APR-5003V

POCKET GUIDE

Sony Corporation

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SECTION 1
INTRODUCTION

1.1 OVERVIEW

The **APR-5003V** Recorder/Reproducer is an extended version of the standard **APR-5003**, and includes new features which are designed for use in Video Post Production, Film Audio Production and Radio Station/Radio Network operations, as well as Recording Studio work.

The fundamental operational and performance characteristics of the **APR-5003V** remain the same as those for all other **APR-5000** series machines, and are fully described in the **APR-5000** Series Operation and Maintenance manual.

1.1.1 Scope and Purpose

This Pocket Guide gives only basic operating information and procedures for the machine, and is NOT intended to replace the **APR-5000** Series Operation and Maintenance manual. In cases where the Guide information differs from that in the Manual, the latter should be accepted as being correct.

The Operations Index given in paragraph 2.1.1 lists alphabetically all of the operations and procedures described in this Guide, and is intended to provide quick access to such functions as the user may desire.

SECTION 2
OPERATION

2.1   OVERVIEW

In this section of the Guide, the functions of all control keys
and indicators on the Tape Transport and the Meter Housing
are described, together with the basic operating sequences.

2.1.1   Operations Index

The following table lists all of the operations and functions
described in this Guide, and is intended to provide quick
access to any desired procedure.

2.2   TRANSPORT CONTROL PANEL

The functions of all the transport control keys and indicators on the tape Transport Control panel are described in the following paragraphs. Refer to Figure 2-1 for all key and indicator locations.

2.2.1   Key and Display Functions

REW

Pressing REW (REWIND) causes the transport to go into fast rewind mode, this cancelling any previous motion command such as FAST FORWARD, PLAY or RECORD. Except when used in conjunction with SHIELD DEFEAT, REW also causes the audio channels to be muted.

Touching the MVC control during FAST REWIND causes the transport to enter SPOOL mode. In this mode, the wind speed is reduced to about 75 ips (inches per second) so as to allow more uniform packing of the tape.
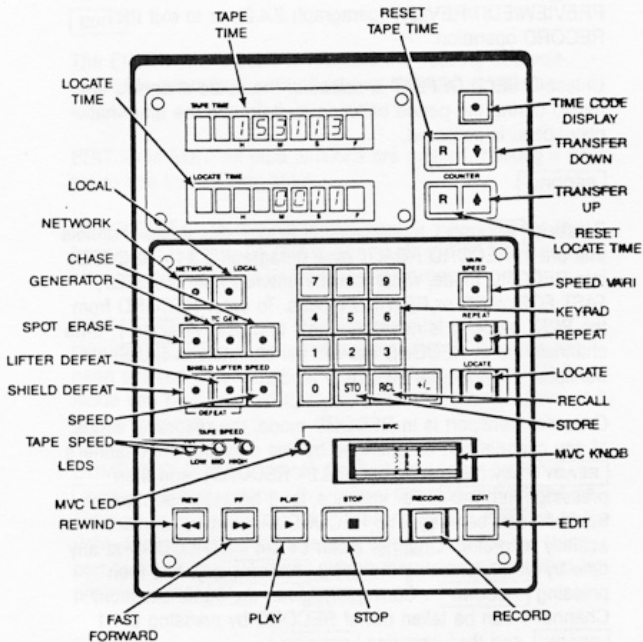
Figure 2-1.   Transport Control Panel

FF

Pressing FF (FAST FORWARD) causes the transport to enter the FAST FORWARD mode, this overriding any previously selected motion command such as REWIND, PLAY or RECORD. Except when used in conjunction with SHIELD DEFEAT, FF also causes the audio channels to be muted.

As with REWIND mode, touching the MVC control during FAST FORWARD causes the transport to enter SPOOL mode.

STOP

Pressing STOP cancels any previously selected motion command and stops the tape. This causes the STOP key to illuminate (so long as there is tape across the End of Tape sensor). In STOP mode, the audio channels are muted unless either LIFTER DEFEAT or SHIELD DEFEAT is selected.

PLAY

Pressing PLAY causes the tape to shuttle across the heads at the selected play speed. PLAY also is used to trigger RESOLVE ON PLAY (paragraph 2.4.1), to manually trigger

PREVIEW/EDIT/REVIEW (paragraph 2.4.2), or to exit the RECORD operation.

Unless SHIELD DEFEAT is selected, the audio channels are muted during the period between start-up and the time that play speed is achieved.

RECORD

Pressing RECORD together with PLAY sets those channels that are in RECORD READY (see paragraph 2.3.1 - **RECORD**) into RECORD mode, which can be entered from the STOP, FAST FORWARD or REWIND modes. To enter RECORD from the PLAY mode, it is necessary only to press RECORD . If no channels are in RECORD READY (all channels in SAFE) the transport will not enter RECORD mode.

Once the transport is in RECORD mode, the recording status of any channel can be changed by first pressing the channel's READY key (see paragraph 2.3.1 - **RECORD**), and then pressing RECORD . For instance, let it be assumed that the transport has been set into RECORD with only Channel 1 actually recording. Channel 2 can be set into RECORD at any time by simply pressing the CH 2 READY key, and then pressing RECORD . Conversely, given the same situation, Channel 1 can be taken out of RECORD by pressing CH 1 READY and then pressing RECORD .

SPEED

This key is used to set the desired PLAY speed. Each time the key is pressed the speed advances to the next higher speed, which then is shown on the **HIGH**, **MID**, or **LOW** TAPE SPEED indicator. The range of these speeds is set by the headstack identification code. At machine power-up, the most recently used speed is selected automatically.

LIFTER

Pressing LIFTER (LIFTER DEFEAT) causes the lifters to be defeated, allowing them to remain disengaged when in any FAST WIND mode, i.e. FAST FORWARD, REWIND, LOCATE or SPOOL.

SHIELD

The SHIELD (SHIELD DEFEAT) key is used to deactivate the shields. When this key is pressed, it illuminates to indicate that the shield will stay down during PLAY or RECORD, leaving the audio channels unmuted.

EDIT

The EDIT mode is used to facilitate the splicing and edit-assembly operations, and offers two different modes, as follows:

EDIT — In EDIT, all tape tensions are relaxed, making it possible to use the splicing block.

