studio scenario, the others will give you plenty of options for tracking. The assignable outputs on the AIEB2 can be addressed in stereo pairs (as1&2, as3&4, and as5&6) or as individuals (as1, as2, as3, as4, as5, and as6). Again, the assignable analog outputs are “dry”. When you assign a Motif ES PART to an assignable output and connect it to the AW1600 input you can apply an AW INPUT Effect, a channel dynamics processor and a channel 4-band parametric EQ. Cool!

On the AW1600 you need to connect the audio output of the MONITOR OUT to your power source or powered monitors. MONITOR OUT has a separate Volume control that will let you turn down the Volume without affecting recording levels.

### SETTINGS within the AW1600

- Press [UTILITY] and select the MIDI page. Set the MIDI OUT column so that both “MIDI” and “CLK” are selected (darkened). This will ensure that MIDI messages generated by the AW1600 will be sent out and clock information will be sent out.

MMC is MIDI MACHINE CONTROL. This can allow you to select a “transport” controller. Basically, it controls the use the START/STOP/FF/REW functions on the AW1600 or the Motif ES. If you set the MMC column in the AW16 to MASTER, then you must set the Motif ES parameter to receive this transport control message.

In the Motif ES it is called “SeqCtl”, set it to IN

- [UTILITY]
- [F5] MIDI
- [SF3] SYNC

When you are using MTC to link the units, **and** you want to use the transport of the Motif ES to start/stop and locate on the AW1600, set the “SeqCtl” parameter to OUT and the AW1600 as SLAVE to MMC. The Motif ES can act as MMC Master **only** while it is acting as a Slave to MTC.

MTC – As mentioned, you will only be using this column when you are set to playback in sync, only. It is not a “working” mode and should be used only when all tracking is finished. The AW1600 will always be the Master clock.

DEV – Device Number; This is a MIDI communication bus between the Motif ES and the AW1600 when using MMC. Set this to 1 in the AW1600 and the Motif ES Device number defaults to ALL (you can leave it or set it to 1).

RX (RECEIVE) – You can select a MIDI channel to receive controlling events that you record to the Motif ES sequencer. This will be used when you are using the sequencer to house AW SCENE events and MIDI automation commands. For example, you could dedicate a channel on the Motif ES to record automation commands for your AW1600 MIX – mutes, Scene recalls, etc., etc. Range: Channels 1~16.

TX (TRANSMIT) – You can select a MIDI channel to transmit controlling events that can then be played back from the Motif ES sequencer to the AW1600. For example, SCENE events are sent as Program Change events on the designated channel. Range: Channels 1~16.

PROGRAM CHANGE – Program Change events are used to recall AW1600 Scenes (snapshots of all mixer settings). You can create a custom SCENE/PROGRAM CHANGE map in the AW1600. Here you can set the AW1600 to receive or send these events – depending on your need at the time. Range: OFF, RX, TX, or RX-TX.

CONTROL CHANGE - Control Change messages is data that can be used to automate the fader movements and other functions via MIDI. Here you will be selecting a mode for dealing with these messages. Range: OFF, 1, 2 or 3.

- Mode 1 will be used only if you are using the entire Motif ES sequencer, all 16 tracks, to record AW1600 mix automation events. This only recommended for such rare occasions when the sheer amount of automation requires extreme measures to accurately accomplish.
- Modes 2 and 3 will allow you to designate a single Motif ES track for **all** AW1600 mix automation events (more likely what you want to do working with the Motif ES as your sequencer). The difference between these two has to do with if you want to automate the INPUTS, i.e., faders, effects, etc., you would use CONTROL CHANGE TYPE 2. If you want to automate the TRACK channels, i.e., faders,

effect sends, etc., you would use CONTROL CHANGE TYPE 3.

In short, TYPE 2 for when you are using automation during a “live” recording session, and TYPE 3 when you are automating a mixdown.

