CLOSED-SERVO-LOOP COMPONENTS

1. SPECIMEN
2. GRIPS
3. LOAD FRAME (REACTION FORCE)
4. TRANSUDCER(S)
5. SIGNAL CONDITIONER(S)
6. READOUTS & RECORDERS
7. PROGRAMMER (FUNCTION GENERATOR, SEGMENT GENERATOR)
8. SERVO CONTROLLER
9. SERVO VALVE
10. HYDRAULIC POWER SUPPLY
11. ACTUATOR
12. GRIPS
13. SPECIMEN
CLOSED-SERVO-LOOP TERMS

1. COMMAND (PROGRAM)
2. SET POINT (MANUAL COMMAND, MEAN)
3. SPAN (+,- AMPLITUDE)
4. RAMP
5. BREAK POINT
6. FEEDBACK
7. SUMMING JUNCTION
8. ERROR SIGNAL
9. ERROR DETECTORS
10. LIMIT DETECTORS
11. INTERLOCKS
12. SERVO GAIN
TERMS CONT.

13. PID

14. DITHER

15. ADAPTIVE COMPENSATION (DIGITAL CONTROLLER)
**FUNCTION ENABLED**

<table>
<thead>
<tr>
<th>DUAL SLOPE</th>
<th>RAMP THRU ZERO NOT SELECTED</th>
<th>RAMP THRU ZERO SELECTED</th>
</tr>
</thead>
<tbody>
<tr>
<td>NOT SELECTED</td>
<td><strong>BREAKPOINT NORMAL</strong></td>
<td><strong>BREAKPOINT REVERSE</strong></td>
</tr>
<tr>
<td><strong>+100</strong></td>
<td><img src="image" alt="Waveform A" /></td>
<td><img src="image" alt="Waveform B" /></td>
</tr>
<tr>
<td><strong>+BP</strong></td>
<td><img src="image" alt="Waveform E" /></td>
<td><img src="image" alt="Waveform F" /></td>
</tr>
<tr>
<td><strong>-BP</strong></td>
<td><img src="image" alt="Waveform I" /></td>
<td><img src="image" alt="Waveform J" /></td>
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</tbody>
</table>

**RATE 1 ONLY**

**RATES 1 AND 2**

**RETURN TO ZERO push-button activated.**

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+100 = 100% OUTPUT (+10V), +BP = BREAKPOINT SETTING, 0 = ZERO REFERENCE (0V), -BP = BREAKPOINT SETTING (NEGATIVE), -100 = -100% OUTPUT (-10V)
SERVO CONTROLLER
ERROR DETECTOR SETTING
TRANS DUCER
CALIBRATION SETTINGS

WHERE:

\[ V_{out} = \text{VOLTAGE OUT TO DISPLAY, SCOPE OR RECORDER} \]
\[ V_{sens} = \text{MANUFACTURER'S STATED SENSITIVITY OF TRANS DUCER} \]
\[ GAIN = \text{AMPLIFIER VOLTAGE GAIN} \]
\[ EXCITE = \text{EXCITATION VOLTAGE FOR TRANS DUCER CALIBRATED USE} \]

\[ V_{out} = V_{sens} * GAIN * EXCITATION \]

\[ V_{out} = \frac{V}{V_{excite}} * \frac{V}{V} \]

THEN:

\[ V_{excite} = \frac{V_{out}}{V_{sens} * GAIN} \]

\[ V_{excite} = \frac{V_{out}}{V / V_{excite} * V / V} \]
WITH DC SIGNAL CONDITIONING, CALIBRATION OF A TRANSDUCER WOULD BE:

FOR A KNOWN LEVEL OF PHENOMENA (FORCE, PRESSURE, STRAIN, ETC.)

SENSITIVITY = \[ \frac{\text{VOLTS (OUTPUT OF CONDITIONER)}}{\text{VOLTS (EXCITATION)) x AMPLIFIER GAIN}} \]

EXAMPLE:

WITH A FORCE OF 1,000 LBS:

OUTPUT OF CONDITIONER = 10.00 VOLTS
WITH EXCITATION = 10.00 VOLTS
WITH AMPLIFIER GAIN = X500

THEN:

\[ S = \frac{10.00 \text{ VOLTS}}{(10.00 \text{ VOLTS}) \times 500} = .002 \text{ V/V}_{\text{EXCIT.}} \]

OR: \[ @ 1,000 \text{ LBS } S = 2 \text{ MV/V} \]