

12. PHOTOFINISHING EQUIPMENT/SYSTEMS SPECIFICATIONS

12.1 OVERVIEW

This section contains the specifications to be followed by photofinishing equipment/system manufacturers. This section provides specifications directly applicable to photofinishing equipment/systems.

The Advanced Photo System requires photofinishing systems to make use of magnetic and optical information on the filmstrip. This is the case for print aspect ratios which are encoded on the filmstrip and shall be used by photofinishing systems to provide prints of the appropriate size. Also, some information on the filmstrip will be imprinted on the prints. There may also be other information included in the magnetic information on the filmstrip which the consumer will expect the photofinishing system to imprint on the prints.

Another major feature of the Advanced Photo System is the return of the filmstrip of negatives in the cartridge. This feature requires photofinishing systems to meet numerous specifications relating to proper filmstrip and cartridge handling, filmstrip detachment and reattachment, filmstrip splicing and the state of the negative when they are returned to the consumer.

In this section;

Photofinishing System means one or more units of Photofinishing Equipment which alone, or in combination, perform a set of functions required by a photofinisher to process a filmstrip, make prints, and return the processed filmstrip to the cartridge.

Photofinisher means a person or business which operates a photofinishing system.

12.2 INFORMATION EXCHANGE (IX)

12.2.1 OVERVIEW

The Advanced Photo System uses three basic methods for IX (1) magnetic read/write, (2) latent image, and (3) cartridge body labeling and data disk. The IX system provides a means by which the filmstrip manufacturer and the consumer provide necessary or valuable information to the photofinisher. The same magnetic IX capability provides the photofinisher the opportunity to record consumer instructions and/or improve lab operations.

12.2.2 MAGNETIC IX

The photofinishing system shall be minimally capable of reading magnetic information written on camera tracks specified for the Advanced Photo System. Photofinishing systems may also choose to record and/or read information as defined in Section 10.3.1.3. Magnetic information is recorded by camera, photofinishing equipment and other devices. The track locations in which the magnetic information is recorded is defined by Figures 100-3, 230, and 235. Recording and reading specifications are defined by Sections 10.1, 10.2, 10.3, and 10.4.

12.2.3 OPTICAL IX

12.2.3.1 LATENT IMAGE IX

Latent image information is recorded on the filmstrip by the filmstrip manufacturer and camera. After processing, the information is presented in machine and human-readable formats. Figures 100-2, 210-1, 210-2-N, 210-2-R, 210-3-N, 210-3-R, 210-4-N, 210-4-R, 211-N, 211-R, 212-N, 212-R, and 213 define the filmstrip manufacturer and camera data fields and bar codes. Sections 8.2 and 8.3 contain the detailed filmstrip manufacturer and camera data specifications, respectively. The photofinishing system shall be capable of reading optical IX information specified for the Advanced Photo System.

12.2.3.2 CARTRIDGE BODY LABELING

The cartridge body labeling contains a machine-readable bar code and a human-readable cartridge identifier. Figures 105-1 and 560 define the cartridge body labeling. Section 9.13 contains the cartridge body labeling specifications.

The photofinishing system shall be capable of reading the cartridge body labeling so that filmstrip can be matched with its original cartridge (see Section 12.7.6).

12.2.3.3 DATA DISK

The data disk contains machine-readable bar codes. Figures 105-1, 542-3, 544, and 546-1 define the cartridge data disk bar codes. Section 9.12 and Section 17, Appendix 1 contain the detailed data disk specifications.

12.3 INTERSPERSED, MULTIPLE ASPECT RATIO PRINTING

12.3.1 OVERVIEW

The Advanced Photo System affords consumers an opportunity to choose from three pre-defined Print Aspect Ratios prior to capturing an image. The consumer's selections are encoded on the filmstrip, by the camera, on a frame-by-frame basis. Therefore, the consumer may create a sequence of randomly interspersed Print Aspect Ratios on a single filmstrip. Photofinishing systems shall decode these instructions and produce photographic prints, the size of which correspond to the Print Aspect Ratios selected by the consumer. If desired, the consumer can override their original Print Aspect Ratio selections for subsequent reprinting.

