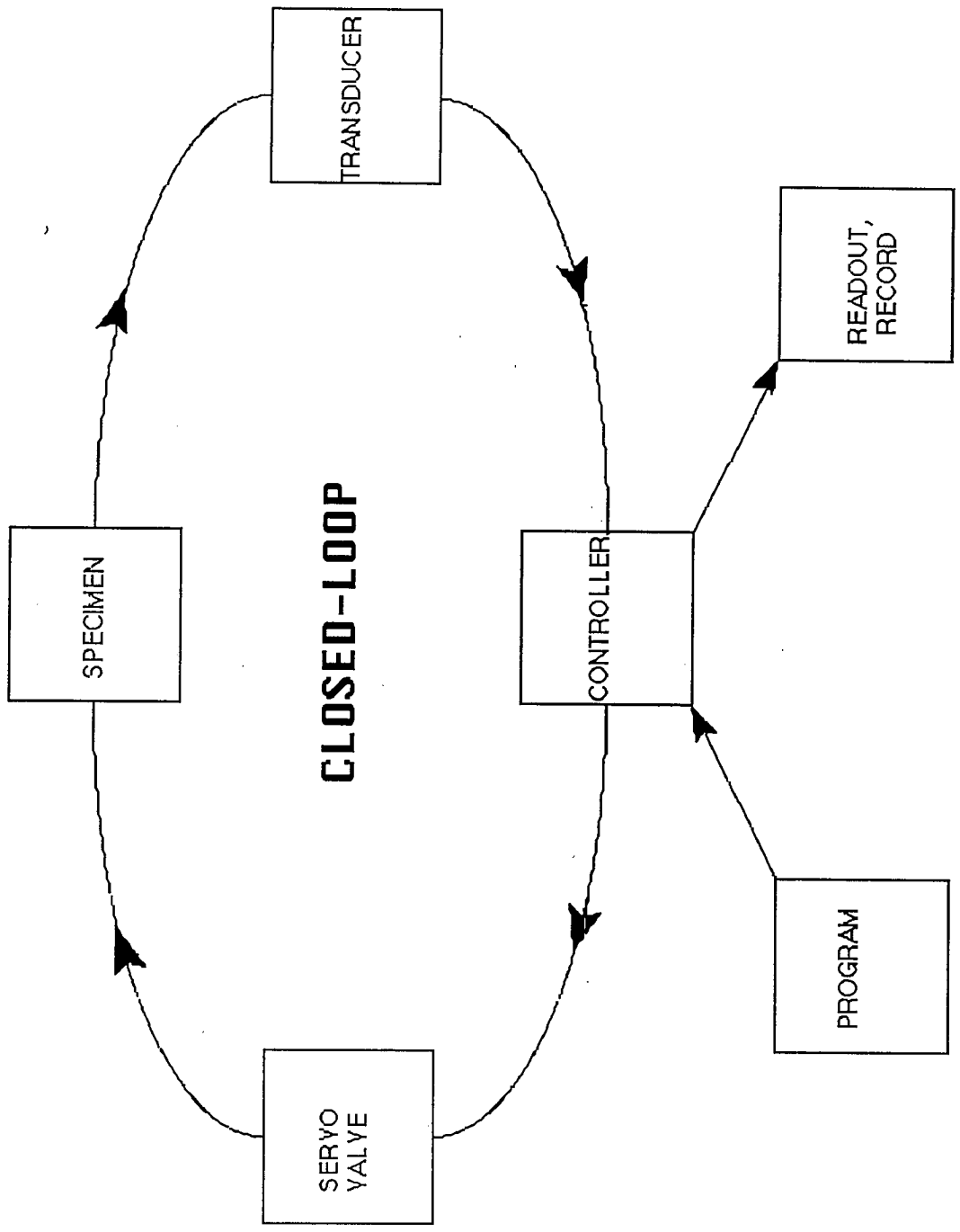


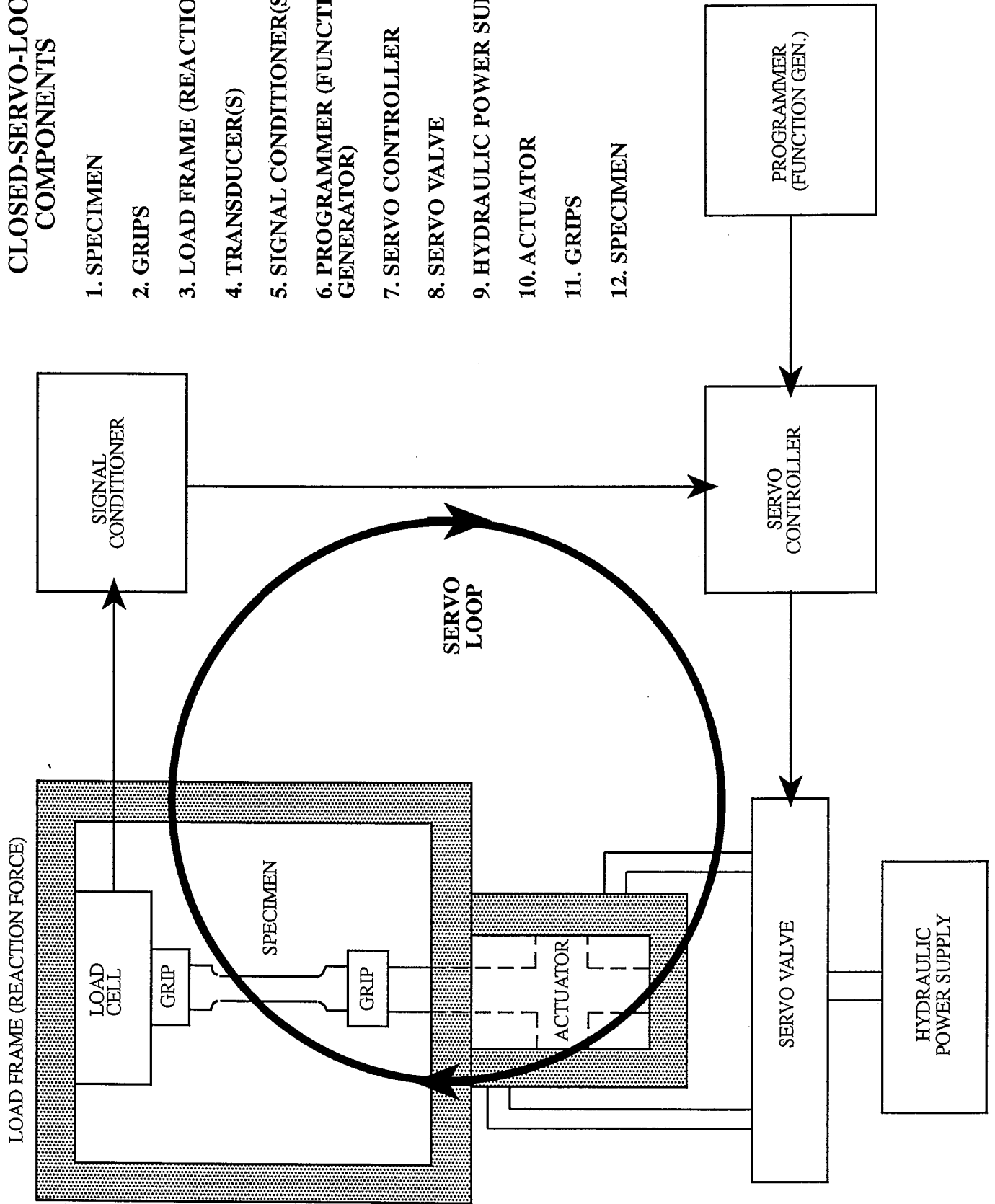
CLOSED-SERVO-LOOP COMPONENTS

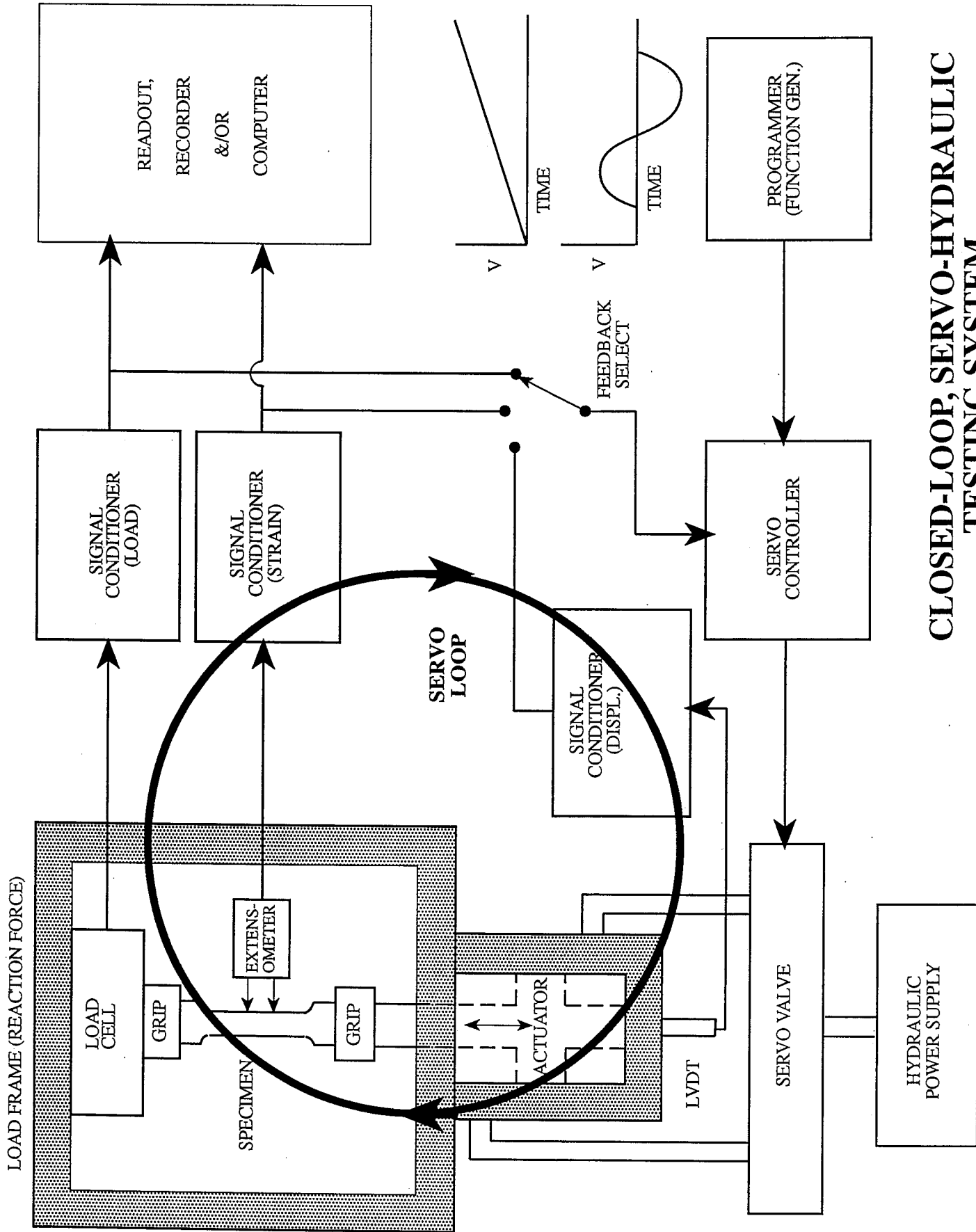
1. SPECIMEN
2. GRIPS
3. LOAD FRAME (REACTION FORCE)
4. TRANSDUCER(S)
5. SIGNAL CONDITIONER(S)
6. READOUTS & RECORDERS
7. PROGRAMMER (FUNCTION GENERATOR,
SEGMENT GENERATOR)
8. SERVO CONTROLLER
9. SERVO VALVE
10. HYDRAULIC POWER SUPPLY
11. ACTUATOR
12. GRIPS
13. SPECIMEN



CLOSED-SERVO-LOOP COMPONENTS

1. SPECIMEN
2. GRIPS
3. LOAD FRAME (REACTION FORCE)
4. TRANSDUCER(S)
5. SIGNAL CONDITIONNER(S)
6. PROGRAMMER (FUNCTION GENERATOR)
7. SERVO CONTROLLER
8. SERVO VALVE
9. HYDRAULIC POWER SUPPLY
10. ACTUATOR
11. GRIPS
12. SPECIMEN





