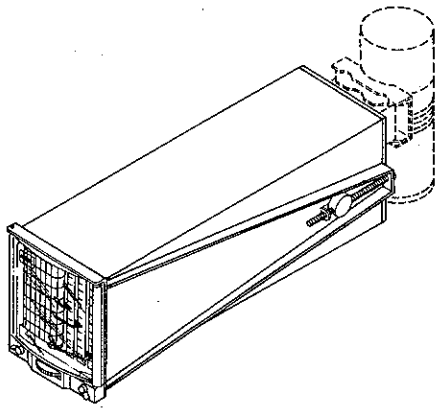
SD53
Issue: 9
Date: 4/80



SERVICE INSTRUCTIONS

SD53

M/P (MINIATURE PANEL)

RECORDING CONTROL STATIONS

TABLE OF CONTENTS

MOORE PRODUCTS CO., Spring House, Pa. 19477

GENERAL INFORMATION

M/P Recording Station panels are 6" x 6" and fit $5\frac{7}{16}$" x $5\frac{11}{16}$" panel cut-outs. Models T2 and T4R are available in either the one-pen (5311) or the two-pen (5321) models. They include an additional pressure element that indicates the valve pressure when on "Valve" or the control-point pressure when on "Reg".

All T2 and T4R Stations can be used with pipe-mounted or manifold-type NULLMATIC Controllers. Combinations are as follows: (1) a pipe-connected station with a pipe-mounted controller; (2) a pipe-connected station with a manifold controller on the field-mounted manifold block; and (3) a station having an accessory manifold block, with a manifold controller "plugged in" directly on the station. Any manifold-type NULLMATIC Controller can be used with either the field-mounted or the station-mounted block.

All manifold blocks contain the female halves of the self-sealing connections (that not only are leak-proof in service but close instantly when the controller is removed). Consequently, the controller can be detached without interruption to the process, when the station is on "Manual".

The position of a gasket in the regulator block assembly completes either the T2 or the T4R internal circuit. (Refer to pages 8 to 15 for diagrams and to page 4 for switching procedure.) Stations are shipped with the gasket assembled as ordered. The T4R models are generally used with Model 56 Controllers. They may also be used with Models 50, 509 (and their manifold counterparts) when field-mounted. Thus used, they require a separate Model 64D Cut-Off Relay.

Station Model No.		Used with Controller (Model)*	Pressure Indicator★	Transfer Switching	Application Recommended		Controller Location
One Pen	Two Pen						
RECORDING CONTROL STATIONS							
5311T2	5321T2	50, 509	The first pen records the process. The indicator shows control point when the selector switch is on "Reg" or indicates valve pressure when the switch is on "Valve". The indicator on the P53 station, in addition, indicates "External Set" when the switch is in "Ext Set".	Man-Seal-Auto	Temperature and other processes with long time constants		In control room
5311T4R	5321T4R	561 569			Flow and other processes with short time constants		At process
5311P5T2	5321P5T2	50, 509	The second pen, when supplied, may be used to record an additional variable. The separate fitting at the rear of the recorder case is used for this connection. The second pen, when supplied with the P53 recorder, is used to record the external set. This connection is located in the block.	Man-Seal-Auto-Seal-Cascade	No bias	Cascade or other interlocking systems as required by process.	As required by cascade or other control systems
5311P5T4R	5321P5T4R	561					
5311P53T2	5321P53T2	50,509		Man-Seal Auto-Seal Ext Set	No bias		
5311P53T4R	5321P53T4R	561					
5311A6T2	5321A6T2	50, 509		Man-Seal Auto-Unload-Load-Cascade	+Bias		
5311A6T4R	5321A6T4R	561, 569					
5311A68T2	5321A68T2	50, 509			±Bias		
5311A68T4R	5321A68T4R	561, 569					

* M in the model number designates a manifold type controller or station.

★ Model 5311 designates a one pen recorder. All models may be furnished with two pen recording, designated by 5321.

INSTALLATION

The pressure elements of all M/P Recording Control Stations are calibrated for a standard 3 to 15 psi transmitter-output range.

The units can be installed easily on panels from ⅛″ to 1″ in thickness. Each recorder is shipped with two mounting brackets, ink, and a chart.

1. First, remove shipping screw from left bracket; then remove mounting brackets.
2. Insert the recorder from the front of the panel.
3. Square the recorder and attach the two mounting brackets.
4. Tighten the clamping screws, to lock the recorder firmly in place.
5. Pull the recorder door open and withdraw the recorder chassis to the inspection position by pulling the rectangular latch (lower right corner.) A second latch (located on the right rear of the chassis) prevents accidental removal of the chassis from the case.
6. To remove the chassis from the case, press the second latch to the left and carefully pull the chassis forward, until it slides free of the case.
7. Removal is completed by unscrewing the knurled jack screw. Place jack screw in hole provided in setting-knob plate, to prevent snarling of spring.
8. Reversal of the above procedure returns the chassis to its operating position.

Use ¼″ O.D. copper tubing, or its equivalent, on all remote-located controller installations. The electrical connection is tapped for ½″ conduit. The chart-drive wires extend through this hole, for connection to the power supply (110V, 60 cycle A.C., unless otherwise specified).

With 20 psi supply to the station and air pressure in the lines, check all connections with suds and eliminate any leaks.

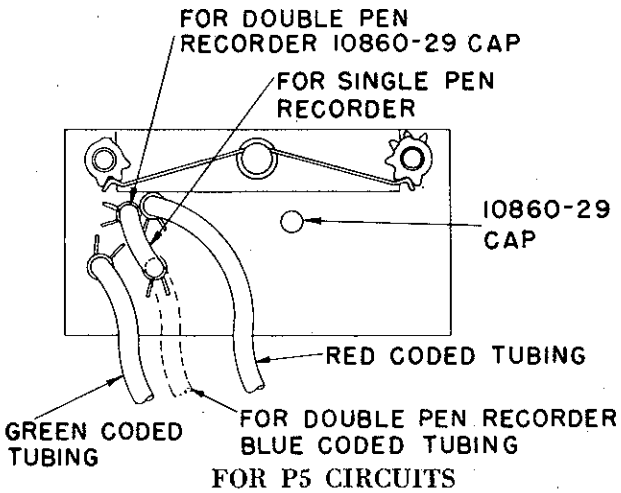
CAUTION

With Models T2 and T4R, the following lines *must be tight:*

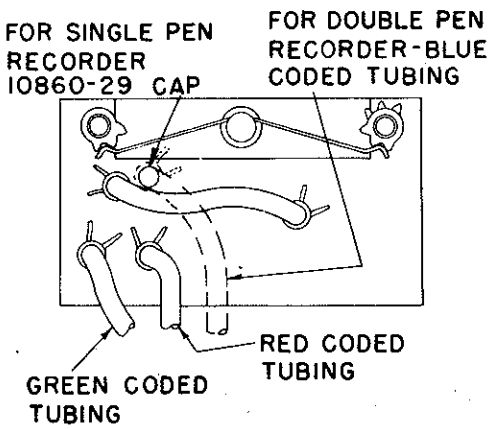
1. The line from port "A" of the controller to the valve or positioner,
2. the line which connects with port "A" of the M/P Recording Control Station, and
3. the reset-feedback line.

Any leakage in these lines will permit the process to drift, when the manual-automatic transfer switch is in the SEAL position. Thus, the advantage of "bumpless" switching will be lost.

If the control valve employs a valve positioner, or if the line to the valve is short, a volume chamber may be added in the valve line to minimize the effect of stray leakage. (A chamber as large as 50 cubic inches in volume will not seriously affect the control-valve response.)



FOR P5 CIRCUITS



FOR P53 CIRCUITS

OPERATING PROCEDURE

Refer to the instructions for operating the process transmitter and the controller. Be sure the correct air pressure is supplied to these units.

Check the valve-action nameplate at the regulator-setting disc on the panel. If necessary, reverse the plate to indicate the valve action which results from an increase in regulated pressure. Set the controller action nameplate to the correct position. Check the position of the feedback switching-plate on the Controllers. The arrow must point to WITH MAN BY-PASS. Recommended supply pressure for all M/P Stations is 20 psi.

MODEL 5311R

Adjust the regulator setting-disc until the Recorder indicates the desired control point.

MODEL 5311P

Automatic Control: Regulator pressure is dead-ended at station in "Auto". Its output may be used to indicate or record desired control point.

Manual Control (MAN) : Adjust the regulator setting-disc until the pointer indicates the desired valve loading.

MODELS T2 AND T4R

Refer to the schematic diagrams on pages 4 to 11.

To start the process on automatic control set the transfer switch in the AUTO position and the selector switch on REG. Adjust the regulator until the double-end pointer indicates the desired control point.

To start the process manually, turn the transfer switch to the MAN position. The regulator is used for loading the control valve manually, and an increase of air-pressure output will either close the control valve or open it—depending upon the action of the valve.

SWITCHING FROM AUTO TO MAN

1. Rotate the selector switch from REG to VALVE. Note the position of the control valve, as indicated by the red double-end indicator. Return the switch to REG.
2. Turn the transfer switch from AUTO to the SEAL position. (This switch has click stops.) Adjust the regulator until the indicator matches the value noted in Step 1.
3. Rotate the transfer switch to the MAN position. (The process is now on manual control, and the process value may be changed by adjusting the regulator.)

SWITCHING FROM MAN TO AUTO

If the process has just been changed, wait a minute or two before switching from manual to automatic (in order to permit the reset-reference pressure and the new valve pressure to equalize). Then proceed as follows:

1. Rotate the transfer switch from the MAN to the SEAL position. Adjust the regulator until the red double-end indicator lines up with the process pen. This adjustment will set the control point to match the existing process value.
2. Turn the transfer switch to AUTO.

CASCADE STATIONS

To obtain "bumpless" transfer, switching to cascade should be performed in the sequence shown below.

MODELS P5

MAN to AUTO and AUTO to MAN, same as T2 and T4R.

MAN OR AUTO TO CASCADE

1. Place transfer switch in SEAL.
2. Align control point regulator with process P1.
3. Switch to CAS.

CASCADE TO AUTO

1. Place transfer switch in SEAL.
2. Align control point regulator with process P2.
3. Switch to AUTO.

MODELS P53 (EXTERNAL SET)

Switching from MAN to AUTO or AUTO to MAN same as for T2 and T4R Stations.

Note: The switching block used in the P5 stations and the P53 stations is basically the same block.

Changing the tubing jumpers and/or caps on the front of the block (see installation drawings, page 3) allows the station to be assembled for either circuit, as required by the process.

All switch positions are required for the P5 circuit. The seal position between auto and external set is present in the P53 stations but is not required for proper switching. See switching sequence below.

SWITCHING TO EXTERNAL SET FROM MAN

1. Adjust the valve loading regulator until the External Set pressure matches the process pressure that is applied to the controller.
2. Switch directly to EXT SET.

SWITCHING TO EXTERNAL SET FROM AUTO

1. Adjust the control point setting regulator in a direction to make the external set pressure and the process pressure equal.
2. Switch to EXT SET.

SWITCHING TO AUTO FROM EXTERNAL SET

1. Place selector switch in REG.
2. Adjust regulator until its output matches process pressure.
3. Switch to AUTO.

SWITCHING TO MAN FROM EXTERNAL SET

1. Place selector switch in VALVE. Note valve pressure.
2. Place selector switch in REG.
3. Adjust regulator until its output matches the valve pressure noted in 1.
4. Switch to MAN.

MODELS A6

MAN OR AUTO CASCADE

1. Place transfer switch in LOAD.
2. Align external air loaded control point regulator with the process.
3. Switch to CAS.

CASCADE TO AUTO

1. Place transfer switch in UNLOAD.
2. Align control point regulator with the process.
3. Switch to AUTO.

OPERATION OF THE CUT-OFF RELAY

With T2 models, while in the SEAL position, the control-valve pressure is locked in at the switch itself.

Model T4R stations are used with Model 561 & 569 controllers (which contain a built-in cut-off relay, operated by the station). T4R stations may also be used with all Model 50 and 509 controllers, if a Model 64D Cut-off Relay is included in the circuit.

The relay contains a 1:2 amplifying diaphragm assembly (to provide ample closing force) and a light loading-spring. When the system is on automatic, the operating chamber of the relay is vented—so that the relay valve permits free passage of the controller-output pressure to the control valve. When the transfer switch is in the SEAL or MAN positions, full supply pressure is on the relay, closing the relay valve and shutting off the controller-output pressure.

MAINTENANCE

PREVENTIVE MAINTENANCE

1. In order to prevent clogging the switches and the regulator restrictions, keep the air supply free from dirt and oil. Periodically, open the blow-off valve on the filter drip-well.
2. When the regulator is in operation, air is exhausted through the holes in the periphery of the exhaust ring. (These holes must never be closed off.)
3. No lubricant should be used—with the exception of an occasional application of light grease to the regulator-adjusting screw and to the detent spring of the switches.

TROUBLE-SHOOTING

The first step in all trouble-shooting is to isolate the source of the difficulty. Check all the external factors—especially leakage. Also investigate the operation of the transmitter, to be sure that it is sending a correct signal to the station. Check all air-supply pressures, to be sure they are not too low.

The following reactions indicate the most likely operational difficulties of the station:

1. Regulator-output pressure cannot be increased.
   a. Low/or/restricted supply pressure.
   b. Plugged restriction screw in center ring of regulator. (Push in protruding pin on side of regulator, automatically cleaning the restriction.)
2. Regulator-output pressure cannot be decreased.
   a. Dirt on pilot valve of regulator. (To remove the pilot valve, proceed as described under "Shop Maintenance.")
   b. Plugged plunger exhaust port in center of diaphragm (or obstructed exhaust holes).
3. Process value drifts when the transfer is in the SEAL position. This drifting may be caused by any of the following conditions:
   a. Leaks in connecting lines on the down-stream side of the cut-off relay.
   b. Dirt in the relay.
   c. Leaks in the switches (see "Shop Maintenance" section).

