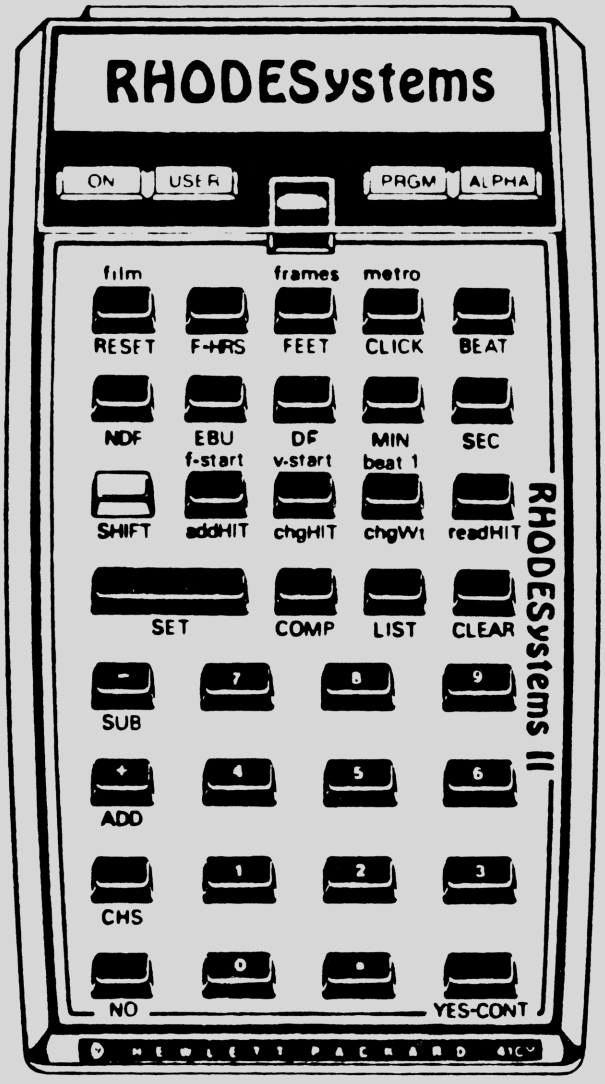
RHODESystems II



RHODESystems Inc.

Creative Solutions for Creative People

PO Box 1550 New York NY 10101 (212) 245-5045

Owner's Guide to the Operation and Use of

RHODESystems II

III/1984

RHODESystems Inc
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NOTICE

See the HP-41C/CV Owner's Handbook and Programming Guide for the HP-41CV warranty and the 82143A Printer Owner's Handbook for the Peripheral Printer warranty.

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PRELUDE

RHODESystems II was developed to fill a void in the world of music and motion pictures. Different methods, all valid historically, are used in film, videotape, and music to describe a point-in-time, elapsed-time, and tempo. The composer/arranger must combine three elements, time, tempo, and beat, to properly execute a score which matches a motion picture.

Before **RHODESystems II**, there was no coherent system which could convert the various measurements of time to one another, to manipulate them by addition and subtraction, and to meet the many practical and mathematical problems of the composer and film/video editor.

The hardware is Hewlett-Packard, the "Rolls-Royce" of the hand-held computer. The HP-41CV Computer, the HP Peripheral Printer, and the **RHODESystems II** Application Module and Overlay, combine to make a system which removes the tedium of mathematics from the creative process.

FOR COMPOSERS AND ARRANGERS:

COUNTS may be taken from **any** Start-Point in:
Film Units: Feet & Frames, Frames, or Film Time Code
Video Units: Drop-Frame, Non-Drop SMPTE, or EBU Time Code
Clock Units: Minutes & Seconds or Seconds & Hundredths

SOLVE problems to find any one of the three variable of scoring if two are given:
Time (expressed in any of the units above),
Tempo (in standard Click Track or Metronome terms)
Beat number.

PRINT a Hit List which provides the following information:
Click Track Tempo
Film Speed
Metronome conversion
Hit Number
Hit Location (in Film, Video, or Clock units)
Beat Number
Weight (user assigned value of a particular hit compared to the others in the list)
Lag (the difference, in fractions of a beat, between the actual hit point and the next available beat or half-beat)
Lagsum (the sum of the lags which can be used to compare a list at one tempo with the same list at another tempo)

PRINT other Hit Lists by changing:
Click Track tempo
Time Units (Feet & frames to Time Code or to Seconds, for example)

COMPUTE Optimum Click
RHODESystems II will determine, given a range of acceptable Click Track tempos, which one matches the hits best.

FOR FILM/VIDEO EDITORS:

CONVERT any of the following to any of the others:
Film Units: Feet & Frames, Frames, or Film Time Code
Video Units: Drop-Frame and Non-Drop SMPTE and EBU Time Code
Clock Units: Minutes & Seconds or Seconds & Hundredths

ADD and **SUBTRACT** any of the above from one another.

EMULATE SYNCHRONIZATION between Film & Videotape:
Any start-point in film may be "locked" with **any** start-point in videotape to find an unknown location in either.
Actual clock time may be read from any start-point.
The start-point may be moved with **or** without affecting synchronization.

The MANUAL

This manual is designed to get you going as quickly as possible and toward that goal we suggest that you first read **Chapter Seven: System Set-Up.**

Next read **Chapter One: Taking Counts,** to learn how **RHODESystems II** handles time.

The composers among you should jump into **Chapter Two: Scoring** and get the feel of manipulating heretofore unwieldy numbers easily.

For the film/video editor's timing, conversion, and synchronization problems, **Chapter Three: Time Manipulation** is invaluable along with **Chapter Four: Unusual Film Sizes & Speeds.**

Chapter Five: Errors and Flags and **Chapter Six: Key Glossary** are references for everyone.

Becoming acquainted with **RHODESystems II,** its applications, philosophy, and hardware, is an adventure. Our goal is for you to become so facile and secure with the system that this manual is unnecessary!

The best time to begin is **NOW!**

Roger C. Rhodes
New York City

RHODESystems Inc.

Creative Solutions for Creative People

The Hewlett-Packard 82240A Infrared Printer

The Infrared Printer and the Infrared Printer Module together have replaced the 82143A Peripheral Printer.

Instructions for use:

1. Load printer with batteries (4-AA) and paper per printer manual.

2. Insert Printer Module in any unused port at the rear of the HP-41CV.

3. Place HP-41CV between you and printer so that module is pointing at a dark red window at the front of the printer.

4. Turn on printer. Turn on HP-41CV and operate as usual.

Some differences:

1. Printer does not have to be turned on first. However, if it is not, then the printing will be much smaller. The instructions from the HP-41CV to the printer regarding size occur during power-up. If you prefer the smaller type, then turn the printer on after the HP-41CV.

2. RHODESystems II is designed to run slower when a printer is not connected in order to comfortably read the display. With the Infrared Printer Module in place and whether or not the printer is on, the HP-41CV thinks the printer is connected and runs a bit fast through some operations. To run at the slower speed, turn HP-41CV off, remove Printer Module, and turn HP-41CV on again.

Always turn HP-41CV off before inserting or removing any module!

Note: any extra set of batteries and roll of paper are useful accessories!

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CONTENTS

CHAPTER ONE: TAKING COUNTS

"Taking counts" is the first step in preparing a musical score to match motion pictures. The process involves watching the picture, reading a film counter or a time-code display and listing the numbers where musical synchronization is required along with a description of each point. This manual will begin with some considerations and suggestions regarding accurate count-taking.

FILM

Measuring time with film is straightforward. When working on an editing machine, the film size is obvious and the speed is a standard based upon geography (American = 24 F/S). However, some counters do have a tendency to slip and display inaccurate counts. Double-checking your figures on a hand-operated table synchronizer is recommended.

Setting a film counter to zero at the start of music is common practice for many composers because it eliminates the problem of subtracting the start-point from every subsequent sync point in a scene. **RHODESystems II** allows you to assign ANY number as the start point and automatically subtracts it from each remaining count. Setting the counter to zero at the Academy Start Mark (12 feet before start-of-picture---a well-marked industry standard) is the best way to make certain that your finished music tracks are synchronized as you expect.

Although the most common film measurement is Feet and Frames, there are counters which display only Frames, Seconds and Frames, or Film-Hours (hours, minutes, seconds, and frames). **RHODESystems II** will accommodate any of these measurement methods.

The following table describes the three Film Time-Unit keys, the format required for, and the label displayed and printed with each one.

FILM-UNITS

KEY	FORMAT	LABEL	DESCRIPTION
frames	fr.e	**FR.8**	Film Frames. Frames before the decimal, eighths after. (Frame rate is selected by the **SHIFT-film** keys.) (**FR.8=15.4** reads 15 Frames-4 Eighths)
FEET	ft.fr	**FT.FR**	Feet and Frames. Feet before the decimal, frames after. (Frames **1-9** MUST be keyed in as **01-09.**) (Film Size and Frame rate are selected by the **SHIFT-film** keys.) (**FT.FR=15.04** reads 15 Feet-4 Frames)
F-HRS	h.mmssff	**FH**	Film hours. (Film Time Code) Hours before the decimal, minutes, seconds & frames (24, 25, or other integer film speed selected by **SHIFT-film**). (FH=0.095423 reads: 9 minutes, 54 seconds, and 23 frames)

VIDEOTAPE

In the United States, two forms of SMPTE Time-Code are in use: **Drop-Frame** and **Non-Drop Frame.** The timing difference between the two over a period of one minute is either two frames or none, depending upon where in the code the comparison is made. For commercials and short cues, the difference is insignificant, but for longer cues and program timing, whether the code is Drop-Frame or Non-Drop becomes important. A technical description of Time-Code may be found at the end of this chapter.

Except for the major television networks which use Drop-Frame, Non-Drop is the most common form at this time. If whether the code is Drop or Non-Drop cannot be determined, assume that it is Non-Drop for two reasons:

1) Non-Drop is more common.

2) A musical hit should be on or after the picture, not before. Counts taken as Non-Drop which are actually Drop-Frame may cause the musical accent to be slightly late by two frames per minute which is preferable to being early. For accuracy in scoring long cues, the code must be identified.

The method of reading time-code poses the question: is the Time-Code Display frame-accurate at very slow speeds and in the stop-frame mode? Two conditions determine whether it is or not:

1) If you are reading the Time-Code from a visual display recorded on the picture itself, it is accurate.

