February 9, 2009

Drilling Monitor

DM – 682/684

DM – 602/604

Instruction manual for repair and inspection

Document No. C25EHZ0100

Koden Electronics Co., Ltd.

Measuring instruments to be prepared:

The following instruments shall be prepared for inspection:

(1) Variable voltage transformer: Variable between 80 - 280 V with 150 VA or more

(2) Ammeter: AC: 0 – 10 A, DC: 0 - 2 A

(3) Digital voltmeter: AC: 0 – 280 V, DC: 0 – 300 V

(4) Frequency meter: 10 Hz – 10 MHz

(5) Oscilloscope: DC: 0 – 50 MHz 2 CR. With 10:1 probe

Confirmation of each block:

This drilling monitor can be divided into the following blocks and each block shall be confirmed:

a. Recorder : Power supply unit: Various power circuits
Motor driving circuit
Paper feed motor driving circuit
Overvoltage protection circuit

b. Recorder: Logic

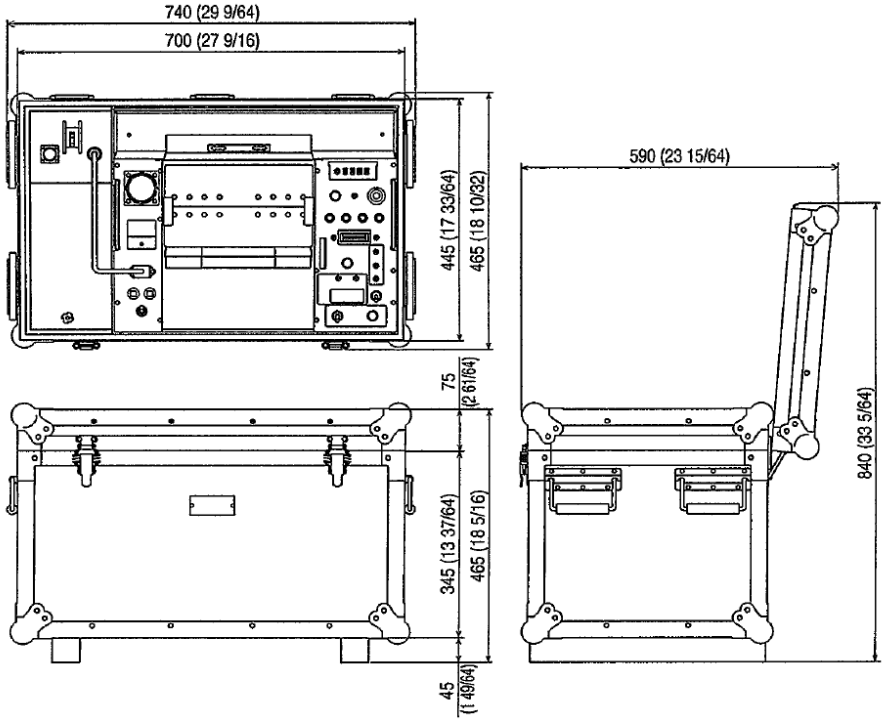
c. Recorder: Transmitter and receiver

d. Interlock with winch:

e. Fixing of data plates and others:

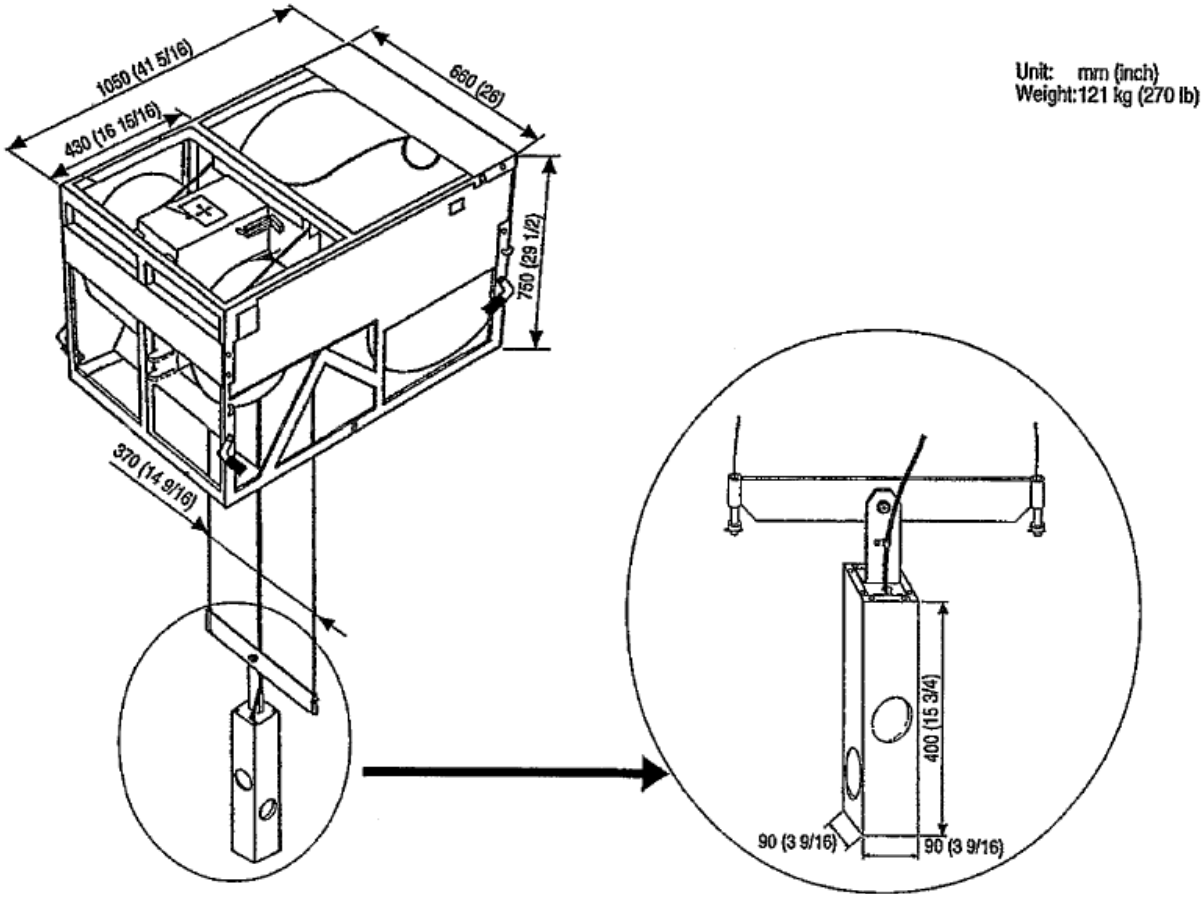
External views and dimensions

1. Recorder unit (External view)



Weight: 57 kg (126 lb) (for 100/110/220 VAC)
59 kg (130 lb) (for 440 VAC)

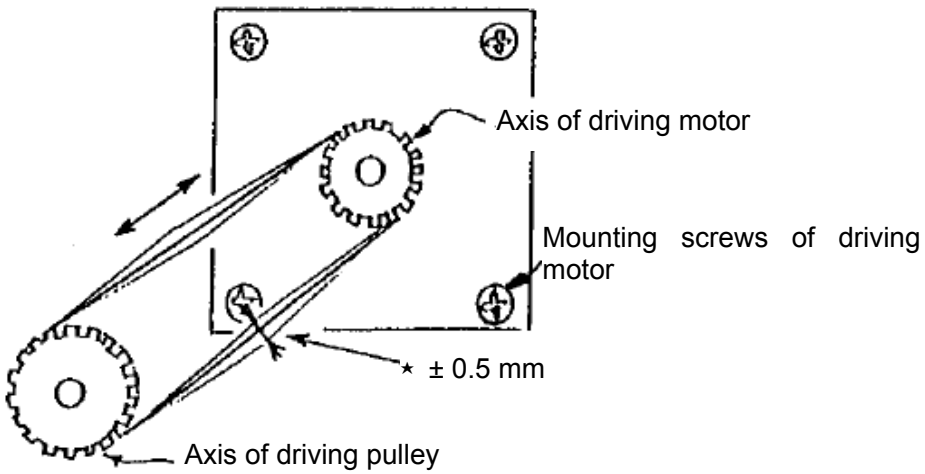
2. Winch unit (External view)