CLOSED-LOOP, SERVO-HYDRAULIC TESTING SYSTEM

CLOSED-SERVO-LOOP TERMS

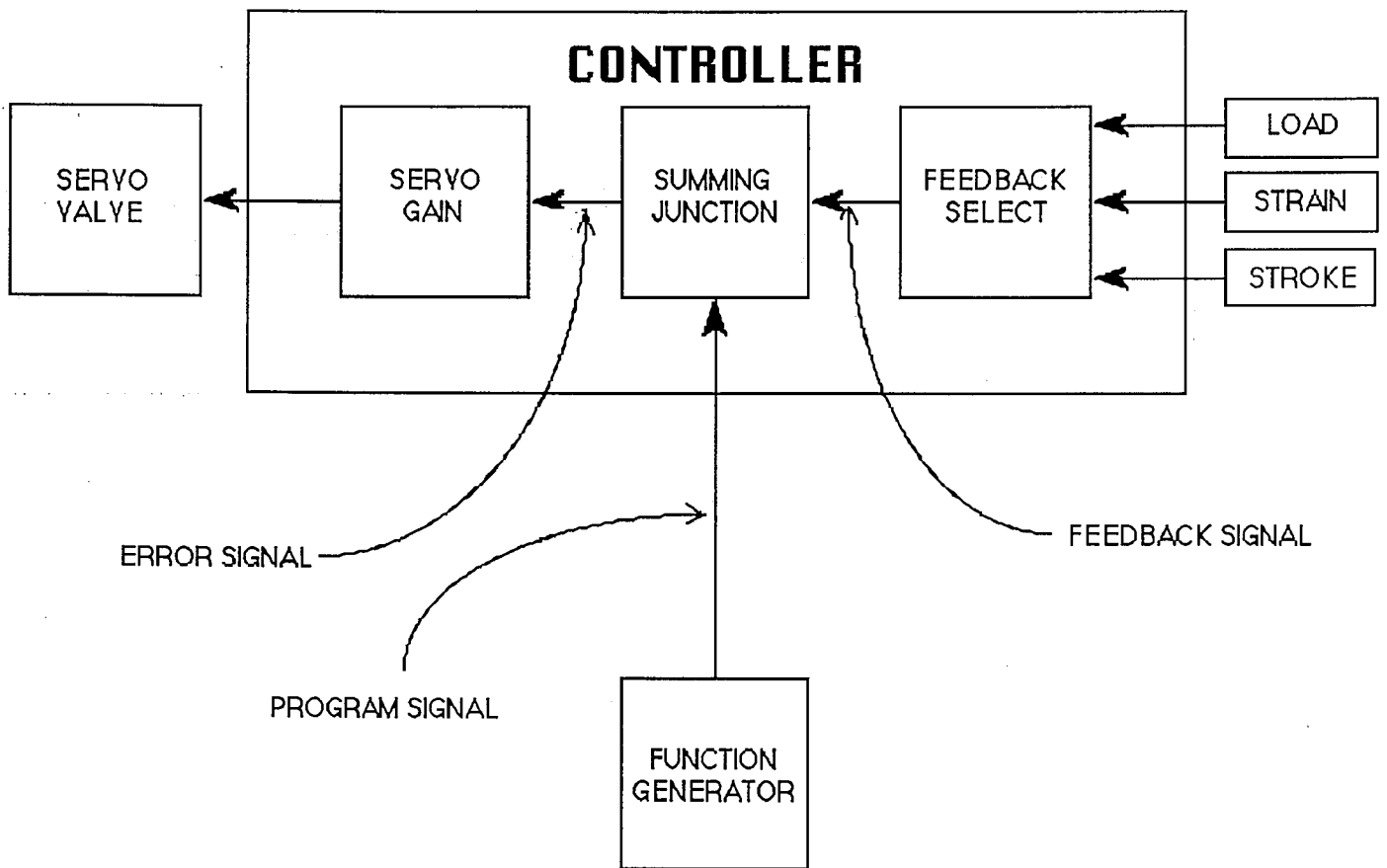
1. COMMAND (PROGRAM)
2. SET POINT (MANUAL COMMAND, MEAN)
3. SPAN (+,- AMPLITUDE)
4. RAMP
5. BREAK POINT
6. FEEDBACK
7. SUMMING JUNCTION
8. ERROR SIGNAL
9. ERROR DETECTORS
10. LIMIT DETECTORS
11. INTERLOCKS
12. SERVO GAIN

TERMS CONT.

13. PID

14. DITHER

15. ADAPTIVE COMPENSATION (DIGITAL
CONTROLLER)



As selected by hitting adjacent button 5 m/s

FUNCTION ENABLED	RAMP THRU ZERO NOT SELECTED		RAMP THRU ZERO SELECTED	
	BREAKPOINT NORMAL	BREAKPOINT REVERSE	BREAKPOINT NORMAL	BREAKPOINT REVERSE
DUAL SLOPE NOT SELECTED				
HOLD AT BRKPT NOT SELECTED				
DUAL SLOPE SELECTED				
HOLD AT BRKPT NOT SELECTED				