2) If the Time-Code is read from a display which is a counter on the editing equipment, the code is NOT frame-accurate at very slow speeds or in the stop-frame mode unless the code is Vertical Interval Time-Code (**VITC**).

If you are using a Time-Code reader, you must find out whether the Code is **VITC**, which is recorded as part of the video signal and accurate just like code burned into the picture, or the more common **LTC** (Linear Time-Code), which is recorded on one of the audio tracks and read by moving the tape at a certain minimum speed. If the tape is not moving fast enough, the code displayed will be the last readable number.

Once time-code is recorded on the tape, it cannot be changed (reset to zero, for example) without re-recording. **RHODESystems II** allows you to assign any Time-Code number as your local start-point and automatically subtracts it from every subsequent number keyed in.

The following table describes the three Video Time-Unit keys, the format required for, and the label displayed and printed with each one.

VIDEO-UNITS

KEY	FORMAT	LABEL	DESCRIPTION
NDF	h.mmssfr	**ND**	Non-Drop Frame SMPTE Time Code. Hours before the decimal, minutes, seconds & frames (30/Second) after. (**ND=1.234529** reads 1 Hour, 23 Minutes, 45 Seconds, 29 Frames)
DF	h.mmssfr	**DF**	Drop Frame SMPTE Time Code. Hours before the decimal, minutes, seconds & frames (30/Second) after. (**DF=23.594320** reads 23 Hours, 59 Minutes, 43 Seconds, 20 Frames)
EBU	h.mmssfr	**EB**	European Broadcasting Union Time Code. Hours before the decimal, minutes, seconds & frames (25/Second) after. (**EB=2.010101** reads 2 Hours, 1 Minute, 1 Second, 1 Frame)

COMBINATION FILM/VIDEOTAPE

Film is often used to shoot a picture for television because it has a different "look" from one shot on videotape. Conversely, videotape used in a film production can be a convenience in editing the picture and preparing additional audio tracks. The time and expense of film lab processing is not required with videotape. Using a combination of film and videotape presents problems in the United States:

1) Film runs at 24 Frames per Second

2) Videotape runs at 29.97 Frames per Second

To transfer film to videotape, the film speed must be slowed slightly so that the film matches videotape on a frame-by-frame basis with the additional help of "3-2 Pulldown"---the system by which 24 film frames are expanded into 30 video frames.

What has all this to do with taking counts? Consider the following process:

1) Film counts are taken and are used to determine the beat numbers in a score which will be recorded with a Click-Track Generator. The finished music track will be transferred to mag film and combined with other audio elements in a film mix studio.

2) The film is transferred to videotape (with Visual Time-Code) for further reference and operating convenience at the scoring session.

3) Using a standard 24 F/S Click-Track Generator, a three minute music cue is recorded and then played back against the videotape.

4) As the scene progresses, the music gets slightly more and more ahead until, at the end, it is five video frames early. Not a large error in three minutes, but if it's a cut or specific action, it could be significant.

The first question is whether or not there is a problem. In this instance, since the film was transferred to videotape as a convenience and is not the medium with which the music will be mixed, there is no problem. The music will match the original film because the film counts were taken and the beat numbers computed based upon 24 frames per second and the music was recorded with a click track generator running on the same standard.

What if the process changes somewhat and instead of a film mix, the music will be combined with the other elements in a videotape mixing studio? Since the picture is now running slower than 24 F/S in the mixing stage, using the original counts could be a problem, again depending upon the need for accuracy.

Three options are available before the music is written and recorded:

1) If extreme accuracy is not necessary. Ignore the error (1/10 of 1%) and use the film counts as they are.

2) Forget the Film counts and take them again from the Videotape. A possibility, but a lot of work.

3) With **RHODESystems II** it is possible to set the film speed to correspond exactly with videotape speed:

a) Change the Film Speed to 23.976.
See Chapter Four for instructions.

b) Key in a Hit List using the original counts in Feet & Frames. See Chapter Two.

c) Change the film speed back to 24 F/S.

d) List the hits using Time-Code with the same start point that is on the video transfer. See Chapter Two.

Using this process, the original 24 F/S Film counts are converted to Time-Code which match the Videotape transfer perfectly.

CLOCK TIME

Counts that are given in Clock-Time---Minutes & Seconds or Seconds & Hundreths---are generally not "first generation" timings but the result of a conversion from Feet & Frames or Time-Code. **RHODESystems II** easily and accurately converts among Film, Video, and Clock-Units, making any pre-conversion unnecessary.

Counts should be taken in the units of the medium with which you are working (Feet & Frames with film and Time-Code with videotape) and then converted to minutes & seconds or seconds & hundredths for reference.

The following table describes the two Clock Time-Unit keys, the format required for, and the label displayed and printed with each one.

CLOCK-UNITS

KEY	FORMAT	LABEL	DESCRIPTION
MIN	mm.ss	**M.S**	Minutes before the decimal, seconds after.
SEC	ss.hh	**SEC**	Seconds before the decimal, hundredths after.

TIME CODE

SMPTE Time Code is the method used in television to provide videotape with electronic edge numbers and sprocket holes. Time Code is a digital signal which is recorded on either the audio track (Longitudinal Time Code) or as part of the video signal (Vertical Interval Time Code). Each frame of the video signal is identified with a number provided by a Time Code Generator.

The SMPTE Time Code Generator counts in hours, minutes, seconds, and frames (hh:mm:ss:fr). The American system (NTSC) counts at 30 frames per second but actually runs at 29.97 frames per second. Because the Time Code is running more slowly than the counter indicates, an error develops when comparing Time Code with Clock-Time. When Time Code displays 1:00:00:00 (one hour), a clock (using the same format) will read 1:00:03:18 (1 hour, 3 seconds and 18 frames), a +108 frame or +3.6 second error. If you use this uncorrected Time Code to determine the length of a program and ignore the error, the program will be long by 3.6 seconds per hour.

The television industry has provided a correction for this error: Drop-Frame Time Code. The uncorrected signal is known as Non-Drop Frame Time Code.

Drop-Frame Time Code eliminates the extra 108 frames by dropping two frames (00 and 01) each minute except for the minutes which are multiples of ten. If two frames per minute were dropped the total per hour would be 120 frames, an overcorrection. To arrive at a proper correction of 108 frames per hour, no frames may be dropped in the six minutes: 0,10,20,30,40,50.

Both Drop-Frame and Non-Drop Frame Time Code run at the same rate, 29.97 Frames per Second, and both count frames at 30 per second. The only difference is that Drop-Frame skips over or "drops" Frames to catch up with Clock-Time.

Whether the Time Code is Drop or Non-Drop is determined at the time of recording and cannot be changed unless the videotape is copied with new code.

EBU TIME CODE

European Broadcasting Union Time Code runs and counts at 25 frames per second with no error. In **RHODESystems II**, this Time Code is called **EBU.** The format is the same as SMPTE.

TIME CODE at 30 Frames per Second

Time Code is often used in audio applications to lock together two or more tape recorders or other devices.

If a Time Code Generator is not fed a NTSC Color Frequency of 29.97 frames per second or does not contain a crystal to generate this frequency, it will use the AC line frequency of 60 Hertz or an internal oscillator to produce Time Code running at 30 frames per second.

In RHODESystems II, use Drop-Frame Time Code (**DF**) for calculations and conversions of Time Code running at 30 frames per second. Drop-Frame Time Code is accurate to within 1.8 frames of Clock-Time.

METRONOMES and CLICK-TRACK GENERATORS

Along with the timing security provided by synchronous film chains and time code generators and readers, a means to assure accuracy in the generation of tempos for musical performance is necessary. The following history will provide some insight into the often obscure terminology used to describe tempo.

HISTORY

The metronome was developed by J. N. Maelzel in 1816 and his first customer was Ludwig Van Beethoven. The marking **M.M. = 120**, for example, in conjunction with a note value (half, quarter, eighth, etc) at the beginning of a piece of music is familiar to all musicians. The **M.M.** stands for **Metronome Maelzel.**

The metronome reference is used by the composer as an indication of the correct tempo. The reverence that conductors and performers have for the composer's wishes is another book, but it's enough to say that extremely accurate metronomes have never been particularly important, either to users or manufacturers. Some metronomes are excellent, but when a composer faces the task of synchronizing music with motion pictures, "approximately right" isn't good enough.

In the early days, for composers to score music to picture accurately, the music editor would punch holes at appropriate intervals in an otherwise blank optical sound track to create clicks at the desired tempo when run on an optical playback machine. The interval from one hole to the next was most easily measured in **frames.** At 24 frames per second, one hole every 24 frames would create a tempo of 60 beats per minute. A hole every 12 frames would generate a tempo of 120 beats per minute and so forth. With 35mm Film it is easy to find the half, quarter, and eighth frame by looking at the perforations. This makes a wide range of intermediate tempos available. From this method the punched film became known as the **Click-Track**, the units became **Frames**, and the fractions became **eighths.**

Originally, the Click-Track was run in synchronization with the projected picture during a scoring session. Today the electronic Click-Track Generator, using the same nomenclature of frames and eighths of frames, is standard equipment for every professional music recording studio and is generally used without simultaneous projection to record the music. A playback of the completed music track with the picture is standard practice.

Converting Metronome Units into Click-Track Units is a problem because most Metronomes and the Click-Track Generator are designed to reproduce only certain discrete tempos, with no possibility for intermediate settings. In converting METRO to CLICK there are only ten mathematically equivalent settings in the range from 40 to 208 beats per minute! All others are fractional conversions and unavailable on one device or the other. This, combined with the general inaccuracy of metronomes and the greater range of tempos in smaller increments with great accuracy on the ubiquitous Click-Track Generator, is the reason that **RHODESystems** recommends the use of the Click-Track Generator in all applications involving music and picture.

CHAPTER TWO: SCORING

TO START:

Please read Chapter Seven: System Set-Up, before beginning this Chapter.

Connect the HP-41CV and the Printer.

First turn on the Printer, then the HP-41CV.

Use **CLEAR** to erase an entry backwards, one digit at a time.
(See Chapter Five for the correction of other errors.)

Film Size and Film Speed MUST be set even if you are only using Time Code. 35 mm @ 24 frames/second is recommended.

