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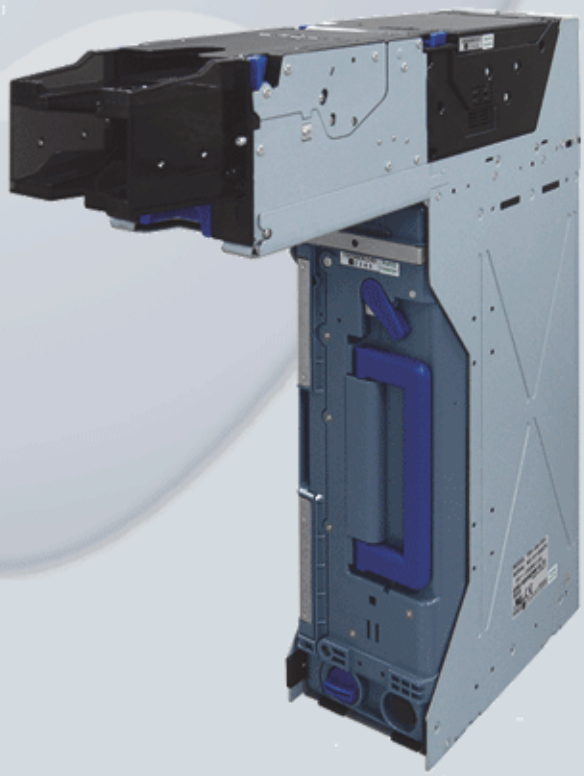
TBV® Series

Transaction Based Validator

Operation and Maintenance Manual

(Revision 2)



P/N 960-100926R_Rev. 2 {EDP #148849}

a RoHS Compliant Product

Issue #4060-SME-01-02

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REVISION HISTORY			
Rev №.	**Date**	**Reason for Update**	**Comment**
A	2/14/11	**Initial Version**	
1	12/08/11	**Added FSH ICB, FLD, GSH and GLD Specification**	
2	3/13/15	**Added TBV Unit Clearance Dimension, JCM Tool Suite Standard Edition Model, TBV Single Bezel Assy. Exploded View & Parts List, ICB Error Codes, Sensor Calibration Error Codes.**	

International Compliance

- RoHS Directives or or or or
- UL & c-UL Marks **File No. E142330**
- CE Mark
- CB Scheme JPULA-03013
- FCC Directives

FCC WARNING
Changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.
FCC NOTICE
This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment.
This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at his own expense.
IC NOTICE
This class A digital apparatus complies with Canadian ICES-003.
Cet appareil numerique de la classe A est conforme a la norme NMB-003 du Canada.

Electrical Current Symbol

Direct Current: ⎓ indicates Direct Current values on product labels.

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Transaction Based Validator
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TBV® Series
Transaction Based Validator
Section 1

1 GENERAL INFORMATION

Description

This section provides a general overview of the TBV® Series Transaction Based Validator pictured in Figure 1-1. This first section is designed to help you navigate through this guide with ease and provides the following information:

- TBV Units
- Model Descriptions
- Type Descriptions
- Software Descriptions
- Precautions
- Primary Features
- Component Names
- Specifications
- Unit Dimensions
- Technical Contact Information.

In order to make operation of this device easier and make navigation within this manual simpler, the following illustrations were used within the text:

- **Safety Instructions,** which need to be observed in order to protect the operators and equipment, have been written in **Bold** text and have been given the pictographs:
- **Special *Notes,*** which effect the use of the Banknote Validator, have been written in *italic* text and have been given the pictograph:
- **Steps,** requiring the operator to perform specific actions are given sequential numbers (1., 2., 3., etc).

TBV Units

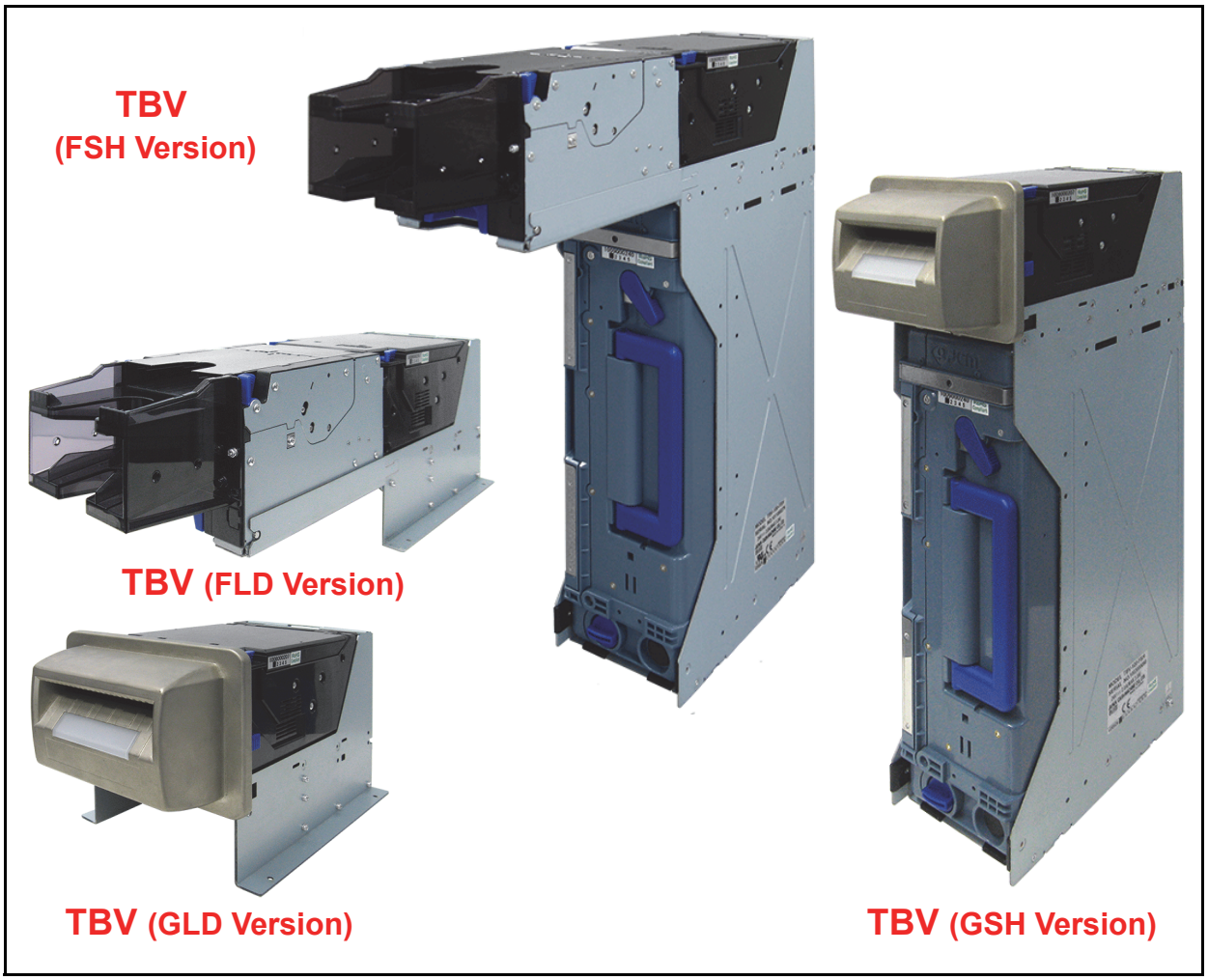


Figure 1-1 TBV Unit Versions Available

Model Descriptions

Table 1-1 lists the Product Model Number Descriptions.

Table 1-1 TBV Model Number Specifications

Nº	Model: TBV - * * * - * * * Nº (1) (2)(3)(4) (5)(6)(7)
(1)	Product Series Name
(2)	Validate Sensor 1 = World Wide Type 1 (Standard) 2 = World Wide Type 2
(3)	Option Board 0 = None (Standard)
(4)	Centering Unit 0 = Feature (Guide Width 60 - 85mm) 1 = None (USA Dollar 66mm only)*
(5)	Accessory Unit F = BNF Unit G = Shutter Unit† A = Reserved
(6)	Stacker Type SH = Horizontal Stacking Mechanism LD = No Stacking Mechanism
(7)	Box Access 0 = Front Access Frame (Standard)‡ R = Rear Access Frame

*. The BNF Section Guides, Validation Section and Bezel width dimensions are all equal in size.

†. Centering Unit is required. Without Centering Unit is not an option.

‡. "0" can be omitted.

Type Descriptions

Table 1-2 lists the Product Type Number Descriptions.

Table 1-2 TBV Type Specifications

Nº	Type: * * * * * - * * * Nº (1)(2)(3)(4)(5)(6)(7)(8)
(1)	Cash Box Capacity* 0 = No Cash Box K = 2,000 notes
(2)	Cash Box Option 0 = Thumb Twist Lock Knob (Standard) 1 = Sealing
(3)	ICB 0 = None (Standard) 1 = Optical Transport Method
(4)	Bezel Type 0 = None 1 = Plastic (Standard) 2 = Metal 3 = Plastic, 79mm (Incorrect Coin Insertion Prevention)
(5)	I/F Harness 0 = None 1 = Standard (RS232C, Photo-Coupler, ccTalk) 2 = USB Interface†
(6)	Reserved
(7)	Reserved
(8)	Reserved

*. The numbers of stacked Notes depends on the Banknote's condition.

†. The corresponding Transport Unit and Software are required. Contact your local JCM Representative for details.

Software Descriptions

Table 1-3 lists the Software Number Descriptions.

Table 1-3 TBV Software Number Specifications

Nº	Software: TBV- *** *** * * * - * * * - V * . * * Nº (A) (B) (C) (D)
(A)	Software Model Name
(B)	Denomination (Country Code)*
(C)	Interface Protocol Name
(D)	Software Version

*. The Country Code is indicated by three (3) Alphabetical Characters following the JIS Standard.

Precautions

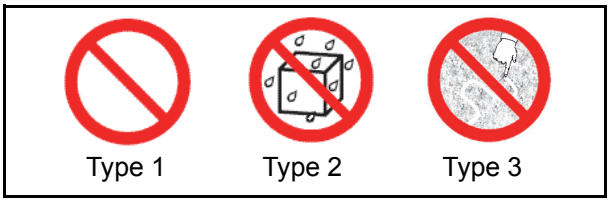


Figure 1-2 Precautionary Symbols

The Figure 1-2 symbols are defined as follows:

1. (Type 1) Do not insert a torn, folded, or wet Banknote, as this action may cause a Banknote jam inside the unit.
2. (Type 2) Do not expose the unit to water. The unit contains several precision electronic devices which can be damaged if water or any liquid is sprayed or spilled into the unit.
3. (Type 3) Do not install the unit into a dusty environment. Dust may affect and degrade the sensor's performance.

USER CAUTIONS

Careful measures are taken in this product to ensure its quality, however, the following cautions should be read and understood by all users in order to confirm safe operation.

Installation Cautions

1. Do not allow the Unit to endure or operate at a high temperature, in high humidity and/or in a dusty environment.
2. Do not install the Unit into an area where excessive vibration or shock are present.
3. This equipment is not full warranted for outdoor use. Be sure that the Host Machine contains enough protection to avoid wet or dusty conditions when installing it in both open-air and indoor space.
4. Avoid exposing the Unit to direct Sunlight and/or incandescent Lamp illumination having a Gradient Angle of 15 Degree or more, and an illumination index of 3,000 Lux or less.
5. Insure that the Host Machine is designed for daily operational access such as maintenance and/or clearing a Banknote Jam.
6. When installing the equipment, connect the Frame Unit to the Frame Ground of the Host Machine.

7. Be sure to connect the Ground Wire of the Interface Connector to the Chassis Frame Ground.

Mounting, Dismounting & Transportation

1. Be sure to turn the Power OFF before mounting or removing the Unit from its permanent location. Plugging or unplugging Connector Plugs from their receptacles while the Power is ON may cause damage to the Unit.
2. When reassembling a disassembled Unit Section, ensure that each part is properly placed in its correct location.
3. Be sure to carry the Unit by both hands when transporting it. Holding the Unit by one hand may cause personal injury if the Unit accidentally becomes disassembled and falls apart.
4. Be careful not to use excessive outside pressure on the Unit, or subject it to excessive vibration during transportation.
5. Be careful not to exert external pressure on the equipment without the Cash Box in place. Strong pressure on the Frame may cause it to distort.
6. When installing the Unit ensure that additional pressure from the Host Machine does not exist, otherwise the Unit's performance will degrade and reading errors and/or Banknote Jams may occur.

Handling

1. Do not drop or severely pound on the Cash Box. The Banknotes in the Cash Box may become unstacked. Operate the Unit after the Cash Box is seated so the Banknotes within will stack properly to avoid Banknote Jams.
2. Do not restore Banknotes into the Cash Box.
3. Do not insert more than a single Banknote into the Insertion Slot. This action may cause damage to the Unit (e.g., in the GSH and GLD Versions).
4. Do not insert any objects into the insertion slot (i.e., coins, receipts, paper clips, rubber bands, cards and etc.) except Banknotes or Barcode Ticket/Coupons. Placing foreign objects into the Insertion Slot may cause damage to the Unit.

Preventive Maintenance

1. Be sure to turn the Power OFF before beginning a Maintenance Procedure. The equipment produces improper operating signals while in maintenance mode that may cause personal injury.
2. If the Validator section is dirty due to dust, foreign objects or other such debris adhering to it, the Banknote acceptance rate will degrade. Clean the Unit once a month to keep its performance stable.
3. Use a soft, lint-free cloth, Cotton swab or Compressed Air spray to clean dust and debris from the Banknote transportation path.
4. Perform cleaning and maintenance regularly when using the equipment in places where excessive Automobile exhaust emission or Cigarette Smoke may exist.
5. Be sure that the Guide or individual Unit Sections are properly placed in their correct location following a maintenance procedure.
6. Do not redesign or disassemble the Unit. Unauthorized use by inadequately trained personnel, or use outside the original manufacture's intent for operation voids the warranty.

> ⚠ **Caution: Do not use any Alcohol, thinner or citrus based products for cleaning any surfaces. The Lenses can become clouded by chemical effect that may cause acceptance errors. Use a lint-free, slightly damp with water, cloth to clean the BNF Rollers only.**

Unacceptable Banknote

1. The following Banknote types may not validate correctly, or can cause a Banknote jam and/or damage to the Unit's Transport path. Banknotes exhibiting the conditions listed below and illustrated in Figure 1-3 should be avoided:
   - torn
   - excessive folds or wrinkles
   - dirty
   - curled
   - wet
   - containing foreign objects and/or oil

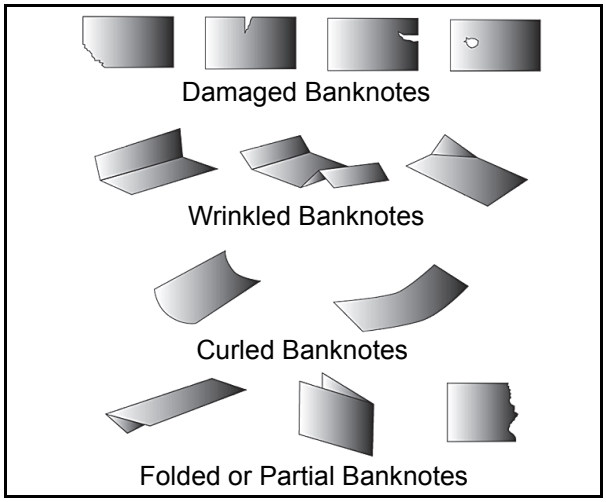


Figure 1-3 Unacceptable Banknotes

2. When inserting a stack of Banknotes, Flip-over and Fan-Flip the Banknotes; especially the new or nearly new Banknotes to insert air in-between them so they do not stick together when inserted into the Bezel (Figure 1-4).

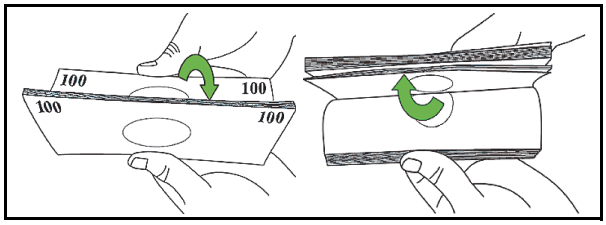


Figure 1-4 Fan-Flipping Banknotes

3. When inserting Banknotes of mixed sizes into the Bezel, align the leading edge of the banknotes before placing in the BNF. (Figure 1-5).

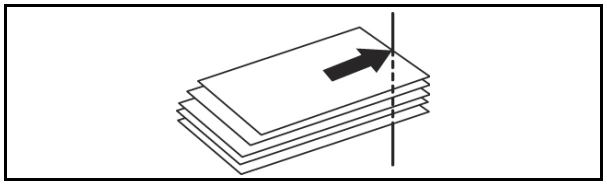


Figure 1-5 Aligning Banknotes Edges

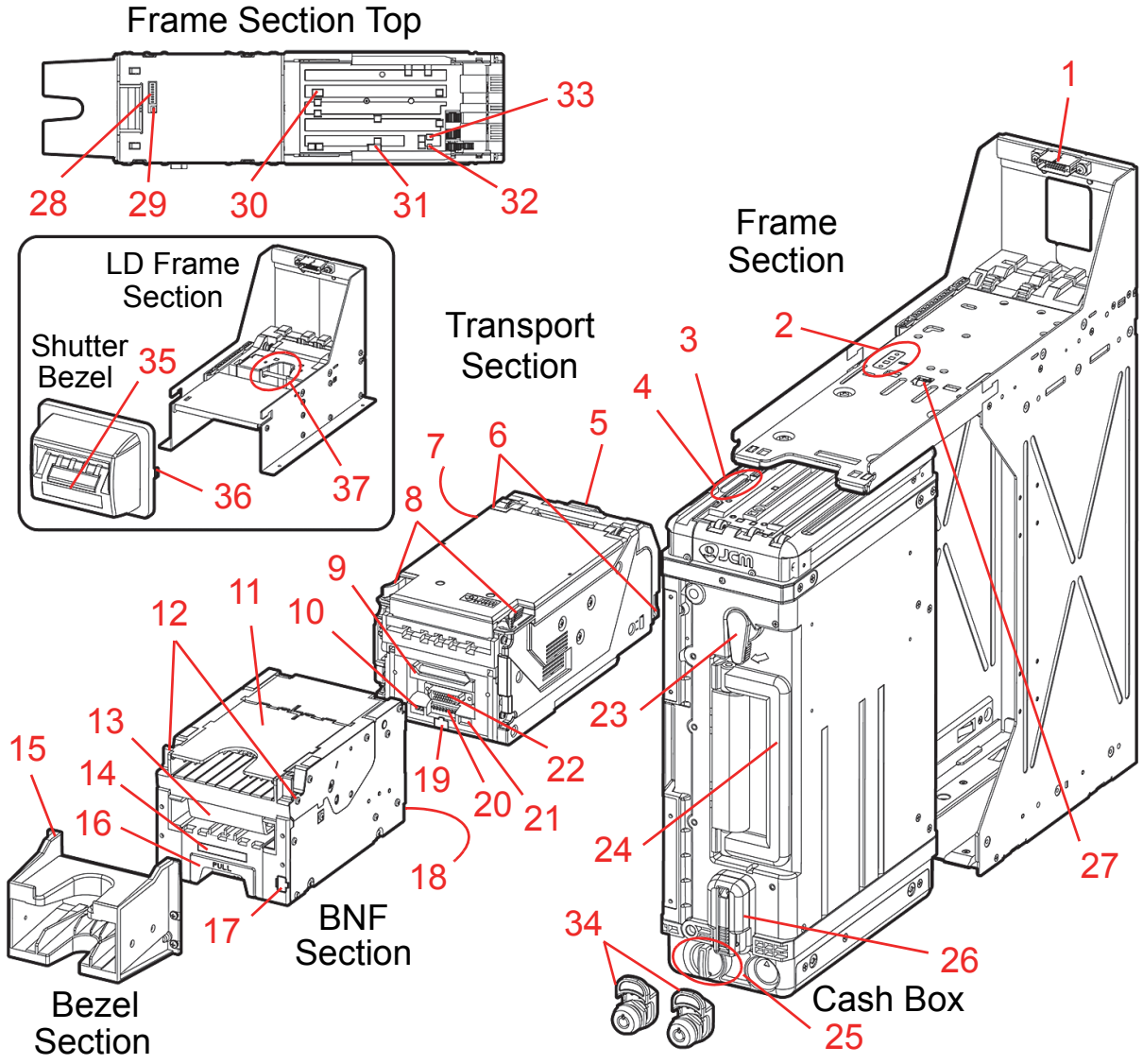
Primary Features

The TBV Series of Banknote Validator contains the following primary features:

- Ability to intake 50 Banknotes at a time.
- High Validation capability using the Centering Mechanism and its own high precision Sensors.
- Able to stack up to 2,000 Banknotes in the plastic Cash Box (only SH Models).

Individual Component Names & Locations

Figure 1-6 illustrates the various TBV Component Names and Locations.



1. Interface Connector
2. Cash Box Lock Lever (Back Side)
3. ICB Sensor Lens Assembly (Option)
4. ICB Power Switch (DS7) (Option)
5. Transport Signal Connector
6. Transport Section Rear Guide Latch
7. Centering Release Port (Back Side)
8. Transport Section Front Guide Release Latch
9. Transport Section Release Lever
10. LED Indicator (Green/Yellow/Red)
11. Return Path Open/Close Cover
12. BNF Guide Latch
13. Pusher Plate
14. BNF LED Indicator (Full Color Range)
15. Bezel (Standard)
16. BNF/Transport Section Release Lever
17. USB Connector Port
18. BNF Connector (Back Side)
19. Transport USB Connector Port
20. Denomination INHIBIT/ACCEPT Switches (DS3 [Set identical as DS1])
21. Bezel LED Indicator Connector
22. Transport Signal Connector
23. Cash Box Release Lever
24. Cash Box Handle
25. Thumb Twist Lock Knob (replaced by Optional Lock)
26. Gasket Seal Assembly (Option)
27. Cash Box Lock Lever (Back Side)
28. Set BNF Buzzer Volume Switches (DS2)
29. Denomination INHIBIT/ACCEPT Switches (DS1 [Set identical as DS3])
30. TBV Centering Mechanism ON/OFF & Select Communication Interface Switches (DS4)
31. ICB Sensor
32. TBV Photo-Coupler/RS232 Interface Selection Switch (DS5)
33. TBV Option Memory Selection Switches (DS6)
34. Lock & Key Assembly (Option)
35. Shutter LED Indicator (Full Color Range)
36. Shutter/Transport Unit Release Lever
37. LD Guide Latch (On LD Frame only).

Figure 1-6 TBV Component Names

Specifications (TBV FSH Version Specification)

FSH TECHNICAL SPECIFICATIONS

Table 1-4 TBV FSH Version Technical Specification

Acceptance Rate:	98% or greater Note: The following banknote types are excluded: a) Worn, dirty wet, stained, torn or excessively wrinkled Banknotes b) Double (dual) Banknotes c) Banknotes with adhering oil or iron powder d) Banknotes having folded corners or edges e) Banknotes with excess or inadequate Magnetism or unclear Graphics f) Banknotes having the wrong cut dimensions or printing displacement g) Banknotes having excessive fold lines or specific Banknote processing machine damage.
Bill Types Accepted:	Long side: 110~170mm (4.33~6.69 in.) Short side: 60~85mm (2.36~3.35 in.)
Barcode Coupon*:	Standard Specification a) Read code interleave interval: 2 of 5 b) Narrow Bar: 0.5mm-0.6mm (0.019-0.023 in.) c) Wide Bar: Narrow Bar = 3:1 d) Characters: 18 Characters e) Print Position: Middle (Coupon divided equally from the left, right, top and bottom of the Coupon's center) f) Print Width: Wider than 10mm (0.39 in.) g) Thickness: 0.1mm
Batch:	Up to 50 Notes
Insertion Direction:	Banknote: Four-way Barcode Coupon: Two way (Barcode Surface Up Only)
Processing Speed†:	TBV-101-FSH (Fixed Type): • **Banknote** - Approximately 1.3 seconds/note from Banknote insertion to Escrow. - Approximately 1.7 seconds/note between the first and next Banknote insertion during a sequential insertion operation. • **Barcode Coupon/Double Read‡** - Approximately 3.0 seconds/note from Coupon insertion to Escrow. - Approximately 3.7 seconds/note between the next Coupon insertion during a sequential insertion operation. • **Barcode Coupon/Single Read‡** - Approximately 1.3 seconds/note from Coupon insertion to Escrow. - Approximately 2.0 seconds/note between the next Coupon insertion during a sequential insertion operation. TBV-100-FSH/TBV-200-FSH (Centering Type): • **Banknote** - Approximately 1.6 seconds/note from Banknote insertion to Escrow. - Approximately 2.0 seconds/note between the next Banknote insertion during a sequential insertion operation. • **Barcode Coupon/Double Read‡** - Approximately 3.5 seconds/note from Coupon insertion to Escrow. - Approximately 4.2 seconds/note between the next Coupon insertion during a sequential insertion operation. • **Barcode Coupon/Single Read‡** - Approximately 1.6 seconds/note from Coupon insertion to Escrow. - Approximately 2.3 seconds/note between the next Coupon insertion during a sequential insertion operation.
Validation Method:	Optical (6 Illumination Types, [Transmissive/Reflective]) and Magnetic
Diagnostic Indicators:	LED Full Color Range
Escrow:	1 Note
Anti-stringing Mechanism:	Optical Sensor & Pusher Mechanism
Cash Box Type**:	Simplified Security Cash Box Intelligent Cash Box (Option)
Cash Box Capacity††:	Approximately 2,000 Notes (New Banknote) (Nearly Full = Approximately 1,800 Notes)
Interface:	Photo-Coupler Isolation, RC232C, ccTalk, USB (Full Speed)

*. Refer to the specific Country's "Barcode Coupon Specification" Sheet for more details.

†. The time between the first Banknote's insertion to the next sequential Banknote insertion operation.

‡. The Barcode Ticket/Coupon Reading Specification can be changed by DIP Switch Settings.

**.User supplied installed Locks (including the attached Plate, Lock and Key).

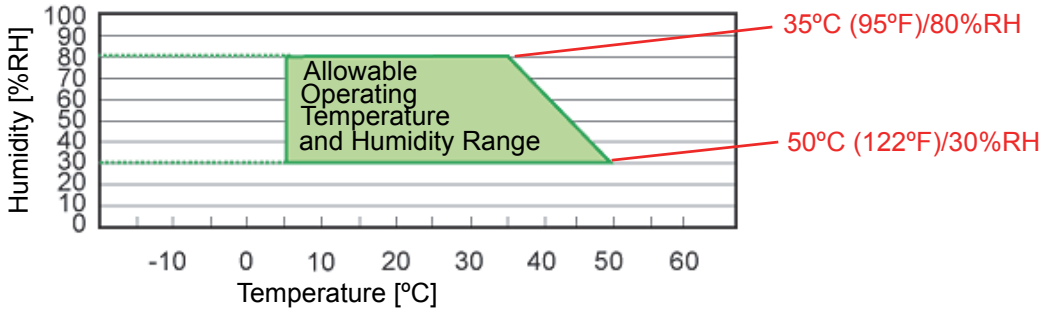
††.The number of Notes stacked depends on the Banknote's condition.

FSH Environmental Specifications

Table 1-5 TBV FSH Version Environmental Specification

Operating Temperature:	+5ºC to +50ºC (41ºF to 122ºF)
Storage Temperature:	-20ºC to +60ºC (-4ºF to 140ºF)
Relative Operating Humidity:	30% to 80% RH (non-condensing)
Relative Storage Humidity:	30% to 80% RH (non-condensing)
Visible Light Sensitivity:	Avoid contact with direct sunlight (Interior lighting must be incandescent with a Radiant Angle of 15 Degree or more having an Illumination index of 3000 Lux or less)
Installation:	Indoors Only, No Cabinet Vibration

FSH Hydrothermal Condition Table



FSH Electrical Specifications

Table 1-6 TBV FSH Version Electrical Specification

Supply Voltage:	24VDC ±5% (Greater than 4.1A [100W] Recommended)
Current Consumption:	Standby = Approximately 0.2 A Operation = Approximately 2.0 A Peak = Approximately 3.3 A (Maximum 3 seconds)

FSH Structural Specifications

Table 1-7 TBV FSH Version Structural Specification

Weight:	Approximately 12kg (26.46lbs)
Mounting:	Horizontal
Outside Dimensions:	See “TBV FSH Version Entire Unit Outside Dimensions” on page 1-14 of this Service Manual.

Specifications (TBV GSH Version Specification)

GSH TECHNICAL SPECIFICATIONS

Table 1-8 TBV GSH Version Technical Specification

Acceptance Rate:	98% or greater Note: The following banknote types are excluded: a) Worn, dirty wet, stained, torn or excessively wrinkled Banknotes b) Double (dual) Banknotes c) Banknotes with adhering oil or iron powder d) Banknotes having folded corners or edges e) Banknotes with excess or inadequate Magnetism or unclear Graphics f) Banknotes having the wrong cut dimensions or printing displacement g) Banknotes having excessive fold lines or specific Banknote processing machine damage.
Bill Types Accepted:	Long side: 110~170mm (4.33~6.69 in.) Short side: 60~85mm (2.36~3.35 in.)
Barcode Coupon*:	Standard Specification a) Read code interleave interval: 2 of 5 b) Narrow Bar: 0.5mm-0.6mm (0.019-0.023 in.) c) Wide Bar : Narrow Bar = 3:1 d) Characters: 18 Characters e) Print Position: Middle (Coupon divided equally from the left, right, top and bottom of the Coupon's center) f) Print Width: Wider than 10mm (0.39 in.) g) Thickness: 0.1mm
Insertion Direction:	Banknote: Four-way Barcode Coupon: Two way (Barcode Surface Up Only)
Processing Speed†:	TBV-100-GSH (Centering Type Only): • Banknote - Approximately 2.0 seconds/note from Banknote insertion to Escrow. - Approximately 3.0 seconds/note between the next Banknote insertion during a sequential insertion operation. • Barcode Coupon/Double Read‡ - Approximately 4.0 seconds/note from Coupon insertion to Escrow. - Approximately 4.9 seconds/note between the next Coupon insertion during a sequential insertion operation. • Barcode Coupon/Single Read‡ - Approximately 2.0 seconds/note from Coupon insertion to Escrow. - Approximately 3.0 seconds/note between the next Coupon insertion during a sequential insertion operation.
Validation Method:	Optical (6 Illumination Types, [Transmissive/Reflective]) and Magnetic
Diagnostic Indicators:	LED Full Color Range
Escrow:	1 Note
Anti-stringing Mechanism:	Optical Sensor & Shutter
Cash Box Type**:	Simplified Security Cash Box Intelligent Cash Box (Option)
Cash Box Capacity††:	Approximately 2,000 Notes (New Banknote) (Nearly Full Approximately 1,800 Notes)
Interface:	Photo-Coupler Isolation, RC232C, ccTalk, USB (Full Speed)

*. Refer to the specific Country's "Barcode Coupon Specification" Sheet for more details.

†. The time between the first Banknote's insertion to the next sequential Banknote insertion operation.

‡. The Barcode Ticket/Coupon Reading Specification can be changed by DIP Switch Settings.

**.User supplied installed Locks (including the attached Plate, Lock and Key).

††.The number of Notes stacked depends on the Banknote's condition.

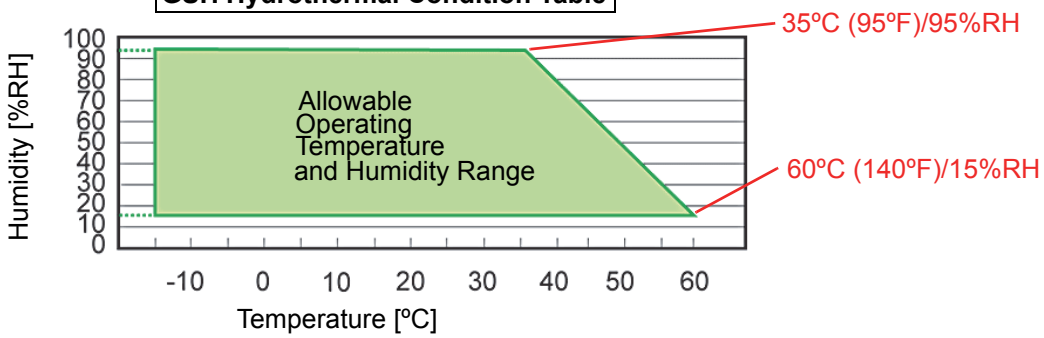
GSH Environmental Specifications

Table 1-9 TBV GSH Version Environmental Specification

Operating Temperature:	-15ºC to +60ºC (5ºF to 140ºF)
Storage Temperature:	-20ºC to +60ºC (-4ºF to 140ºF)
Relative Operating Humidity:	15% to 95% RH (non-condensing)
Relative Storage Humidity:	15% to 95% RH (non-condensing)
Visible Light Sensitivity:	Avoid contact with direct sunlight (Interior lighting must be incandescent with a Radiant Angle of 15 Degree or more having an Illumination index of 3000 Lux or less)
Installation:	Indoors or Outside (Bezel Portion Only)*, No Cabinet Vibration

*. NOT exposed to the elements, including the internal Unit Assemblies.

GSH Hydrothermal Condition Table



GSH Electrical Specifications

Table 1-10 TBV GSH Version Electrical Specification

Supply Voltage:	24VDC ±5% (Greater than 4.1A [100W] Recommend)
Current Consumption:	Standby = Approximately 0.16 A Operation = Approximately 1.0 A Peak = Approximately 3.7 A (Maximum 3 seconds)

GSH Structural Specifications

Table 1-11 TBV GSH Version Structural Specification

Weight:	Approximately 10.2kg (22.48lbs)
Mounting:	Horizontal
Outside Dimensions:	See “TBV GSH Version Unit’s Outside Dimensions” on page 1-16 of this Service Manual.

Specifications (TBV FLD Version Specification)

FLD TECHNICAL SPECIFICATIONS

Table 1-12 TBV FLD Version Technical Specification

Acceptance Rate:	98% or greater Note: The following banknote types are excluded: a) Worn, dirty wet, stained, torn or excessively wrinkled Banknotes b) Double (dual) Banknotes c) Banknotes with adhering oil or iron powder d) Banknotes having folded corners or edges e) Banknotes with excess or inadequate Magnetism or unclear Graphics f) Banknotes having the wrong cut dimensions or printing displacement g) Banknotes having excessive fold lines or specific Banknote processing machine damage.
Bill Types Accepted:	Long side: 110~170mm (4.33~6.69 in.) Short side: 60~85mm (2.36~3.35 in.)
Barcode Coupon*:	Standard Specification a) Read code interleave interval: 2 of 5 b) Narrow Bar: 0.5mm-0.6mm (0.019-0.023 in.) c) Wide Bar : Narrow Bar = 3:1 d) Characters: 18 Characters e) Print Position: Middle (Coupon divided equally from the left, right, top and bottom of the Coupon's center) f) Print Width: Wider than 10mm (0.39 in.) g) Thickness: 0.1mm
Batch:	Approximately 50 Notes
Insertion Direction:	Banknote: Four-way Barcode Coupon: Two way (Barcode Surface Up Only)
Processing Speed†:	TBV-101-FLD (Fixed Type): • Banknote - Approximately 1.4 seconds/note from Banknote insertion to Escrow. - Approximately 2.0 seconds/note between the first and next Banknote insertion during a sequential insertion operation. • Barcode Coupon/Double Read‡ - Approximately 2.9 seconds/note from Coupon insertion to Escrow. - Approximately 3.4 seconds/note between the next Coupon insertion during a sequential insertion operation. • Barcode Coupon/Single Read‡ - Approximately 1.4 seconds/note from Coupon insertion to Escrow. - Approximately 2.1 seconds/note between the next Coupon insertion during a sequential insertion operation. TBV-100-FLD/TBV-200-FLD (Centering Type): • Banknote - Approximately 1.8 seconds/note from Banknote insertion to Escrow. - Approximately 2.4 seconds/note between the next Banknote insertion during a sequential insertion operation. • Barcode Coupon/Double Read‡ - Approximately 4.1 seconds/note from Coupon insertion to Escrow. - Approximately 4.7 seconds/note between the next Coupon insertion during a sequential insertion operation. • Barcode Coupon/Single Read‡ - Approximately 1.9 seconds/note from Coupon insertion to Escrow. - Approximately 2.5 seconds/note between the next Coupon insertion during a sequential insertion operation.
Validation Method:	Optical (6 Illumination Types, [Transmissive/Reflective]) and Magnetic
Diagnostic Indicators:	LED Full Color Range
Escrow:	1 Note
Anti-stringing Mechanism:	Optical Sensor & Pusher Mechanism
Interface:	Photo-Coupler Isolation, RC232C, ccTalk, USB (Full Speed)

*. Refer to the specific Country's "Barcode Coupon Specification" Sheet for more details.

†. The time between the first Banknote's insertion to the next sequential Banknote insertion operation.

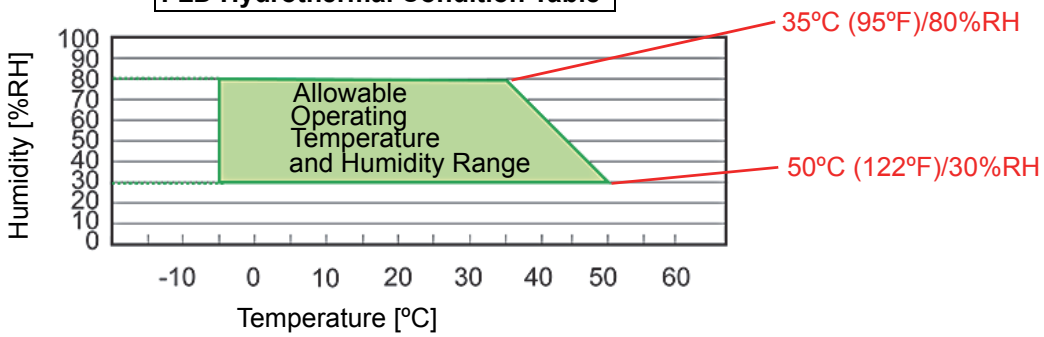
‡. The Barcode Ticket/Coupon Reading Specification can be changed by DIP Switch Settings.

FLD Environmental Specifications

Table 1-13 TBV FLD Version Environmental Specification

Operating Temperature:	-5ºC to +50ºC (41ºF to 122ºF)
Storage Temperature:	-20ºC to +60ºC (-4ºF to 140ºF)
Relative Operating Humidity:	30% to 80% RH (non-condensing)
Relative Storage Humidity:	30% to 80% RH (non-condensing)
Visible Light Sensitivity:	Avoid contact with direct sunlight (Interior lighting must be incandescent with a Radiant Angle of 15 Degree or more having an Illumination index of 3000 Lux or less)
Installation:	Indoors Only, No Cabinet Vibration

FLD Hydrothermal Condition Table



FLD Electrical Specifications

Table 1-14 TBV FLD Version Electrical Specification

Supply Voltage:	24VDC ±5% (Greater than 4.1A [100W] Recommend)
Current Consumption:	Standby = Approximately 0.2 A Operation = Approximately 2.0 A Peak = Approximately 3.3 A (Maximum 3 seconds)

FLD Structural Specifications

Table 1-15 TBV FLD Version Structural Specification

Weight:	Approximately 6.4kg (14.11lbs)
Mounting:	Horizontal
Outside Dimensions:	See “TBV FLD Version FLD Unit Outside Dimensions” on page 1-15 of this Service Manual.

Specifications (TBV GLD Version Specification)

GLD TECHNICAL SPECIFICATIONS

Table 1-16 TBV GLD Version Technical Specification

Acceptance Rate:	98% or greater Note: The following banknote types are excluded: a) Worn, dirty wet, stained, torn or excessively wrinkled Banknotes b) Double (dual) Banknotes c) Banknotes with adhering oil or iron powder d) Banknotes having folded corners or edges e) Banknotes with excess or inadequate Magnetism or unclear Graphics f) Banknotes having the wrong cut dimensions or printing displacement g) Banknotes having excessive fold lines or specific Banknote processing machine damage.
Bill Types Accepted:	Long side: 110~170mm (4.33~6.69 in.) Short side: 60~85mm (2.36~3.35 in.)
Barcode Coupon*:	Standard Specification a) Read code interleave interval: 2 of 5 b) Narrow Bar: 0.5mm-0.6mm (0.019-0.023 in.) c) Wide Bar : Narrow Bar = 3:1 d) Characters: 18 Characters e) Print Position: Middle (Coupon divided equally from the left, right, top and bottom of the Coupon's center) f) Print Width: Wider than 10mm (0.39 in.) g) Thickness: 0.1mm
Insertion Direction:	Banknote: Four-way Barcode Coupon: Two way (Barcode Surface Up Only)
Processing Speed†:	TBV-100-GLD (Centering Type Only): • Banknote - Approximately 1.8 seconds/note from Banknote insertion to Escrow. - Approximately 2.2 seconds/note between the next Banknote insertion during a sequential insertion operation. • Barcode Coupon/Double Read‡ - Approximately 3.9 seconds/note from Coupon insertion to Escrow. - Approximately 4.3 seconds/note between the next Coupon insertion during a sequential insertion operation. • Barcode Coupon/Single Read‡ - Approximately 1.8 seconds/note from Coupon insertion to Escrow. - Approximately 2.3 seconds/note between the next Coupon insertion during a sequential insertion operation.
Validation Method:	Optical (6 Illumination Types, [Transmissive/Reflective]) and Magnetic
Diagnostic Indicators:	LED Full Color Range
Escrow:	1 Note
Anti-stringing Mechanism:	Optical Sensor & Shutter
Interface:	Photo-Coupler Isolation, RC232C, ccTalk, USB (Full Speed)

*. Refer to the specific Country's "Barcode Coupon Specification" Sheet for more details.

†. The time between the first Banknote's insertion to the next sequential Banknote insertion operation.

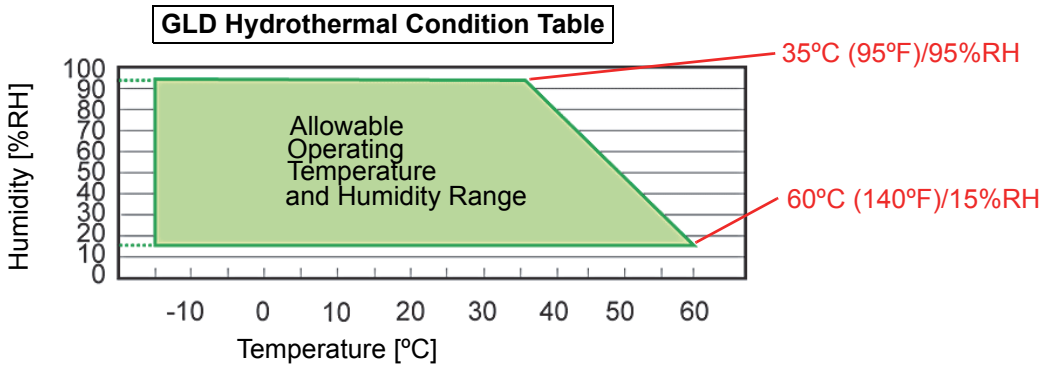
‡. The Barcode Ticket/Coupon Reading Specification can be changed by DIP Switch Settings.

GLD Environmental Specifications

Table 1-17 TBV GLD Version Environmental Specification

Operating Temperature:	-15ºC to +60ºC (5ºF to 140ºF)
Storage Temperature:	-20ºC to +60ºC (-4ºF to 140ºF)
Relative Operating Humidity:	15% to 95% RH (non-condensing)
Relative Storage Humidity:	15% to 95% RH (non-condensing)
Visible Light Sensitivity:	Avoid contact with direct sunlight (Interior lighting must be incandescent with a Radiant Angle of 15 Degree or more having an Illumination index of 3000 Lux or less)
Installation:	Indoors or Outside (Only Bezel Portion)*, No Cabinet Vibration

*. NOT exposed to the elements, including the internal Unit Assemblies.



GLD Electrical Specifications

Table 1-18 TBV GLD Version Electrical Specification

Supply Voltage:	24VDC ±5% (Greater than 4.1A [100W] Recommend)
Current Consumption:	Standby = Approximately 0.16 A Operation = Approximately 1.0 A Peak = Approximately 3.7 A (Maximum 3 seconds)

GLD Structural Specifications

Table 1-19 TBV GLD Version Structural Specification

Weight:	Approximately 4.6kg (10.14lbs)
Mounting:	Horizontal
Outside Dimensions:	See “TBV GLD Version Unit’s Outside Dimensions” on page 1-15 of this Service Manual.

Unit Dimensions

TBV FSH Version Entire Unit Outside Dimensions

Figure 1-7 illustrates the TBV FSH Unit's entire outside dimensions.

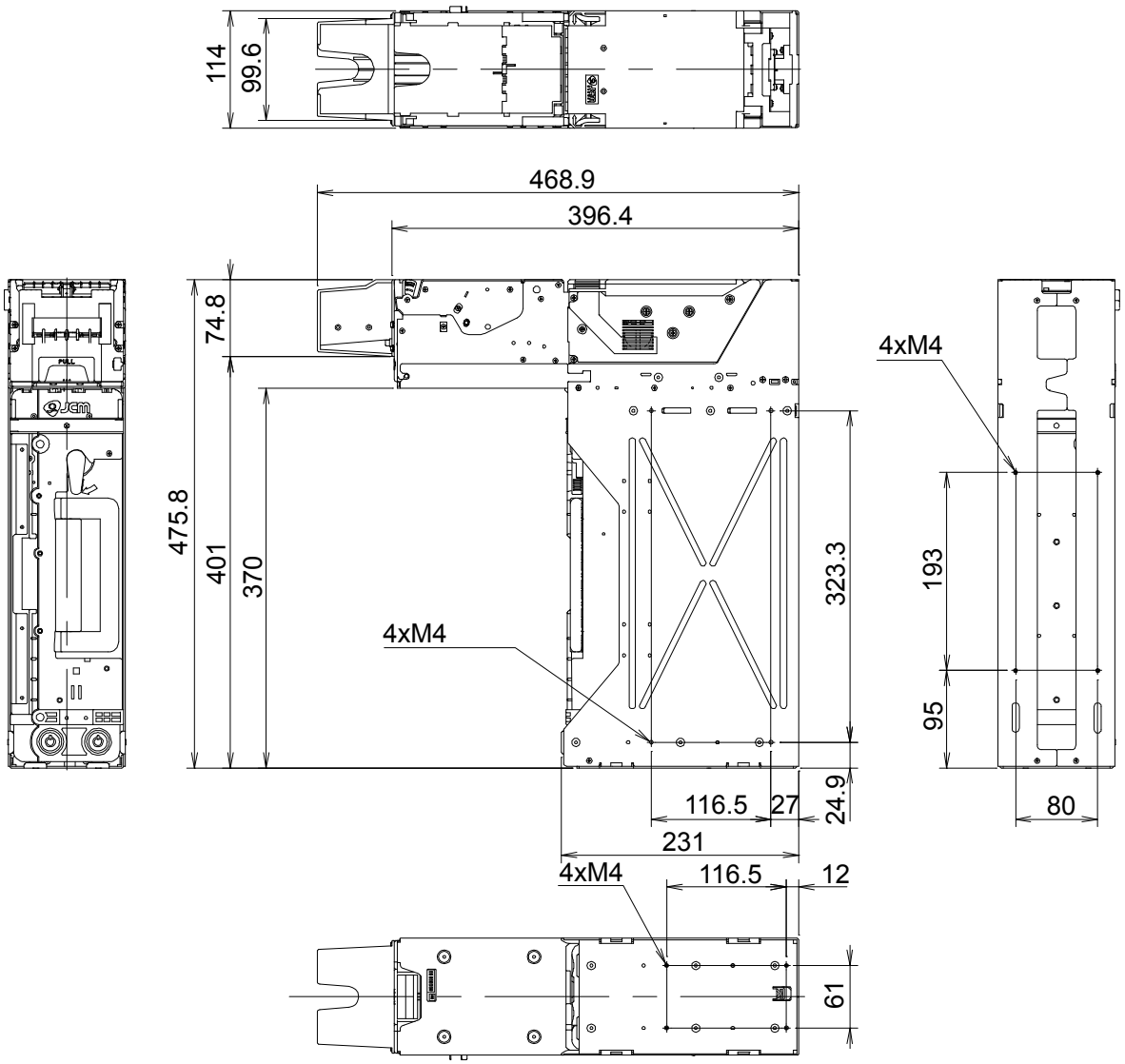


Figure 1-7 TBV FSH Version Outside Dimensions

TBV FLD VERSION UNIT'S OUTSIDE DIMENSIONS

Figure 1-8 illustrates the TBV FLD Unit outside dimensions.

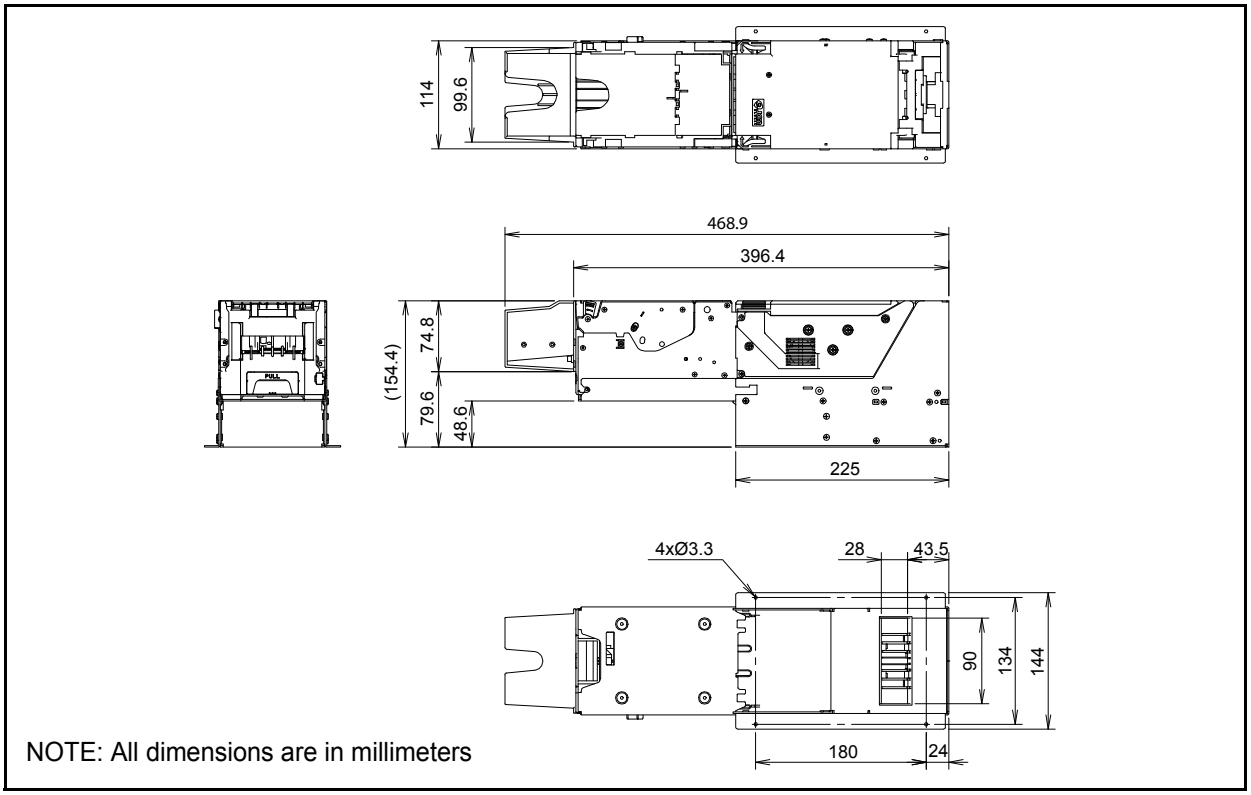


Figure 1-8 TBV FLD Version FLD Unit Outside Dimensions

TBV GLD VERSION UNIT'S OUTSIDE DIMENSIONS

Figure 1-9 illustrates the TBV GLD Unit outside dimensions.

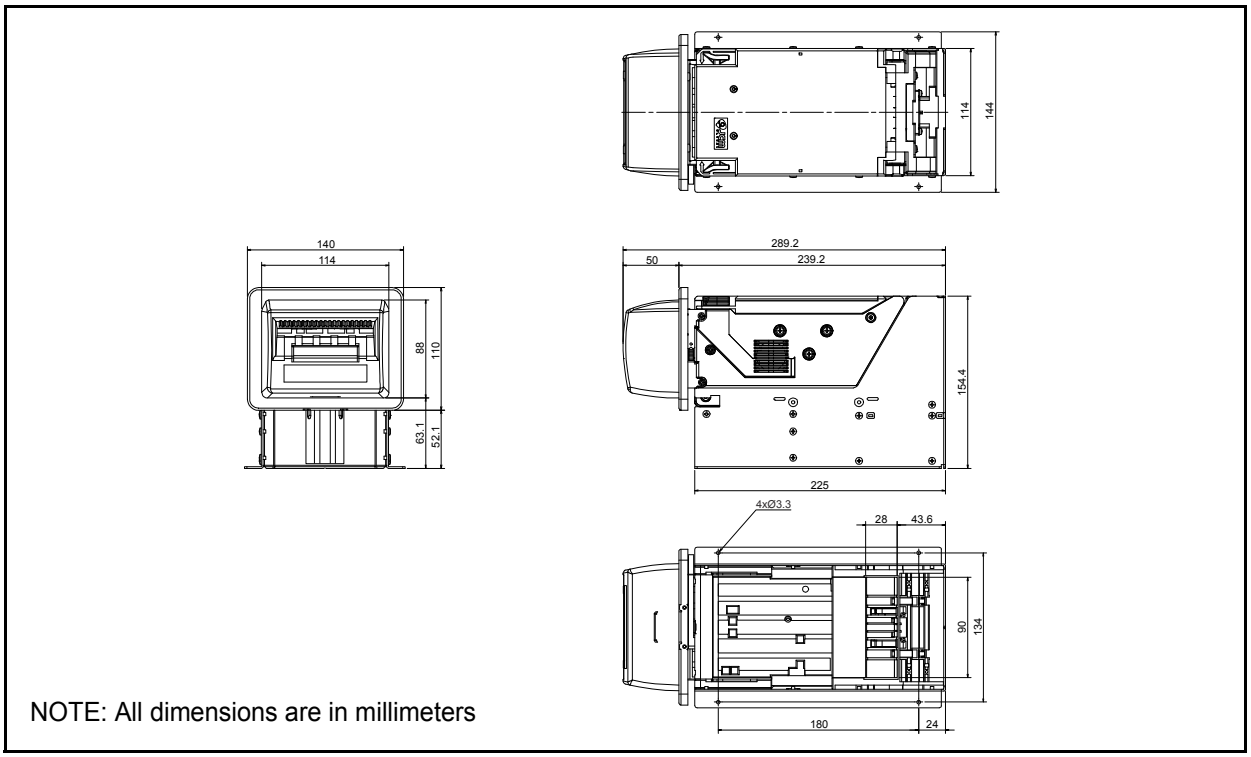


Figure 1-9 TBV GLD Version GLD Unit Outside Dimensions

TBV GSH Version Unit's Outside Dimensions

Figure 1-10 illustrates the TBV GSH Unit Outside dimensions.

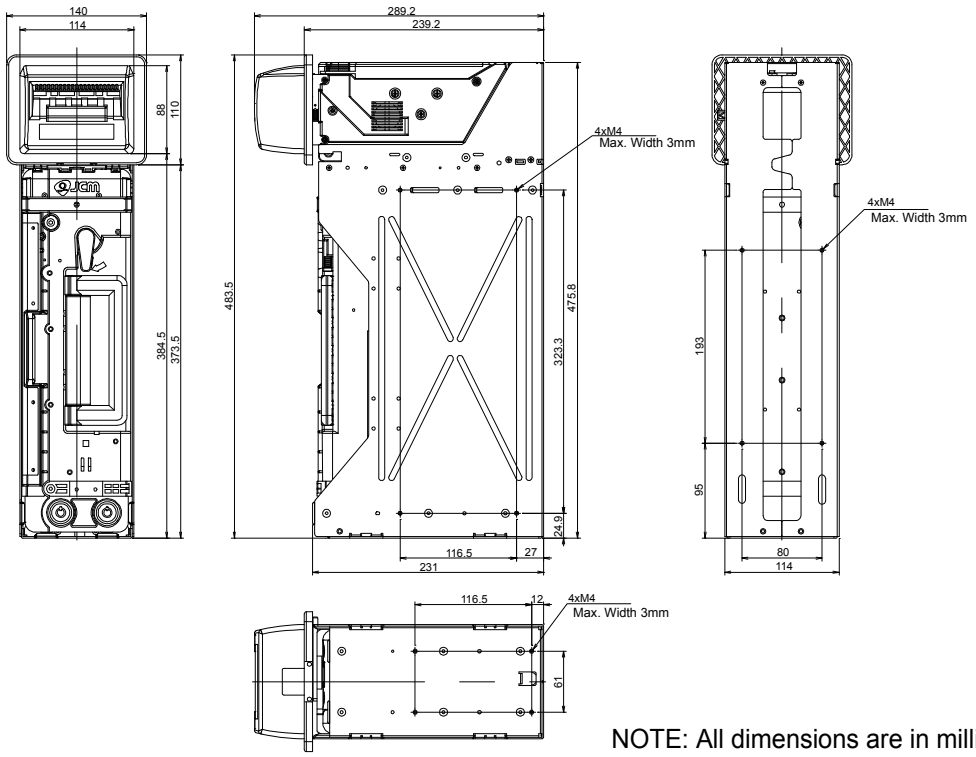


Figure 1-10 TBV GSH Version Shutter Bezel Unit Outside Dimensions

TBV Cash Box Outside Dimensions

Figure 1-11 illustrates the TBV Cash Box outside dimensions.

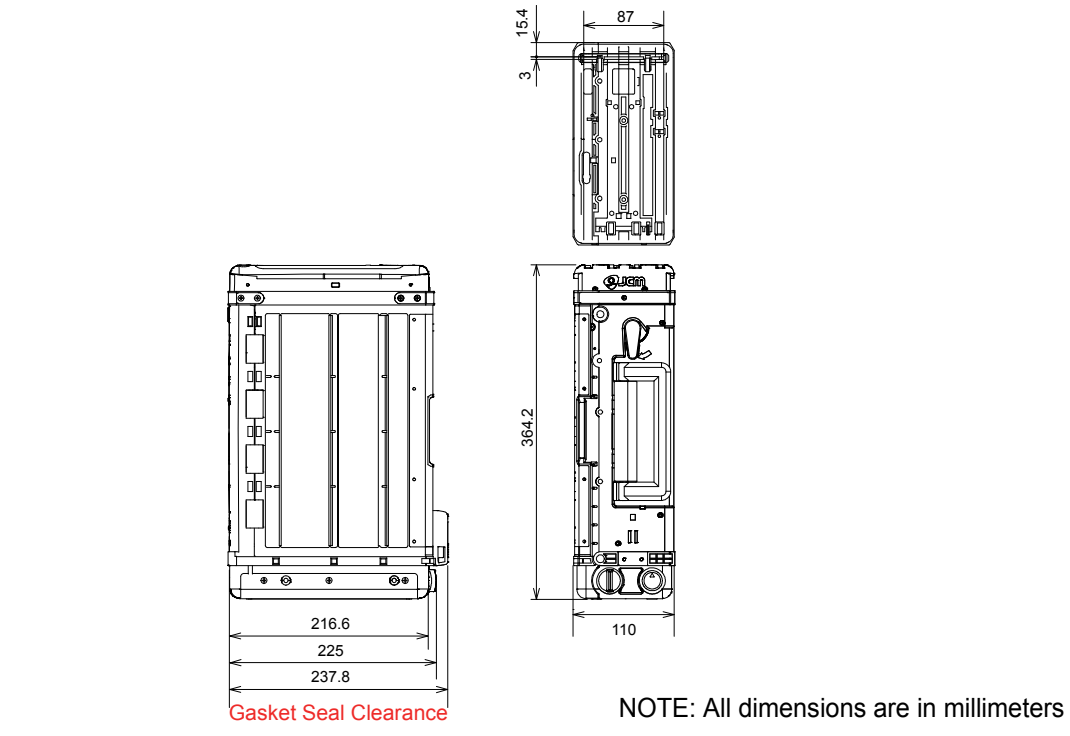
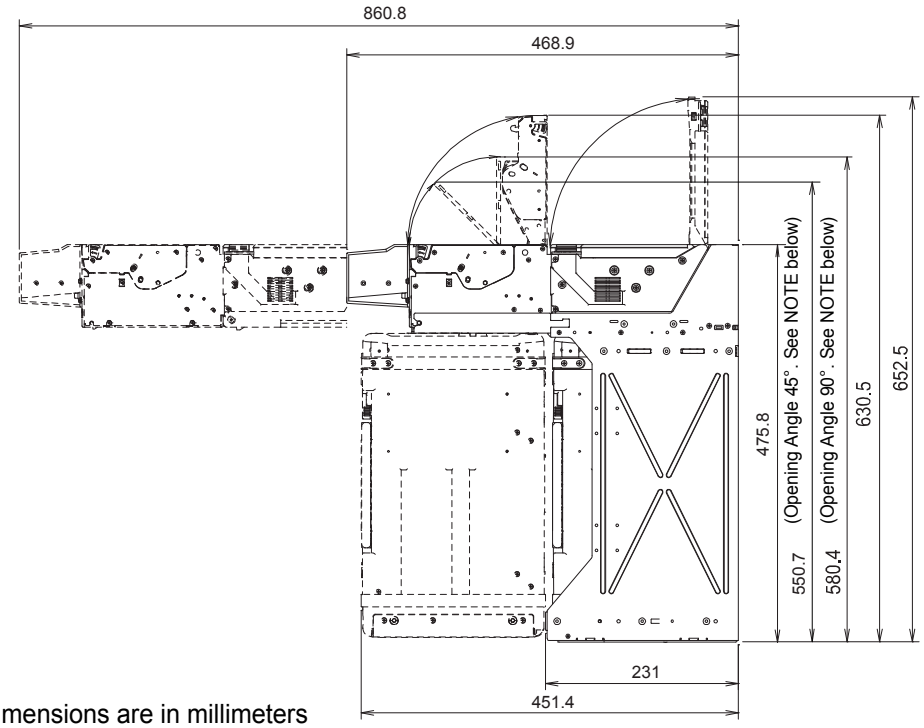


Figure 1-11 TBV Cash Box Outside Dimensions

TBV Unit's Clearance Dimensions

Figure 1-12 illustrates the TBV Unit clearance dimensions.



NOTE: All dimensions are in millimeters

NOTE: To install the TBV BNF Unit, the Upper Guide Cover should be able to open at least 45° up to 90°.

Figure 1-12 TBV Clearance Dimensions

Technical Contact Information

To obtain further Technical Information regarding the TBV Device, please contact the closest office to your location listed below:

AMERICAS

JCM American

Phone: +1-702-651-0000

Fax: +1-702-644-5512

925 Pilot Road, Las Vegas, NV 89119

E-mail: support@jcmglobal.com

EUROPE, AFRICA, RUSSIA & MIDDLE EAST

JCM Europe GmbH

Phone: +49-211-530-645-60

Fax: +49-211-530-645-85

Muendelheimer Weg 60

D-40472 Duesseldorf Germany

E-mail: support@jcmglobal.eu

UK & IRELAND

JCM Europe (UK Office)

Phone: +44 (0) 190-837-7331

Fax: +44 (0) 190-837-7834

Unit B, Third Avenue

Denbigh West Business Park

Bletchley, Milton Keynes,

Buckinghamshire MK1 1DH, UK

E-mail: support@jcmglobal.eu

ASIA AND OCEANIA

JCM Gold (HK) Ltd.

Phone: +852-2429-7187

Fax: +852-2929-7003

Unit 1-7, 3/F., Favor Industrial Centre

2-6 Kin Hong Street, Kwai Chung,

N.T. Hong Kong

E-mail: asiapactechsupport@jcmglobal.com

Japan Cash Machine Co., LTD. (HQ)

Phone: +81-6-6703-8400

Fax: +81-6-6707-0348

2-3-15, Nishiwaki, Hirano-ku, Osaka 547-0035 JAPAN

E-mail: Shohin@jcm-hq.co.jp

All of these Websites are available via:
http://www.jcmglobal.com

TBV® Series
Transaction Based Validator
Section 2

2 INSTALLATION

This section provides installation and operating instructions for the TBV® Series Transaction Based Validator. The information within contains the following features:

- Installation Process
- DIP Switch Configurations
- Connector Pin Assignments
- Preventive Maintenance
- TBV Sensor and Roller Locations
- Standard Interface Circuit Schematics
- Operational Flowchart.

Installation Process

Perform the following steps to install a TBV Device:

1. Place the TBV in its intended mounting location.
2. Bolt both the right and left sides of the TBV Frame into its intended location using eight (8) Pan Head Screws (4 on each side) from the outside of the Frame when this mounting configuration is preferred (Figure 2-1).

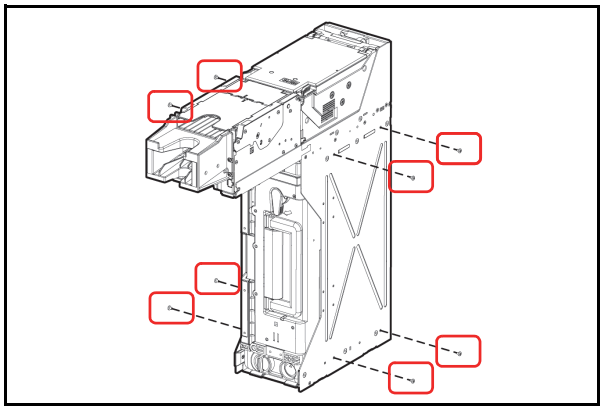


Figure 2-1 M4 Screw Locations (Right & Left)

3. Remove the Cash Box and bolt the back side and bottom side of the TBV Frame into its intended location using eight (8) M4 Pan Head Screws from the outside of the Frame when this mounting configuration is preferred (Figure 2-2).

NOTE: The maximum length of the M4 Pan Head Screws should be 4mm plus the thickness of the related Cabinet or Mounting Bracket (See "TBV FSH Version Entire Unit Outside Dimensions" on page 1-14 of this Manual to confirm the length of each Screw required).

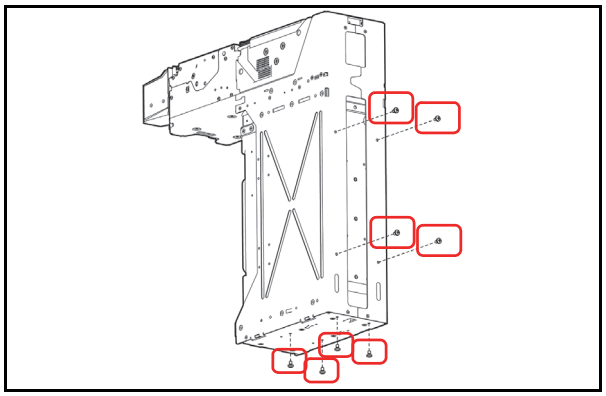


Figure 2-2 M4 Screw Locations (Bottom & Back)

4. Connect the TBV Unit to the Host Machine using a packaged Harness, and then supply the power to the Unit.

NOTE: To install the TBV Unit into a Host Machine, affix at least two (2) of the four (4) side locations in place.

DIP Switch Configurations

This section provides the BNF and TBV DIP Switch Block settings for the TBV Unit.

Table 2-1 BNF Set Vend Denomination Switch DS1 Settings

ON ↕ OFF 

DS1

Switch No.	Switch ON	Switch OFF
1	VEND 1 INHIBIT	VEND 1 ACCEPT
2	VEND 2 INHIBIT	VEND 2 ACCEPT
3	VEND 3 INHIBIT	VEND 3 ACCEPT
4	VEND 4 INHIBIT	VEND 4 ACCEPT
5	VEND 5 INHIBIT	VEND 5 ACCEPT
6	VEND 6 INHIBIT	VEND 6 ACCEPT
7	VEND 7 INHIBIT	VEND 7 ACCEPT
8	N/A*	OFF (Fixed)

*. Not Applicable (N/A). Never Switched to ON.

Table 2-2 BNF Buzzer Volume Switch DS2 Settings

ON ↕ OFF 

DS2

Switch No.	Switch ON	Switch OFF
1	N/A*	OFF (Fixed)
2	Performance Buzzer ON	Performance Buzzer OFF
3	ON Fixed	N/A
4	N/A*	OFF (Fixed)

*. Not Applicable (N/A). Never Switched to ON.

Table 2-3 TBV Set Vend Denomination Switch DS3 Settings

Switch No.	Switch ON	Switch OFF
1	VEND 1 INHIBIT	VEND 1 ACCEPT
2	VEND 2 INHIBIT	VEND 2 ACCEPT
3	VEND 3 INHIBIT	VEND 3 ACCEPT
4	VEND 4 INHIBIT	VEND 4 ACCEPT
5	VEND 5 INHIBIT	VEND 5 ACCEPT
6	VEND 6 INHIBIT	VEND 6 ACCEPT
7	VEND 7 INHIBIT	VEND 7 ACCEPT
8	N/A*	OFF (Fixed)

*. Not Applicable (N/A). Never Switched to ON.

NOTE: When installing the BNF Section onto the TBV-100 Unit, DIP Switch #3 settings will have no effect. In this case, DIP Switch #1 on the BNF Section should be used for setting the required denomination.

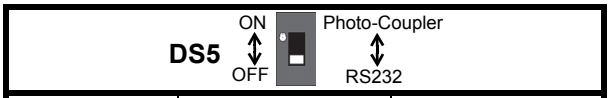
Table 2-4 TBV Centering Mechanism & Select Com Interface Switch DS4 Settings

Switch No.	Switch ON	Switch OFF
1	Fixed Version	Centering Version
2	Barcode Coupon Single Read*	Barcode Coupon Double Read*
3†	I/F Selection / Switch #3 / Switch #4	
4†	RS232 / OFF / OFF	
	Photo-Coupler / ON / OFF	
	ccTalk / OFF / ON	
	ccTalk with Encryption / ON / ON	

*. When using the "Single Read" Barcode Coupon setting, its Checksum may have to be changed to improve reading accuracy. The "Double Read" setting however, has a higher reliability and read accuracy by the TBV Validation System.

†. Match each setting to equal the setting of DIP Switch DS5 Switch #1.

Table 2-5 TBV Photo-Coupler/RS232 Interface Selection Switch DS5 Setting



Switch No.	Switch ON	Switch OFF
1*	Photo-Coupler	RS232

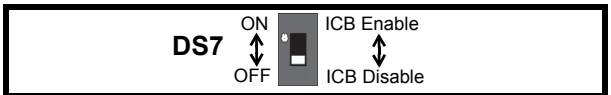
*. Match each setting to DIP Switch DS4 Switches #3 & #4.

Table 2-6 TBV Option Memory Selection Switch DS6 Settings

Switch No.	Switch ON	Switch OFF
1	N/A*	OFF (Fixed)
2	N/A*	OFF (Fixed)

*. Not Applicable (N/A). Never Switched to ON.

Table 2-7 TBV ICB Cash Box DS7 Settings



Switch No.	Switch ON	Switch OFF
1	ICB ON	ICB OFF*

*. Initial Switch setting is OFF. When using the ICB, turn the ICB Switch located on the Intelligent Cash Box side to ON.

ICB AND MACHINE NUMBER SETTINGS

To enable or disable the ICB Cash Box feature, proceed as follows:

1. Set TBV ICB Cash Box DS7 to the desired function either ICB Enable or Disable (Table 2-7). To setup the machine number, set DS7 to ICB Enable.

   NOTE: The ICB function can be permanently disabled by setting TBV ICB Cash Box DS7 to ICB Disable and disabling the ICB function in the TBV with a Disable Ticket using the following procedure.

2. Set BNF 8-Position DIP Switch #2, #4, #7 and #8 to ON (Figure 2-3).

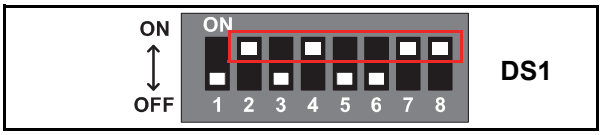


Figure 2-3 ICB DIP Switch Setting 1

3. Turn the TBV Power Switch to ON.The Bezel LED will begin flashing at a White Color Rate (Test Mode).
4. Set BNF 8-Position DIP Switch #8 to OFF (Figure 2-3). The Bezel LED will light a steady Blue Color.

