
How to use this manual

This manual uses certain conventions.

- Descriptive information is in this type
- Commands that you need to enter, or selections from menus are in this type.

Text that you should type directly will be UPPER CASE COURIER TYPE. When you are instructed to enter information to replace a command the text will be in lower case courier type. For example to start R/CARDIO the manual instructs you to enter

```
AREV username,password
```

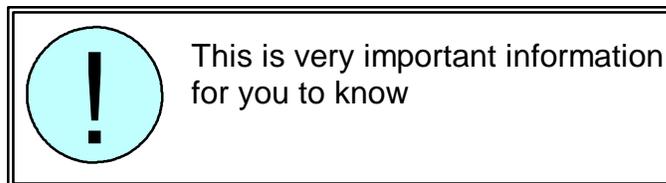
at the DOS prompt. You should type the word AREV, and substitute the correct username and password name separated by a comma, instead of typing the words username and password.

- Menu commands to be executed are displayed as the hyphenation of the menu items. For example Report-Date means select Report from the main menu followed by Date from the report menu.

-

Technical information, or optional information is displayed in this format

-



Introduction to R/CARDIO

The general concept of the program

R/CARDIO¹ is database designed to manage the information commonly generated from interpretation of echocardiographic studies. The database helps you manage order entries, stores and retrieves patient and test information, prints reports, transmits reports to mainframes and fax machines, execute proper billing for tests, and allows specialized searching of stored information.

The R/CARDIO database

The R/CARDIO database is divided into three types of database files, the **main** database, the **test type** databases, and the **utility** databases.

The main patient database

The main patient database stores all demographic information that is unique to the patient. This information includes:

1. The patient name
2. Date of birth
3. A unique patient identifier
4. The tests and dates of test performed or ordered for the patient

Each patient must have a unique patient identifier for each record in the main database. Many laboratories use the hospital unit number, others use the patient's social security number, while others use a combination of the first letter of the first name, the last name and the date of birth , for example (ASMITH060234).

Test type databases

There are **five test type database files** in R/CARDIO. These include

1. Adult echocardiography
2. Transesophageal echocardiography
3. Dobutamine stress echocardiography
4. Stress (exercise) echocardiography
5. Routine stress testing

¹ R/CARDIO is a trademark of Cardioscan Inc.

All test type databases have entries that are similar such as the ordering physician name, the patient location, the patient height and weight, and the study quality. In addition each test type data base *contains sections that are unique to the test type*. For example the echocardiography database has sections unique to the aortic valve and left ventricle, whereas the stress test database has fields that describe the patient performance on the test.

Utility databases

The utility databases include database files that store a list of:

- physicians that order tests with their fax numbers and addresses
- technicians that perform tests
- attendings that interpret tests
- locations for performing the tests
- diagnosis (ICD-9 compliant) as the indication for performing the test
- A list of CPT compliant codes for tests performed for each test type
- other functional information pertinent to the operation of R/CARDIO

An initial outline of how to use R/CARDIO

R/CARDIO was designed to minimize the physician interaction with a computer and maximize flexibility between physician transcription styles. A typical step by step entry sequence for the efficient application of R/CARDIO to your laboratory might be:

1. You install R/CARDIO on your laboratory computer. R/CARDIO is then customized for your laboratory so that it contains your lists of physicians, test locations and so on. A *test type worksheet for each test type database* is generated for data entry and duplicated (two different worksheets can be customized for each test type database). This step is only performed once.
2. On the day of the test the technician fills in the patient demographics on the first page of the worksheet and the examination is completed. Any preliminary measurements are entered into the worksheet by the technician.
3. The interpreting physician reviews the study and uses the remaining pages of the worksheet to enter the performance and findings pertinent to the *test type database*. These entries are selected from a *picklist* printed on the worksheet and customized for the laboratory. The physician then dictates or hand writes out

a narrative summary statement.

As an alternative to using the pick list entry format the interpreting physician can dictated any portion of the findings and summary statement. R/CARDIO does not require that the physician ever use the database computer

4. The transcriptionist enters the worksheet information into R/CARDIO for processing.
5. A final report is printed, reviewed corrected and then signed. The test is then marked as verified to finalize the entry.
6. Test results are disseminated by facsimile, and sent to the laboratory mainframe using a standard *HL7* protocol.
7. Charge tickets and a daily service log are generated to insure accurate and prompt reimbursement for services rendered.

If R/CARDIO is installed on a Novell Network then these additional features are available:

1. A workstation at the scheduling receptionist's desk or at the CCU or cardiac step-down unit is used to order the test.
2. The echocardiography laboratory workstation prints out the test requisition as soon as the test is ordered.
3. On the day of the test the echocardiography laboratory workstation is used to retrieve any of the patient's old studies saving time and improving efficiency.
4. Three to four workstations are used in the transcription pool to enter data simultaneously with other workstations that are printing and faxing reports.
5. A workstation in the coronary care unit or emergency room is used to provide all authorized health care worker's access to all patient information any time, day or night.
6. A remote call in workstation is available for access to the database any time of day.

Essentials for running R/CARDIO

Starting R/CARDIO

R/CARDIO is a program that was designed to run under the Microsoft or IBM version of DOS. You do not need an in-depth knowledge of DOS to operate R/CARDIO, but someone at your institution should have this knowledge, and they should be there to help you if you run into difficulties with your computer.

You must have a basic knowledge of DOS in order to start R/CARDIO. If you are not comfortable with the basics of DOS then seek the advice of a computer consultant. This advice is usually necessary to get started using R/CARDIO, but constant help from a consultant is not necessary every time you run this program.

You start R/CARDIO from the DOS prompt by first changing to the directory that contains R/CARDIO by entering

```
CD \RUNTIME
```

and hitting the enter key. Then to start the program enter the following command

```
AREV username , password
```

at the DOS prompt and then hit the enter key to complete the command.

R/CARDIO comes with five users pre-installed, each of which has a different function. These users are

username	password	description or function
SUPER	SUPER	Complete access to all R/CARDIO functions. Can delete patient studies and complete customization steps.
TYPIST	TYPIST	Access to most R/CARDIO functions. Can not customize the system.
TECH		Limited access to view, order and print patient results
ORDER		Limited access to order patient studies
HCW	¹	Very limited access to view results and access order entry

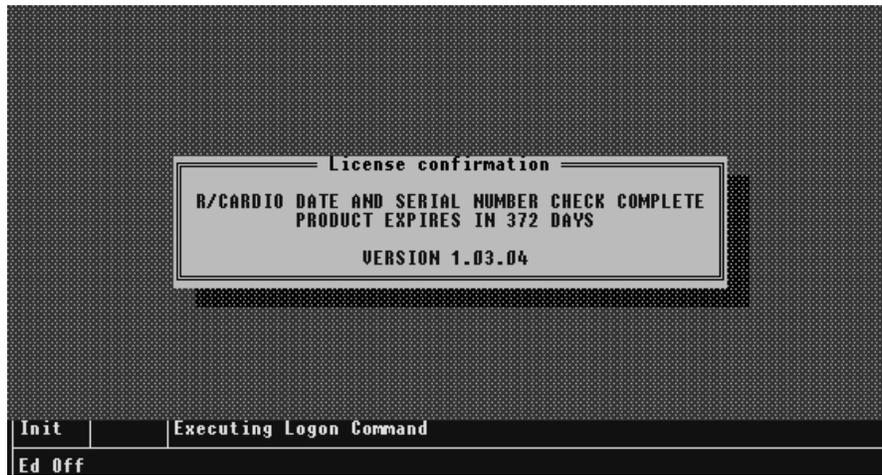
¹ The HCW user should not have a password assigned

You can add more users at anytime, and modify the security level of each user (see *Advanced Features, the Sysprog account*).

If this is your first time using R/CARDIO you should log on as the SUPER user by first changing to the directory that R/CARDIO resides in and then entering

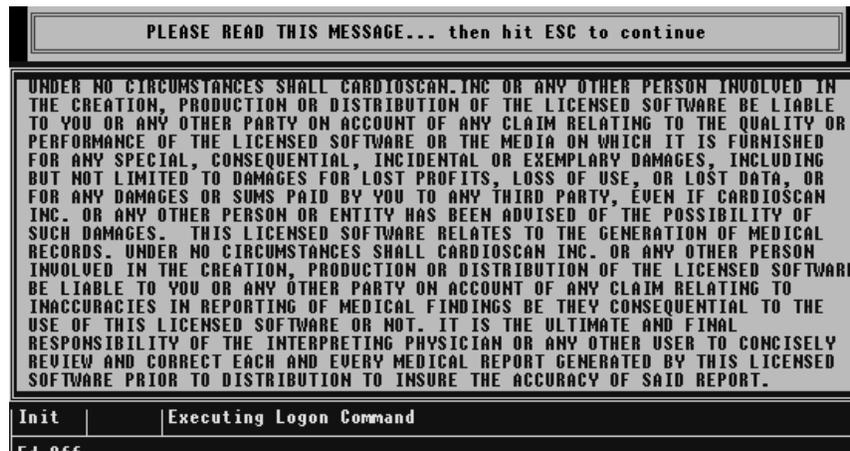
```
AREV SUPER , SUPER
```

at the DOS prompt. When you start R/CARDIO the first thing that you see is a license check screen, which is shown below.



This screen indicates that you have remained in compliance with your yearly license to use this software product. You must renew your license annually with Cardioscan in order to operate the software within the stipulated copyright requirements. When 45 days are left on your license the screen will change to warn you to contact Cardioscan for a license renewal disk.

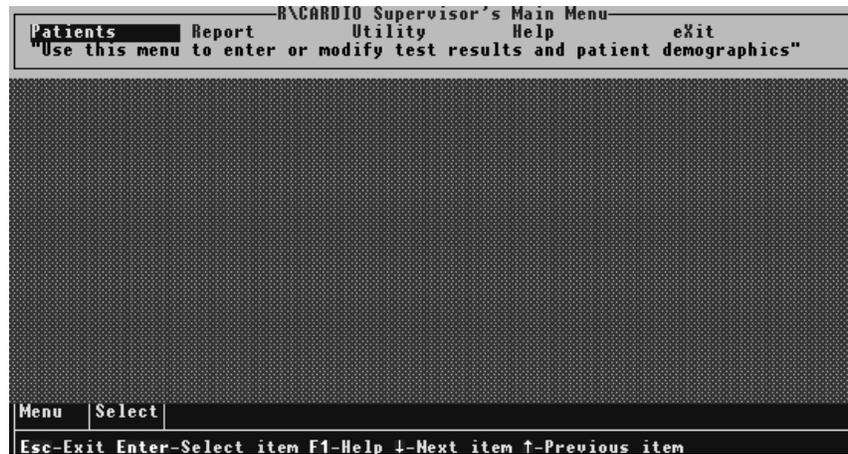
After the license check screen the R/CARDIO disclaimer is displayed.



Be sure to read the disclaimer, and the license agreement that came with this manual. By using this software all users agree to comply with the terms specified in this screen as well as the software license agreement.

The R/CARDIO menus

After the disclaimer statement window R/CARDIO displays the main menu.



Menu commands can be made by either

- Highlighting the selection by moving the cursor and hitting enter
- Enter the highlighted (or capitalized) letter of the menu selection on the keyboard

There are five selections from the main menu. These are,

- PATIENTS - Selecting patients will open the main database window. Use this window to
 - enter and revise all patient data
 - search for patient's
 - print individual reports
 - view the test summary or test report
 - print individual charge slips
 - fax individual reports
 - delete individual studies.
- REPORT - This menu selection opens another menu with selections for...
 - printing or faxing reports by test date or by a selected list of patients
 - batch charge slip generation
 - batch mainframe downloading using an HL7 protocol
 - listing all referring physicians
 - searching for unverified (non-finalized) reports
 - batch updating report status to verified
 - print a daily service log and a daily schedule
- UTILITY - Use the utility menu to customize R/CARDIO for your institution, and perform specialized reports, statistical analysis of the data and maintenance and upkeep of the database.
- HELP - The help selection will give you a brief review of the R/CARDIO functions.

- EXIT - The selection to be made when you leave the R/CARDIO system.



Never turn off the power or reboot your computer without selecting the EXIT option first and returning back to the DOS prompt.

If you do reboot (Ctrl-Alt-Del) or turn power off to the computer before leaving R/CARDIO you run the risk of corrupting your database system. A corrupt database may require costly technical support for repairs or may lose critical patient information.

If your AC power is not reliable you should buy an uninterruptable power supply to prevent file corruption by unexpected power outages.

How to enter patient studies into R/CARDIO

Customize your database

Before you start entering data for patients you must customize R/CARDIO for your laboratory or institution. Complete instructions for customization can be found in the chapter titled *Customizing R/CARDIO*.

Before you run R/CARDIO you *must* complete the customization process. However, certain default entries are included with R/CARDIO when it is shipped to you. You may elect to practice entering a few patients before you complete the customization process since the default variables may be sufficient.

Customization of R/CARDIO is required to

1. Configure the worksheet picklists (Picklists are used to enter the findings and performance for a test. The picklists are an optional R/CARDIO tool that can be used to simplify the data entry process by physicians and technicians)
2. Add names of technicians who perform studies at your institution
3. Add names of doctors that interpret tests at your institution
4. Add locations that studies are performed in (like CCU, South Office, Treadmill room one)
5. Add or modify the possible services for each test type database.
6. Add or modify a list of study quality descriptors for each test type database
7. Add or modify a list of patient diagnoses as indications for the test. R/CARDIO is delivered with ICD-9 compliant indications. Additional study indications can be added, but these should remain compliant with ICD-9 indications so that the charge slips generated by R/CARDIO are internally consistent.
8. Add names of physicians that order test at your institution. The information needed is the physician's name and address as well as their facsimile number and universal provider identification number (UPIN).
9. Print out the picklist worksheet for each test type database.

Fill out the worksheet

If you have not already printed out a worksheet do so now to continue with these instructions. Refer to the chapter *Customizing R/CARDIO* for directions on printing out a worksheet. You must print out a separate worksheet for **each** test type database in the R/CARDIO system (Echocardiography, Dobutamine, Stress Echo, Transesophageal Echo, Stress test).

Each test type database in R/CARDIO has a separate worksheet for data entry. The front page of each worksheet is similar between databases and is usually completed by the laboratory technician or receptionists. It contains patient demographics, test indications, study quality, and place to enter the name of the ordering physician, interpreting physician, and technician performing the test.

The interpreting physician uses the subsequent pages of the worksheet to select from a picklist of canned phrases the necessary responses to describe the pertinent findings of the examination and a description of the patient performance. The physician then completes a dictated or hand written *narrative* summary to provide an individualized interpretation of the findings and patient performance.

Physicians who do not wish to adapt their dictation style to the R/CARDIO picklist format can dictate a paragraph of test findings, followed by a paragraph describing the test summary. The dictated finding's paragraph is entered in the section marked *findings comments* in the test type database, the summary is entered in the *summary* section.

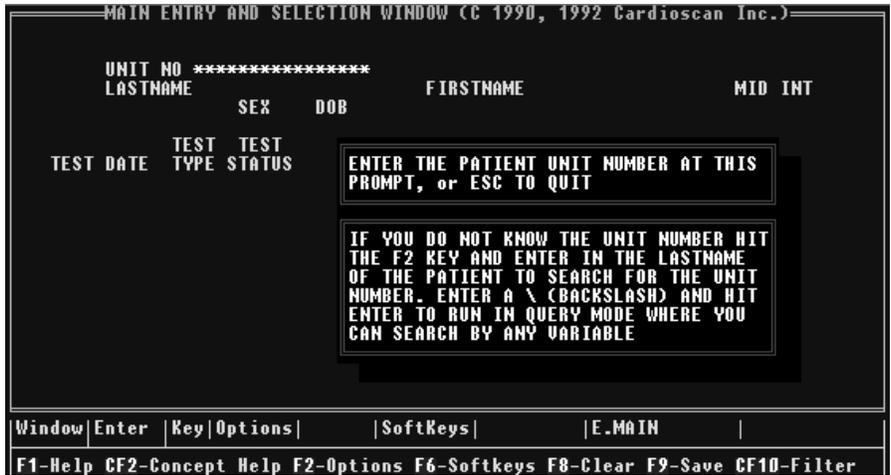
You are not constrained to use the worksheets generated by R/CARDIO. Many centers have designed their own worksheet to conform to their own interpretation guidelines and methods.

Enter the worksheet into the database

Demographics The first page of the worksheet corresponds to the first window of the main database **and** to the first page of the test type database window

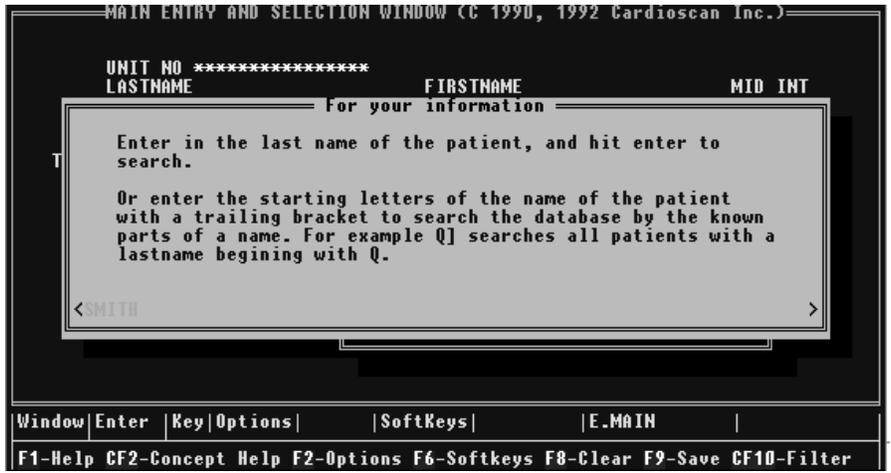
The test type database will have many 'pages' . The transcriptionist pages through each as the data is entered into the database. The main database has only one page.