DUMP EDIT — In this mode, the tape is played across the heads, but the take-up reel is turned off so that the tape runs off the machine into a suitable waste container.

EDIT is entered from the STOP position by pressing EDIT , this key becoming illuminated to show that EDIT mode has been entered and that all tape tensions are relaxed. EDIT mode can be cancelled either by pressing EDIT again, or by pressing STOP .

DUMP EDIT is entered from the EDIT mode by pressing PLAY . Before entering this mode, the tape should first be cut, and have its leading edge dressed off the machine to the right. From DUMP EDIT, pressing STOP causes the transport to revert to EDIT mode, which then can be cancelled by pressing either EDIT or STOP .

LOCATE

Selecting LOCATE causes the transport to fast wind from the current location shown in the **TAPE TIME** display to the location shown in the **LOCATE TIME** display, the direction of wind being determined by the relative values in the two displays. If so desired, the SPOOL mode can be entered by momentarily touching MVC after entering LOCATE mode.

REPEAT

In the REPEAT mode, the tape transport repeatedly plays the same tape segment. The mode can be cancelled by pressing STOP .

To program the REPEAT function, the START time is entered into Storage Location 28 and the STOP time is entered into Storage Location 29. In order for the REPEAT function to operate, the specified STOP time must be later than the START time.

MVC

MVC (MANUAL VELOCITY CONTROL) provides a number of functions, each depending upon the current mode of operation.

In the STOP mode, MVC can be used to shuttle the tape backward or forward at a selectable winding speed, the

direction and speed depending upon the way the control is operated. With the control pushed to the right, the tape winds in the forward direction. Conversely, with the control pushed to the left, the tape rewinds. In either case, the wind speed depends upon the distance that the control is moved. With the control pushed fully left or fully right, the tape shuttles at a speed somewhat greater than that of the SPOOL mode. MVC operation in the STOP mode is summarized in Figure 2-2.

REWIND ◄━━━━━━━━━━━━━━━━━━━━━━━► FORWARD

| FAST | SLOW | SLOW | FAST |
| WIND | WIND | WIND | WIND |
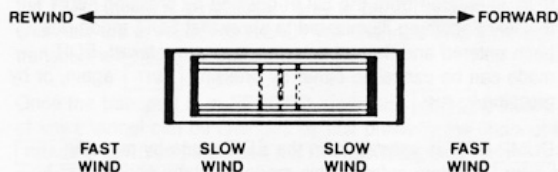
Figure 2-2. MVC Operation

In the LOCATE, FAST FORWARD and REWIND modes, simply touching the MVC control causes the transport to enter SPOOL mode, so that the wind speed becomes reduced to 75 ips.

In PLAY mode, the MVC control is disabled, except when VARI SPEED EXECUTE mode also is selected. In the VARI SPEED EXECUTE mode, the MVC control can be moved to the right to increase the play speed or to the left to reduce the play speed.

VARI SPEED

The VARI SPEED key is used to enable the VARIABLE SPEED mode which allows the selected play speed to be either increased or reduced by up to 50% of its nominal rate. Desired VARIABLE SPEED values are entered in terms of percentage, positive values leading to an increase in speed, and negative values leading to a reduction in speed. Where any value greater than 50% is entered, it becomes truncated to 50%.

VARIABLE SPEED entries can be made via either one of two modes, as illustrated in Figure 2-3 and described below:

To enter the DIRECT SPEED ENTRY mode, VARI SPEED is pressed once. At this time, the key indicator flashes on and off, and any VARI SPEED value that may have been previously entered is shown on the **LOCATE TIME** display. In this

mode, the desired percentage is entered via the numeric keypad.

Once the VARISPEED value has been entered in this manner, the transport can be made to play at the modified speed by simply pressing VARI SPEED again. (It should be noted that this automatically sets the transport into the MANUAL SPEED ENTRY mode described below.)
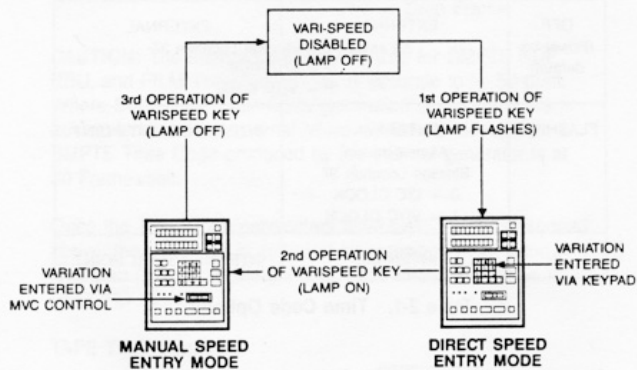
Figure 2-3. VARIABLE SPEED Modes

The MANUAL SPEED ENTRY mode can be entered by pressing VARI SPEED twice. In this mode, any existing VARI SPEED value also is shown in the **LOCATE TIME** display, but the key indicator is solidly illuminated. The desired VARI SPEED percentage now can be entered by means of the MVC control. Moving this control to the right causes the percentage to increase (become more positive), while moving it to the left causes the percentage to be reduced.

In MANUAL SPEED ENTRY mode, the VARI SPEED value can be displayed, if so desired, in terms of semitone variation and inches per second. This display can be invoked by presetting Storage Location 41 to a value of 1. It should be noted that the semitone values are displayed only in increments of 0.25 semitones.

When the VARISPEED value is entered in MANUAL SPEED ENTRY mode, the transport automatically plays at the modified speed, no further action being necessary. To exit this mode, the VARI SPEED key must be pressed.

TC GEN

Time Code can be recorded from either an internal or an external reference. Further, the Time Code data can be either VITC (Vertical Interval Time Code) or LTC (Longitudinal Time

Code). The TC GEN (TIME CODE GENERATOR) key is used to select the desired reference and data options for the Time Code Generator by cycling through three mutually exclusive modes, each of which is identified by the condition of the key indicator.

