

# ISHIDA BC-3000

## Scale to Scale Communications

### Setup Procedure & Operating Instructions



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## Revision History

Date	Page	Description
March 2006		Initial publication
August 2006	2	Added RS-232 cable information

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## BC-3000 Scale to Scale Communications

### Overview

There are two methods available to interconnect the Ishida BC-3000 printing scales with important differences between the two. This document provides details to setup each of these two BC-3000 scale to scale networks.

The original method allows up to five BC-3000 scales to be connected. These scales only communicate during PLU programming and price changes. Note that Scale #1 does not support PC communications as part of the system. PLU and price changes must be programmed at Scale #1. In this document this system is referred to as a "No Master Board" system.

The new BC-3000 scale network utilizes a Master board which provides on-line communication between the Master and Satellite scales. Up to 30 Satellite scales can be connected to the Master scale. The Master board allows communication to the Satellite scales as well as a PC. This system is referred to as "With Master Board". Refer to Table 1 below for a summary of each system.

Feature	With Master Board	No Master Board
Maximum number of scales	31	5
PC Communications	Yes	No
Communication Method	On-Line	Download during programming
Ethernet communications	Optional, Master scale only	Not available

Table 1. Comparison of BC-3000 Scale Systems

### Communication Cables

#### Scale to Scale

A shielded 4-conductor twisted-pair cable is used to inter-connect the scales for both BC-3000 system types. The cable is terminated at a 9-Pin Sub-Miniature D-Type male connector. Grounding, if available, is made at only one point - the chassis of the Master scale (Scale #1). At the other scales the ground wires are "daisy chained" between the cables without connection to the scales. The ground cable at the last scale is not used.

Cable Pinout (straight through configuration)

```

Pair One   5 ----- 5 Data
           9 ----- 9 Data

Pair Two   3 ----- 3 Signal Ground
           7 ----- 7 Frame Ground
    
```

#### Scale to PC (RS-232)

A communication grade cable is required to connect a BC-3000 Master Scale to a PC. The pinout of the required standard, straight-through RS-232 cable is shown below.

PC (9 pin) [female]	Scale (25 pin) [male]
1 _____	8 (DCD)
2 _____	3 (Rx)
3 _____	2 (Tx)
4 _____	20 (DTR)
5 _____	7 (Signal Ground)
6 _____	6 (DSR)
7 _____	4 (RTS)
8 _____	5 (CTS)
9 _____	22 (RI)

**Note:** The mounting terminals for the I2NET and RS-232 connections are metric. The screws supplied with standard US DB9 and DB25 connectors should be replaced with the following metric screws:  
2.5mm x 12mm screws.

## BC-3000 Scale to Scale Communications

### Scale to Scale Communications with a Master Board

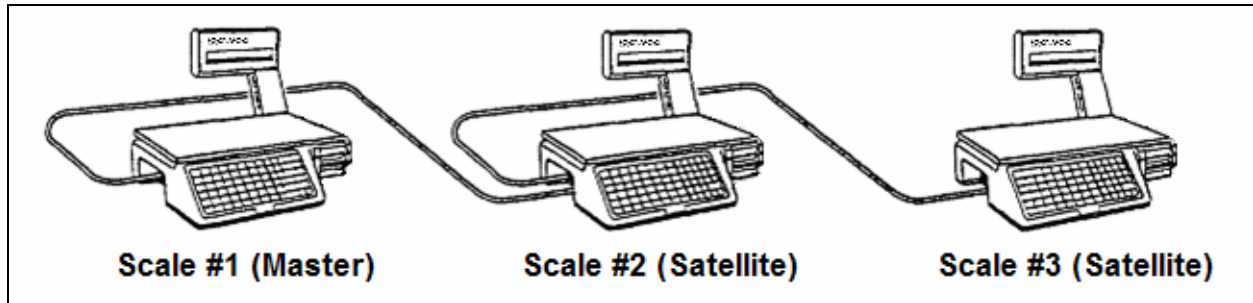


Figure 1. BC-3000 Master - Satellite System

#### System Configuration

- The BC-3000 on-line scale system allows connection of up to thirty-one (31) BC-3000 scales in one system.
- For this system a P-835 Master board must be installed in the Master scale. Please refer to section "Installing the Master Board (P-835) into a BC-3000 Master Scale" for instructions.
- All units are connected by I2NET cables. Please refer to section "Communication Cable" for I2NET cable specifications.
- Note that only BC-3000 scales may be interconnected. The BC-3000 cannot be connected as a Satellite scale to an AC-3000 Master scale.