SHOP MAINTENANCE OF THE M/P RECORDING CONTROL STATION

To disassemble, proceed as follows:

1. Remove the chassis from case—
   a. Pull chassis out to the inspection position and press the chassis release latch to the left. Carefully remove the chassis from the case. (The chassis release is at the back right side of the chassis.)
   b. Disconnect the pneumatic lines and electrical connections from the chassis by unscrewing the knurled head jackscrew on the disconnect block.
2. Unscrew the two flat-head screws located inside the front of the case, just above the regulator setting-disc.
3. Move the plate (held by these screws) to the rear, until the regulator setting-disc is free.
4. Remove the belt from the plate assembly.
5. Set both switches in their most clockwise position.
6. Remove the four screws at the rear exterior corners of the case and pull the switch block assembly out the back of the case. Note: The switch knob shafts will pull out of the sprocket bearings during this disassembly.
7. Inside the sprocket bearings are pins. Note which direction these pins are pointing. (A pencil line on the assembly by the sprocket bearings noting the direction will serve this purpose.)
8. Remove the air lines from the switch block. If recorder has a manifold block on it, remove this by unscrewing the four screws holding it.
9. Remove the four screws retaining the switch block to the rear plate.
10. Remove the tubing connecting the switch block to disconnect block. This tubing and the connection points should be color coded. If not, tag the tubing so it will be replaced on the same connections (see P5 and P53 circuits on Page 3).
11. To disassemble the Regulator:
    a. Remove the two screws holding stop bracket and remove belt.
    b. Put a pencil or identification mark down the side of the regulator onto switch block to be used for reassembly alignment.
    c. Remove the six screws holding the top housing and rings. Detach these parts from the block. (If these sections are stuck together, they may be parted by striking with a non-metallic hammer.)
12. The regulator plunger may be removed for cleaning by unscrewing the plunger-retaining nut.
13. To examine the valve plungers—
    a. Remove the two screws on each of the covers. This permits access to the valve-plunger assemblies. These assemblies are easy to remove for cleaning and replacement of "O" ring seals, if they need replacement.

b. The gasket on the transfer switch has a corner removed. Note the position of this corner. This determines the type of the switching action (see pages 4-11). The covers of the transfer and selector switches are not interchangeable.

14. To remove switch shaft assembly—
    a. Remove detent spring.
    b. Remove screws (2) holding detent spring plate and slide plate out.
    c. Pull switch shafts out. (The valve plungers must be out or up in block to remove the switch shafts.)
    d. When reassembly, make sure the switch shafts are in their proper holes.
15. This completes the disassembly of the unit. To reassemble it, reverse the foregoing procedure. Attention must be given to alignment between the upper and lower pulleys so that the proper switch action will be indicated. Alignment may be done as follows:
    a. Replace both switch shafts and turn clockwise to their stops.
    b. When replacing belts, make sure pins in socket bearings are lined up in accordance with notes taken or with marks made when unit was disassembled.
    c. When switch knob are reassembled, make sure they are in their most clockwise position.
    d. When assembled be sure switch knob lines up with indications on front of recorder.

Leakage in the switches is prevented by the "O" rings on the plungers. Before assembly, be sure these "O" rings are in good condition and in their grooves. A very slight amount of instrument-quality grease on the small "O" ring only will help in assembling. (Dow Corning DC4 Silicone Compound is recommended.)

The eccentric cams must be adjusted (after the station is assembled), in order to give the proper amount of tension to the belts. The cams should be adjusted to eliminate back lash (without introducing binding).

SETTING THE SWITCH-BLOCK CIRCUITRY

Position the gasket on the transfer switch side, in order to give the desired T2 or T4R circuit. (Follow the instructions on the gasket cover.) This detail is also shown on the switching diagrams.

Re-install the transfer-switch cover plate in accordance with the arrow on the cover.

CHECKING THE ASSEMBLED STATION

After assembling the M/P Recording Control Station, check all connections for air leakage. Apply an air pressure within the range of the calibrated indicators (usually 3 to 5 psi).

Check the entire instrument by applying this test pressure to the various ports, by operating the switches, and by observing the action of the indicators. To further check the ability to "lock-in" the control-valve pressure at the SEAL position:

1. Connect two or three feet of ¼" O.D. tubing to port "A".
2. By means of a tee, place a pressure gauge in this line.
3. Connect a source of air (at approximately 20 psi) and a leak-tight valve at the end of the line (with the packing-gland side of the valve toward the supply).
4. With the line under pressure, use suds to be sure that all connections in the line and in the valve are tight.

With the switch in the SEAL position, open the valve and apply a pressure of about 20 psi. Close the valve tight, and then observe the indicator. If the pressure decreases at a rate greater than about ½ psi per minute, an excessive leak in the switches is indicated.

With the air pressure still applied and the switch block assembly out of the case, use suds to check the switch-block gaskets. If the gaskets are leak-tight, the trouble will be within the switches. Then disassemble the switches and clean the neoprene "O" rings and the seats thoroughly, with a solvent.

Drawing
10752-153-N

MODEL 5311T2—and All Two-Pipe Systems

FIG. 1A
AUTOMATIC CONTROL
(Indicating Control Point)

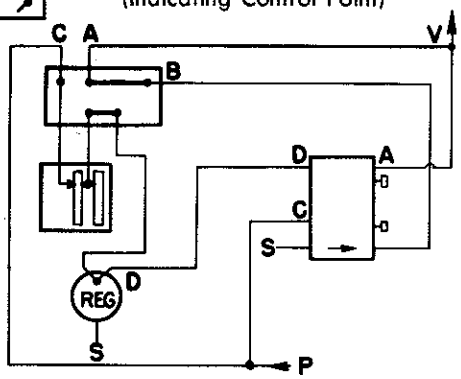


FIG. 1B
AUTOMATIC CONTROL
(Indicating Valve Pressure)

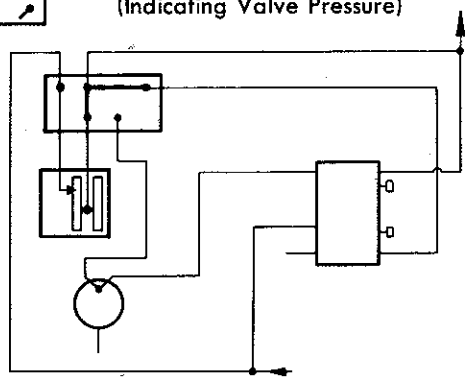


FIG. 2
SEAL
(Locks in Valve Pressure)

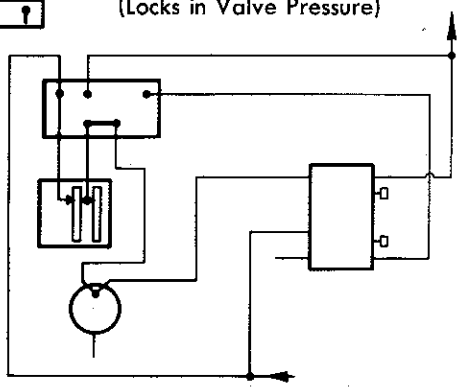
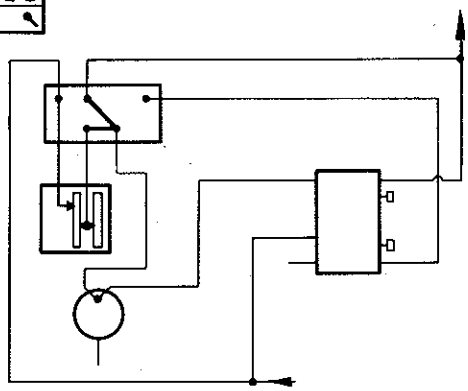


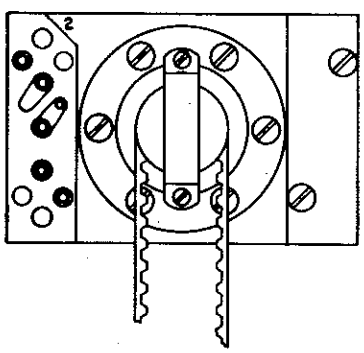
FIG. 3
MANUAL CONTROL

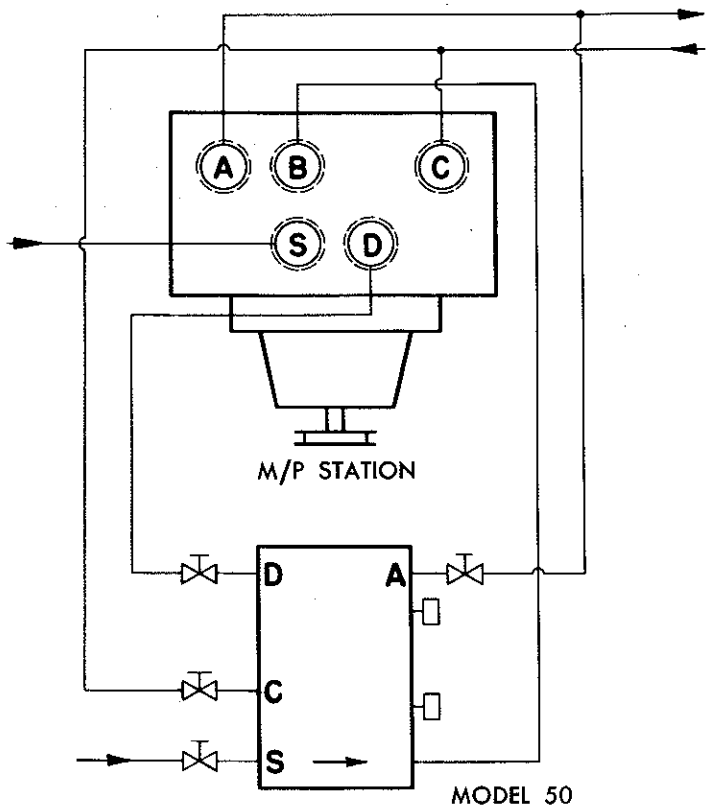


CONNECTION MARKINGS

A—FEEDBACK (Valve)
B—CONTROLLER OUTPUT
C—PROCESS
D—CONTROL POINT
P—PROCESS
REG—PRES. REGULATOR
S—SUPPLY
V—CONTROL VALVE
⋈—MANUAL SHUT-OFF VALVES (NOT NEEDED WITH MANIFOLD-TYPE CONTROLLERS) PERMIT REMOVAL OF CONTROLLER WHEN ON MANUAL

ILLUSTRATION OF
GASKET POSITION
FOR T2 CIRCUIT





Drawing
10752-154-N

MODEL 5311T4R—and All Four-Pipe Systems

FIG. 1A
AUTOMATIC CONTROL
(Indicating Control Point)

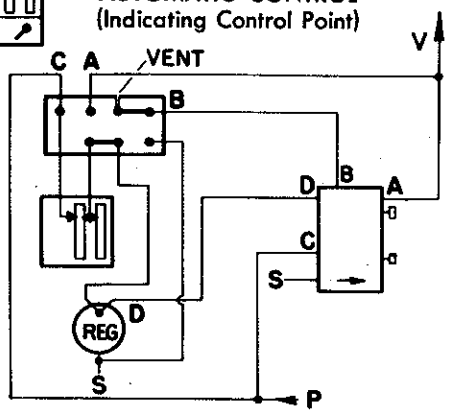


FIG. 1B
AUTOMATIC CONTROL
(Indicating Valve Pressure)

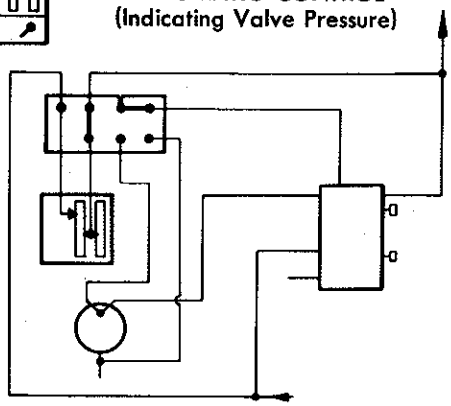


FIG. 2
SEAL
(Locks in Valve Pressure)

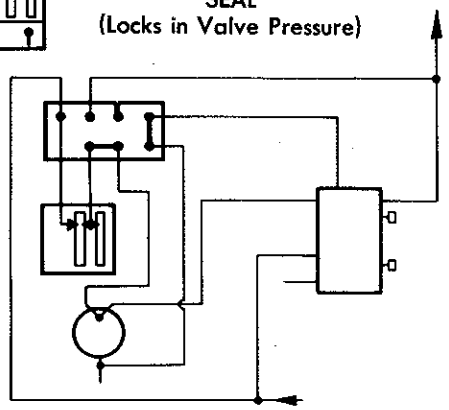
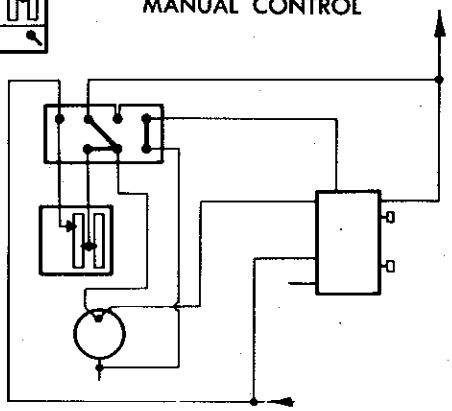


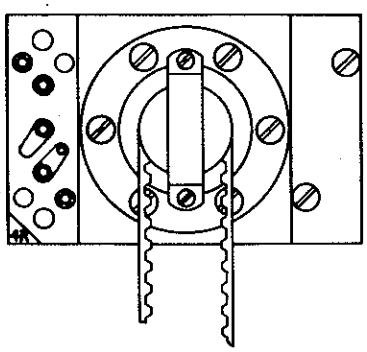
FIG. 3
MANUAL CONTROL

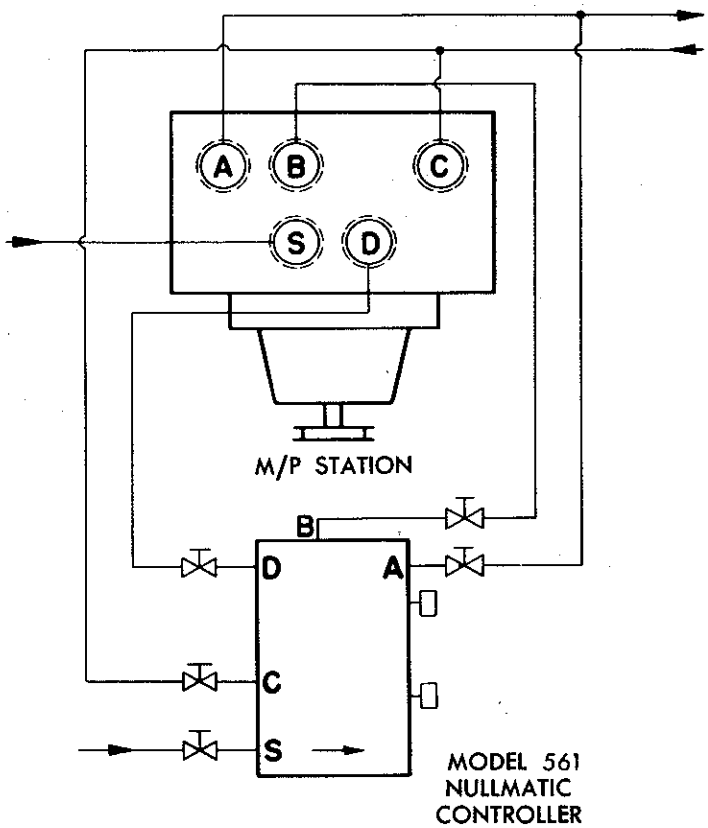


CONNECTION MARKINGS

A—FEEDBACK (Valve)
B—RELAY-OPERATING PR.
C—PROCESS
D—CONTROL POINT
P—PROCESS
REG—PRES. REGULATOR
S—SUPPLY
V—CONTROL VALVE
⋈—MANUAL SHUT-OFF VALVES (NOT NEEDED WITH MANIFOLD-TYPE CONTROLLERS) PERMIT REMOVAL OF CONTROLLER WHEN ON MANUAL