12.3.2 PRINT ASPECT RATIOS

12.3.2.1 PRINTED IMAGE AREA

The three pre-defined Print Aspect Ratios are designated by H, P, and C. The corresponding H, P, and C printed image areas are defined in Figures 600, 610, and 620 respectively.

12.3.2.2 ASPECT RATIO DECODING

Advanced Photo System cameras may encode the Print Aspect Ratio on a frame by frame basis using latent image (see Sections 8.2.8.2 and 8.3.2) and/or magnetic (see Sections 10.4.6.2.1, 10.4.6.20.1 and 10.4.11.8.4) encoding schemes. Photofinishing systems may allow encoding consumer Print Aspect Ratio choices using magnetic recording. Since the consumer has the option to change their original Print Aspect Ratio choice after the image is captured, it is possible that the photofinisher may encounter conflicting printing instructions. The following priority shall be used to resolve these conflicts.

Priority	Encoding Procedure	Location
1	Magnetic Recording	Photofinishing Track P2 or Camera Track C1 and/or C2 depending on the status of Priority Indicator. See Sections 10.3.1.3.2, 10.4.7.8.1, 10.4.12.1.
2	Latent Image Recording	See Figures 211-N and 211-R

The H Print Aspect Ratio shall be used as the default in the event that the photofinishing system is unable to decode the consumer's Print Aspect Ratio request.

12.3.2.3 PRINTING

The Photofinishing System shall be capable of producing and handling H, P, and C prints.

12.4 CARTRIDGE HAND OF LOAD DECODING

Advanced Photo System cameras may encode the Cartridge Hand of Load (CHOL) on the leader of a filmstrip using latent image recording (see Sections 8.2.8.3 and 8.3.3) and/or on each frame in a filmstrip using magnetic recording (see Sections 10.4.6.2.2 and 10.4.6.20.2). In cases where optical encodement and the magnetic encodement do not agree, the following priority shall be used to determine the correct decoding of CHOL.

Priority	Basis	Encoding Procedure	Location
1	Per Frame	Magnetic Recording	Filmstrip Frames, Camera Track C1 and/or C2
2	Whole Filmstrip	Latent Image Recording	Filmstrip Leader. (see Figures 212-N and 212-R)

12.5 INFORMATION IMPRINTING

12.5.1 OVERVIEW

The Advanced Photo System will require that information which is available via the IX system be displayed on the prints

The Print Location Data Item provides the customer with the means of defining the desired location of imprinting.

When the Print Location Data Item is not recorded, the photofinisher is free to define the location of printing on front and/or back.

The Camera Frame Input Priority List and Camera Filmstrip Input Priority List Data Items provide the customer with the means of defining the desired content of imprinting.

When the Camera Frame Input Priority List and Camera Filmstrip Input Priority List Data Items are not recorded, the photofinisher is free to define the following items:

- Maximum number of lines of printing
- Maximum number of characters per line
- Relative positions of separate items
- Print font, density or color

12.5.2 IMPRINTING REQUIREMENTS

The photofinishing system shall be capable of imprinting a minimum of 2 lines and a minimum of 40 characters per line. The location of the 2 lines may be defined by the manufacturer of the photofinishing equipment. The two lines of imprinting are permitted to be arranged side by side.

The photofinishing system shall allocate 24 characters maximum for the Photofinishing Imprinting Data Items, which are the Minimum Data Set (see Section 12.5.2.1.1) and the Photofinishing Lab ID (see Section 12.5.2.1.2).

Photofinishing equipment shall be capable of imprinting Personalization Data in the remainder after the 24 characters have been subtracted.

The character format, text organization, and other characteristics of the imprinted text, which are not specified in this document, may be defined by the manufacturer of the photofinishing equipment.

12.5.2.1 PHOTOFINISHING IMPRINTING DATA ITEMS

12.5.2.1.1 MINIMUM DATA SET

The photofinishing system shall always imprint the following data items on all first time and subsequent orders.

