Kodak *digital science*™

Digital Document
Archive System

Installation
Planning
Guide

1 Overview

This publication is intended for users who are considering or planning the purchase of a *Kodak Digital Science*™ Digital Document Archive System. This Installation Planning Guide introduces you to the simplicity of integrating the Document Archive Writer into your imaging systems, the functions of the Document Archive Writer and the components of the system, and the required connections and communications. It also discusses what considerations you need to follow when setting up your files for the Digital Document Archive System. This publication details the physical requirements for the Document Archive Writer (space needs, electrical, environment, etc.). Additionally, other topics include delivery and installation, training, and publications.

Introduction

The *Kodak Digital Science* Digital Document Archive System offers an excellent advancement in managing the long-term storage of digital document images. The images can be used to back up the imaging system or to produce microfilm for immediate use.

The Digital Document Archive System converts digital images into human-readable analog images on film. This allows for low-cost, long-term storage and electronic access. Image addressing, image marks, and frame annotation are features that allow for easy retrieval of images. This system eliminates the issue of technology obsolescence, as the human-readable images will be accessible long into the future. Image addressing, image marks, and frame annotation are features that allow for easy retrieval of images.

Another major advantage of the Digital Document Archive System is how easy it is to interface with your imaging system. With the *Kodak Imagelink* Archive Writer Interface Software (AWIS), it's as simple as creating a batch of images or a list of the files you want to archive.

A typical job flow might be the following:

Integrated with an Imaging System

The host imaging system organizes the image files to be written and creates either a directory of the image files (for instance, on a file server) or a list file containing full path names for each file. Directories and list files can be structured to designate the proper sequence and address level to be written.
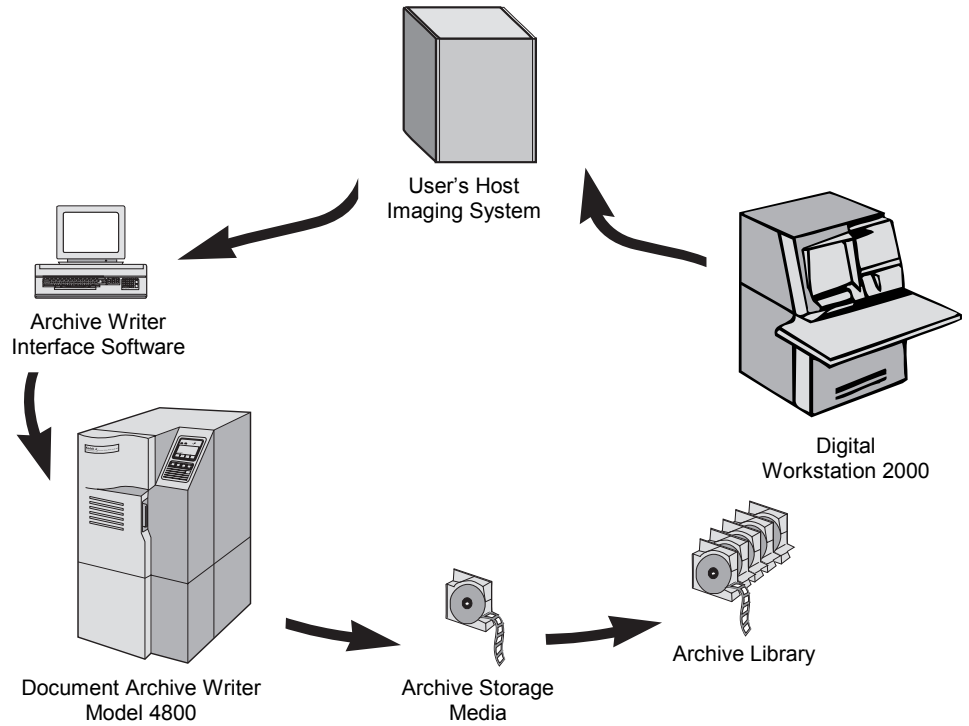

Diagram 1 — Integrated with an Imaging System

Scan to Film Integration

Document images are created using a scanner and are processed and inspected for quality and accuracy. Once the images are ready, they are put in a directory that is accessible to the Digital Document Archive System.
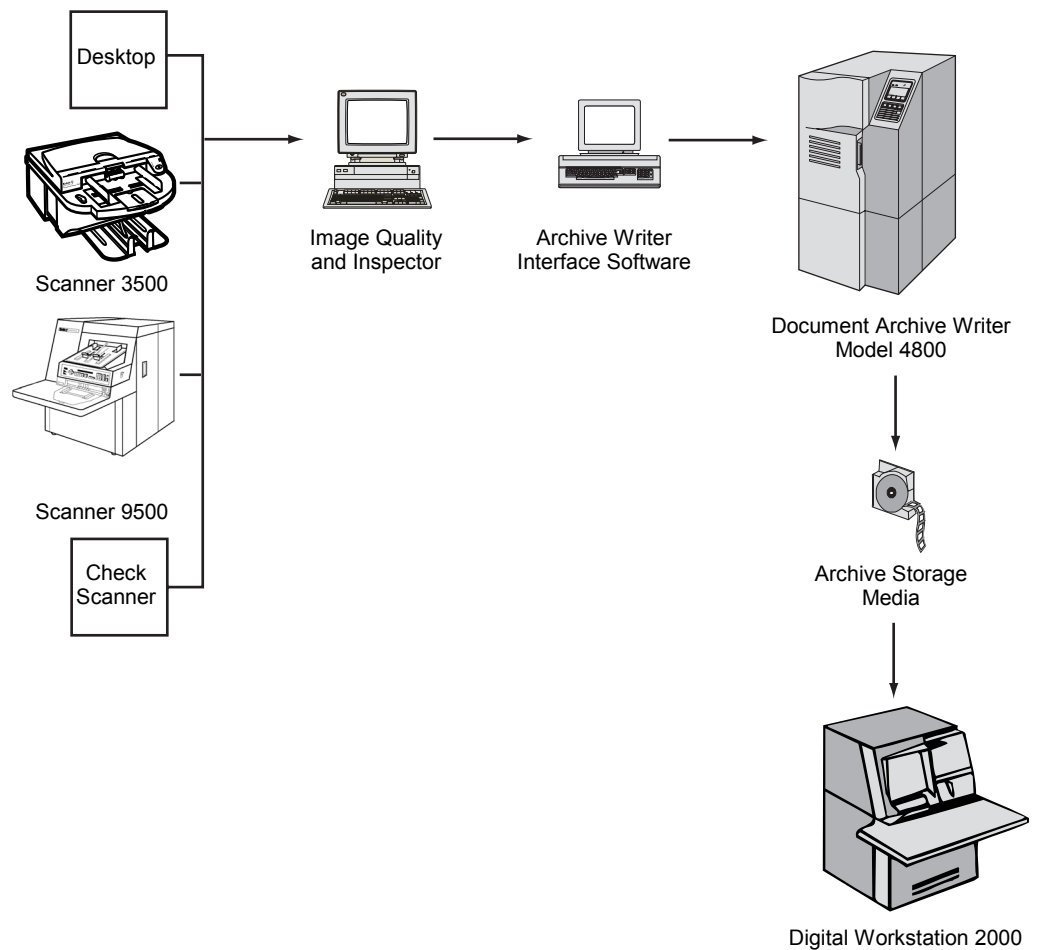
Desktop

Scanner 3500

Scanner 9500

Check Scanner

Image Quality and Inspector

Archive Writer Interface Software

Document Archive Writer Model 4800

Archive Storage Media

Digital Workstation 2000

Diagram 2 — Scan to Film Integration

Archive Writer Interface Software (AWIS), installed on the PC or workstation connected to the Document Archive Writer, processes these directories or list files. The software passes each file to the Archive Writer.

Upon receiving image files from AWIS, the Document Archive Writer automatically decompresses each file and composes the image(s) along with the image mark and frame annotation (image address). Then the image is converted to analog format and exposes the frame on *Kodak* Archive Storage Media. Image addresses defining the location on Archive Storage Media are assigned based on document sequence and index level information designated in the directory structure or list file input. The Archive Writer Interface Software creates a transfer file of these image addresses for each roll of film connecting the name of the file with its corresponding image address. This file can be used to update or append the imaging system's index database.

Next, the images recorded on Archive Storage Media must be processed and developed — in the same manner as other Kodak camera microfilms are processed giving the images their lasting characteristics.

Images on processed Archive Storage Media can be retrieved and scanned for a variety of delivery options using the *Kodak Digital Science* Intelligent Microimage Scanner or the *Kodak Imagelink*™ Digital Workstation 2000 or other reader-printers that accept ANSI/AIIM 16 mm microfilm. Using the image address information (assigned in the archive writing process), requests are input to the Intelligent Microimage Scanner or the Digital Workstation. Both retrieval devices scan images from the Archive Storage Media that you can print, fax, route electronically, or re-enter into digital imaging environments.
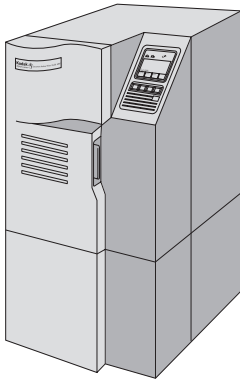
With the *Kodak Digital Science* Digital Document Archive System, added to the proven capabilities of the Intelligent Microimage Scanner or the Digital Workstation 2000, you can increase the versatility, usability, and the options of your imaging systems.

2   Components of the Digital Document Archive System

This chapter explains what each component does and highlights the major functions and optional capabilities of each.

Kodak Digital Science Document Archive Writer, Model 4800

Document Archive Writer
Model 4800

- Accepts bi-tonal digital TIFF (Tagged Image File Format) image files
- Accepts TIFF image files in JBIG, Group III or IV compressed
- Accepts image resolutions from 100 to 600 dpi
- Scales images automatically from 20:1 to 50:1 reduction to readily match image application format requirements
- Accepts mixed image sizes
- Provides image marks and frame annotation (image address)
- Capable of adding image mark coding to film — up to two levels — to support rapid, automated retrieval
- Writes in simplex, 2-up and duplex formats
- Writes to one or two rolls of film concurrently
- Accepts *Kodak Digital Science* Archive Writer Cassette, Model 66 (CAT No. 868 4383) in tandem, or *Kodak Imagelink* Smart Cassette 100 (CAT No. 153 7166)
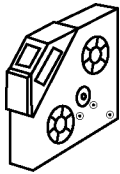
Kodak Digital Science Archive Writer Cassette, Model 66 or *Kodak Imagelink* Smart Cassette 100

Cassette

- Enables convenient film handling in a lightweight, easy-to-load cassette
- Monitors and displays remaining film in 10% increments
- Remembers address of last image filmed
- Simple film path enables easy threading
- Alerts operator to avoid filming over existing images

Kodak Imagelink Archive Writer Interface Software

Archive Writer
Interface Software

- Controls and facilitates the transfer of image files from the imaging system to the Document Archive Writer
- Stores and maintains application and film templates
- Maintains setup and configuration data
- Provides status of writer operations
- Generates activity reports

Kodak TIFFCHKR Module

This module can be used to check the image files before being copied to film to assure the images are compliant with what the Writer and application definition expects.

- Checks if required TIFF tags are present and have acceptable values
- Checks if the images can be decompressed
- Checks if the images can be written at the scaling required
- Checks if the images are in list or batch directories as required
- Converts multi-strip images to single-strip images
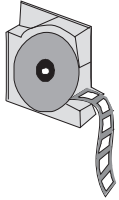
Kodak Archive Storage Media

- 16 mm x 215 ft archival film (CAT No. 844 9449)
- 16 mm x 100 ft archival film (CAT No. 898 1897)
- Silver halide emulsion specially formulated to produce the best possible image from the Document Archive Writer
- Loads like standard microfilm
- Processes with Kodak films in current developer system formulas and setups
- The Archive Storage Media, after exposure and processing, is compatible with ANSI/AIIM standard retrieval devices

Archive Storage Media
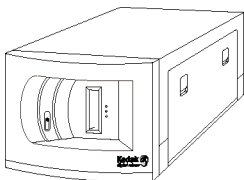
Kodak Imagelink Digital Workstation 2000 or Kodak Digital Science Intelligent Microimage Scanner

- Offers fast, accurate retrieval of images on 16 mm roll film with virtually unlimited delivery options and accessories
- Connects directly to a laser printer, or sends images to local and wide area network printers — eliminating the need for printing and mailing hard copies, and speeding up routing
- Provides Kodak Image Management Code recognition
- Provides three-level intelligent search
- Offers automatic cropping making it easy to print only selected information and protect confidential data
- Offers optional annotation capabilities so you can add important notes and routing information
- Provides auto rotation of images
- Offers the option of CAR interfaces

Intelligent Microimage Scanner
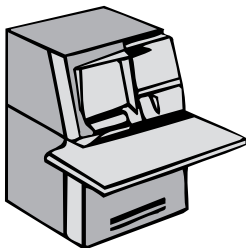
Digital Workstation 2000

3   System Requirements and Connectivity

This chapter specifies the hardware and software requirements that must be provided by you in order to operate the Digital Document Archive System.