ILLUSTRATION OF
GASKET POSITION
FOR T4R CIRCUIT





MODEL 561
NULLMATIC
CONTROLLER

Drawing
10752-310

MODEL 5321P53T2—and Two-Pipe External Set Systems with Five-Point Switching

FIG. 1
EXTERNAL SET
(Indicating Valve Pressure)

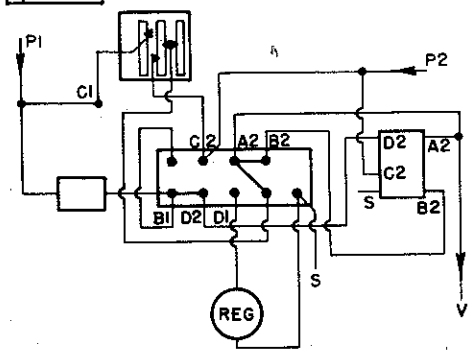


FIG. 1A
EXTERNAL SET
(Indicating Regulator Output)

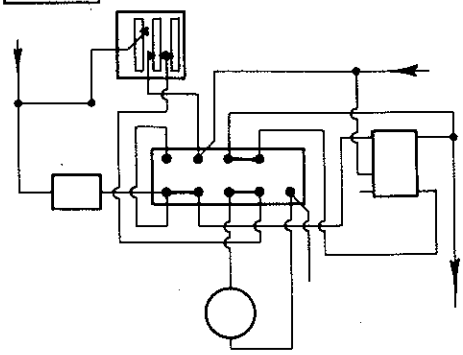


FIG. 4 & 2
SEAL
(Indicating Control Point)

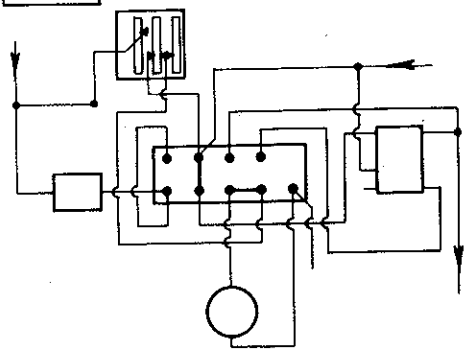


FIG. 3
AUTOMATIC CONTROL
(Indicating External Set)

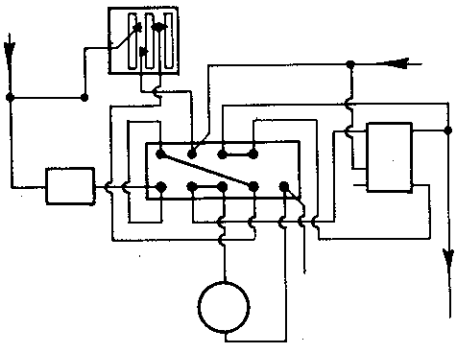


FIG. 3A
AUTOMATIC CONTROL
(Indicating Valve Pressure)

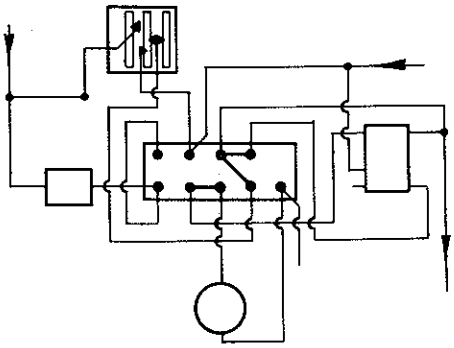


FIG. 5
MANUAL CONTROL

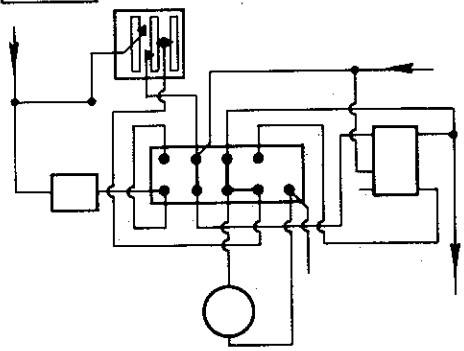
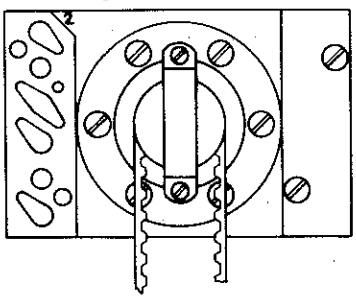
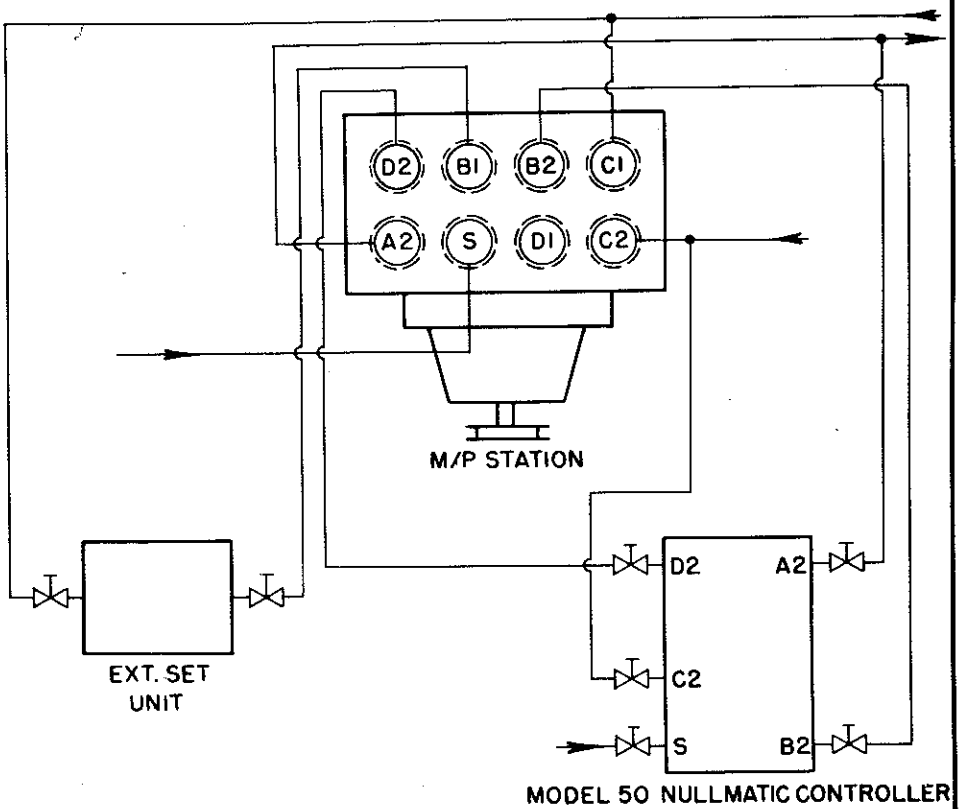


ILLUSTRATION OF
GASKET POSITION
FOR T2 CIRCUIT



CONNECTION MARKINGS

A_2—VALVE
B_1—EXTERNAL SET
B_2—CONTROLLER OUTPUT
C_1 (P_1)—PROCESS NO. 1
C_2 (P_2)—PROCESS NO. 2
D_1—REGULATOR OUTPUT
D_2—CONTROL POINT NO. 2
S—SUPPLY
REG—PRESSURE REGULATOR
V—CONTROL VALVE
—MANUAL SHUT-OFF VALVES
(NOT NEEDED WITH MANIFOLD-TYPE CONTROLLERS) PERMIT REMOVAL OF CONTROLLER WHEN ON MANUAL



Drawing
10752-311

MODEL 5321P53T4R—and Four-Pipe External Set Systems with Five-Point Switching

FIG. 1
EXTERNAL SET
(Indicating Valve Pressure)

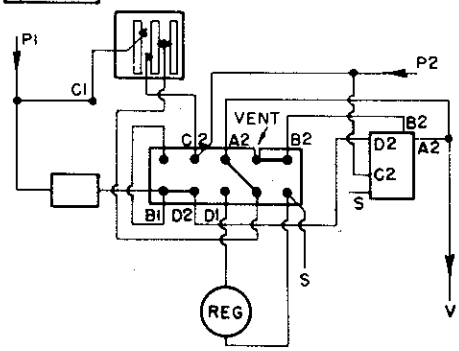


FIG. 1A
EXTERNAL SET
(Indicating Regulator Output)

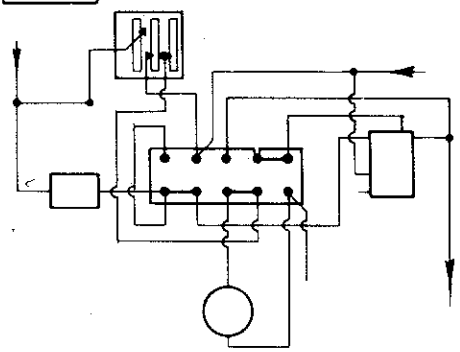


FIG. 4 & 2
SEAL
(Indicating Control Point)

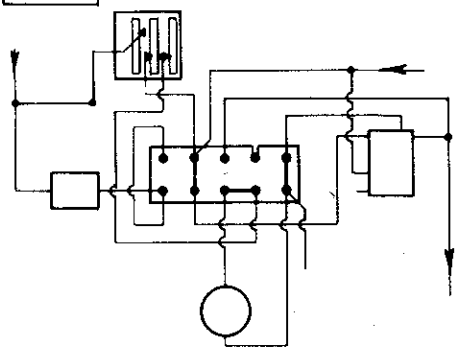


FIG. 3
AUTOMATIC CONTROL
(Indicating External Set)

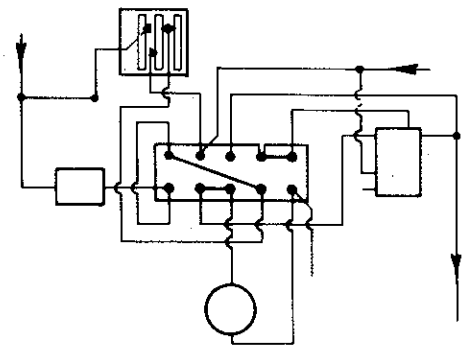


FIG. 3A
AUTOMATIC CONTROL
(Indicating Valve Pressure)

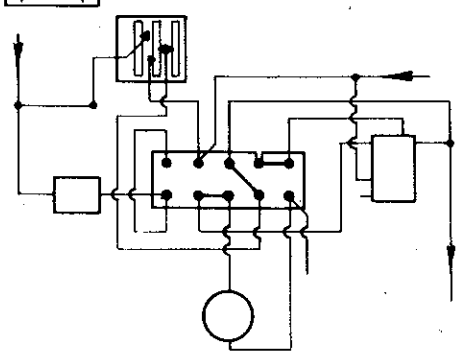


FIG. 5
MANUAL CONTROL

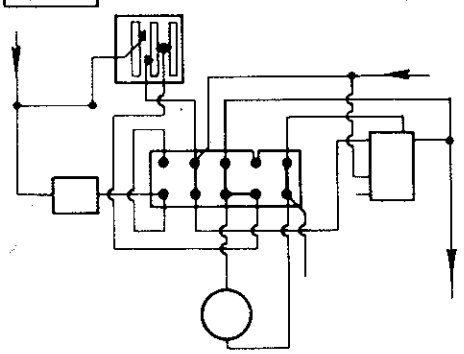
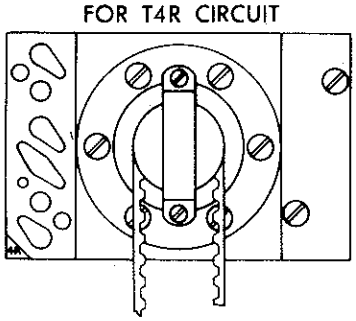
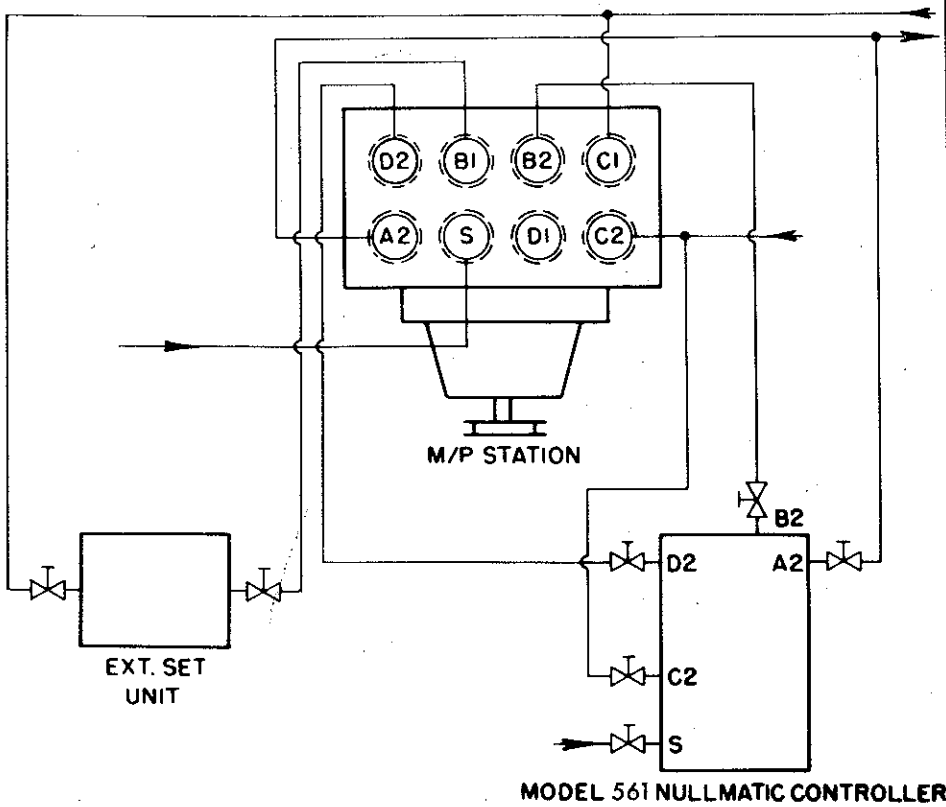