TC GEN INDICATOR	TIME CODE REFERENCE	TIME CODE DATA
OFF (Power-up default)	EXTERNAL As selected in Storage Location 37 0 = LTC DATA 1 = VITC DATA	EXTERNAL
FLASHING	EXTERNAL As selected in Storage Location 37 0 = LTC CLOCK 1 = VITC CLOCK	INTERNAL START POINT
ON	INTERNAL	INTERNAL START POINT

Table 2-1.   Time Code Options

At power-up, the TC GEN indicator is not illuminated, and this condition indicates that, when activated, the generator will record Time Code in accordance with external reference and data. It should be noted that Storage Location 37 must be preset in accordance with the external reference, i.e.:

LOCATION 37   0 = LTC data
                1 = VITC data

From the state described above, pressing TC GEN causes the key indicator to flash on and off, showing that the recorded Time Code will be in step with the external reference (selected in accordance with Location 37), but can be started from a preset internal start time.

NOTE: The Time Code Channel must be in RECORD READY before the entered Time Code can be transferred in the manner described below.

The desired start time can be preset by entering the time into the **LOCATE TIME** display via the numeric keypad, and then moving it into the **TAPE TIME** display by pressing ↑.

From the flashing-key mode, the next operation of the TC GEN key causes the key indicator to become solidly illuminated, showing that the generated Time Code will be in accordance with internal reference and start point. In this mode, Storage Location 37 has no bearing, but Storage Locations 31 and 32 must be preset in accordance with the desired Time Code type, as follows:

NOTE: Where EBU or FILM Time Code types are selected, Storage Location 32 automatically becomes set to a value of 0.

Storage Location 31:   0 = SMPTE
                         1 = EBU
                         2 = FILM

Storage Location 32:   0 = Non-Drop Frame
                         1 = Drop Frame

CAUTION: The internal crystal references for SMPTE NDF, EBU, and FILM Time Code types is accurate to $\pm$ 50 ppm. Where SMPTE DF Time Code generation is required, it is advisable to use an external reference (house video). All SMPTE Time Code produced by the internal generator is at 30 Frames/sec.

Once the Time Code parameters have been set, as described above, the generator is activated by pressing PLAY and RECORD simultaneously. (Time Code channel must be in RECORD READY.)

TAPE TIME Display

The **TAPE TIME** Display provides tape time information in either one of two formats, the format depending upon whether or not the TC DISPLAY (TIME CODE DISPLAY) is enabled.

Where TC DISPLAY is disabled, the TC DISPLAY key is extinguished, and the **TAPE TIME** display shows a real time representation of tape position. The format for this display is:

Hh Mm Ss n

in which: H = tens of hours
              h = hours
              M = tens of minutes
              m = minutes
              S = tens of seconds
              s = seconds
              n = tenths of seconds

Where TC DISPLAY is enabled, TC DISPLAY is illuminated, and the **TAPE TIME** Display shows either the external Time Code presented to the machine (STOP mode) or the internal Time Code from tape (modes other than STOP), the format in this case being:

Hh. Mm. Ss. Ff.

In this format, Hh, Mm, and Ss remain as defined above, but F = tens of frames and f = frames.

LOCATE TIME Display

This display is used for all generalized data entry and recall procedures. The machine will LOCATE to the time presented in this display. In addition, other information which may be monitored on this display are:

$\boxed{\text{STO}}$ (STORE) and $\boxed{\text{RCL}}$ (RECALL) setup and confirmation

VARI SPEED percentage, inches per second, and semitones

$\boxed{\text{TC DISPLAY}}$

This key is used to toggle the TAPE TIME display between Time Code and Tape Time, becoming illuminated when Time Code is selected.

$\boxed{\text{R}}$

Each of the time displays has an associated $\boxed{\text{R}}$ (RESET) key. When pressed, the upper $\boxed{\text{R}}$ key clears the TAPE TIME display down to 00.00. Similarly, the lower $\boxed{\text{R}}$ key clears the LOCATE TIME display.

↑ and ↓

The Up/Down arrow keys allow location and time data to be transferred between displays. Pressing ↓ transfers the contents of the TAPE TIME display down to the LOCATE TIME display, and can be used to capture tape time or Time Code information. Pressing ↑ transfers the contents of the LOCATE TIME display up to the TAPE TIME display, allowing the Time Code recording start point or the tape time position to be preset.

$\boxed{\text{CHASE}}$

The CHASE (follow and lock) facility provides for synchronization of the machine to an external Time Code reference, a necessary pre-requisite being that the external Time Code reference be of the same type as that on the tape. Provision is made for offsetting so that either Slave is ahead of Master or vice versa. Refer to Storage Locations 00 and 98 for Frame and Bit offsets respectively.

The external Time Code reference can be either LTC or VITC, and the External Lock Reference must be entered into Storage Location 37, as follows:

        LOCATION 37   0 = Longitudinal Time Code
                        1 = Vertical Interval Time Code

Once the desired offset and External Lock Reference have been entered, $\boxed{\text{CHASE}}$ is pressed to enable the facility. When $\boxed{\text{CHASE}}$ is first pressed, the indicator flashes on and off to show that the mode is selected but that the Master and Slave machines are not locked. Once lock is attained, the indicator becomes solidly illuminated.

$\boxed{\text{SPOT}}$

The $\boxed{\text{SPOT}}$ (SPOT ERASE) key disables the record head but leaves the erase head activated so that tape can be erased with no bias frequency from the record circuitry. When $\boxed{\text{SPOT}}$ is pressed, the key flashes to indicate that this mode is armed.

Once armed, the SPOT ERASE mode can be entered by pressing $\boxed{\text{RECORD}}$, so long as at least one channel is in RECORD READY. The erase head(s) will become activated, this being shown by the Meter Housing ERASE indicators for all active channels becoming illuminated. At this time, the desired section of tape can be erased by passing it manually over the erase head. To cancel SPOT ERASE, $\boxed{\text{STOP}}$ must be pressed.

$\boxed{\text{LOCAL}}$ and $\boxed{\text{NETWORK}}$

The $\boxed{\text{LOCAL}}$ and $\boxed{\text{NETWORK}}$ keys are used to select the transport control source. Each of these keys becomes illuminated when selected.

When $\boxed{\text{LOCAL}}$ is selected, all transport control is derived from the panel keys or from a parallel remote control.

When $\boxed{\text{NETWORK}}$ is selected, machine control originates from the network (serial remote control), and all the machine transport and audio controls, except $\boxed{\text{STOP}}$, are disabled.

