

PhotoScribe® Series

PS960 Image Mark Reader
world leading 'real time' data capture technology



PS960 Image Mark Reader

Real time data capture technology

The PS960 is built on the PhotoScribe® technology and encapsulates the latest developments in high volume data capture. Designed and manufactured by DRS in Milton Keynes, it can be provided as an integral element in one-off data capture projects or can be provided for outright purchase for continual on-site use.

As a robust network-ready reader, the PS960 is typically used for large volume data capture and imaging exercises such as census projects, examination processing, voter registration and complex ballot counts.



A Holistic Approach

DRS takes a holistic approach to time-critical, complex, high volume data capture and although the PS960 has been designed to handle most paper form types, it is primarily intended for use with forms designed for electronic data capture. That is, printed on high quality paper with form design elements that assist quality checking during scanning.

As part of its service offering, DRS provides a specialist and highly qualified forms design and print facility experienced in producing such high quality forms to ensure efficiency and accuracy are maintained throughout the data capture exercise.

Real Time Data Capture

The key distinguishing capability of the PS960 over traditional document scanners and readers is 'real time data capture'. Unlike conventional imaging scanners or readers which only produce an image, from which data is later extracted, the PS960 allows an application to retrieve data and images from a form while it is still in the reader. The results can be used to control which output stacker a form goes to or to control what is overprinted on the form. It can even be used to take further conditional actions and collect additional data and images depending on the results retrieved.

This is a very powerful concept that makes the PS960 extremely flexible for demanding data capture tasks. It ensures error correction costs are minimised and accuracy is maximised, whilst sustaining an industry-leading throughput of up to 150 A4 pages per minute with an unlimited duty cycle.

Networked or Non Networked

The PS960 software technology is built around Windows® XP Professional. This makes it very easy to integrate into any standard networked IT environment, retaining all of the usual security features and access control.

From an Administrator's point of view, the PS960 is a PC on the network. It can also be used standalone where data may be stored directly to its fast, high-capacity internal drive and exported via memory stick or by writing data to the integral CD writer.

Scanning Intelligence

Application specific validation, flow control and general data processing are provided by the software being used to control the reader. However, the firmware in the PS960 handles all interaction with its operator so that the application does not have to deal with the complexities of handling multiple sheets and exception processing. Although multiple complex operations are running simultaneously in the background, the PhotoScribe® interface presents a very simple model of 'one sheet at a time' to the software.

Data Options

The PS960 offers an unprecedented range of data capture capabilities, some standard and some optional. Examples of the types of information that can be extracted from a form and actions that can be applied include:

- Full duplex bitonal or greyscale images and clips
- Various barcode formats
- Raw optical marks or decoded marks (backward compatible Optical Mark Recognition)
- Optional real time Optical Character Recognition
- Optional carriage printing (printing data on the form)
- Optional stacker extensions allowing for use of forms up to 18".

Efficient and Effective

The seconds wasted on clearing paper jams can add significantly to the schedule in large-scale data collection exercises. If an exception occurs it is imperative that it is both detected and resolved as quickly as possible. The PS960 has been designed with an open paper path to allow for quick and easy resolution of transport issues. Its aim is to ensure overall throughput is maintained at the highest possible levels. Similarly, consumable items, such as the rubber transport wheels or carriage printer ink are easily accessible and user-replaceable, without any need for downtime.

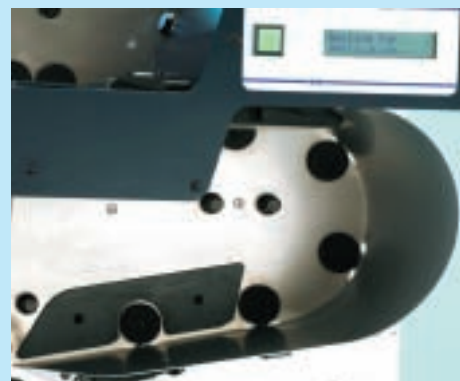
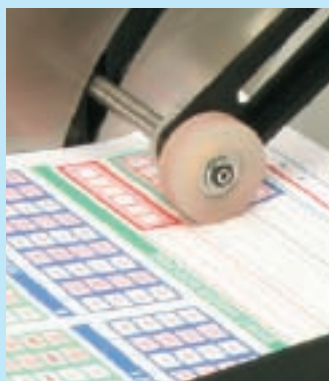
Doubles Detection and Removal System

The design of the doubles detector has been proven by DRS over many years and guarantees two pieces of paper will never be drawn into the reader and scanned at the same time. This is very important as it reduces the need for costly and time-consuming corrective actions later in the process.