- FID: The photofinishing system shall imprint the least significant (last in sequence) 6 digits of the FID number. A hyphen shall be inserted between the third and fourth least significant digits.
- Frame Number

12.5.2.1.2 PHOTOFINISHING LAB ID

Five characters are reserved for imprinting the Photofinishing Lab ID.

12.5.2.2 DEFAULT PRIORITY FOR DATE AND TIME DATA AND PERSONALIZATION DATA

Fifty-six characters shall be reserved for the imprinting of Date and Time data, and Personalization Data Items, Date of Processing, and Other Data Items. Personalization Data Items are items 00 through 14 in the Table of Imprinting Eligible Items (see Section 10.4.6.18). The table also defines the format for imprinting each data item. The imprinting priority for each data item is described in Section 12.5.2.3.

12.5.2.2.1 DATE AND TIME

The magnetically recorded Date and Time of exposure shall always be imprinted in the format specified by the Camera Exposure Date and Time Data Item (see Section 10.4.6.1). When the imprinting of the Date and/or Time is suppressed by the format specified by the Camera Exposure Date and Time data item, the photofinishing system may print Titles, other Personalization Data Items, Date of Processing, or Other Data Items in its place, according to the priority defined in Sections 12.5.2.2.2 through 12.5.2.3.2.

12.5.2.2.2 TITLES

Forty contiguous characters shall be provided for the imprinting of titles (Data Items 00 through 03, in the Table of Imprinting Eligible Items in Section 10.4.6.18). When an input title exceeds 40 characters, a minimum of at least 40 characters shall be imprinted.

Titles have the highest priority for imprinting after the magnetically recorded Date and Time. The priority for printing the titles is as follows.

Highest Priority:	User Input Frame Titles
Second Priority:	User Select Frame Titles
Third Priority:	User Input Filmstrip Titles
Fourth Priority:	User Select Filmstrip Titles

12.5.2.2.3 OTHER PERSONALIZATION DATA ITEMS

Other Personalization Data Items (Data Items 04 through 14, in the Table of Imprinting Eligible Items in Section 10.4.6.18) may be imprinted after all available titles have been imprinted. No priority is implied by the order of appearance of the Data Items in the table. When an "Other Personalization Data Item" exceeds the line, any "Other Personalization Data Items" may be imprinted in its place. If no "Other Personalization Data Items" exist, then the remaining space may be used at the photofinisher's discretion.

12.5.2.2.4 DATE OF PROCESSING AND OTHER DATA ITEMS

After all of the available Titles and Other Personalization Data Items have been imprinted, the photofinisher is allowed to fill the remaining space at their discretion. For example, the Date of Processing and Other Data Items (Data Items 15 through 99, in the Table of Imprinting Eligible Items in Section 10.4.6.18) may be imprinted. The Date of Processing is prohibited when the Date of Exposure is imprinted.

12.5.2.3 IMPRINTING PRIORITY

12.5.2.3.1 PRIORITY RULE FOR IMPRINTING EACH DATA ITEM

When Camera Frame Input Priority List and/or Camera Filmstrip Input Priority List is indicated, the photofinisher shall imprint according to the priorities defined in these data items.

12.5.2.3.2 DEFAULT

When no priority is indicated, the photofinisher shall imprint according to the priorities defined in Sections 12.5.2.2.1 through 12.5.2.2.4.

12.6 PRINT QUALITY IMPROVEMENT (PQI)

12.6.1 OVERVIEW

The Advanced Photo System is capable of transferring information of the conditions at image exposure through magnetic IX and/or optical IX. The photofinishing system can utilize this information for the purpose of Print Quality Improvement (PQI).

12.6.2 BASIC DATA ITEMS FOR PQI

The following data items are available to the photofinishing system for the purpose of improving print quality (see Sections 10.4.4 and 10.4.6).

- Cartridge Hand of Load (CHOL)
- Flash Fire
- Scene Brightness Value
- Artificial Illuminant Flag
- Magnification

12.6.3 SELECTABLE DATA ITEMS FOR PQI

Selectable Data Items are defined in Sections 10.4.4 and 10.4.6. Data items that may be utilized for PQI are described herein.

