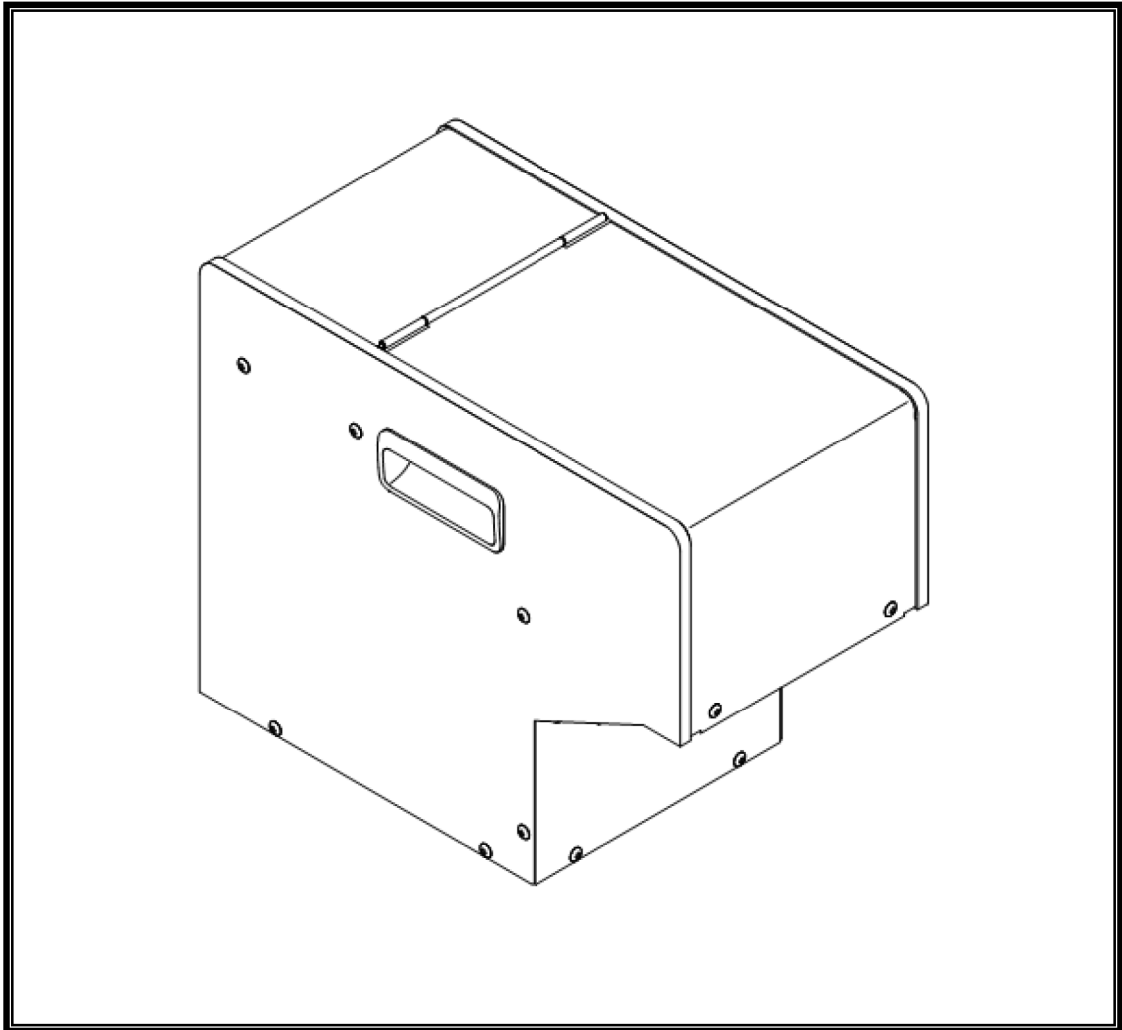


Linear type screw feeder

FF/FM502H, 801H

Supplementary electrical manual



NITTO SEIKO CO., LTD. Industrial Machinery Division

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1. Introduction

This manual describes supplementary electrical explanation of our linear type screw feeder “FF/FM502” and “FF/FM801H”. The main contents are similar to the manual of “502H series”. For how to handle the feeder mechanically, refer to a separate operation manual.

2. History and type of the feeder

(1) Specification list

Type (FF/FM)	Main specification
502H/801H	Built-in control board Hopper automatic stop function (SUNX sensor) Screw shortage output Auxiliary hopper actuation circuit FF specification: Input 100 VAC 24–100 VAC/DC multi-Input from Mar., 1987 onward

(2) Difference between FM and FF specifications

The specifications of FM (Feed Mat) and FF (Feeder alone) are almost the same; however, there is a slight difference in the input and control methods of the screw feed signal. The following shows the specification difference:

FM specification feeder

It is used in combination with a hand-held screwdriver with a single shaft. Screws are fed by means of the back-and-forth motion of the screwdriver.

- Input signal: 3P-connector, No-voltage 1C (1a, 1b) contact input
- Operating time: Set by the built-in timer.

FF specification

It is mainly used in combination with an automatic machine, which requires interlocking/free operation while the feeder is in operation. It is actuated by an external voltage input, and its operating time is also controlled by the input time of the signal.

- Input signal: 2P are used of 5P-connector, Voltage input with the voltage shown in the table in Clause (1).
- Operating time: According to input signal time

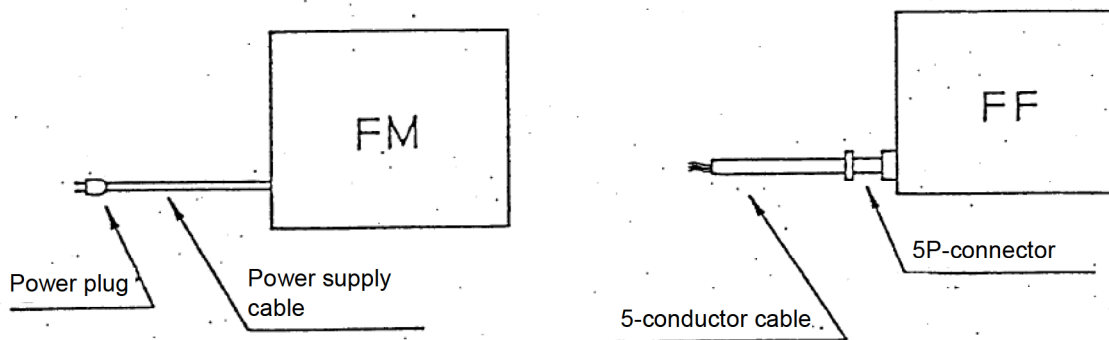
As described above, since the input signal type and wiring are common to FM and FF, they are interchangeable only by replacing the connector except for special specification. However, care must be taken to the following points for replacement:

- 1) The voltage of the power supply to be used should be correct.
- 2) In the case of FF, the input signal voltage should match the voltage at the control side.
If the signal is DC at the control side, only the multi-input type feeders can be used.

3. Specification of voltage and signal

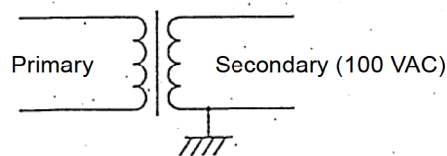
(1) Voltage

Although the power supply voltage is 100 VAC by standard, a transformer is incorporated in special cases (115, 200, 220, or 240 V). So, check the specified power supply voltage before connecting the power.



5P pin number	Wire color	Description
1	Green/Yellow	Ground/Connected to feeder main unit
2	Yellow (Red)	Power supply/No polarity
3	White (Black)	Screw feed signal
4	Black (White)	24–100 VAC/DC multi-input (No polarity)
5	Red (Yellow)	Power supply/No polarity

Since the feeder main unit vibrates, it is isolated using rubber foot. Furthermore, for feeders with a built-in transformer, the secondary side of the transformer is grounded and connected to the ground terminal as shown in the figure for safety purpose. Be sure to connect a ground wire to prevent a current-leakage accident.



★ Power supply maximum current

FM/FF502H: 100 VAC 0.7 A or less

FM/FF801H: 100 VAC 1.0 A or less

If an auxiliary hopper is used, the current for hopper is added to the above currents.

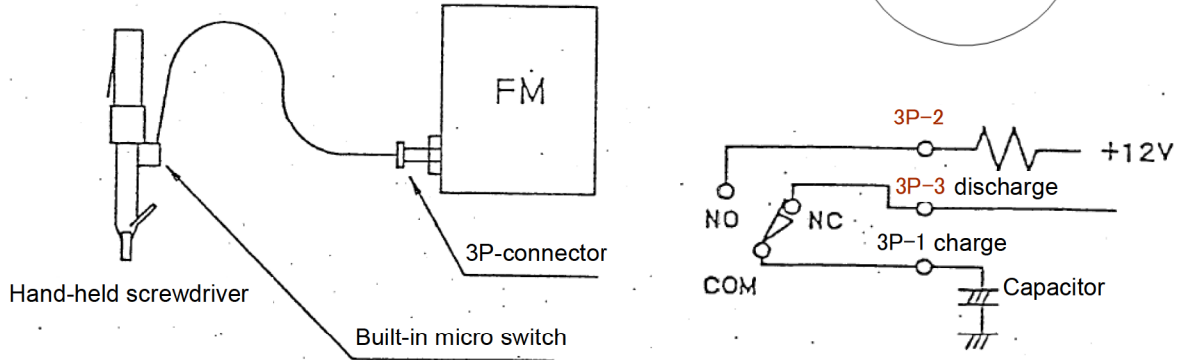
Caution: If the auxiliary hopper can be driven directly by the feeder control circuit, the maximum current for 100 VAC specification (without transformer) should be 1.0 A or less. (Refer to another clause for other voltages than 100 V.)

Pin arrangement of the feeder main body side screw feed signal input connector (receptacle) seen from the outside.

(2) Screw feed signal

FM specification feeder

As shown in the figure, the electrolytic capacitor is charged (momentarily) and discharged (timer setting) by means of the contact input to generate the feed signal.



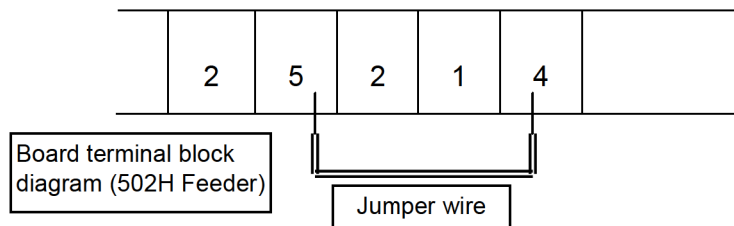
Use the volume (Feeding Time) on the panel to adjust the feed time.

<<Failure check>>

[1] How to check solenoid valve failure

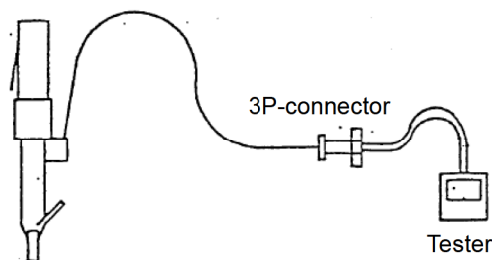
Check the solenoid valve using its manual lever.

If the check by manual lever is OK, perform an electrical check as follows:



Short-circuit the 5 and 4 with power turned ON, and check the operation of the solenoid valve.

[2] Check which is faulty, the board or the signal system.

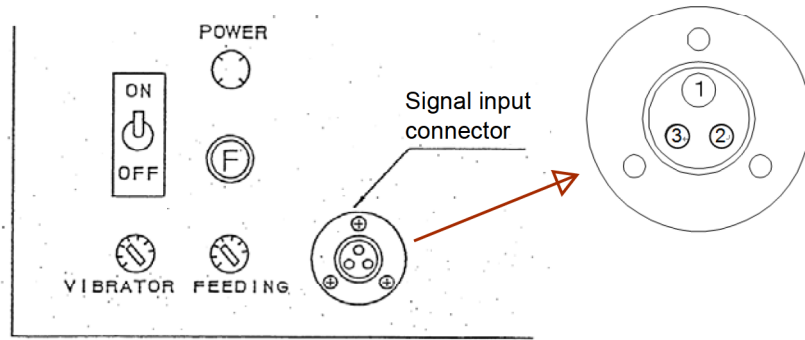


While measuring the resistance of the 3P connector pins with a tester as shown in the figure, move the screwdriver forward and backward to see if the switch is turned ON and OFF.

- When screwdriver returns: 3P-1 and 3P-3 are electrically connected.
- When screwdriver operates: 3P-1 and 3P-2 are electrically connected.

[3] Check the operation of the board.

Pin arrangement of the feeder main body side screw feed signal input connector (receptacle) seen from the outside.



First, short-circuit the pins [1] and [3] of the signal input connector. (Instantaneous short-circuit will do.)

Short-circuit the pins [1] and [2] continuously.

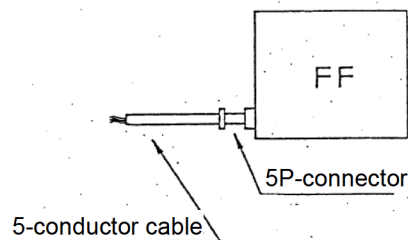
The solenoid valve operates for a certain time if the internal board is correct.

(If the pins [2] and [3] are short-circuited, the solenoid valve stays on while the short-circuit continues.)

With the above check, a judgment can be made which is faulty, the solenoid valve, control board, or signal cable.

FF specification

The feeder is actuated while an external voltage is applied through a 5P-connector as shown in the figure.



5P-3: White (Black)
5P-4: Black (White)
There is no polarity even when a DC is input.

As to the input voltage, multi-input is enabled only if a label stating "AC/DC multi input 24–100 V" is attached. Otherwise, only 100 VAC input is enabled. Therefore, 100 VAC can be input to any types; however, 24 VDC can be input only to multi-input types.

★ Multi-input types: 502H, 801H

Those produced in Mar., 1987 onward.

→ The multi-input label is attached to the rear side of the main unit.

<<Input signal current>>

• Multi-input: About 4 [mA]

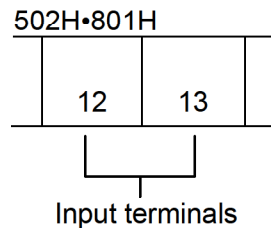
Leak current at OFF state should be 1 mA or less. Otherwise, malfunction may occur.

• Other than multi-input: About 15 [mA]

The voltage is applied to the internal 100 VAC relay (Omron G2C-212PV).

