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Real-Time Operations Tracking and Management Software
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BellHawk TAG Rules-Based Container Barcode Labeling Option

Introduction

This guide is intended to assist the user in using the BellHawk TAG option, which is used to generate barcode labels for application to containers of material. This document assumes the user is already familiar with the operation of the BellHawk software. It also assumes that the user is familiar with the use of the BarTender software from Seagull Scientific, which is used by BellHawk for barcode label layout and printing.

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Overview

The BellHawk TAG barcode labeling option is used with the BarTender Automation software to print labels with "license-plate" tracking barcodes, human readable information, and other barcodes on barcode label printers for application to containers of material or serialized items. It can also be used to print labels for application to shipping containers.

Labels can be printed on a wide variety of barcode printers using the BarTender Automation software. This includes thermal and thermal transfer printers, color inkjet barcode label printers, as well as regular Windows printers.

Please note that TAG and BarTender are not needed to print out forms with barcodes on them from BellHawk, such barcoded receiving-order, pick order, or work-order sheets, as these are printed on office printers by the BellHawk report printing software, which does not require the use of BarTender, as the report printing software includes its own barcode label formatting capability.

Also, please note that TAG is not required for "license-plate" tracking of containers as this can be performed with pre-printed rolls of "license-plate" tracking barcoded. However, when container labels are required that have both a license-plate tracking barcode and human readable information, as well as possibly other barcodes, then TAG provides a convenient way of generating these labels.

The big reason for using TAG is to prevent label printing mistakes. Once the labeling rules are setup, TAG can automatically select the correct label format, populate the label with the correct data, and automatically print the label on the correct printer that is loaded with the correct media. This is in contrast to having someone manually select the label format, "fat-finger" in the data, and then manually select the printer onto which the label which can be a very error prone process.

In the following, we refer to printing labels for attachment to containers. Unless otherwise stated, in the following we use the word container for both type 1 (contents with a single part number) and type 2 (contents with multiple different part numbers) containers as well as barcodes for attachment directly to serialized items.

All the examples shown here were prepared using BarTender 16 running on a Windows 2016 Server except for those in Appendix A which are for BarTender 10.

Printing Labels on Demand
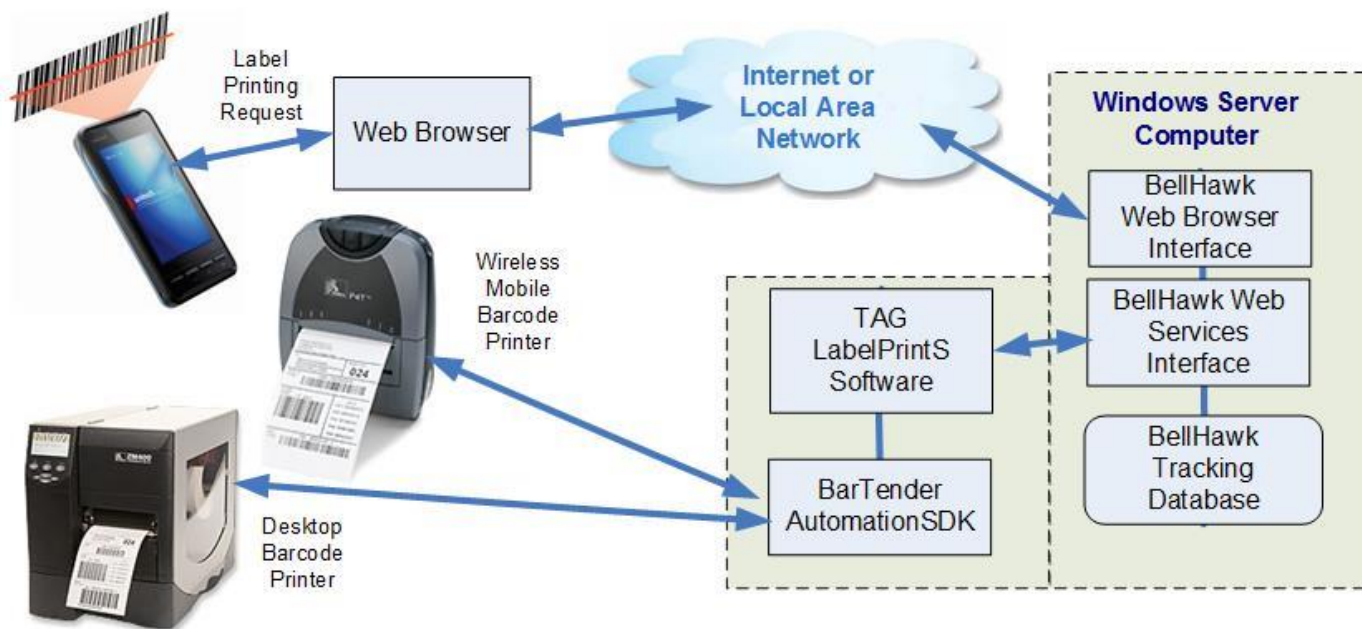
With TAG, a label printing request can be initiated, on demand, from a mobile computer, tablet, PDA, or laptop computer, and printed on a nearby benchtop printer or a wearable barcode printer.

When such a device is used to enter data about a new container of materials into BellHawk then TAG can be used to print a label on demand for the container using the following process:

1. Data is entered about the container and its contents, using a standard BellHawk data entry transaction.

2. The barcode label name to be used is selected by selecting a [#] button which appears on each transaction screen when TAG is licensed (if that transaction is designated by the systems administrator as being available for on-demand printing).

3. When the "Submit" button is selected:

   a. The data about the container is saved in the BellHawk Containers table (for details, please see document on "How BellHawk Stores its Inventory Data").

   b. The BarTender label format and data to be printed on the label is placed in the BellHawk label printing queue (see section below on the Label Print Queue).

   c. If BarTender is running on the Windows Server computer, then the TAG LabelPrintS program is automatically run as a background process to get the data from the print queue and print it on the designated barcode label printer by calling the BarTender Automation SDK software.

   d. If BarTender is running on a Windows Workstation in a remote plant then the LabelPrintR program, which is running in the Windows Workstation, remotely

monitors the data in the print queue and, when there is a new entry, gets the data from the print queue and prints the label on the designated printer in the remote plant.
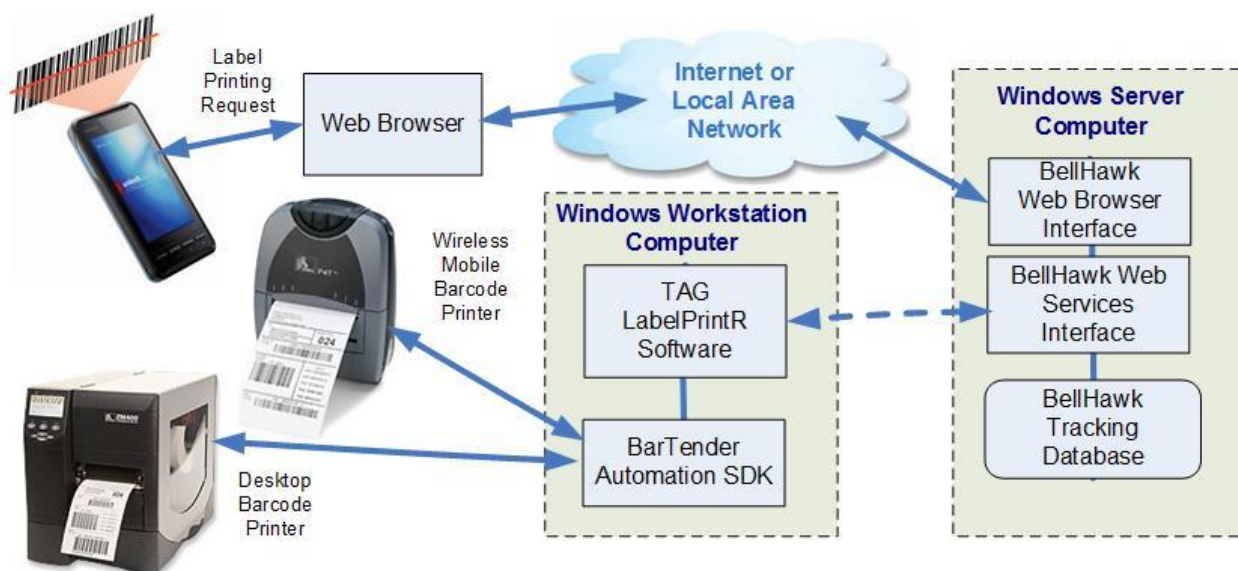
The reason for running the LabelPrintR and BarTender software on a Windows Workstation, if the barcode printers are not on the same local area network as the Windows Server, computer is label printing speed. There is only a small amount of data transferred from BellHawk to LabelPrint (which can be quickly fetched over the Internet or an organization's own wide area network).

But, once the label is populated by calling the BarTender Automation SDK, then a large amount of data needs to be transferred to the printer. For efficiency the printer should be directly network accessible to BarTender over a local area Ethernet or WiFi network or plugged into a Windows PC that is connected to these networks.

Pre-Printing Labels

Sometimes it is not desirable to use barcode printers to print labels on-demand in situations such as:

- Production environments involving hazardous chemicals or other environmental conditions not conducive to having a barcode printers on the floor.

- People on the shop floor not having the skills or training to reload the printer media when needed or to fix printer jams if they occur.

- Container labeling needed in a remote warehouse where a barcode label is not available.

- Production speed could be impeded by waiting for a label to print out

- Labels need to be applied using an automatic applicator.

In such cases, staff personnel can pre-print the labels in the office and then take them to the floor to be applied to containers or serialized items.

With TAG label pre-printing, data about a container to be labeled can be entered on label pre-print screens on a PC in a similar manner to entering the data about the container in a print-on-demand transaction. A set of labels is then printed in the office with each label having a unique "license-plate" tracking barcode and human readable information about the containers to be "entered" into inventory.

With pre-printed labels, records are created in the BellHawk Containers table for each label printed but these containers are marked as "Pending" and so are not visible as part of the BellHawk "inventory".

After a pre-printed label has been attached to each container, the license-plate tracking barcode can be scanned and the data entry transactions screen will be populated with the data about the "pending" container, previously pre-entered in the office. This data can then be edited if needed.

When the "Submit" button is selected on the transactional data entry screen, the data in the container record is updated and the container is marked as no-longer being "pending" and, as a result, is now visible in BellHawk's inventory of containers.

How TAG Works
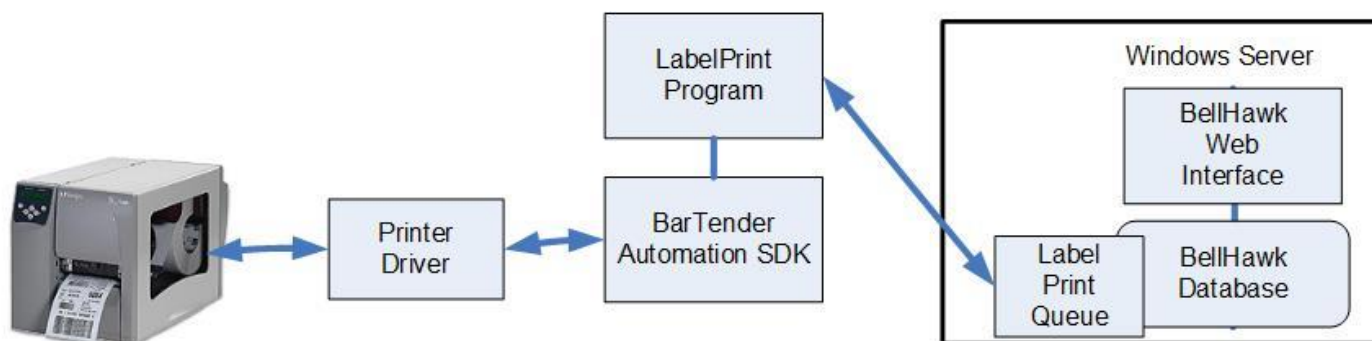
When a label printing request is made, TAG uses rules previously defined by the BellHawk Systems administrator to decide which label format and printer to use. TAG then gathers up the data needed to populate the label and puts this data along with the label format and other data into the TAG label print queue (please see subsequent section of this document on the Label Print Queue for details).

The printing is performed by the LabelPrint program which gets its label printing instructions from the print queue in the BellHawk database and then calls the BarTender Automation SDK software to print out the label.

The print request is retrieved by the LabelPrint program, which then calls the BarTender SDK to insert data into the label format specified in the print queue entry and then cause the labels to be printed using a printer driver. When BarTender is called to print the label, it runs a program called BarTend.exe on the Workstation or Server computer. BarTend.exe then checks with the designated BarTender License server that the designated printer is part of the pool of currently licensed printers before handing off the printing of the label(s) to a BarTender provided printer driver or a Windows driver for the specific printer in question.

If a network addressable printers are used, then the printer drivers need to be installed on the same computer as the BarTender SDK. If a printers is plugged into a PC then the printer driver needs to be installed on the PC.

Printer drivers for a wide range of thermal and thermal transfer barcode label printers are available for download from the Seagull Scientific website. Color barcode label printers use Windows drivers, which are supplied by the printer manufacturers.

Setting up Label Formats

Overview

The process of setting up a label to be printed by BellHawk is as follows:

1. Use the BarTender Designer to create a label format.

2. Give the label a name and setup an Excel spreadsheet that specifies when and where the label will be printed

3. Setup Excel spreadsheets that relate the named fields setup in the BarTender label format to the BellHawk database fields used to fill the named fields with data.

This document assumes that the user knows how to install and use BarTender Automation edition, which is used to perform the label layout and to do the actual barcode printing on a wide variety of barcode label printers, color inkjet printers, and standard windows printers.

Creating a New Label Format using BarTender Designer

This is done by starting the BarTender Designer and selecting File =>New

Give the label a meaningful name such as "CanLabel.btw" and save it in to the directory folder, designated by the TAG installer, to hold the BarTender label formats, on the computer running the BarTender SDK. Alternately develop the label on your local PC and then copy it to the designated directory folder before use.

Select the default printer that you plan to use. Initially this can be a Windows Office Printer for label format testing. Then subsequently you can change the label format to the barcode label printer that you plan to use to hold the media on which to print the label.

Then select or setup the size of label that you intend to use.

