MITSUBISHI ELECTRIC
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Quality in Motion

SETS-01 Inspection and Maintenance Manual for EGOV Setting Value 8 or 9

D55001-A
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1. Outline

SETS-01 is the abbreviation of Smooth Emergency Terminal Slowdown Type-01 and is an electronic safety system. The SETS system enables the governor encoder and reference position switches at the terminals of the hoistway to detect the car position continuously and accurately. As the SETS system detects overspeed and stops the elevator quicker than the conventional system, the speed of collision with the buffer can be decreased and the buffer can be downsized. Therefore, the overhead and pit size can be reduced.

The SETS system consists of SETS control card mounted in the SETS panel, governor encoder and reference position switches. It is necessary to carry out inspection and maintenance of the SETS system on the regular basis to maintain the function properly. Even if the elevator is equipped with the SETS system, safety devices depending on the maximum speed of the elevator will be installed except a buffer.

This manual describes the method of inspection and maintenance of SETS system for the model whose rotary switch EGOV setting is 8 or 9. As the method of inspection and maintenance differs depending on the EGOV setting value, check the value written in the SETS setting label on the back of the cover of the SETS panel and observe the corresponding inspection and maintenance manual.

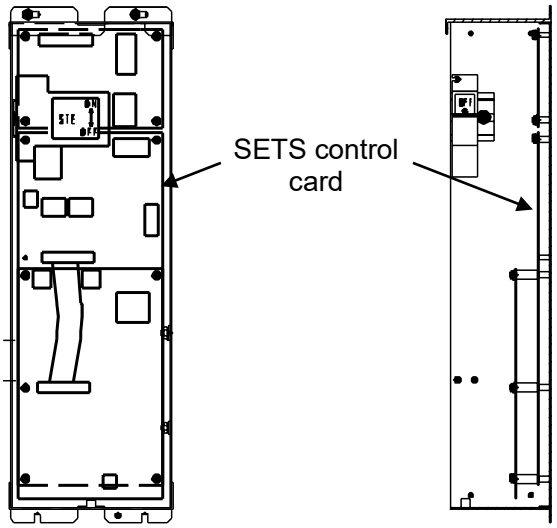


Fig. 1-1 SETS panel

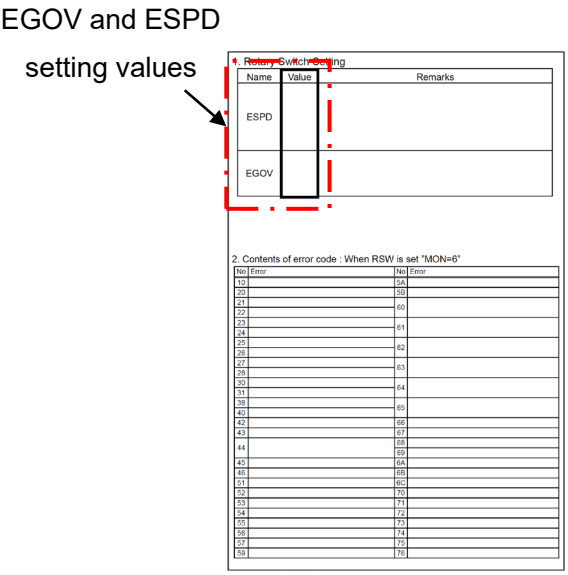


Fig. 1-2 SETS setting label

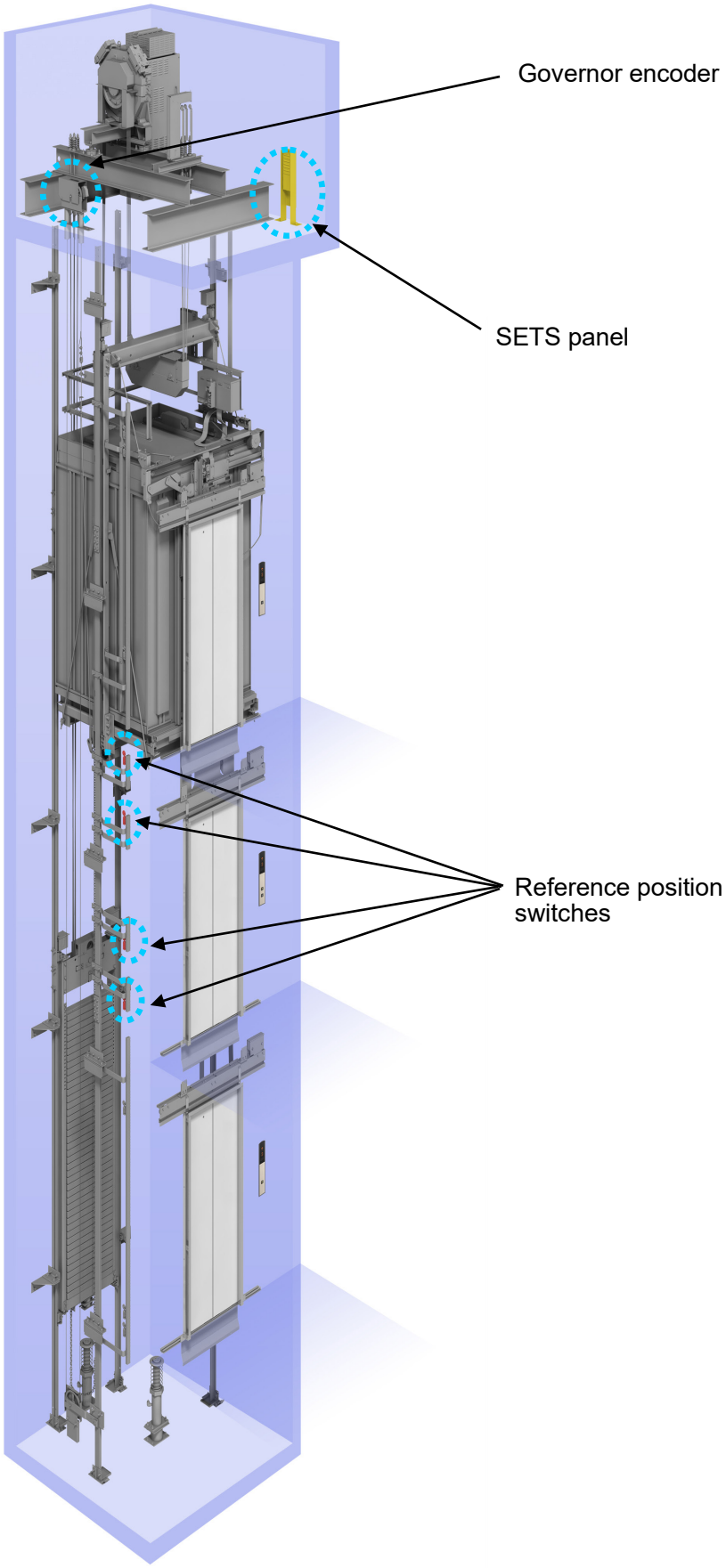


Fig.1-3 SETS system installation position

2. SETS system inspection

2.1. Check of SETS system state in inspection and maintenance

If the SETS system is provided, carry out inspection for the following items once a year to check the state of the system.

2.1.1. SETS panel

(1) Check that there is no change or abnormality in the operation and installation state of control devices such as switches.

(2) Check that terminals are fixed firmly and there is no abnormality in the circuit breakers (circuit protectors).