Figure 2-4 ICB DIP Switch Setting 2

5. Insert an Enable or Disable Ticket. The Bezel LED will begin flashing at a rapid White Color Rate while the ticket is being held.
6. The Enable or Disable Ticket will be returned. Confirm that the Bezel LED flashes at a Green Color Rate 7 times and this repeats 3 times, and then the Bezel LED goes back to Blue Color.
7. Insert an Asset Ticket. The Bezel LED will begin flashing at a rapid White Color Rate while the ticket is being held.
8. The Asset Ticket will be returned. Confirm that the Bezel LED flashes at a Green Color Rate 7 times and this repeats 3 times, and then the Bezel LED goes back to Blue Color.

   NOTE: Refer to "Standard Error and Reject Codes" on page A-3 when a Ticket is returned and the Bezel LED flashes 7 times.

Primary LED Indications

The following Table 2-8 Color LED indications occur during various TBV operating and error conditions.

Table 2-8 LED Error Pattern Indications

Mode	TBV LED Indication	TBV Condition
Normal Mode	Lit Blue	Stand-by (Waiting for a Banknote insertion)
	Lit Yellow	Waiting for a Host Machine Command
	OFF (Extinguished)	BUSY (Processing Validation) or an INHIBIT Command
	Yellow Flashes	Internal processing (Self download: Transport Section → BNF Section)
	Yellow Flashes*	Banknote Jam or Setting malfunction
	Red Flashes†	Abnormal (ABN) Error
Download Mode	Green Flashes	Waiting for a Download
	Yellow Flashes	Downloading
	Green Flashes	Download completed

*. Returns to Stand-by Mode after clearing the error condition (See “Standard Error and Reject Codes” on page A-3 of this Guide to resolve the detected error type).

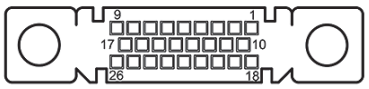
†. Returns to Stand-by Mode from a RESET Command, or after clearing the error condition (See “Standard Error and Reject Codes” on page A-3 of this Guide to resolve the detected error type).

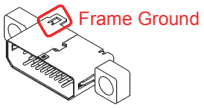
Connector Pin Assignments

Table 2-9 through Table 2-12 list the TBV FSH & GSH Version Pin Assignments respectively.
Table 2-9 lists the TBV FSH & GSH Version USB Interface Pin Assignments.

Table 2-9 TBV FSH/GSH Version USB Interface Pin Assignments

Back Side View





Socket (Transport Unit Side): DR1P026SA1 (JCM)
Socket (Frame Unit Side): DR1R026PA1 (JCM)
Contact (Frame Unit Side): D02-22-22P-10000 (JAE) (Pole# 1,9,18 & 26)
UL3443 AWG#24 Ø1.3 - 1.1mm or less
D02-22-26P-10000 (JAE) (Poles except 1,9,18 & 26)
UL1061 AWG#26 Ø0.9 - 1.1mm or less

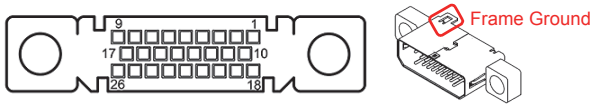
Pin No.	Signal Name	I/O*	Function
1	24V DC (POWER)	-	+24V DC Power Supply
2	M-RESET	IN	Validator Reset Signal Input Line
3	USB+	IN/ OUT	USB Communication Input/Output Signal Line
4	USB-	IN/ OUT	USB Communication Input/Output Signal Line
5	USB GND		USB Communication Ground (0V DC)
6	-		No Connection
7	-		No Connection
8	-		No Connection
9	24V DC (POWER)		+24V DC Power Supply
10	-		No Connection
11	-		No Connection
12	+12V (Opto)		+12V DC (or +5V DC) Power Supply
13	USB Vbus		USB Communication Vbus Signal Line (+5V DC)
14	-		No Connection
15	-		No Connection
16	-		No Connection
17	-		No Connection
18	Power GND		0V DC Power Supply
19	-		No Connection
20	-		No Connection
21	-		No Connection
22	-		No Connection
23	-		No Connection
24	-		No Connection
25	-		No Connection
26	Power GND		0V DC Power Supply
Frame GND	Frame Ground		(Be sure to connect it to the Chassis Frame)

*. I/O (input/output) is the Terminal as viewed from the Banknote Validator's backside.

Table 2-10 lists the TBV FSH & GSH Version Photo-Coupler Interface Pin Assignments.

Table 2-10 TBV FSH/GSH Version Photo-Coupler Interface Pin Assignments

Back Side View



Socket (Transport Unit Side): DR1P026SA1 (JCM)
Socket (Frame Unit Side): DR1R026PA1 (JCM)
Contact (Frame Unit Side): D02-22-22P-10000 (JAE) (Pole# 1,9,18 & 26)
UL3443 AWG#24 Ø1.1 - 1.3mm or less
D02-22-26P-10000 (JAE) (Poles except 1,9,18 & 26)
UL1061 AWG#26 Ø0.9 - 1.1mm or less

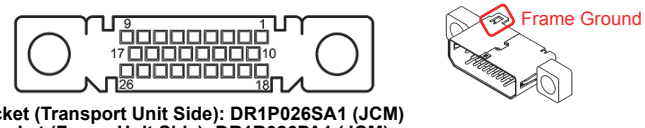
Pin No.	Signal Name	I/O*	Function
1	24V DC (POWER)	-	+24V DC Power Supply
2	M-RESET	IN	Validator Reset Signal Input Line
3	-		No Connection
4	-		No Connection
5	-		No Connection
6	-		No Connection
7	-		No Connection
8	-		No Connection
9	24V DC (POWER)		+24V DC Power Supply
10	-		No Connection
11	Serial OUT	OUT	Serial Communication Output Signal Line TXD
12	+12V (Opto)		Interface Power Supply (+12V DC)
13	-		No Connection
14	-		No Connection
15	-		No Connection
16	-		No Connection
17	-		No Connection
18	Power GND		0V DC Power Supply
19	Opto GND		Photo-coupler Communication Ground
20	Serial IN	IN	Serial Communication Input Signal Line RXD
21	-		No Connection
22	-		No Connection
23	-		No Connection
24	-		No Connection
25	-		No Connection
26	Power GND		0V DC Power Supply
Frame GND	Frame Ground		(Be sure to connect it to the Chassis Frame)

*. I/O (input/output) is the Terminal as viewed from the Banknote Validator's backside.

Table 2-11 lists the TBV FSH & GSH Version RS232 Interface Pin Assignments.

Table 2-11 TBV FSH/GSH Version RS232 Interface Pin Assignments

Back Side View



Socket (Transport Unit Side): DR1P026SA1 (JCM)
Socket (Frame Unit Side): DR1R026PA1 (JCM)
Contact (Frame Unit Side): D02-22-22P-10000 (JAE) (Pole# 1,9,18 & 26)
UL3443 AWG#24 Ø1.1 - 1.3mm or less
D02-22-26P-10000 (JAE) (Poles except 1,9,18 & 26)
UL1061 AWG#26 Ø0.9 - 1.1mm or less

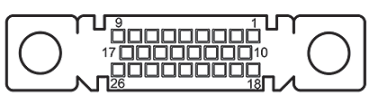
Pin No.	Signal Name	I/O*	Function
1	24V DC (POWER)	-	+24V DC Power Supply
2	M-RESET	IN	Validator Reset Signal Input Line
3	-		No Connection
4	-		No Connection
5	-		No Connection
6	-		No Connection
7	-		No Connection
8	-		No Connection
9	24V DC (POWER)		+24V DC Power Supply
10	GND		RS232 Interface Ground
11	Serial OUT	OUT	Serial Communication Output Signal Line TXD
12	+12V (Opto)		+12V DC (or +5V) Power Supply
13	-		No Connection
14	-		No Connection
15	-		No Connection
16	-		No Connection
17	-		No Connection
18	Power GND		0V DC Power Supply
19	-		No Connection
20	Serial IN	IN	Serial Communication Input Signal Line RXD
21	-		No Connection
22	-		No Connection
23	-		No Connection
24	-		No Connection
25	-		No Connection
26	Power GND		0V DC Power Supply
Frame GND	Frame Ground		(Be sure to connect it to the Chassis Frame)

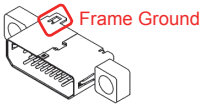
*. I/O (input/output) is the terminal as viewed from the Banknote Validator's backside.

Table 2-12 lists the TBV FSH & GSH Version ccTalk Interface Pin Assignments.

Table 2-12 TBV FSH/GSH Version ccTalk Interface Pin Assignments

Back Side View





Socket (Transport Unit Side): DR1P026SA1 (JCM)
Socket (Frame Unit Side): DR1R026PA1 (JCM)
Contact (Frame Unit Side): D02-22-22P-10000 (JAE) (Pole# 1,9,18 & 26)
UL3443 AWG#24 Ø1.1 - 1.3mm or less
D02-22-26P-10000 (JAE) (Poles except 1,9,18 & 26)
UL1061 AWG#26 Ø0.9 - 1.1mm or less

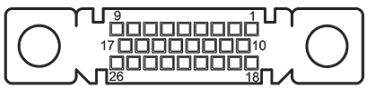
Pin No.	Signal Name	I/O*	Function
1	24V DC (POWER)	-	+24V DC Power Supply
2	M-RESET	IN	Validator Reset Signal Input Line
3	-		No Connection
4	-		No Connection
5	-		No Connection
6	-		No Connection
7	-		No Connection
8	-		No Connection
9	24V DC (POWER)		+24V DC Power Supply
10	GND		ccTalk Interface Ground
11	-		No Connection
12	+12V (Opto)		Interface Power Supply +12V DC
13	-		No Connection
14	-		No Connection
15	-		No Connection
16	-		No Connection
17	ccTalk PULL UP		ccTalk Communication Signal Line Pull Up
18	Power GND		0V DC Power Supply
19	-		No Connection
20	-		No Connection
21	-		No Connection
22	-		No Connection
23	-		No Connection
24	-		No Connection
25	ccTalk	IN/ OUT	ccTalk Communication SIgnal Line
26	Power GND		0V DC Power Supply
Frame GND	Frame Ground		(Be sure to connect it to the Chassis Frame)

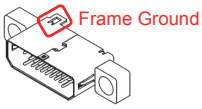
*. I/O (input/output) is the Terminal as viewed from the Banknote Validator's backside.

Table 2-13 through Table 2-16 list the TBV FLD & GLD Version Pin Assignments respectively.
Table 2-13 lists the TBV FLD & GLD Version USB Interface Pin Assignments.

Table 2-13 TBV FLD/GLD Version USB Interface Pin Assignments

Back Side View





Socket (Transport Unit Side): DR1P026SA1 (JCM)
Socket (Frame Unit Side): DR1R026PA1 (JCM)
Contact (Frame Unit Side): D02-22-22P-10000 (JAE) (Pole# 1,9,18 & 26)
UL3443 AWG#24 Ø1.3 - 1.1mm or less
D02-22-26P-10000 (JAE) (Poles except 1,9,18 & 26)
UL1061 AWG#26 Ø0.9 - 1.1mm or less

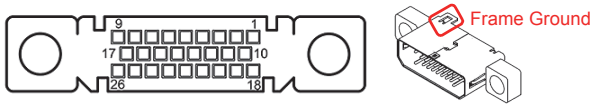
Pin No.	Signal Name	I/O*	Function
1	24V DC (POWER)	-	+24V DC Power Supply
2	M-RESET	IN	Validator Reset Signal Input Line
3	USB+	IN/ OUT	USB Communication Input/Output Signal Line
4	USB-	IN/ OUT	USB Communication Input/Output Signal Line
5	USB GND		USB Communication Ground (0V DC)
6	-		No Connection
7	-		No Connection
8	-		No Connection
9	24V DC (POWER)		+24V DC Power Supply
10	-		No Connection
11	-		No Connection
12	+12V (Opto)		+12V DC (or +5V DC) Power Supply
13	USB Vbus		USB Communication Vbus Signal Line (+5V DC)
14	-		No Connection
15	GND		LD Auto Recognition when Connected to FRAME ID (Pin-21)
16	-		No Connection
17	-		No Connection
18	Power GND		0V DC Power Supply
19	-		No Connection
20	-		No Connection
21	FRAME ID		LD Auto Recognition when Connected to GND (Pin-15)
22	-		No Connection
23	-		No Connection
24	-		No Connection
25	-		No Connection
26	Power GND		0V DC Power Supply
Frame GND	Frame Ground		(Be sure to connect it to the Chassis Frame)

*. I/O (input/output) is the Terminal as viewed from the Banknote Validator's backside.

Table 2-14 lists the TBV FLD & GLD Version Photo-Coupler Interface Pin Assignments.

Table 2-14 TBV FLD/GLD Version Photo-Coupler Interface Pin Assignments

Back Side View



Socket (Transport Unit Side): DR1P026SA1 (JCM)
Socket (Frame Unit Side): DR1R026PA1 (JCM)
Contact (Frame Unit Side): D02-22-22P-10000 (JAE) (Pole# 1,9,18 & 26)
UL3443 AWG#24 Ø1.1 - 1.3mm or less
D02-22-26P-10000 (JAE) (Poles except 1,9,18 & 26)
UL1061 AWG#26 Ø0.9 - 1.1mm or less

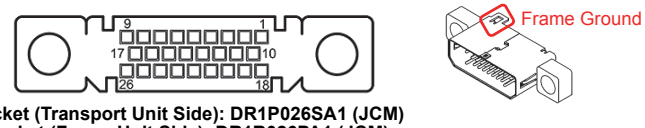
Pin No.	Signal Name	I/O*	Function
1	24V DC (POWER)	-	+24V DC Power Supply
2	M-RESET	IN	Validator Reset Signal Input Line
3	-		No Connection
4	-		No Connection
5	-		No Connection
6	-		No Connection
7	-		No Connection
8	-		No Connection
9	24V DC (POWER)		+24V DC Power Supply
10	-		No Connection
11	Serial OUT	OUT	Serial Communication Output Signal Line TXD
12	+12V (Opto)		Interface Power Supply (+12V DC)
13	-		No Connection
14	-		No Connection
15	GND		LD Auto Recognition when Connected to FRAME ID (Pin-21)
16	-		No Connection
17	-		No Connection
18	Power GND		0V DC Power Supply
19	Opto GND		Photo-coupler Communication Ground
20	Serial IN	IN	Serial Communication Input Signal Line RXD
21	FRAME ID		LD Auto Recognition when Connected to GND (Pin-15)
22	-		No Connection
23	-		No Connection
24	-		No Connection
25	-		No Connection
26	Power GND		0V DC Power Supply
Frame GND	Frame Ground		(Be sure to connect it to the Chassis Frame)

*. I/O (input/output) is the Terminal as viewed from the Banknote Validator's backside.

Table 2-15 lists the TBV FLD & GLD Version RS232 Interface Pin Assignments.

Table 2-15 TBV FLD/GLD Version RS232 Interface Pin Assignments

Back Side View



Socket (Transport Unit Side): DR1P026SA1 (JCM)
Socket (Frame Unit Side): DR1R026PA1 (JCM)
Contact (Frame Unit Side): D02-22-22P-10000 (JAE) (Pole# 1,9,18 & 26)
UL3443 AWG#24 Ø1.1 - 1.3mm or less
D02-22-26P-10000 (JAE) (Poles except 1,9,18 & 26)
UL1061 AWG#26 Ø0.9 - 1.1mm or less

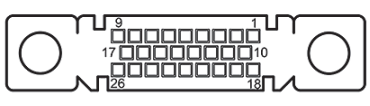
Pin No.	Signal Name	I/O*	Function
1	24V DC (POWER)	-	+24V DC Power Supply
2	M-RESET	IN	Validator Reset Signal Input Line
3	-		No Connection
4	-		No Connection
5	-		No Connection
6	-		No Connection
7	-		No Connection
8	-		No Connection
9	24V DC (POWER)		+24V DC Power Supply
10	GND		RS232 Interface Ground
11	Serial OUT	OUT	Serial Communication Output Signal Line TXD
12	+12V (Opto)		+12V DC (or +5V) Power Supply
13	-		No Connection
14	-		No Connection
15	GND		LD Auto Recognition when Connected to FRAME ID (Pin-21)
16	-		No Connection
17	-		No Connection
18	Power GND		0V DC Power Supply
19	-		No Connection
20	Serial IN	IN	Serial Communication Input Signal Line RXD
21	FRAME ID		LD Auto Recognition when Connected to GND (Pin-15)
22	-		No Connection
23	-		No Connection
24	-		No Connection
25	-		No Connection
26	Power GND		0V DC Power Supply
Frame GND	Frame Ground		(Be sure to connect it to the Chassis Frame)

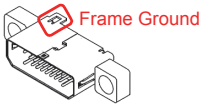
*. I/O (input/output) is the Terminal as viewed from the Banknote Validator's backside.

Table 2-16 lists the TBV FLD & GLD Version ccTalk Interface Pin Assignments.

Table 2-16 TBV FLD/GLD Version ccTalk Interface Pin Assignments

Back Side View





Socket (Transport Unit Side): DR1P026SA1 (JCM)
Socket (Frame Unit Side): DR1R026PA1 (JCM)
Contact (Frame Unit Side): D02-22-22P-10000 (JAE) (Pole# 1,9,18 & 26)
UL3443 AWG#24 Ø1.1 - 1.3mm or less
D02-22-26P-10000 (JAE) (Poles except 1,9,18 & 26)
UL1061 AWG#26 Ø0.9 - 1.1mm or less

Pin No.	Signal Name	I/O*	Function
1	24V DC (POWER)	-	+24V DC Power Supply
2	M-RESET	IN	Validator Reset Signal Input Line
3	-		No Connection
4	-		No Connection
5	-		No Connection
6	-		No Connection
7	-		No Connection
8	-		No Connection
9	24V DC (POWER)		+24V DC Power Supply
10	GND		ccTalk Interface Ground
11	-		No Connection
12	+12V (Opto)		Interface Power Supply +12V DC
13	-		No Connection
14	-		No Connection
15	GND		LD Auto Recognition when Connected to FRAME ID (Pin-21)
16	-		No Connection
17	ccTalk PULL UP		ccTalk Communication Signal Line Pull Up
18	Power GND		0V DC Power Supply
19	-		No Connection
20	-		No Connection
21	FRAME ID		LD Auto Recognition when Connected to GND (Pin-15)
22	-		No Connection
23	-		No Connection
24	-		No Connection
25	ccTalk	IN/ OUT	ccTalk Communication SIgnal Line
26	Power GND		0V DC Power Supply
Frame GND	Frame Ground		(Be sure to connect it to the Chassis Frame)

*. I/O (input/output) is the Terminal as viewed from the Banknote Validator's backside.

Preventive Maintenance

Retrieving Banknotes

To retrieve TBV Cash Box deposited Banknotes, perform the following steps:

1. Rotate the Cash Box Release Lever Clockwise (Figure 2-5 a).
2. Remove the Cash Box from the TBV Frame Unit (Figure 2-5 b).

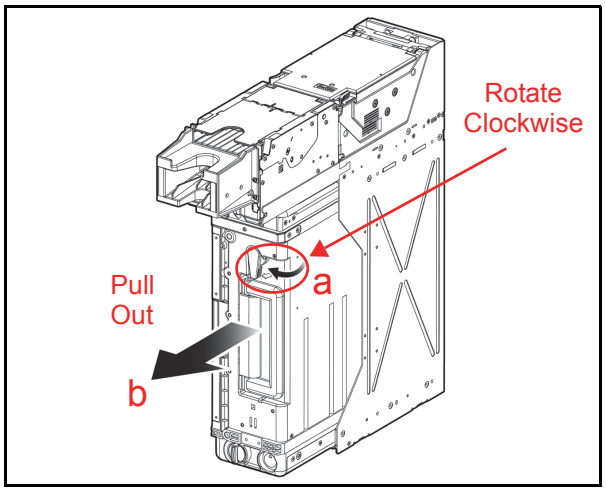


Figure 2-5 Removing the Cash Box

3. Rotate the Thumb Twist Lock Knob at the bottom of the Cash Box to unlock its Door (Figure 2-6 a).
4. Open the Cash Box Door (Figure 2-6 b).

NOTE: A Security Key or Keys may be required to unlock the Cash Box prior to opening it (Figure 2-6 c).

5. Press the Pusher Plate down (Figure 2-6 d) to Retrieve the Banknotes (Figure 2-6 e).

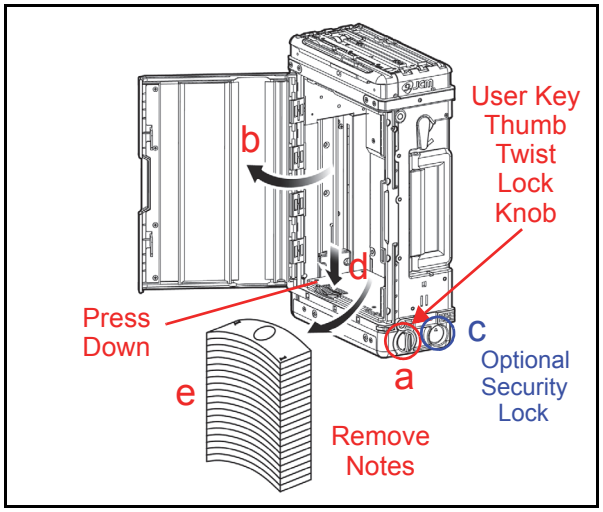


Figure 2-6 Opening the Cash Box Door

The Banknote retrieving operation is now complete.

Clearing a Banknote Jam

To retrieve a jammed Banknote located inside the Banknote Validator, proceed as follows:

1. Open the Return Path Open/Close Cover, and remove the jammed Banknote. (Figure 2-7 a).
2. If the Banknote jam location is not evident, open the BNF Section's Upper Guide by simultaneously pressing in on the BNF Guide Latches (Figure 2-7 b) located on each side of the BNF Unit Upper Guide, and lift the Validator's Top Door up and open. These latches are indicated by the Blue Arrows in Figure 2-7b.
3. Remove the jammed Banknote. If the Banknote jam location is still not evident, open the Transport Section's Upper Guide by simultaneously pressing in on the Front Guide Latches (Figure 2-7 c) located on each side of the Transport Section's Upper Guide, and lift the Transport's Top Door up and open. These latches are indicated by the Green Arrows in Figure 2-7c.
4. Remove the jammed Banknote.

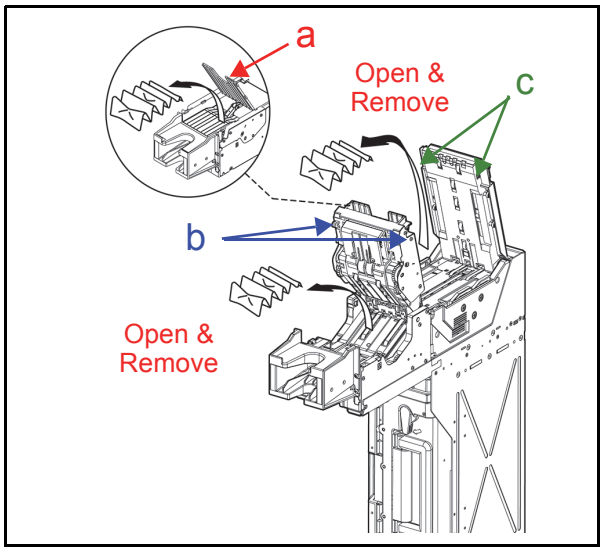


Figure 2-7 Removing a Jammed Banknote 1

5. If the Banknote jam location is still not evident, remove the TBV Unit from its Frame.
6. Open the Transport Section's Rear Guide Latch by simultaneously pressing in on the Rear Guide Latches (Figure 2-8 a) located on each side of the Transport Units Rear Guide, and lift the Guide up and open. These latches are indicated by the Blue Arrows in Figure Figure 2-8a.

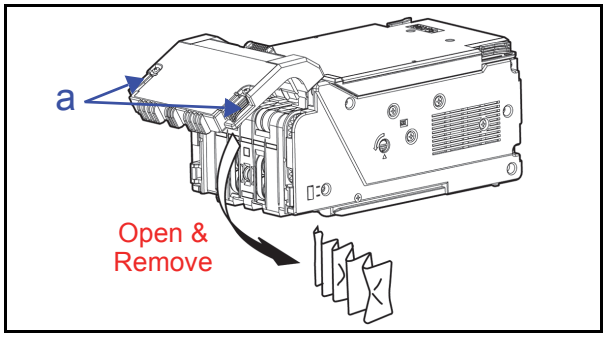


Figure 2-8 Removing a Jammed Banknote 2

7. If necessary, remove the Cash Box (Figure 2-9 a) from the Frame and remove the jammed Banknote as shown in Figure 2-9 b_1 & b_2 (Review "Removing the Cash Box" on page 2-12 if necessary to properly remove the Cash Box).

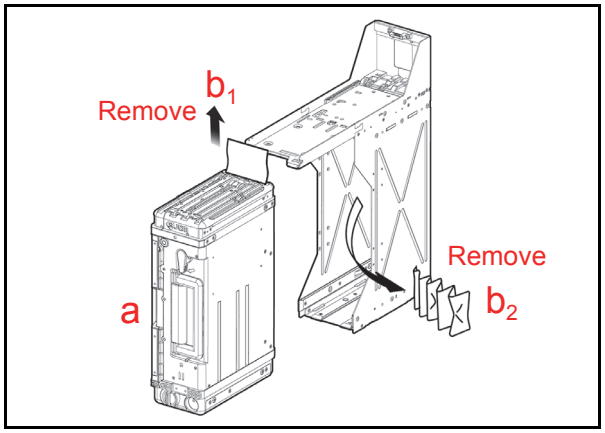


Figure 2-9 Removing a Jammed Banknote 3

Clearing a Banknote Jam from LD Frame

1. Remove the TBV Unit from its Frame.
2. Remove the Banknote (Figure 2-10 a) from the Frame Rear Side.
3. If the Banknote jam location is still not evident, pull on the LD Guide Latch in the direction indicated by the small Blue Arrow in Figure 2-8b.

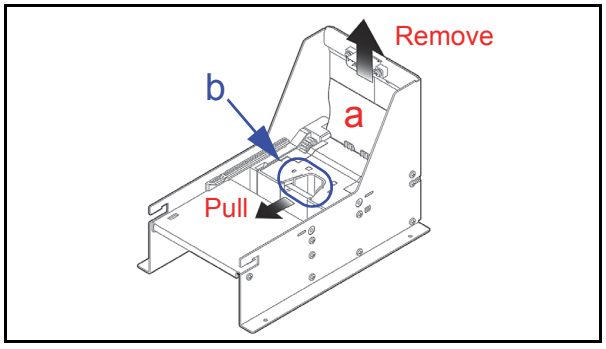


Figure 2-10 Removing a Jammed Banknote 4

4. Lift the LD Guide Latch and open the Frame Base (Figure 2-11 a). Remove the Banknote from underneath the Frame Base.

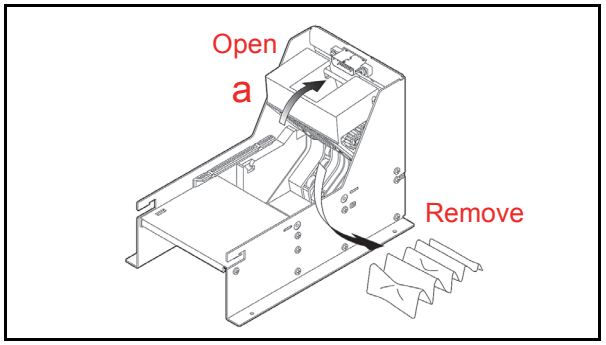


Figure 2-11 Removing a Jammed Banknote 5

The Banknote jam clearing operation is now complete.

Cleaning Procedure

To clean the TBV Validation Section, gently rub the Sensors and Rollers clean using a dry, soft, lint-free Micro-fiber Cloth.

Do not use any Alcohol, solvents, citrus based products or scouring agents that may cause damage to the Validation Section Sensors and Rollers.

Sensor and Roller Cleaning Procedure:

1. Turn the TBV Unit and the Host Machine's Power Supply's **OFF**.
2. Open the Upper Chassis.
3. Clean the appropriate path and Lens of each Sensor (See areas "1" through "34" in Figure 2-13 and their corresponding descriptions in Table 2-18 to locate each Sensor and Roller that requires cleaning.

Caution: Do not use Alcohol, thinner or citrus based products for cleaning any surfaces. The lenses can become clouded by chemical evaporation residue that may cause acceptance errors. Use a lint-free, slightly damp with water, cloth to clean the BNF Rollers only.

LD Sensor/Roller Cleaning Locations

LD Frame cleaning locations and methods are shown in Figure 2-12a, b_1, b_2 & c, and are also listed in Table 2-17.

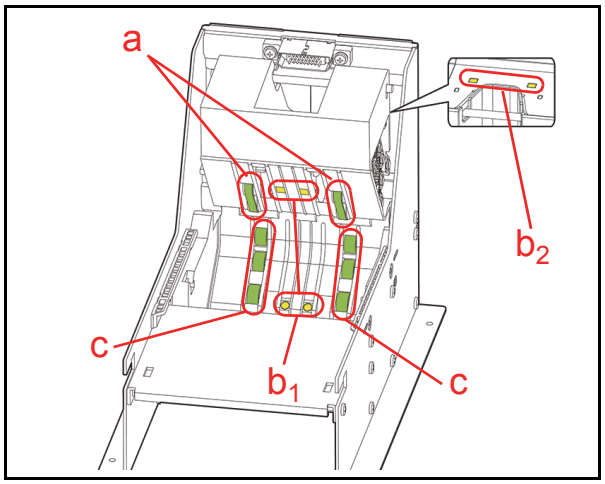


Figure 2-12 LD Sensor/Roller Cleaning Location

Table 2-17 LD Sensor/Roller Cleaning Method

Sym.	Belt/Sensor/Roller Type	Cleaning Method
a	LD Transport Belt	Wipe clean using a soft, lint free, Micro-fiber Cloth*†
b	Feed Out Sensor Prism	
c	LD Transport Roller	

*. Wipe and clean all of the Rollers and Green Colored Belts shown in Figure 2-12 using a soft, lint-free Micro-fiber Cloth.

†. Wipe and clean all of the Yellow Colored Sensors shown in Figure 2-12 using a soft, lint-free Micro-fiber Cloth.

TBV Sensor and Roller Locations

Figure 2-13 illustrates the various TBV Sensor and Roller cleaning locations, and Table 2-18 respectively lists each TBV Sensor and Roller Type Cleaning Method.

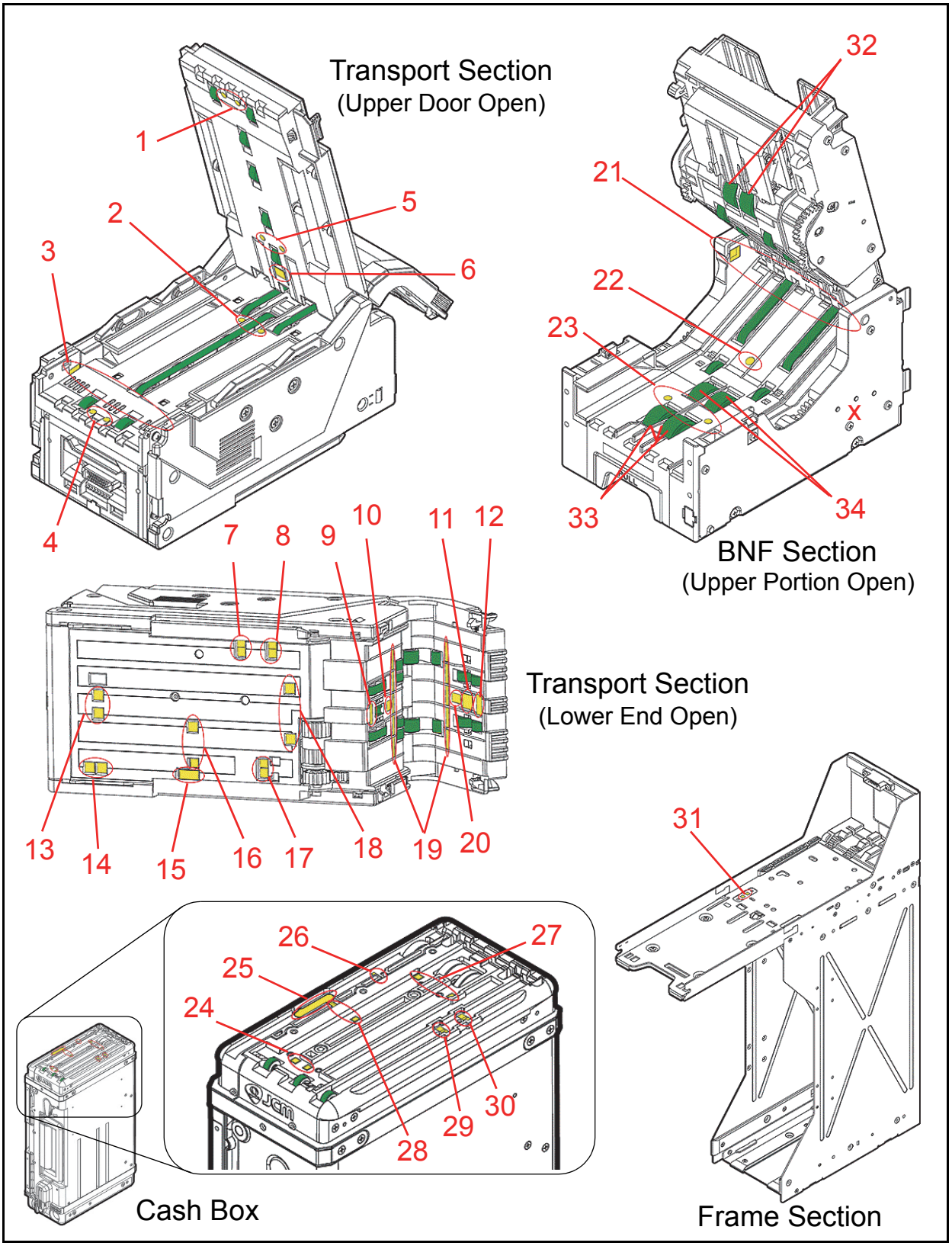


Figure 2-13 TBV Sensor and Roller Cleaning Locations

Table 2-18 TBV Sensor and Roller Type Cleaning Methods

Sym.	Sensor/Roller Type	Cleaning Method
1	Transport Entrance Sensor Prism	Wipe clean using a soft, lint free, Micro-fiber Cloth*
2	Centering Sensor	
3	Side Sensor	
4	Transport Entrance Sensor	
5	Centering Sensor Prism	
6	Bar Sensor	
7	Box Near Full Sensor	
8	Box Full Sensor	
9	Feed Out Sensor Prism	
10	UV Sensor	
11	Magnetic Sensor	
12	Feed Out Sensor	
13	Pusher Plate Home Position Sensor	
14	Box Lock Sensor	
15	ICB	
16	Pusher Mechanism Home Position Sensor	
17	Box Sensor	
18	Box Feed Out Sensor	
19	Line Sensor	
20	UV Sensor	
21	BNF Reject Sensor	
22	BNF Assignation Sensor	
23	BNF Entrance Sensor	
24	Pusher Plate Home Position Sensor Prism	
25	ICB	
26	Box Sensor Prism	
27	Box Feed Out Sensor Prism	
28	Pusher Mechanism Home Position Sensor Prism	
29	Box Near Full Sensor Prism	
30	Box Full Sensor Prism	
31	Cash Box Lock Sensor Prism	
32	Retard Roller	Wipe clean using a damp, lint free, Micro-fiber Cloth†
33	Pick Up Roller	
34	Feed Roller	

*. Wipe and clean all of the Rollers and Green Colored Belts shown in Figure 2-13 using a soft, lint-free Micro-fiber Cloth.

†. When cleaning the Retard Roller, the Pick Up Roller and the Feed Roller, use a lint-free Micro-fiber Cloth slightly damp with water.

NOTE: If any water adheres to the Lenses or the Prism, wipe them dry using a dry, lint-free Micro-fiber Cloth immediately! Then, let it air dry for a sufficient time to allow maximum evaporative drying to take effect.

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Standard Interface Circuit Schematics

Figure 2-14 illustrates the TBV USB Interface Schematic Diagram.

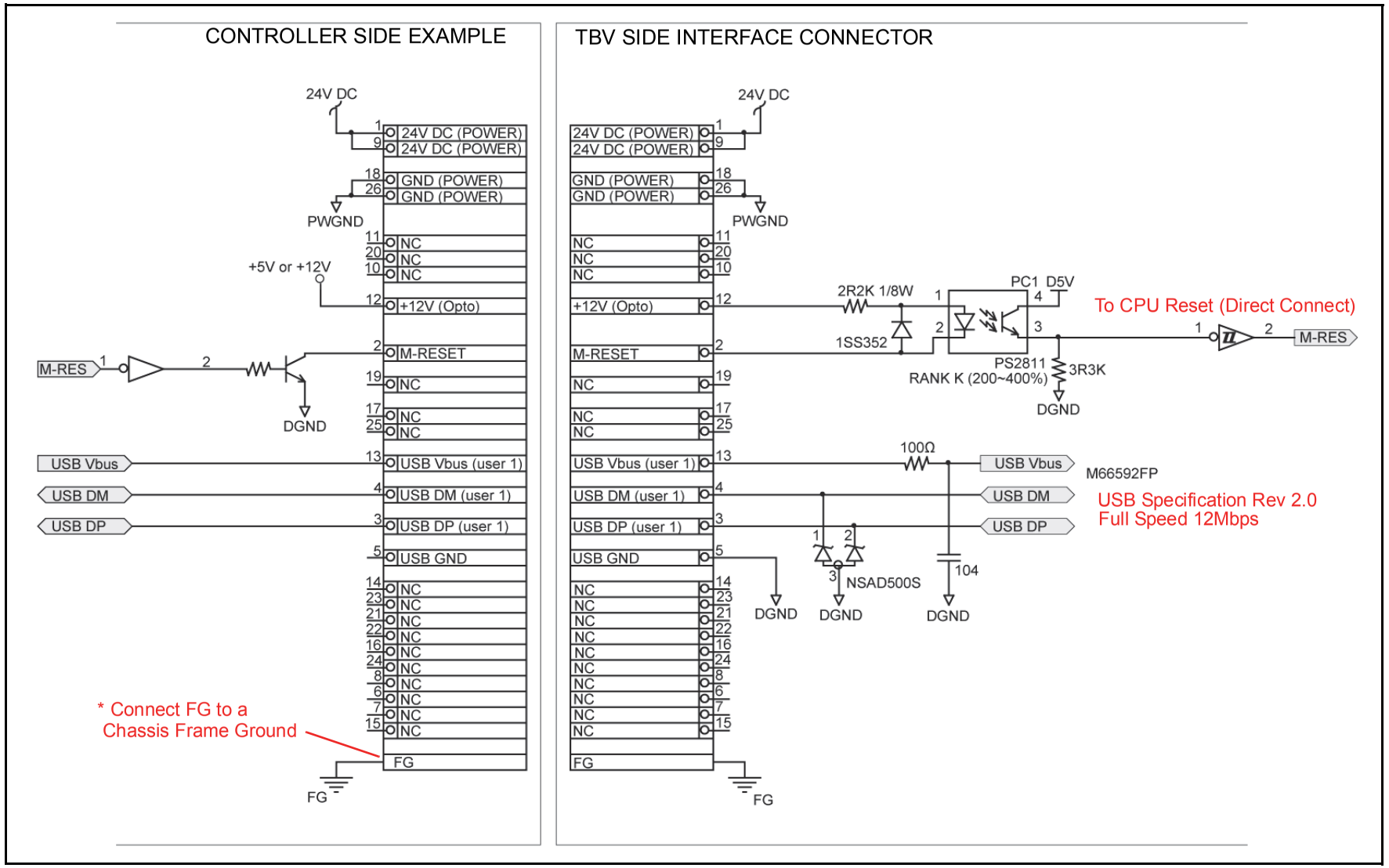


Figure 2-14 TBV USB Interface Schematic Diagram

Standard Interface Circuit Schematics (Continued 1)

Figure 2-15 illustrates the TBV Photo-Coupler Interface Schematic Diagram.

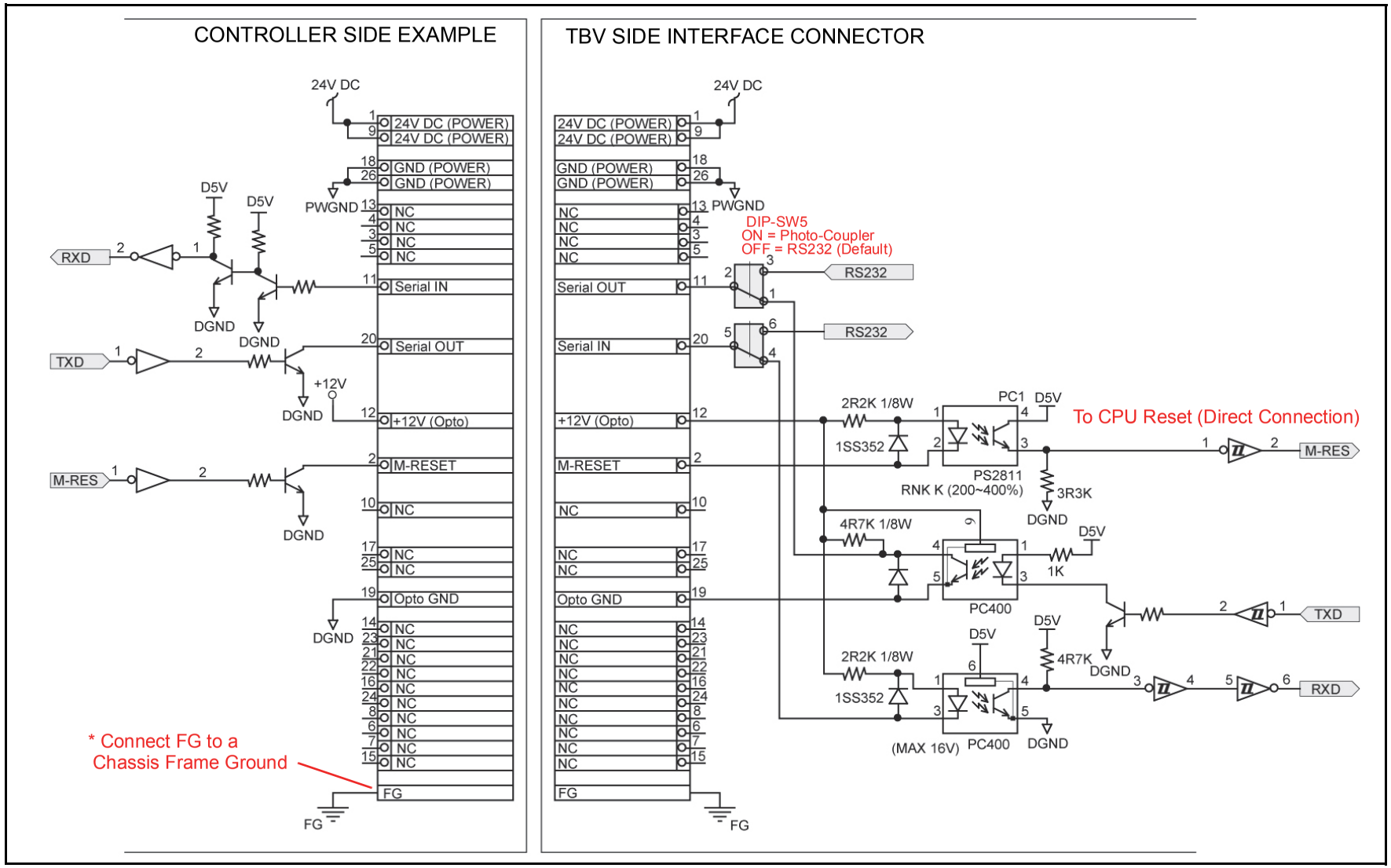


Figure 2-15 TBV Photo-Coupler Interface Schematic Diagram

Standard Interface Circuit Schematics (Continued 2)

Figure 2-16 illustrates the TBV RS232 Interface Schematic Diagram.

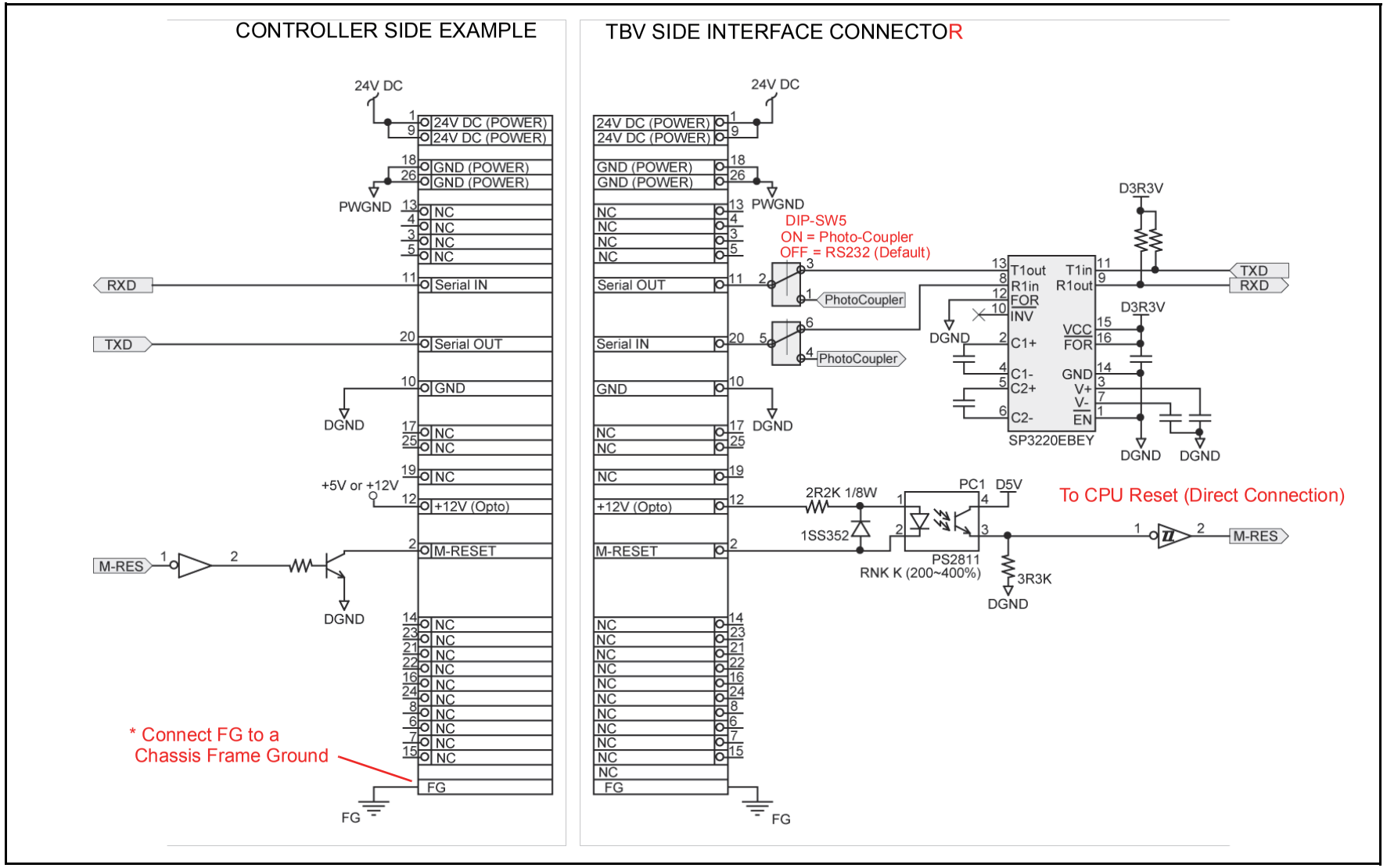


Figure 2-16 TBV RS232 Interface Schematic Diagram

Standard Interface Circuit Schematics (Continued 3)

Figure 2-17 illustrates the TBV ccTalk Interface Schematic Diagram.

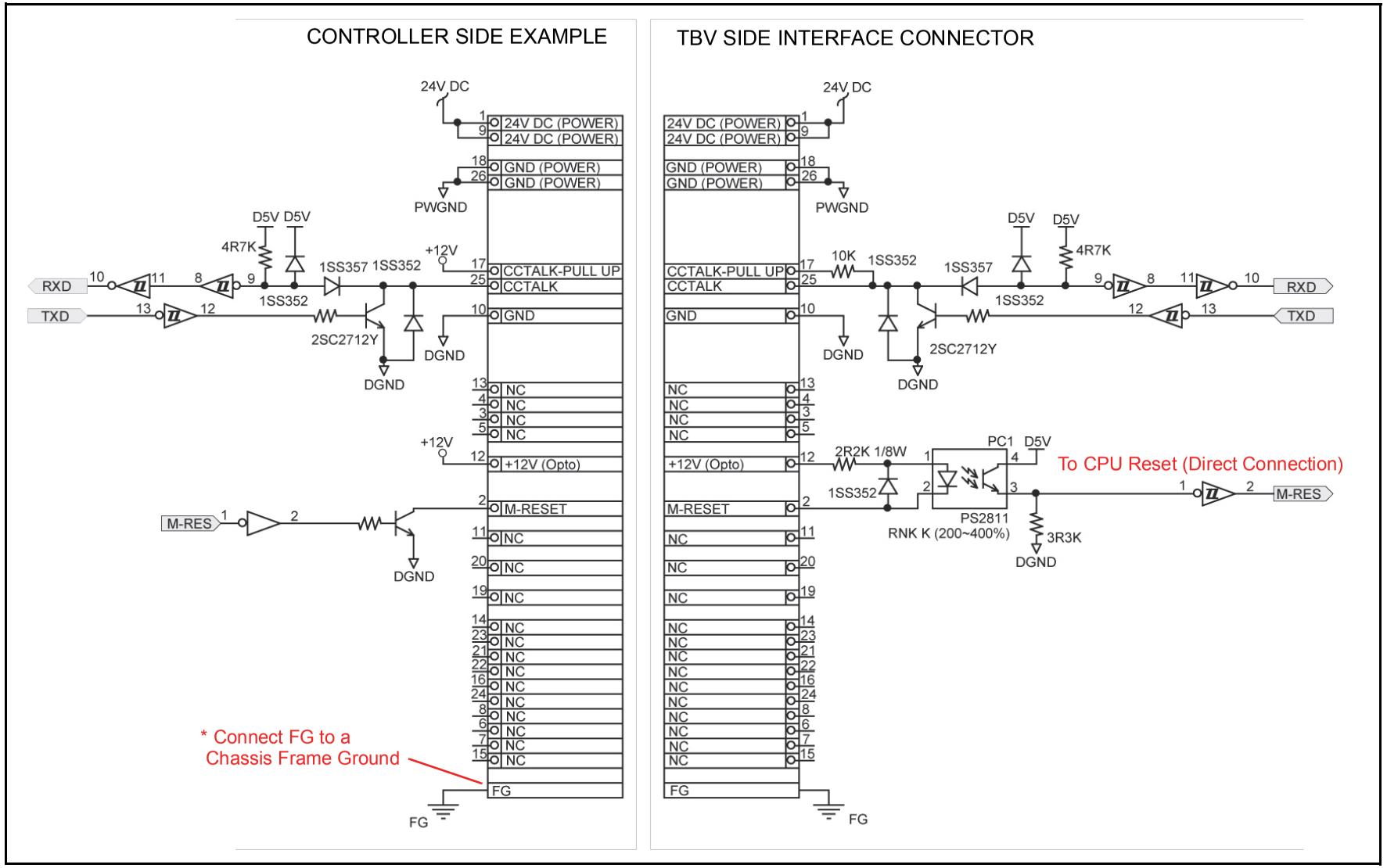
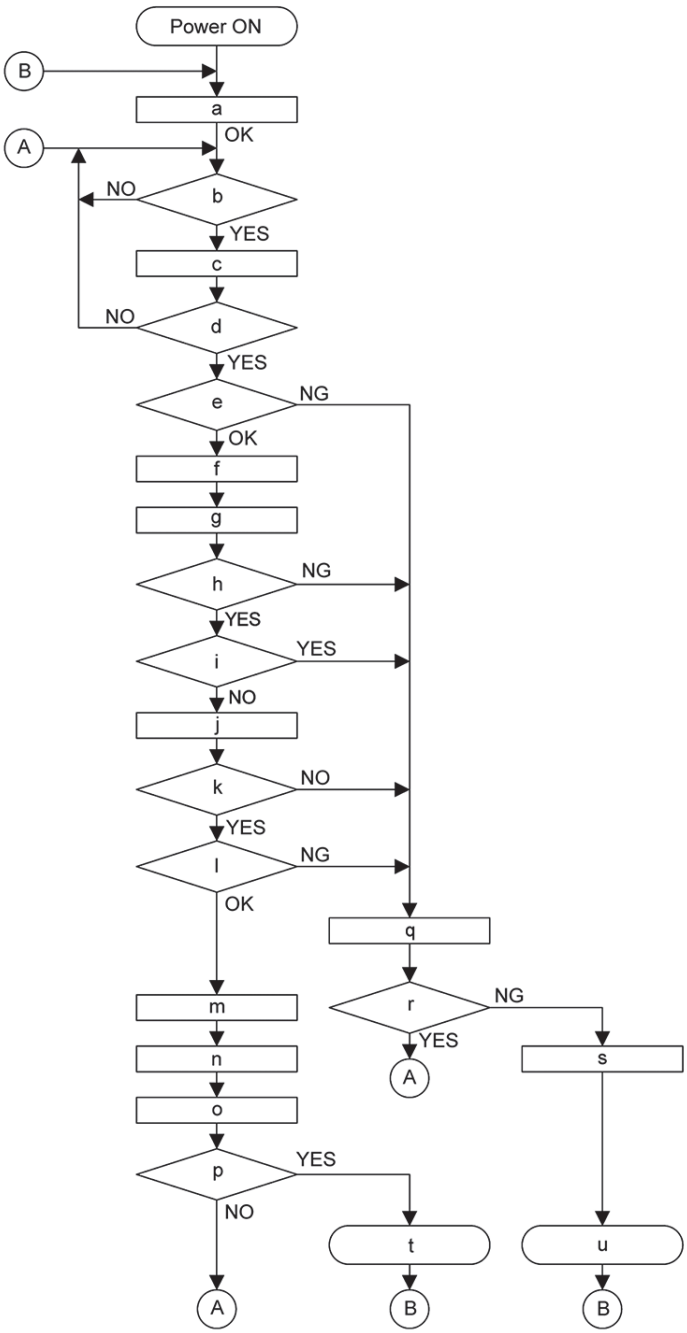


Figure 2-17 TBV ccTalk Interface Schematic Diagram

Operational Flowchart

Figure 2-18 depicts a typical TBV Banknote acceptance flow process.



Apply Power to the Unit.

B) Return from below “t” or “u” Function

a) Initializing

A) Return from below “p” or “r” Function

b) Has ENABLE Command been Received?

c) Stand-by

d) Turn the Entrance Sensor ON?

e) Transport the Banknote?

f) Sampling a Banknote’s Data

g) Sampling Completed

h) Is the Banknote Authentic?

i) Is Denomination Settings un-inhibited?

j) Output the Denomination Value Signal

k) Was a STACKING Command Received?

l) Start Transporting a Banknote

q) Return the Banknote

m) Banknote Transportation Complete

r) Is the Banknote Return Complete?

n) Output a VEND Signal

s) Output a JAM ERROR Signal

o) Start Stacking

p) Is the Cash Box Full?

t) Signal to Change the Cash Box

u) Remove a Jammed Banknote

A) Return to top “b” Function

B) Return to top “a” Function

Figure 2-18 TBV Operational Flowchart

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TBV® Series
Transaction Based Validator
Section 3

3 COMMUNICATIONS

This section was intentionally left out due to a Non-Disclosure Agreement requirement.

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TBV® Series
Transaction Based Validator
Section 4

4 DISASSEMBLY/REASSEMBLY

This section provides disassembly and reassembly instructions for the TBV® Series Transaction Based Validator. This section contains the following information:

- Tool Requirements
- BNF Prism-PTR Circuit Board & PI Sensor Circuit Board Removal
- BNF Prism-LED Circuit Board Removals
- BNF Circuit Board Removals
- BNF Grip Motor Removal
- Transport Motor Removal
- Feed Roller Ass. Removal
- Timing Belt Removal (BNF Lower Section)
- Timing Belt Removal (BNF Upper Section)
- Feed Roller Ass. & TR Feed Roller (A) Removals
- Bar Circuit Board (UP) Removal
- Side Sensor Removal (Transport Section, Right)
- Side Sensor Removal (Transport Section, Left)
- Sensor Circuit Board (OU) Removal
- CPU Circuit Board Removal
- Sensor Circuit Board (ID) Removal
- Timing Belt Removal (Transport Section, Rear)
- Transport Feed Pulley #4 & Timing Belt Removal (Transport Section, Rear Upper)
- Timing Belt Removal (Transport Section, Base Upper)
- Centering Motor Removal
- Centering Circuit Board Removal
- Transport Feed Roller 4 Assembly Removal
- Encoder Circuit Board Removal
- Fan Removal
- Stacker Motor Removal
- Transport Motor Removal
- Power Grip GT Belt Removal

Tool Requirements

The following tools will be required to perform a TBV disassembly and reassembly.

- #1 & #2 Phillips Screw Drivers
- T6 “TORX” Screw Driver
- 5.5mm Nut Driver
- 2/2.5/3 & 4mm E-Clip Holder
- Crescent C-Clip Pliers
- 1.5mm Hex Wrench
- Pliers & Tweezers.

BNF Prism-PTR Circuit Board & PI Sensor Circuit Board Removal

To remove the BNF Prism-PTR Circuit Board and the PI Sensor Circuit Board, proceed as follows:

1. Remove the TBV Unit from the Frame Unit.
2. Remove the four (4) mounting screws (Figure 4-1 a_1 through a_4) from each side of the Transport Section and separate the BNF Section from the Transport Section.
3. Remove the four (4) mounting Screws retaining the Bezel in place (Figure 4-1 b_1 through b_4) and remove the Bezel from of the BNF Section.

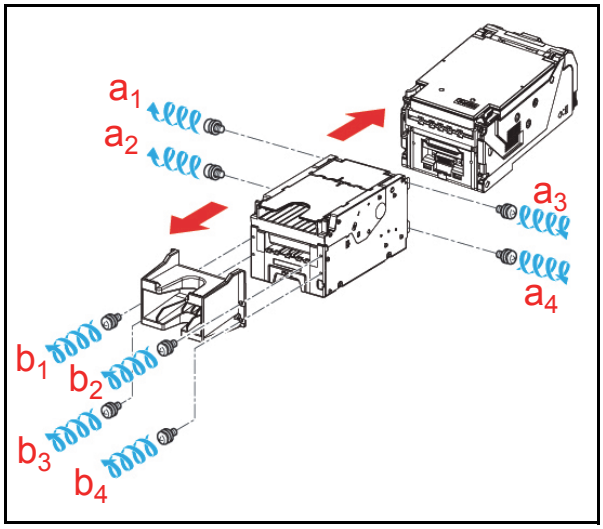

Figure 4-1 Transport/BNF/Bezel Unit Separation

4. Remove the seven (7) mounting screws (Figure 4-2 a_1 through a_7) located on the left side of the BNF Section, and remove the left Side Cover (L) (Figure 4-2 b) from the BNF Section.

NOTE: Ensure that the Gear located inside the Side Cover does not fall out during the removal process.

5. Remove the single (1) mounting screw (Figure 4-2 c) retaining the BNF Prism-PTR Circuit Board in place (Figure 4-2 d); unplug the single (1) Signal Connector (Figure 4-2 e), and remove the BNF Prism-PTR Circuit Board.
6. Rotate the Cam of the Lift Cam Gear (Figure 4-2 f) downward, and hold down the Left Lever (Figure 4-2 g); then
7. Unplug the single (1) Signal Connector (Figure 4-2 h), and remove the PI Circuit Board (Figure 4-2 i) from the BNF Section.

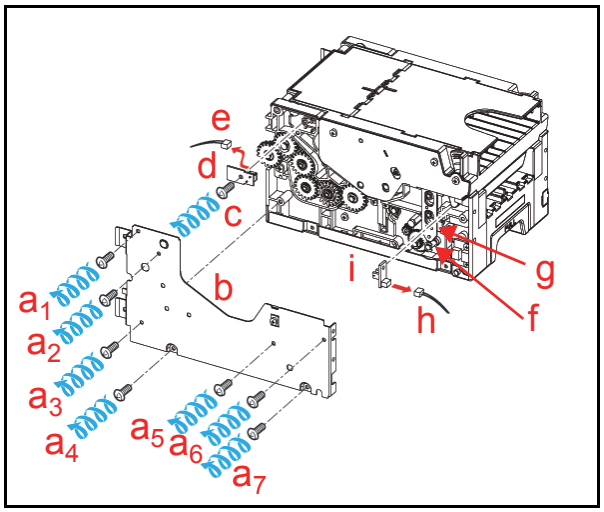

Figure 4-2 BNF Prism-PTR Circuit Board/ PI Sensor Circuit Board Removal

BNF Prism-LED Circuit Board Removal

To remove the BNF Prism-LED Circuit Board, proceed as follows:

1. Remove the seven (7) mounting screws (Figure 4-3 a_1 through a_7) located on the right side of the BNF Section, and then take the right Side Cover (R) (Figure 4-3 b) off of the BNF Section.

   NOTE: Ensure that the Gear located inside the Side Cover does not fall out during the removal process.

2. Remove the single (1) mounting screw (Figure 4-3 c) retaining the BNF Prism-LED Circuit Board (Figure 4-3 d) in place; unplug the single (1) Signal Connector (Figure 4-3 e) and remove the BNF Prism-LED Circuit Board.

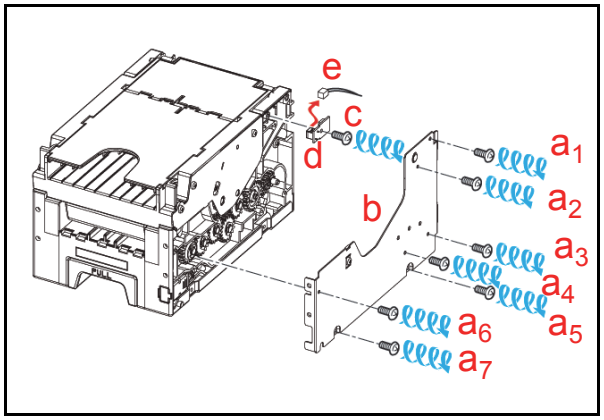

Figure 4-3 BNF Prism-LED Board Removal

BNF Circuit Board Removal

To remove the BNF Circuit Board, proceed as follows:

1. Remove the Base Frame Assembly (Figure 4-4 a) from the base side of the BNF Section.
2. Remove the three (3) mounting screws (Figure 4-4 b_1 through b_3) retaining the BNF Circuit Board (Figure 4-4 c) in place and unplug the five (5) SiBNF Grip Motorgnal Connectors from the Board (Figure 4-4 d_1 through d_5) to remove the BNF Circuit Board.

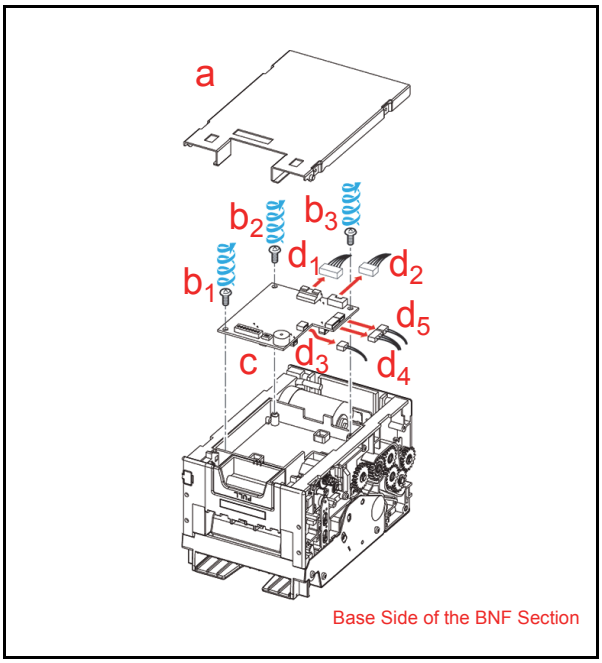

Figure 4-4 BNF Circuit Board Removal

BNF Grip Motor Removal

To remove the BNF Grip Motor, proceed as follows:

1. Remove the single (1) mounting screw (Figure 4-5 a) located on the left side of the BNF Section; then remove the two (2) mounting screws (Figure 4-5 b_1 & b_2) located on the right side of the BNF Section, and lift the PCB Cover (Figure 4-5 c) up and off the BNF Section.

   NOTE: One of the mounting screws (Figure 4-5 b_2) located on the right side of the BNF Section exists underneath BNF I/F Harness #2 (Figure 4-5 d).

2. Remove the single (1) mounting screw (Figure 4-5 e) retaining Prism (F) in place (Figure 4-5 f), and remove Prism (F) from the BNF Section.

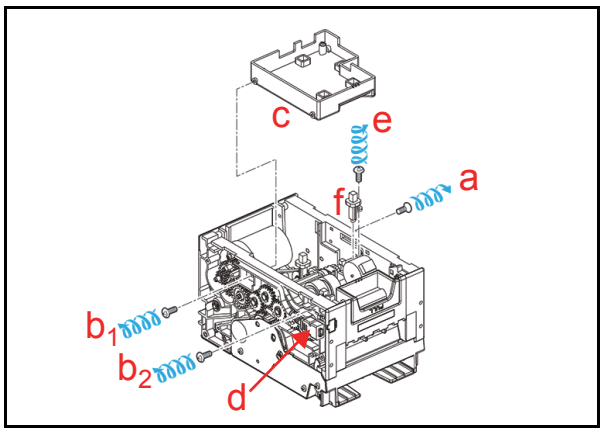

Figure 4-5 PCB Cover/Prism (F) Removal

3. Remove the Lift Mot ST (Figure 4-6 a) using the 5.5mm Nut Driver.
4. Remove the single (1) mounting screw (Figure 4-6 b) retaining the BNF Grip Motor (Figure 4-6 c) in place, and remove the BNF Grip Motor from the BNF Section.

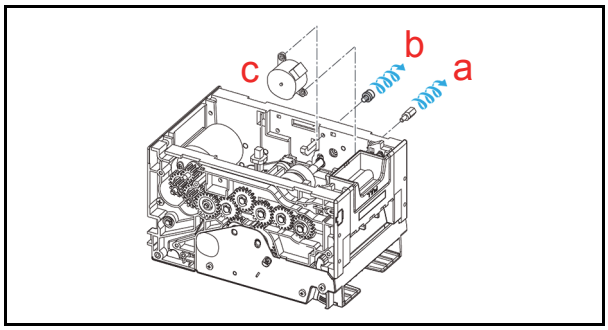

Figure 4-6 BNF Grip Motor Removal

Transport Motor Removal

To remove the Transport Motor, proceed as follows:

1. Cut the Plastic Binding Tie Wrap holding the Harnesses away from the Transport Motor (Figure 4-7 a).
2. Remove the Lift Mot ST (Figure 4-7 b) Mounting Screw using the 5.5 Nut Driver.
3. Remove the single (1) mounting Screw (Figure 4-7 c) retaining the Transport Motor in place, and remove the Transport Motor.

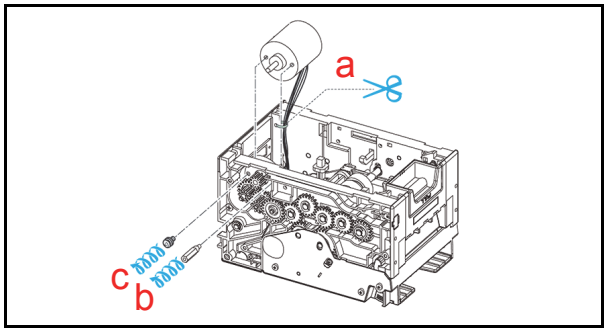

Figure 4-7 Transport Motor Removal

Feed Roller Assy. Removal

To remove the Feed Roller Assembly, proceed as follows:

1. Pull the FULCRUM SH Guide Shaft (Figure 4-8 a) out, and remove the Unit Lift SP (R) Spring (Figure 4-8 b) and the Unit Lift SP (L) Spring (Figure 4-8 c) from the Assembly.
2. Separate the Upper and the Lower Sections of the BNF Frame from one another.

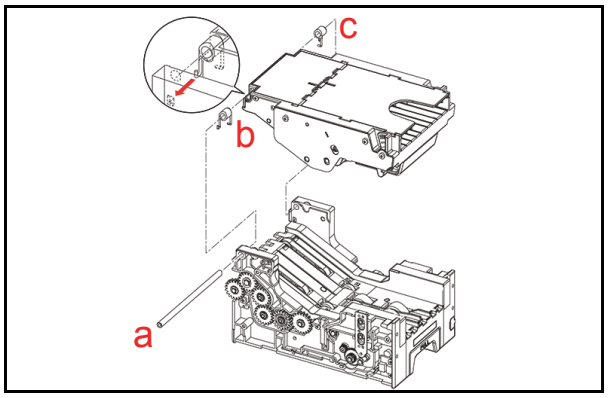

Figure 4-8 BNF Upper/Lower Unit Separation

3. Remove the two (2) E-Clips (Figure 4-9 a_1 & a_2) located on the left side of the BNF Assembly lower Section, and remove the Left Lever Arm (Figure 4-9 b) from the Assembly.

NOTE: Ensure that when the E-Clips are removed, that the two (2) related Collars (Figure 4-9 c_1 & c_2) are not lost following removal.

4. Remove the two (2) retainer E-Clips (Figure 4-9 d_1 & d_2).

NOTE: Ensure that when the E-Clips are removed, that the two (2) related Bushings (Figure 4-9 e_1 & e_2) are not lost following removal.

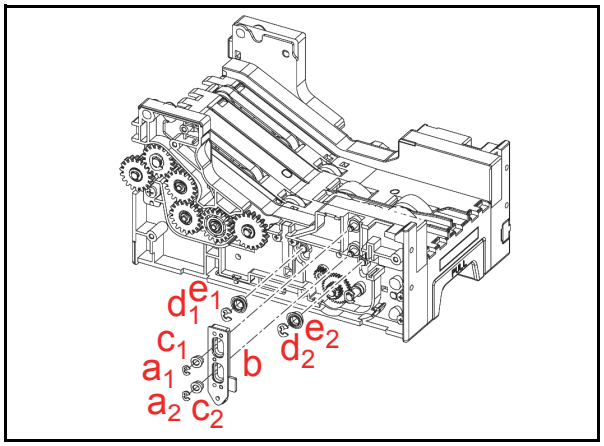

Figure 4-9 Left Lever Removal

5. Remove the two (2) retainer E-Clips (Figure 4-10 a_1 & a_2) located on the right side of the BNF Assembly lower Section, and remove the two (2) related Gears (Figure 4-10 b_1 & b_2).

NOTE: Be careful when removing each Gear that the two (2) related Parallel Pins (Figure 4-10 c_1 & c_2) are not lost during the removal process.

6. Remove the two (2) retainer E-Clips (Figure 4-10 d_1 & d_2).

NOTE: Be careful when removing the E-Clips, that the two (2) related Bushings (Figure 4-10 e_1 & e_2) are not lost following removal.

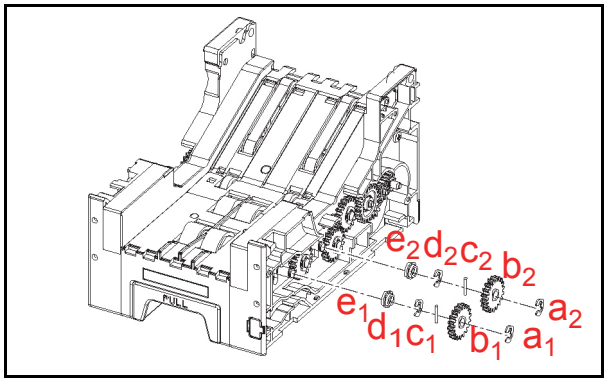

Figure 4-10 BNF Lower Right Gears Removal

7. Remove the two retainer (2) E-Clips (Figure 4-11 a_1 & a_2) and pull the single (1) Shaft (Figure 4-11 b) out of the Assembly; then take the Locking Mechanism (Figure 4-11 c) off of the BNF Section.
8. Remove the two (2) Prism mounting screws (Figure 4-11 d_1 & d_2) and remove Prism (G) from the Assembly (Figure 4-11 e).
9. Remove the two (2) Shaft Retainer E-Clips (Figure 4-11 f_1 & f_2), and the two (2) Feed Roller Assemblies (Figure 4-11 g_1 & g_2) from their related Shafts (Figure 4-11 h_1 & h_2).

