BERTL

HIGHLY RECOMMENDED

Toshiba e-STUDIO281c

28 ppm Monochrome ▪ 11 ppm Color

Print ▪ Copy ▪ Scan ▪ Fax ▪ Internet Fax

100% Independent Analysis

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What's Inside

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The Toshiba e-STUDIO281c is part of the company's workgroup occasional color MFP range, delivering diverse monochrome and color document handling capabilities within the compact footprint that is so important to a small business location.

Important items for the front office include paper handling, print quality, scanned image quality, security, and administration tools which may—in a small business—be handled by the person with the highest IT literacy, since often there is no dedicated IT technical support staff.

One item that is often overlooked is an easy-to-use touch screen control panel, providing the operator a single-step approach for anything from a simple copy job to a multi-page booklet print job.

For those focused on printed output, the 28 ppm monochrome, 11 ppm color-capable copy and print engine delivers high quality output with a diverse choice of finishing options. The e-STUDIO351c delivers space-saving job separation capabilities at one end and sophisticated finishing capabilities such as saddle-stitch booklet making at the other.

For those looking to communicate more efficiently, Toshiba includes extensive fax and scan capabilities through its own technology and third-party integration with eCopy and others.

The Toshiba e-STUDIO281c is part of a series of occasional color MFPs that includes 35 ppm and 45 ppm monochrome versions, all with 11 ppm color speed. The three models incorporate Toshiba's e-BRIDGE open architecture that is the foundation of its network capabilities. This new hardware design allows for excellent process efficiencies such as Internet-ready, mobile/ wireless-ready, and solution-ready technology, providing solid integration into some existing document workflows and infrastructures.

e-Filing is one of the innovative document handling capabilities on the e-STUDIO281c. This tool gives users a seamless approach to input and store documents from the desktop, and permits editing, reprinting on demand, forwarding to new locations, and more. Users can input and store documents into private mailboxes through scanning, printing, or faxing.

The Toshiba e-STUDIO281c incorporates the company's service philosophy with four service modules (Developer Unit, Cleaning, Charger Unit, and Fuser Unit) which target the most frequently-serviced components. This, plus simple steps for changing toner and removing paper jams should help keep downtime to a minimum. Unlike other business color devices, the Toshiba eSTUDIO281c uses a single drum unit which makes one revolution for a monochrome page and four revolutions to create a full color image. This design concept is advantageous in high monochrome environments allowing for longer life consumable items to be installed, which Toshiba claims can reduce overall running costs due to reduced service call requirements.

Device Features Summary	
Monochrome Engine Speed	28 ppm
Color Engine Speed	11 ppm
First Copy Out Mono	6.8 seconds
First Copy Out Color	16.2 seconds
Warm Up Time	40 seconds
Maximum Monthly Volume	100,000 stated volume
Copy	Standard
Print	Standard
PSTN Fax	Optional
Internet/Network Fax	Optional
TWAIN Scan	Standard
Network Scan	Standard

BERTL analyst testing the Toshiba e-STUDIO281c.

Background
Paper handling is a core requirement of every device. If a device cannot create documents a user wants on the paper they need, it does not matter how fast the print engine is, or how many pages it can produce in a month.

Paper handling comes down to three key attributes: weight, capacity, and size.

Weight
The majority of paper used in the general office is graded between 20 lb. bond/80gsm and 28 lb. bond/105gsm. If a device cannot handle these weights through the main paper sources, users are forced to use the low capacity bypass tray, resulting in a higher user intervention rate.

The straight paper path of the bypass tray lets it handle heavier paper stocks to create business cards, covers for reports, product brochures, menus, tickets, programs and other special documents. Paper weights for this type of job usually start at 90 lb. index/163gsm with business card stocks often higher at 110 lb. index/200gsm.

Capacity
Workgroup desktop printers commonly start with either a 500 or 1,000 sheet capacity plus a bypass tray. Workgroup MFPs usually start with capacities over 1,000 sheets.

Paper comes in reams of 500 sheets. A growing trend is paper trays with capacities greater than 500 sheets which let users refill trays that are almost empty with an entire ream of paper at a convenient time without waste or risk of overfilling.

A device's maximum capacity (without increasing the device footprint) depends upon the paper source configuration. Standard paper trays typically are universal or adjustable trays that can accommodate a wide range of paper supplies. Paper upgrade options on some devices include additional universal trays or a high-capacity tandem drawer.

A tandem drawer maximizes letter/A4 capacity by accommodating dual stacks of paper side by side. However, larger-sized paper supplies cannot be loaded. To raise capacity even further, some units can be equipped with a side-mounted large capacity unit These trays are also limited to letter/A4 size paper supplies only.

Paper Handling: Input Features Summary	
Standard Paper Capacity	Standard: 2 x 550-sheet cassettes and 100 sheet bypass Optional: 1 x 550-sheet PFP 1 x 550 cassette 1 x 2,500 sheet LCF
Maximum Paper Capacity	3,700 sheets
Bypass Tray Capacity	100 sheets
Maximum Paper Size (bypass)	12" x 18"
Maximum Paper Size (main trays)	11" x 17"/A3
Maximum Paper Weight (bypass)	110 lb/199 gsm
Maximum Paper Weight (main trays)	28 lb/105 gsm
Standard Legal Capacity	1,200 sheets
Maximum Legal Capacity	2,300 sheets
Standard Ledger Capacity	1,200 sheets
Maximum Ledger Capacity	2,300 sheets
Standard Paper Sources	3
Maximum Paper Sources	5
Post Process Insertion (PPI)	N/A
PPI Capacity	N/A

Size
Letter/A4 size paper is used in the majority of day to day business operations. Legal and financial documents often are printed on the longer legal (8.5" x 14") stock size. As a result, many desktop printers, and some entry-level MFPs reduce production costs by restricting the maximum paper dimensions to legal size.

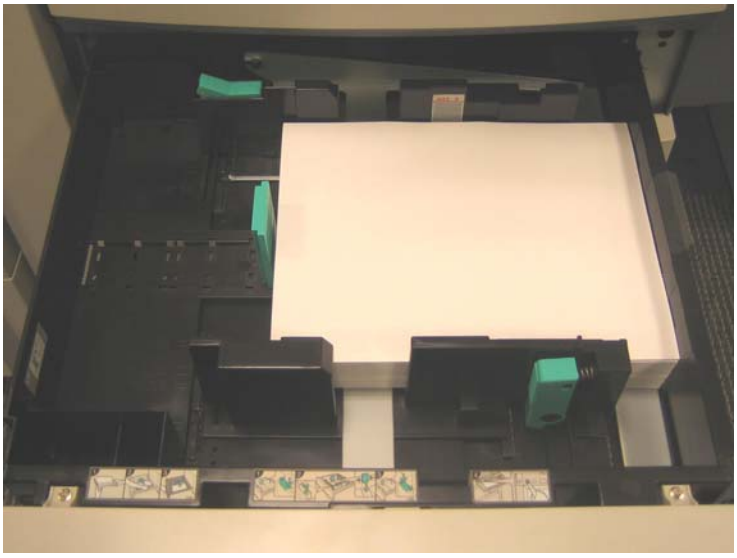
However, some environments also rely heavily on the larger ledger/A3 sizes for printing spreadsheets, schematics, design layouts, plans, and for copying books or magazines.

Reloading Paper Supplies

Loading paper in the Toshiba e-STUDIO281c was straightforward and user-friendly. The home page of the touch screen control panel page displays an image illustrating the current paper status of each tray.

Loading the universal trays is simple. A lock at the back of each drawer prevents accidental change of the media settings. When unlocked, the paper guides are easily adjusted from the front or back. An L-shaped piece on the left side can be moved to make size adjustments.

The drawers hold 550 sheets, allowing full-ream refills prior to complete paper depletion. The bottom drawer, a large capacity cassette, is very sturdy and easy to load. A metal divider separating the two paper stacks must be set correctly to avoid paper jams or size misreads.



Paper refilling process for the Toshiba e-STUDIO281c

WHAT WE LIKED:

- The adjustable paper drawers have a paper capacity of 550 sheets. Users can refill the drawers with a 500-sheet ream of paper as the supply gets low instead of waiting for a job to fail due to a lack of paper.
- An icon on the touch screen's main copy page notifies users of the paper supply status. When a user selects the image of any paper drawer, a graphical display shows how much paper remains.
- The large capacity tray is both sturdy and strong. It can handle misuse by operators.
- The lock function located on the back of the paper drawer ensures size adjustments stay as intended.

WHAT WE WOULD LIKE TO SEE:

- We would like to see the removable L-shaped paper holder attached to the tray and retractable. With such a system, operators will have less difficulty adjusting the paper and will not lose the lever. Currently, the lever must be detached when 11" x 17" paper is used and can be misplaced.
- Automatic paper detection would be a nice addition to the Toshiba e-STUDIO281c. Currently, users must set in the control panel the size of the paper that was added. We would like to see sensors pick up the new size as paper is loaded.
- Currently the touch screen indicates only the paper size and an "R" if it is in a rotated position in the tray. We would like to see a visual illustration showing the way the paper is positioned. The letter-R or A4-R designations may be confusing. Even novice users can understand a picture. During testing, BERTL had paper jams because the paper was feeding in the "R" or rotated position rather than the expected direction, with no prompt to indicate a problem.
- A tray handle that can be grasped from both the top and bottom would make paper loading easier. Currently, users must reach from below to grasp and pull out the drawer, which can be a difficult maneuver for some users. Handles on the top and bottom will improve accessibility for users with disabilities.

Background
The paper output handling options on workgroup products can range from duplex output to saddle-stitch booklet making capabilities. Many devices offer a choice of finishers providing a low cost, minimum footprint solution, or a high-capacity, fully-featured solution.

Stapling
Lower cost stapler units often have a 15- to 30-sheet maximum capacity and are often limited to corner stapling. Floor-standing, higher cost finishers should offer 50-sheet capability and can handle corner and double stapling. Saddle-stitch heads up the finishing capabilities, allowing users to create folded, center-stapled booklets. Some workgroup device saddle-stitch finishers only handle 10 sheets (40-page booklets) with others handling up to 15 sheets (60-page booklets).

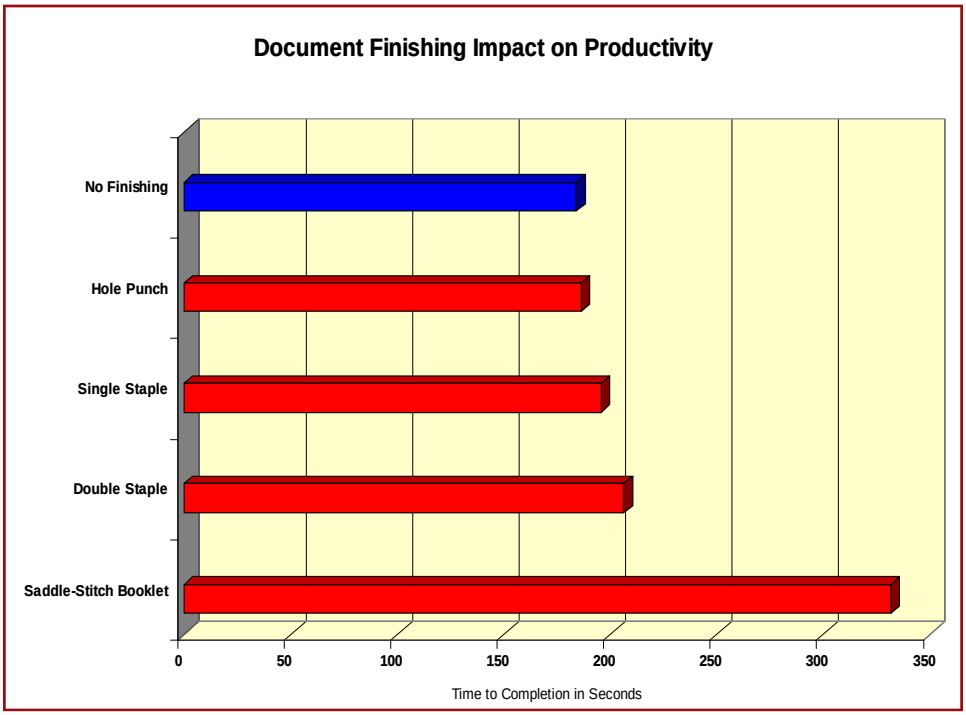
Mail Bin Units and Offset Output
Many workgroup devices offer offset stacking (where each set is offset from the next) to make it easier to separate jobs. Some offer physical mail bin units allowing each user to send jobs to their own output area. Most mail bin units limit delivery to unfinished jobs. A multi-tray finisher can also offer some form of job separation, typically used to route different types of job (fax, print, copy) for easier identification.

Paper Handling: Output/Finishing Features Summary	
Maximum Output Capacity	2,000 sheets (2 trays w/ MJ1024 finisher
Duplex Capability	Standard
Maximum Paper Weight Through Duplex Unit	28 lbs./105gsm
Maximum Stapling Capacity	50 sheets
Maximum Booklet/Saddle-stitch Capacity	15 sheets (60-page booklet)
Hole Punch Options	2 and 3 hole/2 and 4 in UK/ Europe
Physical Mail Bin Option	Limit of two output areas via finisher or job separator options
Folding Options	In booklet making only

Finishing Options

The Toshiba e-STUDIO281c has three external finisher options.

The MJ1022 Single-Position hanging finisher includes two output trays, holding 200 in tray one and 700 in tray two, with stapling capacity of up to 30 sheets. The MJ1023 floor-standing finisher includes two 1,000-sheet capacity output trays, multi-position stapling for up to 50 sheets, and optional hole punch. The MJ1024 multi-position stapling finisher with saddle stitch can do everything that the MJ1023 can, plus provide saddle-stitch capabilities.



Finisher Productivity

To compare finishing results, BERTL analysts ran the same job (10 sets of 12 originals) with various finishing options. We noticed little to no reduction in speed when hole punching was added. The addition of one staple and then two staples showed a small identical jump in both cases. As expected, booklet finishing added a significant jump due to the initial imposition phase which resulted in a longer first-time-out time.

Productivity tests performed on e-STUDIO451c sister device.

WHAT WE LIKED:

- Setting finishing features is intuitive from both the console and desktop and are easy for the first-time user, minimizing errors and costly reprints.
- If the Toshiba e-STUDIO281c runs out of paper in the middle of a job, a red light near the control panel lights up notifying users so prompt action can be taken.
- Replacing staples, located on the front side of the finisher, is easy. An operator opens the door and pulls the staple case from its set position. After staples have been replenished the case is returned to its place and is automatically reset.

WHAT WE WOULD LIKE TO SEE:

- An internal finishing capability would give offices with space limitations the ability to staple documents. Some other manufacturers also include hole-punch capability as well.

Background
Workgroup devices sold through retail and traditional IT distribution outlets usually are maintained by office workers changing the all-in-one cartridge units that encase the entire imaging system. Units sold through the reseller/dealer community are usually maintained by office workers and trained service engineers. Separate long-life parts are more complex to install but offer lower running costs than the low yield, all-in-one alternatives.