AVRG. – MTC SYNC AVERAGE. This parameter has to do with when you are using the AW1600 as an MTC slave and are getting unsteady signal. This will **not** concern you in the AW1600/Motif ES hookup.

OFST+ – OFFSET. This parameter has to do with delaying the start point when you are using the AW1600 as an MTC slave (a situation where you have 2 AW's in sync). This parameter will **not** concern you in the AW1600/Motif ES hookup.

### SETTINGS within the Motif ES

In the Motif ES we will want to set up to ‘slave’ the sequencer to the AW1600’s clock and set it to receive transport and other MIDI messages.

- Press [UTILITY] and select the [F5] MIDI page. Press [SF5] OTHER and make sure that the MIDI IN/OUT is set to **MIDI**, not USB or mLAN.
- Press [SF3] SYNC and set the CLOCK to MIDI
- CLOCK OUT will not matter (the AW does not receive any kind of clock that the Motif ES generates). Set this to OFF.
- SEQ CTRL set as appropriate to whether you are using the Motif ES transport (OUT)<sup>3</sup> or the AW1600 transport (IN) as the Master transport. In most cases you will be using MIDI clock and the AW transport to start/stop and locate measures.

### AW1600 ‘TEMPO MAP’ IN ACTION

The AW1600 was built from the ground up with the musician in mind. The TEMPO MAP and the way the clock is structured speaks a language musicians understand. If you were to join a band and they told you that 1 minute and 23.501 seconds into the tune you go to the Bridge, as a musician this would be confusing and a meaningless command. If, however, they tell you that at measure 49 you go to the Bridge you feel much more comfortable because, without counting, a musician has a sense of 4, 8, 12, 16 measures depending on the form of the tune that makes this a breeze. So the AW1600 speaks

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<sup>3</sup> MMC control OUT is only available when the Motif ES is slaved to MTC. It is a convenient way to remotely control the AW when using MTC synchronization. The Motif ES only generates the MMC control commands when a slave to MTC. The Device numbers must match for MMC messages to be properly sent/received.

many different kinds of clock. It can tell you the ABSOLUTE time from the beginning of the recording. It can tell you the RELATIVE time from some designated point you select to be the musical START time. It can tell you how many hours, minutes, seconds, and frames of visuals have gone by if you are working with video/film. It can tell how much clock time has passed to get to any position within the song. It can tell you how much time remains in the song. And it speaks in a time reference that musicians love: Measures and Beats. The TEMPO MAP contains Time Signature and TEMPO (BPM beats per minute) events and will control the metronome events.

Additionally, the TEMPO MAP can do useful things for you, like recall entire snapshots of all the settings (called a SCENE). SCENES on the AW1600 behave the same as Program Changes on the Motif ES – they let you re-strike the entire MIX on the AW1600. You can use Scenes to mute tracks, change pan position, change fader position, recall different effect setups, etc., etc. It is the audio world's Program Change. Scene Events can be recalled by the AW1600's own TEMPO MAP or sent out via MIDI to be registered in a track in the Motif ES. You have your choice. If you want the SCENES to take place without recording them out via MIDI this is okay. You do not have to record them in an external sequencer. The AW1600 is self-sufficient when it comes to SCENE recalls via the TEMPO MAP. (It is continuous fader movements that really need to be recorded externally).

In addition to its other functions the TEMPO MAP can also automate what audio is on the four Sample PADS. The Sample Pads can be used to hold audio events – things that you do not want to dedicate an entire track to – or for QUICK LOOPS. The four audio channels for the pads are each stereo channels. So at maximum you can have four stereo PAD channels routed to the stereo bus simultaneously. Under each pad are four banks A, B, C, and D; you can house 16 sampled audio events on the PADS (up to a total of 44sec). The TEMPO MAP controls the way you automate what PAD is set to playback at anytime with in the Song – a maximum of four Pads can be playing back at any one time. Data can be imported to the Pads from the hard disk, can be imported from any audio CD or imported as .wav files. You can even extract data from any AW1600 track. Loop segments assigned to a PAD can be 1 measure loops and sliced to 8<sup>th</sup> note, 16<sup>th</sup> note or 1/8-note triplet values. The Quick Loop function is designed to take 1 measure phrases and allow you to time stretch them via the SLICE function. You can record audio phrases of any length and trigger