Document Archive Writer

See Chapter 7, *Site Specifications,* for space, environmental, and electrical requirements.

Film cassettes

A minimum of one cassette must be ordered with the Archive Writer. If two cassettes are used in the Archive Writer, they must be the same type of cassette (and contain the same type of film). Two cassettes are available: the Archive Writer Cassette 215 or the Smart Cassette 100.

Archive Storage Media

This film must be used with the Archive Writer. Two rolls are included with the Writer to allow for ease of installation and initial testing. You can order additional film from your authorized Kodak distributor. The Archive Writer Cassette 215 is for use only with 2.5-mil, 16 mm x 215 ft. film. The *Imagelink* Smart Cassette 100 is for use exclusively with 5-mil, 16 mm x 100 ft. film.

Archive Writer Interface Software

Hardware requirements

Your system must meet the following minimum hardware requirements:

- 300 MHz Pentium II processor
- 64 MB RAM
- 1-2 GB hard drive or enough space to hold resident software and image files
- CD ROM drive
- Monitor, keyboard, and mouse
- 28.8 baud modem for remote diagnostic access (recommended)

Software requirements

A license for software must be purchased with each Document Archive Writer. Your system must meet the following minimum software requirements:

- Microsoft Windows NT V 4.0. Client version, with Service Pack 4
- Microsoft Access (recommended but not required)
- FTP server installed
- Host PC must support Ping

Network connectivity and cables

Connectivity between the host PC or workstation running AWIS and the Document Archive Writer is via Ethernet. The Ethernet implementation is IEEE 802.3 Ethernet, 10 Base 5 (thick coaxial) connection.
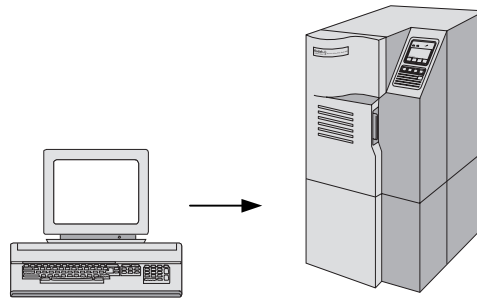
Document Archive Writer, Model 4800

Network card and cabling requirements are:

- Ethernet Card (for host PC): 3COM Etherlink 3 has been tested and recommended.

- Cables: The back of the Archive Writer has a 15-pin AUI connector. The table below specifies connection requirements for standard Ethernet wiring implementations.

Wiring Scheme	Requirements
10 Base 5 (thick coaxial)	Direct connection to Archive Writer or may require a transceiver to convert from male/female to male/male connectors.
10 Base 2 (thin coaxial)	Requires a transceiver to convert from BNC connector to AUI connector on Archive Writer.
10 Base T (unshielded twisted pair)	Requires a transceiver to convert from RJ45 connector to AUI connector on Archive Writer. Also requires a network hub (concentrator).

NOTES:

- Fast Ethernet at 100 MB per second is not supported.
- SCSI Interface is not supported.

All system requirements are to be supplied by you (the user).

Network address
The Archive Writer can only be accessed by one PC at a time. The Archive Writer and PC running AWIS can be on a local network with the PC acting as the server or can be part of a broader network environment.

The AWIS PC and the Archive Writer communicate through four TCP sockets. The Port IDs for these sockets are configurable by service personnel, but configuration is unnecessary unless the Port IDs conflict with an application already existing on the AWIS PC. Three applications are known to have registered Port IDs with Microsoft for Windows NT Server and Workstation: commplex-main, commplex-link, and Radio Free Ethernet. If the AWIS PC and Archive Writer are connected in a local network consisting of only these two devices, then the conflict will not occur.

Following are the default Port IDS:

- By default, the Archive Writer creates and accepts a connection to the input socket on Port Number 5001. To change the Port Number use command 43, Set Network specification. The Port Number must be changed before an initial connection between the Archive Writer and the host can be established:

  – Attach a dumb terminal or terminal emulator to the status/monitor port.
  – Press **Enter** to get the -> prompt.
  – Type the command: netIntMgr_SetInSocketPortNumber <port number>.

- By default, the Archive Writer creates and accepts a connection to the output socket on Port Number 5002. To change the Port Number use command 43, Set Network specification. The Port Number must be changed before an initial connection between the Archive Writer and the host can be established:

  – Attach a dumb terminal or terminal emulator to the status/monitor port.
  – Press **Enter** to get the -> prompt.
  – Type the command: netIntMgr_SetOutSocketPortNumber <port number>.

- By default, the Archive Writer creates and accepts a connection to the File Input socket on Port Number 5003. To change the Port Number use command 43, Set Network specification. The Port Number must be changed before an initial connection between the Archive Writer and the host can be established:

  – Attach a dumb terminal or terminal emulator to the status/monitor port.
  – Press **Enter** to get the -> prompt.
  – Type the command: netIntMgr_SetFileInSocketPortNumber <port number>.

- By default, the Archive Writer creates and accepts a connection to the File Output socket on Port Number 5004. To change the Port Number use command 43, Set Network specification. The Port Number must be changed before an initial connection between the Archive Writer and the host can be established:

  - Attach a dumb terminal or terminal emulator to the status/monitor port.
  - Press **Enter** to get the -> prompt.
  - Type the command: netIntMgr_SetFileOutSocketPortNumber <port number>.

The network administrator must assign static IP addresses to both the Archive Writer and the host PC or workstation running AWIS. DHCP and WINS are not supported. The IP address for the Archive Writer must be provided to the Kodak representative upon installation.

Host imaging system to PC/workstation running AWIS

The customer is responsible for the connection between the host imaging system and the PC running AWIS. When designing this connection, keep in mind the following facts which will help you optimize the connection.

- The performance of the Archive Writer is directly related to network throughput and latency. This means that to obtain the rated speeds of the Archive Writer you need to optimize throughput and latency to ensure they are not affecting performance.

- Because film writing usually takes place at the end of an imaging system's process, the images must be obtained for the network before they can be written to the Archive Writer. This creates problems for users who want to run their Archive Writer at the same time they are getting images from the network. Images coming into the AWIS PC simultaneously with images going to the Archive Writer will compete for use of the network card creating additional latencies. These additional latencies cause performance to be degraded and error conditions in the communications between the Archive Writer and the AWIS PC. The problem is compounded if the segment the AWIS PC is on is overpopulated with clients and network traffic.

To resolve these issues, the following is recommended:

- There should be a dedicated network connection between the AWIS PC and the Archive Writer for their use only.

- Use a second network card to connect to the outside network.

- Be sure that the segment of the outside network that the AWIS PC is connected to is small and not flooded with network traffic and activity.

- Copy images to the local hard drive of the AWIS PC before attempting to write them to the Archive Writer.

If a second network card is used, it must be configured as the secondary card and not the primary card. You can do this by reordering the network bindings from the control panel in NT.

Although it is possible to write images that reside on the outside network to the Archive Writer, it is not recommended. When writing images from an outside network, latencies and extra image file copying is brought into the equation. As previously mentioned, this can cause error conditions and performance degradation. This can be avoided by copying images from the outside network to the AWIS PC in batch fashion while the Archive Writer is not writing film.

Registry command parameters for AWIS

AWIS contains some new registry parameters for optimizing the performance of the Archive Writer system. These parameters and their meanings are described below.

NOTE: These Registry Command parameters apply to Version 1.3 or later.

Registry Entry	Meaning
NumCommands	The maximum number of simultaneous commands that AWIS will send to the Archive Writer. The maximum values depends on the combination of this value and the NumFiles value. The product of the NumFiles and NumCommands cannot exceed 120. The default is 8.
NumFiles	The maximum number of images that a print command can contain. The maximum value depends on the combination of this value and the NumCommands value. The product of NumFiles and NumCommands cannot exceed 120. The default is 8.
FileWaitTime	The amount of time (in milliseconds) to wait before attempting to copy data to the Archive Writer. This value is used in conjunction with the FileWriteRetry value to determine the amount of time AWIS will wait for the Archive Writer to process existing commands and make space available on its disk. The default is 2000.
FileWriteRetry	The number of times AWIS attempts to copy an image file to the Archive Writer before giving up and signaling an error. This value is used in conjunction with the FileWaitTime value to determine the amount of time AWIS will wait for the Archive Writer to process existing commands and make space available on the disk. The default is 20.
TransactionTimeout	The maximum time (in seconds) AWIS will wait for a command to be processed by the Archive Writer. The default is 180.
PollFile	The name of the file that is searched for if InputMode parameter for AWIS is set to Poll. Wild cards are allowed. The default is *.dat.

Registry Entry	Meaning
PollInterval	The interval AWIS waits between searches for the Poll File. The default is 3 seconds.
PollFileType	Indicates how the Poll File will be processed. There are three options: 1. **Check Contents for Path** — this option instructs AWIS to open the Poll File and try to process the first line of the Poll File as a path to either a List file or a Batch directory. If the first line of the Poll File does not indicate a valid List file or Batch directory, the Poll File is processed as specified for the Ignore Content option. 2. **Filename as Path - Ignore Contents** — this option instructs AWIS to use the name of the Poll File (minus its extension) as the name of a Batch directory. 3. **Contents is Listfile** — this option instructs AWIS to treat the Poll File as though it were a List file. The default is Check Contents for Path.

The default values of these parameters are sufficient for many applications. In certain instances, the values can be modified to optimize the Digital Document Archive System for a specific application.

NumFiles and NumCommands

The NumFiles and NumCommands parameters work together to maximize command and image throughput by minimizing the amount of time the Archive Writer will wait for print image commands. This is accomplished by ensuring that there is at least one print image command on the Archive Writer disk ready to be processed when the command currently being processed is finished. This means that at least two commands must be active at once; one being processed by the Writer and one on the Writer disk waiting to be processed. AWIS views four active commands in this case:

- one command being built and copied to the Writer

- one being retrieved from the Writer when complete (response)

- the two mentioned above (one on the Writer waiting to be processed and the one being processed)

This implies that the lower bound for NumCommands is four. Typically, this value is left at the default value of 8. This allows a few extra commands available if needed.

In order to support the situation as documented above, the Writer disk needs to hold three print image commands, plus their associated images and one command response based upon the description above. The Writer reserves its own space for command response, therefore the three print image commands each require a third of the available disk space. The gives approximately 370K of disk space for a command and its images. Using the default value for NumFiles (8), this means that the files in an image group must average approximately 46K.

What happens when files average 70K? In this case, each command occupies approximately 560K on the Writer disk, therefore only two commands will be on the disk, one currently printing and one waiting. AWIS will not begin copying the next command to the Writer until the printing of the first image is complete and its files have been removed. This means that as the next command starts processing, AWIS will start to copy the next command to the Writer, which depending on network speed, can take longer than processing the current command, therefore, throughput is reduced.

To determine the NumFiles value, use this formula as a guideline:

$$\left\lfloor \frac{370}{\text{Average image file size}} \right\rfloor = \text{NumFiles}$$

In the example of 70K image files:

$$\left\lfloor \frac{370}{70} \right\rfloor = 5$$

NumFiles should be set to 5.

When the image files are small (10K or less), if you use the default values, only about 60% of the Writer disk space is used. In this case, NumFiles could be increased. Divide 110 (maximum available Writer space) by 8 (NumCommands), then divide the result by the image file size and round the result down. For example:

$(1100 \div 8) \div 10 = 13$

NOTE: The above descriptions assume the standard small disk model and are intended to be used as general guidelines.

FileWaitTime and FileWriteRetry

The FileWaitTime and FileWriteRetry parameters are associated with copying files from the host to the Writer. When an image file needs to be written to the Writer, AWIS sends a message to the Writer with a request to write a file of a given size.

- if the file will fit, the Writer responds OK.

- if the file will not fit, AWIS pauses for the time specified in FileWaitTime and repeats the file write request.

The number of times AWIS attempts to copy the file before giving up and signaling an error is specified in FileWriteRetry. When AWIS gives up, the error *3034 Failed to copy file X to Writer* is displayed. When the error occurs, a message is displayed, asking if you want to retry copying the file.