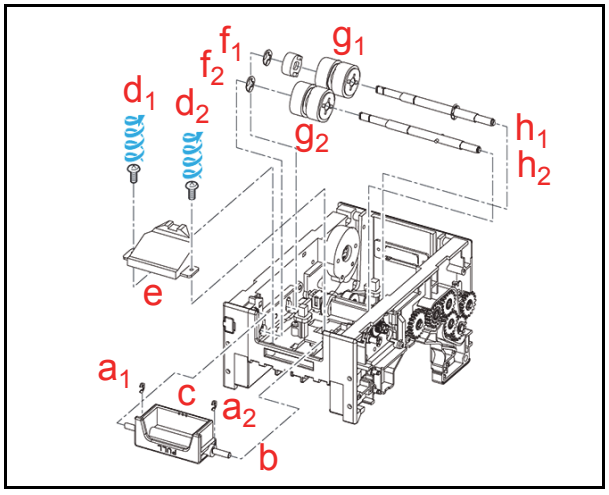

Figure 4-11 Feed Roller Assy. Removal

Timing Belt Removal (BNF Lower Section)

To remove the Timing Belt from the BNF Assembly's Lower Section, proceed as follows:

1. Remove the single (1) retainer E-Clip (Figure 4-12 a), and the related single (1) Gear from the Shaft (Figure 4-12 b).

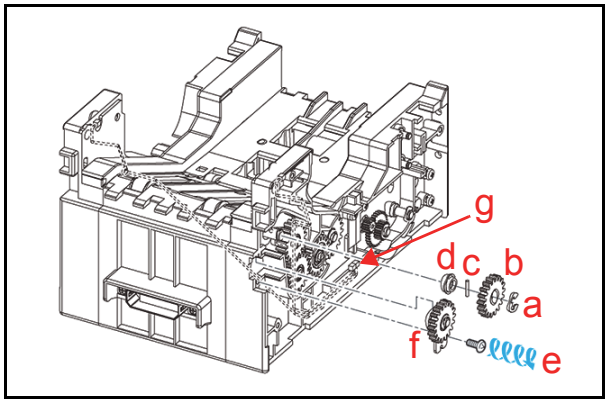

Figure 4-12 Gear and Harness Removal

NOTE: Be careful when removing the Gear that the single (1) related Parallel Pin (Figure 4-12 c) and its single (1) Bushing (Figure 4-12 d) are not lost following removal.

2. Remove the single (1) mounting Screw retaining (Figure 4-12 e) the Plate containing the attached Gear (Figure 4-12 f) in place.

NOTE: When reassembling, hang the Plate attached Gear onto its mounting hook before tightening its retainer screw.

3. Unplug the lower Harness Signal Connector (Figure 4-12 g).
4. Remove the two (2) Left Guide Assembly mounting Screws (Figure 4-13 a), and take the left Side Guide (L) Assembly (Figure 4-13 b) off of the BNF Section.

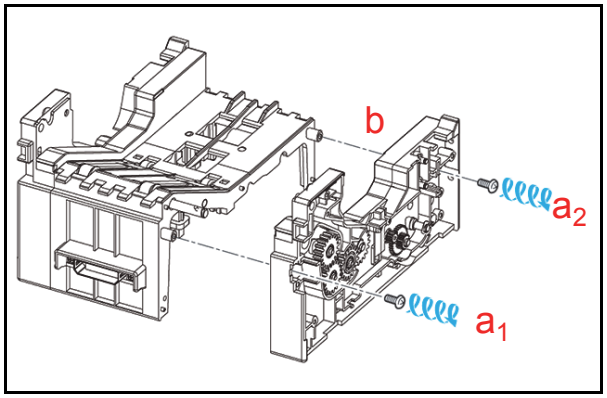

Figure 4-13 Side Guide (L) Assy. Removal

5. Remove the two (2) mounting Screws (Figure 4-14 a_1 & a_2) and the related single (1) E-Clip (Figure 4-14 b) from the Side Guide (R) Assembly (Figure 4-14 c) and remove it from the BNF Section.

NOTE: Ensure that when the E-Clip is removed, that the single (1) related Bushing (Figure 4-14 d) is not accidentally lost following its removal.

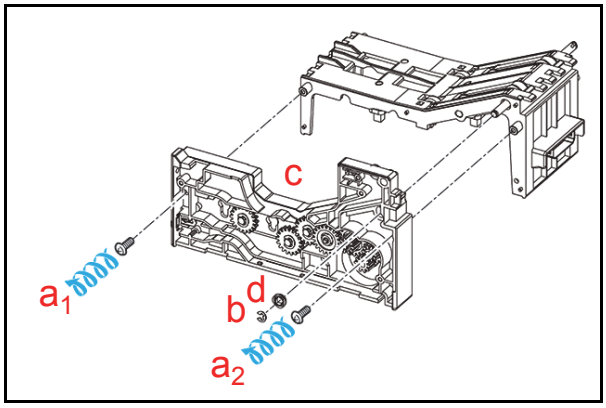

Figure 4-14 Side Guide (R) Assy. Removal

6. Remove the six (6) retainer E-Clips (Figure 4-15 a_1 through a_6), and pull the two (2) Shafts (Figure 4-15 b_1 & b_2) out to remove the two (2) Timing Belt (Figure 4-15 c_1 & c_2).

NOTE: Be careful when removing the Shafts that the two (2) related Parallel Pins (Figure 4-15 d_1 & d_2) are not lost following the removal process.

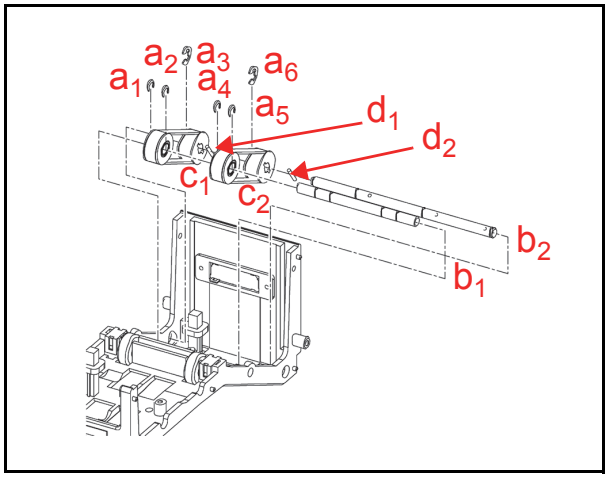

Figure 4-15 Timing Belt Removal

Timing Belt Removal (BNF Upper Section)

To remove the Timing Belt from the Upper BNF Section, proceed as follows:

1. Remove the two (2) mounting Screws (Figure 4-16 a_1 & a_2) retaining the Reject Open/Close Lever (Figure 4-16 b) in place.
2. Slide the Reject Open/Close Lever forward and remove it from the BNF Upper Section.
3. Remove the three (3) mounting Screws (Figure 4-16 c_1, c_2 & c_3) located on the right side of the BNF Section, and take Side Cover (U) off (Figure 4-16 d) of the BNF Section.
4. Remove the three (3) mounting Screws (Figure 4-16 e_1, e_2 & e_3) located on the left side of the BNF Section, and take the other Side Cover (U) off (Figure 4-16 f) of the BNF Section.

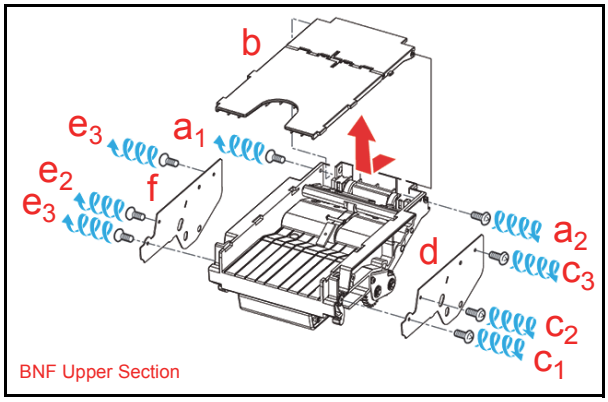

Figure 4-16 Reject Open/Close Lever/Side Cover (U) Removal

5. Remove the two (2) mounting Screws (Figure 4-17 a_1 & a_2) retaining both sides of Reject Guide (B) in place (Figure 4-17 b), and take Reject Guide (B) off of the BNF Section.
6. Remove the four (4) mounting Screws (Figure 4-17 c_1 through c_4) retaining Reject Guide (A) in place (Figure 4-17 d), and take Reject Guide (A) off of the BNF Section.

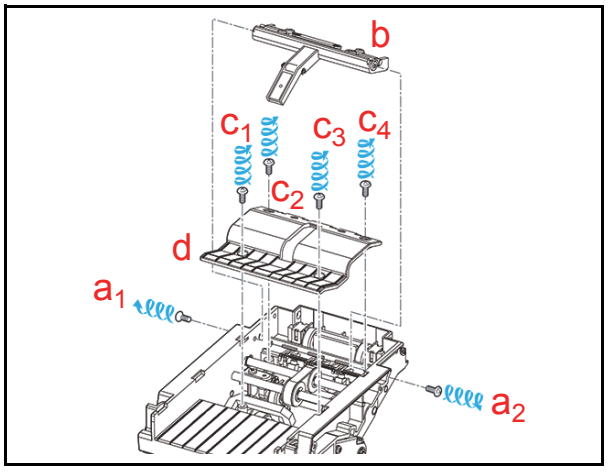

Figure 4-17 Reject Guide (A) & Reject Guide (B) Removal

7. Remove the two (2) mounting Screws (Figure 4-18 a_1 & a_2) retaining both sides of Reject Pulley SH in place (Figure 4-18 b), and remove the Reject Pulley SH Assembly.
8. Remove the single (1) E-Clip (Figure 4-18 c) located on the right side of the BNF Section, and slide the Shaft out to remove the single (1) Timing Belt (Figure 4-18 d).

NOTE: Be careful when removing the Shaft that the single (1) Bushing (Figure 4-18 e) is not accidentally lost following removal.

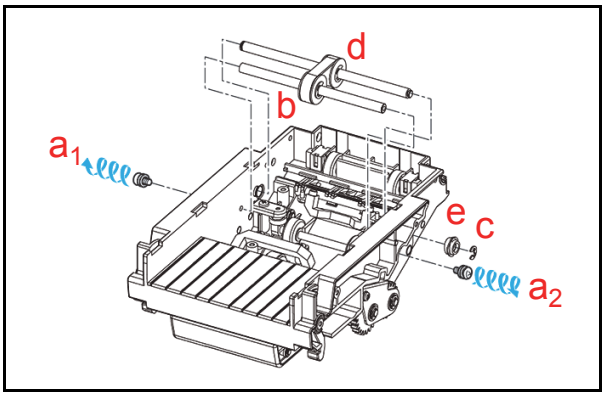

Figure 4-18 BNF Timing Belt Removal

Feed Roller Assy. & TR Feed Roller (A) Removal

To remove the Feed Roller Assembly and TR Feed Roller (A), proceed as follows:

1. Remove the two (2) mounting Screws (Figure 4-19 a_1 & a_2) retaining Prism (C) in place (Figure 4-19 b), and remove Prism (C) from the Assembly.
2. Remove the two (2) retaining E-Clips (Figure 4-19 c_1 & c_2) and the single (1) mounting Screw (Figure 4-19 d) located on the right side of the BNF Section; then remove the right Roller Arm (R) Assembly (Figure 4-19 e).

NOTE: Be careful when removing the Roller Arm (R) Assembly that the single (1) Spring (Figure 4-19 f), the two (2) Poly-Vinyl Washers (Figure 4-19 g_1 & g_2), the three (3) Bushings (Figure 4-19 h_1, h_2 & h_3) and the single (1) Parallel Pin (Figure 4-19 i) are not accidentally lost following their removal.

3. Remove the two (2) E-Clips (Figure 4-19 j_1 & j_2) and the single (1) mounting Screw (Figure 4-19 k) located on the left side of the BNF Section; then remove the Roller Arm (L) Assembly (Figure 4-19 l).

NOTE: Be careful when removing the Roller Arm (L) Assembly that the single (1) Spring (Figure 4-19 m), the two (2) Poly-Vinyl Washers (Figure 4-19 n_1 & n_2), the three (3) Bushings (Figure 4-19 o_1, o_2 & o_3) and the single (1) Parallel Pin (Figure 4-19 p) are not accidentally lost following removal.

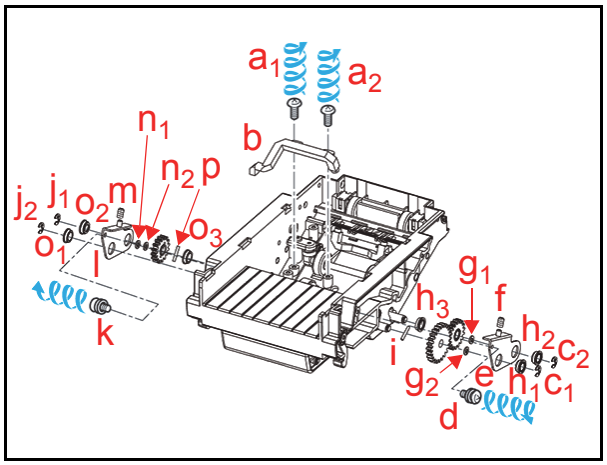

Figure 4-19 Prism (C) & Roller Arm Assy. Removal

4. Remove the single (1) E-Clip (Figure 4-20 a), and remove the Feed Roller Assy. (Figure 4-20 b) from the Shaft (Figure 4-20 c).

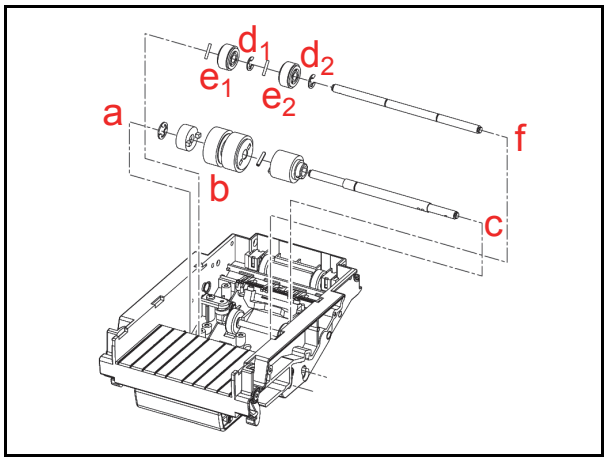

Figure 4-20 Feed Roller Assy./TR Feed Roller Assy. (A) Removal

5. Remove the two (2) retainer E-Clips (Figure 4-20 d_1 & d_2), and remove the two (2) TR Feed Roller (A) Assemblies (Figure 4-20 e_1 & e_2) from the Shaft (Figure 4-20 f).

Bar Circuit Board (UP) Removal

To remove the upper Bar Circuit Board (UP), proceed as follows:

1. Remove the two (2) mounting Screws (Figure 4-21 a_1 & a_2) located on the Transport Assembly, and take TR Cover U (Figure 4-21 b) off of the Transport Assembly.
2. Remove the two (2) mounting Screws (Figure 4-21 c_1 & c_2) retaining the Bar Circuit Board in place and remove its single (1) Signal Connector (Figure 4-21 d) Plug; then remove the Bar Circuit Board (UP) (Figure 4-21 e) from the Transport Assembly.

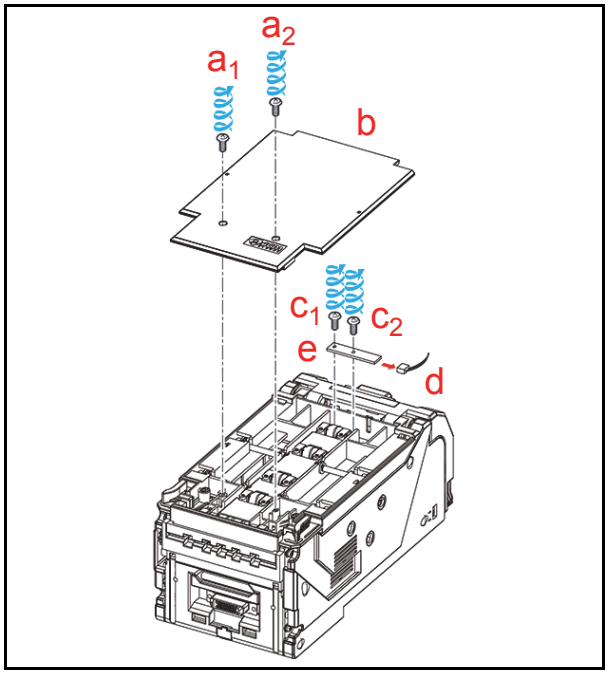

Figure 4-21 Bar Circuit Board (UP) Removal

Side Sensor Removal (Transport Assembly Right Side)

To remove the Side Sensor located on the right side of the Transport Assembly, proceed as follows:

1. Remove the four (4) Cover mounting Screws (Figure 4-22 a_1 through a_4) located on the right side of the Transport Assembly, and take TR Cover R (Figure 4-22 b) off of the Transport Assembly.
2. Remove the single (1) Brake mounting Screw (Figure 4-22 c) retaining the Side SNSR BRK (Figure 4-22 d) in place; then remove the Side SNSR BRK Bracket from the Assembly.
3. Remove the single (1) Signal Connector (Figure 4-22 e) Plug, and remove the Side Sensor (Figure 4-22 f) from the Transport Assembly.

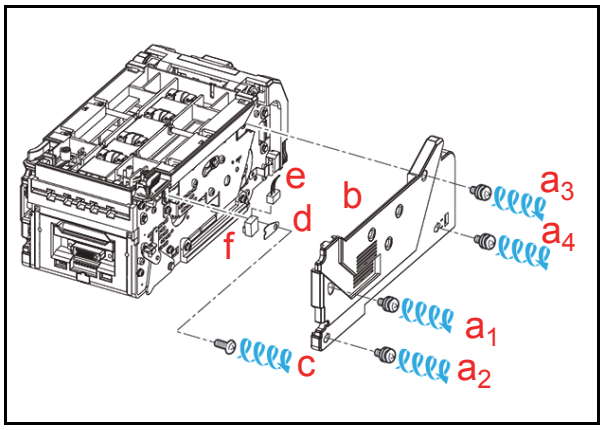

Figure 4-22 Side Sensor (Right Side) Removal

Side Sensor Removal (Transport Assembly Left Side)

To remove the Side Sensor located on the left side of the Transport Assembly, proceed as follows:

1. Remove the four (4) mounting Screws (Figure 4-23 a_1 through a_4) located on the left side of the Transport Assembly, and take TR Cover L (Figure 4-23 b) off of the Transport Assembly.
2. Remove the single (1) mounting Screw (Figure 4-23 c) retaining the Side SNSR BRK in place (Figure 4-23 d), and remove the Side SNSR BRK Brake from the Assembly.
3. Remove the single (1) Signal Connector (Figure 4-23 e) Plug, and remove the Side Sensor (Figure 4-23 f) from the Transport Assembly.

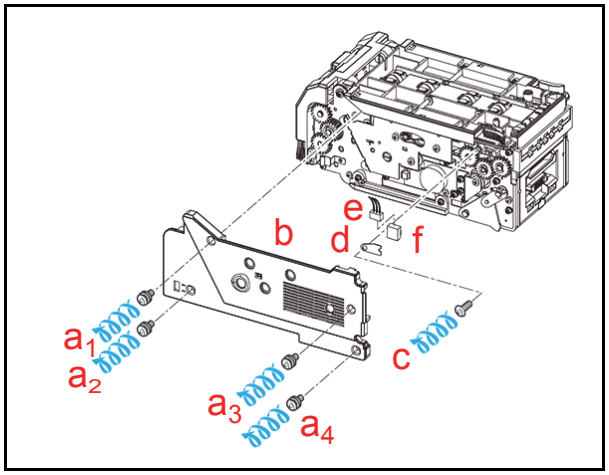

Figure 4-23 Side Sensor (Left Side) Removal

Sensor Circuit Board (OU) Removal

To remove the Sensor Circuit Board (OU), proceed as follows:

1. Remove the four (4) Cover mounting Screws (Figure 4-24 a_1 through a_4) located on the rear side of the Transport Assembly, and take the TR Cover PLT (Figure 4-24 b) off of the Transport Assembly.
2. Remove the five (5) Board mounting Screws (Figure 4-24 c_1 through c_5) retaining Sensor Circuit Board (OU) in place (Figure 4-24 d); then remove the two (2) Signal Connector (Figure 4-24 e_1 & e_2) Plugs and take Sensor Circuit Board (OU) off the Transport Assembly.

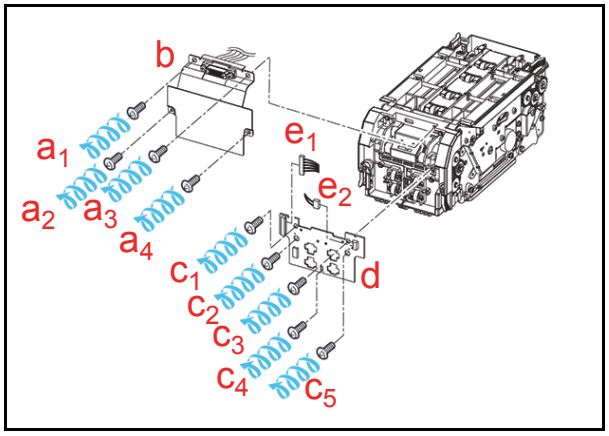

Figure 4-24 Sensor Board (OU) Removal

CPU Circuit Board Removal

To remove the CPU Circuit Board, proceed as follows:

1. Remove the four (4) mounting Screws (Figure 4-25 a_1 through a_4) retaining both sides of the TR Unit Rail in place, and remove TR Unit Rail L (Figure 4-25 b) from the Assembly; then remove TR Unit Rail R (Figure 4-25 c) from the Transport Assembly in the same way.
2. Remove the two (2) mounting Screws (Figure 4-25 d_1 & d_2) retaining both side of TR Cover F1 (Figure 4-25 e) to the Assembly; then take TR Cover F1 and the CPU Cover (Figure 4-25 f) off of the Transport Assembly.

NOTE: Ensure that when the Screws are removed, that the two (2) related Spacers (Figure 4-25 g_1 & g_2) are not lost following their removal.

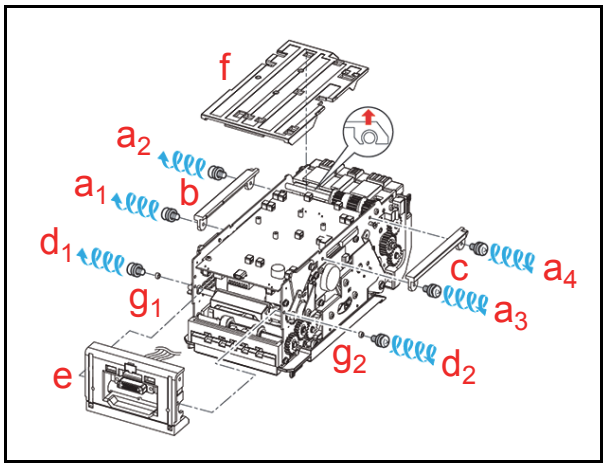

Figure 4-25 CPU Cover Removal

3. Remove the four (4) Board mounting Screws (Figure 4-26 a_1 through a_4) retaining the CPU Circuit Board (Figure 4-26 b) in place, and remove the seven (7) related Connector Plugs (Figure 4-26 c_1 through c_7) from the Board.

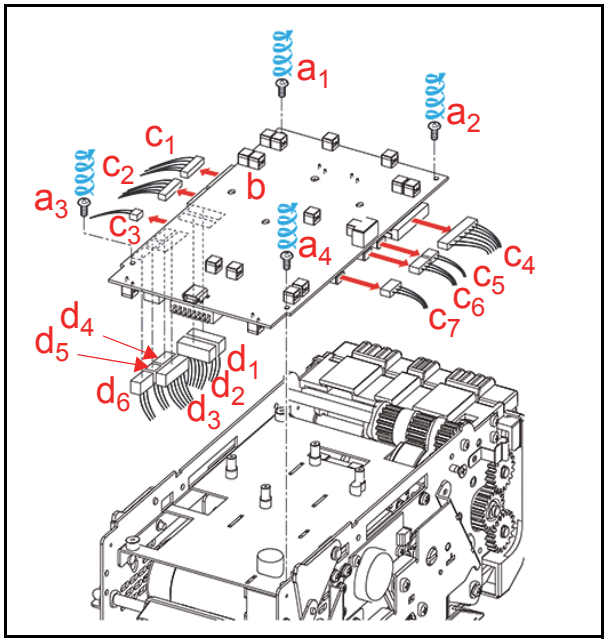

Figure 4-26 CPU Circuit Board Removal

4. Remove the six (6) Signal Connector (Figure 4-26 d_1 through d_6) Plugs located on the back side of the CPU Circuit Board, and take the Board off of the Transport Assembly.

NOTE: The Figure 4-26 c_5 Connector is only used in Centering Type Units.

Sensor Circuit (In-Down) Board Removal

To remove the Sensor Circuit (In-Down) Board, proceed as follows:

1. Remove the five (5) mounting Screws (Figure 4-27 a_1 through a_5) and the single (1) Spring (Figure 4-27 b) located on the right side of the Transport Assembly: then remove Centering Frame Cover Right Assy. (Figure 4-27 c) from the Transport Assembly.

> **Caution: Be sure that the Spring is removed BEFORE taking Centering Frame Cover 'Right' off the Assembly!**

2. Remove the six (6) Cover mounting Screws (Figure 4-27 d_1 through d_6) located on the left side of the Transport Assembly, and take Centering Frame Cover Left Assy. (Figure 4-27 e) off the Transport Assembly.
3. Remove the single (1) Ground mounting Screw (Figure 4-27 f) located on the right side of the Transport Assembly, and remove the Grounding Wire (Figure 4-27 g) from the Frame.

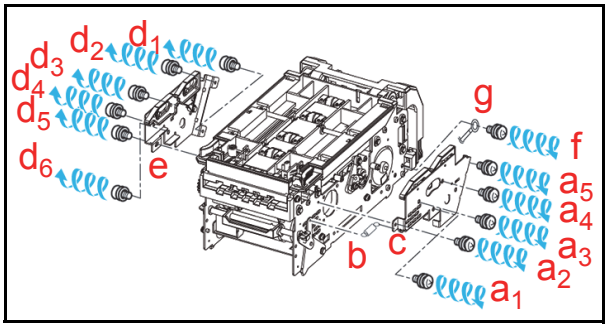

Figure 4-27 Centering Frame Cover R/L Removal

4. Remove the two (2) Guide mounting Screws (Figure 4-27 a_1 & a_2) located on each side of the Transport Assembly, and press-in on the Transport Guide STUDs (Figure 4-27 b_1 & b_2) located on the inside; then separate the Upper Rear Transport Sections (Figure 4-27 c) from the Lower Transport Assembly (Figure 4-27 d).

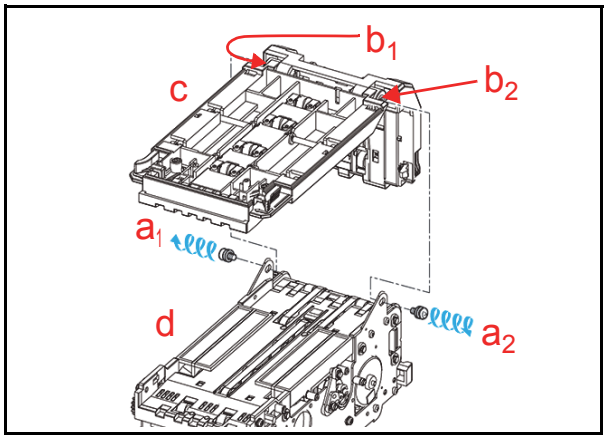

Figure 4-28 Transport Section Separation

5. Remove the single (1) Gear retaining E-Clip (Figure 4-29 a) and remove the single (1) Gear (Figure 4-29 b) from the Assembly.
6. Remove the four (4) Guide mounting Screws (Figure 4-27 c_1 through c_4), and take Transport Guide Lower (Figure 4-27 d) off of the Transport Assembly.

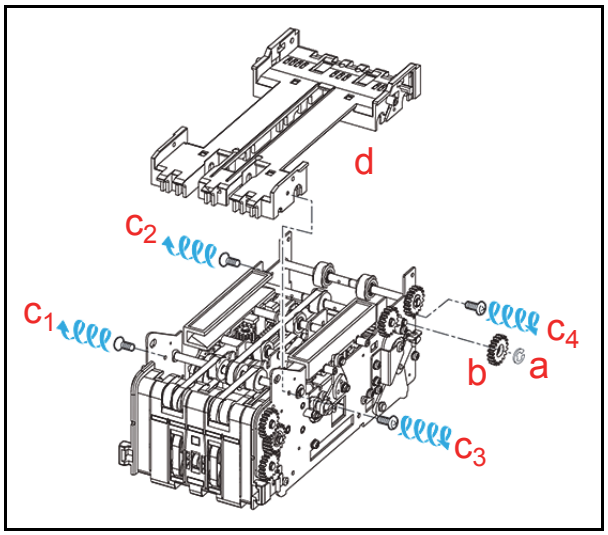

Figure 4-29 Transport Guide Lower Removal

7. Remove the four (4) Guide mounting Screws (Figure 4-30 a_1 through a_4) located on the each side of the Transport Assembly, and take TR Guide F 85 (Figure 4-30 b) off of the Transport Assembly.
8. Remove the four (4) Board mounting Screws (Figure 4-30 c_1 through c_4) and the single (1) Signal Connector (Figure 4-30 d) Plug from the Assembly; then take the Sensor Circuit (In-Down) Board (Figure 4-30 e) off of TR Guide F 85.

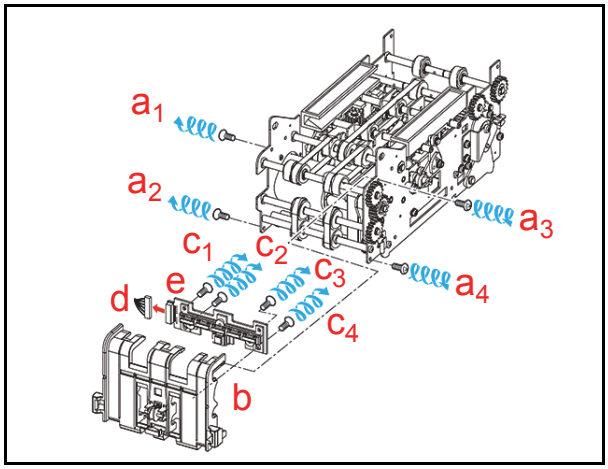

Figure 4-30 Sensor Circuit (In-Down) Board Removal

Timing Belt Removal (Transport Section Rear)

To remove the Timing Belt off of the Transport Section, proceed as follows:

1. Remove the two (2) Shaft retaining E-Clips (Figure 4-31 a_1 & a_2) located on the each side of the Transport Assembly; then remove the single (1) Gear (Figure 4-31 b) from the Assembly.

   NOTE: Ensure that when removing the Gear that the two (2) related Bushings (Figure 4-31 c_1 & c_2) are not accidentally lost following removal.

2. Remove the single (1) Shaft mounting Screw (Figure 4-31 d) located at the left, right side, lower corner of the Transport Assembly.
3. Remove the two (2) Shafts (Figure 4-31 e_1 & e_2), and the two (2) Timing Belts (Figure 4-31 f_1 & f_2) from each of the Shafts.

   NOTE: When removing the Figure 4-31 e_2 Shaft, loosen the Screw located at the lower left, right side, corner of the Transport Assembly first (Figure 4-31 g).

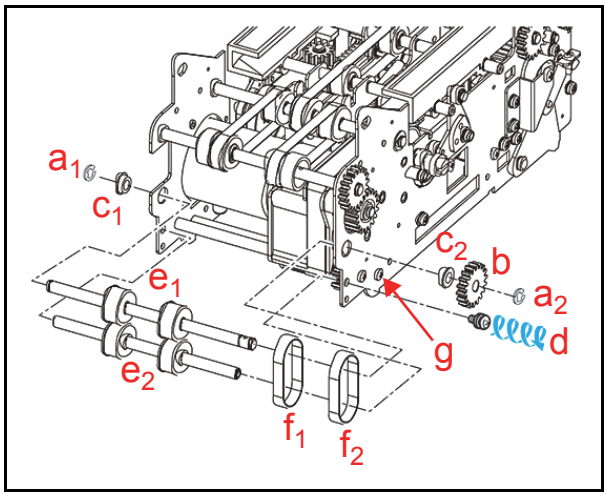

Figure 4-31 Timing Belt Removal

Transport Feed Pulley #4 & Timing Belt Removal (Transport Section Rear Upper)

To remove Transport Feed Pulley #4 and the Transport Section Rear Upper Assembly Timing Belt, proceed as follows:

1. Remove the single (1) Shaft retainer E-Clip (Figure 4-32 a) and the single (1) Gear (Figure 4-32 b) from the Transport Assembly.

   NOTE: Ensure that when removing the Gear that the single (1) Parallel Pin (Figure 4-32 c) is not accidentally lost during the removal process.

2. Remove the four (4) Crescent C-Clip Shaft Retainers (Figure 4-32 d_1 through d_4), and pull the two (2) related Shafts (Figure 4-32 e_1 & e_2) out of the Assembly; then remove the two (2) Timing Belts (Figure 4-32 f_1 & f_2) from each of them.

   NOTE: Ensure that when removing the Shafts the four (4) related Bushings (Figure 4-32 g_1 through g_4) are not accidentally lost during the removal process.

3. Remove the two (2) Pulley Retainer E-Clips (Figure 4-32 h_1 & h_2) from the Shaft, and then remove the two (2) Transport Feed Pulley #4 (Figure 4-32 i_1 & i_2) components from the Assembly.

   NOTE: Ensure that when removing the E-Clips that the two (2) Parallel Pins (Figure 4-32 j_1 & j_2) are not lost following the removal Process.

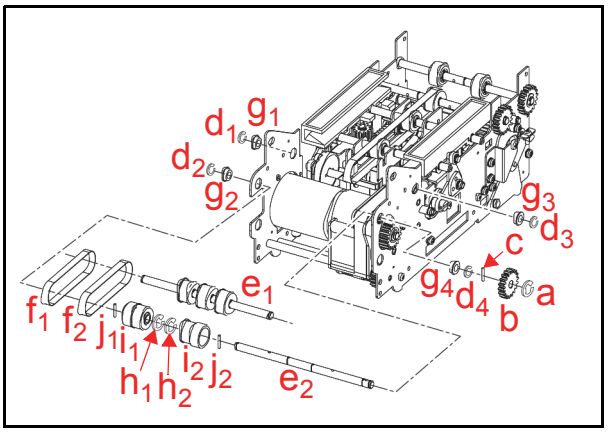

Figure 4-32 Transport Feed Pulley #4/ Timing Belt Removal

Timing Belt Removal (Transport Section Lower Upper)

To remove the Timing Belt from the Transport Assembly's Lower Section, proceed as follows:

1. Remove the two (2) Shaft End Retainer E-Clips (Figure 4-33 a_1 & a_2) and the single (1) Crescent C-Clip (Figure 4-33 b) from the related Shafts.

   NOTE: Ensure that when removing the E-Clips that the single (1) Bushing (Figure 4-33 c) is not accidentally lost following the removal process.

2. Remove the eight (8) Pulley Retainer E-Clips (Figure 4-33 d_{1-4} & d_{5-8}), and slide the three (3) related Shafts (Figure 4-33 e_1, e_2 & e_3) out of the Assembly; then remove the Timing Belt freed by the Shaft removals (Figure 4-33 f).

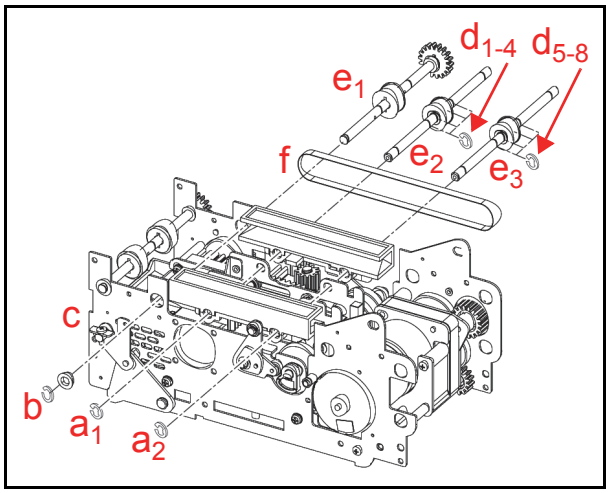

Figure 4-33 Upper Timing Belt Removal

NOTE: Re-align the Centering Guide's position when reassembling the Unit (See "Centering Guide Positioning" on page 4-11 of this Service Manual).

Centering Guide Positioning

To re-align the Centering Guide's position, proceed as follows:

1. Remove the locking E-Clips (Figure 4-34 a) securing the Alignment Gears in place.
2. Press the Alignment Gear (Figure 4-34 b) downward.
3. Carefully widen the Centering Guide Assembly (Figure 4-34 c_1 & c_2) to its limit.
4. Pull the Alignment Gears upward.
5. Reset the Gear by reinserting the locking E-Clips.

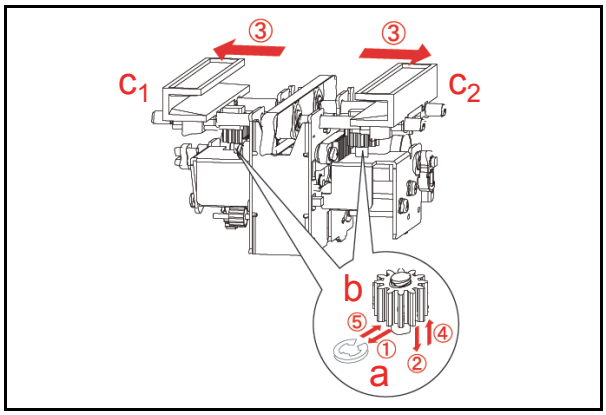

Figure 4-34 Centering Guide Positioning

Centering Motor Removal

To remove the Centering Motor, proceed as follows:

1. Remove the single (1) Centering Unit mounting Screw (Figure 4-35 a) from the lower Transport Frame Assembly.
2. Cut the Plastic Harness binding Tye Wrap apart (Figure 4-35 b) and remove the two (2) Signal Connector (Figure 4-35 c_1 & c_2) Plugs from the Sub-assembly; then lift the Centering Unit up and off the lower Transport Assembly.

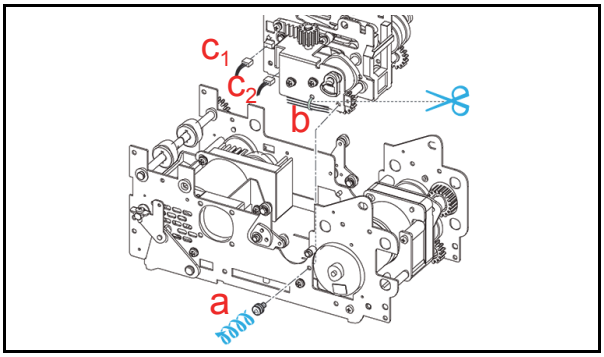

Figure 4-35 Centering Unit Removal

3. Remove the two (2) Motor Bracket mounting Screws (Figure 4-36 a_1 & a_2), and remove the CNT Motor BRK (Figure 4-36 b) Bracket from the Sub-assembly.
4. Remove the two (2) Motor mounting Screws (Figure 4-36 c_1 & c_2), and remove the Centering Motor (Figure 4-36 d) out of the Sub-assembly.

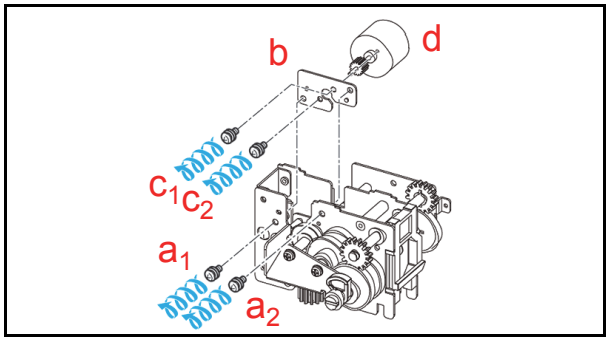

Figure 4-36 Centering Motor Removal

Centering Circuit Board Removal

To remove the Centering Circuit Board, proceed as follows:

1. Remove the single (1) Circuit Board Mounting Screw (Figure 4-37 a).
2. Remove the Centering Circuit Board (Figure 4-37 b) from the Sub-assembly.

NOTE: If there is insufficient clearance to place a Screwdriver into the access hole provided, move the Slider aside to create additional space.

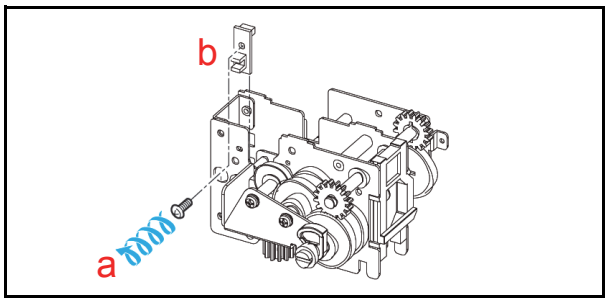

Figure 4-37 Centering Board Removal

Transport Feed Roller 4 Assy. Removal

To remove the Transport Feed Roller 4 Assembly, proceed as follows:

1. Remove the single (1) Shaft retaining Crescent C-Clip (Figure 4-38 a) and the two (2) Roller Retainer E-Clips (Figure 4-38 b_1 & b_2) from the Shaft on the Sub-assembly; then remove the two (2) Transport Feed Roller Assemblies (Figure 4-38 c_1 & c_2) from the Shaft (Figure 4-38 d) as it slides out of the Sub-assembly.

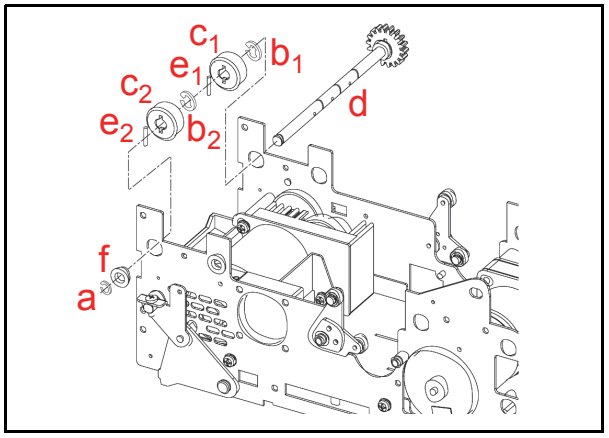

Figure 4-38 Transport Feed Roller 4 Assy. Removal

NOTE: Ensure that when removing the Shaft that the two (2) related locking Parallel Pins (Figure 4-38 e_1 & e_2) and the single Shaft Bushing (Figure 4-38 f) are not lost following their removal from the Shaft.

Encoder Circuit Board Removal

To remove the Encoder Circuit Board, proceed as follows:

1. Remove the single (1) Board mounting Screw (Figure 4-39 a) and remove the single (1) Signal Connector (Figure 4-39 b) Plug; then remove the Encoder Circuit Board (Figure 4-39 c) from the Transport Sub-assembly Section.

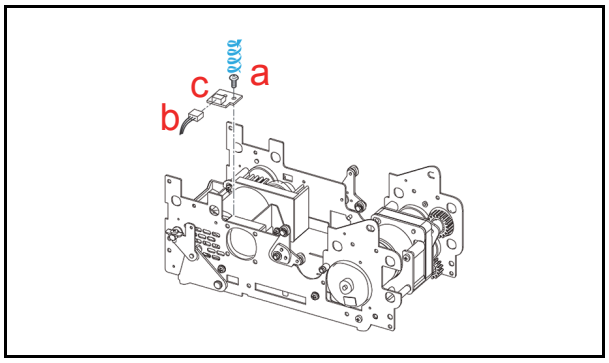

Figure 4-39 Encoder Board Removal

FAN Motor Removal

To remove the FAN Motor, proceed as follows:

1. Remove the two (2) Motor mounting Screws (Figure 4-40 a_1 & a_2) and their two (2) related Nuts (Figure 4-40 b_1 & b_2) from the Sub-assembly; then remove the FAN Motor (Figure 4-40 c) from the Transport Sub-assembly Section.

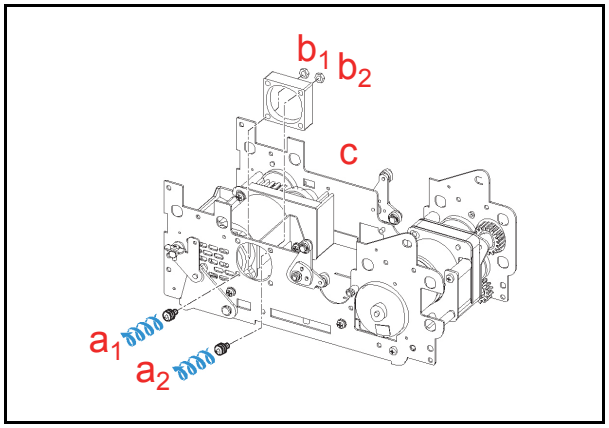

Figure 4-40 Fan Motor Removal

Stacker Motor Removal

To remove the Stacker Motor, proceed as follow:

1. Remove the two (2) Motor mounting Screws (Figure 4-41 a_1 & a_2) located on the left side of the Transport Sub-assembly.
2. Remove the single (1) Arm mounting Screw (Figure 4-41 b), and remove TR LTCH ARM L (Figure 4-41 c) from the Sub-assembly.
3. Remove the single (1) Shaft Retainer E-Clip (Figure 4-41 d), and the two (2) Frame mounting Screws (Figure 4-41 e_1 & e_2) from the Frame plate; then remove TR Frame L Assy. (Figure 4-41 f) from the Bottom Frame Pan.

NOTE: Be careful when removing the TR Frame L Assembly, that the single (1) related Bushing (Figure 4-41 g) is not lost following removal.

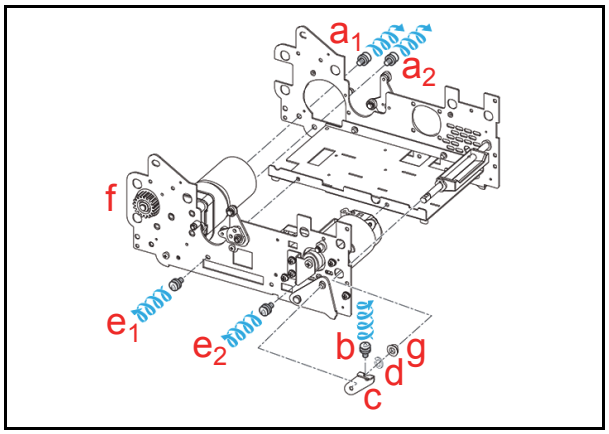

Figure 4-41 TR Frame L Assy. Removal

4. Remove the four (4) Motor Assembly mounting Screws (Figure 4-42 a_1 through a_4) from the Left Frame, and take the Stacker Motor Unit (Figure 4-42 b) off of the TR Frame L Assembly.

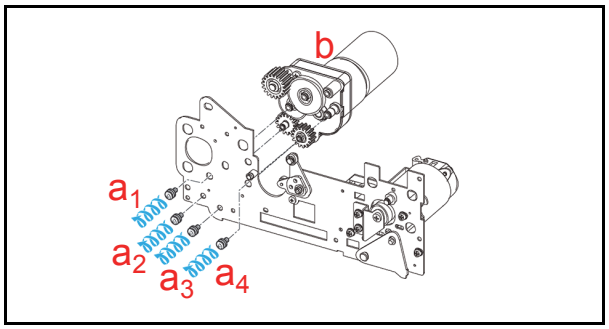

Figure 4-42 Stacker Motor Unit Removal

5. Remove the two (2) Gear Retainer E-Clips (Figure 4-43 a_1 & a_2) and the single (1) Gear Retaining Crescent C-Clip (Figure 4-43 b) from the short Shaft, and remove the four (4) Gears (Figure 4-43 c_1 through c_4) from each of their related shafts.
6. Remove the three (3) Gear Housing mounting Screws (Figure 4-43 d_1, d_2 & d_3), the two (2) Gear Retainer E-Clips (Figure 4-43 e_1 & e_2), and the single (1) Shaft Retainer Crescent C-Clip (Figure 4-43 f); then remove the PRESR Motor BRK 3 Bracket Assembly (Figure 4-43 g) from the Housing.

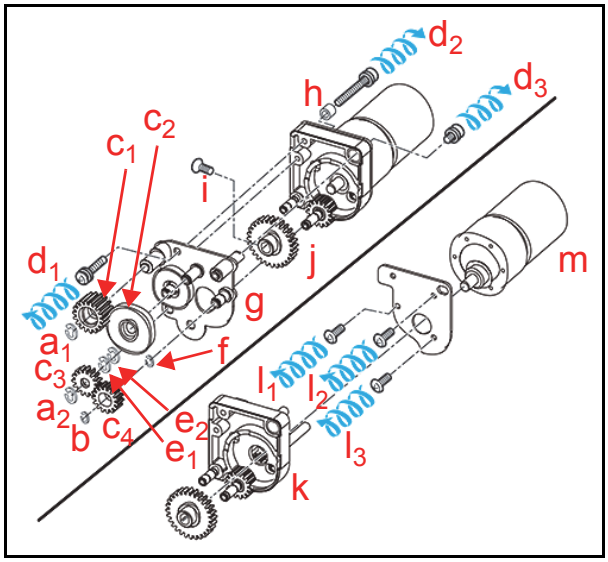

Figure 4-43 Stacker Motor Removal

NOTE: Ensure that when the Screws are removed, that the single (1) Spacer (Figure 4-43 h) is not accidentally lost following their removal.

7. Remove the single (1) Enamel Set W Point Screw (Figure 4-43 i), then remove TR PRESR Gear 1 (Figure 4-43 j) and CNT Guide R1 (Figure 4-43 k) from the Housing.
8. Remove the three (3) Motor Mounting Plate Screws (Figure 4-43 l_1, l_2 & l_3), and remove the Stacker Motor (Figure 4-43 m) from its Mounting Plate.

Transport Motor Removal

To remove the Transport Motor, proceed as follows:

1. Remove the four (4) Motor mounting Screws (Figure 4-44 a_1 through a_4) from the Frame.
2. Remove the Transport Motor Assembly (Figure 4-44 b) off of the Frame Housing.

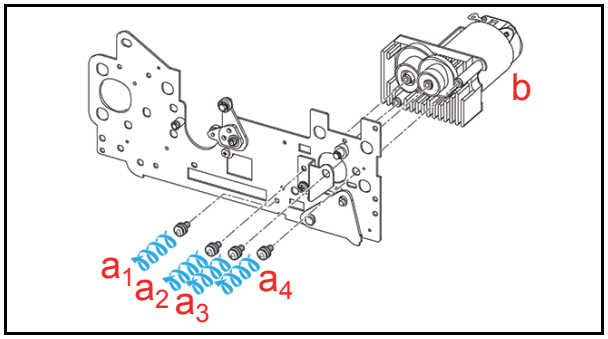

Figure 4-44 Transport Motor Unit Removal

3. Remove the two (2) Cover mounting Screws (Figure 4-45 a_1 & a_2), and take the Encoder Cover (Figure 4-45 b) off the Motor Mount.
4. Remove the Feed Encoder (Figure 4-45 c).

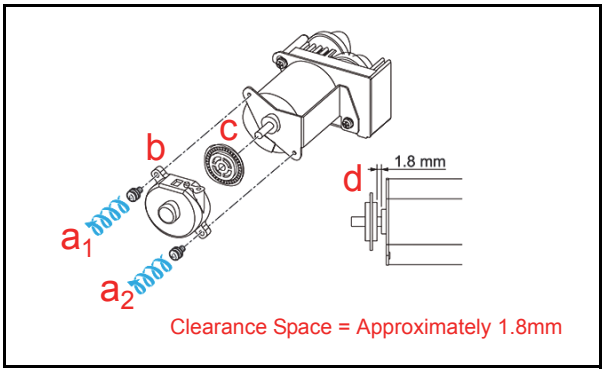

Figure 4-45 Feed Encoder Removal

NOTE: Ensure that Clearance Space between the Feed Encoder and the Motor is approximately 1.8mm when reassembling the Motor Housing (Figure 4-45 d).

5. Remove the three (3) Motor mounting Screws (Figure 4-46 a_1, a_2 & a_3) from the Housing, and remove the Transport Motor (Figure 4-46 b) from the Frame Housing.

NOTE: Be careful when removing the Screws that the two (2) related Washers (Figure 4-46 c_1 & c_2) are not accidentally lost following their removal.

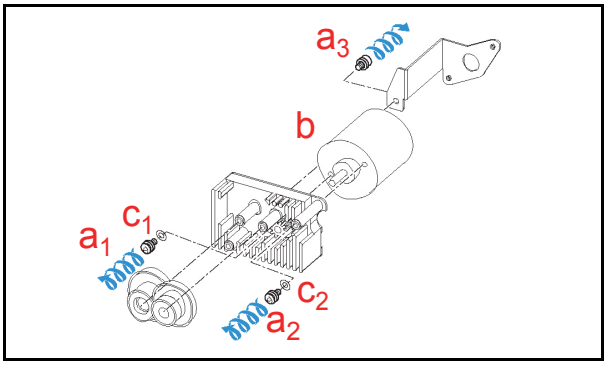

Figure 4-46 Transport Motor Removal

Power Grip GT Belt Removal

To remove the Power Grip GT Belt, proceed as follows:

1. Remove the Cash Box from the Frame Unit.
2. Use a TORX Driver to remove the two (2) TORX mounting Screws (Figure 4-47 a_1 & a_2) located on the rear side of the Cash Box.

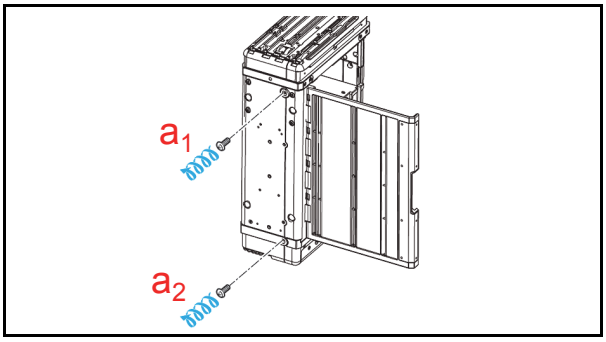

Figure 4-47 Cash Box Rear Screw Removal

3. Remove the two (2) Plate mounting Screws (Figure 4-48 a_1 & a_2), and take Panel Plate L (Figure 4-48 b) off of the Cash Box.
4. Remove the single (1) Wire Loop (Figure 4-48 c) from the Spring (Figure 4-48 d).

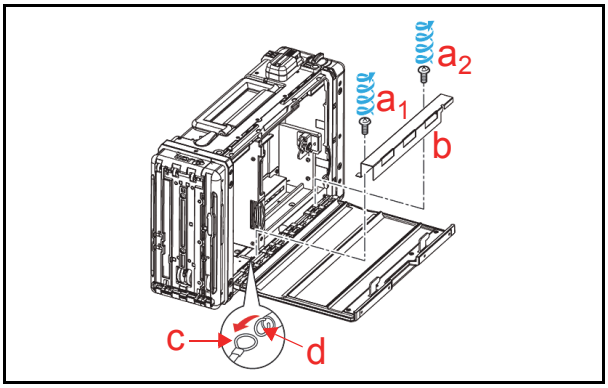

Figure 4-48 Panel Plate L Removal

5. Remove the two (2) Block mounting Screws (Figure 4-49 a_1 & a_2), and take the Receive Plate Block (Figure 4-49 b) off of the Cash Box inner rear side panel.
6. Remove the single (1) Ground mounting Screw (Figure 4-49 c), and remove the single (1) Grounding Wire (Figure 4-49 d) from the Cash Box inner rear side.

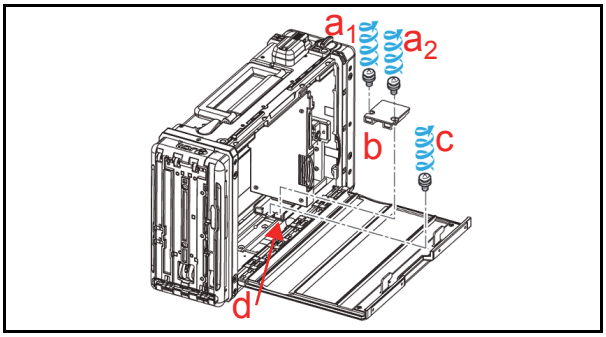

Figure 4-49 Receive Plate Block Removal

7. Remove the three (3) Plate mounting Screws (Figure 4-50 a_1, a_2 & a_3), and take the Receive Plate Assembly (Figure 4-50 b) off of the Cash Box.

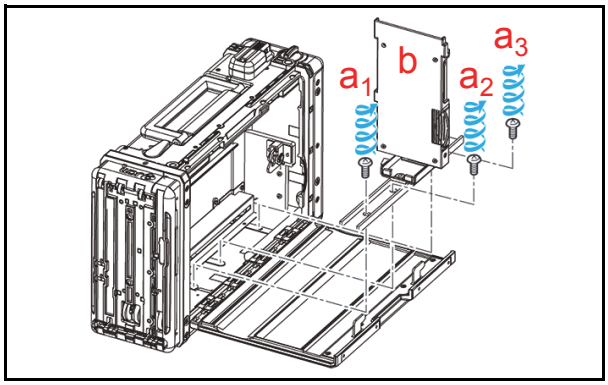

Figure 4-50 Receive Plate Removal

8. Remove the four (4) Panel Plate mounting Screws (Figure 4-51 a_1 through a_4), and remove the Panel B Plate (Figure 4-51 b) out of the Cash Box interior.

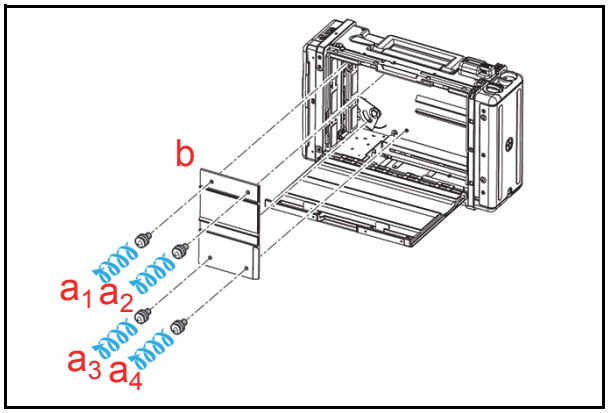

Figure 4-51 Panel B Plate Removal

9. Remove the four (4) Panel Plate mounting Screws (Figure 4-52 a_1 through a_4), and take Panel Plate R (Figure 4-52 b) off and out of the Cash Box interior.

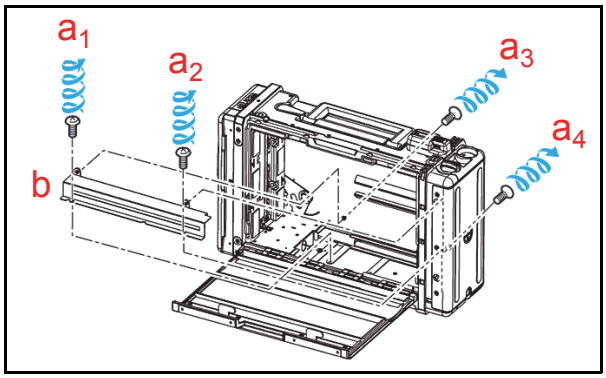

Figure 4-52 Panel Plate R Removal

10. Remove the four (4) external Damper mounting Screws (Figure 4-53 a_1 through a_4) located on the rear side of the Cash Box, and remove the Damper Unit Assembly (Figure 4-53 b) from the Pusher Mechanism.

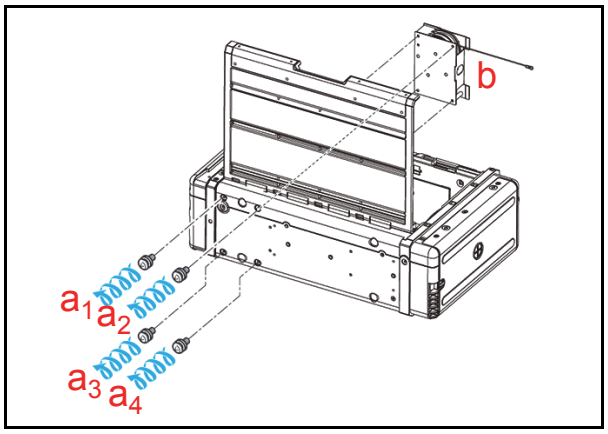

Figure 4-53 Damper Unit Removal

11. Remove the four (4) Pusher Mechanism mounting Screws (Figure 4-54 a_1 through a_4) located inside top area of the Cash Box, and take the Pusher Mechanism Assembly (Figure 4-54 b) out of the Cash Box.

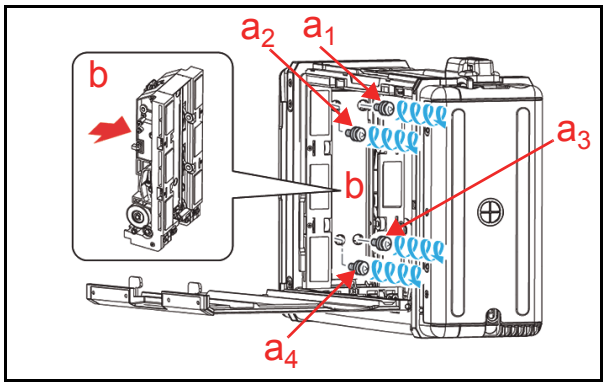

Figure 4-54 Pusher Mechanism Removal

12. Remove the two (2) Guide mounting Screws (Figure 4-55 a_1 & a_2), and then remove TR Guide C (Outside) (Figure 4-55 b) from the Pusher Mechanism Assembly.

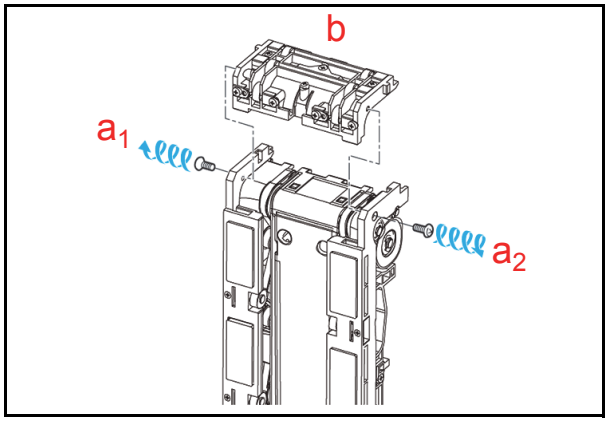

Figure 4-55 TR Guide C (Outside) Removal

13. Remove the four (4) Shaft Retainer E-Clips (Figure 4-56 a_1 through a_4), the two (2) related Gears (Figure 4-56 b_1 & b_2) and the single (1) Parallel Pin (Figure 4-56 c) from the Pusher Mechanism Assembly.

14. Remove the single (1) E-Clip (Figure 4-56 d).

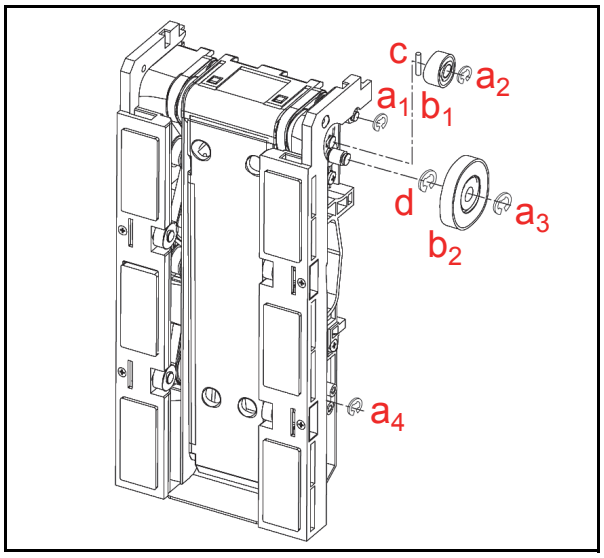

Figure 4-56 Pusher Mechanism Left Gear Removal

15. Remove the two (2) Guide mounting Screws (Figure 4-57 a_1 & a_2), and separate TR Guide L (Figure 4-57 b) from the Pusher Mechanism Assembly.
16. Remove the single (1) Spring (Figure 4-57 c), and remove the Power Grip GT Belt (Figure 4-57 d) from the Pusher Mechanism Assembly.

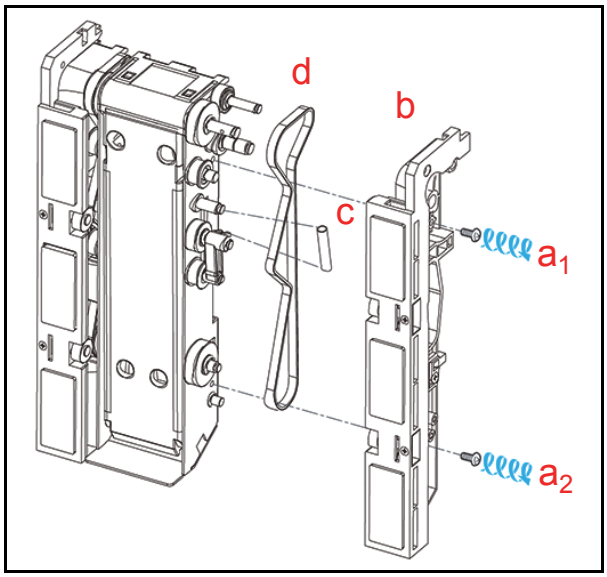

Figure 4-57 Left Power Grip GT Belt Removal

17. Remove the three (3) Shaft Retainer E-Clips (Figure 4-58 a_1, a_2 & a_3) and the two (2) mounting Screws (Figure 4-58 b_1 & b_2) from the Pusher Mechanism Assembly.
18. Separate the TR Guide R (Figure 4-58 c) from the Pusher Mechanism Assembly.
19. Remove the single (1) Spring (Figure 4-58 d), and remove the Power Grip GT Belt (Figure 4-58 e) from the Pusher Mechanism Assembly.

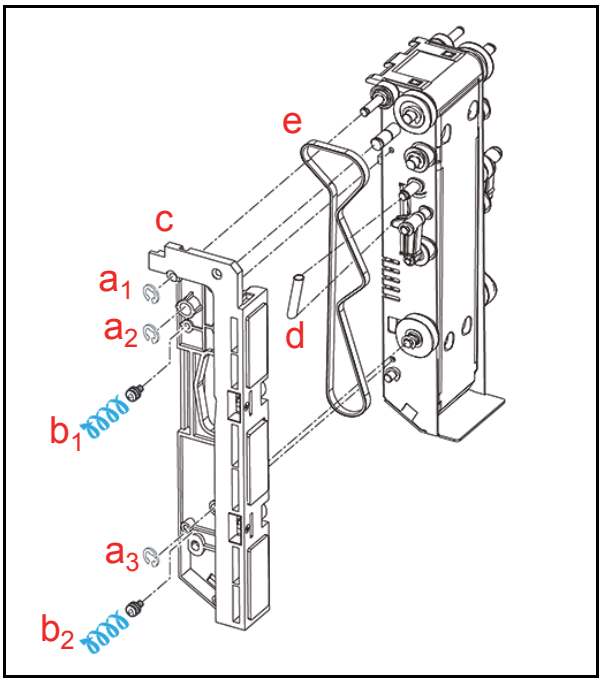

Figure 4-58 Right Power Grip GT Belt Removal

POWER GRIP GT BELT REASSEMBLY

Figure 4-59 illustrates the correct path positions for replacing the Power Grip GT Belts.

NOTE: Replace the Power Grip GT Belts in the locations shown in the Figure 4-59 illustration when reassembling the Unit.

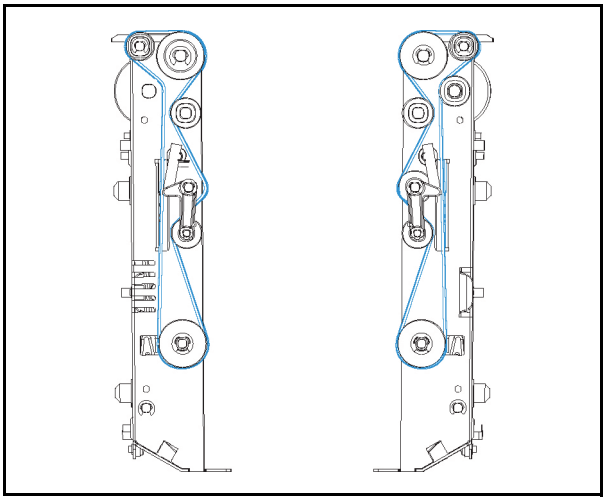

Figure 4-59 Power Grip GT Belt Reassembly

This completes the Disassembly/Reassembly Procedure.

