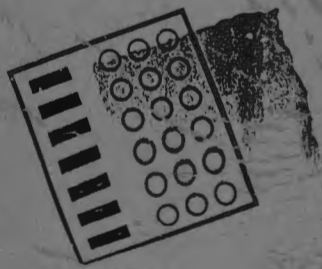
User's Guide



ScanBook®

Form Definition Software

SCANTRON
A HARLAND COMPANY

SCANBOOK FOR WINDOWS

Version 2.0

User's Guide

P/N 910007-001 Rev. A

September 1998

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This is a new document.

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About SCANBOOK

SCANBOOK is a comprehensive software package designed to easily translate printed marks into data records through SCANTRON Optical Mark Readers (OMRs). With SCANBOOK and a SCANTRON OMR, you can read forms that have been designed for Optical Mark Readers and process data into records that can be stored and analyzed.

SCANBOOK's intuitive interface makes it easy to reliably control all aspects of form scanning from the physical operation of the OMR to complex batch processing.

About This Manual

This User's Guide will discuss and teach these operations:

- Installing SCANBOOK
- Understanding form concepts and layout
- Importing form definitions from a scanner or from FLIPS-OMR
- Creating new form definitions within SCANBOOK
- Preparing for scan jobs
- Scanning and processing data from forms

Where do I Start?

Depending on your level of experience, you can master SCANBOOK in a number of ways. Here is a short summary of each of the chapters herein and some recommendations on how to approach them:

Chapter 1, "Getting Started with ScanBook" guides you through installing SCANBOOK and discusses the main window.

Chapter 2, "Understanding Form Definitions" begins with a discussion of form definitions and clearly describes the elements that comprise an OMR form. If you are new to OMR concepts and terminology, this section is essential.

Chapter 3, "Creating and Editing Zones" describes in detail each of the zone types that you use to create a form definition.

Chapter 4, "Importing Form Definitions" discusses importing form definitions from either a scanner or from FLIPS-OMR. If you use either of these methods to create form definitions in SCANBOOK, this chapter teaches the importing process.

Chapter 5, "Job Definition" discusses strategies you use to prepare for scan jobs, including creating booklet definitions and configuring scan jobs. This is recommended reading for all users.

Chapter 6, "Scanning Forms with ScanBook" takes you through processing data from batch scan jobs.

Getting Started with ScanBook

Chapter 1

SCANBOOK performs two primary functions: it enables you to construct form definitions which it will then need to meaningfully interpret data, and scans and processes data from marked forms.

This chapter discusses:

- System requirements
- Installing SCANBOOK
- Navigating the main SCANBOOK window

System Requirements

The minimum system configuration you will need to successfully run SCANBOOK for Windows is:

- A 486DX2 PC 66MHZ
- Windows 95, Windows 98, or Windows NT 4
- 16 Mb RAM
- 10 Mb free disk space
- A double-speed CD-ROM drive (for installation)

Installing SCANBOOK

To install SCANBOOK:

1. Insert the installation CD into your CD-ROM drive.
2. Click **Start** then **Run.**
3. Type `d:setup` and press <ENTER>.
4. Follow the step-by-step installation procedure.

By default, SCANBOOK is installed into the directory `C:\ScanBook` and a program group called ScanBook is created in the **Start** menu.

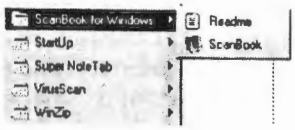


Figure 1.1 The ScanBook Start Menu Item

The SCANBOOK Window

SCANBOOK opens with the **Process Log** window by default, shown in Figure 1.2. The **Process Log** window shows the results of a scanning job as they are sent to SCANBOOK.

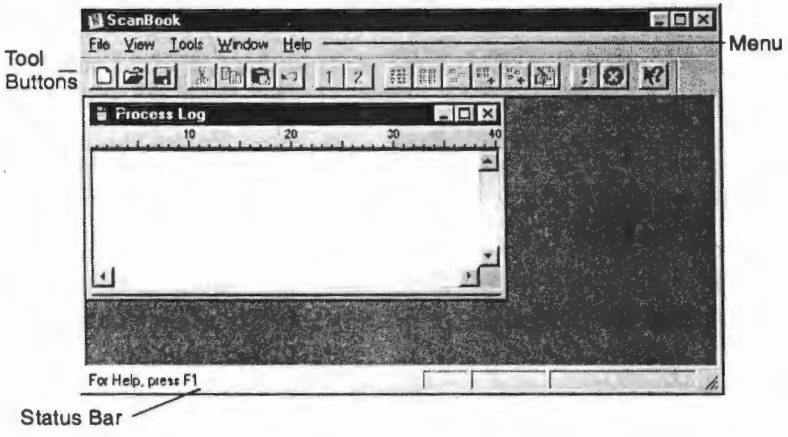


Figure 1.2 The SCANBOOK Window

Menus

SCANBOOK menus differ according to the task you are currently working on. If you are designing a form definition, SCANBOOK displays a menu with functions appropriate for form design, particularly with **Edit** and **Zones** options.

When defining a job, SCANBOOK displays a menu with functions needed for job definition, particularly the **Process** option.

Tool Buttons

Use the tool buttons to quickly choose common tasks without having to navigate menus. SCANBOOK makes the following tools available.

Tool button	*Function*
New	Creates a new form or job definition
Open File	Chooses a file to open for editing
Save	Saves the current file
Cut	Cuts the current object from the form and place it on the clipboard

	Tool button	*Function*
	Copy	Places a copy of the current object on the clipboard
	Paste	Pastes the object on the clipboard on the form
	Undo	Reverses your last action
	Side	Selects which side of the form to work on
	Form Header	Shows the current form's header options
	Multiple Choice Zone	Creates a Multiple Choice zone on the current form
	Related Item Zone	Creates a Related Item zone
	Multiple Summation Zone	Creates a Multiple Summation zone
	Random Summation Zone	Creates a Related Summation zone
	Zone Properties	Shows the properties of the zone currently selected
	Run Job	Begins the defined scanning job
	Stop	Ends the current scanning job
	Help Select	Allows you to get interactive help on any object

Status Bar

The status bar displays relevant information for the task you are currently working on, such as what side of the form you are on, what timing line and channel the mouse is currently closest to and the status of the Caps Lock, Num Lock and Scroll Lock keys, shown in Figure 1.3.

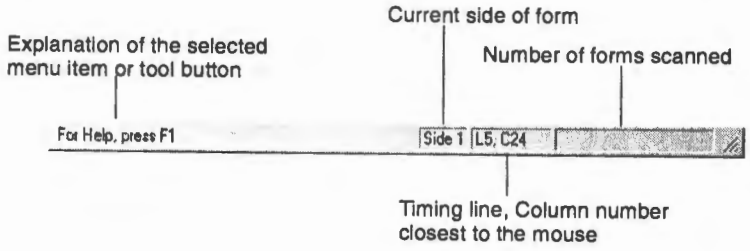


Figure 1.3 The Status Bar

Creating a Form Definition

Forms capable of being scanned by an OMR can be created from scratch. However, it is expected that most form definitions will be created by importing existing forms through a scanner or from the FLIPS-OMR package. When importing from a scanner, key positions on the form are marked and when the form is scanned, a *template* is created showing the marked positions. More information about templates and importing forms can be found in Chapter 4, "Importing Form Definitions."

To Create a New Form

1. Select **New** from the **File** menu or click the **New** tool button.
2. Select **Form Definition** from the list of available choices. A new, blank form will be created and the Form Header dialog box will be shown. For more information on zone types, see Chapter 3, "Creating and Editing Zones."

Creating a Job Definition

A Job Definition is used to communicate to the OMR certain settings that the OMR will need when scanning forms, such as a list of the form definitions to use to interpret data, the scanner configuration, special characters to use to represent errors, etc. More information about a Job Definition can be found in Chapter 5, "Job Definition."

To Create a New Job Definition

1. Select **New** from the **File** menu or click the **New** tool button.
2. Select **Job Definition** from the list of available choices. An empty window that contains Job parameters as they are specified is created.

Understanding Form Definitions

Chapter 2

Before you can scan forms, you need to instruct SCANBOOK on how it will interpret the data it will scan. SCANBOOK needs to know where the response positions on the scanned form are located and what kind of data they will contain. You provide this information to SCANBOOK by describing the kind of form it will be scanning. You can do this in two ways:

- By describing the physical characteristics of your form within SCANBOOK
- By importing your form definition either from form design software, such as FLIPS-OMR or from your scanner

In this chapter, we will discuss the characteristics of a form definition that SCANBOOK looks for: its geometry, the zones used and their orientation.

Form Geometry

From a form definition, SCANBOOK assembles a set of commands that your Optical Mark Reader (OMR) will understand, and stores these in a file.

Typically, OMR forms contain the following basic components:

- A timing track
- Timing lines and channels
- Response positions
- Form identification marks

Timing Track

In order for your OMR to read your responses, each form must contain a timing track. A timing track sits in the margins (either left or right) and is comprised of a series of timing lines numbered in sequence. The timing track is easily identifiable as the series of rectangular black marks that run along one edge of your form (see Figure 2.1).

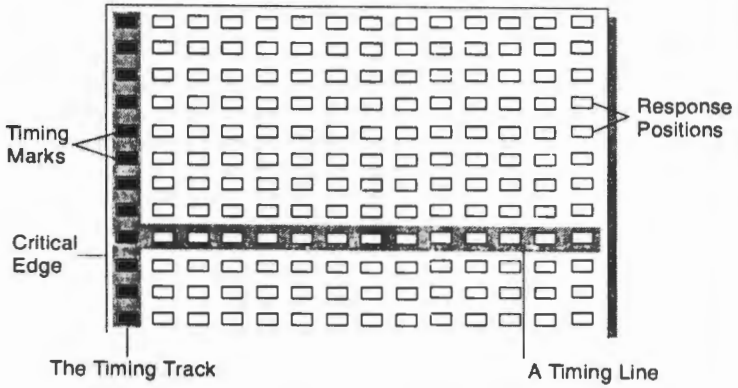


Figure 2.1 Basic Form Geometry

When your form is scanned by your OMR, the timing marks trigger the reading mechanism to read all the mark positions on that timing line, even if there are no marks in all the response positions.

NOTE: The distance between the timing track and the edge of the form closest to the timing track (the *critical edge*) must fall within certain specifications, otherwise the OMR will be unable to interpret the form. For more information, consult your scanner's manual.

Timing Lines and Columns

Timing lines are rows of mark positions that extend across the form, perpendicular to the timing track. Columns consist of mark positions in a line parallel to the timing track.

Timing lines and columns are numbered relative to their relationship to the first timing line or column. Timing line numbering starts at the top of the form and continues consecutively to the bottom of the form.

When the timing track is on the left edge of the form, the columns are numbered starting with the column immediately to the right of the timing track and the count increases as the columns extend across the form. The first column of a form with the timing track along the right edge would be the column immediately to the left of the timing track. When the timing track is on the right edge of the form, the first column is that closest to the right edge. The timing track is never counted as a column.