#### Additional Components

The Master scale in the "With Master Board" system requires the following hardware to fully support Master scale communications.

Two additional harnesses:

- Part 88984 -- I2NET harness  
Connects: Two external I2NET DB9, Master board J3, and CPU board "I2NET"
- Part 88992 -- DC/DC Power harness  
Connects: CPU board CN12, Master Board J2, and Display junction board CN1

One of the following Master Board kits:

- Part 48744 -- Master Board Kit, 256K Memory
- Part 48745 -- Master Board Kit, 1M Memory

An Ethernet Communication option is available for the Master scale in the "With Master Board" system.

- Part 65104 -- Ethernet option, 10baseT communication

#### Firmware

Two versions of BC-3000 firmware support Master - Satellite on-line communications. One is the standard English dual-range weighing and the other is Chinese (Big-5) single-range weighing. All hardware is the same between the two systems. Only the firmware EPROMs installed in the scales is different. Note that the same EPROM version must be installed in each scale in a system.

The following table lists the firmware versions for each system.

	<b>English</b>	<b>Chinese (Big-5)</b>
Main EPROM	C1372x	C1312x
Font EPROM	F0194	F0254
Master EPROM	B0331x	C1099x*
* Note: DIP Switch 8 on Master Board must be set = ON		

Table 2. English vs. Chinese Firmware

## BC-3000 Scale to Scale Communications

### Installing the Master Board (P-835) into a BC-3000 Master Scale

#### Master Board Kit Components (Part No 48744 or 48745)

The kit includes the following parts.

- Master board (P-835) .....1
- Guide rails .....2
- Collar .....1
- M3 screw.....1
- Harness.....4 (use part 88984 - "I2NET harness")
- RS-232C Harness .....1
- Bracket.....1
- Hex mounting bolts .....2