To enter the worksheet into the main database select `Patients` from the main menu. The screen changes to display the main database entry window



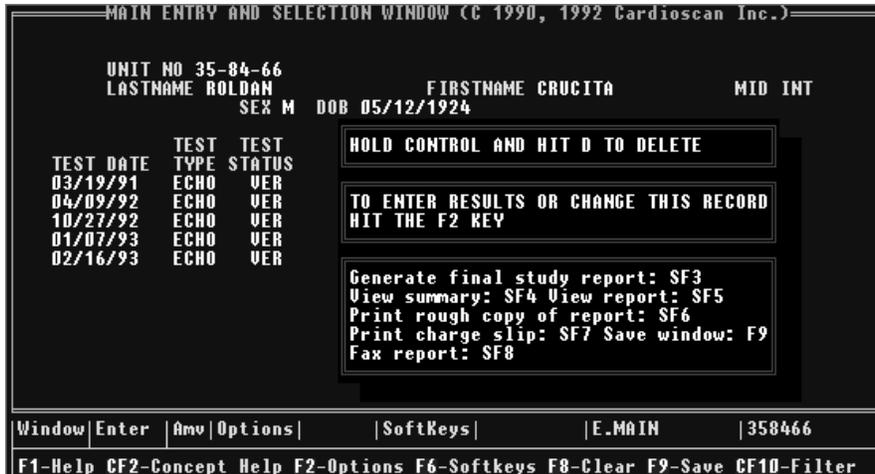
The first prompt on this window is the unit number. To enter, or review, data for the patient you must know the unit number and enter it at the unit number prompt.

If you do not know the unit number of the patient R/CARDIO can look it up for you. Hit the F2 key and R/CARDIO will find the unit number of the patient if it has been previously entered.



This figure shows the R/CARDIO dialog box for searching the database after F2 was pressed. The user is about to search all patients with a last name of Smith.

If you enter a unit number for a patient that does not exist in the main data record you will be prompted to enter the patient's name, date of birth, and gender. This information is found on the front page of the worksheet, and need only be entered once for any one patient. If you enter a unit number that is already in the database for an existing patient then all this information will appear as well as a record of all test dates, types, and status for tests that this patient has had entered into the database.



In the figure above R/CARDIO displays the patient information after the unit number has been entered. The patient has had five separate tests that have been entered into R/CARDIO. Note the information boxes on the side of the screen.

To enter a new study for this patient ...

- move the cursor down the test date column and enter the test date at the blank prompt and hit the enter key.
- select the test type from the popup of choices
- select the test status from the popup of choices (you should select PER if the study was performed)

After you enter the status the cursor returns to the test date prompt. Now hit the F2 key to open up the first page of data entry for the test type database.

(To edit an existing report see *How to print and disseminate patient reports, Correcting errors in the report*. To understand more about the different types of test status choices see *Advanced features, test status*)

The next figure shows the first page of the test type database window after it has been completed. In this case the window is for the echocardiography test type database.

```

Echocardiography test type database
REPORT DATE 12/24/93 PATIENT'S AGE 69 PAGE 1
RECORD ID 358466-12/24/93 LAST NAME ROLDAN HEIGHT 66 (in)
FIRST NAME CRUCITA WEIGHT 156 (lb)
INTERESTING CASE
IN OR OUT PATIENT? OUT
LOCATION
DIAGNOSIS CHEST PAIN
DYSPNEA
PHYSICIAN 1 GENERIC DOCTOR
CODE NUMB 13 Geriatric Clinic

TAPE NUMBER 93-103 STARTING LOCATION 4302 ENDING LOCATION 4794

STUDIES PERFORMED TWO DIMENSIONAL SECTOR SCANNING
DOPPLER COLOR FLOW MAPPING
STUDY QUALITY DIAGNOSTICALLY ADEQUATE

STUDY LOCATION GENERIC LOCATION - ECHO ROOM 1
TECHNICIAN Generic Tech ATTENDING GENERIC DOCTOR
FELLOW Generic Fellow***** PAYER
COMMENT
Window|Enter|Sv| | |SoftKeys| |E.ECHO|New Record|
F1-Help CF2-Concept Help F2-Options F6-Softkeys F8-Clear F9-Save CF10-Filter

```

To complete the first page of the test type database the transcriptionist sequentially fills in the prompts using the information contained on the first page of the worksheet. The information that is to be entered includes.

1. The patient location if an inpatient
2. The height and weight of the patient. R/CARDIO converts this information into body surface area in the final report
3. A mark if the case is interesting and should be stored in the database as an interesting study
4. The patient's diagnosis (which should be the indication for performing the study). When the cursor moves to this prompt you are prompted to enter the diagnosis circled on the worksheet, or hit the option key F2 to select the possible diagnoses from a popup. If the diagnosis is manually entered it must conform with the list of diagnoses entered (customized) for this test type database.

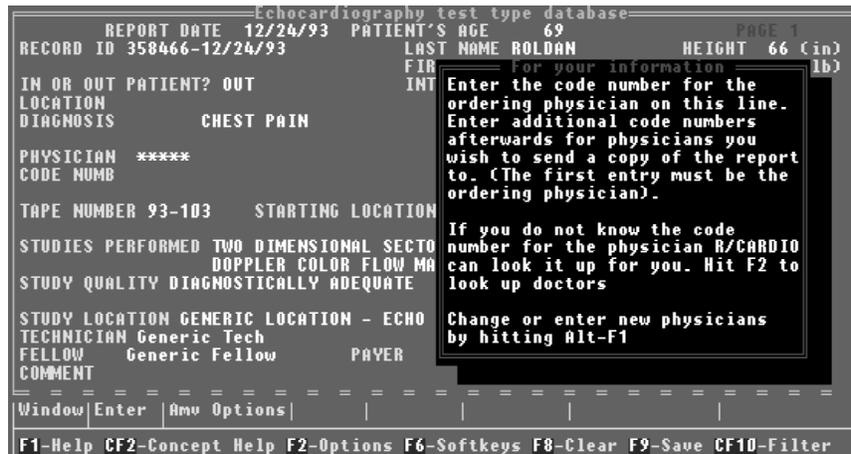
```

Echocardiography test type database
RECO
IN O
LOCA
DIAG
PHYS
CODE
TAPE
STUD
STUD
STUD
TECH
FELL
COMM
THIS IS A MULTI CHOICE POPUP. TO ENTER YOUR CHOICES FOR
THIS PROMPT USE THE ARROW KEYS TO MOVE THE CURSOR TO THE
SELECTION(S) YOU WANT. TO ADD THE ENTRY HIT THE ENTER
KEY WITH THE CURSOR ON THAT SELECTION.
WHEN YOU ARE DONE WITH ALL YOUR CHOICES HIT THE F9 KEY
TO RETURN ALL THE SELECTIONS TO THE DATA ENTRY WINDOW
SELECT THE PATIENT'S DIAGNOSIS
REASONS
7 AORTIC STENOSIS
8 ARRHYTHMIAS
9 ATRIAL FIBRILLATION
10 ATRIAL SEPTAL DEFECT
11 CARDIOMYOPATHY
12>CHEST PAIN
pg 2/6
Pop Up|Multi|Select or cancel rows by pressing [Return] [F9]-Save [Esc]-Exit
Esc-Exit F1-Help Enter-Select Item AnyText-Search for text PgDn-Next Page

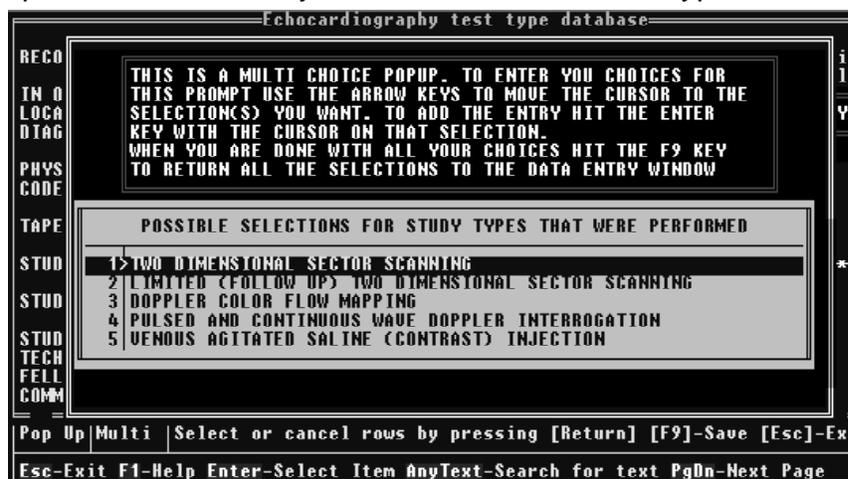
```

5. The ordering physician code number (if you are just practicing with R/CARDIO enter the number 1, since a temporary physician is already defined for this number). The first physician entered into the database is considered the

ordering physician. Each subsequent physician entered should represent those doctors that you wish a copy of the report sent or faxed to. Each physician is identified by a unique number. If you do not know the number of the physician hit F2 search for the physician by last name. If you want to enter a new physician see the chapter *Customizing R/CARDIO, The upkeep menu.* (You can directly add new physicians from within the test type database by hitting Alt-F1)



6. The tape number and start and stop location on the tape. This is a multiple choice entry and you can enter as many entries for tape number and corresponding start and stop locations
7. The study types performed for this test type. These study types are keyed to CPT compliant codes. When you move the cursor to this prompt the window changes to look like the one shown below. Select the studies performed by moving the cursor to the selection and hitting the enter key to *mark* the selection. When all the appropriate selections are marked hit the F9 key to complete the selection process and return your selections to the test type database window.



8. Study quality, select your selection from the popup
9. Study location, select your selection from the popup
10. The technician that performed the test, select the selection from the popup

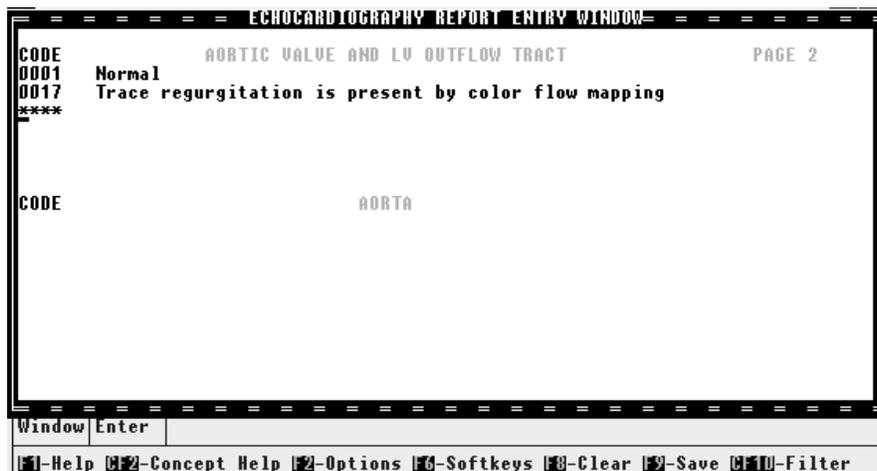
11. The name of a fellow or assistant (optional)
12. The primary payer mix of the patient. This will not appear on the final report.
13. Any comment regarding the study. This prompt will never appear on the final report but can be used by your laboratory to track any other information relevant to your institution.

Test type picklist entries

The subsequent pages of the test type database entry window are composed of prompts for picklist section entries. Using the worksheet the transcriptionist should enter the number's marked for each section by the interpreting physician.



This figure displays the second page of the test type database for echocardiography and the first picklist entry location. The cursor (marked here with ****) is on the code entry prompt for *The aortic valve and LV outflow tract* section of the echocardiography worksheet **and** database. The subsequent figure is the same window after the transcriptionist has entered the picklist code numbers that the physician circled on the worksheet. In this case the picklist code numbers 0001, and 0017.



VALVE THICKENING				REDUCTION OF VALVE EXCURSION				VALVE DOMES
NONE	MILD	MODERATE	SEVERE	NONE	MILD	MODERATE	SEVERE	
0005	0006	0007	0008	0010	0011	0012	0013	0014

9000 - mild non coronary thickening is present

PROSTHETIC VALVE TYPE					VALVE MOTION	
BIOPROSTHESIS	MECHANICAL	BALL-CAGE	TILTING-DISK	BI-LEAFLET	NORMAL	ABNORMAL
0021	0022	0023	0024	0035	0028	0029

In this example the attending has written *directly in the worksheet* the code 9000, next to which the words *mild non coronary thickening is present* are written. The transcriptionist first enters the code 9000, after which a prompt asks for the literal string to be entered. The literal string prints out in the final report along with strings entered using the conventional picklist format.

The transcriptionist then proceeds with entering the picklist selections for each section in the worksheet. A section that has no entries can be skipped and will not appear in the final report.

Wall motion inputicon

Some test type databases allow the interpreting physician to semi-quantitatively describe regional left ventricular function. To do this the interpreting physician scores the contraction pattern of individual ventricular segments as normal or abnormal. This information is then entered into R/CARDIO.

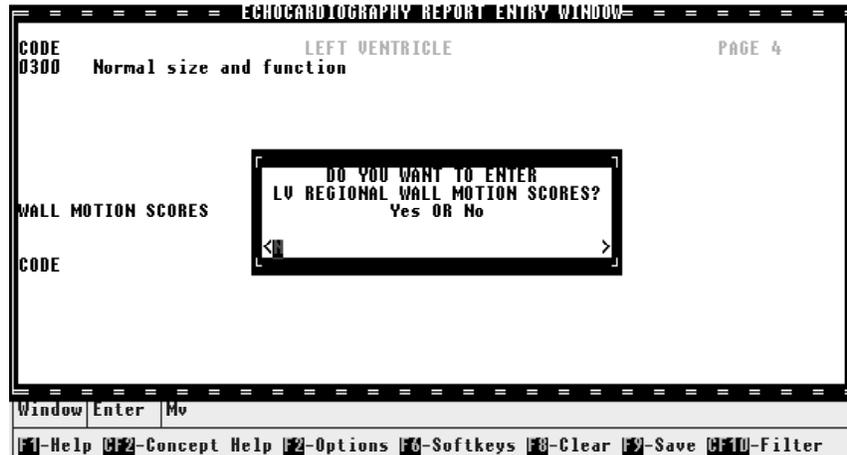
To enter the information correctly the attending scores the ventricle using a specialized inputicon. The following figure demonstrates the inputicon from the echocardiographic test type database worksheet after it has been filled out by the interpreting physician.

ENTER WALL MOTION SCORES		<input checked="" type="radio"/> YES <input type="radio"/> NO		<-- SEGMENTS -->			
SECTIONS		ANTERIOR	LATERAL	INFROPOST	SEPTAL		
					POSTERIOR	ANTERIOR	
	BASAL	<input checked="" type="radio"/> N H A D X	<input checked="" type="radio"/> N H A D X	<input checked="" type="radio"/> N H A D X	<input checked="" type="radio"/> N H A D X	<input checked="" type="radio"/> N H A D X	
	MID	<input checked="" type="radio"/> N H A D X	<input checked="" type="radio"/> N H A D X	<input checked="" type="radio"/> N H A D X	<input checked="" type="radio"/> N H A D X	<input checked="" type="radio"/> N H A D X	
APEX	<input checked="" type="radio"/> N H A D X	<input checked="" type="radio"/> N H A D X	<input checked="" type="radio"/> N H A D X	<input checked="" type="radio"/> N H A D X			

WHERE N = NORMAL H = HYPOKINESIS A = AKINETIC
D = DYSKINETIC X = NOT VISUALIZED

This inputicon uses a 14 segment scoring system that divides the ventricle into three sections, composed of four to five segments. Each segment is then scored as Normal, Hypokinetic, Akinetic, Dyskinetic, or X for not visualized.

This next figure shows the test type database window after the left ventricular section is completed. In this case R/CARDIO ask the transcriptionist if the wall motion scores are to be entered.



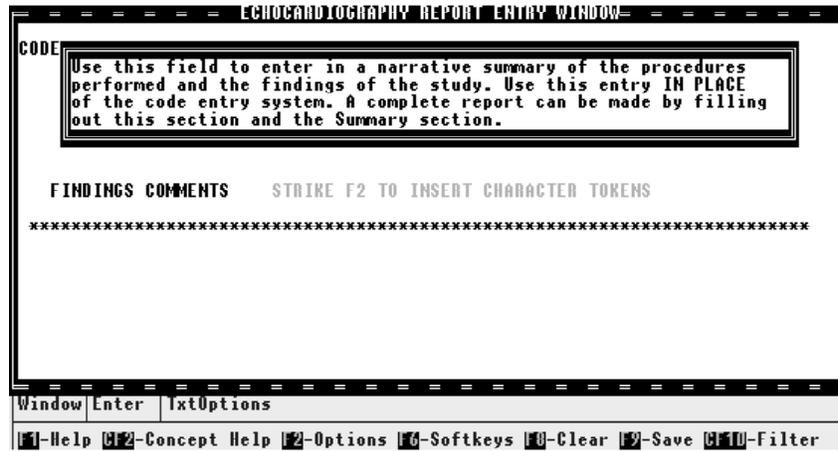
If the transcriptionist enters answers yes then the following window appears.