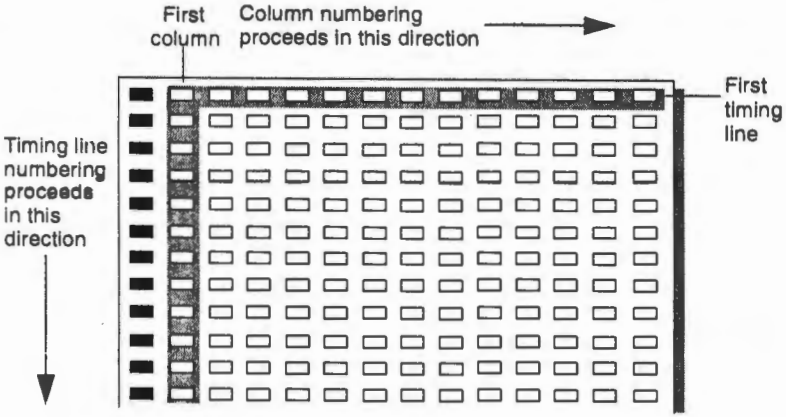


Figure 2.2 Timing Line and Column Numbering

Response Positions

Response positions occur at the intersections of timing lines and columns. OMR forms must conform to certain requirements for the placement of mark positions in an X,Y coordinate grid. Response positions outside these intersections may be unreadable by an OMR.

NOTE: A *response shape* is distinct from a response position. Response positions exist at all intersections of timing lines and columns and response shapes are used to mark the response positions that will contain data.

Form Identification Marks

Many forms contain identification marks that allow the OMR to identify the form being scanned. Usually these marks are pre-printed on the form.

Identification marks can be oriented horizontally (line-oriented) or vertically (column-oriented). When the identification marks are line

oriented, the entire sequence exists on a single timing line. Similarly, the sequence exists in a single column when the identification marks are column-oriented. Figure 2.3 is an example of line-oriented identification marks.

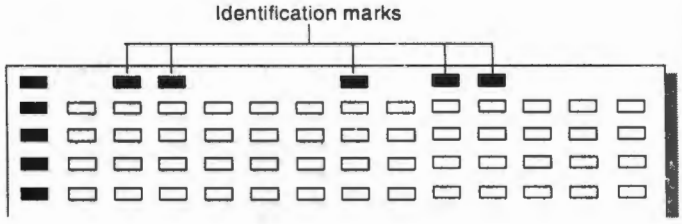


Figure 2.3 Line-oriented Identification Marks

Zones

A zone is the section of a form where the response positions contain data. A zone is designated by a series of response shapes and it is the marks within these response shapes that SCANBOOK processes as data.

Zones can be arranged in one of two ways:

- Multiple Zones are uniform in shape and have their response shapes arranged in a grid
- Related Zones are comprised of response shapes that are not uniformly arranged - they may be staggered across different timing lines and columns

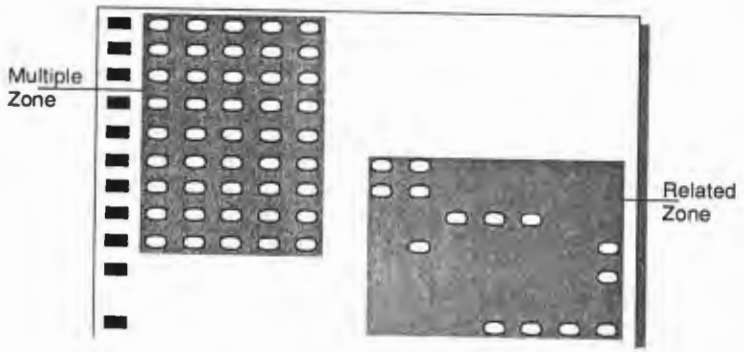


Figure 2.4 Multiple and Related Zones

Zone Elements and Choices

Zones consist of one or more sub-zones called elements. The response positions within the elements used to collect data are called choices.

In Multiple zones, the number of elements and choices must fit exactly within the zone boundary and have uniform spacing between the first and last response position. The choices within each element must be the same number for all elements.

In Related zones, a single response position usually represents both the element and the choice.

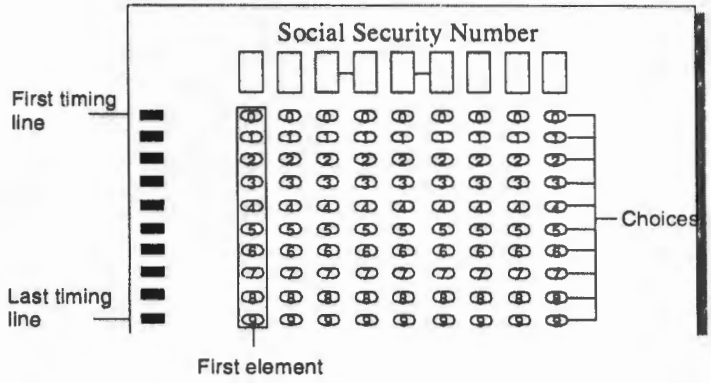


Figure 2.5 Elements and Choices in a Multiple Zone

Zone Orientation

Zone orientation refers to the layout of each new element and the choices within each element. A zone can be oriented so the each new choice in an element appears in a different column (*columnar*) or so that each new choice appears on a different line (*linear*).

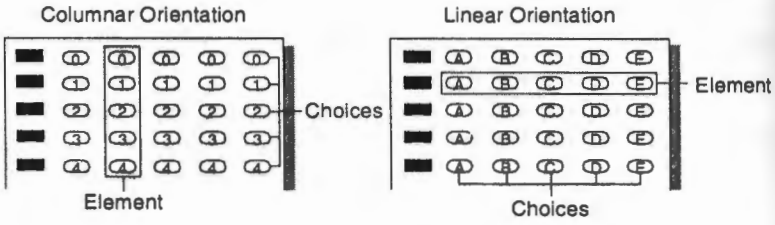


Figure 2.6 Columnar and Linear Orientation

Zone orientation can be determined by the black 'handles' that appear around choices in the upper left corner of the zone when it is selected. For Multiple zones (those arranged in a matrix format), a choice with a single handle denotes the origin of the zone, a choice with two handles shows the direction of the first element and a choice with four handles shows

the direction of the elements. Figure 2.7 shows the handles for a columnar Multiple zone.

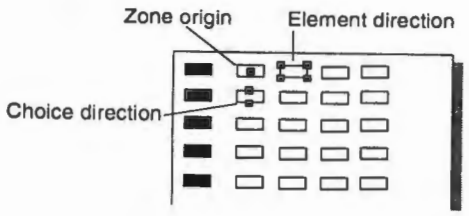


Figure 2.7 Columnar Zone Orientation

Related zones only use one handle to show the zone origin.

Zone Processing

Regardless of orientation, all elements and choices within a zone are processed in the same way. Zones are processed beginning with the first timing line and the first choice of the first element.

Once all of the choices in the first element have been processed, the second element is processed and so on until the OMR reaches the last choice of the last element.

For example, Figure 2.8 shows a form with a linear oriented Multiple Choice zone comprised of 10 elements with 11 choices per element (110 choices in total). Because the orientation of the zone is linear, each element is on a different timing line.

For this zone, processing starts with the first choice in the first element (timing line 1, column 1) and ends with the last choice of the first element (timing line 1, column 11). Each element is processed until the last choice in the last element is read (timing line 10, column 11).

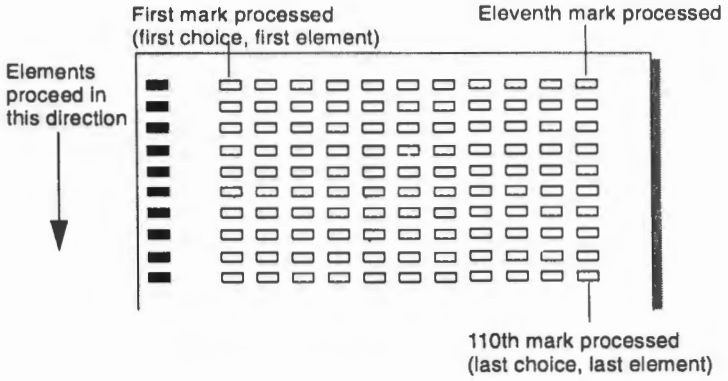


Figure 2.8 Linear Zone Processing Sequence

Form Definitions

SCANBOOK constructs a complete set of instructions - a form definition - from the physical characteristics of the form: its timing marks, zone types and geometry. This form definition is then transmitted to the OMR which then performs the following:

- Verifies the form
- Defines the actions taken if marks do not conform to expectations
- Translates data collected from scanned forms

Verifying the Form

When scanning forms, the OMR compares the current form being scanned with its internal definition for conformance. If the form has identification marks, the OMR checks these against ID zones in the definition.

Responding to Errors

Certain zone types allow error checking criteria to be applied to the zone. For most zone types, it is possible to specify whether more than one mark in an element is allowed (multiple mark criteria), whether a zone must contain at least one mark to be valid, or whether a zone can be unmarked.

Error checking criteria allows the OMR to reject forms if a marking error exists and protects the validity of scanned data.

Translating Scanned Data

Using the form definition, the OMR produces a text string for each scanned form. The length and structure of the text string is determined by the number of zones and the order in which they appear on the form.

SCANBOOK stores these strings collected from scanned forms in a file. Because each text string is the same length on identical forms, data for a specific zone is consistently located in the same place within each string. The consistent structure of the text string (representing data collected from a form) facilitates easy data analysis using a database program.

NOTE: The text string created from a scanned form is also called a *record.* When records are saved to a file, each record appears on a new line. The specific data corresponding with a zone on the form is also called a *field*, and one record is usually comprised of many fields. When scanning a booklet, the entire booklet is saved as one record.

Creating and Editing Zones

Chapter 3

This chapter explains each of the zone types that can be defined with SCANBOOK and demonstrates how to create them. Later, this chapter describes some of the advanced editing features available to simplify the form design process.

Creating Zones

There are fifteen types of zones that can be created. When your Form window is active, the zones are available from the **Zones** menu:

- **Form Header zones** describe preliminary characteristics of the form such as the number of timing lines, whether it is two-sided and how to process the form if errors are encountered.
- **Form Identification zones** provide a method to identify forms. Each form type has a distinct identification zone established during design.
- **Multiple Choice zones** insert alphabetical and numerical data such as names, employee numbers, job numbers and order quantities into the output record.
- **Related Item zones** establish relationships between mark positions that are separated on the form and are mostly used to gather survey information.
- **Multiple Summation zones** gather numeric values through a combination of regular mark positions which are then added (or summed) during the translation process.
- **Random Summation zones** gather numeric values through a combination or random mark positions which are then summed when translated.

- **Insertion zones** insert fixed text into data records.
- **Serial Number zones** generate and insert a unique number into output data records.
- **Book Number zones** insert the current book number in the output record.
- **Batch Number zones** insert the current batch number in the output record.
- **Barcode zones** enable the reading of barcodes.
- **Filler zones** are used to 'pad' the output record with a character for a fixed number of times.
- **Scantron zones** allow for numeric data to be converted to text.
- **Darkness zones** provide specific controls to determine the relative weight of marks in a given zone.
- **Print ASCII zones** are similar to Scantron zones and allow pre-encoded identification of forms.
- **Threshold zones** are used to determine the validity of marks on the form.

Form Header Zone

When you create a new form, SCANBOOK opens the Form Header dialog box where you describe some of the characteristics of your form. On the Form Header zone, you describe the number of timing lines and columns your form contains, whether your form has barcodes, and what actions to take when scanning your form.

Defining the Form Header Zone

From the Zones menu select **Form Header Zone**, or select the Form Header tool button, to open the Form Header dialog box.

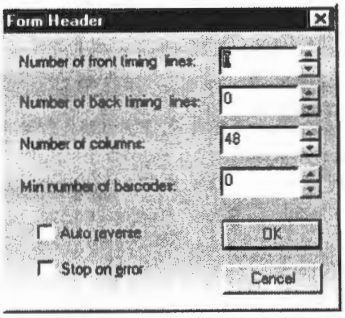


Figure 3.1 The Form Header Dialog Box

Form Header Options

These options are available from the Form Header dialog box:

Number of front timing lines

This is the number of timing lines that you will need to create the zones on your form.

