

TASCAM

TEAC Professional Division

MMR-8

Modular Multitrack Recorder

MMP-16

Modular Multitrack Player

**MMR-8/MMP-16 Version 3.0
OWNER'S MANUAL UPDATE**

TASCAM MMR-8/MMP-16 Version 3.0

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MMR-8 / MMP-16 Version 3.0 Update

This document details changes and new features in software Version 3.0 for the TASCAM MMR-8 and MMP-16 Modular Multitrack units and the MM-RC remote. This document only explains features and enhancements that have been made to the MMR/MMP since release Version 2.09, the last official release software version prior to Version 3.0. The reason for the jump from 2.09 to 3.0 in numbering this software version is due to the inclusion of a large number of major new features. This documentation presumes familiarity with basic operation of the MMR-8 and MMP-16.

Installing The MMR/MMP Software Update

To install software in an MMR-8 or MMP-16, first make sure the unit to be updated already has Version 1.2 or higher software installed (software installed from the Rescue Boot Disk is also acceptable). The most recent software update may always be downloaded from the TASCAM web site at <http://www.tascam.com>. The Version 3.0 software fits on a single floppy disk. To install the software update, insert the floppy disk into the front panel floppy drive while the unit is booted and operating normally. Access Menu 995 (Load Software) and press STO. The system will ask “Are you sure?” Make sure the floppy is properly inserted and press STO again to confirm. The system will access the floppy drive for a few moments to copy the files to the internal drive. During this time, the green LED on the floppy disk drive is the only indication provided by the system that software is being copied from the Floppy disk to the system’s internal disk drive. After the software update has been copied from the floppy, the system will display a message that says “Reboot required for new software”. This verifies that the software has been successfully copied to the system drive.

To reboot the system after the software update, remove the floppy disk and recycle the power on the unit. The first time the system boots after the update, it will go through a longer boot procedure and will update various internal processors. The LCD will indicate the update procedure status as these processors are re-programmed. After all these internal updates are finished, the LCD will briefly show the message “New Software Loaded”, then mount all available SCSI volumes and show the normal display. The unit is now ready for operation.

If an MM-RC remote unit is attached to the MMR/MMP when the software update is performed, the system will update the MM-RC after the reboot. A progress display will be shown on the MM-RC LCD during the update. The MMR/MMP will show the message “Programming Remote” while the MM-RC software is updated. **Warning:** If the system is connected to another MMR/MMP unit with an MMR Bus sync cable, an error message that reads “MMR RCV Overrun Error” may occur. This is normal – just ignore the error message (note that pressing CLR will cancel the error message) and proceed with the system reboot.

Special Version 3.0 Reboot Warning: Version 3.0 uses a new SCSI driver, and needs to be rebooted twice after the Version 3.0 software update is loaded. The first time is immediately after loading the software as outlined above. After rebooting, the system will uncompress the new software files, update all EPROMs and will try (but fail) to mount SCSI volumes. This is because the new SCSI driver is not yet operative until the system is booted one more time. After the system stops at the “Mounting Volumes” display, simply cycle the power. After the second reboot, the system will act normally and will automatically mount all available SCSI volumes.

Overview of Changes in Version 3.0

The following functional changes have been made to the MMR-8/MMP-16 software in Version 3.0. These changes are explained in detail in this document:

- AKAI DD-8 Playback Support Playback 16 and 24 bit files from AKAI DD-8/DD-1500
- MIDI Machine Control Respond to complete MMC protocol via MIDI in port
- Export As Adds a modifiable name field to the Export menu to allow creating a different name when exporting.
- Rename New Backup Menu to rename WF, PT, OMF projects
- Dailies Mode Special mode for recording “dailies” which keeps MMR in record whenever it is locked to incoming TC or Biphase.
- Serial Transport Implements P2 out (Serial Tran mode). When ONLINE, the front panel keys will control an external deck, typically a VTR, which the MMR will then chase using serial time code.
- Varispeed Allows Varispeed playback by % (88.5% to 104.3%)
- DEVA/Broadcast Wave Support Adds support for Broadcast Wave files created by Zaxcom’s DEVA disk recorder on DOS formatted drives.
- Time Stamp support Adds support for record Time Stamp in all format audio files
- New SCSI driver New SCSI driver – makes these improvements:
 - Mount volumes not present at startup
 - No need to restart after low format
 - Performance improvement
 - No performance loss after spin down/spin up
- TapeMode™ Project Length Adds a setup menu to constrain length of TapeMode project
- ONLINE function change Adds SHIFT + ONLINE command to return machine to previously established sync point when in Biphase chase mode. The ONLINE button alone resets sync interlock point.
- Set system record volume New setup menu to choose default record drive volume
- Change UFN generation Takes Unit Serial # into account as part of Unique ID for WaveFrame files, uses same UFN for sound files when making a WaveFrame Project Backup
- Punch in/out Performance Improve speed of record punch in/out
- Improve Lock to External Clocks Use MMR Bus clock PLL to improve lock to External sample or AES/EBU inputs
- In/Out Recalculation Change Recalculate in/out points (time code<->sample conversions) on rate changes
- Show Project drive ID and format Appends drive format information to end of Project name and SCSI ID# plus format to end of Track name
- Commit track slip Will commit any track slips as edits in the EDL

Version 3.0 Software Update Overview - continued

- Pro Tools Performance Improved performance of Pro Tools support – Mounts Mac volumes and loads Pro Tools Session files faster
- Meter Interface Adds support for MMU-16 meter bridge. New menu to select Local or MMR Bus for meters source
- Serial Editor Mode improvements These enhancements added to Serial Editor Mode support:
 - Record ready tallies Front panel record tallies now output to Serial port
 - P2 Chase and Offset Commands Implemented with new menu to specify chase source
 - ONLINE change Unit will follow P2 even when not ONLINE
 - Automatic ONLINE ONLINE state automatic when in P2 chase
 - Program Speed Play Implementation and status improvements
 - Punch Commands Directed to local machine only
 - Editor mode w/out video ref Allows Editor mode to work without video reference
 - Hybrid Protocol on Serial port Enables remote control implementation for Sound Master and other external control devices.
- MMR Bus Slave improvements MMR Slave units will respond locally to record commands regardless of bus Master record status
- Record punch change Punch during chase modes now waits for locked status (time code / biphasic chase plus video resolve).
- Bug Fixes:
 - Slip In/Out in Feet/Frame Allows Slip In/Out to work properly in Feet Frames display mode when there is a “local 0” offset
 - Store nudge amount panel Allows storing Slip In/Out amount from the front panel
(previously worked only on remote)
 - All Safe fix All Safe on MMR Bus slave not overridden by master
 - Fix “Busy” exit Fix potential sync loss in biphasic chase if system is “Busy” while the biphasic master is moving. This typically occurred while slipping tracks.
- Clipping display option New option to inhibit audio clipping display (light “Clip” LED) while leaving it enabled during recording.
- External Resolve changes Permits various combinations of External word clock (or AES/EBU) with external frame references (Video/Lynx/TC/Biph). Video resolve is now supported while the sample clock is locked to the external sample source. Causes "EXT RSLV" LED to illuminate, indicating that external resolve is required to guarantee stable sync.
- Parallel I/O Changes
 - Dedicated Record/Rehearse ON/OFF pins
 - Lock tally out on pin # 28
 - Punch commands directed to local machine only (including when MMR Bus master)
- Show Mounted SCSI Devices New Setup menu provides list of all mounted SCSI drives
- Cleanup for Macintosh Volumes Implemented Project delete and Disk Cleanup for Mac
- TapeMode Project/Session Attributes Don't change if sample/frame rate change