Toner Replacement
Changing the toner or imaging cartridge is a necessary task that traditionally is avoided by some for fear of the dust leaking on clothes or hands. However, most units today offer clean replacement of toner supplies. Imaging units on color MFPs come in two distinct design configurations, tandem single pass with four separate imaging stations or four pass with one central imaging drum. The tandem design usually provides for easier end user drum replacement with a simple side in slide out design compared to the longer life central drum designs which require an engineer visit, albeit much less frequently.

Clearing Paper Jams
The main device issue that office users attempt to remedy themselves is the occasional paper jam. As a general rule, the faster the device engine, and the more paper handling options, the more complex the process of removing paper jams. Common jam sources are the duplex unit and poor loading of paper supplies. The position of the duplex unit can be a major factor in the ease of paper jam removal.

Maintenance Features Summary	
Toner Yield	Mono 27,000/ Color 10,000 Per Color at 6%
Drum Life	200,000 pages
Fuser Life	100,000 pages
Developer Life	100,000 pages
Toner Refill During Printing	No
End-user replaceable drum unit	No
End-user replaceable fuser unit	No

BERTL analyst performs routine maintenance on the e-STUDIO281c.

WHAT WE LIKED:

- Changing the toner was mess-free (if done correctly) and user-friendly.
- Color coding guides users and prevents injury or accidents. Any part of the device that can be touched by a user is green. Adding toner and removing jams is much easier since the user knows what can and cannot be touched. This also keeps the user away from areas of the machine that are hot.
- When jams occur, the control panel displays a guide to help users find the jammed paper. The step-by-step instructions ensure all paper is found the proper way, helping the user as well as the machine itself.

WHAT WE WOULD LIKE TO SEE:

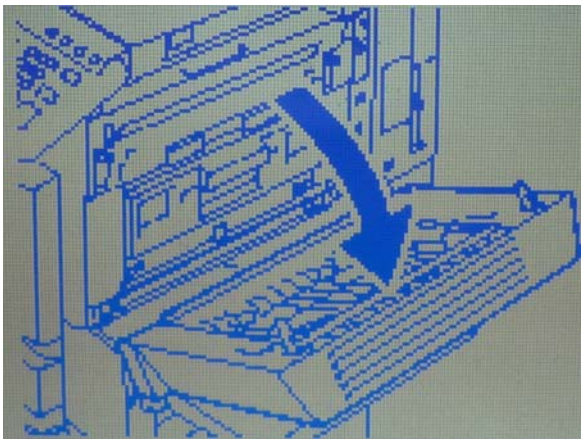
- We would like the process of changing the color toners as simple as the black. Currently, users must use the touch control panel to line up the toner they want to remove. The black toner is easily removed by opening the green cap and pulling it out.
- When removing paper jams from the duplex area, the drum is exposed and subject to being scratched. BERTL would like to see less of the drum unit exposed when removing paper jams.

Paper Jam Removal

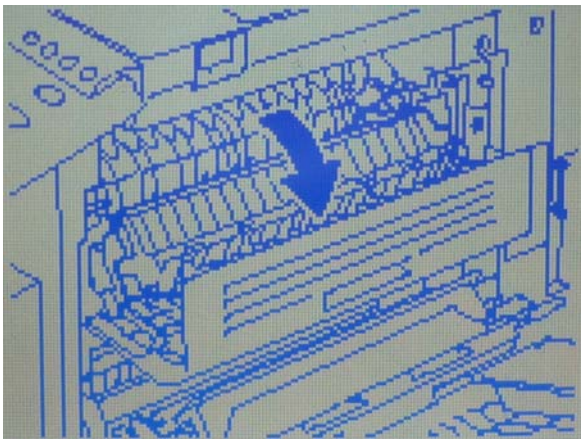
While we did not encounter any jams during the testing of the Toshiba e-STUDIO281c, we did force some jams to see how the unit would react. When a jam occurs, the machine beeps, and a red light appears, making the surrounding users aware that an error has occurred.

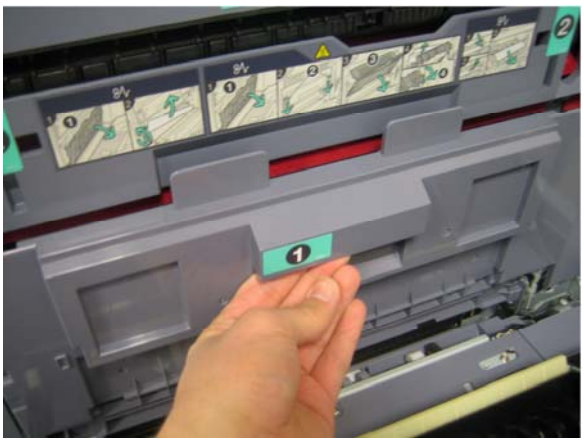
The control panel provides step-by-step illustrations to guide users through clearing paper jams.

The illustration shows which part of the unit to open first.

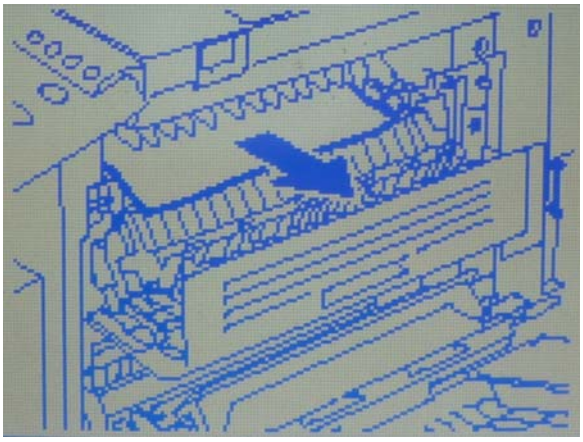


Other illustrations indicate which individually numbered areas must be opened.



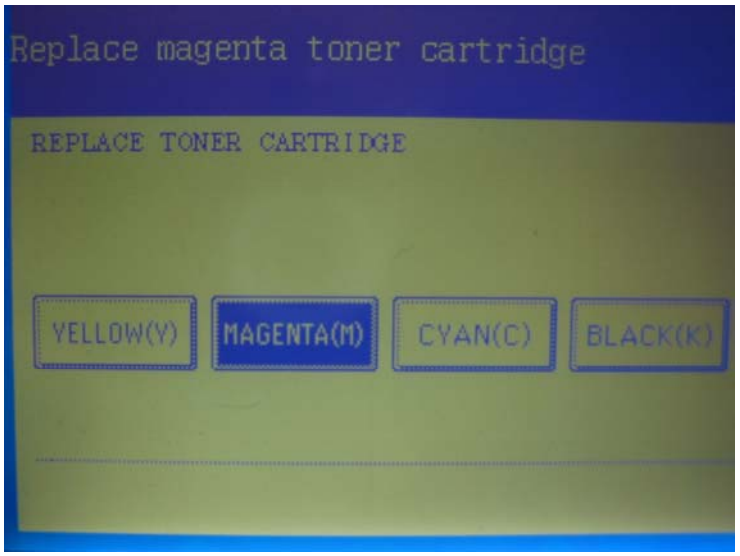


Users are lead directly to the jam and removal is simple.



Toner Replacement Process

After pushing the hard User Settings key and selecting the General touch button, this screen appears. Users then select the toner cartridge they would like to change.



After being selected, the Magenta toner moves to a window where it can be removed. Users open the area and remove the toner.

To remove the black toner, the green door must be opened. Once opened, the long black toner cartridge can be pulled out.

Background
An efficient device management backbone is needed to take maximum advantage of the feature set within a device, be it a printer, fax, scanner or multi-functional product.

Device management is commonly-supported through a Web server on the device controller. This Web server is accessed using any desktop Internet browser; the user simply enters the IP address of the device into the URL address line.

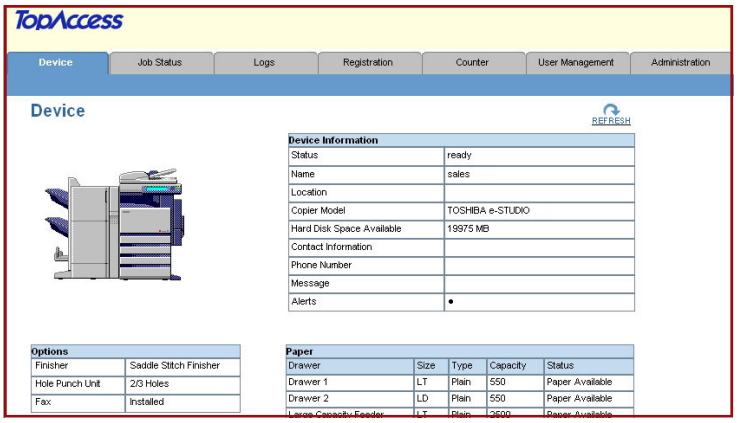
Administrators and office users have different management and monitoring needs.

General Office Users
End users want to know if a device is capable of handling a job. Supply levels and a list of jobs already committed to print are important.

For MFPs with document storage and communications capabilities, end users also need desktop management of print on demand, stored document viewing (to check print on demand files or incoming faxes) and, for the more advanced, the creation of scan-to-email or scan-to-file destination templates.

Administrators
An office or network manager looks for greater control over the device functionality and setup without leaving their desk. They may be looking to manage network setup, establish security for IP filter ranges, apply cost control measures, check supply levels, and set up automated email alerts to different staff members when problems occur. Cost control flexibility is especially important with color-enabled devices due to the opportunity for misuse and the high running costs associated with such activity. Cost control measures should allow administrators to set up controls for monochrome and color independently to ensure that day to day monochrome workflow is not slowed while maintaining strict control over color use.

Due to the nature of the Web server, this capability is usually limited to an individual device. Many manufacturers also include a network device management fleet tool which allows for the monitoring and management of multiple devices around the network concurrently. Many also provide plug-ins to the most popular IT device management utilities to ensure that the maximum amount of information can be relayed from their device to the third-party application.



Users and administrators can view device settings and manage jobs through Toshiba's Web-based TopAccess management system.

WHAT WE LIKED:

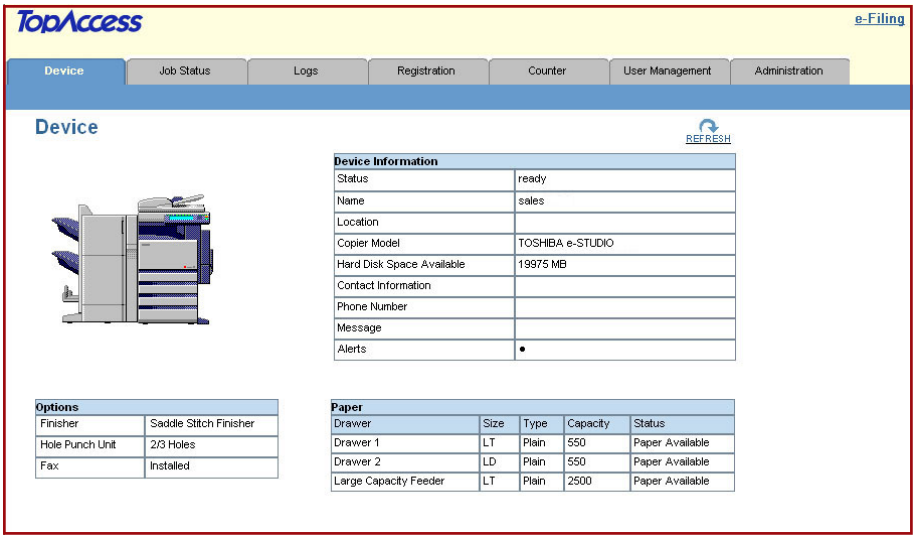
- Toshiba's TopAccess Web monitor is universal across the e-STUDIO product line. This eliminates the learning curve when an e-STUDIO281c is installed into an environment with other Toshiba devices.
- Through Toshiba's TopAccess Web monitor, both copy jobs and print jobs can be viewed from the desktop. Since users can view the job queue, they know the job status in relation to available print time.
- The icon-driven scan template administration system makes the process easy for general office users.
- The simple, yet sophisticated automated fax forwarding feature allows incoming faxes to be routed to one or more destinations: an e-Filing box on the device, email, or network folder locations (with or without security). It also sends an email notice of fax arrival.

WHAT WE WOULD LIKE TO SEE:

- The job status view on the desktop appears in the order that the print jobs will be released (job one, job two, job three). The view on the control panel is reversed, showing job three first, then job two, and then job one.
- The ability to promote or pause jobs in the queue would allow urgent jobs to get handled faster.
- Editing administrative features was a little confusing at times with no obvious prompts on how to get into menus to make changes. The administrator was left to guess that a second click on the menu heading was required to go into edit mode.
- Editing/creating scan templates involved three separate actions rather than a single menu walk-through.

Status Monitoring

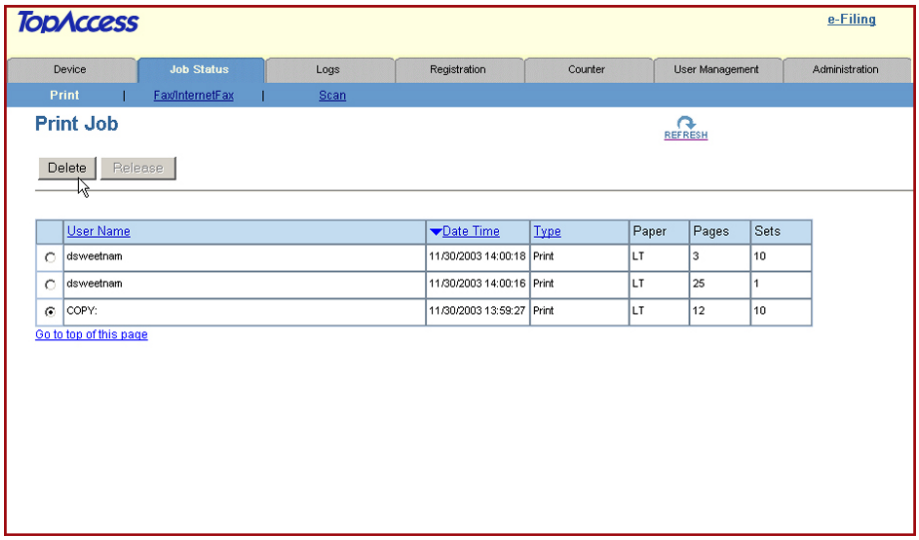
The Device Tab provides a quick view of current operations including paper tray conditions and availability.