Adding a Tracking Barcode to a Container Label

Once you have selected the label size and default printer in the BarTender Designer, the next step is to add a tracking barcode for the container to which the label is to be applied.
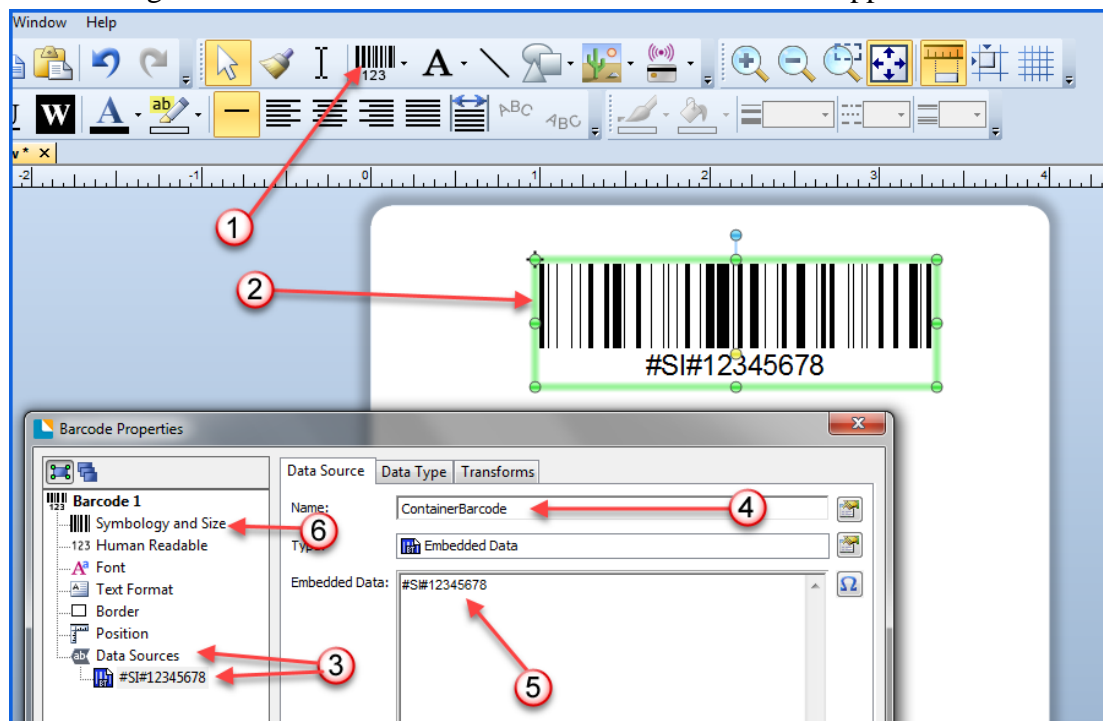
To do this you proceed as follows:

1. Click on the barcode label symbol (1) and select Code 128 as the symbology. Code 128 is what BellHawk uses for tracking containers of materials. The Code 128 barcode is a high-density linear symbology that encodes text, numbers, and the entire 128 ASCII character set. It is also used (in a special GS1-128 or UCC/EAN-128 form) for Serialized Shipping Container Codes (see following section on SSCC barcodes).

2. Place the barcode on your label by clicking on where you want the center of the barcode to be. You can then drag and drop the barcode using your mouse cursor to center it on your label. Remember to leave a white space "quiet zone" on either side of the barcode, which is essential to being able to scan the barcode. Generally this should be about a quarter of an inch or 10x the thickness of the smallest bar in the barcode, whichever is smaller but will depend on the barcode scanner being used.

3. Right click on the barcode and open up the properties screen. Select "Data Source" (3) and click on the default value in the data source (3). This will bring up the Data Source screen as shown above.

4. Enter a name (4) for the data field, such as "ContainerBarcode" this is the first step in giving TAG the information it needs to tie the container barcode field on the label to the tracking barcode, which can be automatically assigned by BellHawk to each container.

5. Enter a sample data for the label, to aid in laying out the barcode label. This should contain the same number of letters and numbers as the barcode format for such labels that has been specified on the Print tab of the BellHawk system administrators screen (see System Admin section following).

6. If the barcode plus white space will not fit into the available space on the label, then you may have to adjust the barcode resolution by clicking on "Symbology and Size (6).
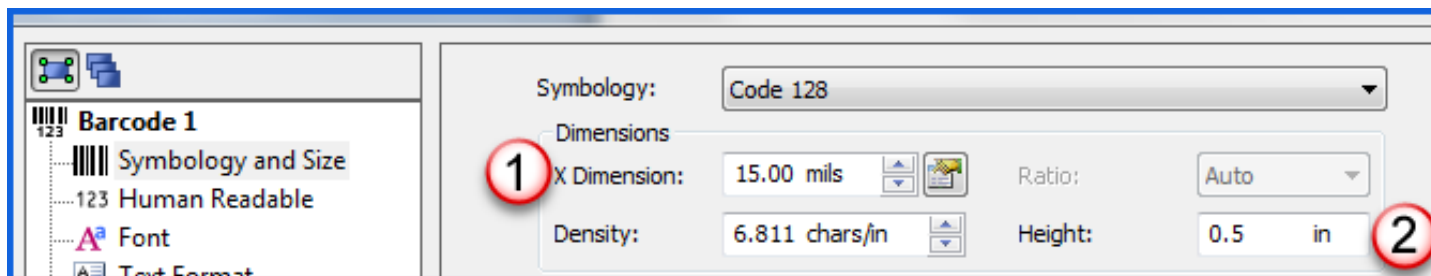
Here you can adjust the X dimension of the label (1), which is the width of the narrowest bar in the barcode. This is also called the resolution of the barcode and is expressed in mils (thousandths of an inch).This impacts the distance at which a barcode can be scanned and whether a barcode scanner has adequate optical resolution to scan the barcode.

BarTender sets this at 15 mils. Most barcode scanners can read this at a distance of a few inches to one or two feet. If you reduce this to 5 mils then only high resolution barcode scanners will be able to read the label. Most standard resolution scanners can read 10 mil barcodes at short range.

For longer scan ranges then you need to increase the X dimension to:

- 20 mils for reading at a range of a few feet

- 40 mils to be able to read at arrange of 8-10 feet from the seat of a fork lift truck with a long-range barcode scanner, such as that embedded in an MC92N0G mobile computer with an adaptive ling range scanner.

- 100 mils, with a retro-reflective background for the label, to scan at a range of 40 feet from the barcode scanner.

You can also adjust the resolution by expanding and contracting the width of the barcode on the screen. This is generally not recommended as then you will not be able to easily correlate scan distance with the published resolution and scan data for the barcode scanning engine that you plan to use.

7. On this screen you can also set the height (2) of the code 128 barcode, which could also be changed interactively on the WYSIWYG layout screen. The default of half-an-inch set by BarTender is a good choice for most cases. If you make the barcode too short then it will make it harder to aim the laser barcode scanners accurately.

8. On this same Symbology screen you should leave the Text Encoding to 7 Bit ASCII as this is what BellHawk uses for the text with which BellHawk encodes the container

tracking barcode numbers that it generates. You should also leave the barcode color to black as this maximizes readability by barcode scanners.

9. On the Human Readable Barcode Properties screen
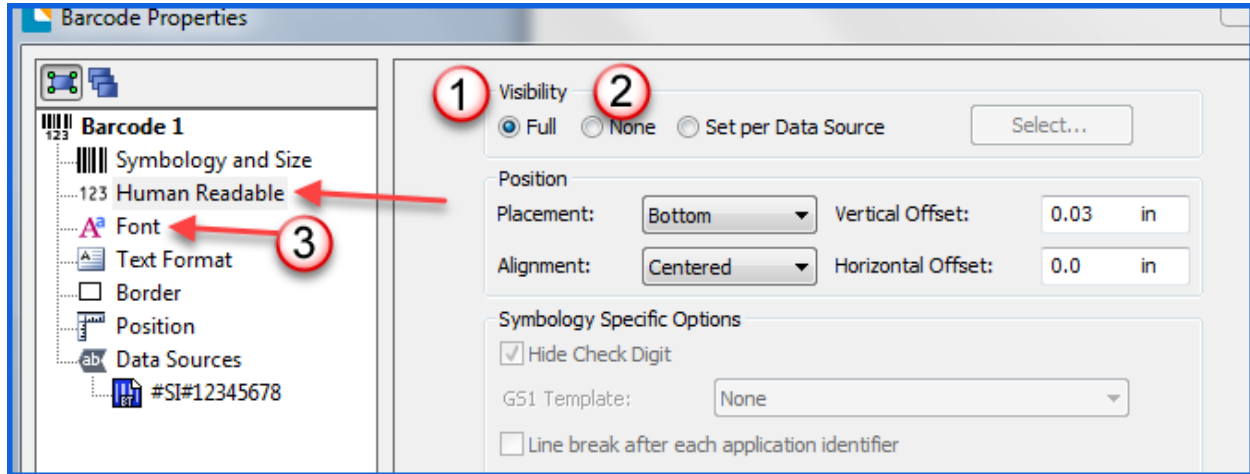
You can set whether the text that appears under the barcode is visible by selecting "Full" (1) or "None" (2). You can also specify the font to be used and its size using the Font screen (3).

It is generally a good idea to print the tracking barcode in human readable form under the barcode itself so that the code by which the container is identified can be manually entered if the label gets damaged and the barcode itself is not scanable.

10. For standard BellHawk generated container tracking barcodes then leave all the other settings alone.

Adding a Human Readable Data Field to the Label
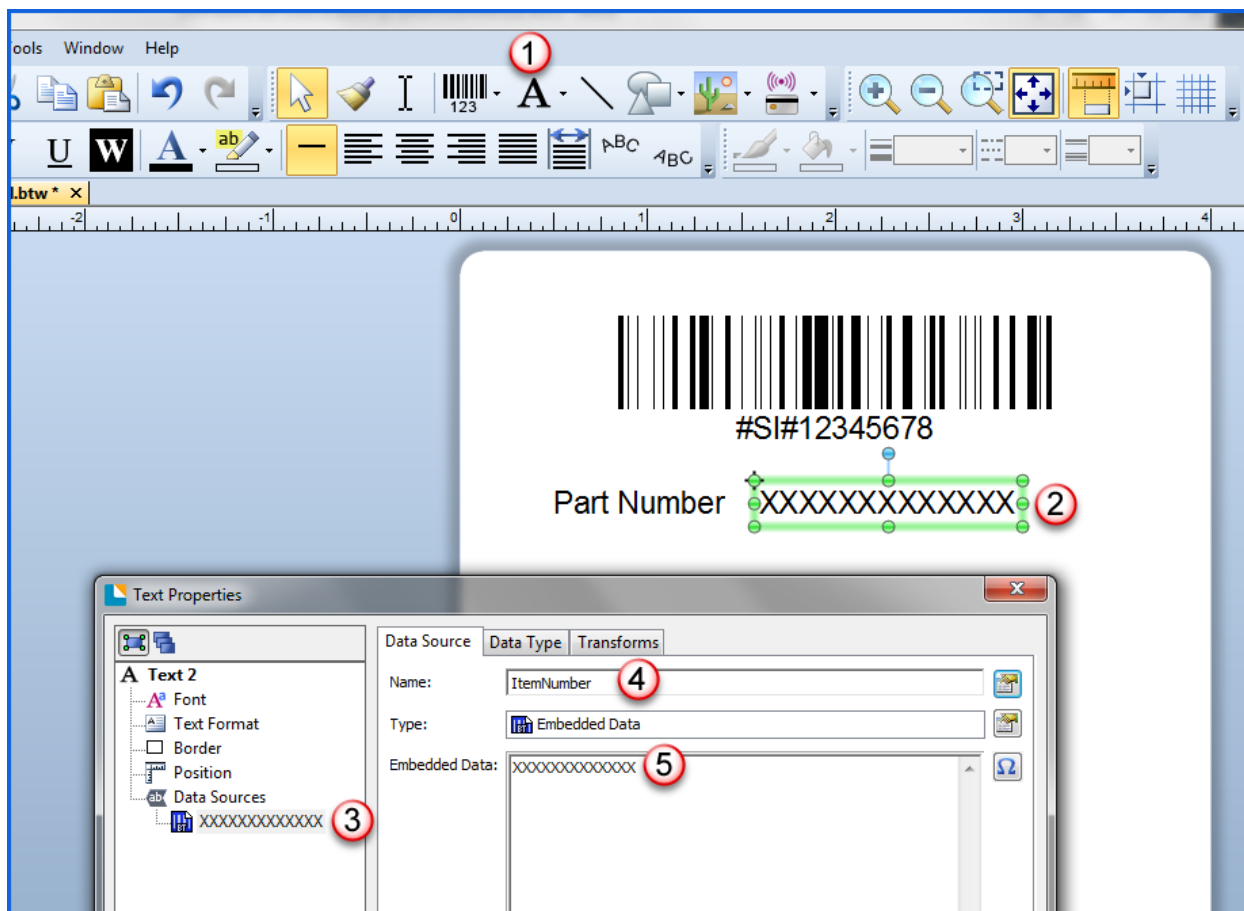
This proceeds as follows:

1. Start with selecting the Text "A" symbol (1) and selecting a Single Line format.

2. Then position the text on the label (2). Do not directly adjust its size but instead use the Font box to make the text an appropriate size. Scaling the text size by stretching the text box may result in unprintable text.

3. Then right click on the text box (2) and select Properties to open the Text Properties screen

4. Select the Data Sources data (3)

5. Enter a Name for the data field, such as "ItemNumber" which will be used to associate this field with data from the BellHawk database.

6. Enter a text field (5) as embedded data with sample data of appropriate length so you can see how your layout will look when populated with real data.

7. Labels can be inserted in a similar manner except that the Data Source Name is left Null and these labels can be directly be edited by right clicking on the label.