TBV® Series
Transaction Based Validator
Section 5

5 WIRING DIAGRAMS

This section provides the TBV® Series Transaction Based Validator Unit wiring diagrams for the following items:

- Centering System Wiring Diagram
- Fixed System Wiring Diagram

TBV FSH Centering System Wiring Diagram

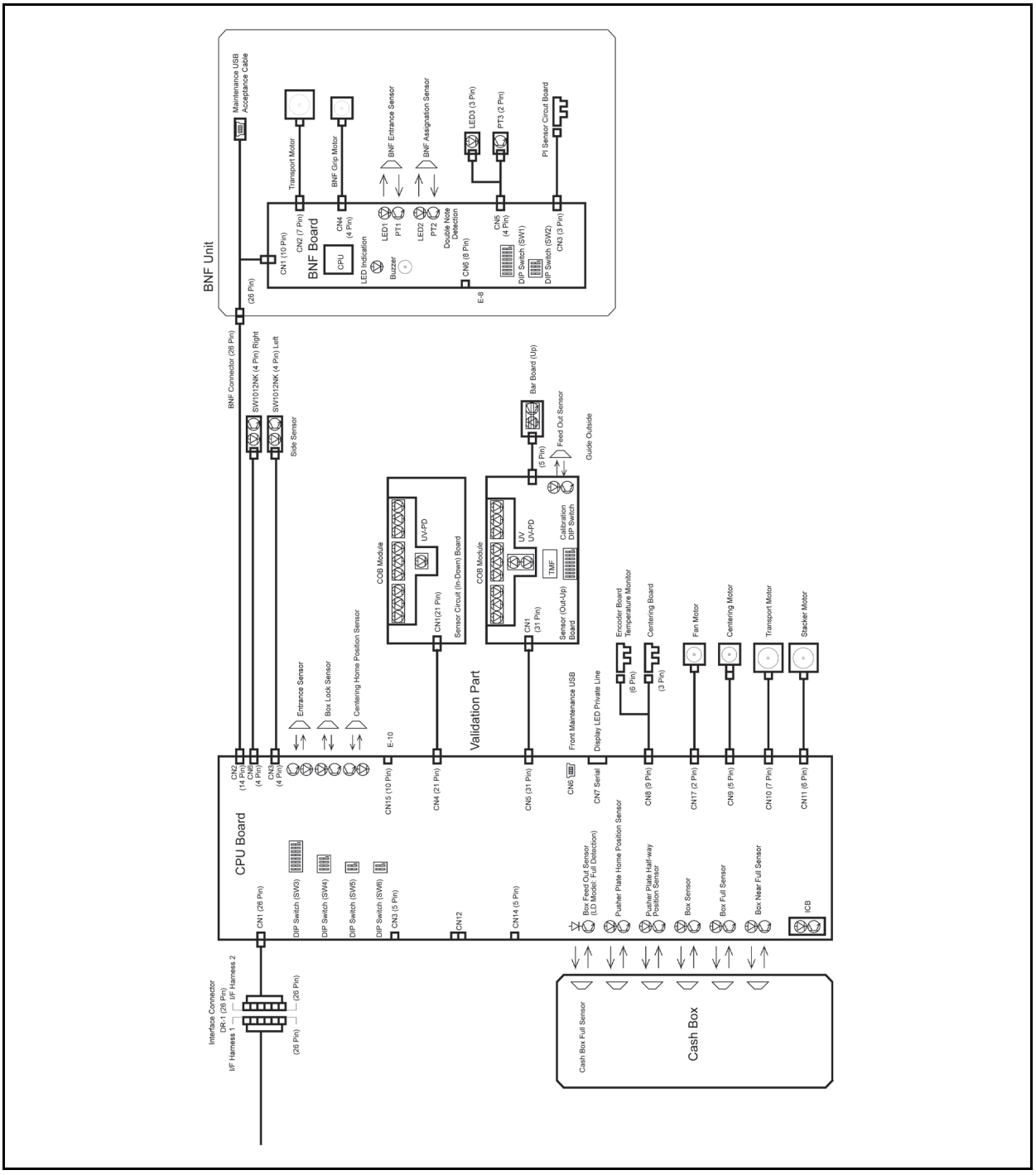

Figure 5-1 TBV FSH Centering System Wiring Diagram

TBV FSH Fixed System Wiring Diagram

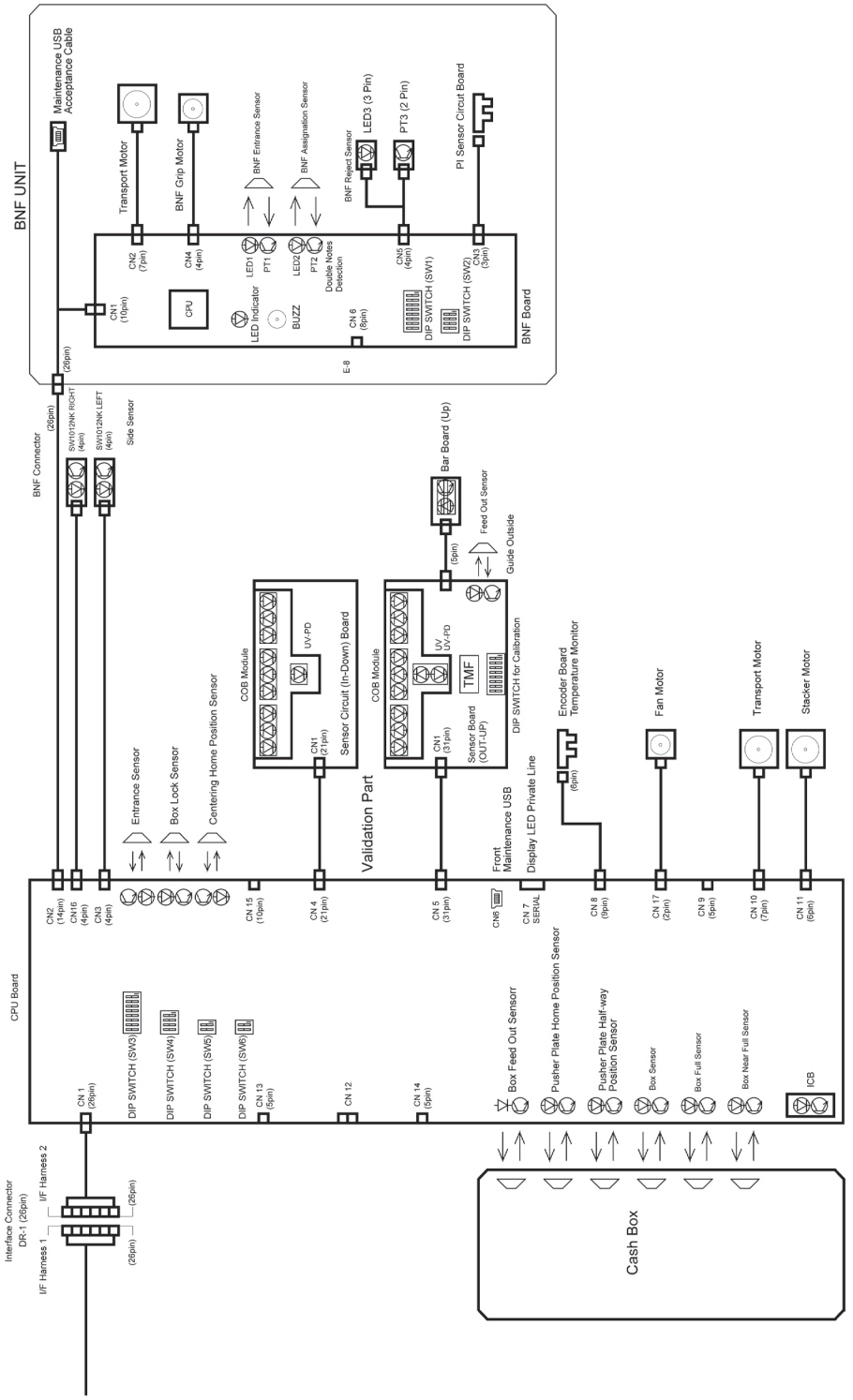

Figure 5-2 TBV FSH Fixed System Wiring Diagram

TBV FSH with ICB System Wiring Diagram

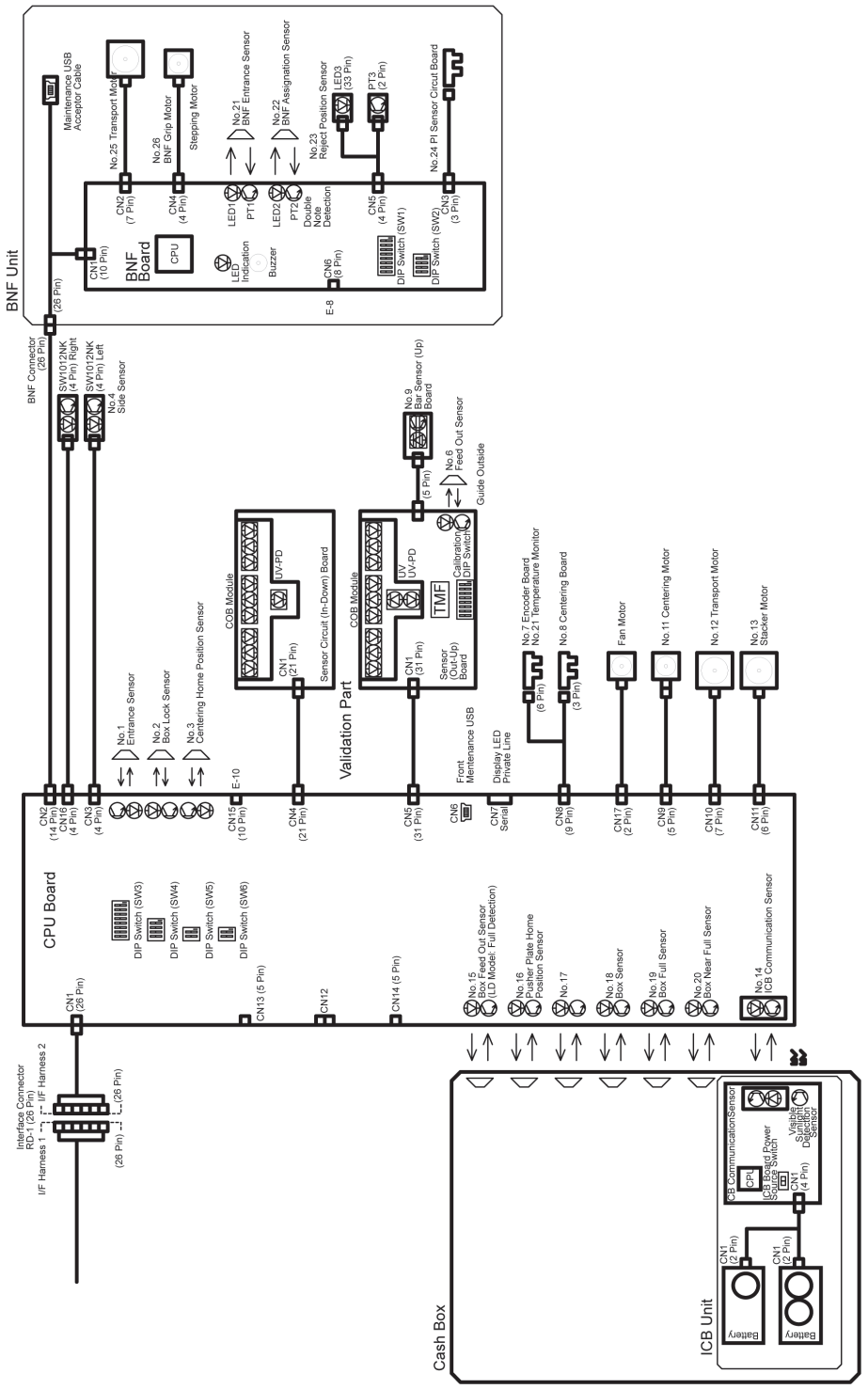

Figure 5-3 TBV FSH with ICB System Wiring Diagram

TBV GSH System Wiring Diagram

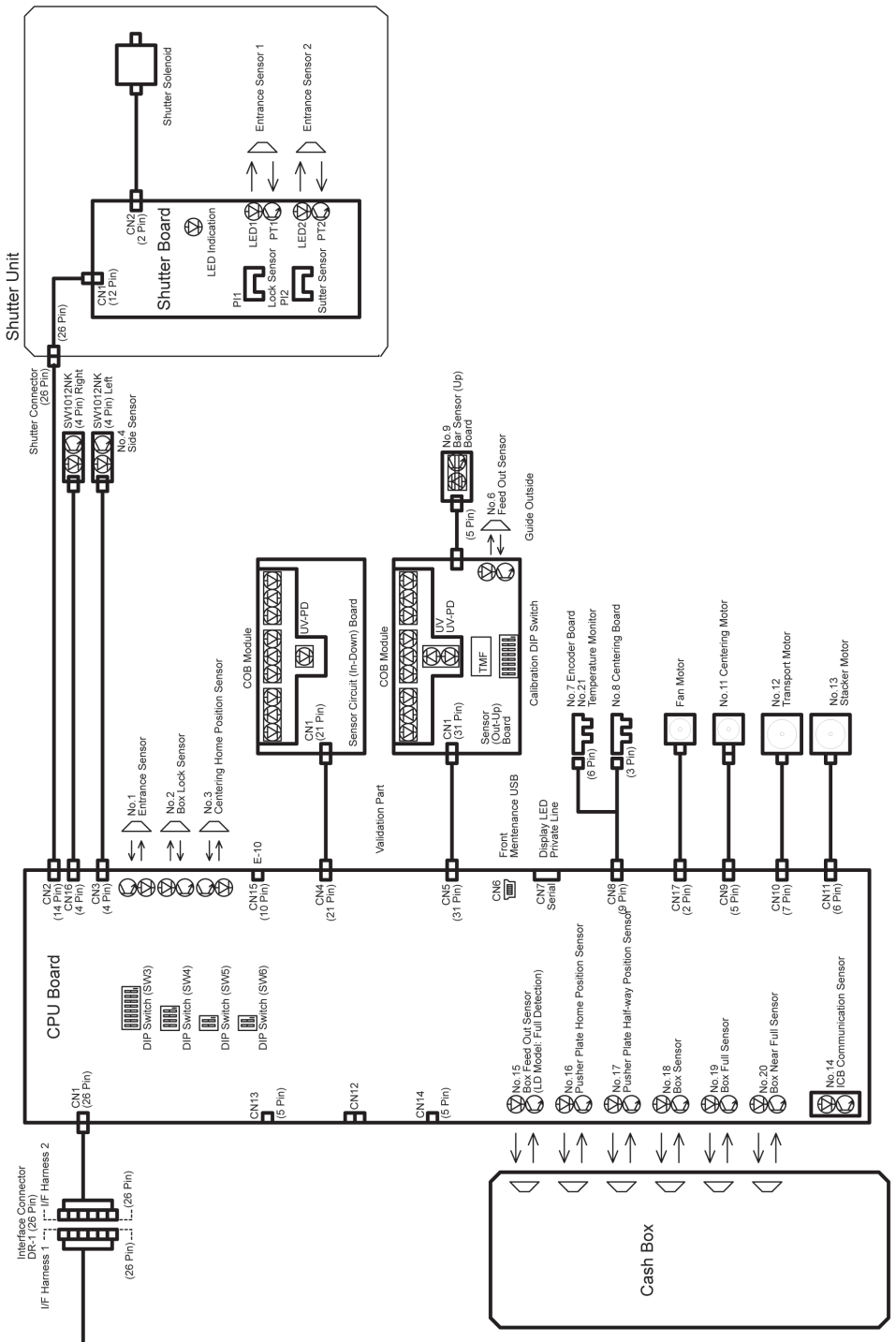

Figure 5-4 TBV GSH System Wiring Diagram

TBV FLD Centering System Wiring Diagram

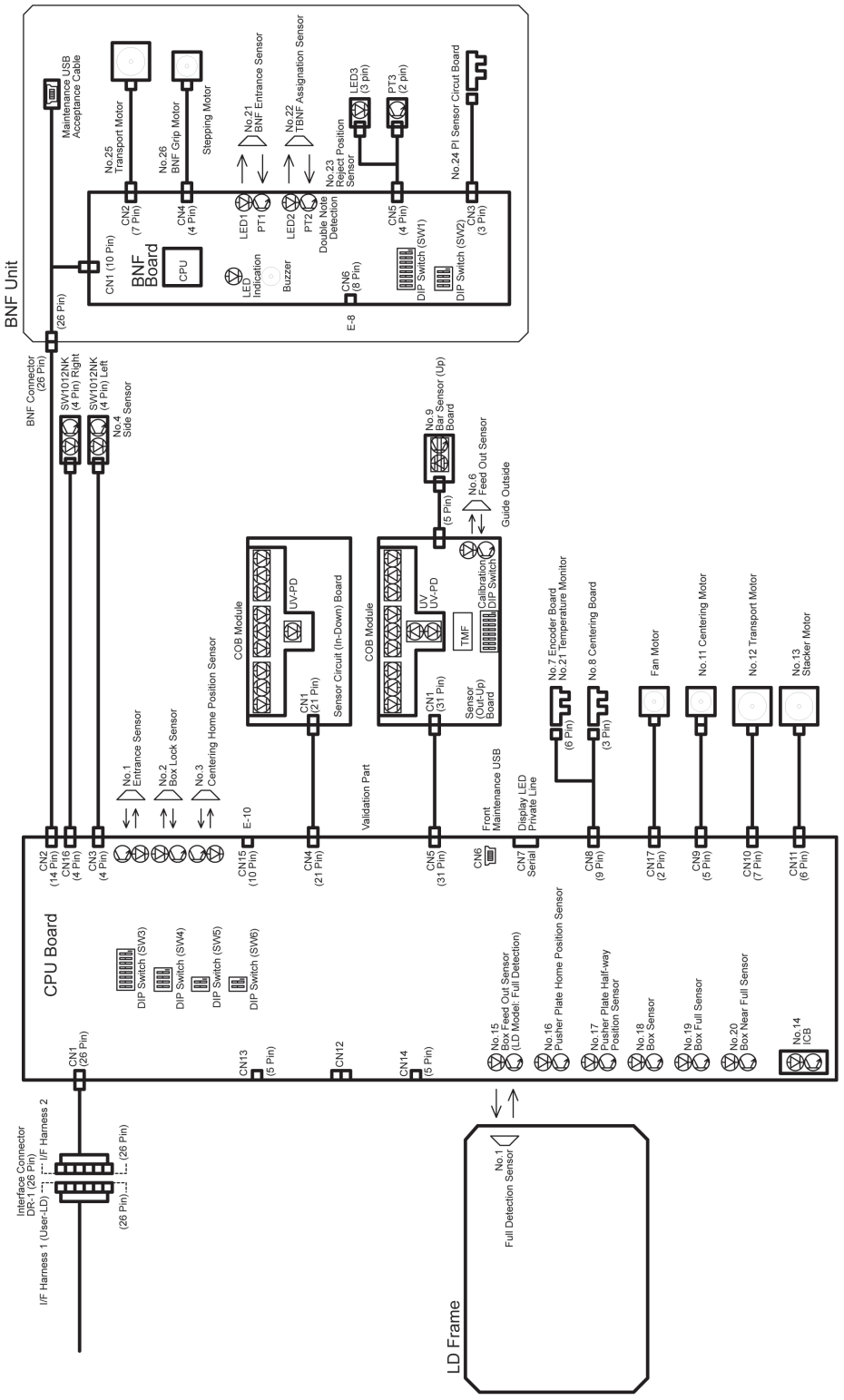

Figure 5-5 TBV FLD Centering System Wiring Diagram

TBV FLD Fixed System Wiring Diagram

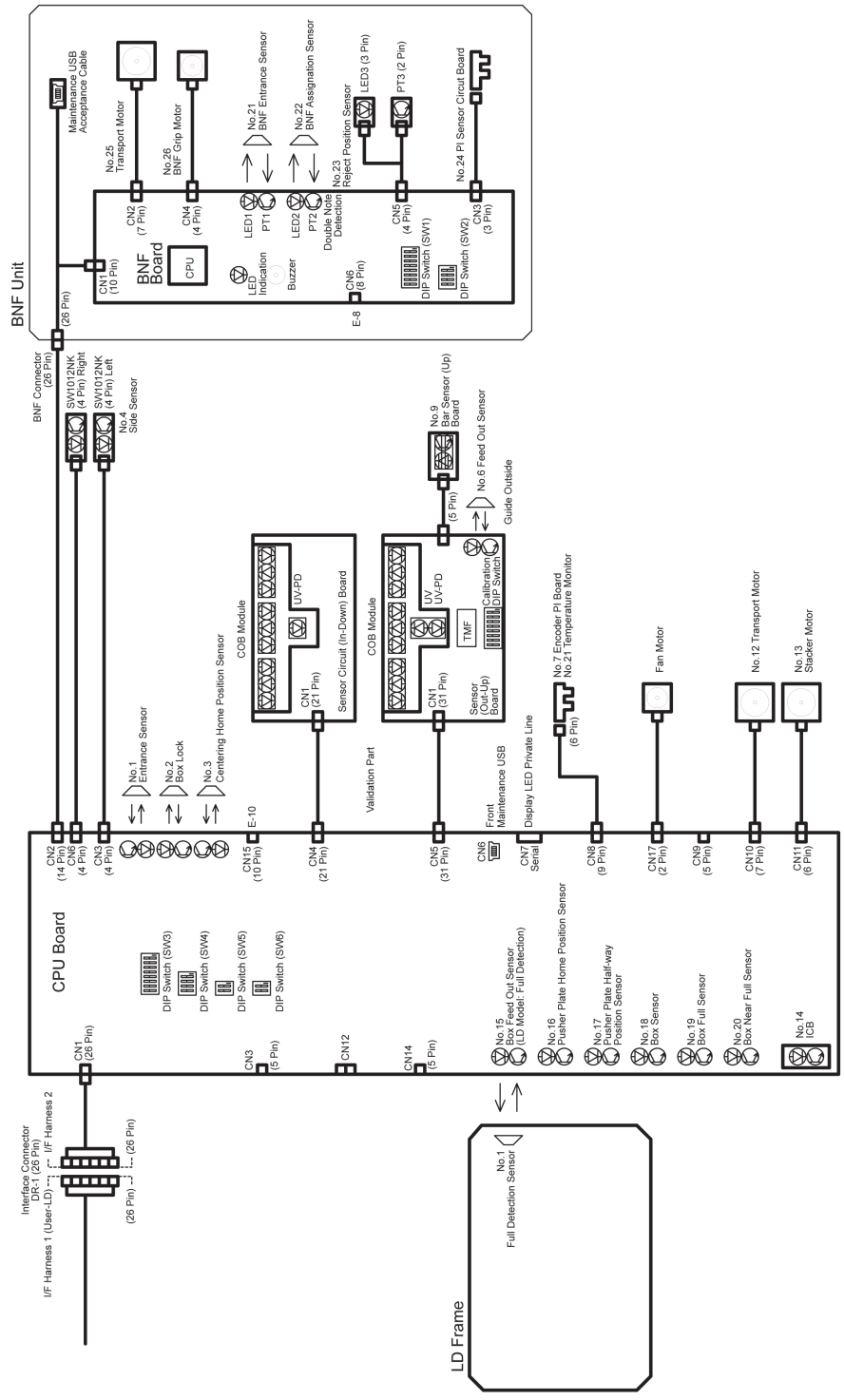

Figure 5-6 TBV FLD Fixed System Wiring Diagram

TBV GLD System Wiring Diagram

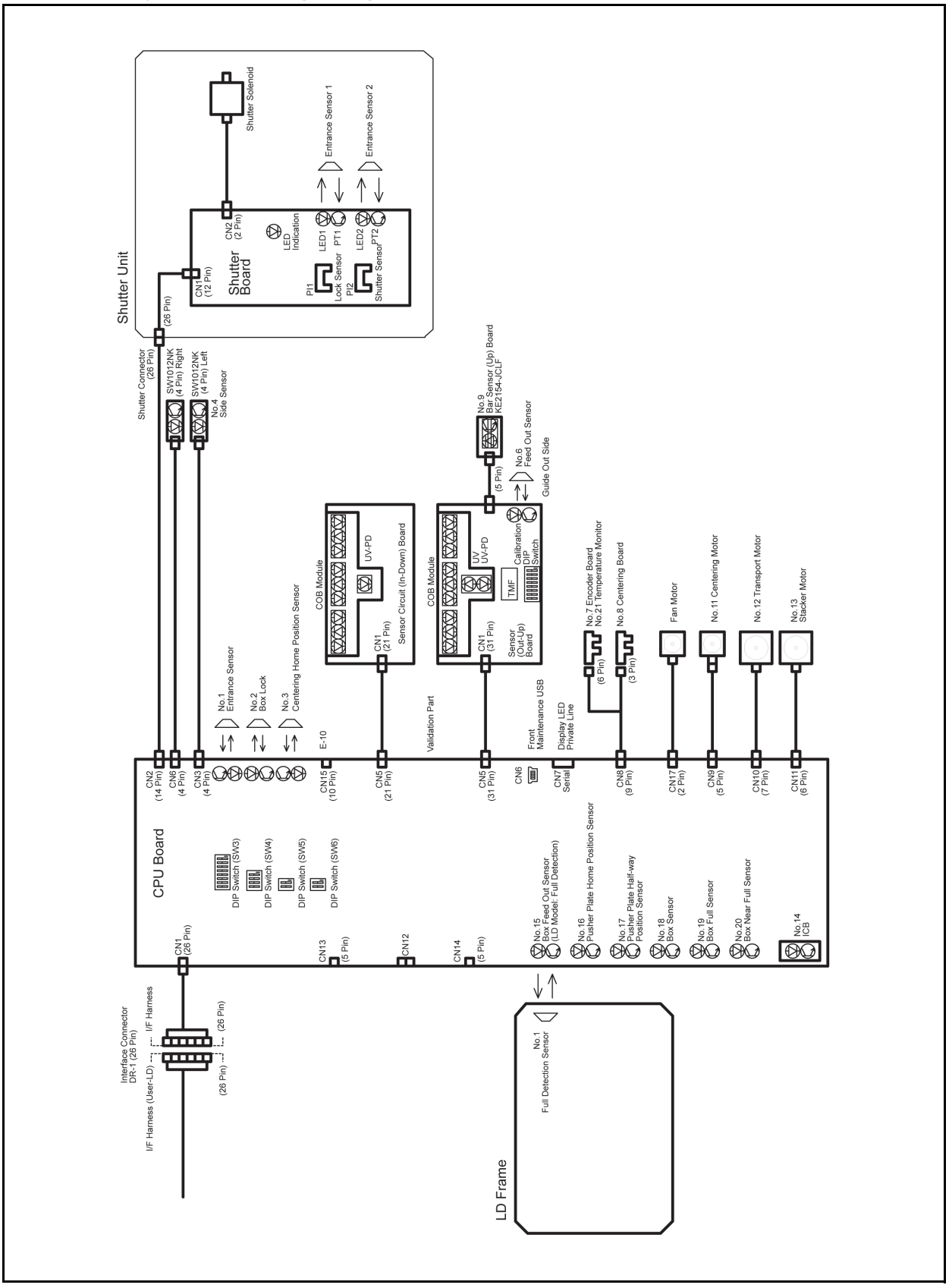

Figure 5-7 TBV GLD System Wiring Diagram

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6 CALIBRATION AND TESTING

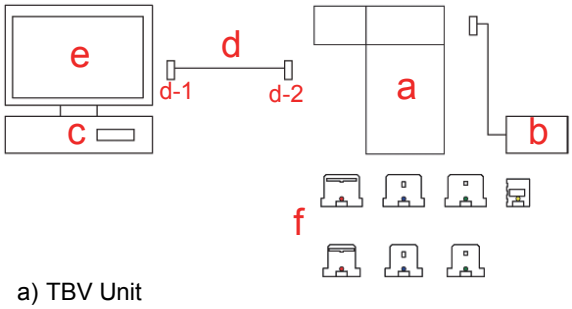
This section provides Calibration and Performance Testing instructions for the TBV® Series Transaction Based Validator Unit and contains the following information:

- Tool Requirements
- Application Software Installation
- Driver Installation Procedure
- JCM Tool Suite Standard Edition Mode
- Download Procedures
- Calibration
- Performance Tests

Tool Requirement

Workbench Tool Requirements With Reference Paper and a PC

Figure 6-1 and Figure 6-2 illustrate and identify the tools and equipment interconnects necessary to download and install the TBV Unit, and to perform a TBV Performance Test using a PC.



a) TBV Unit
b) Power Supply(24V DC ±5%, Minimum 4 A)
c) PC (OS: Windows XP or greater)
d) USB Cable
  d-1) USB A Terminal
  d-2) USB Mini-B Terminal
e) Application (JCM Tool Suite Standard Edition)
f) Reference Paper

***. Containing USB Downloader, Sensor Calibration, Performance Test programs and Utility Function.**

Figure 6-1 Workbench Tool Requirements 1

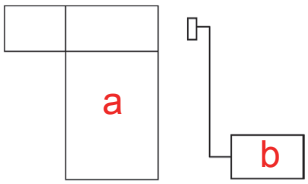
a) PC Side (USB A Terminal)
b) TBV Side (USB Mini-B Terminal)

Figure 6-2 USB Cable Identification

NOTE: When the "USB A Terminal" connects via USB Hub, the TBV may not operate. Ensure that the "USB A Terminal" connects directly to the USB Port of the PC.

Workbench Tool Requirements Without a PC

Figure 6-3 illustrates and identifies the tools and equipment interconnects necessary to perform a TBV Performance Test without a PC.



a) TBV Unit (with Software Program downloaded)
b) Power Supply

Figure 6-3 Workbench Tool Requirements 2

Application Software Installation

Perform the following steps to install the "JCM Tool Suite Standard Edition" Application Software (Refer to Figure 6-1 and Figure 6-2 for the necessary Tool and Harness Connections and USB Cable Type Requirements respectively).

1. Copy the "JCMToolSuiteStandardEdition.zip" Application Software and extract on to the Desktop.
2. Open the Third Layer of the extracted Folder and Double-click on "Setup.exe"(Figure 6-4 a).

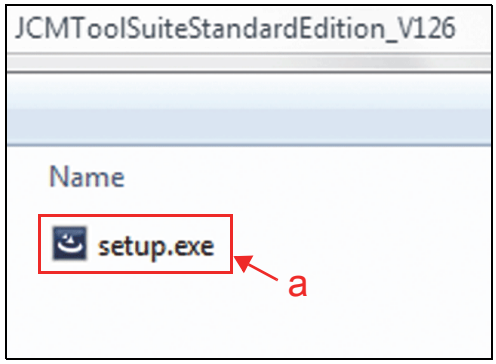


Figure 6-4 Setup.exe File Location

The "JCM Tool Suite Standard Edition - Install Shield Wizard" Screen shown in Figure 6-5 will appear.

3. Click on "Next>" Next > Button (Figure 6-5 a).

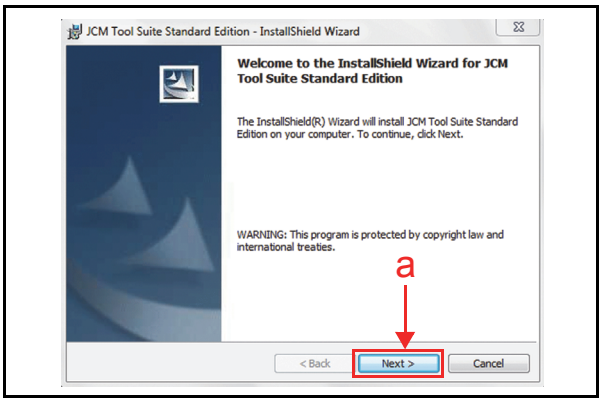


Figure 6-5 InstallShield Wizard Screen

4. Click on "Next>" Next > Screen Button (Figure 6-6 a) when the "Destination Folder" Screen shown in Figure 6-6 appears.

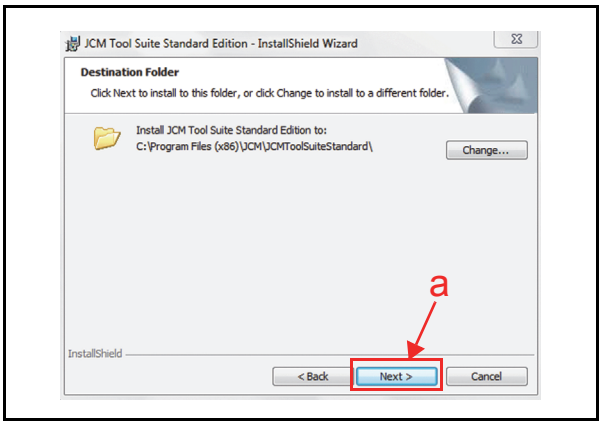


Figure 6-6 Destination Folder Screen

5. When the "Ready to Install the Program" Screen appears, select the "Anyone who use this computer (all users)" (Figure 6-7 a) and then click on the "Install" Install Screen Button (Figure 6-7 b) to start the installation.

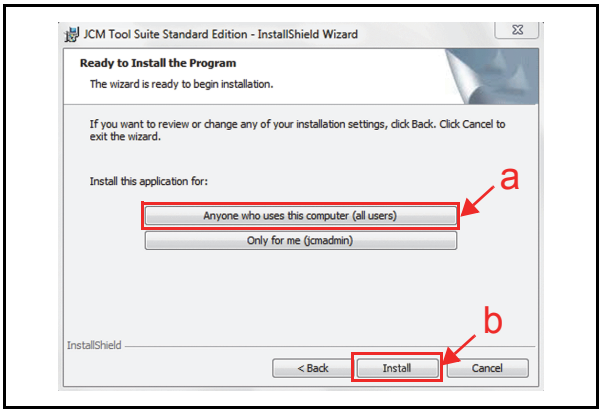


Figure 6-7 Current Settings Confirmation

6. Once installation is complete, the "InstallShield Wizard Completed" Screen shown in Figure 6-8 will appear. Click on the "Finish" Finish Screen Button (Figure 6-8 a) to end the installation process.

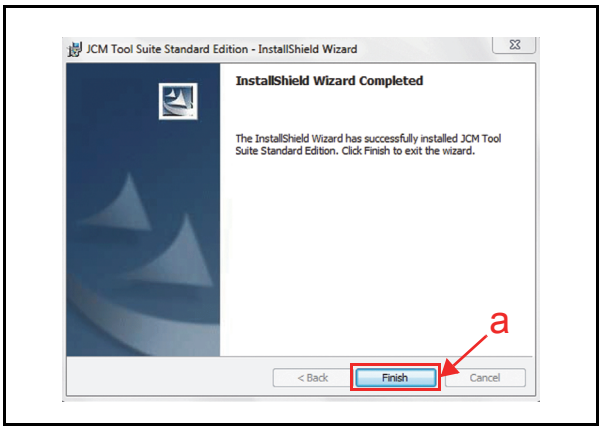


Figure 6-8 Installation Completion Screen

This completes the "JCM Tool Suite Standard Edition" installation procedure.

Driver Installation Procedure

TBV USB Drivers need to be installed on the PC before the JCM Tool Suite Standard Edition can be used. To install the TBV Software Driver, proceed as follows:

1. Connect the USB Cable to the TBV Unit (Refer to Figure 6-1 and Figure 6-2 for the Tool Requirements and Harness Connector locations).
2. When the Device Driver Installation Wizard Screen (Figure 6-9) appears, click on "Next>" Next > Screen Button (Figure 6-9 a) to install the driver for the TBV Unit.

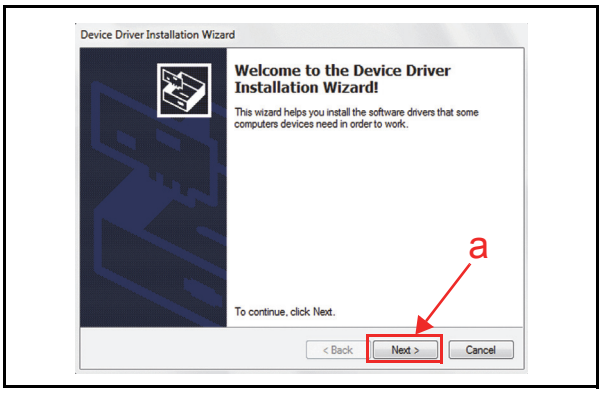


Figure 6-9 Hardware Update Wizard Screen 1

3. When the USB Driver Installation is complete, the "Completing the Device Driver Installation Wizard" Screen will appear as shown in Figure 6-10. Click on the "Finish" Finish Screen Button (Figure 6-10 a) to close the Screen.

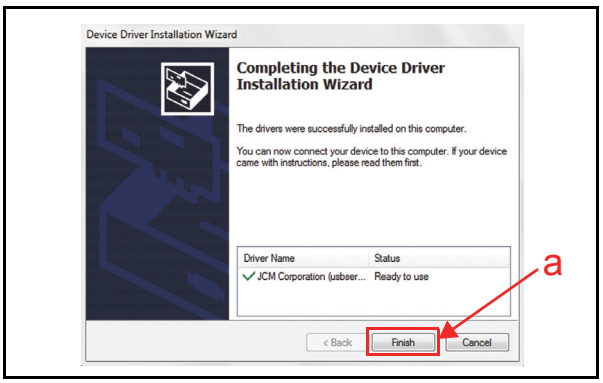


Figure 6-10 Hardware Update Wizard Screen 2

NOTE: If the Windows Security Screen appears, select "Install this Driver Software (I)" to proceed.

This completes the TBV USB Driver Software installation procedure.

JCM Tool Suite Standard Edition Mode

The following two (2) mode feature types exist in the "JCM Tool Suite Standard Edition" package:

- Normal Mode
- Test Mode.

"**Normal Mode**" is a mode designed to provide the TBV Operating Software to be downloaded. The "**Service Mode**" contains three (3) available choices shown in Figure 6-11 as follows:

- **Download** (for downloading software)
- **Statistics** (for observing log data)
- **Event Log View** (for confirming event log)

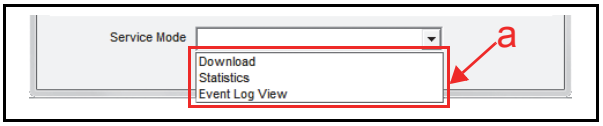


Figure 6-11 Normal Mode Selection

"**Test Mode**" is a mode designed to perform TBV Calibration and Performance Testing. The "**Service Mode**" contains five (5) available choices in its Pull-down Menu shown Figure 6-12 as follows:

- **Download** (for downloading software)
- **Statistics** (for observing log data)
- **Sensor Adjustment** (for calibration)
- **Performance Test** (for performance testing)
- **Event Log View** (for confirming event log)

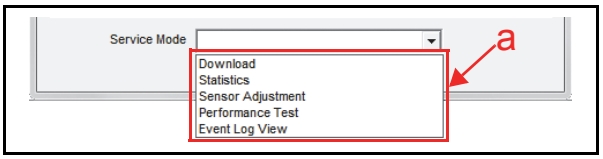


Figure 6-12 Test Mode Selection

Download Procedures

The following two (2) procedures are available to download the TBV Software Program:

- The TBV Software Program is loaded on the Unit (Normal)
- The TBV Software Program is not loaded on the Unit (e.g., after replacing the CPU Board)

Software Program Download

Perform the following steps to download the TBV Software Program. Before downloading the TBV Software Program, copy the TBV Software Program onto the PC Folder desired. (Refer to Figure 6-1 for the Tool Requirements and Harness Connector locations).

1. Turn the TBV Power Switch to OFF.
2. When upgrading the Software in normal condition, set all of the 8-position DIP Switches of DIP Switch 1 to **OFF** (Figure 6-13).

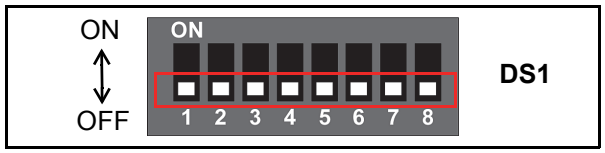


Figure 6-13 Normal Upgrade Setting

When downloading to a Unit (software not previously installed), set Switches #1, #6, #7 and #8 of the BNF 8-Position DIP Switches to ON (Figure 6-14).

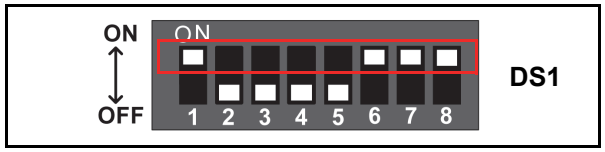


Figure 6-14 Initial Download Setting

NOTE: If the BNF Section is not installed onto the Transport Section, proper Unit communications will not occur correctly.

3. Connect the PC and the TBV Unit together using the recommended USB Cable.
4. Turn the TBV Power Switch to ON.
5. Check that the LED indicator of the BNF Unit is flashing at a Green Color rate.
6. Launch the "JCM Tool Suite Standard Edition" Application and select "Download" (Figure 6-15 a).

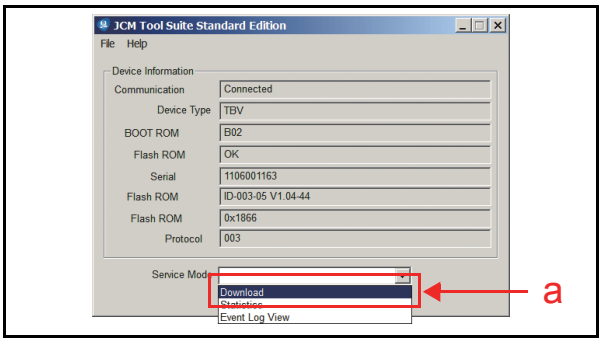


Figure 6-15 Normal Upgrade Screen

NOTE: When downloading the Software Program to the DTBV Unit for the first time, the Device Information will not appear

7. When the Program Installation Screen shown in Figure 6-16 appears, click on the "Browse" Browse Screen Button (Figure 6-16 a).

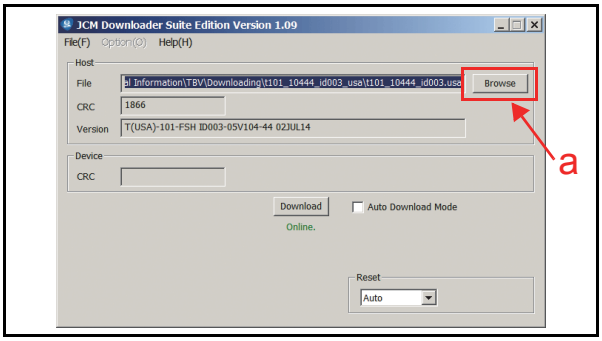


Figure 6-16 JCM USB Downloader Screen

8. Highlight select the desired TBV Software Program (Figure 6-17 a) from the PC Folder.
9. Click on the "Open" Open Screen Button (Figure 6-17 b) to launch the selected file.

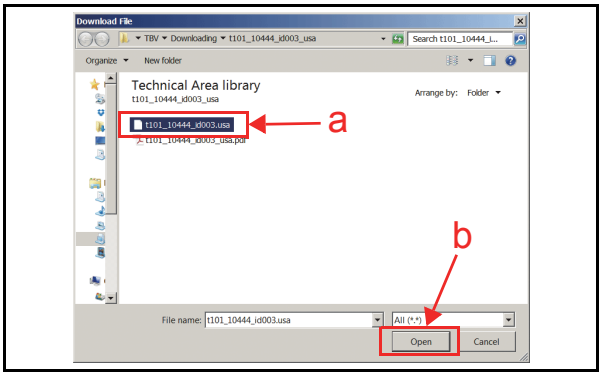


Figure 6-17 TBV Software Selection Screen

10. The JCM USB Downloader Screen will re-appear (Figure 6-18).

11. Click on the "Download" Download Screen Button (Figure 6-18 b) to begin a Software download.

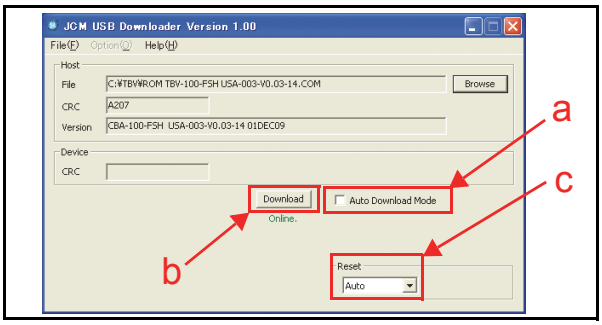


Figure 6-18 Reset Pull Down Menu Selection

12. The Downloading Screen will display a Blue Progress Bargraph during the download operation (Figure 6-19 a), and a Blue Text Line below the "Download" Screen Button will indicate the download Percentage as "Downloading: XX%" (Figure 6-19 b).

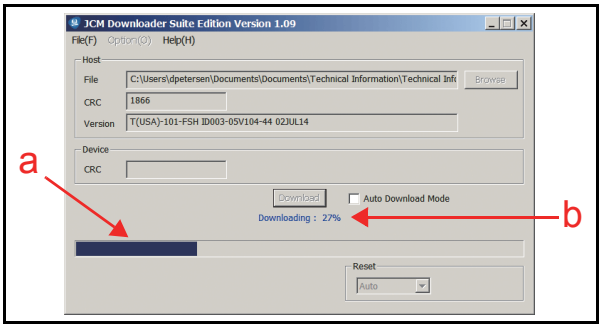


Figure 6-19 Download Progress Screen

NOTE: The TBV LED always flashes at a Yellow Color rate when a download is in progress (Approximately 2 minutes).

13. When the desired download is complete, the "Download Success. Reset Done. Waiting for USB Cable Disconnection." Blue Text Line will appear (Figure 6-20 a).

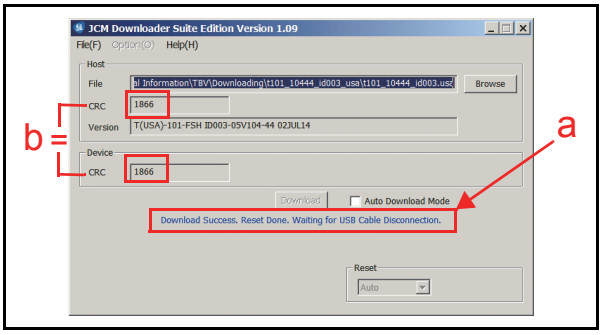


Figure 6-20 Download Completed Screen

14. Confirm that the Host's Checksum and the Unit's Checksums identically match each other (Figure 6-20 b) after the LED starts flashing at a Green Color rate.

15. Clicking on the "Auto Download Mode" Check Box ☐ (Figure 6-18 a) will allow the same TBV Software Program to be downloaded to another TBV Unit automatically when the JCM Downloader Suite is opened.

NOTE: The TBV Program Software Downloaded Data is written in by the TBV Transport Section, and then the data is download transferred to the BNF Section when Power is supplied.

The "Reset" Pull-down Menu contains the following three (3) selections:

- Auto
- Manual
- Manual Reset.

If "Auto" is left pre-selected in the "Reset" Pull-down Menu (Figure 6-18 c), the Downloader will enter Stand-by Mode automatically when the download is complete, and then the LED will start flashing at a Green Color rate.

If "**Manual**" is selected from the "Reset" Pull-down Menu, the LED will light a steady Blue Color when the download is complete.

If "**Manual Reset**" is selected in the "Reset" Pull-down Menu, the Downloader's Status will be reset back to Stand-by Mode. The LED will again begin flashing at a Green Color rate.

NOTE: All of the above steps are explained in detail when "Auto" is selected from the "Reset" Pull Down Menu.

This completes the TBV Software Program installation procedure.

Calibration

This section provides instructions for performing a calibration of the Validation Sensors and the Positioning Sensors within the TBV Unit.

When to Calibrate

Calibration should be performed when the following conditions occur:

- When either the CPU Circuit Board, the Sensor Circuit Board and/or the Bar Sensor Circuit Board in the Transport Section, or the BNF Circuit Board in the BNF Section is removed and/or replaced.
- When removing/replacing ANY Sensor.
- When dirt adheres to Sensors (Perform Calibration after cleaning the Sensors and the Rollers (See "LD Sensor/Roller Cleaning Location" on page 2-13 and "TBV Sensor and Roller Cleaning Locations" on page 2-14 of this Manual)
- When the Banknote Acceptance Rate is drastically degraded.

Calibration Tool Requirements

Refer to Figure 6-1 and Figure 6-2 for the necessary Tool and Harness Connections and USB Cable Type Requirements respectively.

TBV Reference Paper Types

There are two (2) types of Reference Papers for Calibrating the TBV Sensors. The TBV-100 Reference Papers are intended for Centering Mechanism Unit Calibration (Centering Type), and TBV-101 Reference Papers are intended for non-Centering Mechanism Unit Calibration (Fixed Type). Each Reference Paper Type contains five (5) different Reference Papers in their sets.

Table 6-1 Reference Paper Types

Paper Type	Transport Section Validation Portion Only			BNF Section Transport Portion	
TBV-100 (Centering Type)	 KS-073	 KS-074	 KS-075		 KS-076
TBV-101 (Fixed Type)	 KS-077	 KS-078	 KS-079		 KS-076

Caution: DO NOT touch the White Paper Areas indicated by a Gray Color zone shown for each Reference Paper in Table 6-1.

Placing Each Reference Paper Type

This section provides information about the proper placement and treatment of each type of Reference Paper. There are two (2) methods of Paper placement as follows:

- Reference Paper Placed on the Validation Section
- Reference Paper Placed on the Transport and the BNF Sections.

Placing Reference Papers on the Validation Section

Perform the following steps to properly place the following Reference Papers (KS-073/074/075/077/078/079) into the TBV Unit.

1. Rotate the TBV Unit Assembly 90-degree onto its left side (Figure 6-21).
2. Open Transport Guide Rear 85 (Figure 6-21 a) while pressing in on the Rear Guide Latches (Figure 6-21 b) located on each side of the Transport Section indicated by Blue Arrows in Figure 6-21.
3. Place a Reference Paper (Figure 6-21 c) in the Transport Unit until its Catch Edges reach both the left and right side of the Frame (Figure 6-21 d).

NOTE: Place the Reference Paper so the Name ID Sticker is visible, otherwise, calibration will not be performed correctly.

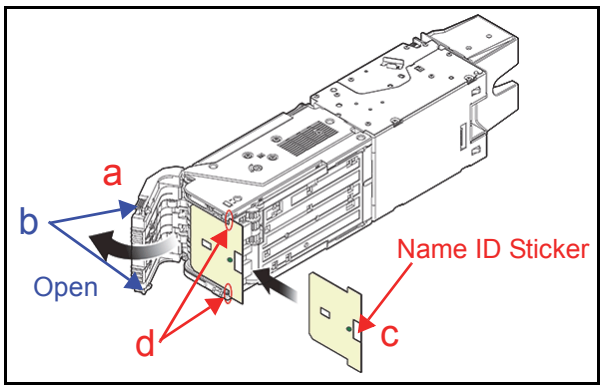


Figure 6-21 Placing Reference Paper Types (KS-073/074/075/077/078 & 079) 1

4. Firmly close the Transport Guide Rear 85 (Figure 6-22 a) Section until it "clicks" in place, and ensure that both sides are tightly closed and locked into place.

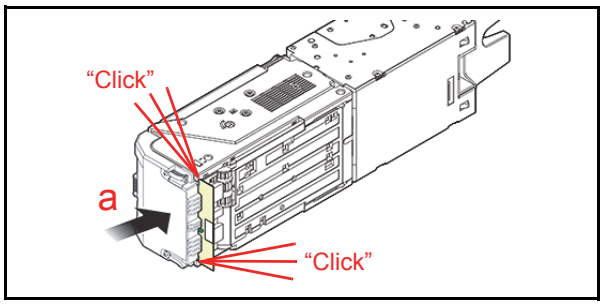


Figure 6-22 Placing Reference Paper Types (KS-073/074/075/077/078 & 079) 2

Placing Reference Paper for the Transport and the BNF Sections

Perform the following steps to properly place the KS-076 Reference Paper into the TBV Unit.

1. Open Transport Cover Upper (Figure 6-23 a) while pressing in on the Transport portion's Front Guide Latches located on each side of the Transport Section indicated by the Blue Arrows in Figure 6-23b.
2. When placing the Reference Paper (Figure 6-23 e) onto the Transport Section, match its position with the Transport Belt and center-notched area of the Reference Paper so that the Centering Sensor can be visually seen (Figure 6-23 f).
3. Then open the Upper Guide (Figure 6-23 c) while pressing in on the BNF Guide Latches located on each side of the BNF Section indicated by the Blue Arrows in Figure 6-23d.
4. When placing the Reference Paper onto the BNF Section (Figure 6-23 g), match its position with the Pinch Roller and the right and left notched portion of the Reference Paper (Figure 6-23 h).

NOTE: Place the Reference Paper so the Name ID Sticker is visible, otherwise, calibration will not be performed correctly.

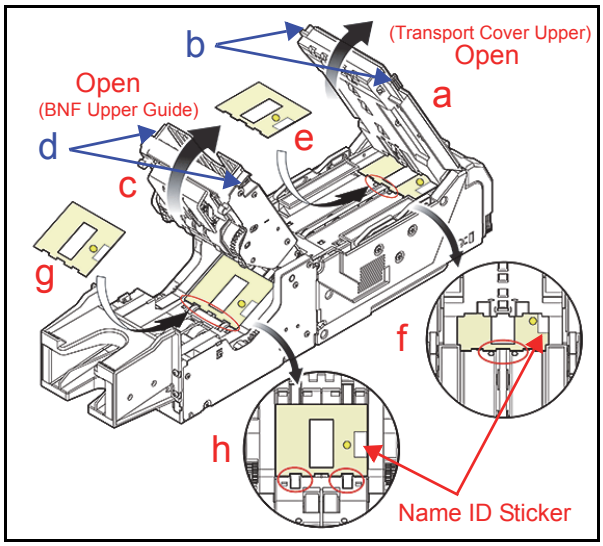


Figure 6-23 KS-076 Reference Paper Setting 1

5. Firmly close the BNF Upper Guide (Figure 6-24 a) and the Transport Cover Upper (Figure 6-24 b) Sections until they each "click" into place, and ensure that both sides of each Cover is tightly closed and locked in place.

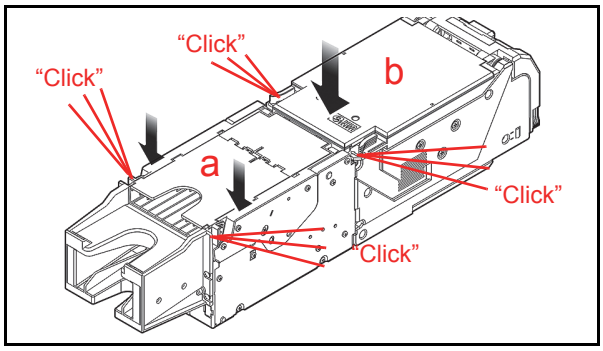


Figure 6-24 KS-076 Reference Paper Setting 2

Calibration Program

This section provides the Calibration Program Configuration. The Calibration Program contains the following three (3) sections:

- Validation Sensor Calibration
- Positioning Sensor Calibration
- Model Information Input Capability.

Each Calibration can be performed individually.

Validation Sensor Calibration

This section provides information for calibrating the Validation Sensors in the TBV Unit. Table 6-2 lists the function of each Reference Paper used to calibrate the TBV Validation Sensors. To perform Validation Sensor Calibration, proceed in the descending numbered order listed in Table 6-2.

Table 6-2 Validation Contents and Calibration Order

No.	Function	TBV-100 Reference Paper	TBV-101 Reference Paper
1	Validation Sensor [D/A Value, non-Paper]	None	None
2	Validation Sensor [with Paper]	KS-073 (Red Mark)	KS-077 (Red Mark)
3	UV (Reflection) Sensor [with Paper]	KS-074 (Blue Mark)	KS-078 (Blue Mark)
4	UV (Transmissive) Sensor [with Paper]	KS-075 (Green Mark)	KS-079 (Green Mark)
5	Validation Sensor [non-Paper]	KS-076 (Yellow Mark) x 2 sheets	KS-076 (Yellow Mark) x 2 sheets
	UV (Transmissive) Sensor [non-Paper]		
	BAR Sensor [with Paper]		
	Strings Detection Sensor [non-Paper]		
	Saving Calibration Value		

VALIDATION SENSOR CALIBRATION PREPARATION

Perform the following steps to prepare the Validation Sensors for Calibration.

1. Turn the TBV Power Switch to OFF.
2. Remove the TBV Unit Assembly out of the Frame.
3. Set BNF 8-Position DIP Switch #8 to ON (Figure 6-25).

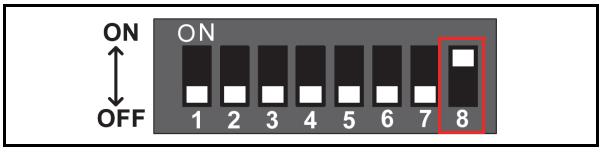


Figure 6-25 BNF Calibration DIP Switch Setting 1

4. Turn the TBV Power Switch to ON. The LED will begin flashing at a White Color rate (See "Individual Component Names & Locations" on page 1-5 of this Manual).
5. Connect the PC and the TBV Unit together using the recommended USB Cable.
6. Launch the "JCM Tool Suite Standard Edition" Application and select "Sensor Adjustment" from the Service Mode drop down selections (Figure 6-26 a).

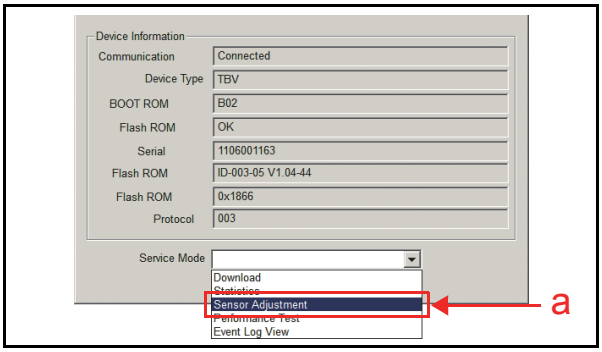


Figure 6-26 Calibration Selection Screen 1

VALIDATION SENSOR [D/A VALUE, NON-PAPER] CALIBRATION

Perform the following steps to complete the first Validation Sensor non-Paper Calibration Procedure.

1. Click select the "Validation Sensor" Radio Button (Review Figure 6-26 a).
2. Click on the "Start" Start Screen Button (Review Figure 6-26 b). The message "(1) Validation Sensor [D/A Value, non-Paper] Calibration Preparation" (Figure 6-28 a) will appear in the top row of the "**Calibration Tool**" "Validation Sensor Calibration" Screen (Figure 6-28 b).

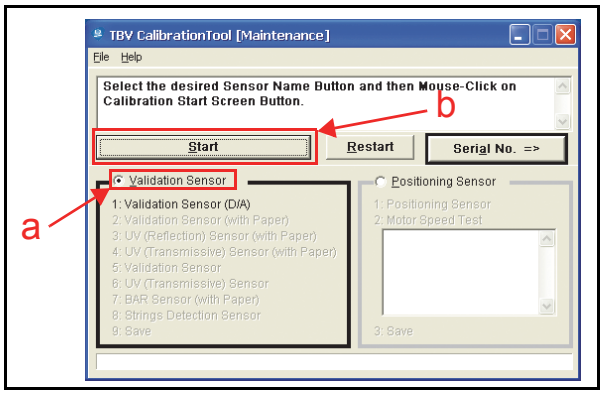


Figure 6-27 Calibration Selection Screen

3. Check that NO Reference Paper exists in the TBV Transport Assembly path.
4. Check that the Transport Guide Rear 85 Section (Review Figure 6-22 a) is firmly closed (e.g., "2 Clicks").
5. Click on the "Calibration Start" Calibration Start Screen Button (Figure 6-28 c) at the bottom of the "**Calibration Tool**" Screen to begin the TBV Validation Sensor non-Paper Calibration Procedure.

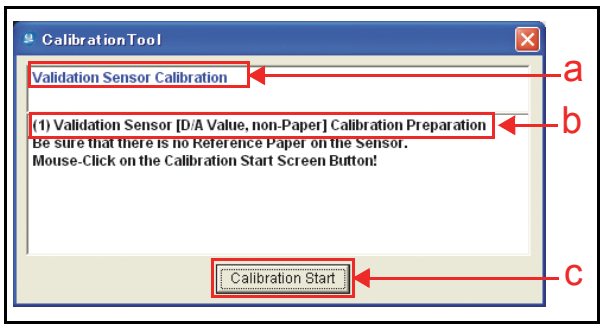


Figure 6-28 Validation Sensor non-Paper Calibration Screen 1

6. Confirm that the LED is alternately flashing between a White and Blue Color rate. The Test's progress will appear on the "**TBV Calibration Tool [Maintenance]**" Screen as indicated by the Figure 6-29a Green Barograph's progress during the Calibration Procedure.

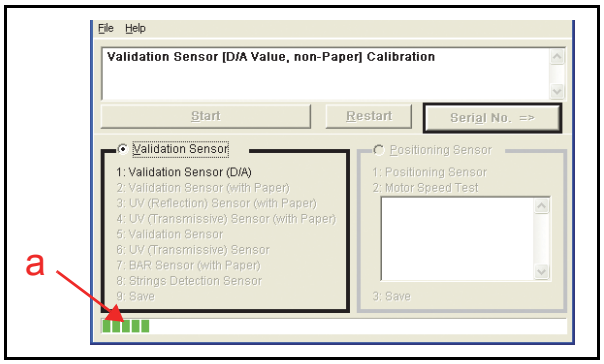


Figure 6-29 Validation Sensor non-Paper Calibration Screen 2

7. When the message "(1) Validation Sensor [D/A Value, non-Paper] Calibration Completed" appears in the first row of the "**TBV Calibration Tool [Maintenance]**" Screen (Figure 6-30 a), the Validation Sensor non-Paper Calibration Procedure is complete.

VALIDATION SENSOR [WITH THE REFERENCE PAPER] CALIBRATION

When the Validation Sensor non-paper Calibration Procedure is complete, perform the following steps to begin the Second Validation Sensor (with Paper) Calibration Procedure.

1. Check that the message "(2) Validation Sensor [with the Reference Paper] Calibration Preparation" is in the second row of the "**Calibration Tool**" Screen (Figure 6-30 b).

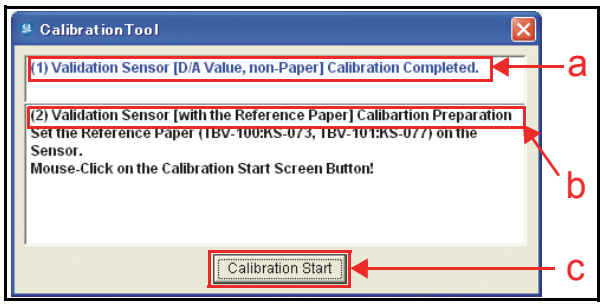


Figure 6-30 Validation Sensor Calibration with Paper Screen 1

2. Place the KS-073 Red marked Reference Paper for calibrating a Centering Type Unit, or the KS-077 Red marked Reference Paper for calibrating a Fixed Type Unit into the Transport Assembly (Refer to "Placing Each Reference Paper Type" on page 6-5 of this Section for detailed instructions).
3. Click on the "Calibration Start" Calibration Start Screen Button (Figure 6-30 c) to begin the Validation Sensor with Paper Calibration Procedure.

   NOTE: This calibration process takes approximately one (1) minute to complete.
4. Confirm that the LED is alternately flashing between a White and Blue Color rate. The Test's progress will appear on the "**TBV Calibration Tool [Maintenance]**" Screen as indicated by the Figure 6-31a Green Barograph's progress during the Calibration Procedure.

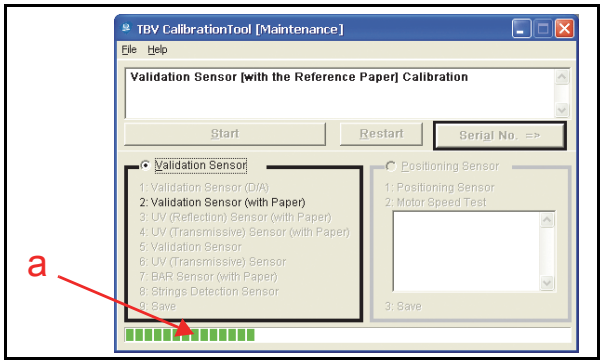


Figure 6-31 Validation Sensor Calibration with Paper Screen 2

5. When the message "(2) Validation Sensor [with the Reference Paper] Calibration Completed" appears in the first row of the "**TBV Calibration Tool [Maintenance]**" Screen (Figure 6-32 a), the Validation Sensor Calibration with Paper Procedure is complete.

UV (REFLECTION) SENSOR WITH PAPER CALIBRATION

When the Validation Sensor with Paper Calibration Procedure is complete, perform the following steps to begin the third UV (Reflection) Sensor with Paper Calibration Procedure Step.

1. Check that the message "(3) UV (Reflection) Sensor [with the Reference Paper] Calibration Preparation" is in the second row of the "**Calibration Tool**" Screen (Figure 6-32 b).

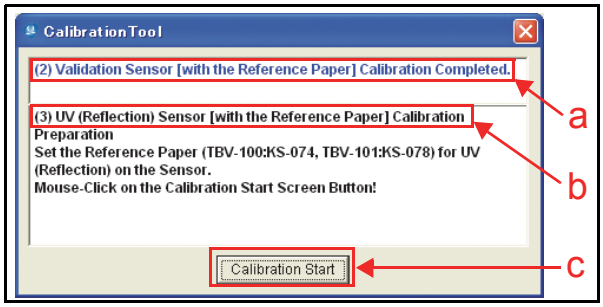


Figure 6-32 UV (Reflection) Sensor with Paper Calibration Screen 1

2. Remove the KS-073 Red marked Reference Paper and place the KS-074 Blue marked Reference Paper for calibrating a Centering Type Unit or, remove the KS-077 Red marked Reference Paper and place the KS-078 Blue marked Reference Paper for calibrating a Fixed Type Unit (Refer to "Placing Each Reference Paper Type" on page 6-5 of this Section for detailed instructions).
3. Click on the "Calibration Start" Calibration Start Screen Button (Figure 6-32 c) to begin the UV (Reflection) Sensor with Paper Calibration Procedure.
4. Confirm that the LED is flashing White and Blue Color rate alternately. The Test's progress will appear on the "**TBV Calibration Tool [Maintenance]**" Screen as indicated by the Figure 6-33a Green Barograph's progress during the Calibration Procedure.

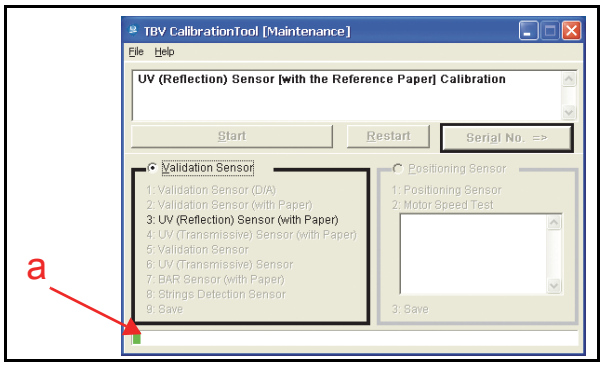


Figure 6-33 UV (Reflection) Sensor with Paper Calibration Screen 2

5. When the message "(3) UV (Reflection) Sensor [with Paper] Calibration Completed" appears in the first row of the "**TBV Calibration Tool [Maintenance]**" Screen (Figure 6-34 a), the UV (Reflection) Sensor with Paper Calibration Procedure is completed.

UV (Transmissive) Sensor with Paper Calibration

When the UV (Reflection) Sensor with Paper Calibration Procedure is complete, perform the following steps to begin the fourth UV (Transmissive) Sensor with Paper Calibration Procedure.

1. Check that the message "(4) UV (Transmissive) Sensor [with the Reference Paper] Calibration Preparation" is in the second row of the "**Calibration Tool**" Screen (Figure 6-34 b).

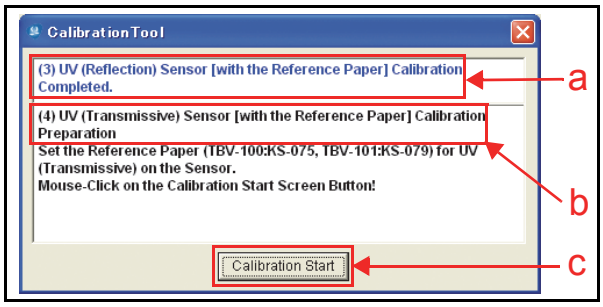


Figure 6-34 UV (Transmissive) Sensor with Paper Calibration Screen 1

2. Remove the KS-074 Blue marked Reference Paper and place the KS-075 Green marked Reference Paper for calibrating a Centering Type Unit or, remove the KS-078 Blue marked Reference Paper and place the KS-079 Green marked Reference Paper for calibrating a Fixed Type (Refer to "Placing Each Reference Paper Type" on page 6-5 of this Section for detailed instructions).
3. Click on the "Calibration Start" Calibration Start Screen Button (Figure 6-34 c) to begin the UV (Transmissive) Sensor with Paper Calibration.
4. Confirm that the LED is alternately flashing between a White and Blue Color rate. The Test's progress will appear on the "**TBV Calibration Tool [Maintenance]**" Screen as indicated by the Figure 6-35a Green Barograph's progress during the Calibration Procedure.

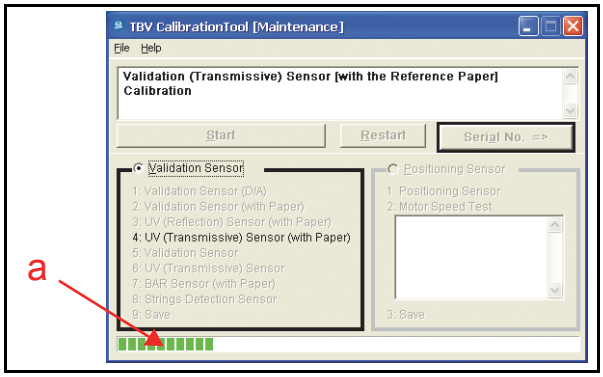


Figure 6-35 UV (Transmissive) Sensor with Paper Calibration Screen 2

5. When the message "(4) UV (Transmissive) Sensor [with Paper] Calibration Completed" appears in the first row of the "**TBV Calibration Tool [Maintenance]**" Screen (Figure 6-36 a), the UV (Transmissive) Sensor with Paper Calibration is complete.

Validation & UV (Transmissive) Sensor non-Paper Calibration/BAR Sensor with Paper/String Detection Sensor Calibration and Saving

When the UV (Transmissive) Sensor with Paper Calibration Procedure is complete, perform the following steps to begin the fifth calibration of each Sensor Type. The following Sensors are calibrated automatically in the following order, and the Calibration Values are then saved (Figure 6-36 b).

- Validation Sensor non-Paper Calibration
- UV (Transmissive) Sensor non-Paper Calibration
- BAR Sensor with Paper Calibration
- String Detection Sensor non-Paper Calibration
- Saving the Calibration Values.

1. Check that the messages "(5) Validation Sensor [non-Paper] Calibration", "(6) UV (Transmissive) Sensor [non-Paper] Calibration", "(7) Bar Sensor [with the Reference Paper] Calibration Preparation", "(8) Strings Detection Sensor [non-Paper] Calibration" and "(9) Save" are in the second row of the "**Calibration Tool**" Screen (Figure 6-36 b).

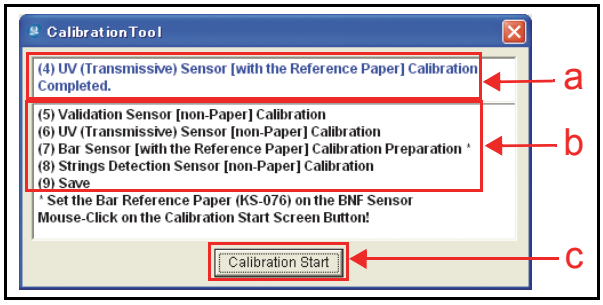


Figure 6-36 Auto Sensors Calibration and Save Screen 1

2. Remove the KS-075 Green marked Reference Paper for calibration of a Centering Type Unit or, remove the KS-079 Green marked Reference Paper or calibration of a Fixed Type Unit (Refer to "Placing Each Reference Paper Type" on page 6-5 of this Section for detailed instructions).
3. Place two (2) KS-076 Yellow marked Reference Papers for calibrating the BAR Sensor with Paper Calibration for either type of aforementioned TBV Unit (Refer to "Placing Each Reference Paper Type" on page 6-5 of this Section for detailed instructions).
4. Click on the "Calibration Start" Calibration Start Screen Button (Figure 6-36 c) to begin the Validation Sensor Calibration non-Paper Procedure.
5. When the first calibration step is complete, the next calibration step will start automatically. The Test's progress will appear on the "**TBV Calibration Tool [Maintenance]**" Screen as indicated by the Figure 6-37a Green Barograph's progress during the Calibration Procedure.

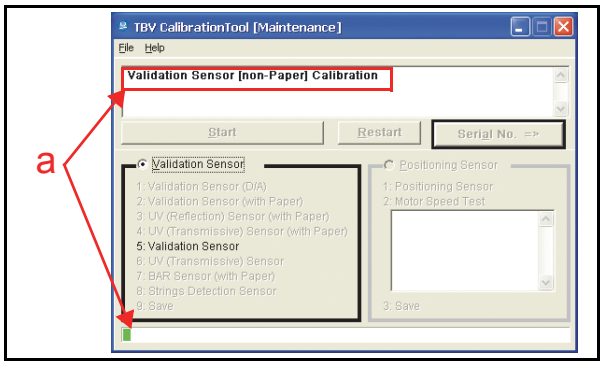


Figure 6-37 Auto Sensors Calibration and Save Screen 2

6. When the Calibration Values are being saved, the LED will be flashing at a White Color rate and "Checking the sensor value" (Figure 6-38 a) will appear.
7. Place the KS-073 or KS-077 Red marked Reference Paper and click on "Calibration Start" Calibration Start Screen Button (Figure 6-38 b).

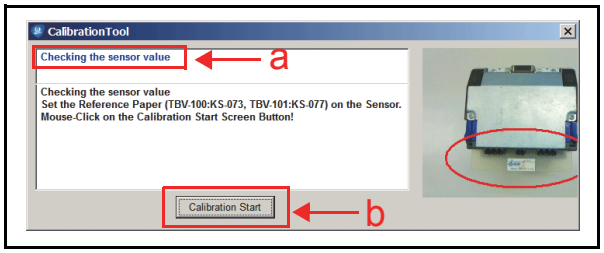


Figure 6-38 Checking Sensor Value (with paper) 1

8. When the Checking the sensor value is completed, the message "Checking the sensor [non-Paper] value" (Figure 6-39 a) will appear.
9. Remove the KS-073 or KS-077 and click on "Calibration Start" Calibration Start Screen Button (Figure 6-39 b).

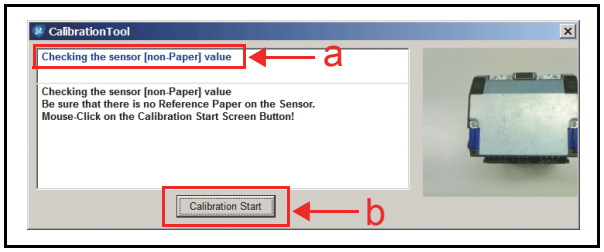


Figure 6-39 Checking Sensor Value (non-paper) 1

10. When the Checking the sensor [non-Paper] value is completed, the message "Calibration Completed" will appear in a pop-up Dialog Box (Figure 6-40)

Figure 6-40 Calibration Completed Dialog Screen

11. Remove the two (2) KS-076 Yellow marked Reference Papers from the related TBV Unit.

WARNING: If the Reference Papers are accidentally left in the Unit and it is returned to normal operation, the Reference Papers will stack-up inside the Validation Section of the Transport Assembly, or in the Cash Box which may cause damage to the TBV Unit.

12. Click on the "OK" OK Screen Button to end this procedure (Figure 6-40 a).

This completes the Validation Sensor Calibration Procedures.

Positioning Sensor Calibration

This section provides information for calibrating the Positioning Sensors within the TBV Unit. Table 6-3 lists the use for each Reference Paper required for calibrating the TBV Positioning Sensors. To perform the Positioning Sensor Calibration Procedure, proceed by following the Table 6-3 Numbered Functions in listed order.

Table 6-3 Position Contents and Calibration Order

No.	Function	TBV-100 Reference Paper	TBV-101 Reference Paper
1	Positioning Sensor Calibration	None Required	None Required
2	Transport Motor Test		
3	Saving Calibration Value		

POSITIONING SENSOR CALIBRATION PREPARATION

Perform the following steps to prepare the Positioning Sensor for Calibration.