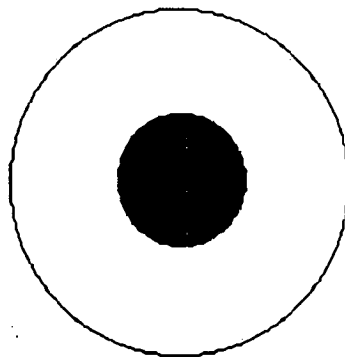
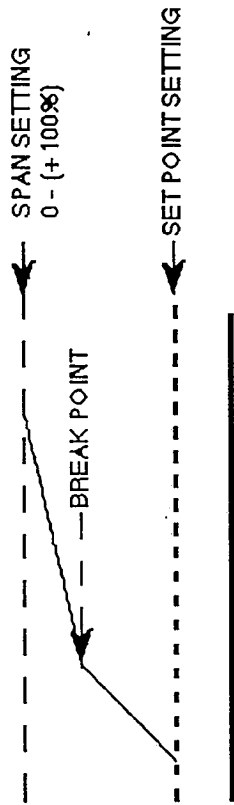
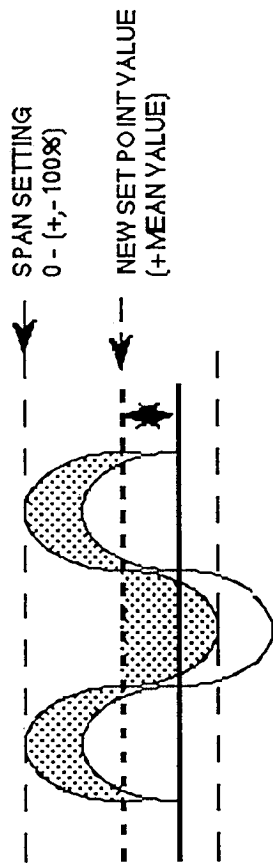
RATE 1 ONLY

RATES 1 AND 2

RATES 1 AND 2

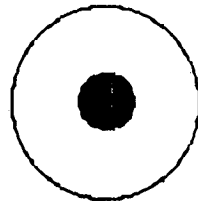
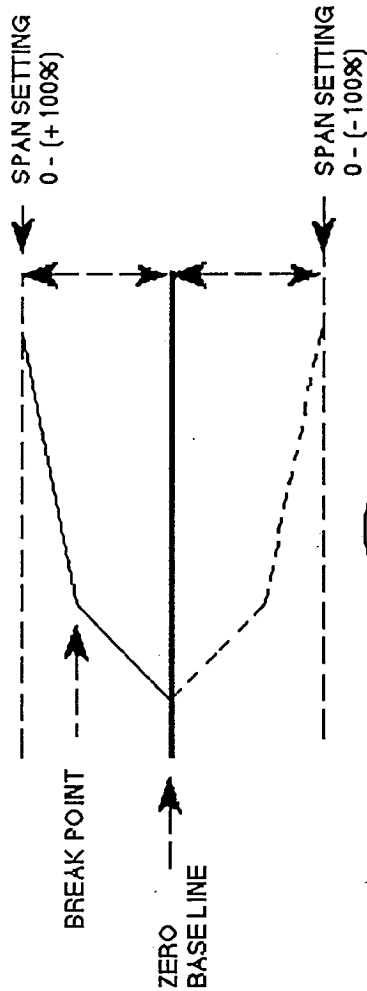
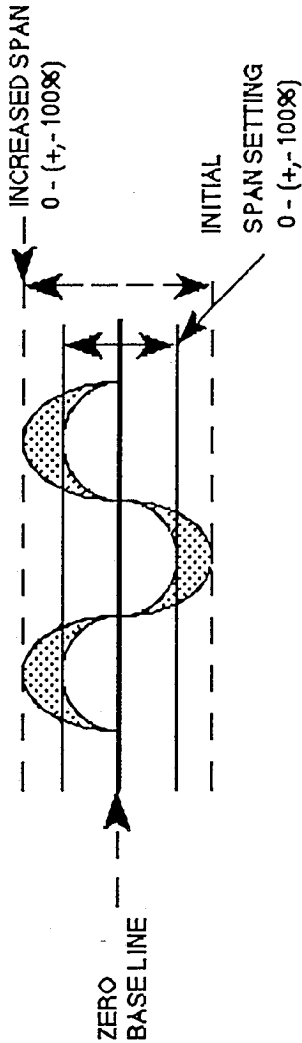
* +100= 100% OUTPUT (+10V), +BP= BREAKPOINT SETTING, 0= ZERO REFERENCE (0V), -BP= BREAKPOINT SETTING (NEGATIVE), -100= -100% OUTPUT (-10V)

SET POINT VS. SPAN



(- 100%) - 0 - (+ 100%)