Setting the Printer to Use
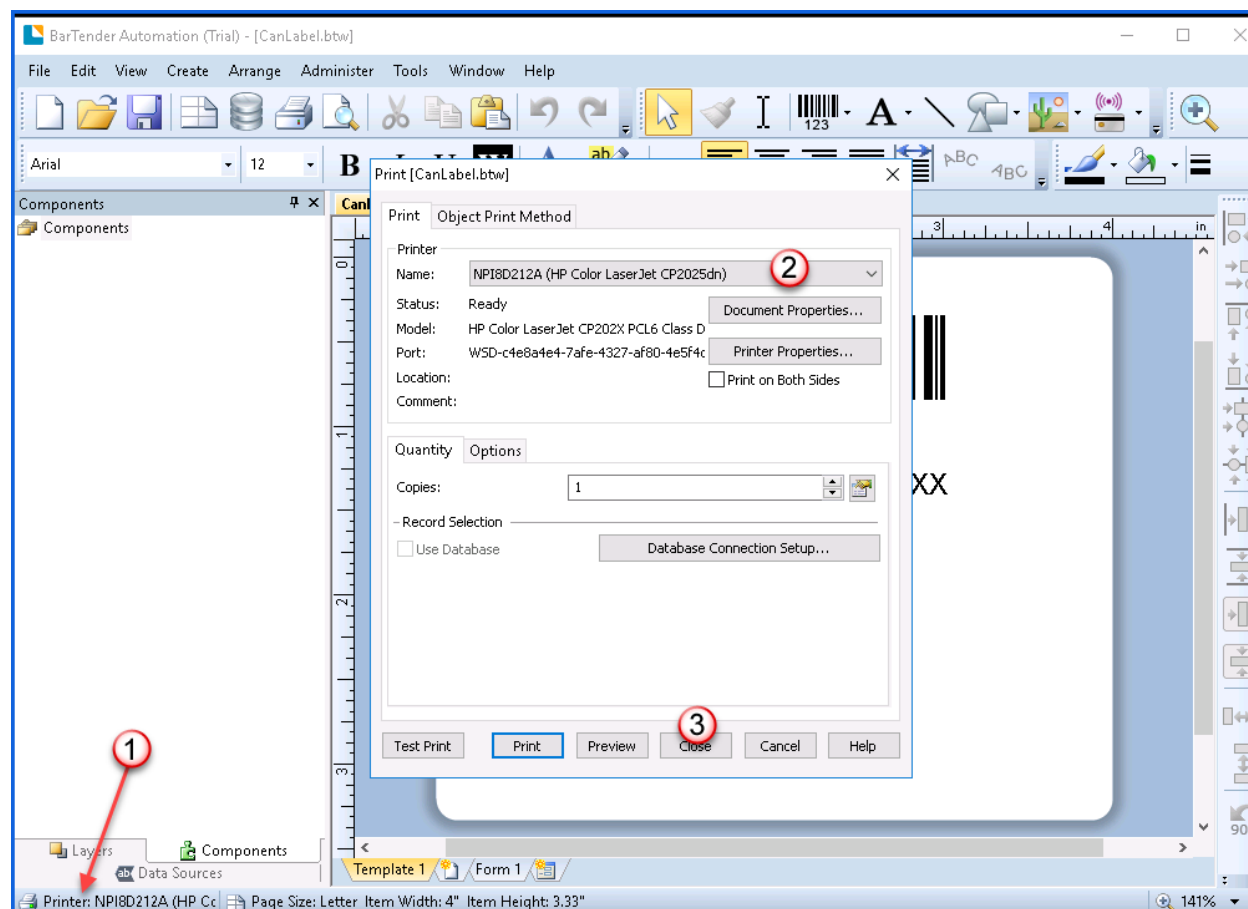
It is important to select the printer to use for the label as otherwise this will default to whatever printer used is the default for the local user "BellHawk" which are used for running the LabelPrint program, which is typically not set.

To set the printer to use, double click on the Printer bar (1) and then select the printer to use from the drop-down list of printers (2) and then Close the screen (3).

Finally do a File Save to save away the settings and the format of the label you have created.

This printer can be a barcode label printer, whose printer driver has been downloaded from Seagull Scientific's website, or a Windows based printer whose driver has been downloaded from its manufacturer. This enable BellHawk to print labels using thermal transfer, thermal, laser, and color inkjet printers.

Make sure that the label is saved in the designated directory folder on the same computer as BarTender, such as `C:\Users\Public\Documents\BarTender\Formats\`, which was setup when LabelPrint was installed on the computer. This path can be found in the LabelPrint initiation file, such as LabelPrintS.ini.

The Finished BarTender Label Format
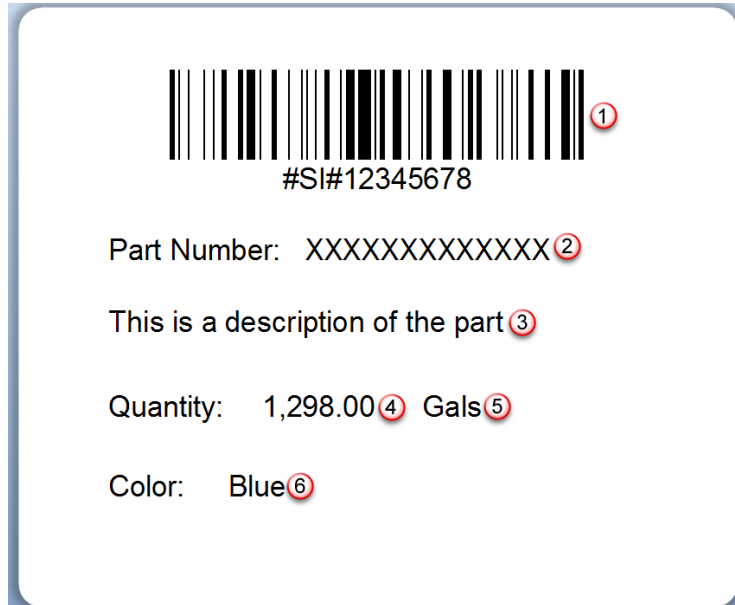
On this form we have six named data fields that will be linked to BellHawk:

1. ContainerBarcode (1) - ASCII text

2. ItemNumber (2) -ASCII text

3. ItemDescription (3)

4. Quantity in Container (4) - properties set to be a numeric filed with 2 decimal places

5. Unit of Measure Nomenclature (5)

6. Color (6) - ASCII text

Note that the names given to the data fields must be unique within the label being used.

You can now print a sample test label to your printer.

High Level Data Objects

BellHawk uses High Level Data Objects (HLDOs) as part of its mechanism to communicate with external systems such as BarTender. HLDOs consist of a keyword, such as "Container" and a set of parameter name:value pairs, with parameter names such as ItemNumber and PrimaryQty.

Each HLDO typically corresponds to a table in BellHawk and enable the specification of data tables and their fields without the user needing to understand the details of the BellHawk database.

HLDOs are used to import data objects into BellHawk using Excel spreadsheets, as described in the BellHawk Setup User Manual. They are used to setup the rules relating the field names on the BarTender label to database entries in BellHawk.

Commonly used HLDO keywords and their parameters are given in Appendix A. For more background information about HLDOs, please see the "BellHawk V7 High Level Data Object User Manual" and "Exchanging HLDO Data with BellHawk" (in the BellHawk Interface User Manual manuals section of www.BellHawk.com) which gives a comprehensive list of HLDOs and their parameters.

Entering the Label Setup Data in BellHawk

Overview

In BellHawk, each label is given a unique name consisting of a user defined string of alphanumeric characters. Entering the setup data for each label in BellHawk requires:

1. Importing data, in the form of an Excel spreadsheet that relates the BellHawk label name (such as "Can Label") to the BarTender label format (such as CanLabel.btw) and the rules that select this label for its intended application

2. Importing data, in the form of an Excel spreadsheet that relates the named data fields on the BarTender label format to data about the container, which is stored in the containers table in the BellHawk database.

Setting up the Label Rules

This is done by the BellHawk systems administrator using DEXEL to import Excel spreadsheets that contain LABEL HLDO instances. Label HLDOs consist of two parts. The first relates to what is printed and is contained in columns A through I

	A	B	C	D	E	F	G	H	I
1	LABEL	LabelName	LabelFileName	Description	LabelType	Printer	Copies	MaxConts	Default
2		Can Label	CanLabel.btw	Can of Coating Materi	STD		1	10	1
3									
4									

The other part is contained columns J through W in the Excel spreadsheet provide the information needed for automatically selecting a label.

J	K	L	M	N	O	P
PrintOnDemand	ItemNumber	MaterialType	ItemCategory	ContainerType	QCStatus	CustomerNumber
Y		Coatings				

P	Q	R	S	T	U	V	W
CustomerNumber	OperationCode	IsWIP	Transaction	Device	Location	Facility	UDP

As with all HLDO imports the header row contains the parameter names for the HLDO and column A contains the keyword, in this case "LABEL". It is important that this header row be exactly as shown. To achieve this, it is recommended that the LABEL HLDO be exported using DEXEL and then edited to add the needed data.

The meanings of the data in the label definition columns below the header row are:

A. Always leave blank unless reimporting the Excel spreadsheet with a D in column A to mark the entry as deleted in the BellHawk database.

B. LabelName - user given label name. Must be unique amongst all labels. This name is used to indicate which label was selected or to present the user with a drop-down list of alternate labels, if more than one label met the criteria specified in the rules.

C. LabelFileName - this is the name of the BarTender format file that was created for this label.

D. Description - for use by the systems administrator

E. LabelType - this specifies which

   a. STD – general use – uses generated "license-plate" container tracking barcodes from the containers table record

   b. SSCC – uses license-plate tracking barcode with an SSCC barcode (see section on SSCC barcodes).

   c. DSCSA - uses 2D DSCSA label as tracking barcode

   d. NT- Non-Tracking - Item label based on Item Master selected in Item Pre-Print transaction rather than container record - does not have a tracking barcode.

F. Printer - not currently used, as printer to be used in label is specified as the default printer when the label is created. This Printer name is, however, carried to the Label Print Queue so that it is accessible for an alternate label printing mechanism.

G. Copies - number of identical copies of each label to be created

H. MaxConts - this sets the maximum number of sequentially numbered labels to be printed to be adhered to multiple containers. This enables labels to be generated on demand for multiple identical containers from a single data entry transaction. These labels are identical except each has a unique tracking barcode. The allowable values of MaxConts are:

   a. If MaxConts is 0 then ask for the number of containers and allow any number.

   b. If MaxConts is blank or 1 then assume that the number of containers is 1 and do not ask for a number of container labels

   c. If MaxConts is >1 then limit the number of containers that a sequence of labels is being printed for to the number in MaxConts.

   d. If MaxConts is <0 then limit the number of containers that a sequence of labels is being printed for to the number in the absolute value of MaxConts and only place a single entry in the print queue with the LabelCount set to the number of labels to be printed.

I.   Default - if MaxConts is >1 then this is the default number that appears to request the number of sequential labels to be generated.

Please note that the total number of labels that will be printed from a single print request is the number of identical copies times the number of containers for which sequential barcode tracking labels are specified to be generated.

Each sequentially numbered barcode label may be a STD format label (internally generated tracking barcode label format such as #C#000100027) or an SSCC (serialized shipping container code) barcode for the license-plate tracking barcode.

Sequentially numbered labels may also be of type DSCSA to produce labels that are compliant with FDA Drug Supply Chain Safety act for having a 2D barcode on each dispensing unit with the GTIN/NDC code, the lot number, serial number and expiration date in GS1 specified format.

Note that, in this case, the Item Master record must be specified as being serialized so that BellHawk is able to keep track of the last serial number issued for that part number.

If MaxConts is 0 or greater, then a separate entry is made in the label print queue for each uniquely numbered label. Identical copies of the label are, however, generated, whenever possible, by instructing BarTender to have the printer generate duplicate copies of each label whenever possible.

If MaxConts is < 0 then a single entry is placed in the print queue with LabelCount being the number of sequential labels requested. In this case it is the responsibility of the client to create label formats that will result in a sequence of correctly formatted labels from the single print queue entry. This normally results in much faster label printing but requires more complex label formats. This can also result in wasted and orphaned labels, as a flaw in any one label usually requires printing out a new batch of labels.

With DSCSA barcodes, TAG computes the contents of the tracking barcode for each serialized container based on the GS1 standard with the following fields

1.   GTIN -14 characters - from Item Master - including GS1 application identifier (AI)

2.   Lot Number - variable length field - Max 20 Characters including AI

3.   Serial Number - variable length field - Max 20 characters including AI

4.   Expiration Date - 6 characters including AI

TAG will include a separator character for the variable length field if set up the Sys Admin Print Tab as a Hex code.

It is the responsibility of the client to create label formats that comply with the GS1 standards for DSCSA compliant 2D barcodes and to setup their barcode scanners to decode the 2D barcodes to match the tracking barcodes placed by TAG for each DSCSA tracked container in the containers table.

The remaining column parameters for the LABEL HLDO are used for rules to select which labels are to be used under which circumstances. Only those columns with data count towards a match but all columns with data must match in order for a label to be selected.

When the [#] button is selected on a print-on-demand transaction then the rules are invoked to try to find a match. They are also invoked once all the data has been entered for pre-printed labels.

If only one label matches then its name is displayed as the selected default label. If multiple Label HLDO instances match then a user is presented with a list of possible matches in the order with the label having the most matching columns at the top of the list. If none of the Label HLDO entries match then the user is notified and not allowed to proceed with selecting the "Submit" button on the transaction or preprinted label entry screen.

The available columns for Rules Based label matching are:

J. PrintOnDemand - if "Y" this specifies that this label can be used for printing on demand. If N it can only be used for pre-printing. If left blank then this label can be used for both print-on demand and pre-printed labels.

K. ItemNumber - matches ItemNumber for Item HLDO in Container. Only applies to Type 1 containers and individually barcoded items.

L. MaterialType - only used if ItemNumber is not specified - matches MaterialType for Item HLDO for part in container. Only applies to Type 1 containers and individually barcoded items.

M. ItemCategory - only used if ItemNumber not specified - matches Category for Item HLDO for part in container. Only applies to Type 1 containers and individually barcoded items.

N. ContainerType - matches ContainerType for Container HLDO. This enables different labels to be specified for Cans versus Barrels for example.

O. QCStatus - matches QCCode in QCState HLDO for container. Only applies to Type 1 containers and individually barcoded items.

P. CustomerNumber - Matches CustomerNumber in Customer HLDO for the Customer for whom the container is designated.

Q. OperationCode - Matches OperationCode in Operation HLDO for "Material Out" transaction producing container

R. IsWIP - Matches IsWIP flag for material in container being produced by "Material Out" transaction.

S. Transaction - to which label entry applies - from the following:

    a. STD - use on any transaction

    b. SR - simple receive

      c.   SS - simple ship

      d.   PO - PO Received

      e.   WOMO - work order material out

      f.   TAG - for Tag container transaction

      g.   PACK - for Pack container transaction

T.   Device - matches DeviceCode for device being used for the transaction

U.   Location - matches to the destination location code used in the transaction. Inferred directly or indirectly from destination barcode

V.   Facility - only used if Location is blank - matches to the destination facility inferred from the destination location.