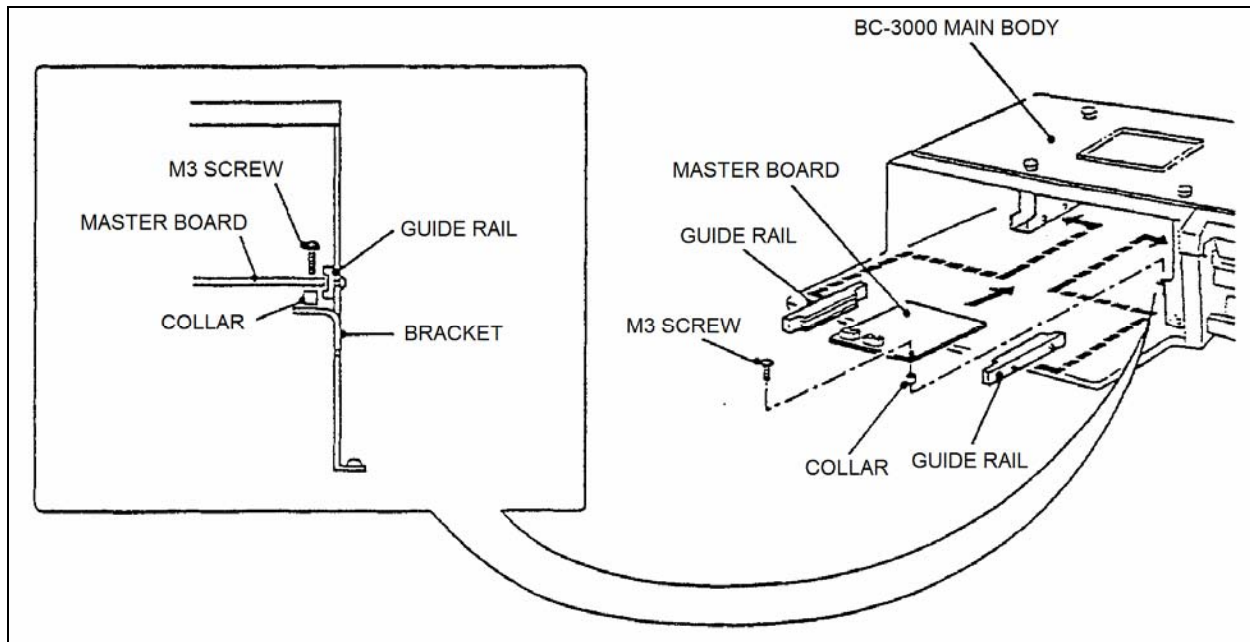


Figure 2. Installation of P-835 Master Board

#### Procedure

1. If necessary, replace the connector bracket on the left side of the BC-3000 to accommodate the 25-pin RS-232 harness. Or remove the existing 25-pin RS-232 harness that is connected to the CPU board.
2. Mount the RS-232C harness from the kit into the connector bracket on the left side of the BC-3000 using the two Hex mounting bolts.
3. Replace the I2NET harness with the new I2NET harness (Part 88984).
4. Connect the new I2NET harness to the CPU board connector marked "I2NET".
5. Replace the DC/DC Power harness with the new harness (Part 88992).
6. Mount the two rails as shown in Figure 2.
7. Install the appropriate EPROM in the Master Board. Refer to Table 2.
8. Move the Master board battery switch to the ON position.
9. For Chinese (Big-5) firmware (C1312x) set DIP Switch 8 to ON.
10. Connect the RS-232 harness to the Master board at J1.
11. Slide the Master board into the two rails.
12. Connect the new I2NET harness to the Master board at J3.
13. Connect the new DC/DC Power harness to the Master board at J2.
14. Place the plastic collar under the front, right corner of the Master board.
15. Secure the Master board using the M3 screw.

