

82B1 TELETYPEWRITER SWITCHING

UNIT

ELECTRONIC DISTRIBUTOR

ALIGNMENT AND TESTING PROCEDURES

CONTENTS	PAGE	
1. GENERAL .....	1	One 400A varistor.
2. PRELIMINARY TESTS AND SETUP .	1	One 145C resistor, 470, 000 ohms $\pm 5$ per cent, 1/2 watt, or equivalent.
3. OPERATIONAL TESTS .....	2	One KS-14056, List 8 capacitor, 300 uuf $\pm 5$ per cent, or equivalent.
Character timer-free running oscilloscope .....	5	Extra capacitors to slow the sweep of the oscilloscope as covered in the DuMont 304A oscilloscope instruction book.
Character timer-synchronized oscilloscope .....	5	
Element timer .....	7, 9	1.04 Connect the 470, 000-ohm resistor across the 400A varistor to form a two-ended probe. This probe is to be used during the test procedure described in 3.05 and 3.06. At the same time, the 300 uuf capacitor is to be connected between the Y-axis input to the oscilloscope and ground.
Oscillator adjustment using DuMont 304A oscilloscope .....	2	
Overall transmission .....	9	
Read-in pulses .....	7	
Recheck of oscillator and character timer .....	8	
Shift pulse .....	8	
Transmitted character .....	8	1.05 Plug in the electronic distributor unit, the oscilloscope, and the 164C2 transmission measuring set and allow suitable warm-up time before beginning tests.
1. GENERAL		
1.01 This section covers the alignment and testing procedures for the electronic distributor unit J70122BM of the 82B1 teletypewriter switching unit.		2. PRELIMINARY TESTS AND SETUP
1.02 Remove the electronic distributor unit from the switching unit outgoing cabinet or test cabinet, remove the unit cover assembly from the distributor unit, and plug the distributor unit into the test bench J70123C facilities for these tests.		2.01 Set up the coding and control unit and the electronic output unit of the test equipment to send R-Y signals.
1.03 The following additional test equipment and apparatus is required:		2.02 Operate the EL DISTR TST key of the coding and control unit.
One DuMont 304A oscilloscope.		2.03 Operate the MK SIGS key of the coding and control unit.
One KS-14234 volt-ohm-milliammeter		2.04 Check that the +130-volt dc, -48-volt dc, and 12.6-volt ac power sources of the test cabinet are present at the electronic distributor unit.
One 164C2 telegraph transmission measuring set.		2.05 Calibrate the oscilloscope for vertical deflection as covered in the instruction manual.
One stop watch.		

3. OPERATIONAL TESTS

3.01 Oscillator Adjustment Using the DuMont 304A Oscilloscope.

- (a) Connect the oscilloscope Y-axis input to terminal 4 of V1 electron tube, and adjust the oscilloscope sweep (without locked-in synchronization) to show a 3-cycle stationary trace as indicated in Figure 1.
- (b) Leaving the oscilloscope sweep adjustments unchanged, connect the oscilloscope Y-axis input to pin 6 of V1 electron tube.
- (c) Set the SPEED SEL switch to 100 and adjust the OSC ADJ 100 potentiometer until a 1/2-cycle stationary trace is obtained as in Figure 2. The setting of the potentiometer adjustment slot shall not be within 30 per cent of either end of its allowable maximum travel.
- (d) Set the SPEED SEL switch to 100/200 and the 1/2-cycle stationary trace of Figure 2 shall remain unchanged without further adjustment of the OSC ADJ 100 potentiometer.

(e) Set the SPEED SEL switch to 200 and adjust the OSC ADJ 200 potentiometer until a 1-cycle stationary trace is obtained as in Figure 3. The setting of the potentiometer adjustment slot shall not be within 30 per cent of either end of its allowable maximum travel.

(f) Reconnect the oscilloscope Y-axis input to terminal 4 of V1 electron tube, and adjust the oscilloscope to show a 4-cycle stationary trace as indicated in Figure 4.

(g) Leaving the oscilloscope sweep adjustments unchanged, connect the oscilloscope Y-axis input to pin 6 of V1 electron tube.

(h) Set the SPEED SEL switch to 75 and adjust the OSC ADJ 75 potentiometer until a 1/2-cycle trace is obtained as in Figure 5 moving to the left at the rate of 7 intersections each  $22 \pm 0.5$  seconds. The setting of the potentiometer adjustment slot shall not be within 30 per cent of either end of its allowable maximum travel.