In the case of FF specification, feeders can be added easily because of voltage input type. All the feeders can be connected in parallel to a single screw feed signal.

Note: The input signal is connected to the internal terminal block on the board through the 5P connector.



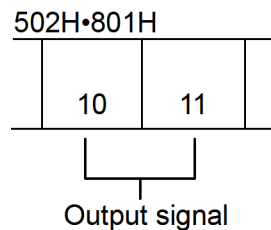
(3) Screw shortage signal

It is output from the photoelectric switch on the chute rail if no screws are placed in a line on the chute rail for a certain time. It is fixed to 25 sec by default. However, in the case of multi-input types, the timer for the signal can be set to about 5 sec by removing the jumper, which sets it to 25 sec, from the control panel.

If the timer is set to 5 sec, adjust the time by using an external timer or so, with consideration given to machine cycle, specification (the shortage time varies depending on whether the screw-taking method is 1pc-taking or 2pc-taking), and the use-frequency of the screw.

The output signal, a non-voltage contact output of a relay, is output to the following terminals.

Contact capacity: Inductive load COS=0.4
110 VAC, 2 A 24 VDC, 2 A



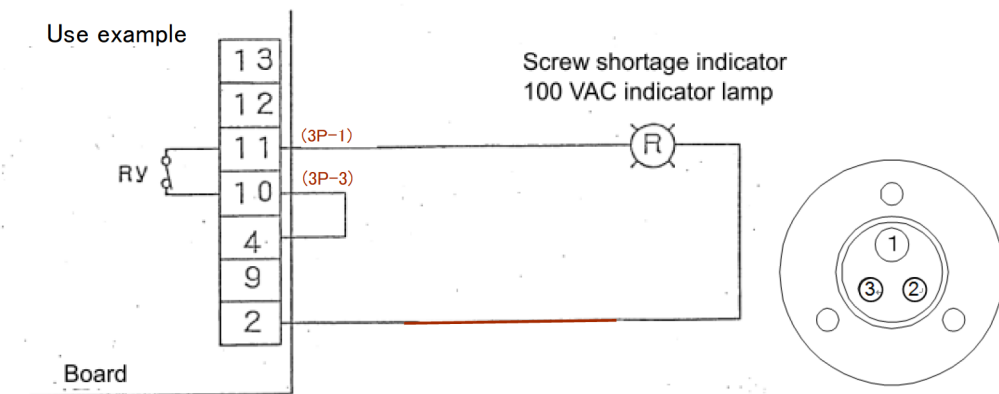
<<Option>>

1: The screw shortage signal can be drawn using a 3P connector.

(3P connector [1]-[3])

2: It can be output as a screw shortage signal for inside the basket. However, in this case, a screw detector for inside the basket must be used. This setting change can be made using the jumper terminals on the control board. However, selectable signal is either of the following signals.

- Screw shortage signal output for on the chute rail: A jumper short circuit
- Screw shortage signal output for inside the basket: B jumper short circuit



Pin arrangement of the feeder main body side screw shortage signal output connector (receptacle) seen from the outside.

4. Control description

(1) Screw feed solenoid valve

[Driven by 100 VAC internal triac]

As to the time required to send a screw to the tip of the chuck, and the time required to divide and drop a screw, adjust those times through the screw feed signal input time for the FF specification and the volume (FEEDING TIME) on the panel for the FM specification.

<<Failure check>>

[1] Measure the voltage between the solenoid valve connection terminals (5) and (4) with a tester.

- When screw feeding is in operation: About 0 V
- When screw feeding stops: About 100 V

[2] To check if the solenoid valve is actuated, short-circuit the (5) and (4), and check the operation of the solenoid valve. If the voltage between the (5) and (4) do not change (100 VAC ⇔ 0 VAC) even when the input signal is input correctly, the control board is faulty. Replace the board.

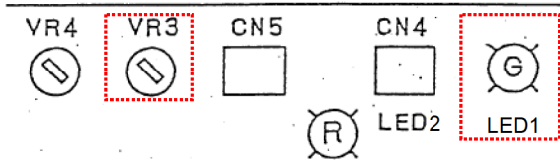
(2) Hopper motor

[Driven by 100 VAC internal triac]

The photoelectric switch on the chute rail actuates the hopper if screws are not detected for a certain time (about 3–4 sec). The hopper stops automatically after screws arrive if the photoelectric switch is turned off for a certain time.

<<Failure check>>

- [1] Measure if 100 VAC is applied between the hopper motor terminals (2) and (7).
- [2] To check if the motor is actuated, short-circuit the (7) and (4), and check if the motor rotates.



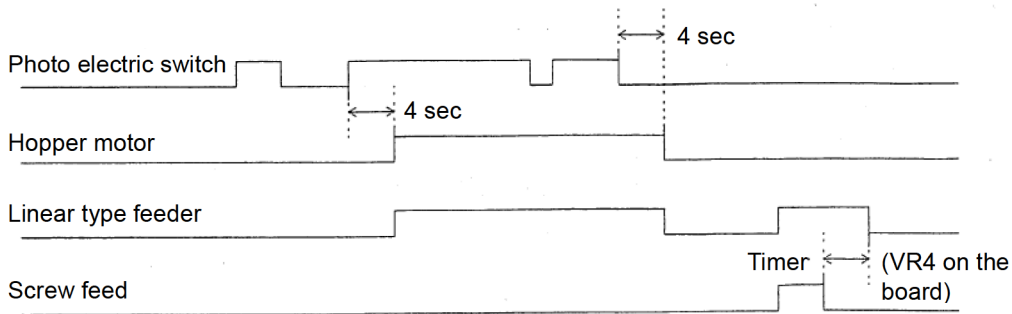
The left figure illustrates the board supporting a photoelectric sensor RT-4104. In the case of a board supporting a photoelectric sensor EX-11EA, the part inside the broken line is not used.

Caution: The feeder behaves as if the photoelectric switch was turned on, so that the hopper motor and the linear type feeder are actuated, if the optical receiver (CN5) of the photoelectric sensor is removed and the CN5-1 and CN5-2 are short-circuited. (LED2 lights up.)

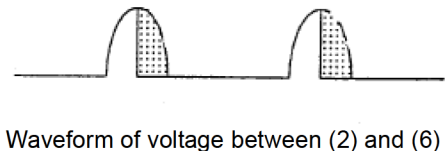
(3) Linear type feeder

[Half wave phase control by 100 VAC internal triac]

The linear type feeder is actuated when the hopper motor starts or the screw feeding starts.



The linear type feeder is turned on at the same time as screw feeding starts. The OFF delay time after the completion of screw feeding can be adjusted with the VR4 on the control panel. To adjust the intensity of the linear type feeder, use the VIBRATOR on the panel surface.



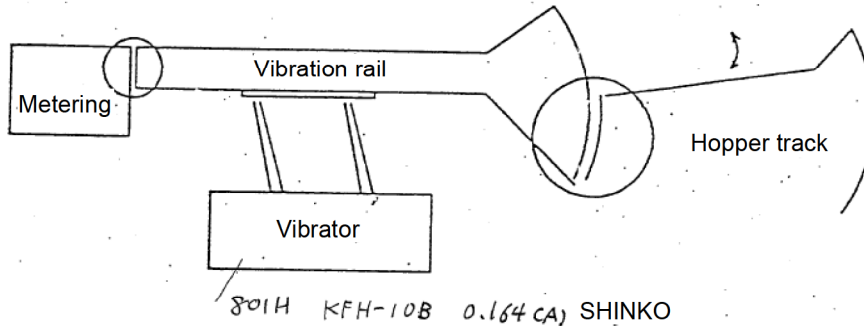
Waveform of voltage between (2) and (6)

Measurement of voltage between connection terminals (2) and (6) of the linear type feeder
 VR-0 Left About 10 V
 VR-H Right About 80 V
 Measurement: Analog type AC voltage meter (Digital type is not allowed)

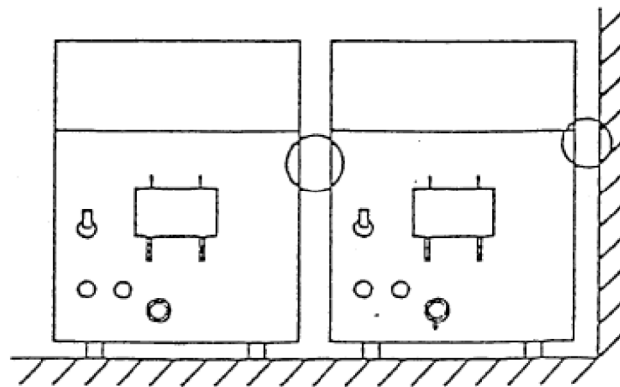
<<Failure check>>

- [1] Decrease in and stop of vibration due to foreign materials entering into between vibration rail and fixed portion.

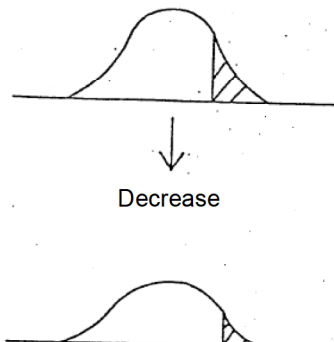
Since the gap between the vibration rail and its joint is very narrow as shown in the figure, vibration may occur if screws or chips enter.



- [2] Since vibration transfers to the case of the feeder main unit, the main unit is isolated from other devices using rubber foot so as not to be affected if those devices are in contact with the main unit. If a feeder and another feeder or the main unit and another device come in contact with each other, resonance or decrease in vibration may occur. Be sure to keep an adequate distance from each other.



- [3] When particularly small screws (2 mm or less) are using, vibration should also be adjusted at low position. If the decrease in power supply voltage is 10%, the decrease in actual vibration may become about 30–40%, almost stopping vibration.



Since phase control is performed, the ON state width becomes narrow due to delayed firing if the voltage drops. With further voltage drop, the power supply voltage is decreased more widely than that of actual voltage drop, causing excessively weak vibration.

- [4] The vibration adjusting volume board is connected to the control board with a connector. So, poor contact of the connector stops the vibration. The vibration also stops if the volume is faulty. If this is the case, check the positions where the vibration stops and does not stop by turning the volume.

Although the above causes are likely, controller failure can also be the cause of the vibration failure. Measure the voltage between the connection terminals (2) and (6) of the linear type feeder with an analog tester to check if correct voltage is output. The voltage varies as the position of the volume varies. If the voltage is 10 V or less and does not vary even when the volume is turned, the control board may be faulty. In this case, replacement is required. If vibration stops although the voltage is correct, mechanical problems [1] and [2] are likely to be the causes. Perform a mechanical check. (General use voltage ACV measured value: 30–60 V)

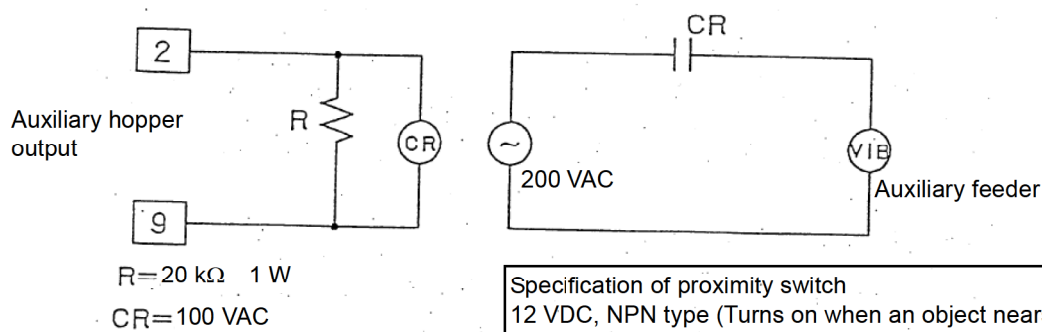
Adjust the vibration to 50/60 Hz basically, by adjusting the volt to change the gap.

(4) Auxiliary hopper (Option)

[Driven by 100 VAC internal triac]

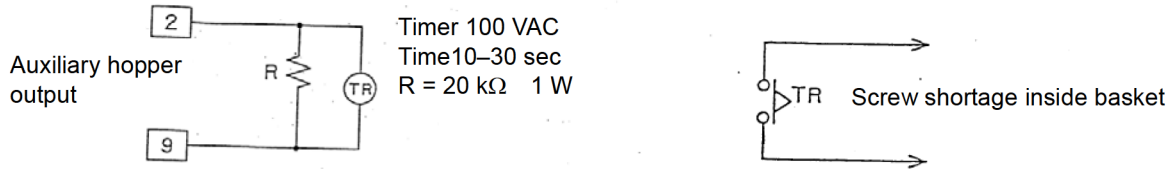
A proximity switch is installed inside the basket. When the amount of screw is decreased exceeding a certain level, the auxiliary hopper adds the screws to the certain level automatically.

- a) Objects that can directly drive the auxiliary hopper
 100 VAC specification auxiliary hopper: 100 VAC/1.0 A at maximum
(Caution: An object using an internal transformer can't be used because of insufficient transformer capacity.)
- b) Others
 Use a relay for those other than for 100 VAC as shown in the figure below.



Specification of proximity switch
 12 VDC, NPN type (Turns on when an object nears.)
 Current consumption 10 mA at maximum (Internal 12 V capacity)

Note: To take out the inside basket screw shortage signal, make a setting for “inside board” and “jumper B” (Jumper A for “on chute rail”). However, output for both “inside basket” and “on chute rail” is disabled. In this case, add the following circuit to take out the signal.



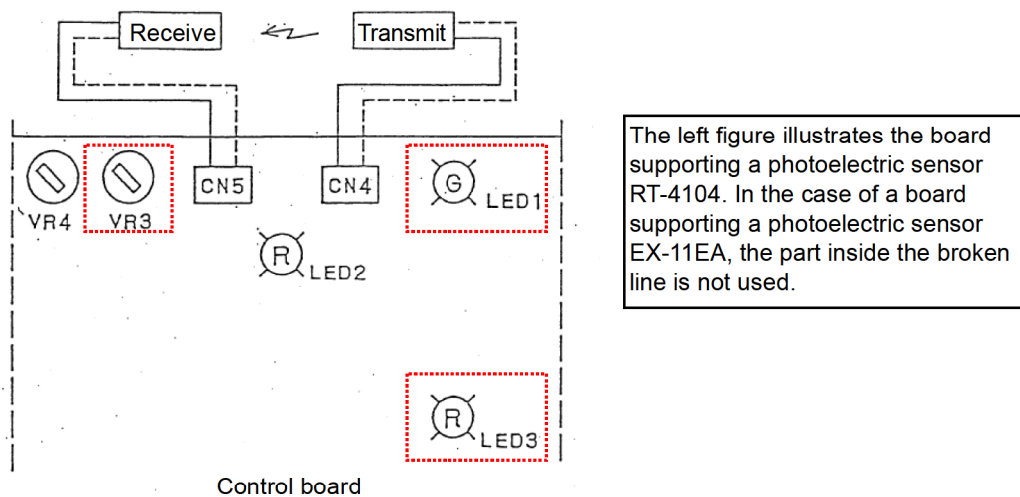
(5) Photoelectric switch to detect screws on chute rail

Sensor type: Other SUNX types than the following can't be used.

