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STROMBERG-CARLSON
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OPERATIONAL INSTRUCTIONS FOR THE
XY SWITCH PORTABLE TEST BOX

DIAL SWITCHING COURSE
"XY"

To be used in conjunction with DS-419046 or DS-50120

STROMBERG-CARLSON
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NEW HAVEN, CONNECTICUT 06510

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SHEET 1 OF 13

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INTRODUCTION:

The proper use and interpretation of your XY Switch Portable Test Box will be a great asset to expedite routining and maintenance of the XY switches in your office. Listed below and in their proper sequence are tests, checks, indications of failures and adjustments to be used as a guide.

I. Preliminary Instructions

- A. Before connecting terminals to D.C. power, all keys on test unit must be in their upright position and with Toggle ON-OFF key in Off position.
- B. D.C. Power must be properly connected to test unit - RED clip to 49 volts DC BATTERY and BLACK clip to GROUND.

NOTE: If the Battery and Ground leads are not properly connected to the power source (Reversed), the speed lamp check (25-32, 32-45) cannot be made.

- C. The XY Switch to be tested must be in the Home - Normal position before inserting into cell bank - Switch must be firmly seated in cell bank and "F" plug must be locked with corresponding male jack terminals.

II. Testing Procedures

- A. Operate Key located next to On-Off toggle to correspond with switch to be tested (36 Pt Key down - 30Pt - Key centered).

NOTE: If XY Universal switch test box (Stock No.419046-018) is being used the 36Pt key will be in the upright position.

- B. Operate On-Off key to On position for spring Pile-up lamp check test.

III. Spring Pile-up Lamp Check

The test box is arranged so that the four (4) spring combinations can be quickly checked for spring contact and electrical continuity. In the tests and procedures outlined below, the following lamps shall light for proper operation.

- A. On-Off Switch to ON. All keys at Normal (upright position), Right hand key to designated 30 or 36 position.

1. Four White Lamps Lighted.

- B. Move switch manually one step to level 1 (X-Direction).

1. White X-ON lamp out - Red X-ON lamp on.

2. White Release lamp out - Red release lamp ON.

- C. Move switch manually one step into the Y normal position.

1. White Y-ON lamp out - Red Y-ON lamp On.

2. White release lamp out - Red release lamp On.

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SHEET 2 OF 43

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NOTE: With the switch being moved manually into the X or Y direction, operation of the Release Magnet (electrically) at this time is an indication that a release path circuit from contacts 3 & 4 of the off normal contacts to the Z magnet is complete.

- D. Moving the switch manually into either the X or Y Overflow banks will extinguish the White Overflow lamps and light the associated Red Lamp.

IV. Pulsing Per-Cent Make

The test unit provides a source of pulses to check the Per-Cent Make (High & Low) capabilities of the XY Switch. The first key on the left acts as a Start key, the second Key selects the cycle, either X-only, Y-only or X-10 to Y-10.

- A. With the cycle key at normal (X & Y), operate the Per-Cent Make Start Key to High Position. The Switch should step positively to X-10 & Y-10 without stuttering, locking or skips - Recycle at least 3 times.
- B. Same as above except to operate the Per-Cent Make Start Key to Low Position.

V. Automatic Stepping Tests

The test unit provides circuits for operating the XY Switch pulse assist in the X & Y direction with automatic release and recycle. The 4th key selects the cycle ("Y" forward, "X" backward or "X" & "Y" center). The third (3rd) key acts as a Start Key, which is thrown forward to start the cycle. It is suggested that the first test to be made is to recycle from the X & Y position at least 10 times; later running "X" and then "Y" separately. The switch shall step out to X-10 & Y-10 without any stuttering, buzzing or locking.

NOTE 1: Initial start of this action and continuous performance is controlled by normally closed interrupter contacts and their associated interrupter leads.

NOTE 2: Operation of the signal lamps testing the overflow contacts shall be observed during the automatic stepping test while running X or Y only.

VI. Speed Test

The test unit will check the automatic stepping speed of the XY Switch. However, the speed test can be made only with the switch moving in one direction only (Either X or Y). The fourth (4th) key selects the cycle and the third (3rd) key serves as the Start Key when pressed backward and then held back in that position (Non-Lock Key). The switch will move to the overflow direction and remain there until the key is restored to normal. Speed indication is given thru the lighting of green lamps.