If both $\boxed{\text{LOCAL}}$ and $\boxed{\text{NETWORK}}$ are selected (BOTH mode), parallel control is available from either the serial remote control or from the machine panel keys on a first come, first served basis.

2.2.2 Numeric Keypad

The Numeric Keypad section of the Transport Control Panel is used to make numeric entries, to store data, and to reclaim data. The functions of all of the keypad controls are described briefly below.

$\boxed{\text{+/-}}$

Pressing $\boxed{\text{+/-}}$ reverses the sign of the contents of the LOCATE TIME display. Where it is desired to change the sign of the TAPE TIME display value, it can be transferred down into the LOCATE TIME display, changed, and then transferred back up to TAPE TIME.

$\boxed{\text{0}}$ through $\boxed{\text{9}}$

These keys provide the means of entering specific values into the LOCATE TIME display. They also are used in conjunction with $\boxed{\text{STO}}$ and $\boxed{\text{RCL}}$ to store or reclaim data to or from Memory and Storage locations.

The |STO| (STORE) and |RCL| (RECALL) keys are used in conjunction with the numeric keys to store or reclaim data to or from Memory and Storage locations.

2.3 METER HOUSING CONTROLS

This section describes all of the Audio channel and Monitor speaker controls and indicators.

2.3.1 Audio Channel Functions

As illustrated in Figure 2-4, each Audio channel control panel is sub-divided into six major sections, these being: **ALN** (Alignment Select Indicator), **RECORD**, **MONITOR**, **RECORD LEVEL**, **OUTPUT LEVEL**, and **VU Meter**.
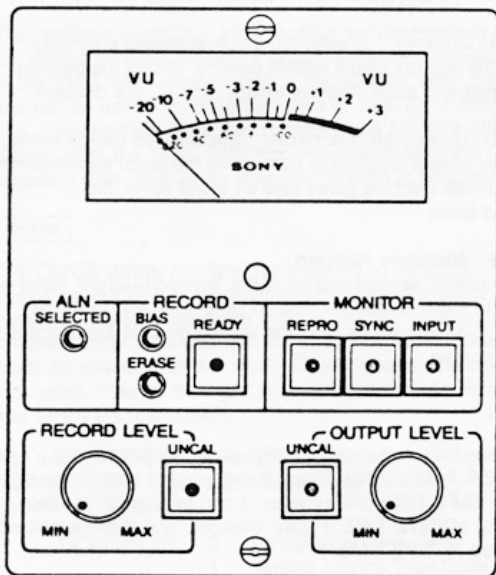

Figure 2-4. Audio Channel Controls

ALN

The **ALN** section has a single, amber indicator which becomes illuminated to show that this particular audio channel is selected during any adjustment at the Alignment Control Panel. When **ALN** is selected for any channel, all of the controls for that channel, except for **RECORD** |READY|, become disabled.

RECORD

The **RECORD** block contains two status indicators and one key. The **BIAS** and **ERASE** indicators become illuminated to show which, if any, of these functions is currently active. During a normal recording operation, both of these indicators become illuminated. During SPOT ERASE, the **BIAS** indicator is extinguished to show that the record head bias is turned off, and the **ERASE** indicator is illuminated to show that the erase head is active.

The |READY| key is used to set the channel into RECORD READY before the transport is placed in RECORD mode. When |READY| is selected, the key becomes illuminated to indicate that the channel is ready to record.

MONITOR

The **MONITOR** block contains three keys which are used to select the source of the audio channel output.

|REPRO|

When |REPRO| is pressed, it becomes illuminated to indicate that the audio channel output is being derived from the reproduce head.

|SYNC|

When |SYNC| is selected, it illuminates to indicate that the audio channel output is being derived from the sync (or cue) head. During a RECORD operation, this will be the same as INPUT. During a PLAY operation, the playback signal will come from the sync head instead of the repro head.

|INPUT|

When |INPUT| is selected, it illuminates to indicate that the audio channel output is derived directly from the audio channel input.

RECORD LEVEL

The recording level can either be preset internally or adjusted by the rotary control on the **RECORD LEVEL** section of the panel, selection between these options being made by means of the |UNCAL| (UNCALIBRATED) key on the same panel section.

When this key is selected, it becomes illuminated to show that the recording level is UNCALIBRATED, i.e. it can be controlled by adjustment of the **RECORD LEVEL** rotary control. When the UNCAL key is extinguished, the control is ineffective, and the recording level is adjusted internally to the preset level.

OUTPUT LEVEL

The **OUTPUT LEVEL** section is similiar to the **RECORD LEVEL** section, differing only in that it controls the channel's audio output level rather than its recording level.

VU Meter

Each audio channel incorporates a **VU** Meter with a range of −20VU to +3VU. The meters are preset at the factory so that an indication of 0 VU corresponds to a level of +4 dBu. (0dBu = 0.778 vrms). If so desired, this reference can be changed by an adjustment on the CNL (channel) board, the procedure being as given in the **APR-5000** Operation and Maintenance Manual.

The **VU** Meter monitors the signals selected at the **MONITOR** section, i.e. when INPUT is selected, the **VU** Meter indicates the audio channel input level, etc.

2.3.2 Monitor Speaker

The machine is fitted with a Monitor Speaker whose output is derived from the signal(s) displayed on the **VU** Meter(s). Track 1, Track 2, or both tracks can be selected by pressing the appropriate key(s), these keys becoming illuminated to indicate the track(s) being monitored. When both keys are selected, the input signals are summed in the monitor amp. The **LEVEL** control is used to adjust the volume of the monitored signal.

2.4 STORAGE LOCATION RELATED OPERATIONS

Paragraphs 2.4.1 through 2.4.2 describe Storage Location related operations, these being RESOLVE ON PLAY, PREVIEW/EDIT/REVIEW, TRIGGERED EDIT SYNCHRONIZA-TION and FIND. All of these operations require argument or time entries into various Storage Locations. Paragraphs 2.5 through 2.5.4 give the specific procedures used for making these entries.