Photo transmitter } RT-4104 or EX-11EA (Those shipped in Oct., 2002 onward)
 Photo receiver }

Note: Since the RT-4104 is no longer produced, it needs to be replaced with EX-11EA if fails. However, the fixing plate and control board are not exchangeable. So, it is impossible to replace the sensor alone.

The sensor and the control board must be replaced at the same time. For more information, contact our sales personnel.



LED1 (G): Monitors photo transmitter actuation. Blink - Correct. If the monitor is not lit, the cause may be photo transmitter failure, wire break, connector failure, or circuit failure.

LED2 (R): Turns ON when it receives light.
 (It also turns ON when the optical receiver is removed from the connector.)

LED3 (R): Turns ON during screw feeding (Multi-input type)

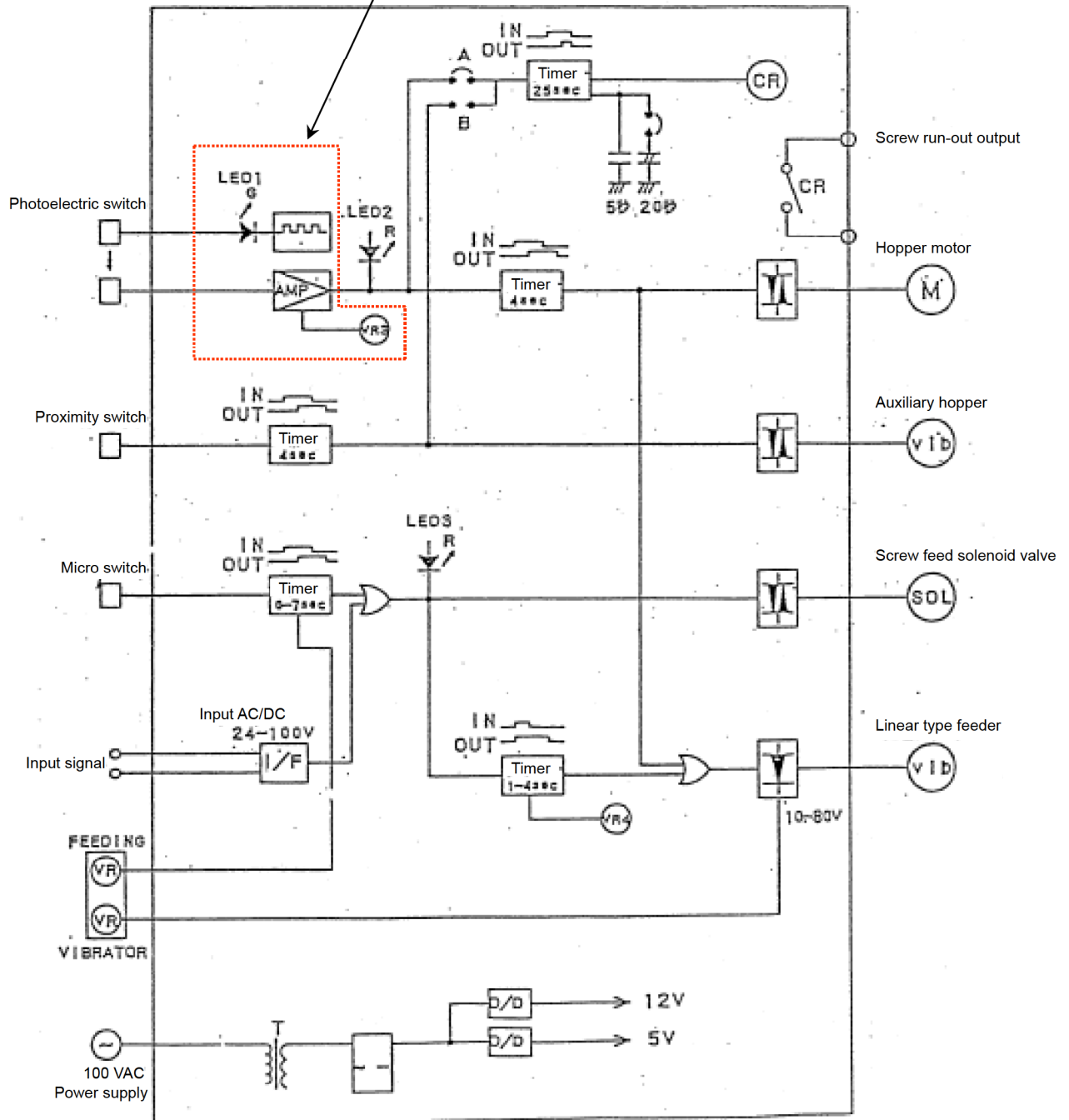
VR3: Sensitivity adjusting volume for photoelectric sensor

VR4: Delay adjusting volume for actuating linear type feeder

Check if LED1 (G) and LED2 (R) are turned off to check the operation of the photoelectric sensor. When checking the operation by the photoelectric switch, allow for the timer as described above.

5. Block diagram

- Used in the case of RT-4104.
- Not used in the case of a board supporting the amplifier-built in photoelectric sensor EX-11EA



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Dear customer,

We appreciate for your purchasing our product. Please carefully read this instruction manual to use the product correctly.

When you need parts for this product, please order referring the parts list which is the later half of this instruction manual.

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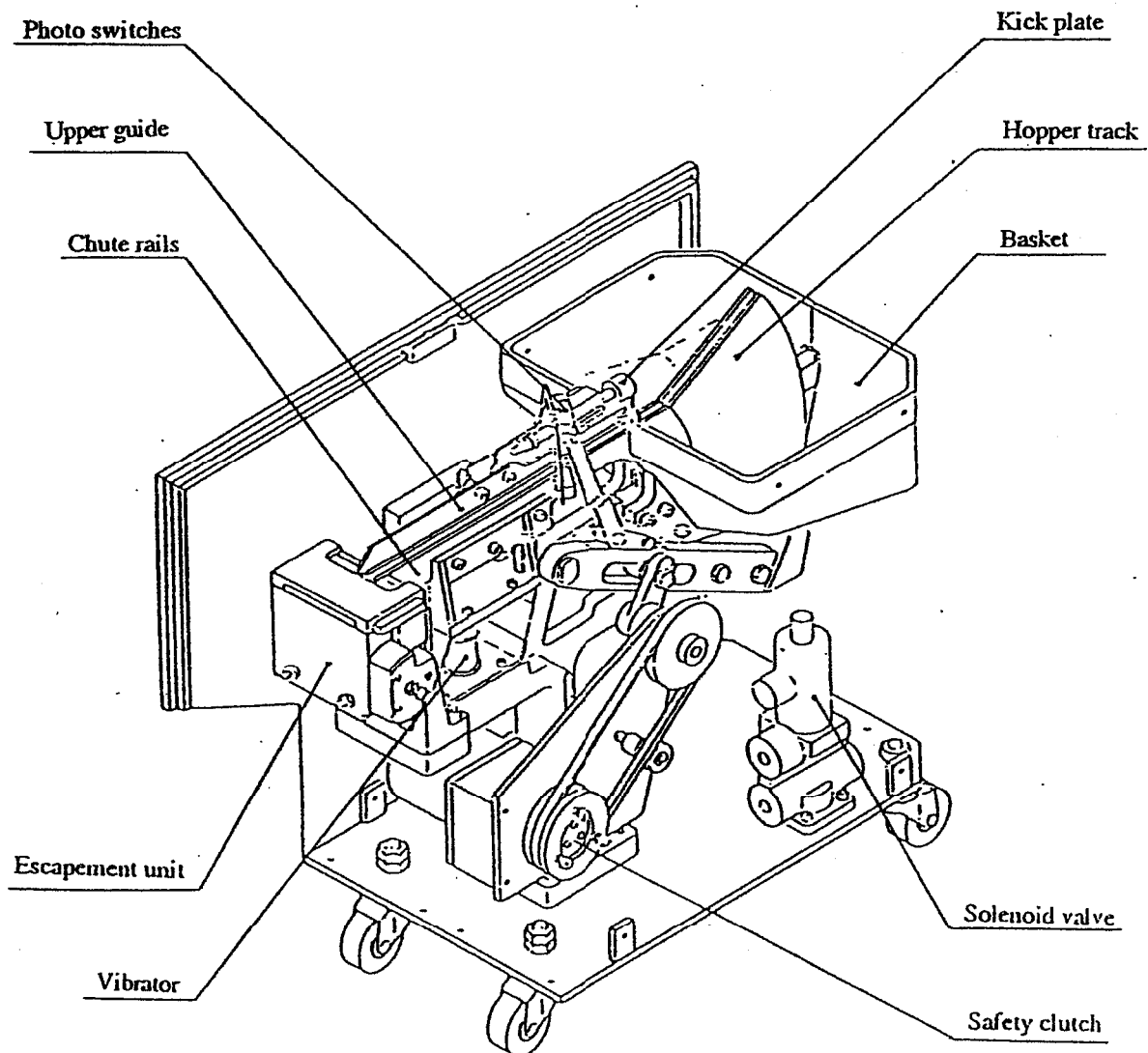
A. Outline of vibratory track screw feeder

The electric-motor-driven oscillating hopper track scoops up screws in the basket and feeds them to the escapement unit through the chute rails mounted on the horizontal vibratory track. The escapement unit blow-feeds one or two screws to the driver unit or the chuck unit with compressed air through the screw feeding hose(s) when a screw feeding signal is given.

The vibratory track screw feeder is divided into two models—① FM801H and ② FF801H. Explanation on each model continues from next page.

[Internal mechanism]

* Explanatory drawing of FF801H model



B. Vibratory track screw feeder models

The vibratory track screw feeder is divided into two models—① FM801H and ② FF801H.

① FM801H model:

A hand-held driver unit is combined with this model for manual screw driving. Air motor type and electric motor type hand-held driver units are prepared.

② FF801H model:

This model is used as a screw feeding device for automatic machines. Therefore FF801H model is offered only as a screw feeder and no hand-held driver unit is combined with.

Model and outline of vibratory track screw feeders:

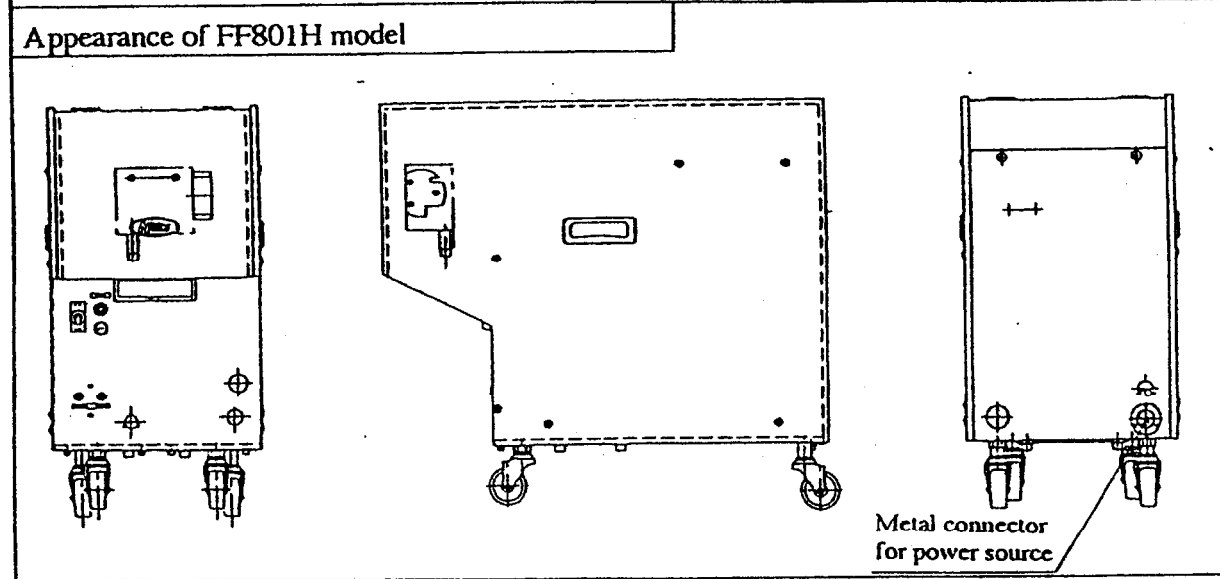
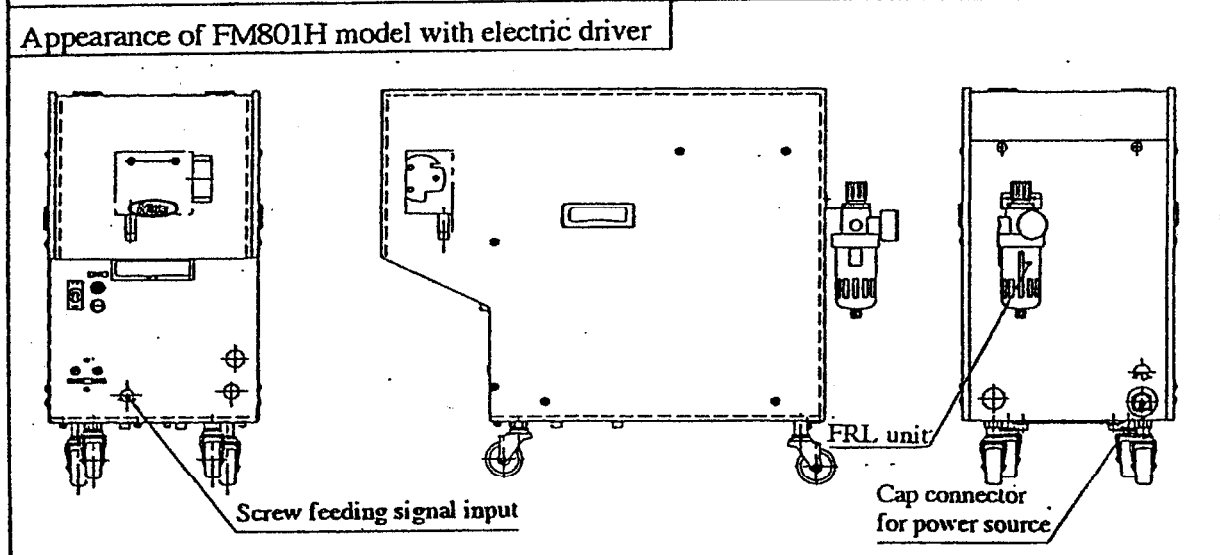
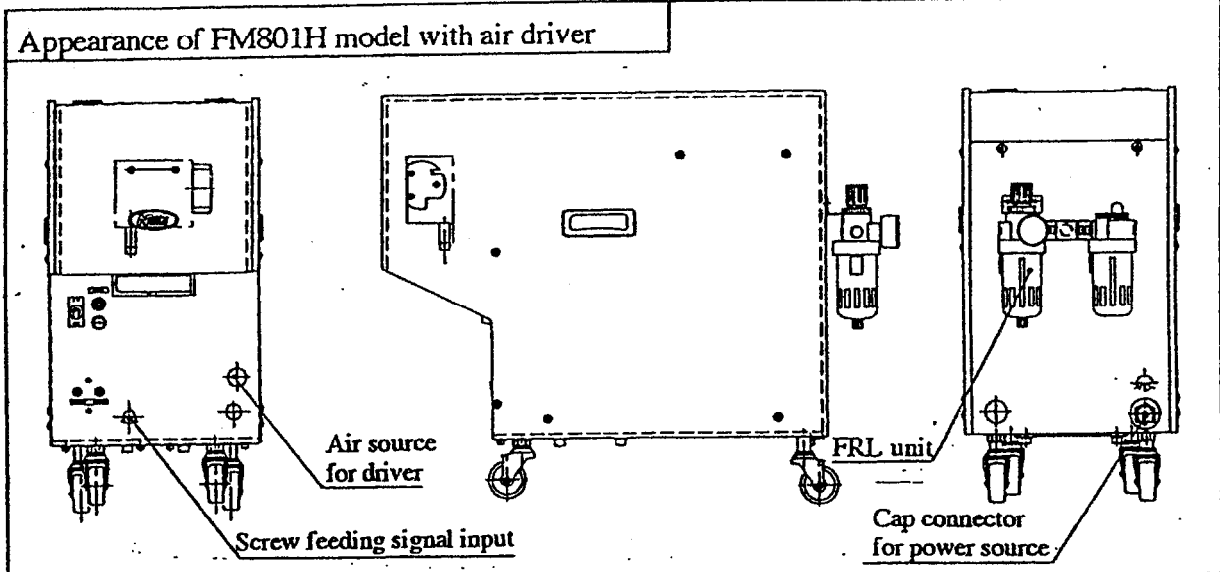
	Model	Type	Specification	Escapement	Hand-held driver unit	Miscellaneous
1	FM801H	Single-spindle Feedmat type combined with a hand-held driver unit	Air driver spec. (Standard)	Single escapement	Air motor type driver	FRL unit attached
2			Electric driver spec.		Electric motor type driver	FR unit attached
3	FF801H	Multi-spindle Feedmat type used as an automatic machine		Dual escapement		