Job Queue Reporting

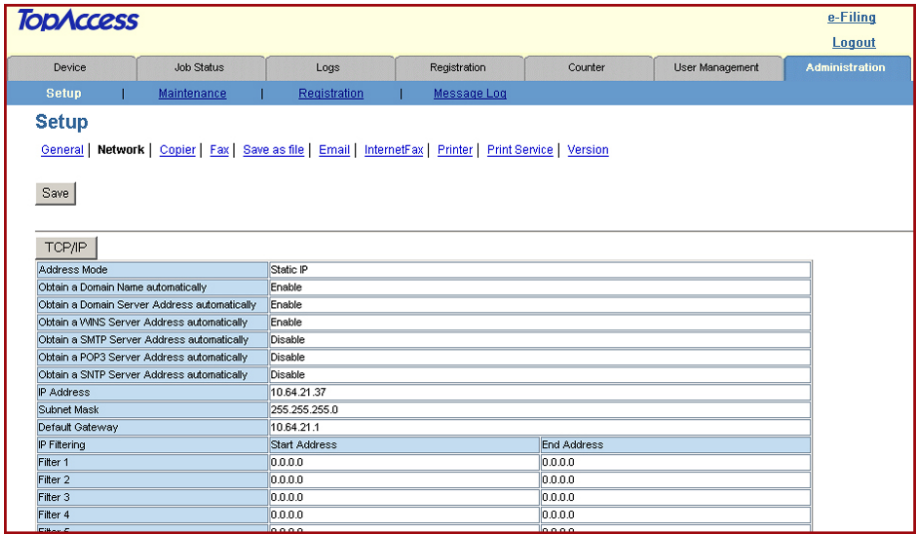
Job Queue Reporting provides a status of where jobs are positioned and the print/copy order. A job that has not been produced can be deleted if desired.

Both the date and time are always displayed and the user name is shown when available. While users can delete jobs in the queue, there is no promote or pause facility as found on some other units.



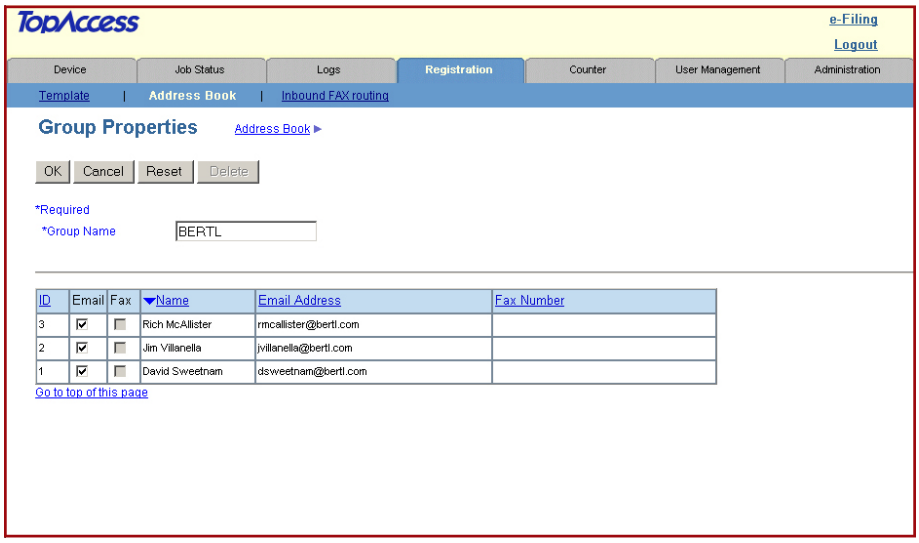
Security Settings

From TopAccess, administrators can set up authorized user lists and IP filters to limit access to the device to specific PC address ranges. They also can establish automatic routing of incoming faxes to lockable mailboxes or folder destinations.



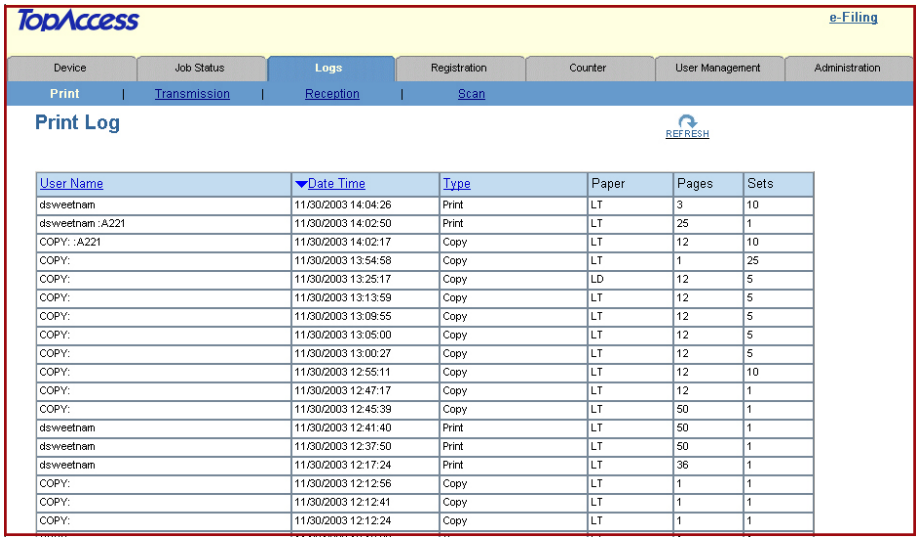
Address Book Management

Users and administrators can set up email, Internet fax, and fax addresses for local storage on the device. Addresses can be gathered into groups for simple one-touch distribution purposes.



Cost Control Reporting

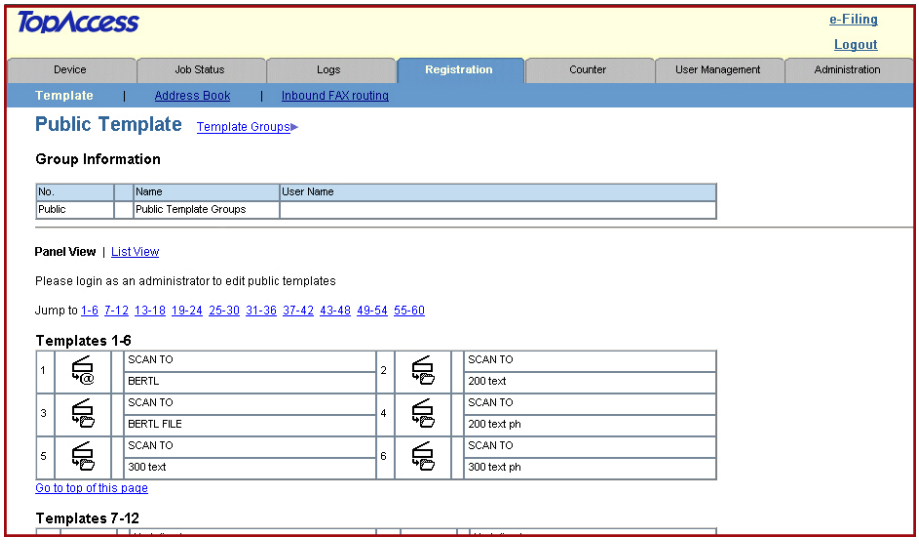
The Toshiba e-STUDIO281c does not come with job accounting capabilities as standard. It can be added through third-party cost recovery suppliers and through the eCopy scan option.



Scan Templates

With TopAccess, users can easily set up scan templates from the desktop. These templates will translate to a one-touch scan button on the unit's control panel. Instructions walk users through the process. Even multi-step functions were relatively simple to follow without a manual or online help.

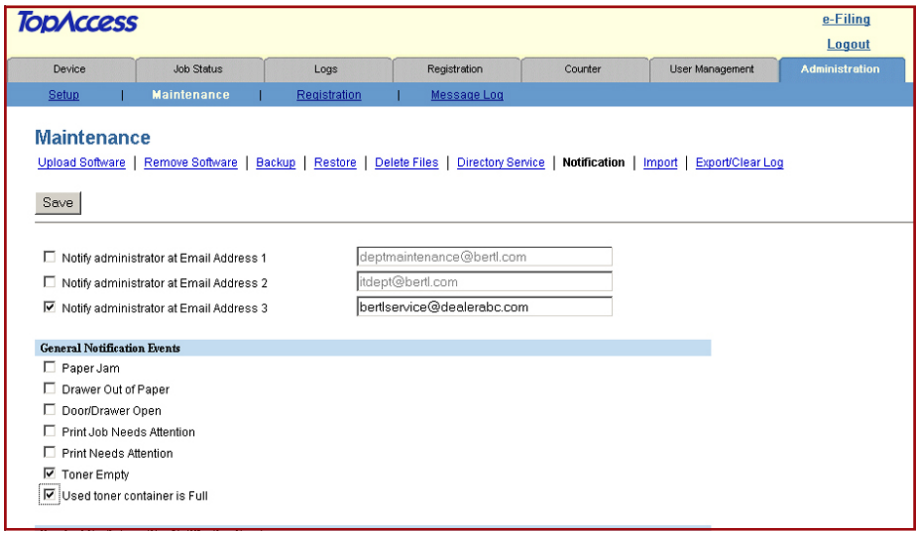
Templates can be stored in a public or private folder. Each user can have a private folder locked with a PIN so they can store scan to email, fax, or folder templates in their own folder for fast retrieval rather than filtering through the shared address book.



Email Notification Alerts

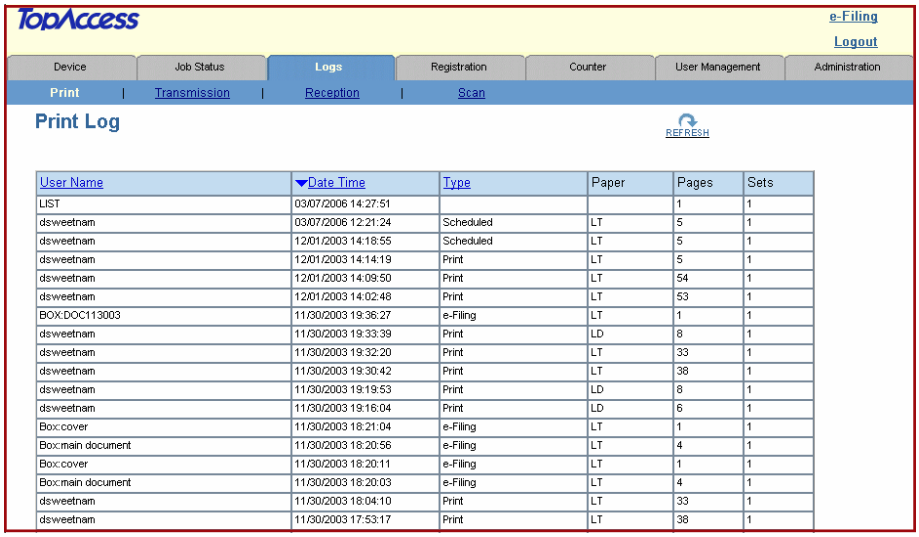
A user can set up to three email addresses to route specific notifications. Some other advanced systems offer unlimited email addresses, but the TopAccess option is probably more than adequate for most environments.

The administrator can set up a local office contact for easy fixes such as paper and toner refill. More complex technical issues can be routed to tech support. Emails automatically can be sent to the dealer for tasks like imaging drum replacement.



Job Log Management

Users can view each job that has been produced on the Toshiba e-STUDIO281c whether it is a print, scan, or simple copy job. The log can be exported to the desktop for further interrogation by Excel or cost accounting applications.



User Name	Date Time	Type	Paper	Pages	Sets
LIST	03/07/2006 14:27:51			1	1
dsweetnam	03/07/2006 12:21:24	Scheduled	LT	5	1
dsweetnam	12/01/2003 14:18:55	Scheduled	LT	5	1
dsweetnam	12/01/2003 14:14:19	Print	LT	5	1
dsweetnam	12/01/2003 14:09:50	Print	LT	54	1
dsweetnam	12/01/2003 14:02:48	Print	LT	53	1
BOX:DOC113003	11/30/2003 19:36:27	e-Filing	LT	1	1
dsweetnam	11/30/2003 19:33:39	Print	LD	8	1
dsweetnam	11/30/2003 19:32:20	Print	LT	33	1
dsweetnam	11/30/2003 19:30:42	Print	LT	38	1
dsweetnam	11/30/2003 19:19:53	Print	LD	8	1
dsweetnam	11/30/2003 19:16:04	Print	LD	6	1
Box:cover	11/30/2003 18:21:04	e-Filing	LT	1	1
Box:main document	11/30/2003 18:20:56	e-Filing	LT	4	1
Box:cover	11/30/2003 18:20:11	e-Filing	LT	1	1
Box:main document	11/30/2003 18:20:03	e-Filing	LT	4	1
dsweetnam	11/30/2003 18:04:10	Print	LT	33	1
dsweetnam	11/30/2003 17:53:17	Print	LT	38	1

Background
High-tech security is never out of the news, with reports of information theft and hacking making headlines. By the very nature of their development, network printers and MFPs are security risks if not managed correctly.

Advanced network connectivity options open ports to hackers. Industry-standard Java and Web browser design elements are vulnerable to virus attack. Large hard drives store a latent copy of every document flowing through the device data for years. Devices link directly to core network components such as the LDAP address list or the central file server. Plus, fast communication options let insiders send information to the outside with no method of being traced.

Security and data compliance buzzwords and regulations such as Common Criteria certification, HIPAA, Sarbanes-Oxley, Gramm Leach Bliley, FERPA, SEC, FSMA, and the Patriot Act look to safeguard information and force companies to conform to best practices in document and data security management.

Safeguarding Data
Most MFPs now offer a standard or optional hard drive. Any company dealing in critical, sensitive information should determine if they need a data overwrite capability that has passed Common Criteria (CC) certification. Data overwrite deletes information on the hard drive by writing a series of random ones and zeros over the sectors storing data, usually multiple times. The CC test relates to how data is deleted from a device's hard drive after being used. CC certification carried out by a government-approved test facility. Many manufacturers get CC certification to satisfy government security requirements and it is a requisite for many government agencies and contractors. Most MFP devices pass evaluation assurance level (EAL) 2, with some aiming higher at EAL 3. The higher the level, the more extensive the testing, and the more secure the hard drive is deemed

Controlling Access
One of the keys to security is limiting the initial access to the device both remotely and at the device itself. TCP/IP and MAC filtering allow the administrator to limit remote access the device. MAC filtering is more secure; the TCP/IP address can be copied but the MAC address is a fixed specification that can not be changed.

IPv6 is now becoming commonplace on network devices. IPv6 makes it harder to crack or hack into a PC address range by making the address more complex.

Security Features Summary	
Hard Drive Overwrite	Optional
Removable Hard Drive	No
Private Print	Standard
Encrypted Print	No
Secure Fax	Yes
Encrypted PDF Send	No
Network Authentication	Yes
LDAP Authentication	Yes
Kerberos Authentication	No
SNMP v3.0	Yes
IPv6	Yes
SSL	Yes
IP Filtering	Yes
MAC Filtering	No

Network authentication is now available on nearly every MFP and printer, forcing users to enter a user name and password before access to the device is granted. Most devices can verify a user by linking to Windows Exchange user lists, Novell network user lists, and LDAP server lists.

There should also be password encryption at the point of the login process through SSL or other encryption or other security technology (such as Kerberos) preventing hackers from watching and capturing user names and IDs as they travel over the network.