Unit: mm (inch)
Weight:121 kg (270 lb)

Recorder

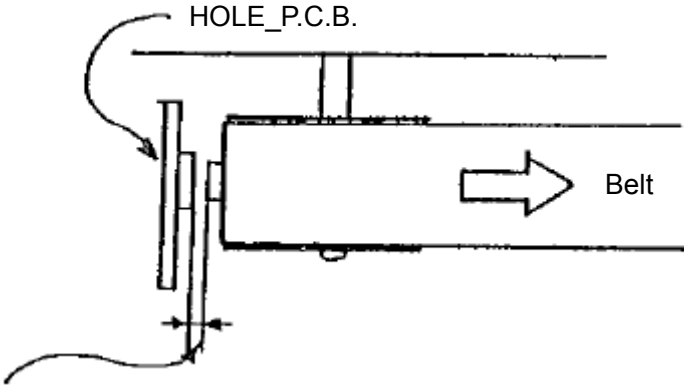
a. Adjustment of belt driving part



a-1 Loosening the mounting screws of driving motor, adjust the mounting position of the driving motor. Rotate the driving motor by hand and adjust the tension of the belt to have approximately ± 0.5 mm deflection.

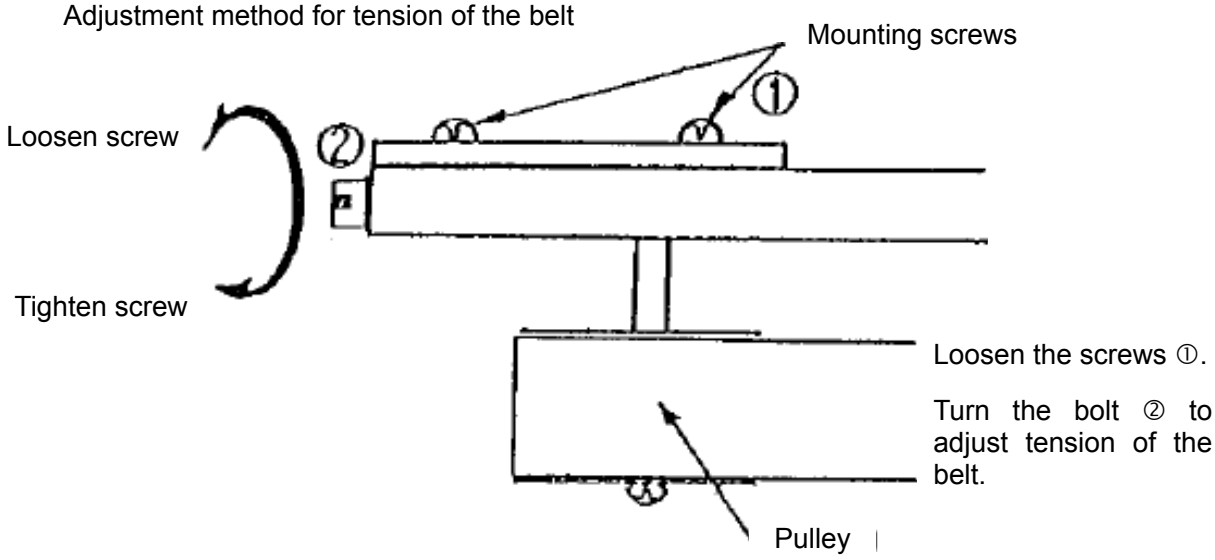
b. Confirmation of rotation signals of the belt and tension of the belt

Rotation detection part (P.C.B. HOLE 100 Mo) shall be as shown below:



Fix the rotation detection PCB to have 0.8 mm ± 0.03 mm gap between the hole IC and the magnet without up-and down of out-of alignment.

Adjustment method for tension of the belt



3. Accuracy (Horizontal direction)

3-1. Receiving clock

a. Set the scale of “Range calibration control dial” on the control panel at 8.

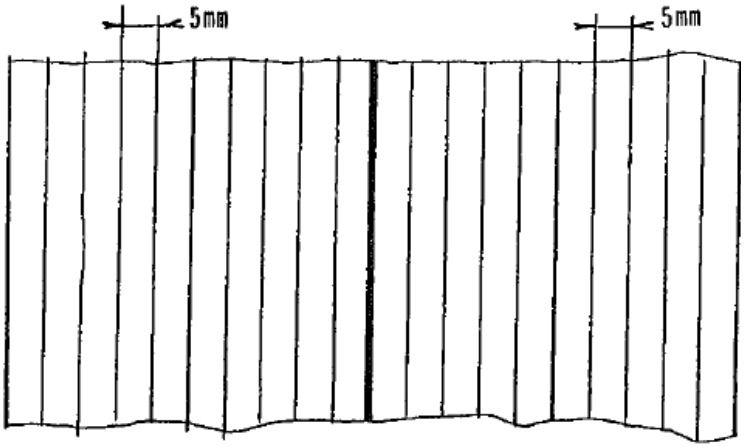
b. Connect a frequency meter to TP-22 on 7000 PCB (for DM 602/4, TP-23 on C25-7000B PCB) (Use a probe of 10:1)

c. Turn the slug of L1 (KT-800) to set at 3,000 MHz
(When there are 2 or more setting points, set at the point with more slug dropouts)

d. After completion of setting in above c., turn the “Range calibration control dial” to “0” and “10” to confirm the following values:

Specification: At position “0” of the dial: 2.550 MHz or less
At position “10” of the dial: 3.150 MHz or more

3-2. Confirmation of recording accuracy

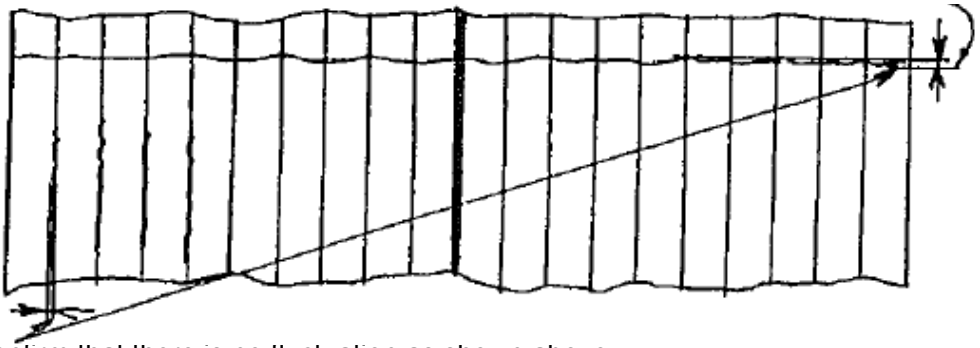


Confirm that the line gap of each marker is 5 mm for full width of recording paper. When there are many errors, vary the VRI on 6000 PCB to set correctly.

