HHP

Quick Check 2D Print Quality Assessment

Applies to the following products:
IT4410, IT4710, IT4600, IT4800, IT4X80

User's Guide

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Introduction

Two-dimensional Print Quality Assessment (2D PQA), a feature of HHP's image readers, identifies a successfully read symbol and also reports graded measurement parameters obtained from the symbol.

2D PQA is not "true" verification in the traditional sense of the word; however it can easily and inexpensively provide test results that you may find useful for 2D bar code symbol print quality process control. This User's Guide explains how to activate HHP's 2D PQA analysis function, what is reported, how the data is measured, what the readings mean, and what you might do to improve your process.

User Operation

To utilize 2D PQA you need to have an IMAGETEAM™ 4600/4800/4X80 with firmware revision 1.135.1.1 or higher or an IMAGETEAM 4410/4710 with firmware revision 1.91.2.18 or higher..

Show Firmware

To see displayed results using the 2D PQA feature, Microsoft® Notepad, a word processor/editing program, or Quick*View is recommended. Refer to Chapter 2 for information regarding Quick*View.

Reading Techniques

Hand held movement, rotation, and location will affect the measured results. To obtain proper repeatable reads that yield useful print quality information, you should follow the techniques listed below.

• Lay the bar code symbol to be tested on a flat surface

• IT4600/4800/4X80: Hold the imager 7.0 in (17.8 cm) for SR models, 3.5 in (8.9 cm) for the HD, and 4.5 in (11.4 cm) for the SF from the bar code symbol. This distance is measured from the imager's front window to the reading surface.

• IT4410/4710: Hold the imager 5.0 in (12.7 cm) for LR models, 2.0 in (5.1 cm) for the HD, and 7.0 in (17.8 cm) for the LX from the bar code symbol. This distance is measured from the imager's front window to the reading surface.

- The hand-held imager has a view finder that projects a bright aiming beam that corresponds to the imager's horizontal field of view. The aiming beam should be centered over the bar code and positioned horizontally over the code (no tilt, skew, or rotation). If the symbol surface is shiny, the reader may have to be held several degrees below the normal position to avoid specular reflections.

2D Matrix symbol

- When testing, attempt to minimize as much movement of the imager as possible. Excessive movement can cause variability in PQA results.
- It is best to take multiple reads of the symbol, comparing the PQA results to form a better indication of the overall symbol quality.

When you use 2D PQA under the above conditions, you can expect meaningful and repeatable results that can be used to make correction adjustments in your symbol generation process.

Symbology/Parameter Specifics

Two-dimensional bar code symbologies come in three distinct varieties or basic structures:

1. Stacked or Multi-Row symbologies (e.g., PDF417 and MicroPDF47),

2. 2D Matrix symbologies (e.g., Data Matrix, Aztec Code, QR Code, and Maxi-code), and

3. Postal (Height-Modulated) symbologies (e.g., Postnet and Planet Code in the U.S. and the 4-State codes used in England, the Netherlands (KIX), Canada, Japan, and Australia).

Since each of these basic types or structures differ, the 2D PQA outputs are quite different to accommodate the quality parameters for each of the classes of 2D symbols.

2D PQA Reporting

Full Report

HHP's 2D PQA reporting can be enabled in two different modes: Full Report or Screening.

If you are using Quick*View, you can enable Full Report, a listing of all of a symbol's identifying information, measurements, and corresponding grades, by typing the following menu command:

   2D_PQA1

   or by scanning the following bar code:

Full Report

Note: With the IT4600/4800/4X80, the PQA report is sent out as a second data/ beep sequence after the bar code data. The report has its own HHP code ID of >(0X3E) so it can be uniquely identified.

Screening Report

Screening is a grade-based mode that allows display of a limited list of identifying information, as well as only those measurements that are below Minimum Acceptable Grade (MAG) level. With the IT4600/4800/4X80, if all of the parameters are met in the screening mode, only the bar code data will be output with a beep. If one or more of the measured parameters fail to meet the MAG, the PQA message is also sent with a beep.

Note: With the IT4410/4710, screening mode outputs are also accompanied by a single beep if all parameters are okay or a triple beep if one or more of the measured parameters fail to meet the MAG.

If you are using Quick*View, you can enable Screening by typing the following menu commands:

   2D_PQA2   *when A is the Minimum Acceptable Grade*

   2D_PQA3   *when B is the Minimum Acceptable Grade*

   2D_PQA4   *when C is the Minimum Acceptable Grade*

   2D_PQA5   *when D is the Minimum Acceptable Grade*

If your imager is in keyboard wedge mode, enable Screening by scanning the following bar codes.

Minimum Acceptable
Grade = A

Minimum Acceptable
Grade = B

Minimum Acceptable
Grade = C

Minimum Acceptable
Grade = D

You can exit both Full Report and Screening modes by either typing the menu command, 2D_PQA0, if you are using Quick*View, or by scanning the following bar code:

Exit

Identifying Symbol Content

To identify content or "format" aspects of a symbol, 2D PQA modes report the less than obvious characteristics of a symbol. For quality determination, 2D PQA reports those parameters that both relate directly to the print or creation process, and that also remain relatively consistent over a range of hand held reading situations.