Akai DD-8 Support

Version 3.0 adds support for the Akai DD-8 digital dubber and other Akai products which use the identical disk file systems and audio formats. These include the Akai DR-8, DR-16, and DD-1500. Support is limited to playback of Akai files and export of Akai files to WaveFrame, Pro Tools, and OMF/SDII formats. Support does not include recording in the Akai format on the MMR-8. To identify files in the Akai format, the MMR/MMP will show [AK] at the end of any Akai Project or Track name when these names are displayed in the LCD.

Playback

Playback of Projects created on the Akai DD-8 digital disk recorder is now supported on the MMR-8 and MMP-16. This includes audio and projects created on the original DD-8 format as well as the newer DD-Plus format using either 16-bit or 24-bit audio files. All files recorded on an Akai DD-8 will play on the MMR/MMP, with the following exceptions:

- 1) The Akai DD-8 20-bit recording mode is not supported on the MMR/MMP.
- 2) The MMR/MMP do not support playback of audio files recorded at 96kHz sample rate.

Export

Akai DD-8 format projects can be exported to WaveFrame, Pro Tools, and OMF/SDII formats on the MMR-8 and MMP-16. To Export an Akai file to one of these other formats, first press LOAD TRACK and scroll through the display until it shows the name of the desired Akai file (the end of the file name will show [AK] when an Akai file is recognized). Then press SHIFT+SLIP (Backup) to show the Backup Menus. Scroll through the menus and choose either WaveFrame Export, Pro Tools Export, or OMF Export and use the normal export procedure. The Project file (EDL) and audio files will be copied to the designated SCSI target device in the format specified. Files can not be exported from any other format into the Akai format because the MMR/MMP do not currently support writing the Akai format.

Zaxcom DEVA Broadcast Wave File Support

Version 3.0 supports playback of Projects and audio files created on the Zaxcom DEVA hard disk recorder. This is a field recorder which records digital audio to an internal hard drive and can immediately mirror recordings to an external SCSI device such as an Iomega Jaz disk. The MMR/MMP can read DEVA files which have been recorded as mono sound files in the Broadcast Wave format to an external SCSI drive formatted as a DOS volume. Only DEVA files recorded in precisely this way can be read by the MMR/MMP. Polyphonic sound files (stereo or more tracks interleaved) can not be read, nor can Sound Designer II files recorded to a DOS disk. Projects and Track Names of files recorded on a DEVA unit will show the designation [DV] at the end of the name when it is displayed in the MMR/MMP LCD window. Support is also provided for Export of DEVA files to the WaveFrame, Pro Tools, and OMF/SDII formats.

Editing Akai and DEVA Files

Akai DD-8 and DEVA files can be edited on the MMR/MMP, but all edits are held in RAM memory only and not written back to the disk. This is because the MMR-8 and MMP-16 do not write the Akai or DEVA formats. Edits in these formats will not be retained in the Project EDL.

File Compatibility Chart

One of the most powerful features of the MMR-8 and MMP-16 units is their support for multiple Digital Audio Workstation formats. The following chart shows the Matrix of formats supported and the various Backup, Export, and TapeMode™ Conversion operations available in Version 3.0 of the MMR and MMP.

File Compatibility Chart	TO	WaveFrame	WaveFrame TapeMode™	OMF / SDII	Pro Tools	Pro Tools TapeMode™
FROM						
WaveFrame		Backup	Convert to TapeMode	Export	Export	Convert to TapeMode
WaveFrame TapeMode™		[Change Record Mode Setting]	Backup	Export	Export	Convert to TapeMode
OMF / SDII		Export	Convert to TapeMode	Backup	Export	Convert to TapeMode
Pro Tools		<i>Not permitted</i>	<i>Not permitted</i>	Export	Backup	Convert to TapeMode
Pro Tools TapeMode™		<i>Not permitted</i>	<i>Not permitted</i>	Export	[Change Record Mode Setting]	Backup*
AKAI DD-8		Export	Convert to TapeMode	Export	Export	Convert to TapeMode
DEVA		Export	Convert to TapeMode	Export	Export	Convert to TapeMode

Table of Backup, TapeMode™ Conversion, and Export Paths

Any file format that can be played on the MMR/MMP can also be written (exported) to any written format supported by the MMR. Written formats are WaveFrame, Pro Tools, and OMF/SDII. The sole exception is that Digidesign Pro Tools files may be written as OMF files, but not as WaveFrame files (shown as *Not Permitted* in the chart above). To convert Pro Tools to WaveFrame, first export Pro Tools to OMF on the same disk, then use that OMF file for export to WaveFrame (one extra step).

**This is true only if the Mac HFS disk being copied to is formatted identically (same block size), otherwise Backup to a Mac volume with a different block size will yield a non-destructive project. In this case, use Convert to Tape Mode to insure the project remains a TapeMode project after being copied to the new disk.*

MIDI Machine Control

The MMR/MMP responds to MIDI Machine Control (MMC) messages received on the unit's MIDI In port. To set the MMC address, go to Setup Menu 420, press Trim and set the appropriate MIDI Device ID number for as required by the device transmitting the MMC messages to which the MMR/MMP will respond. The range of available MIDI device ID's is 1 to 127, with the system default being 74.

01234567890123456789	20 position LCD character positions
420 MIDI Device Id * 74	Top: (Menu Item) Bottom: (Encoding Type)

Supported MIDI Machine control messages are described in the next section of the documentation.

MMR/MMP MIDI Machine Control Protocol

All numerical values are hexadecimal, unless otherwise noted. For descriptions of the following commands and responses, please refer to the MIDI Machine Control 1.0 specification, subtitled MIDI 1.0 Recommended Practice RP-13, January 1992.

