INSTRUCTION MANUAL

FOR

MODEL 314B

DUPLEX LEVEL-TEK

Robertshaw
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INSTRUCTION MANUAL NUMBER

909GF215B

P-2392

SECTION I - DESCRIPTION

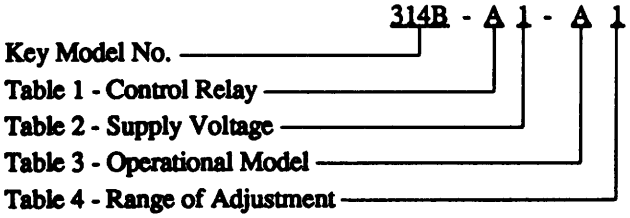
1.1 GENERAL

The Robertshaw Model 314B Duplex Level-Tek is a capacitance sensing ON-OFF control instrument used for detecting or controlling product level changes in vessels or containers. Individual high alarm or low alarm control action is provided by means of relay contact closure.

The Model 314B Duplex Level-Tek is designed for mounting directly onto a Robertshaw probe assembly installed within the vessel or container. The probe assembly senses the change in product or material level as a function of the capacitance change between the probe and the vessel wall. The instrument is available with optional variations of High and Low Alarm Fail Safe as shown in the Model Identification below.

1.2 MODEL IDENTIFICATION

Identify instrument models in accordance with the description and variations listed in each table.



KEY MODEL NO.

Model No.	Description
314B	Capacitance Actuated Level Control Unit offering two individually adjustable set-points (with separate control relay on each setpoint) actuated from a single vertically mounted probe. Adjustable differentials on each setpoint.

TABLE 1 - CONTROL RELAY

Desig.	Description
A	Two control relays having SPDT contacts.

TABLE 2 - SUPPLY POWER

Desig.	Description
1	26.5 VDC ± 10%
2	120 VAC, ± 10%, 50/60 Hz
3	240 VAC, ± 10%, 50/60 Hz

TABLE 3 - OPERATIONAL MODE

Desig.	Description
A	High & low level, fail-safe modes High & Low
B	Low and low-low, fail-safe mode Low
C	High and high-high, fail-safe mode High

TABLE 4 - RANGE OF ADJUSTMENT

Desig.	Description
2	Adjustable range 15 to 500 pf

SECTION II - SPECIFICATIONS

2.1 ENVIRONMENTAL

Operating Temperature Limits .....-40°F to +160°F
Storage Temperature Limits .....-55°F to +225°F
Vibration Limits .....2 g's to 100 Hz
Enclosure Classification .....Class I, Division 1, Groups C & D and Watertight NEMA 4
Operating humidity range .....0 to 90% RH

2.2 ELECTRICAL

Supply Voltage .....26.5 VDC ± 10%, 120 VAC ± 10% or 240 VAC ± 10%
Supply Power ..... 120 VAC, 3W, 5VA, maximum
240 VAC, 3W, 5VA maximum
26.5 VDC, 80 ma, maximum
Output Relay .....Electromechanical relay
Form: SPDT
Rating: 5A 120 VAC/28 VDC noninductive
3A 240 VAC, noninductive

2.3 PERFORMANCE

Zero Adjusment (control point) Range .....15-500 pf
Differential (deadband) .....Varible
(maximum deadband is approximately 50% of span)
Temperture Coefficient .....0.0065 pf/°F
Response Time .....50 ms

SECTION III - INSTALLATION

3.1 PROBE MOUNTING

Robertshaw probes are provided in a variety of sizes and types for specific applications involving liquids or granular materials. Insulated rod-type probes are used for liquid solutions or liquid interface detection where the product is electrically coductive. Bare type probes can be used on nonconductive materials only.

Vertically mounted rod-type probes should be installed in either the top or bottom of the vessel with the mid-point on the probe corresponding to approximately the desired level detection point. Vertically installed probes allow a variation in the level detection point up and down in the length of the probe by means of the instrument zero adjustment.

3.1 INSTURMENT MOUNTING

The model 314B Duplex Level-Tek is designed for mounting directly on the installed probe assembly (see Figure 1) and may be mounted or oriented in any position.