Specification of accuracy: 5 ± 0.1 mm

3-3. Confirmation of recording uniformity

Switching on “Manual mark switch”



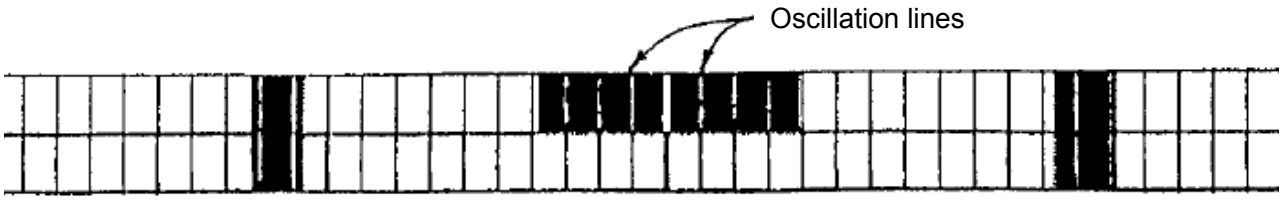
Confirm that there is no fluctuation as shown above.

Specification of accuracy: within ± 0.1 mm

4. Rejection of oscillation lines

Turn on the “Oscillation line rejection switch”.

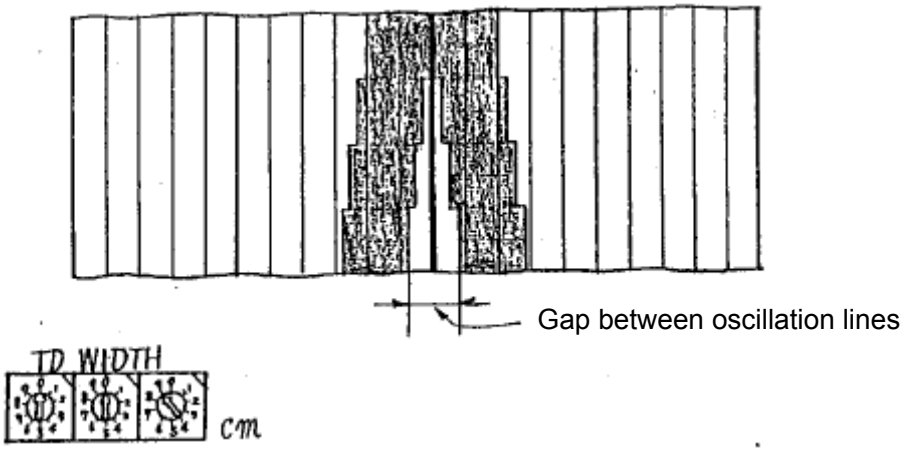
Confirm that oscillation lines will disappear as shown below (Switch off after confirmation)



5. Operation of zero position setting switch (Set at 009 cm)

a. Vary the TD Width switch on sub-panel.

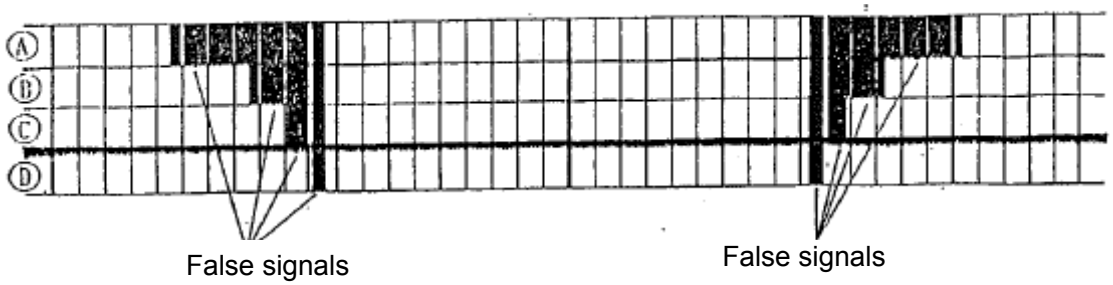
b. Confirm that the gap of oscillation lines will expand responding to the variance, and set it at 009 cm after confirmation.



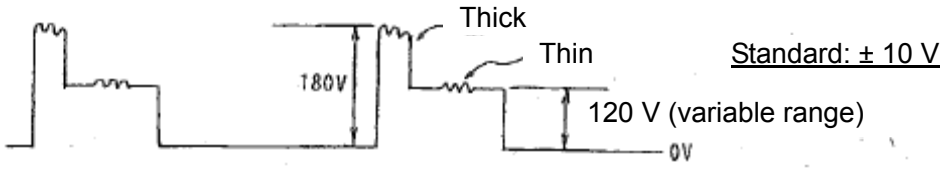
6. Operation of test mode

6-1. After the “Mode switch” on sub-panel is turned to “Test” side, confirm that false signals will be recorded as shown below. After conformation, turn the switch to “MEAS” side.