## BC-3000 Scale to Scale Communications

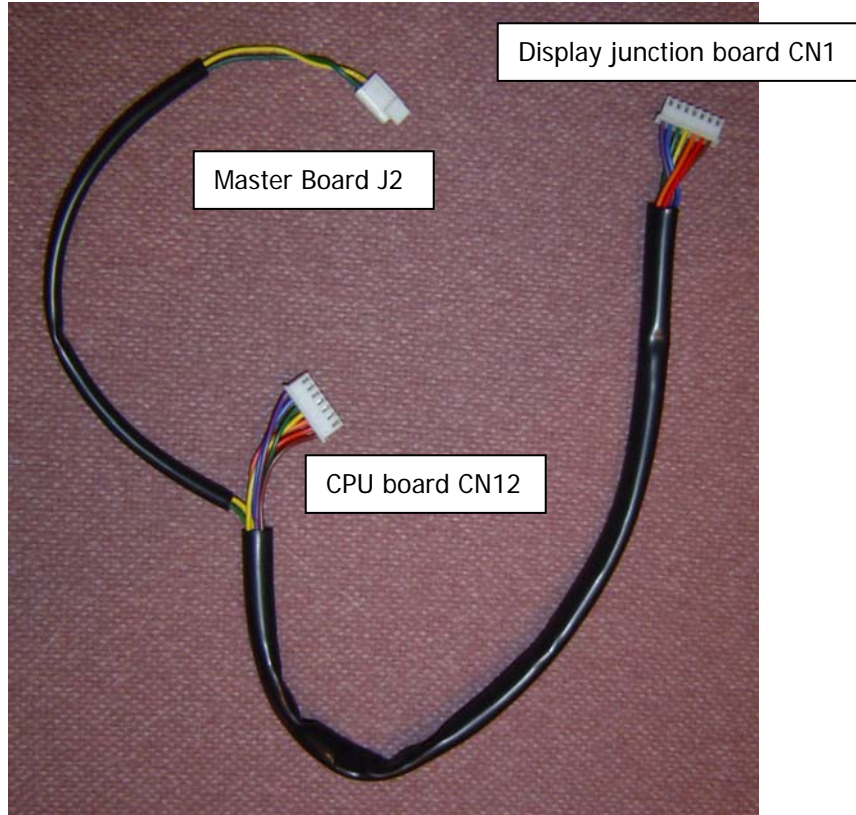


Figure 3. Part 88992 -- DC/DC Power harness

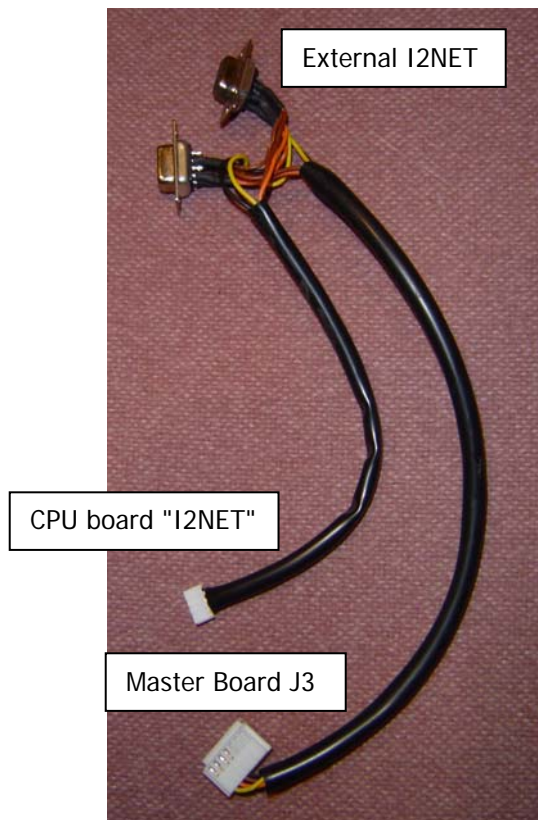


Figure 4. Part 88984 -- I2NET harness

## BC-3000 Scale to Scale Communications

### **Configuration Programming**

After the hardware has been added to the Master scale and the correct EPROMs installed, the scales must be configured to communicate. Each scale is set as either a Master or a Satellite. Then each scale is uniquely numbered and set "on-line". These configuration steps are listed below.

When the BC-3000 is upgraded to support Master - Satellite communications the memory must be cleared due to the changes to the memory structure. If the BC-3000 has data files that will be reused, make a back up of the files with the IF-21 Floppy Disk Recorder prior to clearing the scale's memory. Refer to the BC-3000 Service manual section S5.2 "Data Send/Load (C99)" for complete details.

To navigate the BC-3000 menus use the arrow keys (→←↑↓) and the **ENTER** key. To exit use the **END** and **MODE** keys.

### **Test Mode**

Enter the Test Mode to clear memory, assign the scales as either a Master or a Satellite, and transfer data files by the IF-21 Floppy Disk Recorder.

To access Test Mode turn on the power switch while holding down the **1** key. The display shows C00 indicating the Test Mode.

#### *Clear Memory (C2-01)*

This item is used clear all RAM data on the main CPU board.

Press **ZERO** twice. When all RAM data has been cleared, [OK] will be displayed.

#### *Clear Configuration (C2-01)*

This item is used clear all configuration data on the main CPU board.

Press **ZERO** twice. When all configuration data has been cleared, [OK] will be displayed.

#### *Test Set (C2-03)*

This item is used to write test data to the main CPU board memory.

Press **ZERO** twice. When Test Data has been created, [OK] will be displayed.

Note: this procedure is optional.

#### *Scale Mode (C08-02)*

This item is used to define whether the scale is used as a stand alone unit or is linked to a system as a Master or Satellite scale. Enter the number corresponding to the desired mode, then press **ENTER**.

**Note:** If the Master board memory is unformatted, the BC-3000 will move immediately to step C102-01 "Memory Clear" after selecting Scale Mode as Master Scale.

Scale Mode	Value
Stand Alone	1
Master Scale	2
Satellite Scale	3

Table 3. BC-3000 Mode Settings

#### *Program No. (C101-05)*

This item is used to display the firmware version number of the Master board.