W.   UDP this is to be used to specify a match on one or more UDP parameters for the container. It will be a JSON string with Parameter:Value pairs to be matched, such as {"color";"blue", "size:large"}.

Note that the same BarTender .btw file can be used for multiple BellHawk label name entries. This enables the same label to be selected under different conditions, without creating a new BarTender label format.

Also rules based selection enables different labels can be printed depending on some parameter, such as the QC status. This would enable, for example selection of a label format with a green border, if the container had passed inspection and a red border if it had failed to pass inspection.

Specifying the Label Fields

The data imported for the LABELFIELD HLDO into BellHawk using DEXEL associates the field names specified on the BarTender label format with parameter names of BellHawk data HLDOs:

	A	B	C	D	E	F	G
1	LABELFIELD	LabelFileName	FieldName	Keyword	ParameterName	UdpParameterName	
2		CanLabel.btw	ContainerBarcode	Container	ContainerBarcode		
3		CanLabel.btw	ItemNumber	Container	ItemNumber		
4		CanLabel.btw	ItemDescription	Item	ItemDescription		
5		CanLabel.btw	Quantity	Container	PrimaryQty		
6		CanLabel.btw	UOM	Item	UOM		
7		CanLabel.btw	Color	Container	UDP	Color	
8							
9							
10							

As with all HLDO Excel imports, it is important that the header row be exactly as shown, as the "active" column headers are the parameter names for the LABELFIELD HLDO. As with the LABELFIELD HLDO, it is recommend that the user start by using DEXEL to export an empty spreadsheet and then edit this spreadsheet, before re-importing it.

In this HLDO, the columns contain the following HLDO instance data below the header row:

A. Left blank unless a D is entered to mark the entry as deleted when the Excel spreadsheet is reimported.

B. The BarTender label format file name

C. The fieldnames given to fields on the label into which to import data

D. The keyword of the BellHawk HLDO from which to extract data to put into the named field on the label. Note that HLDO Keywords in BellHawk are not case sensitive.

E. The parameter name from the BellHawk HLDO from which to extract data to put into the corresponding named field on the label. Note that ParameterNames are case sensitive.

F. If UDP (user defined parameter and item configuration data is to appear on the label, then the Parameter Name needs to be UDP and the UDP Parameter Name needs to be a UDP parameter value to be extracted from the JSON string in the UDP field for the container record.

BellHawk has specific rules as to which of the HLDOs in the BellHawk database are available. TAG makes the following HLDO objects available, according to the following rules:

1. Company and Company Address Data from the DBA and DBAAddress HLDOs. Normally the DBA (Doing Business As) relates to MYCOMPANY unless the company is using multiple DBA addresses, when the data for the currently associated DBA with the container is extracted for use on the label.

2. For labels of type STD and SSCC, the Container HLDO data for the container for which the label being printed is always available.

3. The HLDO data for the Item Master, for the parts inside a type 1 container and for individually barcoded items, is available for STD and SSCC type labels.

4. The Container Type (CTYPE) HLDO data for the container is available for STD and SSCC labels.

5. If the container is designated as being for a specific customer then the Customer HLDO data is available. The customer address HLDO CustomerAddr contains the primary Bill-To Address for the customer and the HLDO CustShipAddr contains the primary Ship-To Address for the customer.

6. If a container has been designated as containing material picked and packed for a specific Ship Order and Ship Order Line then the data in the SO and SO Line HLDOs is available for use on the label. The data in the SO HLDO includes the actual ship-to and bill-to address being used.

7. If the container has been received from a supplier then the Supplier HLDO data is available.

8. If the container was received as a result of a PO then the PO and POLine HLDOs are available

9. For labels of type NT only the data for the Item HLDO is available.

The parameters available for each of the HLDOs can be downloaded using the system administrators' DEXEL screen. To do this select the HLDO keyword (1) and select Export Definition (2).
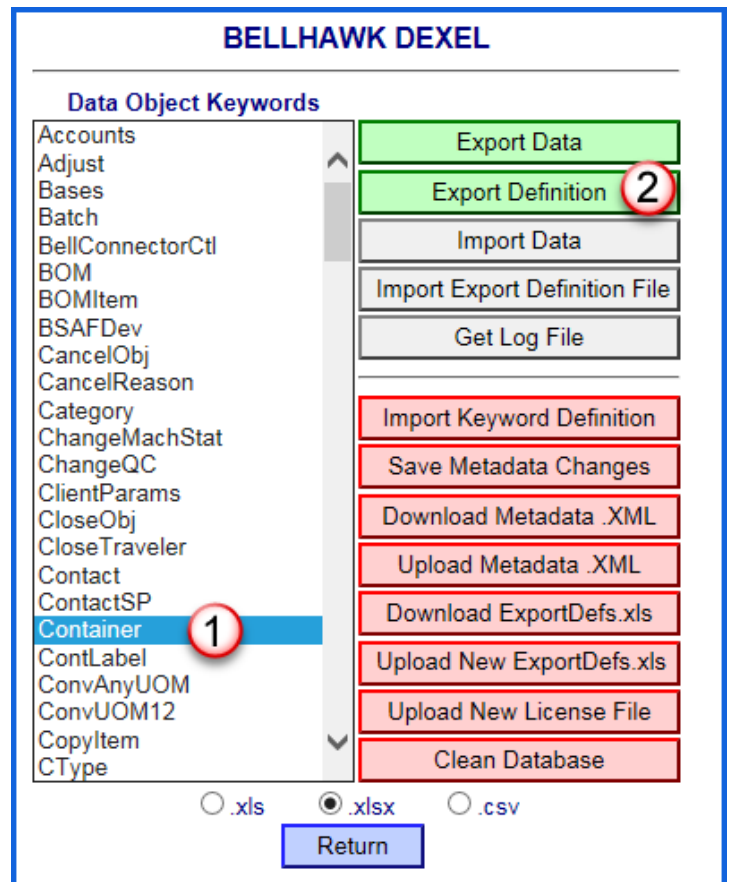
This will result in an Excel export of the HLDO definition as shown below:

	A	B	C
1	KEYHEADER	Keyword	Description
2		Container	Contents of Containers Table
3	KEYPARAMS	ParName	Description
4		ContainerID	Container ID
5		ContainerBarcode	Container Barcode
6		ContainerType	Container Type
7		Location	Location Code - LocationCode or User Badge Barcode
8		LocationType	LocationType 0=Location 1=Employee
9		ItemNumber	Item Master Part Number
10		LotNumber	Lot Number
11		PrimaryQty	Quantity in Primary UOM
12		IsEmpty	Set When Container is Empty
13		IsVirtual	Set when this is a Virtual Container
14		IsIndividual	Set for Individually Barcoded Item; Set Qty =1
15		IsPending	Along with IsDeleted, Set for Pre-Printed Label w/material not yet entered in
16		ParentContainer	Parent Container ID
17		OwnedByCustomer	Customer Number if Customer Owned
18		ForCustomer	Material Designated for this Customer Number
19		SerialNumber	Serial Number
20		QCStatus	A=Auto Approved,P=Passed Inspection,W=Waiting Inspection,F=Failed Inspection
21		UID	UID, such as UPC code, used for product identification
22		PickOrder	Pick Order Number
23		PickOrderLine	Pick Order Line Number
24		ShipOrder	Ship Order Number
25		ShipOrderLine	Ship Order Line Number
26		ExpirationDate	Expiration Date
27		VendorLot	Vendor Lot Number
28		TravelerName	Traveler that produced material
29		POLineBarcode	Barcode of PO Line material was received against
30		UnitCost	Unit Cost
31		TareWeight	Tare Weight
32		GrossWeight	Gross Weight
33		DateCreated	Date Received or Produced
34		ContainerSeqNo	Container sequence number
35		ContainerSeqTotal	Location Code - LocationCode or User Badge Barcode
36		Description	Container description/notes
37		SupplierNumber	Supplier Number
38		UDP	User Defined Parameters

The entries in the ParName column are all the available entries to put in the ParameterName column of the LABELFIELD HLDO when you specify the Keyword shown.

Similar exports can be obtained for the Item and other BellHawk HLDO keywords. Please note that some ParName data may be Null and result in an empty field on the barcode label depending on the data captured.

Specifying UDP Parameters as Label Fields

Note the ParName UDP in the previous LABELFIELD setup example. This is used for the HLDO data field that holds the user defined item configuration data such as Color, Length and Width. When a user defined parameter, such as Color, is to appear on the label, these UDP parameters must first be defined as needing to be captured within a transaction using the OBJECTPARAMS HLDO import as described in the "User Defined Parameters and Item Configuration User Manual".

The parameter data to be captured, either during print-on-demand or ahead-of-time printing, can then be specified by an OBJECTPARAM entry such as:

	A	B	C	D	E	F	G
1	OBJECTPARAM	ParCode	ObjectParamName	Keyword	SeqNo	ParameterLabel	DataType
2		ITEM1	Color	ITEM	1	Roll Color	CHOICES
3		ITEM2	Color	ITEM	1	Coating Color	CHOICES
4		ITEM3	Color	ITEM	1	Roll Color	CHOICES
5							

In this case the ObjectParamName in column C of the OBJECTPARAM HLDO must correspond to the parameter name entered into the LABELFIELD HLDO UdpParameterName column.

Please note that, while the UDP parameter names appear in the records in the BellHawk containers table, after the data about the container is entered into BellHawk, these UDP parameters are setup as Item configuration parameters for data capture. Please see the "User Defined Parameter and Item Configuration User Manual" for details.

Please note that when setting up a field such as Color to appear on the label, the Choices are what appear on the data entry screen, the Values are what are placed in the UDP fields for Container records, and the Choices are what are placed in the label print queue and appear on the label.

P	Q	R	S	T	U	V	W
Identifier3	Identifier4	Identifier5	Identifier6	Identifier7	Identifier8	Choices	Values
Rolls						Red, Blue, Green, Yellow, White	R,B,G,Y,W
Coatings						Red, Blue, Green, Yellow, White	R,B,G,Y,W
CoatedRolls						Red, Blue, Green, Yellow, White	R,B,G,Y,W

Thus, in our example, we map the Color field on a can label to the UDP parameter Color, which is set to be captured whenever an Item with material type Coatings is entered into inventory. This is done by setting the Identifier3 (Material Type) value in the OBJECTPARAM entry to "Coatings" which causes the UDP parameter Color to be captured whenever an item with material type "Coatings" is entered into BellHawk inventory.

Then, when we Submit the data entry record, the Choice will print the can label but the Value of the selected color is placed in the UDP field of the container record so that its short form can be used as part of a composite part number, such as ABC123-B for an item number ABC123 colored Blue.

Please note that, when composite part numbers are in use, the composite part number is what is placed in the print queue and appears on the label, not the base Item number.

Enabling Product Labeling

When TAG is licensed, a Printing tab (1) is added to the BellHawk systems administrators Systems Parameters screen:

This screen is used to enable barcode label printing for certain transactions and to setup certain print parameters, as follows:

1. Enable remote printing (2). If this is left unchecked then LabelPrintS is launched on the server to print out labels. If this is checked then it is expected that LabelPrintR (or some other program) will be remotely monitoring the label print queue and printing the labels.

2. TAG allows the systems administrator to selectively specify (3) on which transactions the [#] will appear to enable the selection of a barcode label to be automatically printed when the "Submit" button is selected.

3. TAG allows the systems administrator to selectively choose (4) which transactions screens will be modified to enable the scanning of a pre-printed labels tracking barcode before data is entered rather than after data is entered, as for print on demand.

4. Note that both print on demand and pre-printing can be selected but this makes the transaction screen more complicated with a data entry box being displayed for scanning pre-printed tracking barcodes before data entry is performed and a [#] button at the bottom for printing a barcode label.

5. As a safety factor, the system administrator can specify a limit on the quantity of print-on-demand and preprinted labels (5) that can be requested at any one time. In many cases the barcode label is not adjacent to where the labels are requested. In such cases, it is possible to inadvertently request 999 labels rather than 9 labels and have all the labels printed before you reach the printer. Setting reasonable limits can help mitigate this issue.

6. Checkbox (6) enables the collection of container sequence numbers and totals during transactional data entry when receiving a number of like containers. Please see the subsequent section of this document on this topic.

7. The textbox (7) enables the setting of a prefix to the numerical unique sequence number for internally formatted container tracking barcodes. It is a good idea to start the prefix with a # to differentiate it as an internal tracking barcode from GS1 standard or other barcodes in common use. Our standard convention is to start the prefix with a #, followed by up to 3 letters for the company initials, and then another # sign.

8. When a container tracking barcode is automatically generated by BellHawk this prefix is followed by a unique, sequentially assigned, 9 digit number. When label generation for a container is requested, on a data entry transaction or a pre-print label screen, then this tracking barcode is generated and assigned to the container record.

9. The last used sequence number for the numeric part of the container tracking barcode can be viewed, and if needed, edited (8). But, if editing, be careful to not generate duplicate tracking barcodes as this will confuse BellHawk.

10. BellHawk TAG keeps a separate sequence number for SSCC barcodes to make sure that it generates unique SSCC barcode labels. Please see section on SSCC barcodes for details.

11. Finally, please do not forget to click on the [Apply] button, while in the Printing tab to save your settings.

Please note that you will not be able to perform barcode label printing if selections are not made on this screen.

Print-On-Demand Labeling of Containers with Single Part Number Contents

The following applies to generating barcode labels on demand for tracking materials in type 1 (single part number contents) containers as well as labels to be applied to individually barcoded items which typically have a unique serial number.

These labels can be generated when entering the containers into BellHawk inventory using the following transactions:

- Enter - enter containers of material into inventory

- Receive - simple receive of containers

- Receive containers against PO lines

- Record material out from work order operation

- Return material from work order operation with new barcode label.

Please see subsequent sections of this manual for pre-printing labels for type 1 containers and for printing labels for type 2 (containing multiple part numbers) containers.

In the following, we will use an Enter transaction for our example can of coating material to illustrate how to print labels. These comments, however apply to all the above transactions.