To set or check film size & speed (see Four and Seven):

a) Press **SHIFT; film**

b) Answer questions with **YES, NO** (followed by **CONT**), or **numbers** (followed by **CONT**), as appropriate.

c) Press **RESET** if a small **3** or **4** appears in the HP-41CV display.

TIME, TEMPO, and BEAT

The scoring process consists of three variables: Time, Tempo, and Beat Number. If any two are known, the third is easy to find.

TIME: Elapsed-Time or Position may be expressed in:

Clock-Units:	Minutes
	Seconds
Film-Units:	Feet & Frames
	Frames
	Film Hours
Video-Units:	Non-Drop Frame SMPTE Time Code
	Drop-Frame SMPTE Time Code
	EBU Time Code

TEMPO: The Beat-rate may be expressed in:

Click-Track Units:	Film Frames-per-beat
	(Unit-of-elapsed-time per beat)
Metronome Units:	Beats-per-minute
	(Beats per unit-of-elapsed-time)

BEAT: A point-in-time in music.

BEATS: Elapsed-time in music.

The difference between Beat and Beats is comparable to the difference between Day and Days. The first beat of music is **one** just like **one** is the first day of the month. Eight elapsed beats or days after the first is described as beat nine or ninth day.

Remember, **BEAT ONE = ZERO SECONDS**

In addition to the Time-Unit keys, which have been described in Chapter One, keys for Tempo and Beat will be necessary. Refer to the following chart for a description of the two Tempo-Unit keys and the Beat key, the format required for, and the label displayed and printed with each one.

TEMPO-UNITS

KEY	FORMAT	LABEL	DESCRIPTION
METRO	bb.hh	**METRO**	Standard metronome units: Beats-per-minute before the decimal, hundredths after.
CLICK	fr.et	**CLICK**	Click-Track units: Frames-per-beat before the decimal, eighths of frames (e) and tenths of eighths (t) after.

BEAT-UNITS

KEY	FORMAT	LABEL	DESCRIPTION
BEAT	bb.hh	**BEAT**	Beat NUMBER before the decimal, hundredths after. When BEAT is displayed, the value is always positive. (After Beat number one.)
		BEATS	NUMBER-of-Beats before the decimal, hundredths after. When BEATS is displayed, the value is always negative. (Before Beat number one.)

To find BEAT:

Example 1 (Film):

```
              Film  = 35mm @ 24 frames/second
        Start Point = 0 feet-0 frames
              Time  = 45 feet-12 frames
              Tempo = 12-1 Click (12 1/8 frames/beat)
              Beat  = ?

Keystrokes:   45.12     SET   FEET
              12.1      SET   CLICK
              BEAT      (BEAT=61.37)
```

To find the beat number for another location at the same tempo:

```
Keystrokes:   54.09     SET   FEET
              BEAT      (BEAT=73.00)
```

Example 2 (Videotape):

```
        Start Point = 01:24:45:11 (Non-Drop)
              Time  = 01:25:14:29
              Tempo = 10-4 Click (10 4/8ths)
              Beat  = ?

Keystrokes:   1.244511  SET  NDF  SHIFT  v-start
              1.251429  SET  NDF
              10.4      SET  CLICK
              BEAT      (BEAT=68.72)
```

To find the beat number for another address:

```
Keystrokes:   1.255901  SET  NDF
              BEAT      (BEAT=169.55)
              RESET
```

ALWAYS press **RESET** after you have finished with **v** or **f-start.**

To find TIME:

Example 3: Beat = 125 (Beat Number 125 is equivalent to 124 elapsed Beats)
Tempo = 9-5 Click
Time = ? Seconds

Keystrokes: **125** **SET** **BEAT**
9.5 **SET** **CLICK**
SEC (SEC=49.73)

To convert to Feet & Frames:

Keystroke: **FEET** (FT.FR=74.10)

To find the Time at Beat number 117:

Keystrokes: **117** **SET** **BEAT**
SEC (SEC=46.52)

To convert to Feet & Frames:

Keystroke: **FEET** (FT.FR=69.13)

Example 4: Beat = 33 (Remember, Beat Number 33 is equivalent to 32 elapsed Beats)
Tempo = 12-0 Click
Start Point = NDF 12:59:57:28
Time = ? Non-Drop Time Code

Keystrokes: **12.595728** **SET** **NDF** **SHIFT** **v-start**
33 **SET** **BEAT**
12 **SET** **CLICK**
NDF (13.001328)

To convert to Seconds:

Keystroke: **SEC** (SEC=16.00)

To change the Time in seconds and read the Beat number and Time Code:

Keystrokes: **18.75** **SET** **SEC** (SEC=18.75)
BEAT (BEAT=38.50)
NDF (ND=13.001620)
RESET

Notice from this last example that changing the Time (expressed in Clock Time, Time Code, or in Film units) affects the Beat number and vice versa. Although scoring problems have three independent variables, Time, Beat, and Tempo, in **RHODESystems II** the Tempo never changes unless you set a new one or follow the instructions in the next section.

To find TEMPO

Example 5: Time = 60 seconds
Beat = 125
Tempo = ? Click

Before a tempo can be computed from a given Time and Beat, the Click must be set to zero. Once the computer has solved for tempo, it will not change until a new Click (or Metro) is set.

Keystrokes:

0	**SET CLICK**
60	**SET SEC**
125	**SET BEAT**
CLICK	(CLICK=11.49)

Read: Eleven, four-eighths, and nine-tenths of an eighth - a tempo which falls between eighths is not available on a Click Track Generator. Round up to 11.5 and set CLICK again. After finding a Click from Time and Beat, as in this example, always key in the number and set it again.

Keystrokes: **11.5 SET CLICK**

To see how the change in Click from 11.49 to 11.5 has affected the Time:

Keystroke: **SEC** (SEC=60.06)

After the Click has been set to zero, the next value keyed in and set (either Time or Beat) will be the one which changes if the Click is subsequently changed. In the example above, reverse the order of SEC and BEAT to demonstrate this point.

Keystrokes:

0	**SET CLICK**
125	**SET BEAT**
60	SET SEC
CLICK	(CLICK=11.49)
11.5	**SET CLICK**
BEAT	(124.87)

Example 6: Start Point = NDF 1:25:25:25
Time = NDF 1.26:25:25
Beat = 125
Click = ?

Keystrokes:

1.252525	**SET NDF SHIFT v-start**
0	**SET CLICK**
1.262525	**SET NDF**
125	**SET BEAT**
CLICK	(11.50)
11.5	**SET CLICK**
	RESET

The HIT LIST

The Hits program makes it possible to:

1) Store a series of counts, taken in Film, Video, or Clock-Units.
2) Set a Click and print a list of the hits along with the corresponding beat number, the weight of each hit, and the lag between each hit point and the next available beat or half-beat.
3) Once the counts have been keyed in, the Hit List may be reprinted with:
    a) a different Click
    b) a different Time-Unit
    c) a different Start-Point in the same or a different Time-Unit.

For the Hit List some definitions and additional keys are necessary. Like **SHIFT-film**, these keys initiate questions to be answered.

DEFINITIONS

HIT In a motion picture, a visual event which requires particular support from the music.

HIT= or **HIT NO.** When displayed or printed, refers to the order in which the counts were entered into the computer.

LAG The difference, in beats, between the actual hit point and the next available beat or half-beat.

LAGSUM The sum of the lags in a list.

WEIGHT The relative importance of a Hit compared with the others in the list. The range is normally **1** (low) to **10** (high) and **0** represents no value at all.

KEYS

addHIT Starts the Hits program or adds data to it.

readHIT Reads the value, weight, and Beat number (using the Click which has been set) of a particular hit.

chgHIT Changes the value and weight of a particular hit.

LIST Lists the hits with the weight, beat number and lag for each. The answer to the question **HALF-BEAT?** determines whether the printed lag is the difference between the actual hit point and the next whole beat (NO) or the next whole **or** half-beat, whichever is closer (YES).

HIT LIST QUESTIONS

The answers to the following questions should be answered **before** using the **addHIT key** to key in the counts which make up a Hit List:

1. **In what units were the counts taken?**

   a) If Feet & Frames, what film size and speed? (See Chapter One regarding Film-Videotape transfers.)
   b) If Time Code, Non-Drop Frame (most common) or Drop-Frame.

2. Is it possible that the music can start slightly late? The answer to the this question determines where **F**(ilm)-**START** or **V**(ideo)-**START** is set.

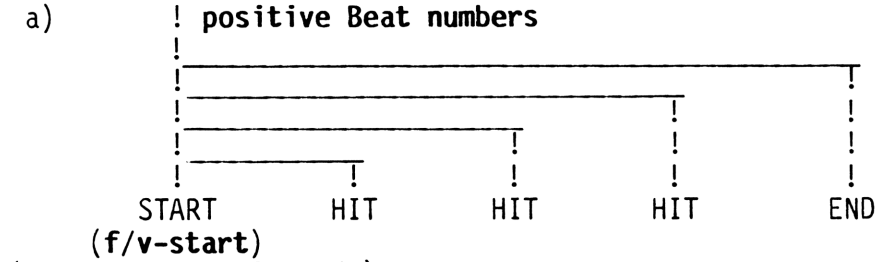
   a) One viewpoint is that music should ALWAYS start at the indicated point (at the start-of-sound in a commercial, for example). If this rule is followed, the chance for subsequent misalignment of the music track with the picture is greatly reduced. In this case, **f**(ilm) or **v**(ideo)-**start** should be set to start-of-sound.

   b) The other view is that the music start is not as important as the relationship among the various points in the picture that must be hit. In this case, a music start which is a few frames late may accomodate a better match between hits and beats. Here, **f** or **v-start** should be set to the first critical hit, no matter where it is in the picture.

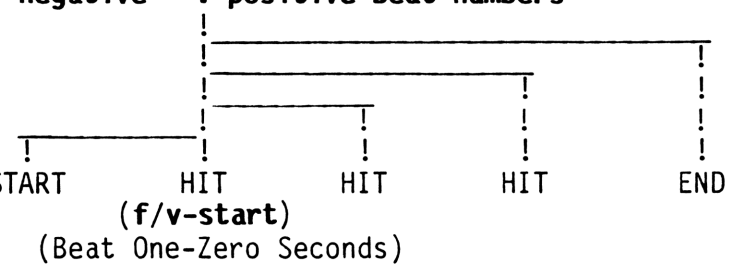
Beat one and zero seconds are always locked to the film or video start-point. Negative beat numbers are both a point-in-time and elapsed-time.