In the 2D PQA Full Report mode, successful scans of a 2D symbol output a message similar to the following (with slight variations based upon the symbology being tested):

```
This is a representative PDF417 symbol
 >>> PQA from HHP <<<
PDF417: 11 rows x 3 cols, 25 data & 8 chks (ECL = 2)
 X roughly = 0.014"
[A] < Row Height = 3.1 X
[A] < Useful Row Height = 2.5 X (82% Row)
[A] < Data Safety Margin = 100% (0 Erasures & 0 Errors)
[B] < Edge Accuracy = 59%
[C] < Print Growth = -43% of X
```

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While the details are explained below, this general format includes:

- the encoded data (the usual output message) in the first line.
- a banner " >>> PQA from HHP <<<" identifying the start of the 2D PQA report.
- the symbology, its features, and approximate size.
- graded print quality parameters in the following lines.

In the 2D PQA Screening mode with "A" as the Minimum Acceptable Grade, this same scan would be accompanied by a triple beep and the following output message:

```
This is a representative PDF417 symbol
 >>> PQA from HHP <<<
Minimum Acceptable Grade = A
PDF417: X roughly = 0.014"
Poor Edge Accuracy (59%)
Excessive Print Shrinkage (-43% of X)
```

With "C" as the Minimum Acceptable Grade, this same scan would produce just a single beep and the following output message:

```
This is a representative PDF417 symbol
 >>> PQA from HHP <<<
Minimum Acceptable Grade = C
PDF417: X roughly = 0.014"
All Measurements within range
```

The actual details of the symbol identifying and print quality parameters are explained in the following sections.

2D Stacked / Multi-row

This section describes 2D PQA outputs for PDF417 and MicroPDF417, as well as their derivative 2D arrays used in UCC/EAN Composite Components and T-Linked Code 39.

PDF417

The Full Report from a typical scan looks like the following (line numbers have been added in curly brackets):

```
{1} This is a representative PDF417 symbol
{2} >>> PQA from HHP <<<
{3} PDF417: 11 rows x 3 cols, 25 data & 8 chks (ECL = 2)
{4}  X roughly = 0.014"
```

```
{5} [A] < Row Height = 3.1 X
{6} [A] < Useful Row Height = 2.5 X (82% Row)
{7} [A] < Data Safety Margin = 100% (0 Erasures & 0
    Errors)
{8} [B] < Edge Accuracy = 59%
{9} [C] < Print Growth = -43% of X
```

where:

{1} is always the **Encoded Message,** the usual data output. In this case "This is a representative PDF417 symbol".

{2} is a standard **Banner** heading that marks the start of the PQA portion of the output.

{3} identifies the **Symbology**, PDF417 (or its derivative COMPOSITE-C), and lists other characteristics of this symbol: the height and width of the data field, the numbers of data and check characters, and the corresponding Error Correction Level.

{4} presents an approximate **X-dimension**, presuming normal viewing distance.

In the Screening PQA modes, the Symbology Identification from Line {3} is combined with the approximate X-dimension from Line {4}.

Note: The reported X-dimension is approximate and based upon use of the IT4410LR at 4.7 in (12 cm) (see "Reading Techniques" on page 1-1). If you use different image engines, the X-dimension will vary. If you hold the reader closer than 4.7 in (12 cm), it will have the effect of reporting a larger than true X-dimension. Conversely, if you hold the reader farther away than 4.7 in (12 cm), it will have the effect of reporting a smaller than true X-dimension. Please contact HHP Application Support for additional information. Refer to Chapter 3 for contact information.

{5} lists the average **Row Height**, assigning the grades as:

A   if Row Height >= 2.5 X

F   otherwise

In Screening modes, this parameter is reported as "Rows are Too Short (2.2X)" when that is the case.

{6} lists the **Useful Row Height**, which is the measured Row Height times the codeword yield (listed in parentheses), the percentage of symbol characters scanned that actually decode. The grade is assigned as:

A   if Useful Height >= 2.0 X, else

B   if Useful Height >= 1.6 X, else

C   if Useful Height >= 1.3 X, else

D   if Useful Height >= 1.0 X, else

F   otherwise

In Screening modes, this parameter is reported as "Useful Row Height is Too Short (1.5X)" when that is the case.

{7} lists the **Data Safety Margin**, which is the ratio of the unused error correction words to the recommended (!) number of such words. Data Safety Margin can exceed 100%, when the ECL is higher than the minimum recommended, or be limited to 50% or lower, even with perfect printing, when the ECL is below minimum. The grade is assigned as:

A   if Safety Margin >= 62%, else

B   if Safety Margin >= 50%, else

C   if Safety Margin >= 37%, else

D   if Safety Margin >= 25%, else

F   otherwise

In Screening modes, this parameter is reported as "Low Data Safety Margin (44%)" when that is the case.