(3) Check that the setting values of the rotary switches (*EGOV* and *ESPD*) on the SETS control card are the same as those written in the label attached on the back of the cover of the SETS panel.

*Turn off the power to check SETS panel. Before starting the checks, confirm that the power has been turned off with a tester.

*After the check, ensure safety before turning on the power again.

2.1.2. Reference position switches

Check that there is no change or abnormality in the operating points and installation state of the reference position switches. For the operating points, refer to Table 2-1 below.

Table 2-1 Operating point of reference position switch

ESPD setting value	Operating point of reference position switch (mm) (Tolerance: within +/- 35 mm)			
	UP2	UP1	DN1	DN2
2	2950	4750	4750	2950
3	4200	6600	6600	4200
8				
4				

2.1.3. Governor encoder

Check that there is no change or abnormality in the operation and installation state of the governor encoder.

2.2. Basic function check in inspection and maintenance

If the SETS system is provided, carry out inspection for the following items once a year to check that there is no abnormality in the basic functions.

2.2.1. Check of governor encoder function

Run the car in manual operation. Check that the direction and speed detected by the governor encoder are correct by the 7-segment indicators.

(1) Check of direction detected by governor encoder

a) Set manual operation.

b) Set both of the rotary switches SET1 and SET0 on the P1 card (control CPU card in the control panel) to 0, and flip the toggle switch SW1 down.

c) Set the rotary switches SET1 and SET0 on the P1 card to 1 and 6, respectively, and flip the toggle switch SW1 down.

d) Run the car manually at the machine room, and check that the directions detected by two detectors of the encoder agree with the actual car running direction. (Refer to Table 2-2.)

*Check the above more than 6 seconds later after the car have started running because there is a time lag between the car movement and indication.

*If the direction detected by the governor encoder is not correct, check the installation state of the governor encoder.

e) Set the rotary switches SET1 and SET0 on the P1 card to 0 and 8, respectively, and flip the toggle switch SW1 down to restore the elevator.