A. Speed Lamp Requirements

1. X-Direction - 25 to 45 Steps per second.
2. Y-Direction - 32 to 45 Steps per second.

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SHEET 3 OF 13

TA-14024

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If neither green lamp lights, the speed is in excess of 45 steps per second.
 If the 32-45 lamp lights, the speed is 32-45 steps per second. If the 32 to 45 lamp flashes and the 25-32 lamp lights, the speed is 25-32 steps per second.
 If both lamps flash and go out, the speed is below 25 steps per second.

NOTE: If test unit is unable to give a proper speed check (No lamps lighting) for any one given direction - Check contact pressures on springs 6 & 7 of the associated Off Normal File-up and check DC power connections for polarity.

VII. Wiper Test

The circuits of the test unit are arranged to give an all-through electrical test for continuity and shorts.

A. Wiper Continuity Check

1. If either X or XX wiper fails to make proper physical contact with its associated wire bank or fails to complete an electrical circuit thru the associated wipers and wire bank, the switch will move onto the X-overflow position and will not restore.
2. If any one of the Tip, Ring, Sleeve and HS wipers fails to make physical contact with their associated wire banks or fails to complete an electrical circuit thru the wipers and their respective banks, the switch will move onto the Y overflow position and will fail to restore and recycle.

B. Shorted Wipers

1. X & XX wiper shorted -
 - a. The XY switch will not step in X direction.
2. T & R Shorted
 - a. Switch will step to X-10 and Y-5 and recycle.
3. S & HS Shorted
 - a. Switch will step to X-10, Y-1 and recycle.

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SHEET 4 OF 13

TA-14024

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FAILURE

1. High Per-Cent Make

2. Low Per-Cent Make

3. Automatic Stepping X and Y

3.1 Fails to Start X

POSSIBLE CAUSE

1.a. Weak Retractable Armature Spring

b. Interrupter bumper improperly positioned in slot - Move bumper towards interrupter contacts.

c. Check Magnet coil for Shorts or grounded leads.

d. Readjust Motor Magnet - refer to Page 6 of T-1014 and/or T-1076 or Page 5 of T-1139.

2.a.. Check for mechanical binds - Switch must move freely in X & Y direction manually.

b. Metal sliver between Armature and Coil Core.

c. Oil Armature Pivot Pin. (XY oil)

d. Brass residual cap damaged.

e. Readjust Armature backstop.

f. Interrupter bumper improperly located, refer to Page 7 of T-1014, and/or Page 6 of T-1076, or Page 5 of T-1139.

g. Readjust X-Rack

h. Oil Tubular Shaft

i. X-Carriage feet tight.

j. Readjust Motor Magnet (Increase Short Pawl Action) refer to Page 6 of T-1014 and T-1076.

a. Open X Interrupter contacts.

b. Open X-Interrupter leads.

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SHEET 5 OF 13

TA-14024

FAILURE

3.2 Fails to Start Y

3.3 Switch Stutters X-Direction
when Auto-Step for X & Y.3.4 Switch Stutters X-Direction -
when Auto-Steps X & Y.4. Switch Stutters and/or fails to
release from X-Overflow.POSSIBLE CAUSE

a. Open Y-Interrupter contacts.

b. Open Y-Interrupter leads.

NOTE: If XY Universal Test Box Stock No. (419046-018) is being used, initial start of the Automatic (X & Y) stepping action is controlled by normally closed interrupter contacts and their associated interrupter leads.

a. Tighten interrupter mounting nuts and bolts.

b. Readjust interrupter bumper for proper contact gauging requirements or until switch runs smoothly. Refer to Page 6--Section E of T-1076 or Page 7 - Section E of T-1014 or Page 5 - Section E of T-1139.

c. Replace interrupter if contact springs show obvious signs of being fatigued (Bottom contact spring weak and Top contact spring to close to brass control arm.

d. X-Retaining Pawl not seating properly.

e. X-Retaining Pawl return spring weak.

f. Readjust X-Magnet - See Page 6 of T-1014 or T-176 or Page 5 of T-1139.

a. See Section 3.3 - a, b and c.

b. Y-Retaining Pawl does not seat properly- Check Y release extension arm.

c. Y-Retaining Pawl does not engage properly See Page 9 - Section E of T-1014 or Pages 8 & 9 of T-1076 or Page 7 of T-1139.

a. Switching lever sticky.

b. X-Overflow springs heavy.

c. Open contacts 1 & 2 or 7 & 8 of the X-Overflow spring combination.