{8} lists the **Edge Accuracy** measured in the Start or Stop patterns. The grade is assigned as:

A   if Edge Accuracy >= 62%, else

B   if Edge Accuracy >= 50%, else

C   if Edge Accuracy >= 37%, else

D   if Edge Accuracy >= 25%, else

F   otherwise

In Screening modes, this parameter is reported as "Poor Edge Accuracy (59%)" when that is the case.

{9} lists the **Print Growth** measured in the Start or Stop patterns (the growth of the dark modules or "bars"). The grade is assigned as:

A   if Print Growth is between +/- 20%, else

B   if Print Growth is between +/- 30%, else

C   if Print Growth is between +/- 40%, else

D   if Print Growth is between +/- 50%, else

F   otherwise

In Screening modes, this parameter is reported as "Excessive Print Growth (33%)" or "Excessive Print Shrinkage (-43%)" when those are the cases.

In rare instances where neither a valid Start nor Stop pattern is measurable, yet the symbol is somehow read, lines {8} and {9} are replaced by a message to that effect. The message is either:

"[F] < Start/Stop Decode Fails" in a Full Report or
"Start/Stop Characters are Bad" in a Screening mode.

In Screening modes, it often occurs that none of the parameters are below the Minimum Acceptable grade. In this case, the final PQA line becomes:

"All Measurements within range".

MicroPDF417

The Full Report from a typical scan looks like the following (line numbers have been added in curly brackets):

```
{1} This is a typical Micro PDF417 symbol
{2}  >>> PQA from HHP <<<
{3} MICROPDF: 15 rows x 3 cols, 24 data & 21 chks
{4} X roughly = 0.015"
{5} [A] < Row Height = 1.8 X
{6} [A] < Data Safety Margin = 100% (0 Erasures & 0
    Errors)
{7} [A] < Edge Accuracy = 70%
{8} [A] < Print Growth = +4% of X
```

where:

{1} is the **Encoded Message**.

{2} is the **Banner** heading.

{3} identifies the **Symbology**, MICROPDF (or one of its derivatives: COMPOS-ITE-A, COMPOSITE-B, or TLC39), and lists other characteristics of this symbol: the height and width, and the numbers of data and check, or error correction characters.

{4} presents an approximate **X-dimension**.

Note: The reported X-dimension is approximate and based upon use of the IT4410LR at 4.7 in (12 cm) (see "Reading Techniques" on page 1-1). If you use different image engines, the X-dimension will vary. If you hold the reader closer than 4.7 in (12 cm), it will have the effect of reporting a larger than true X-dimension. Conversely, if you hold the reader farther away than 4.7 in (12 cm), it will have the effect of reporting a smaller than true X-dimension. Please contact HHP Application Support for additional information. Refer to Chapter 3 for contact information.

{5} lists the average **Row Height**, assigning the grades as:

> *A   if Row Height >= 1.5 X,*
>
> *F   otherwise.*

{6} lists the **Data Safety Margin**. Because MicroPDF's error correction level is fixed, this parameter is just the "Unused Error Correction" and always between 0 and 100%.

{7} lists the **Edge Accuracy** measured in multiple scans through the Row Address Patterns.

{8} lists the **Print Growth** measured within the Row Address Patterns.

2D Matrix

This section describes 2D PQA outputs for Aztec Code, Data Matrix, QR Code, and MaxiCode.

Aztec Code

The Full Report from a typical scan looks like the following (line numbers have been added in curly brackets):

```
{1} This is a representative Aztec Code symbol
{2}  >>> PQA from HHP <<<
{3} AZTEC CODE: 3 layers (Compact) => 23x23 modules
{4} Data Field: 29 data & 22 chks in GF(256), 0 Erasures
    & 0 Errors
{5}  X roughly = 0.021"
{6} [A] < Core Symbol: 0 errors
{7} [A] < Data Safety Margin = 146%
{8} [A] < Horizontal Print Growth = +1% of X
{9} [A] < Vertical Print Growth = +1% of X
```

{1} is the **Encoded Message**.

{2} is the **Banner** heading.

{3} identifies the **Symbology** (AZTEC CODE) and lists the symbol's size and format.

{4} lists the numbers of **Data and Check Words**, as well as the Error Correction used.

{5} presents an approximate **X-dimension**.

Note: *The reported X-dimension is approximate and based upon use of the IT4410LR at 4.7 in (12 cm) (see "Reading Techniques" on page 1-1). If you use different image engines, the X-dimension will vary. If you hold the reader closer than 4.7 in (12 cm), it will have the effect of reporting a larger than true X-dimension. Conversely, if you hold the reader farther away than 4.7 in (12 cm), it will have the effect of reporting a smaller than true X-dimension. Please contact HHP Application Support for additional information. Refer to Chapter 3 for contact information.*

{6} lists the number of **Module Errors** in the central Core Symbol, which consists of the finder bullseye, four orientation clusters at its corners, and the mode message along its perimeter. The grade is assigned as:

A   *if there are 0 (zero) errors,*

B   *if there is 1 error,*

C   *if there are 2 errors,*

D   *if there are 3 errors*

F   *if there are 4 or more errors.*

In Screening modes, this parameter is reported as "Too many Code Symbol Errors (3)" when that is the case.