NOTE:

Prior to installing the instrument to the probe, the probe electrical connection pin (included with the instrument) should be installed in the end of the probe so as to make connection with the instrument chassis when installed.

CAUTION

Care should be exercised when tightening the instrument housing to the probe so as not to disturb the probe packing gland. To do so may cause damage to the probe.

3.3 ELECTRICAL CONNECTIONS

The instrument housing chassis assembly may be removed from the housing for wiring installation by loosening the three chassis mounting screws (captive screws) and withdrawing chassis straight out. In reinstalling the chassis care should be taken to engage the probe connection pin in the chassis receptacale.

All electrical connection should be made in accordance with Figure 2. See Specifications for control relay contact ratings

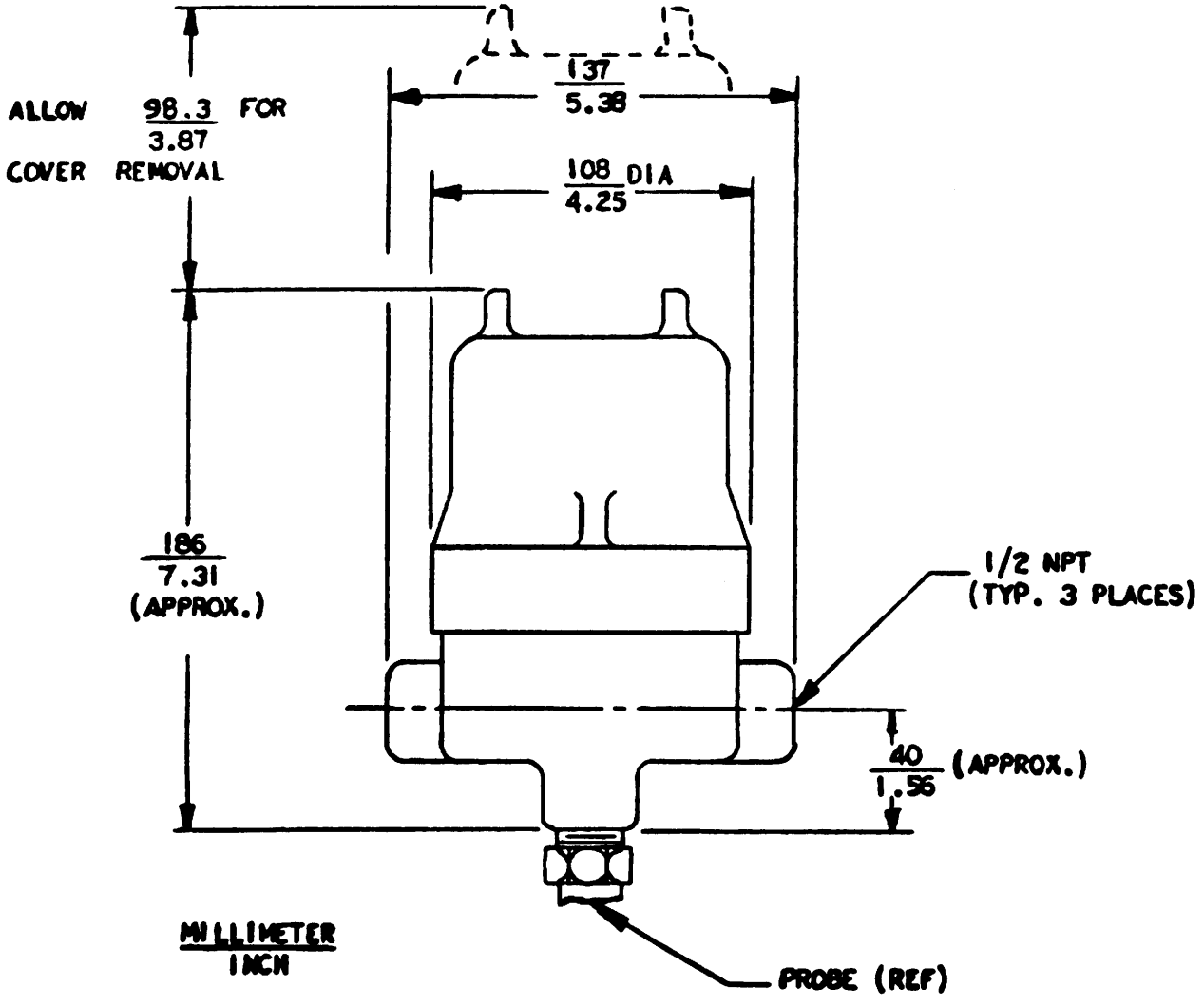
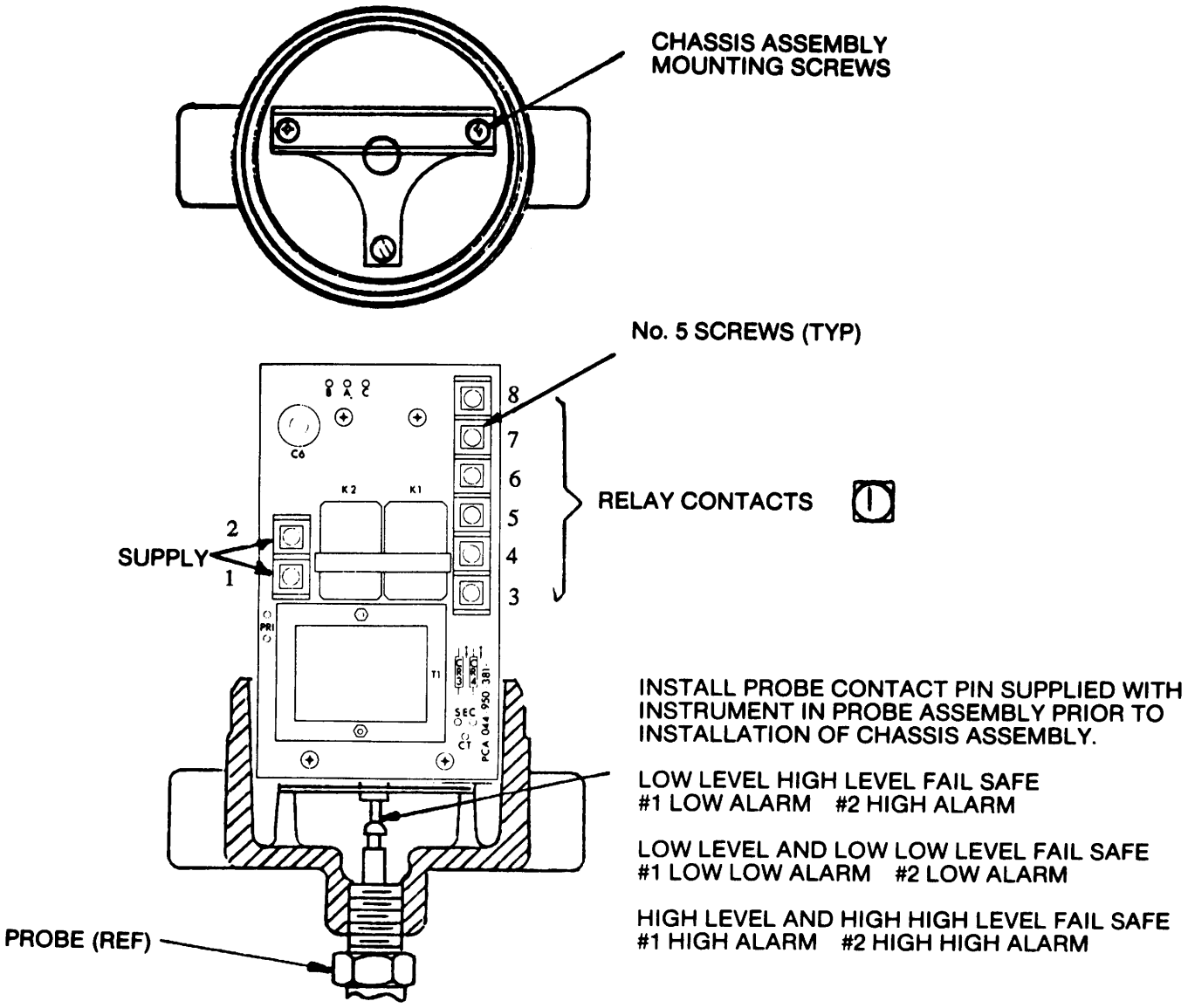