The PS960 not only detects double feeds instantly, but it also automatically refeeds the sheets through the reader using the built-in doubles removal system. This is a mechanism that simply pulls double feeds back into the input hopper and rescans. This further improves throughput by ensuring a reader is not sat idle waiting for a busy operator to remove double sheets and refeed them.

High Capacity

A high capacity input hopper and primary output stacker reduce the amount of loading and unloading of forms. The second and third stackers are used for application specific purposes and ensure that the main processing can continue at speed. The hopper and stackers are adjustable for a range of paper sizes and ensure the straightest possible stacks are collected. This helps retain the forms in excellent condition should further processing be required.





Quality Approach

Images

The PS960 boasts an impressive array of sophisticated features to ensure consistent, high quality images are captured. It typically employs 200dpi Contact Image Sensors using red illumination. This supports OMR capabilities by providing the 'dropout' colour required for OMR forms, and also delivers excellent greyscale images for standard imaging applications.

Quality checks are applied in real time as each page is processed within the reader. The aim is to ensure data correction is eliminated wherever possible and that quality issues are detected and resolved at source. The reader will detect problems like image skew, torn forms and dirt on the read-head and this is reported to the scanning application so that the form can be out-sorted for a rescan, or separate exception processing.

Dynamic Normalisation

Dynamic Normalisation ensures the background of a form is clean and white while protecting foreground content such as faint marks and writing. This standard feature ensures text and images are always of the best possible contrast and quality. In addition, a clean white background will compress far better than an image that has not been processed this way, thus reducing total data storage needs and bandwidth requirements.

Key Data Capture Options

OMR

Although the PS960 employs an imaging read-head, it is still a fully functional Optical Mark Reader (OMR) machine. OMR remains the simplest, cheapest and most accurate way to collect simple category information from forms in a high volume or time critical environment. Backward compatibility with the DRS range of OMR readers is maintained.

The real power of the PS960 comes from applying the real time 'data now' approach of OMR to the capture of multiple other data types (like images, barcodes and OCR).

Image Clipping

An unlimited number of image clips can be captured from each page and saved to disk or retained in memory for real time processing. Clips can be of an entire page or just a small portion and the resolution and bit depth of each is independently controllable.

This has enormous benefits where a range of image types must be collected from a single form. For example, in a registration exercise using photographs it would be typical to collect bitonal images of write-in areas and to capture the photograph in greyscale. A traditional scanner must capture the page at the highest resolution and bit depth and then convert to the formats required as a separate process. This creates a lot of data traffic that is completely wasted and adds time-consuming image manipulation.

The PS960 allows the photograph alone to be captured in 8 bit greyscale while other portions of the form are captured as bitonal, with no intermediate conversion required. This reduces network traffic, lowers total storage requirements and reduces the number of process stages.



Barcodes

The PS960 supports a variety of barcode formats and can very quickly use these to return information to an application. Barcodes are typically used to identify a form type as it is scanned or to uniquely identify a particular form among a batch. There is no limit to the number of barcodes that the PS960 can collect from each form.

Barcodes can also be used to determine the orientation of a form as the form is scanned. This enables full advantage to be taken of clipping particular image areas from forms fed in any orientation.

OCR

In some situations barcodes may not be an appropriate technology. There may be difficulty in producing forms with unique barcodes, some applications may preclude the use of barcodes or there may already be a legacy of existing form stock that uses printed numbers or letters instead.

Once again, the real time processing capabilities of the PS960 provide a solution. Regions with machine printed numbers are defined in exactly the same way as barcodes or image clips and the PS960 will accurately capture them in real time. Reader throughput is maintained at 100% for any reasonable length of printed characters.

With check digits encoded into the number, the Optical Character Recognition (OCR) on the PS960 is so accurate that it is considered a suitable replacement for barcodes. This offers another option for potentially reducing costs and complexity in the form production stages.

Carriage Printing

Using the optional carriage printer a single line of character can be printed along the length of each form in any horizontal position.