2.4.1 RESOLVE ON PLAY

The PLAY operation can be preset to RESOLVE, which establishes and maintains data independent synchronism between the Time Code from tape and some external reference. Being data independent, this occurs in a manner which is independent of any offset. The external reference can be either Longitudinal Time Code (LTC) or a video signal or external tone. RESOLVE ON PLAY is initiated by presetting Storage Locations 37 and 39 as follows:

Storage Location 39 Set to 1 to initiate the mode
Storage Location 37 Set to 0 for LTC reference
                     Set to 1 for Video signal or Tone
                     reference

INPUT SIGNAL	TIME CODE ON TAPE			
	SMPTE NDF	SMPTE DF	EBU	FILM
LTC @ 30 f/s	Resolve	+0.1%	n/a	n/a
60 Hz NTSC B&W Video	Resolve	+0.1%	n/a	Resolve*
LTC @ 29.97 f/s	−0.1%	Resolve	n/a	n/a
59.54 Hz NTSC Color Video	−0.1%	Resolve	n/a	−0.1%*
LTC @ 25 f/s	n/a	n/a	Resolve	n/a
50 Hz PAL/SECAM Video	n/a	n/a	Resolve	n/a
LTC @ 24 f/s	n/a	n/a	n/a	Resolve

Table 2-2. Resolve Capabilities

* **NOTE:** One of the most useful applications of RESOLVE ON PLAY is the ability to resolve 60 Hz input reference signals to the 24 f/s Film Time Code by maintaining a 4:5 Time Code to reference signal resolving ratio.

2.4.1.1 Resolve Capabilities

Table 2-2 shows the resolve capabilities of the machine. The percentage values in the table indicate the deviation from the nominal recorded tape speed at which the transport will operate in the Play-Resolve mode. The non-applicable (n/a) pairings shown in the table are those with more substantially mis-matched clock rates. These pairings do not provide reliable or repeatable results.

2.4.2 PREVIEW, EDIT AND REVIEW

These facilities provide a series of editing operations, as follows:

PREVIEW — Allows the user to rehearse the edit, without actually recording the changes.

EDIT — Performs the edit and records the results.

REVIEW — Allows the user to monitor the results of the edit.

In any of the editing modes, IN POINT, OUT POINT, PREROLL DURATION and POSTROLL DURATION must be defined:

IN POINT —	Start of edit
OUT POINT —	End of edit
PREROLL DURATION —	Time that tape rolls before the IN POINT is reached.
POSTROLL DURATION —	Time that tape continues to roll after OUT POINT.

It should be noted that, where no IN POINT, OUT POINT, PREROLL DURATION and/or POSTROLL DURATION values are entered, these parameters will default to the most recent values entered into the appropriate Storage Locations.

Initiating PREVIEW, EDIT or REVIEW causes the following events to occur:

PREVIEW and EDIT causes both audio channels to monitor the Sync head.

REVIEW causes both audio channels to monitor the Repro head.

In PREVIEW and REVIEW, the PLAY key flashes to indicate that the operation is cued and ready to perform the remainder of the process.

In EDIT, the PLAY and RECORD keys flash to indicate that the operation is cued and ready to perform the remainder of the process, which may include a **RECORD** operation.

2.4.2.1 PREVIEW
The PREVIEW facility provides a rehearsal mode in which the user can adjust the IN POINT, OUT POINT, PREROLL DURATION and POSTROLL DURATION for an edit. In PREVIEW, the recording facility is inhibited globally, and the Record-Readied tracks do not enter RECORD.

The following procedure is used to initiate PREVIEW. Additional steps relating to fine adjustment of the IN POINT and OUT POINT are given in paragraph 2.4.2.1.1

STEP 1 Set the desired audio channel(s) into RECORD READY.

STEP 2 Enter the desired IN POINT time into Storage Location 01.

STEP 3 Enter the desired OUT POINT time into Storage Location 02.

STEP 4 Enter the PREROLL DURATION time into Storage Location 51.

STEP 5 Enter the POSTROLL DURATION time into Storage Location 52.

STEP 6 Set Storage Location 95 to 1 to enable PREVIEW. At this time the machine automatically cues to the appropriate preroll position ahead of the IN POINT. Once the machine is cued, the PLAY key flashes on and off to indicate that the machine is ready.

NOTE: The machine is preprogrammed with an Acceleration Allowance which allows time for the transport to reach the selected speed. Because of this, the machine always cues to a position slightly ahead of the nominal preroll point.

STEP 7 Press PLAY to start the PREVIEW operation. It should be noted that the operation can be cancelled at any time by pressing STOP .

NOTE: The PREVIEW, EDIT AND REVIEW operations can be actuated by an external Time Code trigger. This method of operation is described in paragraph 2.4.3.

2.4.2.1.1 IN POINT and OUT POINT Bit Delays
To allow for very precise settings, the IN POINT and OUT POINT times can be delayed for up to one frame in one-bit (1/80th frame) increments. A number (up to 79) entered into Storage Location 91 causes the IN POINT to be delayed by that number of bits. Similarly, a number (up to 79) entered into Storage Location 92 delays the OUT POINT.

2.4.2.2 EDIT
The EDIT operation is similar to PREVIEW in that IN POINT, OUT POINT, PREROLL DURATION, and POSTROLL DURATION are set in the same manner, but differs in that the results of the EDIT become recorded.

The procedure for initiating EDIT remains the same as for PREVIEW, except that STEP 6 becomes:

STEP 6 Set Storage Location 96 to 1 to enable EDIT. At this time the machine automatically cues to the appropriate preroll position ahead of the IN POINT. Once the machine is cued, the PLAY and RECORD keys flash on and off to indicate that the machine is ready.

2.4.2.3 REVIEW

REVIEW allows the user to listen to the results of the edit after it is completed. To initiate the review, the IN POINT, OUT POINT, PREROLL DURATION and POSTROLL DURATION parameters are left unchanged after the edit. All that is required is to set Storage Location 97 to 1 and then, when the `PLAY` key begins to flash, press `PLAY`.

2.4.3 TRIGGERED EDIT SYNCHRONIZATION

Any of the three Edit sequences can be actuated automatically by being triggered from the external reference. In this mode, it it not necessary to set the audio tracks into RECORD READY, and the IN POINT and OUT POINT only define the duration of the synchronous operation.

It is most important to note that, for successful operation in this mode, the external reference must be presented to the machine in reasonably accurate real time during the preroll time period.