MMC Commands:	Comments
01 STOP	
02 PLAY	
03 DEFERRED PLAY	
04 FAST FORWARD	
05 REWIND	
06 RECORD STROBE	(RECORDER ONLY)
07 RECORD EXIT	(RECORDER ONLY)
09 PAUSE	
0B CHASE	(requires time code input)
0D MMC RESET	
40 WRITE	
41 MASKED WRITE	(RECORDER ONLY)
42 READ	
44 LOCATE	
45 VARIABLE PLAY	(defaults to shuttle)
46 SEARCH	(defaults to shuttle)
47 SHUTTLE	
4C MOVE	
52 GROUP	
54 DEFERRED VARIABLE PLAY	

Note: In all velocity commands and information fields, the MMR-8 and MMP-16 support multiples of play speed from +/- 20 with 1/1024 fractional resolution.

MMC Information Fields

Hex	Field	Read / Read Write
01	SELECTED TIME CODE	r
02	SELECTED MASTER CODE	r
03	REQUESTED OFFSET	RW
04	ACTUAL OFFSET	r
05	LOCK DEVIATION	r
08	GP0/LOCATE POINT	RW
09	GP1	RW
0A	GP2	RW
0B	GP3	RW
0C	GP4	RW
0D	GP5	RW
0E	GP6	RW
0F	GP7	RW
21	short SELECTED TIME CODE	r
22	Short SELECTED MASTER CODE	r
23	Short REQUESTED OFFSET	r
24	short ACTUAL OFFSET	r
25	short LOCK DEVIATION	r
26	short GENERATOR TIME CODE	r
28	Short GP0/LOCATE POINT	r
29	Short GP1	r
2A	Short GP2	r
2B	Short GP3	r
2C	Short GP4	r
2D	Short GP5	r
2E	Short GP6	r
2F	Short GP7	r
45	TIME STANDARD	RW
48	MOTION CONTROL TALLY	r
49	VELOCITY TALLY	r
4C	RECORD MODE	RW (RECORDER ONLY)
4D	RECORD STATUS	r (RECORDER ONLY)
4E	TRACK RECORD STATUS	r (RECORDER ONLY)
4F	TRACK RECORD READY	RW (RECORDER ONLY)
50	GLOBAL MONITOR	RW (RECORDER ONLY)
51	RECORD MONITOR	RW (RECORDER ONLY)
53	TRACK INPUT MONITOR	RW (RECORDER ONLY)
58	CONTROL DISABLE	RW
5A	CHASE MODE	r

RW - indicates read / write r - indicates read only

MMR-8 MMC Signature

2E,	count = n
01, 00, 00, 00,	vi vf va vb
14,	<count_1>
7E, 5D, 00, 00, 00,	c0 c1 c2 c3 c4
00, 00, 00, 00, 00,	c5 c6 c7 c8 c9
71, 31, 50, 00, 00,	c10 c11 c12 c13 c14
00, 00, 00, 00, 00,	c15 c16 c17 c18 c19
14,	<count_2>
7E, 7E, 03, 00, 00,	r0 r1 r2 r3 r4
7E, 7E, 03, 00, 00,	r5 r6 r7 r8 r9
25, 66, 0F, 28, 04,	r10 r11 r12 r13 r14
00, 00, 00, 00, 00,	r15 r16 r17 r18 r19

MMP-16 MMC Signature

2E,	count = n
01, 00, 00, 00,	vi vf va vb
14,	<count_1>
7E, 5D, 00, 00, 00,	c0 c1 c2 c3 c4
00, 00, 00, 00, 00,	c5 c6 c7 c8 c9
71, 31, 50, 00, 00,	c10 c11 c12 c13 c14
00, 00, 00, 00, 00,	c15 c16 c17 c18 c19
14,	<count_2>
7E, 7E, 03, 00, 00,	r0 r1 r2 r3 r4
7E, 7E, 03, 00, 00,	r5 r6 r7 r8 r9
25, 66, 0F, 28, 04,	r10 r11 r12 r13 r14
00, 00, 00, 00, 00,	r15 r16 r17 r18 r19

MIDI Inquiry Message

General Response: F0 7E <channel> 06 02 mm ff ff dd dd ss ss ss ss F7

The MMR-8 and MMP-16 engineering development is done by TimeLine Vista, Inc. The MIDI inquiry response codes are therefore those of TimeLine and not TASCAM.

The MMR-8 responds to a MIDI Inquiry message as follows:

mm	TimeLine manufacturer system exclusive ID	00 00 49
ff ff	Device Family Code	04 00 (LSB First)
dd dd	Device Family Member Code	00 00 (LSB First)
ss ss ss ss	Software Revision Level	00 00 xx xx (e.g. 03 00)

The MMP-16 responds to a MIDI Inquiry message as follows:

mm	TimeLine manufacturer system exclusive ID	00 00 49
ff ff	Device Family Code	04 00 (LSB First)
dd dd	Device Family Member Code	01 00 (LSB First)
ss ss ss ss	Software Revision Level	00 00 xx xx (e.g. 03 00)

Export As

The Export menus in Version 3.0 allow for changing the name of a file when it is exported. After pressing STO to initiate an Export, the Menu changes to allow entering a new name. It is also possible to use Export As to make a copy of the Project (EDL) under a different name to the same disk as the original file. Audio files will only be copied if they do not already exist in the proper format on the target SCSI device.

01234567890123456789	20 position LCD character posit:
Pro Tools Export As:	Top: (menu name)
*MMR Project Name	Bottom:(Enter new file name)

The MMR/MMP software only allows writing to WaveFrame or Macintosh HFS disk volumes. If an attempt is made to Backup, Export, or Convert to a disk that is not in one of these formats, an error message is shown:

01234567890123456789	20 position LCD character posit:
File	Top: (menu name)
Vol does not support	Bottom:(Error message - scroll
format	to read entire message on LCD)

Rename

The MMR-8 and MMP-16 Version 3.0 software can rename any Project or Session file that currently exists on a disk in the WaveFrame, Pro Tools or OMF/SDII formats. Rename of the Akai and DEVA formats is not supported because the MMR and MMP do not write these file types. To rename a file, access the file by pressing LOAD TRACK and scrolling to the name of the Project to be renamed. While the name of the Project to be renamed is showing in the LCD, press SHIFT+SLIP (backup) and scroll to the Rename menu item:

01234567890123456789	20 position LCD character posit:
Rename project as:	Top: (menu name)
*Project Name	Bottom:(shows project name)

Use the Up/Down arrow keys or wheel to choose alphanumeric characters and the Left/Right arrow keys move to the next or previous character. When the new name has been entered, press STO to complete the process and write the new file name to the disk.