If neither print-on demand or nor pre-printing is checked on the system administrators' Printing tab then an Enter transaction appears as shown at right:

Here we have selected the Item Number (1) for the material in the can. Based on the OBJECTPARAM UDP settings described previously to be collected for Items with material type Coatings, the transaction requests the UDP parameter choice (2) from the drop-down list with the specified set of choices.

As this is a new container being entered into BellHawk inventory, the New Container checkbox is checked (3). This is usually set as the default on the systems administrators' Materials tab.

Labels are only generated for new labels. Please see subsequent section of this manual on relabeling containers, if you need to reprint the label on a container.

Finally, a tracking barcode (4) can be applied from a pre-printed roll of simple "license-plate" tracking barcodes, which were not created using TAG, as shown here. This tracking barcode is scanned before selecting [Enter] to enter the container into the BellHawk containers inventory table.

In this case no label is generated or printed.

If instead, the systems administrator turns on Print-on-Demand for the Enter transaction but leaves Pre-Printing turned off then the Enter screen appears as shown here at left:

Note that:

1. The Label Selection button [#] (1) appears next to the New Transaction Barcode data entry box.

2. At this stage of data entry the user has the choice of using a simple license-plate tracking barcode or requesting the system to generate a label by selecting the [#] button.

If the [#] button is selected then the screen changes to:

The New Tracking Barcode changes to Automatic (1) to show that the system will automatically generate a unique tracking barcode for the container. This will use internal format or SSCC format depending on the label type chosen by BellHawk.

If more than one label fits the label selection criteria then the user is given a drop-down list, by name, of the labels that fit the rules setup in the LABEL HLDO instances. Here only a single label meets the rules criteria so the drop-down list is not shown.

If no labels selection rules meet the criteria then the user receives a warning message and is not allowed to proceed to submit the transaction.

If, for the chosen label, multiple sequentially numbered labels can be chosen to put on multiple identical containers (based on settings in the LABEL HLDO instance), then the data entry box
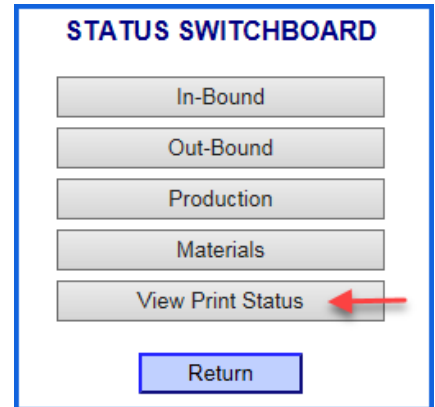
(2) is shown. Finally, when the "submit" [Enter] button (3) is selected then BellHawk writes one entry into the print queue for each container and may call LabelPrintS to print the label.

Viewing the Status of Label Printing Requests

Once the Enter button is selected on the transaction then the status of the label print requests can be viewed from the Status Switchboard by selecting the View Print Status button, which beings up the Status of Recent Print Jobs screen shown below.

Here we see the two labels placed in the print queue from the previous Enter transaction example. They will be shown with status W, for waiting, until printing of the label is complete when it changes to P for printed.

If LabelPrint finds and error in the setup data for the chosen label then it will change the status to E for error and put an error message in the Log Message field

STATUS SWITCHBOARD

| In-Bound |
| Out-Bound |
| Production |
| Materials |
| View Print Status |

| Return |

STATUS OF RECENT PRINT JOBS

Show Print Jobs for the last [1 hour ▼]

Job Number	Submitted	Item# (or Container Type)	Container Barcode	Status	Log Message	
2	10:52:48	P102	#SI#000000102	W		
1	10:52:48	P102	#SI#000000101	W		

[Refresh]   [Return]

If, when LabelPrint calls the BarTender SDK to print the label, BarTender returns an error then the status changes to E and the error is shown in the LogMessage field.

Please note that the status changes to complete once LabelPrint has called BarTender to print the label. If there is a downstream problem with BarTender or the barcode label printer then the status may change to P but no label printed.

If the label fails to print due to problems with BarTender or the barcode label printer, then the label can be reprinted as described in the section of this manual on reprinting labels.

STATUS OF RECENT PRINT JOBS

Show Print Jobs for the last [1 hour ▼]

Job Number	Submitted	Item# (or Container Type)	Container Barcode	Status	Log Message	
1	14:52:46	P102	#SI#000000107	P		Re-Submit

[Refresh]   [Return]

Labels will remain visible in the print queue for up to 24 hours. During that time the print request can be resubmitted from this screen by selecting the Re-Submit button.

What Gets Placed in the Print Queue

It can be informative, as systems administrator, to use DEXEL to export the PRINTQUEUE HLDO which shows the entries in the print queue:

	A	B	C	D	E	F	G	H	I
1	PRINTQUEUE	QueueID	ReportType	DateRequested	IsDeleted	Par1	Par2	Par3	Par4
2		1	LABEL	7/4/2017 10:52:48 AM	N	#SI#000000101	CanLabel.btw		Enter
3		2	LABEL	7/4/2017 10:52:48 AM	N	#SI#000000102	CanLabel.btw		Enter
4									

F	G	H	I	J	K	L	M	N	O	P	Q
Par1	Par2	Par3	Par4	Par5	Par6	Par7	Par8	LabelCount	RtnMsg	PrintStatus	NumberCopies
#SI#000000101	CanLabel.btw		Enter					1		W	
#SI#000000102	CanLabel.btw		Enter					1		W	

R	S	T	U	V	W	X	Y	Z	AA
UDP									
{"Color":"Green","ContainerBarcode":"#SI#000000101","ItemNumber":"P102","Quantity":"1","ItemDescription":"Coating Material","UOM":"ga"}									
{"Color":"Green","ContainerBarcode":"#SI#000000102","ItemNumber":"P102","Quantity":"1","ItemDescription":"Coating Material","UOM":"ga"}									

Here we see:

- The data and time the label printing was requested in column D

- In column E, whether the entry will show in the print queue screen (IsDeleted = N) or not (IsDeleted = Y). Entries are changed to Y after two days.

- Column F (Par1) holds the code by which BellHawk is tracking the container (which could potentially be different from the tracking barcode printed on the container).

- Column G (Par2) contains the BarTender label format to be used.

- Columns I (Par 4) holds the name of the transaction that generated the label request. This is so that, if needed, then special label formatting can be used as a customization.

- Column N contains the number of sequential copies of the label to be printed. Normally defaults to 1.

- RtnMsg, column O, is where LabelPrint places its error messages.

- Print Status, column P, is initially set to W and then changed by LabelPrint.

- Number of Copies Q is the number of identical copies.

- Column R is where the values to be placed in the label fields are provided in JSON format. These are what LabelPrint uses to populate the label fields.

Normally TAG places one entry in the print queue for each unique label to be printed and uses the Number of Copies column about how many identical copies to print.

If MaxConts is less than 0 for the label format then TAG only places a single entry in the print queue and sets LabelCount to the number of sequential labels to print. This results in much faster label printing but can make label formats more complex. It can also make labels more difficult to reprint if there is a failure part way through printing out a batch of labels.

Instead of using LabelPrint to print the Label using BarTender, clients can create their own equivalent to directly access tblPrintQueue and print labels using an alternate barcode label printing program. This is generally done using a single entry in the print queue for a sequential set of labels.

Note that, when generating a sequential set of labels using a label printing program it is important for clients to setup the barcode scanners used to scan the tracking barcodes so they generate data in the identical format to that which TAG stores in the tracking barcode for each container.

Using Preprinted Labels for Containers with Single Part Number Contents

The following applies to Enter, Receive, Receive-against-PO, and Material out of Job Step transactions.

Printing the Labels

The label pre-printing screens are reached from the Production, Shipping/Receiving, and Materials Management Switchboards. This leads to the Pre-Print Labels screen, shown below at left.

The Pre-Print Label screen shown just those transactions for which label pre-printing was enabled on the system administrators' Print tab.

Selecting the pre-print screen for the Enter transaction brings up the screen shown at right.

Note that this is essentially identical to the screen that is presented using the Enter transaction, except that it is only available to a staff user.

As with the Enter transaction, the label to print is chosen automatically, unless there are multiple rulesx-based matches found for labels. In this case a drop-down list is presented for the user.

This results in one or more records being placed in the BellHawk containers table with a status of IsPending = Y and a status of IsDeleted = Y to make them not visible. Then label printing requests for each container are placed in the label print queue.

Note that it is OK to print more labels than you need as their corresponding container records remain marked as IsDeleted=Y and are thus not considered part of the BellHawk inventory.

Using the Pre-Printed Labels

Left form:

ENTER MATERIALS
User Badge
E301

[ ] Use TAG Pre-Printed Label

Reason for Entering
[_____] [v] [...]

Item Number
[_____] [...]

Container Type
[-- Select a Container Type --] [v] [...]

Quantity
[_____]

Destination Barcode
[_____] [...]

[Enter] [Clear] [Return]

Right form:

ENTER MATERIALS
User Badge
E301

[✓] Use TAG Pre-Printed Label

New Tracking Barcode
#SI#000000108   (1)

Reason for Entering
[Setup Inventory]   (2) [v] [...]

Item Number
[P102] [...]

Coating Material
Coating Color: [Green] [v]

[ ] Is Customer Owned

[✓] New Container

Container Type
[Can] [v] [...]

Unit Of Measure
[gallons] [v] [...]

Quantity
[1]

Expiration Date
[7/7/2017] [📅]

Destination Barcode
[Production] [...]
Production

[ ] Mark as Work in Process
(3)

[Enter] [Clear] [Return]

If the use of pre-printed labels has been enabled on the systems administators' Print tab then the Enter Materials transaction gains a Use TAG Pre-Printed Labels, as shown above.

Checking this checkbox then causes the form to change to request the new tracking barcode (1) which is scanned from a pre-printed label.

Once this barcode is scanned then the screen is populated from the corresponding container record in the BellHawk database as shown at right.

Note that some fields, such as the reason for entering (2), are not tracked as part of the container record, and have to be selected so that they can be included in the BellHawk materials history table.

Data fields not grayed out can be modified and then, when Enter (3) is selected the values are saved in the container record and it is marked as IsDeleted = N and IsPending = N and becomes part of the regular BellHawk inventory of containers.

Please note that the label shows data values selected on the pre-print label screen and any changes made to these values on the transaction screen will not be reflected in the label values unless the label is reprinted when the current values stored in the container record are printed on the label.

If both pre-printing and printing on demand are selected on the system administrator's Print tab then both the Use TAG Pre-printed labels (1) can be used, when the screen behaves as described in the prior section, if this is checked.

If the Use TAG Pre-Printed label checkbox is left unchecked then a barcode from a pre-printed roll of license plate barcodes (not generated through the TAG pre-print screen) can be scanned into the tracking barcode box (2) or a print on demand label can be requested by selecting the [#] button.

Printing Barcodes for Containers that can contain multiple part numbers

This section describes the use of TAG with the Tag Container and Pack transactions. For details about how these transactions are used, please see the BellHawk User Manuals for LP-MTS and the Picking and Packing Option respectively.

Using the Tag Container Transaction

The TAG container transaction is used to pre-label type 2 "parent" containers that can hold materials with multiple different part numbers.

A corresponding label pre-print screen is also available.

The behavior of this transaction with respect to labeling is similar to the Enter transaction described previously except that there is no data about materials collected as the container record simply relates to the parent container and not its children.

The customer name is only collected if the Container Type is designated as being for a single customer. In this case the customer name is available for use on the label from the Customer HLDO.

Tag Container can be used in a similar manner, to generate labels for empty Type 1, single part number containers.

TAG CONTAINER

Employee Badge

12345

☐ Use TAG Pre-Printed Label

Container Type

Pallet   ⌄   ...

Destination Barcode

Production   ...

Production

Container Description

New Tracking Barcode

AUTOMATIC   #

Label Name

--Select a Label--   ⌄

Customer Name

-- Select a Customer --   ⌄   ...

Number of Identical Containers

1

Tag   Clear   Return
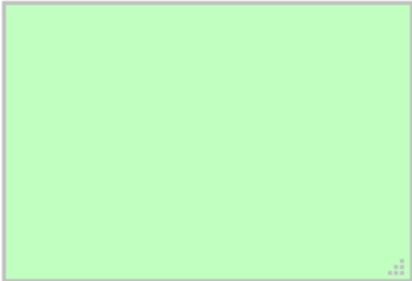
Generating Labels Using the Pack Transaction

PACK

Employee Badge

`12345`

Source Barcode

[Carton Scan Complete]

Pallet Type

`Pallet` ▾ `...`

Destination Barcode

`WRAP01` `...`

WrapStation01

New Tracking Barcode

`AUTOMATIC` `#`

Label Name

`--Select a Label--` ▾

[Submit] [Clear] [Return]

The Pack transaction is used to record the packing of containers with tracking barcodes (such as cartons) onto or into a type 2 parent container, such as a pallet.

The Pack transaction is normally used with TAG to generate a barcode label on demand to place onto a shipping carton or pallet after scanning the tracking barcodes on the containers as the containers to be placed in the shipping container.

There is no corresponding pre-print screen but Pack may be used with tracking barcodes attached from a roll of pre-printed license-plate tracking barcodes that were not generated by TAG.

If the container type is designated as being for a single customer then the customer name will be requested, or inherited from the containers being packed, and the Customer HLDO data will be available for inclusion on the label.

Ship Transaction Labels

SHIP MATERIALS

Employee Badge

`12345`

Customer

`Hattiesburg Paper Company LL` ▼ `...`

Customer Order Number

`CO002`

Source Barcode

`00086995300010000155` `...`

Production

Item Number

`00300` ▼ `...`

Subway Straws

40 Each available

☑ Ship Whole Container `#`

Label Name

`--Select a Label--` ▼

Unit Price

`[          ]`

`Ship` `Clear` `Return`

BellHawk only supports the generation of a barcode label for the simple Ship transaction. Other methods of recording the shipment of containers, such as using the Ship Picked and Load Picked transactions do not support label generation except through the Tag Container and Pack Transactions described previously.

Other than that, both the pre-print and transactional generation of labels to go on containers as they are shipped follows a similar pattern to that previously described.

The available HLDOs from which label data can be drawn include Container, Customer, and Item.

Reprinting Labels

There may be times when you need to reprint a label – when your print job failed for some reason or when a label becomes damaged and unreadable. BellHawk provides a mechanism for reprinting labels from its Transaction Switchboards.