Number of back timing lines

This is the number of timing lines you will need on the back of your form. If your OMR cannot scan double-sided forms, disregard this number.

Number of columns

This specifies the number of channels your OMR is capable of scanning. You should refer to your OMR manual for this setting.

Min. number of barcodes

This is the number of barcodes you will include on your form, if your OMR is capable of scanning barcodes.

Auto reverse

If you have a double-sided scanner, this option enables your OMR to automatically detect side 1.

Stop on error

This is only used in previous releases of ScanBook and should be ignored unless this form is exported to an `.800` file for other applications.

Multiple Choice Zone Options

When you have finished defining your Multiple Choice Zone, either by defining a complete zone or by clicking the right mouse button, the Multiple Choice dialog box opens.

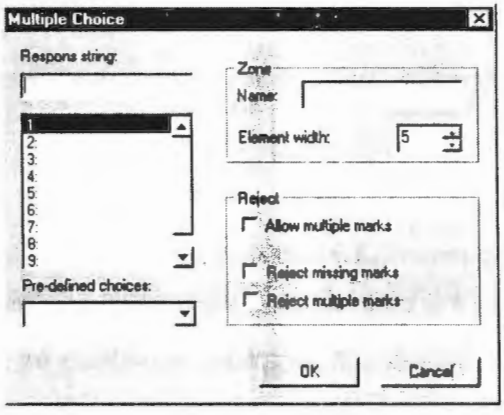


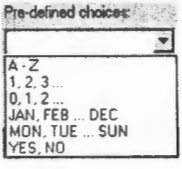
Figure 3.7 The Multiple Choice Dialog Box

Response strings

Response strings specify the particular text that will be recorded in the scanned data record if that mark is checked on the scanned form. They can be individually assigned to marks or you can use pre-defined choices.

To assign particular response strings to response positions, simply enter the text in the **Response string** text box. Particular response positions are selected by clicking the numbered response position.

To use pre-defined response strings, select an available choice from the **Pre-defined choices** list box.



Response strings selected from this list box operate from the current position *forward*. It is possible to manually define the first few response strings and then use the list box to complete the definition.

Figure 3.8 Pre-defined Response Strings

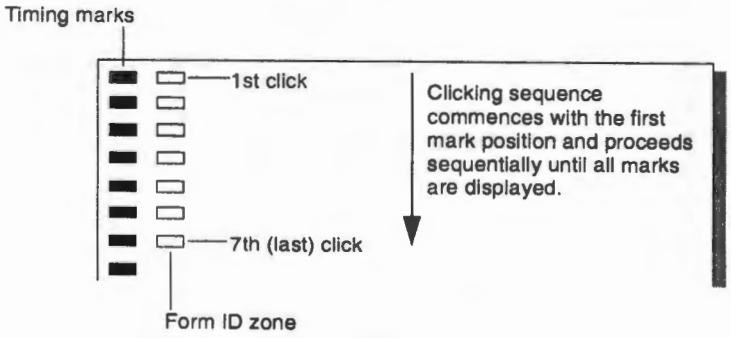


Figure 3.2 Defining the Form ID Zone

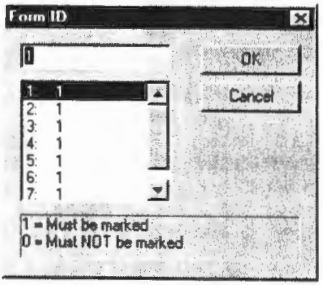


Figure 3.3 The Form ID Dialog Box

Multiple Choice Zone

Multiple Choice zones represent most zones that are regular in shape and spacing. They provide a set of choices that can have several possible responses. Depending on requirements, single, multiple and/or blank choices can be defined in a Multiple Choice zone.

Defining a Multiple Choice Zone

A maximum number of five positions is defined when a full Multiple Choice zone is created. They are:

1 The first choice of the first element, to mark the upper left position of the zone (the *zone origin*).

2 The second choice of the first element, to designate whether the zone is linear or columnar and the spacing between the choices within each element.

3 The last choice of the first element, to specify the number of choices in each element.

4 The first choice of the second element, to specify the spacing between elements.

5 The first choice of the last element, to define the number of elements.

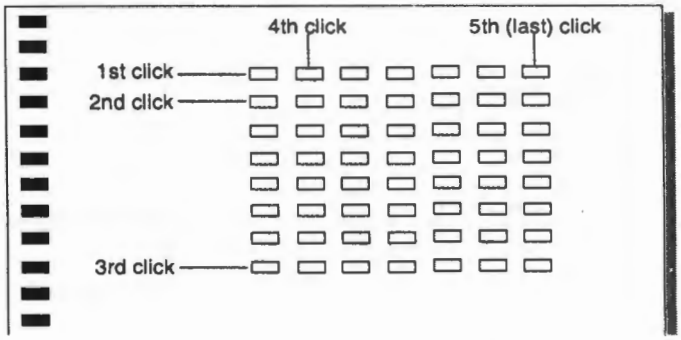
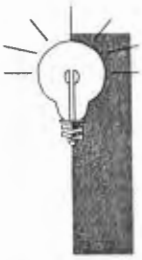


Figure 3.4 Defining a Columnar Multiple Choice Zone

If you are creating a single- or double-element zone (zones that contain only one or two elements respectively), fewer mouse clicks are required.



TIP: This diagram shows a columnar Multiple Choice zone. To create a linear zone, you click your 2nd and 3rd positions *along the timing line* instead of down the column as shown. Similarly, your 4th and 5th clicks would be *down the column* instead of along the timing line.

With a double-element Multiple Choice zone, the sequence is only four clicks and is terminated by clicking the **right** mouse button.

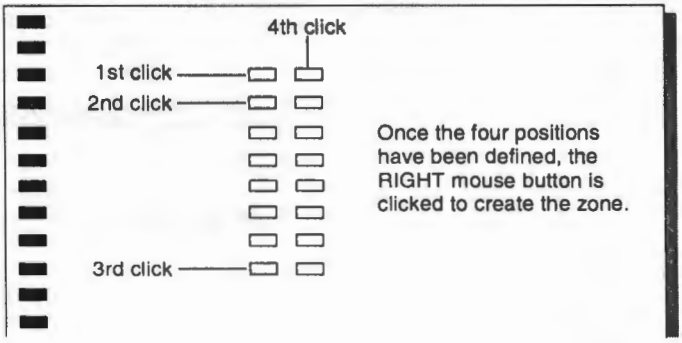
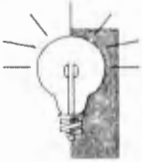


Figure 3.5 Defining a Double-element Multiple Choice Zone

When defining a single-element Multiple Choice zone, only three (orless) mouse clicks are needed, plus the right mouse button.



TIP: Once a zone is created, it can easily be resized and have its spacing altered. For more information, see "Editing Zones" on page 3-24.

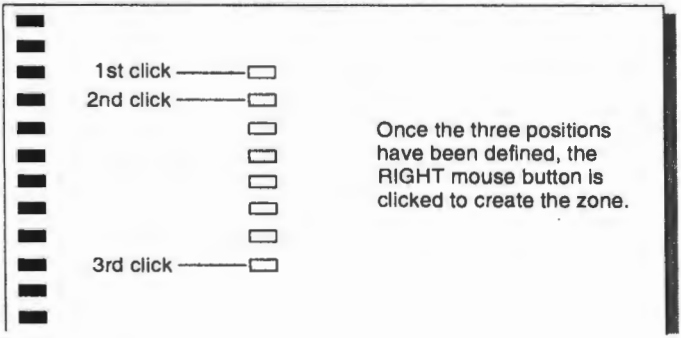


Figure 3.6 Defining a Single-element Multiple Choice Zone

Multiple Choice Zone Options

When you have finished defining your Multiple Choice Zone, either by defining a complete zone or by clicking the right mouse button, the Multiple Choice dialog box opens.

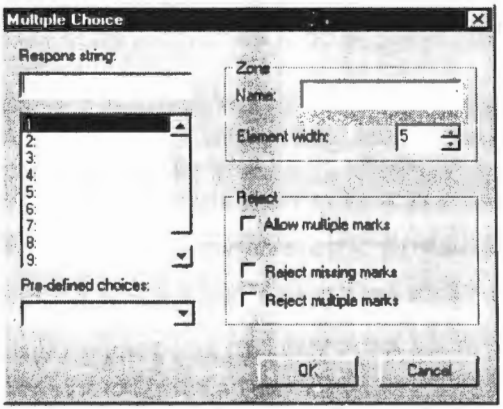


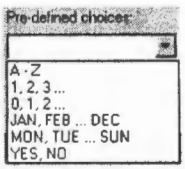
Figure 3.7 The Multiple Choice Dialog Box

Response strings

Response strings specify the particular text that will be recorded in the scanned data record if that mark is checked on the scanned form. They can be individually assigned to marks or you can use pre-defined choices.

To assign particular response strings to response positions, simply enter the text in the **Response string** text box. Particular response positions are selected by clicking the numbered response position.

To use pre-defined response strings, select an available choice from the **Pre-defined choices** list box.



Response strings selected from this list box operate from the current position *forward*. It is possible to manually define the first few response strings and then use the list box to complete the definition.

Figure 3.8 Pre-defined Response Strings

Zone name

The Zone name text box is used to name each defined zone. A zone name can be any length. Naming a zone is optional but is recommended as it assists differentiating zones when editing them.

Zone element width

The Zone element width defines the required field width for output data. SCANBOOK can accommodate a width of up to five characters.

In most cases, the default width of 1 is adequate, however there are situations when a greater output width is required, such as:

- Days of the week (MON, TUE, WED, etc.)
- Months of the year (JAN, FEB, MAR, etc.)
- Yes/No answers
- Numerals greater than 9
- Multiple digit entries (e.g.: AA, A1, LEFT/RIGHT, etc.)

Allow multiple marks

The Allow multiple marks check box specifies whether the zone can have more than one choice marked. This is of particular use in survey forms where the instruction is to mark 'all that apply.'

If this option and the Reject multiple marks option are not checked and multiple marks are entered, a special character ('?' by default) is placed in the relevant field of the output record.

Reject missing marks

This checkbox allows for the rejection of forms that have blank fields where a mark is required in each of the given elements.

Reject multiple marks

If you want to allow only one mark per element in this zone, check this box. Forms with more than one mark in this zone's elements will be rejected. This option is unavailable if multiple marks are allowed in this zone.

Related Item Zone

The **Related Item zone** is similar to the Multiple Choice zone. The main difference is that Related Item zones have no requirements in their shape; they do not have to be matrices. This allows greater flexibility in the placement of zone choices.

An example of a typical use of a Related Item zone could be found on a survey form containing multiple choice questions oriented in an irregular pattern on the form, such as the one shown in Figure 3.9.

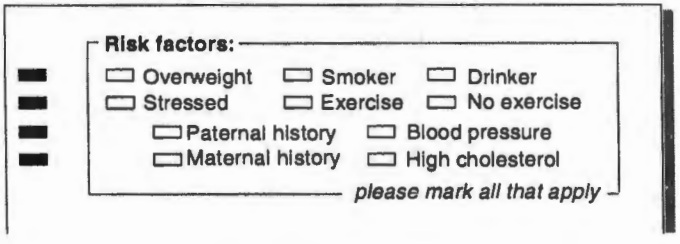


Figure 3.9 A Related Item Zone Example

This zone configuration is not suitable for use as a Multiple Choice zone because of the irregularity of the mark positions. The Related Item zone, with the flexibility to define random mark placement, is the ideal zone for this situation.