When Rename is used, the old file name will be overwritten and will no longer exist. To save a copy of a Project under a new name while still retaining the original file with the original name, use the Export menu to Export the file to the same disk, using the Export As function described elsewhere in this document to create a copy of the file with a different name. The original file will still exist under the original name.

Serial Transport

The MMR-8 and MMP-16 have a 9-pin serial connector labeled TRANSPORT which acts as an output for Sony P2 protocol serial commands. Software Version 3.0 activates this port so that the MMR/MMP can act as a master controller for external serially controlled devices such as video decks or the TASCAM DA-88 (with the SY-88 sync card).

To set the MMR/MMP to act as a serial master, go to Setup Menu 000 and set the Control Mode to Serial Trans.

01234567890123456789	20 position LCD character posit:
000 Control Mode *Serial Trans	Top: (menu name) Bottom:(shows control mode)

Once the Control Mode is set to Serial Trans, and MMR/MMP is ONLINE, the MMR/MMP transport keys will send messages out of the TRANSPORT 9-pin connector. The attached serially controlled device should respond to these messages. Once the external device has responded to a transport message, the MMR will lock to the time code coming from the serial port of the device being controlled.

Dailies Mode

The Version 3.0 software supports a new recording mode in the MMR-8 called Dailies Mode. To activate Dailies Mode, go to Setup Menu 240 and toggle the menu selection to On.

01234567890123456789	20 position LCD character posit:
240 Dailies Mode *Off	Top: (menu name) Bottom:(shows On or Off)

When Dailies Mode is on, and the MMR is ONLINE in Timecode Chase Mode, the MMR will record audio on armed tracks whenever incoming time code is present. To initiate recording it is necessary to arm at least one track , lock the MMR to external time code, and to press REC (or PLAY + REC) to put the MMR-8 into the record state. When time code stops, the MMR-8 transport will stop, but the unit will remain in a record ready state until time code is received again. When valid time code is again present, the MMR will automatically locate to the incoming time code position and go into record. All files will be “stamped” with the time code location at which the recording is made.

Dailies Mode is designed to facilitate the recording of production sound reels (“Dailies”) which are typically recorded with discontinuous time code (and time code breaks) using a Nagra or other field recorder. This allows production sound to be transferred into the MMR with proper time code location information with a minimum of user intervention in the process. Once in the MMR, audio can also be Exported to WaveFrame, OMF, or Pro Tools formats for sound editing.

Varispeed

The Varispeed control mode is implemented in Version 3.0 software. This function allows playback of audio over a range of speeds from 88.5% to 104.33% of nominal play speed. The precise speed can be set in increments of .1% over the entire range. To use the Varispeed function, go to Setup Menu 000 and choose Varispeed as the Control Mode.

01234567890123456789	20 position LCD character posit:
000 Control Mode *Varispeed	Top: (menu name) Bottom:(shows control mode)

To set the precise speed of playback, go to Setup Menu 006 and use the wheel or up/down arrows to select the desired play speed.

01234567890123456789	20 position LCD character posit:
006 Varispeed Rate *100%	Top: (menu name) Bottom:(range 88.5% to 104.3%)

This function works by changing the sampling rate of the unit and this is reflected in the sample rate of the digital audio output stream from the MMR/MMP, which will vary according to the speed set in this menu. This is different from the jog/shuttle mode because that mode produces a constant sample rate output while scrubbing audio off speed. Note that the Varispeed Mode is mutually exclusive with Time Code Chase or Biphase Chase and thus the unit cannot be synchronized to an external source while in this mode. To instantly return to the default of 100% (nominal speed), go to Setup Menu 006, press Trim, then press SHIFT + CLR.

Audio File Time Stamp Support

Version 3.0 adds a time code “stamp” as an attribute of all recorded files. This time code stamp represents the time code location of the MMR unit when the recording was made. This data is now recorded as part of the audio file data. This information will be retained when files are Backed Up, Converted, or Exported to a different format. Many Digital Audio Workstations can use this information to place audio at its recorded time code location for editing.

New SCSI Driver

The software code which controls the operation of the MMR/MMP SCSI disk interface, known in engineering parlance as the “SCSI Driver” has been completely re-written for Version 3.0. This has been done to allow more precise control of certain SCSI disk operations and to improve system performance when dealing with very densely edited material. Changes to MMR/MMP operation caused by this new SCSI Driver are outlined below.

No need to restart after low format

In previous software versions, performing a Low Format (Setup Menu 711) would require a system reboot before the drive could be initialized or another drive used. In Version 3.0, the Low Format process does not interfere with normal operation after the volume has been formatted.

Mount volumes not present at startup

Prior to Version 3.0, all SCSI volumes to be used had to be present when the MMR/MMP booted or they could not be recognized by the system. This has now changed so that SCSI devices which may have been powered off or otherwise not present when the system was booted will be re-polled and mounted even if they are added after the system is in operation. This applies especially to the internal Kingston drive enclosure in the MMR/MMP unit. It is no longer necessary for a drive to be present in the Kingston drive bay when the system is booted. A drive can be plugged in to the Kingston bay and spun up after system boot up and it will be recognized by the system.

It is not a good idea to plug SCSI devices into the SCSI port on the back of the MMR while the drive or the MMR/MMP system is on. This is true of any computer and any SCSI device. SCSI Devices which are physically attached but not powered on or external Kingston or other removable carriers which have no drive currently in place when the system boots will now be able to have their volumes mounted once they are powered on and a drive is present.

No performance loss after spin down/spin up

An intermittent problem in previous software versions would sometimes result in a noticeable loss of drive performance after a drive had been spun down and then spun back up, or a new drive volume mounted. In Version 3.0 this can no longer occur, and spinning a drive down or changing drives in the removable Kingston drive bay causes no degradation of performance.

Performance improvements

Version 3.0 provides a general increase in SCSI performance. This is especially noticeable for slower media such as Magneto-Optical drives, and for 16 channel 24-bit performance on the MMP-16 or other types of very high bandwidth demand uses which can stress the system.

Change in WaveFrame UFN Generation

Unique File Number generation for WaveFrame audio files has been changed to include the unit serial number as part of the UFN generation. This makes it impossible for files created on different machines at precisely the same instant to have the same UFN. A second change is that the WaveFrame UFN is retained for sound files copied as part of a WaveFrame project Backup.

Punch In/Out Performance

The response time of the MMR/MMP system to a manual punch in/out command has been substantially improved in Version 3.0. Programmed punches (using the Loop Record function or a programmed punch from a Lynx KCU or Serial edit controller) are frame and sample accurate, with a delay of 3 frames (100ms).

TapeMode Project Length

TapeMode is a special way of recording on the MMR-8 which creates a single audio file for each track of the project. Punching in and out on a track when in TapeMode does not create new audio files on the disk, it merely adds the new audio data to the existing track's audio file.