The procedure used to enter TRIGGERED EDIT SYNCHRONIZATION is as follows:

STEP 1 Enter the desired OFFSET, IN POINT, OUT POINT, PREROLL DURATION and POSTROLL DURATION times into storage Locations 00, 01, 02, 51 and 52 respectively.

STEP 2 Set Storage Location 43 to 1 to enable TRIGGERED EDIT SYNCHRONIZATION.

STEP 3 Set Storage Location 37 to the appropriate ESTABLISH LOCK reference. (This selects the source from which the machine will establish synchronization ahead of the IN POINT.)
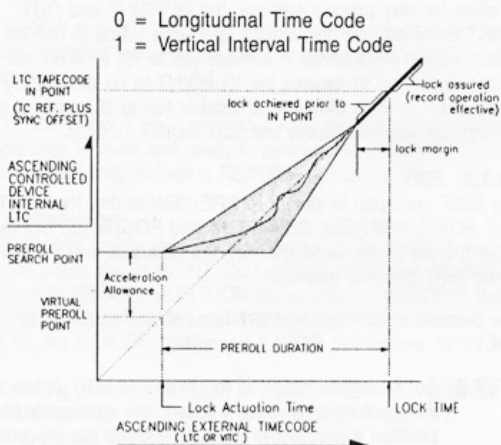
        0 = Longitudinal Time Code
        1 = Vertical Interval Time Code

Figure 2-5. Triggered Edit Synchronization

STEP 4 Set Storage Location 38 to the appropriate MAINTAIN LOCK reference. (This selects the source from which synchronism will be maintained after the IN POINT.)

        0 = External LTC, Data Independent
        1 = External LTC, Data Dependent
        2 = Video signal or external Tone, Data Independent
        3 = VITC, Data Dependent

STEP 5 Set the appropriate Storage Location to 1 to actuate the desired facility.

        Storage Location 95 = PREVIEW
        Storage Location 96 = EDIT
        Storage Location 97 = REVIEW

As STEP 5 is completed, the machine automatically cues to the appropriate position ahead of the IN POINT. Once the machine is cued, the `PLAY` key flashes on and off, and the machine begins to monitor the ascending Time Code reference (Establish Lock Reference). At Lock Actuation Time the controlled device is triggered automatically to synchronize its own internal LTC from tape with the selected External Time Code reference. Figure 2-5 illustrates the TRIGGERED EDIT SYNCHRONIZATION operation.

The Lock Actuation Time is defined as follows:

    Lock Actuation Time =
        IN POINT − (PREROLL DURATION + SYNC OFFSET)

2.4.4 FIND

Some tapes may include a number of live action audio sequences, each starting with a different Longitudinal Time Code. This is frequently the case where audio for Film is recorded, each Take starting with a Time Code corresponding to the time of day at which it was recorded. Consequently, these sequences begin with widely separated time-of-day start points. FIND is a feature that aids in the LOCATE process, allowing speedy access to a Time Code location among any number of such sequences.

At full speed wind, the **APR-5003V** does not read Time Code, but interpolates Time Code from the counter roller. When performing a LOCATE, FIND enables the machine to slow down periodically, sample the tape Time Code, and update it's interpolated position. Each time the transport is required to change LOCATE direction, the distance between samples is halved, and, in this manner, the transport can approach its target location quickly and accurately.

FIND can be activated by setting Storage Location 93 to any value other than 0. For speediest operation, it is desirable to set the Storage Location to a value roughly equal to the length (in minutes) of the Take durations on the tape. (Values greater

than 10 are internally truncated to a value of 10.) The preset value is not critical in any way, since the FIND process is not critical, but presetting the duration between the Time Code updates allows the process to be performed in a shorter time.

2.4.4.1 FIND Operation

The following procedure presupposes a situation in which the user wishes to find the audio corresponding to the film starting at 15:12:02:00, on a tape which has many Takes of about 3:20 minutes each. Intermixed with these Takes, there are several which were cut to be significantly shorter.

The procedure to be used in this instance would be:

STEP 1 Set Storage Location 93 to 3 to enable FIND.

STEP 2 Enter the desire LOCATE TIME of 15:12:02:00.

STEP 3 Press LOCATE . This causes the machine to LOCATE to the desired tape position, regardless of the breaks in the Time Code data.

2.5 STORE/RECALL SEQUENCE OPERATIONS

The following paragraphs define the procedures to be used for STORE and RECALL operations. It should be noted that procedures differ somewhat for different Storage Locations, but that all procedures have these two things in common when entering the two-digit Storage Location codes.

a. If the first digit is entered incorrectly, RCL (or STO) can be pressed and the entry can be started again.

b. If more than three seconds elapses between entering the first and second digits, **LOCATE TIME** will revert to its former display.

A complete index of Storage/Recall Registers is given in Appendix A to this Guide.

2.5.1 Locations 00 through 29 — Position Registers
     Location 50 — Acceleration Allowance Preset
     Location 51 — PREROLL DURATION Preset
     Location 52 — POSTROLL DURATION Preset

For these Storage Locations, the STORE and RECALL functions are separate entities and can be invoked independently from each other.

2.5.1.1 RECALL Procedure

STEP 1 Press RCL .

STEP 2 At the Numeric Keypad, enter the two digits representing the desired Storage Location. The two-digit code becomes displayed for a short time, then the display shows the value currently stored in the selected Storage Location.

2.5.1.2 STORE Procedure

STEP 1 Verify that the time data to be stored is shown in the **LOCATE TIME** display. (This may be recalled data or newly entered data.)

STEP 2 Press STO . Note that the time data remains displayed.

STEP 3 At the Numeric Keypad, enter the two digits representing the desired Storage Location. The two-digit code becomes displayed for a short time, then the display shows the time data which has been stored in the selected Storage Location.

It should be noted that this data is non-volatile, and remains in memory, even when machine power is removed.

2.5.2 Locations 30 through 49 — Enables and Selects
     Location 91 — IN POINT Bit Delay
     Location 92 — OUT POINT Bit Delay
     Location 93 — FIND Enable
     Location 95 — PREVIEW Enable
     Location 96 — EDIT Enable
     Location 97 — REVIEW Enable

For any of these locations, a new argument can be entered only after the current stored value has been reclaimed.

