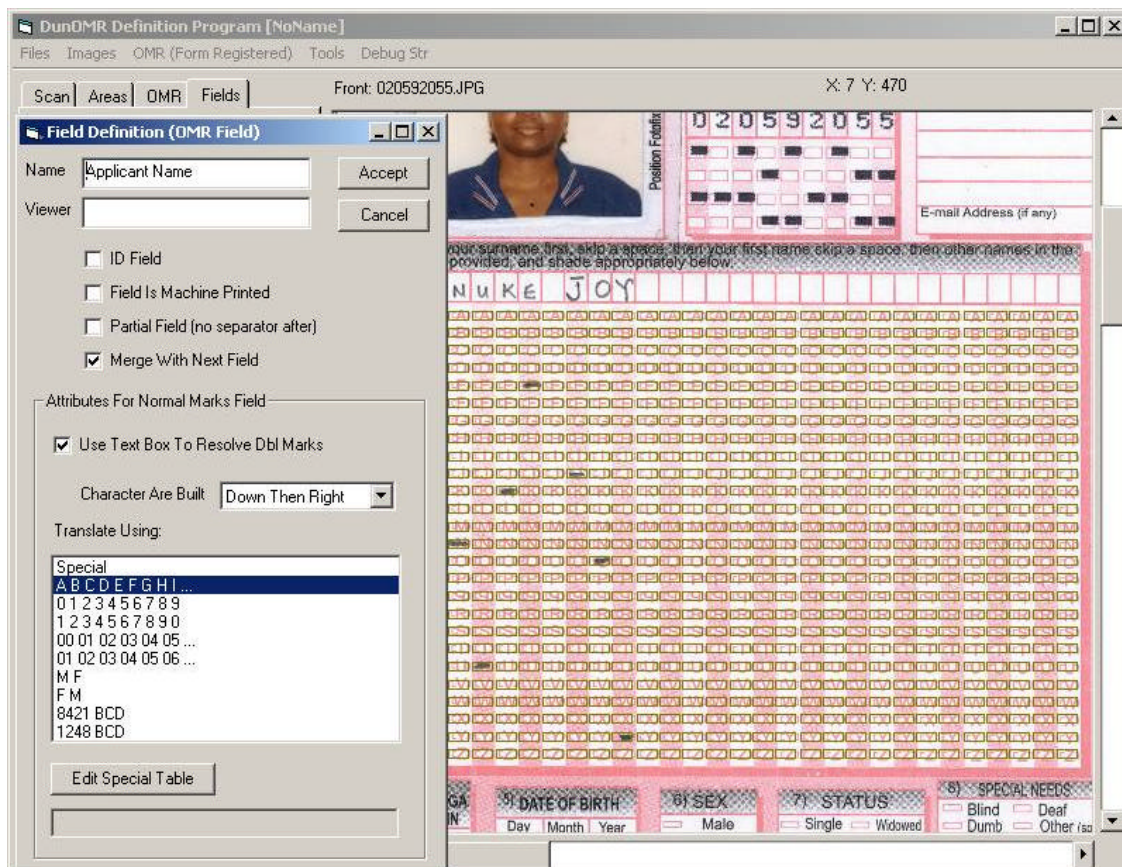




The Form Definition Program

Forms are defined using the form definition program. It relies on forms scanned in colors. Fields are defined by roping around them with the mouse. For traditional forms with timing marks, the program calculates the field coordinates itself.



Example of Form Definition program

In addition to the OMR recognition areas, the definition program can be used to identify non-OMR areas such as photographs, drawings or text as well as the way to save them. Depending on the scanner used, sub-areas can be saved in color, grayscale or black-and-white.

The form definition program will create a "color only" form that will be used in conjunction with the Error form edit program.



The Error Form Edit Program

High speed dedicated OMR scanners usually have one stacker for good forms and one stacker for error forms. Although generally considered advantageous, the error stacker can induce a burden on the workflow because original paper forms have to be manually handled again in order to complete the process.

Dunord's Edit Program makes the workflow more efficient by managing the errors electronically. It works by overlaying the black-and-white OMR form on top of the overlay form created in the Form Definition Program.

The screenshot displays the Dunord Edit Program interface. At the top, a ribbon bar shows the number '1', '22', and '9801203'. Below this is a large grid of bubbles representing the OMR form. On the left side, there is a sidebar with a list of fields: First Name, Middle Initial, Surname, Gender, Id Number, Age, Date Of Birth, Address Numeric, Address Alpha, Photo Number, OCP, Polling Unit, Reg. Area, LGA, and State. The 'Date Of Birth' field is highlighted with a red 'X'. Below the sidebar, there are two circular markers labeled 'LEFT THUMB' and 'RIGHT THUMB'. At the bottom, there are four specific fields: GENDER (Male/Female), ID NUMBER, AGE (22), and DATE OF BIRTH (19801203). The 'DATE OF BIRTH' field shows a missing character in the first position of the year, which is indicated by a missing bubble in the grid.