Setup Menu 231 on the MMR-8 is a new setting which defines a maximum Project length for projects created using TapeMode. The default value for this item is 00:10:00:00 (ten minutes).

01234567890123456789	20 position LCD character positions
231 TapeMode Length *00:10:00:00	Top: (Menu Item) Bottom: (Project Maximum Length)

It is recommended that users always set a TapeMode Length when using TapeMode.

TapeMode works differently for Pro Tools files than with WaveFrame files due to inherent differences between the WaveFrame and Macintosh HFS disk file systems. An advantage of the WaveFrame file system is that it allows a single file to have "holes" in it. This means when using TapeMode with WaveFrame format, a punch in at some point that is past the place where any recording has taken place before will not automatically allocate all of the disk space between the beginning of the file and the point of the punch. In practical terms this means you could have 10 minutes of disk space left and still be able to punch in at 2 hours on a project with a 1 hour start time if you want.

The Macintosh Hierarchical File System has no provision for "holes" in a continuous file the way the WaveFrame file system does. If, for example, you punch in at 3 hours on a ProTools TapeMode Session, all disk space from the beginning of the project to the 3 hour mark is automatically allocated to the Session. This is one of the main reasons for addition of the TapeMode Length menu item in Version 3.0. By constraining the length of a TapeMode project, users are prevented from punching in to a ProTools Session past the end of the project and accidentally allocating disk space which will not be used.

Note: The TapeMode Length data is not stored as an attribute of the Project, Session, or Composition, but can be saved as part of the MMR User settings (Setup Menu 900).

Record Punch Change

Record punch in during Timecode Chase and Biphase Chase control modes or when resolved to video now waits for locked status.

In/Out Recalculation Change

The In and Out time code registers are now recalculated when the sample rate is changed to insure that they are aligned with the same audio samples as they were before the rate change.

Set SCSI Record Volume

A new Setup Menu (701) makes it easier to specify a target SCSI volume for recording. This menu has a range of 0 to 7. If no drives are mounted, this menu will show None to indicate no drive volumes are present.

01234567890123456789	20 position LCD character positions
701 Record Disk *SCSI Disk 0	Top: (Menu Item) Bottom: (Choose SCSI record volume)

To set the record device, press the TRIM key then choose a valid SCSI device ID using either the up/down arrow keys or the wheel. If a SCSI drive ID is chosen which is not currently mounted and available, the system will show a warning that this is a non existent volume. Press CLR to cancel the warning and return to the Record Disk setting.

01234567890123456789	20 position LCD character positions
701 Record Disk Non Existent Volume	Top: (Menu Item) Bottom: (Choose SCSI record volume)

Show Project Format

A new feature of Version 3.0 shows the file format of any project available for loading on the MMR/MMP. This indicated by a two letter code in brackets at the end of the project name.

01234567890123456789	20 position LCD character positions
File Rons Project [PT]	Top: (File Item) Bottom: (Indicates Pro Tools project)

The codes used for currently supported file types are:

- [PT] Pro Tools
- [WF] WaveFrame
- [AK] Akai
- [DV] DEVA (Broadcast Wave)
- [OM] OMF/SDII

Show Track Format, Drive ID

Once a track has been loaded, pressing VIEW TRACK will show the name of the selected track followed by brackets around a number which indicates the drive ID and format type of the track.

01234567890123456789	20 position LCD character positions
Track Contents: 1 MMR Trk1_00837 [0,PT]	Top: (Track contents) Bottom: (Indicates drive ID and Format for track)

Delete and Disk Cleanup for Macintosh Volumes

The Project Delete function (accessed by using SHIFT + LOAD TRACK) and the Disk Cleanup function (Setup Menu 720) now work for Macintosh HFS disks in Version 3.0. The Delete command will Delete the selected Session or OMF file from a Macintosh volume. The Disk Cleanup command will delete all Sound Designer II files that are not being referenced by a Pro Tools Session or an OMF Composition. This command will also delete all linear fade files created by a ProTools Session. Users should make sure there are no other SDII files that they wish to keep (such as raw SDII sound libraries not referenced by an EDL) on a Macintosh disk before using this command. **Warning:** this command cannot be undone.

Show Mounted SCSI Devices

Setup Menu 790 shows a list of SCSI ID numbers for all mounted SCSI drives. This is an information display only, and has no parameters which can be set by the user.

01234567890123456789	20 position LCD character positions
790 Drives Mounted *0,2,3	Top: (Menu Item) Bottom: (list of drives)

If no drives are mounted, the display will indicate “None”.

01234567890123456789	20 position LCD character positions
790 Drives Mounted *None	Top: (Menu Item) Bottom: (no drives mounted)

Clip LED Display Option

Setup Menu 522 allows for setting whether the Clip LED indicator will show clipping only for record tracks or for both record and playback tracks. This feature was requested so that mixers using the MM-RC will not be bothered by having the Clip LED over the REC key indicate level clipping when the clipping occurs only on a playback track, not on a track which is in record.

01234567890123456789	20 position LCD character positions
522 Clip LED on Play * Off	Top: (Menu Item) Bottom: (choose On or Off)

To see a clipping indication at all times when any track (whether in record or playback) clips, set the value of this menu to Off. To only show clipping for tracks which are in playback, set the value of this menu to On.

Pro Tools Performance

The speed of mounting Macintosh volumes with a large number of audio files, OMF Compositions, or Pro Tools Sessions has been dramatically improved.

Project Attributes Not Changed in TapeMode

Changing the sample or fame rate will not change the sample or frame rate attributes of a WaveFrame Project or a Pro Tools Session while the system is in TapeMode. These attributes are created when the Project or Session is first created. If the sample or frame rate is changed while the record mode is set to non-destructive, the file attributes are changed and the new sample rate or frame rate will be set when the file is loaded again.

Commit Track Slip

A new Setup Menu (250) allows any track slip to be committed as an edit. The Track Slip function on the MMR/MMP works by changing the value of a track offset register. This slip offset is volatile and will be cleared when a new Project or track is loaded. When a track slip is committed using Menu 250, the amount of the slip is incorporated into an edit operation which changes the track EDL to reflect the new time code location for all audio events on the track. This change is automatically saved to disk for WaveFrame and Pro Tools projects (not for other formats since they can not be saved to disk) and the EDL is instantly updated.

01234567890123456789	20 position LCD character positions
250 Slip Commit	Top: (Menu Item)
* All Tracks	Bottom: (Allows choice of tracks)

The Slip Commit menu allows for committing all tracks which have a slip offset, or of choosing only a specific track. The default value is to commit all track slips.