When you click the Re-Print Container Labels button on a Transactions switchboard, the following screen opens:

If you know the container's tracking barcode then select "Have Old Barcode" (1) and type that barcode into the Tracking Barcode entry box (2). The system will display the container information for you to verify that you typed the correct barcode (3). Then select the desired Label Format (4), if there are multiple choices that match the label printing rules, and select the [Print Label] button to reprint the label.

Note that the data will be printed based on the current contents of the container record and not what was printed on the original label.

If, however, the human readable container code is illegible and you don't know the tracking barcode for the container, BellHawk gives you 2 ways to identify the container.

The first way is to select "Have Partial Barcode" if any portion of the container tracking code is legible. This option allows you to type in as much of the barcode as you can read and to optionally select the item number of the material within the container, if known.

CONTAINER LABEL REPRINT
Identify Container
- Have Old Barcode
- ◉ Have Partial Barcode
- Search Barcode Range

Partial Barcode
[   ]

Item Number
[   ] [...]

[Print Label] [Return]

In the example shown next, all the user can see is that the barcode starts with a "##R' so he types that information in the Partial Barcode entry box followed by a "%". The system then displays all containers that have tracking codes containing "##R" followed by any characters and contain the desired item number, if selected. The user will click the appropriate container and the system will display the select Label Format drop down list and Print Label button.

Note that the % symbol is a "wild-card" character that can be used to match one or more illegible characters in the partially readable barcode label.

CONTAINER LABEL REPRINT
Identify Container
- Have Old Barcode
- ◉ Have Partial Barcode
- Search Barcode Range

Partial Barcode
##R%

Item Number
[   ] [...]

Select a Barcode

Barcode	Material Type	Item Number	Location	Container Type
##RC01	WILDFLOWER	RedCol	##H1000013	10 lb bag
##RC02	WILDFLOWER	RedCol	##H1000013	10 lb bag
##RC03	WILDFLOWER	RedCol	##H1000013	10 lb bag
##RC04	WILDFLOWER	RedCol	##H1000013	10 lb bag
##RC05	WILDFLOWER	RedCol	##H1000013	10 lb bag

[Print Label] [Return]

The percent sign can be used to take the place of one or more characters at the beginning, in the middle or at the end of the barcode. The readable portions of the barcode do not have to be contiguous characters. If the user can see that the barcode has a "#" near the beginning of the

code and has "2" later in the code followed by some other characters, then he can type %#%2% in the Partial Barcode text box and the system will display the list of containers with a # and a 2 anywhere in the barcode as shown below.

The second way to find a container barcode is to select the **S**earch Barcode Range option. With this option, the user knows that the needed barcode was created around the same time as some other barcode or was created either within a group of barcodes. If he selects "Search Barcode Range", he is presented with these 2 options: "Have One Nearby Barcode" or "Have Barcodes Before & After".

If the user selects Have One Nearby Barcode and types or scans in a Barcode Near, then the system will present the containers with the next 6 alphabetically sequential tracking barcodes and the containers with the previous 6 alphabetically sequential tracking barcodes.

As with the other search options, once the user selects the desired container from the displayed list the Label Format selection and Print Label button will become visible.

If the user selects Have Barcodes Before & After and types in a Barcode Before and a Barcode After, then the system will present the containers with tracking barcodes that are alphabetically between those two barcodes.

CONTAINER LABEL REPRINT
Identify Container
- ○ Have Old Barcode
- ○ Have Partial Barcode
- ◉ Search Barcode Range

Range Type
- ○ Have One Nearby Barcode
- ◉ Have Barcodes Before & After

Barcode Before

Barcode After

[Print Label] [Return]

As with the other search options, once the user selects the desired container from the displayed list the Label Format selection and Print Label button will become visible.

Printing Sequentially Numbered Labels

When the collecting of sequential container numbers feature is turned on, BellHawk permits the printing of sequence numbers of labels, such as in "**5 of 200**" and the tracking of the sequence number of each container within the BellHawk database. This section of the user's manual describes how to setup and use this capability.

Setting up Labels in BarTender

When setting up a BarTender Automation label format, such as that shown here:
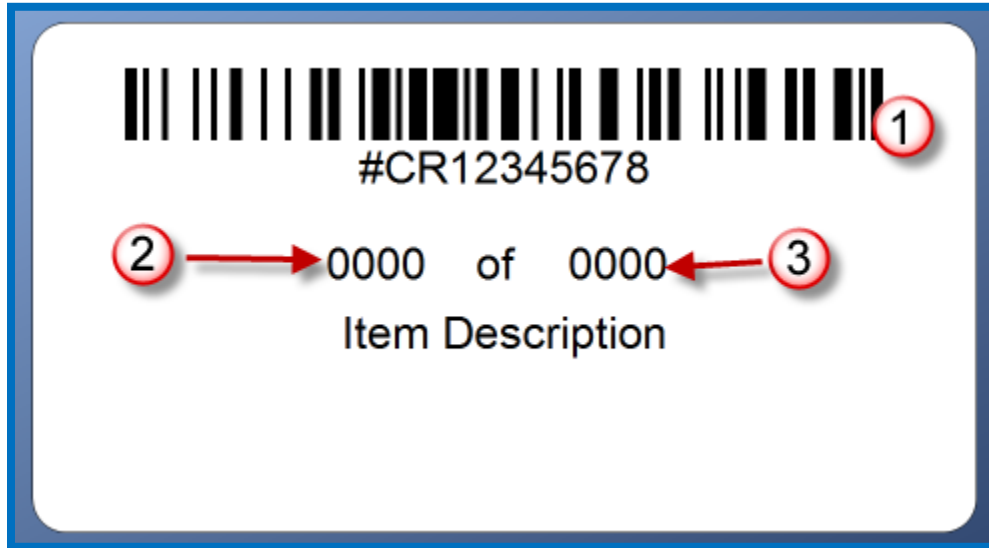
Users have to be mindful of 3 things:

1. When setting up the container barcode field (1), you have to turn on serialization. This is so that the barcode label number is incremented whenever you print a sequence of barcode labels on-demand or pre-print a sequence of labels.

2. When setting up the sequence number field (2) you have to include the Data Source named ContainerSeqNo and mark the field as serialized so that the sequence number gets incremented when a set of labels is printed.

3. When setting up the total number of containers (3) you expect to receive, you have to include a Data Source named ContainerSeqTotal. This is not marked as serialized as it is not incremented for each label.

How to set up data source named fields and marking them as seer numberis described in the label setup section of this manual and in the documentation for BarTender Automation.

Purchase Order Line Detail

The label sequencing feature adds a couple of new fields to the Purchase Order (PO) Line Detail screen. These are (1) the number of containers received to date and (2) the expected total number of containers. When a PO line is initially added to the Purchase Order, these are initially set to zero.

If the person setting up the PO knows how many containers are to be received, then the expected total field (2) can be set at that time. It can subsequently be modified in a PO Receive transaction.

Purchase Order Receive Transaction

When using the Receive against PO transaction, if the New Container checkbox (1) is checked then the number of containers already received and the total expected counts are shown (2).

The total number of expected containers (2) can be set by the user of this screen, if the number has not been setup on the PO line or a different number of containers from that expected have been received.

When the print symbol [#] (3) is selected, the number of identical container labels can be selected (4) as can the label name (5).

If the selected label contains the correctly setup fields, as described previously, then a sequence of labels will be printed, each with a unique container barcode and sequence number.

The ContainerSeqTotal field on the label comes directly from the expected total field (2) on this form, so that it can be changed, if needed.

If a change in the total is made here, it will be reflected on the PO line and vice versa.

Also please note that the total is a user set field, so it is possible to print labels with entries such as

 "32 of 30".

There is no check to detect when the actual number of labels exceeds the total. So it is the responsibility of the user to make sure that this is correct.

When the Receive button is selected, the selected numbers of labels (4) are printed and the same number of serially numbered containers is created in the BellHawk database.

RECEIVE AGAINST PO

Employee Badge
E301

☐ Use TAG Pre-Printed Label

Purchase Order Number
PO1234   [...]

PO Line
1   [...]

☑ New Container   (1)

Our Item: P101
12 inch Paper Roll
Quantity Left To Receive: 5
Units: pounds

Container Type
Roll   [v] [...]

Unit Of Measure
pounds   [v] [...]

Quantity
1

Lot Number
HJ7865

Destination Barcode
#01504   [...]
Warehouse #01504

New Tracking Barcode
AUTOMATIC   [#] (3)

Number of Identical Containers
4   (4)

Label Name
SeqNum   [v] (5)

Previously Received
5   of   20   (2)

[Receive]   [Clear]   [Return]

Appendix A: Generating SSCC Barcodes using the BellHawk TAG Module

Preface

This is an addendum to the Tag User's Manual. It describes how to setup BellHawk and BarTender Automation to print SSCC labels in such a way that they can be used as license-plate tracking barcodes to track the warehousing, picking, packing and shipping of pallets or other containers to which the SSCC barcodes are attached. The resultant tracking data can then be used as a basis for sending EDI 856 Advanced Shipment Notices (ASNs) relating the SSCC codes to the contents of the pallets as well as their lot numbers and expiration dates.

Please note that the examples shown here are for BarTender Version 10 and BellHawk V7.0 of BellHawk. As a result, there may be minor differences with the current V7.8 of BellHawk and BarTender 16.

Introduction

Serialized Shipping Container Codes (SSCC) barcodes are universal "license-plate" tracking barcodes for identifying any container of material in the supply chain. They consist of the GS1 (Global Supply Chain One standards organization) code for the issuer, followed by a unique number assigned to each container by the issuer, plus a checksum to detect any errors in reading the barcode.

SSCC barcodes can be used to identify pallets, cartons, as well as a variety of other containers and large individually tracked items. The important thing about an SSCC code is that it is globally unique, and so uniquely identify a container of material, anywhere in the supply chain.

The information about the contents of each container can then be sent electronically from the shipping organization to the recipient organization. This is usually done in the form of an EDI (electronic data interchange) X12 standard 856 format ASN (Advanced Shipment Notice). The ASN is sent electronically to the recipient as soon as the shipment has left the sending organization and is read into the recipient organization's tracking system, ready for the arrival of the containers.

With the use of an electronic tracking system such as BellHawk, the recipient organization then only needs to scan the SSCC code on the pallet or other container, in order to receive the container into inventory. All the information about the contents of a container, such as the part

number, quantity, lot number and expiration date, is related to the SSCC code is sent as part of the ASN. This saves an enormous of amount of labor in performing keyboard data entry at the receiving dock and prevents many sources of possible mistakes.


With a system such as BellHawk, the SSCC barcode can be supplemented by an RFID tag, encoded at the same time as the label is printed onto a combination barcode label/RFID tag. This RFID tag is encoded with GS1 SSCC RFID data, such that it can be automatically read by an RFID portal when unloaded at the recipient organization, thus avoiding the need for any barcode scanning.

A system such as BellHawk can also tie the incoming SSCC code, through the ASN, to the quality control (QC) status of the container upon receipt, such as to force 100% or statistical inspection of the containers, before their use or can allow preapproval for those items for which the supplier is pre-approved. BellHawk can tie into cold-chain monitoring sensors embedded in each pallet to force QC inspection of a pallet when the contents have exceed a specified temperature or humidity for a certain period of time.

Please note that while SSCC barcodes originated for use on shipping containers, they have many other uses as a universal license-plate tracking barcode.

Format of SSCC Barcodes
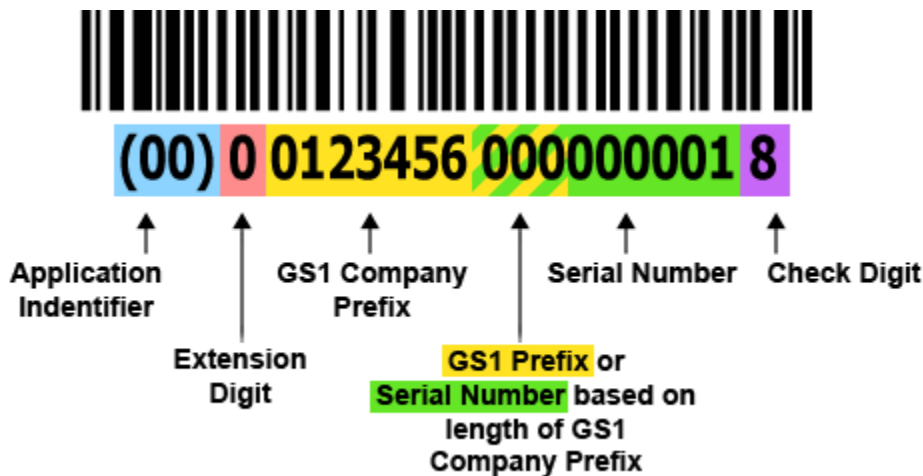
The SSCC barcode consists of a GS1 Application Identifier (type of Barcode) label – always printed in parentheses – always printed as (00) for an SSCC barcode – but the parentheses are not part of the Code 128 characters in the barcode label itself. Note that Code 128 refers to the encoding (bars and stripes) used to represent each character and the Application Identifier refers to the contents of the barcode.

The GS1 company prefix uniquely identifies the company creating the tracking label, just like a state decal uniquely identifies the issuer of a physical automobile license-plate. The GS1 identifier is a successor to the UCC (Universal Company Code) that is the prefix of the Universal Product Code (UPC) on retail products. In fact the GS1 codes for many companies are simply their old UPC codes extended by leading zeros. But, even companies with pre-existing UCC codes still need to pay the GS1 organization to get a registered GS1 Company prefix. The length of this GS1 code can vary from 7 to 10 digits.

Each issuer is responsible for making sure that the serial number issued for each container is unique within their organization. This function is performed automatically by BellHawk whenever a new SSCC code barcode label is issued, even when SSCC barcode labels are being generated by multiple people at the same time.

How BellHawk Generates the SSCC Barcodes

As described ipreviously, barcode labels that can be printed by TAG when creating a new container in an Enter or Record-Material-Out-Of-Job-Step transaction. User generated label formats can be setup in BellHawk by importing an Excel spreadsheet, through BellHawk's Excel Setup facility.