[Notes]

① This instruction manual explains with drawings of the standard vibratory track screw feeder. Depending on the actual specifications for the customer, the appearance, etc. of the machine may differ from this instruction manual.

② For improvement, vibratory track screw feeder may be modified without notice.

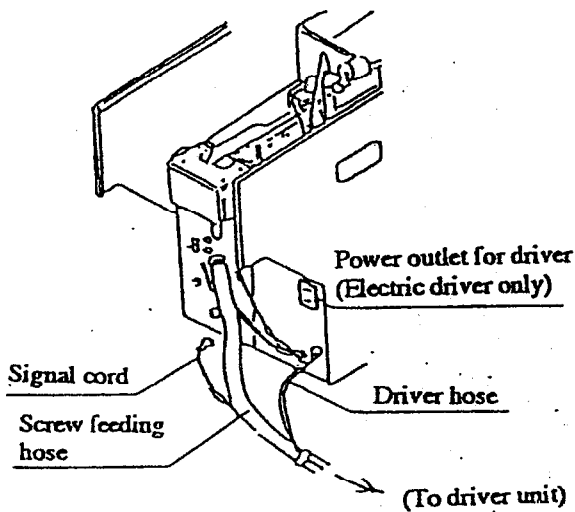
Appearance of machines (FM801H and FF801H models)



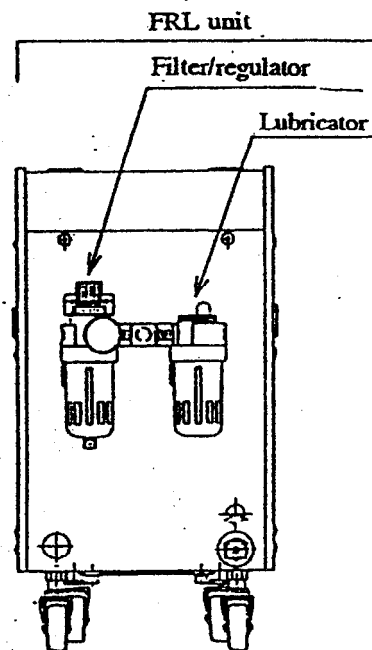
C. Installation of vibratory track screw feeder

[1] Installation of FM801H model (single-spindle Feedmat type)

- (1) In case that a driver unit is attached, connect the screw feeding hose, the signal cord and the air hose from the air driver to the machine. If the customer's machine uses an electric motor type driver unit, connect the power cord for the electric motor to the power outlet on the front panel of the machine.
- (2) Connect the air hose of this machine to the air source. Standard air pressure is 0.4~0.5 MPa.
- (3) Connect the power cord to the power source. Also connect the ground cord to the ground terminal. Refer to the electrical control diagrams on page 21 and 22.
- (4) Adjust the air pressure regulator knob of the FRL unit so that the pressure gauge indicates 0.3~0.4 MPa.

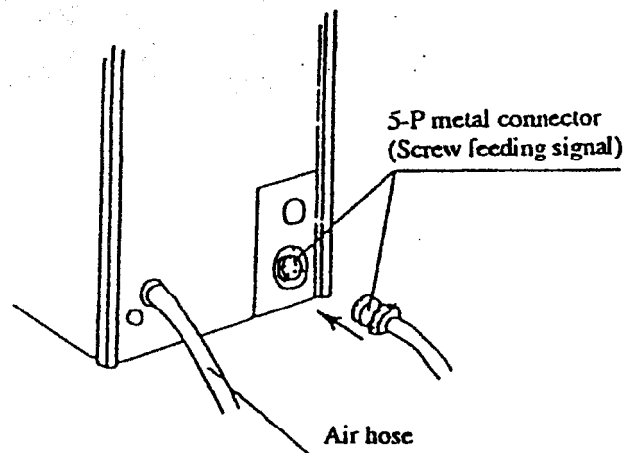
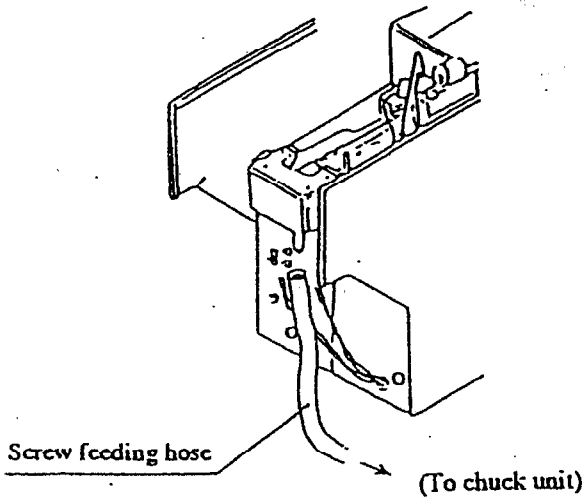


Drawing shows hand-held air driver spec.
Lubricator is not attached in case of hand-held electric driver spec.



[2] Installation of FF801H model (multi-spindle Feedmat type)

Connect the 5-P metal connector, the air hose and the screw feeding hose(s) to the main machine.

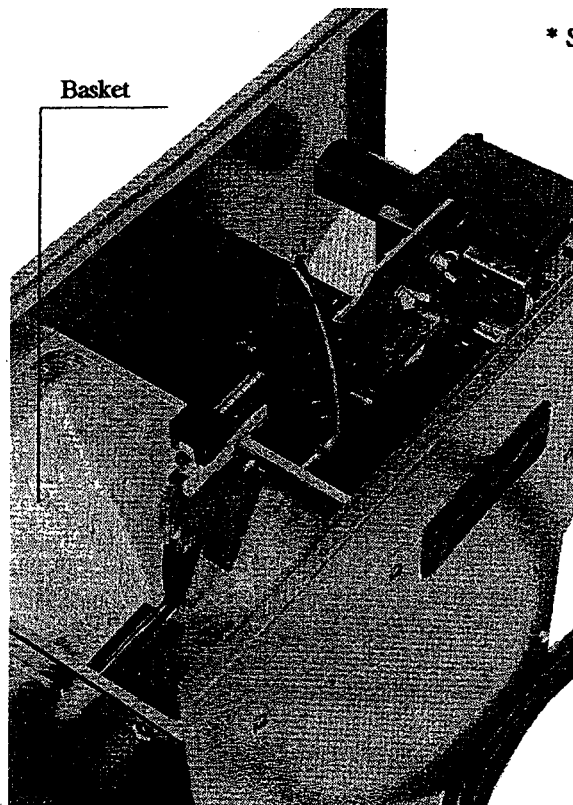


D. Operation of vibratory track screw feeder

- [1] Remove the plastic cover.
- [2] Turn on the power switch. The hopper track will start oscillating.
- [3] Supply screws in the basket.

[Notes]

- ① Make sure to confirm that the specifications of screws (screw size, etc.) are equal to the specifications at the time of machine order.
- ② Do not supply screws more than the upper surface of the partition board in the basket. Excessive amount of screws will cause troubles.



* Supply screws in basket.

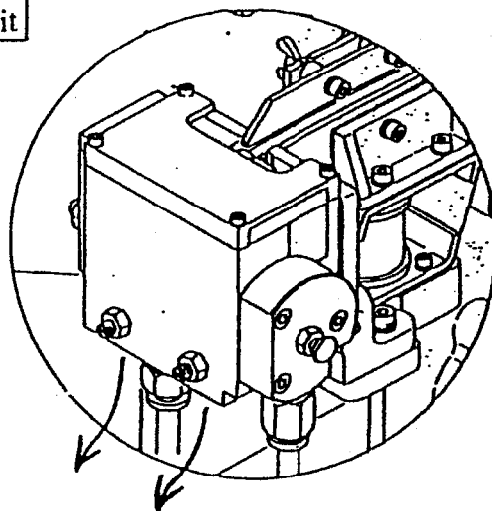
- [4] The oscillating hopper track scoops up the screws in the basket and advances them to the chute rails.
- [5] The vibratory track horizontally transfers the screws to the escapement unit.

[6] When a screw feeding signal is given, one or two screws are escaped from the chute rails, fall into the screw feeding hose(s) through the escapement unit and blow-fed to the chuck unit by compressed air. The table below describes screw feeding signal.

Way to give a screw feeding signal:

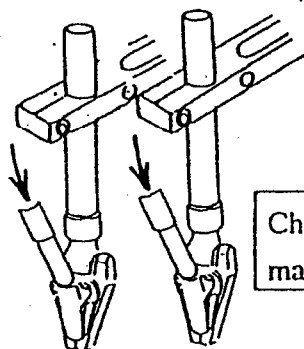
FM801H Single-spindle Feedmat type	When the driver unit is contracted and expanded again, the escapement unit operates and blow-feeds a screw.
FF801H Multi-spindle Feedmat type	When the screw feeding button on the operation panel of the main machine is pressed, the escapement unit operates and blow-feeds screw(s). FF801H can be optionally equipped with a screw feeding button on the front panel for feeding one or two screws manually.

Escapement unit



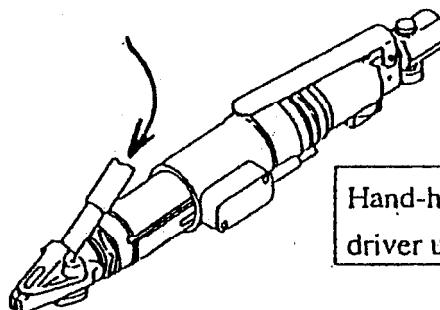
(Screw feeding hose)

(Screw feeding hose)



Chuck units of main machine

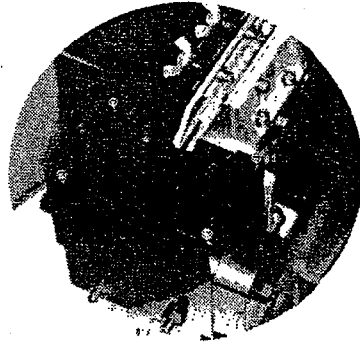
(Screw feeding hose)



Hand-held driver unit

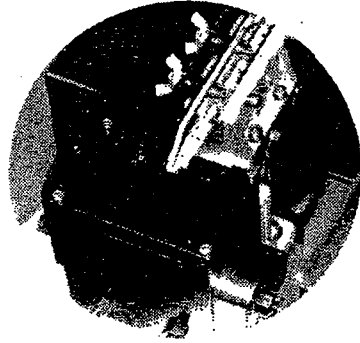
* Examples of standard combination are shown above. Depending on the specifications, the combination may differ from the drawing.

Operation sequence of escapement unit

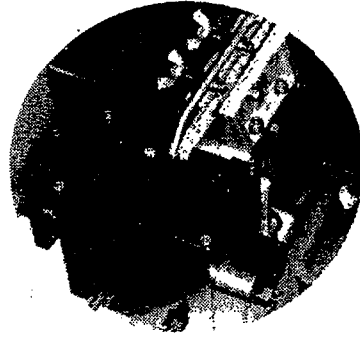


* This is a dual escapement type. When this escapement unit is used as a single escapement, screws fall into right side hole only. Therefore, screw is not transferred during steps ② and ③.

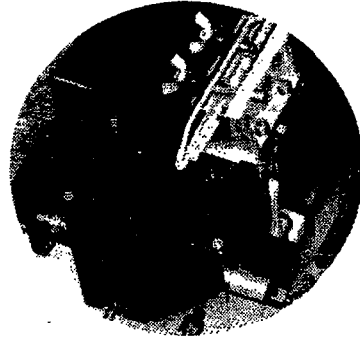
① Screws are transferred on the chute rails.



