May 5, 1989

11:38 AM
May 8, 1989

This is a preliminary document which will allow the demonstration of the new APR-24 software. This is production qualified software that has begun shipment from the factory. Any critical customers who urgently require a copy(s) of this software should contact Karl Kussmaul at (201) 833-5314. The field retro-fit program shall be announced shortly.

Software Release P5.01.02.0

INSTALLATION NOTE:

Should you install the above proms in a machine that was previously using an earlier revision software, it is essential that the following storage location be set as shown below:

STORAGE LOCATION	ARGUMENT
#44 External Record Control Enable	0
#45 External Sync/Repro Control Enable	0
#46 Control Track Follow Enable	0
#53 Erase Ramp Rate	0
#54 Bias Ramp Rate	0

Software Operation

This listing identifies significant operational changes to the APR-24. This does not identify every change. Many subtle improvements have been made since the initial software release, the description of most of these would be to arcane for general distribution. The important changes are identified below.

Burst timecode

Burst timecode, originally lacking in the first software release, is now fully functional. Please consult the O/M Manual or the Pocket Guide relative to this feature.

End of Reel

The Machine now Locates faster at the end of reel.

Small Reels

Significantly improved performance w/ 8" Plastic reels.

Audio Muting/Locate/lifters

Shield defeat will now un-dim audio only if the lifters are OUT.We can now Locate w/ dimming defeated (such that we can listen for slate tones!) and not worry about the loud noise that happens when the lifters drop in at the end of the locate.

Lifters no longer drop when Locate is aborted by the actuation of the STOP key.

Follow in CHASE to High speed TC

Will now CHASE valid High Speed timecode, such as provided by a BVE-950 w/a BKU-905. This is a correction of a software flaw, however, a minor hardware change must also be done on the MRA assy for satisfactory performance.

Hardware modification details:

Assy Affected:	MRA Board (A-7850-734-A)
Component Affected:	C126
Change Required:	Change Value of Capacitor
	From: 150pF
	To: 22pF (1-162-741-21)

Reason for change: Excessive capacitance limited bandwidth of high speed timecode reception, thus compromising the decode process.

Follow in CHASE to high speed Control Track / Direction

New feature has been added for High speed follow of an external transport.

The APR-24 can follow High speed timecode, see above.

While some VTRs to not provide valid timecode at high speed wind, we have added the capability to track external Control Track (1 pulse/frame) and direction. Previously unassigned pins on the parallel ports now will accept these signals.

50 Pin Parallel Port

37	External Direction *
38	External Control Track

* Sense is dependent on the argument held in Storage Location # 46

Storage Location #46 enables the use of this feature:

Storage Location #46; "Control Track Follow Enable"

Argument = 0 normal high speed TC follow in Chase
Argument = 1 Direction line is low true for reverse
Argument = 2 Direction line is low true for forward
This storage locations is non volatile

Due to hardware error, A small hardware change must also be done on the MRA assy prior to the use of this new facility:

Hardware modification details:

Assy Affected:	MRA Board (A-7850-734-A)
Area Affected:	circuit near IC12
Change Required:	Signals to pins 3 and 4 of IC12 must be reversed:
	pin 3 = ext. Tach
	pin 4 = gnd.
	Confirm R13,14 are 4700 ohms

If the above modification is not performed, it becomes essential that storage location #46 be set to zero, as the hardware error can lead to a system malfunction.

REHEARSE, via parallel port

Change in the logical performance of the Parallel port REHEARSE command. In the initial release software this command line would switch to rehearse status upon a negative going strobe of this command line. This has been changed such as to accommodate what seems to be a mutual request of a number of third party developers. This change also provides some additional commonalty with the practice of other manufacturers.

This logical performance command line has been changed such that an active low on the command line will hold the rehearse status true. Third Party developers should note that Rehearse can be still be activated through manual operation of the remote control, a high on the parallel command line does not assure a non-rehearse status. The parallel Status output line will indicates the operation of the rehearse operation.

If the external control device raises the Rehearse line during an active Rehearsing Record Mimic operation, the rehearse mode will not be cancelled even when the Rehearsing Record Mimic operation is concluded by a PLAY or STOP command. The external control device must drop, and then raise the Rehearse line again to clear the Rehearse mode.

The best way to use this line is to change the status of this line just prior to, or coincident with, the issue of a record command.

Tape Dynamics

Tape tensioning has been modified such as to reduce the amount of air trapped in the pack. Depending on the type of tape used, the very high wind speed of the APR-24 previously allowed an undesirable amount of air to be trapped in the pack. This could cause "pack skewing" if a high torque were to be suddenly applied to the reel (such as in the dynamic breaking invoked due to a tape break detection). This has been significantly improved w/ negligible effect on speed of the transport

New Audio Alignment Adjustment provision

Audio alignments can now be adjusted through the JOG Dial, as well as through the use of the INCrement and DECrement Alignment keys. This feature is a substantial time saver.