The combination of the FileWaitTime and FileWriteRetry gives the Writer 40 seconds to finish processing commands and make space for new commands. For most applications this is sufficient; however, when processing very large image files (greater than 750K), 40 seconds may not be enough. In this case, the FileWriteRetry needs to be increased. Increase the value in increments of 5 until the largest file can be processed without an error occurring. It is important not to set this to some arbitrarily large value, because in the event of an error, this can increase the time it takes to report the error which is preventing the files from being copied. Setting FileWriteRetry to a value too small causes the 3034 error to happen more frequently.

Generally, the FileWaitTime should be kept at the default. Decreasing this value causes the requests to copy a file to become more frequent but also increases network traffic. Increasing this value may cause a loss of throughput.

It is important to remember that the total of FileWaitTime times the FileWriteRetry count must be a time interval larger than the time it takes to process the largest image file.

Transaction timeout   This timeout value is associated with the sockets interface. This parameter specifies the maximum amount of time that AWIS will wait for data to be sent from the Writer. This value may only need to be changed when a print image command takes longer than 90 seconds. The value of this parameter should always be about 30 seconds larger than the time specified by the FileWaitTime and FileWriteRetry parameters.

Setting the values   These values are set during software installation and can be changed from the **File>Option** menu in the ADMIN application.
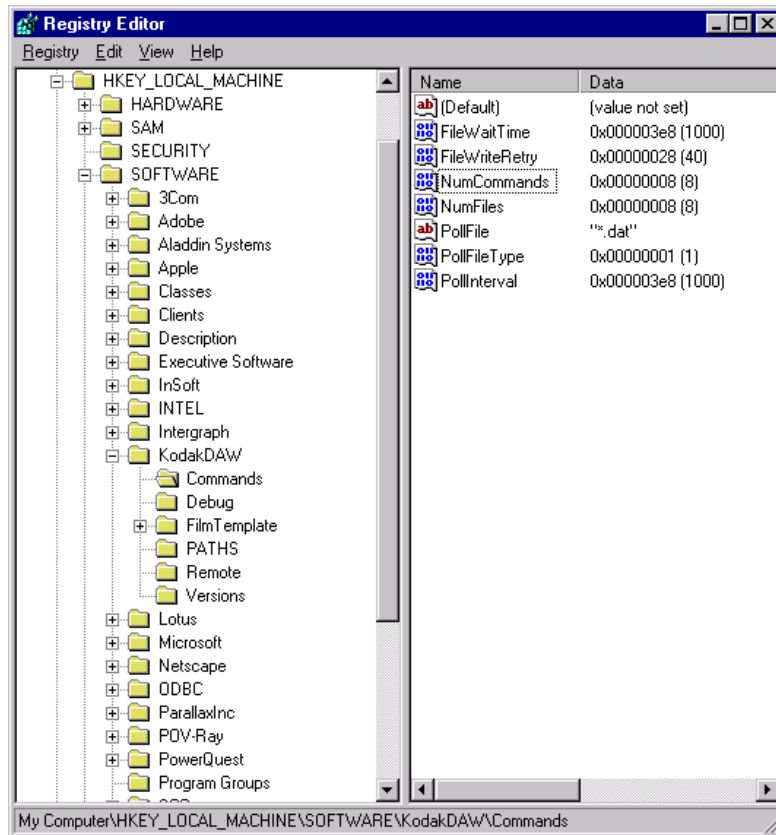
AWIS Poll mode, network configuration and traffic

With the introduction of Poll mode to AWIS, the configuration of the network the Archive Writer, the AWIS PC workstation, and other Kodak accessories reside on becomes important. Customers should design their networks so the connection between the Archive Writer and AWIS PC workstation is free of extraneous network traffic.

When using Poll mode, it may be desirable to poll for images on network-attached drives. An example application may check the hard disk of a PC that scans images and writes them to the Archive Writer. This is reasonable and feasible and works in most cases.

There are times when the network configuration can cause problems with AWIS Poll mode. A primary concern is the amount of network traffic and the contention for bandwidth that AWIS's polling and writing of images can cause in an Ethernet environment. The Archive Writer depends on receiving a steady stream of communication and images from the AWIS PC. Contention for network bandwidth may have a negative effect on performance of the system. The following factors may increase contention for network bandwidth:

- The AWIS PC and the drive containing the images residing on separate networks.

- The separate networks are large.

- The separate networks have diverse traffic.

- The separate networks have large and/or large segments.

- The separate networks have several hops between segments.

If Archive Writer errors occur which are communication related, they will often disappear when writing images located on the AWIS PC's hard drive. Kodak uses this technique to verify a problem with the network and recommends it as a first step in identifying network issues.

Following are some guidelines as you plan your network configuration:

- Be aware of the network your Archive Writer traffic will travel through. Become familiar with its traffic issues and configuration ahead of time and plan around them.

- Put the Archive Writer and the AWIS PC on the same network segment, preferably a very small one with little or no other traffic. Many customers choose to put the Archive Writer and AWIS PC on their own segment.

- If writing images from a network drive (either by Batch or Poll mode) try to minimize the number of network hops the AWIS network traffic will travel through.

- When choosing the computer to host the network drive, take in account the use and processing load of that computer. Choose a computer that is not heavily used or does not present contention risks. For example, do not choose a Primary Domain Controller, application server or heavily used file and print services server. Instead choose an infrequently used Backup Domain Controller, file and print server or dedicated machine.

4   Image File Specifications

This chapter details the specifications of the digital image files to be written to Archive Storage Media.

Input file types   **Tagged Image File Format**

TIFF Files

Image files accepted by the *Kodak Digital Science* Document Archive Writer need to be in the following format and specifications:

- Bi-tonal image files
- Baseline TIFF conformance with extensions for Group III, IV and JBIG compression types*
- Files can be single- or multi-page files
- All image files must be one strip — implying rows per strip equal image length

NOTE: The Document Archive Writer does not support multi-stripped or tiled images. Multi-strip images can be converted to single-strip images using the TIFFCHKR module.

The TIFF tags/fields that must be designated are:

- **X Resolution** — numeric; measured in pixels.
- **Y Resolution** — numeric; measured in lines.
- **Compression type** — options must be specified for Group III compression.
- **Image width** — numeric; measured in pixels. Validation occurs on the scaled image width, which is derived from this value and the desired scaling. Valid scaled image width values are:
    1 to 3888 pixels (simplex mode)
    1 to 1920 pixels (duplex mode)
- **Image length** — numeric; measured in lines. Validation occurs on the scaled image length, which is derived from this value and the desired scaling. Valid scaled image length values: 1 to 6900 lines.

The following fields should be designated. If not, default values will be used. This may or may not result in the image being correctly represented.

Field	Default
Bits per sample	1
Resolution unit	inches
Photometric interpretation	1=black
Rows per strip	=Image length

Text files — must conform to a maximum of 66 lines and 80 characters per line. Files which exceed these limits will be processed by the system, but will be truncated and data will not be written to film.

* TIFF 6.0 Specification, Aldus Corporation, June 3, 1992.

Image file names   For the Digital Document Archive System all file names must conform to the Windows NT file naming convention. Long file names, up to 255 characters, are allowed. The recommended extension for TIFF files is ".tif". The required extension for text files is ".txt" (case insensitive).

Examples

    \image123.tif
    c:\app1\image File 234.tif
    f:\titles\monroe\image1.tif

Compression types supported   The Digital Document Archive System supports the following compression types:

- TIFF type 1 — no compression
- TIFF type 2 — CCITT Group III, 1-dimensional
- TIFF type 3 — CCITT T4 bi-level encoding
- TIFF type 4 — CCITT T6 bi-level encoding
- JBIG — JBIG compression

Maximum image file sizes   The maximum image file size that can be sent to the Archive Writer depends on the size of the DOS RAM disk that is configured on the Writer, and the filming mode (simplex or duplex). The amount of the RAM disk available for image file storage is: RAM Disk Size (bytes) - 300,000 (bytes)

This applies to:

- Single-page file
- Single page of a multi-page TIFF file
- Compressed input file (single page)
- Uncompressed input file (single page)

Film mode (simplex, duplex) also needs to be taken in consideration. In Simplex mode, the entire available space may be used for a single image file. In Duplex mode, it is necessary to store images in pairs, so two image files can fit in the available space.

Image annotations   Annotations, e.g., text overlays or notes, (not frame annotations) are not supported at this time. The Document Archive Writer will not write them to film unless presented as an image file in TIFF format sequenced as part of the input method chosen.

Using JBIG compressed files

A JBIG compressed image file consists of a 20-byte header followed by the JBIG compressed image data*. For use in the Digital Document Archive System these fields should not be modified. However, in order for the Digital Document Archive System to read and decompress these files they must be enclosed in a TIFF file format wrapper.

The TIFF tags/fields that must be designated are:

- X resolution — must be provided; it cannot be derived from the JBIG file header.

- Y resolution — must be provided; it cannot be derived from the JBIG file header.

- Compression type — the JBIG compression type is: 34461 (0x8765).

- Image width — set to the 'Xd' field found in the JBIG file header.

- Image length — set to the 'Yd' field found in the JBIG file header.

- Rows per strip — must be set to the image length.

- Strip offsets — the strip offset into the first strip must point to the JBIG 20-byte header.

- Strip byte counts — the strip byte count must be the number of bytes in the JBIG compressed.

- Data plus the 20-byte header preceding the compressed data.

The bits-per-sample, resolution unit, photometric interpretation, if not present, will be set to the default values shown earlier.

Restrictions for JBIG compression:

- The JBIG compressed file **must** be a single strip only, multi-strip compression is not allowed.

- The JBIG header must be incorporated as part of the JBIG image data as the first 20 bytes of the compressed data.

- The following bits **must** be 0 in the JBIG header:

  - Order field: HITOLO, SEQ, ILEAVE, SMID
  - Options field: TPDON, DPON, DPPRIV, DPLAST

- The P field in the JBIG header must be 1 (single-plane only).

- Currently the JBIGOptions TIFF tag field is not supported in the Digital Document Archive System.

*   ITU-T Recommendation T.82, "Information Technology - Coded Representation of Picture and Audio Information - Progressive Bi-level Image Compression", 03/93

5   Output Formats

This chapter explains the output format and indexing options available to meet your application needs. Selection of the formats is done through AWIS Administration setup.

Film formats

The Document Archive Writer supports three primary film formats: Simplex, Duplex, and 2-Up. Duo is not supported.

Simplex
Cine/Portrait

Duplex
Cine/Portrait

2-Up
Cine/Portrait

24X Simplex

40X Simplex
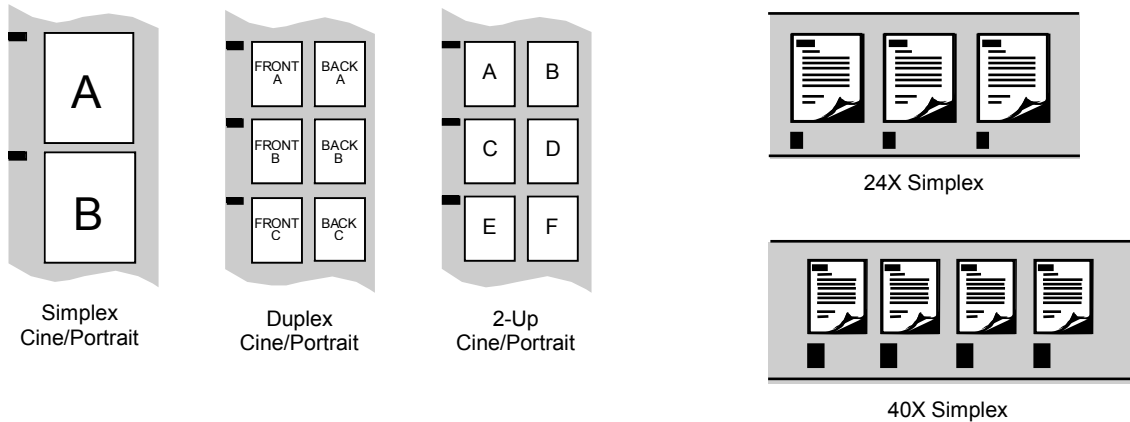
NOTE: All examples are Cine mode film format.

Simplex

One image is written across the width of the film. Each page of a single- or multi-page TIFF file is indexed and addressed individually.

2-Up

Two separate images (not necessarily front and back) are written across the width of film. The system handles this condition as a duplex mode. One index location is assigned to both images. Image files will automatically be assigned to A channel and B channel as they are processed.