2.5.2.1 RECALL and/or STORE Procedure

STEP 1 Press RCL .

STEP 2 At the Numeric Keypad, enter the two-digit number for the desired Storage Location. The **LOCATE TIME** display shows the entered number, then immediately changes so as to show both the Storage Location number and the previously stored argument.

STEP 3 Within ten seconds, enter the new argument on the Numeric Keypad, then press STO .

STEP 4 If it is desired to retain the previously stored argument in the Storage Location, no action should be taken for STEP 3. In this event, the **LOCATE TIME** display reverts to its original indication after ten seconds, and the previously stored value is retained in the Storage Location.

2.5.3　Location 98 — BIT BUMP

BIT BUMP is a special operation that allows Synchronization Offsets to be set with an accuracy of 1/80th of a Frame. This facility is adjusted by means of the | MVC | control rather than by entry at the Numeric Keypad.

2.5.3.1　Adjustment Procedure

To adjust the BIT BUMP value, first press | RCL | and enter | 9 | | 8 | on the Numeric Keypad. This recalls the contents of Storage Location 98 in the format:

$$Ss.Ff -Bb-$$

Where:　S = Tens of seconds
　　　　s = seconds
　　　　F = Tens of frames
　　　　f = Frames
　　　　- = Dash
　　　　B = Tens of bits ⎤
　　　　b = bits　　　　⎦ (Modulo 80)

this being preceded by a minus sign for negative values.

The seconds and frames in this display represent the seconds and frames portion of the Synchronization Offset, and any change made to this value results in the same change in the contents of Storage Location 00.

To change the contents of the display, press | MVC | to the right for an increment or to the left for a decrement. Changes that overflow the modulo 80 bit count upward increase the frame count, and changes that overflow downward reduce the frame count. If it is desired to clear the sub-frame offsets, this can be accomplished quickly by pressing | 0 | on the Numeric Keypad.

Once the desired offset is displayed, press | STO | and enter | 9 | | 8 | on the Numeric Keypad to store the new offset into Storage Location 98. It is most important to note that, even where the BIT BUMP value remains unchanged, | STO | | 9 | | 8 | must be entered to escape the display.

NOTE: All sub-frame offsets become cleared automatically when RESOLVE ON PLAY (paragraph 2.4.1) is actuated. This is a safety feature which ensures that the important Video to tape LTC framing relationship is preserved.

2.5.4　Location 99 — Offset Calculation

Offset Calculation is a special operation that allows the offset between the Master Time Code and the tape Time Code to be captured. This data can be displayed for identification and/or subsequent storage in any of those Storage Locations whose contents are time values.

2.5.4.1　Capture and Display

To capture and display the offset, first press | RCL |, then enter | 9 | | 9 | on the Numeric Keypad. The **LOCATE TIME**

display now shows the offset between the Master and tape Time Codes.

2.5.4.2　Capture, Display and Store

To capture and display the offset, and then store it into Location 00 (Synchronization Offset), all that is required is to capture, as described in paragraph 2.5.4.1, then press | STO | and enter | 9 | | 9 | on the Numeric Keypad.

2.6　MACHINE OPERATIONS

The following paragraphs describe the various, basic machine operations, including PLAY, RECORD, SPOT ERASE and REPEAT.

2.6.1　Transport Control

Depending upon the selected mode, the transport can operate at fast speeds, selected speeds, at SPOOL speed, or at intermediate speeds set by MVC operation.

2.6.1.1　Fast Wind Modes

This paragraphs describes the modes in which the tape is moved from reel to reel at high speed. All of the mentioned controls and indicators are illustrated in Figure 2-1.

FAST FORWARD — To advance the tape to a forward position, press | FF |. This causes the tape to fast wind from the supply reel to the takeup reel.

REWIND — To move the tape in the reverse direction, press | REW |. This causes the tape to fast wind back from the takeup reel to the supply reel.

LOCATE — To wind to a specific position on the tape, enter the time for that position into the **LOCATE TIME** display via the Numeric Keypad, and then press | LOCATE |. This causes the tape to fast wind to the desired position. During the LOCATE operation, depending upon the direction of wind, either | FF | or | REW | becomes illuminated.

During any fast winding mode, the LIFTERS automatically come forward to lift the tape off the heads, this being done to avoid subjecting the tape to unnecessary wear and tear. If so desired, the | LIFTER | key can be pressed during fast wind to allow the tape to ride across the heads.

Where it is desired to ensure that the tape be packed more evenly on the reel, SPOOL mode can be entered from any of the fast wind modes by simply touching the | MVC | control while the tape is winding.

2.6.1.2　MVC Operation

The | MVC | control can be used to shuttle the tape back and forth while the transport is in STOP mode. Tilting | MVC | to the left causes the tape to rewind, and tilting it to the right

causes the tape to wind forward, the speed of the wind depending upon the distance through which the control is tilted. It should be noted that the LIFTERS cannot be defeated while winding or rewinding in MVC mode.

2.6.2   Recording

The various requirements of a RECORD operation are given in paragraphs 2.6.2.1 through 2.6.2.3. All of the mentioned controls and indicators are illustrated in Figures 2-1 and 2-4.

2.6.2.1   Initial Setup

STEP 1   Connect the sources of the material to be recorded to the **INPUT CH-1** and **INPUT CH-2** connectors on the rear panel of the machine.

STEP 2   Set the **POWER** switch to ON and verify that no error message is shown on the Status Display on the Alignment Control Panel.

STEP 3   Select `READY` on the **RECORD** section of the Audio Channel Control Panel(s) to set the desired channel(s) into RECORD READY. Verify that the appropriate `READY` keys become illuminated.

STEP 4   Select `INPUT` on the **MONITOR** section of the appropriate Audio Channel Control Panel(s).

STEP 5   While watching the VU Meter, play a section of the material to be recorded and adjust the input level so that the audio peaks cause meter deflections of about 0 VU. The peaks should never be allowed to cause deflections greater than +3 dB. (It is recommended that this adjustment be done using that part of the audio input that has the greatest volume.)

STEP 6   Cue the machine to the desired tape starting position.