The transcriptionist uses the completed inputicon to enter the wall motion scores for each segment from each section. In this figure the anterior segment of the basal section is about to be scored as normal.

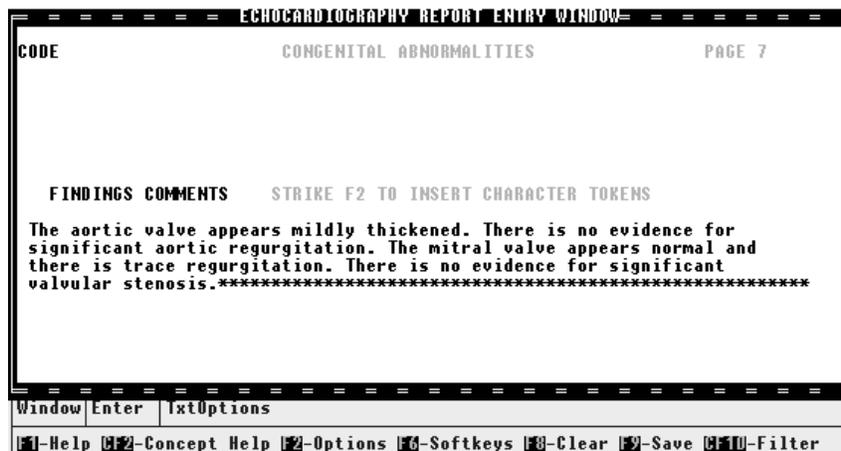
Findings comment entry

Each test type database has a section called findings' comments. This section can be used as an alternative to entering the findings and performance of the study using the picklist sections.



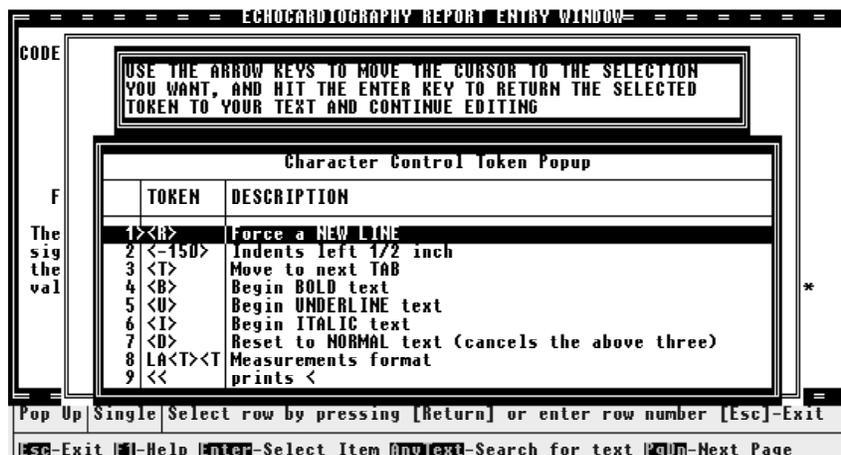
For attendings that not do wish to use the picklist format a narrative report of the findings and performance of the test (including any measurements that are to be embedded in the text) can be entered into the findings comments section. *When the findings comment section is used the other picklist sections should not be completed or this would duplicate the information on the report.* Using the findings comment section there is no difference in the use of the demographics page (the first page of the test type database worksheet) and the test type database summary statement.

The format that the text is entered into the findings comment prompt does not determine how the final report looks, rather, the text is formatted at the time the report is printed.



In the example above the partially entered findings will be formatted to fit into the space on the report. Hitting the enter key at the end of the line will not cause the text to have a

carriage return. Instead R/CARDIO provides tools to format the text entered into this prompt using *character tokens*.



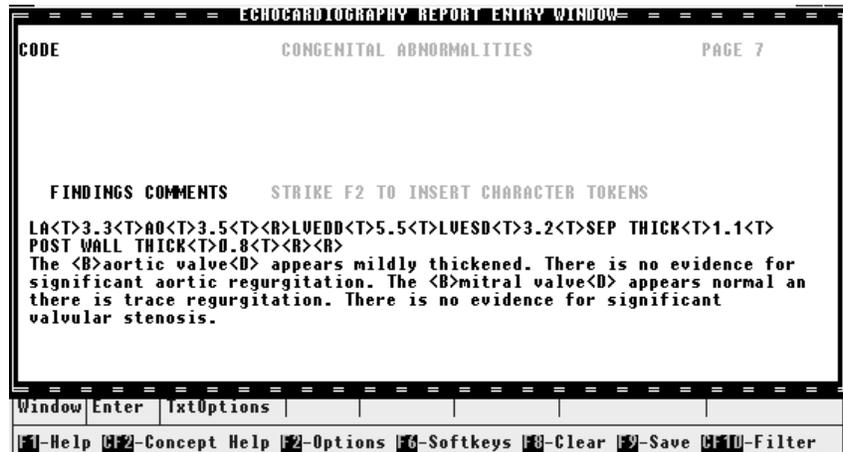
This figure demonstrates that hitting the F2 key while typing in the findings' comments prompt (and in the summary prompt as well) brings up on the screen the character token popup. Move the cursor to the selection that you wish to insert and hit the enter key to continue typing. The character token is inserted in the text for you.

Character tokens are regular typed characters separated by angle brackets (for example <R> means new line, <T> means tab). Inserting character tokens in text is the way to force R/CARDIO to format the printed text in a way other than the default format set by the report. The next table lists the current available character tokens.

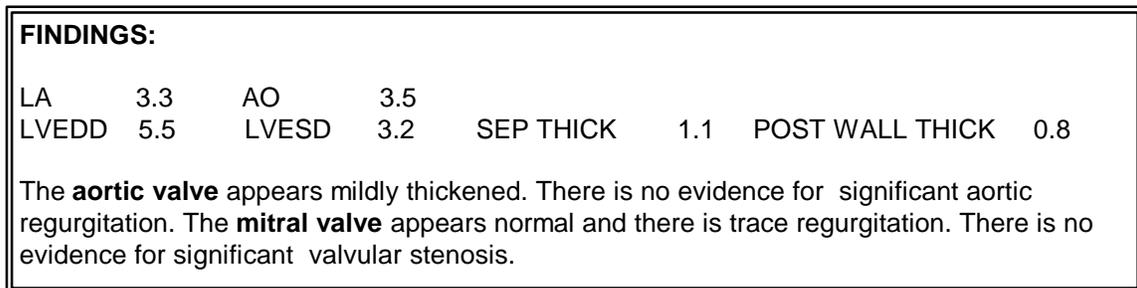
Token	Meaning
<R>	Force a carriage return (new line)
<+n>	Move the text over to the right n/300 of an inch
<-n>	Move the text over to the left n/300 of an inch
<T>	Move the text to the next tab
	Turn on boldfacing
<U>	Turn on underlining
<I>	Turn on italics
<D>	Turn off italics, underlining, and boldfacing. Returns text to a normal font
<^n>	Move up n/300 of an inch
<\n>	Move down n/300 of an inch

To bold face a result, such as a measurement, or a descriptor, you would enter two character tokens on either side of the value like this 6.5<D>. The character tokens can be typed manually or they can be entered by hitting F2, selecting the token,

entering the text 6 . 5, and then hitting F2 and selecting the <D> token. (To print the character < in the summary statement you must enter a << otherwise the subsequent character after the < will be interpreted by R/CARDIO as the beginning of a character token).



In this figure character tokens were inserted at the beginning of the prompt to format the text so that the final report the findings section will look like this



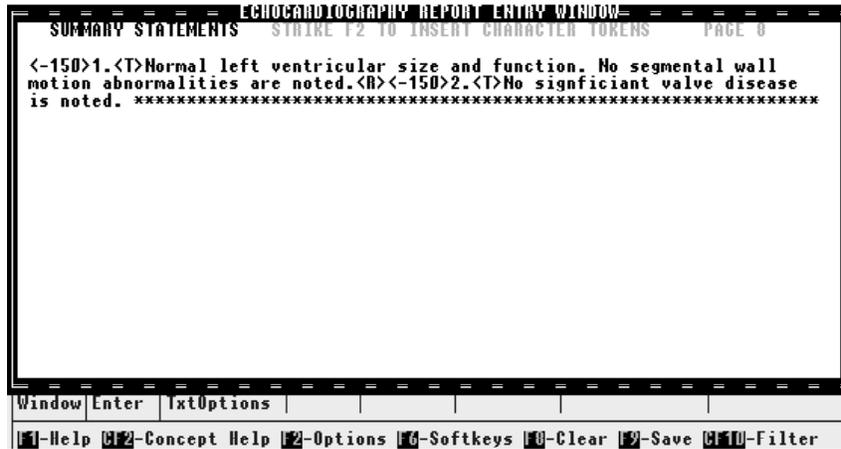
Notice that the text appears after the word findings, and that the format of the paragraph is different then what appears in the test type database findings comment prompt window.

If you have purchased the optional speller you can check your work at any time by hitting Shift-F1 at any text prompt. To learn more about the speller see *Advanced features, spell checking*.

There are many important editing key strokes (sequences of key presses) that are helpful as you enter characters into these text prompts. These keys are described in *Advanced features, the key strokes of R/CARDIO*.

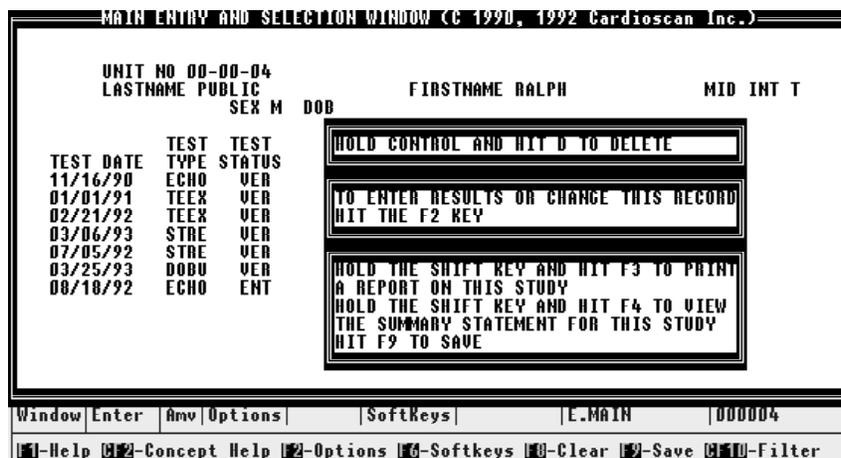
Summary statement

One of the final pages of any test type database window will be the summary section. This text field prompt is used by the transcriptionist to enter the summary of the report.



This figure demonstrates that the summary field in the study was filled in using character tokens to format the final text.

After the summary prompt is filled in the last prompt is a field for the transcriptionist to place their initials. When this field is entered the test type database window closes automatically and returns the user to the main database window. Alternatively the test type database can be closed and saved by hitting F9 once the required fields are completed.



This figure indicates that after the test type database is closed the user is returned to the main database window. The prompt is located on the test date of the test that just was entered.

The data in the main database now needs to be saved separately by hitting the F9 key. After the data is saved the test status for the patient will automatically be changed from ORD to ENT signifying that the study has been entered, but not printed or reviewed.

After saving the main database window hit the escape key to return to the R/CARDIO main menu or enter another unit number to enter another patient study. This completes the steps required to store a patient test record into R/CARDIO. The next chapter discusses report options.

How to print and disseminate patient reports

Printing the final report

The final report is printed using your laser printer. To maintain patient confidentiality and to insure that the final report is not indiscriminately duplicated only the SUPER and TYPIST user can generate final reports.

Printing one study at a time

To print one study report at a time open the main database window and enter the unit number of the patient. Move the cursor down to the test date that you wish to print making sure that the study test type that is selected is the one that wish to print. Hit Shift-F3 to print the report. This figure indicates the print job process as it is occurring. The file being merged (printed) is indicated as is the script used for the merge and the number of copies that are to be printed is indicated



You can print one to nine copies of any test report using this method. Studies which are ordered and not entered can not be printed.

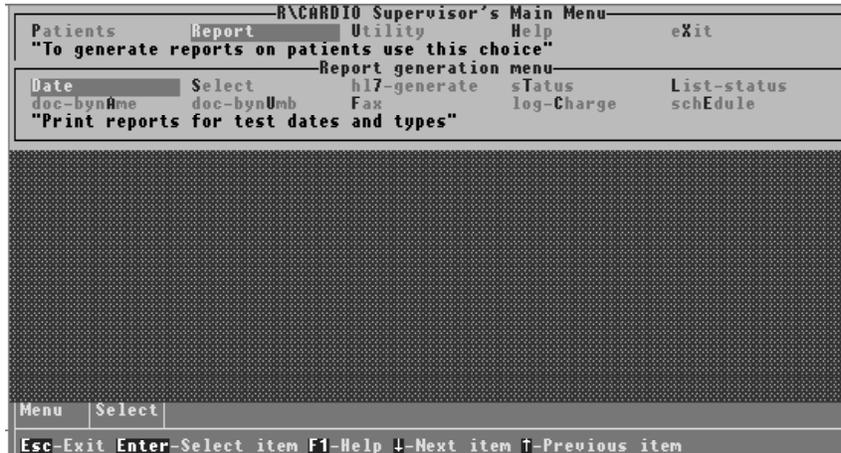
Make sure that your printer is on, plugged in, and connected to your computer prior to printing. If you receive the error message

```
Write fault error writing device LPT1
Abort, Retry, Ignore, Fail?
```

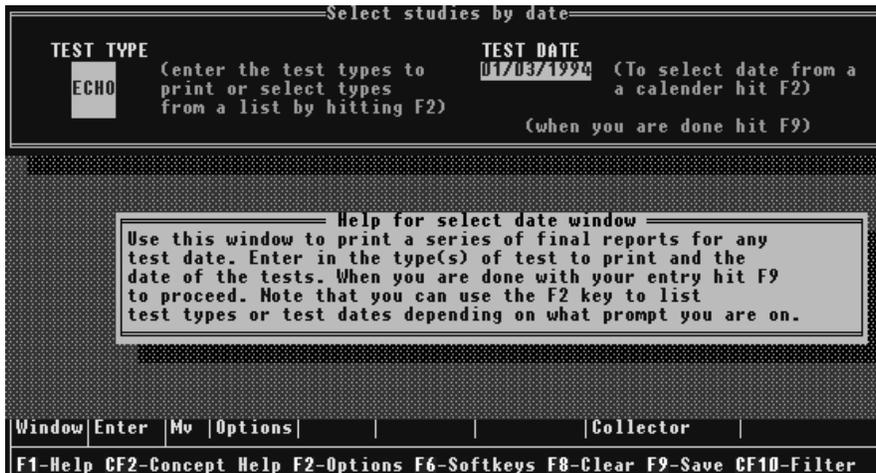
the printer is not connected or working correctly.

Printing studies in batch

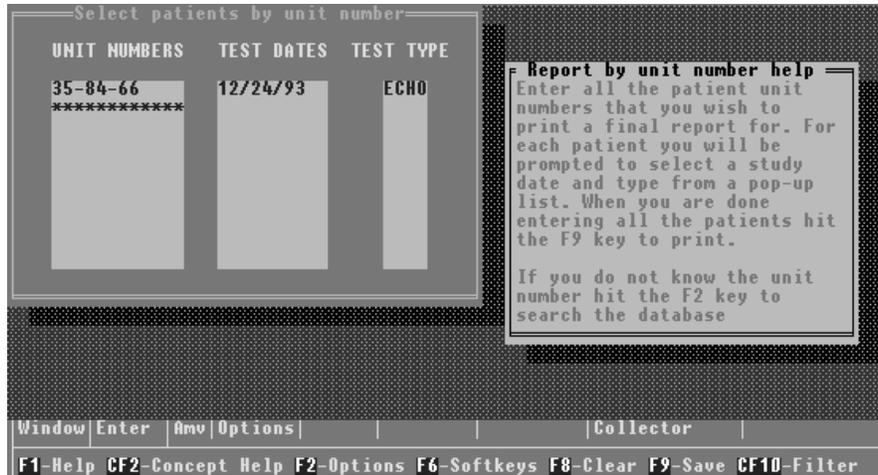
You may wish to enter all the patient studies at one time and then print all the reports at one time. This is called **batch printing**. To batch print select Report-Date or Report-Select from the main menu to print all studies for a specific date, or to print a select series of studies from specific patients respectively.



If you select Report-Date you will be prompted to enter the date of the study, and then the types of tests to print. You can select all studies for one day by selecting all test types as is shown here



If you select Report-Select you will be prompted to enter the unit numbers of the patients that you want to print.