(2) Check of speed detected by governor encoder

a) Set manual operation.

b) Set both of the rotary switches SET1 and SET0 on the P1 card to 0, and flip the toggle switch SW1 down.

c) Set the rotary switches SET1 and SET0 on the P1 card to 1 and 0, respectively, and flip the toggle switch SW1 down.

d) Run the car manually at the machine room, and check that the indication of car running speed is 20 +/- 2 m/min (Refer to Table 2-2.)

*Check the above after the running speed has become constant because there is a time lag between the car movement and indication.

*If the speed detected by the governor encoder is not correct, check SETS setting and the installation state of the governor sheave and encoder.

e) Set the rotary switches SET1 and SET0 on the P1 card to 0 and 8, respectively, and flip the toggle switch SW1 down to restore the elevator.

Table 2-2 Display at check of governor encoder

Item displayed on indicator	Timing of display	Display on indicators on P1 card
Detection direction	(1) d)	7SEG2: The direction detected by detector 1 of encoder 7SEG1: The direction detected by detector 2 of encoder *UP: U, DN: d
Detection speed (Unit: 1 m/min)	(2) d)	7SEG3, 2, 1: Speed

2.2.2. Check of forced braking function at overspeed detection and check of initial operation after power restoration

When the SETS system detects overspeed, it decelerates the car by using the emergency stop function. The check described in this section ensures that the emergency stop function surely decelerates the car to the allowable buffer striking speed while the car is traveling from the overspeed detection position to the top of the buffer. In this test, however, the car does not actually strike the buffer. This is a simulation in which the overspeed detection pattern is shifted to the middle of the hoistway to activate the emergency stop function there. Observe the procedure below, and check that the assumed speed of the car at the buffer position on the basis of the shift amount of the overload detection point (hypothetical buffer striking speed) is within the allowable buffer striking speed range by looking at the indicator. Also, check that the initial operation starts properly and that the SETS system functions normally after the power has been restored.

a) Unload the car to 0% load.
b) Set manual operation.
c) Set both of the rotary switches SET1 and SET0 on the P1 card to 0, and flip the toggle switch SW1 down.
d) Set the rotary switches SET1 and SET0 on the P1 card to 0 and 1, respectively, and flip the toggle switch SW1 down.
e) Run in automatic operation, and stop the car at the bottom floor.
f) Check that the indication of 7-segment 3 on the P1 card changes from L → U → b (not in inspection mode) to L → U → A (in inspection mode).
*It takes several seconds to set the inspection mode. If the SETS system limits the car traveling speed because of an error other than the inspection execution abnormality specified in the SETS setting label, the inspection mode cannot be set.
g) Register a call for the top floor to move the car upward.
h) Check that the emergency stop function is activated and the car stops around the middle of the hoistway.
i) After the emergency stop, the result is displayed on the 7-segment indicator on the P1 card. (Refer to Table 2-3.)
j) Check that the start speed of the emergency stop (S → the speed value) is within -5% to +10% of the maximum speed.
k) Check that the hypothetical buffer striking speed (b → the speed value) does not exceed the allowable buffer striking speed (written in MAX. STRIKING SPEED column in the buffer nameplate).
*If not, check that there is no problem with the governor sheave, governor encoder, reference position switches for SETS, traction machine brake, etc.

l) Switch to manual operation and turn off and on the power. Check that the SETS system is activated properly.

m) Set the rotary switches SET1 and SET0 on the P1 card to 0 and 8, respectively, and flip the toggle switch SW1 down to restore the elevator.

Table 2-3 Braking capability inspection display

Item displayed on indicator	Timing of display	Display on indicators on P1 card
Information on braking capability inspection	d) (Not in inspection mode)	7SEG3: L → U (up) → b
	f) (Inspection mode)	7SEG3: L → U (up) → A
	h)	7SEG3, 2, 1: E, T, - → S, -, - → a value [forced braking start speed (m/min)] → P, -, - → a value → E, -, - → a value → d, -, - → a value → b, -, - → a value [hypothetical buffer striking speed (m/min)]

3. Troubleshooting

3.1. Check of error code on SETS control card

Two 7-segment LED indicators mounted on the SETS control card display an error code which indicates the SETS status. Set the rotary switch MON on the control card to 6 to display error codes on the 7-segment indicators. (Refer to Table 3-1.)

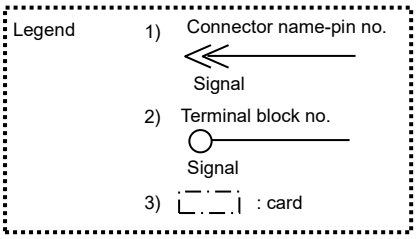
*Inspection of the governor sheave, governor encoder, reference position switches for SETS, etc., or replacement of the card in the SETS panel is required depending on the error.