Setting ranges: Ⓐ < 0.5 >, Ⓑ < 1.0 m >, Ⓒ: < 2.0 m >, Ⓓ: < 4.0 m >

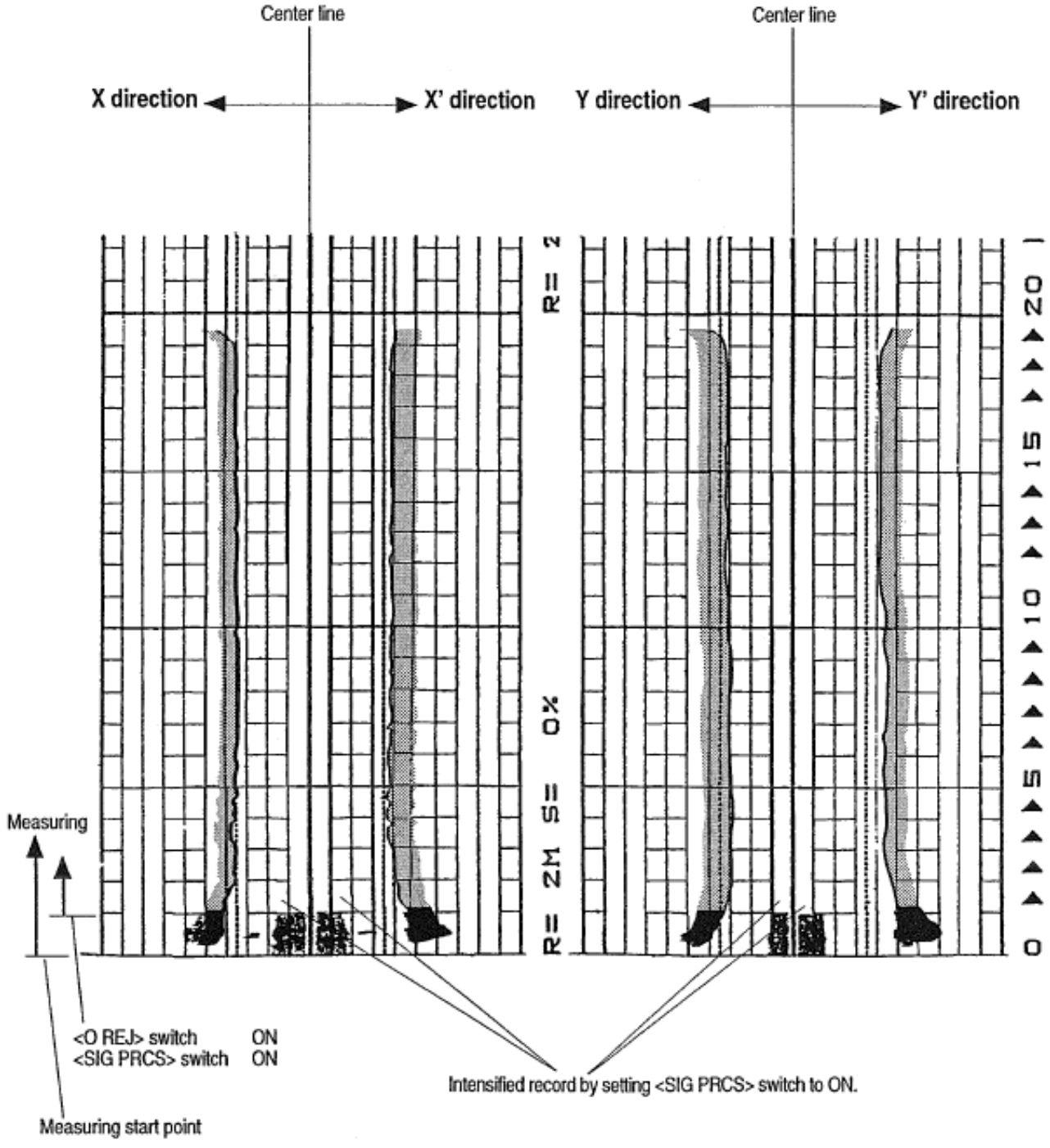


6-2. Turn on the “Signal processing switch” on sub-panel, and connect the oscilloscope to the terminal TP-REC of 6000 PCB. Set the below setting with VR3 1 kΩ.



Standard: ± 10 V

After confirmation, turn the switch to off side.



7. Operations of RANGE and SHIFT, and status of write-in of recoded letters

7-1. Confirm that numerical figures and characters will be displayed at every switching-over of “RANGE” and “SHIFT” switches.

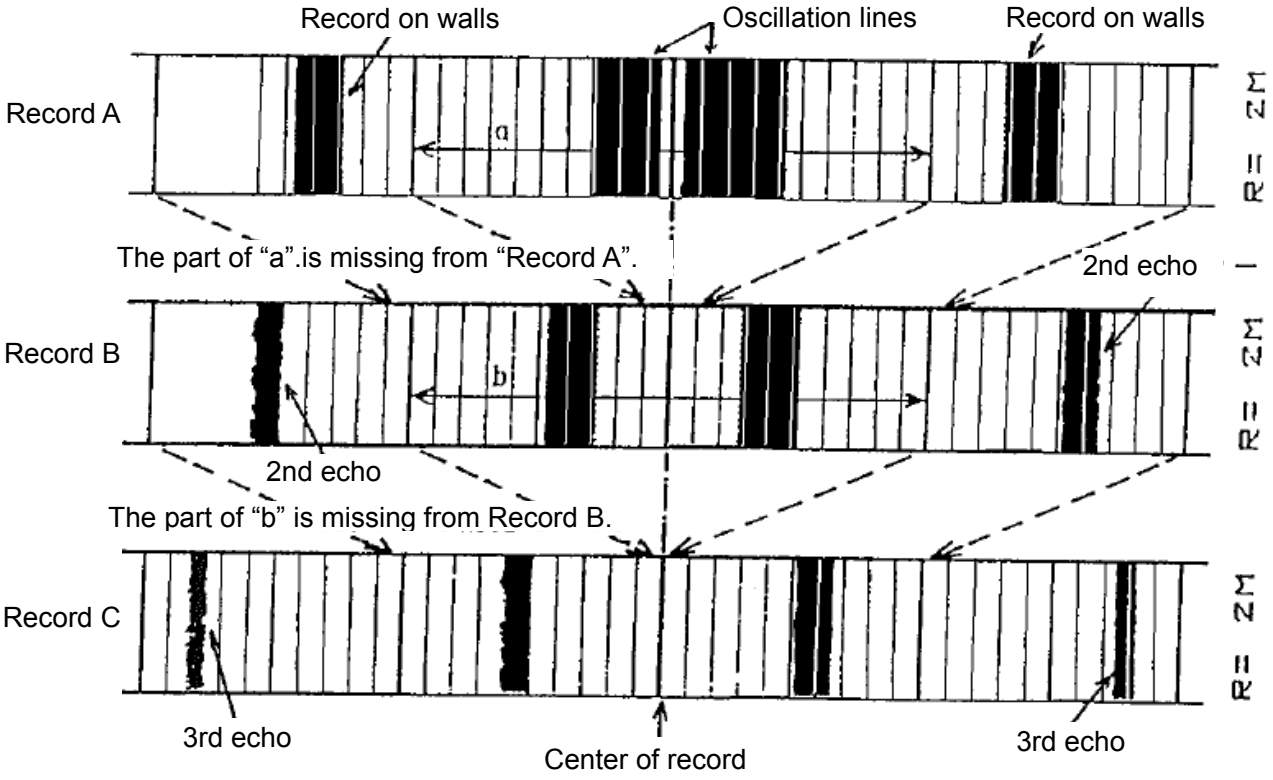
Displaying locations:
DM-682/602: Recorded at the right side
DM-684/604: Recorded at the center

Example: R = 2 M, S = 0 %, X
Range switch Shift switch 682 Direction switch

Confirm that letters are not distorted. In the case of 682/602, confirm also with “Direction” switches for X and Y.

Example of location and recording of “Shift” switch:

Record A: < 0 % >, Record B: < 50 % >, Record C: < 100 % >



The relations between positions and ranges of records for “Range” switch and “Shift” switch are as follows:

Range	Shift		
	0 %	50 %	100 %
0.5 m	Radius to 0.5 m	Radius 0.25 ~ 0.75 m	Radius 0.5 ~1.0 m
1.0 m	Radius to 1.0 m	Radius 0.5 ~ 1.5 m	Radius 1.0 ~ 2.0 m
2.0 m	Radius to 2.0 m	Radius 1.0 ~ 3.0 m	Radius 2.0 ~ 4.0 m
4.0 m	Radius to 4.0 m	Radius 2.0 ~ 6.0 m	Radius 4.0 ~ 8.0 m

The set up range and shift values will be recorded at the right side.

8. Paper feed

8-1. Paper feed speed operation “Const”

Turn on the “Paper speed” switch to Const 60, 30, 15 and 7.5 mm/min, and confirm the feed width of paper per one minute.

Specification: At 60 mm/min: ± 2 mm
At 30 mm/min: ± 1 mm
At 15 mm/min: ± 0.5 mm
At 7.5 mm/min: ± 0.25 mm

8-2. Confirmation of paper feed movement proportional to depth (When sensor stops, paper feed will also stop.)

a. Lift and lower the sensor at a slow speed.

b. Setting the UP/STOP/DOWN switch at 1/40, operate for more than 1 minute.
The gap for 1 m mark shall be 25 mm.