Defining a Related Item Zone

When defining a Related Item zone, the sequence of mouse clicks required is the order of the zone definition positions. All mark positions need to be selected.

The **right** mouse button is used to complete mark definition and open the Related Item dialog box

Related Item Zone Options

The options for Related Item zones are similar to those for Multiple Choice zones.

Response string

You can manually define the response strings for this zone, or select from one of the pre-defined choices available from the Pre-defined choices list box.

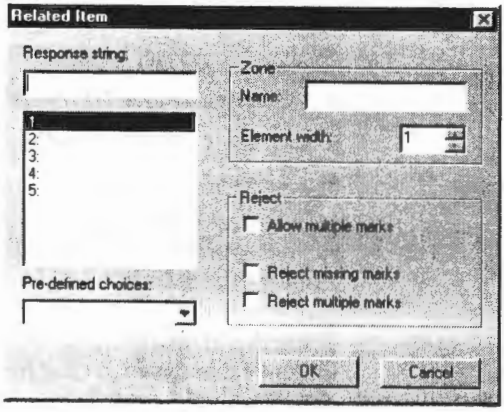


Figure 3.10 The Related Item Dialog Box

Zone name

The Zone name text box is used to name each defined zone. A zone name can be of any length. Naming a zone is optional but is recommended as it is helpful when editing zones.

Zone element width

The Zone element width defines the required field width for output data. SCANBOOK can accommodate a width of up to five characters.

Allow multiple marks

The Allow multiple marks check box specifies whether the zone can have more than one of its choices marked.

Reject missing marks

This checkbox allows for the rejection of forms that have blank fields where a mark is required in each of the given elements.

Reject multiple marks

The Reject multiple marks checkbox is used to reject forms when multiple marks are entered in a zone where they are not allowed. This option is unavailable if multiple marks are allowed in this zone.

Multiple Summation Zone

The **Multiple Summation zone** is a symmetrical data zone where the value for each element in the zone is the sum of all the choices marked for that element. Any number of choices may be marked for each element.

Typical uses of the Multiple Summation Zone include:

- Creating unique ID numbers
- Totaling the hours worked on time sheets
- Totaling job costs

In most cases, Multiple Summation zones are used to sum a series of responses in the range 0-9 (using **Binary Coded Decimal**) or 0-x (using **Binary Summation**).

Defining a Multiple Summation Zone

The series of mouse clicks required to define a Multiple Summation zone is identical to the steps used for a Multiple Choice zone (see Figure 3.4). They are:

1. The first choice of the first element, to mark the upper left position of the zone.
2. The second choice of the first element, to designate whether the zone is linear or columnar and the spacing between the choices within each element.
3. The last choice of the first element, to specify the number of choices in each element.
4. The first choice of the second element, to specify the spacing between elements.
5. The first choice of the last element, to define the number of elements.

It is rare for a Multiple Summation zone to require less than three choices. However, when this does occur, the procedure is exactly the same as defining a one- or two-choice Multiple Choice zone.

When the Multiple Summation zone has been defined, the Multiple Summation dialog box opens (see Figure 3.11).

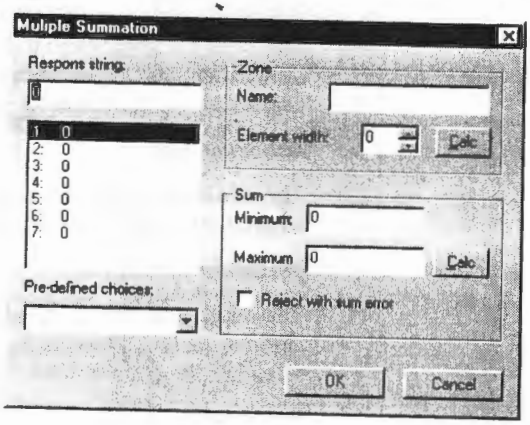


Figure 3.11 The Multiple Summation Dialog Box

Multiple Summation Zone Options

Response string

You can manually define the response strings for this zone, or select from one of the pre-defined choices available from the Pre-defined choices list box:

- **1, 2, 4, 8, 16, ...** numbers the choices in a binary sequence, starting from 1, where each value is double the value preceding it.
- **..., 16, 8, 4, 2, 1** numbers the choices in a reverse-binary sequence.

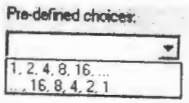


Figure 3.12 Pre-defined Choices for a Multiple Summation Zone

Zone name

The Zone name text box is used to name each defined zone. Naming a zone is optional, but helpful when editing zones.

Element width

The Zone element width defines the required field width for output data. SCANBOOK can automatically calculate the required element width, depending on the response string, by selecting the **Calc** button.

Minimum sum

The minimum sum represents the minimum value the zone can have when it is scanned. By default, this is set to zero.

Maximum sum

The maximum sum is the maximum value the zone can have. This is automatically calculated by SCANBOOK, using the response strings, by selecting the **Calc** button.

Reject with sum error

When the form is scanned, if this zone exceeds the range specified by the maximum or minimum sum values, the OMR rejects the form.

Random Summation Zone

A Random Summation zone, like the Related Choice zone, is not restricted to a regular shape.

Defining a Random Summation Zone

The only sequence of mouse clicks required to define a Random Summation zone is the order of the choice positions. Once all the choice positions have been selected, clicking the right mouse button completes the zone and opens the Random Summation dialog box.

Random Summation Zone Options

Response string

You can manually define the response strings for this zone, or select from one of the pre-defined choices available from the Pre-defined choices list box.

Zone name

The Zone name text box is used to name each defined zone. Naming a zone is optional but is recommended as it is helpful when editing zones.

Element width

The Zone element width defines the required field width for output data. This can be automatically calculated by selecting the **Calc** button.

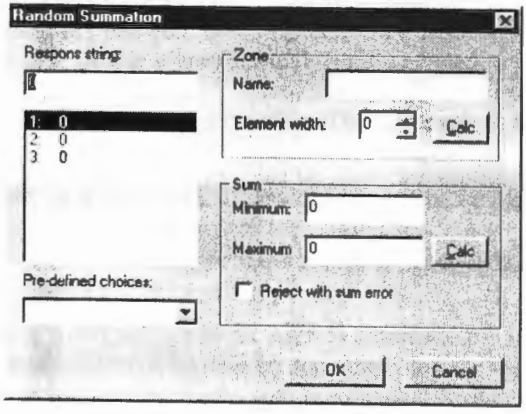


Figure 3.13 The Random Summation Dialog Box

Minimum sum

The minimum sum represents the minimum value the zone can have when it is scanned. By default, this is set to zero.

Maximum sum

The maximum sum is the maximum value the zone can have. This is automatically calculated by selecting the **Calc** button.

Reject with sum error

Checking this option instructs the OMR to reject the form during scanning if this zone is incorrectly marked.

Insertion Zone

The **Insertion zone** provides a method to insert text into the output record. For example, you may want to place a comment or insert punctuation so that the output record is easily readable.

Defining an Insertion Zone

To create an Insertion zone, select **Insertion zone** from the **Zones** menu.

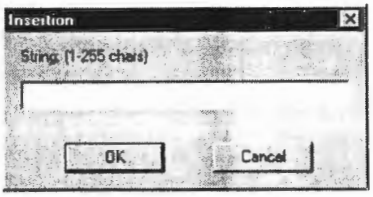


Figure 3.14 The Insertion Dialog Box

Insertion Zone Options

Up to 255 characters of text can be inserted into an output record. The position of the text corresponds to the order in which the field is defined. If, for example, you define a Multiple Choice zone, an Insertion zone, then a Random Summation zone, the Insertion text appears between the Multiple Choice zone and the Random Summation zone data in the output record.

Serial Number Zone

The **Serial Number zone** is used to insert automatically generated serial numbers into the output record. Serial numbers increase or decrease by 1 as each form is processed.

Defining a Serial Number Zone

To create a Serial Number zone, select **Serial Number...** from the **Zones** menu to open the Serial Number dialog box, shown in Figure 3.15. The **Number of digits** is the width of the serial number field in the output record.

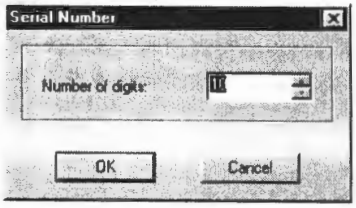


Figure 3.15 The Serial Number Dialog Box

Book Number Zone

Book Number zones are used to automatically insert the current book number being processed by the OMR into the output record. The actual book number is created and incremented by the OMR during scanning.

Defining a Book Number Zone

To create a Book Number zone, select **Book number...** from the **Zones** menu. The **Number of digits** is the field length of the book number in the output record.

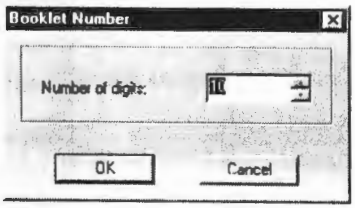


Figure 3.16 The Booklet Number Dialog Box

Batch Number Zone

Like Book Number zones, **Batch Number zones** automatically insert the current batch number into the output record. The batch number represents single or booklet forms scanned into one file. It is created and incremented by the OMR during scanning.

Defining a Batch Number Zone

To create a Batch Number zone, select **Batch number...** from the **Zones** menu. The **Number of digits** specifies the field length of the batch number in the output record.

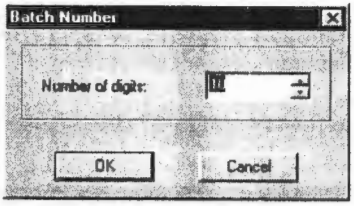


Figure 3.17 The Batch Number Dialog Box

Barcode Zone

The **Barcode zone** can be used only with scanners capable of reading barcodes. Consult your scanner manual if you are unsure whether your OMR scans barcodes.

Defining a Barcode Zone

To create a Barcode zone, select **Barcode zone** from the **Zones** menu.

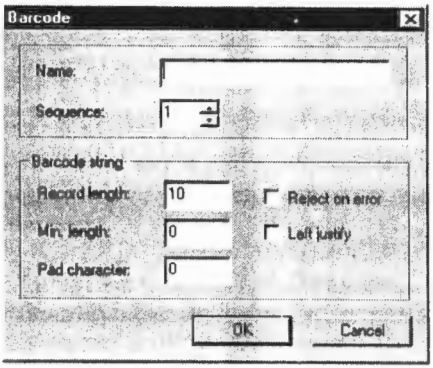


Figure 3.18 The Barcode Dialog Box

Barcode Zone Options

Name

The zone name text box is used to name each defined zone. Naming a zone is optional but recommended.

Sequence

The sequence number indexes the barcode currently being defined when there are multiple barcodes on the form.

Record Length

The Record length text box defines the size of the field in the output record. This varies depending on the information encoded on the barcode. The barcode may represent numeric data with a fixed width (e.g. an ID number), or alphanumeric data with a variable width (e.g. a name). A total of 117 characters can be used on all barcodes on a form.

Minimum length

This value specifies the length of the barcode and instructs the scanner to verify that the barcode scanned is at least this length. If this value is zero, no checking is done.

Pad character

If the barcode is less than the zone element width, the Pad character is used to pad the field in the output record.

Reject on error

If this option is checked and the minimum criteria have not been met, the OMR rejects the form.

Left justify

By default, barcode data is right justified within the barcode field of the output record. Checking this box left justifies this barcode data.

Filler Zone

Filler zones are used to repeat an internally generated character a particular number of times in the output record. Filler zones are typically used to improve readability.

Defining a Filler Zone

To create a Filler zone, select **Filler...** from the **Zones** menu. The **Number of chars** specifies how many times the **Character** will repeat in the output record.

