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Explanation of the changes between RJS D4000 Firmware version A.17, A.16, A.15, A.14, A.12, A.11/A.10, A.08/A.09, A.06/A.07, and A.03/A.05

The D4000 firmware A.17 changes from the previous A.16:

D4000 Auto Optic

- Implemented compliance with the new ISO/IEC 15416: 2016 grading thresholds (increasing the resolution of scan grades to 0.1)

D4000 Laser or SP

- Implemented compliance with the new ISO/IEC 15416: 2016 grading thresholds (increasing the resolution of scan grades to 0.1)

The D4000 firmware A.16 changes from the previous A.15:

D4000 Auto Optic

- No changes

D4000 Laser or SP

- Removed Minimum, Maximum, and Average bar width tolerance from printed reports

The D4000 firmware A.15 changes from the previous A.14:

D4000 Auto Optic

- Allow GS1-128 bar codes to have a subset change after the initial <FNC1>
- Retire the Application Identifier 22 (as per latest GS1 General Specification)

D4000 Laser or SP

- Allow GS1-128 bar codes to have a subset change after the initial <FNC1>
- Retire the Application Identifier 22 (as per latest GS1 General Specification)
- Add results screen to display Minimum, Maximum, and Average bar width tolerance as the exact percentage (previously only the ranges were provided)

The D4000 firmware A.14 changes from the previous A.12 (A.13 was unreleased):

D4000 Auto Optic

- Bar codes with an unacceptable Quiet Zone changed from a Warning to an Error
- Removed outdated Traditional inspection parameters from affecting the Final Grade

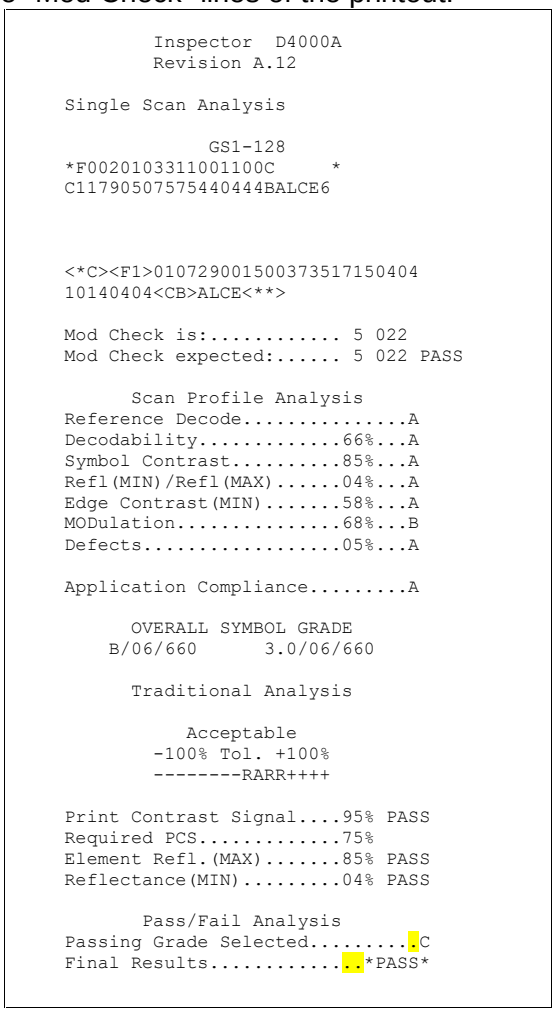
D4000 Laser or SP

- Bar codes with an unacceptable Quiet Zone changed from a Warning to an Error
- Removed outdated Traditional inspection parameters from affecting the Final Grade
- Add the following Application Identifiers: 424, 425, 426, 7003, 8017, 427, and 8019
- Add error if GS1-128 bar code starts with two <FNC1> characters
- Allow for unnecessary <FNC1> characters between all Application Identifiers

The D4000 firmware A.12 changes from the previous A.10/A.11:

D4000 Auto Optic

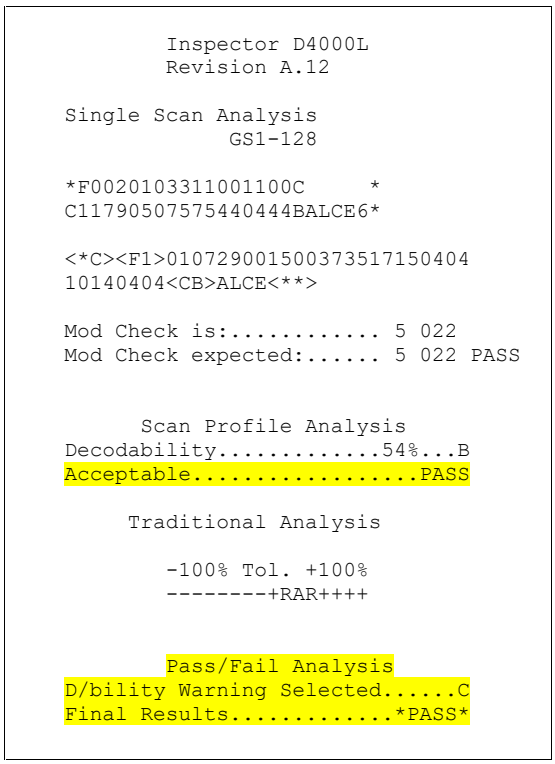
- Added support for Application Identifier (02) which is GTIN of Contained Trade Items
- On the **printed report** (TP140A or VCIR) for the Code 128 (and GS1-128) symbologies the embedded Check Digit was removed on the single row encoded data. This allows for users to match the human readable to the encoded data without indentifying the check digit. The check digit is still displayed as part of the 2 row format and in the "Mod Check" lines of the printout.



```
          Inspector  D4000A
          Revision A.12

Single Scan Analysis

              GS1-128
*F0020103311001100C     *
C11790507575440444BALCE6



<*C><F1>0107290015003735171504040
10140404<CB>ALCE<**>

Mod Check is:..... 5 022
Mod Check expected:..... 5 022 PASS

       Scan Profile Analysis
Reference Decode..............A
Decodability.............66%...A
Symbol Contrast..........85%...A
Refl(MIN)/Refl(MAX)......04%...A
Edge Contrast(MIN).......58%...A
MODulation...............68%...B
Defects..................05%...A

Application Compliance.........A

       OVERALL SYMBOL GRADE
     B/06/660      3.0/06/660

       Traditional Analysis

            Acceptable
          -100% Tol. +100%
          --------RARR++++

Print Contrast Signal....95% PASS
Required PCS.............75%
Element Refl.(MAX).......85% PASS
Reflectance(MIN).........04% PASS

        Pass/Fail Analysis
Passing Grade Selected.........C
Final Results.............*PASS*
```

D4000 Laser or SP

- On the **printed report** (TP140A or VCIR) for the Code 128 (and GS1-128) symbologies:
  - The embedded Check Digit was removed on the single row encoded data. This allows for users to match the human readable to the encoded data without indentifying the check digit. The check digit is still displayed as part of the 2 row format and in the "Mod Check" lines of the printout.
  - Standardized report to more closely match the D4000 Auto Optic report format

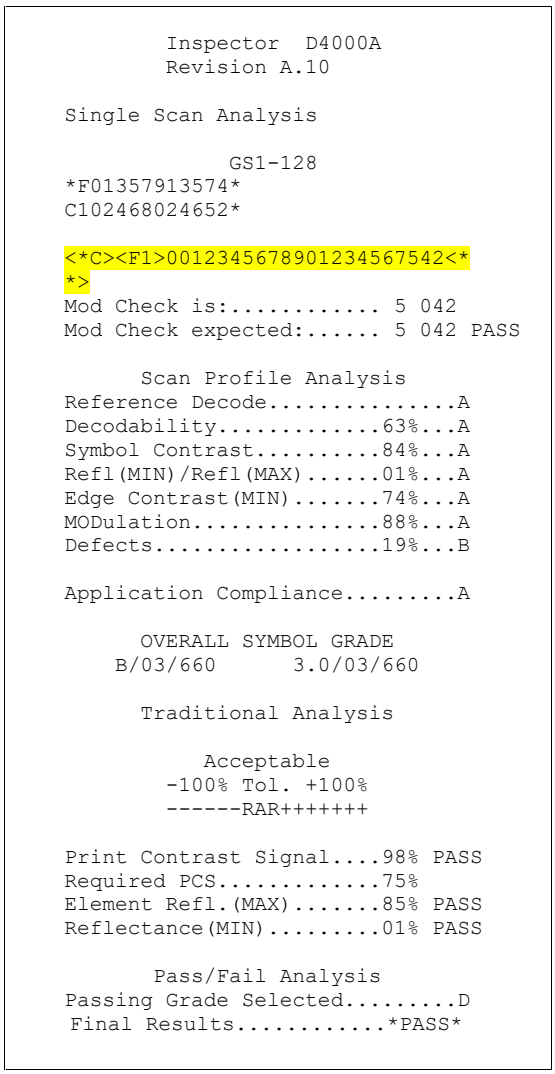


```
          Inspector D4000L
          Revision A.12

Single Scan Analysis
              GS1-128

*F0020103311001100C     *
C11790507575440444BALCE6*

<*C><F1>0107290015003735171504040
10140404<CB>ALCE<**>

Mod Check is:............. 5 022
Mod Check expected:...... 5 022 PASS


      Scan Profile Analysis
Decodability.............54%...B
Acceptable..................PASS

     Traditional Analysis

        -100% Tol. +100%
        --------+RAR++++


        Pass/Fail Analysis
D/bility Warning Selected......C
Final Results.............*PASS*
```