Secure Transmissions
The hard drive (if not equipped with a data overwrite capability) provides the ability to create secure repositories for incoming print and fax jobs. Instead of being printed upon delivery, print jobs and faxes can be stored on the device and printed only after a PIN has been entered by the authorized user. IPv6 makes it harder to crack or hack into a PC address range by making the address more complex.

WHAT WE LIKED:

- The ability to use LDAP Authentication with the e-STUDIO281c is encouraging. This secure feature puts many businesses at ease.
- The ability to lock/secure print jobs is easy to locate and use on both drivers.
- Incoming faxes can be routed to secure destinations such as PIN-protected internal e-Filing folders, limited-access network folders, or email addresses, ensuring that sensitive information does not sit in the output tray of the device.

WHAT WE WOULD LIKE TO SEE:

- The ability to override the hard drive the option is a standard function on some competitors. While the Toshiba e-STUDIO281c allows users to do so, it is a option.
- MAC filtering would provide a greater level of desktop range lockdown capability than the user-changeable IP identifier.
- Secure PDF encryption at the time of scan to email or scan to file, using the measures built into Adobe Acrobat, would provide additional document security. Users scan the confidential document, assign a PIN code, and tell the recipient the PIN code so the file can be opened. Several rival devices now offer this feature.

In the U.S., Section 508 legislation prohibits government agencies from purchasing devices that are not accessible to those with physical impairments. For this reason—and the corporate world's increased focus on delivering a better work environment for all—user-friendly features for physically-impaired users are considered more and more.

Toshiba e-STUDIO281c control panel in standard configuration (left) and tilted position (right).

Common design features include tilting control panels which give wheelchair-bound users a better view of the screen and larger display options for those with impaired vision. Voice navigation and Braille also are becoming increasingly popular. Easy access to the paper path for jam removal or front access to toner supplies make a device more user-friendly to all.

User Accessibility to Device Controls

The e-STUDIO281c control panel consists of a tilting touch screen as well as hard key buttons. The controls are accessible from a wheelchair when adjusted to the lowest point. The document feeder, the standard height of most machines in the industry, can be grasped, opened, and closed from a wheelchair. When fully raised, the document feeder may be difficult for wheelchair users to reach.

User Accessibility for Paper Refilling

The top drawer of the e-STUDIO-451c can be refilled easily from a wheelchair; the second drawer and those below may be somewhat more difficult. Disabled users may struggle to reach below the desired drawer to grab the handle. Once open, they must then reach deep inside the drawer to get to the lock lever to change supply sizes (if required). The L-bracket paper guide that adjusts the paper from the left is difficult to grasp.

User Accessibility for Paper Jam Removal

Disabled users can view the tilted control panel screen to view the location of a paper jam. Due to a tortuous paper path, the duplex unit can be a source of paper jams. The duplex unit on the Toshiba e-STUDIO281c was easily accessible from a wheelchair without the need to move the finisher away as found on some rival devices. The finisher opens at the front of the machine which provides clean access.

WHAT WE LIKED:

- The control panel moves up and down easily through a broad range, giving visibility to disabled users.
- The touchable parts are within reach and are color-coded green. Black toner is very easy and clean to remove.
- Replacing staples is easy and is done at eye level of someone in a wheelchair. After opening the finisher, the staple cassette can be pulled out and refilled.

WHAT WE WOULD LIKE TO SEE:

- The ability to change color toner without using the touch screen. While wheelchair bound users can see the screen its an added awkward step.
- The paper drawers would be easier to open if they could be pulled from both the top and the bottom. Currently the drawers must be grasped from below making it more difficult for disabled users. A handle on the top will let disabled users reach more drawers.
- Although the two top drawers were accessible, the bottom drawer was far from ideal. Changing paper also required reaching far inside the drawer to release the locking lever.
- The port entry, located at the back of the device, could be better positioned so that it is not cumbersome for any operator to use. If located on the front of the device, it would be more accessible. In the current configuration, a wheelchair user would not be able to connect a computer notebook to the device.
- The detachable L-shaped paper holder is difficult to reach and can get lost easily. A movable/retractable lever that cannot be detached is a better option.

Background
Copying is the standard feature on every MFP on the market and is increasingly being offered either as an option or a separate model within network printer product ranges. Before being wowed by headline speeds and advanced features, consider that the most common copy job is a single set of a simplex document that is five pages or less with no finishing and no changes to image quality default settings.

Small, Simple Jobs
Despite the wealth of features that MFPs offer today, most users will not be prepared to wade through countless screen menus to get to the point where they can press the Start button. Think in terms of human productivity, not device productivity. Reporting the productivity of the device from the moment the green start button is pressed until the final page comes out does not consider the most costly element in the copying process: the user's time.

Large, Complex Jobs
Even for big jobs—where you may think engine speed plays a larger role—the simple start-key-to-finish-line productivity measurement approach again disregards the user. The user is less likely to wait at the copier for larger and more complex jobs. They will look for features such as a quick and easy job setup menu, fast scanning (so they can return to their desk with the originals faster), email notification when the job has finished (eliminating the guesswork of when to return to the device to collect the job), or the ability to build a job using a mix of pages scanned from the document feeder and platen.

Features or Benefits?
Many copy features that are overlooked by the masses are critical time savers in niche workflow environments. For example, medical offices or car dealerships need to copy insurance and license cards. A card copy feature allows the user to scan the first side of the card, turn the card over, scan the second page, and produce a single-sided copy with both sides of the card on the single sheet. This saves 50 percent on paper and the print click cost charged by the dealer.

Copier Concurrency
Concurrency, the ability to handle multiple tasks at the same time, varies greatly in workgroup devices. Some devices can not accept a copy job while a print or copy job is in progress. If a connected MFP is carrying out either job, a walk-up user must wait for the job to finish before they can scan in their copy job.

Copy Features Summary	
Maximum Copy Speed	Monochrome 28 ppm Color 11 ppm
First Copy Out Time	Monochrome 6.8 seconds Color 16.2 seconds
Document Feeder Type	Optional reverse automatic document feeder (RADF)
Document Feeder Capacity	100 pages
Job Build	Yes
Job Build Combining Platen and Document Feeder Scans	Yes
Scan Ahead Copy Memories	Unlimited
No. of Copy Job Programs	Information not available
Customizable One-touch Buttons on Home Screen	No
Max/Min Zoom Ratio	25% to 400% at 1%
Cover Insertion	Yes
Sheet Insertion	Yes
Page Stamp Options	Yes

My Copier
MFP design is moving away from proprietary, closed systems and embracing open architecture and IT standards like .NET and Java. This opens the door to greater flexibility in the way the walk-up experience can be tailored to each user. Coupled to this ability is the growing need to account for all device usage for security, compliance or cost considerations. These two trends can result in a "My Copier"-type experience where each user is greeted with their favorite settings when logging in.

Image Quality

Users can select color from Full Color, and Auto Color modes, or Monochrome for only black toner.

When using the Monochrome mode, the Toshiba e-STUDIO281c uses only black toner, not the cyan, yellow or magenta toner.

The device comes with Text, Text/Photo, and Photo modes to allow the user to capture and reproduce different image types. BERTL's testing included all three modes with a wide range of copy originals to look for strengths and weaknesses of the device.

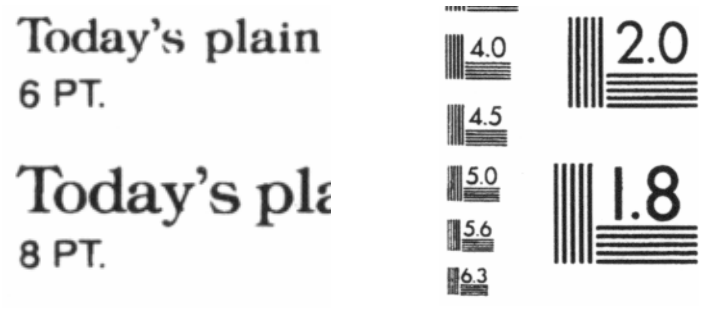
The monochrome image quality scored well across the board, keeping consistent with rival units.

The top figure shows the Text setting. Reproduction for both six and eight point faired very well as did the lines. This mode is recommended for this type of job.

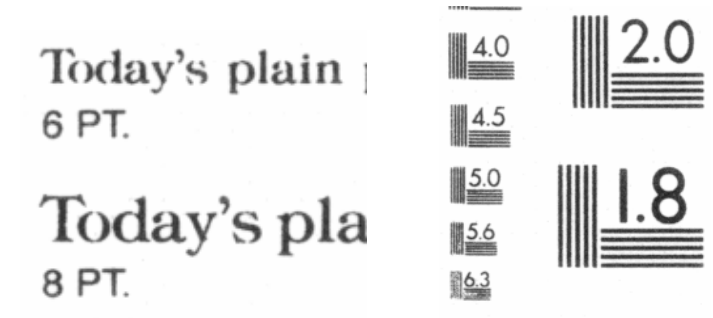
As with most devices, the Text/Photo mode was the default setting for the device and the mode which offered the best overall image quality across the spectrum of copy jobs. While Text/Photo does not perform as strongly as the Text mode on lines and text, it is still a viable option for this type of job.

Photo mode uses a halftone rendering algorithm that produces high quality reproduction of photographs. It is not a good option for text, but produces nice photo reproductions.

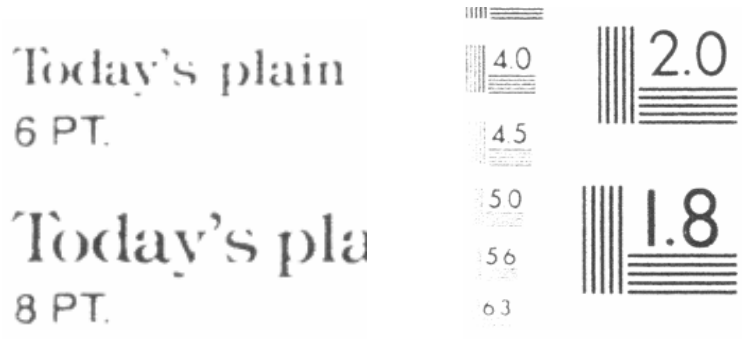
Overall the e-STUDIO281c faired as expected and consistent with rival units



Reproductions in Text setting.



Reproductions in Text/Photo settings.



Reproductions in Photo settings.

Image Quality (continued)

For color, the default setting is Full Color, as shown below. This setting is best for general use; many different types of jobs will reproduce well.

The Warm setting pumps more red into the color gamut. The extra red will show up on skin tones, making it more vibrant and lively. This will look good on photographs containing people.

The Cool setting adds blue to its images. This does not work as well with skin tones as it tends to look washed out or dull. It is better suited for landscape shots.

The Vivid setting saturates the paper with color. This works especially well for presentations. The colors will jump off the paper for a more powerful impact.

Warm setting

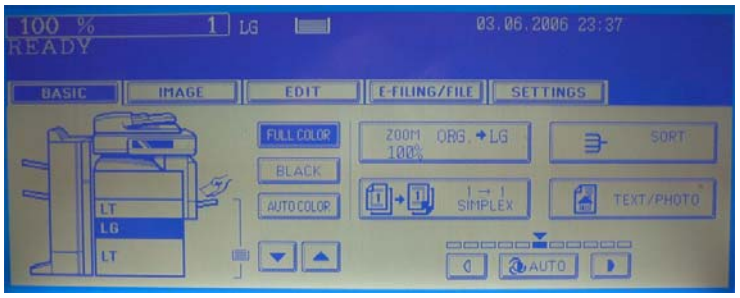
Cool setting

The default setting: Full Color

Vivid setting

WHAT WE LIKED:

- The ability to choose Full Color, Black, and Auto Color is right in the middle of the touch screen.
- The user-friendly interface provides both experienced and novice users with a quick and easy method of building copy jobs.
- Users are able to set up their favorite copy functions as one-touch templates within their own user profile folders.
- With a 100-sheet capacity document feeder (more than some competing units), large jobs can be created without the need for job build steps. reducing user intervention times.
- The job build function allows for the merging of scans from the document feeder and platen, a valuable feature for many environments such as law firms, and one that some competing units do not offer.
- Most common copy functions are within one or two selections of the home screen, limiting menu-mining and keeping user time to a minimum.
- The tilting control panel was especially well-received. The panel can be adjusted for wheelchair users and to minimize glare from overhead lighting.
- The touch screen control panel shows users the functions that they have selected on the home copy screen. When the user has more complex projects which require various tabs to be selected, these functions are shown as a reminder, reducing operator risk and time. Multi-featured tasks such as booklet making with enlargement have specific tab selections that are shown throughout the process.

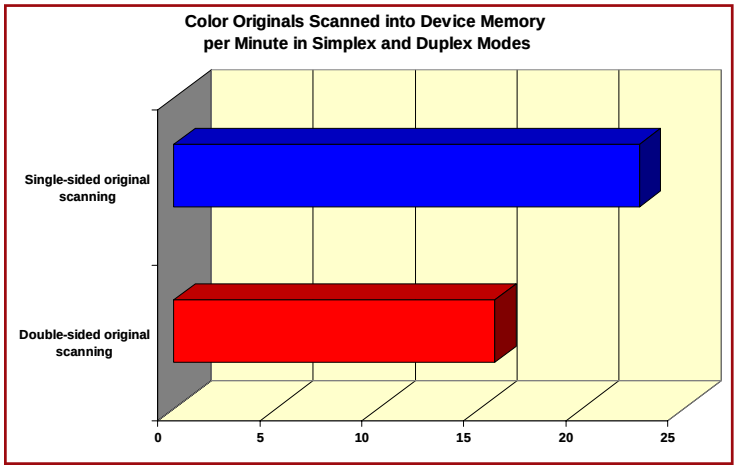


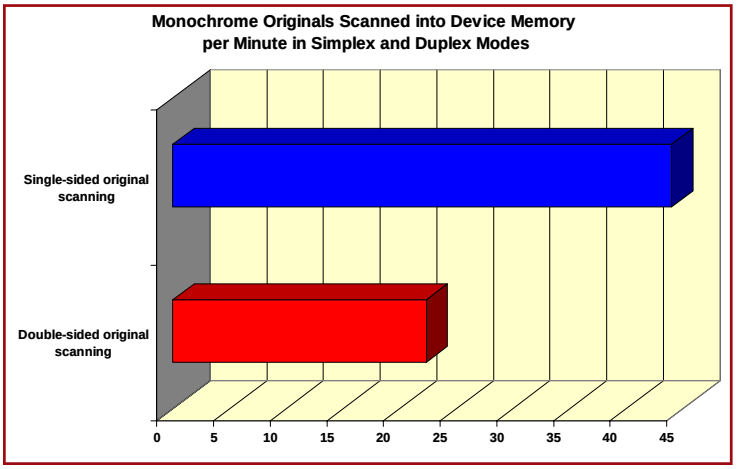
Touch Screen Selections Required for Commonly-used Copy Functions	
Corner Staple	Two steps
Hole Punch	Two steps
Enlarge to 200%	Two steps
2:2	Two steps
Photo Mode	Two steps
Mixed Original	Two steps
Cover mode (printed front cover on bypass supply)	Four steps

WHAT WE WOULD LIKE TO SEE:

- We would like the ability to select monochrome and color from more visible and distinguishable hard keys. Currently those selections are made on the touch screen. While this system works, the hard keys would be more noticeable to less experienced users who may need to change the selection prior to copying.
- The reversing document feeder design can result in longer waiting times when handling double-sided originals.