{7} lists the **Data Safety Margin**. In Aztec Code symbols, the recommended number of error correction words is a minimum that is generally exceeded because any excess codeword capacity is filled with extra check words. Thus this parameter often exceeds 100%, but it also can be forced to much higher or lower levels by user options.

{8} and {9} list the **Horizontal & Vertical Print Growths**, respectively. When one direction's growth is substantially larger than the other, excessive bar dragging in the direction of label travel is indicated and should be fixed. When both directions have excessive growth, then either (a) adjustment of the print process or (b) undercutting of the original bar code symbol graphic is recommended.

Data Matrix

The Full Report from a typical scan looks like the following (line numbers have been added in curly brackets):

```
{1} This is a representative Data Matrix symbol
{2}  >>> PQA from HHP <<<
{3} DATA MATRIX ECC200: 24 x 24 modules in size
{4} Data Field: 36 data & 24 chks in 1 block(s) of
    GF(256)
{5} X roughly = 0.025"
{6} [A] < Fixed Patterns: 0 module errors
```

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```
{7} [A] < Data Safety Margin = 100%
{8} [A] < Horizontal Print Growth = +10% of X
{9} [A] < Vertical Print Growth = +12% of X
```

{1} is the **Encoded Message**.

{2} is the **Banner** heading.

{3} identifies the **Symbology** (DATA MATRIX) and lists the symbol's ECC and size.

{4} lists the numbers of **Data and Check Words**, as well as the error correction used.

{5} presents an approximate **X-dimension**.

Note: The reported X-dimension is approximate and based upon use of the IT4410LR at 4.7 in (12 cm) (see "Reading Techniques" on page 1-1). If you use different image engines, the X-dimension will vary. If you hold the reader closer than 4.7 in (12 cm), it will have the effect of reporting a larger than true X-dimension. Conversely, if you hold the reader farther away than 4.7 in (12 cm), it will have the effect of reporting a smaller than true X-dimension. Please contact HHP Application Support for additional information. Refer to Chapter 3 for contact information.

{6} lists the number of **Module Errors** in the Fixed Patterns, which consist of the Finder "L" and Clocking tracks around the perimeter of the symbol, their adjacent quiet zones, and any interior alignment patterns in larger ECC200 symbols.

In Screening modes, this parameter is reported as "Too many Fixed Pattern Errors (3)" when that is the case.

{7} lists the **Data Safety Margin**. This parameter is measured and reported only for ECC200 symbols. These symbols have a fixed level of error correction. There is no equivalent parameter for the convolutional error encoding used in older versions of Data Matrix. This parameter is just the "Unused Error Correction" and always between 0 and 100%.

{8} and {9} list the **Horizontal & Vertical Print Growths**, respectively.

QR Code

The Full Report from a typical scan looks like the following (line numbers have been added in curly brackets):
```
{1} This is a representative QR Code symbol
{2}  >>> PQA from HHP <<<
```

```
{3} QR CODE: Model 2 Version 3 (29 x 29 modules)
{4} Mask Pattern Reference #3, Error Correction Level
    "M"
{5} Data Field: 44 data & 26 checks in 1 block(s) of
    GF(256)
{6} X roughly = 0.025"
{7} [A] < Data Safety Margin = 100%
{8} [A] < Horizontal Print Growth = +20% of X
{9} [A] < Vertical Print Growth = +17% of X
```

{1} is the **Encoded Message**.

{2} is the **Banner** heading.

{3} identifies the **Symbology** (QR CODE) and lists the symbol's model, version and size.

{4} lists this symbol's **Mask Pattern and Error Correction Level**.

{5} lists the numbers of **Data and Check Words** and their arrangement into blocks.

{6} presents an approximate **X-dimension**.

Note: The reported X-dimension is approximate and based upon use of the IT4410LR at 4.7 in (12 cm) (see "Reading Techniques" on page 1-1). If you use different image engines, the X-dimension will vary. If you hold the reader closer than 4.7 in (12 cm), it will have the effect of reporting a larger than true X-dimension. Conversely, if you hold the reader farther away than 4.7 in (12 cm), it will have the effect of reporting a smaller than true X-dimension. Please contact HHP Application Support for additional information. Refer to Chapter 3 for contact information.

{7} lists the **Data Safety Margin**. "M" is the recommended error correction level for QR Code, so symbols encoded at "H" or "Q" will typically have safety margins exceeding 100%, while those encoded at "L" are limited to values below 50%.

{8} and {9} list the **Horizontal & Vertical Print Growths**, respectively.

MaxiCode

The Full Report from a typical scan looks like the following (line numbers have been added in curly brackets):

```
{1} This is a representative Maxicode symbol
{2} >>> PQA from HHP <<<
{3} MAXICODE: Mode 4
```