ILLUSTRATION OF
GASKET POSITION
FOR T4R CIRCUIT



CONNECTION MARKINGS

A_2—VALVE
(CONTROLLER OUTPUT)
B_1—EXTERNAL SET
B_2—RELAY OPERATING PRESSURE
C_1 (P_1)—PROCESS NO. 1
C_2 (P_2)—PROCESS NO. 2
D_1—REGULATOR OUTPUT
D_2—CONTROL POINT NO. 2
S—SUPPLY
REG—PRESSURE REGULATOR
V—CONTROL VALVE
—MANUAL SHUT-OFF VALVES
(NOT NEEDED WITH MANIFOLD-TYPE CONTROLLERS) PERMIT REMOVAL OF CONTROLLER WHEN ON MANUAL



Drawing 10752-160

MODEL 5321P5T2—and Two-Pipe Cascade Systems with Five-Point Switching

FIG. 1
CASCADE CONTROL

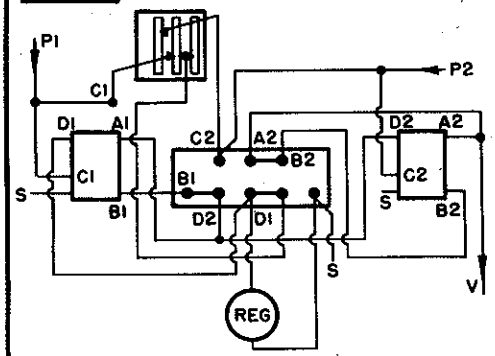


FIG. 2
SEAL

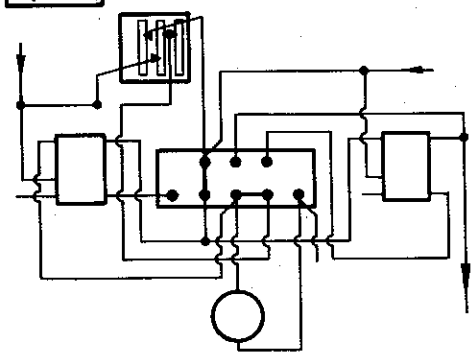


FIG. 3A
AUTOMATIC CONTROL
(Indicating Control Point)

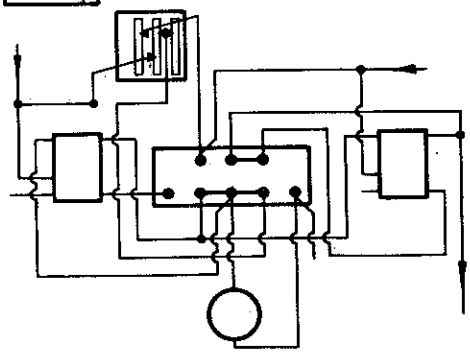


FIG. 3B
AUTOMATIC CONTROL
(Indicating Valve Pressure)

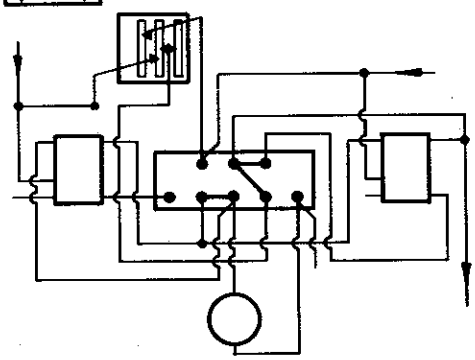


FIG. 4
SEAL

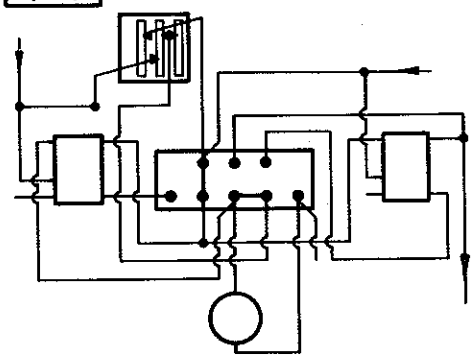


FIG. 5
MANUAL CONTROL

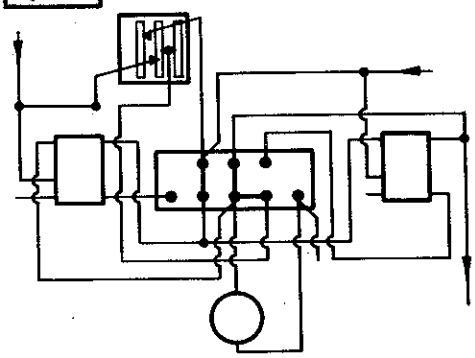
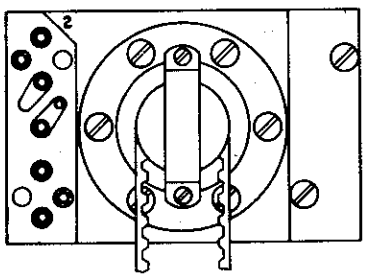
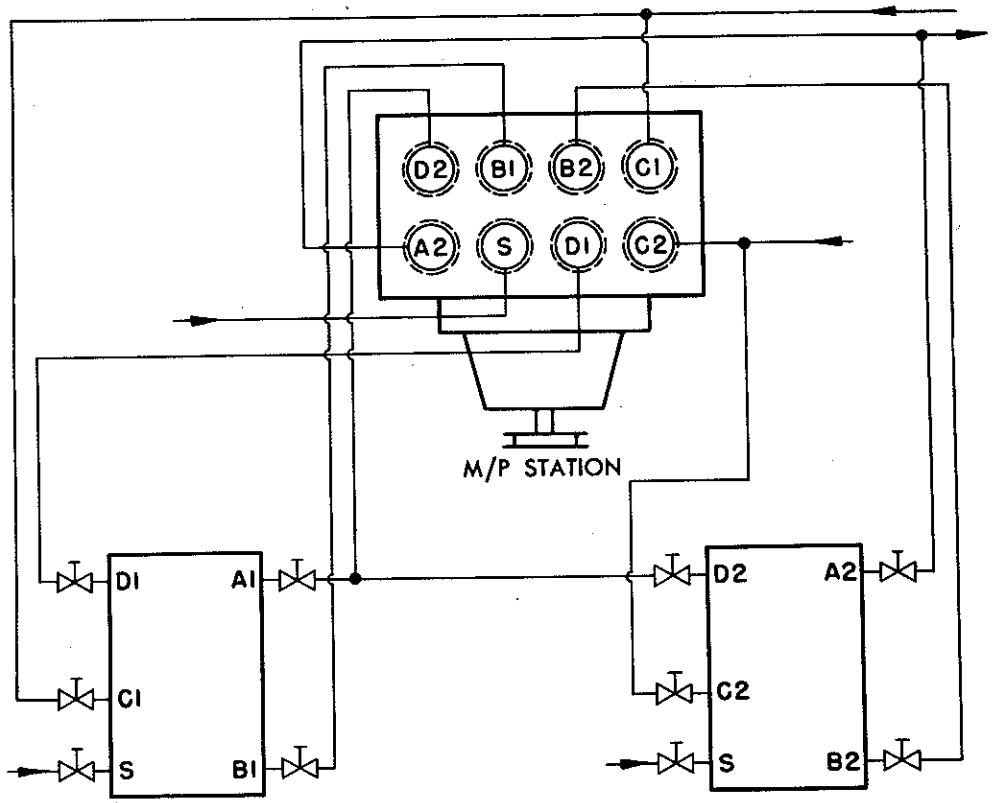


ILLUSTRATION OF
GASKET POSITION
FOR T2 CIRCUIT



CONNECTION MARKINGS

A_1 — FEEDBACK
A_2 — VALVE
B_1 — CONTROLLER OUTPUT
B_2 — CONTROLLER OUTPUT
C_1 (P_1) — PROCESS NO. 1
C_2 (P_2) — PROCESS NO. 2
D_1 — REGULATOR OUTPUT
D_2 — CONTROL POINT NO. 2
S — SUPPLY
REG — PRESSURE REGULATOR
V — CONTROL VALVE
⋈ — MANUAL SHUT-OFF VALVES
(NOT NEEDED WITH MANIFOLD-TYPE CONTROLLERS) PERMIT REMOVAL OF CONTROLLER WHEN ON MANUAL



MODEL 50 NULLMATIC CONTROLLER

MODEL 50 NULLMATIC CONTROLLER

Drawing
10752-161

MODEL 5321P5T4R—and Four-Pipe Cascade Systems with Five-Point Switching

FIG. 1
CASCADE CONTROL

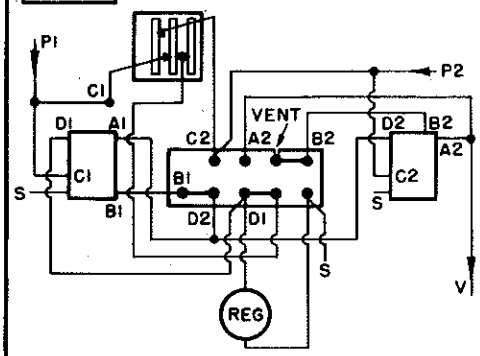


FIG. 2
SEAL

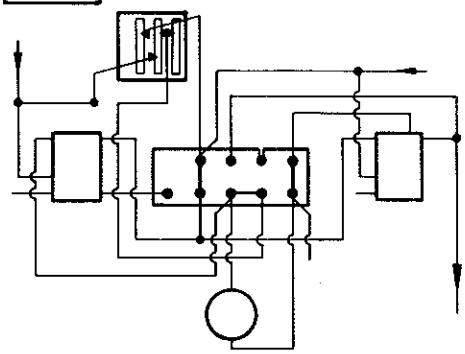


FIG. 3A
AUTOMATIC CONTROL
(Indicating Control Point)

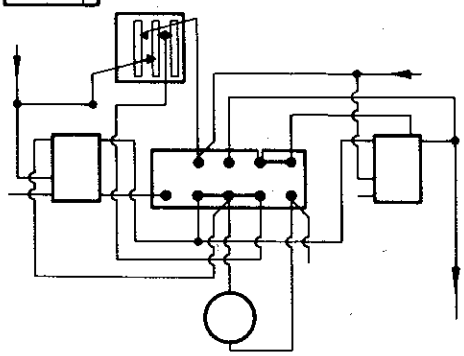


FIG. 3B
AUTOMATIC CONTROL
(Indicating Valve Pressure)

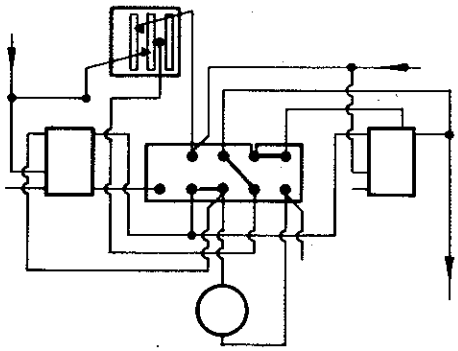


FIG. 4
SEAL

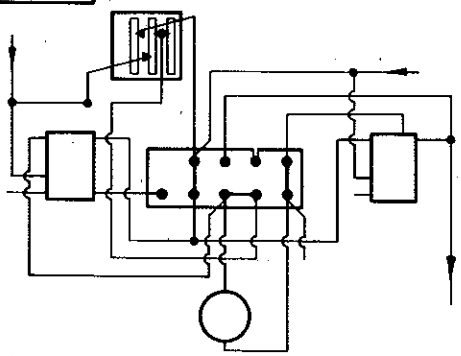


FIG. 5
MANUAL CONTROL

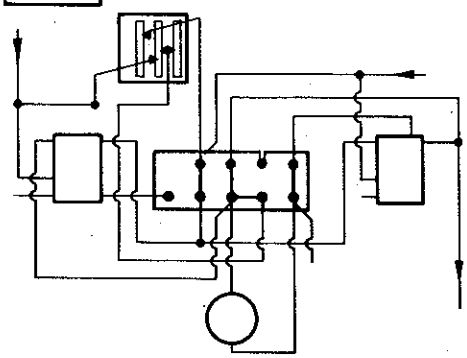
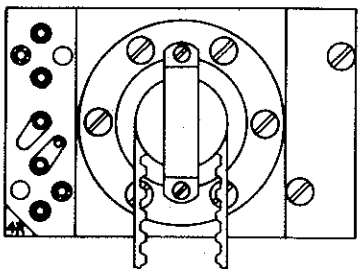
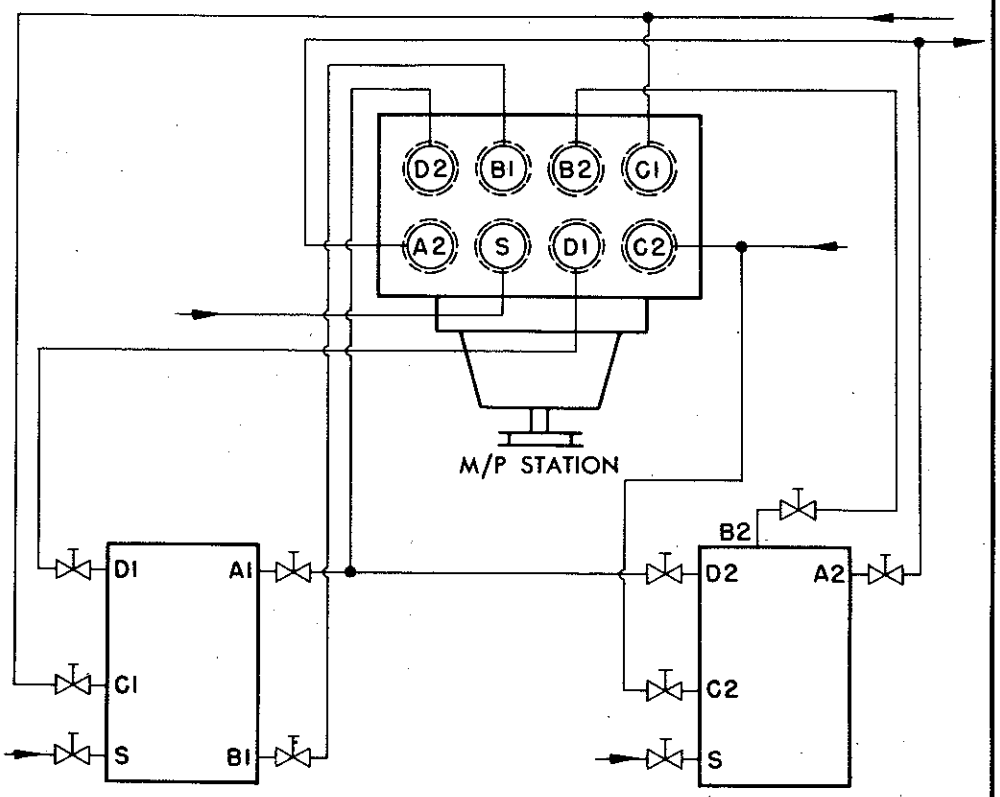