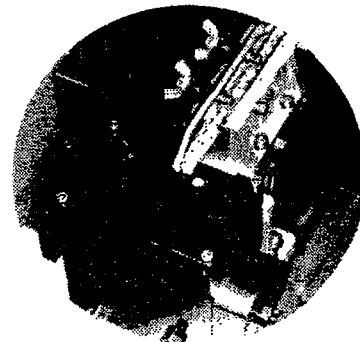
② A screw enters in the screw catcher.



③ When a screw feeding signal is given, the escapement unit opens and the screw is transferred leftward.



④ When the escapement fully opens (left end,) the transferred screw falls into the hole. Simultaneously, the next screw enters in the right screw catcher.



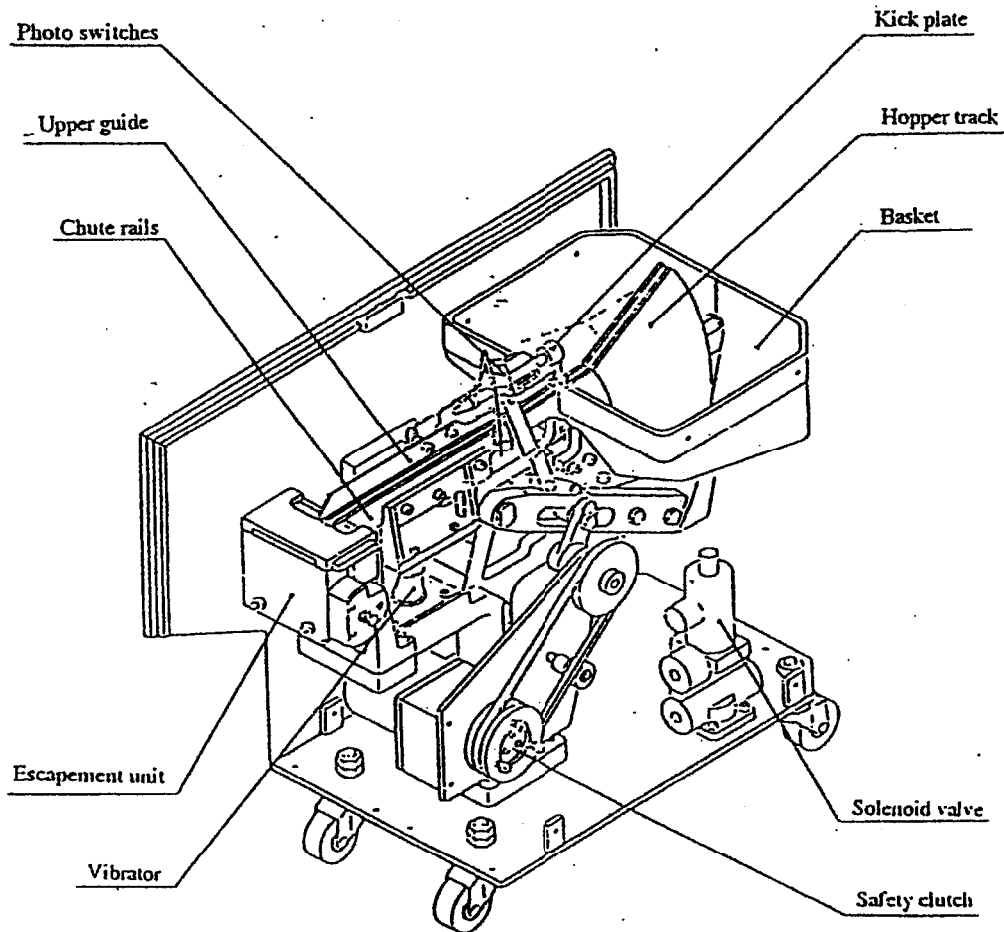
⑤ The escapement unit contracts. The right side screw is transferred rightward and falls into the hole when the escapement fully contracts.



Repeats from the step ②.

E. Inspection and adjustment of each part

Although we have executed trial operation and adjustment of the machine before shipment, re-adjustment may be necessary after running it for certain time period. If so, refer to respective instructions in this chapter and re-adjust the machine.

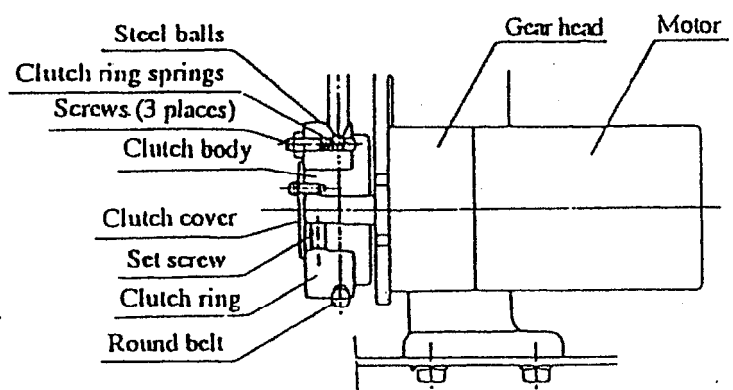


[1] Safety clutch

When the oscillating hopper track is depressed downward, it stops movement as the safety clutch slips. When the depressing force is removed, the hopper track oscillates again.

* When the hopper track is overloaded during oscillating, the safety clutch slips to prevent damage. If the safety clutch slips too often (slips at relatively low load,) it can be corrected by tightening 3 screws.

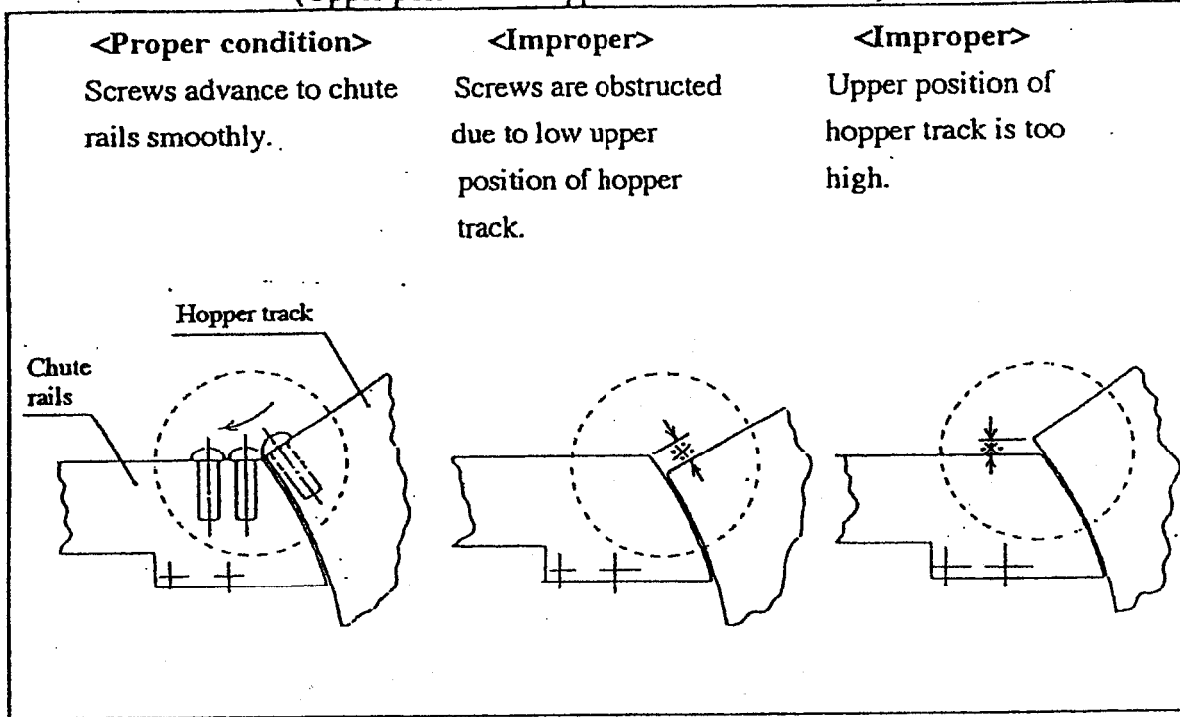
<Safety clutch mechanism>



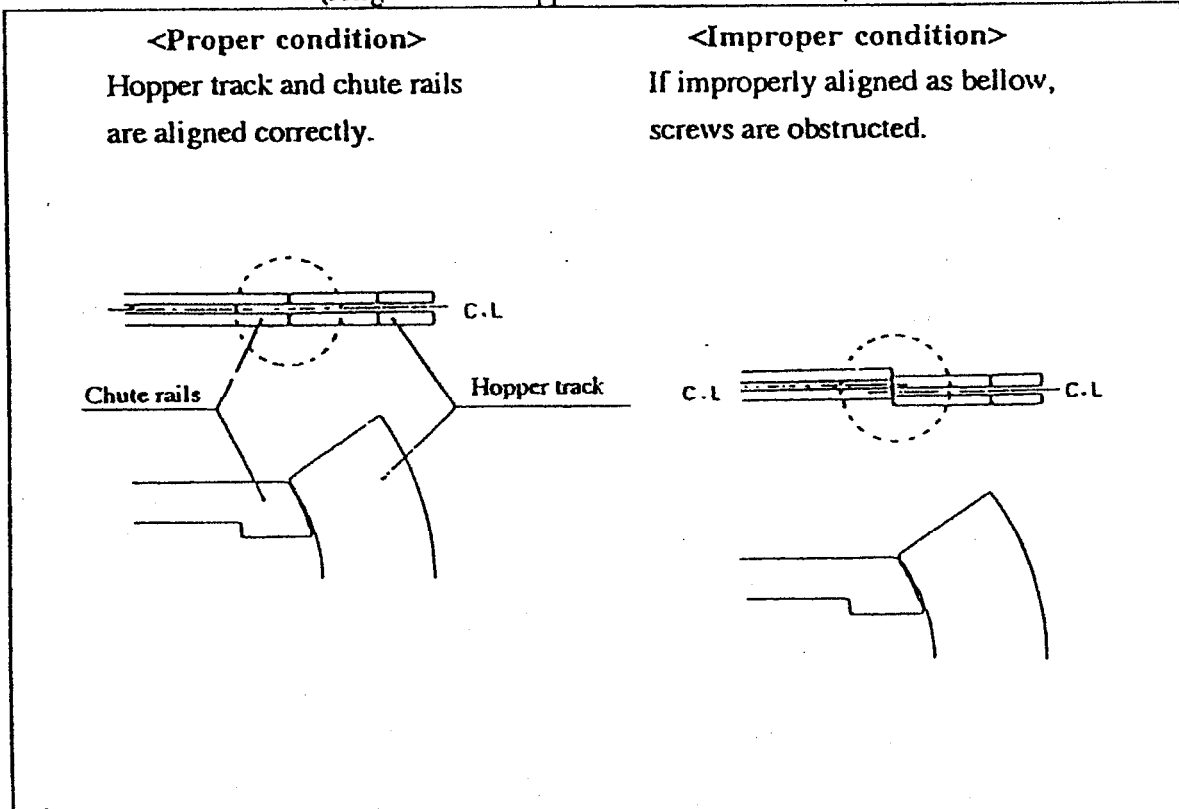
[2] Hopper track and chute rails

Each part has to be correctly assembled to ensure that the oscillating hopper track scoops up screws in the basket and advances them to the chute rails properly.

(Upper position of hopper track and chute rails)



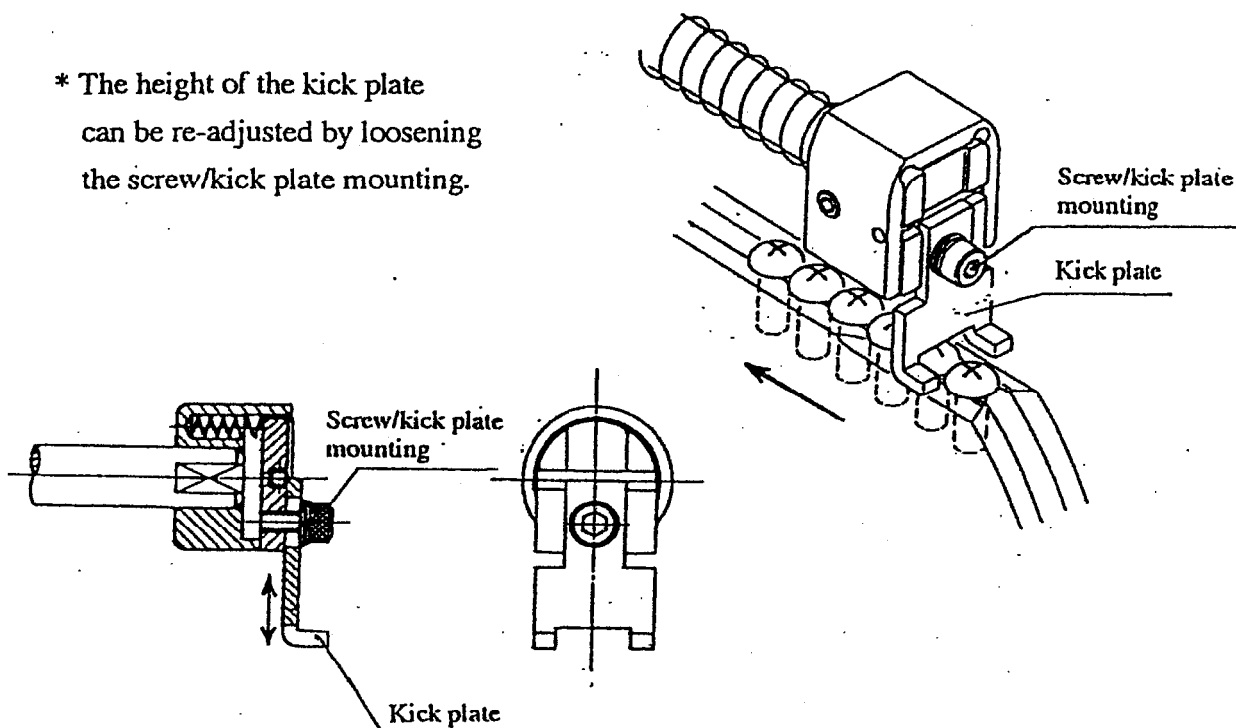
(Alignment of hopper track and chute rails)



[3] Kick plate

The kick plate assembly allows only screws of correct posture to advance to chute rails.

* The height of the kick plate can be re-adjusted by loosening the screw/kick plate mounting.