```
{4} X roughly = 0.043"
{5} [A] < Data Safety Margin = 100%
{6} [A] < Horizontal Print Growth = +2% of X
{7} [A] < Vertical Print Growth = -1% of X
```

{1} is the **Encoded Message**.

{2} is the **Banner** heading.

{3} identifies the **Symbology** (MAXICODE) and lists the symbol's Mode.

{4} presents an approximate **X-dimension**.

Note: The reported X-dimension is approximate and based upon use of the IT4410LR at 4.7 in (12 cm) (see "Reading Techniques" on page 1-1). If you use different image engines, the X-dimension will vary. If you hold the reader closer than 4.7 in (12 cm), it will have the effect of reporting a larger than true X-dimension. Conversely, if you hold the reader farther away than 4.7 in (12 cm), it will have the effect of reporting a smaller than true X-dimension. Please contact HHP Application Support for additional information. Refer to Chapter 3 for contact information.

{5} lists the **Data Safety Margin**. Because the Error Correction level for Maxi-Code is fixed for each mode, this parameter is just the "Unused Error Correction," and is always between 0 and 100%.

{6} and {7} list the **Horizontal & Vertical Print Growths**, respectively.

Postal (Height-Modulated) Bar Code Symbologies

This section describes the height-modulated 2-state symbologies, Postnet and Planet Code, used in the United States, as well as the 4-state symbologies used in England, the Netherlands ("KIX"), Canada, Japan, and Australia. All dimensions, where listed, are in inches for 2-state symbols and in millimeters for 4-state symbols.

Postnet and Planet Code

The Full Report from a typical scan looks like the following (line numbers have been added in curly brackets):

```
{1} 51591
{2}  >>> PQA from HHP <<<
{3} POSTNET: 32 Bars, nominally from 01.30 to 01.56 in.
    in Width
{4} Bar Sequence: 1010100001101010101000001101001
{5} [F] (Hi) < Tall Bar Heights: 0.155 in.
{6} [F] (Hi) < Short Bar Heights: 0.081 in.
```

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```
{7} [A] (Ok) < Bar Widths = 0.022 in.
{8} [A] (Ok) < Inter-Bar Gaps = 0.023 in.
```

{1} is the **Encoded Message**.

{2} is the **Banner** heading.

{3} identifies the **Symbology**, (POSTNET or PLANET Code), and lists also the symbol's size and allowed range of measured width.

{4} lists the **Bar Sequence**, "1" representing a tall bar and "0" representing a short one.

{5} lists the **Average Height** of the tall bars, specified to fall within 0.115 to 0.125 in. The grades are assigned as:

   A   *if within the middle 67% of the specified tolerances, else*

   B   *if within the specified tolerances, else*

   C   *if within a range 25% wider(!) than the specified tolerances, else*

   D   *if within a range 50% wider(!) than the specified tolerances, else*

   F   *otherwise*

Note: These forgiving grade assignments, employed throughout the postal symbologies, reflect what are generally tight and unforgiving print specifications.

In Screening modes, this parameter is reported as ""Tall" Bars are too Short (or Long) (0.xxx in.)" when that is the case.

{6} lists the **Average Height** of the short bars, specified to fall within 0.040 to 0.060 in.

In Screening modes, this parameter is reported as ""Short" Bars are too Short (or Long) (0.xxx in.)" when that is the case.

{7} lists the **Average Width** of the bars, specified to fall within 0.015 to 0.025 in.

In Screening modes, this parameter is reported as "Bars are too Narrow (or Wide) (0.xxx in.)" when that is the case.

{8} lists the **Average Space Width** between bars, specified to fall within 0.012 to 0.040 in.

In Screening modes, this parameter is reported as "Spaces are too Narrow (or Wide) (0.xxx in.)" when that is the case.

4-State Codes

The Full Report from a typical scan looks like the following (line numbers have been added in curly brackets):

```
{1} B15AJ6T
{2}  >>> PQA from HHP <<<
{3} 4-STATE(British): 34 Bars, nominally from 38.5 to
    42.3 mm. in Width
{4} Bar Sequence: ADHTATDAHDDAADADAADTHTADHHDATHTADH
{5} [A] (Ok) < "Tall" Bar Extensions: 2.79 mm. from cen-
    ter
{6} [F] (Hi) < "Short" Bar Extensions: 1.00 mm. from
    center
{7} [B] (Hi) < Bar Widths = 0.60 mm.
{8} [A] (Ok) < Inter-Bar Gaps = 0.59 mm.
```

{1} is the **Encoded Message**.

{2} is the **Banner** heading.

{3} identifies the **Symbology**, 4-STATE (British, or KIX, Canadian, Japanese, or Australian), and also lists this symbol's size and allowed range of measured width.

{4} lists the **Bar Sequence**, "A" representing Ascending bars, "D" representing Descending bars, "T" representing Tracker (short) bars, and "H" representing tall bars that both ascend and descend.

{5} lists the **Average Extension** from the centerline of the tall ascenders and descenders, as specified in Table 1.