Duplex

This is a special version of the 2-up format. The front and back sides of the same document are written across the width of the film. One index location is assigned to both images. For documents which contain fronts and backs, and duplex film is specified, fronts will be written in the A channel and backs will be written in the B channel. The input format (list file or batch) must assure the correct correlation of front and back images to produce film as shown above.

For multi-page TIFF image files, the lead/header page and next (i.e., page 2) will be written across the width of the film and assigned a medium level image mark for two-level applications. Subsequent pages (i.e., 3 and 4, 5 and 6, etc.) will be assigned a single-level image mark. The system accommodates multi-page image files with an odd number of pages by writing the last page in the A channel and skipping the B channel.

Rotation

The Digital Document Archive System does not provide the facility to rotate images. If image rotation is desired, this must be provided by a third party software product. The images must be rotated before being copied to the Writer. See the diagram in the section entitled, "Scaling and image orientation on film".

Maximum document sizes

The Document Archive Writer can archive documents at 1/20 (20X) to 1/50 (50X) of their original size. Reductions are achieved through image file scaling. Standard microfilm reductions are recommended:

Simplex	24X, 28X, 32X, 40X
Duplex/2-Up	40X, 50X

The maximum image widths and lengths accommodated by the Document Archive Writer are listed below for standard reductions:

Reduction Ratio	Width Simplex	Width Duplex	Maximum Length
24X	11.9 in. (302 mm)	5.9 in. (149 mm)	21.2 in. (538 mm)
32X	15.9 in. (403 mm)	7.8 in. (198 mm)	28.3 in (718 mm)
40X	19.3 in. (490 mm)	9.5 in. (241 mm)	34.3 in. (871 mm)
50X	24.9 (632 mm)	12.3 in. (312 mm)	44.3 in. (1125 mm)

Scaling and reduction

The Document Archive Writer applies a digital scaling technique to achieve the desired reduction on film. There are two choices: automatic and none.

Automatic

Automatic scaling allows images of documents of the same physical size (8.5 x 11 in.) to appear the same size on film independent of the digital resolution of the image file. Automatic scaling to a desired reduction is recommended for most applications.

None

Images are written to film with no scaling performed. Reduction ratio depends on the input file resolution.

Scaling — None

Image Resolution dpi	Effective Reduction Ratio	Maximum Width Simplex	Maximum Width Duplex	Maximum Length
100	77X	38.5 in. (977 mm)	19.0 in. (482 mm)	68.5 in. (1740 mm)
200	39X	19.3 in. (490 mm)	9.5 in (241 mm)	34.3 in. (871 mm)
300	26X	12.8 in. (325 mm)	6.3 in. (160 mm)	22.8 in. (579 mm)
400	19X	9.7 in. (246 mm)	4.8 in. (121 mm)	17.2 in. (436 mm)
600	13X	6.4 in. (162 mm)	3.1 in. (78 mm)	11.4 in. (289 mm)

Scaling and image orientation on film

Letter and legal size documents scanned as follows:

Scanner

Letter | Legal

E | G

200 dpi

Original resulting values in the TIFF header tags:

Letter Size
Image Width = 1700
Image Length = 2200

Legal Size
Image Width = 1700
Image Length = 2800

These scanned images will print to film as follows:

Scaled to 24:1 Simplex

E | G

Film Writing →
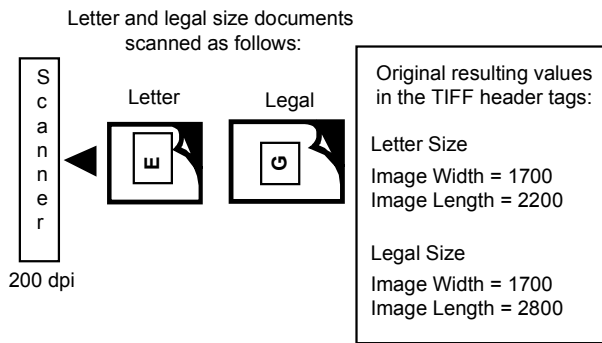
Figure 1

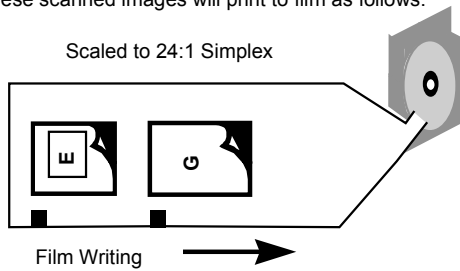
Same images from Figure 1

Images are **rotated** by a software package

Original resulting values in the TIFF header tags:

Letter Size
Image Width = 1700
Image Length = 2200

Legal Size
Image Width = 1700
Image Length = 2800

Resulting values in the TIFF header tags after rotating:

Letter Size
Image Width = 2200
Image Length = 1700

Legal Size
Image Width = 2800
Image Length = 1700

These scanned images will print to film as follows:

Scaled to 32:1 Simplex

E | G

Film Writing →
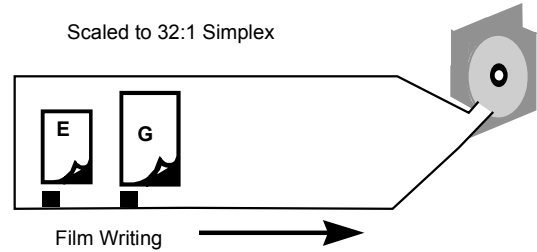
Figure 2

Letter size documents scanned as follows:

Scanner

Letter | Letter

E1 | E2

200 dpi

Resulting values in the TIFF header tags:

Letter Size
Image Width = 2200
Image Length = 1700

These scanned images will print to film as follows:

Scaled to 24:1 Simplex

E1 | E2

Film Writing →
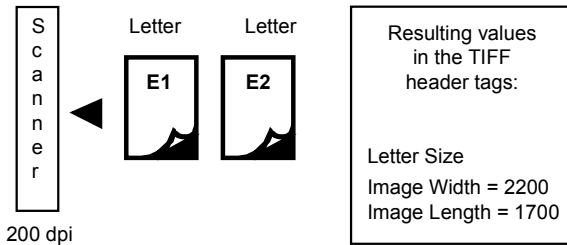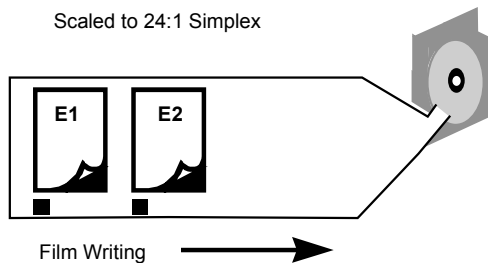
Figure 3

Letter size document scanned as follows:

Scanner

Letter | Letter | Letter | Letter

E1 | E2 | E3 | E4

200 dpi

Rotated images resulting values in theTIFF header tags:

Letter Size
Image Width = 1700
Image Length = 2200

These scanned images will print to film as follows:

Scaled to 40:1 Duplex

E2 | E4
E1 | E3

Film Writing →
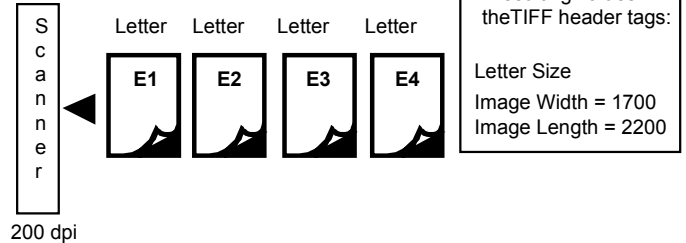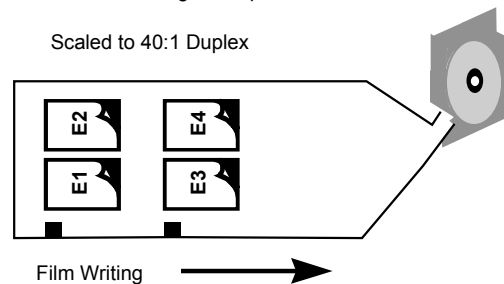
Figure 4

Positive vs. Negative

The Document Archive Writer has the ability to write images in a positive or negative image polarity. Positive is black characters on a clear background. Negative is clear characters on a black background. Traditional source document microfilmers film in a negative mode. Considerations in choosing between positive and negative appearing images are as follows:

Positive

- Facilitates scanning of the film for document retrieval.

- Inversion not required for reading images in positive orientation.

- Lack of definitive borders on film may occur in some documents.

- An image border can be placed around positive images to delineate the edges of the images.

Negative

- More suitable to frequent access in traditional microfilm retrieval equipment.

- Minimizes the impact of dust or other contamination in producing a quality image during retrieval.

Frame annotation and Image Management Code

The Document Archive Writer can optionally write frame annotations (image address) and Image Management Code (IMC) in addition to images and image marks.

Frame annotations are the characters placed alongside the actual image between the image mark and the image itself. Release 1.3 provides the capability to write the image address in comic orientation.

IMC capability includes lead-end and random batch coding. Lead-end coding provides setup parameters for the film (Archive Storage Media) retrieval device. Random Batch Code allows for researches in cases of nonsequential image addresses.

Random Batch can be selected for the IMC choice in the film template. This will lay down Random Batch Code when the Archive Writer gets a nonsequential image address. Lead-end code will not be generated.

R12.25   R12.26   R12.27   R12.28

Frame Annotation: Image Address
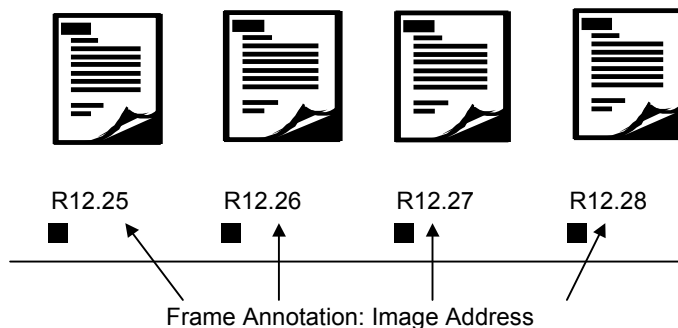
Header and trailer pages/resolution targets

Header and trailer pages are images that can be added to a roll of film in addition to the normal image files. The primary use of header and trailer pages is information supporting the contents on the roll of film such as one or more header sheets with the name of the job, responsible operator, date, resolution targets, and error or job logs. The following types of header and trailer pages have been defined:

- Header pages
- Trailer pages
- Resolution target
- Image error log

Header pages

Header pages come at the beginning of the roll, prior to the first designated image file written, and may contain any kind of information supplied by the host system. Header pages can be image files, conforming to the input naming and file specifications, or text files, conforming to a strict 80 characters x 66 lines orientation. The host system supplies these header pages by placing the TIFF or text files into a directory with the file names alphabetically constructed in the order the files are to be written. At the beginning of a roll, AWIS searches the header page directory, converts any text files (denoted by ".txt" file extension) to TIFF and writes the files in the directory in the proper sequence based on alphabetical order. Header pages may be written as level 0 or level 1 images depending on the application.

Trailer pages

Trailer pages are at the end of the roll after the last designated image file before the roll is printed. They may contain any kind of information supplied by the host system. Trailer pages can be image files, conforming to the input naming and file specifications, or text files, conforming to a strict 80 characters x 66 lines orientation. The host system supplies these trailer pages by placing the TIFF or text files into a directory with the file names alphabetically constructed in the order the files are to be written. At the end of a roll, AWIS searches the trailer page directory, converts any text files to TIFF and writes the files in the directory in the proper sequence based on alphabetical order. Trailer pages may be written as level 0 or level 1 images depending on the application.

Resolution target

AWIS provides a set of resolution target applications. The resolution applications are simplex and duplex. When used, the resolution target must be written in unscaled mode.

Image error log

The Image Error Log file contains a list of images that failed to be written by the Document Archive Writer. Each line in this text file contains the file name, a tab character, and the image address. AWIS provides an application setup option to convert this text file to a TIFF image and write it to film at the end of the roll.

Indexing and image addresses

The Document Archive Writer assigns an image address to each image written to film. The image address assigned is based on the film format (simplex, duplex, 2-up) and index format. The following index formats are supported by the Document Archive Writer.

Sample	Single Level	Two Level	Three Level
Single-level	1	1.0	1.0.0
Two-level	2	1.1	1.0.1
Three-level	3	2.0	1.1.0
		2.1	1.1.1

The image address may also contain a fixed field containing alphanumeric characters which precedes the remaining portion of the image address. Image addresses may contain up to 12 characters and 3 delimiters. Only the fixed field may contain alphas. The maximum field size for any level including fixed field is 9 characters (8 in the fixed field if alphas are being used).