Productivity tests performed on e-STUDIO451c sister device.





Background
Ever since MFPs started including hard drives, manufacturers have looked for ways to offer more and more on-demand document facilities.

The most basic is the ability to store a document on the device for instant reprinting from the walk-up interface. Virtually all manufacturers offer this level of print-on-demand capability. Most allow users to store, copy, and print. Some also include scan and fax documents into the mix.

Are All Documents the Same?
The way different document function types are stored and the way in which they can be reused at a later date create some issues due to the file format in which the function operates. Copy is usually done in a compressed proprietary format, fax in TIFF, and scan in TIFF/PDF or JPEG as selected by the user.

When users look to reuse the files, they are often limited to the same function as it was created in.

Do All Devices Offer the Same Capabilities?
There is much differentiation between products and manufacturers in this area. Those interested in print on demand should look carefully at the functionality offered by each manufacturer.

Areas of differentiation include the range of finishing or output control the user can place upon a reprint-on-demand job; whether more than one stored job can be combined and treated as a single print file; the ability to view, manage and share stored documents using desktop applications; the complexity of the filing system in place; and the ease at which users can search for documents.

The Future
Increasing security concerns may result in more companies using data overwrite kits. This would put an end to the print on demand capability of such devices. For those still looking for a fast reprint capability, the answer may be external media ports such as USB memory sticks, digital camera SD cards, or volatile memory storage.

e-Filing

Users are able to store copy, print, fax, and scan documents to the hard drive, and reprint or retrieve them from either the touch screen display of the copier, or from TopAccess. Documents are stored within the e-Filing system through a series of boxes. There is one public e-Filing box accessed by all members of the office. It is set up by the system administrator.

Up to 200 private e-Filing boxes also can be set up by individuals. These boxes can be password-protected, adding a level of security for sensitive information. Each box can be further divided into a maximum of 100 folders, with storage for up to 400 documents per folder, and a maximum of 1,000 pages per document.

Print to Box: From the printer driver, users select the box where they want to store the document. Documents are stored with the name of the application and document in the proprietary RIPped file from.

e-Filing at the Desktop: With the e-Filing Web utility, users view, edit, reprint, and copy documents stored in public and private folders.

Copy to Box: Copy jobs are stored in an electronic box with or without creating a copy (it's the user's choice). Jobs are stored in the proprietary RIP file format used by the Toshiba print engine. The document name can be entered using a QWERTY keypad on the copier touch screen LCD. Some document copy settings features cannot be added to a copy job stored in a box. These include more than 200 percent enlargement, non-sort mode, magazine sort, magazine sort and saddle-stitch, image shift, Nin1, cover sheet/sheet insertion, date stamp, page numbering, and non-standard size setting. Copy to Box is the only scanning function that can be accessed without purchasing the optional print/scan or scan upgrade kits. Users can access documents stored in a box using the standard TWAIN driver or file downloader software.

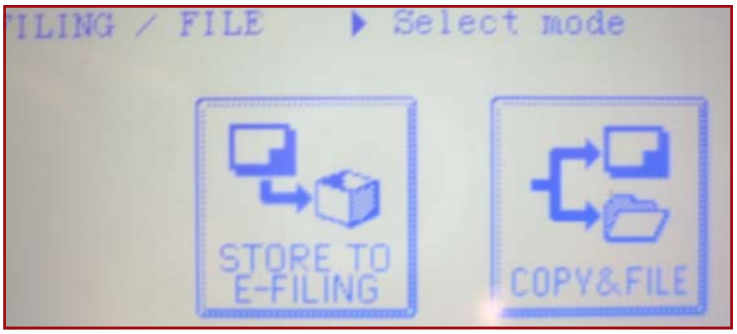
Scan to Box: This operates the same way as copy to box, except 2-bit monochrome files are stored as TIFF or PDF files, and 8-bit greyscale files are stored as TIFF, JPEG, or PDF files.

Print to Box: From the printer driver, users select the box where they want to store the document. Documents are stored with the name of the application and document in the proprietary ripped file format.

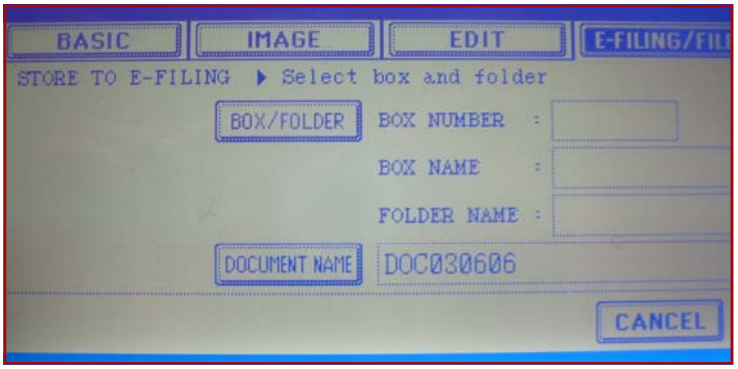
Storing a Job Into an e-Filing Box

First, the user selects the e-Filing file tab at the top of the menu screen.

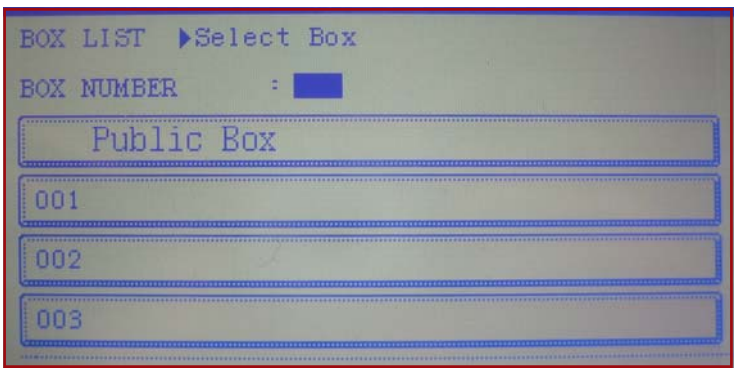
Users then choose if they want to copy the document and save a copy for reuse, or simply store the document with no output.



Users then choose the box/folder destination, the box name, and folder name. They also can allocate a personalized name to the file. If the file name is not created, a unique identifier will be allocated to prevent overwrite of existing files.

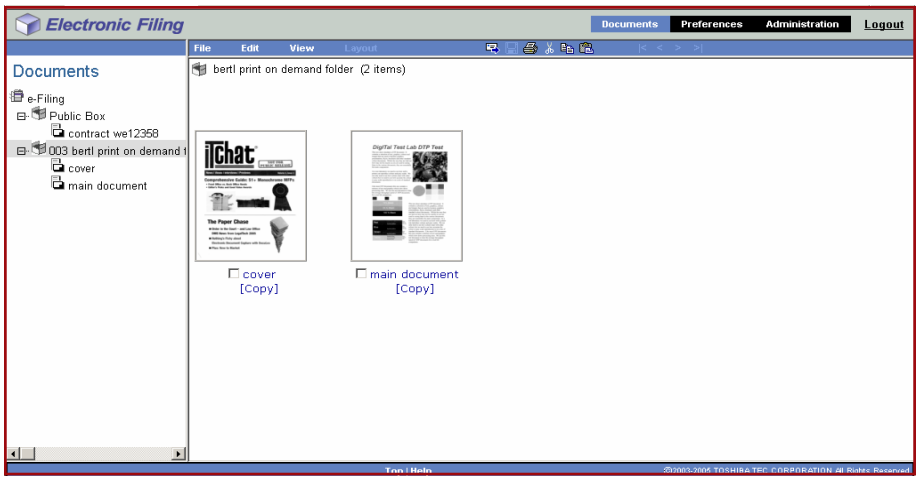


If the user does not know their box or folder details, they can select the box/folder icon and browse to the folder they require.

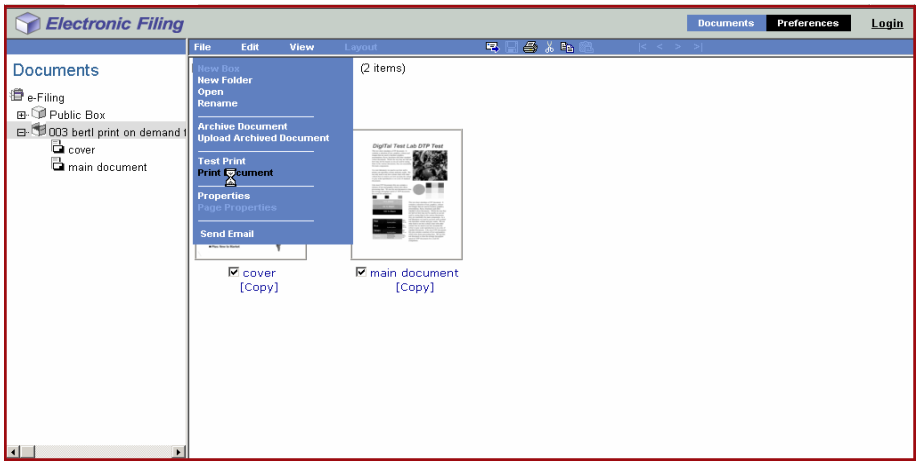


Accessing e-Filing Documents From Desktop

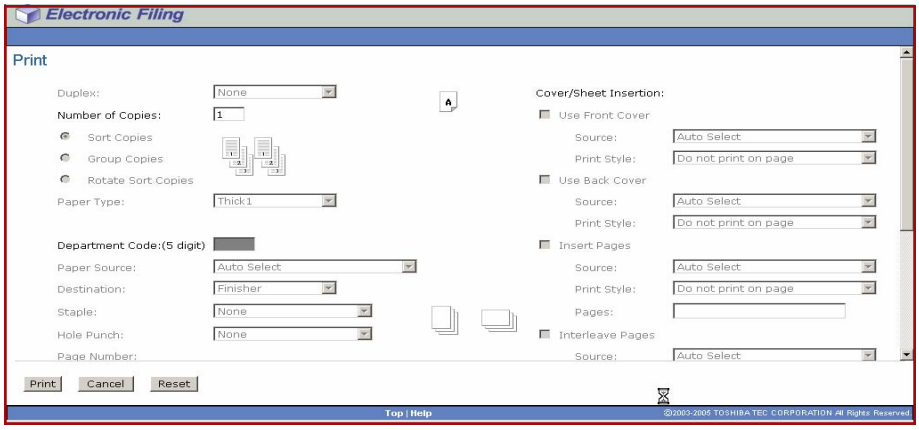
From the desktop, users select e-Filing from the TopAccess main menu. Then, they can browse to a specific folder and view all stored documents. In the example on the right, BERTL analysts created a private folder called BERTL Print on Demand where we stored two documents, cover and main document. The files can be displayed as thumbnails (as illustrated) or as a standard list.



Users can choose to print or email the documents, move them to new folders or pull them back to the desktop for further revisions. Each file must be selected as shown. Multi-page documents can be displayed in their entirety with a thumbnail for each page. Users also can delete pages and replace them with new pages.



When a single document is selected for print, the user has a wide range of finishing and document production options available to them. However, if multiple documents are selected, then virtually all functionality is removed from the mix. Furthermore, the documents are still treated as individual print jobs and can not be combined into a single finished job, a feature found on some rival devices.



WHAT WE LIKED:

- Users familiar with Toshiba and its products will require no adjustment or learning curve with the e-Filing on the e-STUDIO281c.
- The public and private folders give users additional options. Multiple users can access and print the same file through the public folder. Private folders, which are password-protected, allow only specific users access and provide faster access to documents than the one-space-for-all alternative offered by some competitors.
- With e-Filing, users can view thumbnail images of stored documents, delete dated pages and insert new pages in their place, and combine multiple documents created either electronically or from hard copy scan into a single file.
- The ability to cut and paste pages is useful, especially in print-on-demand environments. For example, a human resources department can store training guides so they are ready for printing whenever required, rather than stockpile copies that may become obsolete. When contact lists need replacing, the human resources user can simply delete the old page, and send the new page to the same folder via the printer driver or device scanner, inserting the new page into the main document. This saves the user from having to re-RIP the entire document, a process which could take considerable time.
- Print on demand functions reduce network traffic that otherwise would have been created if the users had to re-send the complete document data to the printing device—a strong argument for network administrators.
- Extensive document production and finishing options are available when submitting the document to print. Some alternatives only allow a simple instruction on the number of sets.

WHAT WE WOULD LIKE TO SEE:

- Users would benefit from the ability to select two jobs stored as individual files in a folder and print them as a single print job with all the print functionality offered when printing a single document.
- An image editing function, that lets users insert text boxes, watermarks, block out/redact areas, and highlight other areas would add more flexibility to the application.

Background
Print passed copy as the primary method of creating output years ago. To limit costs and raise integration between functions, more multifunction products use a single processor board for copy, print, and scan functions.

Connectivity
The vast majority of devices include Ethernet and USB connectivity out of the box; some include parallel connections. In addition, most devices offer a selection of optional connectivity choices like Wireless 802.11b or g (g is the faster, preferred standard.), Bluetooth for connection to cell phones or PDAs, and FireWire for high speed local connectivity.

PDLs
PCL is the de facto printer description language (PDL) of choice provided by all suppliers. Some bundle in PostScript (PS) while others charge for an upgrade. A few manufacturers also include their own PDL which is based loosely on the Windows/GDI printing technology of old. These Windows or GDI drivers often offer significant productivity advantages over traditional PCL/PS drivers since the bulk of the processing is handled by the more powerful desktop PC rather than the less well-equipped printer processor itself.

Productivity
Judging print productivity is an inexact science at best or misleading at worst. Factors such as processor power, memory capabilities, spool and RIPping efficiency, engine throughput speed, RIP while printing capabilities, and more all play a major part, especially when handling color print workflow. Most devices fair better is some of these factors than others, and different workflows benefit from one factor more than another.

It is easy to play judge and pronounce what determines productivity. But, it will have little merit when evaluating print performance for an end user environment. Device A may print Document 1 faster than Device B. But Device B may print Document 2 faster. You cannot determine which document is the best measure of productivity.

The same is true of network traffic tests where multiple jobs are submitted at once. By rearranging the order of the jobs, the productivity of Device A and Device B could easily be reversed.

BERTL does not restrict its evaluation of print performance to such tests. It provides information on how jobs are treated across the various PDLs offered, thus allowing users to get the best out of the device.