ILLUSTRATION OF
GASKET POSITION
FOR T4R CIRCUIT



CONNECTION MARKINGS

A_1 — FEEDBACK
A_2 — VALVE
B_1 — CONTROLLER OUTPUT
B_2 — RELAY OPERATING PR.
C_1 (P_1) — PROCESS NO. 1
C_2 (P_2) — PROCESS NO. 2
D_1 — REGULATOR OUTPUT
D_2 — CONTROL POINT NO. 2
S — SUPPLY
REG — PRESSURE REGULATOR
V — CONTROL VALVE
⋈ — MANUAL SHUT-OFF VALVES
(NOT NEEDED WITH MANIFOLD-TYPE CONTROLLERS) PERMIT REMOVAL OF CONTROLLER WHEN ON MANUAL



Drawing
10752-155-N

MODELS 5311A6T2, 5311A68T2—and Two-Pipe Cascade Systems with Six-Point Switching

FIG. 1A
CASCADE CONTROL
(Indicating Control Point)

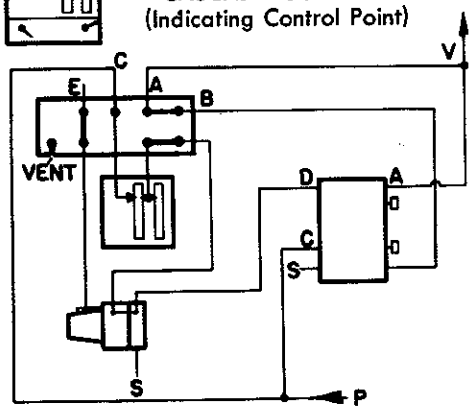


FIG. 1B
CASCADE CONTROL
(Indicating Valve Pressure)

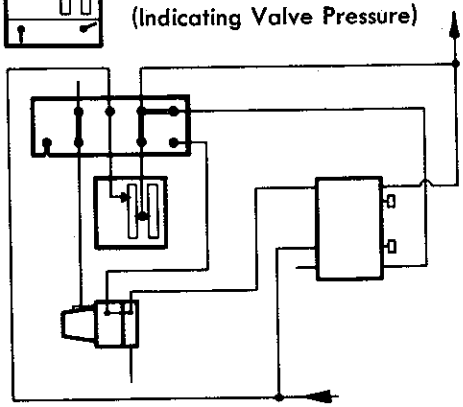
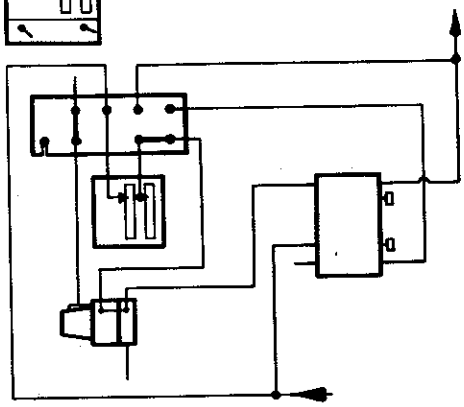


FIG. 2
LOAD



SEAL
UNLOAD

FIG. 3—UNLOAD
OR
FIG. 5—SEAL

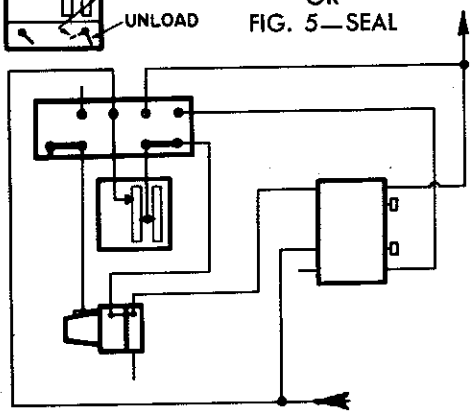


FIG. 4
AUTOMATIC CONTROL

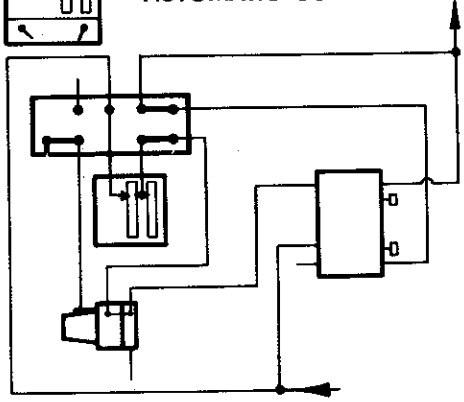


FIG. 6
MANUAL CONTROL

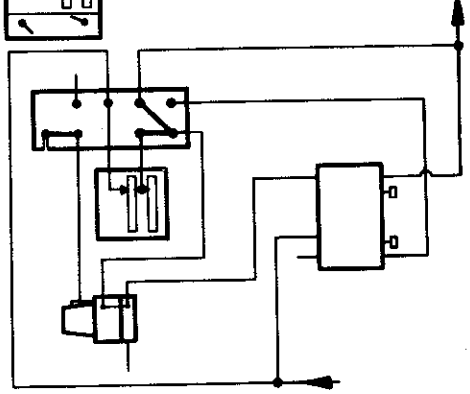
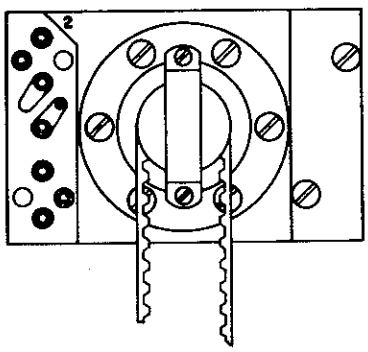
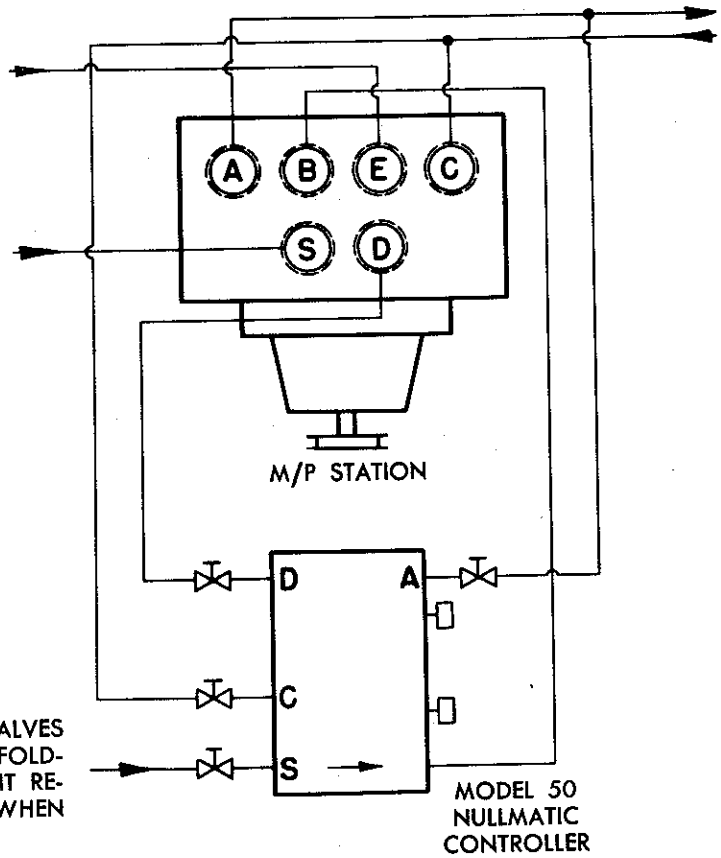


ILLUSTRATION OF
GASKET POSITION
FOR T2 CIRCUIT





MODEL 50
NULLMATIC
CONTROLLER

CONNECTION MARKINGS

A — FEEDBACK (Valve)
B — CONTROLLER OUTPUT
C — PROCESS
D — CONTROL POINT
E — AIR LOAD
P — PROCESS
REG — PRES. REGULATOR
S — SUPPLY
V — CONTROL VALVE
⋈ — MANUAL SHUT-OFF VALVES (NOT NEEDED WITH MANIFOLD-TYPE CONTROLLERS) PERMIT REMOVAL OF CONTROLLER WHEN ON MANUAL

Drawing
10752-156-N

MODELS 5311A6T4R, 5311A68T4R—and Four-Pipe Cascade Systems with Six-Point Switching

FIG. 1A
CASCADE CONTROL
(Indicating Control Point)

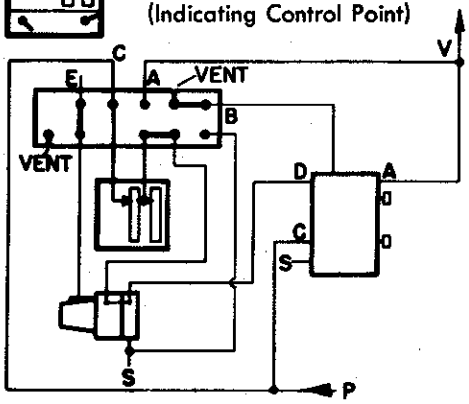


FIG. 1B
CASCADE CONTROL
(Indicating Valve Pressure)

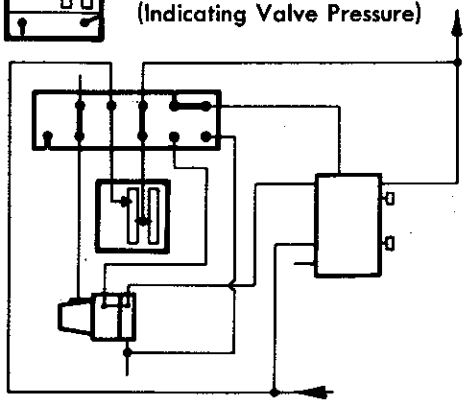
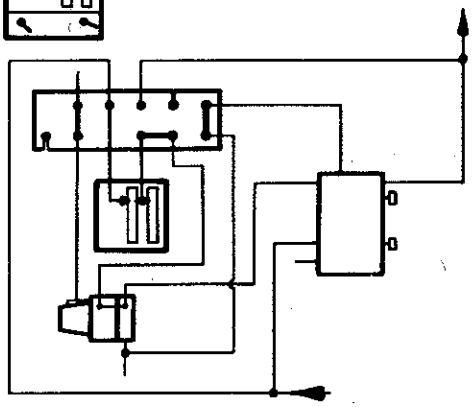


FIG. 2
LOAD



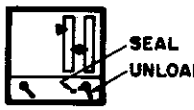


FIG. 3—UNLOAD
OR
FIG. 5—SEAL

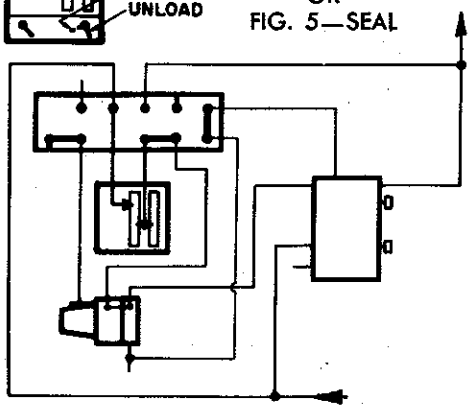


FIG. 4
AUTOMATIC CONTROL

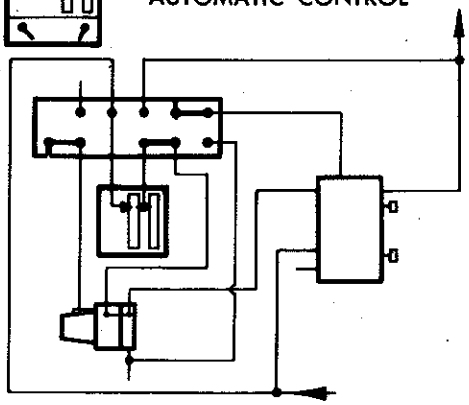


FIG. 6
MANUAL CONTROL

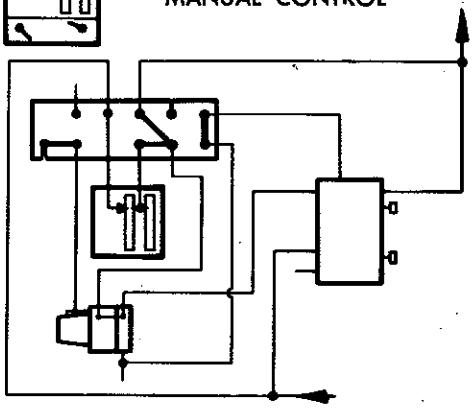
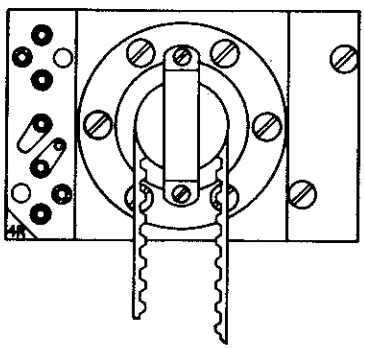
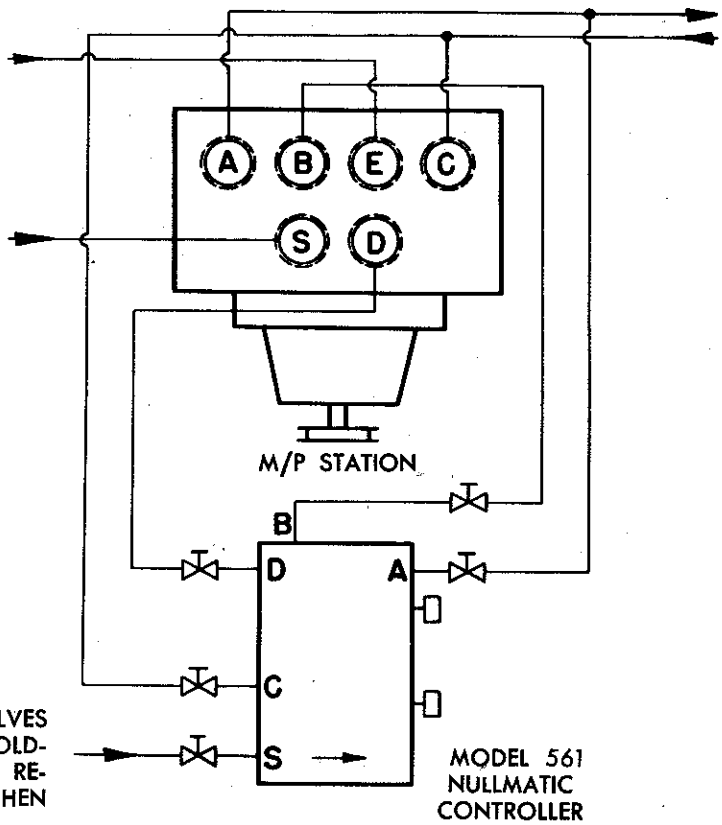