Image addresses are assigned based on level changes and level-to-follow-level rules. The level-to-follow-level rules are established as part of application setup. AWIS takes care of level changes based on the structure of file input (batch or list file).

Transfer file

A transfer file is a flat ASCII file containing indexing information that can be used to upload to or build a database for image retrieval. AWIS maintains an optional transfer file for each roll containing the filenames, page numbers within the file, roll number, and image addresses for each of the files written. The fields are separated by tabs. See the example below.

Filename	Page No. Within File	Roll No.	Image Address
c:\input\abc.tif	1	9999	FF.001.001
c:\input\abc.tif	2	9999	FF.001.002
c:\input\xyz.tif	1	9999	FF.002.001

Tab

Transfer file entries for two-level index format can be done at document or page level.

A custom transfer file can be selected to add index data to the transfer file via a user exit routine.

6   Image Organization and Input Modes

This chapter describes how to organize your image files for input to the Document Archive Writer.

Image organization

Document levels

The Digital Document Archive System supports multiple document levels, e.g., book/chapter/page. This allows image files organized into documents or folders to be structured similarly on Archive Storage Media for convenient retrieval. Document levels are designated by standard image marks (blips) in the left-most channel.

Level 0 — an image(s) written to film with no image mark associated with it. Use of Level 0 should be limited, as the images are not retrievable by automated methods. Appropriate use includes images that are in the header or trailer pages category; or other images used for film test and quality control purposed that are not part of the image database.

Level 1 — an image(s) written to film with a small image mark associated with it.

Level 2 — an image(s) written to film with a medium image mark associated with it.

Level 3 — an image(s) written to film with a large image mark associated with it.
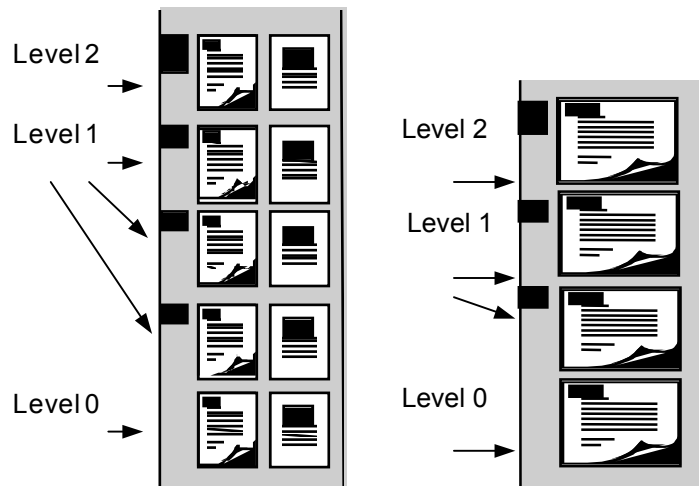
Indexing options

Single-, two- and three-level formats are supported in Release 3.0.

Single-Level

Each image (simplex mode) or pair of images (duplex/2-up mode) is separately addressed as a document. Under this arrangement, every frame is written with a small image mark.

Landscape	Simplex	Duplex (2-up)
Single Level Comic Mode	**Single Level Cine Mode**	**Single Level Cine Mode**
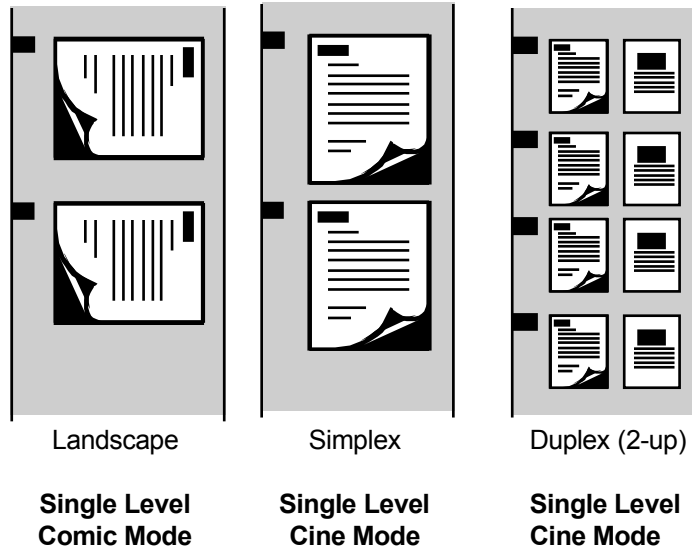
Two-Level

Two-level image organization denotes a grouping of one or more images. The first frame, consisting of one image (simplex) or pair of images (duplex/2-up) is written with a medium image mark. Subsequent frames within the group are written with a small image mark. Retrievals can be made at the group (document/folder) or individual (image or pair of images) level.

Level 2

Level 1

Simplex	Duplex (2-up)

Two-Level

Cine Mode
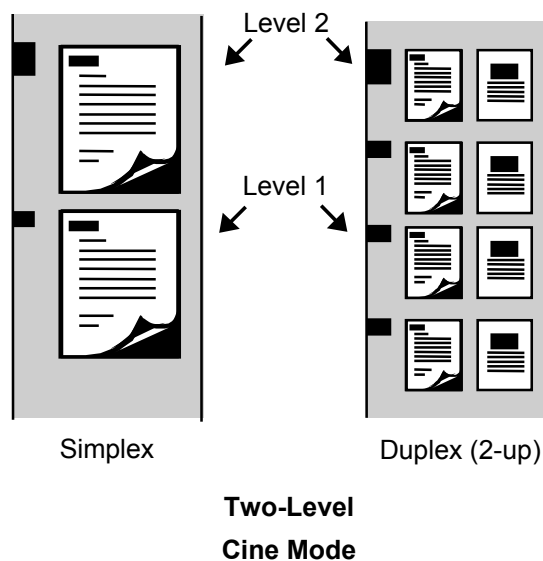
Three-Level

Three-level image organization denotes a grouping of one or more images. The first frame, consisting of one image (simplex) is written with a large image mark. Subsequent frames within the group are written with a medium or small image marks. Retrievals can be made at the group (book/document/folder) or individual image level. Simplex mode is the only mode currently supported with three-level indexing.

Level 3

Level 2

Level 1

Simplex

**Three-Level
Cine Mode**
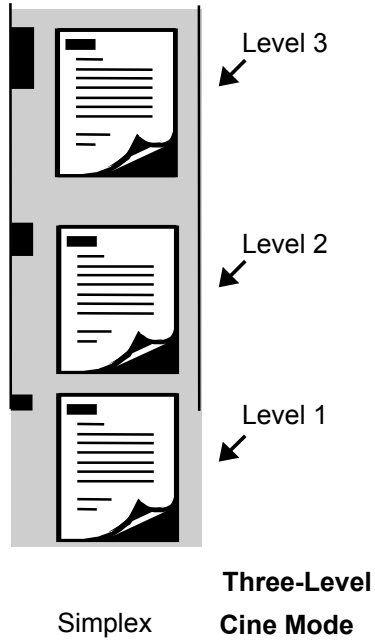
Sequencing The input modes allow you to sequence documents as desired. In Batch input mode, you will need to name files such that when alphabetically sorted within directories, they are sequenced in the desired order.

Using single- and multi-page input files For each application in Batch mode, designate if the input TIFF files are single- or multi-page files. If one or more files are multi-page, use the multi-page designation even if the majorit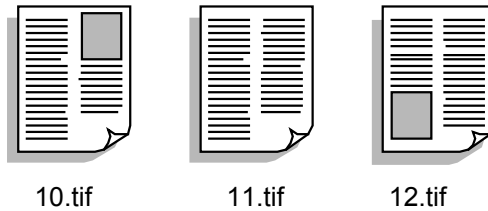y of the files are single-page. In this case, single-page files are treated as a multi-page file with only one page. Note that multi-page TIFF files are only supported in one- and two-level index mode.

10.tif   11.tif   12.tif

Multi-page Input Files

10.tif   11.tif   12.tif
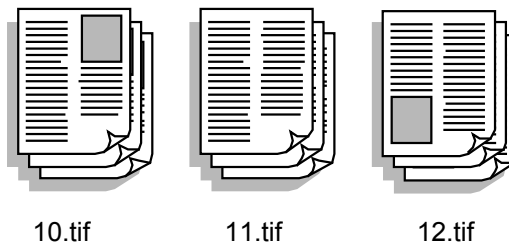
Single-page

Each file contains only one image. The image can be written as a single-level or grouped with other images and written as the lead or subsequent page of a two-level document.

Multi-page

Each file contains one or more images with each image identified in a single image file directory within the TIFF header information. The first page (simplex mode) or pair of image pages (duplex/2-up mode) of a multi-page TIFF file can be treated as the lead or header page and assigned a level 2 (medium) image mark. Subsequent pages are assigned single-level (small) image marks. The treatment of the lead page at a higher level provides the capability to index and retrieve the entire multi-page file as a unit. This assumes the Archive Writer is configured with the level-to-follow-level rule: level 1 follows level 2.

Input modes   AWIS reads image files from a disk drive (usually a drive that is shared on the network) and sends them to the Document Archive Writer. There are several modes of image file input:

- Batch
- List file
- Poll mode

Batch   In this method, image files are read from a specified file directory.

For multi-level indexing, the directory must contain subdirectories that indicate changes in indexing levels. For two-level the specified directory must contain one level of subdirectory for single-page files and none for multi-page files. For three-level indexing the specified directory must contain two levels of subdirectory for single-page files.

Files in the batch mode are sorted and written by file name in alphanumeric order.

In 2-up (duplex) mode (one- or two-level index only), image files within a subdirectory will be written in pairs. A blank image file will automatically be inserted as the last image if there is an odd number of files within a subdirectory.

```
┌──────────────┐
│  Specified   │
│  Directory   │
└──────┬───────┘
       │
       │    ┌──────────────────┐
       ├────│  Subdirectory A  │
       │    └────────┬─────────┘
       │             │    ┌──────────────────┐
       │             ├────│  Subdirectory C  │
       │             │    └────────┬─────────┘
       │             │             │    ┌──────────────┐
       │             │             ├────│  Image1.tif  │
       │             │             ├────│  Image2.tif  │
       │             │             ├────│  Image3.tif  │
       │             │             ├────│  Image4.tif  │
       │             │             └────│  Image5.tif  │
       │             │    ┌──────────────────┐
       │             └────│  Subdirectory D  │
       │                  └────────┬─────────┘
       │                           ├────│  Image6.tif  │
       │                           └────│  Image7.tif  │
       │    ┌──────────────────┐
       └────│  Subdirectory B  │
            └────────┬─────────┘
                     │    ┌──────────────────┐
                     ├────│  Subdirectory E  │
                     │    └────────┬─────────┘
                     │             ├────│  Image8.tif  │
                     │             ├────│  Image9.tif  │
                     │             └────│  Image10.tif │
                     │    ┌──────────────────┐
                     └────│  Subdirectory F  │
                          └────────┬─────────┘
                                   ├────│  Image11.tif │
                                   └────│  Image12.tif │
```
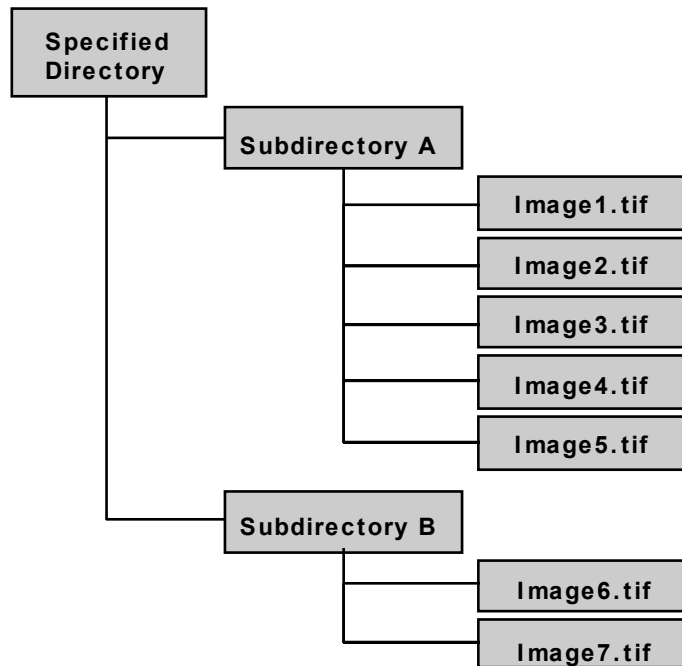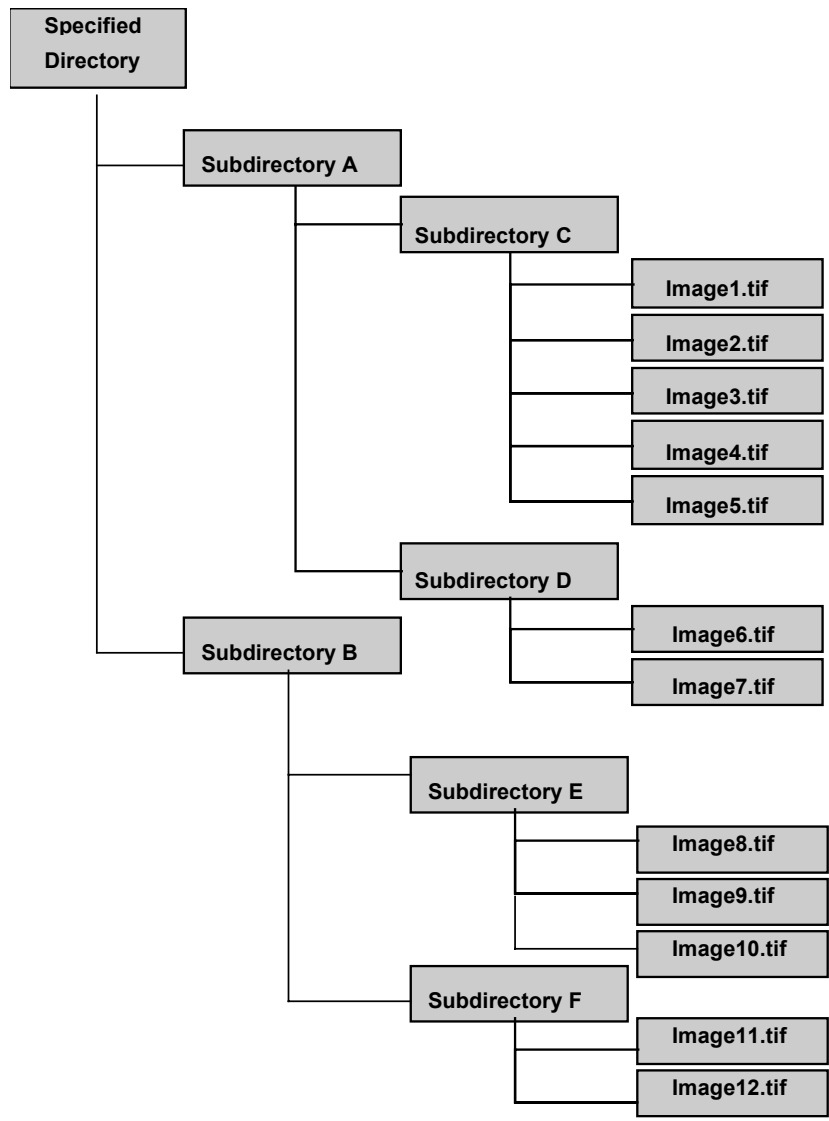
Single-page TIFF files