FIGURE 1 — Probe Mounting Dimensions



ELECTRICAL CONNECTIONS

SUPPLY VOLTAGE SEE RATING PLATE	
TERMINAL	
1	120V 50/60 Hz
2	
1	240V 50/60 Hz
2	
1 -	26.5 VDC
2 +	

(1)	RELAY CONTACTS
TERMINAL	
3	NORMALLY CLOSED NO. 1
4	COMMON NO. 1
5	NORMALLY OPEN NO. 1
6	NORMALLY CLOSED NO. 2
7	COMMON NO. 2
8	NORMALLY OPEN NO. 2

(1) CONTROL RELAY CONTACT DESIGNATIONS ARE SHOWN WITH RELAY IN THE DE-ENERGIZED CONDITION. THE RELAY IS NORMALLY ENERGIZED AND BECOMES DE-ENERGIZED WHEN LEVEL OR PROCESS REACHES THE CONTROL POINT.

FIGURE 2 — Electrical Connections

SECTION IV - OPERATION

4.1 SELECTING THE OPERATIONAL MODE

The model 314B Duplex Level-Tek is designed with three different operational mode provisions to allow for fail-safe relay contact closure upon loss or electrial power (see Model Identification).

4.1.1 Low Level and High Level Fail Safe

Low Level and High Level Fail Safe operation is intended for applications requiring a low-alarm point and a high-alarm point. The process or material is normally above the low-alarm point and below the high-alarm point and both control relays (low alarm No.1 and high alarm No. 2) are energized. A decrease in the level of the process or material below the low-alarm point will de-energize the low alarm relay No. 1 and conversely an increase in the level of the process or material above the high-alarm point will de-energize the high-alarm relay No. 2.

4.1.2 Low Level and Low-Low Level Fail Safe

Low Level and Low-Low Level Fail Safe operation is intended for applications requiring a low-alarm point and a lower alarm point. The process or material is normally above both alarm points and both control relays (low-low alarm No.1 and low alarm No. 2) are energized. A decrease in the level of the process or material below the low-alarm point will de-energize low-alarm relay No. 2 and a further decrease in the level of the process or material below the low-low alarm point will de-energize the low-low alarm relay No. 1.

4.1.3 High Level and High-High Level Fail Safe

High Level and High-High Level Fail Safe operation is intended for applications requirring a high-alarm point and a high-high alarm point. The process or material is normally below both alarm points and both control relays (high alarm No. 1 and high-high alarm No. 2) are energized. An increase in the level of the process or material above the high-alarm point will de-energize the high-alarm relay No. 1 and a further increase in the level of the process or material above the high-high alarm point will de-energize the high-high alarm relay No. 2.

4.2 CHANGING THE OPERATIONAL MODE

The operational mode may be changed in the field by relocating the shorting wires on the chassis assembly (see Figure 3). The supply voltage to the instrument should be momentarily disconnected when making this change.

4.3 Calibration Adjustments

The adjustments for calibrating the Model 314B Duplex Level-Tek are located on the top of the chassis assembly and consist of the following (see Figure 3).

4.3.1 Setpoint Number 1

This adjustment is a multiturn potentiometer (approximately 20 turns) that varies the low of the two alarm points (i.e., the low alarm on high and low, the low-low alarm on low and low-low, and the high alarm on high and high-high). Clockwise rotation of this adjustment raises the lower alarm point.

4.3.2 Differiential Deadband Number 1

This adjustment is a multiturn potentiometer (approximately 20 turns) that varies the differential deadband for Setpoint Number 1. Clockwise rotation of this adjustment increases the deadband.

4.3.3 Setpoint Number 2

This adjustment is a multiturn potentiometer (approximately 20 turns) that varies the higher of the two alarm points (i.e., the high alarm on high and low, the low alarm on low and low-low, and the high-high alarm on high and high-high). Clockwise rotation of this adjustment raises the higher alarm point.

4.3.4 Differential Deadband Number 2

This adjustment is a multiturn potentiometer (approximately 20 turns) that varies the differential deadband for Setpoint Number 2. Clockwise rotation of this adjustment increases the deadband.