12.7 SENSITIZED FILMSTRIP AND CARTRIDGE HANDLING

12.7.1 OVERVIEW

The Advanced Photo System cartridge and filmstrip are unique. No filmstrip leader extends from the cartridge. In the fully wound condition the cartridge does not provide access to the filmstrip leader. However, the filmstrip may be thrust from the cartridge after opening the light lock door by simply rotating the cartridge spool. The filmstrip may be separated from and then reattached to the cartridge. This is important, since the Advanced Photo System enables the consumer's negatives to be returned by the photofinisher in the origination cartridge.

12.7.2 SENSITIZED FILMSTRIP RETURN METHOD

A principle feature of the Advanced Photo System is the negative return method, Negative-Return-In-Cartridge (NRIC). The photofinishing system shall enable photofinishers to return uncut consumer negatives in the original cartridge. As a result, Advanced Photo System develop and print orders, as well as reorders, arrive at the photofinisher in cartridges. The Irreversible Processed Indicator has been provided as a means to enable the photofinisher to discriminate between cartridges that contain unprocessed filmstrips, from those that contain processed filmstrips.

12.7.3 VISUAL EXPOSURE INDICATOR (VEI) and IRREVERSIBLE PROCESSED INDICATOR (IPI)

Sections 9.9.3 and 9.9.4 describe the Visual Exposure Indicator (VEI), the Double Exposure Prevention (DEP) and the Irreversible Processed Indicator (IPI) features that are available to discriminate the exposure state of the filmstrip / cartridge. Sections 9.9.3 and 9.9.4 also reference the appropriate figures and specifications that relate to VEI, DEP, and IPI features.

12.7.3.1 VISUAL EXPOSURE INDICATOR (VEI)

Photofinishing apparatus is required to properly position the VEI of Filmstrip Loaded Cartridge and Display Cartridges in the appropriate exposure position as described in Section 9.9.4.1. The required positioning shall be established at the time the processed filmstrip is loaded into the cartridge.

Photofinishing apparatus is required to position the VEI of Utility Cartridges in the PROCESSED position.

12.7.3.2 IRREVERSIBLE PROCESSED INDICATOR (IPI)

The IPI feature provides a mechanical means of identifying the "Processed" or "Unprocessed" exposure state.

12.7.3.2.1 IPI ACTUATION

Photofinishing apparatus is required to actuate the IPI as described in Sections 9.9.4.1 and 9.9.4.3. The required actuation shall be established at the time the processed filmstrip is contained in the cartridge.

12.7.3.2.2 IPI SENSING

Photofinishing apparatus is required to sense the IPI as described in Sections 9.9.4.1 and 9.9.4.3.

12.7.4 SENSITIZED FILMSTRIP DETACHMENT AND REATTACHMENT

The cartridge and filmstrip trailer are designed to facilitate removal from, and re-attachment to, the original cartridge. Figures 400 and 402 describe the filmstrip trailer configuration. Section 9.10 and Figures 710-1 and 710-2 describe the filmstrip to cartridge interface. Special tools are required to detach and reattach the filmstrip from/to the cartridge. Figures 710-1, 710-2, 720-1, 720-2, and 720-3 describe the cartridge clearances available for detach or reattach tool insertion. Figure 705 describes the interface between the reattachment tool and the cartridge spool.

12.7.5 SENSITIZED FILMSTRIP SPLICING

The Advanced Photo System may require that individual filmstrips be joined together end-to-end, yielding a spliced roll which is similar to the existing 135 size spliced roll format configuration. The filmstrip and splicing equipment/process shall allow repeated splicing of the filmstrip.

If thermal splicing equipment/process is used, the configuration of the spliced filmstrip web shall conform to the specification of Figure 730.

Maximum increase in filmstrip thickness due to filmstrip splicing shall be 0.25 mm.

12.7.6 CARTRIDGE AND SENSITIZED FILMSTRIP MATCHING

12.7.6.1 OVERVIEW

The Advanced Photo System allows the filmstrip to be separated from the cartridge. FID and CID is provided to facilitate reliable cartridge and filmstrip matching.