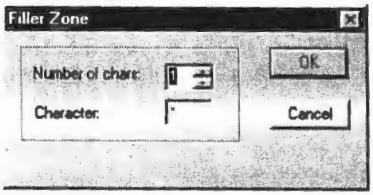


Figure 3.19 The Filter Zone Dialog Box

Scantron Zone

The **Scantron zone** is used when a host computer, rather than the scanner translates the output data. Instead of individual zones defined on a form, the entire form, or a portion of it, is defined as a Scantron zone.

The Scantron zone returns marked or unmarked values in a compressed format and is most often used in the following situations:

- Where a large amount of data (usually everything except the Form ID) is read from the form and a compressed format is more efficient for communication with the host computer.
- With complex forms that require more memory than the scanner has available.
- With very large booklets where there is a significant probability of a user error in form translation. In this case, the data can be retained while the form translation instructions are corrected, thus avoiding the need to re-scan forms.

Using a Binary summation structure, the Scantron zone produces one ASCII character for each 6 choices (or fraction of 6 choices) on a form.

Defining a Scantron Zone

Scantron zones are defined in exactly the same way as Multiple Choice zones, shown in Figure 3.4. When you have finished defining the zone, either by five mouse clicks or by clicking the right mouse button, the Scantron dialog box opens. Naming the zone is optional but recommended.

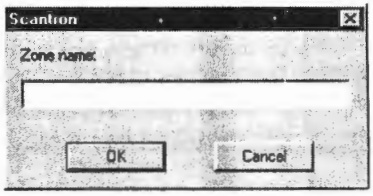


Figure 3.20 The Scantron Dialog Box

Format of Scantron zone data

- Each mark position within the zone returns: 0 (unmarked) or 1 (marked).
- The value from the first choice of the first element is placed in the low order bit (bit 0) of the first byte. Subsequent choices within the first element are placed in the next higher bit until the first six

choices are stored. Bit 6 is always set to the reverse of bit 5 and the high order bit (bit 7) is always set to 1, restricting the range of possible values from 32 - 95 (0x20 - 0x5F).

- The values from each subsequent set of six choices (or part thereof) are placed in subsequent bytes until all choices in the first element are coded.
- The values from the second and subsequent elements then follow, each element starting a new byte.

Scantron zone example

An example of a Scantron zone is shown in Figure 3.21. It consists of 20 questions, one per timing line. Each question has ten possible choices, A through J. Multiple choices are allowed and no spaces occur between choices.

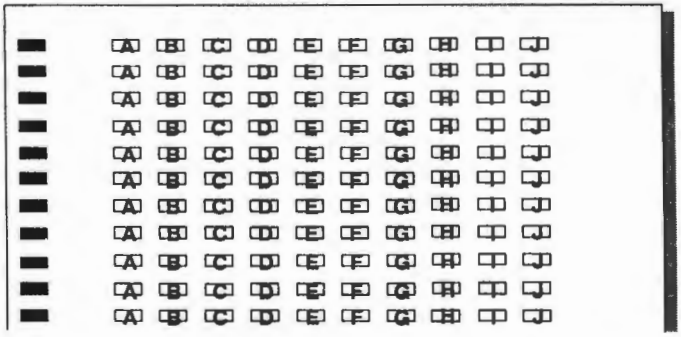


Figure 3.21 A Scantron Zone Example

Only 2 characters are needed to store all possible choices for each element. The first 6 possible choices (A - F) are encoded in the first character, the remaining 4 choices (G - J) are encoded in the second character. The entire zone can be encoded in 22 characters.

Darkness Zone

The **Darkness zone** reports information on the darkness of each of the choices in the zone, returning a value for each choice between 'white paper' (hexadecimal 0) and 'totally black' (hexadecimal F). A Darkness zone is typically defined over the top of another zone, and the darkness

data output is used to assist reading the marked inputs of the underlying zone.

Defining a Darkness Zone

Darkness zones are defined in exactly the same way as Multiple Choice zones. When you have finished defining the zone, either by five mouse clicks or by clicking the **right** mouse button, the Darkness dialog box opens. Naming the zone is optional but recommended.

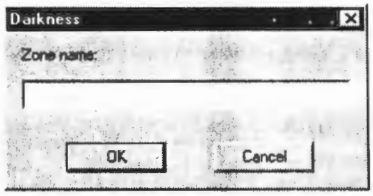


Figure 3.22 The Darkness Dialog Box

Print ASCII Zone

The **Print ASCII zone** defines a rectangular group of elements (containing a minimum of 6 and a maximum of 7 choices), that produce one character per element. Using a decimal structure similar to binary summation, a sum between decimal 32 and decimal 127 for a 7-choice element is converted to a single ASCII character. Where a 6 choice element is used, the decimal sum is between 32 and 63. The individual characters created in each element are used to enter text information in the form definition.

Defining a Print ASCII Zone

Print ASCII zones are defined in exactly the same way as Multiple Choice zones. Remember, Print ASCII zones can only consist of six or seven choices and this limits the way they are created. When you have finished defining the zone, either by five mouse clicks or by clicking the **right** mouse button, the Print ASCII dialog box opens. Naming the zone is optional but recommended.

Print ASCII example

An example of a Print ASCII zone consisting of 8 elements, each containing 7 choices, is shown in Figure 3.24.

The maximum 7 mark positions with a binary summation structure have been used with the decimal values **1**, **2**, **4**, **8**, **16**, **32** and **64**. The form

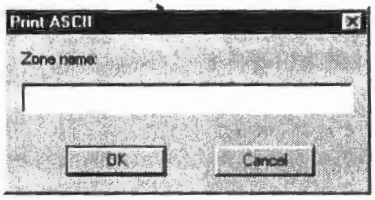


Figure 3.23 The Print ASCII Dialog Box

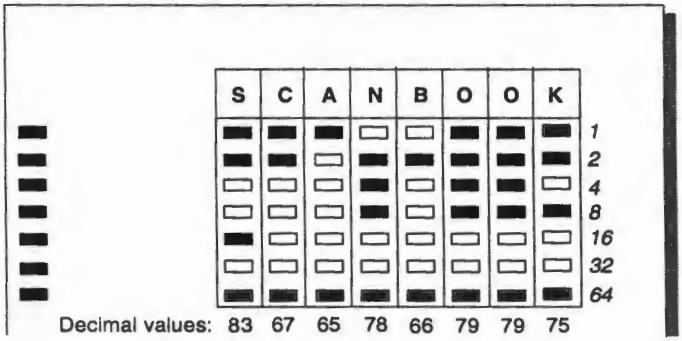


Figure 3.24 Print ASCII Zone Example

marked as above causes the string **SCANBOOK** to be recorded in the output record.

Threshold Zone

The **Threshold zone** sets the optimum darkness level. For a mark position to be considered "marked" the darkness of the mark must be greater than the threshold value.

Scantron OMRs measure the darkness of each mark position on a scale from 0-99. The threshold command sets the value used to evaluate the mark positions for all data zones following the Threshold zone.

The Threshold zone does not apply to zones defined earlier in the form description. However, any number of Threshold zones can be defined.

Defining a Threshold Zone

To create a Threshold zone, select **Threshold zone** from the **Zones** menu. See Figure 3.25.

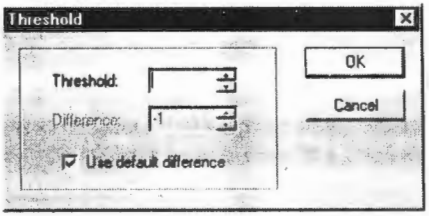


Figure 3.25 The Threshold Zone Dialog Box

Threshold Zone Options

Threshold

The **Threshold** value sets the required darkness threshold for the zones that follow. The default value is encoded within your scanner and differs from machine to machine.

Difference

Where multiple marks are read, the scanner compares their darkness. If the **Use default difference** box is not checked, the difference value is used by the OMR to determine which of the two marks is correct. If the darkness varies by *at least* the **Difference** value, the darker of the marks is selected. If the darkness varies by less than the **Difference** value, a multiple mark character ('?' by default) is placed in the output field.

The **Difference** value is used only in Multiple Choice and Related Choice zones where multiple marks are not allowed. The default difference value varies between OMR models.

Editing Zones

SCANBOOK features powerful editing features that allow you to re-position zones on your form definition and change the zone order.

Resizing a Zone

You can quickly and easily change the number of elements and choices in a Multiple zone. When you select a Multiple zone, large 'handles' appear at each corner of the zone. Click one of these and drag it until the zone has the dimensions you require.

Due to their irregular arrangement, Related zones cannot be resized in this way. However SCANBOOK allows you to quickly add and remove choices from the zone.

Changing Zone Spacing

The distance between choices within an element, and between elements within a Multiple zone, can easily be altered. Because of the uniform regularity of Multiple zones, altering the distance between one choice or one element reshapes the entire zone.

To Change Zone Spacing

1. Double click the zone. The mouse pointer changes to a hand and the Zone Orientation handles appear in the upper-left corner of the zone. For more information on the Zone Orientation handles, see "Zone Orientation" on page 2-6.
2. To change the spacing between choices, click and drag the response shape with the Choice Direction handles (two handles).
3. To change the spacing between elements, click and drag the response shape with the Element Direction handles (four handles).
4. Click the right mouse button to finish changing the zone spacing.

Editing Related Zones

Because of the arbitrary nature of Related zones, the location of each choice must be altered manually once the zone has been defined. You can easily add new choices to, and delete choices from, Related zones.

To Add Choices to a Related Zone

1. Double-click the zone. The mouse pointer changes to a hand.
2. Press the **Insert** key. The mouse pointer changes to a cross hair.
3. Click the new locations for the choices. New choices will be appended to the end of the choice list.
4. Click the right mouse button to finish adding choices.

To Delete Choices from a Related Zone

1. Double-click the zone. The mouse pointer changes to a hand.
2. Select the choice you want to delete and press the **Delete** key.

3 Click the right mouse button to finish deleting choices.

NOTE: If you enlarge the number of choices in a zone, you will need to specify response strings for the new choices in the Zone Properties dialog box.

Copying a Zone

Where two identical zones are to be defined on the same form, it is more efficient to copy and paste the first definition rather than redefine it.

To Copy a Zone to the Clipboard

1 Click anywhere within the source zone. Black 'handles' appear on the edges of the zone to show that it is selected.

2 Select **Copy** from the **Edit** menu, or press **<CTRL+C>**. The zone is copied to the clipboard.

To Paste a Zone from the Clipboard

1 Select **Paste** from the **Edit** menu, or press **<CTRL+V>**.

2 The zone is pasted to the form definition at the same position as the original zone. Click and drag the zone to its new position.

3 Rename the zone.

To Delete a Zone

1 Click anywhere in the zone you wish to delete. Black 'handles' appear around the zone.

2 From the **Edit** menu, select **Delete** or press the Delete key.

Editing Zone Properties

At any time, if you wish to change the properties of a zone, you can open the zone dialog box and edit its properties.

To Edit a Zone

1 Select **Zone List** from the **Edit** menu, or press **<CTRL+L>** to open the Zone List dialog Bexley **Side** column shows the side of the form where the zone appears. The **ID** value represents an internally assigned number to distinguish zones without names.

2 Select the zone you wish to edit and press the **Edit** button. To delete a zone, press the **Delete** button.

TIP: You can edit zone properties by selecting the zone and either pressing **<ALT + ENTER>**, clicking the **right** mouse button or by selecting **Zone Properties** from the **Edit** menu.