The D4000 firmware A.10 changes from the previous A.08/A.09:

D4000 Auto Optic - On the **printed report** (TP140A or VCIR) the Code 128 (and GS1-128) bar code encode data is now displayed in two formats:

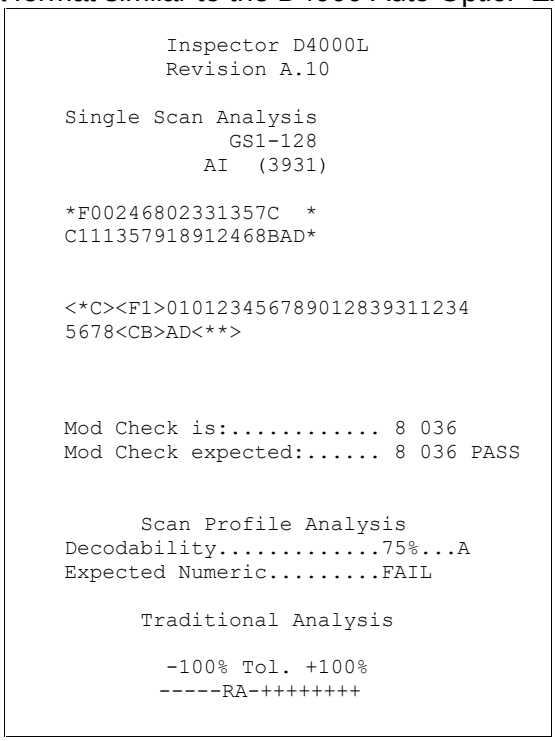
- Previous method - 2 row format (to allow displaying compressed digit mode in subset C)
- New method - Single row format showing text on a single line (wrapping if needed) Example:



```
          Inspector  D4000A
          Revision A.10

Single Scan Analysis

              GS1-128
*F01357913574*
C102468024652*

<*C><F1>00123456789012345675 42<*
*>
Mod Check is:..... 5 042
Mod Check expected:..... 5 042 PASS

      Scan Profile Analysis
Reference Decode.............A
Decodability.....63%...A
Symbol Contrast.....84%...A
Refl(MIN)/Refl(MAX).....01%...A
Edge Contrast(MIN).....74%...A
MODulation.....88%...A
Defects.....19%...B

Application Compliance.....A

      OVERALL SYMBOL GRADE
    B/03/660      3.0/03/660

      Traditional Analysis

          Acceptable
        -100% Tol. +100%
        ------RAR+++++++

Print Contrast Signal....98% PASS
Required PCS.....75%
Element Refl.(MAX).....85% PASS
Reflectance(MIN).....01% PASS

       Pass/Fail Analysis
Passing Grade Selected.....D
 Final Results.....*PASS*
```

D4000 Laser or SP

- New **printed report** (TP140A or VCIR) format. This was implemented to standardize on a format similar to the D4000 Auto Optic. Example:



```
          Inspector D4000L
          Revision A.10

Single Scan Analysis
              GS1-128
           AI  (3931)

*F00246802331357C  *
C111357918912468BAD*


<*C><F1>0101234567890128393112345678<CB>AD<**>



Mod Check is:..... 8 036
Mod Check expected:..... 8 036 PASS


      Scan Profile Analysis
Decodability.....75%...A
Expected Numeric.....FAIL

      Traditional Analysis

        -100% Tol. +100%
       -----RA-++++++++
```

- On the **printed report** (TP140A or VCIR) the Code 128 (and GS1-128) bar code encode data is now displayed in two formats:
  - Previous method - 2 row format (to allow displaying compressed digit mode in subset C)
  - New method - Single row format showing text on a single line (wrapping if needed)

The D4000 firmware A.08 changes from the previous A.06/A.07:

D4000 Auto Optic

- With the unit set to GS1-128 - if the FNC1 character is missing the results screen and print-out will display "Error Missing F1" instead of "Warn Missing F1" and an "Error" tone will be played
- With the unit set to Std 128 - if there is a FNC1 character encoded the results screen and print-out will display "Format Error" instead of "Format Warning" and an "Error" tone will be played