If the data printed is automatically generated such as date, time or document sequence number, then the full rated throughput of the reader is maintained. However, if what is printed is derived from data extracted from the form then some application delay is introduced. For example printing the result of a multiple choice exam on the test paper after reading the answers and calculating a score. However, even in a scenario such as this, the speed of 4000-6000 forms/hour is still achievable.

It is the combination of all these key features that make the PS960 an efficient and effective solution to many document processing challenges.



Technical Specifications

Dimensions

Physical	417mm depth x 650mm width x 548mm height
Weight	40kgs
Nominal form size	A4
Minimum form size	200mm x 90mm
Maximum form size	356mm x 227mm
Maximum form size in long sheet mode (optional)	457mm x 227mm
Nominal form weight	85 - 95gsm
Minimum form weight	80gsm
Maximum form weight	135gsm

Environmental

Nominal operating temperature	18 - 25 degrees C
Minimum operating temperature	10 degrees C
Maximum operating temperature	35 degrees C
Maximum operating humidity (non-condensing)	80%

Power

Maximum consumption	220 watts
Supply	50-60Hz Universal 100 - 240V AC

Hopper and Stackers

Input hopper maximum capacity	600 sheets
Stacker 1 maximum capacity	600 sheets
Stacker 2 maximum capacity	200 sheets
Stacker 3 maximum capacity	50 sheets

Operator Controls

LCD display 2 lines, 32 characters	Start Up/System messages
Green push button	Context sensitive (soft key)
Rear panel switch	Power isolation
Blue push button	Standby

Operating System and Platform

Operating system	Windows XP Professional
Mainboard	Full ATX Industrial Standard PC
Processor	Minimum P4 3GHZ
Disk 1	200Gb SATA
Memory	1Gb
Port 1	Parallel
Port 2	Serial + USB
Network card	10/100/1000 BASE T

Interconnections

Keyboard	PS2
Mouse	PS2
Monitor	TFT (15 way D)
Parallel port	25 way D
Serial/USB	9 way D/USB A
Network	CAT5

Speed

Transport	1177 mm/sec
Sheet throughput	Up to 10500 forms per hour (A5) 9000 forms per hour (A4) 7500 forms per hour (356mm by 227mm) 5000 forms per hour (457mm by 227mm)

Image Heads

Illumination	Red (visible light image head with red dropout)*
Resolution	256 levels of approx. 200 dpi linescan greyscale
Maximum image width	215mm

OMR Features

Format	Software selectable European standard (5 tracks per inch, 40 data tracks) USA standard (6 tracks per inch, 47 data tracks)
Barcode types	2 of 5 interleaved, code 39
Minimum barcode element size	0.5mm
Barcode orientation	Vertical
Maximum number of barcodes	64 mixed per side
Sheet routing	Real time sheet sorting based on OMR and Barcode data
DRS SOS decode	Compatible

Image Features

Image resolution	8 bit greyscale, approx. 200 x 200 dpi
Image cropping	Automatic sheet edge detection
Skew detection	Automatic
Image orientation	Automatic under application control
Image clipping (ROI)	Software selectable
Maximum number of clip regions	16 per data request
Compression	Selectable per clip
Compression formats	8 bit JPEG 1, 4 or 8 bit TIFF - RLE or Group IV
Clip capture	Memory or disk
Threshold	Software selectable per clip
Contrast and brightness	Software selectable per clip
Barcode types	2 of 5 Interleaved, code 39, code 128
Orientation	Vertical or horizontal
Maximum number of barcode regions	16 per data request
Maximum number of barcodes	64 mixed per data request

OCR Features

Maximum number of OCR regions	16 per data request
Minimum font size	8 points
Character Set	Latin alphabet upper and lower case letters, digits, punctuation and maths symbols etc.

Other Features

Feed	Automatic
Paper path	Open for easy access
Separation	User adjustable
Doubles detection	Contactless electronic self calibrating
Doubles Removal System	User configurable automated separation attempting
Feed Wheels	Push on and user replaceable
Jam detection	Automatic with position reporting
Hopper/stacker status	Automatic empty/full detection
Transport Printer	Optional inkjet audit trail printing
Stacker Extension	Optional stacker extensions for scanning long sheets up to 457mm

* Other colours and IR available on request

DRS customer base spans over 50 countries worldwide. Its core business is essentially large volume, time critical, complex and sensitive data capture projects. It designs and manufactures its own range of sophisticated OMR, OCR and Imaging technology which is fully supported with a range of associated services including project management, software, training and technical support and back-up on-site.



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