1. Turn the TBV Power Switch to OFF.
2. Install the TBV Unit to the Frame Unit until it locks into place correctly.
3. Confirm that the Transport Cover Upper (Figure 6-23 a) and the Upper Guide (Figure 6-23 c) Sections are firmly closed.
4. Set BNF 8-Position DIP Switch #8 to ON (Figure 6-41).

Figure 6-41 BNF Calibration DIP Switch Setting 2

5. Turn the TBV Power Switch to ON. The LED will begin flashing at a White Color Rate after few seconds (See "Individual Component Names & Locations" on page 1-5 of Section 1 in this Manual).
6. Connect the PC and the TBV Unit together using the recommended USB Cable.
7. Launch the "JCM Tool Suite Standard Edition" Application and select "Sensor Adjustment" (Figure 6-42 a).

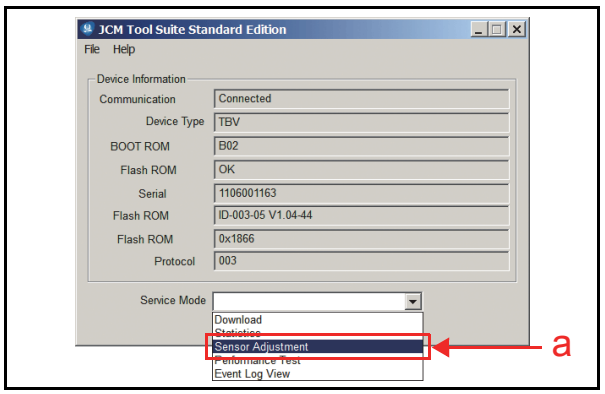


Figure 6-42 Calibration Selection Screen 2

POSITIONING SENSOR CALIBRATION/TRANSPORT MOTOR TEST & SAVING CALIBRATION VALUES

The following Sensors are automatically calibrated in order, and their Calibration Values are then saved.

- Positioning Sensor Calibration
- Transport Motor Test
- Saving Calibration Value.

Perform the following steps to begin the Positioning Sensor Calibration Procedure.

1. Click select the "Positioning Sensor" Radio Button (Figure 6-43 a).

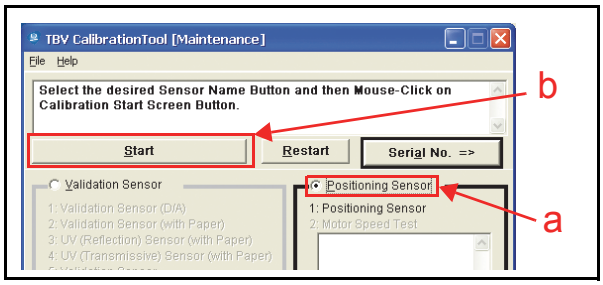


Figure 6-43 Calibration Selection Screen 2

2. Click on the "Start" Start Screen Button (Figure 6-43 b). The message "(1) Positioning Sensor Calibration Preparation" will appear in the top row of the "**TBV Calibration Tool [Maintenance]**" Screen shown in Figure 6-44a.

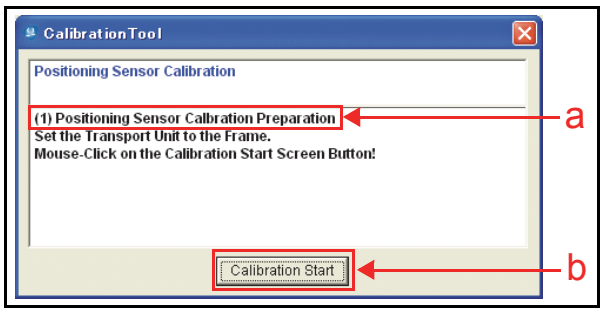


Figure 6-44 Positioning Sensor Calibration Preparation Screen

3. Click on the "Calibration Start" Calibration Start Screen Button (Figure 6-44 b) to begin the TBV Positioning Sensor Calibration Procedure. The Test's progress will appear on the "**TBV Calibration Tool [Maintenance]**" Screen as indicated by the Figure 6-45a Green Barograph's progress during the Calibration Procedure.

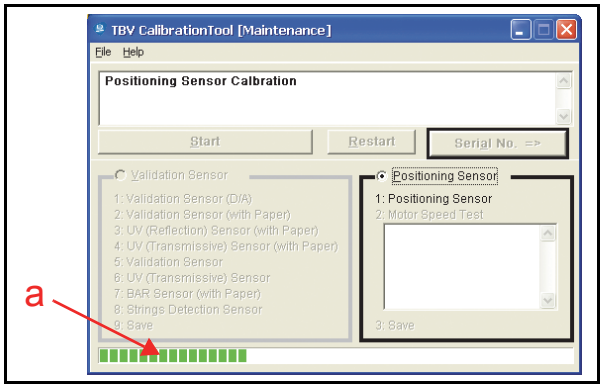


Figure 6-45 Positioning Sensor Calibration Screen

4. When the Positioning Sensor Calibration Process is complete, the Transport Motor Test will automatically begin (Figure 6-46 a).
The current Calibration Status can be confirmed by viewing Figure 6-46a & b. The Test's progress will appear on the "**TBV Calibration Tool [Maintenance]**" Screen as indicated by the Figure 6-46c Green Barograph's progress during the multiple Calibration Procedures

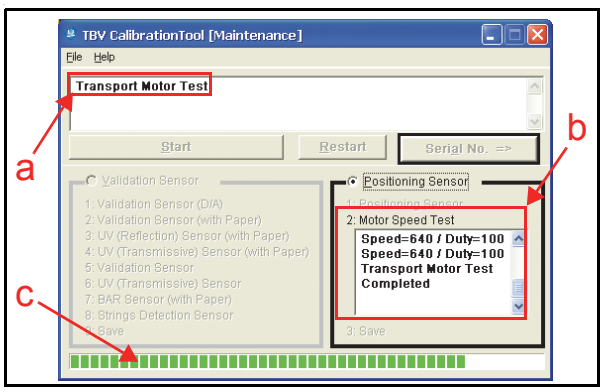


Figure 6-46 Transport Motor Test Screen

5. When the Transport Motor test is completed, the message "Checking the sensor value" (Figure 6-47 a) will appear. Remove the Transport Unit from the Frame Unit and set Reference paper KS-073 or KS-077.
   Click on "Calibration Start" [Calibration Start] Screen Button (Figure 6-47 b).

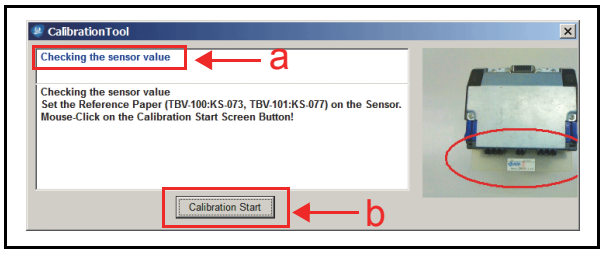


Figure 6-47 Checking Sensor Value (with paper) 2

6. When the message "Checking the sensor (Non-Paper) value" (Figure 6-48 a) appears. Remove the Reference Paper KS-073 or KS-077.
   Click on "Calibration Start" [Calibration Start] Screen Button (Figure 6-48 b).

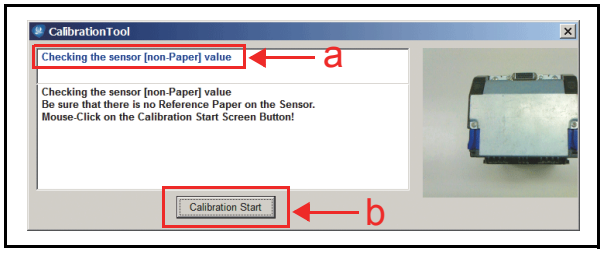


Figure 6-48 Checking Sensor Value (non-paper) 2

7. When the message "Calibration Completed" appears, calibration is completed. Click on the "OK" [OK] Screen Button (Figure 6-49 a) to end this procedure.

Figure 6-49 Calibration Completed Dialog Screen

This completes the Positioning Sensor Calibration Procedures.

MODEL INFORMATION CONFIRMATION

Perform the following steps to confirm the TBV Model Information. Input the TBV Unit's Model Information if it does not exist by performing the following steps:

1. On the "**TBV Calibration Tool [Maintenance]**" Screen, click on the "Serial No. =>" [Serial No. =>] Screen Button (Figure 6-50 a).

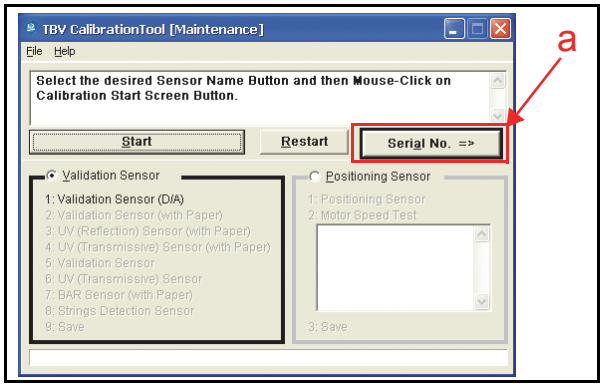


Figure 6-50 Serial No. Screen Button Location

2. Confirm the "Model Name" and the "Serial No." of your Unit as shown in Figure 6-51a & b.

NOTE: The Model Name of "TBV-100" (Figure 6-40 a) and the Serial No. "0000000000" (Figure 6-40 b) are default settings for use in this "Saving the Model Information" example.

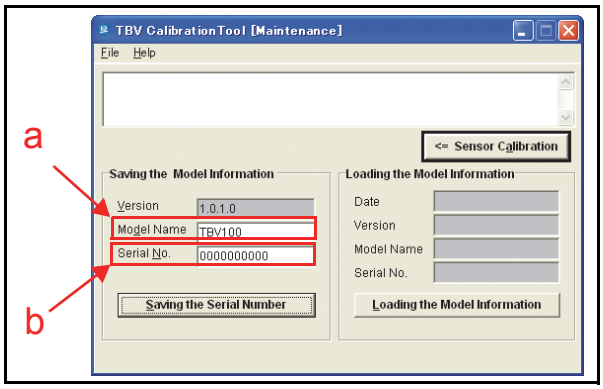


Figure 6-51 Model Information Saving Screen 1

3. Type in the required TBV Model Name using six (6) characters, and a Serial No. containing a maximum of ten (10) characters into each related Text Entry Field; then, click on the "Saving the Serial Number" [Saving the Serial Number] Screen Button (Figure 6-52 c).

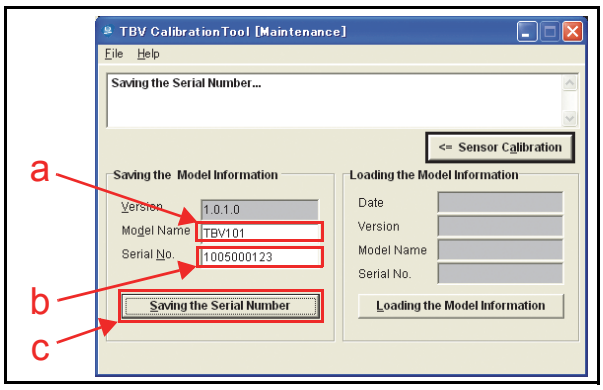


Figure 6-52 Model Information Saving Screen 2

4. Confirm that the message in the second row of the "**Calibration Tool**" Screen reads "Saving Completed" (Figure 6-53 a).

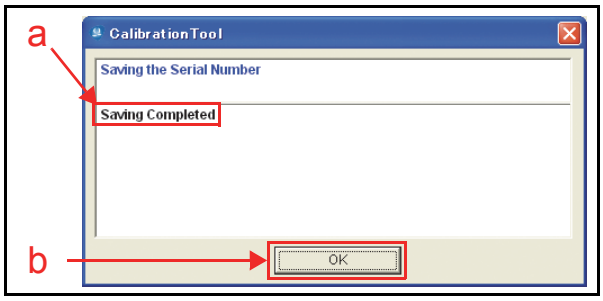


Figure 6-53 Model Information Saving Completed Screen

5. Click on the "OK" OK Screen Button to end this procedure (Figure 6-53 b).

This completes the Model Information Saving Procedure.

READING THE MODEL INFORMATION

Perform following steps to read a TBV Unit's Model Information using the "TBV Calibration Tool For Maintenance.exe" Application.

1. Click on the "Serial No. =>" Serial No. => Screen Button (Figure 6-54 a).

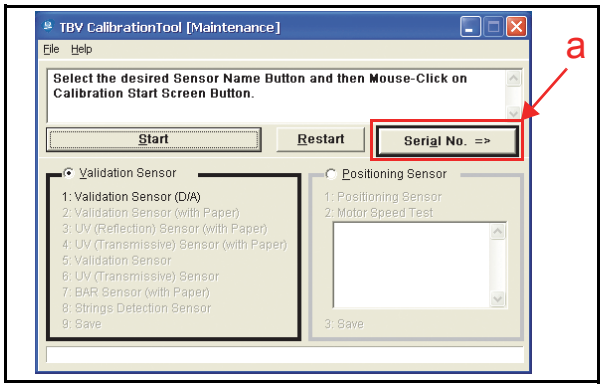


Figure 6-54 Serial No. Screen Button Location

2. Confirm that the "**TBV Calibration Tool [Maintenance]**" Screen shown in Figure 6-55 appears.

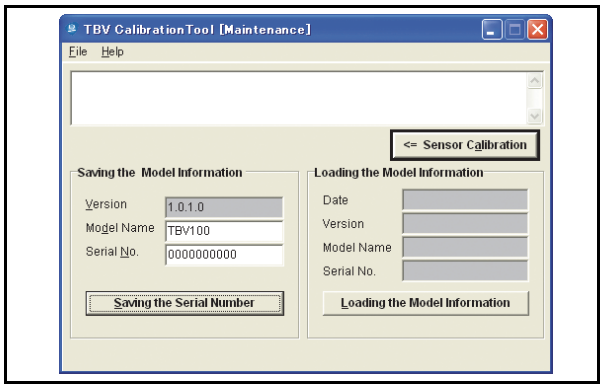


Figure 6-55 Loading Model Information Screen 1

3. Click on the "Loading the Model Information" Loading the Model Information Screen Button (Figure 6-56 a) located bottom of the "Loading the Model Information" Column.

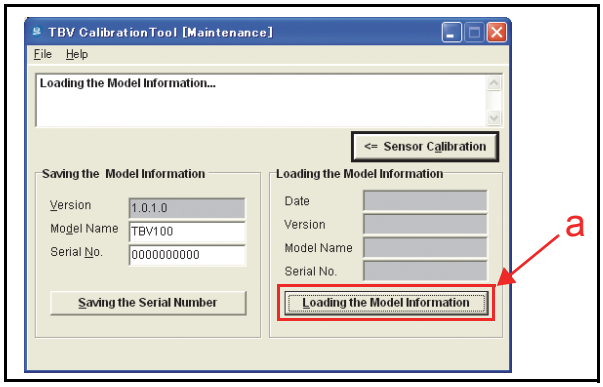
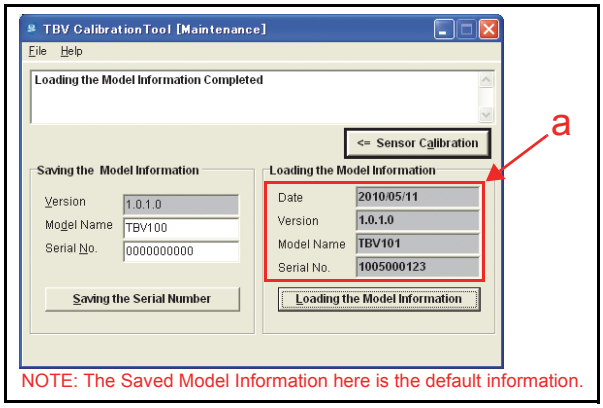


Figure 6-56 Loading Model Information Screen 2

4. The current Model Information for the Date, Version, Model Name and Serial No. will appear in each related Cell Field located below the "Loading the Model Information" Column (Figure 6-57 a).



NOTE: The Saved Model Information here is the default information.

Figure 6-57 Loading Model Information Screen

This completes the Reading Model Information Procedure.

READING THE TBV CALIBRATION TOOL'S SOFTWARE VERSION

Perform the following steps to read the Software Version of the "TBV Calibration Tool For Maintenance.exe" Application.

1. Click on, and hold-down the "TBV Calibration Tool Maintenance" Tool Bar "Help" pull-down Menu, and slide-down select "Version" (Figure 6-58 a).

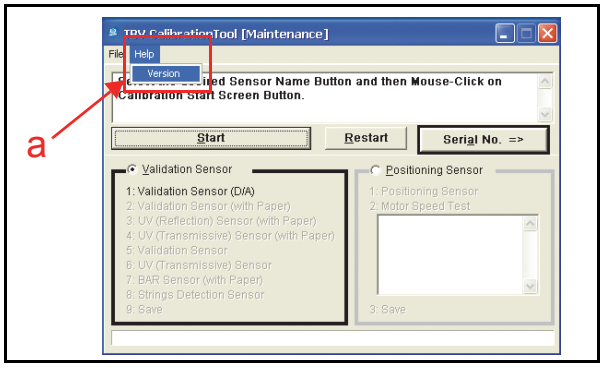


Figure 6-58 Version Information Screen 1

2. The Version of the TBV Calibration Tool For Maintenance.exe Calibration Program Application information (Figure 6-59 a) will appear in the Figure 6-59 Dialog Screen on the PC. Each Version is indicated in an "X.X.X.X" Format (Figure 6-59 a).

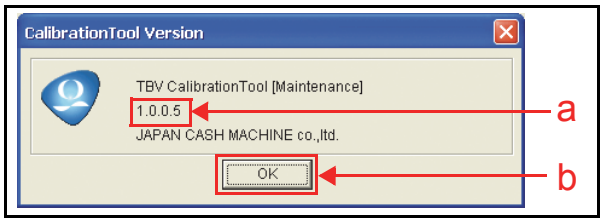


Figure 6-59 Version Information Screen

3. Click on the "OK" OK Screen Button to accept the "read" state reported (Figure 6-59 b).

This completes Reading the Calibration Tool's Software Version Information Procedure.

Performance Test

This section explains the TBV Performance Test Procedures. The following two (2) methods exist to perform this Performance Test Procedure:

- Performance Test using a PC
- Performance Test without a PC.

Choose one (1) of the two (2) above Performance Test Procedures by selecting the one related to the particular test circumstance desired.

Performance Test Tool Requirement using a PC

Refer to Figure 6-1 and Figure 6-2 for the necessary Tool and Harness Connections and USB Cable Type Requirements respectively.

Performance Test Using PC Procedures

The following five (5) TBV Performance Tests exist for using a PC for testing:

- Operation Test
- Motor Test
- Device Function Test
- Sensor Test
- DIP Switch Test

Perform the following steps to begin the PC Performance Test Preparation Procedure:

1. Turn the TBV Power Switch to OFF.
2. Set the BNF 8-Position DIP Switch #8 to ON. (Figure 6-60).

Figure 6-60 BNF Calibration DIP Switch Setting 3

3. Turn the TBV Power Switch to ON. The LED will begin flashing at a White Color Rate when the TBV is in the Performance Test Mode.
4. Connect the PC and the TBV Unit together using the recommended USB Cable.
5. Launch the "JCM Tool Suite Standard Edition" Application and select "Performance Test" (Figure 6-61 a) from the Service Mode drop down selections.

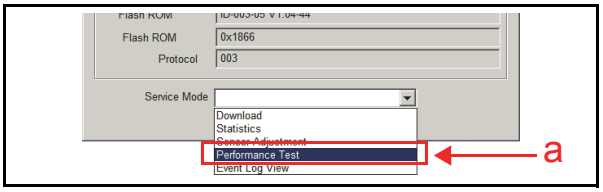


Figure 6-61 Performance Test Selection Screen

6. Four (4) Tabs (Figure 6-62 a) will appear at the top of the Screen.

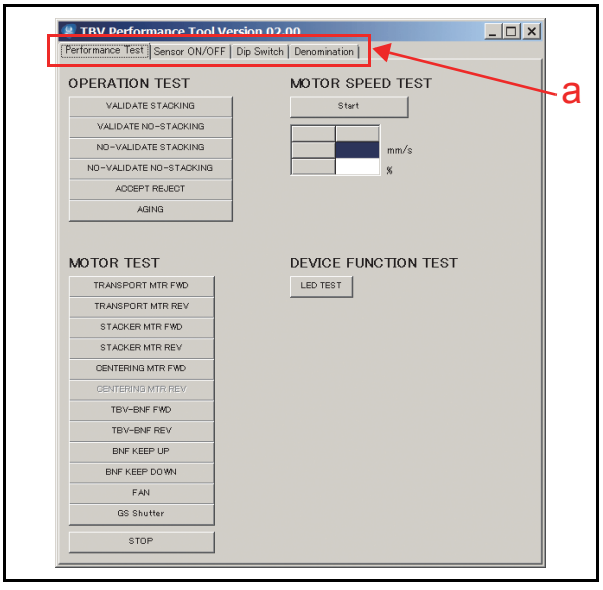


Figure 6-62 Performance Test Selection Screen 1

PERFORMANCE TEST TAB

Select the "Performance Test" Tab (Figure 6-63 a) to perform one of the following three (3) test items:

- Operation Test (Figure 6-63 b)
- Motor Test (Figure 6-63 c)
- Device Function Test (Figure 6-63 d).

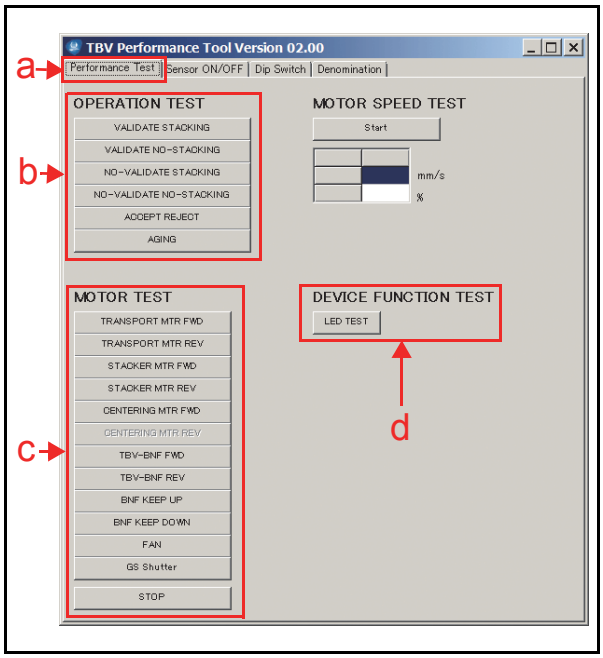


Figure 6-63 Performance Test Selection Screen 2

SENSOR ON/OFF TAB

The "Sensor ON/OFF" Tab (Figure 6-64 a) is selected to perform the Sensor Test.

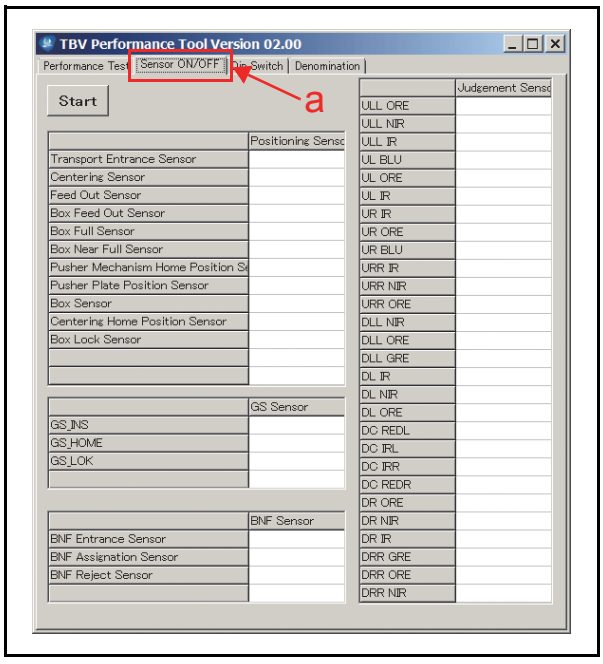


Figure 6-64 Sensor ON/OFF Test Screen Selection

DIP SWITCH TAB

The "DIP Switch" Tab (Figure 6-65 a) is selected to perform the DIP Switch Test.

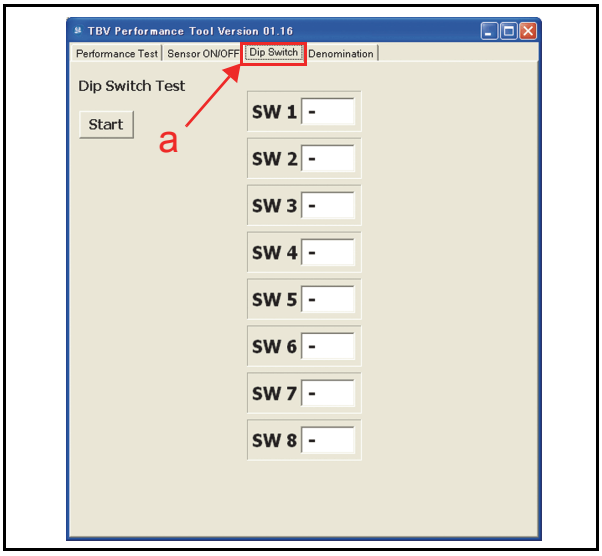


Figure 6-65 DIP Switch Test Selection Screen 1

DENOMINATION TAB

The "Denomination" Tab (Figure 6-66 a) is selected to confirm the denomination value during a VALIDATE STACKING operation (Banknote Acceptance Test with Cash Box), or VALIDATE NO-STACKING (Banknote Acceptance Test without Cash Box) during an Operational Test Performance Mode.

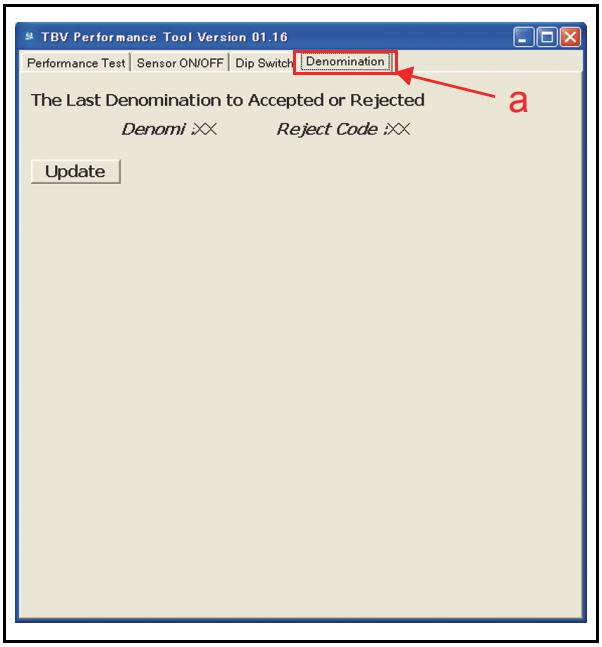


Figure 6-66 Denomination Update Screen

Operation Test Mode

Table 6-4 lists the TBV Operational Test items.

Table 6-4 Operation Test Items

Test Item	PC Screen	Test Purpose	LED			
			Stand-by	Normal Operation	After Banknote Insertion	Abnormal Indication*
Banknote Acceptance with Cash Box†	VALIDATE STACKING	Tests the Stacker's Movement with a Cash Box and the Acceptance Rate	White Flashes	Blue Lit	Purple Flashes‡ $1 = 1 time $5 = 3 times $10 = 4 times $20 = 5 times $50 = 6 times $100 = 7 times	Yellow Flashes Red Flashes Green Flashes
Banknote Acceptance without Cash Box**	VALIDATE NO-STACKING	Tests the Stacker's Movement without a Cash Box and the Acceptance Rate	White Flashes	Blue Lit		Yellow Flashes Red Flashes Green Flashes
Banknote Acceptance with Cash Box (No Validation)†	NO-VALIDATE STACKING	Tests the Stacker's Movement with a Cash Box (No Validation)	White Flashes	Blue Lit	Purple Flashes‡ (1 time)	Yellow Flashes Red Flashes Green Flashes
Banknote Acceptance without Cash Box (No Validation)**	NO-VALIDATE NO-STACKING	Tests the Stacker's Movement without a Cash Box (No Validation)	White Flashes	Blue Lit		Yellow Flashes Red Flashes Green Flashes
Banknote Reject†	ACCEPT REJECT	Tests a Banknote's Reject Movement from the Escrow Position when Off-Line	White Flashes	Blue Lit	Green Flashes‡ (10 times)	Yellow Flashes Red Flashes Green Flashes
Aging†	AGING	Tests each moving part and Sensor through aging movements	White Flashes	Blue Lit	Extinguished (OFF)	Yellow Flashes Red Flashes

*. Refer to Error Type definition or related Reject Code when any of these LED Color Errors occurs.

†. This test is available when a Cash Box is correctly seated in place.

‡. The LED flashes (either Purple or Green) once for each denomination value detected, and repeats the sequence three (3) consecutive times; then lights a steady Blue Color.

**.This test is available when a Cash Box is NOT seated in place.

ACCEPTANCE TESTS

To perform each Acceptance Test, proceed as follows:

1. Click on the "Performance Test" Screen Tab (Figure 6-67 a).
2. Click on the desired Test Item Screen Button to begin the related Test (Figure 6-67 b).

NOTE: The "AGING" Test is not included in this set of Tests! It will be preformed separately following this set of Acceptance Tests.

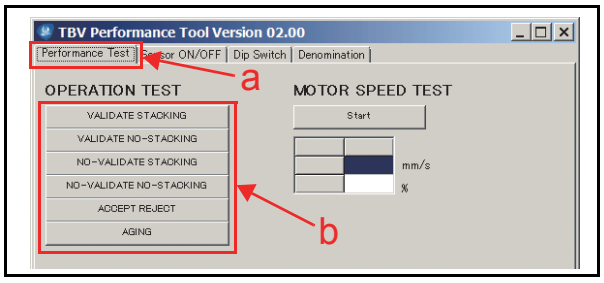


Figure 6-67 Performance Test Tab Selection

3. When the TBV is ready to accept a Banknote, the LED is lit a steady Blue Color (Table 6-4).
4. Start test by inserting a Banknote.
5. The following two (2) methods exist to confirm the inserted Banknote's denomination value:
   a) **By LED**: Count the number of LED flashes to confirm the Banknote Denomination Value. The number of LED flashes for each denomination value is listed in Table 6-4. The TBV repeats the Flash sequence three (3) times, then lights a steady Blue Color.
   b) **By Denomination Tab**: Click on the "Denomination" Tab to reveal the Denomination Screen (Figure 6-68 a).
   Click on the "Update" Update Screen Button (Figure 6-68 b) AFTER a Banknote insertion; the denomination value will appear next to "*Denomi* : XXX" (Figure 6-68 c).

NOTE: If the Banknote is not validated, the denomination value will not appear.

When performing a "Banknote Reject" Test, the tested Banknote will be returned (Table 6-4).

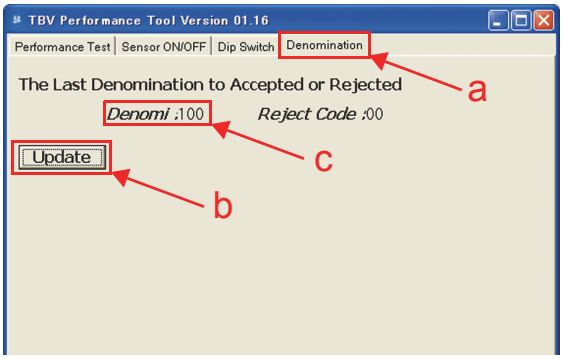


Figure 6-68 Denomination Tab Selection

NOTE: If the user desires to perform other tests, close all of the Screens on the PC, and turn the TBV Power Switch OFF; then, Turn the TBV Power Switch back ON, and start the Performance Test Procedures again from the beginning.

AGING TEST

To perform an Aging Test, proceed as follows:

1. Click on the "Performance Test" Tab (Figure 6-69 a).
2. Click on the "**AGING**" AGING Screen Button (Figure 6-69 b) to begin the Aging Test.

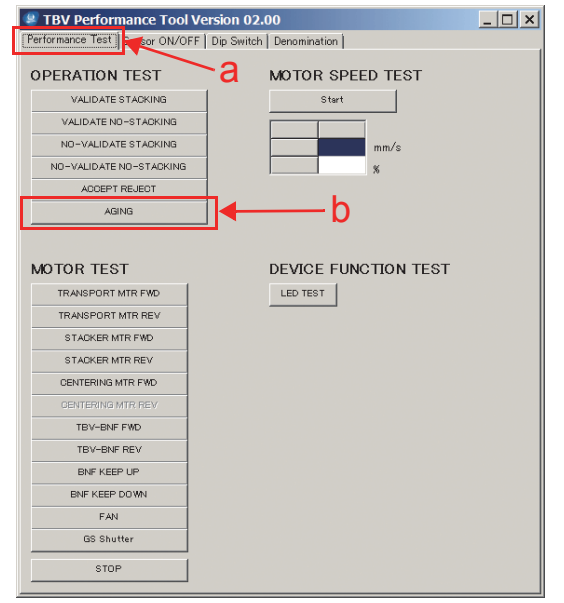


Figure 6-69 Aging Test Screen Button Location

3. Check that the LED is lit a steady Blue Color while sequential Aging movement is occurring (Table 6-4), and one cycle of movement is confirmed.
4. Click on the "**STOP**" STOP Screen Button to end the Aging Test (Figure 6-70 a).

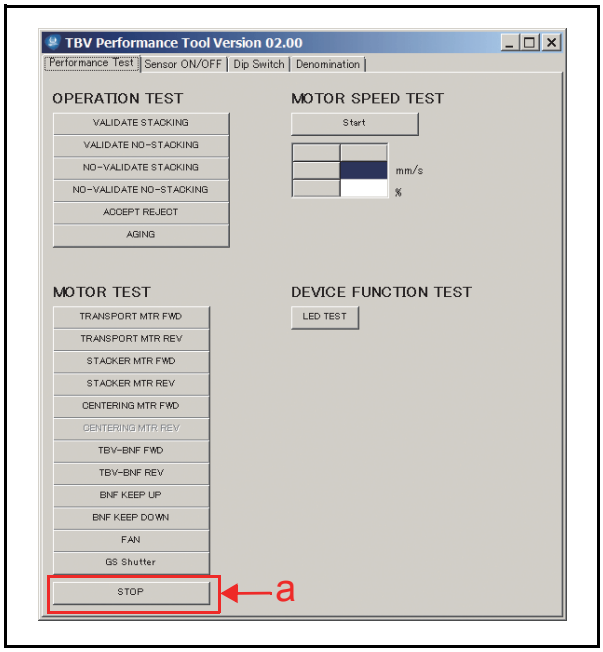


Figure 6-70 Performance Test Stop Screen Button Location

MOTOR TESTS

Table 6-5 lists all of the TBV Motor Test Functions.

Table 6-5 Motor Test Functions

Test Item	PC Screen	Test Purpose	LED		
			Stand-by	Performing (Normal)	Abnormal Indication*
Transport Motor Normal Rotation	TRANSPORT MTR FWD	Tests the Transport Motor's movement and speed while performing normal forward rotation	White Flashes	Blue Lit	Red Flashes
Transport Motor Reverse Rotation	TRANSPORT MTR REV	Tests the Transport Motor's movement and speed while performing reverse rotation			
Stacker Motor Normal Rotation†	STACKER MTR FWD	Tests the Stacker Motor's movement, each Stacker Home Position Sensor and Stacker Half Position Sensor while performing normal forward rotation			
Stacker Motor Reverse Rotation†	STACKER MTR REV	Tests the Stacker Motor's movement, each Stacker Home Position Sensor and Stacker Half Position Sensor while performing reverse rotation			
Centering Motor Normal Rotation‡	CENTERING MTR FWD	Tests the Centering Guide's movement and the Centering Home Position Sensor while performing normal forward rotation			
Transport Motor and BNF Transport Motor Normal Rotation**	TBV-BNF FWD	Simultaneously tests both the Transport Motor's and the BNF Transport Motor's movement and speed while performing normal forward rotation			
Transport Motor and BNF Transport Motor Reverse Rotation**	TBV-BNF REV	Simultaneously tests both the Transport Motor's and the BNF Transport Motor's movement and speed while performing reverse rotation			
BNF Pusher Mechanism Push Up**	BNF KEEP UP	Tests the BNF Pusher Mechanism's Banknote push-up movement			
BNF Pusher Mechanism Push Down**	BNF KEEP DOWN	Tests the BNF Pusher Mechanism's Banknote push-down movement			
Fan Motor	FAN	Tests the Fan Motor's Motion			

*. Refer to the Error Type definition or the related Reject Code when any of these LED Color Errors occurs.

†. This test is available when a Cash Box is correctly seated in place.

‡. This test is available only for the TBV-100 (Centering Type) Unit.

**.This test is available only when the BNF Section is set in place and connected.

To perform the Motor Tests, proceed as follows:

1. Click on the "Performance Test" Tab (Figure 6-71 a).
2. Click on the desired Motor Test Item Screen Button to begin the related Test (Figure 6-71 b).

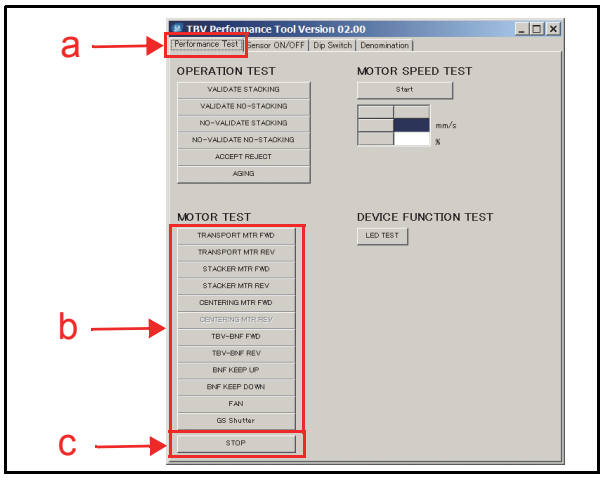


Figure 6-71 Performance Test Tab Selection

3. Confirm that the LED is lit a steady Blue Color while the test is in progress (Table 6-5).
4. Click on the "**STOP**" STOP Screen Button to end the Motor Test (Figure 6-71 c).

NOTE: When clicking on the MOTOR SPEED TEST "START" Screen Button (Figure 6-72 a), and performing one of the four (4) available Tests (e.g., The Transport Normal Rotation Test, Transport Reverse Rotation Test, Transport/BNF Motor Normal Rotation Test or the Transport/BNF Reverse Rotation Test), the Motor Speed rotational rate will appear as XXX mm/s (Figure 6-72 b).
Click on the "STOP" Screen Button (Figure 6-72 c) to end a selected Motor Speed Test.

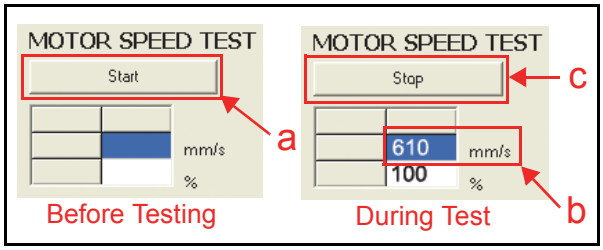


Figure 6-72 Motor Speed Test Screen

DEVICE LED FUNCTION TEST

LED Indication Tests exist within the Device Function Test. Table 6-6 lists the Device Function Test Item LED Indications.

Table 6-6 Device LED Function Test

Test Item	PC Screen	Test Purpose	LED		
			Stand-by	Performing (Normal)	Abnormal Indication*
LED Indication†	LED TEST	Tests the LED Color Illumination Levels	White Flashes	Red Lit Green Lit Blue Lit White Lit	One of four (4) Colors (Red, Green, Blue or White) lit or extinguished.

*. Refer to Error Type definitions or the related Reject Code when any of these LED Color Errors occurs.

†. This test is available only when the BNF Section is set in place.

To perform the Device Function Test, proceed as follows:

1. Click on the "Performance Test" Screen Button (Figure 6-73 a).
2. Click on the "LED TEST" LED TEST Screen Button to begin each selected Test (Figure 6-73 b).
3. Check that the LED alternately flashes at a Red, Green, Blue and White Color rate (Table 6-6).
4. Click on the "**STOP**" STOP Screen Button (Figure 6-73 c) to end the Test.

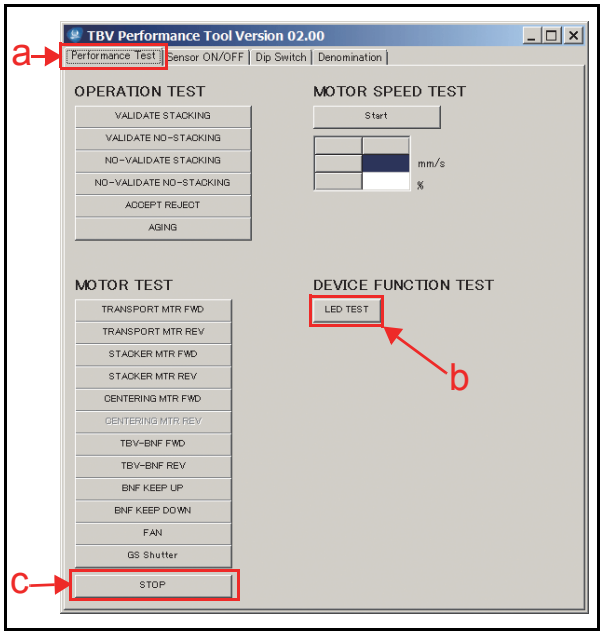


Figure 6-73 LED Test Screen Button Location

SENSOR TESTS

Fourteen (14) tests exist within the Sensor Test Menu.Table 6-7 lists the function of each Sensor Test Item.

Table 6-7 Sensor Test Items

Test No.	PC Screen Indication	Sensor Purpose*	PC Screen		LED	
	Sensor Names		Detected	NOT Detected	Stand-by	Operating
1	Transport Entrance Sensor	Detects a Banknote existing on the Entrance Sensor.	ON	OFF	White Flashes	Blue Lit
2	Centering Sensor	Detects a Banknote existing on the Center Position Sensor.				
3	Feed Out Sensor	Detects a Banknote existing on the Feed Out Sensor.				
4	Box Feed Out Sensor†	Detects a Banknote existing on the Stack Position Sensor.				
5	Box Full Sensor†	Detects that the Cash Box is full.				
6	Box Near Full Sensor†	Detects that the Cash Box is nearly full.				
7	Pusher Mechanism Home Position Sensor†	Detects that the Pusher Mechanism's Pusher Plate is correctly positioned at the Home Position.				
8	Pusher Plate Position Sensor†	Detects that the Pusher Mechanism's Pusher Plate correctly positions itself at the half position.				
9	Box Sensor†	Detects that the Cash Box is properly seated.				
10	Centering Home Position Sensor‡	Detects that the Centering Mechanism is correctly positioned at the Home Position.				
11	Box Lock Sensor†	Detects that the Cash Box Release Lever is locked.				
12	BNF Entrance Sensor**	Detects a Banknote existing on the BNF Entrance Sensor.				
13	BNF Assignation Sensor**	Detects a Banknote existing on the BNF Middle Sensor.				
14	BNF Reject Sensor**	Detect a Banknote existing on the BNF Reject Sensor.				

*. Refer to "LD Sensor/Roller Cleaning Location" on page 2-13 and "TBV Sensor and Roller Cleaning Locations" on page 2-14 of Section 2 in this Manual to identify the exact Sensor locations.

†. This test is available when the Cash Box is correctly seated.

‡. This test is available only for the TBV-100 (Centering Type) Unit. Rotate the knob located on the side of the Transport Unit to control the ON/OFF condition to perform this test.

**.This test is available only when the BNF Section is set in place and connected.

To perform a Sensor Test, proceed as follows:

1. Click on the "Sensor ON/OFF" Screen Tab (Figure 6-74 a).
2. Click on the "Start" Start Screen Button (Figure 6-74 b) to begin the Test.

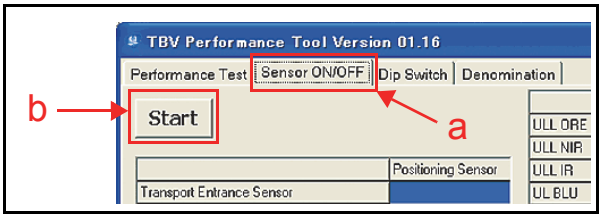


Figure 6-74 Sensor ON/OFF Test Screen 1

3. Confirm that the "*Sensor Timer running.*" Red Text Line appears next to the "Stop" Screen Button (Figure 6-75 a on page 6-21 of this Section), and that the LED is lit a steady Blue Color.
4. The Sensor detection condition indicates "ON" or "OFF" in the "Positioning Sensor" Column or "Judgment Sensor" Column or the "BNF Sensor" Column on the PC Screen (Figure 6-75 b). Refer to Table 6-7 "Sensor Test Items" on page 6-20 of this Section for details regarding the meaning of each Sensor Test "ON" and "OFF" indication.
5. Click on the "**STOP**" STOP Screen Button (Figure 6-75 c) to finish the Sensor Test.

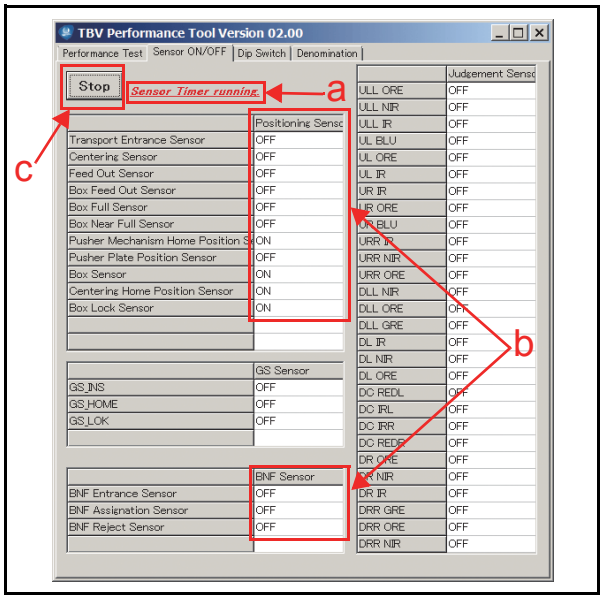


Figure 6-75 Sensor ON/OFF Test Selection Screen 2

DIP SWITCH TEST

To perform the BNF Section's 8-Position DIP Switch Block Test and the Transport Section's 8-Position DIP Switch Block Test, proceed as follows;

1. Click on the "Dip Switch" Screen Tab (Figure 6-76 a).
2. Click on the "Start" Start Screen Button (Figure 6-76 b) to begin the Test.

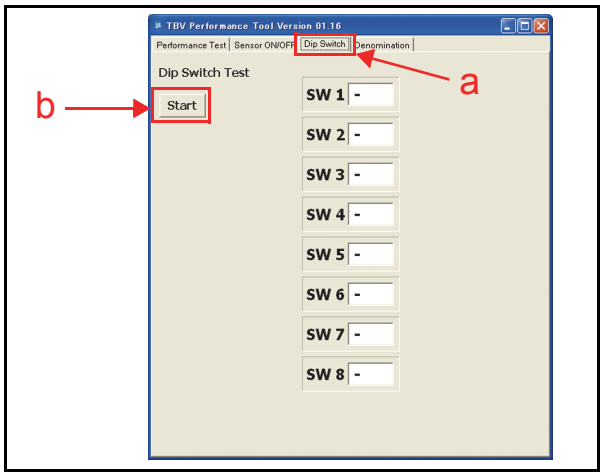


Figure 6-76 DIP Switch Test Selection Screen 1

3. Confirm the DIP Switch ON/OFF operational condition for each Switch (Figure 6-77 a) and that the LED is lit a steady Blue Color.
4. Click on the "**STOP**" STOP Screen Button (Figure 6-77 b) to finish the DIP Switch Test.

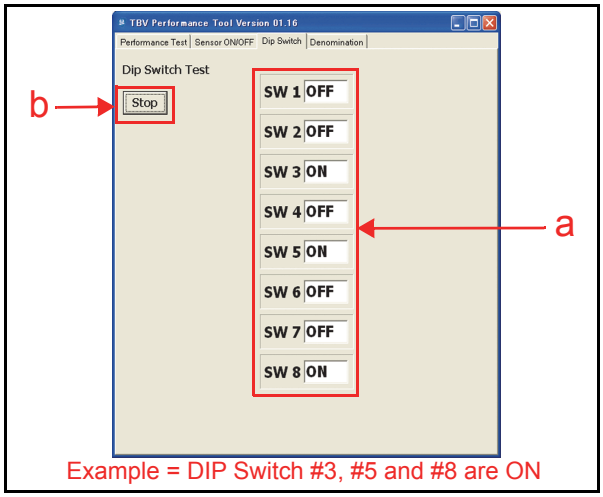


Figure 6-77 DIP Switch Test Selection Screen 2

Performance Test Tool Requirement without a PC

Figure 6-78 illustrates and list identifies the tools and equipment interconnects necessary to perform the TBV Performance Test without a PC.

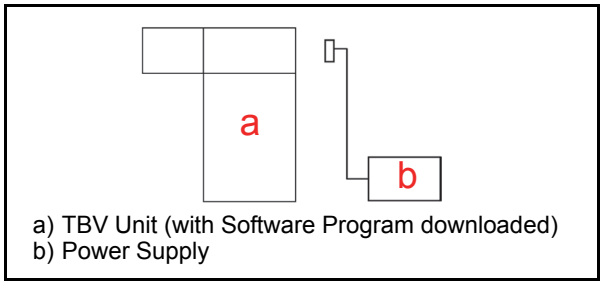


Figure 6-78 Performance Test Tool Requirements

DIP SWITCH CONFIGURATION FOR PERFORMANCE TESTS WITHOUT A PC

Table 6-8 lists the DIP Switch Settings for running the TBV Performance Tests without using a PC for testing. Refer to the "Test Purpose" and the "Sensor Purpose" information available in Table 6-4, Table 6-5, Table 6-6 and Table 6-7 previously in this Section for detailed Test function descriptions of each Test listed in Table 6-8 below.

Table 6-8 DIP Switch Configurations for Tests without a PC

No.	Test Item	DIP Switch Settings								LED			
		1	2	3	4	5	6	7	8	Stand-by	Operating	After Banknote Insertion	Abnormal Indication
1	Banknote Acceptance with a Cash Box*	ON	ON	ON	ON	-	-	-	ON/OFF	White Flashes	Blue Lit	Purple Flashes $1=1 time $5=3 times $10=4 times $20=5 times $50=6 times $100= 7 times	Yellow Flashes Red Flashes Green Flashes
2	Banknote Acceptance without a Cash Box†	ON	-	ON	ON	-	-	-	ON/OFF	White Flashes	Blue Lit	Purple Flashes $1=1 time $5=3 times $10=4 times $20=5 times $50=6 times $100= 7 times	Yellow Flashes Red Flashes Green Flashes
3	Banknote Acceptance non-Validation with a Cash Box*	-	ON	ON	ON	-	-	-	ON/OFF	White Flashes	Blue Lit	Purple Flashes (1 time)	Yellow Flashes Red Flashes Green Flashes
4	Banknote Acceptance non-Validation without a Cash Box†	-	-	ON	ON	-	-	-	ON/OFF	White Flashes	Blue Lit	Purple Flashes (1 time)	Yellow Flashes Red Flashes Green Flashes
5	Banknote Reject*	ON	ON	-	ON	-	-	-	ON/OFF	White Flashes	Blue Lit	Green Flashes (10 time)	Yellow Flashes Red Flashes Green Flashes
6	Aging*	-	ON	-	ON	-	-	-	ON/OFF	White Flashes	Blue Lit	-	Yellow Flashes Red Flashes
7	Transport Motor Normal Forward Rotation	ON	-	-	-	-	-	-	ON/OFF	White Flashes	Blue Lit	-	Red Flashes
8	Transport Motor Reverse Rotation	-	ON	-	-	-	-	-	ON/OFF	White Flashes	Blue Lit	-	Red Flashes
9	Stacker Motor Normal Forward Rotation*	-	-	ON	-	-	-	-	ON/OFF	White Flashes	Blue Lit	-	Red Flashes
10	Stacker Motor Reverse Rotation*	-	-	-	ON	-	-	-	ON/OFF	White Flashes	Blue Lit	-	Red Flashes
11	Centering Motor Normal Forward Rotation‡	-	-	-	-	ON	-	-	ON/OFF	White Flashes	Blue Lit	-	Red Flashes
12	Fan Motor	ON	ON	-	-	-	-	ON	ON/OFF	White Flashes	Blue Lit	-	Red Flashes
13	Transport/BNF Transport Motor Normal Forward Rotation at same time**	ON	-	-	-	-	-	ON	ON/OFF	White Flashes	Blue Lit	-	Red Flashes
14	Transport/BNF Transport Motor Reverse Rotation at same time**	-	ON	-	-	-	-	ON	ON/OFF	White Flashes	Blue Lit	-	Red Flashes
15	BNF Pusher Mechanism Up Movement**	-	-	ON	-	-	-	ON	ON/OFF	White Flashes	Blue Lit	-	Red Flashes

Table 6-8 DIP Switch Configurations for Tests without a PC (Continued)

No.	Test Item	DIP Switch Settings								LED			
		1	2	3	4	5	6	7	8	Stand-by	Operating	After Banknote Insertion	Abnormal Indication
16	BNF Pusher Mechanism Down Movement**	ON	-	ON	-	-	-	ON	ON/OFF	White Flashes	Blue Lit	-	Red Flashes
17	LED Indication**	ON	-	-	-	ON	-	-	ON/OFF	White Flashes	Red Lit Green Lit Blue Lit White Lit	-	One of four (4) Colors (Red, Green, Blue or White) extinguished
18	DIP Switch	ON	ON	ON	ON	ON	ON	ON	ON/OFF	White Flashes	Yellow Lit Blue Lit	- -	No Indication
19	Sensor	ON	ON	-	-	ON	-	-	ON/OFF	White Flashes	Blue Lit Extinguish	- -	No Indication

*. This test is available when the Cash Box is correctly seated.

†. This test is available when the Cash Box is NOT present or correctly seated.

‡. This test is available only for the TBV-100 (Centering Type) Unit. Rotate the knob located on the side of the Transport Unit to control the ON/OFF condition to perform this test.

**.This test is available only when the BNF Section is set in place and connected.

Performance Test without PC Procedures

Perform the following steps to conduct TBV Performance Tests No.1 through 19 without a PC:

1. Turn the TBV Power Switch to OFF.
2. Set BNF 8-Position DIP Switch #8 to ON (Figure 6-79).

Figure 6-79 BNF Calibration DIP Switch Setting 4

3. Turn the TBV Power Switch to ON. The LED will begin flashing at a White Color rate when the TBV is in the Performance Test Mode.
4. Set the desired DIP Switch Number on the 8-Position DIP Switch to ON for the desired Performance Test (Table 6-8).
5. Set DIP Switch #8 to OFF in order to start the Test.
6. Set 8-Position DIP Switch #8 back to ON in order to end the Test. The TBV will revert to Stand-by Mode status following each Test.

NOTE: If the user desires to perform other tests following Acceptance Evaluation Tests No.1 through No.4, turn the TBV Power Switch to OFF; then, Turn the TBV Power Switch back ON again, and re-start the Performance Test Procedures again from the beginning.

Return to Step 5 of this procedure if necessary to perform another DIP Switch Performance Test.

DIP Switch Test

Perform the following steps to conduct a TBV DIP Switch Test without using a PC:

1. Turn the TBV Power Switch to OFF.
2. Set BNF 8-Position DIP Switch #8 to ON (Figure 6-80).

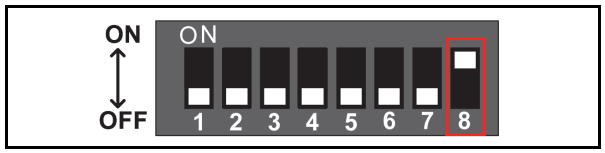


Figure 6-80 BNF Calibration DIP Switch Setting 5

3. Turn the TBV Power Switch to ON. The LED will begin flashing at a White Color rate when the TBV is in the Performance Test Mode.
4. Set the desired DIP Switch Number on the 8-Position DIP Switch to ON (Table 6-8 Test 18).
5. Set the DIP Switch #8 to OFF in order to start the DIP Switch Test.
6. When 8-Position DIP Switches #2, #4 and #6 are set to OFF, the LED is lit a steady Yellow Color.
7. When 8-Position DIP Switches #1, #3, #5 and #7 are set to OFF, the LED is lit a steady Blue Color.

*NOTE: If the LED does not light Yellow or **Blue** when performing this Test correctly, the selected DIP Switch's Function may be malfunctioning.*

This completes the DIP Switch Test procedure.

SENSOR TEST

Perform the following steps to conduct the TBV Sensor Test without using a PC.

1. Turn the TBV Power Switch to OFF.
2. Set BNF 8-Position DIP Switch #8 to ON (Figure 6-81).

Figure 6-81 BNF Calibration DIP Switch Setting 6

3. Turn the TBV Power Switch to ON. The LED will begin flashing at a White Color rate when the TBV is in the Performance Test Mode.
4. Set 8-Position DIP Switches #1, #2, #5 and #8 to ON (Table 6-8).
5. Set DIP Switch #8 to OFF in order to ready the Sensor Test.
6. Set the DIP Switch Number for the desired Test on the 8-Position DIP Switch to ON (Table 6-9).
7. The Sensor LED will indicate a steady Blue Color for a "Detect" condition, or be extinguished (Out) for a "NOT Detect" condition. Refer to Table 6-9 "Sensor Test DIP Switch Configurations" on page 6-24 of this Section for reading the definition of the "Blue" or the unlit "Extinguished" LED condition.

Table 6-9 Sensor Test DIP Switch Configurations

No.	Test Item	Test Item	DIP Switch Settings								LED		
			1	2	3	4	5	6	7	8	Stand-by	Detect	NOT Detect
1	Centering Sensor	Detects a Banknote existing on the Centering Position Sensor.	ON	-	-	-	-	-	-	-	White Flashes	Blue Lit	Extinguish
2	Pusher Plate Position Sensor	Detects that the Pusher Mechanism's Pusher Plate is correctly positioned at half position	ON	ON	-	-	-	-	-	-			
3	Box Feed Out Sensor*	Detects a Banknote existing on the Stack Position Sensor	-	-	ON	-	-	-	-	-			
4	Centering Home Position Sensor†	Detects that the Centering Mechanism is correctly positioned at the Home Position.	ON	-	ON	-	-	-	-	-			
5	Transport Entrance Sensor	Detects a Banknote existing on the Entrance Sensor.	-	ON	ON	-	-	-	-	-			
6	Box Lock Sensor*	Detects that the Cash Box Release Lever is locked.	ON	ON	ON	-	-	-	-	-			
7	Box Sensor*	Detects that the Cash Box seated.	-	-	-	ON	-	-	-	-			
8	Pusher Mechanism Home Position Sensor*	Detects that the Pusher Mechanism's Pusher Plate is correctly positioned at the Home Position.	ON	-	-	ON	-	-	-	-			
9	Feed Out Sensor	Detects a Banknote existing on the Feed Out Sensor.	-	ON	-	ON	-	-	-	-			
10	Box Near Full Sensor*	Detects that the Cash Box is nearly full.	ON	ON	-	ON	-	-	-	-			
11	Box Full Sensor*	Detects that the Cash Box is full.	-	-	ON	ON	-	-	-	-			
12	BNF Entrance Sensor‡	Detects a Banknote existing on the BNF Entrance Sensor.	ON	-	ON	ON	-	-	-	-			
13	BNF Assignation Sensor‡	Detects a Banknote existing on the BNF Middle Sensor.	-	ON	ON	ON	-	-	-	-			
14	BNF Reject Sensor‡	Detects a Banknote existing on the BNF Reject Sensor.	ON	ON	ON	ON	-	-	-	-			

*. This test is available when the Cash Box is seated correctly.

†. This test is available only for the TBV-100 (Centering Type) Unit. Use a screwdriver and move the Centering Mechanism (access is on the left side of the Transport Unit) to control the ON/OFF condition to perform this test.

‡. This test is available only when the BNF Section is set in place and connected.

TBV® Series
Transaction Based Validator
Section 7

7 EXPLODED VIEWS AND PARTS LISTS

This section provides product exploded views and parts lists for the TBV® Series Transaction Based Validator. This section contains the following information.

NOTE: Parts may be changed for improvement without notice.

- Entire TBV Unit Exploded View
- TBV BNF Unit Exploded View
- TBV Transport Unit Exploded View
- TBV Box Unit Exploded View
- TBV Frame Unit Exploded View
- TBV Bezel Unit Exploded View.

Entire TBV Unit Exploded Views

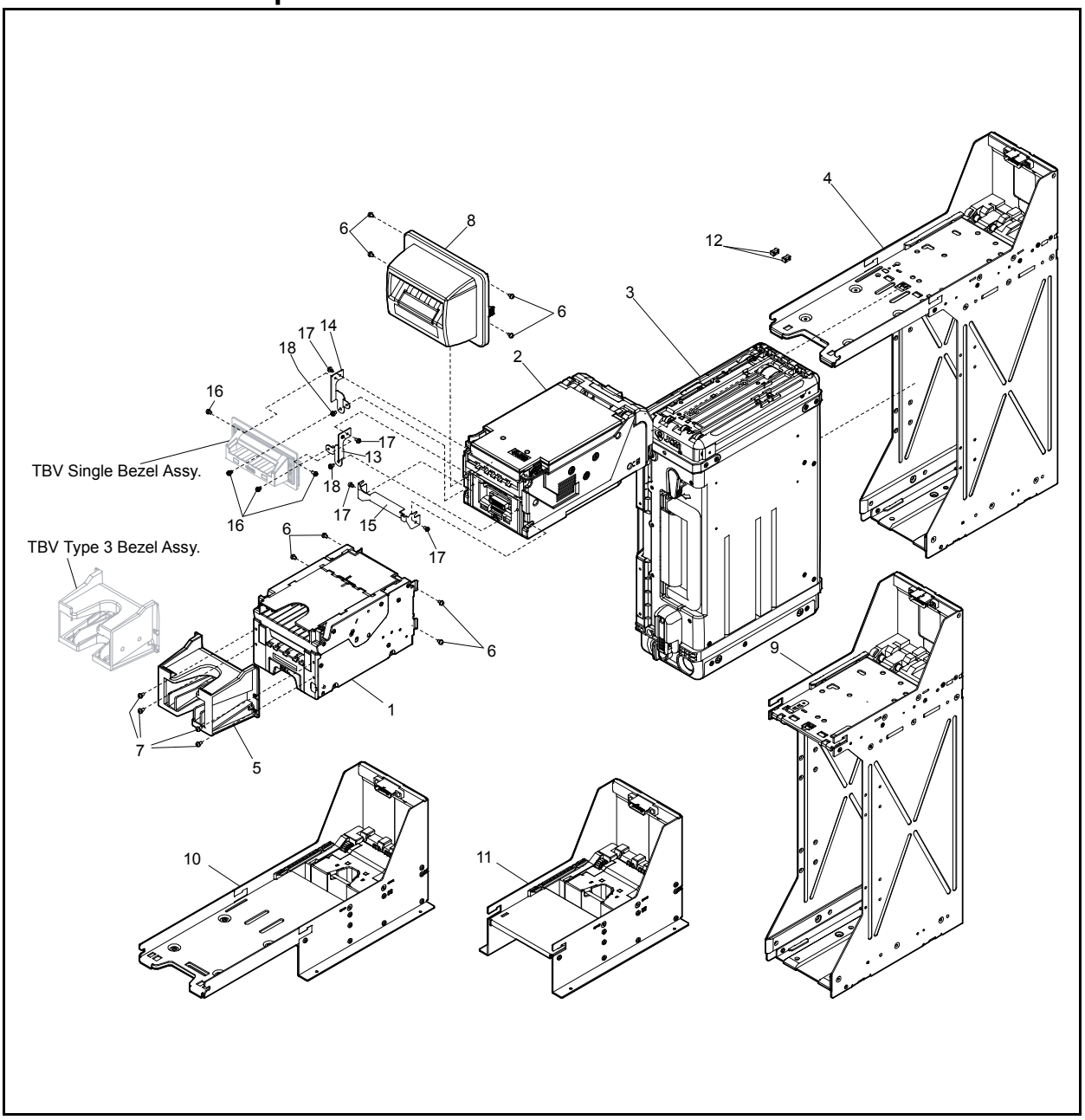


Figure 7-1 Entire TBV Unit Exploded Views

ENTIRE TBV UNIT MAJOR PARTS LIST

Table 7-1 Entire TBV Unit Major Parts List

Ref No.	EDP No.	Description	Qty	Remark
1	185971	BNF Unit	1	
2	185972	TBV-100 Transport Unit (Centering Type)	1	For TBV-100
	152007	TBV-101 Transport Unit (Fixed Type)	1	For TBV-101
	203546	TBV-200 Transport Unit (Centering Type)	1	For TBV-200
3	197667	TBV Cash Box Unit	1	
	197668	TBV Cash Box Unit with Sealing	1	
	209391	TBV ICB Cash Box Unit	1	
	210456	TBV ICB Cash Box Unit with Sealing	1	
	227783	TBV Cash Box Unit T-Proof	1	
	227814	TBV Cash Box Unit T-Proof with Sealing	1	
4	152001	TBV Frame Unit	1	
5	205939	TBV BNF Bezel Kit (Fixed Type)	1	
	205940	TBV BNF Bezel Kit (Centering Type)	1	
6	001767	M3x5 W Washer Small 3M	4	
7	003611	M3x8 Pan Head W Washer Small 3M	4	
8	202840	TBV Shutter Unit	1	
9	202839	TBV-GSH Frame Unit	1	
10	206625	TBV-FLD Frame Unit	1	
11	206627	TBV-GLD Frame Unit	1	
12	202619	Transport Unit Locks	2	
13	216333	Bezel Bracket Right	1	
14	216334	Bezel Bracket Left	1	
15	216335	Connector Cover	1	
16	003601	3x6 Pan Head Washer	4	
17	003600	3x5 Pan Head Washer	4	
18	006037	3x612 Pan Head W Washer (Small)	2	Option

TBV BNF Unit Exploded View 1

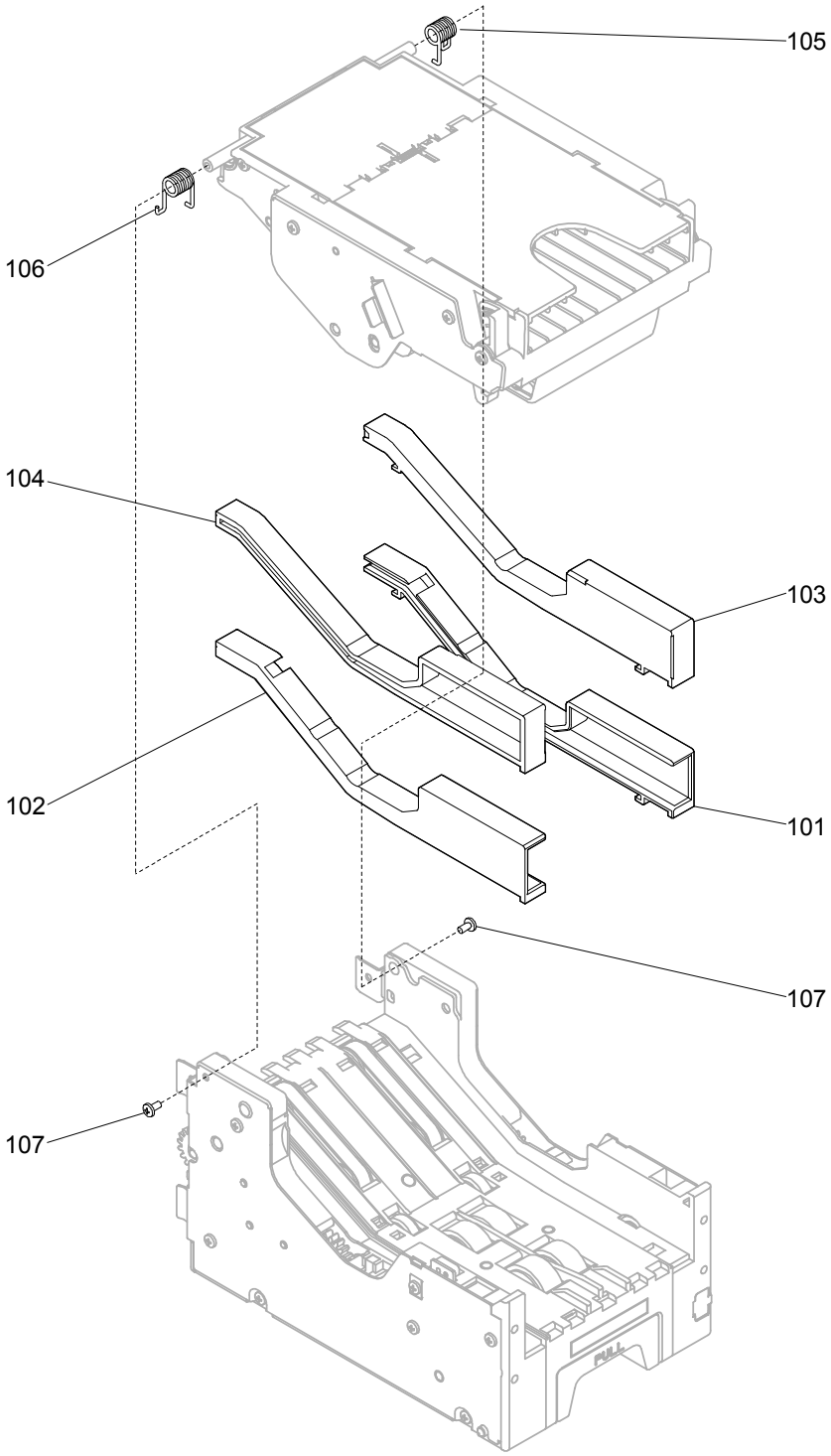


Figure 7-2 TBV BNF Unit Exploded View 1

TBV BNF UNIT PARTS LIST 1

Table 7-2 TBV BNF Unit Parts List 1

Ref No.	EDP No.	Description	Qty	Remark
101	150415	Guide 67 (Right)	1	For TBV-101 FSH/FLD
102	150414	Guide 67 (Left)	1	For TBV-101 FSH/FLD
103	150385	Guide 86 (Right)	1	For TBV-100 FSH/FLD
104	150386	Guide 86 (Left)	1	For TBV-100 FSH/FLD
105	151815	Unit Lift Spring (Left)	1	
106	151816	Unit Lift Spring (Right)	1	
107	029532	2.6x4 Binding 3M Screw	2	