2.6.2.2   RECORD Operation
At the Transport Control Panel Figure 2-1), press `PLAY` and `RECORD` simultaneously. This causes the record-readied channels to enter RECORD mode, this being indicated by their **BIAS** and **ERASE** indicators becoming illuminated, together with the `PLAY` and `RECORD` keys.

2.6.2.3   Monitoring During Record
During the RECORD operation the user has the option of monitoring either the input material or the repro signal that is being recorded. To monitor the input signal, either `INPUT` or `SYNC` can be selected on the **MONITOR** section of the Audio Channel Control Panel. To monitor the repro signal, the `REPRO` key should be selected. The selected function is indicated by the illumination of the appropriate key.

2.6.3   Playback

The various requirements of a PLAY operation are given in paragraphs 2.6.3.1 and 2.6.3.2. Unless otherwise stated, all of the mentioned controls and indicators are illustrated in Figures 2-1 and 2-4.

2.6.3.1   Initial Setup

STEP 1   Connect the inputs to the mixing console, audio amplifier, or other playback device to the **OUTPUT CH-1** and **OUTPUT CH-2** connectors on the rear panel of the machine.

STEP 2   Set the **POWER** switch to ON and set the audio channels for the desired playback source. This can be either the repro head (select `REPRO` on the **MONITOR** section) or the sync head (select `SYNC` on the **MONITOR** section). It should be noted that the repro head gives better frequency response.

2.6.3.2   PLAY Operation
Before entering PLAY mode, the machine should be cued to the point where RECORD was started. Once the machine is cued, pressing `PLAY` on the Transport Control Panel initiates the playback.

If so desired, the playback level can be adjusted by selecting `UNCAL` on the **OUTPUT LEVEL** section of the Audio Channel Control Panel. In the UNCALIBRATED mode, the rotary control can be used to set the desired playback volume.

2.6.4   Other Operations

2.6.4.1   SPOT ERASE
The SPOT ERASE operation provides a method of erasing a section of tape with the transport under manual control. Use the following procedure:

STEP 1   Set the POWER switch to **ON**.

STEP 2   Select `READY` on the Audio Channel Control Panel for the track to be erased.

STEP 3   At the Numeric Keypad, enter the time for the tape position where the erasure is to be made into the **LOCATE TIME** display, and then press `LOCATE` on the Transport Control Panel to wind the tape to that position.

STEP 4   Press `SPOT` on the Transport Control Panel to arm the SPOT ERASE mode. Verify that the `SPOT` key is flashing.

STEP 5   Press `RECORD` on the Transport Control Panel. Verify that the `SPOT` key becomes solidly illuminated, together with the **ERASE** indicator for the selected channel.

STEP 6 Upon completion of STEP 5, the tape tension is released, and the reels can be turned by hand to move the desired section of the tape over the erase head.

STEP 7 When the erasure is completed, press STOP on the Transport Control Panel.

2.6.4.2 REPEAT
The REPEAT function is used to create a "looping mode" in which the same section of the tape is played back repeatedly. The tape section to be repeated is programmed by entering START and STOP Times into Storage Locations 28 and 29, respectively. Note that the STOP time must be later than the START time.

The procedure used to enter REPEAT mode is detailed below.

STEP 1 Set up the machine for PLAY mode.

STEP 2 Enter the START point time into the **LOCATE TIME** Display.

STEP 3 Press STO 2 8 on the numeric keypad to enter the START time into memory.

STEP 4 Enter the STOP point time into the **LOCATE TIME** Display.

STEP 5 Press STO 2 9 on the numeric keypad to enter the STOP time into memory.

STEP 6 Press REPEAT to enter the mode.

STEP 7 Upon completion of the REPEAT operation, press STOP to exit.

Where the times for the START and STOP locations are not known, the following procedure can be used:

STEP 1 Set up the machine for PLAY mode

STEP 2 Cue the tape to the desired START point.

STEP 3 Press the ↓ to transfer **TAPE TIME** into **LOCATE TIME**.

STEP 4 Press STO 2 8 on the numeric keypad to enter the START time into memory.

STEP 5 Cue the tape to the desired STOP point.

STEP 6 Press ↓ to transfer **TAPE TIME** into **LOCATE TIME**.

STEP 7 Press STO 2 9 on the numeric keypad to enter the STOP time into memory.

STEP 8 Press REPEAT to enter the mode.

STEP 9 Upon completion of the REPEAT operation, press STOP to exit.

APPENDIX A
APR-5003V STORAGE/RECALL REGISTER INDEX

Location Number	Location Name	Argument Range
Position Registers 00-29		
00	Synchronization Offset, Frames	time
01	Current IN POINT Preset	time
02	Current OUT POINT Preset	time
03-27	LOCATE TIME (Cue Position Data)	time
28	REPEAT Start Time	time
29	REPEAT Stop Time	time
Enables/Disables and Selects 30-49		
30	Auto TC Enable	0/1
31	Time Code Type (SMPTE, EBU, FILM) Select	0/1/2
32	Drop Frame Select (SMPTE only)	0/1/2
33	Remote CHASE Enable	0/1
34	*Reserved*	
35	Burst Time Code Enable	0/1
36	Wind Speed Limit Enable	0/1
37	Establish Lock Reference Select	0/1
38	Maintain Lock Reference Select	0/1/2/3
39	RESOLVE ON PLAY Enable	0/1
40	Auto Shift Down Enable	0/1
41	Ips/Semitone VARI SPEED Display Select	0/1
42	*Reserved*	
43	Triggered EDIT Operation Enable	0/1
44-49	Not Assigned	
Presets 50-59		
50	Acceleration Allowance Preset	time
51	PREROLL DURATION Preset	time
52	POSTROLL DURATION Preset	time
53-59	Not Assigned	
Reserved and non-assigned Registers 60-74		
60-64	*Reserved*	
65-69	Not Assigned	
70-74	*Reserved*	
Special Operations 90-99		
90	Not Assigned	
91	Current IN POINT Bit Delay	00-79
92	Current OUT POINT Bit Delay	00-79
93	FIND Enable	0/1-10
94	Not Assigned	
95	PREVIEW Enable	0/1
96	EDIT Enable	0/1
97	REVIEW Enable	0/1
98	BIT BUMP (Sub-frame Offset)	MVC dial
99	Offset Calculation, Frames	none

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