Print Features Summary	
CPU	600MHz (Shared for all imaging functions)
RAM and Hard Drive	Main Memory: 384 MB, Page Optional up to 768 mB RAM Memory 32 MB / 80 GB HDD
Operating Platforms Supported	Netware 4.x, 5.x, 6.x, Windows ME/2000/XP, Windows NT 4.0, Windows Server 2003, Citrix MetaFranme, Macintosh, Linux, UNIX
Printer Drivers	PCL 5, 6, & PostScript 3
Network Protocols	IPX/SPX , TCP/IP, Ethertalk, Appletalk, NetBIOS, Over TCP/IP LPR/LPD, IPP, SMB, SNMP, Netware, Port 9100, Bluetooth (HCRP)
Interfaces / Standard	10BaseT/100BaseTX Ethernet, USB 2.0
Interfaces / Options	802.11b/g Wireless LAN, Bluetooth (HCPP), Parallel
Client Software	TopAccess DocMonitor, e-BRIDGE Viewer
Std PCL Fonts Supported	Info Not Available
Std PS Fonts Supported	Info Not Available

Printer Drivers

Driver design varies enormously from manufacturer to manufacturer. Most try to keep a common style throughout their range to reduce learning curves. However, many have significant design differences between PDLs which can raise issues. While many features are common throughout drivers from all manufacturers, there are some differentiators which—while niche benefits in many instances—can be valuable in the right hands. Review the strengths and weaknesses on the following pages.

Ease of Installation

The e-STUDIO281c drivers are available on CDs with the hardware or can be located on the Toshiba Web site. Both PCL and PostScript drivers were installed without problems. The wizard installation process found the device, set up the port, and updated the driver with the installed features on the device with no user intervention. We especially like this for users who do not have the IT savvy to install drivers correctly on an MFP and may not

Print Productivity

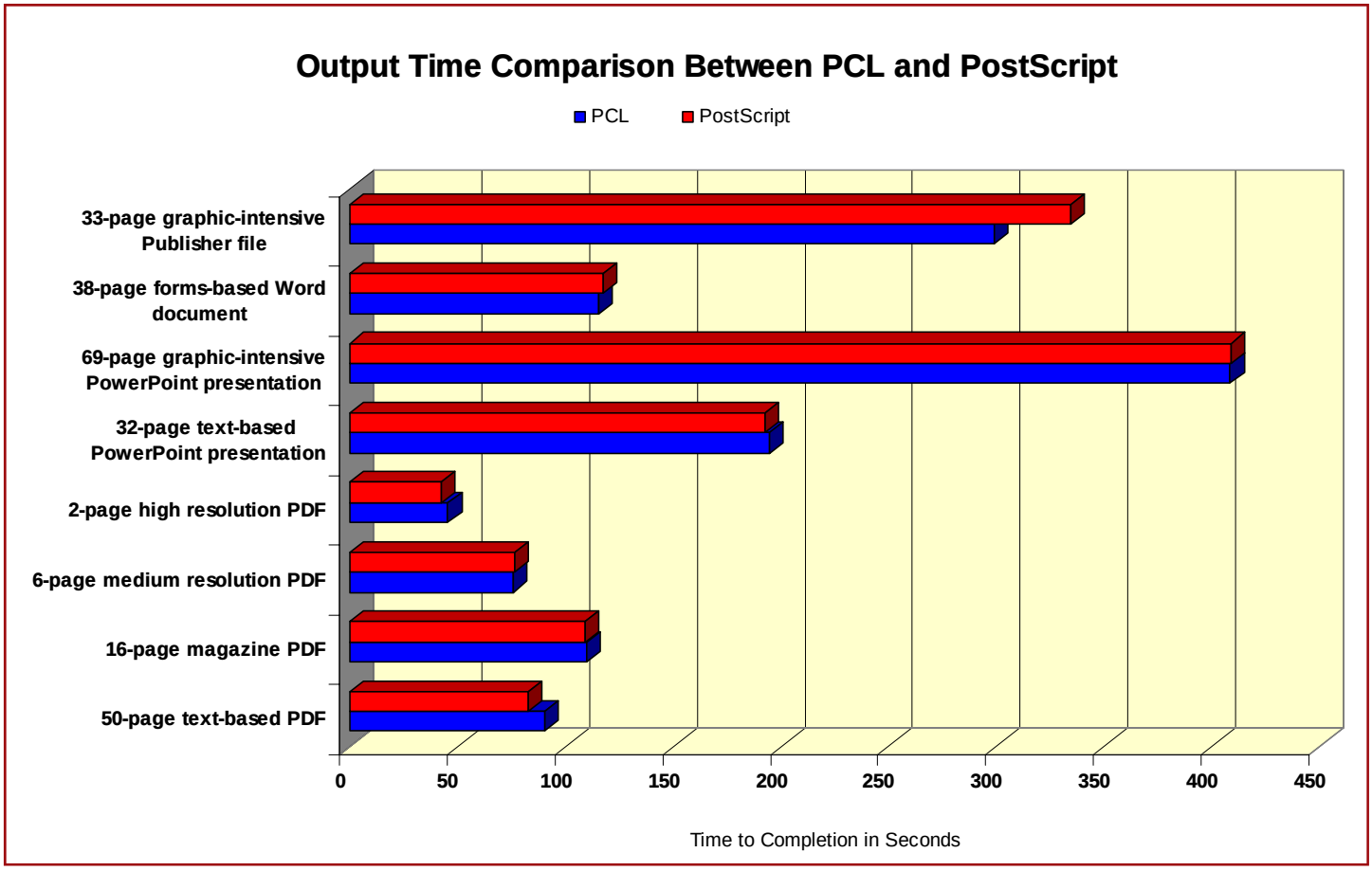
The design of the PCL and PostScript drivers is very similar, allowing users to easily switch from one to the other without confusion. While many users will never veer away from PCL—and many IT managers will not give them the option—those that do will reap benefits in bandwidth and productivity.

For smaller file sizes, the PostScript driver required less bandwidth overall than the PCL, although most differences were not significant. However, the 33-page, graphic-intensive Publisher file did show a big gap in favor of PCL.

The output speed time results were similar. The largest difference was once again in favor of the PCL with the 33-page graphic-intensive document. Other than that, each output was generally neck and neck.

Bandwidth Comparison		
	PCL	PostScript
50-page text based PDF (monochrome)	677 KB	1.50 MB
16-page magazine in PDF (color)	4.13 MB	3.30 MB
6-page medium resolution graphic PDF (color)	2.78 MB	1.13 MB
2-page high resolution PDF (color)	4.68 MB	6.47 MB
32-page text-based PowerPoint (color)	1.92 MB	1.84 MB
69-page graphic intensive PowerPoint (color)	11.5 MB	10.10 MB
38-page form- intensive Word document (mostly monochrome with some color pages)	3.26 MB	0.98 MB
33-page graphic intensive Publisher (color) document	42.4 MB	127.0 MB

Productivity tests performed on e-STUDIO451c sister device.

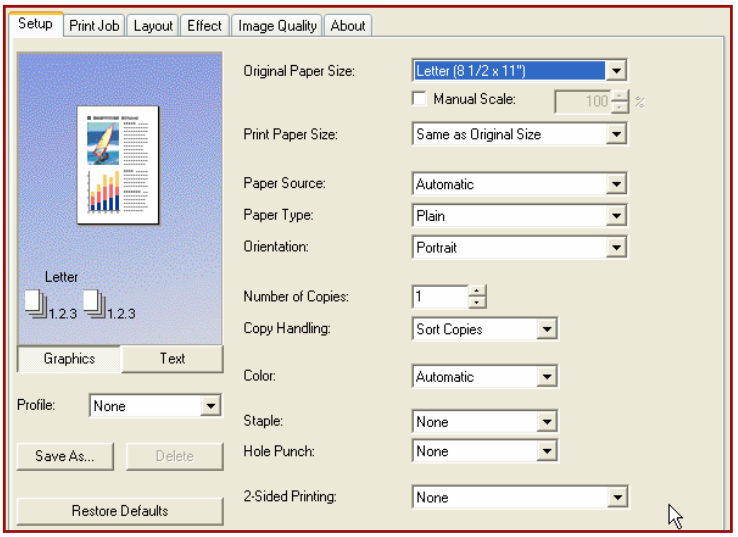


Print Driver Functionality

The **Setup** tab of the Toshiba driver can be reached from the Properties menu. From this tab, users can select paper, paper size, source, orientation, number of copies, post print handling such as stapling and hole punch, and duplex printing.

A status box on the left indicates the current selected functions in either graphic or text form.

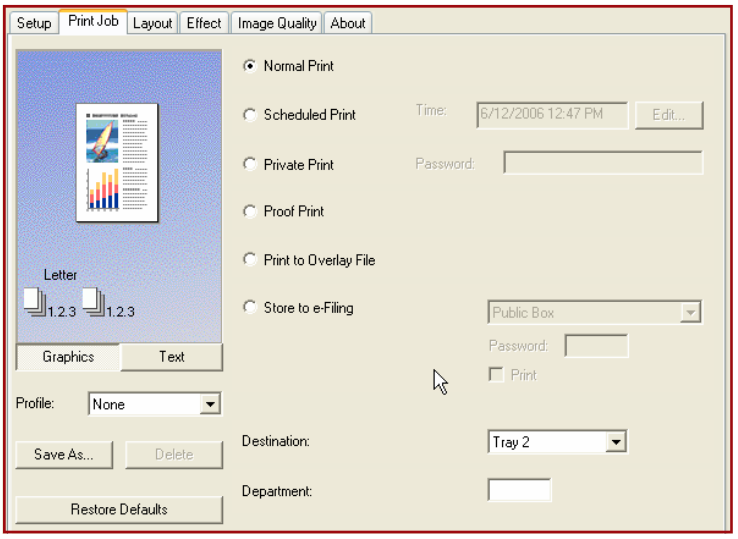
The other driver tabs follow a nice workflow approach, going room left to right.



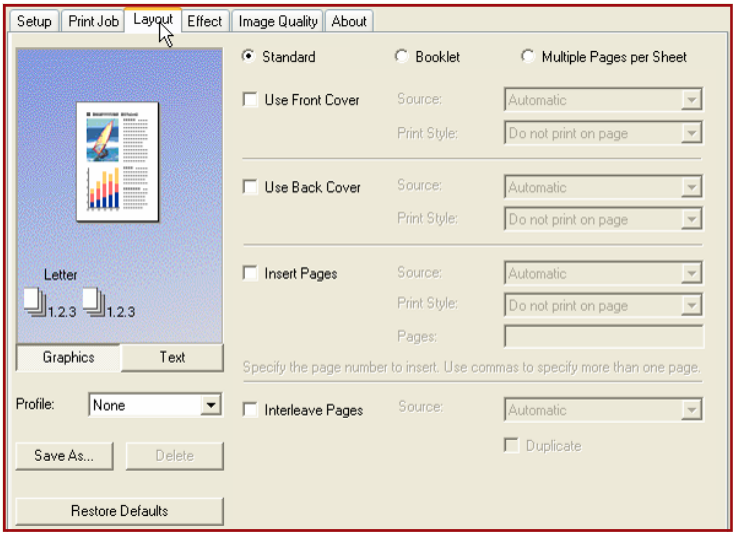
The **Print Job** tab provides a thorough overview of the print capabilities with a feature-rich environment. The driver defaults is Normal Print; a print job will be spooled immediately in the appropriate page and type settings.

Scheduled Print, which lets users select a specific time and day to print a job, is ideal for print large runs that can be scheduled for off-peak office hours. The user sets the print time and date and sends the job.

Private Print stores jobs on the e-STUDIO281c hard drive and allows printing only after a personalized security code has been entered. When Private Print is selected, the grayed out areas are active to allow custom alpha-numeric pass codes to be entered by the operator. When retrieving jobs, both the QWERTY touch keypad and hard number keys can be used for entering the pass codes.



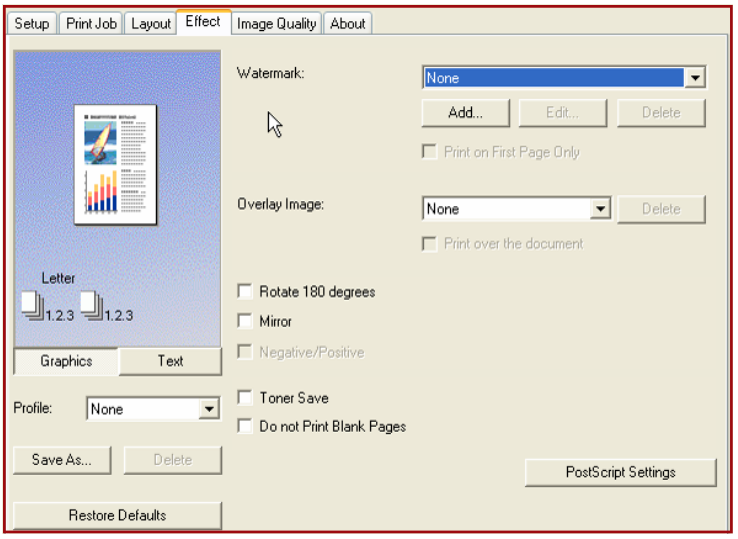
The **Layout** tab provides some good paper arrangement options including paper and cover insertion tools. This gives users the versatility to create booklets or merge multiple pages per sheet. From this tab, BERTL also tested multiple-page insertion requirements from different paper sources along with front and back covers. The unit performed flawlessly.



Print Driver Functionality (continued)

The **Effect** tab positions the output for some specific options and Toner Save mode. The Watermark option lists standard phrases, such as “confidential”, and also lets users customize the phrasing to support a particular requirement.

When selecting Toner Save mode, users should expect coverage to decrease as the toner placement will not be as heavy for print and copy jobs as in the normal setting.



The **Image Quality** tab allows for the selection of distinguishable image modes such as halftone.

With visual aids, users can see which type of selection will go with the document they plan on printing. From left to right, users can choose from General, Photograph, Presentation, and Line Art.

Users also have the option of selecting changes with halftone, resolution, smoothing, distinguishing thin lines, black over print, pure black, pure grey, and use black for all text.

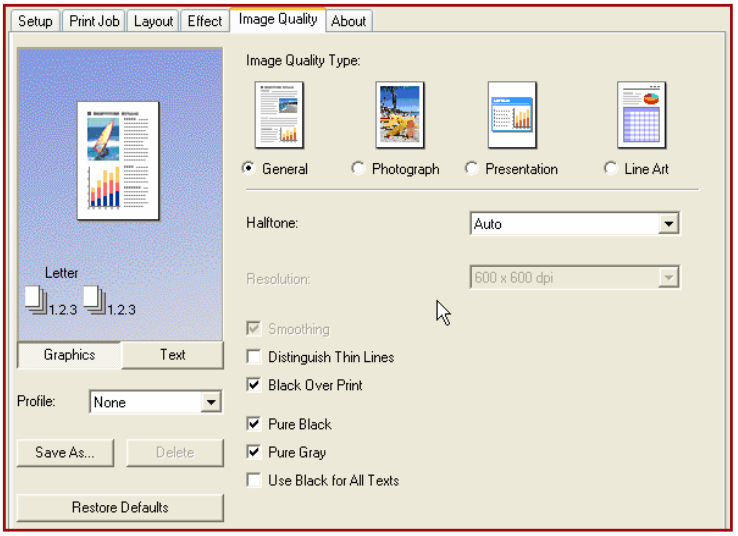


Image Quality

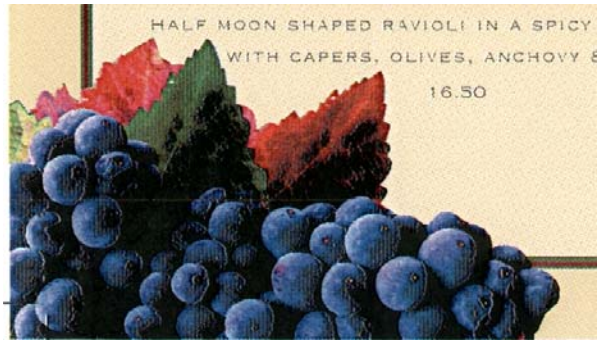
Overall, we felt the print quality faired well when compared against similar devices. While the e-STUDIO281c prints 28 ppm in monochrome, it only prints 11 ppm in color. It should not be confused with competitors producing 28 ppm in mono and color. Toshiba has a whole other line of devices to compete with that market.