TBV BNF Unit Exploded View 2

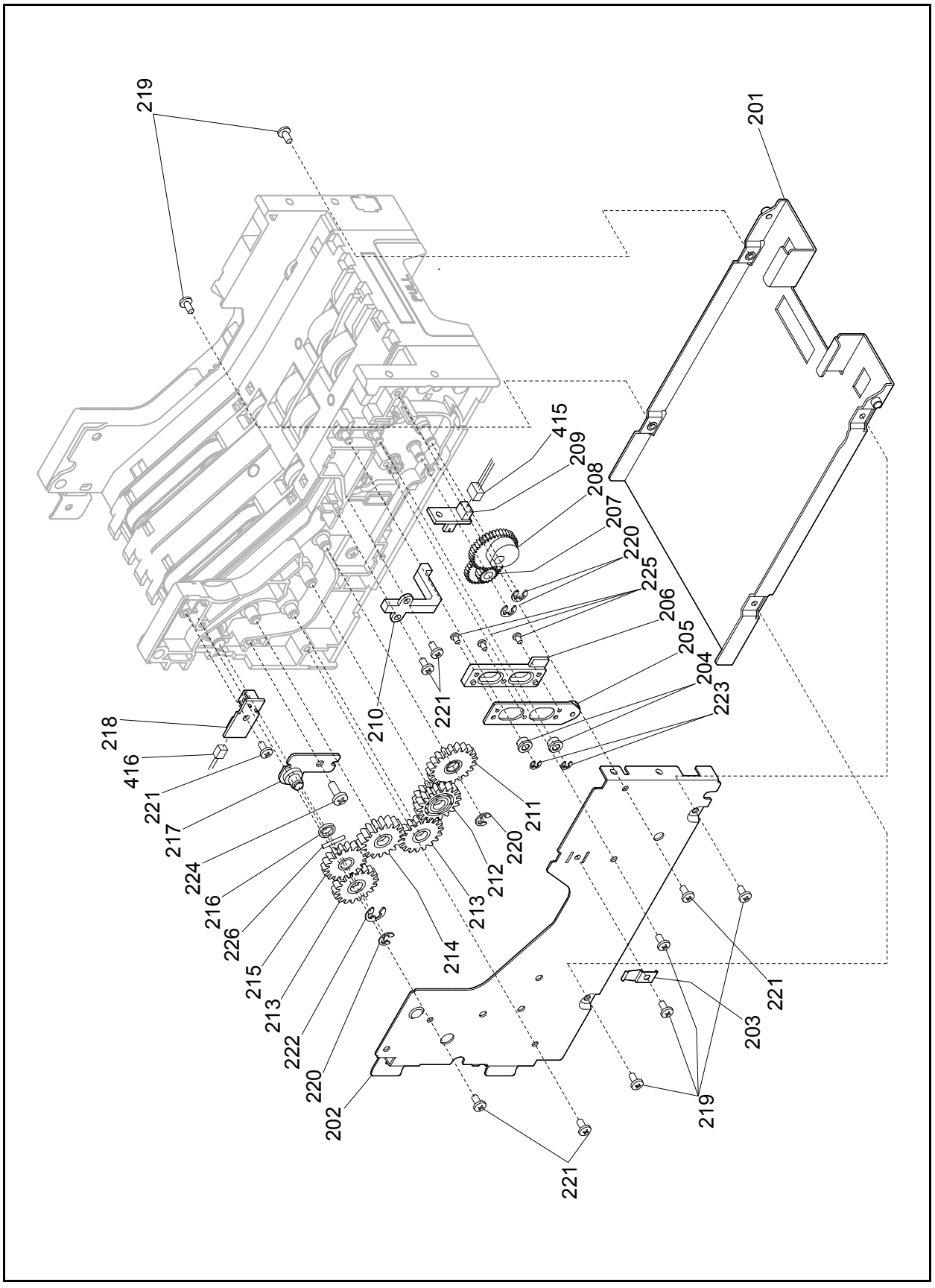


Figure 7-3 TBV BNF Unit Exploded View 2

TBV BNF UNIT 2 PARTS LIST 2

Table 7-3 TBV BNF Unit Parts List 2

Ref No.	EDP No.	Description	Qty	Remark
201	150779	Base Frame Assy.	1	
202	150361	Side Cover (Left)	1	
203	150374	Contact Plate	1	
204	150405	Guide Roller	2	
205	150359	Lift Plate Assy.	1	
206	150391	Lift Lever	1	
207	150813	Lift Gear	1	
208	150808	Lift Cam Gear	1	
209	116207	PI Sensor Circuit Board	1	
210	150413	Prism (H)	1	
211	150807	Idle Gear (C)	1	
212	150818	Idle Gear (B)	1	
213	150800	Transport Feed Gear	2	
214	150806	Idle Gear (A)	1	
215	150809	Feed Roller Gear (1)	1	
216	185240	Gear Spacer	1	
217	150358	Connection Plate Assy.	1	
218	148555	BNF Prism-PTR Circuit Board	1	
219	029532	M2.6x4 Binding 3M Screw	6	
220	003707	Φ3 E-Ring	4	
221	058274	2.6x5 Phillips Head, Self-Tapping, Binding 3M Screw	6	
222	003708	Φ4 E-Ring	1	
223	003705	Φ2 E-Ring	2	
224	189552	3x5 Phillips Head, Self-Tapping, Binding 3M Screw	1	
225	006244	2x3 Pan Head 3M Screw	3	
226	137787	Φ1.6x10 Parallel Pin (Hard)	1	

TBV BNF Unit Exploded View 3

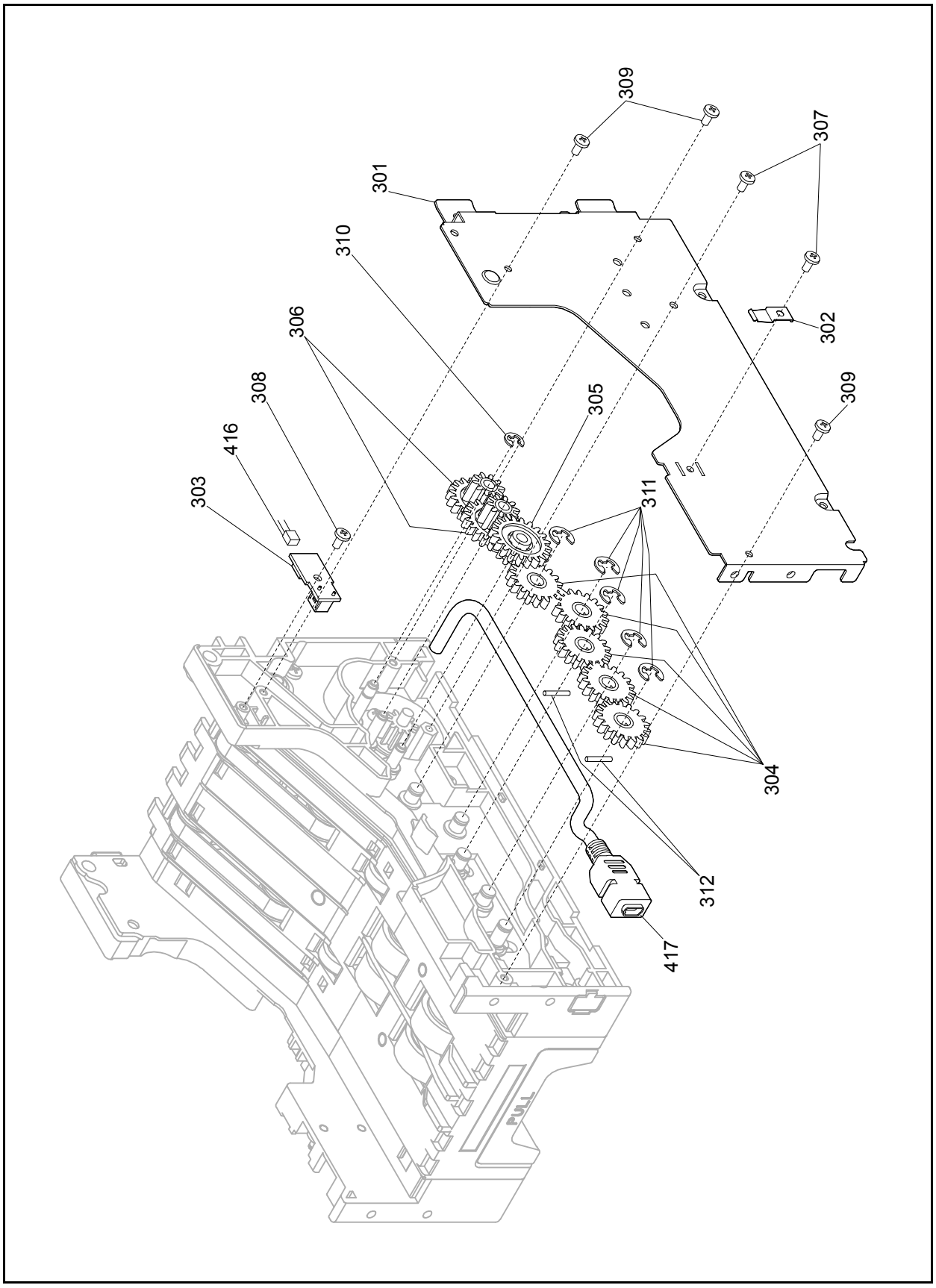


Figure 7-4 TBV BNF Unit Exploded View 3

TBV BNF UNIT 3 PARTS LIST 3

Table 7-4 TBV BNF Unit Parts List 3

Ref No.	EDP No.	Description	Qty	Remark
301	150362	Side Cover (Right)	1	
302	150374	Contact Plate	1	
303	148551	BNF Prism-LED Circuit Board	1	
304	150809	Feed Roller Gear (1)	5	
305	150816	Drive Gear (B)	1	
306	150815	Drive Gear (A)	2	
307	029532	M2.6x4 Binding 3M Screw	2	
308	058274	2.6x5 Phillips, Self-Tapping, Binding Head Screw 3M	1	
309	063250	2.6x6 Phillips, Self-Tapping, Binding Head Screw 3M	3	
310	003707	Φ3 E-Ring	1	
311	003708	Φ4 E-Ring	5	
312	137787	Φ1.6x10 Parallel Pin (Hard)	2	

TBV BNF Unit Exploded View 4

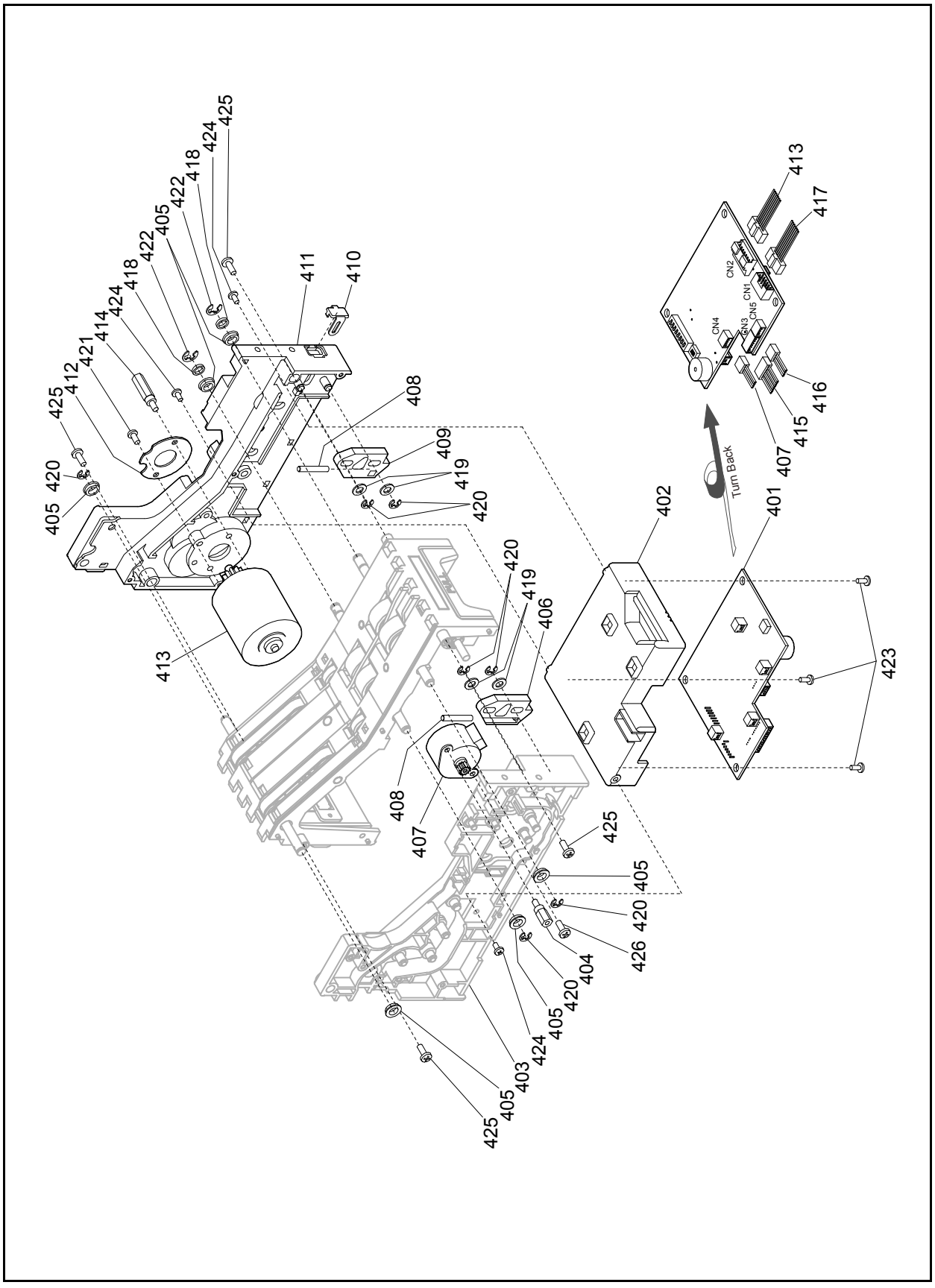


Figure 7-5 TBV BNF Unit Exploded View 4

TBV BNF UNIT PARTS LIST 4

Table 7-5 TBV BNF Unit Parts List 4

Ref No.	EDP No.	Description	Qty	Remark
401	139353	BNF Circuit Board	1	
402	150381	PCB Cover	1	
403	150775	Side Guide (Left) Assy.	1	
404	151930	Lift Motor Stud	1	
405	131125	Bearing	6	
406	150383	Unit Lock (Left)	1	
407	151485	BNF Grip Motor	1	
408	151801	Unit Lock Spring	2	
409	150382	Unit Lock (Right)	1	
410	150424	USB Cover	1	
411	150776	Side Guide (Right) Assy.	1	
412	150373	Motor Plate	1	
413	151455	Transport Motor	1	
414	151929	Feed Motor Stud	1	
415	151489	BNF Grip Home Harness	1	
416	151491	BNF Reject Sensor Harness	1	
417	151488	Relay Harness 2 (BNF-TBV)	1	
418	185240	Gear Spacer	2	
419	004015	Φ4x10x0.8 Plain Washer	4	
420	003707	Φ3 E-Ring	7	
421	003601	M3x6 Washer 3M Screw	1	
422	003708	Φ4 E-Ring	2	
423	058274	2.6x5 Phillips Head, Self-Tapping, Binding 3M Screw	3	
424	063250	2.6x6 Phillips Head, Self-Tapping, Binding 3M Screw	3	
425	091519	3x8 Phillips Head, Self-Tapping, Binding 3M Screw	4	
426	005555	M2.6x6 W Washer Small 3M Screw	1	

TBV BNF Unit Exploded View 5

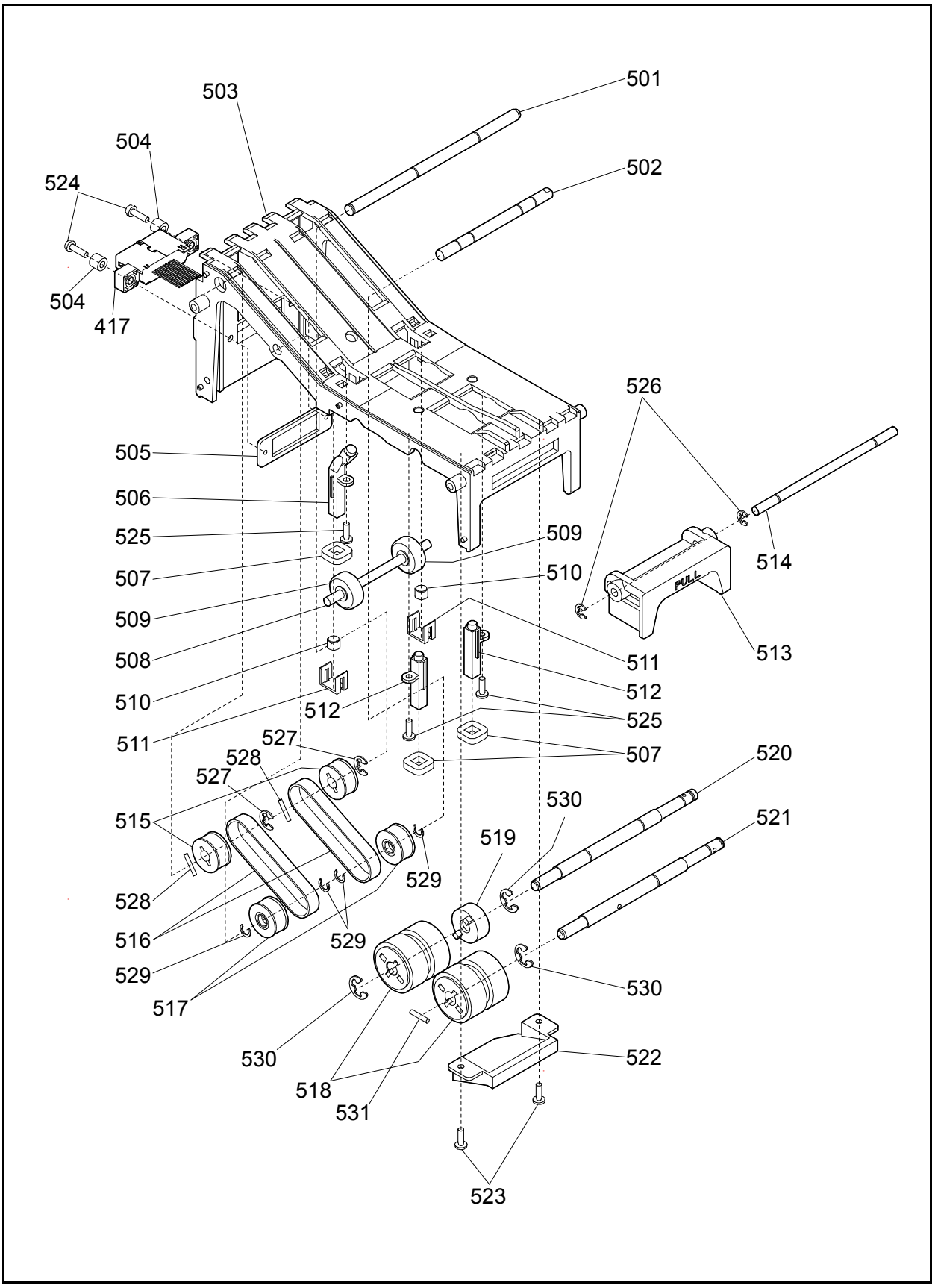


Figure 7-6 TBV BNF Unit Exploded View 5

TBV BNF UNIT PARTS LIST 5

Table 7-6 TBV BNF Unit Parts List 5

Ref No.	EDP No.	Description	Qty	Remark
501	151900	Feed Roller Shaft (D)	1	
502	151884	Feed Roller Shaft (B)	1	
503	150375	Lower Guide	1	
504	151792	Collar	2	
505	150370	Connector Bracket	1	
506	150398	Prism (E)	1	
507	150422	Dust Guard	3	
508	151901	Pinch Roller Shaft	1	
509	150393	Pinch Roller	2	
510	151800	Pinch Roller Spring	2	
511	150410	Clump	2	
512	150397	Prism (F)	2	
513	150380	Unit Lock	1	
514	151898	Unit Lock Shaft	1	
515	150820	Transport Feed Pulley 2	2	
516	185268	Timing Belt EPDM Specification	2	
517	150782	Feed Pulley Assy.	2	
518	185246	Feed Roller Assy.	2	
519	150774	Clutch Guide Assy.	1	
520	151882	Feed Roller Shaft	1	
521	151881	Pick Roller Shaft	1	
522	150396	Prism (G)	1	
523	056165	2.6x8 Phillips Head, Self-Tapping, Binding 3M Screw	2	
524	104280	M2.6x12 W Washer Small 3M	2	
525	058274	2.6x5 Phillips Head, Self-Tapping, Binding 3M Screw	3	
526	003707	Φ3 E-Ring	2	
527	003708	Φ4 E-Ring	2	
528	091515	Φ1.6x8 Parallel Pin (Hard)	2	
529	003718	Crescent Snap Ring	4	
530	003709	Φ5 E-Ring	3	
531	082026	Φ2x12 Parallel Pin	1	

TBV BNF Unit Exploded View 6

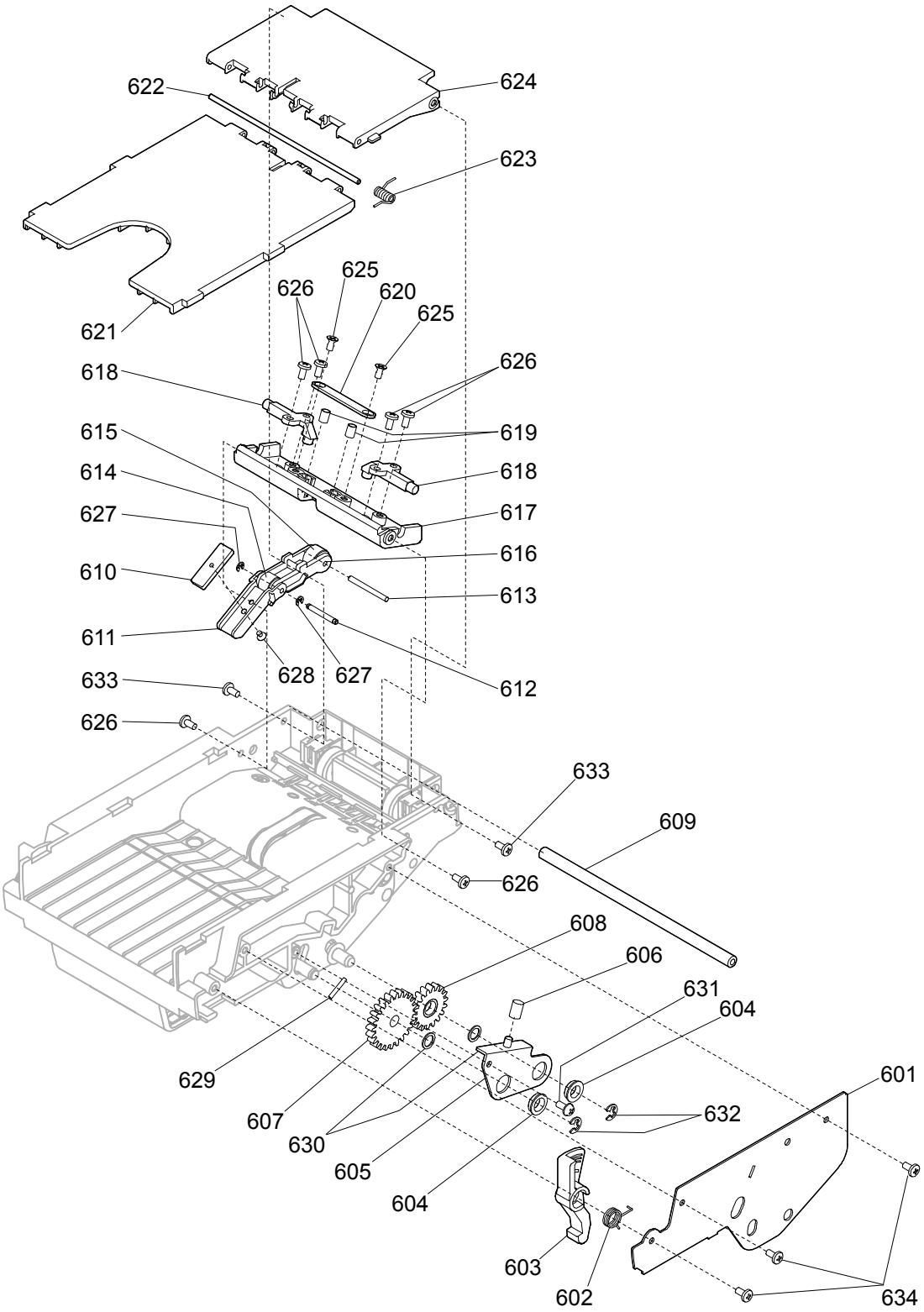


Figure 7-7 TBV BNF Unit Exploded View 6

TBV BNF UNIT 6 PARTS LIST 6

Table 7-7 TBV BNF Unit Parts List 6

Ref No.	EDP No.	Description	Qty	Remark
601	150363	Side Cover (Upper)	1	
602	151809	Guide Lock Spring (Right)	1	
603	150384	Guide Lock (Right)	1	
604	131125	Bearing	2	
605	150357	Roller Arm (Right) Assy.	1	
606	151802	Roller Arm Spring	1	
607	150810	Retard Roller Gear	1	
608	150780	Roller Gear (A) Assy.	1	
609	151889	Guide Fulcrum Shaft	1	
610	150372	Weight Plate	1	
611	150418	Reject Guide Lever Center	1	
612	151903	Reject Roller Center Shaft	1	
613	151890	Reject Roller Shaft	1	
614	150417	Reject Roller Center	1	
615	150394	Reject Roller Shaft	1	
616	150392	Reject Guide Lever Center	1	
617	150390	Reject Guide (B)	1	
618	150402	Prism (A)	2	
619	151804	Reject Roller Spring	2	
620	150366	Reject Spring Plate	1	
621	150378	Upper Guide Cover (A)	1	
622	151899	Upper Guide Cover Shaft	1	
623	151813	Upper Guide Cover Spring	1	
624	150379	Upper Guide Cover (B)	1	
625	052564	2.6x6 Flat Head, Phillips, Self-Tapping, 3M Screw	2	
626	063250	2.6x6 Phillips, Self-Tapping, Binding Head Screw 3M	6	
627	003704	Φ1.5 E-Ring	2	
628	006022	M2.4 Flat Head 3M Screw	1	
629	137787	Φ1.6x10 Parallel Pin (Hard)	1	
630	185910	Φ5x7x0.5 Poly Slider	2	
631	003598	M2.6x6 Washer 3M	1	
632	003707	Φ3 E-Ring	2	
633	056165	2.6x8 Phillips, Self-Tapping, Binding Head Screw 3M	2	
634	058274	2.6x5 Phillips, Self-Tapping, Binding Head Screw 3M	3	

TBV BNF Unit Exploded View 7

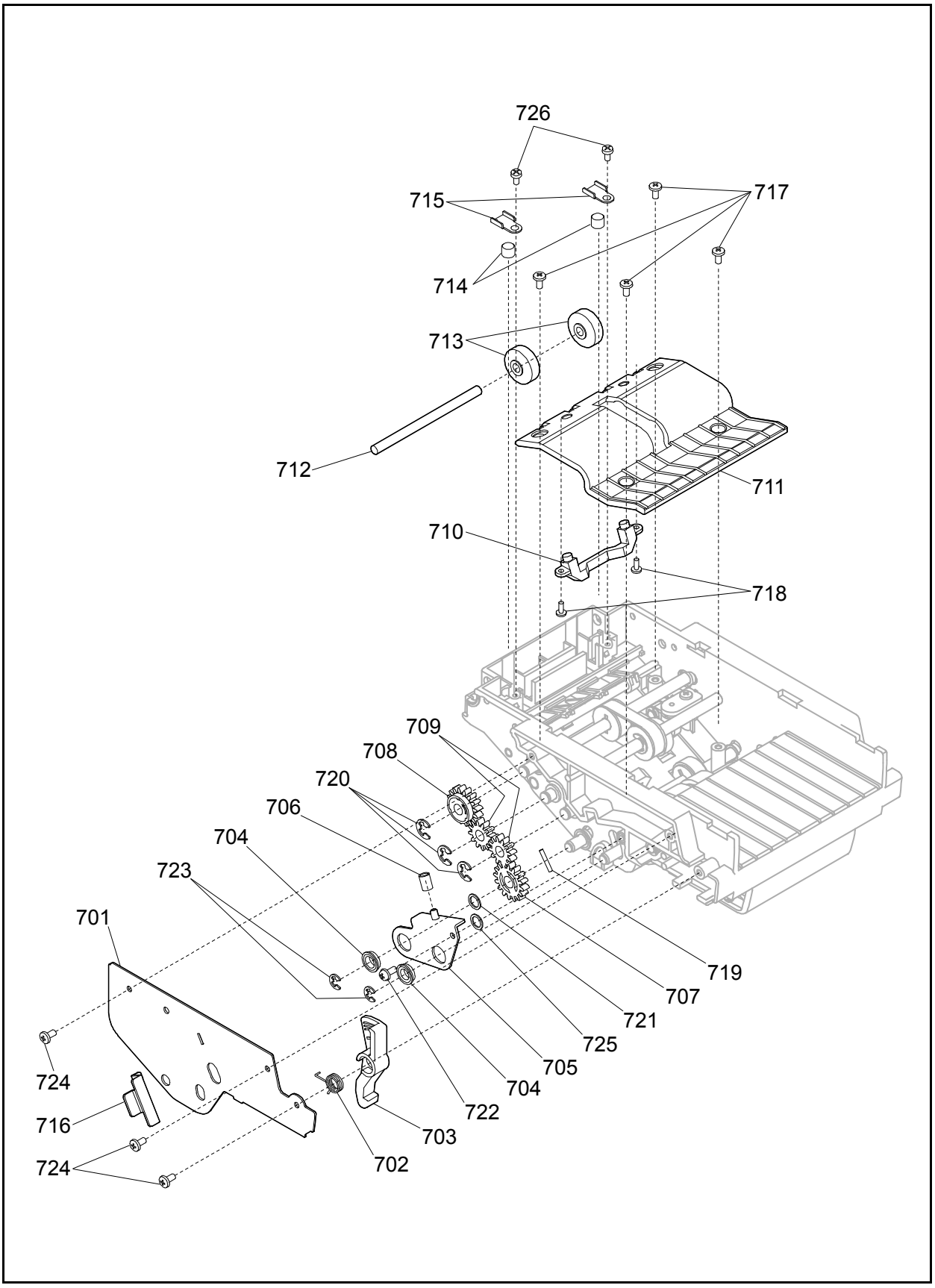


Figure 7-8 TBV BNF Unit Exploded View 7

TBV BNF UNIT PARTS LIST 7

Table 7-8 TBV BNF Unit Parts List 7

Ref No.	EDP No.	Description	Qty	Remark
701	150363	Side Cover (Upper)	1	
702	151811	Guide Lock Spring (Left)	1	
703	150407	Guide Lock (Left)	1	
704	131125	Bearing	2	
705	150356	Roller Arm (Left) Assy.	1	
706	151802	Roller Arm Spring	1	
707	150819	Feed Roller Gear (B)	1	
708	150771	Feed Roller Gear (C) Assy.	1	
709	150805	Idle Gear (D)	2	
710	150403	Prism (D)	1	
711	150377	Reject Guide (A)	1	
712	151901	Pinch Roller Shaft	1	
713	150393	Pinch Roller	2	
714	151803	Pinch Roller Spring	2	
715	150657	Spring Lock	2	
716	150371	Idle Plate	2	
717	056165	2.6x8 Phillips, Self-Tapping, Binding Head Screw 3M	4	
718	138053	2x5 Phillips Head, Self-Tapping, Binding 3M Screw	2	
719	137787	Φ1.6x10 Parallel Pin (Hard)	1	
720	003708	Φ4 E-Ring	3	
721	185910	Φ5x7x0.5 Poly Slider	1	
722	003598	M2.6x6 Washer 3M	1	
723	003707	Φ3 E-Ring	2	
724	058274	2.6x5 Phillips, Self-Tapping, Binding Head Screw 3M	3	
725	143306	Poly Slider	1	
726	063250	2.6x6 Phillips Head, Self-Tapping, Binding 3M Screw	2	

TBV BNF Unit Exploded View 8

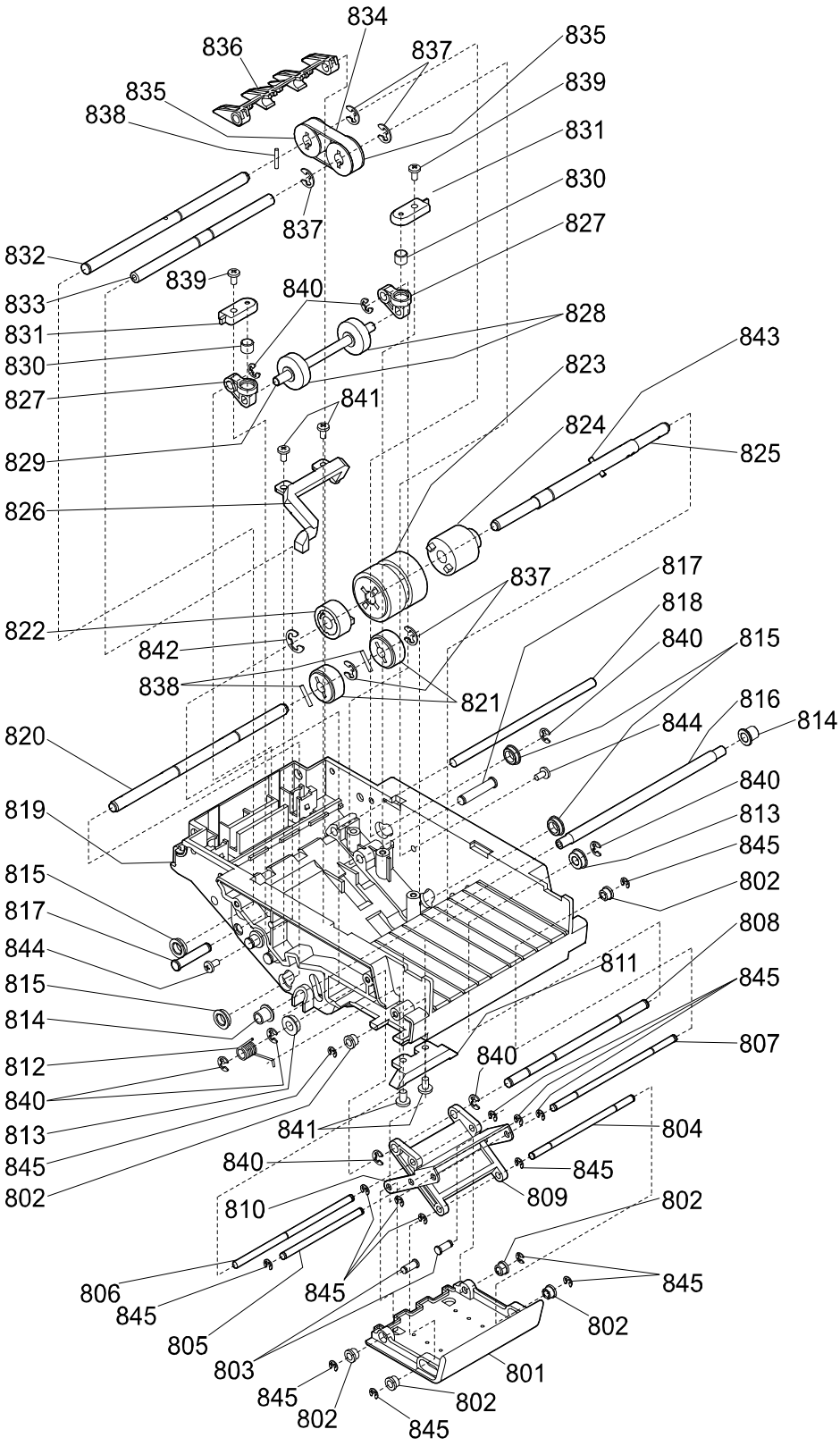


Figure 7-9 TBV BNF Unit Exploded View 8

TBV BNF UNIT PARTS LIST 8

Table 7-9 TBV BNF Unit Parts List 8

Ref No.	EDP No.	Description	Qty	Remark
801	150781	Note Suppression Assy.	1	
802	150405	Guide Roller	6	
803	151897	Suppression Shaft (F)	2	
804	151895	Suppression Shaft (D)	1	
805	151893	Suppression Shaft (C)	1	
806	151892	Suppression Shaft (B)	1	
807	151894	Suppression Shaft (E)	1	
808	151891	Suppression Shaft (A)	1	
809	150388	Suppression Arm	1	
810	150367	Hold Arm	1	
811	150400	Prism (B)	1	
812	151812	Suppression Spring	1	
813	150406	Bush 840	2	
814	151794	Roller Arm Spacer	2	
815	131125	Bearing	4	
816	151888	Roller Arm Beam	1	
817	151931	Pinch Roller Stud (A)	2	
818	151887	Switch Lever Shaft	1	
819	150778	Upper Guide Assy.	1	
820	151883	Feed Roller Shaft (A)	1	
821	185247	Transport Feed Roller #4 Assy.	2	
822	150774	Clutch Guide Assy.	1	
823	185246	Retard Roller Assy.	1	
824	124278	Torque Limiter	1	
825	151885	Retard Roller Shaft	1	
826	150401	Prism (C)	1	
827	150420	Pinch Roller Lever	2	
828	150393	Pinch Roller	2	
829	151904	Pinch Roller Shaft (A)	1	
830	151803	Pinch Roller Spring	2	
831	150419	Pinch Roller Spring Guide	2	
832	151886	Feed Roller Shaft (C)	1	
833	151902	Reject Pulley Shaft	1	
834	185269	Timing Belt	1	
835	150820	Transport Feed Pulley 2	2	
836	150389	Switch Lever Shaft	1	
837	003708	Φ4 E-Ring	5	
838	091515	Φ1.6x8 Parallel Pin (Hard)	3	
839	056165	2.6x8 Phillips, Self-Tapping, Binding Head Screw 3M	2	
840	003707	Φ3 E-Ring	8	
841	063250	2.6x6 Phillips, Self-Tapping, Binding Head Screw 3M	4	

Table 7-9 TBV BNF Unit Parts List 8 (Continued)

Ref No.	EDP No.	Description	Qty	Remark
842	003709	Φ5 E-Ring	1	
843	142670	Φ2x10 Wave Spring Pin (General)	1	
844	005555	M2.6x6 W Washer Small 3M	2	
845	003705	Φ2 E-Ring	14	

TBV Transport Unit Exploded View 1

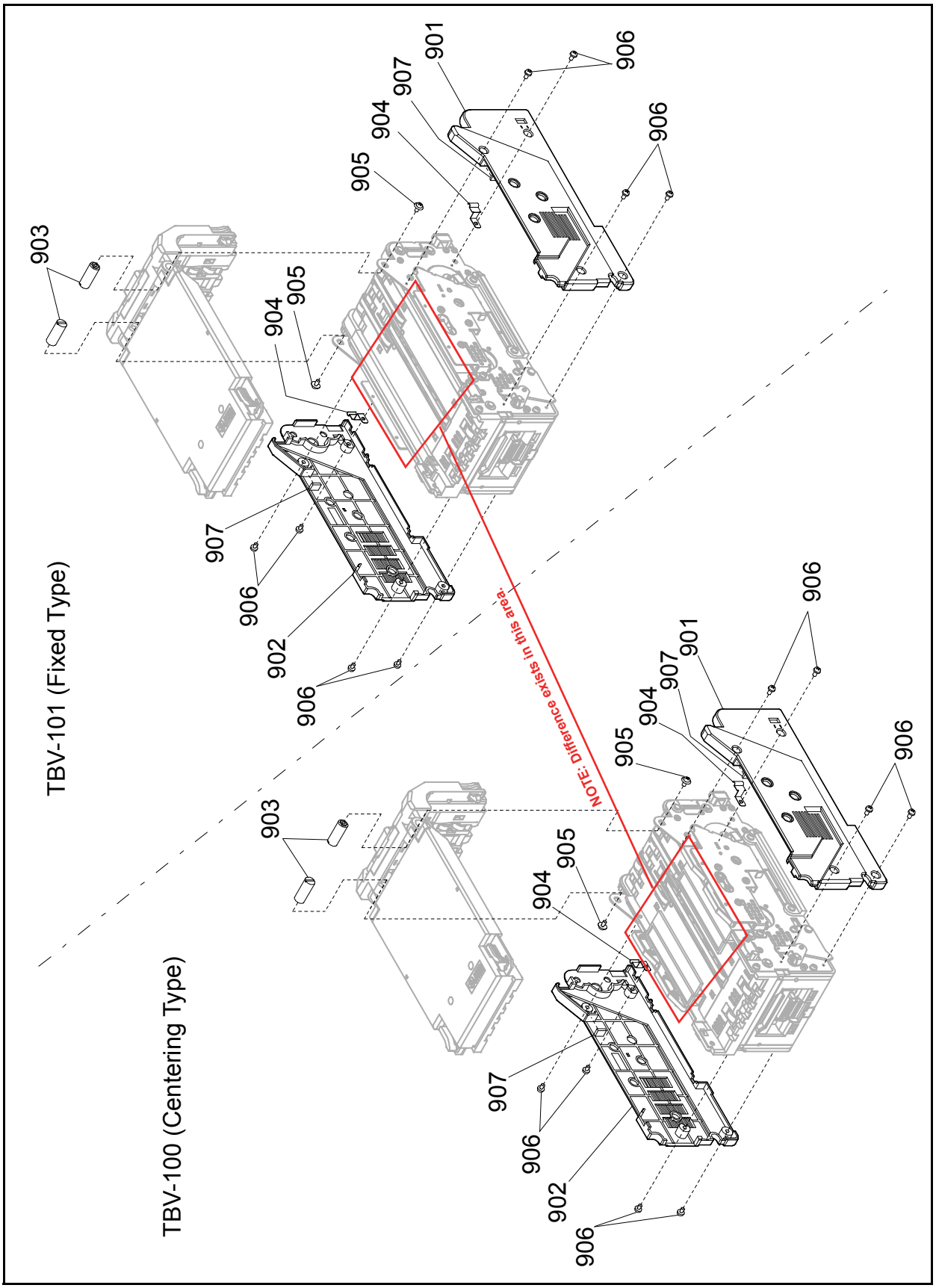


Figure 7-10 TBV Transport Unit Exploded View 1

TBV TRANSPORT UNIT PARTS LIST 1

Table 7-10 TBV Transport Unit Parts List 1

Ref No.	EDP No.	Description	Qty	Remark
901	150536	Transport Cover Right	1	
902	150537	Transport Cover Left	1	
903	151905	Transport Guide Stud	2	
904	150658	Earth Spring 1	2	
905	003610	M3x6 W Washer Large 3M	2	
906	010377	M2.6x5 W Washer Small 3M	8	
907	189571	CNT Absorber	2	

TBV Transport Unit Exploded View 2

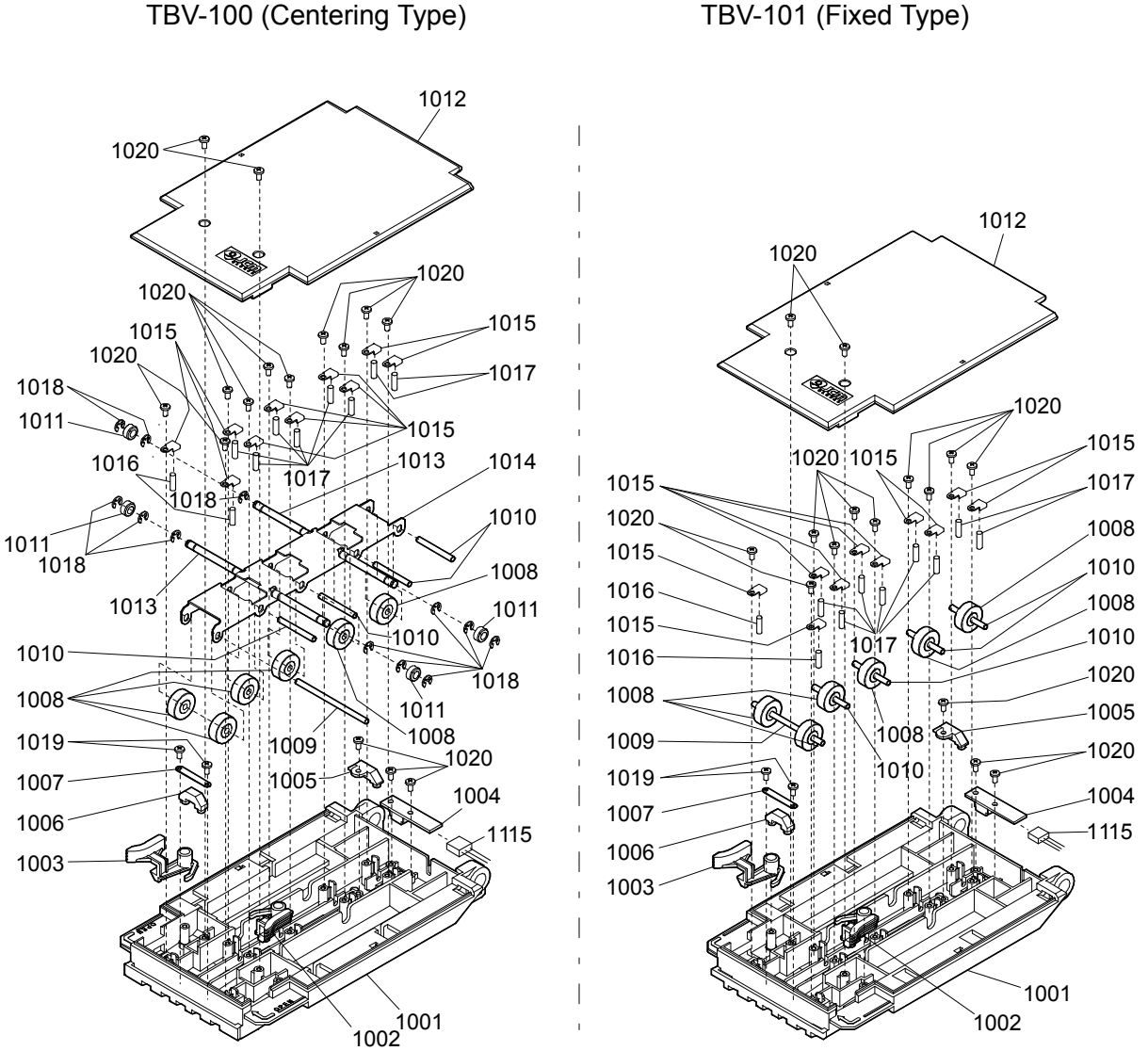


Figure 7-11 TBV Transport Unit Exploded View 2

TBV TRANSPORT UNIT PARTS LIST 2

Table 7-11 TBV Transport Unit Parts List 2

Ref No.	EDP No.	Description	Qty	Remark
1001	150533	Transport Guide Upper Centering	1	For TBV-100/200
	185997	Transport Guide Upper 67	1	For TBV-101
1002	150547	Transport Latch Upper Right	1	
1003	150548	Transport Latch Upper Left	1	
1004	151486	Bar Board (Up)	1	
1005	150544	Transport Gate Prism 5	1	
1006	150541	Transport Gate Prism 1	1	
1007	185923	Lens Hold	1	
1008	150829	Transport Feed Roller #1	6	
1009	151834	Transport Feed Shaft Upper 1	1	
1010	151835	Transport Feed Shaft Upper 2	4	
1011	150830	Centering Roller 1	4	For TBV-100/200
1012	150538	Transport Cover Upper	1	
1013	151836	Centering Shaft Upper 1	2	For TBV-100/200
1014	150633	Centering Pressure Bracket	1	For TBV-100/200
1015	150657	Spring Lock	10	
1016	151795	Pinch Roller Spring 1	2	
1017	151796	Pinch Roller Spring 2	8	
1018	003707	Φ3 E-Ring	12	For TBV-100/200
1019	104285	2.3x5 Phillips, Self-Tapping, Pan Head Screw 3M	2	
1020	063250	2.6x6 Phillips, Self-Tapping, Binding Head Screw 3M	15	

TBV Transport Unit Exploded View 3

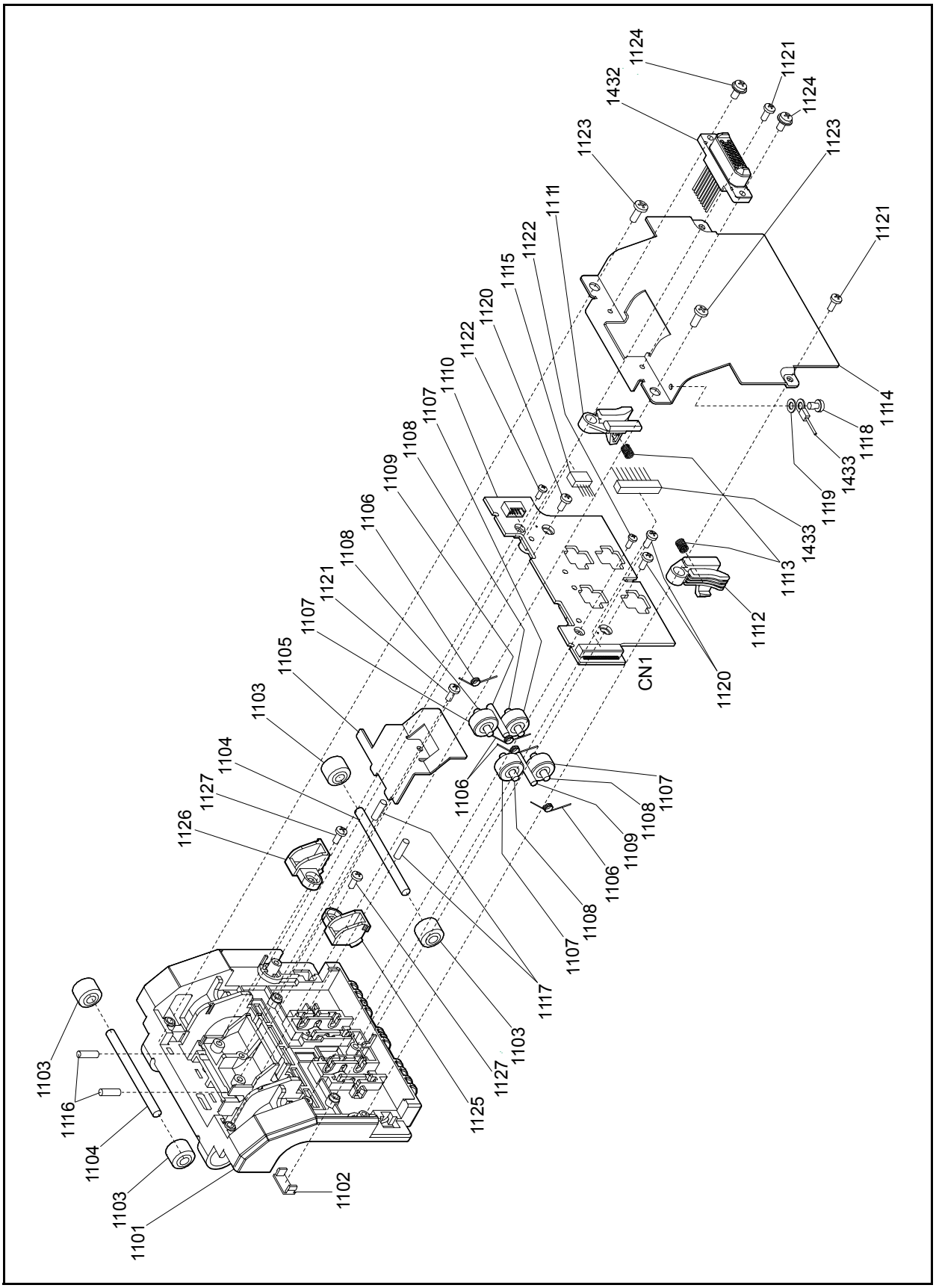


Figure 7-12 TBV Transport Unit Exploded View 3

TBV TRANSPORT UNIT PARTS LIST 3

Table 7-12 TBV Transport Unit Parts List 3

Ref No.	EDP No.	Description	Qty	Remark
1101	150535	Transport Guide Rear 85	1	TBV-100/200
	232975	Transport Guide Rear 67	1	
1102	150546	Transport Gate Prism 9	1	
1103	150823	Transport Feed Pulley 6	4	
1104	151837	Transport Feed Shaft Rear 1	2	
1105	150664	Spring Lock B 2	1	
1106	151807	Trans Tension Spring	4	
1107	150831	Transport Feed Roller #3	4	
1108	151838	Transport Feed Shaft Rear 3	4	
1109	151839	Transport Feed Shaft Rear 4	2	
1110	139313	Sensor (Out-Up) Board	1	
	203544	Sensor (Out-Up) Board	1	TBV-200
1111	150550	Transport Latch Rear Left	1	
1112	150549	Transport Latch Rear Right	1	
1113	151804	Reject Roller Spring	2	
1114	150634	Transport Cover Plate	1	
1115	151479	Bar Sensor Harness (Up)	1	
1116	151797	Pinch Roller Spring 3	2	
1117	151798	Pinch Roller Spring 4	2	
1118	003600	M3x5 Washer 3M	1	
1119	006371	Φ3 External Tooth Washer	1	
1120	116313	2.6x4 Phillips, Self-Tapping, Binding Head Screw 3M	3	
1121	063250	2.6x6 Phillips, Self-Tapping, Binding Head Screw 3M	3	
1122	076466	2x4 Phillips, Self-Tapping, Binding Head Screw 3M	2	
1123	080908	3x6 Phillips, Self-Tapping, Binding Head Screw 3M	2	
1124	005555	M2.6x6 W Washer Small 3M	2	
1125	210021	Corner Roller Guide Right	1	TBV-100/200
1126	210022	Corner Roller Guide Left	1	TBV-100/200
1127	014448	2.6x5 Phillips, Self-Tapping, Binding Head Screw 3M	2	TBV-100/200

TBV Transport Unit Exploded View 4

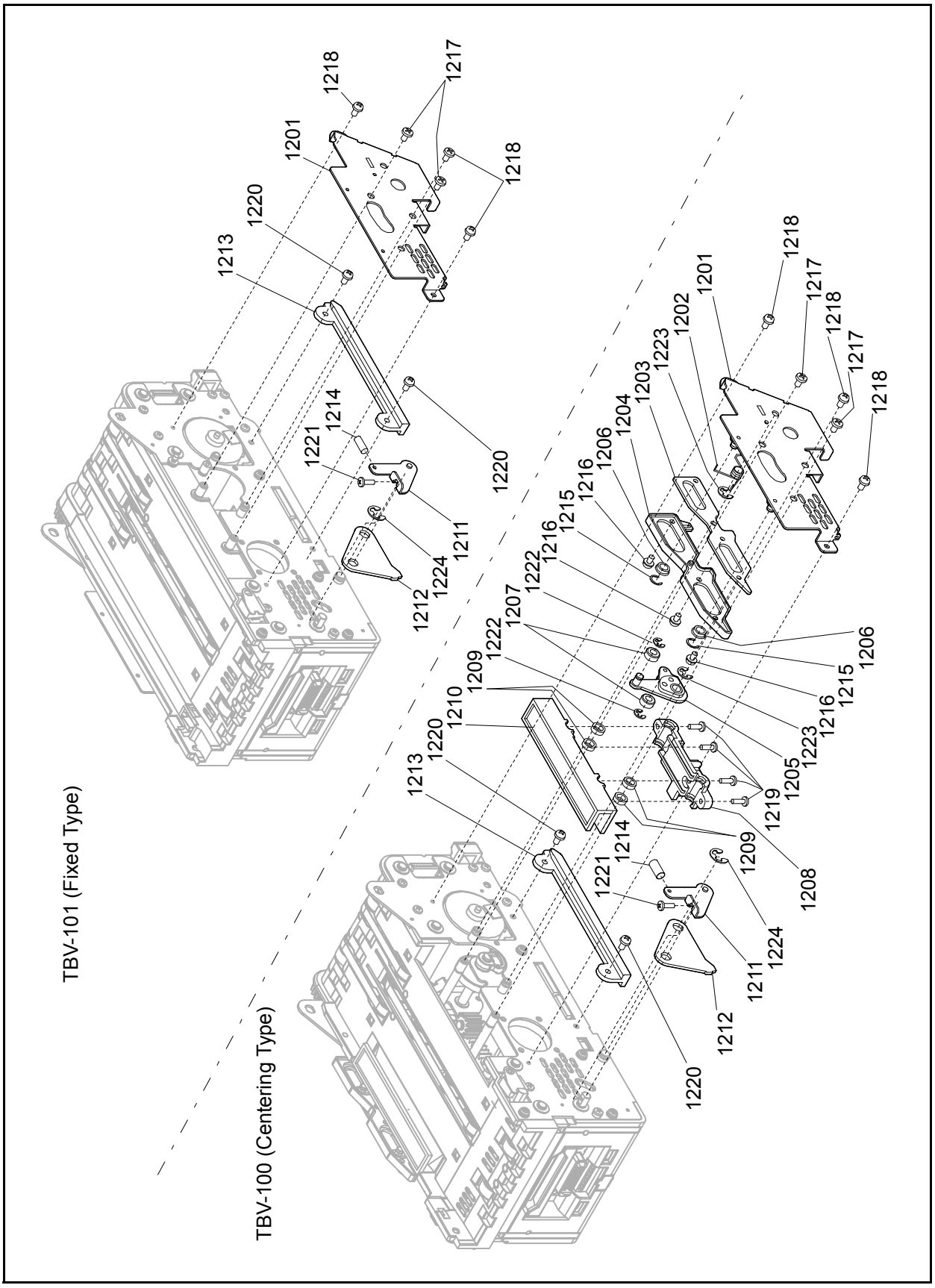


Figure 7-13 TBV Transport Unit Exploded View 4

TBV TRANSPORT UNIT PARTS LIST 4

Table 7-13 TBV Transport Unit Parts List 4

Ref No.	EDP No.	Description	Qty	Remark
1201	185307	Centering Frame Cover Right Assy.	1	
1202	151805	Centering Move Spring 1	1	For TBV-100/200
1203	150650	Centering Rail Bracket	1	For TBV-100/200
1204	150561	Centering Move Right	1	For TBV-100/200
1205	185309	Centering Arm Bracket Right Assy.	1	For TBV-100/200
1206	131124	Flanged Ball Bearing	2	For TBV-100/200
1207	150830	Centering Roller 1	2	For TBV-100/200
1208	150559	Centering Guide Right 2	1	For TBV-100/200
1209	185239	Ball & Retainer	4	For TBV-100/200
1210	150557	Centering Guide Right 1	1	For TBV-100/200
1211	185303	Transport Latch Right Assy.	1	For TBV-100/200
1212	150640	Transport Latch Plate Right	1	
1213	150554	Transport Unit Rail Right	1	
1214	151934	Latch Spring	1	
1215	003717	Crescent Snap Ring	2	For TBV-100/200
1216	098269	2.6x3 Binding, 3M Screw	3	For TBV-100/200
1217	081210	2.6x6 Binding, 3M Screw	2	
1218	003648	3x6 Binding, 3M Screw	3	
1219	082040	2.6x6 Pan Head, Phillips, Self-Tapping, 3M Screw	4	For TBV-100/200
1220	010377	M2.6x5 W Washer Small 3M	2	
1221	101171	M2.5x6 W Washer Small 3M	1	
1222	003707	Φ3 E-Ring	2	For TBV-100/200
1223	003708	Φ4 E-Ring	2	For TBV-100/200
1224	003709	Φ5 E-Ring	1	

TBV Transport Unit Exploded View 5

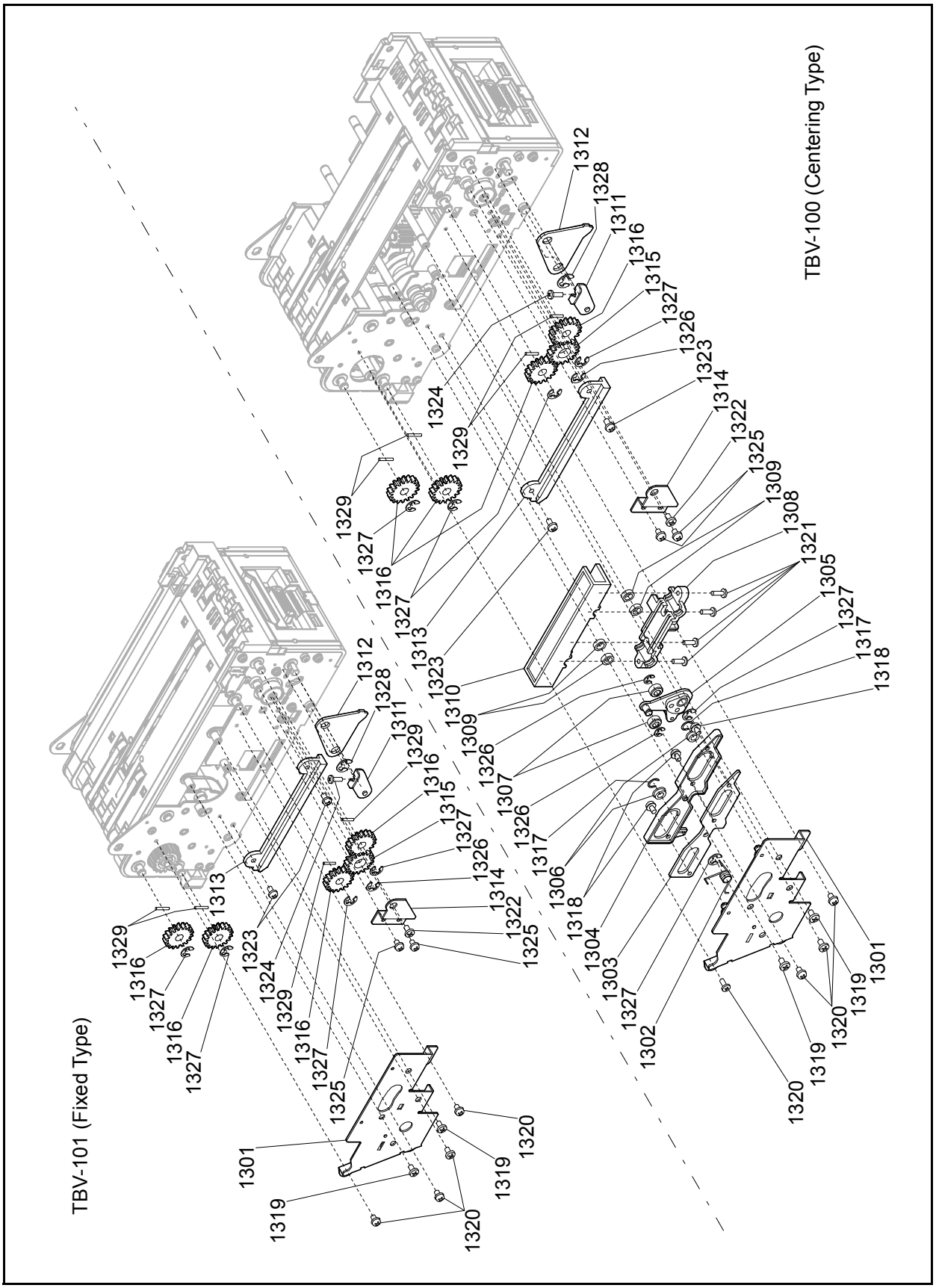


Figure 7-14 TBV Transport Unit Exploded View 5

TBV TRANSPORT UNIT PARTS LIST 5

Table 7-14 TBV Transport Unit Parts List 5

Ref No.	EDP No.	Description	Qty	Remark
1301	185308	Centering Frame Cover Left Assy.	1	
1302	151806	Centering Move Spring 2	1	For TBV-100/200
1303	150650	Centering Rail Bracket	1	For TBV-100/200
1304	150561	Centering Move Right	1	For TBV-100/200
1305	185448	Centering Arm Bracket Left Assy.	1	For TBV-100/200
1306	131124	Flanged Ball Bearing	2	For TBV-100/200
1307	150830	Centering Roller 1	2	For TBV-100/200
1308	150560	Centering Guide Left 2	1	For TBV-100/200
1309	185239	Ball & Retainer	4	For TBV-100/200
1310	150558	Centering Guide Left 1	1	For TBV-100/200
1311	185304	Transport Latch Left Assy.	1	
1312	150640	Transport Latch Plate Right	1	
1313	150555	Transport Unit Rail Left	1	
1314	150644	Feed Gear Bracket	1	
1315	150800	Transport Feed Gear 10	1	
1316	150809	Feed Gear (1)	4	
1317	003717	Crescent Snap Ring	2	For TBV-100/200
1318	098269	M2.6x3 Binding, 3M Screw	3	For TBV-100/200
1319	081210	M2.6x6 Binding, 3M Screw	2	
1320	003648	M3x6 Binding, 3M Screw	4	
1321	082040	2.6x6 Pan Head, Phillips, Self-Tapping, 3M Screw	4	For TBV-100/200
1322	003610	M3x6 W Washer Large 3M	1	
1323	010377	M2.6x5 W Washer Small 3M	2	
1324	101171	M2.5x6 W Washer Small 3M	1	
1325	003600	M3x5 Washer 3M	2	
1326	003707	Φ3 E-Ring	3	For TBV-100/200
			1	For TBV-101
1327	003708	Φ4 E-Ring	6	For TBV-100/200
			4	For TBV-101
1328	003709	Φ5 E-Ring	1	
1329	137787	Φ1.6x10 Parallel Pin (Hard)	4	

TBV Transport Unit Exploded View 6

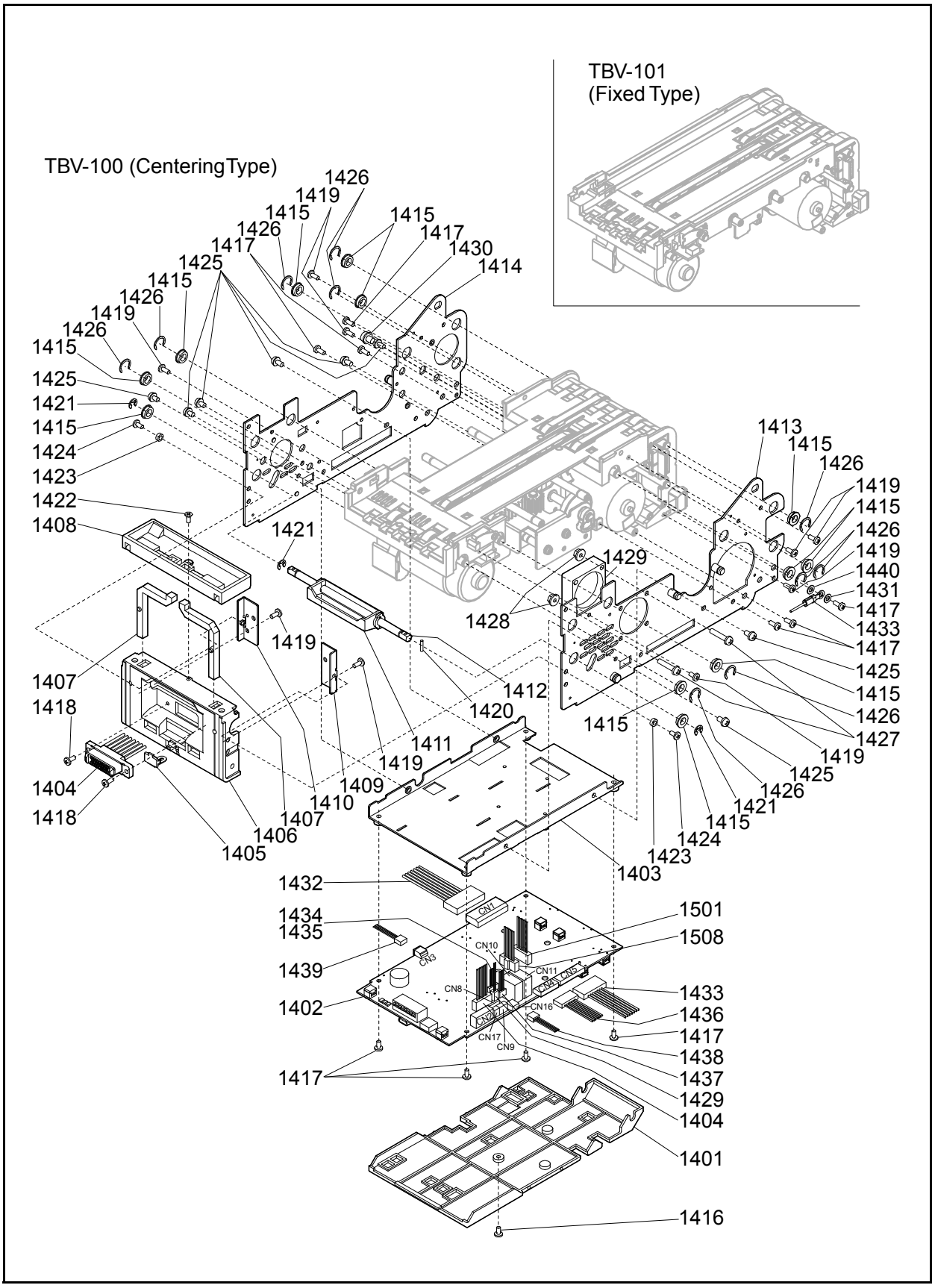


Figure 7-15 TBV Transport Unit Exploded View 6

TBV TRANSPORT UNIT PARTS LIST 6

Table 7-15 TBV Transport Unit Parts List 6

Ref No.	EDP No.	Description	Qty	Remark
1401	150553	CPU Cover	1	
1402	188462	CPU Circuit Board	1	
1403	150635	CPU Bracket	1	
1404	151470	Relay Harness 1 (TBV-BNF)	1	
1405	150424	USB Cover	1	
1406	150539	Transport Cover Front 1	1	
1407	150543	Transport Gate Prism 3	2	
1408	150540	Transport Cover Front 2	1	
1409	150636	Front Prism Bracket Right	1	
1410	150637	Front Prism Bracket Left	1	
1411	150551	Transport Latch Lever	1	
1412	151844	Latch lever Shaft	1	
1413	230472	Transport Frame Right Assy.	1	
1414	230473	Transport Frame Left Assy.	1	
1415	131125	Bearing	12	
1416	189554	M2.3x3 Pan Head 3M Screw	1	
1417	005555	M2.6x6 W Washer Small 3M	10	
1418	056165	2.6x8 Phillips Head, Self-Tapping, Binding 3M Screw	2	
1419	063250	2.6x6 Phillips Head, Self-Tapping, Binding 3M Screw	9	
1420	091515	Φ1.6x8 Parallel Pin (Hard)	1	
1421	003708	Φ4 E-Ring	3	
1422	189527	2.6x10 Flat Head, Phillips, Self-Tapping 3M Screw	1	
1423	151791	BNF FXD Spacer	2	
1424	013536	M3x10 W Washer Small 3M	2	
1425	003609	M3x6 W Washer Small 3M	8	
1426	003718	Crescent Snap Ring	10	
1427	013697	M3x18 W Washer Small 3M	2	
1428	014189	M3 Flanged Nut	2	
1429	151461	Fan Motor	1	
1430	012818	M4x6 W Washer	1	
1431	006371	Φ3 External Tooth Washer	1	
1432	188834	I/F Harness 2 (TBV-USB)	1	
1433	151469	Sensor Harness 2 (OU)	1	
1434	151475	Encoder Harness	1	For TBV-100/200
1435	151547	Encoder Harness 2	1	For TBV-101
1436	151467	Sensor Harness 1 (ID)	1	
1437	151477	Centering Motor Harness	1	For TBV-100/200
1438	151472	Side Sensor (R) Harness	1	
1439	151474	Side Sensor (L) Harness	1	
1440	006371	Φ3 External Tooth Washer	1	