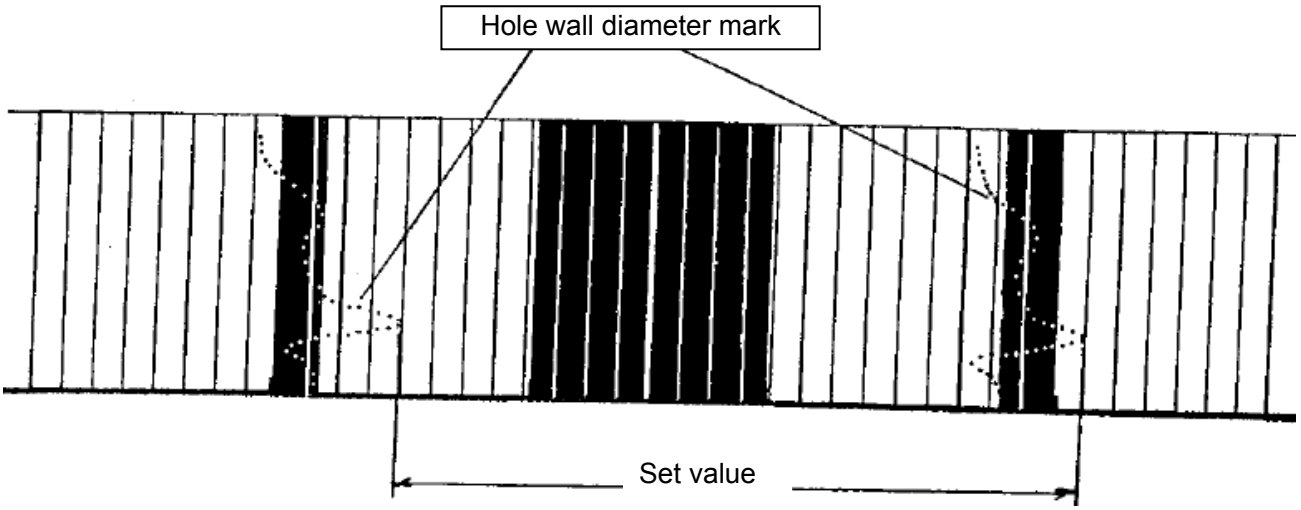
c. Setting the UP/STOP/DOWN switch at 1/50, 1/100 and 1/200, confirm as above.

At 1/50, the gap of 1 m mark: to be 20 mm
At 1/100, the gap of 1 m mark: to be 10 mm
At 1/200, the gap of 1 m mark: to be 5 mm

The “SPEED control” switch shall be set at the position shown at left.

9. Operation of hole wall diameter marks

a. By turning the “Width marker” switch on right panel, it shall be confirmed that the records of dotted lines will change.

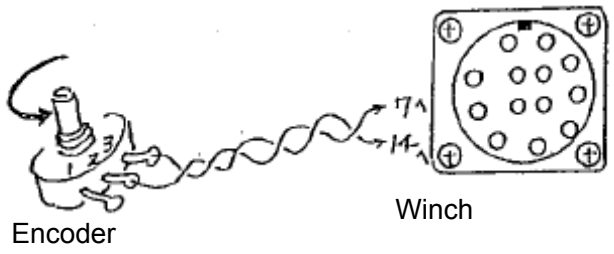


b. The gap between hole wall diameter marks shall be confirmed to be matched with the set value (see above figure). The set values are as follows:

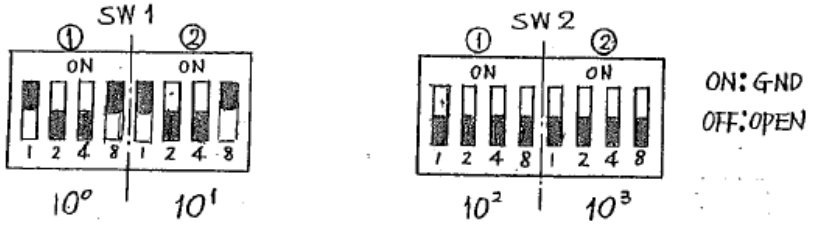
Range	Shift	Set value of hole wall diameter mark	Variance of hole wall diameter mark
0.5 m	0 %	1 – 9 cm	1 cm gap
1 m	0 or 50 %	1 – 2 m	10 cm gap
4 m	0 or 50 %	1 – 9 m	1 m gap

c. It shall be confirmed that the dotted lines will be shifted to right or left depending on the operation of L – R Shift switch (see above figure).

d. Connect the encoder for recording to pin Nos. 7 and 14 of the Winch connector as follows:



e. At switch ① of 7000 PCB, Nos. 1 and 8 shall be ON, and at switch ②, Nos. 1 and 8 shall be also ON.



Set value is 99.

For DM 602/4, S3, S4 and S5 of C25-700B PCB will be 3E8.

f. Confirmation on records: By rotating the encoder.

- Mark at every 1 m:

  – – – – – – – – – – – –

- Mark at every 5 m:

  ————————

- Double mark at every 10 m. This is double thick record per each 5m.

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- Depth value records:

  To confirm 0, 5, 10, 15, ……., up to 30m

- Record the following marks by Winch up/down switch operation:

  ■: Stop mark
  ▲: Up mark
  ▼: Down mark (This mark will not appear on DM 602/4.)

10. Depth (LED) display operation

a. This confirmation shall be performed under the connection in above 9.

b. Make sure that the “Depth mark” switch on control panel shall not be “OFF”.

c. When the sensor was lifted up and lowered down to measure 1 m movement, it shall be confirmed that dotted lines will be recorded on recording paper and 1 m will be displayed on the LED indicator.

d. When it moved 5 m, a solid line shall be recorded on recording paper, and when it moved 10 m, two solid lines shall be recorded.

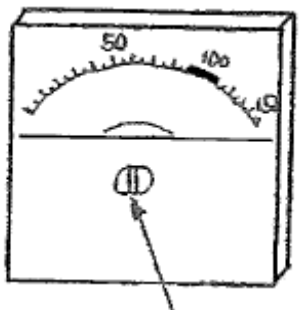
e. When the “Depth mark” switch is turned OFF, all indications on the LED indicator shall show “0” and no depth marks shall be recorded on recording paper.

11. Confirmation of meter indication at power supply and operation of leakage current breaker.

a. The output of the variable voltage transformer shall be varied between 80 – 120 V, and it shall be confirmed that the output voltage shall be matched to the indications of the meter within the range with green mark of 80 – 120 V. Compensation shall be performed with the adjustment screw.

b. The meter shall be activated regardless “ON” or “OFF” of the power supply switch.

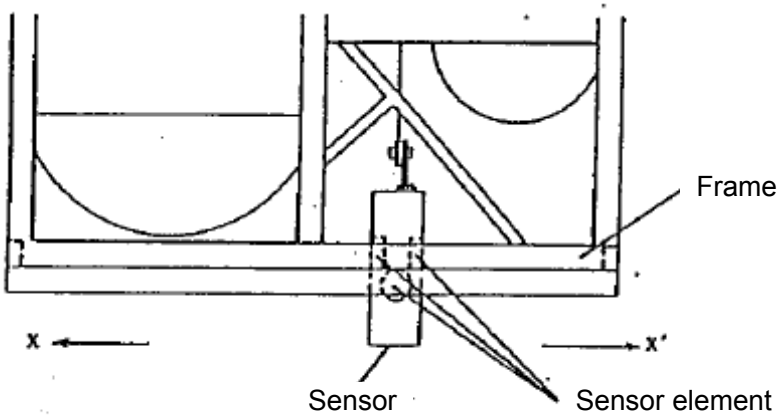
c. When the leakage current breaker is “OFF”, it shall be confirmed that the meter will be “OFF”.



Adjustment screws

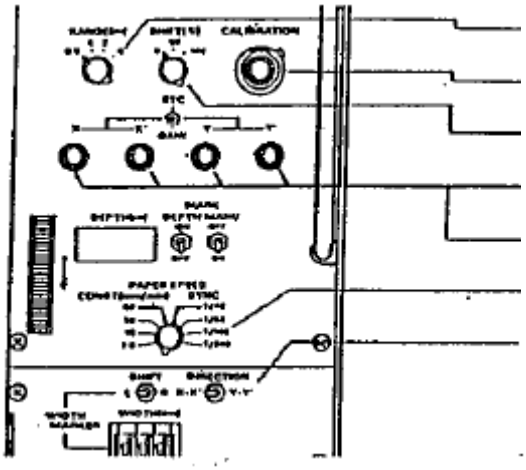
12. Confirmation of gain in air

a. The sensor shall be held at the position as shown in the figure below.