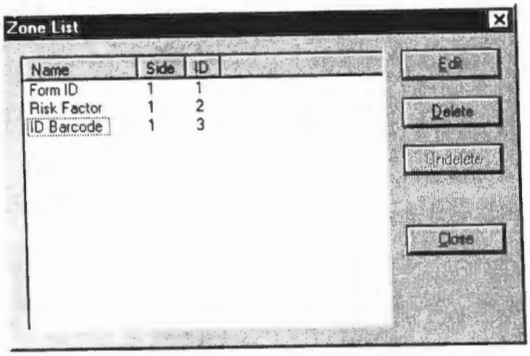


Figure 3.26 The Zone List Dialog Box

Changing the Zone Order

By default, zones are ordered in the sequence of their creation, with zones defined later appearing later in the zone sequence. However, you may need to change the zone order and therefore change the order in which zone data appears in the output record.

To Change the Zone Order

1 Select **Zone Order...** from the **Edit** menu to open the Set Zone Order dialog box.

2 Choose the zone you want to reorder. Press the up or down arrow button to move it up or down the list.

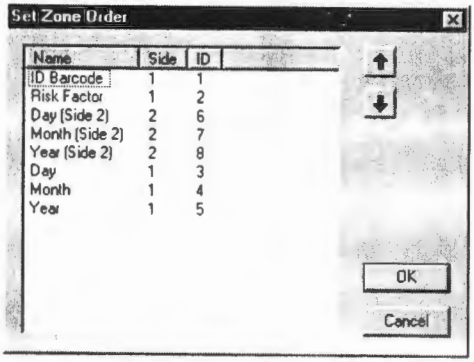


Figure 3.27 The Zone Order Dialog Box

After scanning, the output record will reflect the new zone order. Data from zones on side 1 can appear after data from zones on side 2.

NOTE: Form ID zones cannot be re-ordered. They must always be first in the zone list. Because of this, they do not appear in the Set Zone Order dialog box.

Viewing Your Form

When editing a form definition, you can change the way SCANBOOK displays the form. You can alter the form's magnification, shift the Timing Mark orientation and view the reverse side of the form.

To Change the Form's Magnification

1 From the **View** menu, select **Zoom...**

2 Select one of the following options:

- **Full page** to view the entire page in the window.
- **Page width** to fit the width of the page in the window.
- **Percent** to select a custom magnification.

To Shift the Timing Mark Orientation

1 From the **View** menu, select one of the following options:

- **Left Timing Line** to orient the Timing Line to the left edge of the page.
- **Right Timing Line** to shift the Timing Line to the right edge.

To View the Reverse Side of the Form

1 From the **View** menu, select either **1st Side** or **2nd Side** to view the respective side of the form, or press the **Side 1** or **Side 2** tool button.

Importing Form Definitions

Chapter 4

You have the ability to import existing form definitions. This greatly simplifies the form definition process. In SCANBOOK, you can import forms from three sources:

- a scanner
- FLIPS-OMR form definitions
- `.800` form definitions

Importing From a Scanner

When you import a form definition from a scanner, SCANBOOK creates a template of the form and marks key areas on the form (usually zone boundaries). Using this template, you can then define the types of zones on your form, and instruct SCANBOOK on how to interpret data when your forms are scanned.

When importing from a scanner, you need to mark *zone keypoints* on your form and then use the scanner to import the marked form. These marked keypoints are recognized by SCANBOOK and are displayed in **yellow**. They are to be used as a navigation aid when you create a new form definition.

NOTE: A *zone keypoint* refers to any part of the zone that helps you determine the zone boundaries when the form is imported into SCANBOOK. In Multiple zones, the zone keypoints may be the four corners of the zone. In Related Item zones, you might want to mark each choice as a zone keypoint to help you correctly define the zone.

When you import zone keypoints from a scanner residual, unwanted marks are scanned as well as the marked keypoints. The number of extraneous marks you may scan varies and is caused by text and marks not printed in an OMR *blind color*.

NOTE: OMR *blind colors* are usually in the **red** to **brown** spectrum and are colors that an OMR is unable to read. As such, these colors are used in form design to make the form easy for users to understand, without interfering with the output data required.

Unwanted, residual, marks can be cleaned from a form template by scanning a blank (unmarked) form. SCANBOOK compares the marked form and the blank form and any marks common to both forms are removed. When this process is complete, SCANBOOK displays only the zone keypoints ready for zone definition.

Importing the Definition

Before importing a form using a scanner, connect and configure your scanner. For more information on configuring your scanner, see Appendix A.

You will need two copies of the form you wish to import. Use one to mark zone keypoints and one (blank form) to clear extraneous marks. You now need to mark your zone keypoints. Because this process sets up a template, mark the choices that outline the zones on your form.

From the **File** menu, select **Import from OMR...** The Scanner Import dialog box opens.

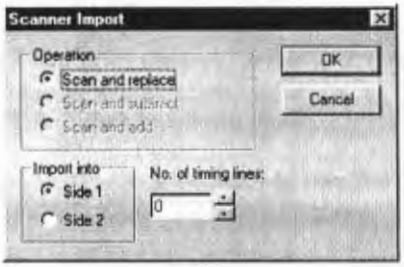


Figure 4.1 The Scanner Import Dialog Box

Scanner Import Options

The following options are available from the Scanner Import dialog box:

Scan and replace

Once the zone keypoints have been marked, this is the first step to import a form from a scanner.

Depending on the structure and color of the form being scanned, there will usually be a clean template showing the marked keypoints plus unwanted marks that need to be cleared.

We recommend you define the Form ID and any other fixed marks before you scan and subtract. Otherwise, these marks will be lost.

Scan and subtract

Once the **Scan and replace** is completed and marks on the form are visible in SCANBOOK, scan an unmarked form. Clearing extraneous detail from the form leaves only those marks needed for definition.

Scan and add

If you erased an ID Zone or other fixed marks in the **Scan and subtract** process, use this feature to restore them.

Import into

This specifies the side of the form you are currently scanning.

Number of timing lines

This specifies the number of timing lines on the scanned form. If some part of the form has been previously defined, this reports the number of

timing lines defined in the Form Header dialog box. If you are scanning a new form, count the number of timing lines and enter it here.

Scanning the Form

When you scan a form, SCANBOOK reads the form and displays the zone keypoints in **yellow**. If there are previously defined zones on your form, these display in **red**.

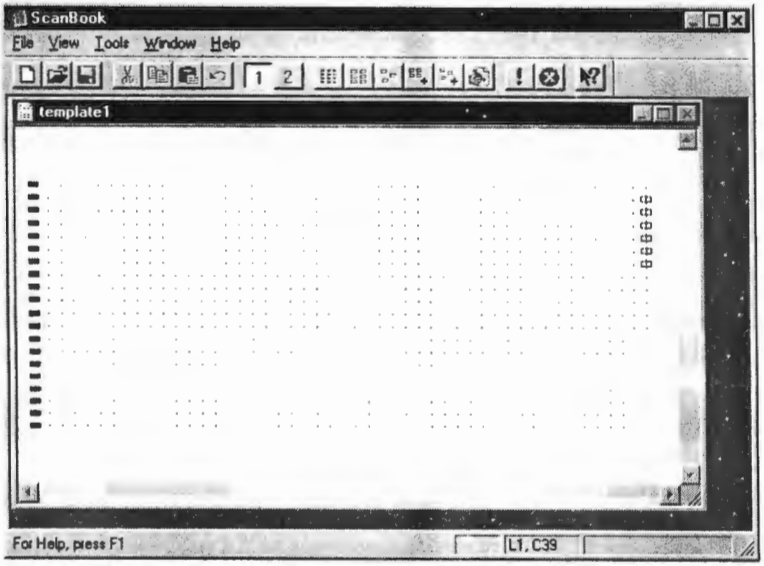


Figure 4.2 A SCANBOOK Template

There may be a number of extraneous, unwanted marks caused by the scanner detecting other graphics and non-blind colors on the form. These are removed by selecting **Scan and subtract** from the Scanner Import dialog box and scanning the blank, unmarked form.

Defining a Scanned Zone

Once a form is scanned, you can use the keypoints marked on the form as a navigation aid to define various zones. The process of form definition is exactly the same as defining a form from scratch.

Once a zone has been defined, you can move the zone to the template and erase the zone from the form definition by selecting **Move to template** from the **Edit** menu. Similarly, you can delete the template by selecting **Delete template** from the **Edit** menu.

Importing a FLIPS-OMR Definition

You can directly import forms designed using FLIPS-OMR. FLIPS-OMR is a software application used extensively to design OMR forms.

NOTE: If you do not intend to use the FLIPS-OMR application, you can skip this section.

It is expected that, in most cases, a FLIPS-OMR definition will be imported directly from an installed copy of the application.

To Import a FLIPS-OMR Definition

1. From the **File** menu, select **Import form...**
2. From the **Files of type** list box, choose whether you will be importing a form from FLIPS-OMR for DOS (`.DEF` file) or FLIPS-OMR for Windows (`.FRM` file).
3. Navigate to your file and select **Open** to begin importing.

The FLIPS-OMR Template

The advantage of importing from a FLIPS-OMR definition is that SCANBOOK automatically creates the zones for you and associates the relative text with the response shapes.

NOTE: When SCANBOOK creates zone types as it imports your form, it always creates either a Multiple Choice or Related Item zone. If you wish to use a Multiple Summation or Related Summation zone, you need to manually create them.

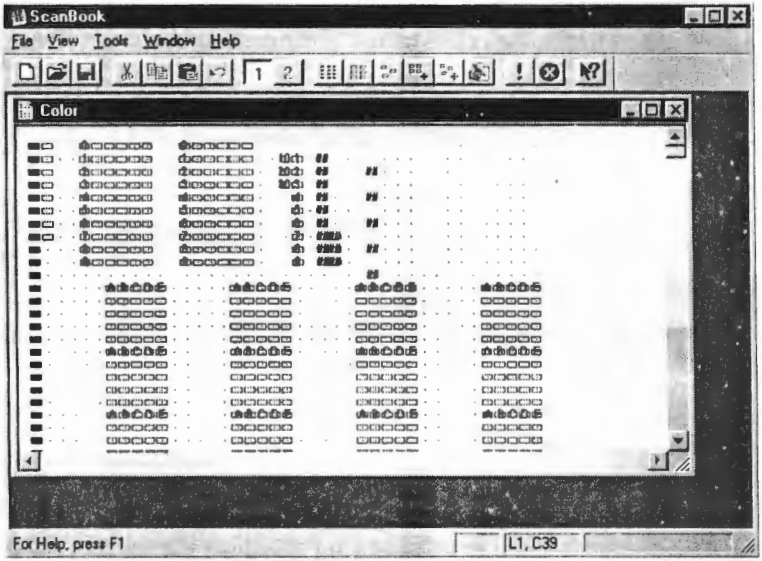


Figure 4.3 An Imported FLIPS-OMR Definition

Converting .800 Files

You can import and convert files created by previous versions of ScanBook *for Windows* (`.800`) into the new file format (`.sh`) retaining all the form and zone information. If you maintain an extensive library of old ScanBook *for Windows* forms, you can batch convert these to the new format quickly and easily. However, if you only occasionally need to access `.800` files, these can be directly imported into SCANBOOK for editing and processing in the same way the FLIPS-OMR are.

To Batch Convert .800 Files

1. From the File menu, select **Convert 800 files...**
2. Select the files you wish to convert, either by dragging a marquee around them or by holding down the CTRL key and clicking each file.
3. Select **Open**. The Browse for Folder dialog box opens.

4 Select the location for the converted forms (.sh files) and click OK.

NOTE: If the forms you are converting are booklet pages, the Insertion zone that defines the page number is no longer needed and should be removed. SCANBOOK now tracks this information internally.