TBV Transport Unit Exploded View 7

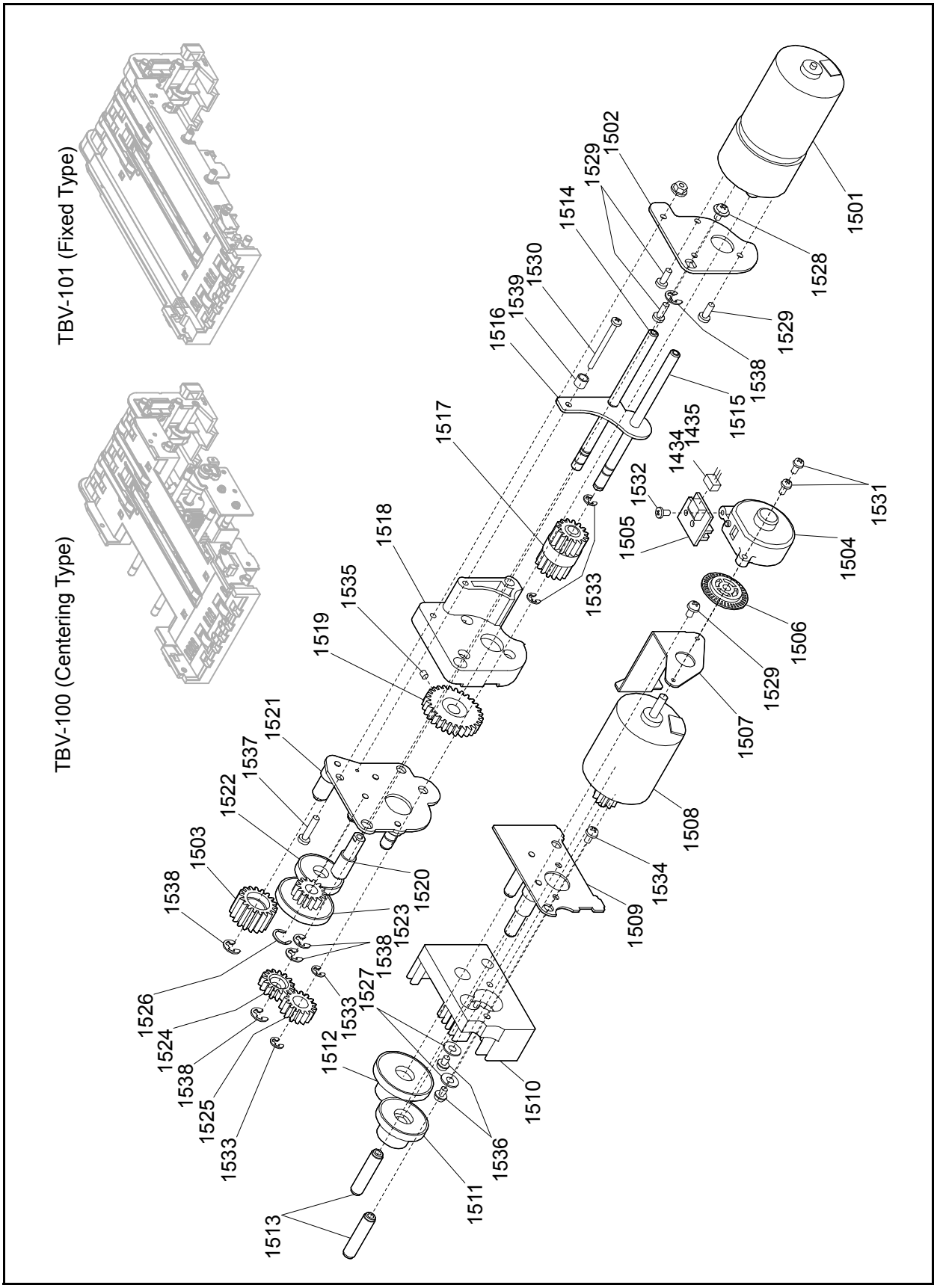


Figure 7-16 TBV Transport Unit Exploded View 7

TBV TRANSPORT UNIT PARTS LIST 7

Table 7-16 TBV Transport Unit Parts List 7

Ref No.	EDP No.	Description	Qty	Remark
1501	151457	Stacker Motor	1	
1502	150646	Pressure Motor Bracket 2	1	
1503	150785	Transport Feed Gear 4	1	
1504	150569	Encoder Cover	1	
1505	139357	Encoder Board	1	
1506	150552	Feed Encoder	1	
1507	150643	Feed Sensor Bracket	1	
1508	151455	Transport Motor	1	
1509	241528	Feed Motor Bracket Assy.	1	
1510	151817	Heatsink A	1	
1511	150783	Transport Feed Gear 2	1	
1512	150784	Transport Feed Gear 3	1	
1513	151782	Transport Gear Beam 1	2	
1514	151789	Transport Gear Beam 2	1	
1515	151785	Out Gear Beam	1	
1516	150645	Pressure Motor Bracket 1	1	
1517	150789	Transport Pressure Gear 2	1	
1518	150556	Pressure Motor Box	1	
1519	150788	Transport Pressure Gear 1	1	
1520	151906	Pressure Gear Stud 1	1	
1521	241529	Pressure Motor Bracket 3 Assy.	1	
1522	150797	Transport Feed Gear 8	1	
1523	150786	Transport Feed Gear 5	1	
1524	150798	Transport Feed Gear 9	1	
1525	150787	Transport Feed Gear 7	1	
1526	003718	Crescent Snap Ring	1	
1527	100946	Φ3x8x0.5 Flat Washer	2	
1528	003610	M3x6 W Washer Large 3M	1	
1529	003600	M3x5 Washer 3M	4	
1530	186335	M2.6x35 W Washer Small 3M	1	
1531	033460	M2.6x8 W Washer Small 3M	2	
1532	063250	2.6x6 Phillips Head, Self-Tapping, Binding 3M Screw	1	
1533	003707	Φ3 E-Ring	4	
1534	003609	M3x6 W Washer Small 3M	1	
1535	069059	M3x3 Enamel Set W Point	1	
1536	003611	M3x8 W Washer	2	
1537	006481	M3x16 W Washer	1	
1538	003708	Φ4 E-Ring	5	
1539	005651	Φ3x3 Winding Spacer	1	

TBV Transport Unit Exploded View 8

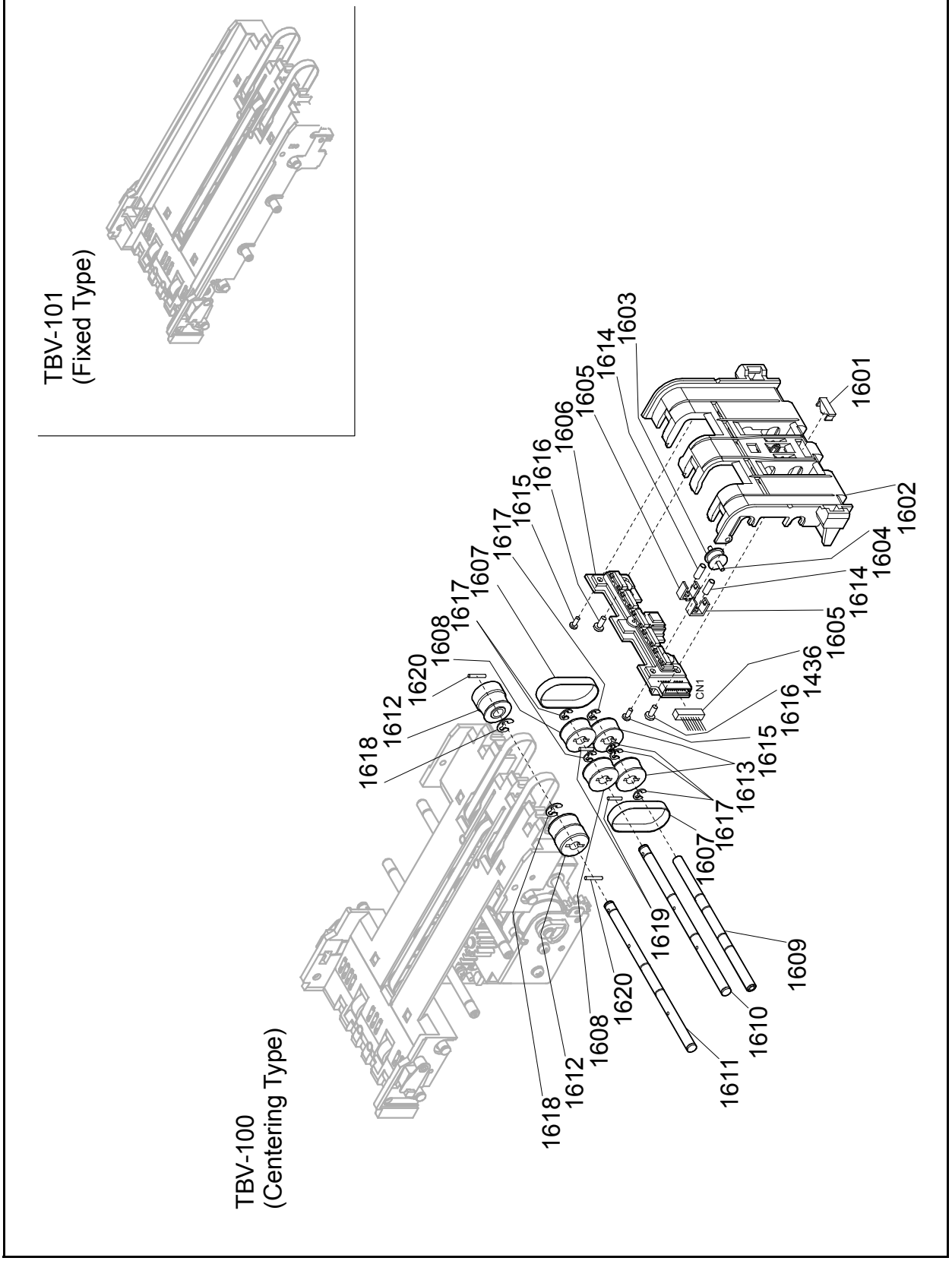


Figure 7-17 TBV Transport Unit Exploded View 8

TBV TRANSPORT UNIT PARTS LIST 8

Table 7-17 TBV Transport Unit Parts List 8

Ref No.	EDP No.	Description	Qty	Remark
1601	185994	Transport Gear Prism 4	1	
1602	150534	Transport Guide Front 85	1	For TBV-100/200
	185998	Transport Guide Front 67	1	For TBV-101
1603	119303	Roller MG	1	
1604	151845	Mag Roller Shaft	1	
1605	119330	Spring Rock MG	2	
1606	239696	Sensor Circuit (In-Down) Board	1	
	239697	Sensor Circuit (In-Down) Board	1	For TBV-200
1607	185273	Timing Belt 2GT-84EPDM (Soft)	2	
1608	150820	Transport Feed Pulley 2	2	
1609	151780	Transport Feed Beam 1	1	
1610	151843	Transport Feed Shaft Lower 4	1	
1611	151842	Transport Feed Shaft Lower 3	1	
1612	185248	Transport Feed Pulley #4 Assy.	2	
1613	150782	Feed Pulley Assy.	2	
1614	151799	Mag Spring	2	
1615	138053	2x5 Phillips Head, Self-Tapping, Binding 3M Screw	2	
1616	116313	2.6x4 Phillips Head, Self-Tapping, Binding 3M Screw	2	
1617	003707	Φ3 E-Ring	6	
1618	003708	Φ4 E-Ring	2	
1619	091515	Φ1.6x8 Parallel Pin (Hard)	2	
1620	137787	Φ1.6x10 Parallel Pin (Hard)	2	

TBV Transport Unit Exploded View 9

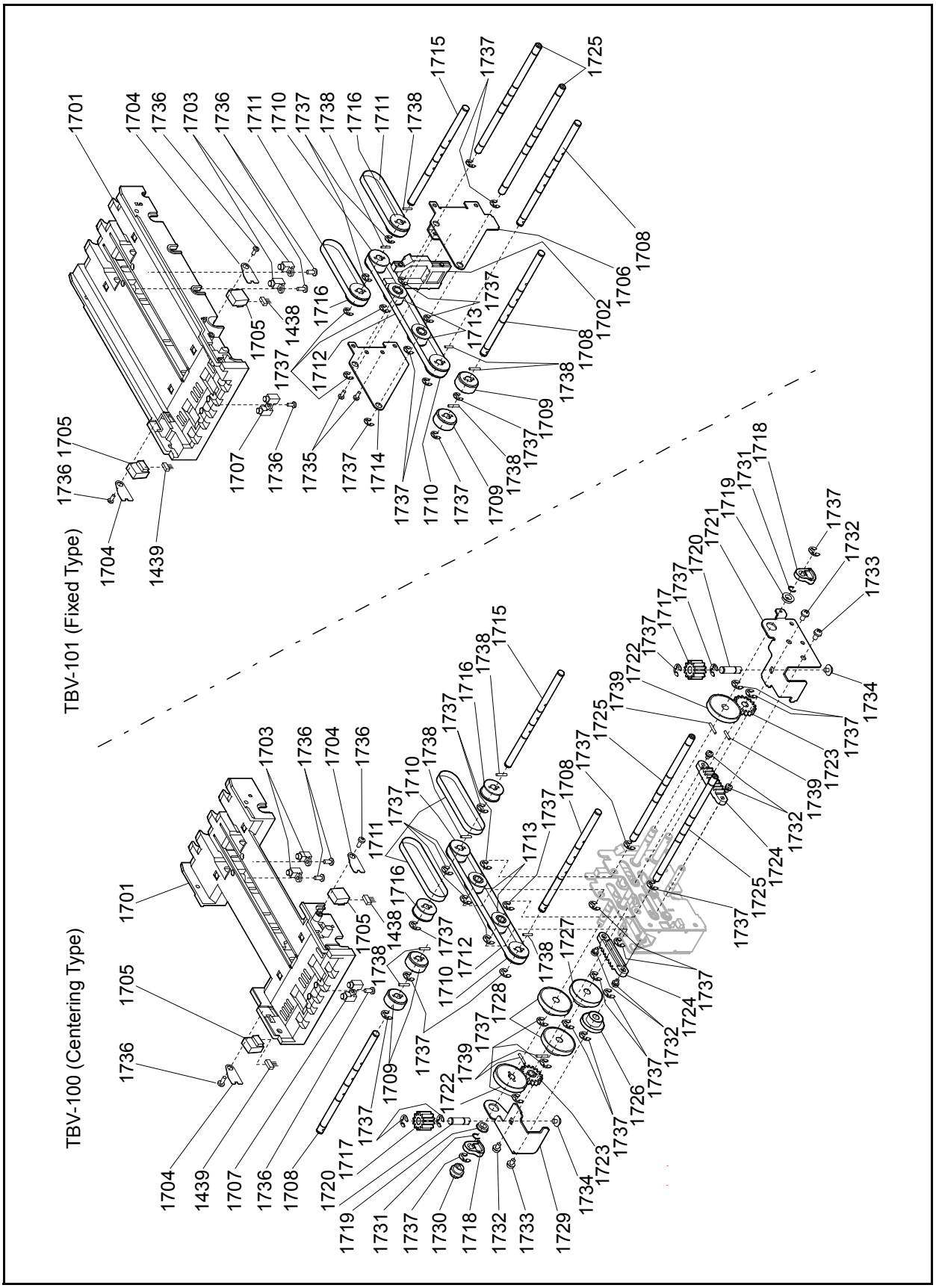


Figure 7-18 TBV Transport Unit Exploded View 9

TBV TRANSPORT UNIT PARTS LIST 9

Table 7-18 TBV Transport Unit Parts List 9

Ref No.	EDP No.	Description	Qty	Remark
1701	150532	Transport Guide Lower Centering	1	For TBV-100/200
	185996	Transport Guide Lower 67	1	For TBV-101
1702	150545	Transport Gate Prism 7	1	For TBV-101
1703	185995	Transport Gate Prism 6	2	
1704	150641	Side Sensor Bracket	2	
1705	151464	Side Sensor	2	
1706	185992	US Lens Bracket Right	1	For TBV-101
1707	150542	Transport Gate Prism 2	1	
1708	151840	Transport Feed Shaft Lower 1	2	
1709	185247	Transport Feed Roller #4 Assy.	2	
1710	150820	Transport Feed Pulley #2	2	
1711	188663	Timing Belt 2GT-132EPDM (Soft)	2	
1712	185271	Timing Belt 2GT-264EPDM (Soft)	1	
1713	150821	Transport Feed Pulley #3	2	
1714	185993	US Lens Bracket Left	1	For TBV-101
1715	151841	Transport Feed Shaft Lower 2	1	
1716	188621	Transport Feed Pulley #5	2	
1717	150796	Centering Gear 7	2	For TBV-100/200
1718	150564	Centering Cam	2	For TBV-100/200
1719	131125	Bearing	2	For TBV-100/200
1720	151907	Centering Gear Stud 2	2	For TBV-100/200
1721	150652	Centering Frame R	1	For TBV-100/200
1722	150793	Centering Gear 4	2	For TBV-100/200
1723	150794	Centering Gear 5	2	For TBV-100/200
1724	150795	Centering Gear 6	2	For TBV-100/200
1725	151788	Centering Beam 3	2	
1726	150799	Centering Gear 8	1	For TBV-100/200
1727	150791	Centering Gear 2	1	For TBV-100/200
1728	150792	Centering Gear 3	2	For TBV-100/200
1729	150653	Centering Frame Left	1	For TBV-100/200
1730	150570	Free Bush	1	For TBV-100/200
1731	003718	Crescent Snap Ring	2	For TBV-100/200
1732	005555	M2.6x6 W Washer Small 3M	6	For TBV-100/200
1733	001767	M3x5 W Washer Small 3M	2	For TBV-100/200
1734	003608	M3x5 W Washer Large 3M	2	For TBV-100/200
1735	087042	M2.6x5 Washer 3M	2	For TBV-101
1736	063250	2.6x6 Phillips Head, Self-Tapping, Binding 3M Screw	5	
1737	003708	Φ4 E-Ring	34	For TBV-100/200
			13	For TBV-101
1738	091515	Φ1.6x8 Parallel Pin (Hard)	5	
1739	137787	Φ1.6x10 Parallel Pin (Hard)	4	For TBV-100/200

TBV Transport Unit Exploded View 10

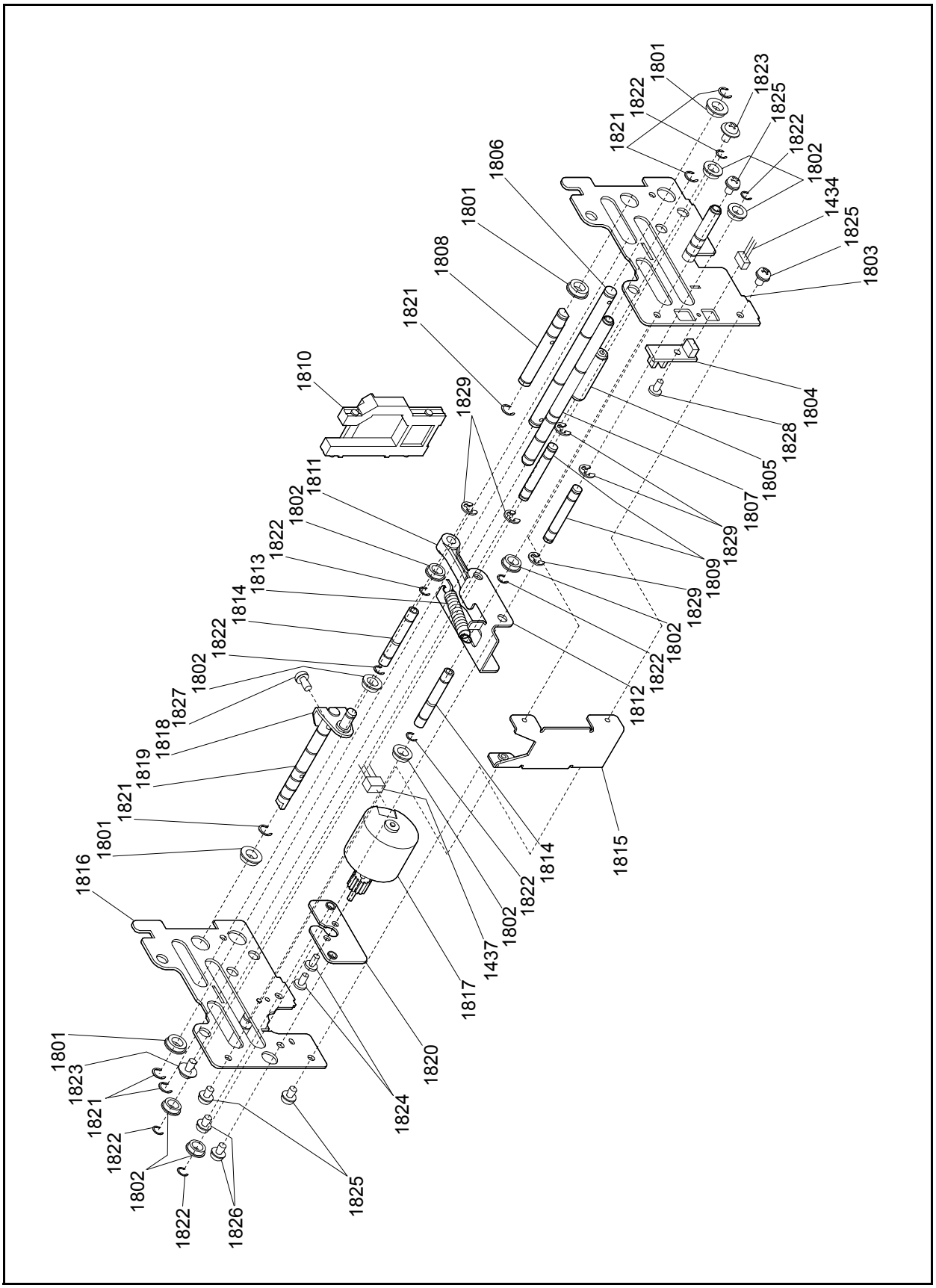


Figure 7-19 TBV Transport Unit Exploded View 10

TBV TRANSPORT UNIT PARTS LIST 10

Table 7-19 TBV Transport Unit Parts List 10

Ref No.	EDP No.	Description	Qty	Remark
1801	131125	Bearing	4	
1802	131124	Flanged Ball Bearing	8	
1803	185311	Centering Frame Right Assy.	1	TBV-100/200
1804	148547	Centering Circuit Board	1	TBV-100/200
1805	151790	Centering Beam 4	1	TBV-100/200
1806	151849	Centering Shaft 4	1	TBV-100/200
1807	151787	Centering Beam 2	1	TBV-100/200
1808	151847	Centering Shaft 2	1	TBV-100/200
1809	151846	Centering Shaft 1	2	TBV-100/200
1810	150545	Transport Gate Prism 7	1	
1811	150563	Centering Link Arm	1	TBV-100/200
1812	150654	Centering Move Plate	1	TBV-100/200
1813	151933	Centering Tension Spring	1	TBV-100/200
1814	151786	Centering Beam 1	2	TBV-100/200
1815	150661	Centering Frame Front	1	TBV-100/200
1816	185312	Centering Frame Left Assy.	1	TBV-100/200
1817	151459	Centering Motor	1	TBV-100/200
1818	185310	Centering Link Plate Assy.	1	TBV-100/200
1819	151848	Centering Shaft 3	1	TBV-100/200
1820	150655	Centering Motor Bracket	1	TBV-100/200
1821	003718	Crescent Snap Ring	6	
1822	003717	Crescent Snap Ring	8	
1823	003608	M3x5 W Washer Large 3M	2	
1824	003595	M2.6x4 Washer 3M	2	
1825	087042	M2.6x5 Washer 3M	4	
1826	003600	M3x5 Washer 3M	2	
1827	003601	M3x6 Washer 3M	1	
1828	189561	M2.6x5 Poly Pan Head Screw	1	TBV-100/200
1829	003707	Φ3 E-Ring	5	

TBV Cash Box Unit Exploded View 1

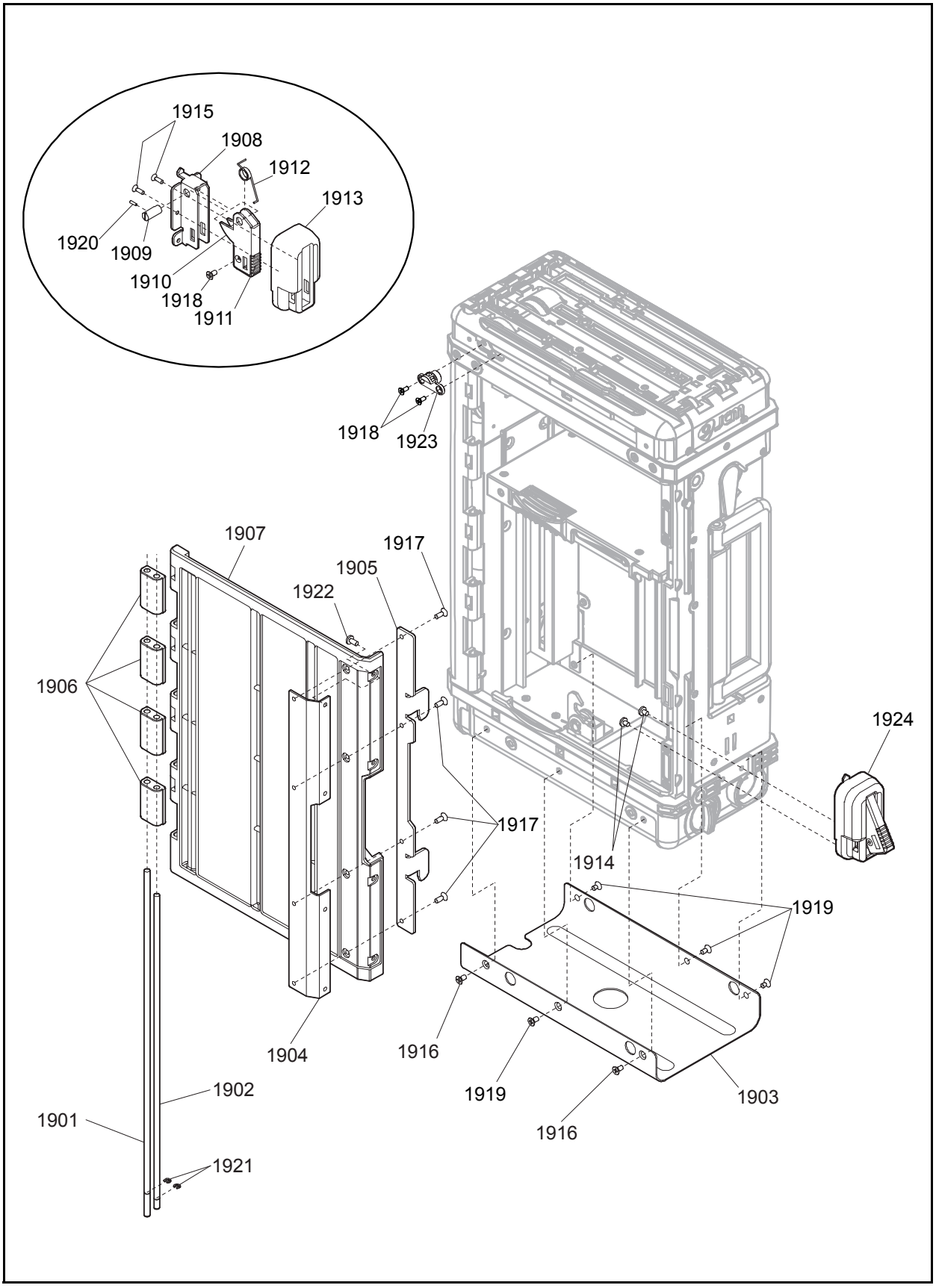


Figure 7-20 TBV Cash Box Unit Exploded View 1

TBV CASH BOX UNIT PARTS LIST 1

Table 7-20 TBV Cash Box Unit Parts List 1

Ref No.	EDP No.	Description	Qty	Remark
1901	151850	2K Box Hinge Shaft A	1	
1902	151851	2K Box Hinge Shaft B	1	
1903	150669	2K Box Bottom Plate	1	
1904	188495	Key Latch Plate B	1	
1905	150665	Key Latch Plate A	1	
1906	150574	2K Box Hinge	4	
1907	150573	2K Box Door	1	
1908	187194	Sealing Base Plate	1	Sealing Version
1909	188666	Sealing Shaft	1	
1910	188493	Sealing Lever Plate	1	Sealing Version
1911	188501	Sealing Passage	1	Sealing Version
1912	188504	Sealing Lever Plate	1	Sealing Version
1913	188498	Sealing Cover	1	Sealing Version
1914	189777	M3x10 Binding 3M Screw	2	Sealing Version
1915	189527	2.6x6 Flat Head, Phillips, Self-Tapping 3M Screw	2	Sealing Version
1916	005332	M3x5 Flat Head 3M Screw	2	
	222776	M3x5 TPR Flat Head Screw (F-Loc)	2	T-Proof Version
1917	017052	M3x8 Flat Head 3M Screw	4	
1918	052564	2.6x6 Flat Head, Phillips, Self-Tapping 3M Screw	2	
			3	Sealing Version
	227780	2.6x6 TPR Flat Head, Phillips, Self-Tapping Screw	2	T-Proof Version
1919	092229	3x8 Flat Head, Phillips, Self-Tapping 3M Screw	4	
	227782	3x8 TPR Flat Head, Phillips, Self-Tapping Screw	4	T-Proof Version
1920	017752	Φ1.6x5 Wave Spring Pin	1	Sealing Version
1921	003705	Φ2 E-Ring	2	
1922	199249	3x4 Slim Head 6-Lob Nickel	4	
1923	195102	Registration Bush	1	
1924	225182	TBV Cash Box Sealing Unit.	1	

TBV Cash Box Unit Exploded View 2

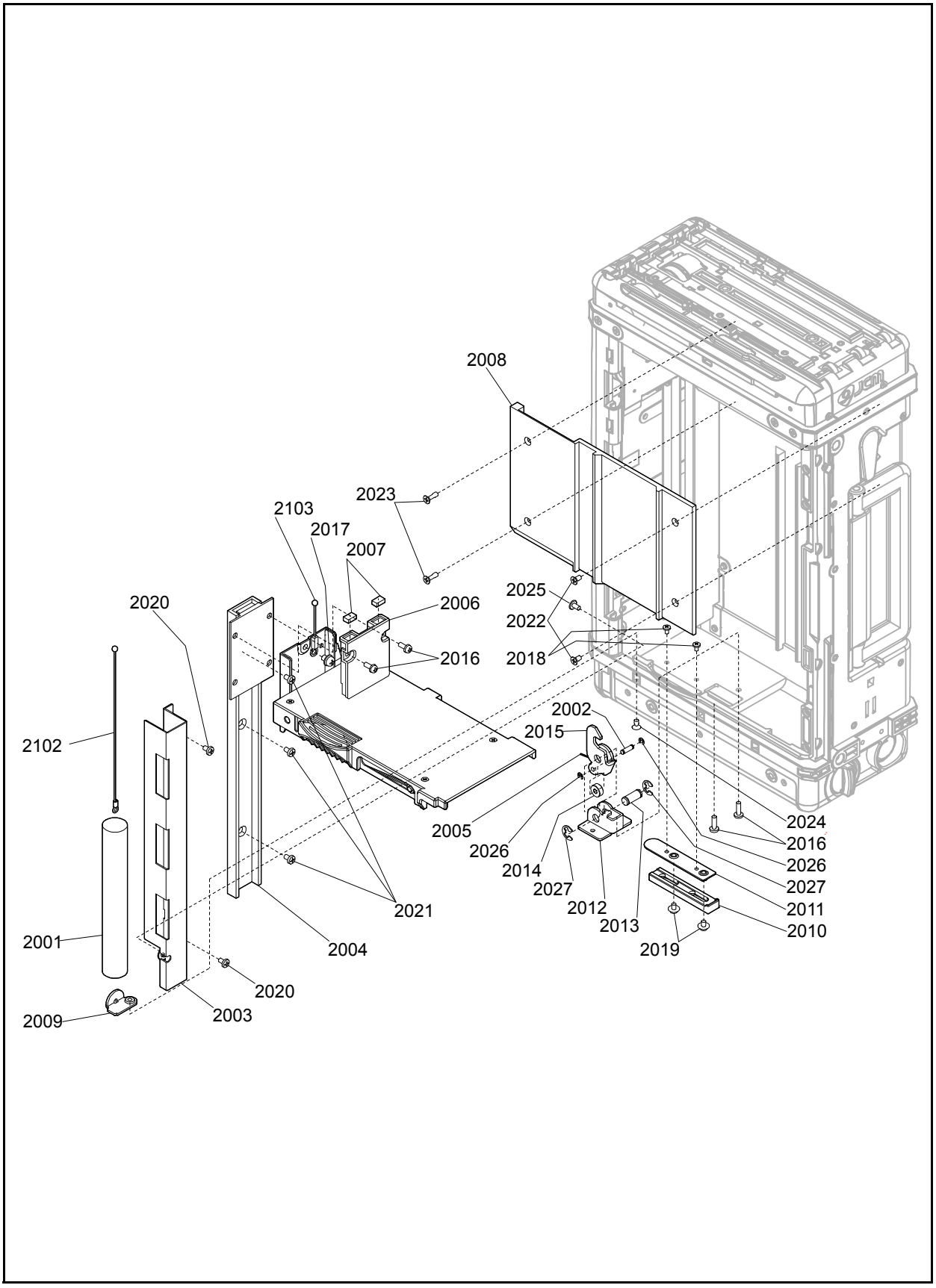


Figure 7-21 TBV Cash Box Unit Exploded View 2

TBV CASH BOX UNIT PARTS LIST 2

Table 7-21 TBV Cash Box Unit Parts List 2

Ref No.	EDP No.	Description	Qty	Remark
2001	185951	Receive Plate Spring	1	
2002	151878	Locking Hook Shaft B	1	
2003	150698	Panel Plate Left	1	
2004	186187	Slide Pack	1	
2005	185944	Locking Hook Spring	1	
2006	150614	Receive Plate Block	1	
2007	185914	RCV PLT Shock Absorber B	2	
2008	150618	Panel B	1	
2009	150695	Receive Plate Spring Hang Plate	1	
2010	150616	Release Block	1	
2011	150758	Release Block Base Assy.	1	
2012	150701	Locking Hook Holder	1	
2013	151877	Locking Hook Shaft A	1	
2014	150615	Locking Hook Roller	1	
2015	150700	Receive Plate Locking Hook	1	
2016	013536	M3x10 W Washer Small 3M	4	
2017	189521	M4x5 W Washer Small 3M	1	
2018	014915	M2.6x5 W Washer Large 3M	2	
2019	025195	M3x4 W Washer Large 3M	2	
2020	189522	3x5 Phillips Head, Self-Tapping, Binding 3M Screw	2	
2021	030766	4x6 Binding 3M Screw	3	
2022	101973	3x6 Flat Head, Phillips, Self-Tapping 3M Screw	2	
2023	117447	3x10 Flat Head, Phillips, Self-Tapping 3M Screw	2	
2024	017052	M3x8 Flat Head 3M Screw	1	
2025	189524	3x6 Slim Head 6-lob Nickel	1	
2026	003705	Φ2 E-Ring	2	
2027	003708	Φ4 E-Ring	2	

TBV Cash Box Unit Exploded View 3

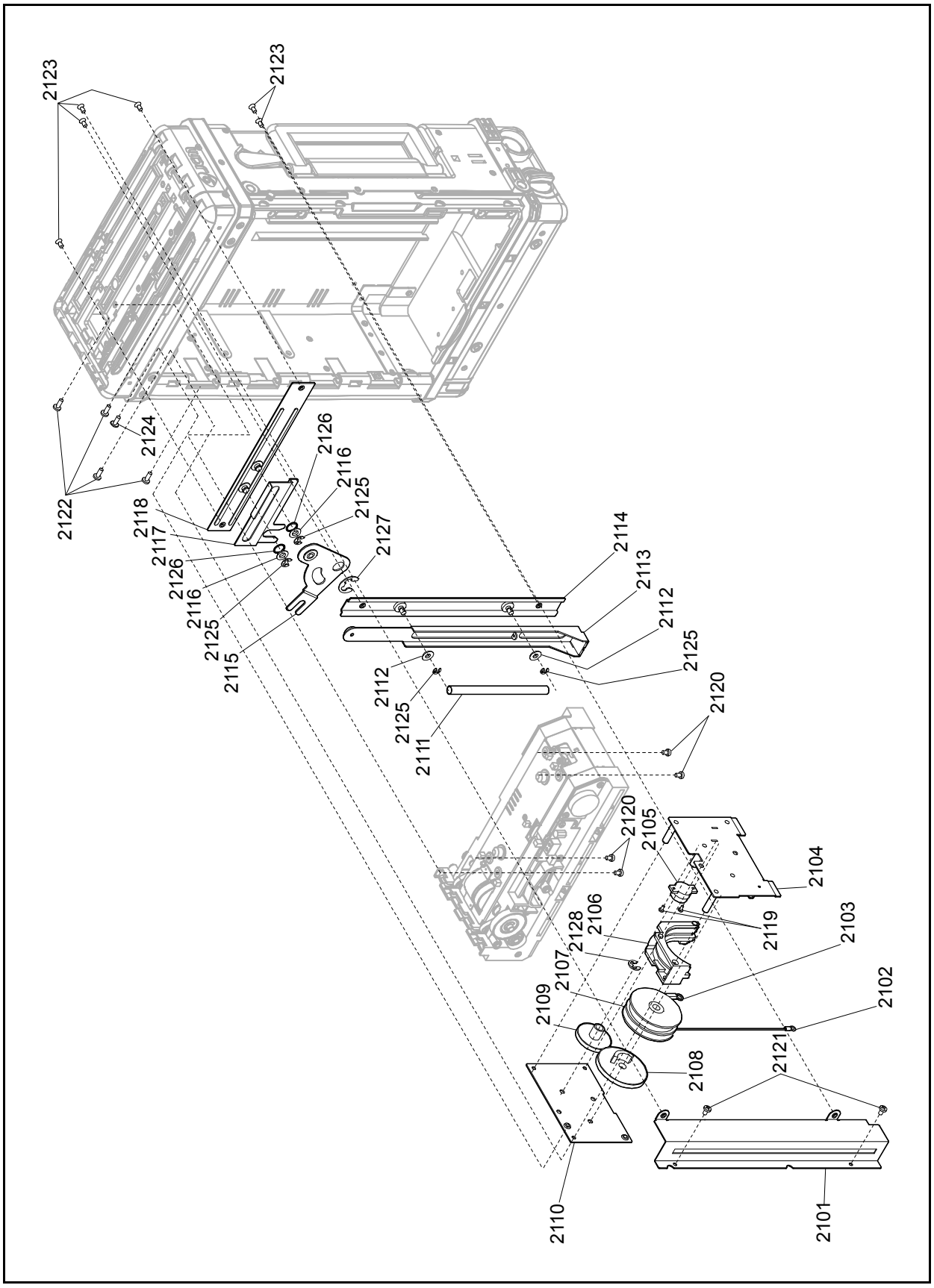


Figure 7-22 TBV Cash Box Unit Exploded View 3

TBV CASH BOX UNIT PARTS LIST 3

Table 7-22 TBV Cash Box Unit Parts List 3

Ref No.	EDP No.	Description	Qty	Remark
2101	150699	Panel Plate Rear	1	
2102	232419	Receive Plate Wire A	1	
2103	232420	Receive Plate Wire B	1	
2104	150763	Damper Base Plate A Assy.	1	
2105	186249	Gear Damper	1	
2106	150610	Wire Reel Cover	1	
2107	232418	Wire Reel	1	
2108	150803	Damper Gear A	1	
2109	150804	Damper Gear B	1	
2110	150694	Damper Base Plate B	1	
2111	185952	Box Full Spring	1	
2112	151830	Box Full Roller Lower	2	
2113	150683	Box Full Link Plate B	1	
2114	150755	Box Full Base Plate B Assy.	1	
2115	150753	Box Full Link Plate A Assy.	1	
2116	131125	Bearing	2	
2117	150680	Box Full Dowser	1	
2118	150752	Box Full Base Plate A Assy.	1	
2119	051496	M2x5 W Washer Small 3M	2	
2120	003600	M3x5 Washer 3M	4	
2121	189522	3x5 Phillips Head, Self-Tapping, Binding 3M Screw	2	
2122	014050	3x8 Binding Screw	4	
	227778	M3x8 TPR Binding Screw (F-Loc)	4	T-Proof Version
2123	005769	M3x6 Flat Head 3M Screw	6	
	227777	M3x6 TPR Flat Head Screw (F-Loc)	6	T-Proof Version
2124	189524	3x6 Slim Head 6-lob Nickel	1	
2125	003707	Φ3 E-Ring	4	
2126	151827	Box Full Roller A	2	
2127	003713	Φ9 E-Ring	1	
2128	003708	Φ4 E-Ring	1	

TBV Cash Box Unit Exploded View 4

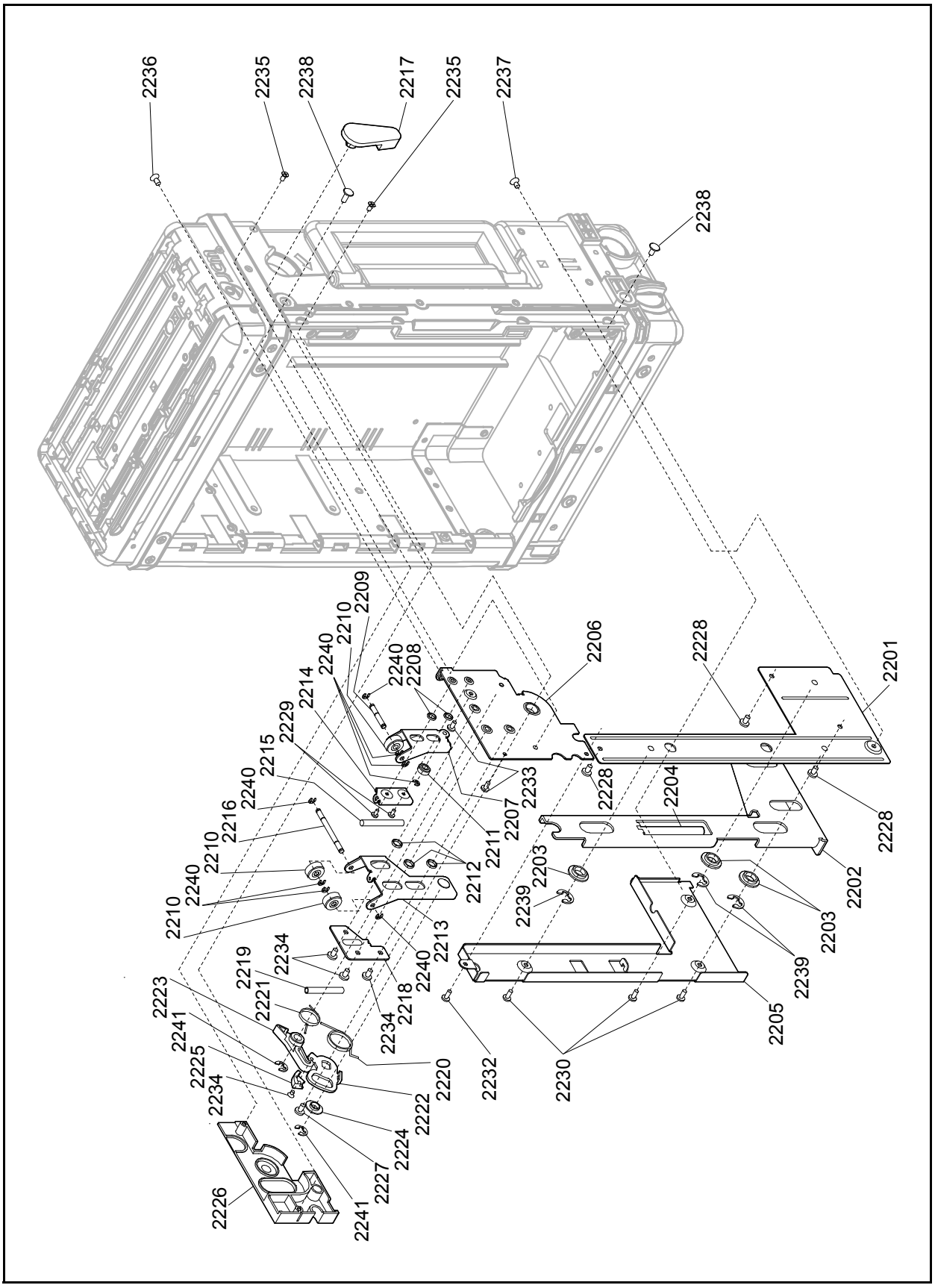


Figure 7-23 TBV Cash Box Unit Exploded View 4

TBV CASH BOX UNIT PARTS LIST 4

Table 7-23 TBV Cash Box Unit Parts List 4

Ref No.	EDP No.	Description	Qty	Remark
2201	150756	Key Base Plate Assy.	1	
2202	150685	Key Slider Plate	1	
2203	151831	Key Roller	3	
2204	185948	Key Spring	1	
2205	150686	Key Unit Cover	1	
2206	150749	Ratchet Unit Base Assy.	1	
2207	150751	Ratchet Release Plate A Assy.	1	
2208	151826	Ratchet Release Roller B	2	
2209	151854	Ratchet Release Shaft	1	
2210	150585	Box Remove Roller	3	
2211	150582	Ratchet Release Roller A	1	
2212	151824	Box Remove Roller A	3	
2213	150750	Box Remove Plate A Assy.	1	
2214	150677	Ratchet Release Plate B	1	
2215	185947	Ratchet Release Spring	1	
2216	151853	Box Remove Shaft	1	
2217	150747	Box Remove Lever Assy.	1	
2218	150675	Box Remove Plate B	1	
2219	185945	Box Remove Spring	1	
2220	185937	Box Remove Spring	1	
2221	185936	Ratchet Release Spring	1	
2222	150678	Ratchet Plate	1	
2223	150581	Release Latch	1	
2224	151825	Box Remove Roller B	1	
2225	150584	Ratchet Block	1	
2226	150617	Panel A	1	
2227	025195	M3x4 W Washer Large 3M	1	
2228	124661	M3x6 Washer 3M	3	
2229	142671	M2x4 Binding 3M	2	
2230	029532	M2.6x4 Binding 3M	3	
2231	026964	M3x4 Binding 3M	3	
2232	116313	2.6x4 Phillips Head, Self-Tapping, Binding 3M Screw	1	
2233	058274	2.6x5 Phillips Head, Self-Tapping, Binding 3M Screw	2	
2234	006022	M2x4 Flat Head 3M Screw	1	
2235	189527	2.6x10 Flat Head, Phillips, Self-Tapping 3M Screw	2	
	227781	2.6x10 TPR Flat Head, Phillips, Self-Tapping Screw	2	T-Proof Version
2236	005769	M3x6 Flat Head 3M Screw	1	
2237	005769	M3x6 Flat Head 3M Screw	1	
	227777	M3x6 TPR Flat Head Screw (F-Loc)	1	T-Proof Version
2238	189524	3x6 Slim Head 6-lob Nickel	2	
2239	003710	Φ6 E-Ring	3	

Table 7-23 TBV Cash Box Unit Parts List 4

Ref No.	EDP No.	Description	Qty	Remark
2240	003705	Φ2 E-Ring	8	
2241	003708	Φ4 E-Ring	2	

TBV Cash Box Unit Exploded View 5

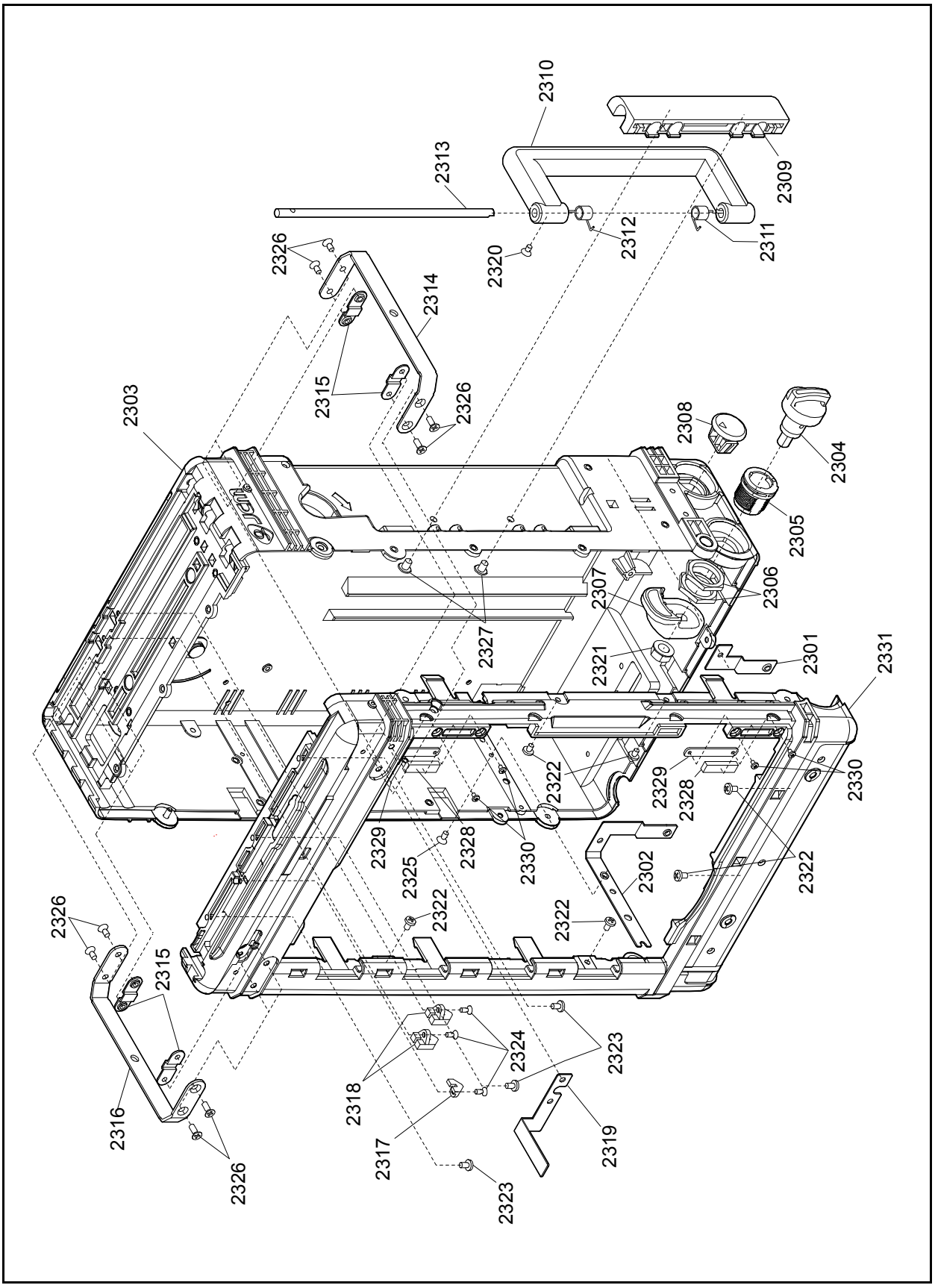


Figure 7-24 TBV Cash Box Unit Exploded View 5

TBV CASH BOX UNIT PARTS LIST 5

Table 7-24 TBV Cash Box Unit Parts List 5

Ref No.	EDP No.	Description	Qty	Remark
2301	150672	Frame Ground Line Plate C	1	
2302	150671	Frame Ground Line Plate B	1	
2303	238774	2K Box A Assy.	1	
2304	188512	Door Knob Assy.	1	
2305	135328	Thumb Turn B	1	
2306	135329	Thumb Turn Nut	2	
2307	150586	Key Tongue	2	
2308	188503	Key Hole Cap	1	
2309	150748	2K Box Handle Hinge Assy.	1	
2310	150575	2K Box Handle (F)	1	
2311	185935	Handle Spring (Lower)	1	
2312	185934	Handle Spring (Upper)	1	
2313	151852	Handle Shaft	1	
2314	188494	2K Box Buckle Plate C	1	
2315	150668	2K Box Buckle Plate B	4	
2316	150667	2K Box Buckle Plate A	1	
2317	150578	Box Home Prism	1	
2318	150580	Box Full Prism	2	
2319	150670	FG Line Plate A	1	
2320	005332	M3x5 Flat Head 3M Screw	1	
2321	191317	1/4 Nut (Inch Nut)	1	
2322	026964	M3x4 Binding 3M Screw	6	
2323	024328	M3x5 Binding 3M Screw	3	
2324	052564	2.6x6 Flat Head, Phillips, Self-Tapping 3M Screw	3	
2325	005769	M3x6 Flat Head 3M Screw	1	
	227777	M3x6 TPR Flat Head Screw (F-Loc)	1	T-Proof Version
2326	017052	M3x8 Flat Head 3M Screw	8	
	227779	M3x8 TPR Flat Head Screw (F-Loc)	8	T-Proof Version
2327	189523	4x6 Slim Head 6-lob Nickel	2	
2328	194069	Door Catch Magnet A	2	
2329	195104	Mag Plate Cover	2	
2330	195300	M2x3 Binding 3M Screw	4	
2331	196633	2K Box B Assy..	1	

TBV Cash Box Unit Exploded View 6

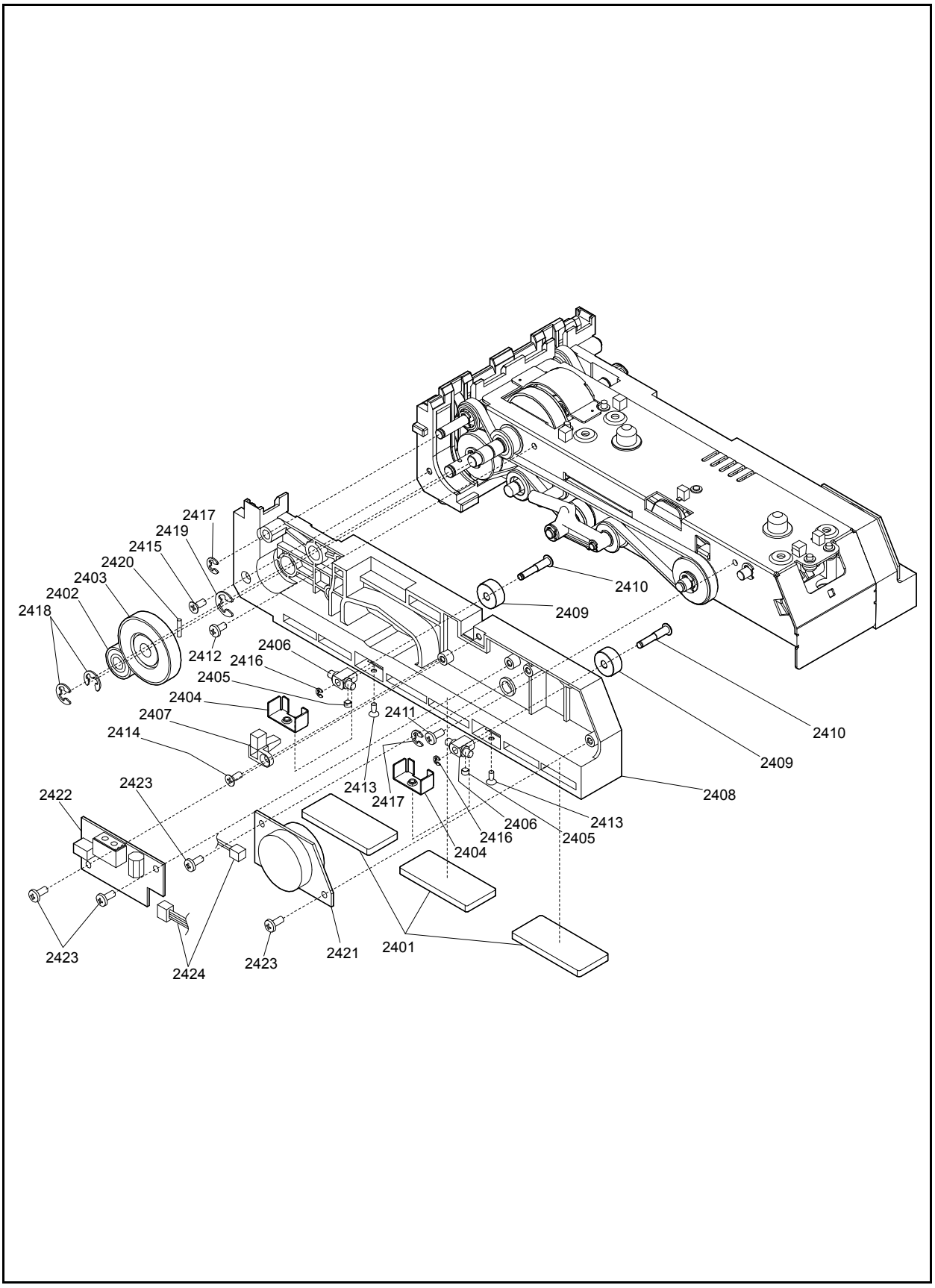


Figure 7-25 TBV Cash Box Unit Exploded View 6

TBV CASH BOX UNIT PARTS LIST 6

Table 7-25 TBV Cash Box Unit Parts List 6

Ref No.	EDP No.	Description	Qty	Remark
2401	185916	Receive Plate Shock Absorber A	3	
2402	150801	Transport Gear B	1	
2403	150767	Transport Gear A Assy.	1	
2404	150690	Transport Roller Holder Fixed Plate	2	
2405	185933	Transport Pinch Roller Spring B	2	
2406	150601	Transport Roller Holder	2	
2407	150606	Push Plate Home Prism A	1	
2408	150589	Transport Guide L	1	
2409	150600	Transport Pinch Roller Spring B	2	
2410	151863	Transport Shaft G	2	
2411	005555	M2.6x6 W Washer Small 3M	1	
2412	189526	M2.6x14 Binding 3M Screw	1	
2413	006022	M2x4 Flat Head 3M Screw	2	
2414	052564	2.6x6 Phillips, Self-Tapping 3M Flat Head Screw	1	
2415	101782	M2.6x8 Phillips, Self-Tapping 3M Flat Head Screw	1	
2416	003704	Φ1.5 E-Ring	2	
2417	003707	Φ3 E-Ring	2	
2418	003708	Φ4 E-Ring	2	
2419	003709	Φ5 E-Ring	1	
2420	091515	Φ1.6x8 Parallel Pin (Hard)	1	
2421	210061	Battery Board 1	1	For TBV ICB Cash Box
2422	210135	Intelligent Board	1	For TBV ICB Cash Box
2423	058274	2.6x5 Phillips, Self-Tapping, Binding Head Screw	4	For TBV ICB Cash Box
2424	210158	ICB Harness	1	For TBV ICB Cash Box

TBV Cash Box Unit Exploded View 7

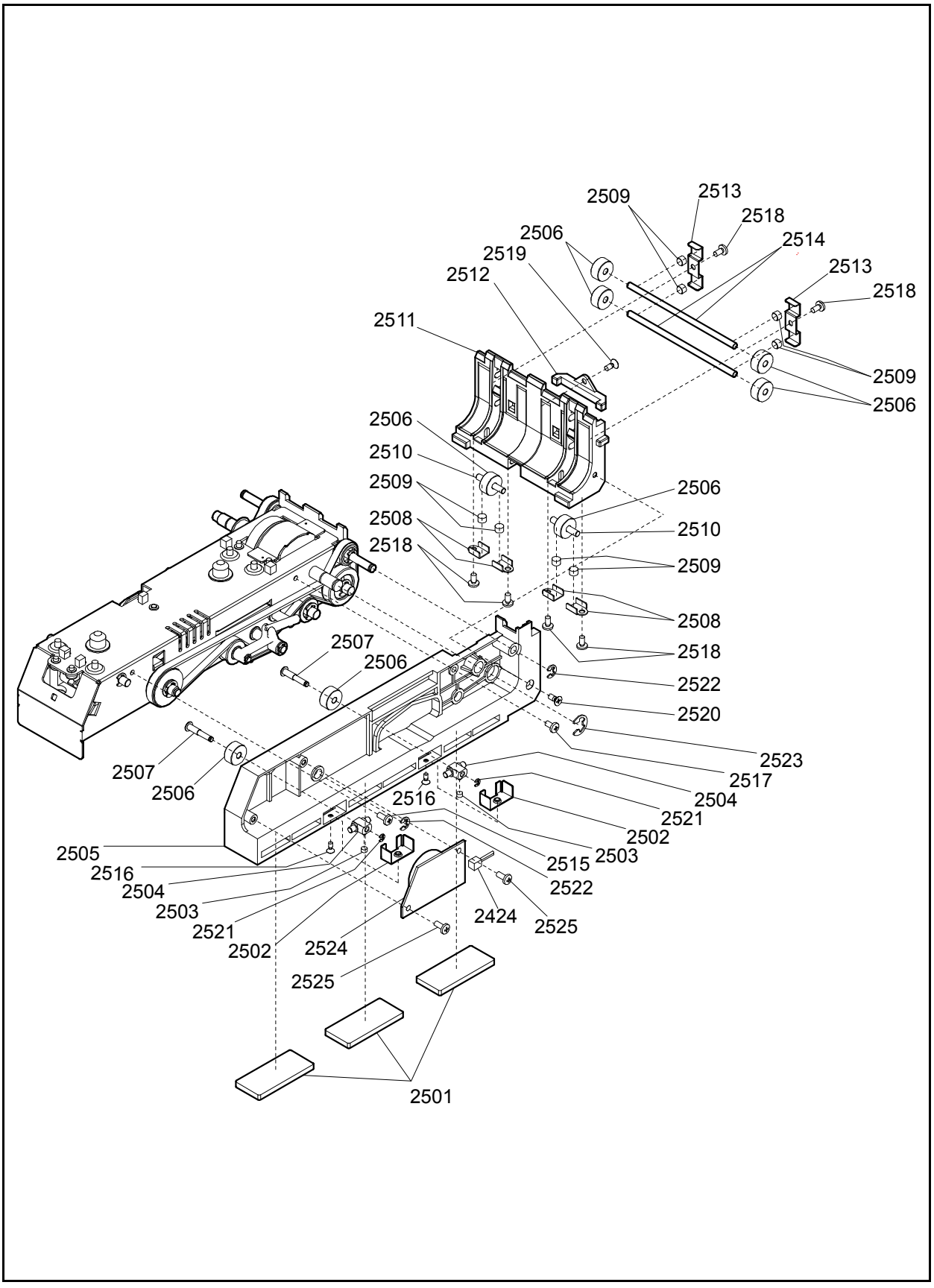


Figure 7-26 TBV Cash Box Unit Exploded View 7

TBV CASH BOX UNIT PARTS LIST 7

Table 7-26 TBV Cash Box Unit Parts List 7

Ref No.	EDP No.	Description	Qty	Remark
2501	185916	Receive Plate Shock Absorber A	3	
2502	150690	Transport Roller Holder Fixed Plate	2	
2503	185933	Transport Pinch Roller Spring B	2	
2504	150601	Transport Roller Holder	2	
2505	150590	Transport Guide Right	1	
2506	150600	Transport Pinch Roller	8	
2507	151863	Transport Shaft G	2	
2508	150692	Transport Spring Presser Plate B	4	
2509	185932	Transport Pinch Roller Spring A	8	
2510	151862	Transport Shaft F	2	
2511	150588	Transport Guide C (Outside)	1	
2512	150605	Stack Start Prism C	1	
2513	150689	Transport Spring Presser Plate A	2	
2514	151861	Transport Shaft E	2	
2515	005555	M2.6x6 W Washer Small 3M	1	
2516	006022	M2x4 Flat Head 3M Screw	2	
2517	189526	M2.6x14 Binding 3M Screw	1	
2518	058274	2.6x5 Phillips Head, Self-Tapping, Binding 3M Screw	6	
2519	052564	2.6x6 Flat Head, Phillips, Self-Tapping 3M Screw	1	
2520	189527	2.6x10 Flat Head, Phillips, Self-Tapping 3M Screw	1	
2521	003704	Φ1.5 E-Ring	2	
2522	003707	Φ3 E-Ring	2	
2523	003709	Φ5 E-Ring	1	
2524	210062	Battery Board 2	1	For TBV ICB Cash Box
2525	058274	2.6x5 Phillips, Self-Tapping, Binding Head Screw	2	For TBV ICB Cash Box

TBV Cash Box Unit Exploded View 8

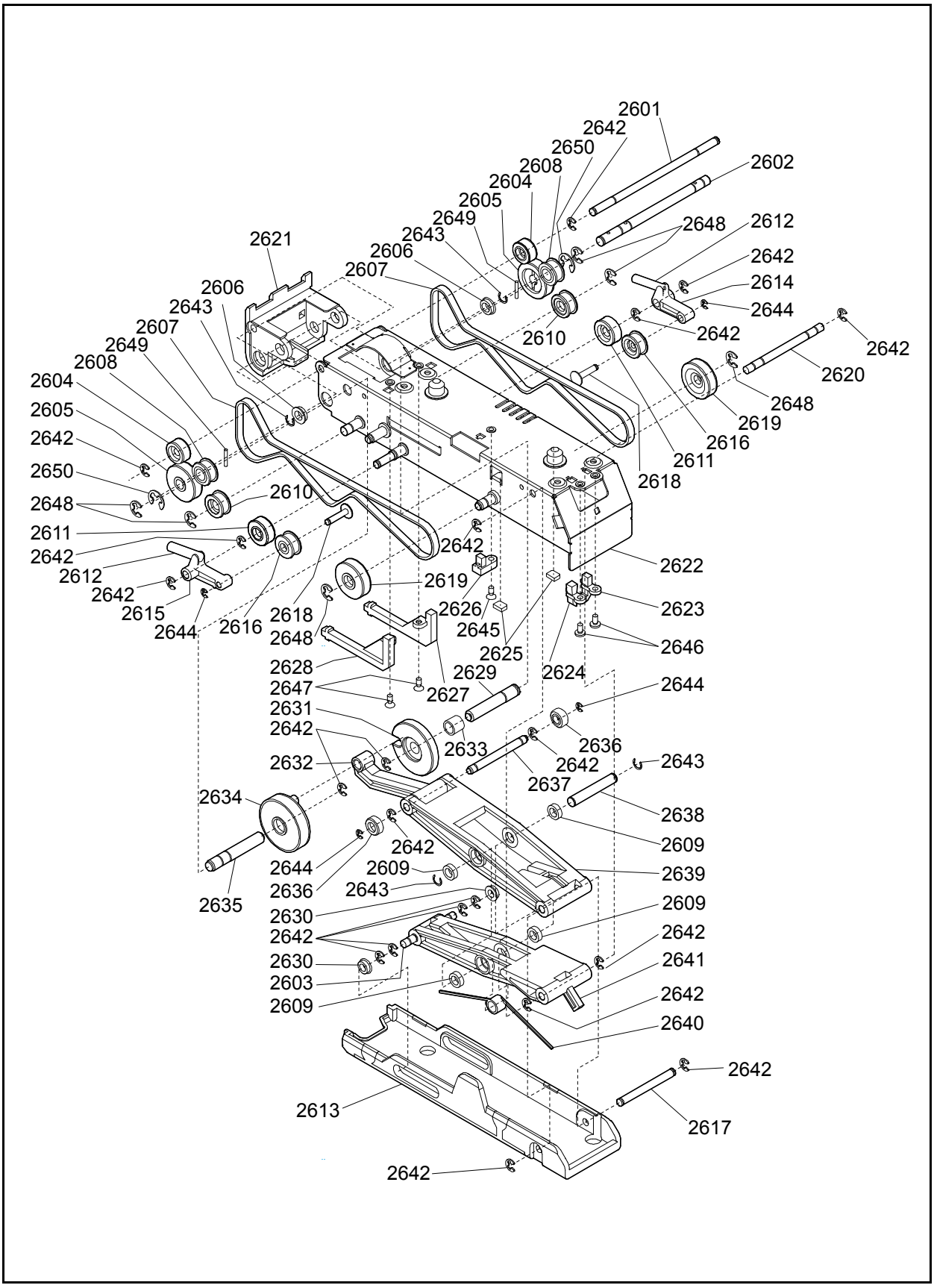


Figure 7-27 TBV Cash Box Unit Exploded View 8

TBV CASH BOX UNIT PARTS LIST 8

Table 7-27 TBV Cash Box Unit Parts List 8

Ref No.	EDP No.	Description	Qty	Remark
2601	151856	Transport Shaft A	1	
2602	151857	Transport Shaft B	1	
2603	151864	Stacker Shaft B	1	
2604	150762	Transport Pulley D Assy.	2	
2605	150824	Transport Pulley A	2	
2606	131125	Flanged Ball Bearing	2	
2607	185270	Power Grip GT Belt	2	
2608	150826	Transport Pulley G	2	
2609	185244	Ball Bearing	4	
2610	150768	Transport Pulley E Assy.	2	
2611	150759	Transport Pulley B Assy.	2	
2612	185950	Transport Belt Tension Arm Spring	2	
2613	150591	Push Plate	1	
2614	150599	Transport Belt Tension Arm Right	1	
2615	150598	Transport Belt Tension Arm Left	1	
2616	150769	Transport Pulley Front Assy.	2	
2617	151865	Stacker Shaft C	1	
2618	151860	Transport Shaft D	2	
2619	150760	Transport Pulley C Assy.	2	
2620	151868	Stacker Shaft F	1	
2621	150587	Transport Guide C (Inside)	1	
2622	150757	Stacker Base Plate Assy.	1	
2623	150609	Push plate Home Prism B	1	
2624	150608	Push Plate Half Prism A	1	
2625	185917	Stacker Plate Shock Absorber	2	
2626	150607	Push Plate Home Prism B	1	
2627	231782	Stack Start Prism Right	1	
2628	231781	Stack Start Prism Left	1	
2629	151859	Stacker Shaft A	1	
2630	131124	Flanged Ball Bearing	2	
2631	150596	Stacker Gear Support Disk	1	
2632	150594	Coupling Rod	1	
2633	189525	Φ6x7 Winding Bush 3M	1	
2634	195103	Stacker Gear A Assy.	1	
2635	151858	Transport Shaft C	1	
2636	188861	Stack Roller B Assy.	2	
2637	151867	Stacker Shaft E	1	
2638	151866	Stacker Shaft D	1	
2639	150593	Push Plate Arm A	1	
2640	185938	Stacker Spring	1	
2641	150592	Push Plate Arm B	1	

Table 7-27 TBV Cash Box Unit Parts List 8 (Continued)

Ref No.	EDP No.	Description	Qty	Remark
2642	003707	Φ3 E-Ring	16	
2643	003718	Crescent Snap Ring	4	
2644	003705	Φ2 E-Ring	4	
2645	028607	M2.6x6 Flat Head 3M Screw	1	
2646	029532	M2.6x4 Binding 3M Screw	2	
2647	006021	M2.6x4 Flat Head 3M Screw	2	
2648	003708	Φ4 E-Ring	8	
2649	137787	Φ1.6x10 Parallel Pin (Hard)	2	
2650	003709	Φ5 E-Ring	2	

TBV Cash Box Unit Exploded View 9

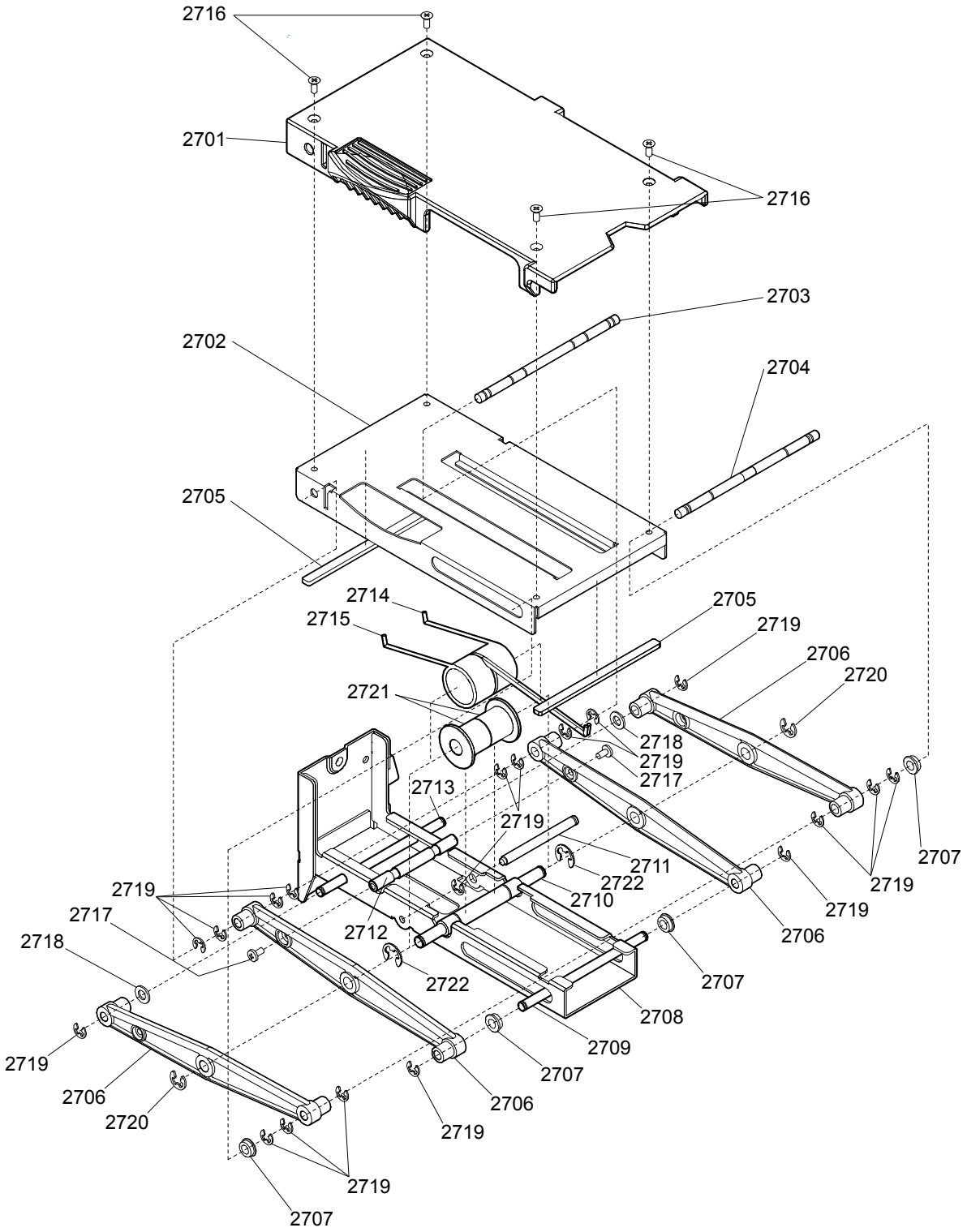


Figure 7-28 TBV Cash Box Unit Exploded View 9

TBV CASH BOX UNIT PARTS LIST 9

Table 7-28 TBV Cash Box Unit Parts List 9

Ref No.	EDP No.	Description	Qty	Remark
2701	150611	Receive Plate	1	
2702	150704	Receive Plate Core Plate	1	
2703	151870	Receive Plate Shaft A	1	
2704	151871	Receive Plate Shaft B	1	
2705	185919	Receive Plate Shock Absorber C	2	
2706	150612	Receive Plate Arm	4	
2707	131124	Flanged Ball Bearing	4	
2708	150765	Receive Base Plate A Assy.	1	
2709	151874	Receive Plate Shaft E	1	
2710	151872	Receive Plate Shaft C	1	
2711	151876	Receive Plate Shaft G	1	
2712	151875	Receive Plate Shaft F	1	
2713	151873	Receive Plate Shaft D	1	
2714	185942	Receive Plate Spring Right	1	
2715	185940	Receive Plate Spring Light	1	
2716	006021	M2.6x4 Flat Head 3M Screw	4	
2717	189529	M2.6x6 Binding with F Lock 3M Screw	2	
2718	004015	Φ4x10x0.8 Flat Washer	2	
2719	003707	Φ3 E-Ring	19	
2720	003708	Φ4 E-Ring	2	
2721	195101	Receive Plate Spring Collar	2	
2722	003709	Φ5 E-Ring	2	