Stopping position

b. Set the switches and knobs on the control panel as follows:



Range switch……..< 4 m >

Calibration dial……< 8 >

Shift switch ……..< 0 % >

Gain knob (small) ……Clockwise: Full

STC knob (large)…Counterclockwise: Full

Paper speed switch…..< 30 mm/min > of <CONST >

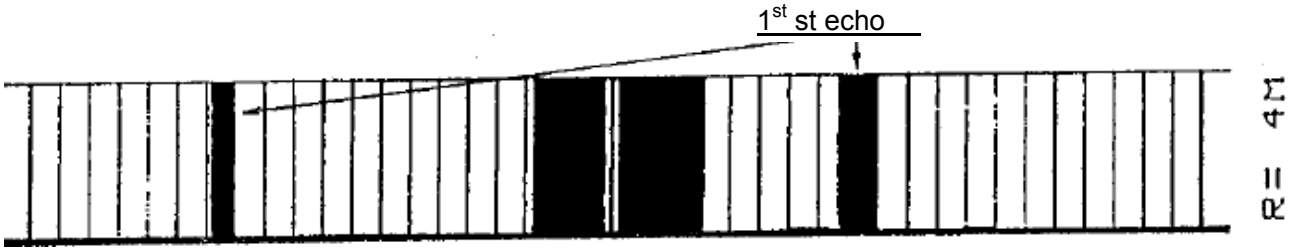
Direction switch……..< X – X' > or < Y – Y' >
Only for DM-682

Shift switch on DM 602/4 is mounted inside the control panel.

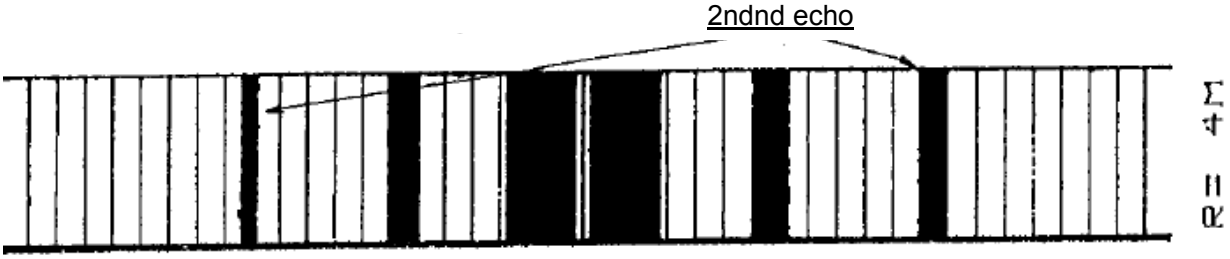
c. It shall be confirmed that the frame of the winch will be recorded on recording paper.

In the case of DM-682:

1) When "Direction" switch is turned to the < X – X' > side, it is normal when the 1st echo is recorded.

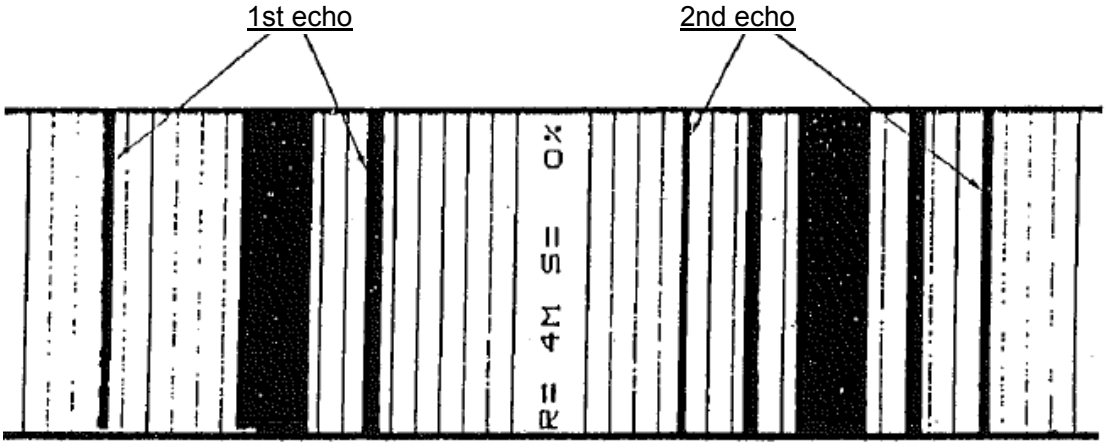


2) When “Direction” switch is turned to the < Y – Y’ > side, it is normal when the 2nd echo is recorded.

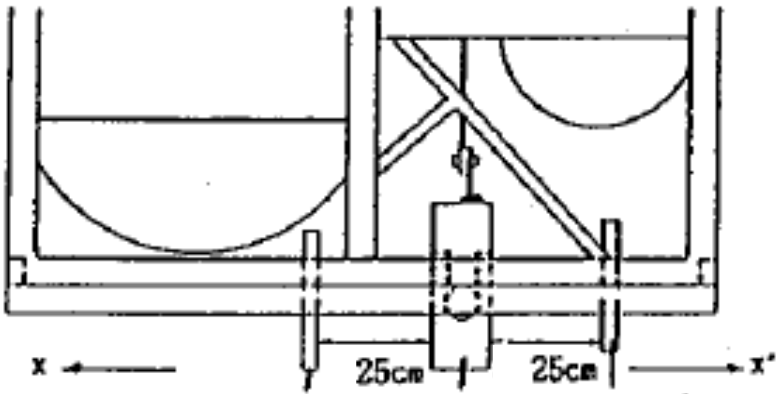


In the case of DM-684:

It shall be confirmed that the 1st echo is recorded in the direction of < X – X’ > and the 2nd echo in the direction of < Y – Y’ >.



When there is no record, place two aluminum plates at about 25 cm distance from both side of the sensor element facing each other as shown below, and confirm that the 2nd echo will be recorded in the direction of X – X’.



Confirmation of gain in the direction of < X – X’ >

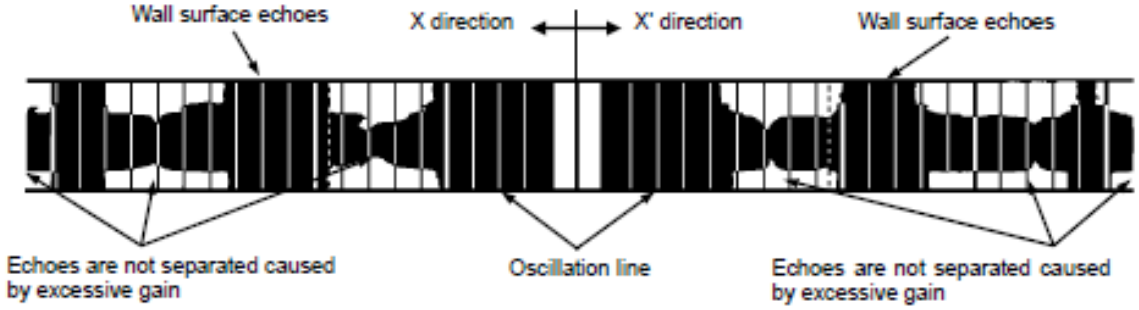
13. Confirmation of “Gain control” knobs and STC knobs operation