In Screening modes, this parameter is reported as ""Tall" Bar Extensions are too Short (or Long) (0.xxx in.)" when that is the case.

{6} lists the **Average Extensions** from the centerline of the Short tracks, as specified in Table 1.

In Screening modes, this parameter is reported as "Short" Bar Extensions are too Short (or Long) (0.xxx in.)" when that is the case.

{7} lists the **Average Width** of the bars, as specified in Table 1.

{8} lists the **Average Space Width** between bars, as specified in Table 1.

Note: *For the Canadian and Australian 4-State symbologies only, any bar error that has invoked their error correction triggers an additional PQA parameter line:*

"[F] < One or more Bars are in Error!" in a Full Report or
"One or more Bars are in Error!" in a Screening mode.

Table 1: Dimensional Tolerances for the Various 4-State Bar Code Symbologies

	"Tall" Bar Extensions	*"Short" Bar Extensions"*	*Bar Widths*	*Gap (Space) Widths*
British	2.16 - 2.92 mm	0.51 - 0.76 mm	0.38 - 0.63 mm	0.50 - 0.87 mm
Netherlands	2.16 - 2.92 mm	0.51 - 0.76 mm	0.38 - 0.63 mm	0.42 - 0.89 mm
Canadian	2.1 - 2.50 mm	0.25 - 0.40 mm	0.40 - 0.60 mm	0.40 - 0.76 mm
Japanese	1.70 - 1.80 mm	0.52 - 0.68 mm	0.50 - 0.70 mm	0.45 - 0.60 mm
Australian	2.10 - 2.90 mm	0.50 - 0.80 mm	0.40 - 0.60 mm	0.40 - 0.76 mm

Parameter Interpretation

Average Bar/Gap Width

Average Bar or Inter-Bar Gap Widths are the average of such dimensions measured across an entire postal symbology. A low average bar width or inter-bar gap width grade indicates print conditions that expand or shrink the apparent size of the dark elements, threatening to make the narrow bars or spaces disappear. Potential areas of correction include adjusting the print process (e.g., ink flow, transfer heat, print speed), adjusting the original bar code symbol graphic or pattern (through techniques such as undercutting), or by making the symbol larger.

Average (Bar) Height/Extension Height

Average Height/Extension Height is a measure of the average height of the bars or dark elements in a symbol. Depending on the symbology and print process, this can be corrected by graphically stretching the symbol for 2D stacked symbols (see "Row Height" on page 1-19 and "Useful Row Height" on page 1-19), or may be an indication that the symbol generating program, in the case of the postal symbologies, does not meet the required specifications.

Bar Sequence

Bar Sequence is the bar height pattern within a height modulated, multi-state, postal-type symbology. In a 2-state symbol, a "1" represents a tall or full height bar and a "0" represents a short or half height bar. In a 4-state symbol, "A" represents the ascending bars, "D" the descending bars, "T" the short bars, and "H" the tall bars that both ascend and descend. Incorrect sequencing can be systematic and can be caused by the symbol generating program not meeting requirements.

Codeword (Data and Check)

A Codeword is a symbol character value or intermediate level of coding between source data and the graphical encodation in the symbol. A data codeword encodes data according to the rules or scheme of the symbology, where check codewords are reserved for error detection/correction purposes.

Codeword Yield

Codeword Yield is an indication of the interference between adjacent rows in a 2D stacked symbology. A low Codeword Yield can indicate print conditions where this interference is caused by drag, streaking, or other situations where there is carry-over of ink from one row to another (see "Useful Row Height" on page 1-19).

Data Safety Margin

Data Safety Margin is the ratio of the unused error correction codewords to the recommended number of error correction codewords. A low Data Safety Margin indicates a symbol that is close to reading failure and can be improved by improving the printing, correcting the cause of bad or missing symbol characters (e.g., spots, voids), or by raising the Error Correction Level (ECL).

Edge Accuracy

Edge Accuracy is a measure of the accuracy of the bar or dark element edge positions within the symbol. A low Edge Accuracy indicates print conditions, such as a "print pitch to X-dimension" mismatch or general edge irregularities (but not uniform print growth), which can harm character decoding. The first condition is improved by properly scaling the symbol to the print pitch, and both conditions are improved by making the symbol larger.

Encoded Message

The encoded message is the information (alpha, numeric, and/or control characters) or message contained within the bar code symbol and output as part of the decoding process. This information precedes the calculated PQA parameters. This information must be manually compared to the characters that should be encoded.

Error Correction/Error Correction Characters

Error Correction is a reader/decoder's use of mathematical processes to reconstruct or replace damaged or missing symbol characters. Error correction characters are specific symbol characters that are created automatically from the other symbol data characters and used for error correction and detection.

Error Correction Level (ECL)

Error Correction Level is an indication of the number of characters used in a symbology for the purpose of error correction. Higher levels of error correction allow for correcting greater potential symbol damage.

Error Detection/Error Detection Characters

Error Detection is the use of error correction characters (symbol characters that are reserved for error detection and calculated automatically from the other symbol characters) to detect whether the presence of errors in the symbol exceeds the error correction capacity. Error detection will keep the symbol from being decoded as erroneous data.