TBV and TBV-SH Frame Unit Exploded View

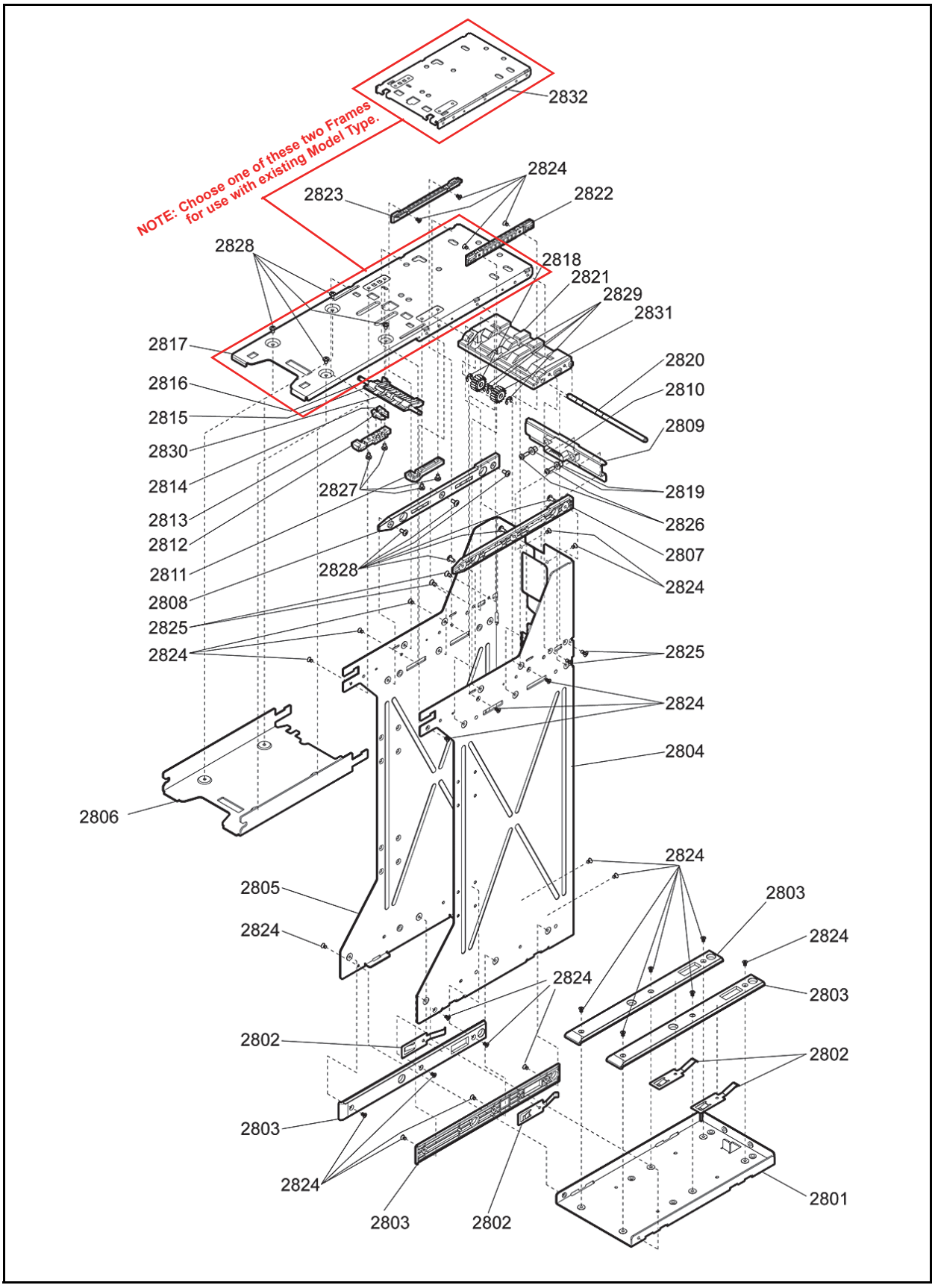


Figure 7-29 TBV and TBV-SH Frame Unit Exploded View

TBV AND TBV-SH FRAME UNIT PARTS LIST

Table 7-29 TBV and TBV-SH Frame Unit Parts List

Ref No.	EDP No.	Description	Qty	Remark
2801	150708	Base Frame	1	
2802	150711	Ground Bracket	4	
2803	150625	Box Transport Guide	4	
2804	150706	Right Frame	1	
2805	150707	Left Frame	1	
2806	150709	BNF Slide Frame	1	For TBV Frame Unit
2807	150621	Box Guide Right	1	
2808	150622	Box Guide Left	1	
2809	150710	Connector Bracket	1	
2810	188833	I/F Harness 1 (USER)	1	
	151465	I/F Harness 1 (FSH-USB)	1	
2811	150627	Latch Block Right	1	
2812	150628	Latch Block Left	1	
2813	150629	latch Prism Right	1	
2814	150630	Latch Prism Left	1	
2815	150626	Box Latch	1	
2816	151880	Latch Shaft	1	
2817	150705	Upper Frame	1	For TBV Frame Unit
2818	150787	Transport Feed Gear 7	1	
2819	151792	Collar	2	
2820	151879	Frame Gear Shaft	1	
2821	150620	Frame Transport Guide 1	1	
2822	150623	TBV Guide Right	1	
2823	150624	TBV Guide Left	1	
2824	149635	M3x4 Flat Head Small with F Lock 3M Screw	28	
2825	101782	3x8 Flat Head, Phillips, Self-Tapping 3M Screw	4	
2826	185911	M2.6x12 Washer	2	
2827	006014	M3x4 Pan Head 3M Screw	4	
2828	026964	M3x4 Binding 3M Screw	10	
2829	003708	Φ4 E-Ring	4	
2830	151808	Latch Spring	1	
2831	200867	Presser Gear	1	
2832	202249	Transport Upper Frame	1	For SH Version

TBV BNF and Type 3 Bezel Unit Exploded View

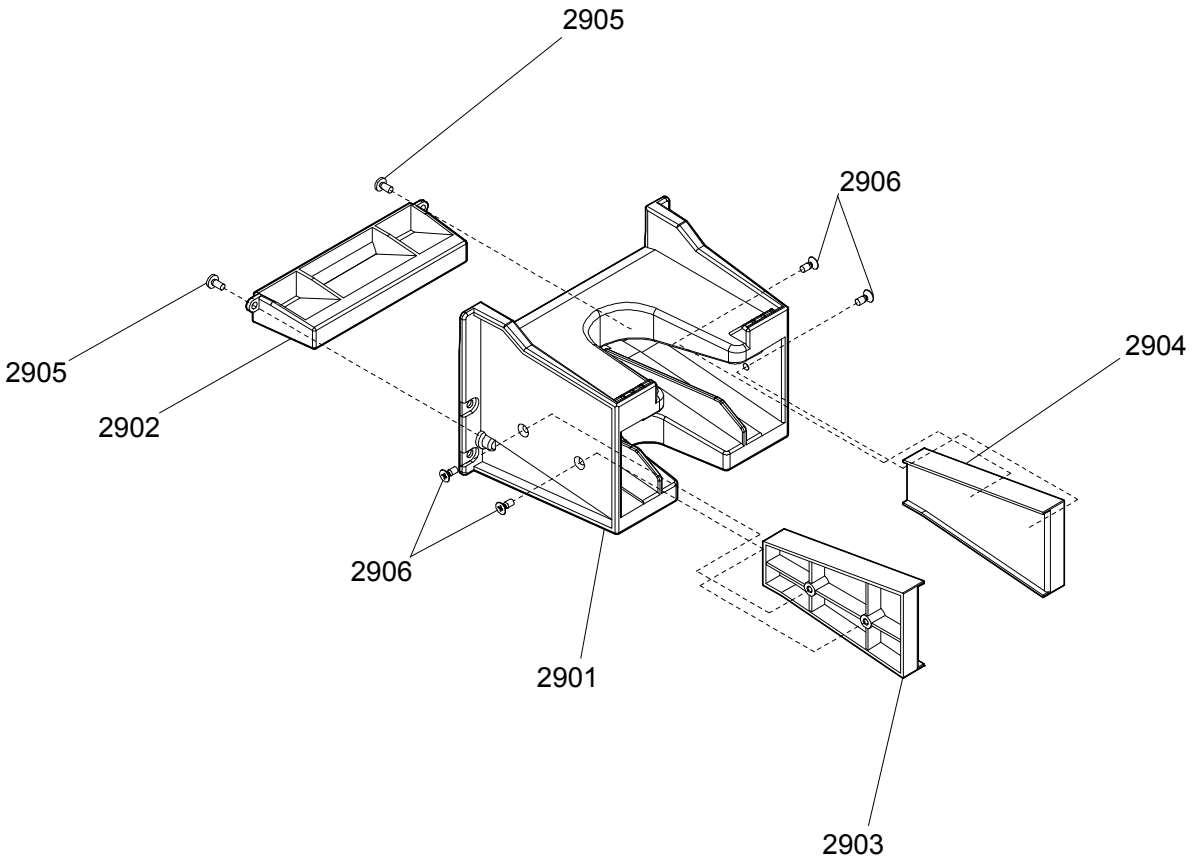


Figure 7-30 TBV BNF Bezel Unit Exploded View

TBV BNF AND TYPE 3 BEZEL UNIT PARTS LIST

Table 7-30 TBV BNF Bezel Unit Parts List

Ref No.	EDP No.	Description	Qty	Remark
2901	150411	Face Plate	1	
	210026	Coin Measure Bezel A	1	For Type 3 Bezel
2902	150412	Light Guide	1	
	210025	Coin Measure Bezel B	1	For Type 3 Bezel
2903	185990	Face Bit 67 Left	1	For Fixed Type
	210024	Face Bit 80 Left	1	For Type 3 Bezel
2904	185991	Face Bit 67 Right	1	For Fixed Type
	210023	Face Bit 80 Right	1	For Type 3 Bezel
2905	063250	2.6x6 Phillip, Self-Tapping, Binding Head Screw 3M	2	
2906	052564	2.6x6 Phillips, Self-Tapping, Binding Flat Head Screw 3M	4	For installing Face Bit

TBV Shutter Bezel Unit Exploded View

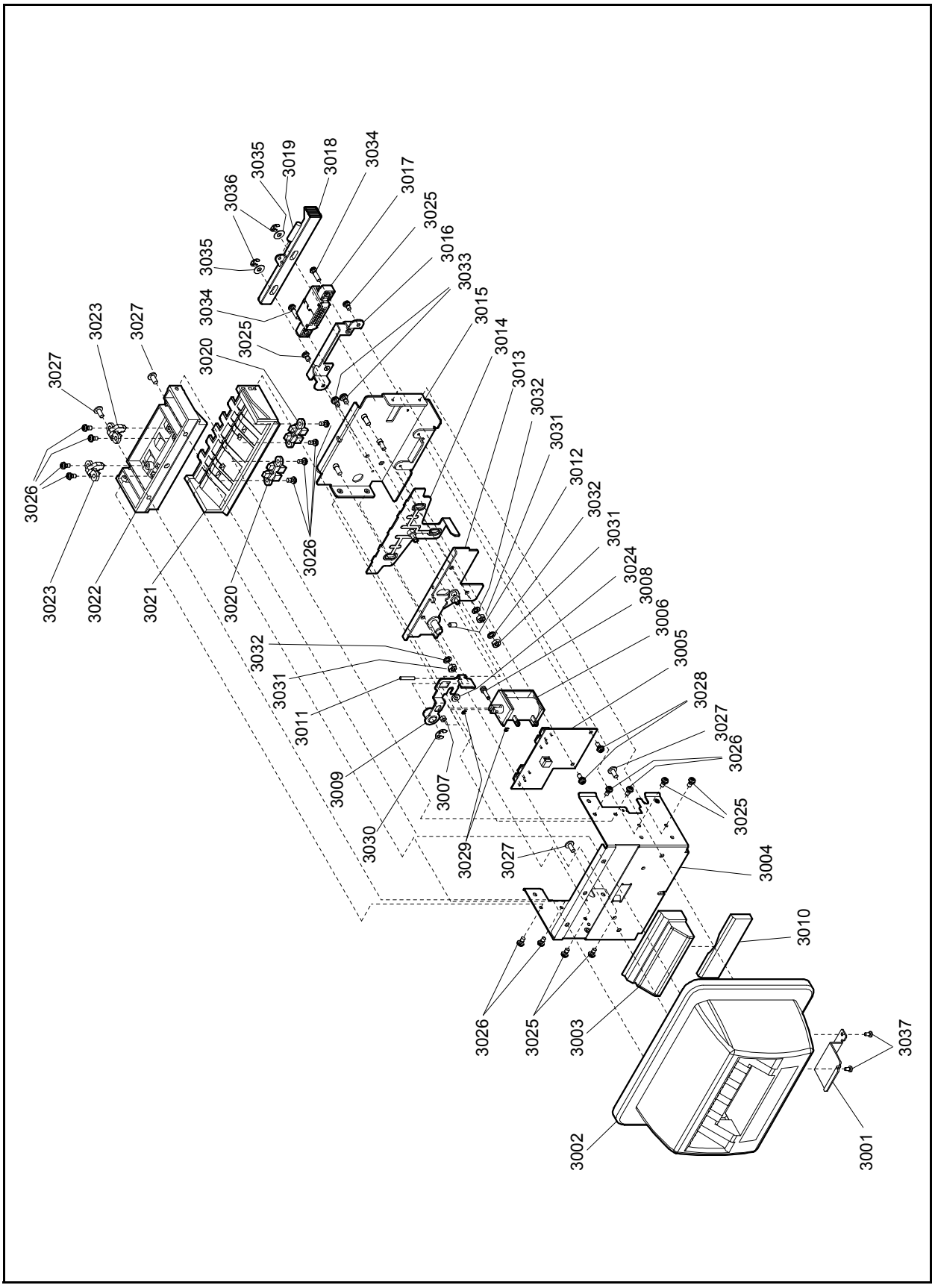


Figure 7-31 TBV Bezel Unit Exploded View

TBV SHUTTER BEZEL UNIT PARTS LIST

Table 7-31 TBV Shutter Bezel Unit Parts List

Ref No.	EDP No.	Description	Qty	Remark
3001	202250	USB Cover	1	
3002	202258	TBV Bezel	1	
3003	202248	Light Interception Guide	1	
3004	202251	Bezel Frame	1	
3005	202711	Shutter Board	1	
3006	202707	DC Solenoid	1	
3007	202256	Lock Collar B	1	
3008	202255	Solenoid Shaft	1	
3009	202261	Shutter Arm Assy.	1	
3010	202247	Light Interception Prism	1	
3011	202253	Lock Spring	1	
3012	202254	Shutter Spring	1	
3013	202262	Shutter Bracket Assy.	1	
3014	202264	Shutter Assy.	1	
3015	202263	Shutter Frame Assy.	1	
3016	202269	Connector Bracket	1	
3017	202708	Relay Harness	1	
3018	202244	Unit Release Lever	1	
3019	202252	Release Spring	1	
3020	202246	Prism A	2	
3021	202243	Bezel Guide D	1	
3022	202259	Bezel Guide U	1	
3023	202245	Prism B	2	
3024	202257	Lock Collar A	1	
3025	003596	M2.6x5 Washer	8	
3026	058274	2.6x5 Phillips, Self-Tapping, Binding Head Screw	12	
3027	202265	3x6 Phillips, Self-Tapping, Binding Head Screw (Steel)	4	
3028	005555	M2.6x6 W Washer	2	
3029	003704	Ø1.5 E-Ring	2	
3030	003708	Ø4 E-Ring	1	
3031	014554	M3 Nut Type1	3	
3032	004016	Ø3 Spring Washer	3	
3033	001767	M3x5 W Washer	2	
3034	099340	M2.6x10 Washer	2	
3035	198152	Ø4.3x8x0.8 Small Round Flat Washer	2	
3036	003707	Ø3 E-Ring	2	
3037	202266	2x4 Phillips, Self-Tapping, Binding Head Screw (Steel)	2	

TBV FLD/GLD Frame Unit Exploded View 1

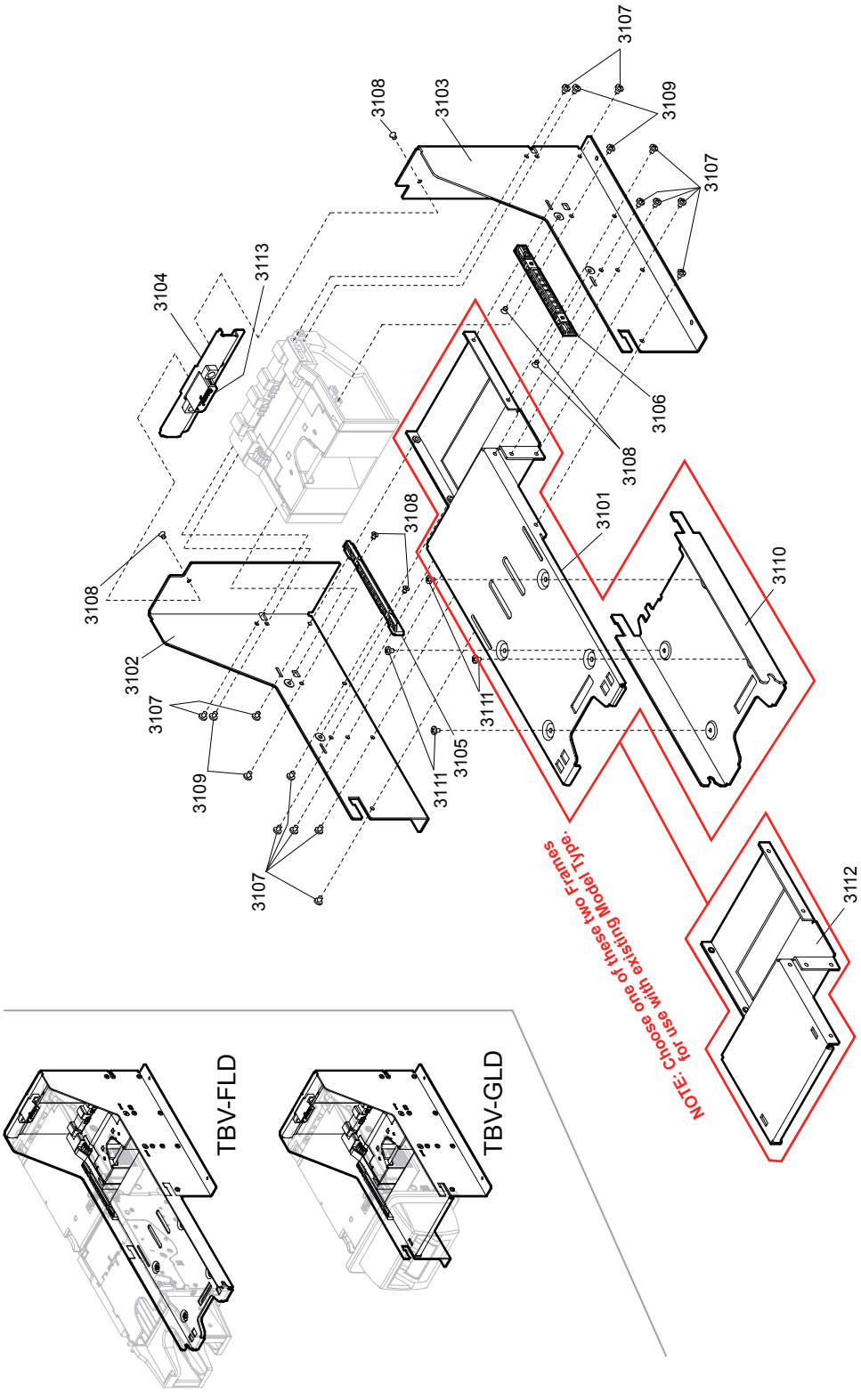


Figure 7-32 TBV FLD/GLD Frame Unit Exploded View 1

TBV FLD/GLD FRAME UNIT PARTS LIST 1

Table 7-32 TBV FLD/GLD Frame Unit Parts List 1

Ref No.	EDP No.	Description	Qty	Remark
3101	206539	LD Upper Frame	1	For FLD
3102	206538	LD Left Frame	1	
3103	206537	LD Right Frame	1	
3104	150710	Connector Bracket	1	
3105	150624	CBA Guide Left	1	
3106	150623	CBA Guide Right	1	
3107	003600	M3x5 Pan Head Washer	14	
3108	149635	M3x4 Flat Small Head Screw (F-loc)	6	
3109	080908	3x6 Phillips, Self-Tapping, Binding Head Screw	4	
3110	150709	BNF Slide Frame	1	For FLD
3111	026964	M3x4 Binding Head Screw	4	For FLD
3112	206541	LD Upper Frame	1	For GLD
3113	208125	I/F Harness (USER-LD)	1	
	217541	I/F Harness 1 (FLD-USB)	1	

TBV FLD/GLD Frame Unit Exploded View 2

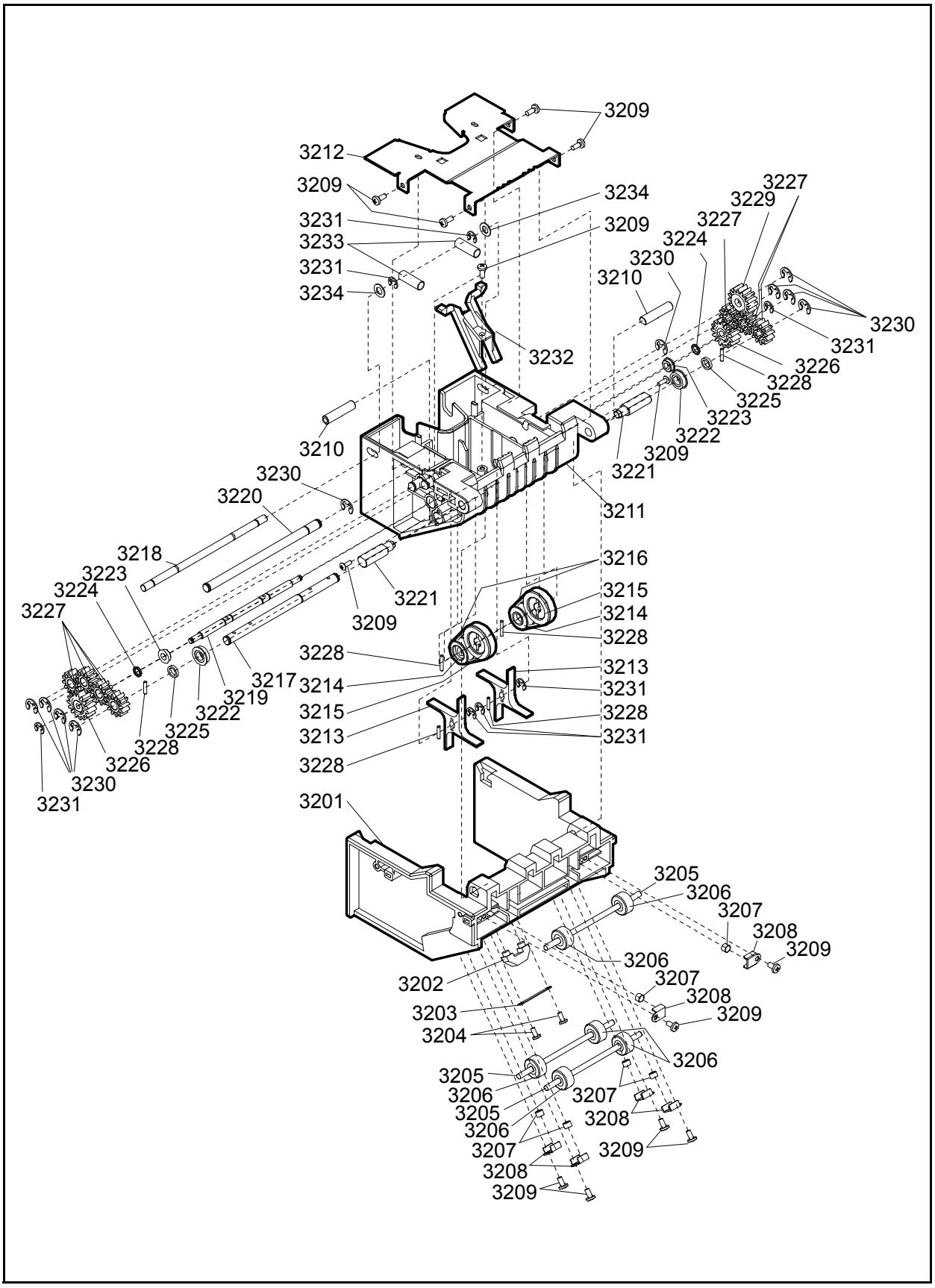


Figure 7-33 TBV FLD/GLD Frame Unit Exploded View 2

TBV FLD/GLD Frame Unit Parts List 2

Table 7-33 TBV FLD/GLD Frame Unit Parts List 2

Ref No.	EDP No.	Description	Qty	Remark
3201	206536	LD Guide D	1	
3202	150541	Transport Gate Prism 1	1	
3203	185923	Lens Holder	1	
3204	104285	2.3x5 Phillips, Self-Tapping, Pan Head Screw	2	
3205	151861	Transport Shaft E	3	
3206	150831	Transport Feed Roller #3	6	
3207	185932	Transport Pinch Roller Spring A	6	
3208	150692	Transport Spring Presser Plate	6	
3209	063250	2.6x6 Phillips, Self-Tapping, Binding Head Screw	9	
3210	206529	LD Shaft 6	2	
3211	206535	LD Guide U Assy.	1	
3212	206540	LD Guide Cover	1	
3213	206528	Exit Propeller	2	
3214	150759	Transport Pulley B Assy.	2	
3215	150824	Transport Pulley A	2	
3216	206544	Timing Belt EPDM Soft Specification	2	
3217	206533	LD Shaft 4	1	
3218	206532	LD Shaft 3	1	
3219	206530	LD Shaft 1	1	
3220	206531	LD Shaft 2	1	
3221	206534	LD Shaft 5	2	
3222	131125	SMF85ZZ Bearing	2	
3223	131124	SMF74ZZ Bearing	2	
3224	151826	Ratchet Release Roller B	2	
3225	185240	Gear Spacer	2	
3226	206543	LD Gear Assy.	2	
3227	150801	Transport Gear B	7	
3228	091515	Ø1.6x8 Parallel Pin	2	
3229	150787	Transport Feed Gear 7	1	
3230	003708	Ø4 E-Ring	10	
3231	003707	Ø3 E-Ring	8	
3232	206542	LD Prism	1	
3233	067486	Open Spring	2	
3234	000756	Flat Washer	2	

TBV Single Bezel Assy. Exploded View

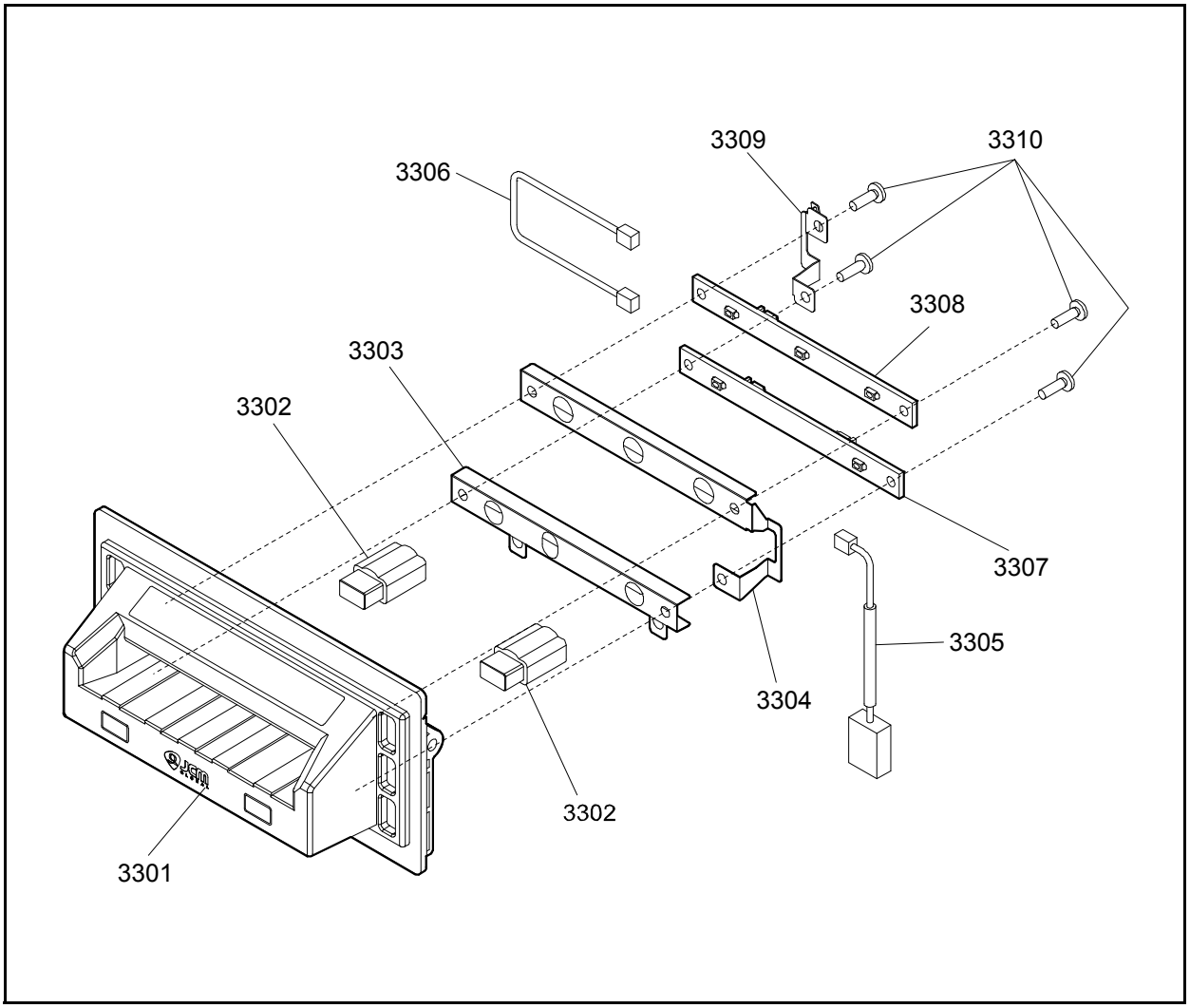


Figure 7-34 TBV Single Bezel Assy. Exploded View

TBV Single Bezel Assy. Parts List

Table 7-34 TBV Single Bezel Assy. Parts List

Ref No.	EDP No.	Description	Qty	Remark
3301	216336	TBV Single Bezel	1	
3302	112644	INS Light Guide	2	
3303	237536	Shield Plate R	1	
3304	113927	Shield Plate	1	
3305	218441	Bezel LED Harness	1	
3306	196594	Bezel Relay Harness	1	
3307	195804	Bezel Lower Board 01	1	LED Color: Green
	195805	Bezel Lower Board 02	1	LED Color: Blue
3308	194258	Bezel Upper Board 01	1	LED Color: Green
	195806	Bezel Upper Board 02	1	LED Color: Blue
3309	113928	Wire Holder	1	
3310	056165	2.6x8 Phillips, Self-Tapping, Binding Head Screw	4	

TBV® Series
Transaction Based Validator
Section 8

8 INDEX

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TBV® Series
Transaction Based Validator
Appendix A

A TROUBLESHOOTING

This section provides Troubleshooting instructions for the TBV® Series Transaction Based Validator Unit. This section contains the following information:

- Introduction
- Troubleshooting Overview
- Malfunction LED Error Codes
- LED Indication Conditions.
- Standard Error and Reject Codes
- Sensor Calibration Error
- Maintenance Equipment

Introduction

Most Banknote Validator failures are due to minor causes. Before replacing any parts, make sure that all assembly and circuit board connectors are properly fitted and the harness is properly connected.

Faulty Banknote acceptance by the Validator portion of the TBV is often caused when dust or Iron powder adheres to the Identification Sensor, Magnetic Sensor or Transport Belt. Clean the Acceptor Sections first, then observe the operating state of the Validator in detail when re-initializing power. This observation is important in locating any failure causes and the possible fault area. If the Validator Head has to be repaired by disassembling it, always re-calibrate the Sensors following repair.

Perform all repairs by referring to Calibration and Testing in Section 6, and Disassembly/Reassembly in Section 4 of this Service Manual.

Troubleshooting Overview

The TBV allows the operator to perform fault diagnosis by checking various fault Table listings against the symptom exhibited, and survey the cause(s) of any failure occurrences during the process.

After determining the cause of the failure, execute the Performance Test, perform a Sensor re-adjustment, and then repair the TBV Unit by replacing any appropriate parts deemed necessary.

Malfunction LED Error Codes

The TBV Bezel LED lights a solid Color, or flashes a combination of three (3) Colors when errors, Banknote jams or a note reject occurs. The TBV Status, Error Codes, Banknote Jam Code or Banknote Reject Codes are indicated by the number and/or Color of the Status LEDs solid or flashing light condition.

LED Indication Conditions

Table A-1 lists the Bezel LED Status/Error Code indications for the TBV Unit.

Table A-1 LED Status/Error Code Condition

Symptoms	Causes	Solutions
The TBV is not working. (TBV's Bezel LED and CPU Board LEDs are not lighting).	Power is not supplied to the Unit.	Check that the Interface Connectors are properly fitted. Verify that the Power Supply meets its specification.
	The Program is not activate. (The Software download has not completed correctly).	Re-download the correct Software. (Refer to the TBV Service Manual for details regrading proper "Software Download" procedures).
	The CPU Board is malfunctioning.	Check that the TBV's internal Harnesses and Connectors are properly fitted.
	Unit is not communicating with the Host Machine. Different Interface DIP Switches are set on the TBV and/or the Host Machine. Interface DIP Switch settings are not correct.	Check that the Interface settings and the DIP Switch settings meet their design specifications. (See "DIP Switch Configurations" on page 2-1).
The TBV is not working. (TBV's CPU Board Red LED is lit).	RAM malfunctioning.	Check that the TBV's internal Harnesses and Connectors are properly fitted.
The TBV is not working. (TBV's Fan Motor goes ON and OFF alternately).	ROM malfunctioning.	Check that the TBV's internal Harnesses and Connectors are properly fitted.

Table A-1 LED Status/Error Code Condition (Continued)

Symptoms	Causes	Solutions
The TBV is not working. Banknote Jam has occurred. (TBV's Bezel LED is flashing Red or Yellow).	A Unit setting malfunctioning. An improper assembly and/or Harness connection exists. Banknote Jam or poor condition occurred due to foreign object in path interference.	Check that the Unit, Assembly and Connections are properly set in place. Check that there is not a Banknote Jam or a foreign object interfering inside the TBV Unit Banknote Transport Path. Check that the flashing pattern is correct, and identify the indicated error by referring to the Error Codes Table; then perform the necessary action required (See "Standard Error Codes" on page A-3 or the "Reject Error Codes" on page A-7 of this Guide).
Most Banknotes are rejected. (TBV's Bezel LED is flashing Green).	The current Software is not designed to accept the current Banknotes.	Check that the acceptable denomination values are correct. Download the correct Software Program (Refer to the TBV Service Manual for details regrading the proper "Software Download" procedures).
	DIP Switch settings are incorrect.	Check that the DIP Switch settings are properly set. (See "DIP Switch Configurations" on page 2-1).
	The Banknote accept/inhibit setting is being made by command from the Host Machine.	Check that the command from the Host Machine is correct, and change the setting to be acceptable for use with the TBV Unit.
	Dirt or foreign objects are adhering to the Sensors.	Clean the Sensors by referring to See "Cleaning Procedure" on page 2-13.
	Improper validation process performance. Improper assembly and/or Harness connection. The CPU Board and/or the Sensors are malfunctioning.	Check that all assembly and connections are properly set. Identify the LED error flashing pattern, and identify the error by referring to the Error Codes Table; then perform the necessary action required (See "Standard Error Codes" on page A-3 or the "Reject Error Codes" on page A-7 of this Guide).
Banknote reject occurs sometimes, and the Banknote acceptance rate is low. (TBV's Bezel LED is flashing Green)	The Software version is old. Banknotes require proper denomination from the specific Country's Software being validated.	Confirm that the required denomination and/or issued year is correct by referring to the specific Country's Software Information Sheet.
	Foreign objects are adhering to the Sensors.	Clean the Sensors by referring to See "Cleaning Procedure" on page 2-13.
	Need to perform to the Sensor Calibration Tests (Did not perform Sensor Calibration Tests after Unit disassembly or repair).	Identify the LED error flashing pattern and locate the error by referring to the Error Codes Table; then perform the necessary action required. Perform a Validation Test if necessary. (Refer to TBV Service Manual for details regrading proper "Calibration and Testing" procedures).

Standard Error and Reject Codes

The Bezel LED indicates various solid/flashing Color lighting conditions when any of the Standard Errors listed in Table A-2 occur. Identify the cause and solutions for these indications from each Table listing and ensure that the relative assembles are properly connected and/or harnessed, and that all of the Unit's Sensors are clean.

Standard Error Codes

Table A-2 lists the various LED Flash Error Code causes & solutions.

Table A-2 Standard LED Error Codes

Online	Offline	Error	Causes and Solutions
LED Color (Flash Sequence)	LED Color (Flash Sequence)		
Yellow (1)	Yellow (1)	Banknote Jam (in the Cash Box)	When transporting a Banknote to the Cash Box, the Sensors are not detecting a Banknote present condition even when the number of the Banknotes being transported is greater than the specific number for that function or within the specific time interval. [Solution] Check that the following parts are properly assembled and/or Harness connected. Clean or adjust the following parts and Sensors. [Relative Parts] Feed Motor, Stacker Sensor, Feed-out Sensor. If the error is not resolved, change the above related part or parts.
Yellow (2)	Yellow (2)	Banknote Jam (in the Transport Section)	When transporting or returning a Banknote in the Transport Section, the Sensors do not detect a Banknote present condition even when the number of the Banknotes being transported is greater than the specific number for that function or within the specific time interval. [Solution] Check that the following parts are properly assembled and/or Harness connected. Clean or adjust the following parts and Sensors. [Relative Parts] Feed Motor, BNF Entrance Sensor, BNF Assignation Sensor, Entrance Sensor, Centering Sensor, Line Sensor, Feed-out Sensor. If the error is not resolved, change the above related part or parts.
Yellow (3)	Yellow (3)	Banknote Chain	While performing a BNF Banknote assignation, the Sensors do not detected a Banknote present condition even when the number of the Banknotes being transported is greater than the specific number for that function or within the specific time interval. [Solution] Check that the following parts are properly assembled and/or Harness connected. Clean or adjust the following parts and Sensors. [Relative Parts] BNF Feed Roller, BNF Retard Roller, BNF Assignation Sensor, Entrance Sensor, Feed-out Sensor. If the error is not resolved, change the above related part or parts.
Yellow (4)	Yellow (4)	Cash Box Removal	The Cash Box has been removed. [Solution] Check that the following parts are properly assembled and/or Harness connected. Clean or adjust the following parts and Sensors. [Relative Parts] Cash Box Sensor. If the error is not resolved, change the above related part or parts.
Yellow (5)	Yellow (5)	Fraud Detection	Sensors detect Banknotes remaining in path or none exist during an abnormal timing operation. [Solution] Check that the following parts are properly assembled and/or Harness connected. Clean or adjust the following parts and Sensors. [Relative Parts] Line Sensor, Feed-out Sensor, Cash Box Feed-out Sensor, Side Sensor. If the error is not resolved, change the above related part or parts.
Yellow (6)	Yellow (6)	Cash Box Lock Released	Sensors detect that the Cash Box Lock has been opened. [Solution] Check that the following parts are properly assembled and/or Harness connected. Clean or adjust the following parts and Sensors. [Relative Parts] Cash Box Lock Sensor. If the error is not resolved, change the above related part or parts.
Yellow (7)	Yellow (7)	Transport Section Upper Cover Open	Sensors detect that the Upper Cover of the Transport Section has been opened. [Solution] Check that the following parts are properly assembled and/or Harness connected. Clean or adjust the following parts and Sensors. [Relative Parts] Entrance Sensor, Centering Sensor. If the error is not resolved, change the above related part or parts.

Table A-2 Standard LED Error Codes (Continued)

Online LED Color (Flash Sequence)	Offline LED Color (Flash Sequence)	Error	Causes and Solutions
Red (1)	Red (1)	Cash Box Full	While stacking a Banknote, the Cash Box Full Sensors detect that the Cash Box is full. [Solution] Check that the following parts are properly assembled and/or Harness connected. Clean or adjust the following parts and sensors. [Relative Parts] Cash Box Full Sensor, Pusher Mechanism, Pusher Plate. If the error is not resolved, change the above related part or parts.
Red (2)	Red (2)	Feed Motor Lock-up	While operating the Feed Motor, no pulse inputs exist greater than the rated value. [Solution] Check that the following parts are properly assembled and/or Harness connected. Clean or adjust the following parts and Sensors. [Relative Parts] Feed Motor, Feed Encoder. If the error is not resolved, change the above related part or parts.
Red (3)	Red (3)	Stacker Motor Lock-up	While operating the Stacker Motor, no pulse inputs exist greater than the rated value. [Solution] Check that the following parts are properly assembled and/or Harness connected. Clean or adjust the following parts and Sensors. [Relative Parts] Stacker Motor, Stacker Motor Encoder, Pusher Mechanism, Pusher Plate. If the error is not resolved, change the above related part or parts.
Red (4)	Red (4)	Centering Motor Lock-up	While the Centering Motor is operating, no pulse inputs exist greater than the rated value. [Solution] Check that the following parts are properly assembled and/or Harness connected. Clean or adjust the following parts and Sensors. [Relative Parts] Centering Motor, Centering Guide, Centering Home Sensor. If the error is not resolved, change the above related part or parts.
Red (5)	Red (5)	BNF Unit	While operating the BNF Section, no pulse inputs exist greater than the rated value. [Solution] Check that the following parts are properly assembled and/or Harness connected. Clean or adjust the following parts and Sensors. [Relative Parts] BNF Feed Motor, BNF Grip Motor. If the error is not resolved, change the above related part or parts.
Red (6)	Red (6)	Shutter Error	While the Shutter Motor is operating, Sensors detect abnormal movement. [Solution] Check that the following parts are properly assembled and/or Harness connected. Clean or adjust the following parts and Sensors. [Relative Parts] Shutter Motor, Shutter Sensor If the error is not resolved, change the above related part or parts.
Red (7)	Red (7)	Banknote Jam at the Pusher Mechanism Home Position	The Pusher Mechanism Home Position Sensor detects that the Pusher Mechanism has not moved to the Home position. [Solution] Check that the following parts are properly assembled and/or Harness connected. Clean or adjust the following parts and Sensors. [Relative Parts] Pusher Mechanism, Stacker Motor, Stacker Home Sensor, Stacker Motor Encoder. If the error is not resolved, change the above related part or parts.
Red (8)	Red (8)	Pusher Mechanism Home Position	When stacking Banknotes, the Pusher Mechanism is not returning to the Home end position. [Solution] Check that the following parts are properly assembled and/or Harness connected. Clean or adjust the following parts and Sensors. [Relative Parts] Pusher Mechanism, Stacker Motor, Stacker Home Position Sensor, Stacker Encoder Sensor. If the error is not resolved, change the above related part or parts.
Red (9)	Red (9)	Pusher Plate Half-way Position	The Pusher Plate is not returning to the Pusher Plate Half-way Position. [Solution] Check that the following parts are properly assembled and/or Harness connected. Clean or adjust the following parts and Sensors. [Relative Parts] Pusher Plate, Stacker Motor, Pusher Plate Half Sensor, Stacker Motor Encoder If the error is not resolved, change the above related part or parts.
Red (10)	Red (10)	Centering Home Position	The Centering Mechanism is not presently seated at its Home end position. [Solution] Check that the following parts are properly assembled and/or Harness connected. Clean or adjust the following parts and Sensors. [Relative Parts] Centering Motor, Centering Guide, Centering Home Sensor If the error is not resolved, change the above related part or parts.

Table A-2 Standard LED Error Codes (Continued)

Online LED Color (Flash Sequence)	Offline LED Color (Flash Sequence)	Error	Causes and Solutions
Red (11)	Red (11)	Feed Motor Speed	While Initializing, no pulse inputs exist greater than the rated value. [Solution] Check that the following parts are properly assembled and/or Harness connected. Clean or adjust the following parts and Sensors. [Relative Parts] Feed Motor, Feed Motor Encoder. If the error is not resolved, change the above related part or parts.
Red (12)	Red (12)	BNF Section Communication Error	While the BNF is communicating, no communication data exists that is longer than the expected rated time. [Solution] Check that the following parts are properly assembled and/or Harness connected. Clean or adjust the following parts and Sensors. [Relative Parts] BNF Communication Harness. If the error is not resolved, change the above related part or parts.
Red (14)	Red (14)	Voltage	Input Voltage is too low. [Solution] Check that the following parts are properly assembled and/or Harness connected. Clean or adjust the following parts and Sensors. [Relative Parts] Power Supply Unit. If the error is not resolved, change the above related part or parts.
Red (15)	Red (15)	Fraud Detection	Sensors detect Banknotes remain in path, or none existed during an abnormal timing condition. [Solution] Check that the following parts are properly assembled and/or Harness connected. Clean or adjust the following parts and Sensors. [Relative Parts] Line Sensor, Feed-out Sensor, Box Feed-out Sensor, Side Sensor. If the error is not resolved, change the above related part or parts.
Red (16)	Red (16)	I2C Access Error	While communicating with each device on the CPU Board, Sensors detect an abnormal operating condition. [Solution] Check that the following parts are properly assembled and/or Harness connected. Clean or adjust the following parts and Sensors. [Relative Parts] CPU Board. If the error is not resolved, change the above related part or parts.
Red (18)	Red (18)	SDRAM Error	SDRAM reading and/or writing is not properly performed. [Solution] Check that the following parts are properly assembled and/or Harness connected. Clean or adjust the following parts and Sensors. [Relative Parts] CPU Board. If the error is not resolved, change the above related part or parts.
Red (19)	Red (19)	EEPROM Reading Error	EEPROM reading is not properly performed. [Solution] Check that the following parts are properly assembled and/or Harness connected. Clean or adjust the following parts and Sensors. [Relative Parts] CPU Board. If the error is not resolved, change the above related part or parts.
Red (20)	Red (20)	EEPROM Writing Error	EEPROM writing is not properly performed. [Solution] Check that the following parts are properly assembled and/or Harness connected. Clean or adjust the following parts and Sensors. [Relative Parts] CPU Board. If the error is not resolved, change the above related part or parts.
Red (21)	Red (21)	Feed Motor Over Current	While operating the Feed Motor, Sensors detect an over current condition. [Solution] Check that the following parts are properly assembled and/or Harness connected. Clean or adjust the following parts and Sensors. [Relative Parts] Feed Motor. If the error is not resolved, change the above related part or parts.
Red (22)	Red (22)	Stacker Motor Over Current	While the Stacker Motor is operating, Sensors detect an over current condition. [Solution] Check that the following parts are properly assembled and/or Harness connected. Clean or adjust the following parts and Sensors. [Relative Parts] Stacker Motor. If the error is not resolved, change the above related part or parts.
Red (23)	Red (23)	Feed Motor Overheat	While the Feed Motor is operating, Sensors detect an overheating condition. [Solution] Clean that the following parts are properly assembled and/or Harness connected. Clean or adjust the following parts and Sensors. [Relative Parts] Feed Motor. If the error is not resolved, change the above related part or parts.

ICB Error Code Conditions

Table A-3 lists the various ICB LED Flash Error Code causes and solutions.

Table A-3 ICB LED Error Codes

Online LED Color (Flash Sequence)	Offline LED Color (Flash Sequence)	Error	Causes and Solutions
Red (13)	Red (13)	ICB Communication Error	While the ICB is communicating, no communication data exists that is longer than the expected rated time. [Solution] Check that the following parts are properly assembled and/or Harness connected. Clean or adjust the following parts and Sensors. [Relative Parts] ICB Board. If the error is not resolved, change the above related part or parts.
Red (26)	OFF	Incorrect ICB Settings	The ICB function is disabled on the TBV Unit when the Intelligent Cash Box is used. [Solution] Change the ICB settings to be acceptable for use with the Cash Box.
Red (27)	OFF	ICB Communication Error	ICB unable to communicate. [Solution] Check that the ICB settings are properly set. [Relative Part] ICB Circuit Board, ICB Sensor, Cash Box Module, ICB Board. If the error is not resolved, change the above related part or parts.
Red (28)	OFF	ICB Checksum Error	ICB data is incorrect. [Solution] Initialize the ICB Cash Box data using Read Write Tool. [Relative Part] Cash Box ICB Module. If the error is not resolved, change the above related part or parts.
Red (29)	OFF	ICB Number Error	The Game Machine Number is different. [Solution] Initialize the ICB Cash Box data using Read Write Tool. [Relative Part] Cash Box ICB Module. If the error is not resolved, change the above related part or parts.
Red (30)	OFF	ICB Initialize Error	The Intelligent Cash Box has not been initialized. [Solution] Initialize the ICB Cash Box data using Read Write Tool. [Relative Part] Cash Box ICB Module. If the error is not resolved, change the above related part or parts.
Red (31)	OFF	ICB Module Error	While communicating to the ICB, the Intelligent Cash Box has been removed. [Solution] Check that the ICB settings are properly set and firmly reseat the Intelligent Cash Box

Reject Error Codes

Table A-4 lists the various LED Flash Reject Code causes & solutions.

Table A-4 LED Flash Reject Error Codes

Online	Offline	Error	Causes and Solutions
LED Color (Lit)	LED Color (Flash Sequence)		
Blue	Green (1)	Skew Insertion Error	The Banknote has been inserted in an incorrect direction. [Solution] Check that the following parts are properly assembled and/or Harness connected. Clean or adjust the following parts and Sensors. [Relative Parts] Centering Guide, Centering Sensor, Belts Rollers. If the error is not resolved, change the above related part or parts.
Blue	Green (2)	Abnormal Magnetic Detection	The Magnetic Sensor detects an abnormal Banknote Type. [Solution] Check that the following parts are properly assembled and/or Harness connected. Clean or adjust the following parts and Sensors. [Relative Parts] Magnetic Sensor. If the error is not resolved, change the above related part or parts.
Blue	Green (3)	Remaining Banknotes Returned	While Initializing, Sensors detect that Banknotes remain in the TBV Unit. [Solution] Check that the following parts are properly assembled and/or Harness connected. Clean or adjust the following parts and Sensors. [Relative Parts] BNF Entrance Sensor, BNF Assignation Sensor, Entrance Sensor, Line Sensor, Feed-out Sensor. If the error is not resolved, change the above related part or parts.
Blue	Green (4)	Magnification	When adjusting Banknote data, Sensors detect an abnormal Banknote magnification condition. [Solution] Check that the following parts are properly assembled and/or Harness connected. Clean or adjust the following parts and Sensors. [Relative Parts] Line Sensor. If the error is not resolved, change the above related part or parts.
Blue	Green (5)	Banknote Transportation	Sensors detect Banknotes remain in path, or none exist during an abnormal timing interval. [Solution] Check that the following parts are properly assembled and/or Harness connected. Clean or adjust the following parts and Sensors. [Relative Parts] BNF Assignation Sensor, Entrance Sensor, Centering Sensor, Line Sensor, Feed-out Sensor, Box Feed-out Sensor. If the error is not resolved, change the above related part or parts.
Blue	Green (6)	UV Sensor	The UV Sensor detects an abnormal Banknote Type. [Solution] Check that the following parts are properly assembled and/or Harness connected. Clean or adjust the following parts and Sensors. [Relative Parts] UV Sensor. If the error is not resolved, change the above related part or parts.
Blue	Green (7)	Pattern Error	The Line Sensor detects an abnormal Banknote Type. [Solution] Check that the following parts are properly assembled and/or Harness connected. Clean or adjust the following parts and Sensors. [Relative Parts] Line Sensor. If the error is not resolved, change the above related part or parts.
Blue	Green (8)	Double Banknotes Detected	The Line Sensor's transparency level is less than the accepted value. Dirt, stickers, or foreign object may be present on the Banknote. [Solution] Confirm the Banknote's condition. If the error is not resolved, change the above related part or parts.
Blue	Green (9)	Inhibit Setting	The Banknote accept/inhibit setting is being made by a command from the Host Machine. [Solution] Check that the Commands from the Host Machine are correct, and change its setting to be acceptable for use with the TBV Unit. DIP Switch settings are incorrect. [Solution] Check that the DIP Switch settings are properly set.
Blue	Green (10)	Reject Command	The TBV received a Reject command form the Host Machine. [Solution] Check that the Command from the Host Machine is correct.
Blue	Green (11)	Cash Box Removal	While transporting a Banknote, Sensors detect a Cash Box removal. [Solution] Check that the following parts are properly assembled and/or Harness connected. Clean or adjust the following parts and Sensors. [Relative Parts] Box Sensor, Box Lock Sensor. If the error is not resolved, change the above related part or parts.

Table A-4 LED Flash Reject Error Codes (Continued)

Online LED Color (Lit)	Offline LED Color (Flash Sequence)	Error	Causes and Solutions
Blue	Green (12)	Fraud Detection	The Side Sensor Level interval between before, and after, a Banknote has passed the Side Sensors is greater than the rated value. [Solution] Check that the following parts are properly assembled and/or Harness connected. Clean or adjust the following parts and Sensors. [Relative Parts] Side Sensor. If the error is not resolved, change the above related part or parts.
Blue	Green (13)	Banknote Length	The Line Sensors calculated a Banknote length longer or shorter than the rated value. [Solution] Check that the following parts are properly assembled and/or Harness connected. Clean or adjust the following parts and Sensors. [Relative Parts] Line Sensor. If the error is not resolved, change the above related part or parts.
Blue	Green (14)	2-Color Margin	The Line Sensors calculated that the 2-Color margin of a Banknote is greater than the rated value. [Solution] Check that the following parts are properly assembled and/or Harness connected. Clean or adjust the following parts and Sensors. [Relative Parts] Line Sensor. If the error is not resolved, change the above related part or parts.
Blue	Green (15)	Authentic Banknote Identity Error	Banknote rejected by the authentic Banknote validation process. [Solution] Check that the following parts are properly assembled and/or Harness connected. Clean or adjust the following parts and Sensors. [Relative Parts] Line Sensor. If the error is not resolved, change the above related part or parts.
Blue	Green (16)	3-Color Comparison	The Line Sensors calculated a 3-Color comparison that is greater than the rated value. [Solution] Check that the following parts are properly assembled and/or Harness connected. Clean or adjust the following parts and Sensors. [Relative Parts] Line Sensor. If the error is not resolved, change the above related part or parts.

Sensor Calibration Error

Sensor Calibration Error Code Formats

Table A-5 lists the Sensor Calibration error code formats.

Table A-5 Sensor Calibration Error Code Format

Sensor Calibration	Digit Number	Error Code Format
Validation Sensor [D/A Value, non-Paper]	18 digits	01-YYYY-YYYY-YYYY-YYYY*
Validation Sensor [with the Reference Paper]	18 digits	02-YYYY-YYYY-YYYY-YYYY*
Validation Sensor non-Paper	18 digits	05-YYYY-YYYY-YYYY-YYYY*
UV (Reflection) Sensor with paper	8 digits	03-000-000
UV (Transmissive) Sensor with paper	8 digits	04-000-000
UV (Transmissive) Sensor non-Paper	8 digits	06-000-000
Bar Sensor	8 digits	07-ZZ-ZZ-ZZ*
String Detection Sensor	8 digits	08-000-000
Positioning Sensor	8 digits	09-ZZ-ZZ-ZZ*

*. Refer to Table A-6 and Table A-7 for sensor flag values indicted in the “YYY-YYY-YYY-YYY” or ”zz-zz-zz” format.

Sensor Flag Values

Bar Sensor and Positioning Sensor Calibration Error

Table A-6 lists the Sensor Flag Values indicated in the "ZZ-ZZ-ZZ" format when the Bar Sensor or Positioning Sensor Calibration error occurs.

Table A-6 Sensor Flag Values (Bar Sensor or Positioning Sensor Calibration Error)

String	Sensor	Sensor Flag Value
INS	Entrance Sensor	00-00-01
WID_PO	Centering Sensor	00-00-02
FEEDOUT	Feed Out Sensor	00-00-04
STK_POS	Box Feed Out Sensor	00-00-08
BOX_FUL	Box Full Sensor	00-00-10
BOX_NFUL	Box Near Full Sensor	00-00-20
STK_HOM	Pusher Plate Home Position Sensor	00-00-40
STK_HAF	Pusher Plate Half-way Position Sensor	00-00-80
BOX_IN	Box Sensor	00-01-00
WID_HOM	Centering Mechanism Home Position Sensor	00-02-00
GS_INS_L	Shutter Unit Home Positioning Sensor (left)	00-04-00
GS_INS_R	Shutter Unit Home Positioning Sensor (right)	00-08-00
BOX_LOK	Box Lock Sensor	00-10-00
GS_HOME	Shutter Unit Home Positioning Sensor	00-20-00
BNF_INS	BNF Entrance Sensor	01-00-00
BNF_MID	BNF Assignation Sensor	02-00-00
BNF_REJ	BNF Reject Sensor	04-00-00
BAR	Bar Sensor	10-00-00

Validation Sensor Calibration Error

Table A-7 lists the Sensor Flag Values indicated in the "YYYY-YYYY-YYYY-YYYY" format when the Validation Sensor Calibration error occurs.

Table A-7 Sensor Flag Values (Validation Sensor Calibration Error)

String	Sensor Flag Value	String	Sensor Flag Value
dll_ore_ref	0000-0000-0000-0001	dl_ir_pen	0000-0000-0400-0000
dl_blu_ref	0000-0000-0000-0002	dc_irl_pen	0000-0000-0800-0000
dc_redl_ref	0000-0000-0000-0004	dr_ir_pen	0000-0000-1000-0000
dr_blu_ref	0000-0000-0000-0008	drr_nir_pen	0000-0000-2000-0000
drr_ore_ref	0000-0000-0000-0010	dll_ore_pen	0000-0000-4000-0000
dl_ir_ref	0000-0000-0000-0020	dl_nir_pen	0000-0000-8000-0000
dc_irl_ref	0000-0000-0000-0040	dc_irr_pen	0000-0001-0000-0000
dr_ir_ref	0000-0000-0000-0080	dr_nir_pen	0000-0002-0000-0000
dc_irr_ref	0000-0000-0000-0100	drr_ore_pen	0000-0004-0000-0000
dll_gre_ref	0000-0000-0000-0200	dll_gre_pen	0000-0008-0000-0000
dc_redr_ref	0000-0000-0000-0400	dl_ore_pen	0000-0010-0000-0000
drr_gre_ref	0000-0000-0000-0800	dc_redr_pen	0000-0020-0000-0000
ull_ore_ref	0000-0000-0000-1000	dr_ore_pen	0000-0040-0000-0000
ul_blu_ref	0000-0000-0000-2000	drr_gre_pen	0000-0080-0000-0000
uc_redl_ref	0000-0000-0000-4000	ull_ore_pen	0000-0100-0000-0000
ur_blu_ref	0000-0000-0000-8000	ul_blu_pen	0000-0200-0000-0000
urr_ore_ref	0000-0000-0001-0000	ur_blu_pen	0000-0400-0000-0000
uc_irl_ref	0000-0000-0002-0000	urr_ore_pen	0000-0800-0000-0000
uc_irr_ref	0000-0000-0004-0000	ull_nir_pen	0000-1000-0000-0000
ull_gre_ref	0000-0000-0008-0000	ul_ore_pen	0000-2000-0000-0000
ul_ir_ref	0000-0000-0010-0000	ur_ore_pen	0000-4000-0000-0000
uc_redr_ref	0000-0000-0020-0000	urr_nir_pen	0000-8000-0000-0000
ur_ir_ref	0000-0000-0040-0000	ull_ir_pen	0001-0000-0000-0000
urr_gre_ref	0000-0000-0080-0000	ul_ir_pen	0002-0000-0000-0000
dc_redl_pen	0000-0000-0100-0000	ur_ir_pen	0004-0000-0000-0000
dll_nir_pen	0000-0000-0200-0000	urr_ir_pen	0008-0000-0000-0000

Maintenance Equipment

This section provides product information for the TBV Maintenance Equipment.

Figure A-1 provides the Additional Maintenance Equipment Requirements for TBV Maintenance, and Table A-8 on page A-11 provides the related Additional Maintenance Equipment Parts Lists for the Additional Equipment.

TBV Maintenance Equipment

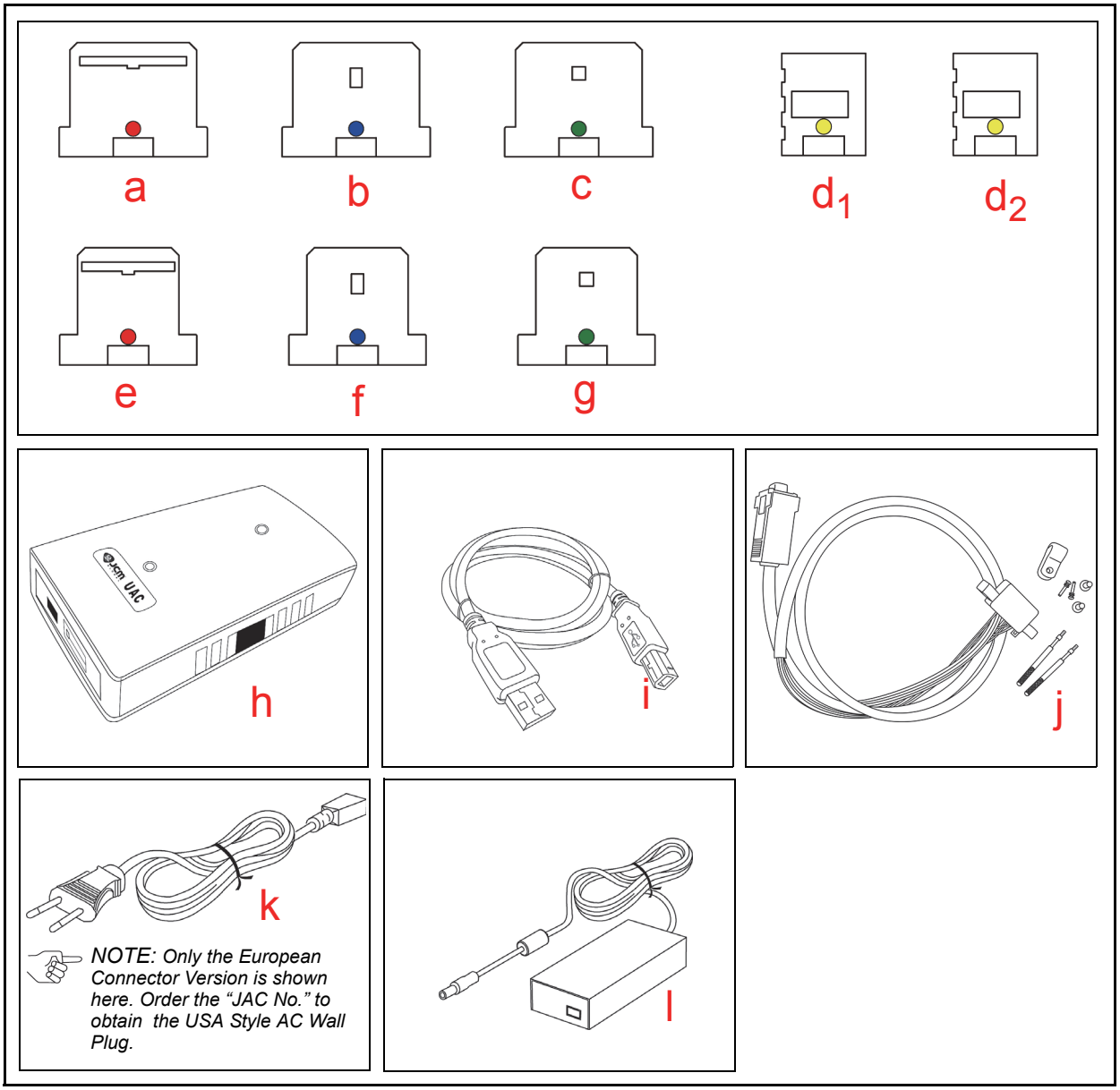

Figure A-1 Additional Maintenance Equipment Requirements

Table A-8 Additional Maintenance Equipment Parts Lists

Ltr.	EDP No.*	JAC No.	Description	Qty.	Remark
a	191048	N/A	Reference Paper (White: KS-073)	1	For TBV-100
b	191049	N/A	Reference Paper (White: KS-074)	1	For TBV-100
c	191050	N/A	Reference Paper (White: KS-075)	1	For TBV-100
d_1	191051	N/A	Reference Paper (White: KS-076)	2	For TBV-100
d_2	191051	N/A	Reference Paper (White: KS-076)	2	For TBV-101
e	191052	N/A	Reference Paper (White: KS-077)	1	For TBV-101
f	191053	N/A	Reference Paper (White: KS-078)	1	For TBV-101
g	191054	N/A	Reference Paper (White: KS-079)	1	For TBV-101
h	G00205	501-100218R	UAC	1	
i	G00230	400-100249R	UAC USB Cable	1	
j	G00262	40i-000026R	UAC iVIZION/TBV Harness (ID-003)	1	
k	G00213	302-100007RA	Power Cord	1	For AC Adapter
l	G00286	N/A	AC Adapter	1	For UAC

*. The product that includes a “G” in it’s EDP Number is a JCM-E product development.

Reference Paper Handling

All JCM Reference Paper should be handled as follows:

1. Do not allow the Reference Papers to endure high temperatures and/or high humidity environments.
2. Store unused Reference Papers in their original Shipping Container’s to avoid exposing them to direct Sunlight and/or bright indoor light. Ensure that the Reference Papers being stored are not damaged as they are replaced into their respective shipping containers.
3. Do not use Reference Paper containing damaged areas that are worn, dirty, wrinkled, distorted and/or discolored.
4. Use new Reference Paper for every 400 Units being calibrated. Incorrect calibration errors may occur when using Reference Paper that has been used for calibrating more than 400 Units.

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TBV® Series
Transaction Based Validator
Appendix B

B GLOSSARY

A

1 Anti-stringing Mechanism
a mechanism (optical, mechanical, or a combination of both designed) to prevent the unauthorized retrieving of Banknotes from a Cash Box – … 1-6

B

2 Bezel
a removable Plastic Assembly attached to the front of the Banknote Insertion Slot of a TBV Unit – … 1-2

3 BNF
an acronym for Bulk Note Feeder. A BNF is an assembly that separates a single Banknote from a stack of Banknotes fed into the entrance Bezel of the TBV Unit – … 2-1

C

4 Calibration
a process performed on electronic equipment which ensures that all circuits are properly aligned and operating at optimum levels. For TBV, calibration is accomplished using a software based program which checks and sets the operational reference levels for each sensor. This helps to ensure that the Unit operates with the highest Banknote acceptance rate possible. Calibration is recommended whenever the CPU Board, or one of the Sensor Boards are replaced – … 6-1

5 ccTalk
a Serial based Communication Protocol commonly used in control, electronic payment, and vending systems. Developed by Money Controls Ltd., the format enjoys widespread use throughout Europe. ccTalk is supported communications format in the TBV Unit – … 1-6

6 Centering Mechanism
a mechanical assembly designed to center Banknotes that enter the Validator at a skewed angle – … 1-4

7 Checksum
a numerical value assigned to data file or block of data (usually expressed in hexadecimal notation). Checksum values are used to verify that the contents of a data file are not corrupted in any way during transmission or encryption. The Checksum values of both the original and duplicate files are compared to each other. If the values match, then the duplicate file is considered to be acceptable. In instances where the Checksum values DO NOT match, it is recommended that the file be copied or encrypted again until the Checksums do agree technique, which is highly accurate and can detect data errors down to a single computer datum bit – … 6-4

E

8 E-Clip
a semicircular clip that resembles a capital “E” designed to fit onto a shaft groove to retain a component, or the shaft itself in place – … 4-1

9 EEPROM

an acronym for Electronically Erasable Programmable Read Only Memory. A form of non-volatile Read Only Memory (ROM) which can be both written to, and erased via electronic signals without the need to physically remove the IC from the Circuit Board on which it is installed. EEPROMS are often used to store system command instructions and reference data sets that are accessed on a frequent basis or when the equipment is first initialized – … A-5

10 Encryption

with respect to the TBV, encryption coding is used with the ccTalk Communications Protocol to enhance security of its transmitted data – … 2-2

F

11 FLD

an acronym meaning "with Feeder (BNF)", Less (e.g., without) Stacker & Down Stack Model Specifications – … 1-10

12 FSH

an acronym meaning "with Feeder (BNF)", with Stacker & Horizontal oriented Model Specifications – … 1-6

G

13 GLD

an acronym meaning "with a Gated designed Bezel" (for outdoor installation), Less (e.g., without) Stacker & a Down Stack Model Specifications – … 1-12

14 GSH

an acronym meaning "with a Gated designed Bezel" (for outdoor installation),with Stacker & Horizontal oriented Model Specifications – … 1-8

H

15 Host Machine

a generic term used to refer to any electronic cabinet, equipment, or platform into which a TBV Unit will be installed. The Host Machine provides both the supply power and the communications interface necessary for proper operation of the TBV Unit – … 1-2

L

16 LED

an acronym for Light Emitting Diode. An LED is Semiconductor Device which when turned on, emits a signal output in the visible light range. Available in a variety of colors, LEDs are cost effective and are commonly used as Indicator Lights in a variety of equipment devices. LED are also available in the invisible light range (i.e., ultraviolet, near-infrared etc.) making them useful as operational indicators for a variety of electronic equipment and applications, such as Banknote Validation Circuit in the TBV Unit – … 1-1

M

17 Magnetic Sensor

a Sensor used to detect the Magnetic Ink present on certain Banknote denomination types – … 2-15

P

18 Photo-Coupler

a method of increasing safety to both the equipment and personnel by isolating and routing transmitted data signals vie using a Light Emitting Diode (LED) and Photosensitive Transistor combination circuit in various electronic equipment devices – … 1-6

19 Pictograph

small internationally recognized safety and attention symbols placed to the left Notes, Cautions and Warnings throughout a JCM Maintenance Manual – … 1-1

20 Precautions

a set of special instructions and warnings provided to the user in JCM Maintenance Manuals. When read and properly followed, they are intended to endure personal safety and prevent unnecessary equipment damage when working with the applicable JCM Product – … 1-2

R

21 Radio Button

a term used as reference to an On-Screen selection Button (usually circular in shape) which can be selected or deselected by clicking on it with a Computer Mouse. Radio Screen Buttons are frequently used in desktop based application to allow the user to enable or select specific program functions or features – … 6-7

22 RC232C

a common serial data communication standard protocol – … 1-6

23 Reference Paper

specially coated/colored paper strips which are inserted into a Banknote Validator when performing the TBV Unit Calibration. Reference Paper is used to help set minimum and maximum thresh hold detection levels when calibrating the Photo-optical sensors in the unit for optimum performance – … 6-5

S

24 Special Notes

notes provided to alert the reader to specific information which often affects the operation of the Unit within JCM Maintenance Manuals. The notes are provided throughout the Manual, and are identified by the pictograph of a small hand pointing to the word “NOTE”. Special Notes are always written in italic text – … 1-1

T

25 TBV

an acronym for Transaction Based Validator – … 1-1

V

26 Validation

in Banknote Validators (such as the TBV Unit), identifies the process of drawing a Banknote into the Unit and then uses various Sensors to read and determine the authenticity of the Banknote based on the comparison of collected readings to a set of reference data stored in memory – … 1-4

27 Validator

a piece of electronic equipment designed to accept and validate the authenticity of Banknotes used in automated cash transactions and vending operations. The validation process involves evaluating data received from Sensors within the Unit. Validation techniques are constantly being improved in order to thwart the efforts of would-be counterfeiters. Newer validation technologies employ the use of CMOS Photo-imaging Sensors to obtain even more accuracy and security. JCM Global is a World Wide recognized leader on the field of Banknote Validation – … 1-1

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