Meter Interface

Version 3.0 adds support for the MMU-16 Meter unit. Setup Menu 550 (Rmt Meter Source) allows a choice of MMR Bus or Local as the source of the data for the remote meters. When set to MMR Bus, the meter data is communicated via the MMR Bus and the UI/B board to an MM-RC remote so that the MM-RC can send digital meter data to an MMU-16 connected to the MM-RC. The MM-RC can thus direct meter data to the MMU-16 for any currently selected MMR/MMP unit which can be addressed by the MM-RC. When set to Local, the meter data is sent directly out of the UI/B board's remote control connector on the back of the MMR/MMP unit to an MMU-16 connected directly to the unit.

01234567890123456789	20 position LCD character positions
550 Rmt Meter Source	Top: (Menu Item)
* MMR Bus	Bottom: (Allows choice meter source)

External Resolve Changes

Video resolve is now supported while the sample clock is locked to the external sample source. This permits various combinations of external word clock (or AES/EBU sample clock) with external frame references (Video/Lynx/TC/Biphase). This causes the "EXT RSLV" LED to illuminate, indicating that external resolve is required to guarantee stable sync.

Improve Lock Speed to External Clocks

Lock to an external digital clock signal (AES or Word Clock) has been dramatically improved and stable lock to external digital clock signals now happens immediately. If the MMR/MMP sample rate is 48kHz, or one of the 48kHz pull up/pull down values, it will lock to an external sample clock in the range 46008 Hz to 50078 Hz. If the MMR/MMP rate is centered around 44.1kHz, the lock range is 37566 Hz to 46008 Hz.

ONLINE Function Change

Taking an MMR/MMP unit offline when in Biphase Chase mode will cause the MMR/MMP to ignore incoming Biphase and then set a new sync interlock point at the current position when the unit is put back ONLINE. A new function in Version 3.0 adds a SHIFT + ONLINE command to return the machine to a previously established sync point when in Biphase Chase mode. This means that the system now will keep track of position on the Biphase input even while offline.

To put the unit back ONLINE at the previously established sync point (the interlock location that existed prior to when the unit was taken offline), press SHIFT + ONLINE. To reset the sync point to be the current time and set the interlock to the current position of the biphase master, simply press ONLINE as in all previous versions of the MMR/MMP software.

Serial Editor Port Changes

A number of changes have been in Version 3.0 to the operation of the 9-pin serial Editor port. These are detailed in this section of the documentation.

Record Ready Tallies

Record ready tallies issued over the 9-pin serial Editor port now include tracks armed at the MMR-8 front panel or MM-RC, and not just those tracks armed by serial command. This allows an external Serial device to know when a track has been armed for recording, regardless of the source of the track arm command.

Sony P2 Chase and Offset Commands

Sony P-2 protocol Chase and Offset commands are now accepted by the MMR/MMP. Setup Menu 404 allows for setting the chase source to either Timecode, Biphase, or Disabled.

Serial Editor Port Active When Not ONLINE

The MMR/MMP unit will follow transport, track arm, and record commands given on the 9-pin serial Editor port even when the unit is not ONLINE.

Automatic ONLINE

The MMR/MMP unit will now automatically be placed in the ONLINE state when placed in Chase via the serial 9-pin Editor port.

Local Machine Response to Serial Record Commands

Serial record arm and punch in/out commands are now honored locally on each machine, regardless of whether it is acting as an MMR Bus slave or master machine. These commands are not propagated across the MMR Bus to other machines, and serve only to activate the machine to which the Serial control device is directly connected.

Program Speed Play

The MMR/MMP now responds in a very controlled way to Sony Program Speed Play commands. Previous version used a jog/shuttle mode. The status response during Program Speed Play now indicates Play mode, with the VAR bit set in byte 2 of the Sony Status array.

Editor Mode Operation Without Video Reference

The Editor Control Mode (set via Setup Menu 000) will no longer force the Frame Reference (Setup Menu 001) to Video, and will allow operation of the MMR/MMP without a valid video sync reference source attached to the MMR/MMP. It is highly recommended to have such a source when operating in this mode, and to set the Frame Reference Setup Menu to Video, but the system will no longer require it and will allow operation even if no such source is detected. If the controlling device is synchronizing the MMR/MMP via the serial Editor port, it is essential to provide a video reference to insure correct operation and synchronization.

Hybrid Protocol on Serial Editor Port

The MMR/MMP internal communication protocol (TimeLine's Hybrid Protocol) can now be accessed via the serial 9-pin Editor control port. This is most useful for companies which want to exercise remote control (from some other device) of MMR/MMP features not supported via any of the other standard remote interfaces. Requests for Hybrid Protocol information and documentation should be directed to the Marketing Director at TimeLine Vista, Inc. at (760)761-4440, or via email request to: TimeLine@digaudio.com.

Parallel I/O Changes

Version 3.0 makes some changes to the operation of the MMR/MMP parallel control ports. These changes are detailed here.

Dedicated Record/Rehearse ON/OFF pins

Two previously unused pins have been activated to initiate Record ON and Record OFF commands on the Parallel Transport port. The pins activated for these commands are pin #1 for Record ON and pin #2 for Record OFF. These pins differ from the existing Record pin in that they have no connection to the MMR motion control unit, do not require the concurrent activation of the Play pin, and will not affect the ONLINE status of the MMR-8. Rehearse mode may be achieved by holding the Preview pin (pin #36) low while pulsing the Record ON pin (pin #1). The operation of the existing Record pin (pin #35) has not changed. A chart showing the complete pin assignments for the Parallel Tracks and Parallel Transport connectors is given at the end of this document.

Lock Tally Out

A system lock tally is now provided on pin #28 of the Parallel Transport port. This active low lock tally signal is provided when the system transport achieves lock status as indicated by the >L indication in the LCD window and illumination of the LOCK LED.

Record Punch to Local Only

Record punch in and out commands will only be honored on the machine to which they are directed, and will not cause other machines which may be connected via the MMR Bus to respond to these commands. This means punching via the parallel port on the MMR Bus Master machine, will only affect that machine and will not propagate via the MMR Bus to any Slave machines.

Bug Fixes:

The following software bugs have been fixed in Version 3.0.

Slip In/Out in Feet/Frame

The Edit commands and Slip In/Out function (accessed on the front panel by pressing SHIFT + MON) now work properly when the display style is feet and frames and a local zero offset (equating 0 feet and frames with a time code offset amount) is stored in the time register.

Store Slip In/Out amount

Storing a numeric value to the Slip In/Out key on the MM-RC remote will cause the selected audio material (any audio on the selected tracks between the In and Out register time code positions) to be slipped by that amount. The Slip In/Out function is accessed on the front panel of the MMR/MMP by pressing SHIFT + MON, but storing a number on the front panel did not work properly in previous versions of the software. In Version 3.0, this function now works properly on the front panel of the MMR/MMP by pressing STO + SHIFT + MON to enter a time value for the Slip In/Out operation.