A graphic description of the two points-of-view:

a)



b)



Example 7: Music **must** start at NDF 00:12:03:15
Hit at 00:12:17:01
Hit at 00:12:23:29
Hit at 00:12:27:09
End at 00:12:32:29

STEP 1: SET THE START POINT

Keystrokes: **.120315 SET NDF**
SHIFT v-start
To Check: **BEAT** (BEAT=1.00)
SEC (SEC=0.00)

STEP 2: LOAD THE HITS

a) Press **addHIT**
Key in music Start Point
Press Time Unit key (**FEET, NDF,** etc)
Answer **WEIGHT=?** by pressing the **CONT** key (=1).

Keystrokes: **addHIT .120315 NDF** (WEIGHT=?) **CONT**

(wait for Hit No, Time-Unit, and Weight=1 to print before continuing.)

b) Press **addHIT**
Key in next Hit; Press Time Unit Key; **CONT**

Keystrokes: **addHIT .121701 NDF CONT**

c) Repeat (b) for every Hit except the End Point.
d) For the End Point, Answer **WEIGHT=?** with **0 CONT.**

Keystrokes: **addHIT .123229 NDF 0 CONT**

STEP 3: SET A CLICK TRACK

a) Key in Click (in Frames & Eighths), Press **SET CLICK**

Keystrokes: **12.1 SET CLICK**

STEP 4: PRINT A LIST

a) Press **LIST**

b) Answer **UNITS?** with **FEET, NDF, SEC,** or whatever Time Units you are using OR to which you would like the list converted.

c) Answer **HALF BEAT?** with a **YES** if you want the printed **LAG** to be the difference between the actual Hit point and the next available half **OR** whole beat. A **NO** (followed by **CONT**) will compute the **LAG** as the difference between the Hit and the next available **whole** beat. The answer to **HALF BEAT?** in the Hit List only affects the computation of the **LAG** in the printout.

Keystrokes: **LIST NDF YES**

If the actual music start is flexible and one or more of the hits in the picture are critical, follow these instructions:

Example 8: Music may start at 12 feet-12 frames
Music must hit at 16 feet- 9 frames
hit at 25 feet-10 frames
end at 56 feet- 4 frames

STEP 1: SET THE START POINT

Keystrokes: **16.09 SET FEET**
SHIFT f-start

STEP 2: LOAD THE HITS (The weight of a non-critical music start should be zero)

Keystrokes: **12.12 addHIT FEET 0 CONT**
16.09 addHIT FEET CONT
25.10 addHIT FEET CONT
56.04 addHIT FEET 0 CONT

Comparing this example with the previous one, note that either **addHIT** or the number may be keyed in first. Either sequence is acceptable.

Keystrokes: **addHIT** number units
or: number **addHIT** units

STEP 3: Repeat Step 3 from previous example. Set Click = 11-6.

STEP 4: Repeat Step 4 from previous example.

In reading the **HIT LIST** keep the following points in mind:

a) Beat #1 (zero seconds) is always the point where **v-start** or **f-start** has been set.
b) The location of a Beat which occurs before Beat #1 is named **BEATS** and is both the number of elapsed beats and the negative beat number.

STEP 5: TO FIND THE MUSIC START POINT

a) round negative beats to the nearest more positive beat or half-beat (-5.19 rounds to -5, for example) and key in the number.
b) change the sign by pressing **CHS** (the multiply key, not the key with CHS engraved on top!).
c) press **SET, BEAT,** and the desired time unit key.

Keystrokes: **5 CHS** (the multiply key) **SET BEAT FEET** (FT.FR=12.14)

In example 8 above, Hit #1 (music start), at a 11-6 Click, falls on -5.19 Beats. To begin numbering the score with beat #1, just add 5 beats to each hit and have the editor lay out the music starting at 12 feet-14 frames.

OPTIMUM CLICK

STEP 6: To compute an **OPTIMUM CLICK**:

a) Press **COMP**

b) Answer **HALF BEAT?** as in Step 4. In this case, the answer affects the computation of the optimum click.

c) Answer **FAST CLICK=** by keying in Click (frames & eighths followed by **CONT**).

d) Answer **SLOW CLICK=** the same way.

e) **RHODESystems II** will compute the **OPTIMUM CLICK.**

The highest number that appears in the display during the count-down represents the product of the number of hits and the number of available Click Track tempos. For example, 15 hits with a tempo range of 12-0 to 12-5 (six tempos) will begin with 90 and count down to zero.

The basis for the **OPTIMUM CLICK** is that:

a) the program computes the difference between the actual hit point and the next available beat or half-beat (depending on the answer to HALF-BEAT?).

b) the lowest total error between hits and beats (or half-beats), in a list, represents the best match between tempo and hits.

c) the **WEIGHT** of a particular hit, on a scale of 1-10 with 10 the most favored, will influence the **OPTIMUM CLICK.** The program ignores a hit with a WEIGHT=0.

d) in the case of a tempo which causes many beats to be more or less equally late, the computer must assume that the tempo is not optimum. If the whole track is shifted, this tempo could, in fact, be the best one. When in doubt, print a list!

CHAPTER THREE: TIME MANIPULATION

PRELIMINARY EXERCISES

To become familiar with the system, work through the following exercises.

Turn the Printer on, then the HP-41CV.

After **RHODESystems** is printed and displayed,

Key in **60**

Press the **SET** key, wait until SET is printed and the HP-41CV displays **60.000000** before continuing. (Note that a small **0** appears at the bottom of the display.)

Press the **SEC** key.

SEC=60.00 is displayed and printed.
(The small **0** disappears.)

Turn the Printer and HP-41CV off.

Now turn the Printer on, then the HP-41CV.

Press **SEC**

SEC=60.00 is displayed and printed.

Read answer as 60 seconds, zero hundredths.

Turning the equipment off does NOT erase the memory.

Key in **1.30**
Press **SET** (Note the small **0**)
Press **MIN**

M.S=1.30 is printed and displayed.
(The small **0** disappears)

Read answer as 1 Minute, 30 Seconds.

Press **SEC**

SEC=90.00 is displayed and printed.

More Examples

Press **FEET** (FT.FR = 135.00)

(Read: 135 feet-0 frames)

SHIFT; frames (FR.8 = 2,160.0)

(Read: 2160 frames-0 eighths)

DF (DF = 0.012929)

(Read: 0 hours, 1 minute, 29 seconds, 29 frames)

NDF (ND = 0.012927)

(Read: 0 hours, 1 minute, 29 seconds, 27 frames)

EBU (EB = 0.013000)

(Read: 0 hours, 1 minute, 30 seconds, zero frames)

F-HRS (FH = 0.013000)

(Read: 0 hours, 1 minute, 30 seconds, zero frames)

Note that you have not keyed in any of these values; you have only pressed the indicated keys.

What relationship does each of the above have with the value (M.S=1.30) which was set?

More EXAMPLES

1) Press **60 SET SEC** (SEC=60.00)

2) Press **30**

3) Press **ADD** (The small **0 1** appears)

4) Press **SEC** (SEC=90.00)
(**0 1** disappears)

5) Press **45** (SEC=45.00)

6) Press **SUB** (The small **0 1** appears)

7) Press **SEC** (SEC=45.00)
(**0 1** disappears)

8) Press **90 ADD FEET** (FT.FR=157.08)

9) Press **SEC** (SEC=105.00)

10) Press **MIN** (M.S=1.45)

11) Press **.01 SUB EBU** (EB=0.004500)

12) Press **SEC** (SEC=45.00)

13) Press **SHIFT-frames** (FR.8=1080.0)

RHODESystems II uses a particular logic for its operation. To better understand that logic and the terminology employed in this manual, some definitions, explanations and a bit of philosophy are in order.

DEFINITIONS

ELAPSED-TIME / POINT-IN-TIME

With film and videotape we constantly use time, measured in various ways, as a reference. In doing so, one of two definitions can apply:

1) the "how long" or elapsed time, of an event

2) the "when" or point-in-time of an event.

To describe the point-in-time or elapsed-time many different terms may be used:

"January 17, 55 Seconds, 45 feet-2 frames, Beat 33, Non-Drop Time Code 01:23:45:12", locate points-in-time.

"7 days, 10 minutes, 28 feet-14 frames, 32 Beats", represent elapsed-time.

Whether it is elapsed-time or a point-in-time, the time value of a number is determined by the unit of measurement used to describe it. "59.15" followed by "seconds" is a very different value from "59.15" labeled with "feet and frames." Note that most often the same unit, seconds for example, is used for both elapsed-time and a point-in-time.

TIME-UNITS

RHODESystems II uses the units-of-time commonly used in film, videotape, and music. For flexibility in manipulation, the computer program divides these time-units into three categories:

CLOCK-UNITS: Minutes & Seconds
Seconds & Hundredths

FILM-UNITS: Frames
Feet & Frames
Film-Hours

VIDEO-UNITS: Non-Drop Frame SMPTE Time Code
Drop Frame SMPTE Time Code
European Broadcasting Union Time Code

TERMINOLOGY

CLOCK-UNIT, FILM-UNIT, or **VIDEO-UNIT** is used to refer to any time-unit which is in one of these categories. **TIME-UNIT** is used to describe a measurement of time which is not specifically identified.

The **FORMAT** of a number determines where the decimal point is placed and which digits represent eighths, sixteenths, sixtieths, hundredths, etc., when a number is keyed in.

Key in refers to the process of pressing the number keys. This term is used instead of **Enter** to avoid confusion with the function of the **Enter** key in the HP-41CV non-USER mode.

A **LABEL** is attached to a number in the display and on the printer by pressing a unit key so that both the operator and the computer program can identify it.

NUMBER refers to a series of digits without a label.

POSITION refers to a point-in-time.

VALUE refers to a number with a label.

Refer to the chart in Chapter One for a description of the Time-Units, the Time-Unit keys, the format required for, and the label displayed and printed with each one.

The EXAMPLES

In the examples, the keystrokes appear in **boldface**, and the parentheses **()** enclose the information displayed by the HP-41CV and the Printer.