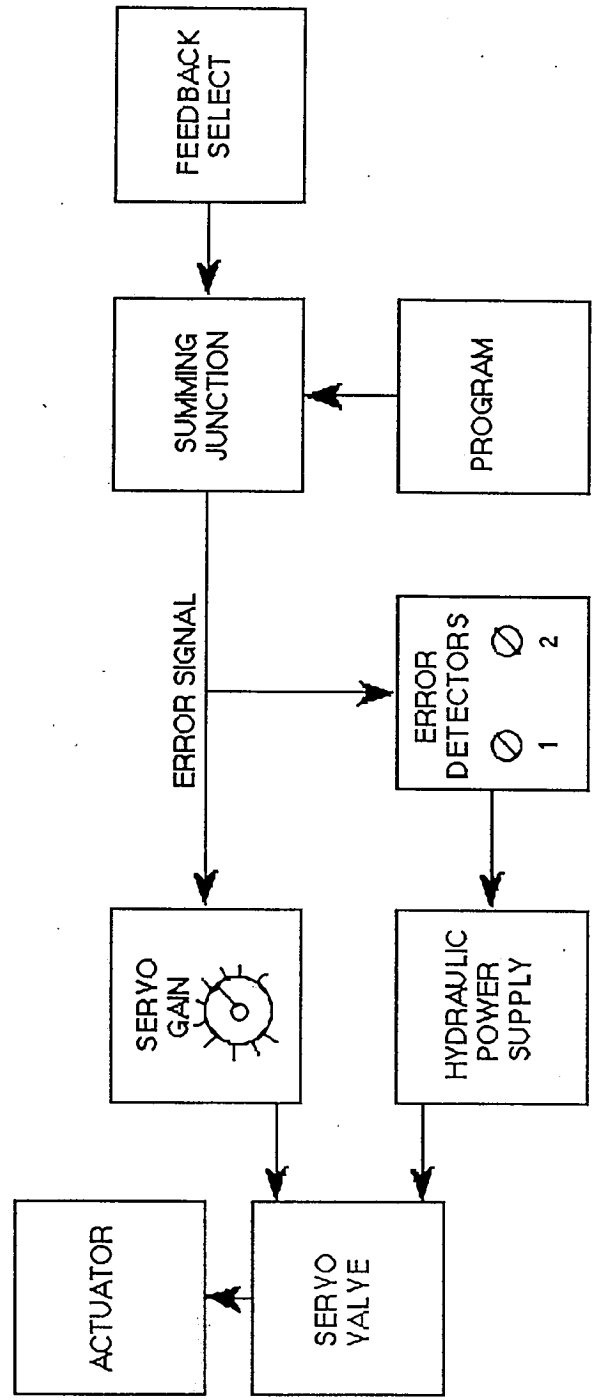
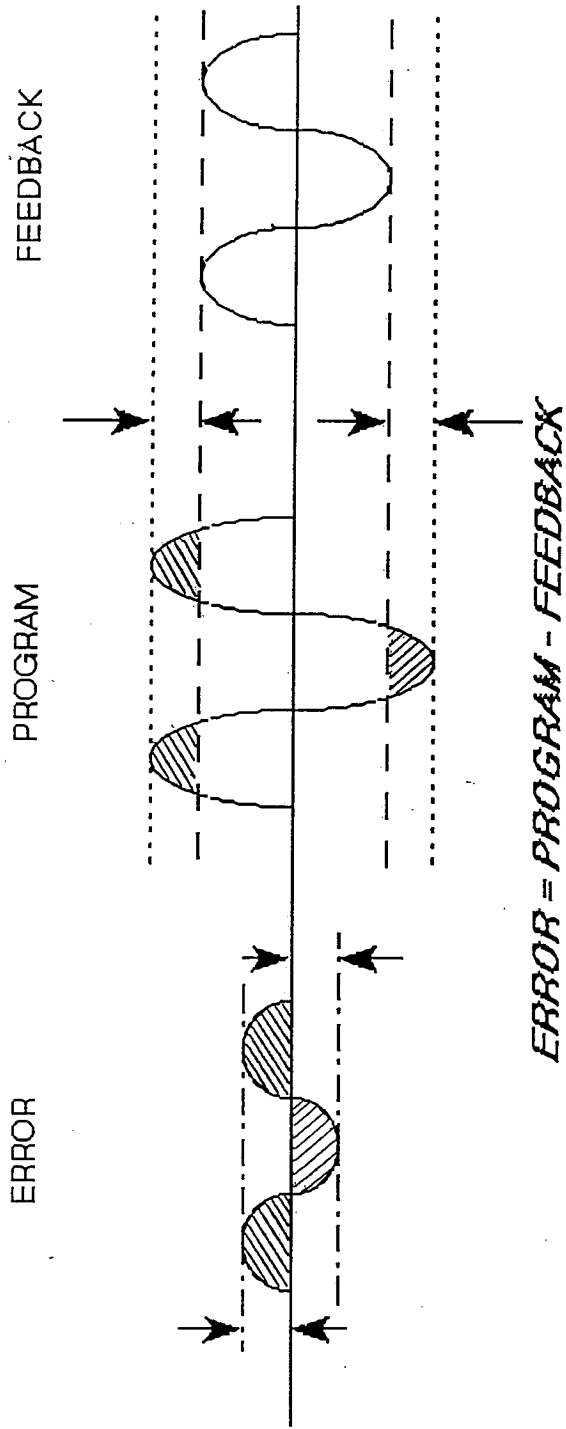
SET POINT