D4000 Laser or SP

- With the unit set to GS1-128 - if the FNC1 character is missing the results screen and print-out will display "GS1 Fmt Err F1" instead of "GS1 Fmt Warn F1" and an "Error" tone will be played
- With the unit set to Std 128 - if there is a FNC1 character encoded the results screen and print-out will display "Format Error" instead of "Format Warning" and an "Error" tone will be played

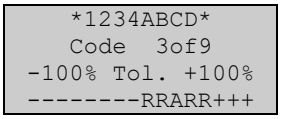
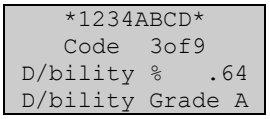
The D4000 firmware A.06/A.07 changes from the previous A.03/A.05:

- Updated Terminology - The firmware will update the terminology used in both the symbology and the sub-symbology names as listed on the Setup menu options and the printed reports
- Addition of the Decodability Percentage and Grade to the Pass/Fail Analysis Screen (Displayed after a scan is captured)
- Full GS1-128 Application Identifier Support - Current D4000 units have a limit of 32 characters, and are missing some newer Application Identifiers (AIs). The new A.06/A.07 allows for the full GS1 limit of 48 data characters to be inspected and will not impose a limit on the maximum number of AIs in the bar code.
- Improvements for Interleave 2 of 5 and Code 39 - ratio testing will be upgraded, to report ratio warnings in addition to ratio failures

Setup Menu Options (Applies to D4000 Auto Optic and Laser)

Setting	Version	
	A.03/A.05	**A.06/A.07**
Decode 3of9 as	USS 3of9	Code 3of9
Decode I2of5 as	Case Code	ITF14 Case Code
Decode I2of5 as	USS 2of5	Std I2of5
Decode C128 as	N/A	Std 128
Decode C128 as	N/A	GS1-128
Database Storage	0-20kb 0-20kb	N/A (all Storage)

Pass/Fail Analysis Screen (Applies to D4000 Laser ONLY)

	Version	
	A.03/A.05	**A.06/A.07**
Description of screen information:	*Displays Bar Tolerance Chart*	*Displays ISO/ANSI Decodability results*
Screen Examples:		

GS1-128 Testing (Applies to D4000 Laser with version A.06/A.07 ONLY)

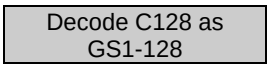
Testing Parameters

The D4000 Laser will inspect all GS1 Application Identifier (AI) content and length, this includes:

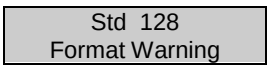
- FNC1 (Variable length AIs must start with a FNC1 character)
- Multiple AI support (unlimited number of AIs in a bar code)
- Date encodation (AIs with dates will be tested for proper formatting)
- GTIN prefixes (Some AIs require a prefix digit in the GTIN),
- Linked AIs (Some AIs require another AI to be encoded in the bar code)
- Numeric requirements (Some AIs are numeric only)
- Testing to ensure 48 data characters (excludes sub-set changes) are not exceeded

FNC1 Testing

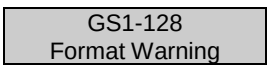
When a Code 128 symbol is decoded **AND** the first character after the Start character is **FNC1** then the symbol must follow the GS1-128 format and the verifier must have the following Code 128 sub-specifications setting:



When a Code 128 symbol is decoded with the Code 128 sub-specifications setting of **Std 128** but the first character after the Start character **is** a **FNC1** then the following error will be displayed:

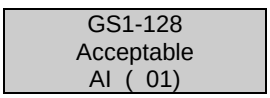


When a Code 128 symbol is decoded with the Code 128 sub-specifications setting of **GS1-128** and the first character after the Start character **is not** a **FNC1** then the following error will be displayed:

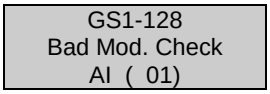


Data Content Testing

When Code 128 sub-specifications setting is GS1-128 and a GS1-128 bar code is inspected an additional screen will be inserted into the Data Analysis screens:



Example of a bad check digit in the GTIN:



Data Content Testing (continued)

Example of a too many characters in the bar code:

GS1-128
Exceeds 48 Chars
AI (10)

Example of an alpha-character in a numeric only AI:

GS1-128
Expected Numeric
AI (3931)

Note:
If a bar code has multiple errors **only** the first error will be displayed

Example of a bar code with more than 48 data characters:

GS1-128
Exceeds 48 Chars
AI (250)

Note:
If a bar code data length is exceeded, the AI that exceeded the 48 character limit will be displayed

Example of an invalid date encoded in an AI:

GS1-128
Out-Of-Range
AI (17)

Note:
For Month and Year only encodes the Day may be encoded as “00”