To correct a mistake while keying in a number, **CLEAR** erases the number from the HP-41CV display backwards one digit at a time.

Instructions for correcting other kinds of errors and an explanation of the small numbers that come and go in the HP-41CV Display can be found in Chapter Five.

The examples all use 35mm Film at 24 frames per second as the film standard. If these values have not been set, press **SHIFT film** and answer the displayed questions or refer to Chapter Seven.

General procedures are in boxes.

Proceed slowly and carefully. Wait until **PRGM** disappears from the HP-41CV Display before you continue with the next keystroke.

SET

To manipulate a number which represents time, it must be **SET** and **LABELED.**

TO SET A NUMBER

1) Key in the number
2) Press **SET**
3) Press the appropriate time-unit key

SET, immediately followed by a value with its label, appears on the Printer. The HP-41CV displays only the labeled value.

EXAMPLES

1) **SET** 29.5 seconds

   29.5 SET SEC (SEC=29.50)

2) **SET** 49 feet-2 frames

   49.02 SET FEET (FT.FR=49.02)

3) **SET** 2 minutes-75 seconds

   2.75 SET MIN (M.S=3.15)

   (The program rounds the number properly.)

4) **SET** 3:45:56:28 in Non-Drop Time Code

   3.455628 SET NDF (ND=3.455628)

5) **SET** 1440 film frames

   1440 SET SHIFT-frames (FR.8=1440.0)

6) **READ** seconds

   SEC (SEC=60.00)

CONVERSION

RHODESystems II automatically converts the time value, which has been set and labeled to any of the others when another time-unit key is pressed.

TO CONVERT FROM ONE TIME-UNIT TO OTHERS

a) Key in the first number
b) Press **SET**
c) Press first time-unit key
d) Press second time-unit key to read conversion
e) Press third time-unit key to read conversion
f) etc.

EXAMPLES

CONVERT: 75 feet-14 frames to: seconds and Non-Drop Frame Time-Code.

75.14 SET FEET	(FT.FR = 75.14)
SEC	(SEC = 50.58)
NDF	(ND = 0.005016)

CONVERT: 58.50 Seconds to: Minutes, Feet & Frames, Drop Frame Time Code, and Frames.

58.5 SET SEC	(SEC = 58.50)
MIN	*(M.S = 0.59)
CLEAR	(0.585000000)
FEET	(FT.FR = 87.12)
DF	*(DF = 0.005813)
CLEAR	(0.005813247)

NOTE: * = ROUNDED. CLEAR will display all possible digits on the first press. On the second press, zeros will be displayed.
CLEAR does not affect the computer memory.

ADDITION

ADDING provides two kinds of answers:

1) The sum or total elapsed-time of two or more time values.

2) A new position or point-in-time which is later than the one which has been **SET.**

TO ADD TIME

a) Key in first number
b) Press **SET**
c) Press time-unit key

The first value is **SET,** displayed, and printed.

d) Key in second number
e) Press **ADD**
f) Press the time-unit key which represents the time-unit of the second number.

See answer in Display and on Printer. **SET** is printed because the answer has REPLACED the previous value.

g) Convert answer, if desired, by pressing another time-unit key.

To continue to add values:

h) Key in next number
i) Press **ADD**
j) Press time-unit key (read answer)
k) continue with next number, if desired

Unlike values may be added to one another: feet & frames to seconds, etc. In doing so, make certain that you press the time-unit key which matches the number keyed in.

EXAMPLES TO DETERMINE ELAPSED-TIME

ADD 29 feet-15 frames to 129 feet-14 frames and read answer in minutes:

129.14 SET FEET	(FT.FR = 129.14)
29.15 ADD FEET	(FT.FR = 159.13)
MIN	(M.S = 1.47)

ADD Drop Frame 1:59:39:29 and 0:00:45:24 and read answer in minutes:

1.593929 SET DF	(DF = 1.593929)
0.004524 ADD DF	(DF = 2.002523)
MIN	(M.S = 120.26)

ADD 29 minutes-59 seconds and 28 minutes-14 seconds:

29.59 SET MIN	(M.S = 29.59)
28.14 ADD MIN	(M.S = 58.13)

EXAMPLES TO FIND POSITION

ADD 29.5 seconds to Non-Drop 1:24:25:29 and read answer in Non-Drop:

1.242529 SET NDF	(ND = 1.242529)
29.5 ADD SEC	(SEC = 5,100.53)
NDF	(ND = 1.245513)

ADD Non-Drop 0:04:32:29 to 513 feet-0 frames and read answer in feet:

513 SET FEET	(FT.FR = 513.00)
0.043229 ADD NDF	(ND = 0.101419)
FEET	(FT.FR = 922.14)

SUBTRACTION

Like addition, subtraction provides two kinds of answers:

1) The difference or net elapsed-time between two positions in Time.

2) A new position that is earlier may be determined by subtracting one time value from another.

TO SUBTRACT TIME

a) Key in the later time value
b) Press **SET**
c) Press time-unit key

The first Value is **SET**, displayed, and printed.

d) Key in the earlier time value
e) Press **SUB**
f) Press the time-unit key which represents the earlier number

See answer in display and on Printer. **SET** is printed because it has REPLACED the previous value.

g) Convert answer by pressing another time-unit key.

Unlike values may be subtracted from one another, but make certain you press the time-unit key which matches the number just keyed in.

EXAMPLES

SUBTRACT 14 Feet-2 frames from 101 feet-12 frames:

101.12 SET FEET	(FT.FR = 101.12)
14.02 SUB FEET	(FT.FR = 87.10)

SUBTRACT Non-Drop 1:24:47:29 from NDF 2:01:02:11:

2.010211 SET NDF	(ND = 2.010211)
1.244729 SUB NDF	(ND = 0.361412)

SUBTRACT 29.89 seconds from 65.23 seconds

65.23 SET SEC	(SEC = 65.23)
29.89 SUB SEC	(SEC = 35.34)

Find the **DIFFERENCE**, in seconds, between Drop-Frame 1:02:34:29 and 1:03:23:27:

1.032327 SET DF	(DF = 1.032327)
1.023429 SUB DF	(DF = 0.004826)
SEC	(SEC = 48.92)

Find the **DIFFERENCE**, in feet and frames, between 3 minutes-29 seconds and 5 minutes-12 seconds:

5.12 SET MIN	(M.S = 5.12)
3.29 SUB MIN	(M.S = 1.43)
FEET	(FT.FR = 154.08)

SUBTRACT 44 feet-12 frames from Drop Frame 0:34:21:01. Read the answer in Drop Frame:

0.342101 SET DF	(DF = 0.342101)
44.12 SUB FEET	(FT.FR = 3,136.05)
DF	(DF = 0.345025)

SUBTRACT Non-Drop 0:01:34:29 from 130 feet-2 frames:

130.02 SET FEET	(FT.FR = 130.02)
.013429 SUB NDF	(ND = 23.595121)
FEET	(FT.FR = 129,717.02)

If the answer is either a negative number or an extremely large number, the later value has been subtracted from the earlier one. Reverse the values for a more logical answer.

.013429 SET NDF	(ND = 0.013429)
130.02 SUB FEET	(FT.FR = 12.07)

Find the **DIFFERENCE** in minutes & seconds between Drop Frame 2:34:59:20 and Non-Drop 2:43:01:19:

2.430119 SET ND	(ND = 2.430119)
2.345920 SUB DF	(DF = 0.081123)
MIN	(M.S = 8.12)

Find the **DIFFERENCE** in seconds between Non-Drop 0:02:01:29 and 180 Feet-2 Frames:

180.02 SET FEET	(FT.F = 180.02)
0.020129 SUB NDF	(23.595800)
SEC	(SEC = 86,484.39)

The later value has been subtracted from the earlier. Try it the other way around:

0.020129 SET NDF	(ND = 0.020129)
180.02 SUB FEET	(FT.FR = 3.00)
SEC	(SEC = 2.01)

In subtracting, always make certain that the earlier value is subtracted from the later. Otherwise, the answer will be without any practical value.

When adding or subtracting different time-units, ALWAYS press the time-unit key which matches the number which has been just keyed in.

The 24-HOUR CYCLE of TIME CODE

Time Code Generators run in a 24 hour cycle: **0:00:00:00** follows **23:59:59:29** in Non-Drop and Drop Frame Time Code or **23:59:59:24** in EBU.

EXAMPLES

SUBTRACT 3 minutes from Non-Drop Frame Time Code 0:02:35:01:

0.023501 SET NDF	(ND = 0.023501)
3 SUB MIN	(M.S = -0.25)
NDF	(ND = 23.593506)

Then **ADD** 29.5 seconds:

29.5 ADD SEC	(SEC = 4.69)
NDF	(ND = 0.000421)

Find the **DIFFERENCE,** in seconds, between
Drop Frame 0:01:15:14 (the later time) and
Drop Frame 23:59:50:28 (the earlier time):

0.022514 SET DF	(DF = 0.022514)
23.595028 SUB DF	(DF = 0.023416)
SEC	(SEC = 154.55)
MIN	(M.S = 2.35)

Generally, the 24 hour roll-over point is avoided because many video editing systems are not equipped to deal with it. These examples demonstrate that if it is necessary to cross the roll-over point, **RHODESystems II** can compute the values properly.

FILM and VIDEO START-POINTS

In working with film or videotape it is not always convenient or possible to position the beginning of a scene or music cue at **ZERO** on a film counter or in Time-Code.

For example, the Academy Start-Mark in film is usually 12 feet ahead of the picture start and the start-of-sound comes two feet later (for a film release). It is easy to reset the counter because it's mechanical, but a useful Start-Point for the editor is not necessarily equally useful for the composer.

In video, the Time-Code numbers are arbitrary because Time-Code Generators generally run continuously and provide whatever number is available at that moment. It is possible to reset the generator, but to find one Start-Point useful to all is still a problem.

RHODESystems II makes it possible to position a Start-Point in film and a Start-Point in videotape. At these Start-Points, Clock-Time = zero seconds and the Beat number = one.

In both film and video, the time value of the Start-Point is automatically subtracted from all subsequent film or video time values.

FILM-START

To set or change the film Start-Point to a value which is displayed by a Time-Unit:

SHIFT f-start (F-START SET)

(Notice that a small **3** appears in the display after **F-START** is set.)