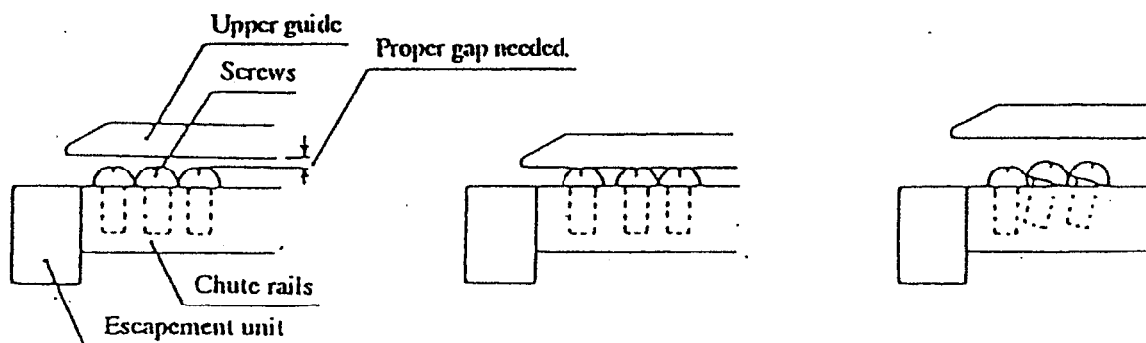
[4] Chute rails and upper guide

Adjust the height of the upper guide so as screws advance smoothly.

<Proper condition>
 Proper gap between head of screws and upper guide allows screws to advance smoothly.

<Improper condition>
 Too low upper guide obstructs advancement of screws.

<Improper condition>
 Too high upper guide causes overlapping of screw heads causing jamming.

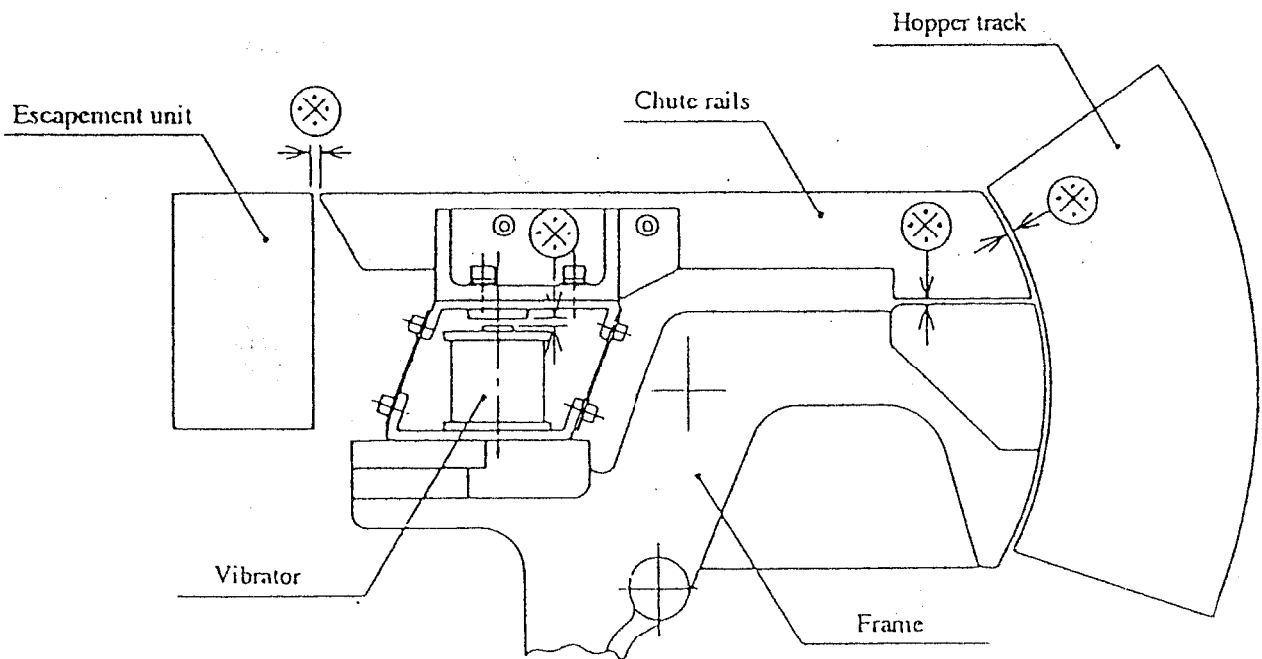


[5] Chute rails and vibrator

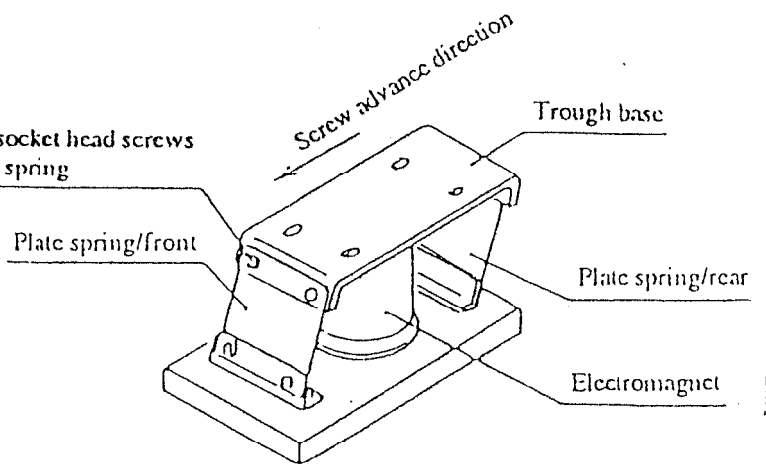
The vibrator vibrates the chute rails to force screws on the chute rails advance forward by the vibration. Proper vibration of the chute rails is most important to ensure smooth advancement of screws.

<Location of each part related to vibration of vibrator>

Vibrator, chute rails, escapement unit, hopper track and frame are assembled as shown below. To obtain proper vibration of the chute rails, each gap (marked as ⊗) must be correctly maintained.



As the chute rails are mounted on the trough base, the position of the chute rails moves when the trough base is lifted. When fixing the trough base, be careful to keep the chute rails aligned correctly to prevent further troubles.



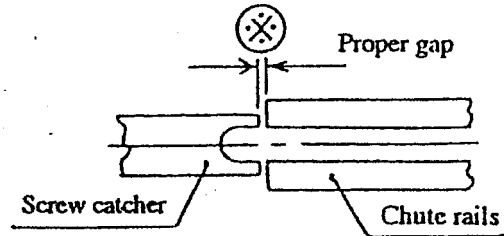
<Vibrator>

[6] Chute rails and escapement unit

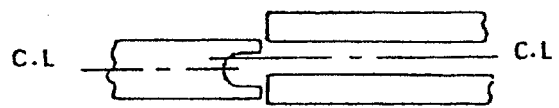
Chute rails and escapement unit must be correctly aligned to ensure screws on the chute rails enter the screw catcher and transferred into the escapement unit smoothly.

<Alignment of chute rails and screw catcher>

Proper condition
Chute rails and screw catcher
are aligned correctly.

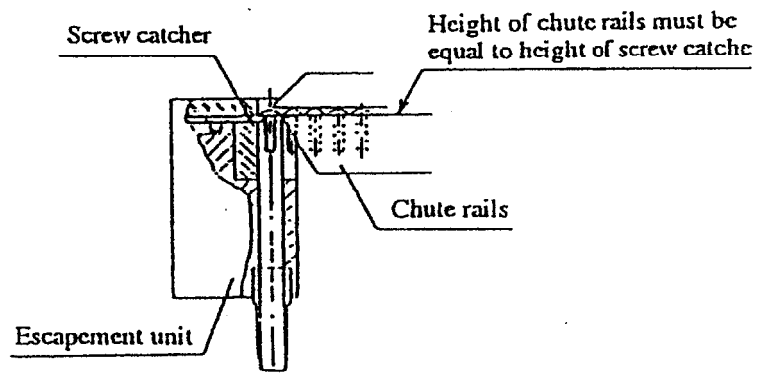


Improper condition
Chute rails and screw catcher
are mis-aligned.



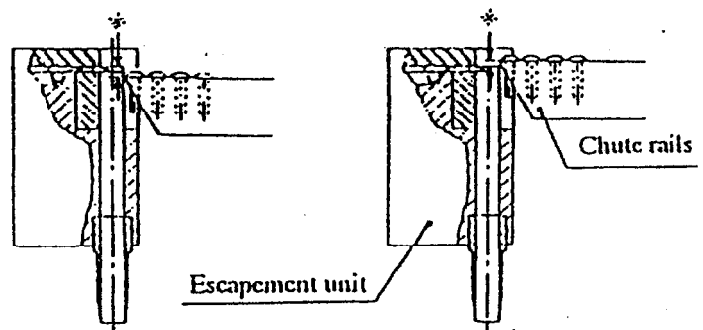
<Height of chute rails and screw catcher>

Proper condition
Screws advance smoothly when the
height of the chute rails is equal to
the height of the screw catcher and
the escapement unit is correctly
attached without inclination.



Improper condition
Screws are obstructed when the
escapement unit is attached too
high or too low or inclined.
If so, correct the position of
the escapement unit.
(Avoid difference in the height
of chute rails and the screw
catcher as drawings right.)

(Chute rails are too low.) (Chute rails are too high.)



(After above re-adjustment, execute trial screw feedings of the escapement unit. To avoid later occurrence of mis-alignment, firmly tighten screws to fix the escapement unit.)

[7] Escapement unit

- (1) Adjust opening and closing speed of the escapement unit with the cylinder needle or the speed control valve attached to the escapement unit.

<Adjustment of opening and closing speed of escapement unit>

Direction to turn cylinder needle or speed control valve	Opening and closing speed of escapement
Clockwise	Slower speed
Counter clockwise	Faster speed

- (2) Adjust screw feeding time — time to blow feed screws from escapement unit to chuck unit or hand-held driver unit — with the screw feeding timer on the front panel of the machine. (Refer to explanation of the screw feeding timer on page 16.)
- (3) If not only screw feeding time but also screw feeding speed has to be re-adjusted to obtain a satisfactory condition, turn the feeding needle attached to the escapement unit.

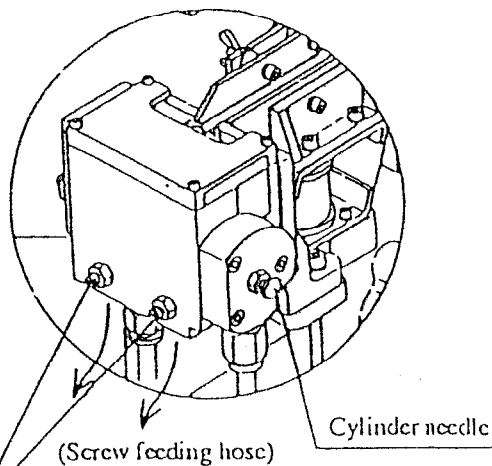
<Adjustment of screw feeding speed>

Direction to turn feeding needle	Screw feeding speed
Clockwise	Slower speed
Counter clockwise	Faster speed

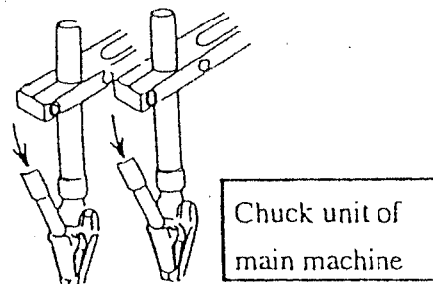
- (4) Adjustment of screw feeding air pressure

In case of FM801H model, screw feeding air pressure can be adjusted with the pressure regulator of the FRL unit behind the machine.

Escapement unit

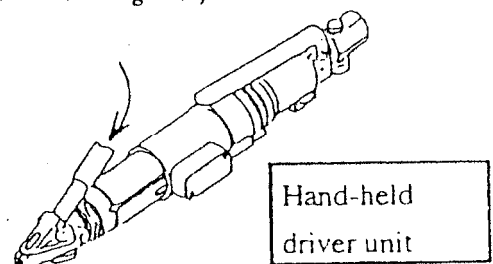


Feeding needle



* In case of single escapement, adjust right screw only. In case of dual escapement, adjust both screws.

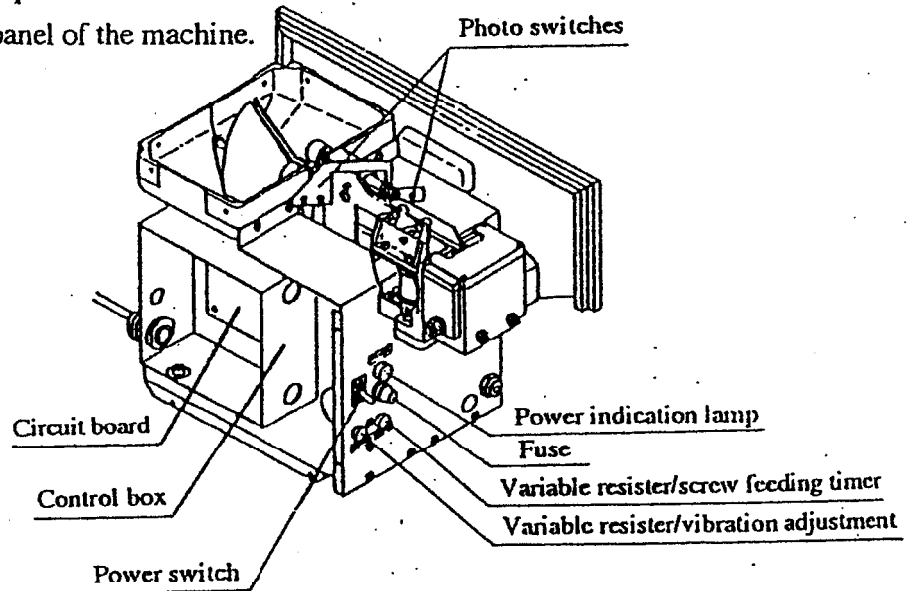
(Screw feeding hose)



[8] Electrical control

(1) Front panel of machine

Although each part is already adjusted before shipment, if re-adjustment of vibration or screw feeding time is necessary, turn the respective variable resistor on the front panel of the machine.