Combined template and completed form

As can be seen from the above image, when the completed form is combined with the template, the first digit of the 'year' field on the bottom right hand side of the form was not marked in. At the top in the completion 'ribbon bar' the missing character is clearly indicated (top right). In many cases the Dunord solution will be able to automatically complete this character via ICR from the interpreted character in the box.

Traditional OMR scanners depend on using high quality fixed weight (typically 24lb uncoated) paper with a fine weave and timing marks to control their feeding. This allows for specialized tuning of the scanners in order to get high quality read results.

Document scanners in contrast are designed to allow for the capture of a wide variety of paper and image types, from onionskin to card stock, but because of this their feeders have looser tolerances. In addition the pickup and feed rollers tend to stretch or twist the image slightly. As a result images have to be normalized in different ways in order to fit a template -- Dunord's scan program not only controls the scanner at high speed, but also normalizes the images in order to achieve a high and reliable OMR decode rate.

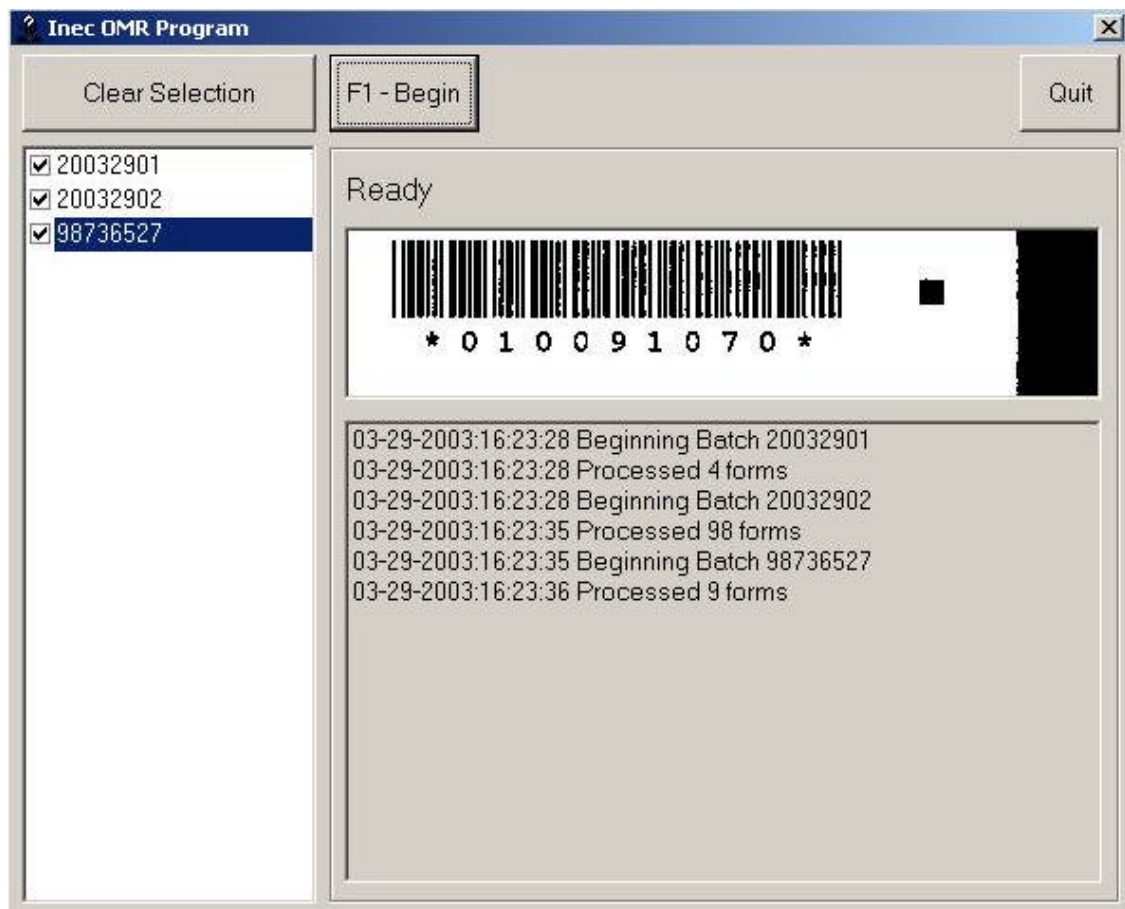


Example of Scan program



The OMR batch program and Engine

For very large volume applications, it might be desirable to do the OMR interpretation in a separate step. The OMR batch program is a stand alone "worker" that monitors semaphore files in order to process batches of forms.



Example of Batch Processing program

Each form processed by the OMR engine is virtually de-skewed before the marks' edges are located and evaluated. The OMR Engine automatically adjusts its sensitivity to the form being processed. If text boxes are used in addition to the marks, the engine will try to resolve double marks and orphans.