ILLUSTRATION OF
GASKET POSITION
FOR T4R CIRCUIT



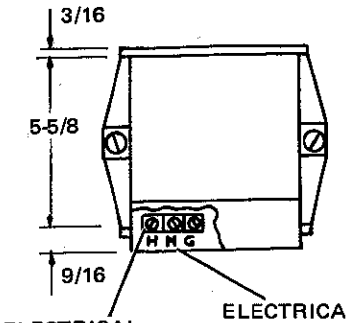


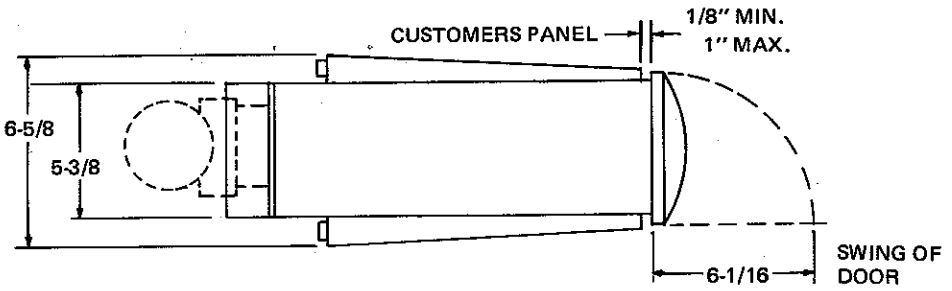
MODEL 561
NULLMATIC
CONTROLLER

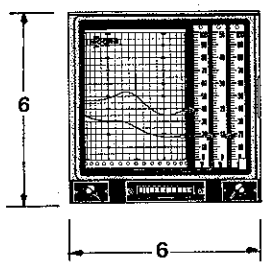
CONNECTION MARKINGS

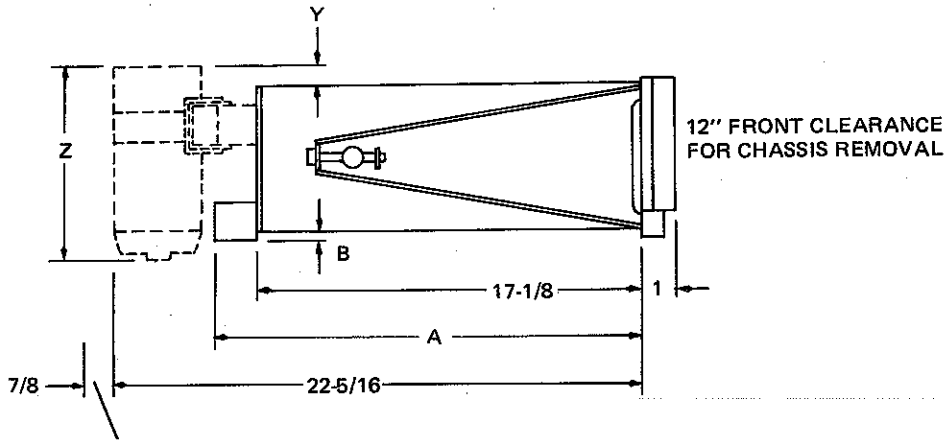
A — FEEDBACK (Valve)
B — RELAY OPERATING PR.
C — PROCESS
D — CONTROL POINT
E — AIR LOAD
P — PROCESS
REG — PRES. REGULATOR
S — SUPPLY
V — CONTROL VALVE
⋈ — MANUAL SHUT-OFF VALVES (NOT NEEDED WITH MANIFOLD-TYPE CONTROLLERS) PERMIT REMOVAL OF CONTROLLER WHEN ON MANUAL

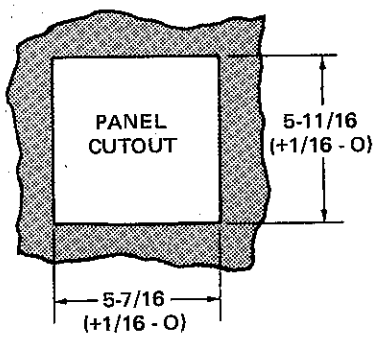
INSTALLATION DIMENSIONS







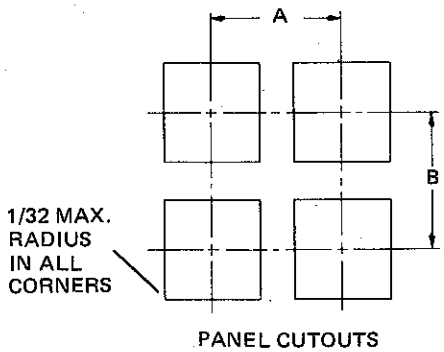




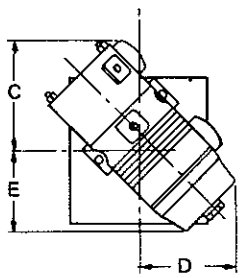
CONTROLLER SERIES NO.	Y	Z
50	1-5/8	8-1/16
509	1-3/4	11-1/16
561	2-1/2	8-15/16
569	2-1/2	11-13/16

	A	B
RECORDING CONTROL STATION	18-11/16	9/16
RECORDER ONLY	18-3/4	—
"P" & "R" STATIONS	18-3/4	9/16

ANGLE MOUNTING DIMENSIONS



PANEL CUTOUTS



WHEN MOUNTING ANGLE IS NEXT TO A SIDE PANEL USE DIMENSION "D"

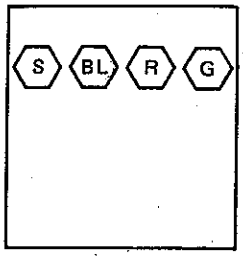
SUGGESTED MINIMUM CENTER-TO-CENTER SPACING.

CONTROLLER MODEL	A	B
50M	7-1/2	7-3/4
561M	7-1/2	7-3/4
509M	9-3/4	8-1/2
569M	9-1/4	8-1/8

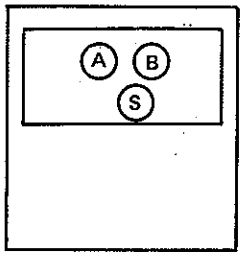
MODEL	C	D	E
50M 50MW 50MY 50MF 50MFW 50MFY	4-3/4	4-3/4	3-3/4
50MX 50MZ	3	4-3/4	3-3/4
561 SERIES	5-3/8	4-7/8	3-1/2
509 SERIES	4-3/4	6-3/4	5-1/4
569 SERIES	5-3/8	6-3/4	5-1/2

INSTALLATION DIMENSIONS FOR 45° ANGLE MOUNTING NULLMATIC CONTROLLERS FOR M/P STATIONS AND RECORDERS.

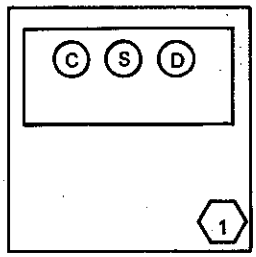
REAR PLATE ASSEMBLIES



RECORDER ONLY

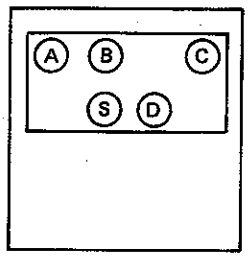


"P" STATION

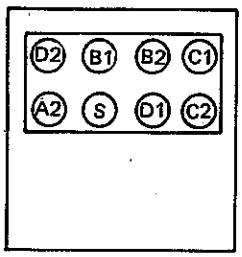


"R" STATION

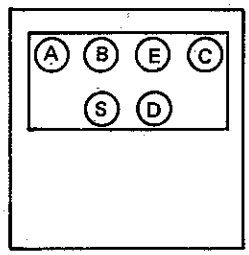
CONTROL STATION REAR PLATE ASSEMBLIES WITHOUT PLUG-IN MANIFOLD



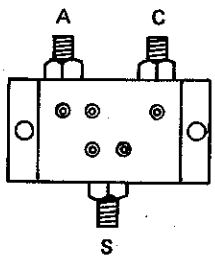
SINGLE LOOP STATION

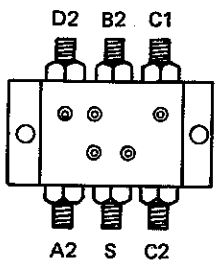


P5 & P53 STATIONS

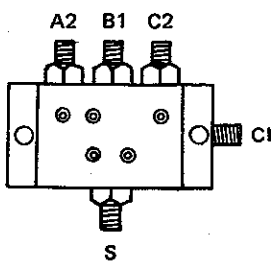


A6 & A68 STATIONS

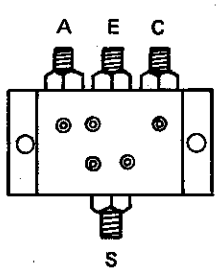




P5 MANIFOLD



P53 MANIFOLD



CONTROLLER PLUG-IN MANIFOLDS FOR REAR PLATE ASSEMBLIES

A output to control valve
(T4R) feed back—when plug-in manifold is removed
A2 output to control valve
B (T4R) output to controller cut-off relay
(T2) input from controller
(P) input from external source
B1 (P53) input from remote setpoint source
(P5) input from primary controller
B2 (T4R) output to controller cut-off relay
(T2) input from secondary controller
BL input to blue pen
C input from process transmitter
C1 input from primary process transmitter
C2 input from secondary process transmitter
D output to controller setpoint connection
(R) output to control valve
D1 output to primary controller setpoint connection
D2 output to secondary controller setpoint connection
E input from external air-loading source
G input to green pen
R input to red pen
S supply air
1 input to blue pen

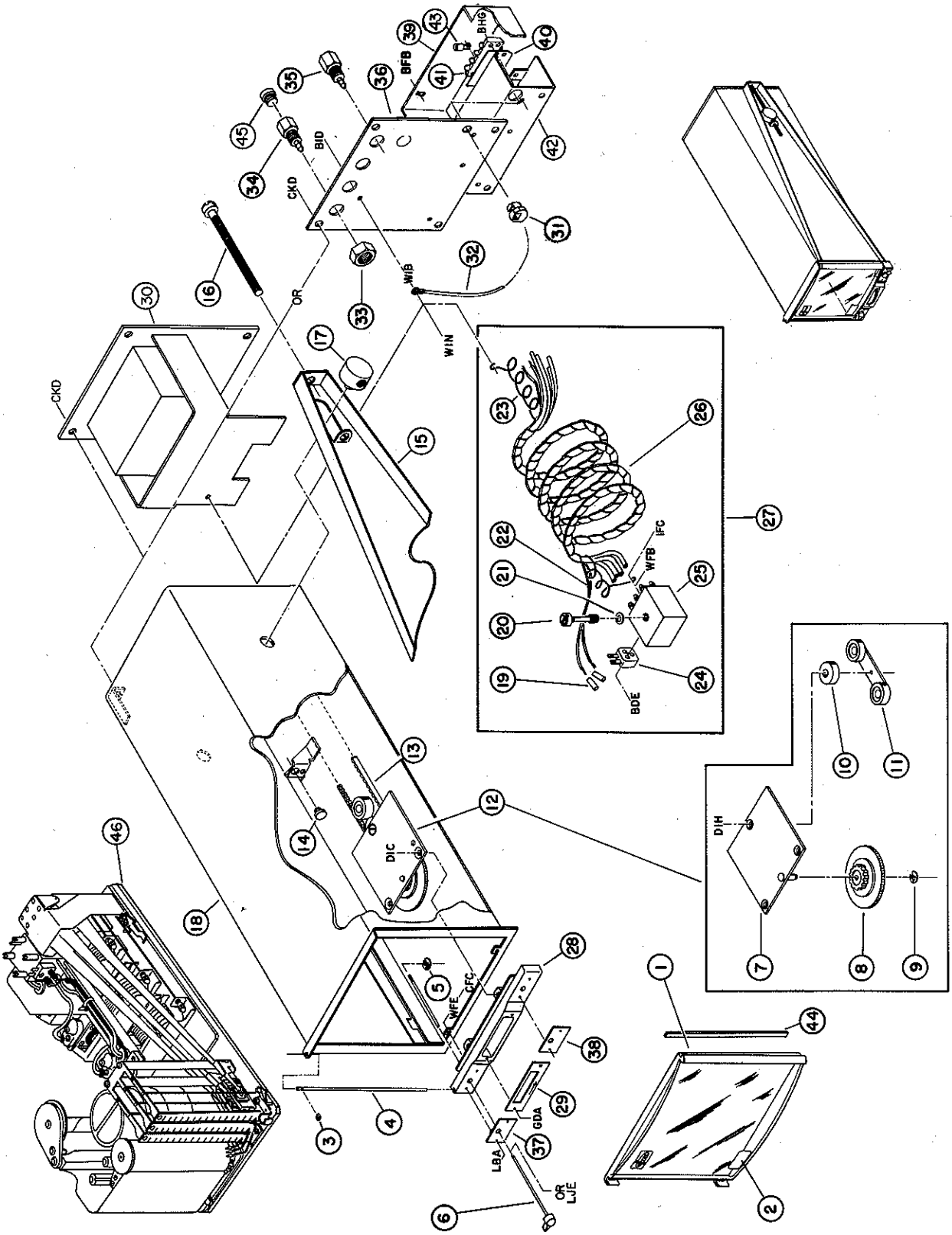
PNEUMATIC CONNECTIONS

MOORE PRODUCTS CO.
SPRING HOUSE, PA. 19477

PARTS LIST

SERIES 53
M/P RECORDER STATIONS

Drawing
No. 14230–375PL
(Sheet 1 of 2)