them manually and record the triggers to a special PAD TRACK. It is important to understand this about the PADS and the PAD TRACK: The PADS themselves are used to trigger the playback of the audio they are pointing to. When you place the PAD TRACK in RECORD you are recording when you touch a pad (not the audio) much like a sequence track in the Motif ES records (not the audio) but MIDI note-on triggers. When the PAD TRACK plays back, much like a MIDI track it triggers the audio data with a 'note-on' event. Samples on PADS can be made to play as ONE SHOT, or as a LOOP. They can GATE (stop when you let go) or TRIGGER (play all the way through with a single touch). They can play forward (NORMAL) or backwards (REVERSE).

For example, let's say you have an eight measure audio phrase that you want to build your song around. You can assign that to any pad and trigger it at the downbeat of measure 1, then using the AW1600's [EDIT] jobs you could "COPY" the trigger event and many times as you need it, wherever you need it. "COPY measure 001:01 ~ 009:01 <TO> 009:01 x times. This is a method to quickly assemble a track made from various audio clips. You could set them as "ONE SHOT" samples that are set to "TRIGGER" by PAD TRACK events at the designated time intervals.

### Setting up to record an Automated Mix

Automation mixdown events can be stored in the Motif ES sequencer. Set the AW1600 MIDI page so that you are transmitting (TX) MIDI data on a specific MIDI channel (for our example we will use track 16). Set the Program Change parameter on the AW1600 to "TX" (transmit) if you are going to record SCENE events to the sequencer. Set the Control Change mode to MODE 3 (this will setup for TRACK Channel, as opposed to INPUT Channel automation - Mode 2). Setup the Motif ES to record the data to an empty track. When slaving the Motif ES to arm the recorder simply hit the RECORD button. The unit will start when you start playback of the AW1600.

Rather than inputting SCENE events onto the TEMPO MAP, you can record the AW SCENE events to the Motif ES's sequencer. Each SCENE EVENT is assigned a Program Change number. All Fader moves, PAN moves, and track mutes can be sent as MIDI control change events to the Motif ES sequencer. During the MIXDOWN process you can automate your moves. SCENES will take care of radical, immediate changes, such as which effect is assigned, which tracks are active or muted, while fader movements and pan position sweeps - continuous gestures - will be recorded as cc events within the sequence data.

In order to playback the MIX data from the Motif ES sequencer to the AW1600, you will simply need to set the AW1600 up to receive (RX) the data on the designated channel and to receive (RX) Program Change events (SCENE).

#### Warnings:

-Be careful not to duplicate events in the TEMPO MAP **and** the external sequencer. If you are using the TEMPO MAP to recall AW1600 Scene events do not duplicate your events by then recording them out to the external sequencer (and compound it by playing them both back). You can select what data you are going to transmit or receive on the AW1600 – for example, you can choose not to receive Program Change events or you could select not to transmit them in the first place.

#### Set the START point of a SONG

It is highly recommended that you leave a small amount of time before the actual start of the song content. This way you can allow for count-ins and other musical ideas you may have at a later time. If you leave room in the beginning you don't have to worry about **not** having it if later you need it.

Here is a STEP-BY-STEP guide to the setting the critical clock START point of an AW1600 SONG at the start of a session.