13-1. Confirmation of “Gain control” knobs

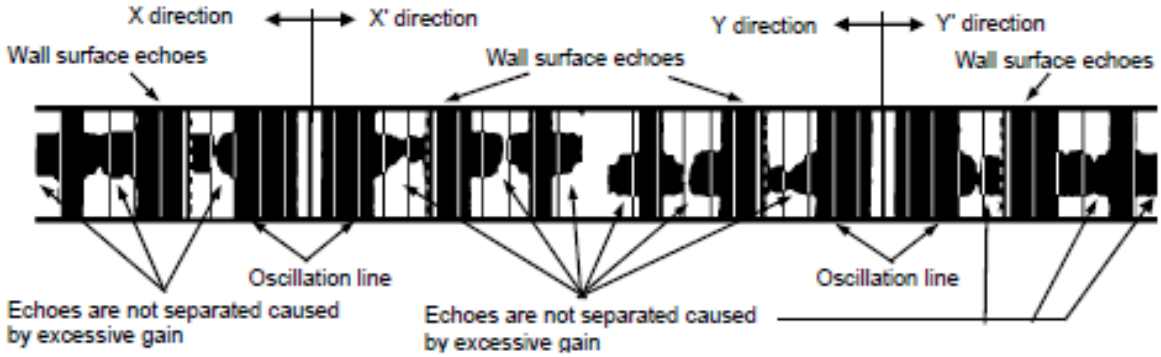
This will be performed by “Gain control” knobs. Turning of these knobs clockwise will increase the gain of receiver and turning counterclockwise will decrease the gain. By adjusting 4 knobs for X, X’, Y and Y’, images of wall surface shall be recorded respectively.

Example 1: Excessive gain disenables separation of oscillation lines and wall surface images, and they will be recoded running on.

DM-682/602:



DM-684/604:

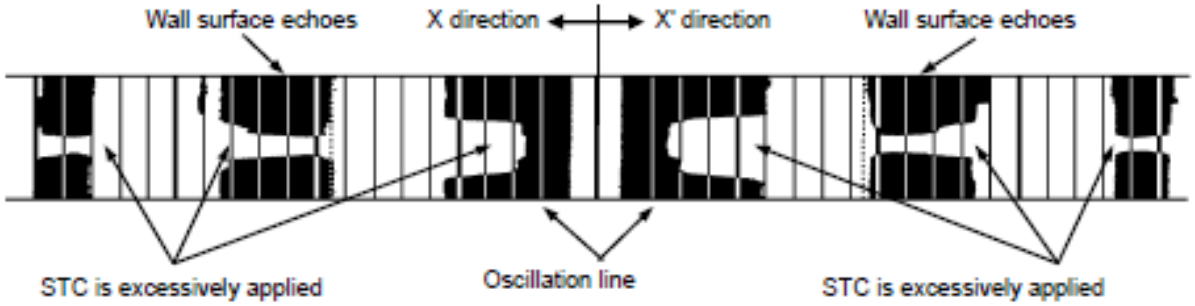


13-2 Confirmation of STC knobs

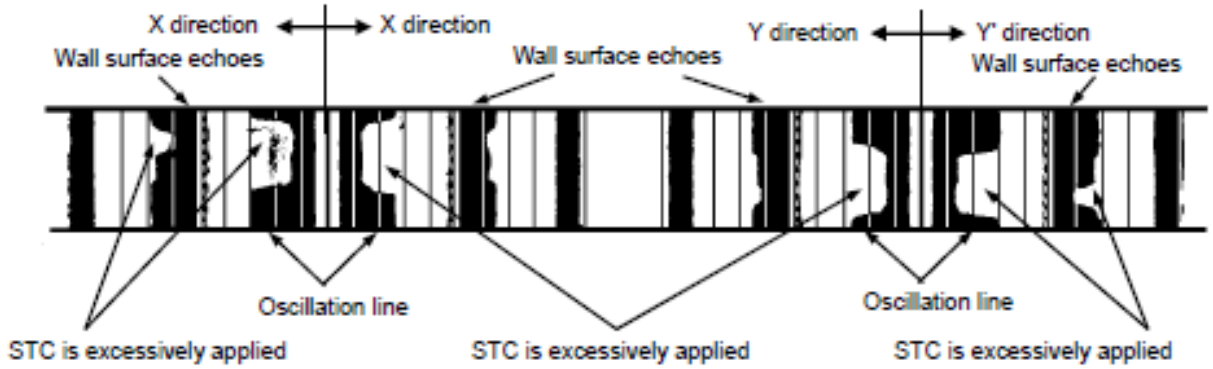
This will be performed by STC knobs. Turning of these knobs clockwise will reduce the gain near oscillation lines resulting in elimination of diffused reflection from oscillation lines to wall surface. By adjusting 4 knobs of X, X', Y and Y', wall surface images shall be recorded respectively. When discrimination of oscillation lines and wall surface images is not possible, turn the STC knobs counterclockwise to separate the records of oscillation lines and images.

Example 2: Variation of records when STC is adjusted.

DM-682/602:



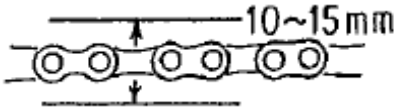
DM-684/604:



14. Operation of phasing devices for winch (for cable drum, wire drum)

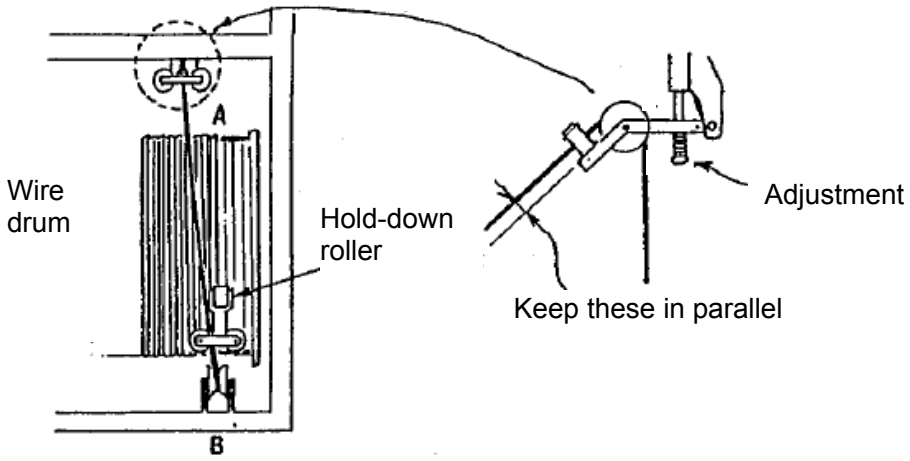
a. By lifting and lowering the sensor, the cable and the wire shall be wound on the drums respectively without overlapping, making neat layers.
(Confirm at high-speed and low-speed).

b. Each chain shall have 10 ~ 15 mm slack.

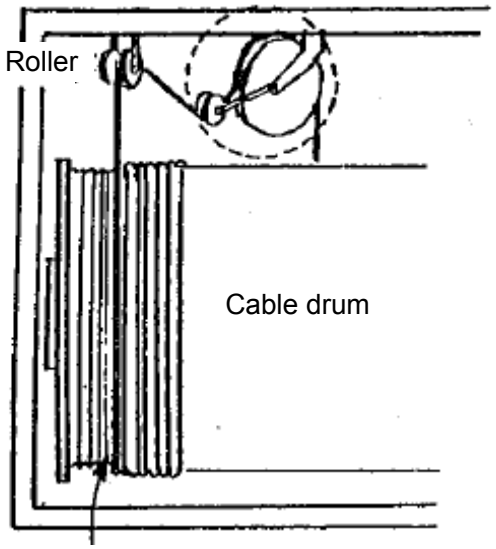


c. Adjustment procedure is shown below:

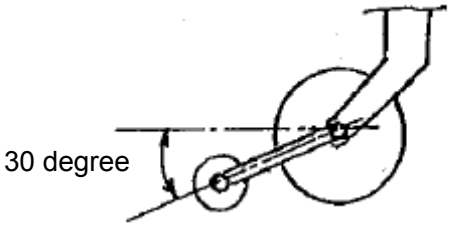
As for wire side, confirm the both right and left sides.