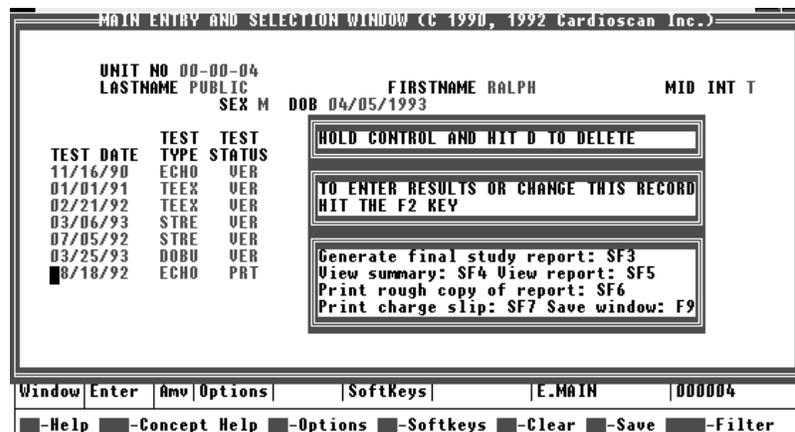


For each unit number you must select the one test date and type to print. Note that the window prompts you to hit the F2 key if you want to search the database based upon the patient last name. To select multiple studies for one patient enter their unit number once for each test to print. If a report is not entered then it will not be printed by either method.

Correcting errors in the report

R/CARDIO is designed to have the transcribed reports entered and printed in batch form. Batch printed reports are then distributed to the interpreting physician for review. Errors are marked on the reports and returned to the transcription center for correction. Reports are then signed and returned for distribution.

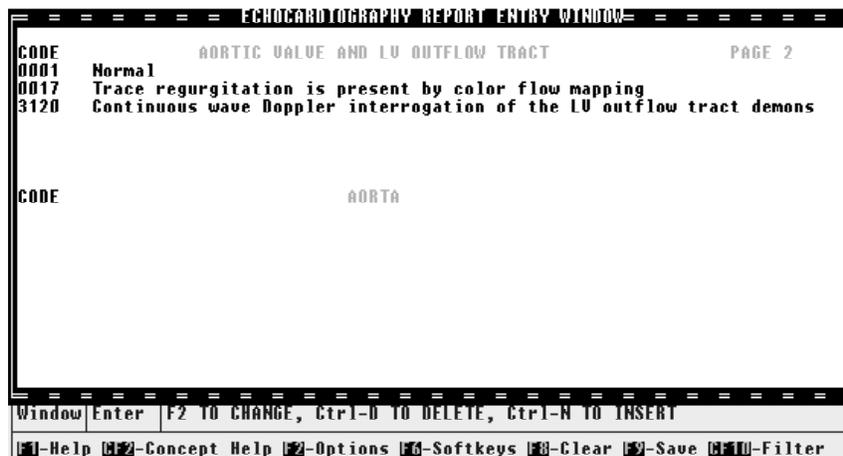
Entry errors in the patient report are corrected by the transcriptionist returning to the main database window (Patient) entering the unit number in and moving the cursor to the test date for the test to be corrected, and hitting F2.



This figure shows the prompt on the test date 08/18/93 for the test type database ECHO, whose status is PRT. This record can be opened for correction by hitting F2.

Once the status of a test is changed to VER or verified the report you can not change or alter the report in this fashion. The status must be changed to PRT or ENT to revise the study

- Errors on the demographic page can be corrected by using the page up key or moving the cursor to the incorrect entry. The entry can be deleted and re-entered.
- Errors in the picklist codes (an incorrect picklist number was entered) must first be deleted using the control-D key combination (see *Advanced features, the key strokes of R/CARDIO*) and a new picklist code entered. To *insert* a new picklist code first insert a blank prompt line using the control-N key press combination (see *Advanced features, the key strokes of R/CARDIO*) and then enter the new number.
- Errors in entries in picklist which require additional information can be corrected by hitting F2 while the cursor is on the picklist code number

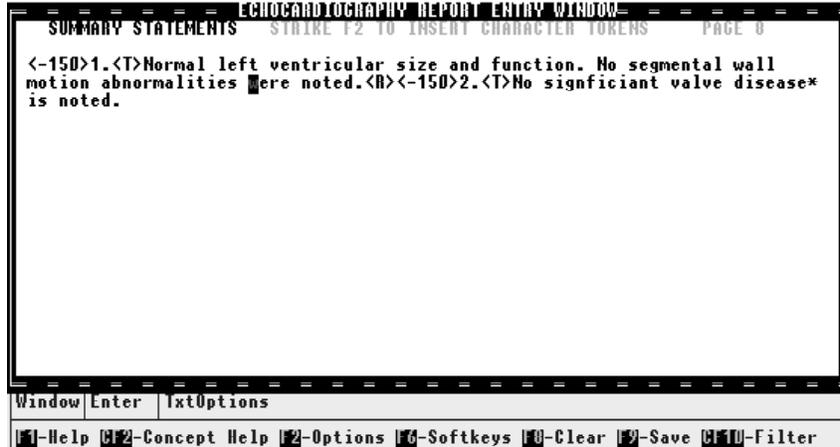


In this figure the cursor is on the picklist code number 3120 in the aortic valve and LV outflow section. To change the value of the additional information hit the F2.



In this figure the old value of 1.7 is in the prompt. To change this value enter a new value and then hit enter

To correct errors in the finding comments or summary section move the cursor to these prompts by paging down. Once at the prompt use the cursor keys to move to the word that is to be changed.



This figure indicates that the cursor is located at the word *were* in the text of the summary statement. The cursor is large and indicates that R/CARDIO is in a non edit mode. To change to the edit mode hit the F4 key (see Advanced features, the key strokes of R/CARDIO).



The cursor changes to a small underbar (_) and the required changes can be made. In this case the word *were* is to be changed to *are*.



When the changes are made use the down arrow key to move the cursor to the bottom of the prompt to close and save the changes.

When all the changes to the test type database are made hit the F9 key to save it and return to the main database window. Reprint the report using the Shift-F3 key, or the Report-Select menu selection. The report should then be re-reviewed by the attending physician.

Verifying the study as final

Once the printed final report is reviewed and signed by the interpreting physician the study should be marked as verified (VER) so that it can be distributed in final form.

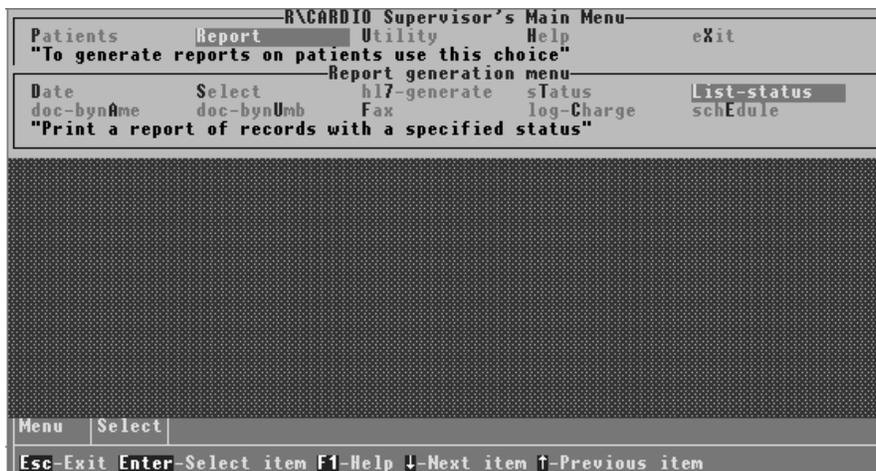
Understanding the need for a verified status of a study can best be done by example. Consider a pathologist dictating a surgical report of a sample. He decides that the sample contains malignant cells and generates his final report to indicate this. The surgeon then removes the malignant organ based upon this report. For obvious reasons the pathologist would not want the test results changed after he signs the report, and he would be unlikely to want to come back some time later and change the report from malignant to normal. Thus the act of changing the status to VER is a *fait accompli*, once done it can not and should not be undone. Thus a report with a status other than verified is preliminary.

Verifying the study can be done on an individual basis from the main database window or using the `Report-Status` option from the main menu. Use the main database window to change the status of only one report by moving the cursor to the status line for the test date of the test that needs to be changed. Type the letters VER, or hit F2 on the prompt and select the VER selection to change the status to verified.

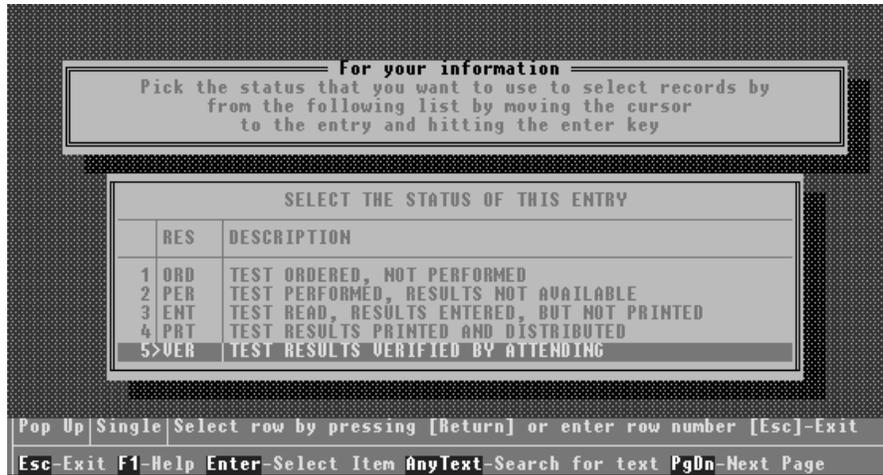
Use the `Report-Status` option from the main menu to change the status of one or many tests, or all test from one day in batch mode.

The batch mode status changes are primarily used when all the printed reports for a day are reviewed by the physician and corrected. The transcriptionist then uses the `Report-Status-Date` option to changes the status to VER for all studies performed on the test date of all the studies.

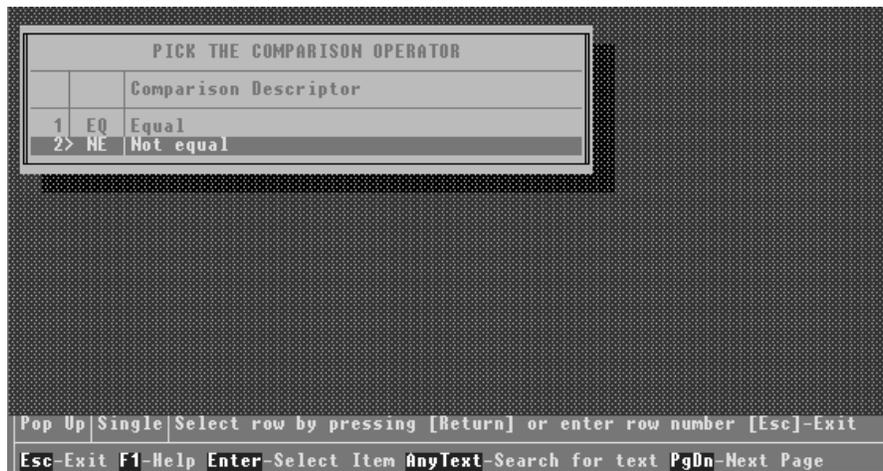
If the status of a report is not VER the report will be marked preliminary by HL7, and will not be available to review by the Health Care Worker main database window. Moreover, R/CARDIO is configured to not facsimile a report summary unless the status is changed to VER (that is a test with an ENT or PRT status can not be faxed or viewed by other unqualified nodes)



To identify which studies in the main database are not VER use the Report-Liststatus menu selection (shown above) to generate a list of all patient studies from the main database who do not have a status set to VER. In this next figure the user has selected the List-status function



and has selected to chose those test with a VER status. Then the user selects the qualifier



NE for not equal to search the database for all patients with a test status that is not equal to VER (that is all non-verified reports, including preliminary studies, ordered, and scheduled studies).

Sending your report to the mainframe

Select Report-HL7-Generate to download reports to your mainframe. You must be connected to a network to use this feature. You can either batch transmit all studies for a day, or select individual reports for transmission.

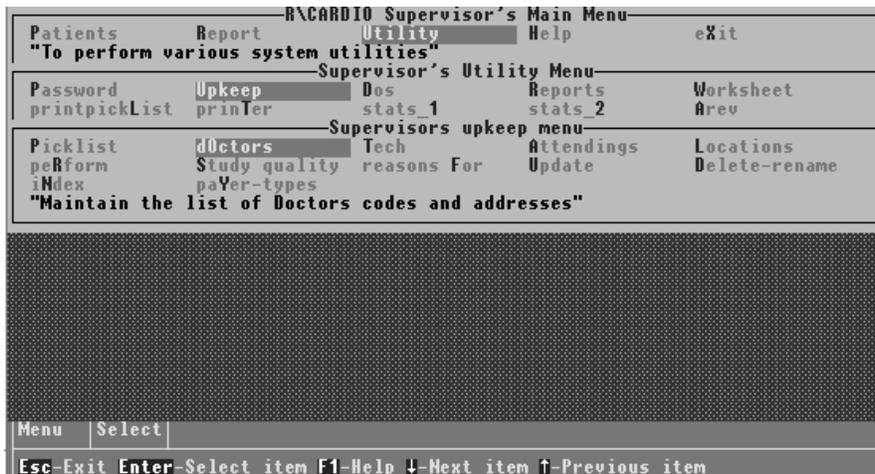
Sending your report by facsimile

Prior to using the R/CARDIO fax service you must correctly install a CAS compliant fax board, and obtain a license to use the FAX Pak utilities. See the document FPREAD.ME in the \runtime\faxpak directory

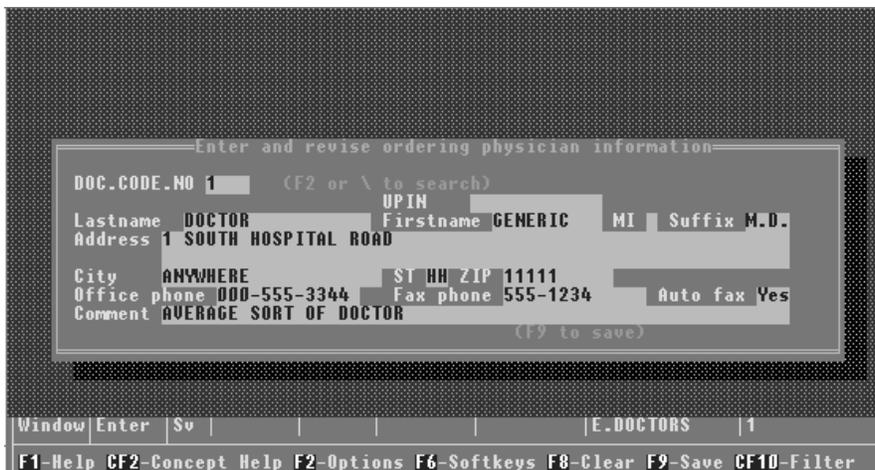
R/CARDIO will transmit the report by facsimile to any physician that has a fax number. To maintain patient confidentiality and to insure that the final report is not indiscriminately duplicated the transmitted fax report is not a copy of the actual final report. To transmit a document follow these steps.

Add fax numbers for physicians

The supervisor (SUPER) user adds or modifies facsimile numbers for each physician by selecting *Utility-Upkeep-Doctors* from the main menu.



Enter the doctor code number at the doctor prompt, in the following example the number one is entered. Move the cursor to the prompt *Fax phone* and enter the facsimile phone number for the physician's office.

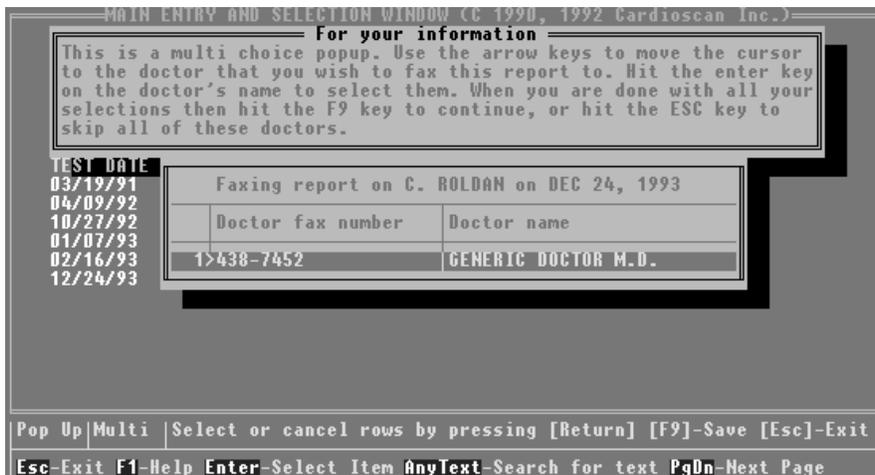


If you need to access an outside line then enter the access code followed by a comma if necessary (9,555-1212 would dial 9, wait 2 seconds for a dial tone, and then dial the number). Likewise if you need to dial a long distance number enter the entire number sequence that is necessary (like 9,1-212-555-1234).

If you wish to send every report to this physician automatically place a Yes response in the prompt marked *Auto fax*. If this box is marked then R/CARDIO will automatically send out a fax report to this doctor for every study that fax generation is requested for. If the box is not marked then each report that is sent to the physician will not be sent unless the typist indicates that the report is to be sent. If a physician does not have a fax number filled in at the *Fax phone* prompt then a facsimile copy will never be sent to them.

Fax individual reports

Individual reports are sent by opening the *Patient* menu selection, entering the unit number, placing the cursor over the test date and type of study that is to be sent and hitting shift F8.

