Chapter 17
Creating Multiple-Scan Reports

Introduction

This chapter explains how to create multiple-scan reports, in which two or more tables are scanned by the same controlling table. The explanation of multiple-scan reports is presented in these sections:

❑ Conventional v. Multiple-Scan Reports
❑ Multiple Scanning and Composite Records
❑ Multiple Scanning and Report Layout
❑ Tools for Creating Multiple-Scan Reports

Conventional v. Multiple-Scan Reports

In a multiple-scan report, the same controlling table is used to scan several other tables in sequence. Unlike conventional reports in which table A scans table B, which then scans table C, multiple-scan reports use table A to scan both tables B and C, one after the other. In other words, more than one scan happens at the same relational level.

Figures 17.1 and 17.2 illustrate the difference between conventional and multiple-scan reports by showing how scans occur at different relational levels.
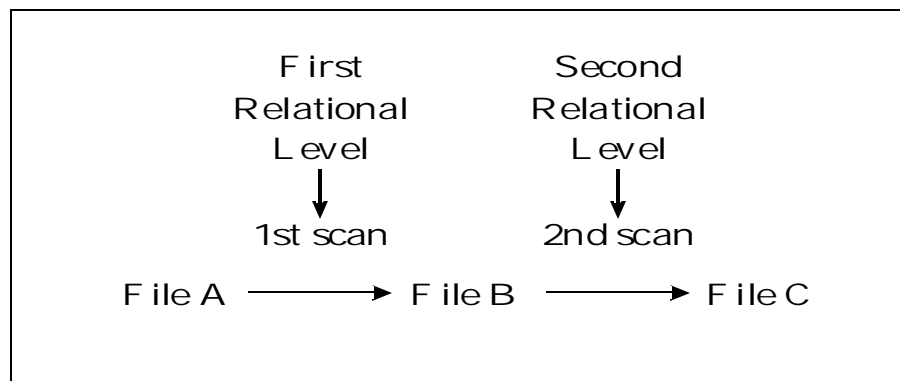

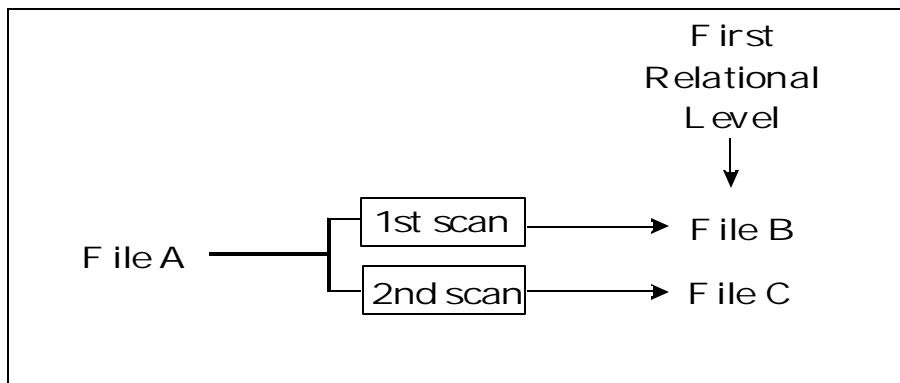
Figure 17.1 Conventional Report

First
Relational
Level

1st scan → File B

File A

2nd scan → File C

Figure 17.2 Multiple-Scan Report

Multiple Scanning and Composite Records

Creating a multiple-scan report is different from creating a report in which only one table is scanned at a given relational level. Because several tables are being scanned in sequence (that is, at different times), the composite records do not always contain values for all fields.

When table B is being scanned, it (and any other tables it looks up or scans) supplies data to the composite records created during that scan. When table C is being scanned, it supplies data from itself and any other tables it looks up or scans. At any given time, some fields in the composite record do not contain data.

Suppose you have a customer table (RRCUST.DBF) with name and address information; a charges table (RRCHGS.DBF) with customer numbers, order numbers, total invoice amounts, and invoice dates; and a payments table (RRPAYS.DBF) with customer numbers, payment amounts, and payment dates.

To report both charges and payments for each customer, you can use the customer table to scan first the charges and then the payments table. The customer number field in the customer table is used to locate every charge record belonging to that customer in the charges table. Then the same field is used to locate every payment record belonging to the same customer in the payments table.