Exporting Files

SCANBOOK can produce files compatible with previous versions of ScanBook *for Windows* (`.800`). When exporting booklet definitions, ScanBook strips the Insertion zone that defines the page number. The BookDef module of ScanBook *for Windows* re-creates this zone within `.800` files automatically.

To Export Files to .800 Format

1 From the **File** menu, select **Export...**

2 Choose a file name for the exported form and select **OK**.

Job Definition

Chapter 5

Before you begin scanning, you need to instruct SCANBOOK to interact with your scanner to retrieve data. You do this by setting up a Job that defines these settings:

- A list of the forms to be processed (mandatory)
- The name of the file to store the results of the scanning session (if no file is defined, data is not saved)
- The starting Serial, Booklet and Batch numbers
- Your OMR configuration
- Any messages you want printed on the forms as they are scanned
- Special characters used to represent errors and other contingencies

Creating a Job Definition

To Create a Job Definition

You can define and save your Job settings by beginning a new job.

1 Select **New** from the **File** menu

2 Choose **Job definition** from the available list.

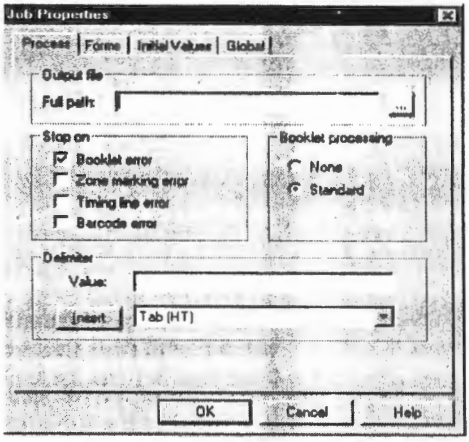


Figure 5.1 The Job Properties Dialog Box - Process Tab

Process Options

From the **Process** tab you define these settings:

Output file

This is the full path to the file that contains the results of a scanning session.

Stop on

This defines the error conditions under which SCANBOOK will stop the scanning job.

- **Booklet error** pauses the job if forms in a defined booklet are received out of sequence. For more information about booklets, see "Forms Options" on page 5-3.
- **Zone marking error** pauses the job if multiple marks are scanned in a zone specifically configured to reject multiple marks.
- **Timing line error** pauses the job if the number of timing lines scanned by the OMR is unequal to the number of timing lines defined in the Form Header zone.
- **Barcode error** pauses the job if the OMR cannot scan barcodes that have been defined in the form definition.

Booklet processing

This specifies if you will be processing many forms as a booklet. For more information about booklet processing, see "Forms Options" on page 5-3.

Delimiter

The delimiter is the character that is inserted between fields in the output record. Typically, a comma is used. However you can choose any character or series of characters. To use tab characters, carriage returns or line feeds, use the list box to choose the character and then select **Insert**.

Forms Options

The **Forms** tab of the Job Properties dialog box controls the forms to be scanned in this job. Also, you can configure booklet processing from this tab.

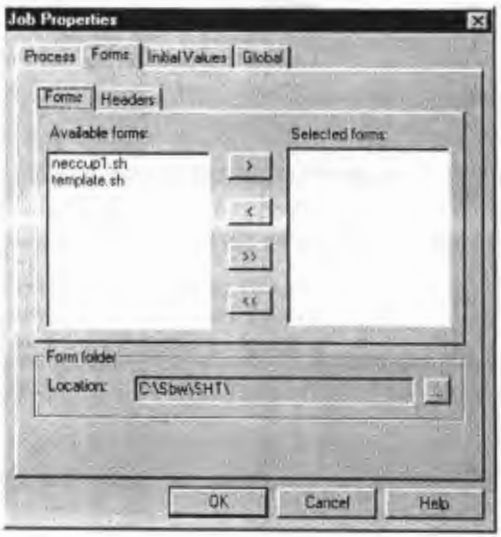


Figure 5.2 Job Properties Dialog Box - Forms Tab

SCANBOOK provides a Booklet facility to verify that pages are scanned in a defined order and to combine multiple forms into a single data record. When you define a booklet, you group together multiple forms into a structure that your OMR can recognize.

A booklet contains two important elements:

- Header sheets (optional)
- Booklet pages (forms)

Header sheets contain information relating to a batch of booklet pages, such as the date the data was collected, the name of the collector and the location the data was collected. The header sheet is a form.

Booklet pages are the multiple forms contained in a survey booklet. The scanned data from each booklet page is joined to create a single data record. Booklet pages are usually identified in a Form ID zone.

NOTE: Form ID zones for each booklet page are only required if two or more forms in the booklet share the *same number of timing lines*. If each booklet page uses a different number of timing lines, SCANBOOK is able to determine the page being scanned.

To create a booklet, select the **Standard Booklet processing** option from the **Process** tab and select the appropriate files from the **Forms** tab.

Figure 5.3 shows a survey booklet of one header page and three booklet pages.

When you have completed configuring your job, the booklet is displayed in the job window.

Booklet processing provides convenience when you have to process a number of forms that can be logically grouped together. If you are processing single forms, it is unnecessary to define a booklet.

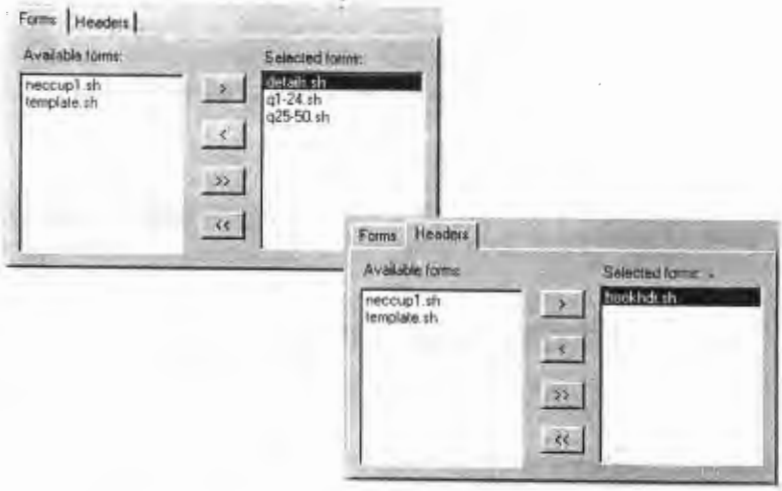


Figure 5.3 A Sample Booklet Definition

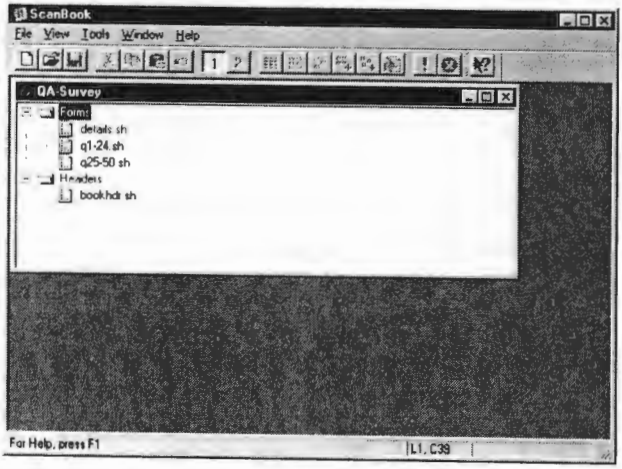


Figure 5.4 A Booklet Job Definition

Initial Values Options

The **Initial values** tab of the Job Properties dialog box contains the settings returned from, or printed by, your scanner. Some OMR models include printers that optionally print messages on forms as they are scanned. All scanners have the ability to insert serial numbers in the data records, and some scanners can insert booklet and batch numbers when those zones are defined.

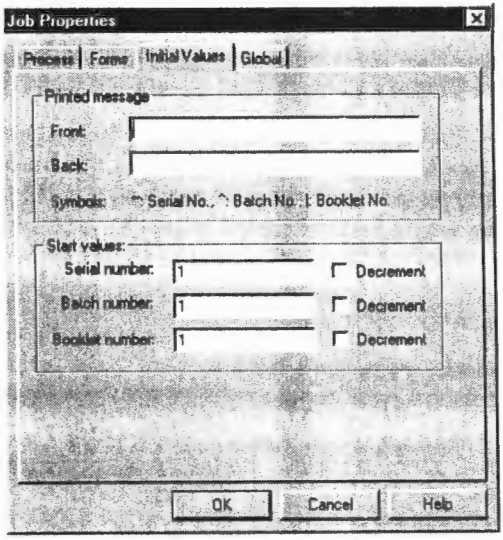


Figure 5.5 The Job Properties Dialog Box - Initial Values Tab

Printed message

If your scanner has a printer, and you have chosen the proper scanner options (see Appendix A, ""), you can print a message on your forms as they are scanned. If a serial, booklet or batch number is required as part of the message, the relevant symbol should be entered. Multiple symbols (such as ^^) have the effect of padding the number with leading zeros.

For example, entering:

```
Batch: ^^^, Booklet: |||, Number: ~~~~~
```

prints:

```
Batch: 001, Booklet: 001, Number: 00001
```

on the first form scanned.

Start values

You can set the initial values of the Batch, Booklet, and Serial numbers and determine whether the numbers will increment or decrement after each form is scanned. These start values are used for both printed messages, and for their respective zones on your form.

Global Options

Global options control the specific characters that are entered in the output record when particular situations arise. It is rare that these settings should be changed.

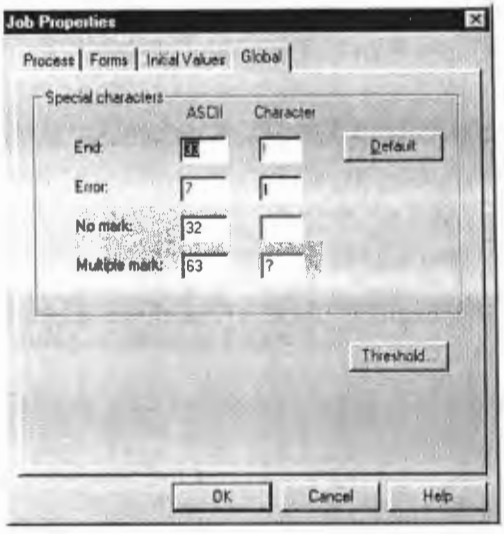


Figure 5.6 The Job Properties Dialog Box - Global Tab

In this tab, you can enter either the particular ASCII value, or simply type the character you want to appear in the output record.

End

This character signals the end of a processing job (default is '!').

Error

This character is inserted if an error (terminating or non-terminating) is encountered during scanning (default is <BELL>).

No mark

This character is inserted into the output record when no mark has been detected in a zone element (default is **<space>**).

Multiple mark

If multiple marks have been detected in a zone specified to reject multiple marks, this character is inserted in the output record (default is '?').

Threshold

The global threshold value is applied to all zones not affected by a Threshold zone. For more information on threshold values, see "Defining a Threshold Zone" on page 3-23.

Scanning Forms with SCANBOOK

Chapter 6

Once the forms you wish to scan are defined, and scanning jobs created within SCANBOOK, you are now ready to begin scanning form data.

Scanning Form Data

During processing, SCANBOOK receives data from the OMR and displays it in the Process Log window as it writes the data to the file. Each line in the Process Log window represents a single record (booklet or form), as shown in Figure 6.1.