- Press the [SONG] button and select the LIST screen
- Cursor to the "NEW" box and press [ENTER]. The unit will ask you do you want to save the current song and then offers you the opportunity to import data from an existing recording. This function<sup>4</sup> means that once you get to know the AW you will be able to import your favorite setups from any previous recording sessions making working with the unit easier as you go along. Just select OK and press [ENTER]
- Many people will use the [SOUND CLIP] function to tryout some ideas. This is particularly useful if you play an acoustic instrument and want to quickly put down an idea. Either way, we need to set up the Metronome function.
- Metronome: You can set the metronome by pressing the [TRACK] button and selecting the VIEW screen. Use the down cursor to the select the "METRO" ON/OFF parameter and turn it ON. This is an audible metronome but will not be recorded to the track (HINT: unless

<sup>4</sup> This is part of the LIBRARY function of the AW1600. Much of the setup work that you do can be named and stored in a Library, then recalled when necessary into another session

you have an open microphone near your speakers). You can use this click as opposed to the click of the Motif ES for all recording, if you wish. It is also recommended that you get a comfortable, quality set of headphones.

- Set the TEMPO MAP. Press the [SONG] button until you select the TEMPO screen. Here the first event (STEP) is already placed. Input the time signature and BPM of the song you are getting ready to record. (Later you can input which PADS are active and what SCENE you want to recall). You cannot remove this "STEP 01" event – because every SONG must have a beginning point. What you can do is affect where "Measure 001: beat 1" occurs. It is, generally, a good idea to place a few seconds in front of the meaningful start of the song just in case you need you to build a count-in or want to place information in front of the main song. To do this we can "Set the START Point"... This will be the time at which the measure counter begins and the AW1600 begins to generate MIDI clock (or MTC) for controlling the connected slave devices.
- Under the [SONG] button select the POINT screen and select the "LOCATOR" function. This will show you a list of key points within the recording. You will see RELATIVE, START, END, Marker A, Marker B, LAST REC IN, LAST REC OUT, etc., time reference points of the SONG. Move the cursor to the 'seconds' position next to the "START" time:

**Hrs:Min:Sec.fractions:** 00:00:00.00.

[The fractions can be tenths of a second or frames depending on the clock display you have selected.]

As you begin to move the Data Wheel to input a new start time the screen will prompt you "CHANGE START POINT?" Select OK. Moving the start point will affect all the other points appropriately. As you dial **up** the seconds you will see the BEAT counter (in the upper right corner) start counting according to your selected time signature. If, for example, your song is in 4/4 time, you will see the BEAT counter count ".4", ".3", ".2", ".1". As you scroll the time you can count how many measures of lead-in you are creating. If you want a two measure count-in let it count back from "4" twice. If you need 8 measures – let it count backwards from "4" 8 times.

Always allow one extra click so that you have a complete beat. So for example, to create a two measure count-in:

**4 -3 -2 -1 -4 -3 -2 -1 -4**

## **PLAN AHEAD...**

An important part of music production on the AW1600/Motif ES Studio is the actual project planning. There are no specific rules or ways to proceed. Only suggested guidelines for using the strongest tool for the job given the technology. For example, the biggest advantage that recording as MIDI tracks offers you, is the ability correct the performance data and the ability to control the sound of the instrument. You can maximize the use of the Motif ES as a synthesizer/tone generator by recording tracks as MIDI, correcting any performance errors in the event data and then maximizing the sound before transferring that MIDI track to the AW1600 as an audio track. This is only one of many possible scenarios. You might never commit your Motif ES tracks to audio. Instead you could use the AW1600 audio tracks to record only acoustic sounds (vocals, live guitars, live drums, acoustic piano, etc.) while keeping the MIDI tracks "virtual". The word "virtual" here is used in the sense that the Motif ES (and other MIDI modules) will run along side the AW1600 audio tracks in perfect synchronization. One of the main strengths of MIDI is that it is repeatable time and time again without varying. The AW1600 is capable of handling eight channels of "live" input (each channel having its own EQ and dynamics processors) as well as playing back sixteen channels of audio from the hard disk (each channel having its own EQ and dynamics processors). Therefore, many users will setup their MIDI rigs to playback live during the mixdown session. It really will depend on your music, your musical concept and your approach to music composition. The idea is to know the rules, learn the tools and write your own script as to how you use it. You can use a combination of methods. "Whatever it takes" is the general rule.

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