When the charges (RRCHGS.DBF) table is being scanned, the composite records look like the sample record in Figure 17.3.

```
Fields from RRCUST.DBF          CUSTNO  10001
                                COMPANY  Micro Supply
                                ADDRESS  12 Exchange St.
                                CITY  Birmingham
                                STATE  AL
                                ZIP  35244


Fields from RRCHGS.DBF          CUSTNO  10001
                                ORDERNO  0901
                                TOTALAMT  250.55
                                CHGDATE  04/10/95


Fields from RRPAYS.DBF          CUSTNO  -----
                                PAYDATE  --------
                                AMT  ----------
```

Figure 17.3 Composite Record During First Scan

When the payments table (RRPAYS.DBF) is being scanned, the composite records look like the sample record in Figure 17.4.

```
Fields from RRCUST.DBF          CUSTNO  10001
                                COMPANY  Micro Supply
                                ADDRESS  12 Exchange St.
                                CITY  Birmingham
                                STATE  AL
                                ZIP  35244


Fields from RRCHGS.DBF          CUSTNO  -----
                                ORDERNO  -----
                                TOTALAMT  -----
                                CHGDATE  -----


Fields from RRPAYS.DBF          CUSTNO  10001
                                PAYDATE  05/10/95
                                AMT  345.55
```

Figure 17.4 Composite Record During Second Scan

Multiple Scanning and Report Layout

When you place a field on a report layout, you must consider when data will be available for the field. If the field comes from one of the scanned tables

(or a table that is scanned or looked up by these tables), data will be available only when that table is being scanned. At other times the field will not contain data. You can avoid having empty fields on your report in one of two ways:

❑ Use the Format ⇒ Band Line Properties "Scan Table" setting to specify that a line or lines print only when a selected table is being scanned.

❑ Create calculated fields that will always contain data, no matter which table is being scanned.

The first approach enables you to segregate data from the scanned tables. For example, you can design a report in which data gathered by scanning table B prints with one set of Headers and Footers, while data gathered by scanning table C prints with different Headers and Footers. The second approach enables you to print data drawn from all the scanned tables in the same area of the report, even on the same line, sharing the same Headers and Footers.

Using Scan Tables to Print Conditionally

One way to lay out a report that scans both a charges and a payments table for each customer is to use the Format ⇒ Band Line Properties "Scan Table" setting. This setting enables you to indicate that some lines should print when the charges table is being scanned, and others should print when the payments table is being scanned.