#### *Clear Memory (C102-01)*

This item is used clear all RAM data on the Master board.

Press **ZERO** twice. When all RAM data has been cleared, [OK] will be displayed.



## BC-3000 Scale to Scale Communications

### *Test Set (C102-02)*

This item is used to write test data to the Master board memory.  
Press **ZERO** twice. When Test Data has been created, [OK] will be displayed.

### *Memory Check (C105-00)*

This item is used to check the amount of memory (in kilobytes) on the Master board.  
The first value is the Total Memory. The second value is the Remaining Memory.

### *Data Send/Load (C199)*

This item is used for data communication with an IF-21 Floppy Disk Recorder. All IF-21FD operations can be performed from the BC-3000 keyboard. Before attempting to transmit data, make sure the BC-3000 is connected to the IF-21 unit, and the scale and IF-21 power switches are ON. Refer to Table 4 for a list of the files that can be transmitted by the IF-21.

File Number	File Name	File Number	File Name
1	All Files	12	----
2	Master File <sup>#</sup>	13	----
3	E2ROM File <sup>+</sup>	14	Title File
4	PLU File <sup>*</sup>	15	Department File <sup>*</sup>
5	Store Name File <sup>*</sup>	16	Group File <sup>*</sup>
6	----	17	----
7	Extra Message File <sup>*</sup>	18	----
8	Operator File <sup>*</sup>	19	----
9	Preset Keys File	20	SubTotal File
10	Label Format File	21	Nutrition File <sup>*</sup>
11	Configuration File		
<sup>#</sup> Transmits files 4-9, 12-21 <sup>+</sup> Transmits files 10 and 11 <sup>*</sup> Compatible with AC-3000			

Table 4. IF-21 Floppy Disk Files.

### *File Transfer (C199-02)*

File Transfer is used to transmit, verify, and delete (from the floppy disk) data files.

**IMPORTANT:** The floppy disk must have been formatted using step **C99-03** prior to performing file transfers as described in steps C199-02-0x.

### *Select IF-21 Track No. (C199-02-01)*

Enter the number corresponding to the desired floppy disk track number (1-8), then press **ENTER**.

### *Send (C199-02-02)*

This item is used to transmit data from the scale to an IF-21 Floppy Disk Recorder.  
Enter the number corresponding to the file(s) to be sent, then press **ENTER**.  
To start transmission press **PRINT**.

### *Receive (C199-02-03)*

This item is used to receive data from an IF-21 Floppy Disk Recorder.  
Enter the number corresponding to the file(s) to be received, then press **ENTER**.  
To start reception press **PRINT**.

### *Verify (C199-02-04)*

This item is used to compare data files between the IF-21 Floppy Disk Recorder and BC-3000.  
Enter the number corresponding to the file(s) to be compared, then press **ENTER**.  
To execute press **PRINT**.

## BC-3000 Scale to Scale Communications

### *Delete (C199-02-05)*

This item is used to delete all files.

Press **ZERO** twice. All files will be deleted.

### **Programming Mode**

Enter the Programming Mode assign the scale number and set the scale on-line or off-line.

To access Programming Mode enter the password 9000 and press the MODE key. The display shows P00 indicating the Programming Mode. Note that 9000 is the default password but it can be changed.

### *Scale Number (P17-01)*

This item is used to assign a unique number to each scale. The Master scale must be assigned #1. The remaining scales are assigned numbers 2 ~ 31. Note that the scale number will be display during power up and after exiting any menu.

### *On-Line Mode (P19-01)*

This item is used to set the scales either on-line or off-line. Set the value as "1" (on-line) or "0" (off-line). Note that the BC-3000 will display the current On-Line setting during power up and after exiting any menu.

### *Download (P20)*

This item is used to manually download data files from the Master board memory to the Satellite scale memory. The Download procedure is performed at the Satellite scale. Note that the Download can also be done at the Master scale to copy data files from the Master board to the Master scale's main CPU board memory. Refer to Table 5 to select the desired file and press the COPY key to execute. The items are counted on the display and "PASS" is displayed after the download is complete.