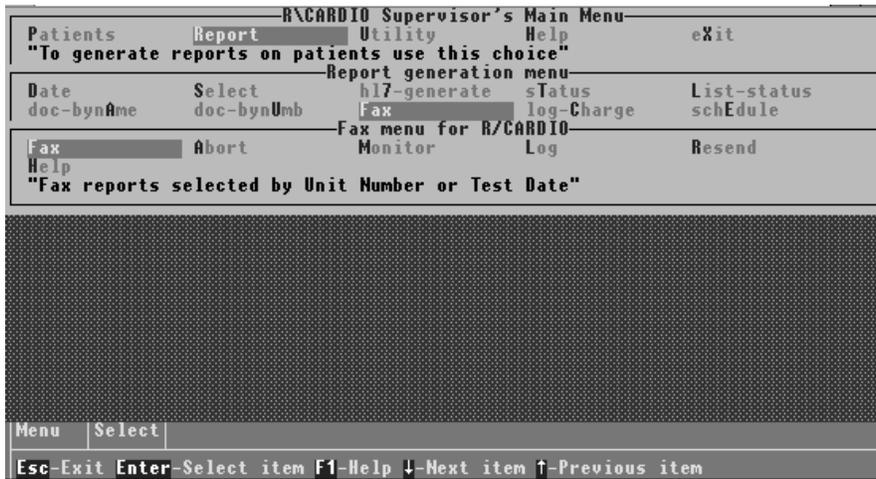


In this case the physician Generic Doctor has his facsimile number entered into the *Fax phone* prompt but *Auto Fax* was not selected. Accordingly when shift F8 was hit at the 12/24/93 test date R/CARDIO prompts you to indicate if you wish to send the fax to the doctor. If you select the doctor from this list (by hitting enter and then F9) the doctor will receive a copy, if you do not select the doctor (by hitting ESCape) you will abort the facsimile transmission. *Had the Auto Fax prompt been selected you would not be presented with this option, rather the report would have automatically been transmitted to the physician. Had no phone number been entered into the doctor's Fax phone prompt then hitting shift F8 on the test date would result in no action from R/CARDIO.*

Batch fax generation

R/CARDIO provides ready access to generation of facsimile reports using either a selection of studies by test date, or by an individual list of studies. To batch fax select

Report-Fax-Fax from the main menu.



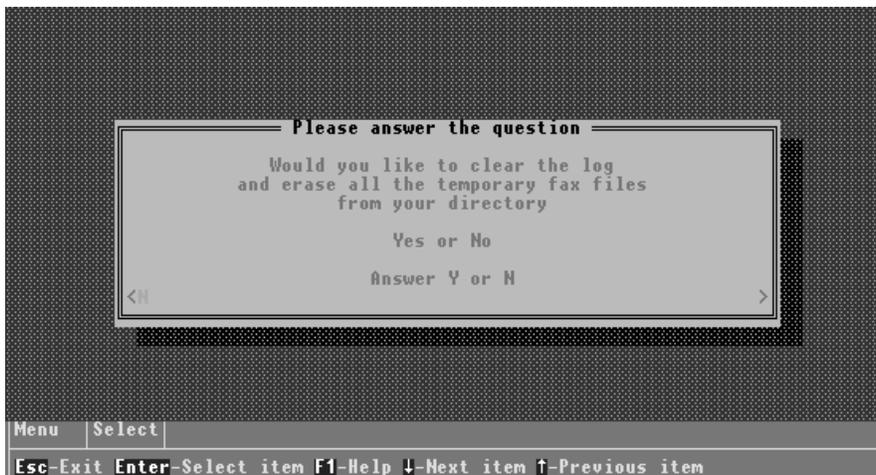
You can fax reports by selecting a date or by selecting individual studies in much the same fashion as HL7 out-loading is performed. When your selection is made R/CARDIO will print out a list of patient reports that have been queued.

Monitoring fax progress

Select Report-Fax-Monitor to monitor the status of your current fax board. This option will indicate the current connection of your your fax board, who the connection is with and the name of the fax file to be sent.

Generating a fax log

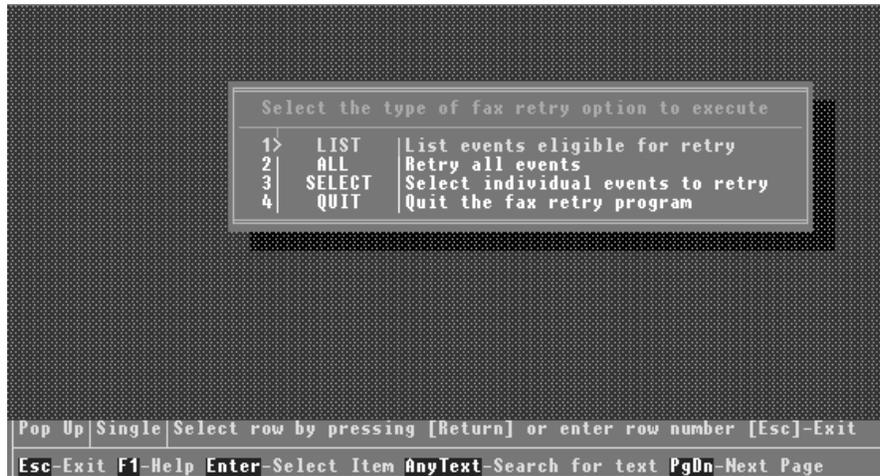
Select Report-Fax-Log to print out a log of all fax board activity including failed transmissions. Pending transmissions will not be listed in the log. Failed transmissions can be retried as described below.



After printing the log it can be cleared but doing so will prevent re-transmission of any failed faxes. It is a good idea to clear the log at the end of each day after all the retries have been made.

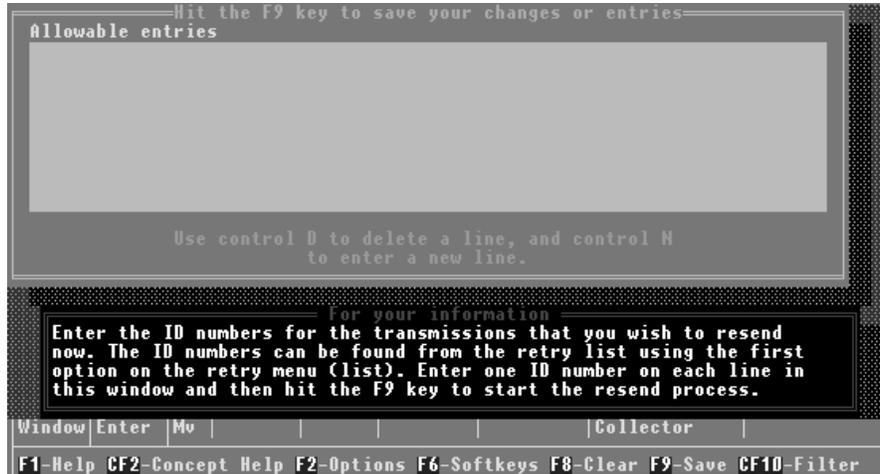
Re-transmission of failed faxes

Selecting Report-Fax-Resend opens the following window.



From this window you can List any fax events that are eligible for retry (those are events that have been marked failed in the fax log), Retry all eligible events, Select individual events to retry, and Quit the re-send program.

To select individual events for re-transmission first use the List function and note the ID number of the eligible event that you wish to retry. Then use the Select function



to enter the ID numbers to retry into the Allowable entries window depicted above. These items will be re-transmitted. All items can be continuously re-transmitted unless you clear the fax log.

A typical reason for failure and re-transmission is a busy line or a line out of service.

Aborting all activities

Select Report-Fax-Abort to terminate the current transmission and all pending transmissions. Aborted transmissions are *not* eligible for re-transmission.

Generating the charge slip

Many laboratories require submission of a charge slip for each test for the correct reimbursement for interpretation of the study. In addition many states require a signed attestation statement indicating that the studies were interpreted and performed by the charging physician. R/CARDIO can generate this form automatically for each test entered. These charge slips can be generated manually or in batch mode. In addition the batch mode format also prints out a ledger of all the studies performed on any one day for reconciliation with your laboratory.

To print out a single charge slip manually open the main database window (`Patients`), enter the unit number of the patient and move the cursor to the test date for the test that you wish to generate a charge slip. Hit Shift-F7 to print the charge slip.

To print in batch mode select `Report-ChargeSchedule`, enter the date of service and hit F9 to print a list of studies and all the charge slips for that day.

Generating a hardcopy report

R/CARDIO was designed to print final reports for distribution to physicians and hospital medical records. Frequently the results of an old study are needed for comparison. To maintain patient confidentiality and to insure that the final report is not indiscriminately duplicated the R/CARDIO has an alternate print format for generating an old report for comparison.

The TECH, SUPER and TYPIST user can print out a 'rough draft' summary of any report for this purpose. Generate this *hardcopy report* by opening the main database window (`Patients`), entering the unit number of the patient, moving the cursor to the test date of the report to be printed and hit the shift-F6 key combination.

Installation



You should have a member of your information management department assist you with the installation

Installation of R/CARDIO software

To install R/CARDIO you must be running DOS version 3.00 or better and have at least 20 MB of free disk space.

Cardioscan recommends that you operate your R/CARDIO system from DOS or from a DOS box in OS/2[™] or Windows[™]. You should not

- Use a menu or Dosshell to run R/CARDIO
- Run R/CARDIO from another command shell (such as NDOS, or Xtree)
- Use any TSR's (terminate and stay resident programs), including any emulation programs. The only TSR's that are compatible with R/CARDIO are those required to run a network interface board, specifically IPX and NETX and any Fax board software you need to use the fax option of R/CARDIO
- Load EMS memory incorrectly (see the separate QEMM recommendations)
- Run a concurrent 3270 emulator such as Attatchmate

Follow these installation instructions

Place your installation diskette labeled *R/CARDIO disk one* into drive A or B of your computer.

Change to that drive by entering its drive assignment letter at the DOS prompt followed by a colon. For example if you put the disk into drive B: then you would enter

B :

at the DOS prompt followed by the enter key.

At the DOS prompt enter the command `INSTALL`, followed by a space, the drive containing the installation disk, a space, and the drive you want to install the software on then hit return. For example if you put the R/CARDIO installation disk number one into drive A: and you want to install the software on Drive D: you would enter

`INSTALL A: D:`

and then hit the enter key. Follow the directions to switch installation disks when asked, make sure that you put the disks in correctly.

When you are done put the disks away as they are your only copy. Once you start to enter patient information into R/CARDIO you will want to back your system up on a daily basis (it is highly recommended that you purchase, install and use one of the commercially available tape backup systems). The distribution diskettes can always be used to restore the original program but they can not be used to restore any patient information that you enter.

Recommendations for tape backup

Each R/CARDIO system should be completely backed up every day that data is entered. Typically you should make sure that you perform

- a full backup of the \RUNTIME directory (or the directory that R/CARDIO is located in) and ALL it's subdirectories
- a backup of all files, not an incremental or date stamp backup
- a backup of all files, not a backup based upon the DOS archive bit
- a backup that first deletes the old volume on the tape prior to completing the backup

For R/CARDIO to run properly you should always start R/CARDIO in the directory that the AREV.EXE file resides in. This is usually the \RUNTIME or the \AREV directory.

To insure that users change to this directory properly you should create a batch file in your root directory that automatically changes to the directory. The batch file should be named *arev.bat* A typical batch file might contain the following commands

```
cd \runtime
arev %1
cd \
```



You must run R/CARDIO from the application directory that contains the program arev.exe

Installing the FAX board

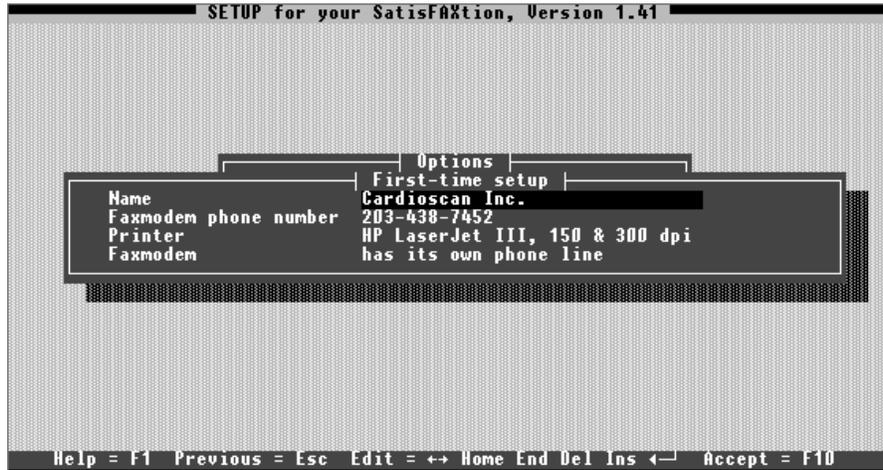
R/CARDIO fax requires the DCA/Intel Communicating Applications Specification (CAS) program to be installed into your computer prior to running the fax applications.

Recommended Intel products that support the CAS specification include the Intel SatisFAXtion modems models 200, 350 and 400. All of these models are internal and

contain a CO-processor board. The board should be installed, and the CAS terminate and stay resident (TSR) program loaded correctly prior to running R/CARDIO on your computer. Follow the directions in the *Intel SatisfAXtion Modem Installation guide* to correctly install and test your equipment.

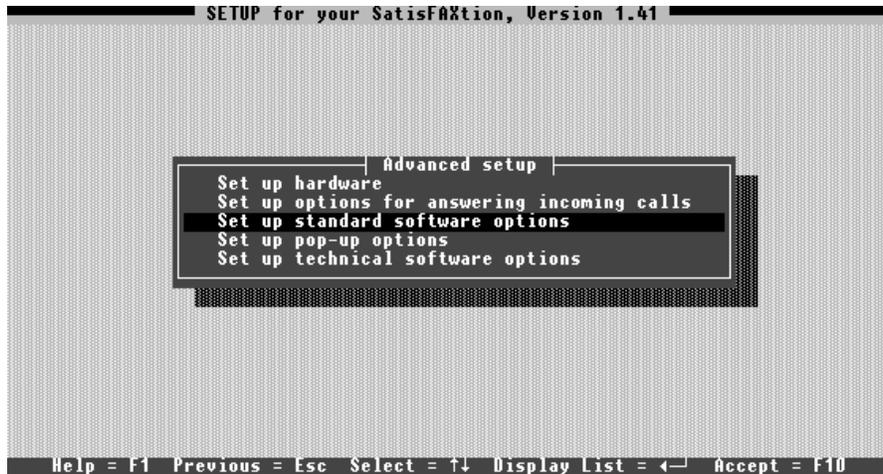
Use the following guidelines when setting up your fax modem

1. Run the setup utility and complete the first time setup options as shown below



Use the "has its own phone line" option, and fill in your company name at the name prompt along with your phone number.

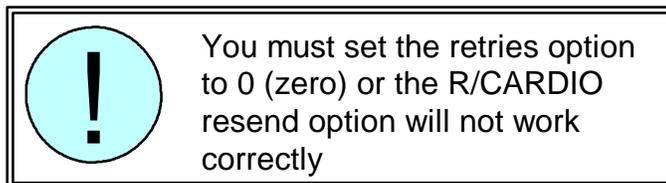
2. Select advanced options



and use the "options for answering incoming calls" prompt to set your board to answer calls if you want to receive faxes outside of R/CARDIO. Use the "Set up technical software options"



to set the "# of dialing retries prompt" to 0 (zero)



Installing the FAXPak software

R/CARDIO uses the FAX Pak software DOS interface to send and report on CAS specific application functions. In order to operate the FAXPak software within license agreements you must register your software with the FAXPak manufacturers. To register your product copy the file *order.frm* from the \faxpak directory off of the R/CARDIO main directory to your printer. Order the \$39.00 standard edition by sending in the completed copy of the order with your payment. When you receive the software disk do not install the software, it has been pre-installed for you.

Installing QEMM

Expanded Memory Support

R/CARDIO utilizes expanded memory conforming to the LIM EMS version 4.0 for the relocation of workspace and variables. To utilize Expanded Memory Support (or EMS) you need a memory support application. Cardioscan recommends the installation of QEMM from Quarterdeck Memory systems as the EMS driver, and not the DOS EMM386 driver. Both the 6.X and 7.X versions of QEMM have been tested with R/CARDIO and are compatible with the Advanced Revelation database engine.