EXAMPLES

If 14 feet-0 frames is the Film-Start what is the value in feet at 58.5 seconds?

RESET (RESET...)

14 SET FEET (FT.FR = 14.00)

SHIFT f-start (F-START SET)

SEC (optional check) (SEC = 0.00)

58.5 SET SEC (SEC = 58.50)

FEET (FT.FR = 101.12)

At 34.75 seconds?

34.75 SET SEC (SEC = 34.75)

FEET (FT.FR = 66.02)

Make FT.FR = 66.02 the Start-Point

SHIFT f-start (F-START SET)

Now what is the value in feet at 30 seconds?

30 SET SEC (SEC = 30.00)

FEET (FT.FR = 111.02)

RESET (RESET...)

RESET cancels **F-START.** (Notice that the small **3** in the display disappears when Film-Start is cancelled.)

ALWAYS press **RESET** when finished with Film-Start.

VIDEO START

To set or change the Video Start-Point to a value which is displayed in a Time-Unit, press:

SHIFT **v-start** (V-START SET)

(Notice that a small **4** appears in the display after **V-START** is set.)

EXAMPLES

If Drop Frame 1:29:59:24 is the Video-Start what is the Drop-Frame value at 59.75 seconds?

RESET (RESET...)

1.295924 **SET** **DF** (DF = 1.295924)

SHIFT **v-start** (V-START SET)

SEC (optional check) (SEC = 0.00)

59.75 **SET** **SEC** (SEC = 59.75)

DF (DF = 1.305915)

At 1 minute 25.5 seconds from the Start-Point, set a new Video-Start and read the value in Drop-Frame:

1.255 **SET** **MIN** (M.S = 1.26)
(Display is rounded)

SHIFT **v-start** (V-START SET)

DF (DF = 1.312508)

At 90 Feet after the new Start-Point, find the Drop-Frame equivalent. Read in seconds also.

90 **SET** **FEET** (FT.FR = 90.00)

DF (DF = 1.322509)

SEC (SEC = 60.00)

RESET (RESET...)

RESET cancels **V-START.** (Notice that the small **4** in the Display disappears when **V-START** is cancelled.)

ALWAYS press **RESET** when finished with **V-START.**

Setting F-START and V-START Simultaneously

In working with a combination of film and videotape, it is often necessary to compare film-units with video-units. Generally, neither the Film-Start nor the Video-Start will be zero in their respective units. Both **F-START** and **V-START** will have to be set.

For the purposes of demonstrating the keystrokes, the following example synchronizes Film and Videotape in an ideal system where each runs at its own standard speed: Film at 24 Frames per Second and Videotape at 29.97 Frames per Second (NTSC Color standard). In the actual transfer of Film to Videotape, the Film must run at 23.976 F/S. See Chapter Four for instructions about changing and checking a non-integer Film Speed.

EXAMPLE

If 14 feet-0 frames is the Film-Start and Non-Drop Time Code 1:02:34:12 is the Video-Start, what are the values in feet and Non-Drop at 29.5 seconds?

RESET	(RESET...)
14 SET FEET	(FT.FR = 14.00)
SHIFT f-start	(F-START SET)
1.023412 SET NDF	(ND = 1.023412)
SHIFT v-start	(V-START SET)
29.5 SET SEC	(SEC = 29.50)
FEET	(FT.FR = 58.04)
NDF	(ND = 1.030326)

To check the Start Point

0 SET SEC	(SEC = 0.00)
FEET	(FT.FR = 14.00)
NDF	(ND = 1.023412)

What is the Non-Drop value at 104.00 FEET?

104 SET FEET	(FT.FR = 104.00)
NDF	(ND = 1.033410)
RESET	

BEAT 1

When both **F-START** and **V-START** are set, a particular synchronization exists between film and video. It is often useful to change the common Start-Point without losing this synchronization. To change the Start-Point press the following keys:

SHIFT beat 1 (BEAT 1 SET)

Do **NOT** confuse the **beat 1** key, which must be preceded by **SHIFT**, with the **BEAT** key.

EXAMPLE

Film Start = 14 feet-0 frames
Video-Start = Drop Frame 1:25:48:29

RESET	(RESET...)
14 SET FEET	(FT.FR = 14.00)
SHIFT f-start	(F-START SET)
1.254829 SET DF	(DF = 1.254829)
SHIFT v-start	(V-START SET)

At 1 Minute-25 Seconds, move the common Start-Point and read values in FEET & DF:

1.25 SET MIN	(M.S = 1.25)
SHIFT beat 1	(BEAT 1 SET)
MIN (to check)	(M.S = 0.00)
FEET	(FT.FR = 141.08)
DF	(DF = 1.271400)

By Pressing **SHIFT beat 1,**

Film-Start becomes **FT.FR = 141.08**
Video-Start becomes **DF = 1:27:14:00**

The synchronization between film and video has not changed. To prove it, compare the original **F-START** with **V-START**:

14 SET FEET	(FT.FR = 14.00)
DF	(DF = 1.254829)
MIN	(M.S = -1.25)

The value in minutes is negative because the original Start-Point is now earlier than the new Start-Point by 1 minute-25 seconds.

BEAT 1 simultaneously shifts the Video-Start and the Film-Start to whatever Time-Unit is being displayed. The original synchronization between the two which had been set with **v-start** and **f-start** is not changed.

FINDING BEAT 1, FILM START, or **VIDEO START**

a) Key in **0**
b) Press **SET SEC**
c) Press a Film-Unit for the Film-Start
   Press a Video-Unit for the Video-Start

CHAPTER FOUR: UNUSUAL FILM SIZES & SPEEDS

RHODESystems II recognizes the most common Film Sizes (35, 16, 17.5, 70, 8, Super 8) and can provide the number of frames-per-foot for each. For special applications, other film sizes and frame-rates other than 24 or 25 frames-per-second may be used.

The film program, which is initiated by **SHIFT-film**, stores three values: frames-per-second, film size, and frames-per-foot.

FRAME-RATE

The film frame-rate (frames-per-second) determines the conversion from Film-units (**FRAMES, FEET, F-HRS**) to Video-units (**DF, NDF, EBU**) and Clock-units (**MIN,** and **SEC**). Any Frame Rate between 1 and 99 may be used.

As the film frame-rate also affects the speed of the Click-Track, it will in turn affect the solution of Time/Rate/Beat problems. Computations using click should be avoided when frame-rates other than 24 Fr/Sec (American) or 25 Fr/Sec (European) are used.

Click-Track Generators run at either 24 or 25 frames per second and are not adjustable for other rates.

FRAME-RATES OTHER THAN 24 or 25

EXAMPLE: Set **RHODESystems II** for 35mm Film at 48 frames-per-second.

SHIFT FILM	(FILM MM = 35.0)
	(FR/FT = 16.0)
	(FILM F/S = 24)
	(VALUES OK?)
NO CONT	(FILM MM = ?)
35 CONT	(FILM F/S = 24?)
NO CONT	(FILM F/S = 25?)
NO CONT	(FILM F/S = ?)
48 CONT	(FILM MM = 35.0)
	(FR/FT = 16.0)
	(FILM F/S = 48)
	(VALUES OK?)
YES	(READY...)
CLICK (To check)	(CLICK = 48.00)

PROBLEM: Convert 90 Ft 0 Fr @ 48 fr/sec to seconds.

90 SET FEET	(FT.FR = 90.00)
SEC	(SEC = 30.00)

90 Feet of 35mm film at 48 fr/sec = 30 seconds

USING 23.976 F/S

The transfer of film to videotape presents two problems:

1) How to fit the 24 frames of film into the 30 Frames of Videotape.

2) Once the 24 to 30 problem is solved, how to match the 24 f/s film speed with the 29.97 f/s video speed.

The first problem was solved in the days of black and white television with a mechanical device that exposes 12 of the 24 Film Frames to an additional video field (1/2 frame). The solution to the second problem is to run the film at 23.976 f/s when transferring it to videotape.

Using and calculating with a 23.976 f/s is as easy as 24 f/s. The steps required to change the film speed are the same as the previous example with one exception: the display rounds 23.976 to 24. The film program will not tell you whether the speed is 24 or 23.976. Pressing **RESET CLICK** will display the this altered frame-rate in eighths: CLICK = 23.78.

Refer to the following two methods to change the film speed to a non-integer value.

Remember to change the system back to 24 F/S before calculating beat numbers!

TO SET FILM SPEED = 23.976 F/S

METHOD #1

1) Press **SHIFT** **film**
2) Answer VALUES OK? with **NO** **CONT**
3) Answer FILM MM = ? with **35** **CONT**
4) Answer FILM F/S = 24? with **NO** **CONT**
5) Answer FILM F/S = 25? with **NO** **CONT**
6) Answer FILM F/S = ? with **23.976** **CONT**
7) Displays:
   FILM MM = 35.0
   FR/FT = 16.0
   FILM F/S = 24.
   VALUES OK?
8) Answer **YES**

To check film speed:

1) Press **RESET** **CLICK**
2) CLICK = 23.78 (equivalent to 23.976 in decimal fractions)

METHOD #2

This is for experienced users of the HP-41C/CV. Any mistake in the following steps will require the execution of Program Initialization.

1) Assumption: 35mm is already set by **film**
2) Press **USER**
3) Key in 23.976
4) Press **STO**
5) Key in **05**
6) Press **USER**

To check:

1) Press **RESET** **CLICK**
2) CLICK = 23.78

OR

1) Press **USER** **RCL**
2) Key in **05**
3) Displays 23.97600000
4) Press **USER**

When finished with FILM F/S = 23.976, always change it back to 24 F/S.

FRAMES per FOOT

The **FILM** program also stores frames-per-foot. This value is used to determine the frame total when a number representing feet and frames is keyed in and set with the **FEET** key. If you key in a non-standard film size, like 32mm, when the **FILM** program prompts for film size, **RHODESystems II** will then ask **FR/FT = ?** Answer with the appropriate value for the unusual film size and then continue with the answer to **FILM F/S = ?**

FRAMES per ?

To accommodate those users who may not measure film by the foot, a method is available to use other units.