4.4 CALIBRATION PROCEDURE

4.4.1 Low Level and High Level Fail Safe

a. Adjust level of material in vessel to the desired low level differential port.

b. Rotate Differential Deadband No. 1 to the full counter-clockwise position (no deadband).

c. Rotate Setpoint No. 1 to the full clockwise position Relay No. 1 should be de-energized as indicated by LED DS-1 being "OFF"

d. Slowly rotate Setpoint No. 1 counter-clockwise until LED DS-1 is "ON". (Relay No. 1 is energized).

e. Rotate Differential Deadband No. 1 to the full clockwise position (full deadband).

f. Decrease the material in vessel to the desired low level alarm point.

g. Slowly rotate Differential Deadband No.1 counter-clockwise until LED DS-1 is "OFF". (Relay No. 1 is de-energized)

h. Increase level of the material in vessel to the desired high level alarm point.

i. Rotate Differential Deadband No. 2 fully counter-clockwise (no deadband)

j. Rotate Setpoint No. 2 to the full clockwise position. Relay No. 2 should be energized as indicated by LED DS-2 being "ON".

k. Slowly rotate Setpoint No. 2 counter-clockwise until LED DS-2 is "OFF". (Relay No. 2 is de-energized.)

l. Rotate Differential Deadband No. 2 to the full clockwise position (full deadband).

m. Decrease the material in the vessel to the desired high level differential point.

n. Slowly rotate Differential Deadband No. 2 counter-clockwise until LED DS-2 is "ON". (Relay No. 2 is energized).

4.4.2Low Level and Low-Low Level Fail Safe

a. Adjust level of material in vessel to the desired low level differential port.

b. Rotate Differential Deadband No. 1 and No. 2 to the full counter-clockwise position (no deadband).

c. Rotate Setpoints No. 1 and No.2 to the full clockwise position. Both relays should be de-energized as indicated by LED DS-1 and DS-2 being "OFF".

d. Slowly rotate Setpoint No. 2 counter-clockwise until LED DS -2 is "ON". (Relay No. 2 is energized).

e. Rotate Differential Deadband No. 2 to the full clockwise position (full deadband)

f. Decrease the material in the vessel to the desired low level alarm point

g. Slowly rotate Differential Deadband No. 2 counter-clockwise until LED DS-2 is "OFF". (Relay No. 2 is de-energized).

h. Decrease the material in vessel to the desired low-low differential point.

i. Slowly rotate Setpoint No. 1 counter-clockwise until LED DS-1 is "ON". (Relay No. 1 is energized).

j. Rotate Differential Deadband No. 1 to the full clockwise position (full deadband).

k. Decrease the material in the vessel to the desired low-low level alarm point

l. Slowly rotate Differential Deadband No.1 counter-clockwise until LED DS-1 is "OFF". (Relay No. 1 is de-energized).

4.4.3 High Level and High-High Level Fail Safe

a. Increase level of material in vessel to the desired high level alarm point.

b. Rotate Differential Deadband No. 1 and No. 2 to the full counter-clockwise position (no deadband).

c. Rotate Setpoints No. 1 and No.2 to the full clockwise position. Both relays should be energized as indicated by LEDs DS-1 and DS-2 being "ON".

d. Slowly rotate Setpoint No. 1 counter-clockwise until LED DS -1 is "OFF". (Relay No. 1 is de-energized).

e. Rotate Differential Deadband No. 1 to the full clockwise position (full deadband)

f. Decrease the material in the vessel to the desired high level differential point

g. Slowly rotate Differential Deadband No. 1 counter-clockwise until LED DS-1 is "ON". (Relay No. 1 is energized).