	A	B	C	D	E
1	LABEL	LabelName	Description	LabelType	LabelFileName
2		SSCC	SSCC Sample	SSCC	F:\TEST\LaChiquita\Sample_SSCC_barcode.btw
3	①	②	③	④	⑤
4					

This import provides the following information, for each label:

1. The Keyword LABEL (1) identifies this as label setup data.

2. The short-form label name (2) which uniquely identifies the label

3. A longer form label description (3) which is used on some status screens.

4. The label type (4). This is a new field, which is used to determine how BellHawk will process the label. This can be a comma separated list, if multiple attributes of the label type are used to drive the label processing algorithm. If this is "SSCC" then BellHawk will proceed as described below, in this document.

5. The full path (5) from the BellHawk Server to the BarTender label format that will be used to generate the label.

As described in the TAG user's manual, users can create their own label formats using BarTender's label layout tool and use named fields to cause BellHawk to insert data from its database in those fields. One of these fields is "Container:ContainerBarcode". This is the license-plate tracking barcode for the container.

When a user is entering a new container into inventory and specifies that an SSCC Label Type barcode label is to be printed for that label, BellHawk does the following:

1. Generates a Unique SSCC code based on the GS1 code for the company and a unique shipping label sequence number, generated by BellHawk.

2. Uses this SSCC code as the tracking barcode for the container record being created in the containers table. This is so that the SSCC barcode code can be scanned as the tracking barcode when the container is moved or picked for shipment.

3. Places a request to print the label in the print queue with a reference to the container being created and the label format being used.

This entry in the print queue is then picked up by the BHBTI process (see TAG Installation and Configuration Guide), which retrieves the user specified label format, including the named fields. It then replaces the named fields with the appropriate values for the container (see TAG User's Manual for details). This includes replacing the Container:ContainerBarcode field with the SSCC barcode so that it will print out on the label.

Please note that printing out the SSCC code does not preclude printing other data, such as the lot number or expiration date, on the barcode label or even having these as additional barcodes. It is important, however to correctly format the label field that is to receive the SSCC barcode, as described below, otherwise it will not print out in the GS1 approved standard format.

Setting up the BarTender SSCC Label Field

Please note that:

1. You need to use BarTender Automation or Enterprise; BarTender Pro does not have the necessary features.

2. The following screen shots were generated using BarTender Version 10.1; they may vary somewhat with different versions.

3. It is important that the TAG BHBTI executable program be created by linking in the BarTender dynamic link libraries that correspond to the BarTender Automation version being used.

The steps to creating an SSCC barcode label to work with BellHawk TAG are as follows:

[1] Open a new file for label design.

Insert a *GS1-128* barcode (or any *Code 128* barcode if you have trouble finding one).
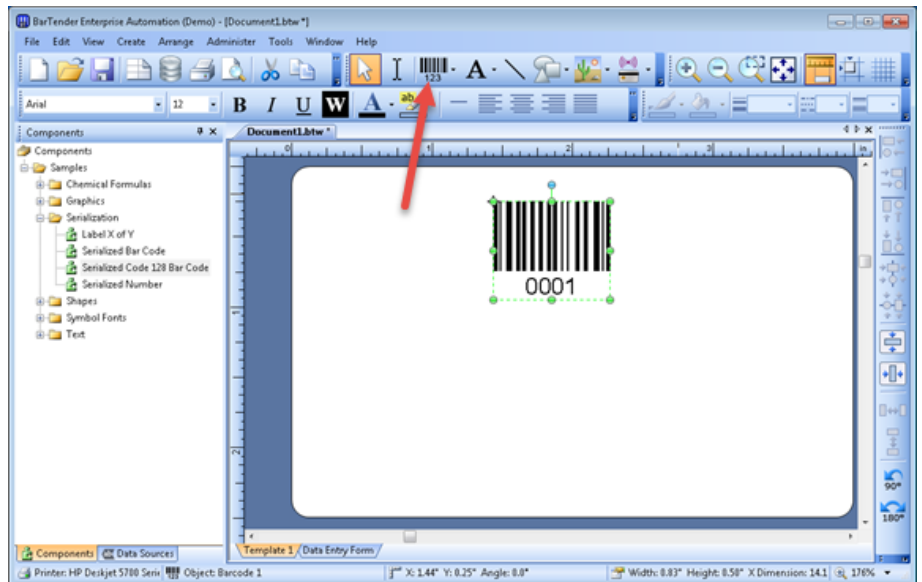
[2] Double-click the barcode to open its Properties window. Be sure that <u>Symbology</u> is set to *GS1-128*. Then click the <u>GS1 Application Identifier Data Source Wizard</u>.
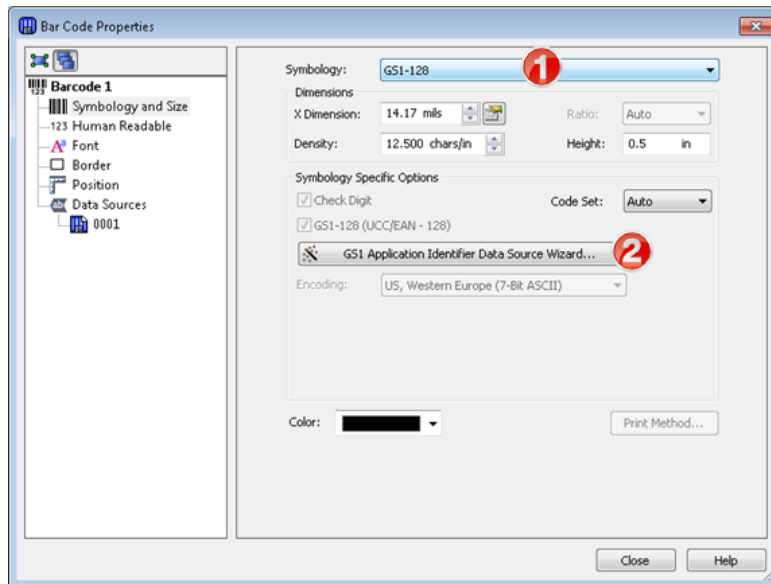
[3] Select *SSCC-18 Serial Shipping Container Code*, which should be first on the list.
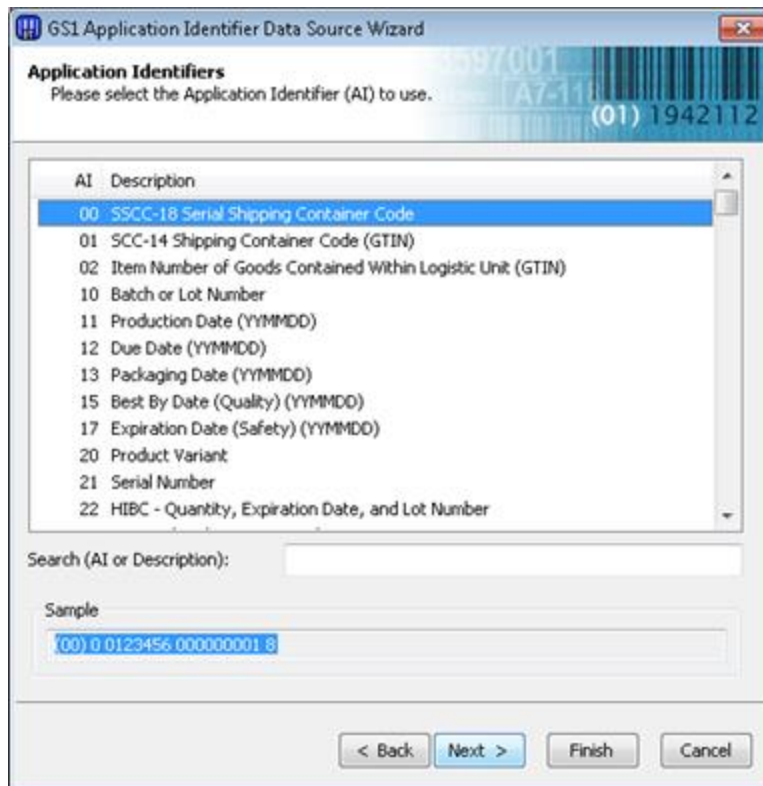
[4] Click <u>Next</u>

[5] Select One data source for all components.

[6] Click Next
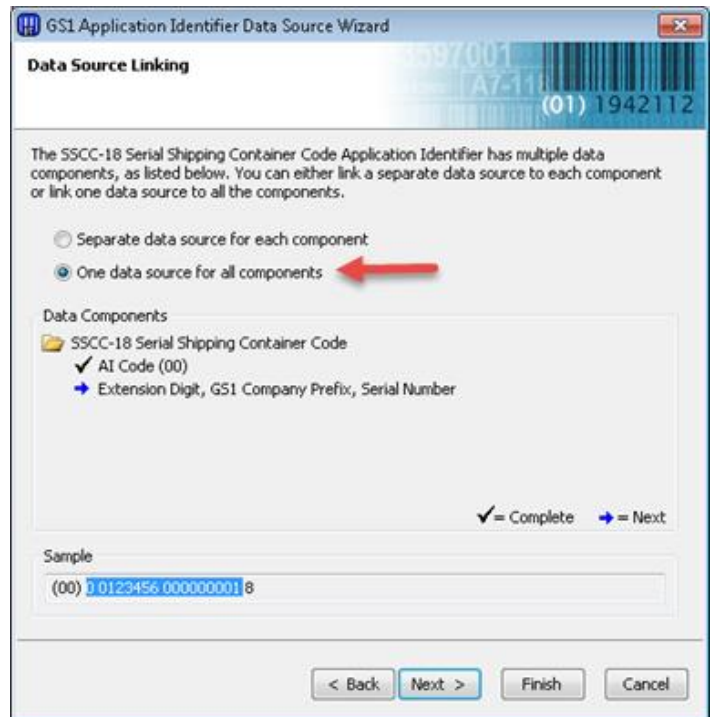
[7] Select *Embedded Data* as the Data Source Type.

[8] Click Next
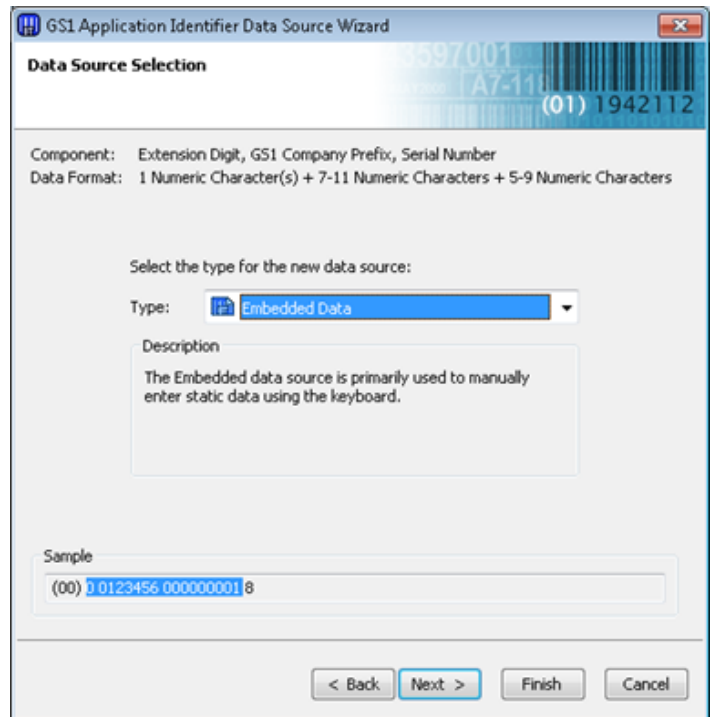
[9] If you like, you can enter some sample text or just leave the default. Click <u>Finish</u>
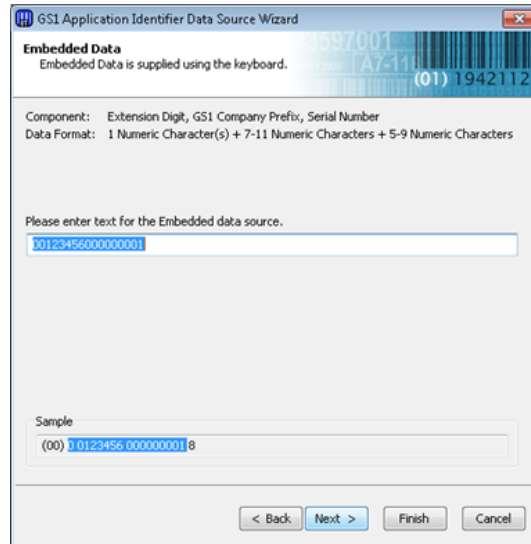
[10] Back in the <u>Bar Code Properties</u> window, note the *Data Sources* in the left pane and select *Container Code* (1) to display its properties in the right pane. Under the *Data Source* tab, click the button beside the *name* field (2) to assign a data source name.
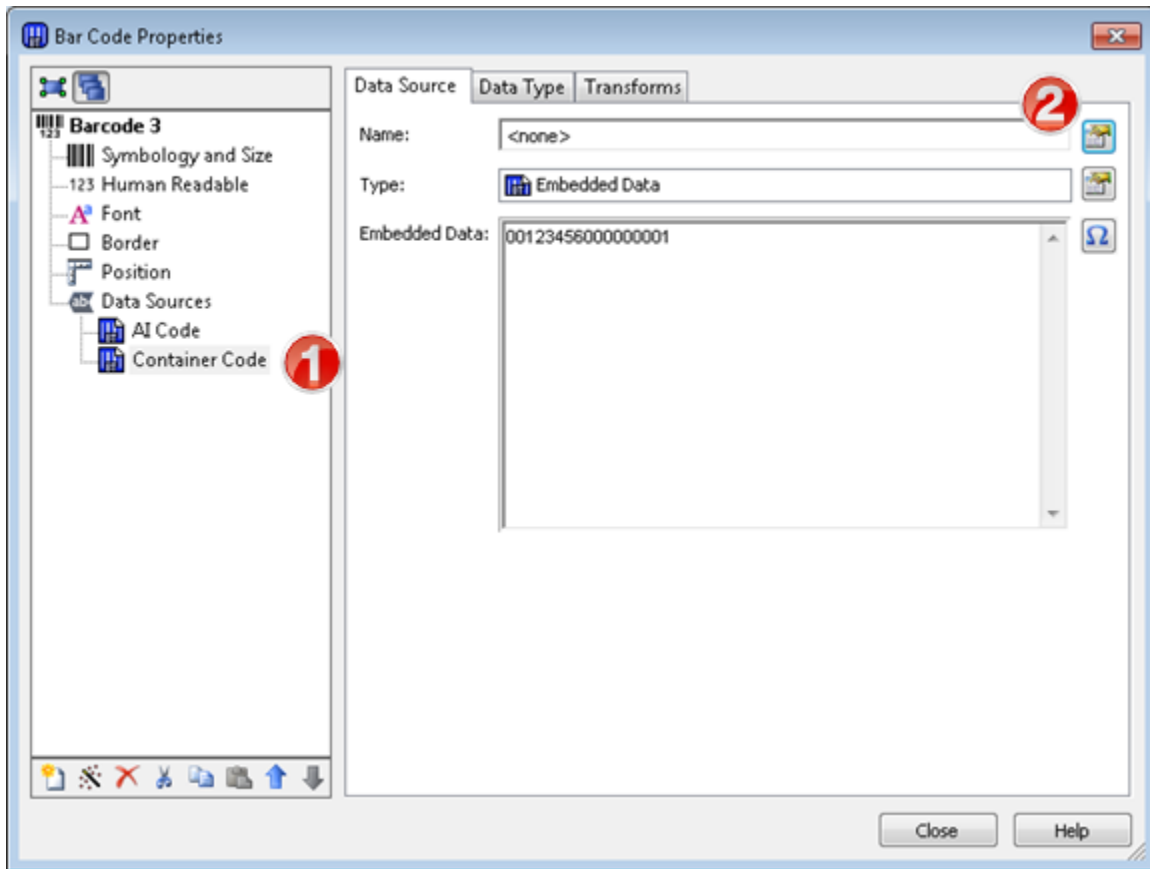
[11] Enter **Container:ContainerBarcode** (case sensitive) as shown. The data source name is what TAG uses as a key to a "dictionary" of values available for a given container or label from BellHawk. The key represents a *Keyword:Parameter* pair in the BellHawk metadata. Some examples of other valid keys: "Container:Description", "Container:SeqNo", "Container:SeqTotal".