Indexing Levels	Levels of Subdirectories Allowed	Typical File Spec
One	None	\<specified image directory path>\ \<filename>.tif
Two	One	\<specified image directory path>\ \<subdir>\<filename>.tif
Three	Two	\<specified image directory path>\ \<subdir>\< subdir>\<filename>.tif

Multi-page TIFF files

Indexing Levels	Subdirectories Allowed	Typical File Spec
One	None	\<specified image directory path>\ \<multi-page filename>.tif
Two	None	\<specified image directory path>\ \<multi-page filename>.tif

List file

In this method, the images to be written to film must be listed in a file. Files are read and written to film in the same order as they appear in the list file.

The image address level is indicated by prefixing the filename with dashes. The file name without dashes indicates the highest level, indexing level of the job. Each dash preceding a file name indicates that the file is to be written at one address level below the indexing level of the job.

Indexing Level of Job	Number of Dashes Preceding Filename	Address Level of File
1	0	1
1	1	0
2	0	2
2	1	1
2	2	0
3	0	3
3	1	2
3	2	1
3	3	0

Example of a two-level indexing list file	Example of a three-level indexing list file
c:\123000.TIF (level 2)	c:\123000.TIF (level 3)
-c:\123001.TIF (level 1)	--c:\123001.TIF (level 1)
-c:\123002.TIF (level 1)	--c:\123002.TIF (level 1)
-c:\123003.TIF (level 1)	-c:\123010.TIF (level 2)
c:\124000.TIF (level 2)	--c:\ 123011.TIF (level 1)
-c:\125000.TIF (level 1)	c:\124000.TIF (level 3)
	--c:\124001.TIF (level 1)

In addition to the indicators in the examples, specifying two dashes (- -) for two-level indexing, or three dashes for three-level indexing will result in an image being written with no image mark. This is known as a "level 0." For more information see the section entitled "Document levels" earlier in this document.

NOTE: Use of level 0 should be limited and is not recommended.

In duplex or 2-up mode, image files will be written in pairs with the first two files after a level change designation appearing with the higher level image mark.

Creating a list file   List files can be created using a computer-text editor or customer-defined program. List file creation is not part of the Archive Writer Interface Software. AWIS uses list files as an input for writing image files. List files must conform to the following specifications:

- A separate line (entry) must be used for each image file
- There must be no blank lines
- Each entry must include the full path name of the file
- Every line should start at column 0
- No spaces are allowed ahead of each entry in the list file
- One-level:
  - Files without a dash are indexed at level 1
  - Files preceded by a single dash are written at level 0
- Two-level:
  - Files without a dash will denote the start of a level 2 document
  - A single dash ("–") must precede the file names of all subsequent (level 1) images

  Two dashes preceding a file name indicate a level 0 image
- Three-level:
  - Files without a dash will denote the start of a level 3 document
  - Files preceded by two dashes ("—") will denote the start of a level 2 document
  - A single dash ("–") must precede the file names of all subsequent (level 1) images

  Three dashes preceding a file name indicate a level 0 image
- No spaces are allowed between the dash ("–") denoting a lower level file and the image file name

List file examples　This section contains examples of list file input and the resultant output addresses given a particular set of application parameters.
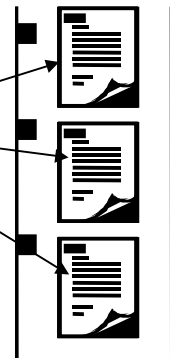
Example 1

Job Index Level:　　　　　1
Input File Type:　　　　　Single-page TIFF files
Print Mode:　　　　　　　Simplex
Starting Image Address:　XYZ.00001

List File Contents

```
c:\input\spaabb.tif
e:\acct1\spdddee.tif
l:\ap\spkkdl.tif
c:\ar\current\sppch23.tif
```

Resultant Image Addresses

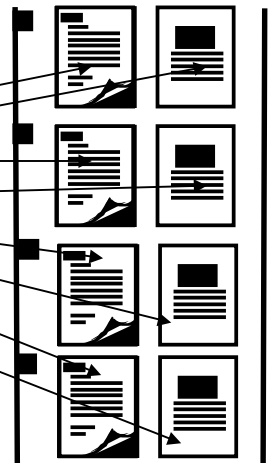| File	Page	Image Address
c:\input\spaabb.tif	1	XYZ.00001
e:\acct1\spdddee.tif	1	XYZ.00002
l:\ap\spkkdl.tif	1	XYZ.00003
c:\ar\current\sppch23.tif	1	XYZ.00004

Example 2

Job Index Level:　　　　　1
Input File Type:　　　　　Multi-page TIFF files (each file contains 3 images)
Print Mode:　　　　　　　2-up (duplex)
Starting Image Address:　XYZ.00001

List File Contents

```
c:\input\mp123.tif
e:\acct1\mphah.tif
l:\ap\mproy.tif
```

Resultant Image Addresses

File	Page	Image Address
c:\input\mp123.tif	1	XYZ.00001
c:\input\ mp123.tif	2	XYZ.00001
c:\input\ mp123.tif	3	XYZ.00002
e:\acct1\mphah.tif	1	XYZ.00002
e:\acct1\mphah.tif	2	XYZ.00003
e:\acct1\mphah.tif	3	XYZ.00003
l:\ap\mproy.tif	1	XYZ.00004
l:\ap\mproy.tif	2	XYZ.00004
l:\ap\mproy.tif	3	XYZ.00005

Example 3

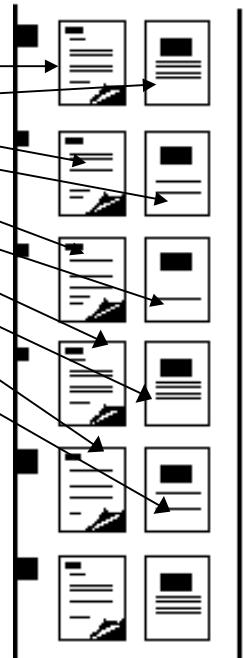|	
Job Index Level:	2
Input File Type:	Single-page TIFF files
Print Mode:	Duplex
Starting Image Address:	ACT.001.000

List File Contents

```
c:\ar\spartif1.tif
-c:\ar\spartif2.tif
-c:\ar\spartif3.tif
-c:\append\spappend.tif
-c:\ap\spspaptif1.tif
-c:\ap\spspaptif1.tif
-c:\ap\spspaptif1.tif
-c:\ap\spspaptif1.tif
c:\append\spappend.tif
-c:\append\splev1.tif
```

Resultant Image Addresses

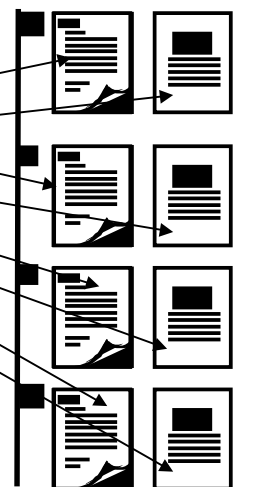| File	Page	Image Address
c:\ar\spartif1.tif	1	ACT.001.000
c:\ar\spartif2.tif	1	ACT.001.000
c:\ar\spartif3.tif	1	ACT.001.001
c:\append\spappend.tif	1	ACT.001.001
c:\ap\spspaptif1.tif	1	ACT.001.002
c:\ap\spspaptif1.tif	1	ACT.001.002
c:\ap\spspaptif1.tif	1	ACT.001.003
c:\ap\spspaptif1.tif	1	ACT.001.003
c:\append\spappend.tif	1	ACT.002.000
c:\append\splev1.tif	1	ACT.002.000

Example 4

Job Index Level   2
Input File Type   Multi-page TIFF files (each file contains 3 images)
Print Mode   Duplex
Starting Image Address   2D.001.000

List File Contents

```
c:\input\mp123.tif
-c:\input\mp123cont.tif
c:\input\mp456.tif
c:\input\mp789.tif
```

Resultant Image Addresses

File	Page	Image Address
c:\input\mp123.tif	1	2D.001.000
c:\input\mp123.tif	2	2D.001.000
c:\input\mp123.tif	3	2D.001.001
c:\input\mp123cont.tif	1	2D.001.001
c:\input\mp123cont.tif	2	2D.001.002
c:\input\mp123cont.tif	3	2D.001.002
c:\input\mp456.tif	1	2D.002.000
c:\input\mp456.tif	2	2D.002.000
c:\input\mp456.tif	3	2D.002.001
c:\input\mp789.tif	1	2D.003.000
c:\input\mp789.tif	2	2D.003.000
c:\input\mp789.tif	3	2D.003.001

### Example 5

Job Index Level   3
Input File Type   Single-page TIFF files
Print Mode   Simplex
Starting Image Address   00a.001.001.001
Level-to-follow-level rules 2-1-1-0

List File Contents

```
c:\modes\image1.tif
--c:\modes\image2.tif
--c:\modes\image3.tif
--c:\modes\image4.tif
--c:\modes\image5.tif
-c:\modes\image6.tif
--c:\modes\image7.tif
c:\modes\image8.tif
-c:\modes\image9.tif
--c:\modes\image10.tif
-c:\modes\image11.tif
--c:\modes\image12.tif
```

Resultant Image Addresses

File	Page	Image Address
c:\modes\image1.tif	1	00a.001.000.000
c:\modes\image2.tif	1	00a.001.001.000
c:\modes\image3.tif	1	00a.001.001.001
c:\modes\image4.tif	1	00a.001.002.000
c:\modes\image5.tif	1	00a.001.002.001
c:\modes\image6.tif	1	00a.002.000.000
c:\modes\image7.tif	1	00a.002.001.000
c:\modes\image8.tif	1	00a.002.001.001
c:\modes\image9.tif	1	00a.002.002.000
c:\modes\image10.tif	1	00a.002.002.001
c:\modes\image11.tif	1	00a.002.002.002
c:\modes\image12.tif	1	00a.002.002.003
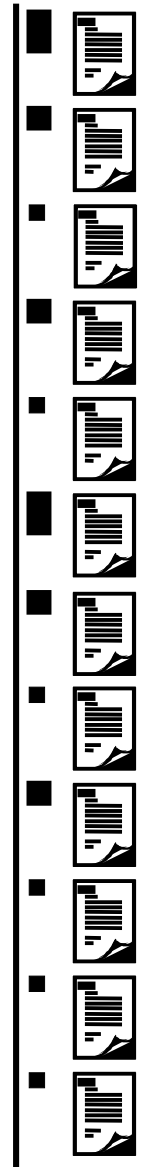
Poll mode

In this mode, AWIS searches for a Poll File, which is written by some other means external to AWIS. This mode facilitates simultaneous scanning of images with archival capture without the need of an intermediate, manual batching step.