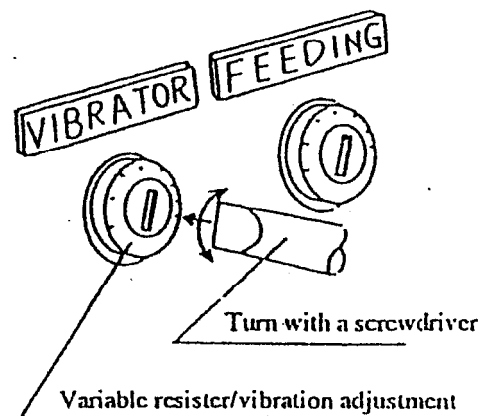


Vibration adjusting variable resistor

Screw advancement speed on the chute rails varies by adjusting the vibration amplitude of the vibrator. Turn the vibration adjusting variable resistor to obtain proper vibration.

Direction to turn	Vibration of vibrator	Screw advancement speed
Clockwise	Stronger	Faster
Counter clockwise	Weaker	Slower

Note: Avoid too strong vibration by which screws jump on the chute rails as this may cause screw feeding error of the escapement unit.



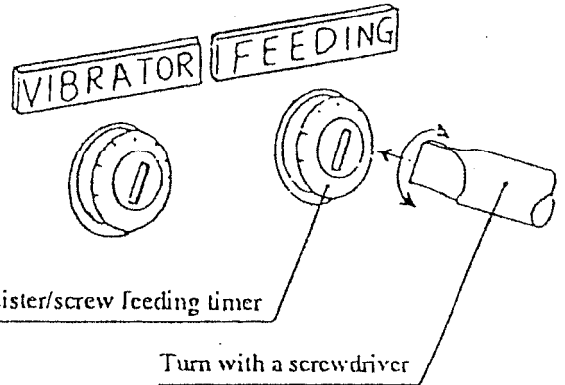
Screw feeding timer

FM801H model

In case of FM801H model, screw feeding time varies by adjusting the screw feeding timer.

Direction to turn	Screw feeding time
Clockwise	Longer
Counter clockwise	Shorter

Note: Proper screw feeding time varies depending on size of screws, air pressure, hose diameter, etc.
Adjust the screw feeding time little longer than the time in which screw reaches the chuck unit.



FF801H model

In case of FF801H model, screw feeding timer is included in the main machine control. Refer to the circuit diagram and adjust the respective timer.

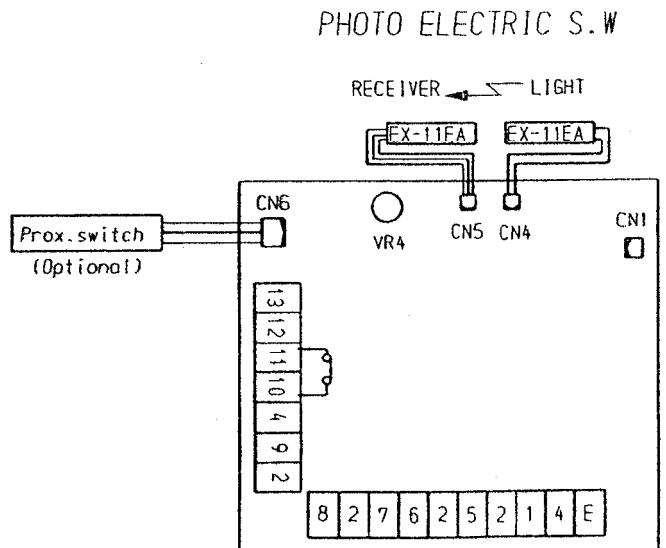
(Although variable resistor for screw feeding time is attached to this model, it is not functional.)

(2) Circuit board in control box

VR4: Variable resistor to adjust vibration time of vibrator

Direction to turn	Vibration time
Clockwise	Longer
Counter clockwise	Shorter

Note: Refer to the time chart for details on VR4 adjustment.



CN1: In case of FM801H (single-spindle Feedmat type,) screw feeding signal is received by this connector.

CN6: Proximity switch for auxiliary supply hopper is connected to this terminal.

<No-screw alarm function>

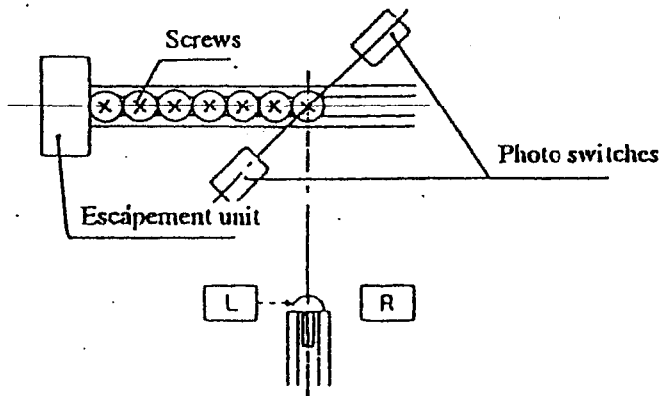
The controller outputs no-screw alarm signal when screw is not fed to chute rails for a certain time period due to no screw in basket or jamming at the entrance of chute rails (when photo switches do not go off for approximately 30 seconds.)

Use the terminal No. 10 and 11 on the circuit board to obtain no-screw alarm signal.

(3) Photo switches

- ① Hopper track automatically stops oscillating when screws accumulate to the position of the photo switches as fig. A. The hopper track starts oscillating again to feed screws when screws on the chute rails are consumed and there is no screw between photo switches as fig. B.

[Fig. A]

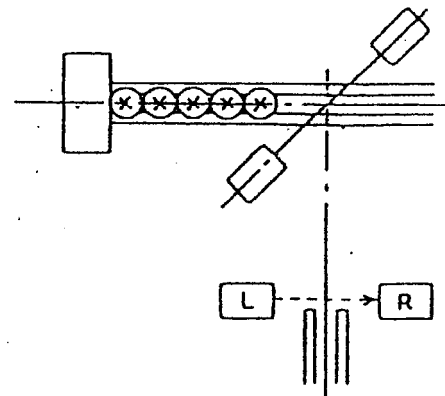


Screws have fully accumulated to the position of photo switches.
(Photo switches go off; LED goes off.)



Hopper track stops oscillating.

[Fig. B]



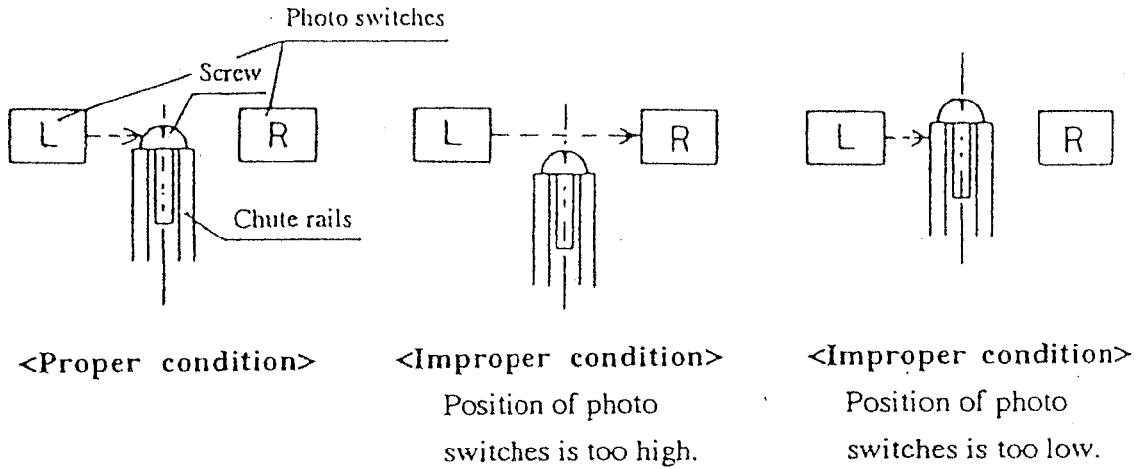
Screws have not accumulated to the position of photo switches.
(Photo switches go on; LED goes on.)



Hopper track oscillates.

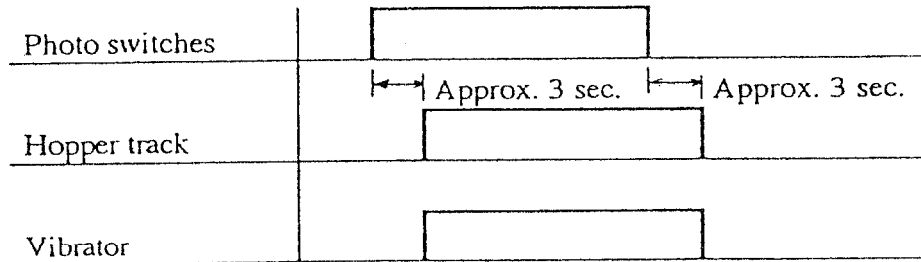
Inspection method: When LED goes off in the fig. A condition and it goes on if screws at the photo switches are removed, function of photo switches is normal.

② Position (height) of photo switches must be correct as shown bellow. If the position is improper, carefully re-adjust it and inspect the function as explained on page 17.

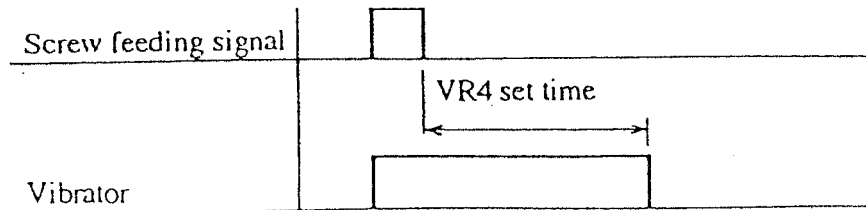


(4) Time chart

① Hopper track starts oscillating approximately 3 seconds after photo switches turns on (no screw.) It stops oscillating approximately 3 seconds after photo switches turns off (screws present.) When hopper track oscillates, vibrator also vibrates.



② Vibrator starts vibrating when screw feeding signal is given. It keeps vibrating for the time period determined by VR4 on the circuit board in the control box.



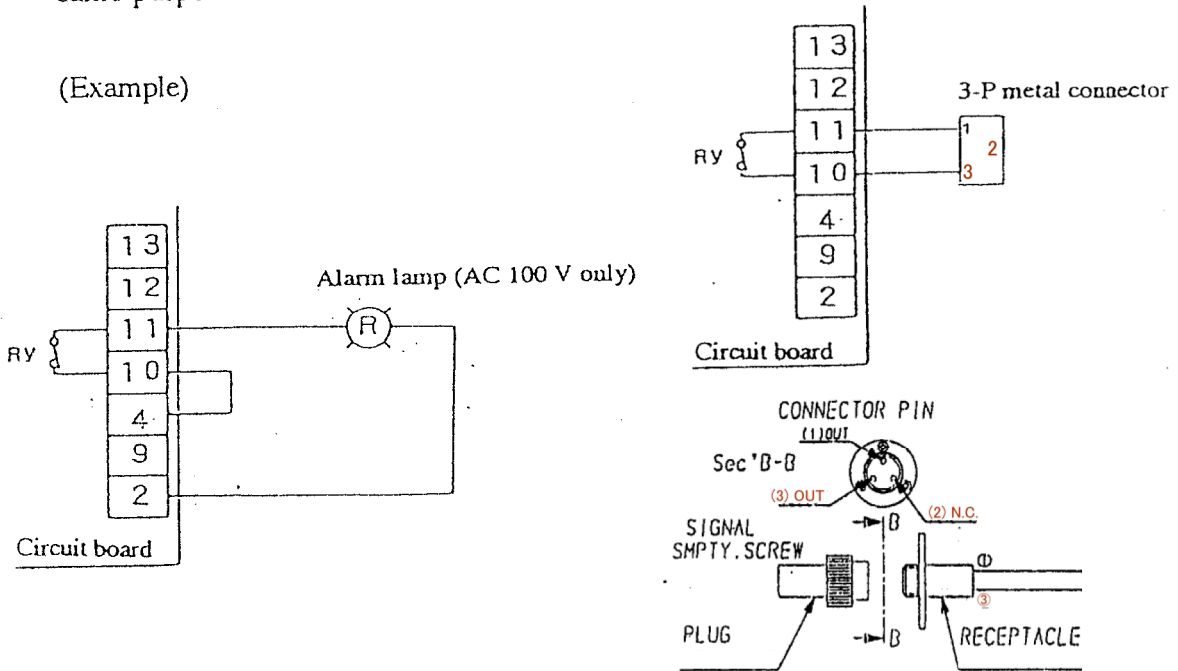
(5) Optional functions

<No-screw alarm function>

The controller outputs no-screw alarm signal when screw is not fed to chute rails for a certain time period due to no screw in basket or jamming at the entrance of chute rails (when photo switches do not go off for approximately 30 seconds.)

Use the terminal No. 10 and 11 on the circuit board to obtain no-screw alarm signal. If 3-P metal connector is attached to the machine, use pins No. 1 and No. 2 for the same purpose.

(Example)



<Contact ratings>

Item	Load	Resistive load ($\text{COS } \varphi = 1$)	Inductive load ($\text{COS } \varphi = 0.4, L/R = 7 \text{ ms}$)
Rated load		AC 120 V, 5 A DC 30 V, 5 A	AC 120 V, 2.5 A DC 30 V, 2.5 A
Rated current		5 A	
Maximum contact voltage		AC 250 V, DC 125 V (DC 30 V	UL/CSA/IEC/VDE)
Maximum contact current		5 A	3 A
Maximum switching capacity		600 VA, 150 W	330 VA, 70 W
Minimum applicable load (P level, reference value)		DC 5V, 100 mA	

(6) External wirings

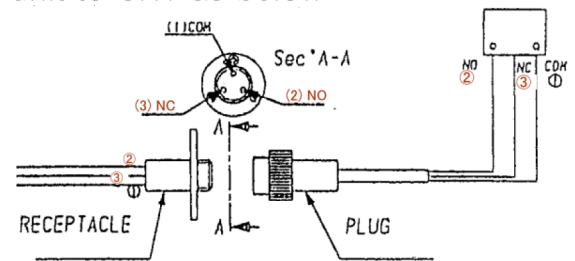
A: Single-spindle specification

Connect the limit switch of the driver unit to CN1 as below:

CN1, terminal No. 1 — COM

CN1, terminal No. 2 — N.O.

CN1, terminal No. 3 — N.C.