R/CARDIO requires three blocks of memory to use EMS, **one 16K expanded memory window**, and **two 64K overflow buffers**. Performance will be greatly improved when

all of these blocks of memory are located into the upper memory area between 640K and 1MB of memory. *Locating these blocks below 640K will reduce the conventional memory available to Advanced Revelation by up to 128K potentially resulting in termination of your application.*

Installing QEMM

To install QEMM you must have a 386 based computer or better. Install QEMM into your config.sys file using the NS command *without* the RAM statement.

```
rem specify command processor and increase environment
SHELL=C:\DOS\COMMAND.COM C:\DOS /P/E:512
rem set QEMM up
DEVICE=C:\QEMM\QEMM386.SYS NS
rem set file control data
BUFFERS=40
FILES=99
rem set DOS into hma
DOS=HIGH
```

In this figure from a typical config.sys file the fourth line down is the line that installs QEMM. This configuration maximizes R/CARDIO's use of high memory, but does not provide for high memory areas to relocate any terminate and stay resident programs. An alternative to this is to include the area of RAM that you wish to map into upper memory, allowing relocation of device drivers, and yet still leaving sufficient mappable memory to relocate both the 16K window, and the two 64 K overflow buffers from Advanced Revelation. The following example indicates how to do this with QEMM.

```
DEVICE=D:\QEMM\QEMM386.SYS RAM=b000-b7ff RAM=C800-CBFF NS i=cc00-dfff
```

In this line, removed from a config.sys file, QEMM is instructed to map the upper memory region B000 through B7FF, and the region C800 through CBFF as upper memory (where drivers can be relocated using the LOADHI command), and configure the region CC00 through DFFF as a mappable region. Using this configuration the EMS page frame, and thus one of the 64K overflow buffers will be located in the region E000-EFFF, and the other in the region D000-DFFF, whereas the 16K window will be relocated in CC00-CFFF. This gives the highest amount of available memory. To verify that these windows and buffers are relocated into upper memory use the WHO command from the TCL window.

The following table gives the results of the AVAILABLE MEMORY field in the first page of the WHO command window. (login on as the supervisor, at the main menu press the F5 key, and at the TCL prompt enter WHO and hit enter.)

EMS SERVER	Device statement in Config sys	Available memory
EMM386	DEVICE=C:\DOS\HIMEM.SYS DEVICE=C:\DOS\EMM386.EXE FRAME=E000 I=CC00-DFFF DOS=HIGH	328,780
QEMM	DEVICE=C:\QEMM\QEMM.SYS NS	383,500
QEMM	DEVICE=C:\QEMM\QEMM.SYS NS RAM=B000-B7FF RAM=C800-CBFF I=CC00-DFFF	393,468

Included in this comparison is the DOS 6.0 EMS server EMM386.EXE. This server does not provide upper memory UMB's if it maps to the upper memory area (640k-1MB), thus it can not relocate drivers from conventional memory. Its performance is the worse, as indicated in the Available Memory column on the right. The second and third configuration are for QEMM which is more robust, especially when 64 K is reserved for the page frame and 80K is reserved for the AREV window and 64K buffer (the last configuration)

Advanced Features

The key strokes of R/CARDIO

The two most important keys to know about in R/CARDIO are the escape key and the F9 key.

ESCAPE	Exit and aborts the window
F9	Save the current window or selects the current choice that the cursor is presently on. Additionally in a popup use F9 to accept the selected entries.
F1	Help for the window that you are currently viewing.
F2	The OPTION key. Will perform a function that is dependent on the prompt that the cursor is on.
Ctrl-F1	Displays an Advanced Revelation help window containing general information about the object that you are viewing.
Ctrl-F2	Displays an Advanced Revelation help file that will give specific help about the Advanced Revelation function that is being used. For instance if you are generating a report using EasyWriter the help will be related to the concept of generating a report, if you are making new users the help will be related to that concept, if you are in a window the help will be related to what you can do in a Window.
F6	List Soft keys. Each window has up to 20 key combinations that may be available for specific functions. These key strokes are termed softkeys and are the shifted and alt'd function keys (SF1-SF10 and AF1-AF10). F6 lists the softkeys that are available for the current window.
F10	Display menu. The R/CARDIO main menu can be displayed anywhere you are working and you can select another function and thus another level of work. The previous level remains undisturbed until you return to it by using the ESCape key.
F3	Zoom window. Some prompts are too small to see the whole entry. Hitting the F3 key will open the prompt into an expanded or

zoomed window. Hit F9 to close the zoomed window and return to the prompt.

F4 Toggles in or out of Edit mode. In Edit mode typing an entry will not erase the information in the current line. If Edit mode is off then typing an entry in a line which contains information will erase all the information in the line. The cursor looks like a [] when you are NOT in the edit mode and like a _ when you are in the edit mode.

F8 Refresh/clear the window.

Ctrl-F7 Re-size window toggle on/off. Allows you to change the size of the window.

Ctrl-F8 Move window toggle on/off. Allows you to move a window.

KEYS THAT HELP YOU MOVE THE CURSOR AROUND

Up-arrow	Move cursor up one prompt or line
Down-arrow	Move cursor down one prompt or line
Left-arrow	Move cursor left one character
Right-arrow	Move cursor right one character
PgDn	Move to next page down if multi-page window
PgUp	Move to next page up if multi-page window
Ctrl-PgDn	Move cursor forward one prompt
Ctrl-PgUp	Move cursor backward one prompt

KEYS THAT DELETE OR INSERT LINES

Ctrl-N	Insert new line within a prompt
Ctrl-D	Delete line at within a prompt
Ctrl-C	Cut line into two lines at current cursor position
Ctrl-J	Join two lines
Ctrl-F3	Cut text into buffer
Ctrl-F4	Paste text from buffer

Effective data entry

There are several fundamental principles for effective data entry using the R/CARDIO worksheets and picklists. These are:

1. Each time you change the picklist (by adding, removing, or modifying phrases) you should reprint a new worksheet (see *Customization, utility menu*).

2. Send the printed worksheet to your copy center for duplication on both sides of the paper.
3. Each worksheet is divided into sections delimited by a dark black bar. Each section corresponds to an entry prompt in the test type database window. If a given section is left blank by the interpreter then the typist should skip that section in the entry window. Sections without entries will not appear on the final report. This feature keeps the final report uncluttered.
4. The interpreting physician should circle the picklist number corresponding to the entry for the final report. For some picklist entries an abbreviated key word is present on the worksheet, but a full sentence is printed out in the final report. In other cases the entire sentence is present on the worksheet. For example if the interpreter circles number 0017 on the worksheet where it says TRACE under the entry Color Flow Regurgitation the phrase *There is trace regurgitation present by color flow Doppler.* will appear in the final report. elect Utility-Worksheet to print out a list of the phrase that each picklist code stands for (see *Customizing R/CARDIO, the utility menu*).
5. For some picklist selections more than just a code number selection is required. For example selecting code number 6250 in the left atrial section of the echo test type database requires an entry for left atrial dimension. The interpreter circles the number 6250 and then writes the dimension of the left atrium in the space provided. When the picklist number 6250 is entered in the echo test type window the transcriptionist will be prompted for the size of the left atrium. In some cases words are used instead of dimensions as a modifier for the picklist entry.
6. The R/CARDIO picklist worksheets are designed to accommodate the usual interpreter reading the usual study. Admittedly in many cases the canned words and phrases will not suffice to describe the observed finding. In this case the interpreter should make use of a 9000 code. A 9000 code allows the user to enter free text anywhere in any section to describe those observation that defy normality of our canned phrases. You should write the number 9000 down on the worksheet in the place where you want the text to appear in the final report. Next to the number hand write out the words that you wish to place in the report, or dictate the text prior to dictating the final report. As many 9000 codes can be used as necessary

Test status

There are many types of test status for R/CARDIO. These include

status	definition	purpose
ORD	The test has been ordered	Used by scheduling office after the main database page has been completed at the time the test is scheduled ¹

PER	Test performed but results have not been entered into the test type database	Used to indicate that the test has been performed by the laboratory. Results are pending interpretation and entry.
ENT	Test interpreted, results have been entered into R/CARDIO.	Status is automatically changed to ENT when the test type database window is opened and closed.
PRT	Test results have been printed	Status is automatically changed to PRT when the final report is generated
VER	Test has been reviewed, corrections have been made, and the final report has been signed by the interpreting attending.	Used to indicate that the report is ready for dissemination in final form. (see below)

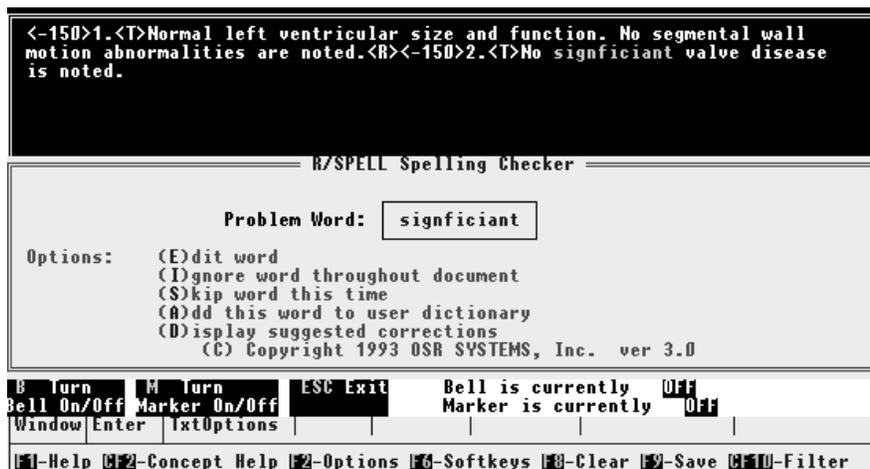
1 Optional - Network system

The status can be changed individually from the main database menu, or in batch form using the Report-Status option from the main menu.

Spell checking

To use the spell checker, called R/SPELL you must purchased a separate license agreement keyed to your R/CARDIO serial number. You can contact Cardioscan technical support to complete this purchase.

Spell check any field within a window by hitting Shift F1 on the field.



In this figure the spell checker has been invoked on the summary prompt of the test type database. Each word that is misspelled will be displayed in the center of the window. You then have the following options.

E Edit and correct the word. When the word has been corrected press the Enter key. The misspelled word will be replaced with the corrected one in the text.

I Ignore the word throughout the record or field. The spelling check will proceed and if this word is found again it will be ignored, even though it may be spelled incorrectly.

S Skip the word for just this one time. If the incorrectly spelled word is found again you will be alerted.

A Add the word to the user dictionary. This should be done if the word is correct but is not in the normal dictionary. The next time the word is found it will be skipped and you will not be alerted.

D Display possible selected alternative words. Use the Up and Down arrow keys to move the selection bar over the desired choice and then hit Enter to replace the word. Hit the Esc key if you wish to abort and not make a selection from this list.

The user dictionaries are found in the file RSPELL.DICTIONARY. There are 26 user dictionaries, one for each letter of the alphabet, A to Z. Added words are placed in the dictionary records based on the first letter of the word. Thus the word Eggplant would be put in the USER.DICT*E record in the file RSPELL.DICTIONARY, whereas the word Washboard would be placed in the USER.DICT*W record. You can remove words from these dictionaries if you wish by editing the record and deleting the word (by placing the cursor on the word and hitting ^D). To edit the record for the 'W' words open the TCL window and type

```
EDIT RSPELL.DICTIONARY USER.DICT*W
```

The TCL window

Only the supervisor may access this window. TCL stands for The Command Language and is one of the native Advanced Revelation command languages available. To access this window hit the F5 key anywhere in the R/CARDIO program at any time. To see a list of Advanced Revelation TCL commands hit F6 or Shift F2 at the TCL window. For a complete list of TCL commands see the separate TCL documentation. Use TCL to access the Advanced Revelation QBE (query by example - enter QBE at the prompt), Advanced Revelation R/LIST features, and the ANSI standard Structured Query Language. In addition the TCL window allows access to copy and delete records from R/CARDIO files.

R/CARDIO file structure

R/CARDIO utility files, test type database files, and the main database file are stored in files that can be accessed by you from TCL. Most files all have the format E.* where * is the name of the test type database, the word *main*, or the name of the R/CARDIO utility, such as *study.quality* or *doctors*. In addition to R/CARDIO files Advanced Revelation has files necessary for the operation of the system. Files are stored in volumes.

Advanced Revelation files are stored in the volume *revboot*, R/CARDIO utility and main database files are stored in the volume *cs_main*, and test type database files are stored in the volume *cs_data*. Volumes are name of specific DOS directories, so that *revboot* usually refers to the DOS directory `\runtime`, and *cs_data* refers to the directory `\runtime\cs_data`.

Each test type database record is uniquely identified by the patient identifier, the type of test that was performed and the test date. A patient may not have two reports for one day for the same test.

R/CARDIO is a *synchronized* database and builds indexes within a parent-child table system. Thus the data in the test type databases is *dependent* on the data in the main database. For example, when an entry is made in the echocardiography test type database R/CARDIO automatically places a corresponding entry in the main database. Accordingly never edit or remove a database entry manually unless you appropriately edit or remove the related entry in the associated database file to

Each database in R/CARDIO is made up of two separate special DOS files which can not be edited or copied using conventional DOS tools (such as a word processor). These files can be manually altered only using the R/CARDIO Arev editor, and require an in-depth understanding of the database structure.

Most files have an associated dictionary file that indicates the location of a specific field (or column) within each record stored in each file. Dictionary files always begin with the prefix DICT. For the main database E.MAIN the dictionary file is DICT.E.MAIN. The dictionary defines each field name or column in the E.MAIN record. For example the dictionary item `lastname` indicates that the first field of each E.MAIN record will be reserved for the lastname prompt. To see a list of field names or prompt for each database type

```
listdict e.*
```

at the TCL window (substitute for the * the name of the database, like e.main). To see a list of file names type

```
listfiles
```

Many files have indexes located on certain fields within the files. Indexing dramatically improves the time required to search a database for a certain field value. To see a list of files and fields that are indexed type

```
listindex
```

at the TCL prompt. Use the main menu selection `Utilities-Update-Index` to create or delete new indexes on files.

Searching the database

The R/CARDIO databases are searched using one of four possible utilities. All require a knowledge of the database file name (referred to as the table name) and the field names (referred to as the column names). The table names can be printed by entering

```
LISTFILES (P)
```

at the TCL prompt. The column names can be listed by entering

```
LIST DICT.table_name DESC JUSTLEN 'T60' WITH @ID NOT CONTAINING  
'%' BY @ID (P)
```

at the TCL prompt.

Use the column names and table names to complete the searching and listing of the database with the following tools.

Searching the database with R/LIST

To search using R/LIST open the TCL window with the F5 key. Enter the R/LIST commands directly into the prompt. Refer to the separate R/LIST guide for the proper search syntax or use EasyWriter to construct the R/LIST query automatically for you.

Searching the database with EasyWriter

Select *Utility-Reports* from the supervisor's main menu. Select choice 3, a Quick Overview of EasyWriter to learn how to use this powerful tool.

Searching the database with QBE

Enter *QBE* at the TCL prompt. Hit Control-F2 to get an overview of QBE, and F1 on any prompt for specific help on using QBE. This search facility allows for easy searching of the database by displaying each table, each column, and the search results that depend on the criteria specified in each columns.

Searching the database with SQL

To search using SQL open the TCL window with the F5 key. Enter the SQL commands directly into the prompt. Refer to the separate SQL guide for the proper search syntax.

Searching the database using R/CARDIO menus

There are two menu selections from the supervisor's utility menu that you can use to search the picklist codes of the database.

Utility-Stats_1 This selection will count the number of times a value appears in any field in any R/CARDIO database. The database can first be filtered using standard selection criteria.

For example you can select to list the number of times each attending read echocardiographic studies from 01/01/91 until 06/30/91 using the *STATS_1* function. To do this

1. Select STATS_1
2. Move the cursor to the E.ECHO file (table) and select it
3. Move the cursor to the ATTENDING field (column name) and select it
4. Answer Yes to the questions about comparisons
5. Select the field (column name) TEST_DATE
6. Select the comparison GE
7. Enter the phrase 01/01/91
8. Enter Yes, the date 06/30/91, and then No to complete the search

R/CARDIO will print out a list of attendings that interpreted studies from January to June of 1991, and how many studies each attending interpreted.

Utility-Stats_2 This option is used to search the number of times a picklist code and associated value were entered into the database, or alternatively list any other value with the associated value. The use of STATS_2 is best clarified by example.

Suppose that you were interested in seeing how many echocardiographic studies had a left atrial size between 3 and 4 cm since January 1, 1991, and you wanted to get a list of the patients by atrial size. To do this you would.....

1. Select Stats_2
2. Select the E.ECHO database (table name)
3. Select the field (column name) LACODE from the popup (this field contains the picklist code number for the left atrial section - see the dictionary listing for a listing of each field in each database file)
4. Select the LA_MEASURE1 column as the multi-valued field to list (this field is the first additional value field for picklist codes that request additional input)
5. Select 6250 as the picklist value of LACODE to search on
6. Enter Yes to limit the selection
7. Select TEST_DATE as the field (column name) to limit on
8. Select GE as the field comparison operator
9. Enter 01/01/90 as the comparison value
10. Enter no to proceed with the search.

The routine then finds and sort the data and then ask if you want to list each left atrial size with an associated field (such as lastname or unit number), or count the number of times each left atrial size was used in this search, and prints either results to the printer.

The utility menu selection

The utility menu is used primarily to maintain the R/CARDIO program. The utility menu executed by the typist logon only has the first three options, the menu run from the supervisor logon has all of the following options.