Mask Pattern/Masking

Mask Pattern/Masking is a specific part or characteristic of QR Code where a process is used to provide a more evenly balanced number of light and dark modules to reduce the occurrence of arrangements of adjoining modules that might interfere with efficient processing of a symbol's image. For additional information, refer to the QR Code symbology, available from AIM Global Specification (www.aimglobal.org).

Module Errors

Module Errors are individual errors within fixed pattern/data areas. Although often benign, Module Errors in the fixed regions of a symbol can signal a fault that, in some instances, will prevent proper decoding. They can generally be corrected by using a larger X-dimension and/or cleaning up the print process to eliminate stray ink, voids, and other causes of inconsistency in the print.

Print Growth (Horizontal and Vertical)

Print Growth is a measure of the growth or shrinkage of the bar widths (2D stacked) or element/module (2D matrix) width and/or height. A low Print Growth grade indicates print conditions that expand or shrink the apparent size of the dark bars or elements, which can cause them to optically disappear. In 2D matrix symbols, if the growth/shrinkage in one direction is larger than the other, this can indicate excessive drag in the direction of label travel. Potential areas of correction include adjusting the print process (e.g., ink flow, transfer heat, print speed), adjusting the original bar code symbol graphic or pattern (through techniques such as undercutting), or by making the symbol larger.

Row Height

Row Height is an approximate measure of the average height of the elements in a row, which indicates growth or shrinkage of the element widths. In 2D stacked symbologies, row heights of less than the recommended height can impede hand held scanning. This can be corrected by graphically stretching the symbol.

Symbology

Symbology is the symbology type that has been tested. A symbology is a standard means of representing data in a bar code form. Each symbology specification sets out its particular rules of composition or data architecture.

Useful Row Height

Useful Row Height is the measured Row Height times the Codeword Yield. A low Useful Row Height usually indicates print conditions where rows interfere with their adjacent neighboring rows, creating a dead band of wasted scanning in between. Useful row height scales these interfering rows to the printed row

height, giving more leeway to symbols printed with above minimum row heights (e.g., 4.0 X). A poor grade here is corrected by either stretching the symbol vertically or correcting the print condition (e.g., turning down the thermal burn setting or adjusting inking) that causes rows to interfere.

X-dimension

The X-dimension is an approximate measure of the average width of the narrow elements in a 2D stacked bar code symbol or a single element or module in a 2D matrix symbol, and indicates growth or shrinkage of the element widths.

*Quick*View*

*Quick*View Demonstration Software Instructions*

Quick*View is a Microsoft Windows® program that displays decoded symbol messages and captures images (for instance, ID photographs) from the imager. Bar code information and images are displayed in the Quick*View window.

*Note: For additional information about Quick*View, please refer to the user's guide for your imager.*

*Setting Up the Imager and the Quick*View Software*

1. Connect the Imager to the PC's com port (com port 1 or com port 2) via the appropriate interface cable (refer to the user's guide for your imager). Connect the appropriate power supply to the Imager. (The Imager cannot get its power from the PC's com port.)

2. Insert the SDK CD. Load Quick*View from the CD.

For Microsoft Windows 95 or NT 4.0

3. Insert the Quick*View diskette labelled "32 Bit Release" into Drive A or B.

4. From the Start Menu, click on Run. Type "x:\setup" in the command line box, where "x" represents a drive letter, typically "A" for the 3.5" floppy drive on most PCs. Click on OK.

5. Follow the instructions in the setup screens.

6. To start the Quick*View program, from the Start Menu click on Programs, Quickview, QuickView (32 Bit).

*Installing Quick*View from the Web*

1. Access the HHP web site at www.hhp.com.

2. Click in the **Quick Search** text box and enter **Quick*View**.

3. Click on **Search Now**.

4. Click on the entry for Quick*View.

5. When prompted, select **Save File**, and save the files to the **c:\windows\temp** directory.

6. Once you have finished downloading the file, exit the web site.

7. Using Explorer, go to the **c:\windows\temp** file.

8. Double click on the **Quickview.exe** file. Follow the screen prompts to install the Quick*View program.

9. To start Quick*View, from the Start Menu click on **Programs**, **Quick*View**, **Quick*View**.

*Note: If you wish, you can create a shortcut to the Quick*View executable on your desktop.*

*Temporary Quick*View Configuration*

For a quick download communication configuration, scan the appropriate Quick*View bar code, and the imager will be temporarily configured for Quick*View settings.

*Note: If you have a unit capable of keyboard wedge mode, scan the bar code below. The unit will communicate in RS-232 mode, allowing it to work with Quick*View through an appropriate serial cable. To convert the imager back to keyboard wedge communication, cycle the power.*

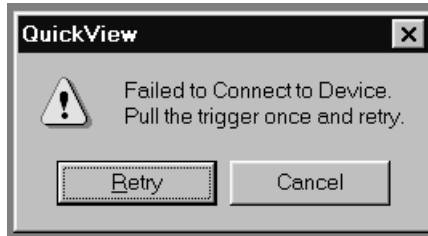### *IT4600/4800/4X80*

Quick*View

IT4410/4710

Quick*View

*Using the Quick*View Software*

Upon startup, the Quick*View splash screen appears for approximately three seconds. Quick*View will then attempt to establish communications with the Imager.