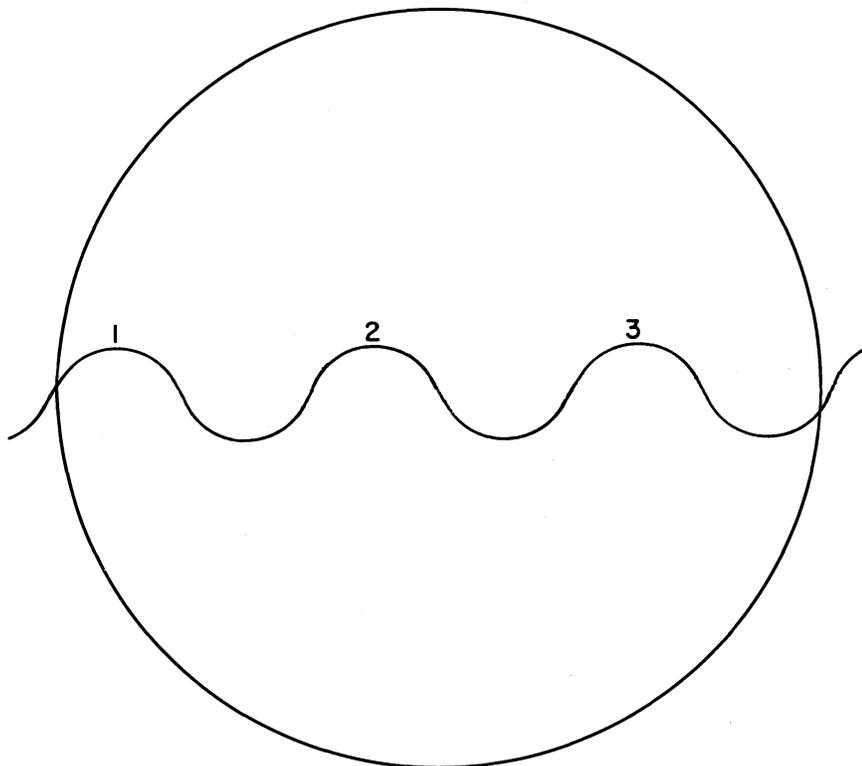


Figure 1

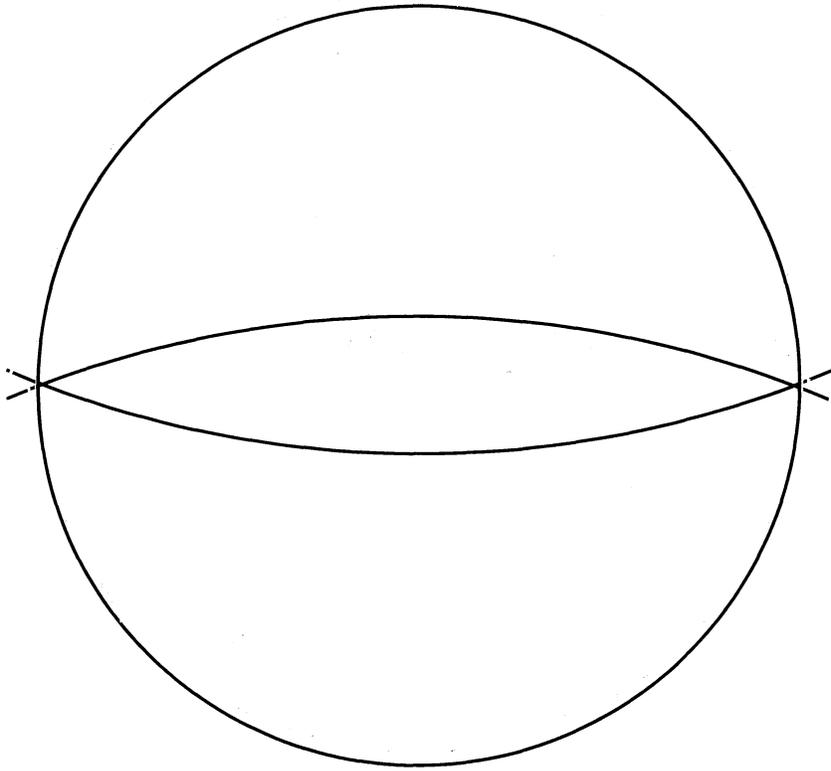


Figure 2

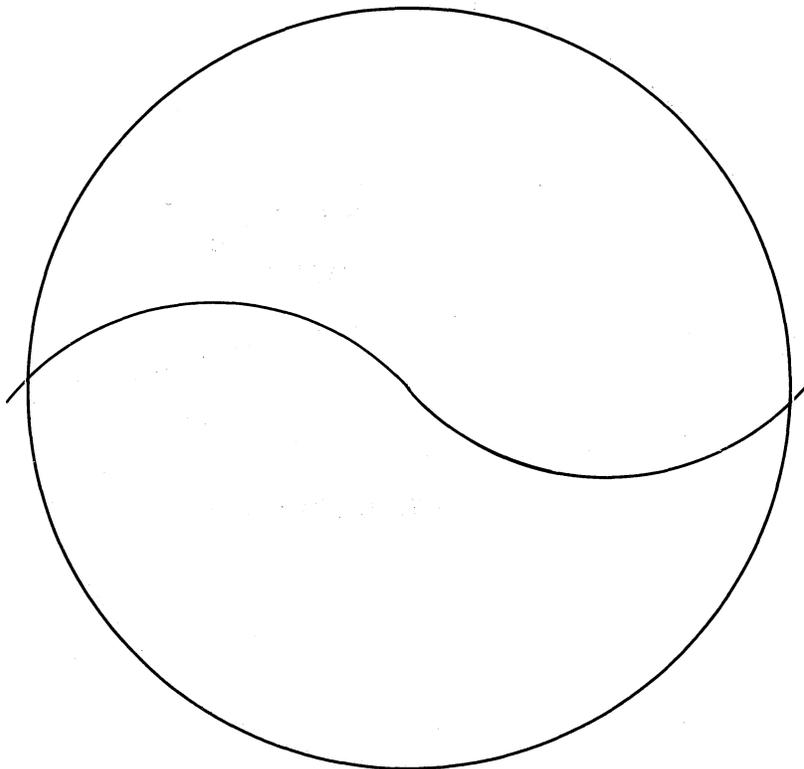


Figure 3

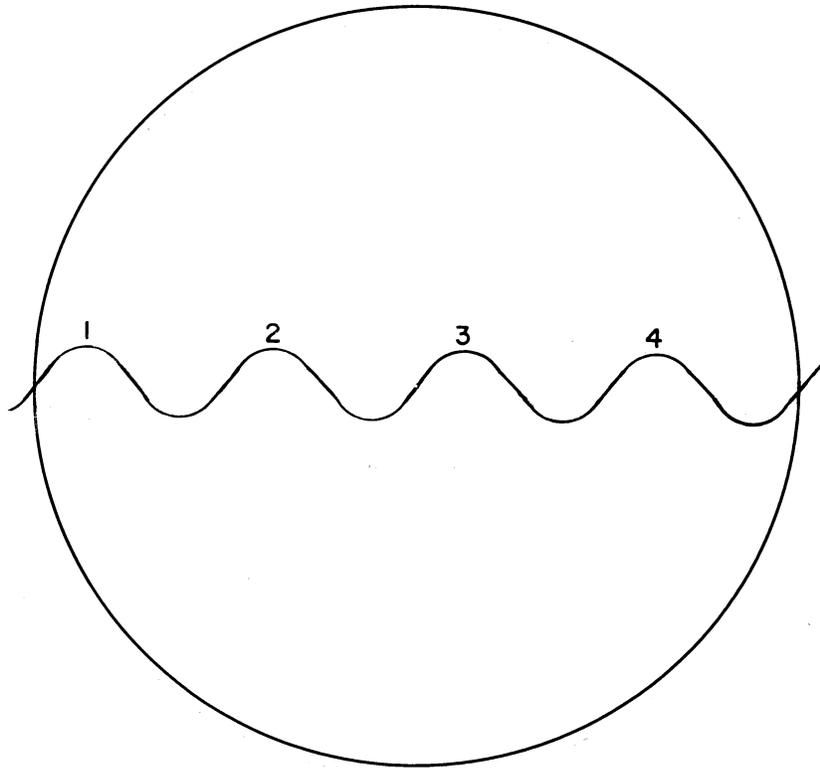


Figure 4

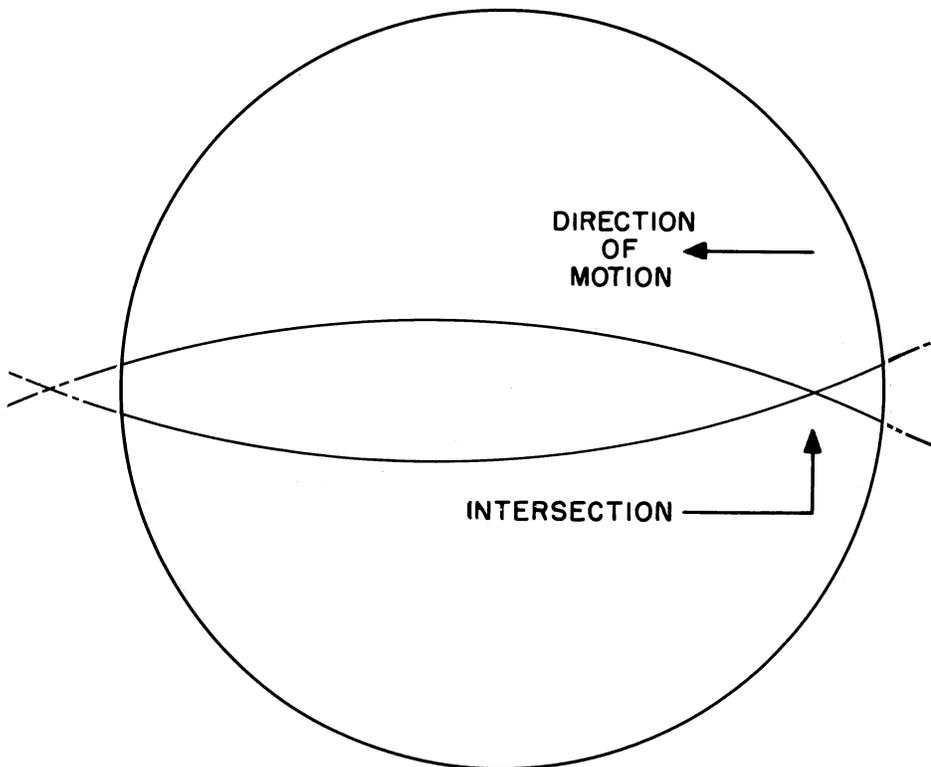


Figure 5

(i) Reconnect the oscilloscope Y-axis input to terminal 4 of V1 electron tube, and adjust the oscilloscope to show a 5-cycle stationary trace as indicated in Figure 6.

(j) Leaving the oscilloscope sweep adjustments unchanged, connect the oscilloscope Y-axis input to pin 6 of V1 electron tube.

(k) Set the SPEED SEL switch to 60 and adjust the OSC ADJ 60 potentiometer until a 1/2-cycle trace