[12] Click OK
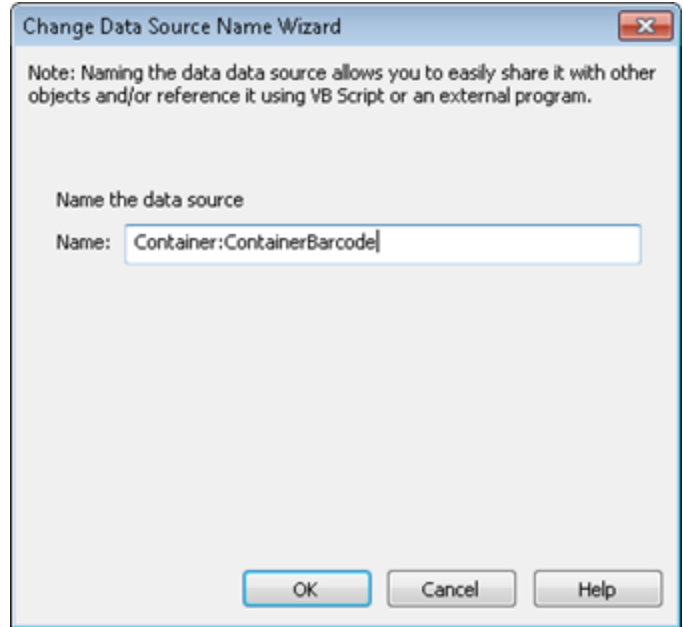
[13] BellHawk creates and stores the full 18-digit SSCC barcode. BarTender expects only 17 digits and calculates the 18th digit – the "check digit" – using the same industry-standard algorithm as BellHawk. To avoid a conflict, select the *Transforms* tab and set Truncation (1) to use only the leftmost 17 digits of data, and remove any warnings from Number of Characters if maximum is exceeded.
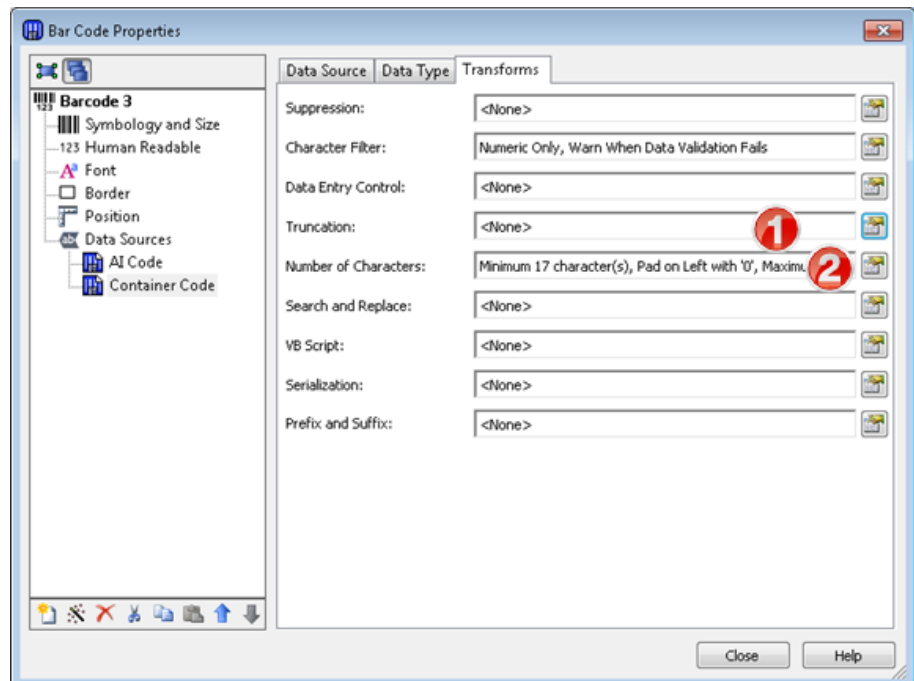
[14] The truncation and maximum number of digits is set from subsidiary screens (selected by clicking the icons to the right of the data entry boxes) as shown below.
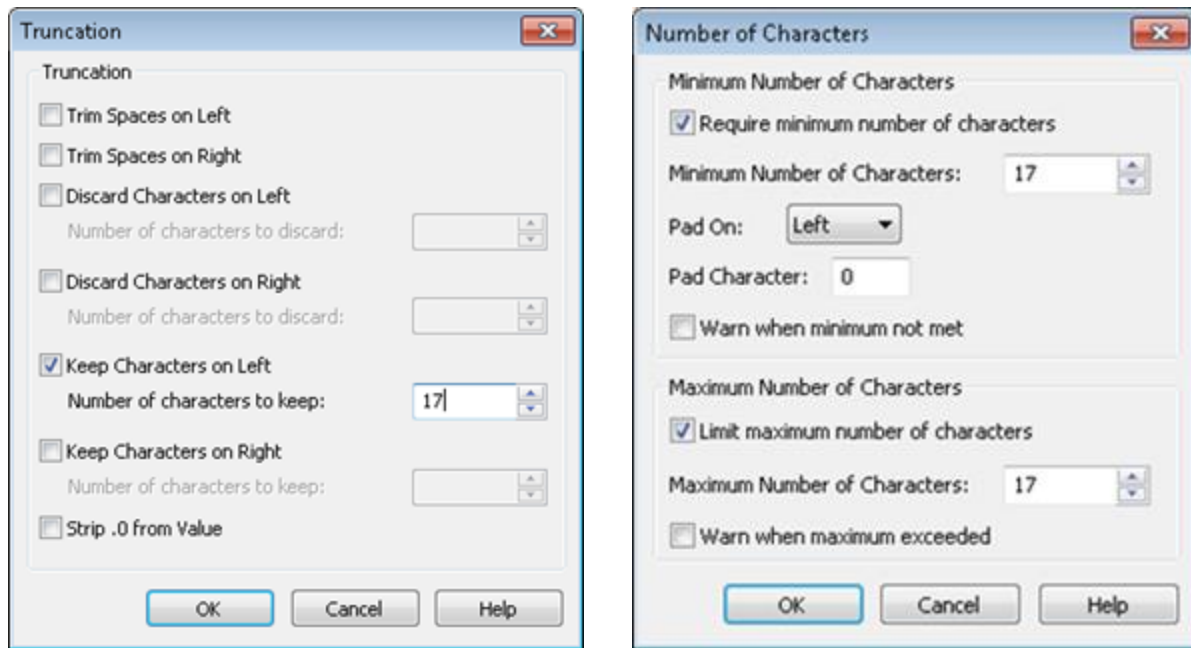
Once this setup is performed, along with
selecting other BellHawk data to appear as human readable information or as other barcodes to appear on the label, the label format can be saved in a location specified in the Label setup file.

Setting Up the BellHawk System Printing Parameters

In order to generate SSCC barcodes on demand, the BellHawk Systems Administrator needs to setup the system for barcode label printing using the Printing tab, which will appear if TAG is licensed. The settings are as follows:

1. Select those transactions (1) from which print-on-demand labels are allowed to be printed.

2. Allow on-demand printing of barcode labels for empty mixed use containers (2).

3. Select those transactions (3) for which pre-printed labels can be scanned and have the system automatically populate to container record based on information previously setup when the labels were generated.

4. BellHawk supports the generation of a sequence of tracking barcodes for identical containers with the same contents, both for on-demand and pre-printed barcodes. Because this can be error prone (such as requesting 100 labels instead of 10), a system administrator can set limits (4) on the number of labels that can be printed at any one time. If these fields are zero then there is no limit.

5. BellHawk has the ability to set and track container sequence numbers, as in 3 of 40, as each container is recorded into inventory. The sequence and the total can be printed on the barcode label printed by TAG, if printed on-demand. This feature can be turned on or off (5). It is generally better to leave it turned off, unless the sequence number is needed to be printed on the label.

6. For an unspecified Label Type, which is the standard default, the license-plate tracking barcode generated for each container label consists of a prefix followed by 9 numeric digits. The system admin can set the prefix to be used (6). The generated container barcode appears in the Container:ContainerBarcode field on the label. It is recommended that the prefix start with a character such as # to avoid confusion with GS1 and other barcodes and have a different prefix from any rolls of preprinted license-plate tracking barcodes in use.

7. The sequence number (7) to be used for generating the next standard barcode label can be viewed and edited by the systems administrator. Please note that it is important not to change this while anyone is using the system or to set it "back" so as to have TAG generate duplicate labels. BellHawk has built-in capabilities for reprinting both on-demand and pre-printed labels, which should be used for this purpose.

8. A separate sequence number (7) is used for generating SSCC labels. This enables the number of digits available in the SSCC code format to be used for the largest number of containers. It also enables internal "standard" barcode labels to be used alongside SSCC and pre-printed standard rolls of license-plate barcodes.

Enabling GS1 Code Entry for the Company

The first step in setting up the GS1 code is to enable the capture of a user defined parameter named UCC as part of the company information. This is set up through Excel imports into BellHawk via the System Administrator's DEXEL import facility. The Excel spreadsheet below shows the setup for enabling input of the GS1 code on the System Administrator's Company setup screen.

A	B	C	D	E	F	G	H	I
OBJECTPARAM	ObjectParamID	Keyword	Identifier1	Identifier2	Identifier3	ObjectParamName	ObjectParamEntryLabel	ObjectParamDataType
	1	DBA	MYCOMPANY			UCC	UCC/GS1 Company Code	TEXTID

BellHawk enables users to setup User Defined Parameters, such as the GS1 code, for different data objects on their setup screens. These parameters can then be accessed for the generation of barcode labels, as well as for purposes such as report generation and EDI exports. Please note that the above spreadsheet, which is imported through the BellHawk DEXEL Setup screen, sets the parameters requested and not their values, which must be entered through the [Parameters] button on the setup screen for the data object with the specified keyword.

The fields on this screen are:

1. The keyword OBJECTPARAM (1) identifying the type of import.

2. A unique ObjectParamID (2) that is user assigned alpha-numeric ID that must be unique amongst all object parameter entries as it is used to modify or delete specific entries in the object parameters table.

3. This is the keyword for the data object on which we want the [Parameters] button to appear. With its 3PL option, BellHawk supports shipping products under multiple "Doing Business As" (DBA) names and addresses. The default DBA instance "MYCOMPANY" (4) is used to identify the specific instance of the DBA object. This is treated as the issuer of the SSCC license-plate tracking barcodes.

4. The Object Parameter Name (5) of "UCC" is the name that is used for this parameter in the JSON encoded UDP column of the DBA table in BellHawk. When creating barcodes, BellHawk looks to retrieve the UCC/ GS1 value from this named parameter.

5. The Object Parameter Entry Label (6) is how the text entry box is labeled on the User Defined Parameters entry screen reached from the Parameters button.

6. The Object Parameter Data Type (7) is used for checking that the data entered in the text box for this parameter is correct. In this case TEXTID specifies that it is an alpha-numeric string with no punctuation characters. We use this format because often GS1 codes may have leading zeros, which would be lost if we treated this as an integer number.

Setting the GS1 Code

Once the GS1 object parameter data capture is setup for MYCOMPANY, the current value for the UCC/GS1 code (1) is shown on the Administrator's Edit Company Information screen. Initially this GS1 value is blank.

Also a [Parameters] button (2) appears. When selected, this leads to the screen shown below:

The UCC/GS1 code can then be setup (or subsequently edited) through this screen. Once setup, the value appears as part of the company information as shown below:

Please note that it is important not to change the ObjectParamName from "UCC" as this the UDP parameter from which BellHawk is picking up the GS1 code for the company.

Commentary

While setting up the barcode labels and the needed information is complex, the actual generation of the barcode labels, by material handlers or line operators is simple.

Besides entering information about the product that is being made, they need to select:

1. That a new container is being created (1)

2. The [#] button for print on demand barcode labels (2)

3. The number of labels being created for identical containers (such as pallets) being labeled at the same time.

4. Select the Label Name, in this case SSCC, from a drop-down list, if needed, and select Enter.

5. The system will create records for each container in its table of containers and assign a unique SSCC license-plate tracking barcode to each container.

6. BellHawk will then place printing request for each label into the Print Queue and the TAG BHBTI process will print them onto the printer designated in the BarTender label format file.

Creating and scanning pre-printed barcode labels follows a similar process, as is described in the TAG User's Manual.

Please note that since the writing of the TAG User's Manual all of the parameters of a selected data object, such as containers, can be printed on a label for that container. Also any data encoded in its UDP field of the container records, as Name:Value pairs in JSON format, can be printed on the barcode label. The available parameters for each data object can be viewed by using the system administrators DEXEL screens.