B: Multi-spindle specification

Connect the 5-P metal connector to the terminals on the circuit board as bellow;

5-P, pin No. 1 — Ground ————— E

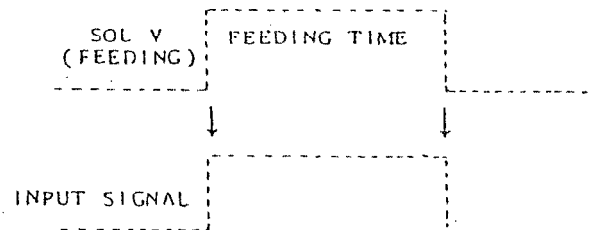
5-P, pin No. 2 — Power source ————— 1

5-P, pin No. 3 — Screw feeding signal ————— 13

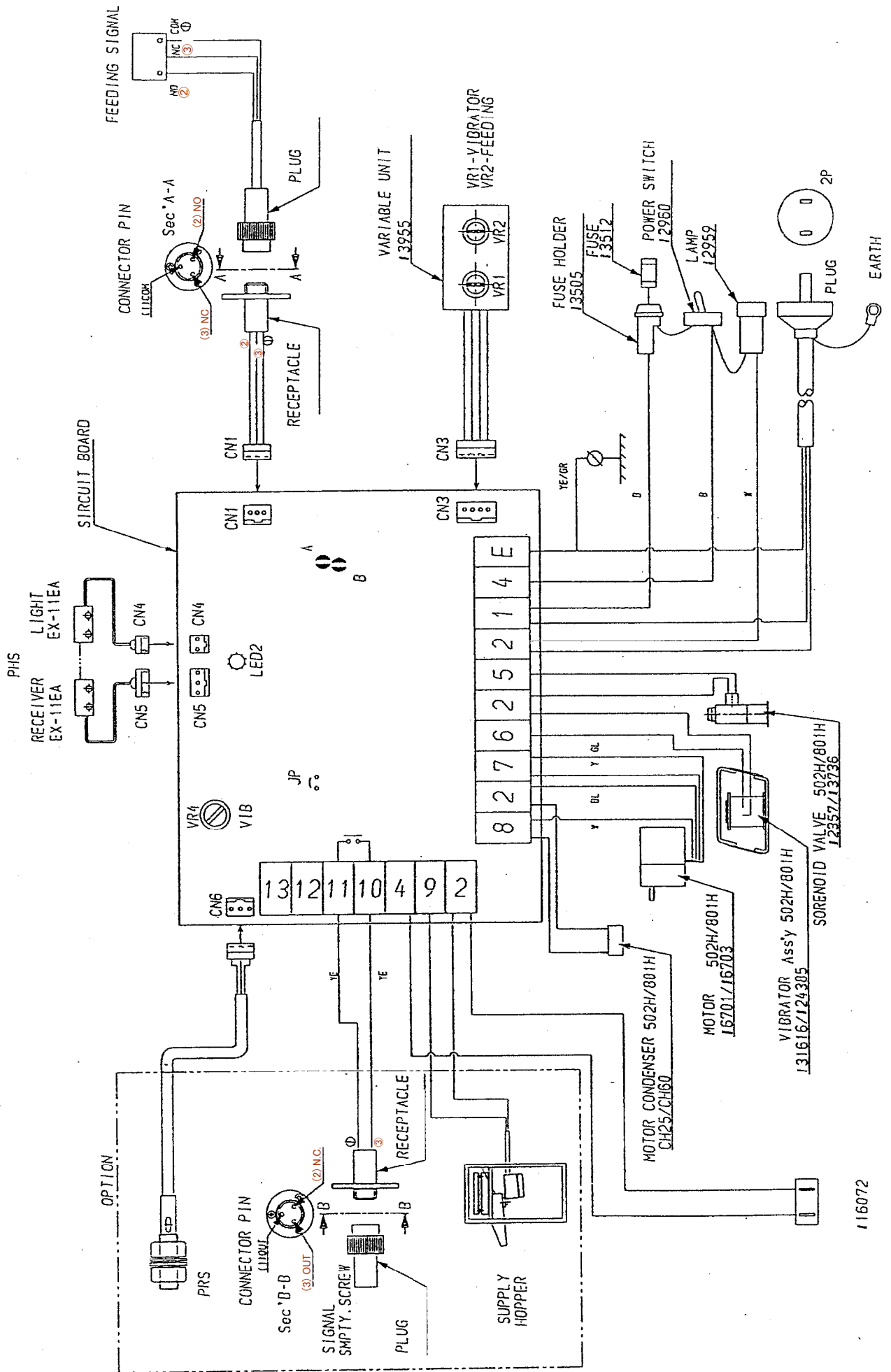
5-P, pin No. 4 — Screw feeding signal ————— 12

5-P, pin No. 5 — Power source ————— 2

(Example) External feeding signal: Terminals (TB No. 12 and 13) or 5P metal connector pins (5P-3 and 5P-4) are used for input terminals of screw feeding signal. Supply the screw feeding signal (AC/DC 24 ~ 120 V) to these terminals connector pins throughout screw feeding time.

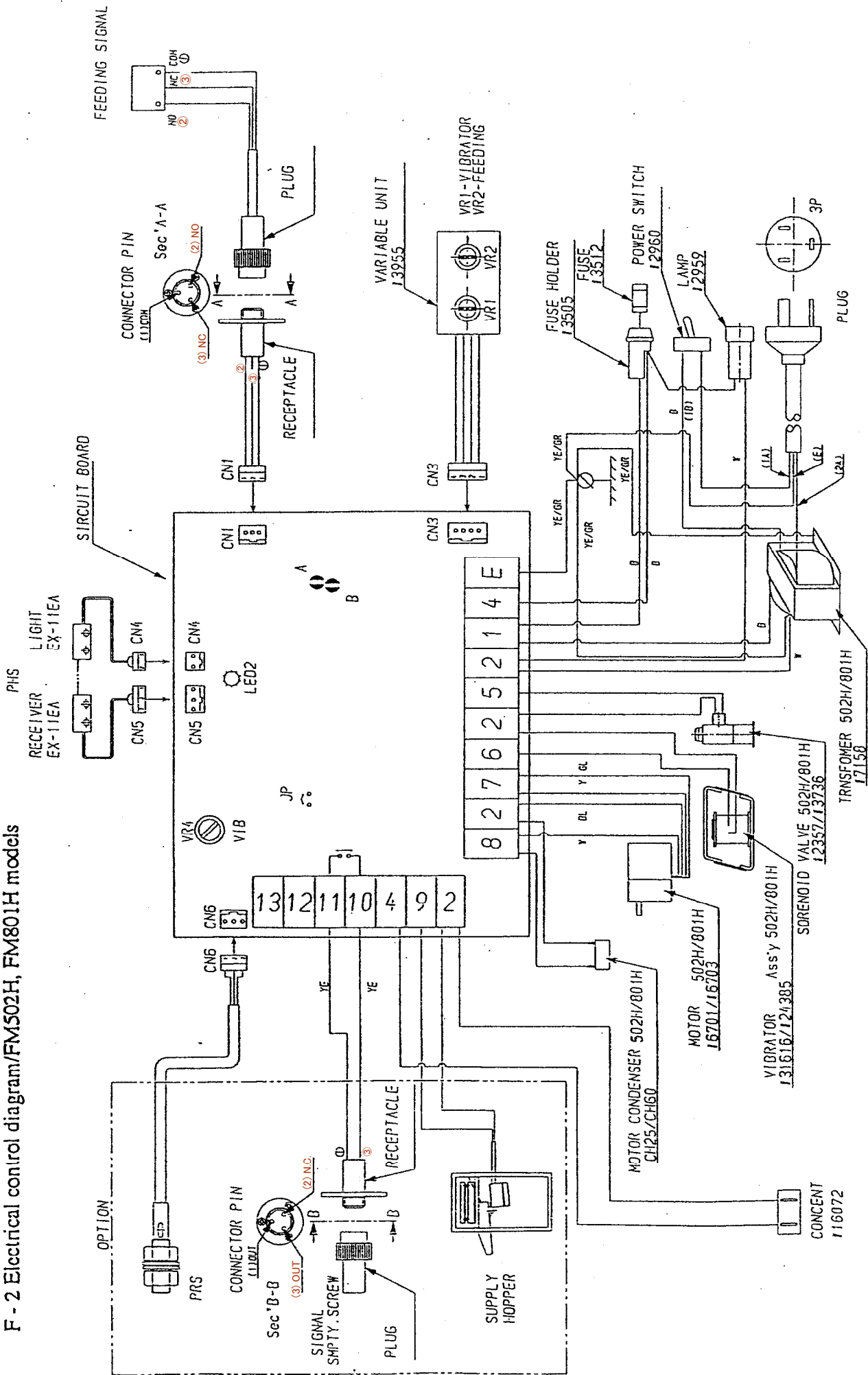


F - 1 Electrical control diagram/FM502H, FM801H models

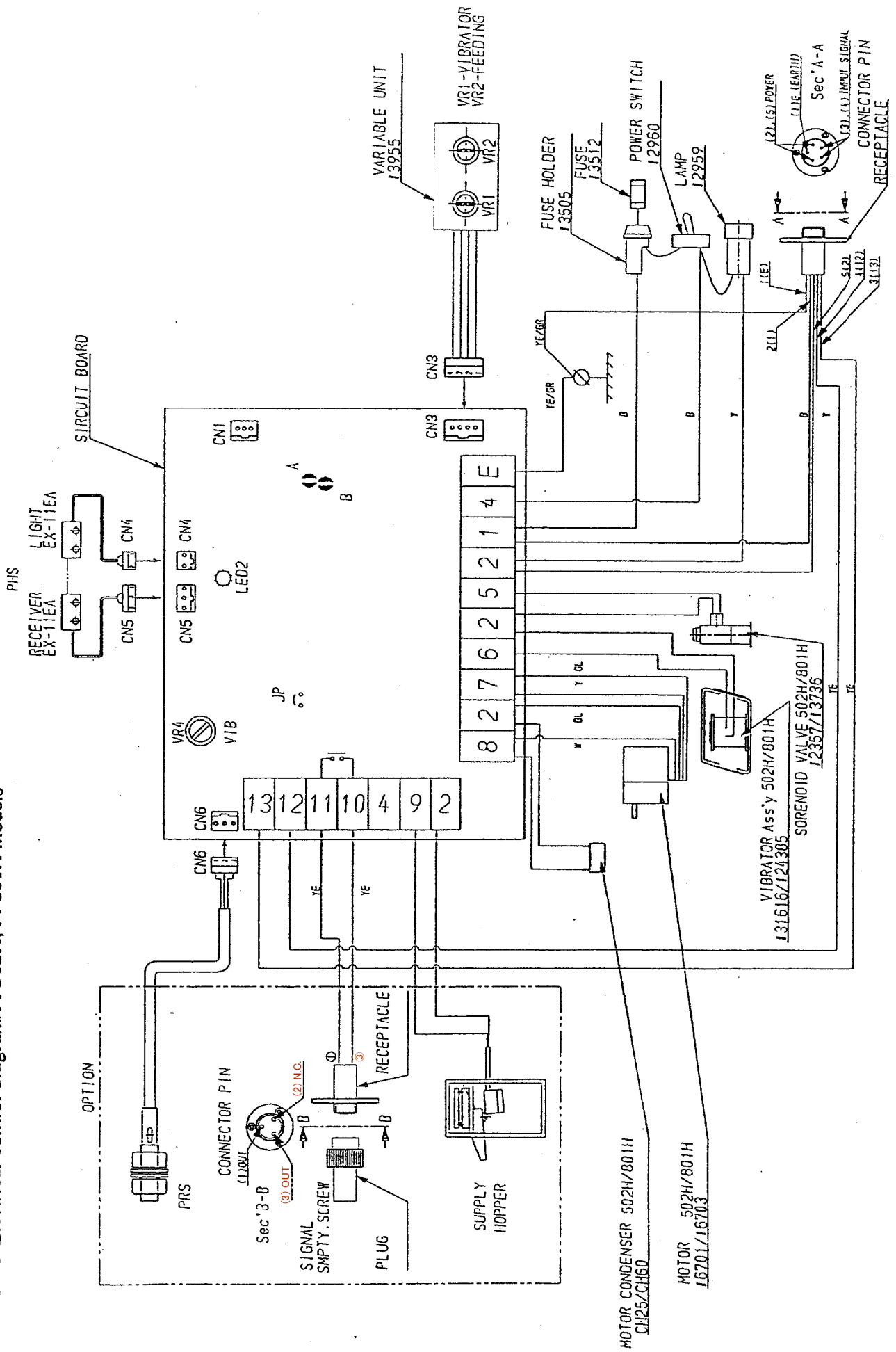


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F - 2 Electrical control diagram/FM502H, FM801H models



F - 3 Electrical control diagram/FF502H, FF801H models



G. Pneumatic control diagram

<p>FM801H model</p>	<p>Hand-held air driver spec.</p>	
<p>FM801H model</p>	<p>Hand-held electric driver spec.</p>	
<p>FF801H model</p>	<p>(To chuck unit of main machine)</p>	

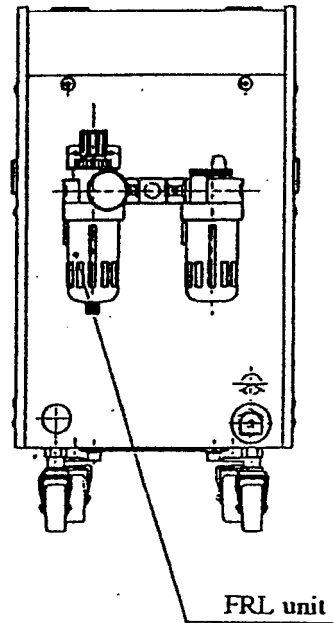
H. Daily care after finishing operation

Execute care of the machine as instructed bellow every day after operation;

[1] Draining water (only in case of FM801H model)

Slowly open the cock of the air filter behind the machine and drain water in it completely. After draining, tighten the cock firmly.

<Draining water from FRL uni>
(FM801H model only)



[2] Cleaning

If the upper surface of chute rails and hopper track are soiled with oil or dust, carefully clean them with new cloth.

I. Maintenance

[1] Cleaning inside basket

Periodically wipe off oil or dust contaminated inside the basket.

[2] Lubricator (in case of FM801H model only)

Fill the lubricator with turbine oil #90 (JIS, non-additive No. 1.) Maintain the oil amount so that the lower end of the oil-leading pipe is always lower than the oil level.

When filling oil, make sure to close the air source cock or the stop valve attached to the FRL unit and confirm that air pressure is 0 (zero) MPa.

Do not use any other oil than turbine oil #90 (JIS, non-additive No. 1) as it may damage the lubricator.

J. Cause of troubles and troubleshooting

Trouble and location of trouble

Countmeasure

Item to refer in manual

Refer to drawing on next page