As the sample layout and report in Figures 17.5 and 17.6 illustrate, this approach may require paired Header, Record, and Footer lines. The first member of each pair will print when the charges table is being scanned; the second member will print when the payments table is being scanned. A calculated field called SCAN, whose value changes as the scanned table changes, triggers printing of the second-level Headers and Footers. See the section in this chapter on multiple-scan tools for an explanation of how the SCANNING function can be used in a calculated group field.
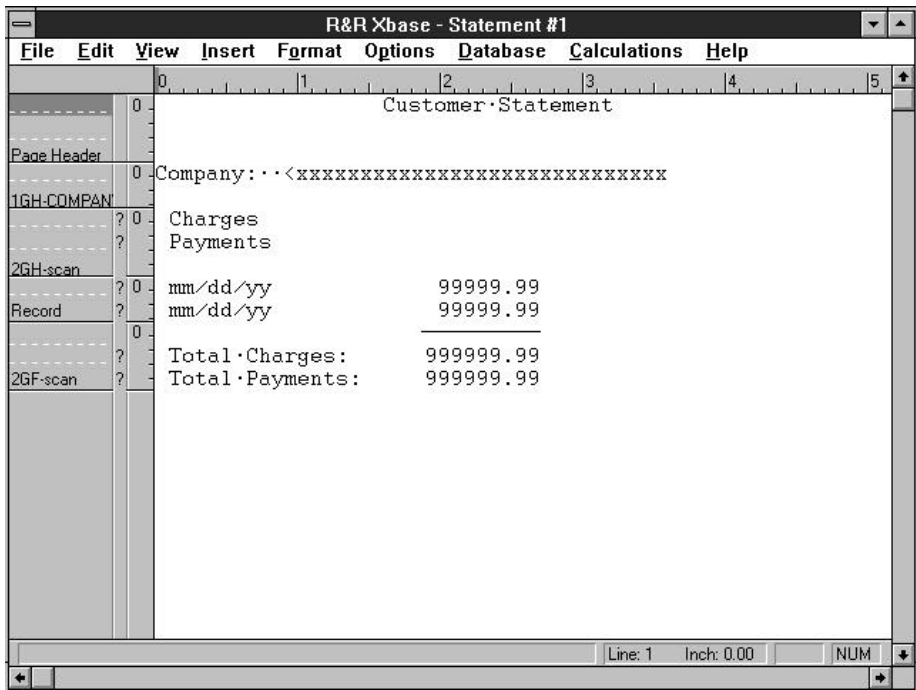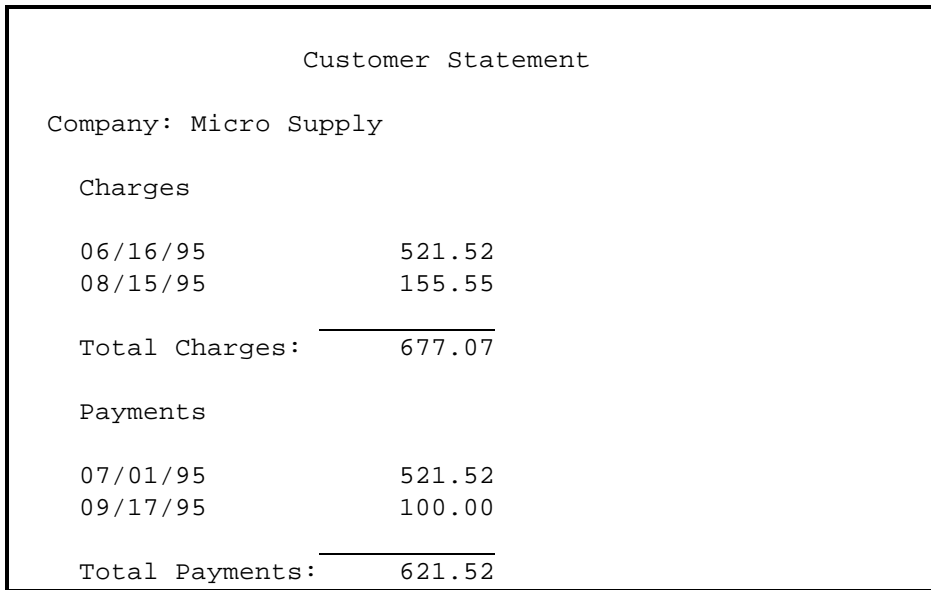
Figure 17.5 Sample Layout with Scan Table Setting

Figure 17.6 Sample Output with Scan Table Setting

Using Calculated Fields to Conditionally Print

A second way to report charges and payments for each customer is to use the SCANNING function to create fields that will always contain data, no matter which table is being scanned. This approach combines payments and charges, sorting them together by date rather than printing them under separate headers on the report.

In the report layout and sample report illustrated in Figures 17.7 and 17.8, a SORTDATE field has been created so that when the charges table is being scanned, the SORTDATE field contains the charge date, and when the payments table is being scanned, the SORTDATE field contains the payment date. The expression for SORTDATE is:
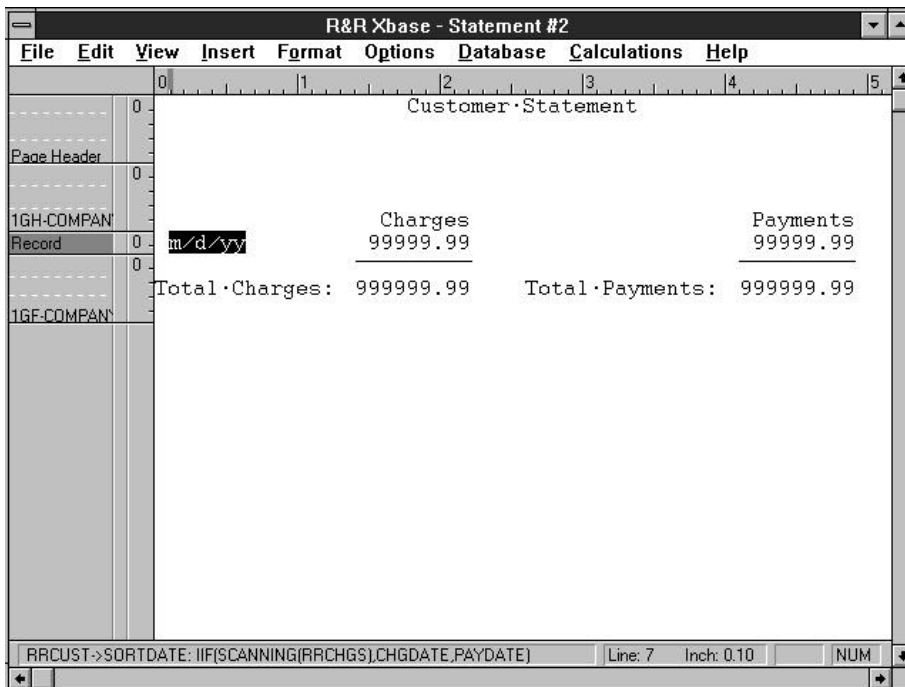
IIF(SCANNING(RRCHGS),CHGDATE,PAYDATE)