The CID is printed on the cartridge body labeling (see Figure 560), while the FID is latent image information which is encoded on the filmstrip leader and trailer. Both identifiers are encoded by the filmstrip manufacturer, and support human and machine recognition methods. Figures 100-2, 210-1, 210-3-N, and 210-3-R define the latent image FID. Sections 8.2.3 and 8.2.7.3 contain the detailed FID specifications. Section 9.13 contains the detailed CID specifications of origination cartridges.

12.7.6.2 ORIGINATION CARTRIDGE AND SENSITIZED FILMSTRIP MATCHING

Filmstrips and origination cartridges are identified with a common ID to facilitate filmstrip and cartridge identification. If the filmstrip is removed from the cartridge, the photofinishing equipment enables the photofinisher to reattach the filmstrip to the origination cartridge before it is returned to the consumer. The CID number and FID number are provided to facilitate reliable origination cartridge and filmstrip matching.

12.7.6.3 DISPLAY CARTRIDGE AND SENSITIZED FILMSTRIP MATCHING

If a Display Cartridge is used instead of the origination cartridge, the machine-readable CID number may not match the FID number. However, the exposure length indicator in the Display Cartridge cartridge bar code identifies the filmstrip length(s) that the Display Cartridge is capable of holding (see Section 9.13.3.1). The number of frames allowed in the Display Cartridge selected shall match the number of frames in the filmstrip.

12.7.7 SENSITIZED FILMSTRIP ALTERATION AND CARTRIDGE DAMAGE

12.7.7.1 SENSITIZED FILMSTRIP LEADER & TRAILER ALTERATION

Cartridge performance may be adversely affected when damage or excessive alteration to the filmstrip leader and/or trailer occurs. The length of the as manufactured Advanced Photo System filmstrip allows for recovery from leader and/or trailer damage/alteration due to either of the following:

- a) photofinishing operations.
- b) normal wear due to reaching the minimum specified number of complete cartridge cycles (see Section 9.2.6).

Damaged filmstrips may be repaired, where possible, but repairs cannot compromise the performance of the cartridge after the filmstrip is reinserted.

The photofinishing system is required to meet the following specifications:

- 1) Photofinishing equipment which alters the original condition of the filmstrip leader and/or trailer, shall not degrade the cartridge performance specified in Section 9.
- 2) At no time can the overall length of the filmstrip be reduced below the minimum specifications of Figures 400, 401, and 402.
- 3) Localized increases in filmstrip thickness (build-up) at the leader and trailer are permissible, as long as the build-up does not prevent re-sizing the overall length of the filmstrip as specified in Figures 400, 401, and 402. Build-up shall be confined to the area that will be removed from the filmstrip during the next restoration. The localized increase in filmstrip thickness at the leader and/or trailer, including any build-up, shall be 0.25 mm maximum.

12.7.7.2 DISPLAY CARTRIDGE USAGE

It is possible that cartridges may become damaged. The Display Cartridge enables the photofinisher to replace damaged cartridges with a Display Cartridge if the performance of the origination cartridge is not longer satisfactory.

Additionally, some SSU cameras may not include SSU cartridges. In this case, the Display Cartridge enables the photofinisher to return the processed filmstrip to the consumer in a cartridge.

Display Cartridges are specified in Section 17.

12.7.8 LIGHTLOCK OPENING/CLOSING

SPECIFICATION:

1. When the cartridge contains unprocessed film, the apparatus loading chamber shall be lighttight before the cartridge lightlock door is rotated from the closed position.
2. The apparatus shall rotate the lightlock door as specified in Figure 540.
3. During cartridge unloading, the apparatus shall hold the cartridge spool in the correct "park" position while the lightlock door is being rotated from the "open" to the "closed" position.

12.7.9 MINIMUM REWIND DRAG

PURPOSE:

The minimum rewind drag ensures that the cartridge can properly rewind the filmstrip into the cartridge without damaging the sensitized filmstrip, and that the cartridge will again thrust the filmstrip.

SPECIFICATION:

See Section 11.5.3.