Since the **FEET** key is only a device to convert values keyed in as Feet and frames to frames, then this key may be used to convert any unit of linear measure (metres, yards, furlongs, etc) to frames. The catch is that **RHODESystems II** knows the number of frames per foot in the standard film sizes, so these sizes may not be entered directly. Also the display and Printer will always use **FT.FR** as the label for measurements larger than the frame.

To measure 35mm Film in units other than feet, the film size can be entered as **34.99** (Display rounds to **35.0**, but internally it is still **34.99** and cannot be recognized as **35** by **RHODESystems II**). This will trigger the program to ask FR/FT =? Answer with the number of frames-per-unit of your measure.

The other Film Sizes: 16, 17.5, 70, 8, and Super 8 (entered as 88) may be dealt with in the same way.

PROBLEM: Set FILM program for 35mm measured in metres @ 25 frames-per-second.

SHIFT FILM	(FILM MM = 35.0)
	(FR/FT = 16.0)
	(FILM F/S = 24)
	(VALUES OK?)
NO CONT	(FILM MM = ?)
34.99 CONT	(FR/FT = ?)
52.49 CONT	(FILM F/S = 24?)
NO CONT	(FILM F/S = 25?)
YES	(FILM MM = 35.0)
	(FR/FT = 52.5)
	(FILM F/S = 25)
	(VALUES OK?)
YES	(READY...)

NOTE that **FEET** and **FT** now stand for **METRE** using the values above. The labels cannot be changed, but the units they represent has been redefined.

SUMMARY

1) Film frame-rates other than 24 or 25 f/s may be used for Time conversions among film, video, and clock.

2) Solving Time/Rate/Beat problems using **CLICK** should **NOT** be attempted with film frame-rates other than 24 f/s (American) or 25 f/s (European).

3) To measure standard film in units other than feet, **RHODESystems II** must not recognize the standard sizes (35,16,17.5,70,8,88).

> Enter 34.99, 15.99, 17.49, etc, which rounds up to the standard size in the display and printout but remains incognito to the computer.
>
> Keeping in mind that **FT** and **FEET** now stand for your new unit of measure, answer **FR/FT = ?** with the number of frames appropriate for the unit.

4) All the above may seem obscure to most users, but for that one project that defies logic, it will prove invaluable.

CHAPTER FIVE: ERRORS & FLAGS

FIXING KEYSTROKE ERRORS

1) If you are keying in a number on the keyboard and find that there is a mistake in it, press **CLEAR.** In this case:

a) **CLEAR** erases the number from the display backwards, one digit at a time.

b) Change the number and continue with your operation.

2) If you have keyed in a number and pressed **SET** then a Unit-Key and then find an error in either the number or the Unit-Key chosen, **CLEAR** will not help you.

a) Key in the number again
b) Press **SET**
c) Press the Unit-Key

3) If you recognize an error after a number has been keyed in and **SET** (or **SUB** or **ADD**) has been pressed but the Unit-Key has not, **CLEAR** will not help you.

To cancel **SET, SUB,** or **ADD:**

a) press **SET, SUB, or ADD** again
b) Key in the number again
c) Press **SET, SUB,** or **ADD**
d) Press the Unit-Key

SET, SUB, and **ADD** are toggle keys: press to operate, press again to clear the function.

4) If you have keyed in a number and have pressed **SUB** instead of **ADD,** or **SET** instead of **SUB:**

Simply press the correct key.

With **SET, SUB,** and **ADD,** the program will follow the instructions of the **last** key pressed.

5) If you have unintentionally pressed **SHIFT,** press again and it will cancel itself and the small **SHIFT** in the display will disappear.

RESET

6) If you want a powerful solution for getting the system back to normal: press **RESET**, which:

a) Restores all Time-Units to zero.
b) Clears **SET, SUB, & ADD**
c) Cancels **V-START, F-START** and **BEAT 1**
d) Sets **CLICK** to the Film-Speed (determined by **SHIFT-FILM**)

7) If **RESET** is pressed accidentally before you want to start a new Hit List, all is not lost! Go through the following steps and you'll have your list back:

a) Press **USER** (USER disappears from the display)
b) Key in the number of Hits which have been entered
c) Press **STO** (engraved on the keytop)
d) Key in **11** (eleven) (this number is critical!)
e) Press **USER** (USER reappears in the display)
f) Set your **CLICK**
g) Continue where you left off

The computer remembers **how many** Hits there are in the list very much like a telephone answering machine remembers the number of current calls. To start a new list, press **RESET.** The computer replaces old Hits with new and keeps track of how many new ones there are.

8) Turning the HP-41CV off does NOT clear:

a) The Current Time-Value
b) **F-START, V-START, & CLICK**
c) **CLICK**

9) Turning the HP-41CV off, CLEARS:

a) **SET, SUB,** or **ADD,** if the function has not been completed by pressing a Unit-Key.

FLAGS

For those of you who are interested in the HP-41CV display with the small numbers that come and go as keys are pressed, the following may be useful.

In addition to **USER, PRGM, ALPHA, SHIFT** and **BAT** which appear in the display, **0, 1, 3,** or **4** may also be seen. These "Flags" are the only indication that some particular keys have been pressed. To explain:

0 Appears whenever **SET** has been pressed.

Disappears when the **SET** process is completed by pressing a Unit-Key.

OR

Disappears if the process has been aborted by pressing **SET** again.

OR

Disappears if the HP41-CV is turned off.

0 1 Appear whenever **ADD** or **SUB** have been pressed.

Disappear whenever the addition or subtraction is completed by pressing a Unit-Key.

OR

Disappear whenever the process has been aborted by pressing **ADD** or **SUB** again

OR

Disappear if the HP-41CV is turned off.

3 Disappears whenever **F-START** is set.

Disappears when **RESET** is pressed.

Does not disappear when the HP-41CV is turned off.

4 Appears whenever **V-START** is set.

Disappears when **RESET** is pressed.

Does not disappear when the HP-41CV is turned off.

CHAPTER SIX: KEY GLOSSARY

The keys in this glossary are organized according to function.

HP-41CV MODE KEYS

The mode keys affect the basic operation of the computer by changing the function of all the keys.

ON, USER, ALPHA, PRGM

RHODESystems II KEYS

The standard HP-41CV keys have been redefined by **RHODESystems II** and are labeled by the overlay supplied with the module.

1. Function keys: **SET, ADD, SUB, SHIFT, RESET, CHS**
2. Response keys: **YES, NO, numbers, CONT**
3. Film size/speed key: **film**
4. Film Time-Unit keys: **FEET, frames, F-HRS**
5. Video Time-Unit keys: **DF, NDF, EBU**
6. Clock Time-Unit keys: **MIN, SEC**
7. Start Point keys: **f-start, v-start, beat 1**
8. Tempo keys: **CLICK, metro**
9. Beat Key: **BEAT**
10. Hits Program keys:

    addHIT, chgHIT, chgWt, readHIT, LIST, COMP

HP-41CV MODE KEYS

ON

The power switch. With the **RHODESystems II** Module in place, turning the HP-41CV ON will automatically engage the **USER** mode and USER will appear in the display. If connected, the Printer MUST be turned on first or the HP-41CV may not operate properly.

USER

With the **RHODESystems II** Module in the computer and USER displayed, all keys are redefined according to the **RHODESystems II** Overlay supplied with the module. To use the original computer functions, press **USER** and USER will disappear from the display. To return to **RHODESystems II,** press **USER** again.

ALPHA

This key is not required for the operation of **RHODESystems II.** ALPHA is displayed when the user is prompted with a question which calls for a YES/NO answer.

PRGM

This key is not required for the operation of **RHODESystems II.** No key should be pressed when PRGM is displayed. Wait until PRGM disappears to continue.

RHODESystems II KEYS

1. FUNCTION KEYS

SET

In conjunction with a Time, Tempo, or Beat key, replaces the current Time, Tempo, or Beat value with the number just keyed in.

ADD

In conjunction with a Time or Beat key, adds the number in the display to the current value.

SUB

In conjunction with a Time or Beat key, subtracts the number in the display from the current value.

SHIFT

Permits one key to be used for two different functions. Press once to activate: SHIFT appears in the display and will disappear when any other key is pressed or if it is pressed a second time.

CLEAR

Affects the Display only, it does the following:

1) erases a number which is being keyed in.

2) if a number is displayed with a label:
   a) on the first press, displays all possible digits.
   b) on the second press, displays zeros.

RESET

Affects the computer memory, it does the following:

1) Sets all **TIME UNITS = 0.000000**
2) Sets **BEAT = 1.00.**
3) Sets **CLICK = Frame Rate**
4) Sets **metro = 60.00**
5) Clears **SET, SUB** and **ADD.**
6) Clears **f-start, v-start,** and **beat 1**
7) Cancels Flags **0, 1, 3, 4**

CHS

There are two keys labeled CHS:

1) the one marked on the keytop works in the HP-41CV non-user mode.

2) the one on the overlay, which changes the function of the multiply key, works with **RHODESystems II.** This is used to set a negative number.

2. RESPONSE KEYS

YES

A positive response to a YES/NO question.

NO

Followed by **CONT,** a negative response to a YES/NO question.

Numbers

Followed by **CONT,** a response to a question asking for a numerical answer.

CONT

The CONTinue key signals the computer to proceed after keying in a numerical answer or NO.

3. FILM KEY

film

Initiates a sequence of statements and questions regarding film size, film speed, film frames-per-foot, which are used to set or change these values.

4. FILM TIME-UNIT KEYS

The following keys are affected by the frame-rate set by the **film** key.

FEET

Feet and frames. Feet before the decimal, frames after. (Frames 1-9 MUST be entered as 01-09)

frames

Frames and eighths of frames. Frames before the decimal, eighths after.

F-HRS

Film Hours or Film Time Code. Hours before the decimal, minutes, seconds and frames after.

5. VIDEO TIME-UNIT KEYS

DF

Drop-Frame SMPTE Time Code. Hours before the decimal, minutes, seconds and frames (30/second) after.

NDF

Non-Drop Frame SMPTE Time Code. Hours before the decimal, minutes, seconds and frames (30/second) after.

EBU

European Broadcasting Union Time Code. Hours before the decimal, minutes, seconds, and frames (25/second) after.

6. CLOCK TIME-UNIT KEYS

MIN

Minutes before the decimal, seconds after.