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SHEET 6 OF 13

TA-14024

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FAILURE

4.1 Switch Stutters and/or fails to release from Y-Overflow

4.2 Switch stutters or double steps at Y-Overflow.

4.3 Switch fails to release from Y-Overflow.

5. WIPER FAILURES

5.1 Switch fails to stop at X-10 goes to X-Overflow and fails to recycle.

5.2 Switch fails to Stop at Y-10, but steps to Y-Overflow and does not recycle.

POSSIBLE CAUSE

d. Open leads to overflow contacts springs 1 & 2 or 7 & 8.

e. X-Retaining Pawl not engaging fully at X-Overflow -
1. Check X-Rack Adjustment.
2. Check X-Carriage feet clearances.
3. Check Release Magnet Adjustments.

a. See Section 3.4 b & c.

b. Y-Overflow cam does not engage actuating level of overflow spring pile-up properly.

a. Y-Overflow cam contacting the actuating pile-up lever too soon -
1. Loosen 2 allen screws and reposition cam -
2. Check Y-Stop to Y stop cam clearance - Increase Tolerance clearance.

a. Y-Overflow cam contacting the actuating Pile-up level to late - contacts 1 & 2 or 7 & 8 light.

1. Loosen 2 allen screws and reposition cam.

b. Check Release Magnet Adjustment.

a. Open lead to X or XX wiper.

b. X or XX wiper failing to make physical contact on wire bank.

1. Wiper engagement off.

2. Wiper contact pressure weak.

a. Opens leads to either T, R, S or HS wipers.

b. Either T, R, S or HS wiper failing to make physical contact on wire bank.

1. Wiper engagement off.

NOTE: Step switch electrically to X-5 & Y-5 and lock for proper wiper engagement adjustments.

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SHEET 7 OF 13

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FAILURE

5.2 cont.

5.3 SHORTED WIPERS

5.3.1 Switch fails to Auto-Step X, but runs in Y Direction.

5.3.2 Switch Auto Steps to X-10 and Y-1 and recycles.

5.3.3 Switch Auto Steps to X-10 & Y-5 and recycles

6. Release

6.1 Switch fails to release from X-10, Y-10 position.

NOTE: Switch must release (mechanically) positively as a 2 step release.

6.2 Switch fails to release from Y-10.

POSSIBLE CAUSE

b. cont.

2. Wiper contact pressure weak.

c. Excessive Y overdrive.

1. Check Y-Retaining Pawl engagement See Page 9 Section E of T-1014 or Page 8 & 9 of T-1076, or Page 7 of T-1139.

a. Shorted X and XX wiper.

b. Shorted S & HS wiper.

c. Shorted T & R wiper

a. Check for mechanical binds

1. Shaft end play to tight.

2. Y-Carriage feet binding.

3. X-Carriage bearings to Pinion Gear flanges tight or lacking lubrication.

4. Cog Roller support binding.

b. Y-Return Spring weak.

c. Y-Retaining Pawl does not clear cog roller teeth.

d. Y-Drive Pawl striking cog roller teeth. (Check Y-Armature backstop clearance).

a. Check for Mechanical binds.

b. Release armature binding on frame.

c. Release Armature pivot pin lacks lubrication.

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SHEET 8 OF 13

TA-14024

FAILURE

6.2 cont.

6.3 Switch fails to release from
X-10 after releasing from Y-10.

6.3.1 Switch releases from
Y-10 Fails to release
X but recycles in Y-
Direction.

7. Speed Failure

7.1 X Speed Slow

POSSIBLE CAUSE

- d. Release pile-up roller spring not striking armature properly -
 - 1. Reposition release pile-up assembly.
- a. Check for mechanical binds.
- b. Open or weak contacts pressure of springs 3 & 4 of the X-ON pile-up.
- c. Y-Return spring weak - Switch does not restore fully - Pinion Gear flange can now rub against Guide Rule.
- d. Heavy Y-ON pile-up - will have same affect as stated in Section 6.3 c.
- e. X-Retaining Pawl does not release.
- f. X-Return spring weak.
 - a. Operated contacts 4 & 5 of the release pile-up open or weak.
 - b. Broken Pusher on release pile-up.
 - c. Broken Stop on Release pile-up.
 - d. Stop improperly located on stationary (heavy) springs, of the release pile-up.
- a. Check for any Mechanical Bind.
- b. Tighten Interrupter mounting nuts.
- c. Readjust Interrupter contacts.
- d. Increase Short Pawl action on X-magnet.
- e. Oil switch
NOTE: Recheck pulsing of switch if Short Pawl action is changed.