- When the hold down roller is lifted up, wire between A and B shall become straight.
- Phasing device for wire can be relocated to right and left independently.

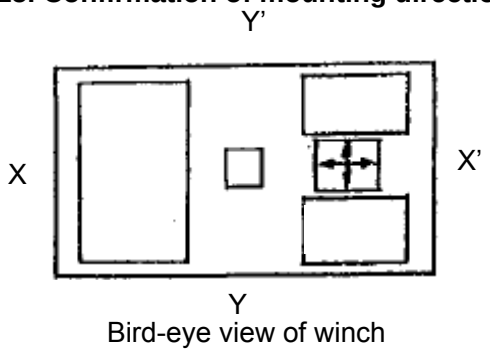


From cable drum to roller, the cable shall be in straight.



When reached to sea bottom, tension of cable shall be adjusted to make this angle to be about 30 degrees.

15. Confirmation of mounting direction of transducer



Bird-eye view of winch

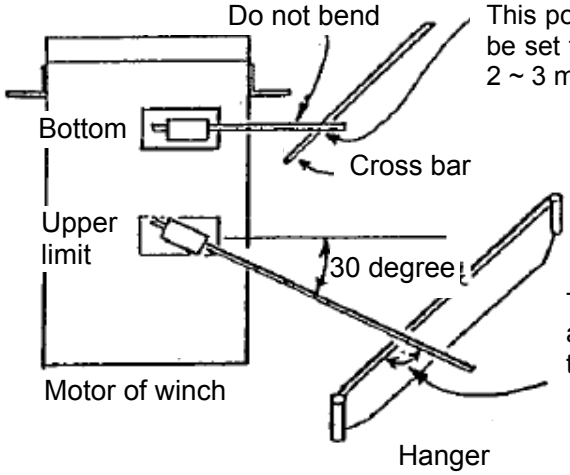
a. Plates to show X, X', Y and Y' directions shall be confirmed to have been affixed correctly.

b. It shall be confirmed that when a metal plate such as a tab of a can is attached to one of the transducer surface, the corresponding image will be changed.

c. This shall be applied to 4 transducers.

16. Operation of limit switches for reaching sea bottom and upper limits

When the sensor is raised up and down, the driving motor shall stop with signals from limit switches.



This portion shall be kept contacted. The switch shall be set to be turned off, when this portion is raised by 2 ~ 3 mm. (Sensor will stop descent)

There shall have 2 ~ 3 mm allowance at the beginning of contact between the hanger and the switch.

17. Adjustment of sensor's lifting speed and lowering speed

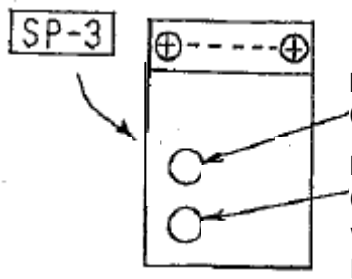
a. The winch shall be mounted on a water bath where the sensor could be lifted and descend by 2 m or more.

b. After the "Sensor speed control" knob has been turned fully counterclockwise, the "Sensor movement control" switch for UP/STOP/DOWN shall be switched over. When the sensor starts moving, the lifting speed shall be increased.

c. The moving speed shall be set at "STOP" at full counterclockwise position of the "Sensor speed control" knob and to be "lowering speed of 20 m/min" at full clockwise position. Dead slow speed at scale "2" shall be also confirmed.

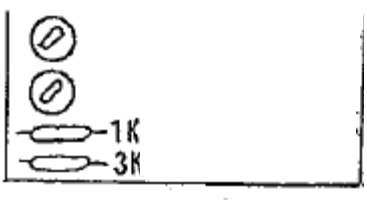
After connecting the frequency meter (with a probe of 10:1) to TP-17 of 7000 PCB, set the maximum voltage of motor controller to be 33 Hz max at full clockwise position of the lifting and lowering speed control knob during lowering of the sensor. Neglect the fractional part.

d. Speed adjustment shall be performed by "Motor controller (SP-3) or (DMC-001)" at the rear panel of recorder unit.



Minimum voltage adjustment (Low speed fine adjustment)

Maximum voltage adjustment (high speed fine adjustment)



When adjustment of high speed cannot be done, the fixed resistance of 1 kΩ in the controller should be replaced with a resistance of a few kΩ.

- For DM-602/604, a frequency meter shall be connected to terminal TP-16 of C25-700B PCB.

TEST DATA FOR DRILLING MONITOR

MODEL DM-　　DATE OF INSPECTION . ,2009

SERIAL No.　　CHIEF INSPECTOR

DATE OF MANUFACTURE　　INSPECTOR

No	Test item	The contents of inspection	Result	Remarks
1.	Appearance (Recorder unit)	Over viewing	good	AC Power cable, Connecting cable, Spare parts, Operation manual
2.	Appearance (Winch unit)	Over viewing	good	
3.	Accuracy (Horizontal direction)	Range calibration by control dial within a range of 2.550MHz ～ 3.150MHz or more. Variable	Scale 0 2.27 MHz Scale 10 3.20 MHz	Range calibration by control Dial with scale 8. Set at 3.00MHz.
	Functional check Range calibration control dial	X, X', Y, Y'	good	
4.	Oscillation line rejection switch	Oscillation line rejection test	good	Set to OFF after test.
5.	"Distance0" position correction switch	Switching test	good	Set at 009 after test.
6-1.	Mode switch	Mode switching test	good	Set as MEAS after test.
6-2.	Signal processing switch	Recording of echo change	good	Set to OFF after test.
7-1.	Switching of a range switch	0.5m, 1m, 2m, 4m	good	
7-2.	Switching of a shift switch	0%, 50%, 100%	good	
8-1.	Paper feeding (Constant)	7.5, 15, 30, 60(mm/min)	good	
8-2.	Paper feeding (Depth proportional)	1/40, 1/50, 1/100, 1/200	good	
9-1.	The wall face diameter mark (Setting the width)	Movable at intervals of 10cm from 1m to 2m.	good	Check on a recording form
9-2.	The wall face diameter mark (Width movement)	Movement of record width	good	
9-3/10.	Depth scale, Depth markers	1m, 5m, 10m	good	
—	Manual mark	Record line	good	
11.	Power meter indication 100VAC input	Meter indication	good	
12.	Direction check of an echo	X, X', Y, Y'	good	
13-1.	Functional check GAIN control knob	X, X', Y, Y'	good	Check on a recording form
13-2.	Functional check STC control knob	X, X', Y, Y'	good	
14.	Accuracy (Vertical Direction)	Wire drum perimeter 1.143～1.150m(0.6%)	good	
15.	The limit switch for bottom detection	Motor-stop at the time of bottom detection.	good	
16.	The limit switch for storing detection	Motor-stop at the time of storing.	good	
17.	Sensor winding-up speed(Max.)	20±1m／min (Frequency conversion 31～33Hz)	33 Hz	Frequency measurement
18.	Consumption current	At the time of a 100VAC input (Less than 6A)	5.3 A	

Koden Electronics Co., Ltd.

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