MOORE PRODUCTS CO.
SPRING HOUSE, PA. 19477

PARTS LIST
SERIES 53
M/P RECORDER STATIONS

Drawing
No. 14230–375PL
(Sheet 2 of 2)

RECORDERS AND RECORDING CONTROL STATIONS CASE ASS'Y – ALL MODELS

Item No.	Part No.	Description	Req'd. 5311†, 5321†	5311P	5311R	5310, 20, 30 5311, 5321
1	14230–333	Door	1	1	1	1
2	10700–105	Door Card	1	1	1	1
3	6773–6	Retainer Ring	1	1	1	1
4	14230–297	Hinge Pin	1	1	1	1
5	7044–2	Retainer Ring	2	1	-	-
6	10700–60	Switch Shaft Assy.	2	1	-	-
7	10700–5	Knob Mtg. Plate Assy.	1	1	1	-
8	8878–27	Adjusting Knob	1	1	1	-
9	7044–2	Retainer Ring	1	1	1	-
10	10700–13	Spacer	1	1	1	-
11	10700–8	Pivot Arm Assy.	1	1	1	-
12	10700–192	Knob & Belt Take-up Sub-Assy. (Incl. 7 thru 11 incl.)	1	1	1	-
*13	10700–34	Timing Belt	1	1	1	-
14	10815–9	Bumper	1	1	1	1
15	14230–335	Mtg. Bracket (Inc. 16 & 17)	2	2	2	2
16	12740–262	Screw	2	2	2	2
17	12740–263	Stud	2	2	2	2
18	14230–299	Case	1	1	1	1
19	9231–9	Terminal Insulator	2	2	2	2
20	14230–488	Captive Screw	1	1	1	1
21	14230–233	Washer	1	1	1	1
22A	W04101	Wire, 22 Awg., 54" Lg. (Red)	1	1	1	1
22B	W03801	Wire, 22 Awg., 54" Lg. (Blk)	1	1	1	1
23	10752–368	Retractor Spring	1	1	1	1
24	10975–6	Electrical Comp. Conn.	1	1	1	1
25	14230–217	Top Connecting Block	1	1	1	1
26	14570–0480	Tubing	4	4	4	4
27	14230–481	Top Connecting Block Assy. (Incl. 19 thru 26 incl.)	1	1	1	1
28a	14230–341	Bezel	-	-	-	1
28b	14230–342	Bezel	-	-	1	-
28c	14230–343	Bezel	1	1	-	-
29	10700–67	Namelate (Adj. Knob)	1	1	1	-
30		Rear Plate Assemblies (See Parts List 20024–15PL)	1	1	1	-

CODE	Hardware				
BDE	#2–56 x 3/8 Lg. Rd. Hd. Screw	1	1	1	1
BFB	#4–40 x 3/16 Lg. Rd. Hd. Screw	2	2	2	2
BHG	#6–32 x 1/2 Lg. Rd. Hd. Screw	2	2	2	2
BID	#8–32 x 5/16 Lg. Rd. Hd. Screw	1	1	1	1
CFC	#4–40 x 1/4 Lg. Fill. Hd. Screw	2	2	2	2
CKD	1/4 –20 x 5/16 Lg. Fill Hd. Screw	4	4	4	4
DIC	#8–32 x 1/4 Lg. Flat Hd. Screw	2	2	2	-
DIH	#8–32 x 9/16 Lg. Flat Hd. Screw	1	1	1	-
GDA	#2–56 x 1/8 Lg. Bind. Hd. Screw	2	2	2	-
IFC	#4–40 x 1/4 Lg. Truss Hd. Screw	1	1	1	1
WFC	#4 Ext. Tooth Lockwasher	1	1	1	1
WFE	#4 Lockwasher (Reduced O.D.)	2	2	2	2
WIC	#8 Ext. Tooth Lockwasher	1	1	1	1
WIN	#8–32 Hex Nut	1	1	1	1

† Recording Control Stations Only

REAR PLATE ASS'Y RECORDERS ONLY

Item No.	Part No.	Description	Req'd. 5310	5320	5311	5330	5321
31	10823–3	Strain Relief	1	1	1	1	1
32	14230–484	Ground Wire	1	1	1	1	1
33	126–8	Nut	4	4	4	4	4
34	10700–94	Hose Fitting	3	3	3	3	3
35	10700–186	Hose Fitting	1	1	1	1	1
36a	14230–1001	Rear Plate	1	1	1	1	1
36b	20069–3	Rear Plate Assy. (Incl. Items 27 & 31 thru 36a & 40 thru 43 & 45)	1	1	1	1	1
39	14588–201	Cover	1	1	1	1	1
40	7418–185	Marker Strip	1	1	1	1	1
41	7418–182	Terminal Block	1	1	1	1	1
42	14588–202	Electric Box	1	1	1	1	1
43a	2292–22	Terminal	2	2	2	2	2
43b	2292–25	Terminal	1	1	1	1	1
44	14230–452	Door Gasket	1	1	1	1	1
45	12014–46	Plug	2	1	1	-	-
46A	20000–1	Chassis (See Parts List 20000PL)	1	-	-	-	-
46B	20000–2	Chassis (See Parts List 20000PL)	-	1	-	-	-
46C	20000–3	Chassis (See Parts List 20000PL)	-	-	-	1	-
46D	20000–11	Chassis (See Parts List 20000PL)	-	-	1	-	-
46E	20000–21	Chassis (See Parts List 20000PL)	-	-	-	-	1

RECORDING CONTROL STATION NAMEPLATES

Item No.	Part No.	Description	5311T, 5321T	5311A6T, 5321A6T	5311A68T, 5321A68T	5311P, 5321P	5311P4T, 5321P4T	5311P4T2B, 5321P4T2B	5311P5T	5321P5T	5311P53T, 5321P53T
37a	10700–68	Nameplate	1	1	-	1	1	-	1	-	
37b	10860–6	Nameplate	-	-	-	-	-	1	-	-	
37c	10860–44	Nameplate	-	-	-	-	-	-	-	-	1
38a	10700–69	Nameplate	1	-	-	-	-	-	-	-	
38b	10700–70	Nameplate	-	-	1	-	-	-	-	-	
38c	10700–71	Nameplate	-	1	-	-	-	-	-	-	
38d	10860–5	Nameplate	-	-	-	-	-	1	1	-	
38e	10860–43	Nameplate	-	-	-	-	-	-	-	-	1
38f	10700–204	Nameplate	-	-	-	1	-	-	-	-	
38g	10700–205	Nameplate	-	-	-	-	1	-	-	-	

CODE	HARDWARE								
LBA	#0 x 1/8 Lg. Drivescrew	4	4	2	4	4	4	4	4
LUE	#10 x 3/8 Lg. Drivescrew	-	-	1	-	-	-	-	-

*Recommended On-Hand Spare Parts. Always Specify Range, Serial No., or Other Nameplate Information When Ordering Spare Parts.

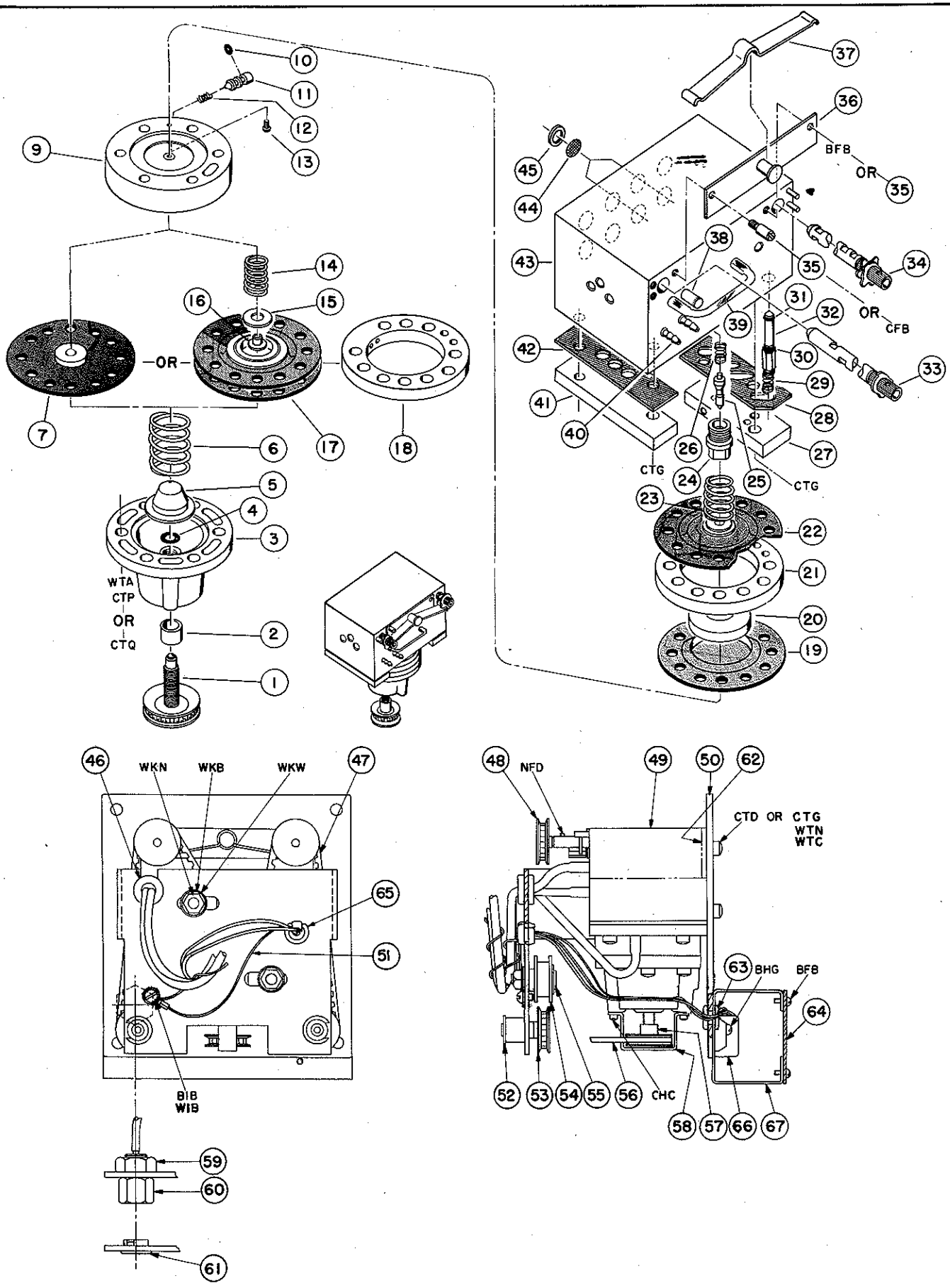
Printed in U.S.A. 4/80 Supersedes 9/77

MOORE PRODUCTS CO.
SPRING HOUSE, PA. 19477

PARTS LIST

M/P RECORDER & RECORDING CONTROL STATION
REAR PLATE ASSEMBLIES

Drawing
No. 20024–15PL
Sheet 1 of 2



*Recommended On-Hand Spare Parts. Always Specify Range, Serial No., or Other Nameplate Information When Ordering Spare Parts.