The grapes show noticeable color discrepancy and lack of shading. A very bright color appears next to a very dark color without much shading. For an 11 ppm device, this output is expected.

The picture of the lion is not particularly smooth but it is more than acceptable.

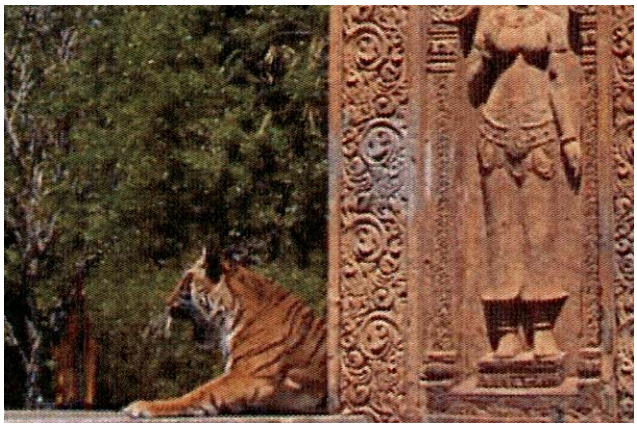
Shading becomes somewhat grainy as it moves toward areas with less and less coverage. The contrast of the test line patterns is not completely consistent. This gives the effect of the line getting smaller and smaller, although the effect should be good enough for most situations.

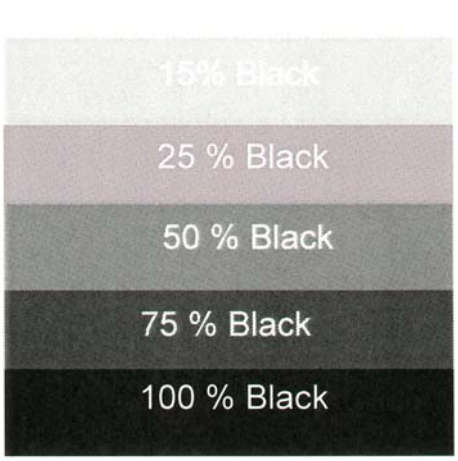
As the image showing the percent contrast faired quite well. Some discoloration is expected and acceptable. The e-STUDIO281c shows some hints of magenta within the 25 percent range. This is normal.



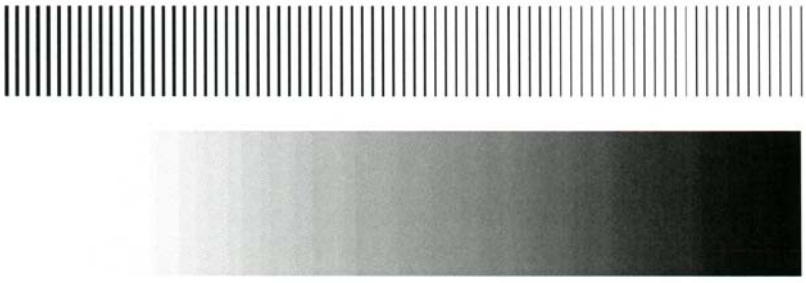
Above: High resolution PDF

Below: High resolution digital camera picture





Shading and fine line text sample test patterns



WHAT WE LIKED:

- The hard buttons on the control panel display if a user is printing in color or monochrome making the mode evident to walk-up users.
- The upper left hand window on each driver has an option which can be viewed in both graphic and text mode. As a job develops, the current selections can be viewed to help ensure that the correct feature sets are chosen for the current run. The graphic selection supports more visually-oriented users who prefer to see how the job will be laid out on paper. The text mode uses only words when describing the layout elements.
- The ability to view the jobs in the queue from the desktop is a nice feature. Users can see not only what jobs are printing but also the exact order of how they are being spooled. Users also can see copy jobs in this viewer.
- The print quality is more than acceptable for a color second unit. For an 11 ppm machine the Toshiba e-STUDIO 281c performs quite well.
- The print quality was very good. Clear, crisp lines and graphic reproduction were apparent across a variety of different resolution settings. Different types of jobs will run well on this unit.
- The PostScript and the PCL drivers were nearly identical in the layout and overall appearance. This similarity allows users to jump from one driver to the next without issue.
- Complex operations such as cover insertion and page insertion were user-friendly, intuitive processes.

WHAT WE WOULD LIKE TO SEE:

- We could not move one job ahead of another in the print queue. This is a necessary feature when some jobs take priority over others, from job to job and user to user.
- When multiple sets of a print run are submitted, the display on the device only shows the number of sets remaining. We would have liked a page count within each set so walk-up users would have a better knowledge of the time remaining before the device is free to use.
- The Scheduled Print function is ideal for those users who have large runs and print them at night. This function allows the user to select the time and day and will begin the print job at that time. However, we would like to see a confirmation of the time and date of the MFP with the user's PC. That way, the operator can confirm that both are in sync.
- Direct PDF support is not available. PDF files must be opened and submitted to print via either the PCL or PostScript driver, which is a more time-consuming, labor-intensive process than the simple drag-and-drop or right-click-and-submit offered by some competitors

Background
In just a few years, network scanning has moved from a luxury item to one of the most important functions on many MFPs.

Virtually all MFPs offer standard or optional network scanning. Document feeder design is now a major focus with users looking for higher speed, low resolution capabilities, more versatile scan functions, and even color scanning on devices only equipped with monochrome marking engines.

Address Book Integration
Integration into central corporate address books on LDAP or NT servers is the de facto standard today, as is the ability to force-populate outgoing email with sender information through an enforced login process. This way, outgoing communications from the remote MFP can be traced back to the user and audited for compliance purposes.

Destinations
Scan-to destinations include email, SMB (Windows desktop locations), FTP, and Internet fax. In some instances, the scan goes directly to the hard drive; an email is sent to the recipient with a URL link so they can quickly download the scan file from the device hard drive location. A growing number of devices are starting to include external media ports to allow scanning directly to USB memory sticks or digital camera SD chips. We expect to see be commonplace over the next year.

Security
Security is another hot point in scanning. Several devices now include the capability to send scan messages using encrypted PDF or other secure transfer medium. This can be an important factor in many industries sensitive to data theft or misuse.

Integration with Third-Party Applications
The big buzz in the MFP industry is the move toward open architecture, where the firmware backbone of the device is based on an industry standard like Java or .NET rather than a proprietary systems. This opens great opportunities for far greater MFP integration with other software applications through third-party applications created with software developer kits (SDK).

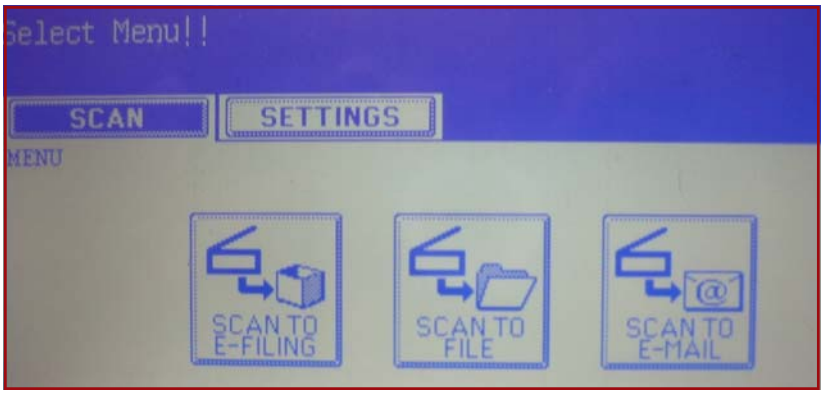
Scan Features Summary	
Maximum Scan Speed (Mono)	50 spm
Maximum, Scan Speed (Color)	40 spm
Document Feeder Capacity	100 sheets
Connectivity Options	10/100BaseT Ethernet USB 2.0
Scan to email	Yes
Scan to SMB	Yes
Scan to FTP	Yes
Scan to HDD	Yes
Scan to URL	No
Scan to Internet Fax	No
TWAIN Scanning	Yes
Scan to External Memory Source (USB/SD card)	No
Network Authentication	Yes
LDAP Authentication	Yes
File Formats Supported	TIFF, PDF, JPEG
Encrypted PDF Format	No
Resolution Options	150 dpi, 200 dpi, 300 dpi, 400 dpi, 600 dpi
Ad hoc Subject Line Entry	Yes
Ad hoc Message Line Entry	Yes
Ad hoc File Name Entry	Yes

Through these partnerships, scanning from the MFP can take on a new life, doing more than just routing files from the MFP to an email or folder. Now, information can be directed into a sophisticated workflow complete the metadata, billing information, image enhancement, and other functions, all from the initial scanning action, rather than the multi-stage process used previously.

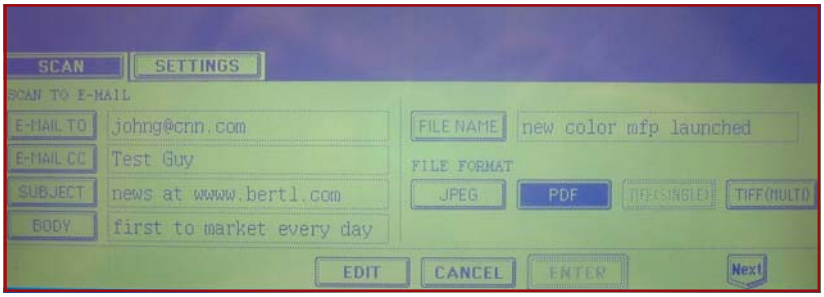
Currently, there is great differentiation in the field of scanning as manufacturers continue to develop this aspect of the device. Watch for more image enhancement and workflow capabilities to become commonplace as scanning continues to pick up the pace as a dominant factor.

Scan to Email

From the scan screen, users select scan to email.

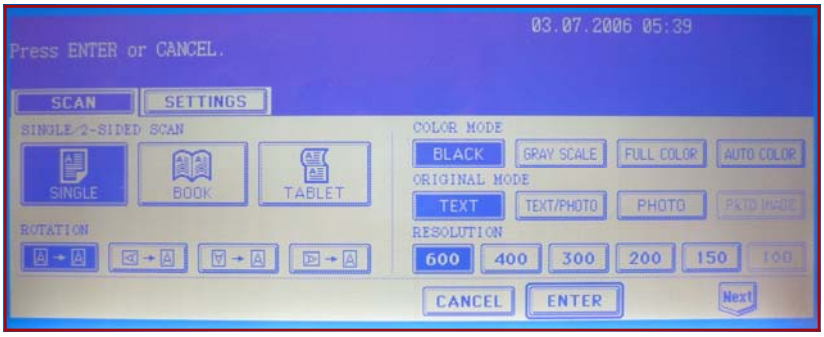


Users can view all the options from this screen. Both grayscale and color scanning is possible with the Toshiba e-STUDIO281c. The destination email address and anyone being copied can be accessed from here. A subject and body can be typed as well. The file name and format can also be changed.



To change any text, users can use the QWERTY keyboard which fills the entire screen.

Users can do more than scan in TIFF, PDF, and JPEG. They can scan in Black, Gray Scale, Full Color, and Auto Color or choose Text, Text/Photo, and Photo. The can also choose 150 dpi, 200 dpi, 300 dpi, 400 dpi, and 600 dpi.



Scan Data Capture Accuracy

One of the fastest growing needs for high-speed scanning is the conversion of legacy hard copy documents into an electronic format for better information sharing, reduced storage space, and easier search and data retrieval.

A scan converts a page into an image which is not very manageable. Most companies use optical character recognition (OCR) software to convert the images into editable text which can then be searched, changed, or incorporated into a new document as required.

The OCR engine recognizes individual images on the page, converting them into letters, numbers, and other symbols. The OCR engine then runs complex analysis on the text in conjunction with spell checkers, technical dictionaries, and other data sources before offering up its best conversion into electronic format.

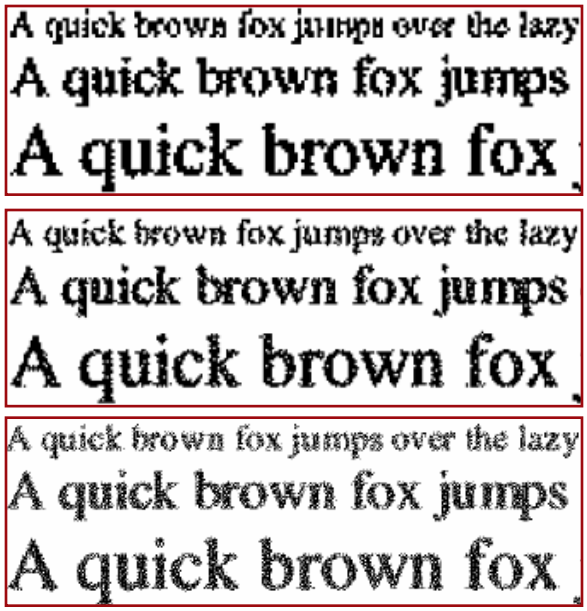
This stage can be very time-consuming, especially if the quality of the scanned data is poor leading to character recognition errors.

To look into this important workflow issue, BERTL ran a series of standard test patterns with multiple font types, sizes, and colors capturing the data at various resolutions using both text and text/photo settings. Text is the default setting for most OCR work due to its 2-bit format which tends to produce the best text reproduction.

However, as more documents incorporate images and color elements, text/photo, which operates in 8-bit and reproduces grey shades for better reproduction of images and colored text elements, is also being used.

After scanning each page of its test originals, BERTL analysts then ran the scanned files through ABBYY FineReader 8.0, in default configuration. The impact of the accuracy of the scanning process at the various resolutions and settings is reflected in the number of manual confirmations that the OCR application demands before the document is deemed clean and ready to use.

The higher the human intervention rate, the higher the cost of carrying out the action. As expected, the greatest difficulty in OCR recognition was found on the smallest 4 point text sections of the test documents.



Above is a portion of BERTL's OCR test chart scanned at 200 dpi (top), 300 dpi (middle) and 600 dpi (bottom) in text format and saved as a PDF file. The image has been zoomed to 400 percent in Adobe Acrobat and screen-captured for display.