<b>File Number</b>	<b>File Type</b>
P20-01	PLU File
P20-02	Store Name/Address File
P20-04	Extra Message File
P20-05	Department File
P20-06	Group File
P20-07	Operator File
P20-08	Preset Keys File
P20-10	Title File*
P20-14	Receipt Barcode File*
*Not supported by BC-3000	

Table 5. List of Files to be Downloaded from the Master.

## BC-3000 Scale to Scale Communications

### Communication Settings

Refer to Table 6 for the various communication settings used by the BC-3000.

<b>Setting</b>	<b>Standard USA [C1372x]</b>	<b>Chinese (Big-5) [C1312x]</b>
Master Board	DIP Switch 8 = Off	DIP Switch 8 = On
Baud Rate ROM Switch	26 = 00 (9600, default) = 01 (2400) = 02 (4800) = 03 (9600) = 04 (19200) = 05 (38400)	1F = 00 (9600, default)
ScaleLink Pro, RS-232	Baud Rate = see ROM Sw 26 Date Bits = 7 Parity = Even Stop Bits = 1	Baud Rate = 9600 Date Bits = 8 Parity = None Stop Bits = 1
ScaleLink Pro, Ethernet	Do not check select "Assume 8-bit comms...".	Select "Assume 8-bit comms...". If not, scale will connect but fail when data are transmitted.
UDS-10 (Ethernet Converter)	I/F mode = "78"	I/F mode = "4C"

Table 6. BC-3000 Communication Settings.

### Label Formats

The default label formats for the standard US firmware and the Chinese (BIG-5) firmware are different. Refer to Table 7 below for the list of default label formats.

<b>Firmware</b>	<b>Description</b>
C1372x / F-0194x <i>USA Standard, Dual-Range Weighing</i>	Format #1: 60mm x 44mm Format #2: 64mm x 47mm Format #3: 64mm x 85mm, Safe Handling Format #4: 64mm x 59mm, Safe Handling
C1312x / F0254x <i>Chinese (BIG-5)</i>	Format #1: 60mm x 44mm Format #2: 64mm x 67.5mm Format #3: 64mm x 79mm, Nutrition + non-standard Barcode Format #4: 64mm x 85mm Coupon

Table 7. Label Formats for BC-3000 scales.

## BC-3000 Scale to Scale Communications

### Chinese (Hong Kong) firmware (version C1312x) - Special RAM Clear

#### Background

When special Chinese (Hong Kong) firmware (version C1312A) is installed in the BC-3000 it may not be possible to perform the standard memory clear procedure. This is because the firmware memory structure is significantly different from the standard USA firmware. This procedure covers the "special" memory clear procedure.

#### Procedure

1. Remove the keyboard assembly and turn off the battery switch located on the main CPU board.
2. Wait 15 minutes for the circuit to fully discharge.
3. Turn on the battery switch and reassemble the keyboard assembly.
4. Hold down the **HELP** key (top, right corner) and turn on the power.  
"TEST" is displayed.
5. Key in **4141** and press the **ENTER** key.  
"C02-01" is displayed.
6. Press the **DOWN ARROW** key.  
"C02-02" is displayed.
7. Press the **ZERO** key twice.  
"PASS" is displayed.
8. Press the **END** key and turn off the power.
9. Enter the normal Test Mode:  
Hold down the **1** key and turn on the power. "C00" is displayed.
10. Perform the standard memory clear:
  - a. Press the **2** key followed by the **ENTER** key.  
"C02-01" is displayed.
  - b. Press the **ZERO** key twice. [RAM Clear]  
"PASS" is displayed.
  - c. Press the **DOWN ARROW** key.  
"C02-02" is displayed.
  - d. Press the **ZERO** key twice. [E2ROM Clear]  
"PASS" is displayed.
11. Press the **END** key and turn off the power.

#### Notes

- This special procedure involving the **HELP** key and "4141" password is not available in the standard USA BC-3000 firmware.
- This procedure should also be followed if the BC-3000 memory becomes corrupted to the point that the standard memory clear does not work.