is obtained as indicated in Figure 7 moving to the left at the rate of 6 intersections in  $22.0 \pm 0.5$  seconds. After adjustment, the setting of the potentiometer slot shall not be within 30 per cent of either end of its allowable maximum travel.

### 3.02 Character Timer — Free Running Oscilloscope.

(a) Connect the oscilloscope Y-axis input to pin 6 of V1 electron tube, set the SPEED SEL switch to 100, and adjust the oscilloscope sweep (without locked-in synchronization) to show a stationary trace as indicated in Figure 3.

(b) Leaving the oscilloscope sweep adjustment unchanged, connect the oscilloscope Y-axis input to pin 6 of V2 electron tube. The trace of Figure 8 should appear stationary in the middle of the oscilloscope face.

### 3.03 Character Timer — Synchronized Oscilloscope

(a) Connect the oscilloscope Y-axis input to pin 6 of V2 electron tube, and set the SPEED SEL switch to 100.

(b) Set the SYNC AMPLITUDE on the oscilloscope to about -20 and adjust the SWEEP VERNIER and X-axis AMPLITUDE to obtain a trace as indicated in Figure 9.

(c) Adjust the ADJ STOP potentiometer until the width of the negative pulse is  $3/5$  inch.

(d) Set the SPEED SEL switch to 200. Set the SWEEP VERNIER to obtain the trace indicated in Figure 9. The negative pulse shall be approximately  $3/5$  inch.