PASSWORD	Selected this choice for changing your password.
DOS	Select this choice to temporary suspend the R/CARDIO program and exit back to DOS. To return to R/CARDIO enter EXIT at the DOS prompt.
PRINTER	Select this choice to control your printer. Selecting this choice opens a new menu which is displayed below.

```
R/CARDIO Main Menu - COPYRIGHT Cardioscan Inc. 1989, 1992
Patients Report Utility Help exit
  "To perform various system utilities"
          UTILITY MENU
Password Dos printer
  "Printer control menu"
          CONTROLS FOR YOUR PRINTER
formfeed Send Load Test New
formWidth formHeight Query
  "Transmit a formfeed to your printer"

Menu Select
Esc-Exit Enter-Select item F1-Help F2-Next item F3-Previous item er
```

The choices in the printer menu include

- FORMFEED - to send a form feed and eject paper from your printer
- NEW - to configure a new printer type for your current R/CARDIO session
- LOAD - Selects the initialization or other font selection codes for your printer. Once you LOAD you must always SEND
- SEND - send the loaded configuration to the printer
- TEST - to test the printer as you just configured it
- FORMWIDTH and FORMHEIGHT to adjust the way R/CARDIO prints out lists. These choices indicate the number of characters on a line (formwidth) and number of lines on the page (formheight).
- QUERY - indicates the type of printer that you have loaded into the system (with the NEW command).

UPKEEP	For customizing your version of R/CARDIO. See <i>Customizing R/CARDIO</i> .
--------	---

REPORTS	Choosing this selection starts the Arev EasyWriter window. EasyWriter allows you to generate queries and lists for each of your databases. When you select EasyWriter for the first time chose the selection marked Quick overview of EasyWriter for a detailed explanation of how to use the report system.
WORKSHEET	Prints the worksheet for each test type database. You can print either a long or short form. The worksheet can be configured to your laboratory, see <i>Customizing R/CARDIO</i> .
PRINTPICKLIST	This selection prints out a list of the picklist codes and their associated literal strings
AREV	This selection access the Advanced Revelation main menu included with your version of R/CARDIO. Use this selection to import and export files and data to DBase, ASCII, and Lotus 123 files for direct analysis by your other programs. Other AREV tools are available from this menu for copying and deleting records, updating indices, and updating mouse and video environment settings.
STATS_1	Run statistical analysis on a single valued field in a database. (see <i>Advanced Features, searching the database</i>)
STATS_2	Run statistical analysis on a multivalued field in a database. (see <i>Advanced Features, searching the database</i>)
UPKEEP	Runs the upkeep menu. The advanced features of the upkeep menu are described below, the commonly used features are described in the section called <i>customizing R/CARDIO</i> .

Advanced Features in the Upkeep menu

DELETE-RENAME	Chose this selection to change test dates for studies, copy studies from patient files if the unit number was incorrectly entered, and delete a patient's main file and associated records (individual test records can be deleted within the main window.
UPDATE	Select this option when you receive updates for the R/CARDIO system or when you receive your yearly license update.
INDEX	Select this option to add or remove indices to R/CARDIO database files.

- ◆ Two types of indexing can be generated BTREE and CROSS-REFERENCED
- ◆ BTREE - this index works on a single field value. To turn on or off BTREE indexing select Utilities-Upkeep-Index from the supervisor's menu. Read the message, hit the enter key, answer yes to list the indexed fields if you want to see which fields in which files are currently indexed in your system. Then select B to make a BTREE index, and either M or D to (M)ake or (D)elete the index. Select the R/CARDIO file to put the index on and then select the field to index

- ◆ **CROSS-REFERENCING** - will construct an index on words within a field. This form of index should be applied on fields with text fields where the index is constructed for each word in the field. To turn cross reference indexing on for a field in a datafile select Utilities-Upkeep-Index from the supervisor's menu then select C to make a Cross Reference index, and M to (M)ake or D to (D)elele the index. Select the file that you want to index (NEVER SELECT A FIELD THAT ENDS IN .XREF). Answer yes to the prompt to make the index. Enter the hexadecimal code for the delimiter. The default delimiter is the space (Hex code 20), but other delimiters can be added. Multiple delimiters can be added by putting the codes together (2A242F would make a cross reference using a *, a \$, and a / as delimiters in the field to be cross referenced). In all cases hex codes must be entered in upper case, and must conform to the ASCII Hexadecimal Standard. To use the index specify that your listing process use the field name that ends in .XREF.

INDEXING CAN DRASTICALLY ALTER AND MARKEDLY ENHANCE THE PERFORMANCE OF R/CARDIO. IN ADDITION INDEXING MAY MAKE IRREVERSIBLE CHANGES TO YOUR DATA. ACCORDINGLY IT IS RECOMMENDED THAT YOU ALWAYS MAKE A FULL BACKUP (IN ADDITION TO YOUR DAILY BACKUP) PRIOR TO CHANGING ANY INDEXING IN THE EVENT YOU MAKE A MISTAKE IN YOUR COMMANDS.

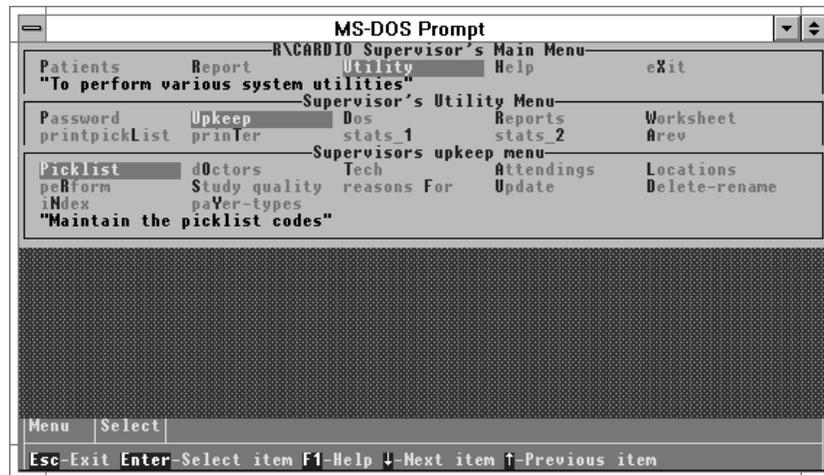
Customizing R/CARDIO



For customization you must complete the following as a minimum.

The minimum customization steps required

Customization of R/CARDIO is performed primarily from the Upkeep menu (Select Utility-Upkeep)



The selections under the Upkeep menu include:

PICKLIST

Chose this selection to modify the literal script associated with each picklist code for each test type database. If you change a value then use the Utility-Worksheet selection from the main menu to print out a new list of literal strings.

Each test type database has a series of literal strings associated with each picklist codes. The resultant strings displayed in the test type database window **can not be edited or altered**, rather the meaning of the codes are defined at the time of customization. R/CARDIO only stores the picklist code or free text with each test type database record to conserve space. The values of the picklist codes are looked up whenever the report is viewed, printed, or downloaded to the mainframe. Thus it is important not to arbitrarily change the value of the associated literal strings once customization is complete since this could change the meaning of the code. For example if the picklist code was initially defined as mild regurgitation, and then PICKLIST was used to change the value to severe regurgitation each test using that code would have the meaning changed when it was printed. For this reason never delete a printcode associated literal string, and do not change the essential meaning of the sentence.

The format of each picklist code number determines which section it is used in the test type database. Each printcode is four numbers long. The first number is the process control byte and determines if any associated strings are present and the number of strings that are required. The second number is the string group identifier and determines the section.

The values of the process control byte can be:

- ◆ 0 = Single descriptor, is returned, no associated strings are requested
- ◆ 1 = Three associated strings are requested. The format is STRING1 MEASURE1
STRING2 MEASURE2 STRING3 MEASURE3 STRING4
- ◆ 2 = Two associated strings are requested. The format is STRING1 MEASURE1
STRING2 MEASURE2 STRING3
- ◆ 3 = One associated strings is requested, the format is STRING1 MEASURE1
STRING2
- ◆ 4 = Used for wall motion icons
- ◆ 5 = Single descriptor, is returned, no associated strings are requested
- ◆ 6 = One associated strings is requested, the format is STRING1 MEASURE1
STRING2
- ◆ 7 = Two associated strings are requested. The format is STRING1 MEASURE1
STRING2 MEASURE2 STRING3
- ◆ 8 = Three associated strings are requested. The format is STRING1 MEASURE1
STRING2 MEASURE2 STRING3 MEASURE3 STRING4

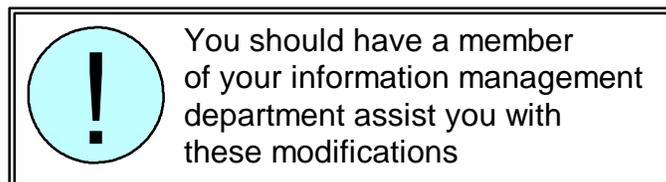
DOCTORS

Chose this selection to enter in or modify the database of referring physicians. Enter a unique identifying number for each physician, and the last and first name of the physician, the suffix (M.D. or D.O.), the mailing address, the city, state, zip code, and telephone and Facsimile number, and any comment. Use the main menu selections `Reports-Doc_byname`, or `Reports-Doc_bynumb` to list the physicians in the database sorted by name, or by the

	unique identifying number respectively. (See <i>sending your report by facsimile</i> to understand how to add phone numbers for fax machines) If you want to print physician UPIN's on the charge slip enter the physician UPIN in the UPIN prompt.
TECH	Chose this to add or remove the list of technicians performing studies at your institutions. A separate list of technicians is stored for each test type database.
ATTENDINGS	Chose this to add or remove a list of interpreting physicians from the database. There is only one list of physicians for all databases.
LOCATIONS	Chose this selection to modify the list of possible locations to perform each test type database.
PERFORM	Chose this selection to modify the list of studies that can be performed for each test type database. Each study must be accompanied by a CPT code. Your list of codes should conform to HCFA-CPT codes.
STUDY QUALITY	Chose this selection to modify the possible study qualities for each test type database.
REASONS FOR	Chose this selection to modify the list of indications for each test type database. This list should conform to ICD-9 codes for diagnosis and symptoms.

You must go through each of these selections to customize your version of R/CARDIO before entering patient data. When you are done with customizing select LASERFORM from the Utility menu to print out a worksheet for each test type database.

Optional customization using The R/CARDIO license file



The license file contains most of the configuration settings for R/CARDIO. Each record can be edited by entering

```
EDIT LICENSE recordname
```

at the TCL prompt. The records that are in the license file and their functions are listed below. Use care when editing these records, it is reasonable to make a backup copy of the record using the following command

```
RECORDCOPY LICENSE recordname TO: recordname_BAK
```

from which you can restore the original record.

RECORD NAME	DESCRIPTION
AREV.SERIAL.NU	The serial number of the Advanced Revelation engine that your version of R/CARDIO is licensed to. Do not change or delete this record.
CHAR.CTL	The character tokens that are present when F2 is used from a text prompt in the test type databases.
CONFIRM	Do not change or alter this record. Your version of R/CARDIO will not run if you change this record.
CHG_OUT	Indicate the printer port to use to print charge slips. Valid entries include NUL, PRN, LPT1, LPT2, LPT3, COM 1-4, and a file name.
DOBU.CONFIG	The test type database configuration files. Currently determines if the reason_for_study prompt on the first page of each test type database verifies that the entry is in the reason.for.study file for that test type database. In addition, this record determines what fields will be displayed when the view record selection is made.
ECHO.CONFIG	see above
EXEC.CONFIG	see above
STRE.CONFIG	see above
TEEX.CONFIG	see above
DOBU.WALL.MOTION.CODE	The record number in the rescode file that contains the names of the individual sections and segments of the wall motion icon when printed.
ECHO.WALL.MOTION.CODE	see above
EXEC.WALL.MOTION.CODE	see above
E.DOBU.SCORES	The record which has the numeric equivalent of each wall motion descriptor. Used to calculate the wall motion score.
E.EXEC.SCORES	see above
E.DOBU.WALL.MOTIONS	The record which contains the wall motion descriptors for each icon.
E.ECHO.WALL.MOTIONS	see above
E.EXEC.WALL.MOTIONS	see above
FAX.GENERAL	Configuration for the fax output, the name of your sending institution, the location of the FAXPak files, the output device for sending the fax log, the disclaimer and warning message located on the top of each fax, and the status that the fax can be sent for (the default is VER only)
FAX.ECHO	The names of the fields for the ECHO test type database sent during a fax transmission
FAX.DOBU	see above
FAX.EXEC	see above
FAX.STRE	see above
FAX.TEEX	see above

HL7.DOBU	The configuration for each test type database determining what fields are sent to the mainframe
HL7.ECHO	see above
HL7.EXEC	see above
HL7.STRE	see above
HL7.TEEX	see above
HL7.GENERAL	Configuration file for HL7 outload system
HL7_RS	List of characters, or character tokens to strip from the HL7 outload (this way they will not appear in the outloaded report)
INSTALL_PROG	Do not modify
LICENSED.TO	Your institution name as it appears on the top of the reports.
LOGMSG	Do not modify
LS.MERGE.DOBU	The name of the script used to merge the final report for each test type database
LS.MERGE.ECHO	see above
LS.MERGE.EXEC	see above
LS.MERGE.NAME	see above
LS.MERGE.STRE	see above
LS.MERGE.TEEX	see above
LS_OUT	The name of the printer device that the final report should be sent to. See CHG_OUT for a valid list of devices
PASSWORD.HCW	a list of names and passwords for the health care worker login window.
ORDERS	If this record exists (and it should be blank to begin with) then order entries will be automatically placed in this record. When the technician logs in (as the TECH user) this will trigger this record to print all orders to the printer attached to the TECH node. If this record does not exist then this print order function will not occur
PAYER_TYPE	list of payer types
PRINT.INITIALIZATION	The name of your printer
PRODUCTS_SUPPORTED	The name and description of all test type databases in your system
THOUGHTS	Include comments that you would like to replace the screen blanker used for the HCW users.
UNIT.NO.MASK	The number of characters and the mask (format) of the unit number that you use
VALID.UNTIL	Your R/CARDIO product expires on this date. Do not change this value, your program will not run
VERSION	The current version of your R/CARDIO file

Optional customization using other R/CARDIO configuration files

Other files and file records are used to configure the final report. Each test type database has a set of these files. For each file name below substitute the name of the test type database for the *.

FILE	RECORDS	PURPOSE
E.rescodes.pictures.*	5/10/20/30 BRUCE	The names of the stages of exercise, doses of Dobutamine, etc., separated by sub value marks (^E to edit)
E.rescodes.pictures.*	*.dat	Records substituted into the worksheet. Use these records to put key words next to printcodes to customize your worksheet
E.rescodes.pictures.*	Codes.to.print Short.form.codes .to.print	List of *.dat records to print in the long or short form version of the worksheet. The number you enter in these records must correspond to a *.dat record.
E.rescodes.pictures.*	Codes.not.to.print Short.form.codes .not.to.print	List of records in the file E.RESCODES.* not to print (to suppress) when the worksheet is printed with WORKSHEET. This file contains the relation between the picklist code and the associated literal string for each test type database. Never delete these records, instead suppress their presence on the worksheet using this record.
E.rescodes.pictures.*	Demographics_*	The entries for the first page of the worksheet

The Sysprog Account

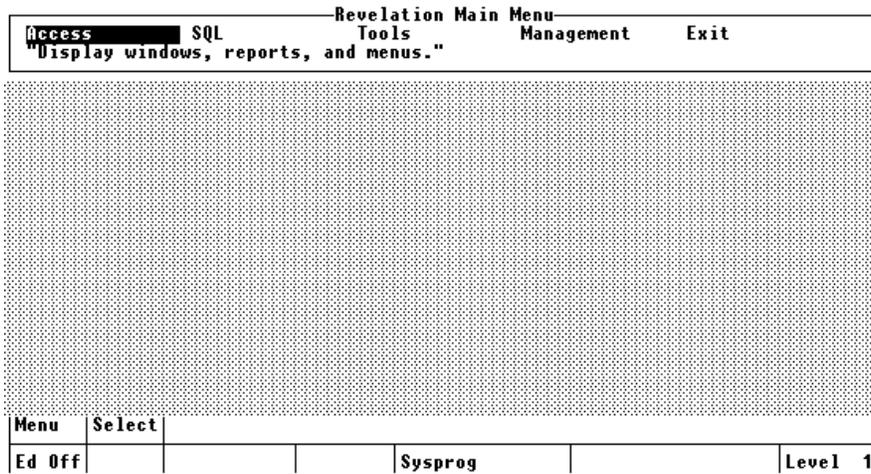
Use the Sysprog account to add new users, assign their security level, and change the appearance and color of the screen.

To access the Sysprog account start R/CARDIO as the Sysprog user. At the DOS prompt enter

```
AREV SYSPROG, CARDIOSCAN
```

The password for the user is *CARDIOSCAN* and should not be changed.

Logging into this account bypasses the license check screen and the R/CARDIO disclaimer. The program starts from the Advanced Revelation main menu.

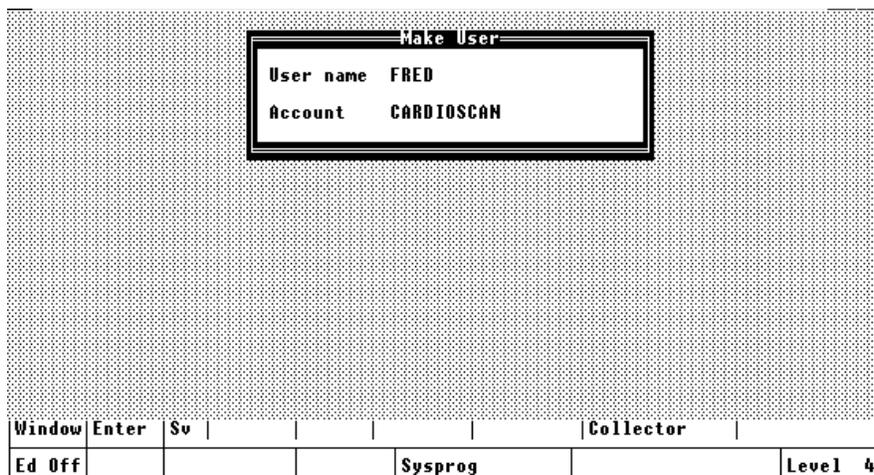


From this menu select Management-Users to add, delete, or modify a user.