Higher IN and Out point Editing resolution

Bit resolution adjustment of edit In and Out Points is now fully supported. (see O/M manual for specifications)

Support for a future Interface Accessory

Software support is provided for an interface accessory which is yet to be publicly announced. The use of this accessory affects the manner in which record/record ready operations and Global Repro/Sync monitor switching is controlled.

Storage Locations #44 and 45 allow control of this new . Accessory. When an APR-24 is not fitted with this accessory, or if the user wishes to disable the use of this accessory, these Storage Locations #44 and 45 must be set to 0.

Triggered Edit / Timecode track
A triggered edit on the designated Timecode track is disallowed, in addition, we prohibit triggered Edit operation should there be no Timecode track assigned.

Jog/Shuttle enable
Jog/Shuttle enable will now toggle, rather than require a STOP to exit the enable mode. This provides a more intuitive operation.

Shield defeat
Shield defeat will now toggle rather than requiring a PLAY to raise the shields. This provides a more intuitive operation.

User Adjustability of Erase and Bias Ramp Durations
The user can now customize his Punch in and Punch out Erase and Bias Envelope ramp durations.

The default ramp durations for the APR-24 have been chosen after long hours of listening tests to determine the best sounding settings for these transitions. Unless you have a driving need to alter the machine's default characteristics, we recommend that you refrain from making capricious adjustments. Punch in and out operations can be very subjective things. Choosing responsible Erase and Bias envelopes ramp durations for specific applications can be a rather formidable task.

Punch In/out transitions vs ramp durations

Low frequency artifacts
Longer transitions are quieter, while shorter transitions produce a more pronounced Low frequency artifact. This artifact is an unavoidable detection of the erase and bias ramp crossing through the non-linear magnetic transfer characteristic of the tape. Though the details are rather complicated, the audible effect is similar to that of listening to the ramp itself through a differentiator. (A differentiator is a circuit which has a constant 6dB/octave rise starting a zero frequency) The faster the ramp is, the larger the disturbance. Slower ramps show a smaller albeit more prolonged disturbance.

The shape of the ramp can also affect the sound of the artifact. Ramps which are created through simple RC networks can only produce exponential ramps. Exponential ramps change quickly at first and then slow down as they approach their end. Exponential ramps can produce exaggerated low frequency artifacts unless they are made over a long ramp duration. Exponential ramps also produce asymmetric punch in and out characteristics.

Smoothed Linear ramping performs the transition in the shortest duration, with the least possible low frequency artifact.

Audio Transition Speed
Musically critical punch in operations frequently require rapid punch in operations. Likewise there is a need to perform the punch in the least amount of time without compromising the audio performance.

Audio Transition Fidelity

As transition times get longer, the length of the underbiased duration also gets longer. During underbias conditions, the tape's distortion performance is rather poor. The longer the underbiased condition exists, the more pronounced the Underbias Transition Distortion artifacts become to the ear. This is another reason to keep the ramp duration short. It is interesting to note that exponential ramping is asymmetric in this regard as well, making Punch-In and Punch-Out performance sound different in their distortion characteristics.

We have found that the best unified test for all of the above is to perform Punch-Ins on identical, synchronous program material. Tone-on-tone test can be useful but do not give a good feel for the musical performance. If performing tone-on-tone testing, it is wise to use tones of different frequencies to avoid phase cancellation effects.

The great trade off summarized:

Short			<< RAMP DURATION >>						Long	
10	20	30	40	50	60	70	80	90	100	ms

larger <------- Low Freq. Artifact --------> smaller
Forte <--------- Program Dynamics ---------> Piano

abrupt <-------- Audio Transition ---------> prolonged
tight <--------- Program Material---------> open

inaudible <---- Underbias Transition ------> more audible Distortion

Storage Locations #53 and #54 provide the means to adjust the Erase and Bias Ramp durations respectively. The storage arguments may be set from 0 to 16. (refer to the graph) . An argument value of 0 returns to machine to its default settings. Changing the tape speed, or turning the machine off will automatically return the machine to the default conditions.

While it is permissible to set the erase and bias ramp durations to widely different settings, it is not likely to provide beneficial results, as this can create holes and/or overlaps in the transition. Should this be your desired effect, please feel free to experiment.

Remember!... with power comes responsibility!.

Timecode referenced In and Out points such as used in programmed Edit operations, are specific to the center of the default bias ramp duration. If you wish to maintain this same relationship to the center of the bias ramp, you may wish to adjust the In and Out Point Bit Delay to compensate for your change in bias ramp duration. You probably will not need to consider this a significant concern unless you have changed the ramps duration to a time greater than 36ms.

$$\text{Bit Adjustment} = (R_b/.75) - 32$$

Where R_b = The Bias ramp duration (in milliseconds)

A negative Bit adjustment value implies an earlier time or a smaller delay. A positive Bit adjustment value implies a later time or a larger delay

ERASE & BIAS RAMP CONTROL