Figure 17.7 Report Layout Using Calculated Fields

Creating this field enables R&R to sort charges and payments together by date and print the appropriate date no matter which table is supplying data to the composite records. Since the data resulting from the two scans is not segregated on the report, the same Header and Footer prints during each scan. No print conditions are attached to any line in the report.

```
                Customer Statement

 Company: Micro Supply



                 Charges                        Payments
   06/16/95        521.52
   07/01/95                                        521.52
   08/15/95        155.55
   09/17/95                                        100.00
                  _____                        _____
 Total Charges: 677.07     Total Payments: 621.52
```

Figure 17.8 Sample Report Using Calculated Fields

In a multiple-scan report, R&R creates a separate composite record for each scan. As a result, in the report output the charges and payment values are on separate lines, even though the charges and payments data fields appear on the same Record line in the layout.

Tools for Creating Multiple-Scan Reports

Several R&R features will help you create multiple-scan reports:

❑ The Format ⇒ Band Line Properties "Scan Table" setting enables you to indicate when lines should print.

❑ The Band Line Properties dialog box shows you when each line on the report will print.

❑ The Database ⇒ Relations Group command specifies the order in which related tables will be scanned.

❑ The SCANNING function allows you to create calculated fields that help you sort and group data.

Scan Table Setting

The Format ⇒ Band Line Properties "Scan Table" setting enables you to select a table that controls printing of any line or lines in your report. When you select the command, a list box displays the names of the tables that will be scanned to create the report. By selecting a table, you indicate when the lines you select will print (only when that table is being scanned).

Band Line Properties Dialog Box

Right-clicking in the Band Area opens the Band Line Properties dialog illustrated in Figure 17.9. The "Scan Table" edit box displays the alias of the table assigned to the current line. If the Scan Table box displays "(None)," the line will always print (assuming no Logical Field expression has been attached to the line).
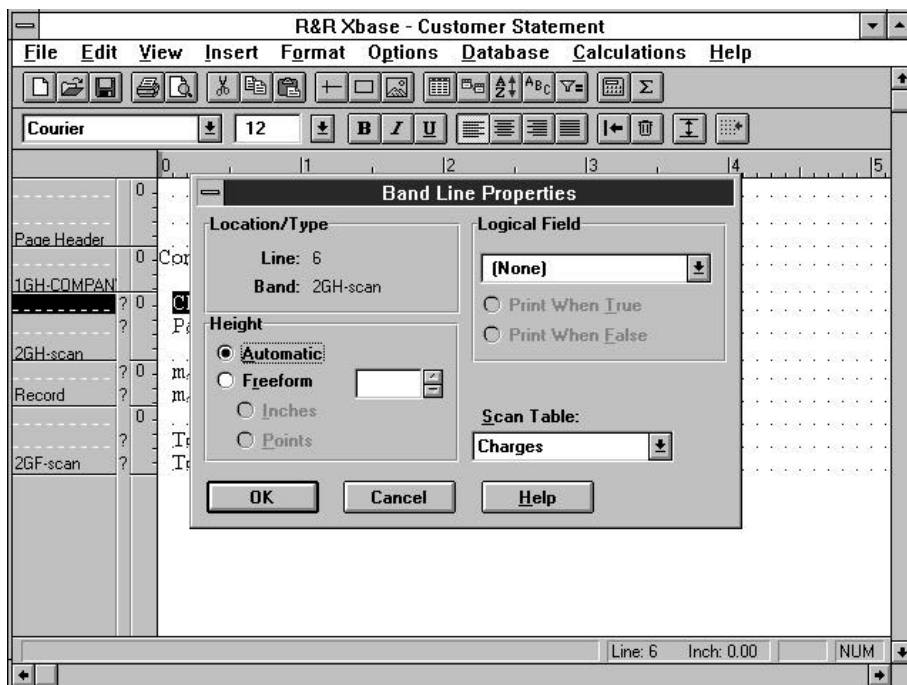