How to make a new R/CARDIO user

Select Make user from the *user management menu* to create a new user. Fill in the new user name, and enter CARDIOSCAN as the account.

This figure



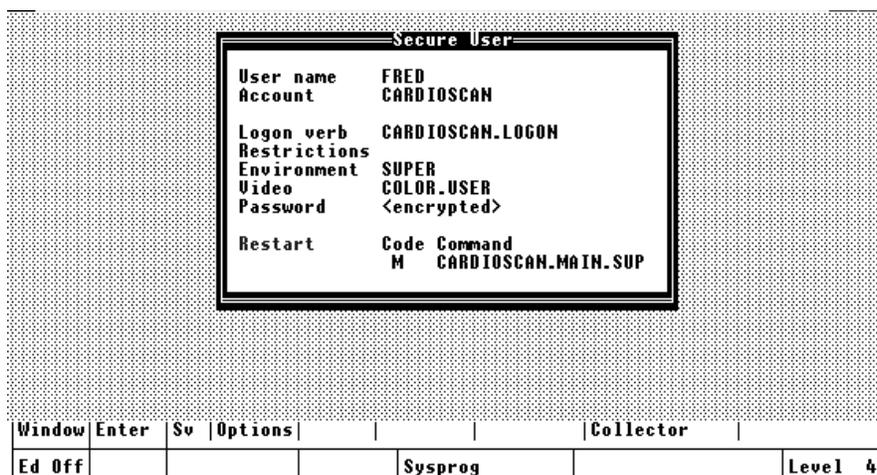
demonstrates that the new user *Fred* is to be added to the CARDIOSCAN account. After you enter the information hit F9 to save the entry and make the user.

Next from the *user management menu* select `Secure` user to correctly configure the new user that was just added.



As shown in the figure above the user name `FRED` was entered into the prompt. Advance Revelation fills in the account `CARDIOSCAN` for this user. To add this users to the Typist level of security enter `CARDIOSCAN.LOGON` for the Logon Verb, leave Restrictions blank, chose either `COLOR.TYPIST` or `TYPIST` for the environment, depending on whether the user will use a VGA color system or not respectively, enter a password (which becomes invisible after you enter it) enter a `M` at the restart code prompt and at the restart command enter `CARDIOSCAN.MAIN`. Hit `F9` to save the changes.

To add the users with supervisory rights (the `SUPER` user) fill in the Secure User window field like this



Enter `SUPER` for the environment prompt, and `CARDIOSCAN.MAIN.SUPER` for the restart command.

To add users with TECH rights fill in the secure user window like this.



The restart code is S;M and the command is KEY.DISABLE;CARDIOSCAN.TECH. The logon verb is KEYDISABLE.LOGON, the restrictions prompt must be left blank, the password prompt can be filled in with the users password.

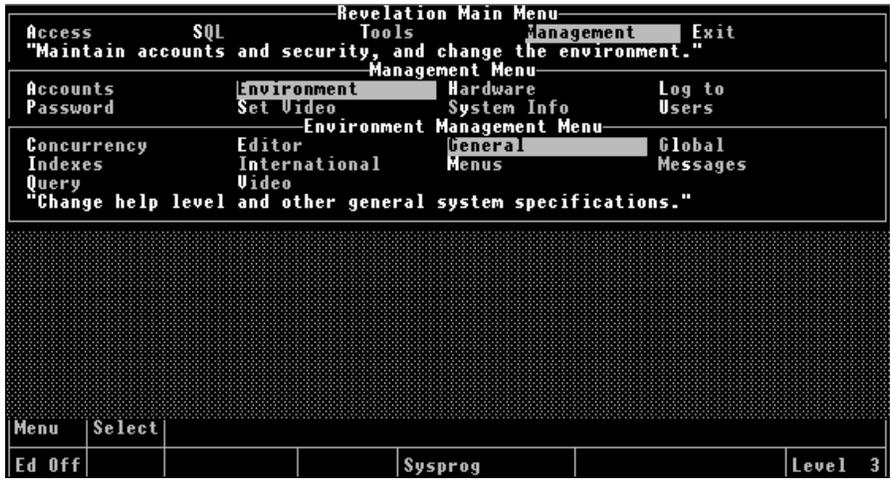
To add a user with the ORDER rights secure the user window like this.



The restart code is S;M and the command is KEY.DISABLE;CARDIOSCAN.ORDER. The logon verb is KEYDISABLE.LOGON, the restrictions prompt must be left blank, the password prompt can be filled in with the users password.

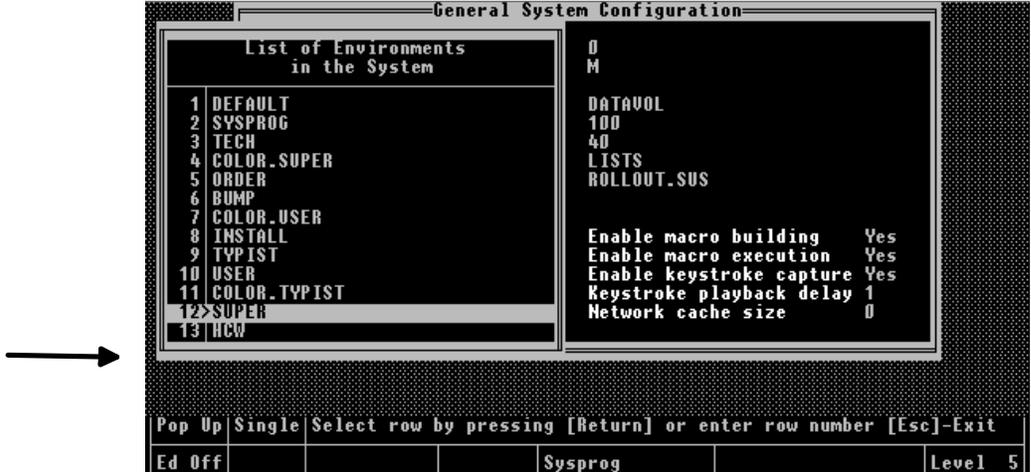
To delete a user select `Delete user` from the *user management menu*, and enter the name of the user that is to be deleted. Never delete the INSTALL, COLOR.USER, ORDER, TECH, TYPIST, BUMP, USER, SUPER, COLOR.TYPIST, HCW, or the COLOR.SUPER users.

R/CARDIO is configured with a help level that displays popup "on line" help for many of the prompts. Once users become proficient with the R/CARDIO entry system this help can be disabled. To do this select the `Management-Environment-General` menu selection.



The following window is displayed to alter the **sysprog** environment. **To edit the general environment for any user** hit Shift-F1 and select the name of the user that you wish to modify.

This figure demonstrates the selection box displayed after selecting Management-Environment-General and hitting Shift F1



The SUPER user is being selected to change by moving the cursor down to the super selection and hitting Enter. The General Systems Configuration dialog box reappears. To disable the help menus change the value of the first prompt (marked *help level*) from

a 2 to a 0.



Hit F9 to save the changes for that user, and ESCape several times to exit to the main menu.

User License Agreement

THIS IS A LEGAL AGREEMENT BETWEEN YOU (EITHER AN INDIVIDUAL OR AN ENTITY, hereafter referred to as the acceptor) AND CARDIOSCAN INC. READ ALL OF THE FOLLOWING TERMS AND CONDITIONS CAREFULLY BEFORE USING YOUR VERSION OF R/CARDIO SOFTWARE. USING THE SOFTWARE CONSTITUTES YOUR ACCEPTANCE OF THE TERMS AND CONDITIONS OF THIS AGREEMENT.

If you do not fully accept the following terms and conditions, you must return this agreement (and any related software, together with any and all accompanying materials) and your money will be refunded. Otherwise no refund will be given.

1. License. Each copy of software produce or distributed by CARDIOSCAN Inc. is contained on a diskette bearing the name R/CARDIO². Each such copy is referred to in the agreement as an "Original Copy". Subject to the terms and conditions of this agreement:
 - (a) Each Original Copy lawfully acquired by you may be used at any given time only on one central processing unit ("CPU") or, in the case of software marketed for use on a local area network ("LAN"), on a single file server managing the individual workstations of a LAN;
 - (b) You may modify each Original Copy lawfully acquired by you for your use in machine-readable object code format on such single CPU or file server only in accordance with the user manuals or documentation published by CARDIOSCAN Inc. with respect to that Original Copy (but any portion so modified shall continue to be subject to the terms and conditions of this agreement except that CARDIOSCAN Inc. will assume no responsibility for and will not warrantee such modified software) ;and
 - (c) Unless an Original Copy is marked "Copy Protected" you may make, for back-up purposes only, one or more duplicate copies of the Original Copy and of any portions of it which are modified in accordance with this agreement. A back-up copy may only be used to replace the copy from which it has been made.If the Original Copy includes, or is accompanied by, software or hardware designed to prevent use of the licensed software other than in accordance with this agreement, you agree at all times to employ such software or hardware in connection with your use of the licensed software.
2. Copyright. Each Original Copy, and all associated user manuals and other documentation produced or distributed by CARDIOSCAN Inc., are the copyright of CARDIOSCAN Inc., and such copyright and proprietary information is owned by CARDIOSCAN Inc. You will not at any time translate, decode decompile or disassemble any portion of the licensed

² R/CARDIO is a trade mark of Cardioscan Inc.

software, or make any derivative works of it, nor permit anyone else to do so. You will reproduce and include the CARDIOSCAN's copyright notice on all back-up copies. You will not rent or loan out the licensed software to others, either for profit or on a non-profit basis. YOU WILL NOT COPY OR DISTRIBUTE ANY PORTIONS OF THE LICENSED SOFTWARE OR ANY OF THE ASSOCIATED WRITTEN MATERIALS PRODUCED OR DISTRIBUTED BY CARDIOSCAN INC. EXCEPT AS EXPRESSLY PROVIDED FOR BY THIS AGREEMENT. Each patient report generated by CARDIOSCAN is the copyright of Cardioscan Inc., and bears the label "Cardioscan Inc." on the bottom of each page. You are free to distribute and copy the report as long as the original copy and each reproduction continue to legibly bear the label "Cardioscan Inc.".

3. Disclaimer of Warranties. EXCEPT AS OTHERWISE EXPRESSLY PROVIDED FOR BY THIS AGREEMENT, THE LICENSED SOFTWARE IS PROVIDED "AS IS" AND IS WITHOUT EXPRESS OR IMPLIED WARRANTY OF ANY KIND BY EITHER CARDIOSCAN INC. OR ANYONE ELSE WHO HAS BEEN INVOLVED IN THE CREATION, PRODUCTION OR DELIVERY OF IT, INCLUDING BUT NOT LIMITED TO ANY IMPLIED WARRANTY OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE. Some states do not allow the exclusion of implied warranties, so the above exclusion may not apply to you.
4. Limited Warranty. CARDIOSCAN Inc. warrants to the licensee that the Original Copy of the licensed software shall substantially conform to the accompanying standard user documentation published by CARDIOSCAN Inc., if any, when used in accordance with such documentation on compatible, non-defective hardware. In addition, CARDIOSCAN Inc. warrants that the tangible media on which the Original Copy is embodied shall be free, at the time it is delivered, from defects in materials and workmanship when given normal use and care.
5. Limited Remedy. If within ninety (90) days following shipment of the Original Copy from CARDIOSCAN Inc. you discover and report to CARDIOSCAN Inc. any failure on the part of the Original Copy to conform to the limited warranty specified above, CARDIOSCAN Inc. shall replace such copy at its own expense with a new Original Copy of the licensed software which conforms to that limited warranty, in which event the new Original Copy furnished to you shall be subject to all of the terms and conditions of this agreement and all rights and license granted to you with respect to the licenses granted to you with respect to the licensed software shall terminate. CARDIOSCAN Inc. shall have no responsibility if your claim results from any accident, abuse or misapplication of the licensed software. The forgoing shall constitute CARDIOSCAN Inc.'s exclusive liability, and your sole remedy, in connection with any claim of any kind relating to the quality, condition, or non-performance of the licensed software, whether such claim be based upon principles of contract, warranty, negligence or other tort, breach of any statutory duty,

principles of indemnity or contribution, or otherwise. Under no circumstances shall the aggregate liability of CARDIOSCAN Inc. and anyone else who has been involved in the creation, production or delivery of the licensed software exceed the sum which you paid to the supplier of such software for it.

6. Limitation of Liability. **Under no circumstances shall CARDIOSCAN Inc. Or any other person involved in the creation, production or distribution of the licensed software be liable to you on account of any claim relating to the quality or performance of the licensed software or the media on which it is furnished (whether based upon principles of contract, warranty, negligence or other tort, breach of any statutory duty, principles of indemnity or contribution, the failure of any limited remedy to achieve its essential purpose, or otherwise) for any special, consequential, incidental or exemplary damages, including but not limited to damages for lost profits, loss of use, or lost data, or for any damages or sums paid by you to any third party, even if CARDIOSCAN Inc. Or any such other person or entity has been advised of the possibility of such damages. IT IS FURTHER UNDERSTOOD THAT A COMPONENT OF THIS LICENSED SOFTWARE RELATES TO THE GENERATION OF MEDICAL RECORDS AND THAT UNDER NO CIRCUMSTANCES SHALL CARDIOSCAN INC. OR ANY OTHER PERSON INVOLVED IN THE CREATION, PRODUCTION OR DISTRIBUTION OF THE LICENSED SOFTWARE BE LIABLE TO YOU OR ANY OTHER PARTY ON ACCOUNT OF ANY CLAIM RELATING TO INACCURACIES IN REPORTING OF MEDICAL FINDINGS BE THEY CONSEQUENTIAL TO THE USE OF THIS LICENSED SOFTWARE OR NOT. IT IS THE ULTIMATE AND FINAL RESPONSIBILITY OF THE INTERPRETING PHYSICIAN OR ANY OTHER USER TO CONCISELY REVIEW AND CORRECT EACH AND EVERY MEDICAL REPORT GENERATED BY THIS LICENSED SOFTWARE PRIOR TO DISTRIBUTION TO INSURE THE ACCURACY OF SAID REPORT.** Some states do not allow the limitation of exclusion of liability for incidental or consequential damages, so the above exclusion may not apply to you.
7. Term. The rights granted by CARDIOSCAN Inc. to you by this agreement shall be effective until terminated. If you breach any or the terms or conditions of this agreement, such rights automatically shall terminate without any notice from CARDIOSCAN Inc. to you. In the event of any such termination, you shall have no right to any refund of any sum paid by you for the licensed software, and you shall destroy or deliver to CARDIOSCAN Inc. all copies of the licensed software. If requested by CARDIOSCAN Inc. at any time you will certify under oath that you have fully and faithfully observed all of the terms and conditions of this agreement. CARDIOSCAN Inc. may at reasonable times inspect your premises and equipment to verify that all of the terms and conditions of

this agreement are being observed. To extent that the terms of this agreement extend only through the period which your Original Copy is licensed for, and that for an additional fee the term of your license will be extended, CARDIOSCAN Inc. may increase or decrease any such fee or charge upon written notice to you.

8. Transfers. You may transfer to another party all of your rights and obligations under this agreement, but only if the party to whom you transfer such rights and obligations expressly agrees to be bound by all the terms and conditions of this agreement, and in advance supplies CARDIOSCAN Inc. written notice of such agreement. You will not transfer your rights and obligations under this agreement to a person or entity located in any country lacking copyrights laws applicable to computer programs. Any purported transfer except as expressly allowed by this agreement shall be null and void.
9. Enforcement of Agreement. This agreement shall be construed and governed in accordance with the laws of the State of New York, U.S.A., and shall inure to the benefit of CARDIOSCAN Inc., its successors and assigns. Any legal action by one party against the other must be commenced and maintained in any state or federal court located in New York County, State of New York, U.S.A, having subject matter jurisdiction over such dispute. Both of us submit to the jurisdiction of such courts over each of us personally connected with any such litigation, and agree that venue may be laid in or transferred to any such court. In the event that any action is brought to enforce the agreement or any of its provisions, the prevailing party shall be awarded its reasonable attorneys' fees, together with all costs and expenses incurred in connection with such litigation.
10. Severability. All of the terms and conditions of this agreement shall be construed so as to be enforceable to the fullest possible extent. A determination that any such term of condition is either invalid or unenforceable shall not affect the remaining terms and conditions of this agreement, which shall remain in full force and effect.

BY USING R/CARDIO SOFTWARE YOU ACKNOWLEDGE THAT YOU HAVE READ THIS AGREEMENT, UNDERSTAND IT, AND AGREE THAT THIS AGREEMENT IS THE COMPETE AND EXCLUSIVE STATEMENT OF THE AGREEMENT BETWEEN US, AND SUPERSEDES ALL PROPOSALS OR PRIOR AGREEMENTS, VERBAL OR WRITTEN, AND ANY OTHER COMMUNICATION RELATING TO THE SUBJECT MATTER OF THIS AGREEMENT.