SEC

Seconds before the decimal, hundredths after.

7. START-POINT KEYS

f-start

Sets the Film Start-Point (Zero Seconds/Beat One) to the displayed value.

v-start

Sets the Video Start-Point (Zero Seconds/Beat One) to the displayed value.

beat 1

Permits simultaneous changing of the Start-Point (Zero Seconds/Beat One) in both film and video without changing the synchronization of the original film and video Start-Points.

8. TEMPO KEYS

CLICK

Click-Track Units. Frames-per-beat before the decimal, eighths of frames and tenths of eighths after. Click is dependent upon the film frame-rate.

metro

Metronome Units. Beats-per-minute before the decimal, hundredths after.

9. BEAT KEY

BEAT

Beat/Beats before the decimal, hundredths after.

In Display:

If positive, represents beat number.
If negative, represents number-of-beats and beat number.

With **SET**:

Key in beat number if positive.
Key in number-of-beats if negative.

With **ADD & SUB**:

Key in number-of-beats if negative or positive.

10. HITS PROGRAM KEYS

addHIT

Initiates the **HITS** program or permits adding data to it. Asks for value, units, and weight. **addHIT** may be pressed before the number is keyed in or vice versa.

readHIT

Reads the value, weight, and beat number (dependent upon tempo) of a particular Hit. Asks for Hit number and units.

chgHIT

Changes the value and weight of a particular Hit. Asks for Hit number, value, units, and weight.

chgWT

Changes the weight of a particular Hit. Asks for Hit number and weight.

COMP

Starts the Compute Optimum Click Program. Asks HALF-BEAT? and for fastest and slowest click.

LIST

Lists the Hits along with weights, corresponding beat numbers (beat numbers re dependent upon the tempo) and the lag between the actual Hit and the next available beat or half-beat.

CHAPTER SEVEN: SYSTEM SET-UP

This chapter presents the HP-41CV computer and the Peripheral Printer, the operating modes of each, and the steps necessary to prepare **RHODESystems II** for use. The Program Initialization described is ESSENTIAL to the proper operation of the system.

If you are interested in more detailed information about the capabilities of the HP-41CV and the Printer, please refer to the Operators' Manuals supplied with the equipment.

The HP-41CV

The HP-41CV **MUST** BE OFF when inserting or removing any applications module, peripheral device, or batteries; otherwise damage to the module or HP-41CV may occur.

BATTERIES

The HP-41CV comes equipped with four type N batteries. When replacement is required, be certain that the HP-41CV is OFF and that the correct polarity is observed when inserting each cell. See the HP-41CV Manual for detailed instructions.

BATTERY INDICATOR

BAT appears in the display when the batteries are exhausted. Always keep an extra set available.

RHODESystems II MODULE

Although any port will work, remove the cover from port #1 and keep in a safe place. With the computer turned OFF and with the end label right side up, carefully insert the **RHODESystems II** module.

RHODESystems II OVERLAY

Slip the overlay feet first over the keys. Pull back the lock, lay the overlay flat, and relock.

The PERIPHERAL PRINTER

LOADING PAPER

See Printer Manual for instructions.

BATTERY INDICATOR

BAT lights when the rechargeable battery needs charging. Connect to the proper AC source. Printer may be used while charging. See Printer Manual for further instructions.

CONNECTING The HP-41CV and PRINTER

PRINTER and HP-41CV MUST BE OFF while connecting. Printer may be plugged into any remaining port. Save the port cover!

HP-41CV OPERATING MODES

ON

With the **RHODESystems II** module in place, turning the computer on will automatically engage the **USER** mode and **USER** will appear in the display. With the **RHODESystems II** module out, the computer operates as a normal HP-41CV.

USER

With the **RHODESystems II** module in the computer and **USER** displayed, all keys are redefined according to the **RHODESystems II** overlay supplied with the module. To use the HP-41CV computer functions, press the **USER** key and **USER** will disappear from the display. To return to the control of **RHODESystems II**, press **USER** again.

PRGM

PRGM is displayed when **RHODESystems II** performs an operation. Keys must not be pressed when **PRGM** is in the display. Wait until the **PRGM** display disappears before continuing with the next operation, otherwise incorrect results may be obtained. The **PRGM** key is not required to operate RHODESystems II.

ALPHA

ALPHA is displayed when the computer displays a question which calls for a **YES/NO** answer. See the HP-41CV manual for more information about the use of this mode. The **ALPHA** key is not required to operate **RHODESystems II.**

OTHER APPLICATION MODULES

The **RHODESystems II** module is not designed to operate with any other application module in the computer. To use another module: **TURN THE POWER OFF,** remove the **RHODESystems II** module and its overlay and insert the new module and its overlay.

Program Initialization, described in the next section, **MUST** be performed every time **RHODESystems II** is inserted into the HP-41CV.

PRINTER OPERATING MODES

MAN/TRACE/NORM

Use the **MAN** position on the printer **MODE** switch to print **RHODESystems II**. **TRACE & NORM** have no application with this system.

OPERATION WITHOUT THE PRINTER

RHODESystems II is designed to operate with or without the Printer, but when the HP-41CV is connected to the Printer, the Printer **MUST** be turned on **FIRST**, otherwise the HP-41CV may not operate properly.

OTHER PRINTERS

Instead of the Peripheral Printer the HP Printer/Plotter may be used.

USING THE HP-41C instead of the HP-41CV

Because of its limited storage capacity, the **HP-41C** is not recommended for scoring applications.

PROGRAM INITIALIZATION

There are three cases when program initialization is required:

1) After the **RHODESystems II** module is plugged into the HP-41CV.

2) If any program other than **RHODESystems II** has been run in the HP-41CV.

3) If it takes longer than about 30 seconds to install new batteries in the HP-41CV.

Program Initialization is in two parts:

1) Executing the **film** program which sets the Film Size, Film Speed, and Film Frames per Foot. This step **MUST** be performed even if one is not dealing with film.

2) Executing **RESET.**

NOTE:

Program Initialization **MUST** be executed otherwise **RHODESystems II** will not perform properly and **DATA ERROR** may appear in the display.

The **KEYS** necessary for Program Initialization are:

SHIFT This key is similar to the shift key on a typewriter in that it permits one key to be used for two different functions. A small "SHIFT" will appear in the HP-41CV display when this key is pressed and will disappear when any other key is pressed. The shifted functions on the keyboard are those which appear just above a key, are gold in color, and contain lower case letters.

film This key initiates a sequence of statements and questions regarding Film Size, Film Speed, Film Frames per Foot. **film** is used to check or change these values.

YES-CONT This is two functions on one key: **YES** and **CONTINUE.**

In responding **YES** to a **YES/NO** question, press this key.

To answer a question which requires a numerical answer, key in the number and follow it with **CONT** to continue the program.

NO To respond negatively to a **YES/NO** question, two keystrokes are necessary: **NO** and **CONT.**

numbers The keys **0-9** and the decimal point.

CLEAR Erases a numerical entry from the Display one digit at a time. This key has other functions which will be explained in context.

RESET This key sets the computer to a predetermined state. It does **NOT** affect the Film Size, Film Speed, or Film Frames per Foot which can only be modified by the **film** key.

HARDWARE SET-UP: STEP BY STEP

Now that you are familiar with the equipment and the keys which are used for Program Initialization, let's begin.

1) Install the **RHODESystems II** module and overlay.

2) Connect the Printer to the HP-41CV with the power OFF.

3) The Printer should be turned on FIRST, then the HP-41CV. If the HP-41CV is turned on first, the system may not function properly.

4) **RHODESYSTEMS** will appear in the HP-41CV display and on the Printer.

You are ready for **Program Initialization.**

PROGRAM INITIALIZATION: STEP-BY-STEP

NOTE: The Film Size and Speed MUST be set even if none of your work is in Film. A standard setting of 35mm at 24 Frames per Second for American operation is recommended and demonstrated.

This sequence is a running program. Wait until the **PGRM** indicator disappears before continuing with additional keystrokes. If you hold the keys down too long, **NULL** will appear in the display and cancel your keystroke.

PART 1: SETTING FILM SIZE AND SPEED

Keystrokes:	**SHIFT FILM**
Display:	FILM MM = 0 FR/FT = 0 FILM F/S= 0
VALUES OK?	(not printed)

VALUES OK? must be answered with **YES** or **NO.** Here **NO** is appropriate. (Remember that **YES** only requires one keystroke and **NO** requires two.

Keystrokes:	**NO CONT**	
Display:	NO	(not printed)
FILM MM = ?	(not printed)	

FILM MM = ? must be answered with a number. The following example uses 35mm. 16, 17.5, 70, 8, or Super 8 (keyed in as 88) may also be used. For other sizes, see Chapter Seven.

Keystroke:	**35 CONT**
Display:	FILM F/S = 24?

FILM F/S = 24? must be answered with a **YES** or **NO.** For now we will choose **24** by answering **YES.** (Had you wanted **25** Frames/Second, a **NO** answer to the last question would have prompted **FILM F/S=25?** To which you would answer **YES**)

Keystroke:	**YES**

Display:	YES	(not printed)
	FILM MM = 35	
	FR/FT = 16	
	FILM F/S = 24	
VALUES OK?	(not printed)	

This Display also indicates the number of frames-per-foot in the selected film size. **RHODESystems II** includes the following values in its memory:

35 mm = 16 Fr/Ft	16 mm = 40 Fr/Ft
17.5 mm = 32 Fr/FT	8 mm = 80 Fr/Ft
70 mm = 12.8 Fr/Ft	*Super 8 mm = 72 Fr/Ft

(* Super 8 must be keyed in as **88**)

To continue, **VALUES OK?** gives you another chance to change the Film Size or Speed. If they are correct, answer **YES.**

Keystroke:	**YES**	
Display:	YES READY...	(not printed)

The Film Size and Speed are now set. They may be changed at any time by performing the steps in this section with different values.

PART 2: EXECUTING RESET

To complete **Program Initialization** only one step remains:

Keystroke:	**RESET**
Display:	RESET...

You have completed the steps necessary to prepare **RHODESystems II** for use.

Turn the HP-41CV and the Printer **OFF.**

Film size and speed are in the memory of the HP-41CV and will remain until changed or if it takes longer than about 30 seconds to change the batteries. The ON/OFF switch does NOT change these values.