## BC-3000 Scale to Scale Communications

### Scale to Scale Communications without a Master Board

The BC-3000 firmware listed in Table 8 supports connecting up to five scales. When PLU related data such as Price Changes, Extra Messages, and Nutrition are programmed at Scale #1 the changes are automatically transmitted down to the other scales. Please refer to the Overview section below for a complete list of features and limitations of this "No Master Board" system.

Firmware	Description
B-0312x / F-0194x	Standard, Dual-Range Weighing
B-0209x / F-0194x	Standard, Single-Range Weighing
C-0840x / F0208x	Korean/English, Single-Range Weighing
C-0877x / F-0218x	Chinese/Japanese/English, Single-Range Weighing

Table 8. BC-3000 Firmware.

### Overview

A BC-3000 system without a Master board has limited communication capabilities as compared to a system with a Master board. Important system considerations are listed here.

- PLU and Price Changes programmed at Scale #1 are instantly sent to the other scales that is connected and set "on-line".
- After programming, Scale #1 and all of the remaining scales contain identical PLU files in their memory.
- If scales #2 through #5 are not connected or are turned off or are set "off-line" the changes cannot be registered into their memory.
- The memory from Scale #1 cannot be downloaded or retransmitted to the memory of any other scale.
- A maximum of five scales (Scale #1 plus four other scales) may be connected.
- PC communications is not supported by a "No Master Board" system. Scale #1 cannot communicate with a PC and simultaneously download the data to the remaining Satellite scales.

### Configuration

Three separate memory areas of each BC-3000 scale must be configured to allow communications.

#### A. Test Menu

Step 06-01: ROM Switch [Access by powering up holding 1 key, 6, ENTER]

Set the on-line flag in all scales:

Address 2D = 1

[Access by entering the address and pressing the → key]

Identify Satellite scales (in Scale #1 only)

Address 2E = 2

Address 2F = 3 (only if a third scale is connected)

Address 30 = 4 (only if a fourth scale is connected)

Address 31 = 5 (only if a fifth scale is connected)

#### B. Programming Menu

Step P17-01: Scale Number. [Access by password 9000, MODE, 17, ENTER]

Scale #1 = 1

Remaining Scale2 = 2 ~ 5

Step P19-01: On-Line Mode. [Access by password 9000, MODE, 19, ENTER]

On-Line = 1

Off-Line = 0

## BC-3000 Scale to Scale Communications

### Communication Cable

Refer to the Communication Cable information on Page 2 of this document for details and specifications of the scale to scale communication cable.

### Programming

The following programming steps are available at Scale #1 only:

- 1 - PLU Editing
- 2 - PLU Name
- 22 - Price Changes

### Operation

A BC-3000 system scale operates the same as a normal stand-alone machine.

### Totals

A BC-3000 system scale operates the same as a normal stand-alone machine. Totals must be taken at each machine separately.

### Errors

If a Satellite scale is not communicating scale #1 will display:

On Line Error No X

where X is the Satellite number that is not communicating.

### Label Formats

The default label formats differ depending on the weighing method: Single-Range vs. Dual-Range. Refer to Table 9 below for the list of default label formats.

Firmware	Description
B-0312x / F-0194x <i>Standard, Dual-Range Weighing</i>	Format #1: 60mm x 44mm Format #2: 64mm x 47mm Format #3: 64mm x 85mm, Safe Handling Format #4: 64mm x 59mm, Safe Handling
B-0209x / F-0194x <i>Standard, Single-Range Weighing</i> C-0840x / F0208x <i>Korean/English, Single-Range Weighing</i> C-0877x / F-0218x <i>Chinese/Japanese/English, Single-Range Weighing</i>	Format #1: 60mm x 44mm Format #2: 64mm x 47mm Format #3: 64mm x 85mm, Safe Handling Format #4: 64mm x 37mm, non-Barcode

Table 9. Label Formats for "No Master Board" BC-3000 scales.

### Miscellaneous

If a scale is to be removed from the system, reset its ROM switch number 2D = 0. Refer to Step A in **Setup** section above.