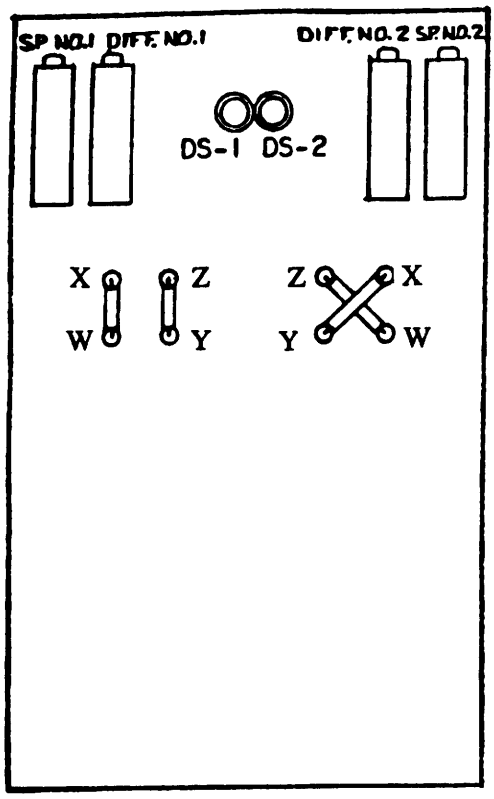
h. Increase level of the material in vessel to the desired high-high level alarm point.

i. Slowly rotate Setpoint No. 2 counter-clockwise until LED DS-2 is "OFF". (Relay No. 2 is de-energized).

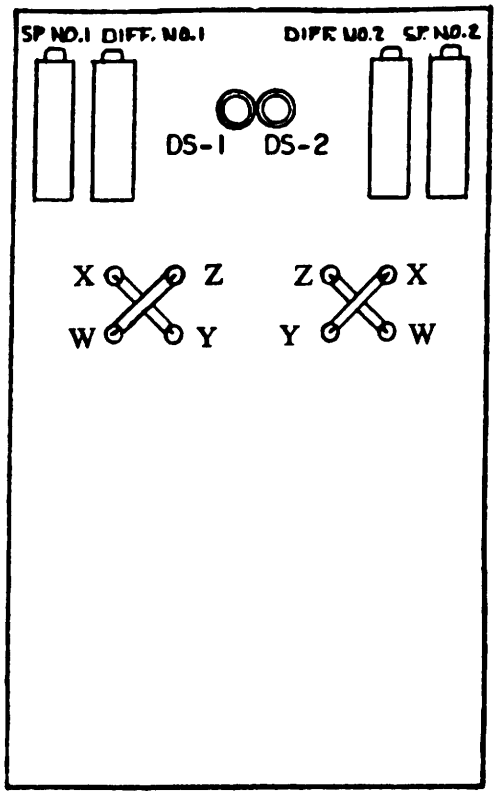
j. Rotate Differential Deadband No. 2 to the full clockwise position (full deadband).

k. Decrease the material in the vessel to the desired high-high level differential point

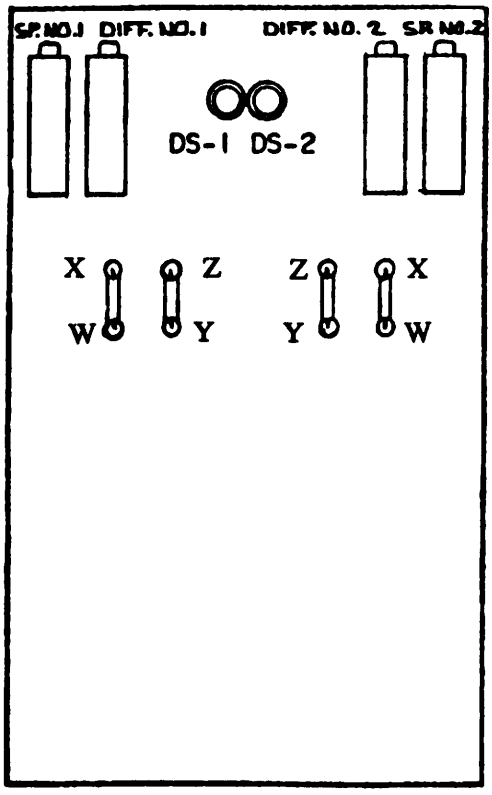
l. Slowly rotate Differential Deadband No.2 counter-clockwise until LED DS-2 is "ON". (Relay No. 2 is energized).



LOW AND HIGH OPERATION



HIGH AND HIGH-HIGH OPERATION



LOW AND LOW-LOW OPERATION

FIGURE 3 — Calibration And Operational Mode Adjustments

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