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SHEET 9 OF 13

TA-14024

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FAILURE

7.2 X-Speed too fast.

7.3 Y-Speed slow.

7.4 Y-Speed fast

8. Y-Drive Pawl Sticking or binding
against Y-Pawl Stop.

POSSIBLE CAUSE

- a. Tighten Interrupter mounting nuts.
- b. Readjust X-Interrupter contacts.
- c. Decrease Short Pawl Action.

NOTE: Recheck pulsing of switch
if Short Pawl action is
changed.

- a. Check for Mechanical binds.
- b. Tighten Interrupter mounting nuts.
- c. Readjust Interrupter contacts.
- d. Increase Short Pawl action
NOTE: Recheck Pulsing of switch
if magnet adjustment is
changed.

- a. Tighten Interrupter mounting nuts.
- b. Readjust Interrupter contacts.

- c. Decrease Short Pawl Action
NOTE 1: Recheck pulsing of switch
if Short Pawl action is cha
changed.

NOTE 2: If Short Pawl adjustment
if changed refer to
Pages 8 & 9 of T-1076 or
Pages 7 & 8 of T-1139.

- a. Lubricate Y-Drive Pawl and
Y-Ejector bushing.
- b. Check Pawl Stop Adjustment.
NOTE: If Y-Pawl Stop is to be
readjusted, refer to
Pages 8 & 9 of T-1076
and/or Pages 7 & 8 of
T-1139.

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SHEET 10 OF 13

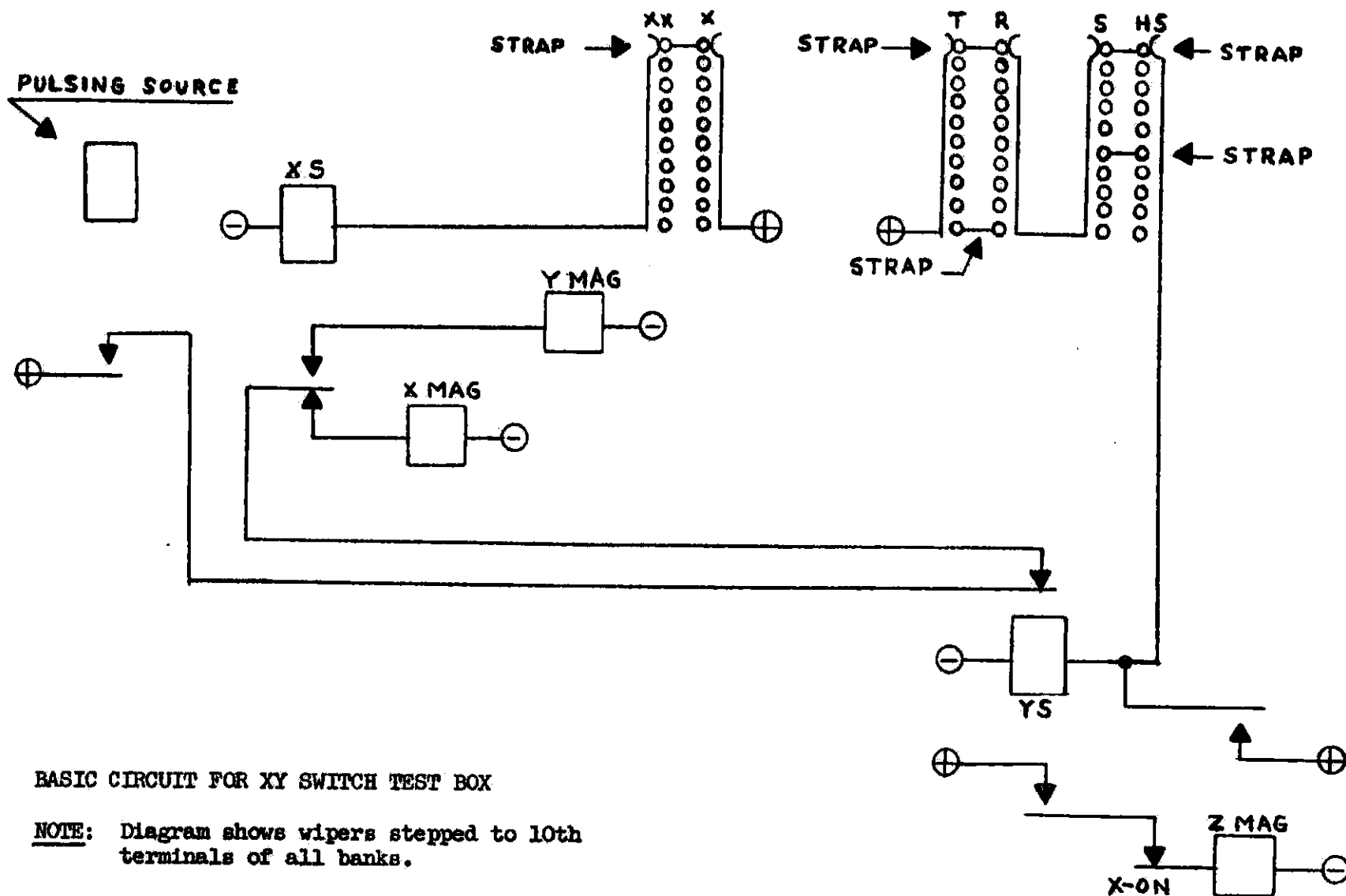
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HOW CAN YOU HOLD A NEGOTIATION WITH YOUR LEGS