Table 3-1 Setting of rotary switch MON and indication

MON setting value	Item displayed on indicators	Display on indicators on SETS card
6	S/W error signal (Refer to the SETS setting label.)	a) Two-digit codes of all detected errors are displayed one by one. For example, if two errors with the codes XY and YZ are detected, they will be displayed as below. E → X → Y → E → Y → Z → H → X → Y → H → Y → Z → E → (repeated) *E represents an error code being detected at present, and H represents an error code detected in the past. b) If no error is detected, the indicator displays as below. E → 0 → 0 → H → 0 → 0 → E → (repeated)
Others	Indefinite value	Item unrelated to inspection or maintenance

4. SETS panel connection diagram

SETS panel is connected to other devices as follows.



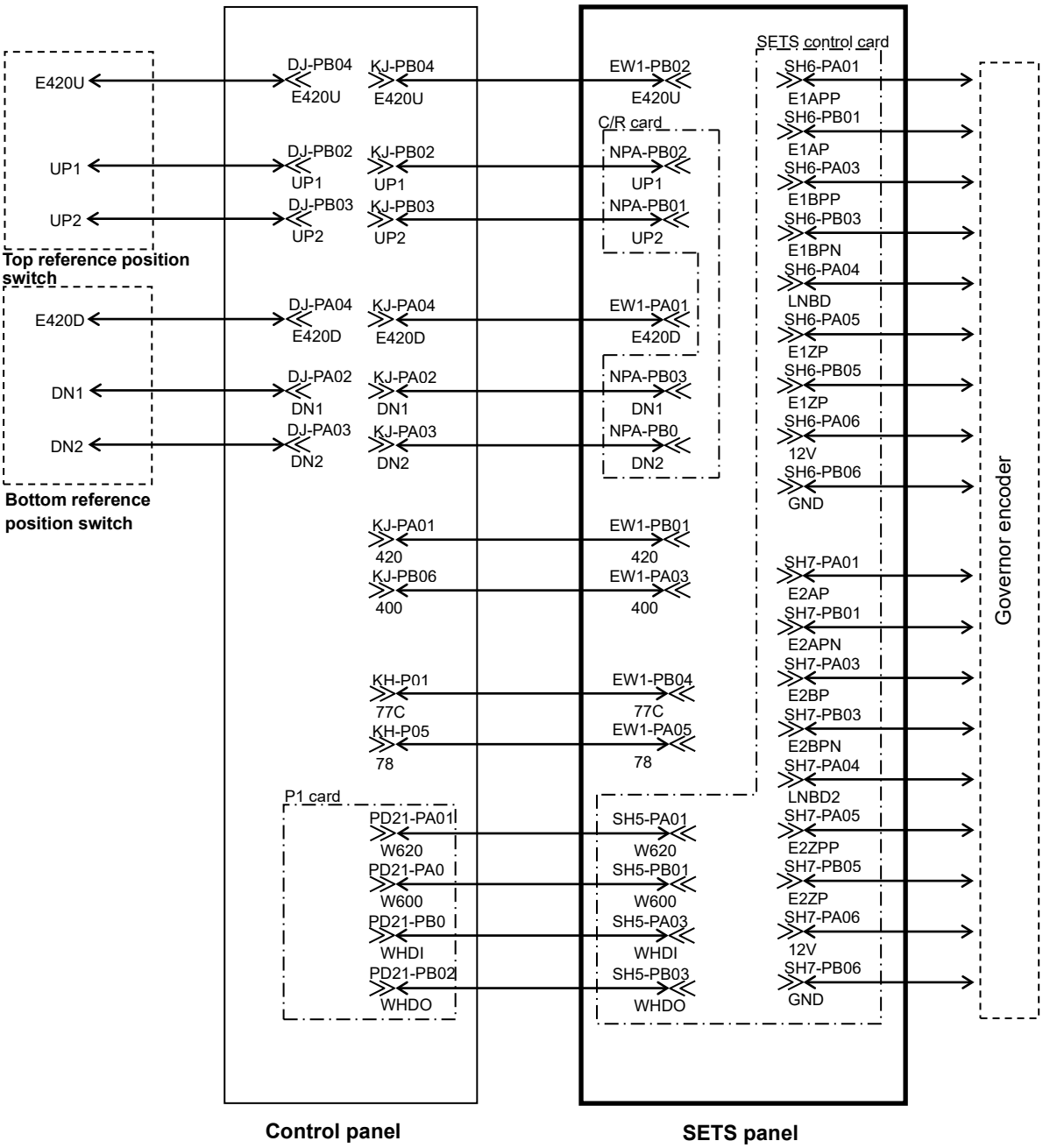


Fig.4 SETS panel connection diagram