All Safe for MMR Bus Slave

A bug in previous software versions allowed the MMR-8 to ignore its All Safe setting (Setup Menu 201) when receiving a Record command from an MMR Bus master. This has been fixed in Version 3.0, and the All Safe setting is always honored.

Fix “Busy” Exit

In Version 3.0 of the MMR/MMP software, the system keeps track of incoming biphasic signals even while the system is “busy”. This most typically occurs if a track is slipped while the unit is ONLINE in biphasic chase mode. This fix insures that if any sync changes (track slip) are made while incoming time code or biphasic signals are present, the system will return to the proper sync point when it emerges from the “busy” state.

MMR-8 Setup Menus for Version 3.0

The following chart shows all MMR-8 Setup menus and parameters in Version 3.0. Note that * indicates the default selection.

MENU #	MENU NAME	PARAMETERS
000	Control Mode	Local/MMR* Time Code Chase Biphase Chase Serial Transport Editor Varispeed
001	Frame Reference	Automatic* Video
002	Sample Reference	Automatic* AES/EBU Input Ext Wordclock
003	Time Code Type	24/24 25/25 29.97/DF 29.97/NDF 30/DF 30/NDF*
004	Sample Rate	42294 (44x23/25) 42336 (44x24/25) 44056 (44100-) 44100 44144 (44100+) 45938 (44x25/24) 45983 (44x25/23) 46034 (48x23/25) 46080 (48x24/25) 47952 (48000-) 48000* 48048 (48000+) 50000 (48x25/24) 50050 (48x25/23)
006	Varispeed Rate	100% * (range 88.5% to 104.3%)
100	Sync Group	1* 2 3 4

MENU #	MENU NAME	PARAMETERS
110	MMR Bus Request	Master Off* Slave
111	Ident Request	Auto Assign* 01 (Range 01-100)
112	Ident Assigned	01* (Range 01–100 read-only display)
120	Lynx Bus	Off* Slave/KCU Master
121	Lynx Address	1* Range: 0 through 127
122	Lynx V500 Mode	Off* On
200	Record Mode	Non-Destructive* TapeMode
201	All Safe	Off* On
202	Record Key	Record+Play* Record
203	Rehearse key	Rehearse+Play* Rehearse
210	Loop Mode	Play Repeatedly* Play once and Cue Play once and Stop
211	Loop Record	Repeat Record* Record Once Only Repeat w/Unload
212	Pre-Roll	00:00:05:00*
213	Post-roll	00:00:02:00*
220	Next/Prev Mode	Event* Cue
221	Edit Sync Mode	Sync at In Point* Sync at Playhead
230	TapeMode Start	01:00:00:00* (Range 00:00:00:00 to 23:59:59:29)
231	TapeMode Length	00:10:00:00* (Range 00:00:00:00 to 23:59:59:29)

MENU #	MENU NAME	PARAMETERS
240	Dailies Mode	Off* On
250	Slip Commit	All Tracks* Track 1 [lists all tracks through Track 8 on MMR-8, Track 16 on MMP-16] Track N
300	Biph Frame Rate	24 fps* 25 fps 30 fps
301	Biph Pulse Rate	2 ppf 4 ppf 10 ppf* 20 ppf 25 ppf 50 ppf 100 ppf
302	Biphase Input	Biphase* Tach + Dir Tach + Inverse Dir
400	Editor Device	TASCAM MMR-8* Sony PCM-7030 Sony BVU-950
401	Editor Auto EE	Off* On
402	Editor Edit Fld	Auto* Field 1 Field 2
403	Editor Trk Arm	Digital Audio* Analog A1-A4 Local Local [enbl=A1] Local [enbl=A2] Local [enbl=A3] Local [enbl=A4]
404	Editor Chase	Disabled * Timecode Biphase
410	Parallel Trk Arm	Pulse (toggle)* Pulse w/ Auto Rec Hold Hold w/ Auto Rec Pulse In + Out
420	MIDI Device Id	74* (Range 1 to 127)

MENU #	MENU NAME	PARAMETERS
500	Input Source	Analog* Digital Rate Converter
501	Auto Input	Rec Only Rec or Non-Play* Rec or Rec-Ready
510	Crossfade	10 ms* Range: 0 through 100
520	Meter Ref Level	-20 dBFS* Range: -15 through -24 dBFS
521	Meter Calibrate	Off* On
522	Clip LED on Play	Off* On
530	Reference Tone	Off* 1kHz
540	Gapless Punchout	On* Off
550	Remote Meter Source	MMR Bus* Local
600	Digital In Ref Track	1* 3 5 7
602	Digital In Delay	Internal* Number of Samples (Range:1 through 255 Samples)
610	Digital Out Delay	Internal* Number of Samples (Range:1 through 255 Samples)
620	Rate Conversion	Slow response* Fast Response

MENU #	MENU NAME	PARAMETERS
700	Disk Encoding	WaveFrame 16-bit* WaveFrame 24-bit Pro Tools 16-bit Pro Tools 24-bit
701	Record Disk	SCSI Disk 0* [Shows SCSI Disk ID Number (Range 0 to 7)] None
710	Disk Initialize	Press STO
711	Disk Low Format	Press STO
720	Disk Cleanup	Press STO
790	Drives Mounted	[shows list in format: 0,1,2,3,4,5,6]
800	Project Name	MMR Project*
810	Track Prefix	MMR Trk*
900	Store Settings	User 1 [through] User 10
901	Recall Settings	Default User 1 [through] User 10 Previous
910	Set MM:DD:YY	Date: __:__:__
911	Set HH:MM:SS	Time: __:__:__
912	Change Password	Press STO
920	LED Brightness	8* Range: 0 through 15
980	Serial Number	Read – only display
990	Software Version	Read – only display
995	Load Software	Press STO key

MMP-16 Setup Menus for Version 3.0

The following chart shows all MMP-16 Setup menus and parameters in Version 3.0. Note that * indicates the default selection.