Figure 17.9 Band Line Properties Dialog Box

Scan Group Dialog

Using the Scan Group dialog box (accessed by selecting the Group button on the Relations dialog), you can specify the order in which related tables will be scanned. Records will appear in this order on the report, unless you have selected sort fields.

Since the scan order determines when data is available, this command can help you order report records without sorting. For example, you can use the Scan Group dialog to change the charges/payments order of the report illustrated in Figure 17.10 without using any sort fields.
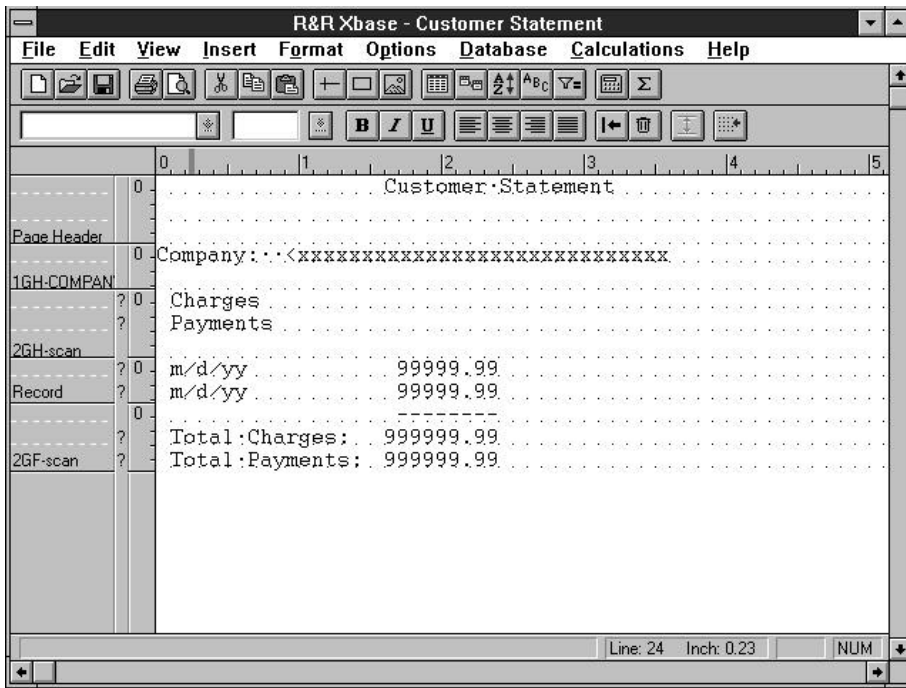
Figure 17.10 Sample Multiple-Scan Report

Assume that for each customer you want a chronological list of charges followed by a chronological list of payments. If the records in both the charges and payments table have been entered in date order, you will be able to order the report by indexing RRCHGS.DBF and RRPAYS.DBF on the CUSTNO field and by using the Scan Group dialog.

In order to set database relations, you must select a linking field to scan the indexes. Since the indexes use CUSTNO as their key expression, the linking field from RRCUST.DBF must also be CUSTNO.

Once this linking field and the two customer number indexes have been established, R&R can use RRCUST.DBF to scan both RRCHGS.DBF and RRPAYS.DBF, reading each table by customer number.