Printed in U.S.A. 4/79 Supersedes 4/78

MOORE PRODUCTS CO.
SPRING HOUSE, PA. 19477

PARTS LIST

M/P RECORDER & RECORDING CONTROL STATION
REAR PLATE ASSEMBLIES

Drawing
No. 20024–15PL
Sheet 2 of 2

Item No.	Part No.	Description	Req'd. 5311T2	5311P5T2	5311P53T2	5311P4T2	5311A6T2	5311A68T2	5311P	5311R
1a	10700–54	Adjusting Screw	1	1	1	1	–	–	1	1
1b	10700–84	Adjusting Screw	–	–	–	–	1	–	–	–
1c	8878–33	Adjusting Screw	–	–	–	–	–	1	–	–
2	10700–55	Spacer	1	1	1	1	1	–	1	1
3a	7916–92	Housing	1	1	1	1	1	–	1	1
3b	7916–102	Housing (Incl. Item 4)	–	–	–	–	–	1	–	–
*4	2938–4	"O" Ring	–	–	–	–	–	1	–	–
5	6750–6	Spring Seat	1	1	1	1	1	1	1	1
6a	6750–40	Spring (Red) 30 P.S.I.	1	1	1	1	1	–	1	1
6b	6750–37	Spring (Red-White) 50 P.S.I.	–	–	–	–	–	1	–	–
*7	6750–125	Diaphragm Assy.	1	1	1	1	1	–	1	1
9a	7916–151	Pilot Ring	1	1	1	1	1	–	1	1
9b	10145–35	Pilot Ring	–	–	–	–	–	1	–	–
*10	2938–16	"O" Ring	1	1	1	1	1	1	1	1
*11	10320–17	Cleaning Plunger	1	1	1	1	1	1	1	1
*12	10320–10	Spring	1	1	1	1	1	1	1	1
*13	10320–25	Screw	1	1	1	1	1	1	1	1
14	10105–12	Spring	–	–	–	–	–	1	–	–
15	10145–33	Retaining Spring	–	–	–	–	–	1	–	–
16	10145–30	Spring Seat	–	–	–	–	–	1	–	–
*17	10145–34	Diaphragm	–	–	–	–	–	1	–	–
18	6750–62	Exhaust Ring	–	–	–	–	–	1	–	–
*19	6750–17	Diaphragm	1	1	1	1	1	1	1	1
20	6750–14	Spacer	1	1	1	1	1	1	1	1
21	6750–62	Exhaust Ring	1	1	1	1	1	1	1	1
*22	6750–18	Diaphragm	1	1	1	1	1	1	1	1
23	6750–45	Differential Spring	1	1	1	1	1	1	1	1
24	7916–36	Pilot Seat	1	1	1	1	1	1	1	1
*25	6750–21	Plunger	1	1	1	1	1	1	1	1
*26	7916–164	Spring	1	1	1	1	1	1	1	1
27a	10860–32	Cover Plate	–	1	1	–	–	–	–	–
27b	7916–33	Cover Plate	–	–	–	–	–	–	1	–
27c	10700–72	Cover Plate	1	–	–	–	–	–	–	–
27d	10700–73	Cover Plate	–	–	–	–	1	1	–	–
27e	7916–34	Cover Plate	–	–	–	1	–	–	–	–
*28a	10860–33	Gasket	–	1	1	–	–	–	–	–
*28b	7916–66	Gasket	–	–	–	–	–	–	1	–
*28c	10700–74	Gasket	1	–	–	–	1	1	–	–
*28d	7916–188	Gasket	–	–	–	1	–	–	–	–
*29	7916–8	Plunger Spring	5	9	9	7	7	7	2	–
*30	2938–15	"O" Ring	5	9	9	7	7	7	2	–
*31	2938–20	"O" Ring	5	9	9	7	7	7	2	–
32	7916–95	Valve Plunger (Incl. 29,30,31)	5	9	9	7	7	7	2	–
33a	10860–15	Switch Shaft	–	1	1	–	–	–	–	–
33b	7916–119	Switch Shaft	1	–	–	1	1	1	–	–
34a	10860–10	Switch Shaft	–	1	1	–	–	–	–	–
34b	7916–100	Switch Shaft	–	–	–	–	–	–	1	–
34c	7916–94	Switch Shaft	1	–	–	–	–	–	–	–
34d	7916–104	Switch Shaft	–	–	–	–	1	1	1	1
34e	7916–186	Switch Shaft	–	–	–	1	–	–	–	–
35	7916–27	Cam Stop	2	2	2	1	1	1	1	–
36	7916–138	Pivot Pin & Plate	1	1	1	1	1	1	1	–
37	7916–202	Detent Spring	1	1	1	1	1	1	1	–
38	10860–29	Barb Cap (See Note 3)	–	1	1	1	–	–	1	–
39	14550–0030	Tubing (See Note 3)	–	1	1	–	–	–	–	–
40a	7916–10	Tube Fitting	1	2	2	3	1	1	1	1
40b	7916–75	Tube Fitting	1	3	3	–	1	1	2	1
40c	12740–14	Tube Fitting	–	–	–	–	–	–	1	1
41	7916–33	Cover Plate	1	1	1	1	1	1	–	–
*42a	10860–14	Gasket	–	1	1	–	–	–	–	–
*42b	7916–64	Gasket	1	–	–	1	1	1	–	–
43a	10860–20	Switch Block Only	–	1	1	–	–	–	–	–
43b	14230–324	Switch Block Only	–	–	–	–	–	–	–	1
43c	14230–474	Switch Block Only	–	–	–	–	–	–	1	–
43d	7916–204	Switch Block Only	–	–	–	1	–	–	–	–
43e	7916–127	Switch Block Only	1	–	–	–	–	–	–	–
43f	7916–103	Switch Block Only	–	–	–	–	1	1	–	–
*44	7115–43	Screen	2	2	2	2	2	2	2	2
*45	7115–44	Washer	2	2	2	2	2	2	2	2
46	4951–13	Grommet	1	1	1	1	1	1	1	–
*47	8878–37	Belt	2	2	2	2	2	2	1	–
48	10700–48	Upper Pulley	2	2	2	2	2	2	1	–
49a	15169–7	Regulator Assy. (complete)	–	1	1	–	–	–	–	–
49b	15169–11	Regulator Assy. (complete)	–	–	–	–	–	–	1	–
49c	15169–10	Regulator Assy. (complete)	–	–	–	–	–	–	–	1
49d	15169–4	Regulator Assy. (complete)	1	–	–	–	–	–	–	–
49e	14230–454	Regulator Assy. (complete)	–	–	–	–	1	–	–	–
49f	14230–328	Regulator Assy. (complete)	–	–	–	–	–	1	–	–
49g	15169–12	Regulator Assy. (complete)	–	–	–	1	–	–	–	–
50a	14230–1002	Regulator Mounting Plate	–	–	–	–	–	–	–	1
50b	14230–2000	Regulator Mounting Plate	1	1	1	1	1	1	1	–
51	14230–484	Chassis Ground Wire	1	1	1	1	1	1	1	1
*52	7044–6	Retainer	4	4	4	4	4	4	2	–
53	10700–45	Lower Pulley	2	2	2	2	1	2	1	–
54	10700–50	Idler Pulley	2	2	2	2	2	2	1	–
55	10700–49	Idler Stud	2	2	2	2	2	2	1	–
*56	10700–34	Belt	1	1	1	1	1	1	1	1
57	10700–55	Spacer	1	1	1	1	1	–	1	1
58a	10700–14	Stop Bracket	1	1	1	1	1	–	1	1
58b	7916–17	Stop Bracket	–	–	–	–	–	1	–	–
59	126–8	Jam Nut (See Note 2)								
60	10700–94	Hose Fitting (See Note 2)								
61	14952–5	Plug Button	1	1	1	–	1	1	1	1
62	10700–63	Closure Plate	–	–	–	–	–	–	–	1
63	10823–4	Strain Relief	1	1	1	1	1	1	1	1
64	14588–201	Cover	1	1	1	1	1	1	1	1
65	10823–3	Grommet	1	1	1	1	1	1	1	–
66a	7418–182	Terminal Block	1	1	1	1	1	1	1	1
66b	7418–185	Marker Strip	1	1	1	1	1	1	1	1
66c	2292–22	Terminal	3	2	2	2	3	2	2	2
66d	2292–25	Terminal	–	1	1	1	–	1	1	1
67	14588–200	Electric Box	1	1	1	1	1	1	1	1
CODE		HARDWARE								
BFB		#4–40 x 3/16 Lg. Rd. Hd. Scr.	2	2	2	3	3	3	2	2
BHG		#6–32 x 1/2 Lg. Rd. Hd. Scr.	2	2	2	2	2	2	2	2
BIC		#8–32 x 1/4 Lg. Rd. Hd. Scr.	1	1	1	1	1	1	1	–
CFB		#4–40 x 3/16 Lg. Fil. Hd. Scr.	–	–	–	–	–	–	1	–
CHC		#6–32 x 1/4 Lg. Fil. Hd. Scr.	2	2	2	2	2	2	2	2
CTD		#10–32 x 5/16 Lg. Fil. Hd. Scr.	4	4	4	4	4	4	4	3
CTG		#10–32 x 1/2 Lg. Fil. Hd. Scr	4	4	4	4	4	4	2	1
CTP		#10–32 x 1-1/4 Lg. Fil. Hd. Scr.	6	6	6	6	6	–	6	6
CTQ		#10–32 x 1-1/2 Lg. Fil. Hd. Scr.	–	–	–	–	–	6	–	–
NFD		#4–40 x 5/16 Lg. Socket Set Scr. Cup Point	2	2	2	2	2	2	1	–
WIB		#8 Int. Tooth Lockwasher	1	1	1	1	1	1	1	1
WKB		1/4 Internal Tooth Lockwasher	2	2	2	2	2	2	1	–
WKN		#1/4–20 Hex Nut	2	2	2	2	2	2	1	–
WKW		1/4 Flat Washer	2	2	2	2	2	2	1	–
WTA		#10 Lockwasher	6	6	6	6	6	6	6	6
WTB		#10 Int. Tooth Lockwasher	–	–	–	–	–	–	–	1
WTN		#10–32 Hex Nut	–	–	–	–	–	–	–	1

1. Quantities shown are for 1 & 2 pen recording control stations.

2. Items 59 & 60 require 1 each for 2 pen recording control station Mod. 5321P4T2B only require 2 each.

3. Mod. 5321P5T2 requires 2 caps, no tubing
Mod. 5321P53T2 requires 1 tubing, no cap
Mod. 5321P4T2B requires 1 cap

*Recommended On-Hand Spare Parts. Always Specify Range, Serial No., or Other Nameplate Information When Ordering Spare Parts.

Printed in U.S.A. 4/79 Supersedes 4/78

THIS IS THE ONLY KNOWN TUBING DIAGRAM FOR THESE TWO MODELS

KIT NO.	MODEL NO.	CHASSIS	①	②	③	④	⑤	
20015-8	5311P	20000-11	1	1	2	1	1	1
20015-9	5321P	20000-21	1	1	2	1	1	

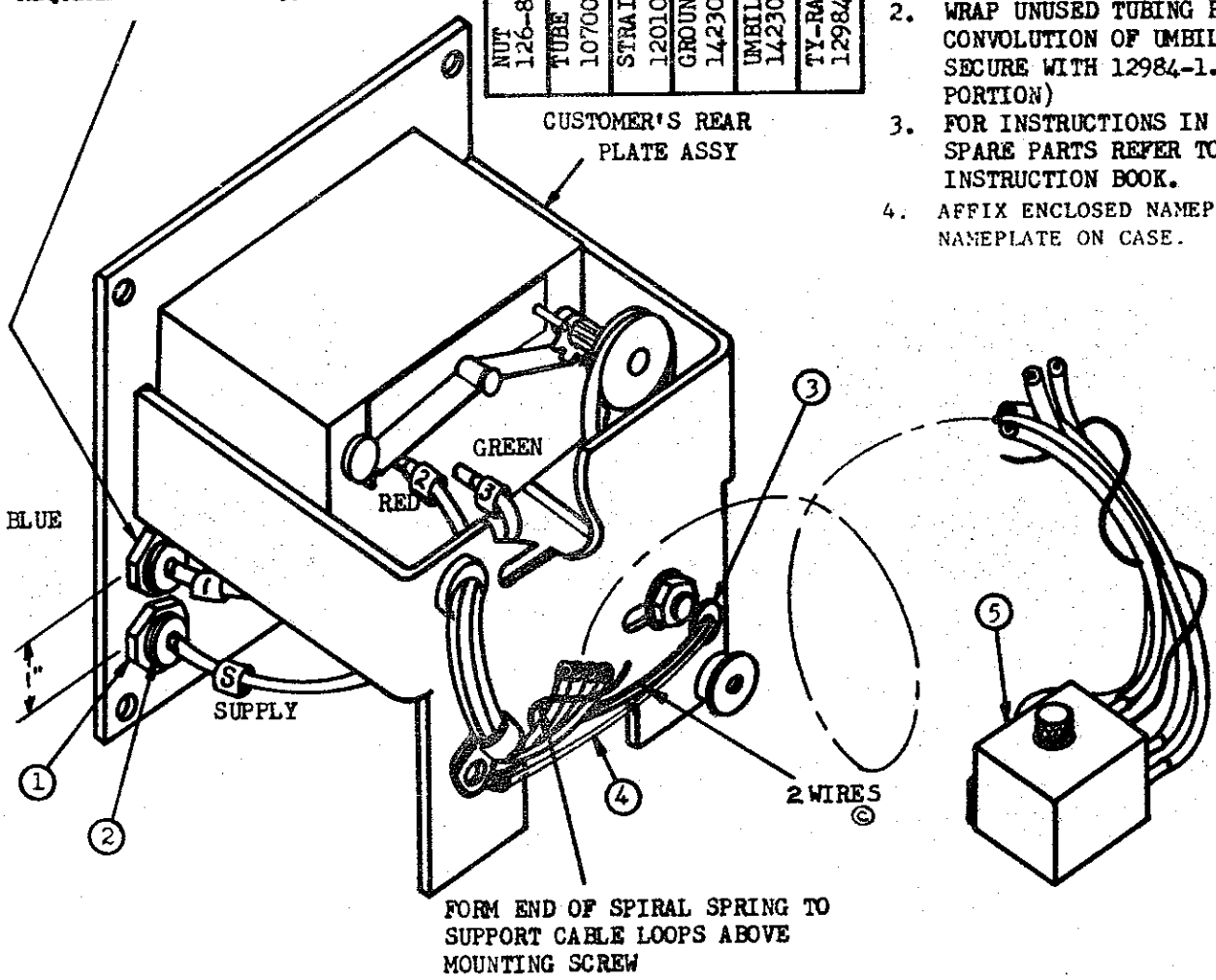
	NUT 126-8	TUBE FITTING 10700-186	STRAIN RELIEF 12010-4	GROUND WIRE 14230-484 Ⓐ	UMBILICAL ASSY 14230-481 Ⓑ	TY-RAP TIE 12984-1

TOLERANCE ON LINEAR DIMENSIONS
FRACTIONS ± 1/64 DECIMALS ± .002
TOLERANCE ON ANGLES ± 2°
FOR GENERAL MACHINING STANDARDS REFER TO DRAWING NO. 14484-N

ISSUE NO.	APP.
1. 10-1-69 Ⓐ WAS 14230-312 Ⓑ WAS 14230-287 Ⓒ WAS 2-WIRE CABLE EC 7915	HW
2. 12-4-74 ADDED NOTE #4 Suffix WAS "N" EC15393	HW
3. 02-10-88	

NOTES:

1. CONNECT MARKED TUBES TO TUBE FITTINGS AS SHOWN. (ALL CONNECTIONS ARE THE SAME EXCEPT FOR THE ADDITION OF SUPPLY)
2. WRAP UNUSED TUBING BACK AROUND FIRST CONVOLUTION OF UMBILICAL ASSY AND SECURE WITH 12984-1. (DO CUT UNUSED PORTION)
3. FOR INSTRUCTIONS IN USE OF CHASSIS AND SPARE PARTS REFER TO RECORDER INSTRUCTION BOOK.
4. AFFIX ENCLOSED NAMEPLATE OVER CURRENT NAMEPLATE ON CASE.



MOORE PRODUCTS CO.
SPRING HOUSE, PA., U.S.A.

RECORDER FIELD CONVERSION

CAPSULE ACTUATOR TYPE CHASSIS TO SERVO ACTUATOR TYPE CHASSIS WITH ELECTRIC CHART DRIVE

DR'N	CH'D	APP.	DWG. NO.	
REP	JWC		20015-7	S
SCALE HALF	DATE 9-11-69			

BRUNING 11446

FORM 43