The top line is 4 point, the middle line is 6 point, and the bottom line 8 point.

The choice of OCR application will also have a dramatic effect on the level of human intervention that is required after the initial scanning has taken place. For that reason, we have standardized on ABBYY, a well-respected leading OCR software developer.

Our tests are run using the latest level of ABBYY's FineReader 8.0 software in default modes. Through fine tuning of the rich feature set in ABBYY, an additional portion of the manual intervention could be removed. However, to maintain benchmark comparison procedures, default settings were selected.

Scan Data Capture Accuracy Results

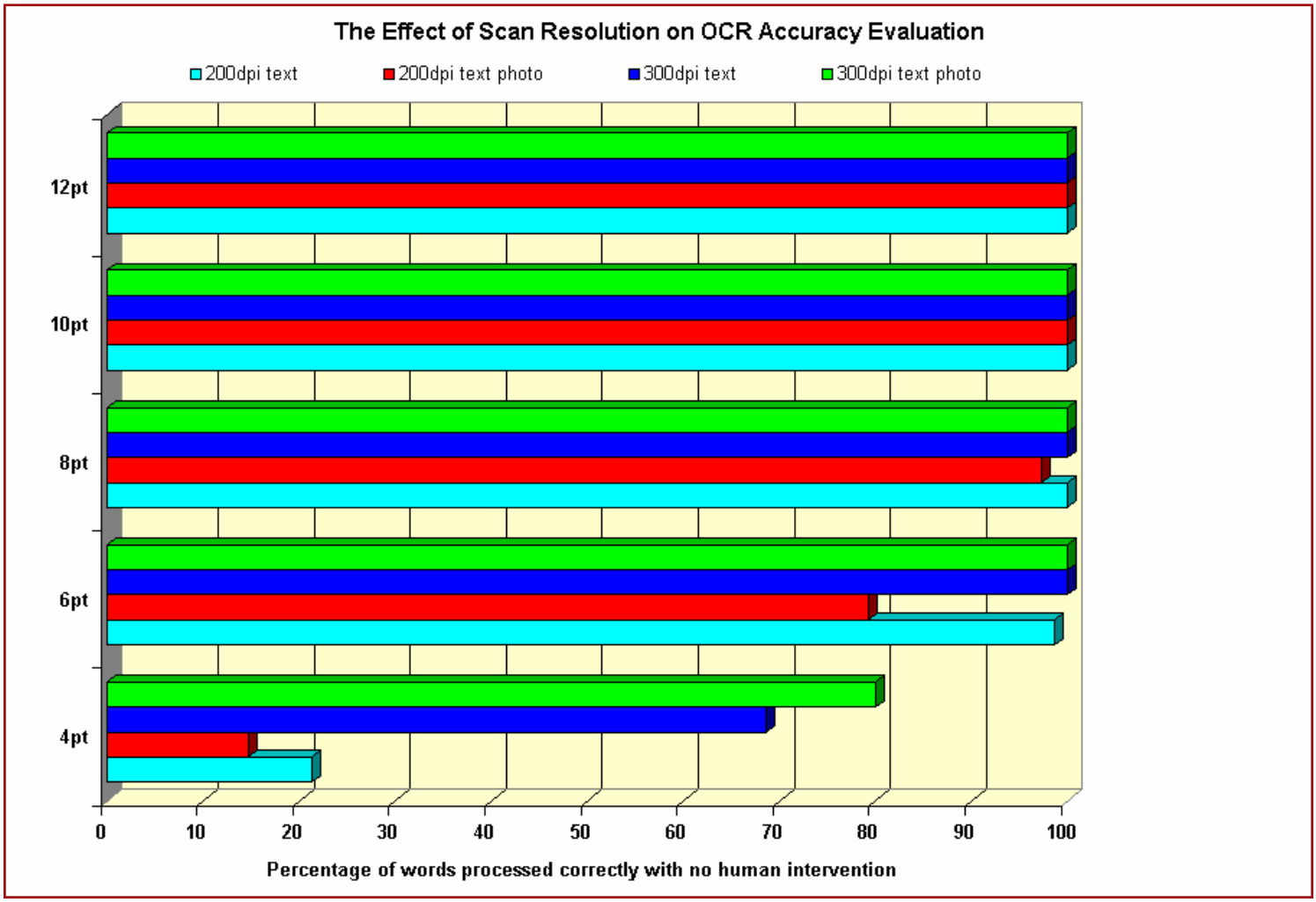
The device fared well on 8 point and 10 point type, which is standard in most documents. Four point text, which will be processed on diagram labels, and terms and conditions on contracts, did not fair as well with a very low recognition rate at 300 dpi, even on the bold black font.

As the chart shows, within the 200 dpi scanning range, text mode delivered a higher level of OCR accuracy across the smaller font point sizes than the text/photo algorithm.

By raising the scanning resolution to 300 dpi, which is the more common default for OCR applications, the OCR accuracy was perfect on all but the 4 point fonts.

The accuracies that should be critiqued the most are 10 point Arial and Times New Roman as these are the most commonly-used settings in general office work today. These fonts came through at pinpoint accuracy across all four resolutions, across all font sizes, and all three font colors.

Productivity tests performed on e-STUDIO451c sister device.



Scan Data Capture Productivity

Judging scan productivity is another difficult task. The impact of the user on the overall process will be largely determined by the amount of work required at the initial scan operation. In other words, if the scan operator is expected to enter copious amounts of metadata using the device touch screen interface before hitting the scan start button, then the overall productivity is going to be governed more by the user-friendliness of the interface rather than the scanner technology or transfer rate.

However, if the user is merely scanning a file to a preconfigured location, then the scan productivity can be measured looking at two aspects: the time the user must wait until they can return to their desk with originals in hand, and the time they must wait before the files can be accessed.

BERTL looks at both of these factors across a selection of scanning settings.

Scan Data Capture Productivity Results

Scanning time is only one part of the time required to support image creation. Getting it to your destination is another. The charts show the scanning time but also reflects something just as, if not more important: the time it takes to actually use this image. This is a frequently overlooked aspect of scanning. There are differing time elements in the actual scan side of the operation but also in the time to desktop.

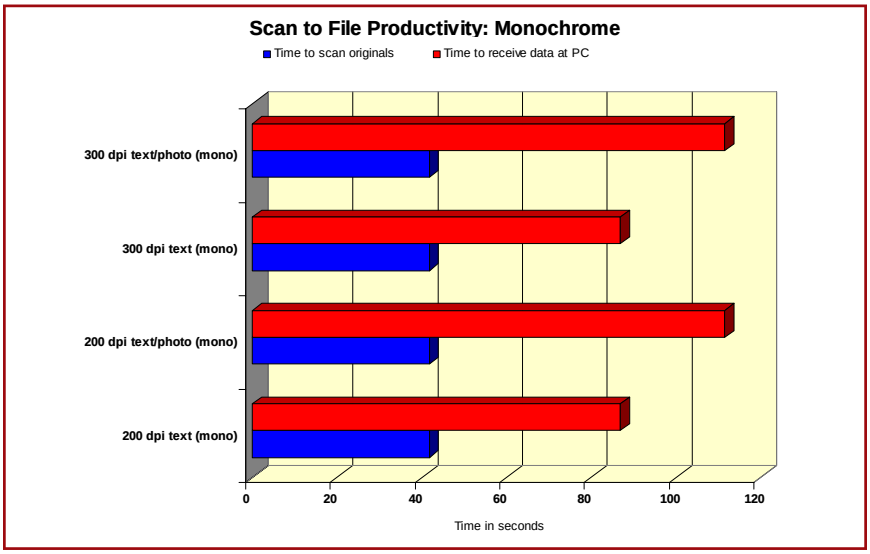
BERTL's test included different resolution settings (200 dpi and 300 dpi) as well as different capture levels: text only and text/photo. As the chart shows, there is not much difference in scan time, and the difference of the time to use the image at the PC is relative to the resolution and not the scan type. All are scanned in less than 30 seconds and all can be used in approximately one minute from the time it was initially scanned.

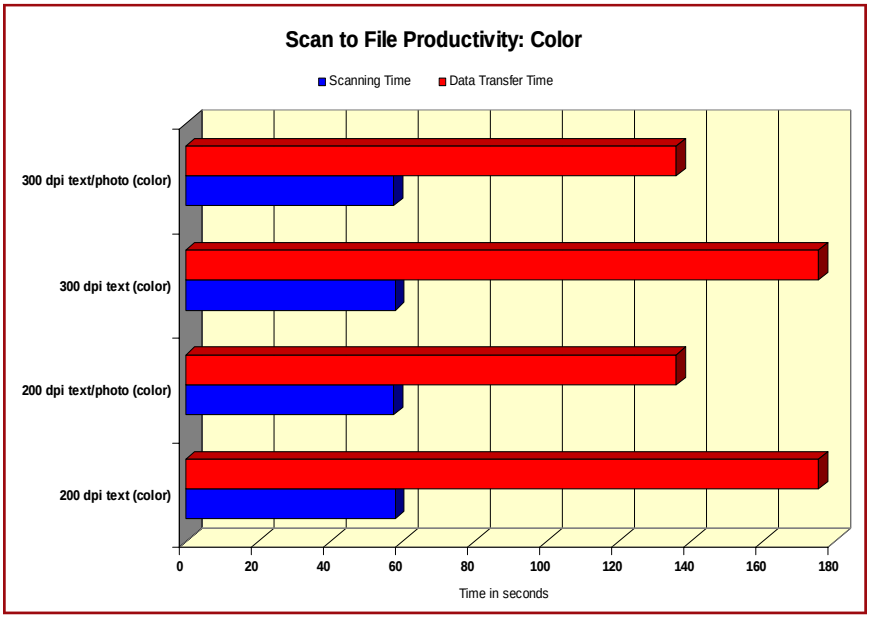
Users will delight in the ease of use and quick turnaround time for a MFP scan as they find more and more reasons to scan their documents and support requirements ranging from knowledge sharing to records management.

When scanning in monochrome the Toshiba e-STUDIO281c showed no signs of slowing during the initial originals scanning phase. There was no differentiating the 200 dpi sessions from the 300 dpi sessions. The same was shown while scanning in color, both 200 dpi and 300 dpi showed no difference.

A difference was seen in the time it took to transfer the data across the network to the desktop PC.

As the charts show, the time taken before the scanned files could be accessed and used from the desktop jumped while scanning at 300 dpi as opposed to 200 dpi. This is expected.





Productivity tests performed on e-STUDIO451c sister device.

WHAT WE LIKED:

- Choosing grayscale and color from the touch screen is very simple with the e-STUDIO281c.
- The scan template creation process is easy for novice users, with graphical aids adding to the user experience.
- The 100-sheet, 50 opm scanner allows for fast original handling, minimizing user intervention time.
- JPEG file creation is offered, in addition to the standard PDF and TIFF, providing a low bandwidth image file creation option that some environments demand.
- When documents are scanned, it is vital that they are not skewed; crooked documents may lose information and gain file size. The Toshiba e-STUDIO281c automatic document feeder offers a rigid support and two control levels that maintain stability in the input process, thereby avoiding unnecessary skewing.
- Data entry via the QWERTY keyboard was reasonably efficient with the QWERTY design taking up the full width of the large touch screen. Each key is larger and easier to press than some rival devices.

WHAT WE WOULD LIKE TO SEE:

- Creating scan templates, while easy to do, involved multiple individual steps. We would have preferred to see the entire template creation to be created in a single operation.
- The reversing document feeder design is less productive when handling double-sided originals resulting in slower throughput scanning speeds and a greater opportunity for jamming errors.
- We would like to see a PDF encryption capability, offering users a method of securing data during transit. This is a feature offered by some competing units.

Summing Up

While the Toshiba e-STUDIO281c is not perfect, it offers a great bang for the buck to the typical front office workgroup or small business buyer.

A great deal of care and attention has gone into creating a user-friendly experience for both walk-up and desktop users spanning all the core document handling disciplines. This is exemplified by the template system that is unique to the Toshiba e-STUDIO range, offering each user the ability to store their most commonly-used features, workflows, and documents in their own repository for quick access.

We'd like to see the queue monitoring and control system improved and the TopAccess system made more user-friendly with fewer separate stages to change settings.

The e-Filing document management application, while not without its glitches, offers a wide range of document handling capabilities that can save valuable time and network bandwidth in certain environments.

We would like to see greater flexibility in the system, especially when handling multiple documents at the same time.

The high quality imaging system delivered good, crisp output across a wide range of copy and print document types. It is well-complemented by extensive finishing and complex document production capabilities. This document production feature set is, in our opinion, more than adequate for most workgroups, and is well within the technical grasp of most office users.

Standard communication capabilities are good. Scanning template management utilities are easy to set up, and a diverse range of destination types and advanced fax forwarding capabilities are offered.

We would like to see the addition of PDF encryption and the ability to create searchable PDF files within the general scan-to capabilities of the device.

Having said that, Toshiba is also building its portfolio of third-party software vendors that work with their MFP range including the likes of eCopy for enterprise level scanning capabilities, ReRite for one-touch, low-cost OCR workflow and more.

One of the keys to the Toshiba MFP product range is its e-BRIDGE controller technology which integrates day-to-day and high end functions onto one controller board.

Built into the e-BRIDGE controller are many additional functions that are activated through special kits, usually consisting of USB enablers. This make it easier for users to upgrade their machines quickly, and as needed without requiring additional assistance such as an outside technician.

The Toshiba e-STUDIO281c will be a tough device to beat in today's diverse, cost-sensitive digital world.

BERTL analyst with the Toshiba e-STUDIO281c.

About BERTL

The success of an organization depends on its ability to manage its information and assets. An effective workflow process requires the complex integration of information, devices, software, and people.

IT managers, office managers, and other knowledge management professionals need to know which digital imaging devices would best serve their specialized workflow processes.

BERTL's services are designed around this real-world framework, delivering business consumers the independent analysis and insight they need to make critical decisions about digital imaging's role in their organization.

Independent Analysis and Insight

BERTL's reports, comparative data, and strategic guides look and digital imaging through the eyes of the business user. The research examines not only the technical features, but also vertical market applications, and business benefits. The impact on worker productivity is a primary concern.

BERTL is 100 percent independent. It receives no funding from manufacturers and all product evaluations and reports are published at BERTL's own expense for its subscribers. Business users worldwide trust BERTL for objective, unbiased analysis of digital imaging systems.

BERTL Services

Reports and Star Ratings

BERTL analysts provide detailed reports of the technical and practical benefits of thousands color and monochrome workgroup, office, graphic arts, and production devices.

Product Specifications

DataCheck Gen II provides the most current competitive data on printers, copiers, MFPs, fax devices, wide format printers, scanners and more.

News, Interviews, and Analysis

The ITchat online magazine provides insight into the dynamics and trends of the digital imaging marketplace through interviews, feature articles, and software reviews

BERTL Awards

BERTL analysts recognize the leading devices and software solutions in the annual BERTL's Best awards. BERTL also honors the performance of manufacturers in the annual Readers' Choice selections.

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