In order to print charges before payments, you can select Database $\Rightarrow$ Relations and then select Group to specify which table is scanned first. If RRCHGS.DBF is scanned first, each customer's charges will print before his or her payments. The charges will be in chronological order, since they have been entered that way in the table. If RRPAYS.DBF is scanned first, each customer's payments will print before his or her charges, also in chronological order.
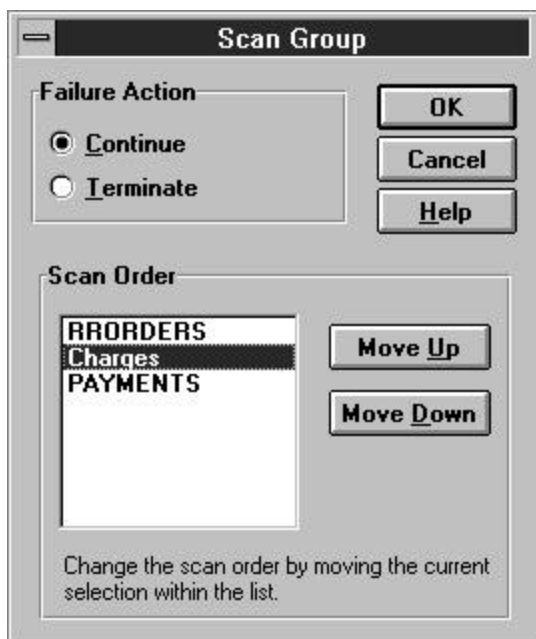
Figure 17.11 Scan Group Dialog

The Scan Group dialog also allows you to select a Failure Action to specify what action should be taken if no records are found in scanning any tables in the group. To generate this report, you would probably select "Continue", since some customers may have neither charges nor payments for the period for which you are generating the report.

The SCANNING Function and Group Fields

In order to print the appropriate Headers and Footers in the report in Figure 17.10, R&R needs two group fields: one group field to control printing of the company name and a second to control printing of the Charges/Payments and Total Charges/Total Payments lines.

You can use CUSTNO or COMPANY as the first group field: every time the value in this field changes, R&R will print the first level company Header. To determine when to print the second level Headers and Footers, R&R needs a group field whose value changes when the scanned table changes. This field can be created using the SCANNING function.

The SCANNING function, SCANNING(alias), returns a true value when the table with the specified alias is being scanned. In this report, you can use a calculated field with the expression SCANNING(RRPAYS) or

SCANNING(RRCHGS) to trigger printing of second-level Headers and Footers. Each time the value in this field changes, in other words each time the scanned table changes, R&R prints a Group Header. Body lines are printed until the scanned table changes again, and then a Footer is printed.

In addition to setting up an appropriate group field, you must also use the Format ⇒ Band Line Properties "Scan Table" setting to attach print conditions to second-level Header and Footer lines. This setting will cause the charges lines to print when the charges table is being scanned, and the payments lines to print when the payments table is being scanned. Without this setting, R&R will print both members of the Group Header and Footer pairs each time the value of the group field changes.

You can also use a field based on the SCANNING function as a group field in reports that scan more than two tables at the same relational level. For example, if you use a customer table to scan three related tables — service charges (RRSCHGS.DBF), material charges (RRMCHGS.DBF), and payments (RRPAYS.DBF) — you will need a group field that combines the SCANNING function with the IIF function. The expression below will return a unique value (0, 1, or 2) for each table being scanned:

IIF(SCANNING(RRSCHGS),0,IIF(SCANNING(RRMCHGS),1,2))

Grouping on a field with this expression works the same way as grouping on SCANNING(RRPAYS): each time the value in the group field changes, the associated Headers and Footers print.

The SCANNING Function and Sort Fields

You can use the SCANNING function to sort as well as group reports. For example, charges will print before payments in the report illustrated in Figure 17.10 if the sort field expression is SCANNING(RRPAYS). All the composite records containing 'F' in this field (that is, all the records created by scanning the charges table) will print first, because false values sort before true.

If a report scans more than two tables at the same relational level, data from the different tables can be sorted by using a sort field expression that combines the SCANNING function with the IIF function. The sample IIF expression above can also be used as the expression for a sort field.

Using SCANNING to "Swap" Data

Finally, the SCANNING function is useful when you want to "swap" the contents of a data field depending on which table is being scanned. To take the example used earlier, suppose you want to sort each customer's charges and payments together by date, printing a date followed by a charge or payment amount. If you want the date to print in the same position on the report, regardless of whether it is a charge or payment date, you must create a calculated field that will return either date, depending on the table being scanned. This field can also be used to sort the report. The expression for such a calculated field would be similar to the following:

IIF(SCANNING(RRCHGS),CHGDATE,PAYDATE)

When you place this calculated field on the report, it will supply a date value regardless of which table is being scanned.