All parameters and options for Poll mode are set on the Polling tab from the AWIS Administration icon under the File>Option menu. In Poll mode, AWIS searches for files named as specified by the Poll File entry at an interval as specified by the Poll Interval entry. Once a Poll File is found, it is processed by whatever mechanism is indicated by the Pollfile's option. After Poll File is processed (all images indicated are written) it is deleted and AWIS starts searching for the next Poll File.

- A Poll File processed by the "Check Contents for Path" option will result in the indication of either a List file or Batch directory, based on the contents of the Poll File.

- A Poll File processed by the "Filename as Path - Ignore Content" option instructs AWIS to use the name of the Poll File (minus its extension) as the name of a Batch directory.

- A Poll File processed by the "Contents is Listfile" option will result in the indication of a List file to be processed.

Images are processed as specified for List file or Batch mode as appropriate.

Document, job setup, image addressing in duplex mode

The table below specifies the following for each of the possible indexing level/file type combinations:

- What constitutes a document,

- what the software is looking for in terms of directory and list file contents at Job Setup time (i.e., Input Method specifications), and

- when a *Print Remaining Image* command is sent in duplex mode, which forces the Writer to move back to the A channel for the next image. This determines the image addressing in duplex mode.

Indexing Level	Type of TIFF File	What Constitutes a Document	Job Setup Requirements (list file and batch modes)	Image Addressing in Duplex Mode
1	Single	A file	**List File Mode:** May contain entries preceded with a single dash. A dash indicates that the image in the file should be indexed at one level below the job's indexing level—in this case, level 0.* The first file in the list file may be preceded with a dash; that is, the first file may be indexed at level 0. **Batch Mode:** Only the files in the specified directory are used (subdirectories are ignored—no error generated).[†]	**When Print Remaining Image command is sent:** Following the last file in the job. **Result:** Every other image in the job is written to the B channel, which requires a channel change at retrieval to locate the B channel images (i.e., not automatically addressable at retrieval).
1	Multi	Each page of each file	**List File Mode:** May contain entries preceded with a single dash. A dash indicates that each image in the file should be indexed at one level below the job's indexing level—in this case, level 0.* The first file in the list file may be preceded with a dash; that is, the images in the first file may be indexed at level 0. **Batch Mode:** Only the files in the specified directory are used (subdirectories are ignored—no error generated).[†]	**When Print Remaining Image command is sent:** Following the last file in the job—same as single-level, single page files above. **Result:** Every other image in the job is written to the B channel — same as single-level, single-page files above.

(continued)

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* Indexing at level 0 is allowed, but not recommended. Images written at level 0 contain no image mark. *Note that via the batch input method there is no way to specify level 0 images; it can only be done in a list file.*

[†] The files are sorted by name using the standard ASCII collating sequence when the job list is generated, so the order they are printed is not necessarily the order seen in a directory listing.

Indexing Level	Type of TIFF File	What Constitutes a Document	Job Setup Requirements (list file and batch modes)	Image Addressing in Duplex Mode
2	Single	**List File Mode:** Each filename in the list file which is not preceded by a dash is page one of a document; all filenames under it preceded by a single dash are subsequent pages of the document. **Batch File Mode:** Each subdirectory under the specified directory is treated as a document; the files within a subdirectory make up the pages of the document.	**List File Mode:** Each file without a dash denotes the first page of a document. Second and subsequent pages of a document are denoted with a single dash. A filename in the list file may be preceded with two dashes, indicating the image in the file is to be indexed at two levels below the job's index level—in this case, level 0.* The first file in the list file must specify either level 2 or level 0 indexing (no dashes or two dashes). **Batch Mode:** The files in each subdirectory under the specified directory make up the pages of a document. Files in the specified directory and directories under the subdirectories are ignored (no error generated). Both the subdirectories (documents) and the files within (pages) are sorted by name when the job list is generated, so the document order within the job and page order within the documents are not necessarily the order in a directory listing.	**When Print Remaining Image command is sent:** Following each document in the job (i.e., the last file in each directory). **Result:** The first page of each document always begins in the A channel.
2	Multi	**List File Mode:** The first page of each file specified in the list file that does not have a preceding dash is the first page of a document. The second and subsequent pages, and all of the pages of any files following this file with a single dash preceding the filename make up the rest of the pages of the document. A document consists of one or more multi- or single-page TIFF files. **Batch File Mode:** A file.	**List File Mode:** Each file without a dash denotes the first image in that file becomes the first page of a document. Second and subsequent pages of a document are derived from the other pages in the file whose name is not preceded with a dash, along with any other filenames under it that are preceded with a single dash. A filename in the list file may be preceded with two dashes, which indicates that the images in the file are to be indexed at two levels below the job's index level—in this case, level 0.* The first file in the list file must specify either level 2 or level 0 indexing (no dashes or two dashes). **Batch Mode:** Each file in the specified directory is a document. Any subdirectories under the specified directory are ignored (no error generated).	**When Print Remaining Image command is sent:** Following each document in the job. **Result:** The first page of each document always begins in the A channel.

(continued)

*Indexing at level 0 is allowed, but not recommended. Images written at level 0 contain no image mark. *Note that via the batch input method there is no way to specify level 0 images; it can only be done in a list file.*

Indexing Level	Type of TIFF File	What Constitutes a Document	Job Setup Requirements (List file and Batch modes)
3	Single	**List File Mode:** Each filename in the list file which is not preceded by a dash is the first page of a book; each filename in the list file which is not preceded by a dash or preceded by a single dash is the first page of a document; all filenames under it preceded by two dashes are subsequent pages of the document **Batch File Mode:** Each subdirectory under the specified directory is treated as a book; each second level subdirectory is treated as a document; the files within the second level subdirectory make up the pages of the document.	**List File Mode:** Each file without a dash denotes the first page and first document of a book. Each file with a single dash denotes the first page of a subsequent document. Second and subsequent pages of a document are denoted with two dashes. A filename in the list file may be preceded with three dashes, indicating the image in the file is to be indexed at three levels below the job's index level—in this case, level 0*. The first file in the list file must specify either level 3 or level 0 indexing (no dashes or three dashes). **Batch Mode:** The files in each second level subdirectory under the specified directory make up the pages of a document. Files in the specified directory and in the first level subdirectory and third level subdirectories are ignored (no error generated). The subdirectories (books then documents within book) and the files within (pages) are sorted by name when the job list is generated, so the book order within the job, document order within the book and page order within the documents are not necessarily the order in a directory listing.

*Indexing at level 0 is allowed, but not recommended. Images written at level 0 contain no image mark. *Note that via the batch input method there is no way to specify level 0 images; it can only be done in a list file.*

Guidelines for using batch or list file modes

Use the following table for inputting image files according to your application needs.

| Input	Output Format	Batch	List File
Single-page files	Single-level Simplex	Place all files in a single directory. AWIS will sort the directory to determine writing sequence.	List files in the sequence they are to be written.
Single-page files; front and back page orientation known	Single-level Duplex; Fronts—A channel Backs—B channel	Place all files in a single directory. Name files to ensure frontside images are followed by correct backside image. Insert a blank file if no backside exists to maintain front/back relationship.	List files in sequence they are to be written. Insert a blank file if no backside exists to maintain front/back relationship.
Single-page files; grouped as document or folder	Two-level, Simplex or Duplex	Place files in subdirectories with each subdirectory representing the document or folder. Name image files alphabetically so first file becomes lead (level 2) page followed by level 1 pages.	List files using a single dash in the names of all image files following the first (either simplex or duplex) image file representing the start of the document. If duplex, make sure files are listed in order such that first and second files are paired together.
Single-page files; grouped as document and documents grouped as book	Three-level, Simplex	Name two level subdirectories alphabetically to represent each book and each document in the required order. Place files in second level subdirectories with each subdirectory representing the document. Name image files alphabetically so first file becomes lead (level 2 or 3) page followed by level 1 pages.	List files using two dashes in the names of all image files following the first file representing the start of the document or book. Use a single dash to indicate second and subsequent documents in a book.
Multi-page file	Two-level, Simplex or Duplex	Place files in specified directory. Name files in the order that documents are to be written. If duplex or 2-up, first two pages will be written with medium mark.	List files in order that they are to be written. Every file is treated as a document. Use a dash to append a file to a previous document.
Multi-page file, containing a single front and back image	Single- or two-level, Duplex	Place files in specified directory. Each multi-page image file will be written as a front/back in single-level format or as a series of front/back images if two-level.	List files in the order they are to be written. Each multi-page image file will be written as front/back. If two-level, use single dash in the names of all image files following the first file representing the start of the document or folder.

7   Site Specifications

This chapter describes the information you need to prepare the site before the installation of the Document Archive Writer. Information is provided on the amount of space needed, environmental requirements, and power specifications. For information on the PC requirements for the Digital Document Archive System see Chapter 3, *System Requirements.*

Dimensions and weights

The table below details the physical dimensions and the weights for the Document Archive Writer, as well as for the shipping carton.

Dimensions	Archive Writer	With Shipping Carton
Width	24.2 in. (615 mm)	30.5 in. (775 mm)
Length	31.9 in. (810 mm)	38.3 in. (973 mm)
Height	47.1 in. (1196 mm)	62 in. (1575 mm)
Weight (approx.)	350 lbs (159 kg)	400 lbs (182 kg)
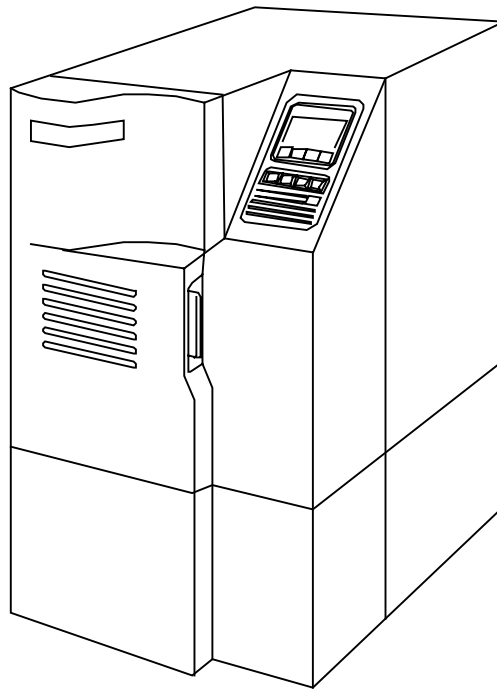
Document Archive Writer, Model 4800

Space requirements

Recommended space requirements for servicing the Document Archive Writer are as follows: a minimum of 24 in. (610 mm) on the right side and 4 in. (102 mm) on the rear side of the unit. The unit is on casters so it can be moved to reach the main power switch located in the back of the unit. All operator procedures are accessible from the front of the unit.

4 in.
(102 mm)

Document
Archive Writer
Model 4800

31.9 in.
(810 mm)

24 in.
(610 mm)

24.2 in.
(615 mm)
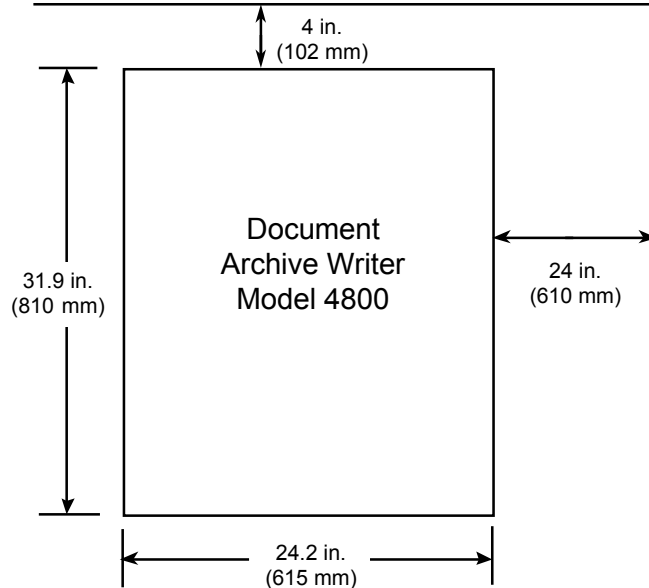
Top View

**Dimensions and service requirements for the
Document Archive Writer**

Operating conditions

The table below shows the conditions that the Document Archive Writer requires for operation.