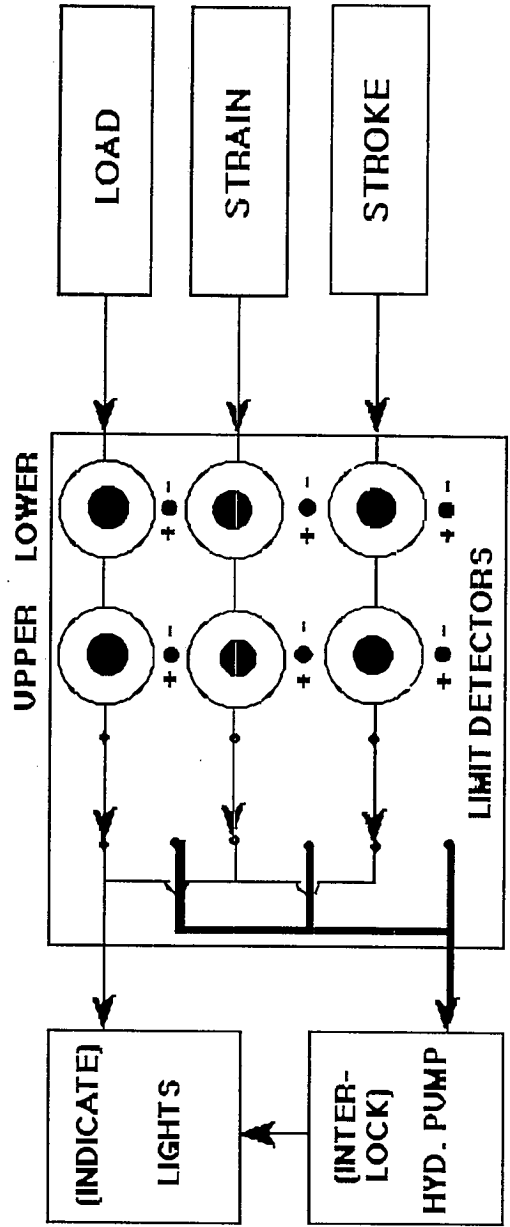
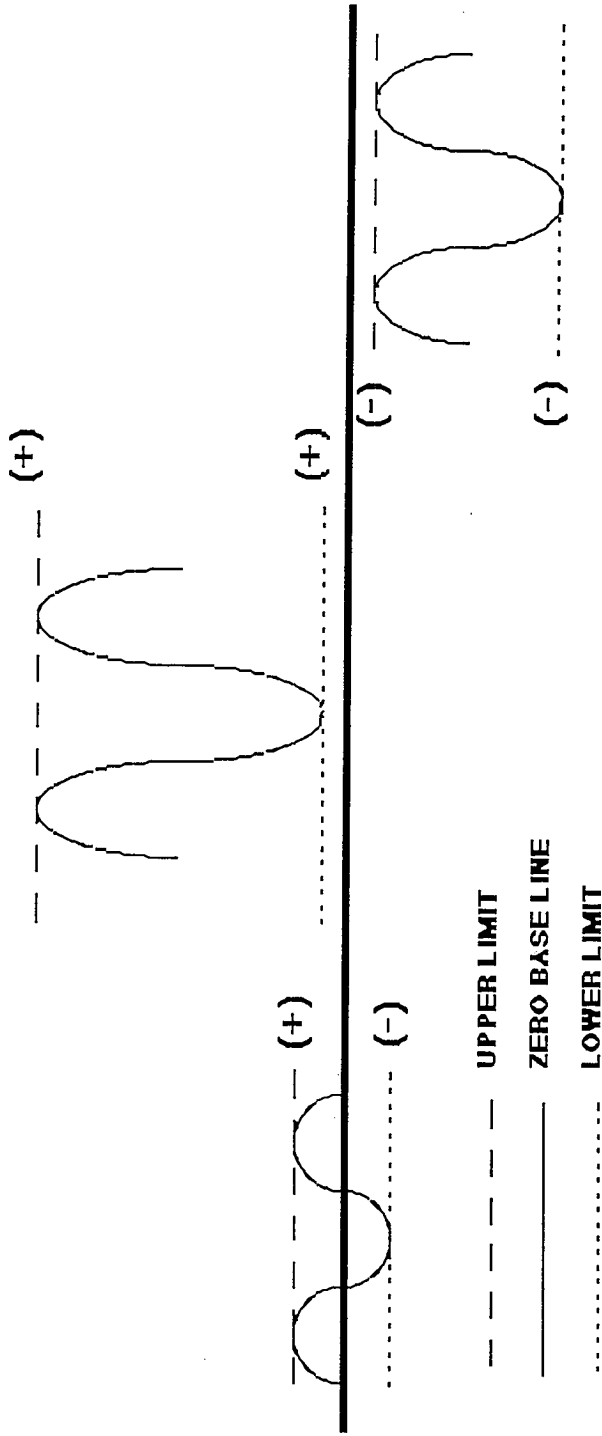
0 - (+, - 100%) OR,
0 - (+ 100%) OR,
0 - (- 100%)