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BASIC CIRCUIT FOR XY SWITCH TEST BOX

NOTE: Diagram shows wipers stepped to 10th terminals of all banks.

Refer to S-50120 or S-419046-018 for complete circuitry of XY Switch Test Box.

1. X-Motor Magnet Assembly (X Magnet)
 - a) X Armature Assembly
 - b) Armature Backstop
 - c) 60 W X-motor magnet Coil (60 ohms)
 - d) Drive pawl
 - e) Interrupter Assembly
 - f) Int. bumper or adjustment Screw
 - g) Retractable Spring
2. X-Retaining Pawl Assembly
 - a) X-Retaining Pawl
 - b) Ejector Strap
 - c) X-Retaining Pawl Assembly base
3. XX-X Rack Assembly
 - a) XX-X Rack
 - b) Spring Wiper Assembly (XX-X wiper)
 - c) XX-X Piller Assembly (Nylon pillar post)
 - d) XX-X Rack Base (X-Rack)
4. X-Gear Assembly (X-Gear Cluster)
 - a) Sprocket Gear
 - b) Ratchet Gear
 - c) Bell Cup Gear
5. Y Motor Magnet Assembly (Y Magnet)
 - a) Y Armature assembly
 - b) Armature backstop
 - c) Drive Pawl
 - d) Interrupter Assembly (Y Interrupter)
 - e) Y Interrupter bumper or adjustment screw
 - f) 60 W Y-motor magnet coil (60 ohms)
 - g) Retractable (Coiled Spring)
6. Y Retaining Pawl Assembly
 - a) Y Retaining Pawl
 - b) Y Ejector bushing
 - c) Y Retaining pawl base
 - d) Pawl Stop
7. Release Magnet Assembly (Z magnet)
 - a) Release magnet coil
 - b) Spring Combination (Z pile up)
 - c) Release magnet armature assembly
 - d) Release armature backstop
 - e) X-Extension Arm
 - f) Y-Extension Arm
 - g) Resistor - 2200 ohms
8. Spring Combination (Main Pile Up)
 - a) X-ON Stack
 - b) Y-ON Stack
 - c) OF Stack
 - d) Toggle Lever

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SHEET 12 OF 13

TA-14024

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9. Switching Lever

10. X Carriage Assembly

- a) X Carriage
- b) Y Carriage
- c) Wiper Assemblies (T, S, HS)
- d) Pinion
- e) Flange of pinion gear

11. Cog Roller Assembly

- a) Cog Roller
- b) Cog Roller Support

12. Tubular Shaft Assembly

- a) Tubular Shaft
- b) Y-ON Cam
- c) OF Cam

13. Left Bearing (Base) Assembly

- a) Y-Limit Cam
- b) Y Stop Screw (Y normal adjusting screw)

14. Right Bearing (Yoke) Assembly

- a) Digit drum
- b) Guide rule
- c) Y return spring assembly

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SHEET 13 OF 13

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