### *If Communication Cannot Be Established*

This message appears if communication cannot be established:

Quick*View defaults to com 1 as the communications port. If you have plugged the Imager into another com port, you must Cancel out of this message.

Click on **File - Preferences**. This popup appears:

Click on the radio button for the appropriate com port, then click on **OK**. Quick*View should now be able to locate the Imager.
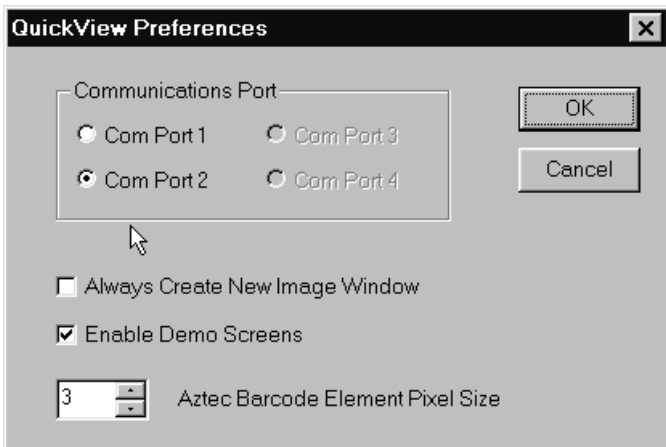
You may also need to pull the Imager's trigger to establish communications between the PC and the Imager.

If you want Quick*View to search for the Imager and establish communication, click on **Device - Auto Baud Detect**.
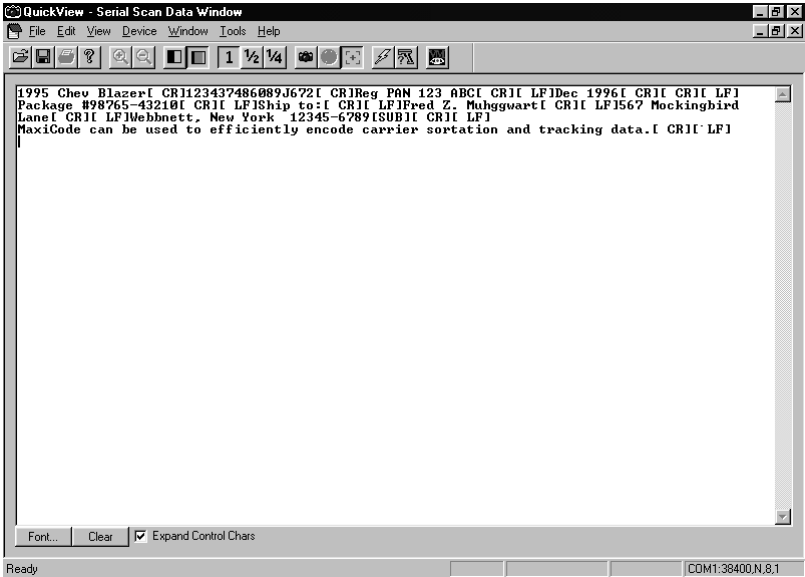
Scan Data Window

Once successful communication has been established, you can scan codes and display the bar code data in a window. Select **View - Scan Data Window**.

As you scan bar codes, the data appears in the Serial Scan Data Window.

You can alter the font in this window by using the **Font** button, or clear all data in the window with the **Clear** button.

If you wish to see the mnemonic for any embedded control characters, you should put a check in the checkbox for **Expand Control Chars** (the default setting). If you wish to see the ASCII control character rather than the mnemonic, turn off this checkbox.

Note: The ASCII control character that is displayed is dependent on the font you are using.

Customer Support

Obtaining Factory Service

HHP provides service for all its products through service centers throughout the world. To obtain warranty or non-warranty service, return the unit to HHP (postage paid) with a copy of the dated purchase record attached. Contact the appropriate location below to obtain a Return Material Authorization number (RMA #) before returning the product.

North America

HHP Corporate Offices
Telephone: (800) 782-4263, Option 3
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E-mail: ProductService@HHP.com

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Fax: +81-3-5842-6335
E-mail: kobayashit@HHP.com

Technical Assistance

If you need assistance installing or troubleshooting your imager, please call your Distributor or the nearest HHP technical support office:

North America/Canada:

Telephone: (315) 685-2476, Option 4 (8 a.m. to 6 p.m. EST)
or in the U.S.   (800) 782-4263
Fax number: (315) 685-4960
E-mail: *support@*HHP*.com*

Europe, Middle East, and Africa:

Telephone-
European Ofc: Int+31 (0) 40 29 01 600

U.K. Ofc: Int+44 1925 240055
E-mail: *euro_support@*HHP*.com*

Asia:
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