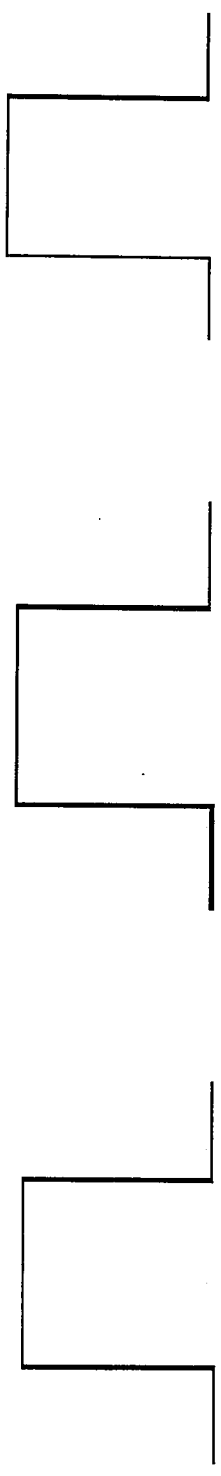
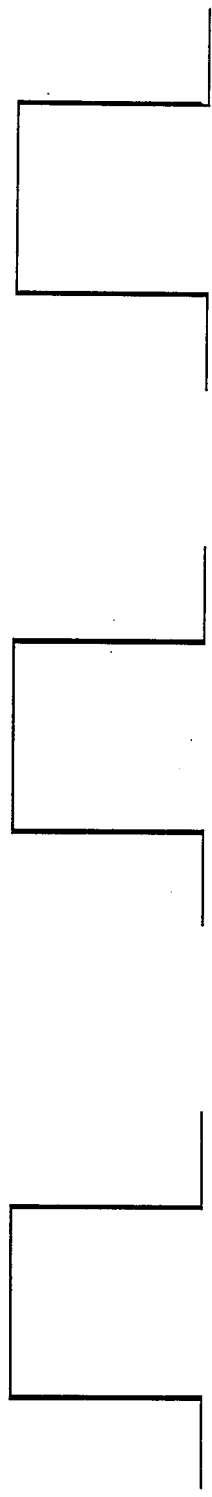
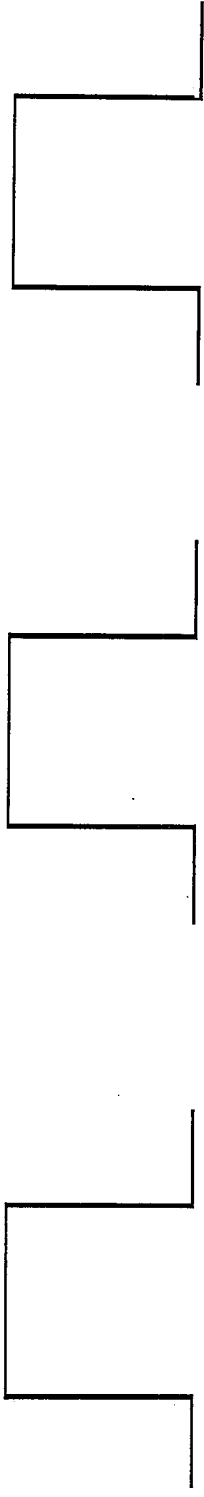
SPAN

ERROR SIGNAL



LIMIT DETECTORS





ADJUSTING PID

TRANSDUCER CALIBRATION SETTINGS

WHERE:

V_{OUT} = VOLTAGE OUT TO DISPLAY, SCOPE OR RECORDER

V_{SENS} = MANUFACTURER'S STATED SENSITIVITY OF TRANSDUCER

GAIN = AMPLIFIER VOLTAGE GAIN

EXCITE = EXCITATION VOLTAGE FOR TRANSDUCER CALIBRATED USE

$$V_{OUT} = V_{SENS} * GAIN * EXCITATION$$

$$V_{OUT} = \frac{V}{V_{EXCITE}} * \frac{V}{V} * V_{EXCITE}$$

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.)

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

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 LBS S = 2 MV/V