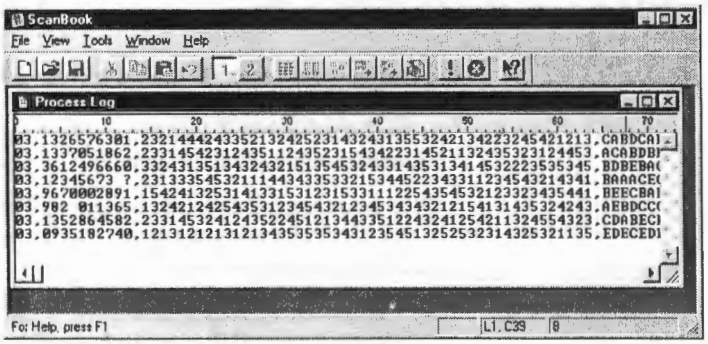


Figure 6.1 A Sample Process Log

Before you begin scanning, you need to download the form definitions to the scanner.

With SCANBOOK, you achieve this in two ways:

- To download your forms and begin scanning, activate the job definition window and select **Scan Job** from the **Process** menu or click the **Run Job** tool button. The form is sent to your OMR and your OMR is instructed to start scanning forms immediately.
- To download forms, select **Download** from the **Process** menu. Your scanner will not begin to scan forms until you send the **Scan!** instruction from the **Process** menu.

NOTE: To clear all the form definitions currently in your scanner, select **Reset** from the **Process** menu. Downloading new form definitions, automatically resets your scanner and overwrites existing definitions.

To stop scanning forms and save the collected data to a file, select **Stop** from the **Process** menu, click the **Stop** tool button, or press the 'End' button on your scanner. It may be necessary to press the 'End' button on the scanner, or the scanner may refuse to accept new forms and return a **Scanner not ready** error.

Analyzing Scanned Data

Turning the scanned data into meaningful information is the most important stage of the data collection process. The structure of the record is such that scanned data can easily be imported into a database or spreadsheet program, or analyzed by purpose-built software.

When you export data into an output file, SCANBOOK follows consistent rules. Understanding these rules will help you translate the scanned data into the format *you* want:

- Regardless of the extension you gave your output file when creating a job, scanned data will *always* be saved in a plain-text (ASCII) format and can be viewed with an ordinary text viewer, such as Microsoft's Notepad.
- Data from each element in a zone will *always* appear in the same place within a record, even if elements or zones before it have not been completed on the form. The **No mark** character will be used

where data is not scanned. For example, in the scanning results shown in Figure 6.1, the mark from the first element in the fourth zone will *always* be located at position 65 on each line of the output file.

- A delimiter is *never* placed at the end of the last field of the record. Each record is always terminated with a carriage-return/line-feed character pair (0x0D/0x0A).
- *Never* choose a character as a delimiter that will appear as response text. For example, if you have a zone that uses response characters 'A' to 'C', never choose character 'C' as a delimiter. Most applications recognize commas or tabs as default delimiters.
- Think about how you will analyze your data and ensure your output record is structured accordingly. If you plan to import information into a database or spreadsheet, remember to insert delimiters at the appropriate places so that the application can correctly extract fields from your record.

Scanner Configuration Options

Appendix A

Before scanning forms, you need to configure your scanner. To configure SCANBOOK, you specify the COM port settings of your computer and OMR model, as well as any peripherals.

COM Port

The COM port options specify the settings SCANBOOK uses to communicate with the OMR.

To configure this information, select **Scanner options...** from the **Tools** menu.

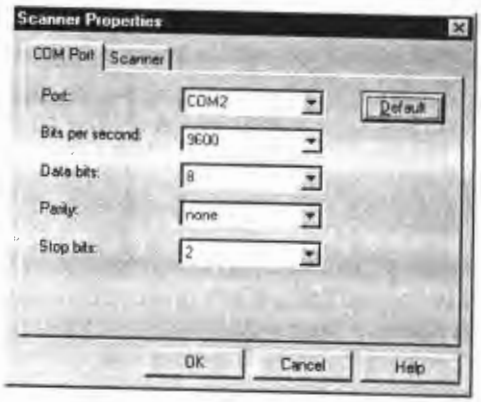


Figure A.1 COM Port Settings

COM Port Options

Port

This selects the communications port on your PC that the OMR is attached to. By default, this is COM2.

Bits per second

This determines the speed at which data is transferred between the OMR and your PC.

Data bits

This sets the number of data bits for each character and is 8 by default.

Parity

This setting determines the type of parity required for transmitting data.

Stop bits

This sets the number of stop bits needed to terminate a character.

NOTE: The COM port settings cannot be detected by SCANBOOK and must be set manually. Default settings can always be restored by selecting the **Default** button.

Scanner

The options on the **Scanner** tab of the Scanner Properties dialog box set configuration options for the type and model of the scanner you are using.

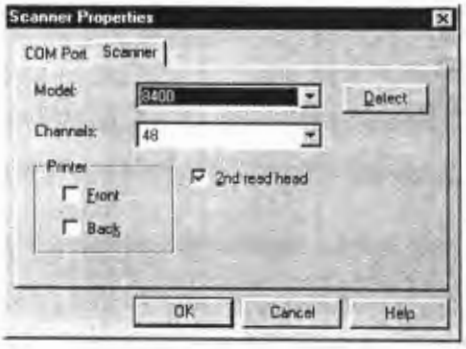


Figure A.2 Scanner Settings

Scanner Configuration Options

Model

This list box contains the Scantron OMR models supported by SCANBOOK.

Channels

This sets the number of channels the scanner is able to read. Consult your OMR manual for this setting.

2nd readhead

If your OMR has a second readhead, this box enables its use.

Printer Front and Back

This sets the type of printer contained within the scanner.

NOTE: Your scanner model, number of channels and number of readheads can be detected automatically by SCANBOOK by pressing the **Detect** button. Your printer settings must be manually specified. Consult your OMR manual for the capabilities of your scanner.

Error Messages

Appendix B

When scanning forms, error messages returned by the scanner are displayed in the Process Log window. SCANBOOK may halt the scanning job, if it has been instructed to do so.

These are the error messages SCANBOOK may encounter:

Error Message	Probable cause and recommended action
Timing line count error or no Form ID	Either a different number of timing lines from that specified in the Form Header zone is encountered or an error is detected with the scanned form ID. Either no ID has been detected where one should be, or the ID is unequal to the one specified on the form definition. Double-check the form's ID with definition to ensure they both match and count the number of timing lines on the offending form.
Zone marking error	A zone has been marked in a way that contradicts expectations. If multiple marks are not allowed, a zone element may have been marked twice. If missing marks are not allowed, a zone element may not have been marked. Compare the offending zone marking with the expected behavior defined in the zone properties on the form definition to ensure compliance.
Barcode error	A barcode on your form has caused an error. Either the barcode type is not recognized by your scanner or it has been misprinted. Confirm the barcode can be read by your scanner and check its authenticity by scanning it using another barcode reader.

The Terminal Tool

Appendix C

SCANBOOK offers features that allow you to directly communicate with your scanner and to monitor the raw data your scanner returns. These features are available for advanced users who wish to trace an error in scanner communication or directly interrogate the scanner firmware.

The Terminal tool provides a direct interface for communicating with your scanner. Keystrokes you enter into the terminal window are relayed directly to your scanner and responses to your commands are displayed. Figure C.1 shows an example terminal session.

NOTE: Because you directly communicate with the firmware, we recommend you only issue commands your firmware supports. For more information on the commands your firmware supports, consult the scanner's programmer's reference.

The Terminal window has two panels. The top panel reports filtered I/O while the bottom panel reports raw binary throughput from the serial port. By default, the bottom panel is hidden when the Terminal

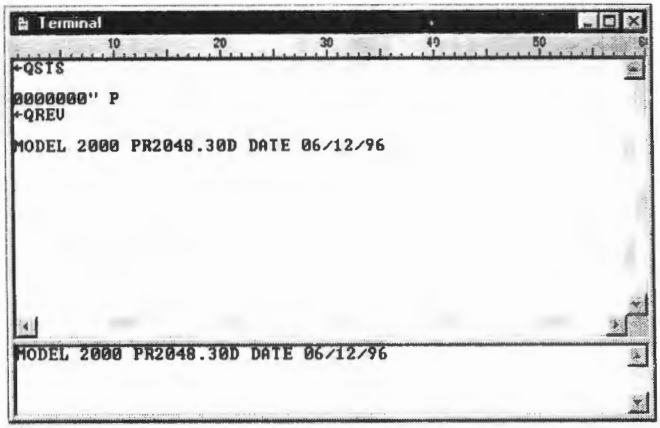
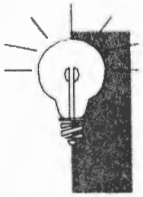


Figure C.1 The Terminal Window

window is open. To view the bottom panel, click the bottom edge of the top panel and drag the separator upwards.



TIP: The raw binary throughput panel is also available from the Process Log window. You can directly monitor the data sent from your OMR during a scanning job.

Glossary

Barcode	An encoded image representing specific data, designed to be scanned.
Barcode Zone	Used to insert barcode data into an output record.
BCD	Binary Coded Decimal is a way of representing numbers in their binary format.
Bin Sum	Binary Summation (Bin Sum) is the most efficient way to capture and store large numbers in a relatively small amount of space. The value of each choice doubles from the previous choice.
Booklet	A defined series of forms and their associated headers read in sequence by a scanner.
Choice	A single mark position, denoted by a response shape, within a zone element.
Comment Zone	Provides a method of documenting a form (ignored by an OMR).
Darkness Level	The density or darkness of a mark. For a mark position to be valid, the darkness of the mark must be above a preset threshold value.
Darkness Zone	Provides specific controls to determine the darkness level of the marks in a given zone.
Delimiter	A character inserted between output fields to assist in the portability of the output file to a database or spreadsheet program.
Difference Value	A value that enables an OMR to determine which of two marks is the most likely correct choice.
Element	A set of one or more mark positions (choices).

Field	An element of a record representing data collected from a zone.
Headers	Forms containing specific information relating to a batch of other forms that will follow in sequence. Headers are used with booklets to provide information applicable to the booklet pages that follow.
ID Zone	Used to identify a particular form in a booklet when other forms in the booklet share the same number of timing lines. ID zones usually correspond to pre-printed marks on the form.
Insertion Zone	Used to insert fixed text into data records.
Job	A set of form, scanner, and output definitions required to collect data from a scanner.
Keypoints	Specific extremes of a zone that are marked on a scannable form. Keypunches create a template after a form is imported using a scanner. This template can then be used as a navigation aid to define zones.
Multiple Choice Zone	A matrix-format zone type used to enter alphabetical and numerical data. The most common zone type.
Multiple Summation Zone	A matrix-format zone type used to enter numeric values by marking a combination of choices that are then added (summed) when scanned.
OMR	Optical Mark Reader - a scanning device.
Output File	The file to which the results of scanning are stored.
Parity	A communications setting used for error detection.
Print ASCII Zone	Uses a 6- or 7-choice ASCII format to allow encoded values on forms.
Random Summation Zone	Used to enter numerical values by marking a combination of random mark positions that are then added (summed) when scanned.
Record	A collection of data fields that represent the results of one scanned form or booklet.

Related Item Zone Used to establish relationships between mark positions that are irregularly spaced on a form.

Scanner A hardware device used to detect marks on paper, *see* OMR.

Scantron Zone Allows zone information to be compressed by the scanner before transmission (and subsequent decoding) by SCANBOOK.

Serial Number Zone Generates a unique number that is inserted into the output data record.

Threshold Value A value, between 1 and 99, that sets the optimum threshold for the form.

Threshold Zone Used to determine the validity of marks. This zone temporarily overrides the current Threshold value.

Timing Mark A black mark at the edge of each form that instructs the scanner to read data from that position on the form.

Zone A data field with an output record, usually derived from specific mark positions on an OMR form.

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