MENU #	MENU NAME	PARAMETERS
000	Control Mode	Local/MMR* Time Code Chase Biphase Chase Serial Transport Editor Varispeed
001	Frame Reference	Automatic* Video
002	Sample Reference	Automatic* AES/EBU Input Ext Wordclock
003	Time Code Type	24/24 25/25 29.97/DF 29.97/NDF 30/DF 30/NDF*
004	Sample Rate	42294 (44x23/25) 42336 (44x24/25) 44056 (44100-) 44100 44144 (44100+) 45938 (44x25/24) 45983 (44x25/23) 46034 (48x23/25) 46080 (48x24/25) 47952 (48000-) 48000* 48048 (48000+) 50000 (48x25/24) 50050 (48x25/23)
006	Varispeed Rate	100% * (range 88.5% to 104.3%)
100	Sync Group	1* 2 3 4

MENU #	MENU NAME	PARAMETERS
110	MMR Bus Request	Master Off* Slave
111	Ident Request	Auto Assign* 01 (Range 01-100)
112	Ident Assigned	01* (Range 01–100 read-only display)
120	Lynx Bus	Off* Slave/KCU Master
121	Lynx Address	1* Range: 0 through 127
122	Lynx V500 Mode	Off* On
210	Loop Mode	Play Repeatedly* Play once and Cue Play once and Stop
211	Loop Record	Repeat Record* Record Once Only Repeat w/Unload
212	Pre-Roll	00:00:05:00*
213	Post-roll	00:00:02:00*
220	Next/Prev Mode	Event* Cue
221	Edit Sync Mode	Sync at In Point* Sync at Playhead
250	Slip Commit	All Tracks* Track 1 [lists all tracks through Track 8 on MMR, 16 on MMP] Track N
300	Biph Frame Rate	24 fps* 25 fps 30 fps
301	Biph Pulse Rate	2 ppf 4 ppf 10 ppf* 20 ppf 25 ppf 50 ppf 100 ppf
302	Biphase Input	Biphase* Tach + Dir Tach + Inverse Dir

MENU #	MENU NAME	PARAMETERS
400	Editor Device	TASCAM MMR-8* Sony PCM-7030 Sony BVU-950
404	Editor Chase	Disabled * Timecode Biphase
420	MIDI Device Id	74* (Range 1 to 127)
510	Crossfade	10 ms* Range: 0 through 100
520	Meter Ref Level	-20 dBFS* Range: -15 through -24 dBFS
522	Clip LED on Play	Off* On
530	Reference Tone	Off* 1kHz
550	Remote Meter Source	MMR Bus* Local
610	Digital Out Delay	Internal* Number of Samples (Range:1 through 255 Samples)
710	Disk Initialize	Press STO
711	Disk Low Format	Press STO
720	Disk Cleanup	Press STO
790	Drives Mounted	[shows list in format: 0,1,2,3,4,5,6]
800	Project Name	MMR Project*
810	Track Prefix	MMR Trk*
900	Store Settings	User 1 [through] User 10
901	Recall Settings	Default User 1 [through] User 10 Previous
910	Set MM:DD:YY	Date: __:__:__
911	Set HH:MM:SS	Time: __:__:__

MENU #	MENU NAME	PARAMETERS
912	Change Password	Press STO
920	LED Brightness	8* Range: 0 through 15
980	Serial Number	Read – only display
990	Software Version	Read – only display
995	Load Software	Press STO key

Technical Notes

Now that a large number of MMR/MMP units are working in post production facilities around the world, we have identified a few common problems encountered by users. This section discusses some issues to be aware of when using the MMR-8 and MMP-16.

SCSI Setup

One of the most crucial factors in using external drives with the MMR/MMP is the quality of the SCSI hardware used. The most important factors to be aware of are the following:

- 1) Use only high quality SCSI cables which have separate ground wires for each data wire. A good rule is the cable should be closer to the thickness of a thumb than a pencil.
- 2) Be sure the external SCSI device is terminated using an active SCSI terminator.
- 3) Use short SCSI cable runs. This is especially important when using an external enclosure supporting multiple Kingston SCSI bays. We recommend cable runs of 1 meter or less.
- 4) Use only disk drives that have been certified to work with the MMR/MMP. We are constantly testing new drives for performance and suitability. The latest list of certified SCSI drives is available on the TASCAM web site at <http://www.tascam.com>

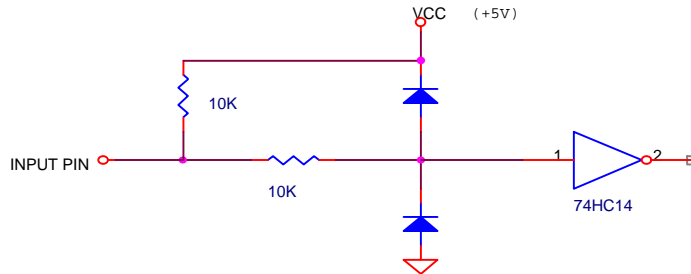
MMR Bus Procedures

When multiple MMR/MMP units are connected to each other via the MMR Bus connector, it is important to assign each unit a unique unit ID number using Setup Menu 111. If the Auto-assign setting is used, this could cause confusion when a new unit is added to the bus, since the ID's are assigned based on unit serial numbers. This could cause a unit already on the bus to change ID numbers, which might result in inadvertent changes to the MMR Bus sample rate or frame rate settings. If units use only pre-assigned unit ID numbers, this cannot occur and new units can safely be added to the bus without affecting units already on the MMR Bus.

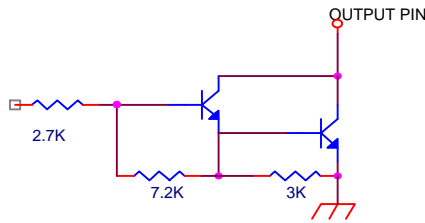
Parallel Tracks and Parallel Transport Connector Pinout

Connectors are 37-pin D male. I/O on connectors share same logical ground. Electrical characteristics are:

TYPICAL INPUT



TYPICAL OUTPUT



DARLINGTON OUTPUT STAGE OF ULN2803A
MAX RATINGS: 50V @ 500MA

<u>Tracks</u>		<u>Tracks</u>		<u>Transport</u>	
Switch	Tally	Switch	Tally	Switch	Tally
1. Trk 1 Input	21.	9. Trk 1 Rec	29.	1. Record ON	
2. Trk 2 Input	22.	10. Trk 2 Rec	30.	2. Record OFF	
3. Trk 3 Input	23.	11. Trk 3 Rec	31.	Locked	28.
4. Trk 4 Input	24.	12. Trk 4 Rec	32.	9. Online	29.
5. Trk 5 Input	25.	13. Trk 5 Rec	33.	10. Rewind	30.
6. Trk 6 Input	26.	14. Trk 6 Rec	34.	11. Rev Play	31.
7. Trk 7 Input	27.	15. Trk 7 Rec	35.	12. Stop	32.
8. Trk 8 Input	28.	16. Trk 8 Rec	36.	13. Play	33.
				14. FFwd	34.
				15. Record	35.
				16. Preview *	36.

Pins Common to Both Connectors

19. +5VDC 20. GRD 37. GRD

**When preview is grounded, all record functions will invoke rehearse.*

TASCAM

TEAC Professional Division

MMR-8/MMP-16

Version 3.0 Update

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