Operating conditions of the Document Archive Writer

Temperature range	Humidity range	Altitude
59 to 86°F (15 to 30°C)	Relative humidity 15 to 76%	Barometric pressure 0.6 to 1 atm

Static electricity

Buildup of static electricity near the Document Archive Writer does not affect operation.

| **Electrical requirements** | The Document Archive Writer is manufactured to operate within one of the following sets of power constraints or configured to do so by your Kodak Field Engineer: |

Voltage	Hz/Cycles	Amps
90–127 V ac	50/60 Hz, 1 phase	3 amps at 120 V ac
198–254 V ac	50/60 Hz, 1 phase	1.5 amps at 240 V ac

NOTE: Power usage equivalent to 1228 Btu/hr.

- Neutral to ground impedance is less than (<) 2 ohms.
- Neutral to ground voltage is less than (<) 1 volt ac maximum.
- Maximum impulse voltage spikes: 50% of nominal line voltage maximum.
- Maximum voltage surge: 5% of nominal line voltage maximum.
- Maximum power usage for all configurations is 360 kVA.

The acceptable operational frequency range is from +3 to -3 Hz from nominal frequency. The equipment may malfunction if frequency is outside of this specified range.

Consult with your electrical contractor or utility to ensure on-site wiring complies with the Archive Writer specifications and wall outlets use isolated grounds and comply with codes.

Power outlets A separate, dedicated power line is highly recommended for each Archive Writer.

One individual dedicated branch AC circuit employing two standard 3-prong, grounded duplex outlets.
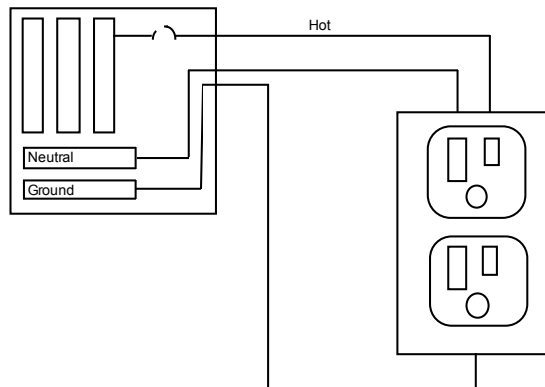
The outlets should meet the following standards:

- Amperage: 15 amp
- Wire size: 12-gauge — minimum
- Phase: 1 (single)
- Voltage drop across the circuit breaker: less than 0.1 volts

NOTE: Receptacles should be placed within 5 feet (1.5 meters) of the equipment.

Because multiple outlets are usually wired together on a single circuit, you must know which outlets are controlled by each circuit breaker and the steady state current draw of the equipment to be plugged into each circuit.

Power cords   A 3-prong, grounded power cord is provided with your Archive Writer. The power cord receptacle is a NEMA 5-15P. The maximum power cord length is 6.5 feet (2 meters).

Special plugs and cords may be required outside of the United States and Canada; these will be provided by the Kodak distributor (the power cord provided for international locations must be at least 14-gauge wire).

CAUTION: **Make certain nothing obstructs or is placed on power cords. Do not use extension cords; they can cause voltage loss which may result in unreliable equipment performance or equipment damage.**

Grounding requirements   Use the standard grounding power cable which is supplied with the Document Archive Writer *or* an equivalent locally procured grounding power cable.

The Document Archive Writer can be grounded to the following objects:

- Grounding terminal of wall outlet
- Copper bar buried more than 25.6 in. (650 mm) under the ground
- Water service pipe authorized by the local Water utility as a ground *(never use a gas pipe)*

Acoustic noise   The following chart provides the following acoustic noise which is measured in accordance with DIN 45 635, ANSI S12.10-1985, and ISO 7779 in a hemi-anechoic chamber.

Acoustic Noise	Noise Level dB (A)
Standby	33 dB (A)
Operating	50 dB (A)

Safety and EMC classifications

The Document Archive Writer has been certified to the following standards.

Safety

60 Hz	UL 1950 (US)
	CSA C22.2 No. 950 (Canada)
50 Hz	EN 60950 (Europe)

EMC

Emissions	FCC 47 CFR part 15 (Class A) (US)
	ICES-003 Issue 2 Rev A (Class A)
	(Canada) CE (Europe)

Year 2000 compliant

The Digital Document Archive System (AWIS and Archive Writer) has been certified to be compliant for Year 2000 usage.

8   Delivery/Installation

The period between the placement of the order with Eastman Kodak Company and the installation of the system may vary. During this time, you should prepare the installation site. This will help prevent unexpected problems and additional charges on the installation day.

NOTE: All site preparation should be completed well in advance of the equipment delivery.

Liaison

The Kodak Customer Service Representative must be notified in advance of any special site requirements. These requirements include special delivery procedures, time restrictions, and security clearance. Failure to comply with site requirements may result in additional charges for return visits if these cause excessive delays.

Delivery

In the United States, Kodak will designate transportation companies to deliver the equipment to the facility or onto the loading dock. **Do not unpack** the carton until the Kodak installer arrives.

You must notify the Kodak Representative in advance of any alternative transportation and delivery arrangements that you may desire.

Kodak can arrange to have the equipment delivered to the installation site. Ask your Kodak Representative to make arrangements before the delivery date.

You should have your own personnel or representatives present at delivery for verification, last-minute instructions or special delivery arrangements.

Inspecting shipment

You are responsible for inspecting the shipment and signing the Bill of Lading. The following inspections should be performed:

- Check for partial shipment
- Inspect the cartons for damage
- Check for signs of pilferage
- Note any concerns and sign the Bill of Lading

Partial shipment: When the shipment arrives, check the number of pieces against the number of pieces specified in the Bill of Lading. If a portion of the shipment is missing, this must be noted in the *Exceptions* column on the Bill of Lading. The driver should sign the same *Exceptions* column on the customer copy of the Bill of Lading. A copy of the Bill of Lading must be retained for claims purposes. (See *Claims process.*)

Inspection of cartons: While the equipment is still crated, carefully inspect each carton for signs of damage. Examples of shipping damage include:

- Cuts
- Dents
- Crushed cartons
- Punctures
- Scrapes
- Wet cartons (including those that were wet but have dried out and have watermarks).

Signs of pilferage: If any carton shows signs of pilferage at the time of receipt, (i.e., the carton was opened, resealed, torn, or had a hole at the time of delivery), the customer should also state this in the *Exceptions* column on the Bill of Lading.

Signing the Bill of Lading: Inspect all cartons before signing the Bill of Lading. The exceptions should be reviewed with the driver, and the driver should sign the customer copy.

The Kodak Representative is responsible for the following:

- Uncrating equipment
- Checking for hidden damages
- Checking for partial shipment of accessories

Hidden damage: If the Kodak Representative discovers damage to the equipment, a claim still can be made. (See *Claims process*.) If the Kodak representative finds any accessory parts missing, he or she should notify the appropriate Broker or Sales Representative to obtain the right accessories from Distribution.

Claims process

The following steps should be taken before making a claim:

Outside the United States
Contact your local Kodak dealer or Kodak Representative.

Within the United States
- Save all packing materials from the carton in question.
- Do not move damaged equipment any farther than necessary (equipment should be moved no farther than an immediately adjacent area).
- Do not attempt any repairs until authorized by Kodak's Equipment Customer Relations in Rochester, New York.
- Obtain and retain a copy of the Bill of Lading.
- If possible, take photographs of damages.

Either you or the Kodak Representative should notify Kodak's Equipment Customer Relations (1-800-421-6633) in Rochester to handle the claim. Provide the following information when you call:

- Date and time of delivery.
- The estimated value of the damage.

Equipment Customer Relations will notify the carrier. The carrier's claim representative will be dispatched to the customer site for inspection of the damaged merchandise.

NOTE: It is important to report damage immediately. A damage claim must be submitted to the carrier within 15 days of equipment delivery. The carrier is not legally responsible to accept any claims for equipment loss or damage after 15 days of equipment delivery.

If either you or the Kodak Representative discover portions of the shipment damaged or missing after the carrier has left and the Bill of Lading was signed, a claim can still be made. Either you or the Kodak Representative should notify Equipment Customer Relations (1-800-421-6633) in Rochester to handle the claim. Provide the same information to the Equipment Customer Relations as already noted.

In this case, claims may be made for:

- Fewer pieces delivered than stated on invoice.
- Concealed damages not evident from carton inspection.
- Missing items in a carton due to pilferage.

There is no minimum value for making a claim.

Equipment Delivery/Removal Survey

An Equipment Delivery/Removal Survey is not required by Kodak Distribution for the Document Archive Writer, unless your site has unique or difficult installation considerations. The Kodak Representative must complete the Equipment Delivery/Removal Survey (A5181 3/92) in cases with unique or difficult installation considerations.

Scheduling hardware installation

Within the U.S.

Contact Kodak Customer Equipment Service at 1-800-3KODAK3 to schedule installation of the Document Archive Writer.

Outside the U.S.

Contact your local Kodak dealer or Kodak Representative.

Hardware installation

Hardware Installation is included in the sale price. This is provided by a Kodak Field Engineer and verifies the operation of the Writer to Kodak requirements and the hardware training. See Chapter 9, *Training* for more information. It does not include software installation.

Kodak offers the *Kodak Digital Science* Digital Document Archive System Pre-installation and Site Accreditation professional service (CAT No. 877 1495) that reviews and accredits the installation plan and physical site requirements. At this time, the Archive Writer Interface Software is installed on the PC/ workstation designated by the customer.

NOTE: This is required for the first-time installation of a system at a site.

See Chapter 9, *Training* for more information. The Service includes evaluation of the proposed application definition and system capability.

9   Training

The installer will conduct training on the Archive Writer and either the Archive Writer Cassette or Smart Cassette 100 for the key operator. The installer and key operator will use the User's Guide for the *Kodak Digital Science* Document Archive Writer as a reference. The installer will conduct hardware-only training for the operation of the Archive Writer using the operator controls and installing cassettes and how to load film in the cassette.

Hardware

The installer will conduct hardware-only training on the Document Archive Writer and the Archive Writer Cassette for the key operator. The installer and key operator will use the User's Guide for the *Kodak Digital Science* Document Archive Writer as a reference using the operator controls. The installer will train the key operator on how to load film into the cassette(s) and how to load the cassette(s) into the Writer.

Software

Application setup and complete training on the Archive Writer Interface Software is a chargeable service that can be provided by a Kodak Certified Technical Trainer. The *Kodak Digital Science* Digital Document Archive System Key Operator Training Course (CAT No. 833 4350) is highly recommended and can be purchased through your Kodak Reseller. This service should be scheduled to occur shortly after the completion of the installation of the Archive Writer.

10   Publications and Ordering Information

The following manuals are available:

A-61038   *Kodak Digital Science* Archive Writer User's Guide

A-61056   *Kodak Imagelink* Archive Writer Interface Software User's Guide

A-61057   *Kodak Digital Science* Archive Writer Interface Software Integrator's Guide

D-35   *Kodak* Archive Storage Media 1459 — Media Data Sheet

Catalog numbers   Products and services may be ordered using the following catalog numbers:

Product	CAT No.
Kodak Digital Science Document Archive Writer, Model 4800	870 9248
Kodak Imagelink Archive Writer Interface Software, Release 3.0	123 9557
Media	
Kodak Archive Storage Media 3459, 16 mm x 215 ft *Kodak* Archive Storage Media 1459, 16mm x 100 ft	844 9449 898 1987
Accessories	
Kodak Digital Science Archive Writer Cassette, Model 66 (1 required)	868 4383
Kodak Imagelink Smart Cassette 100	173 7166
Professional Services	
Kodak Digital Science Digital Document Archive System Pre-Installation Accreditation	877 1495
Kodak Digital Science Digital Document Archive System Key Operator Training Course	883 4350

DOCUMENT
IMAGING