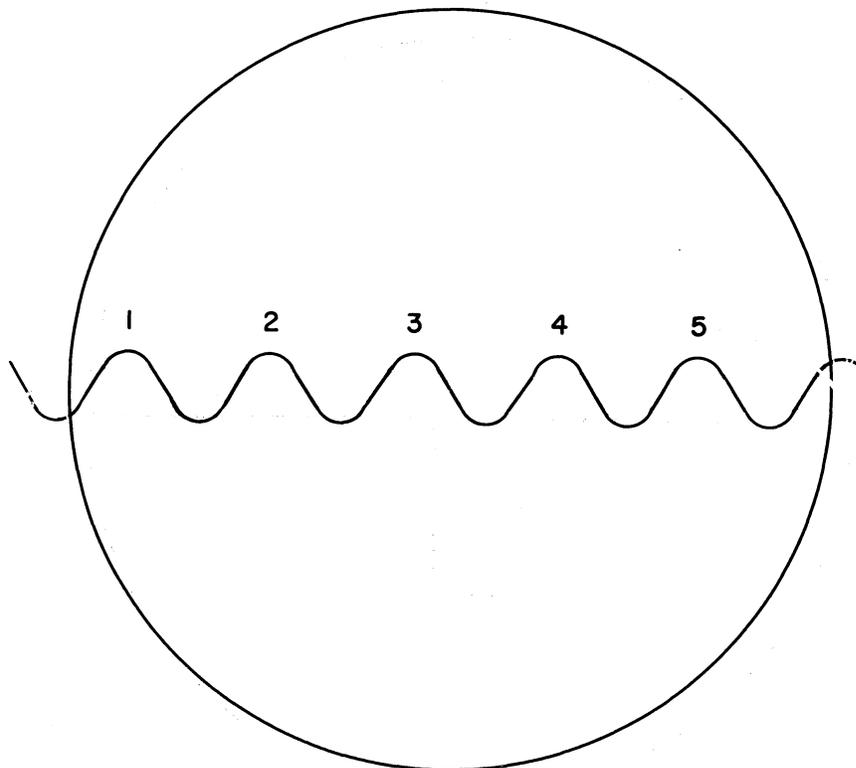


Figure 6

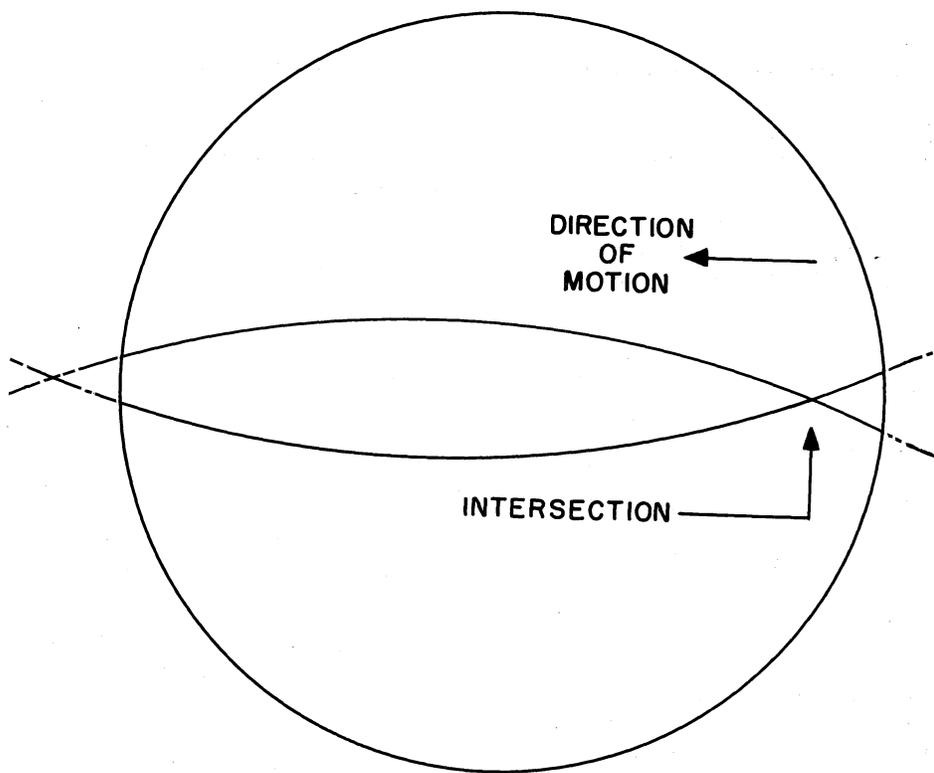


Figure 7

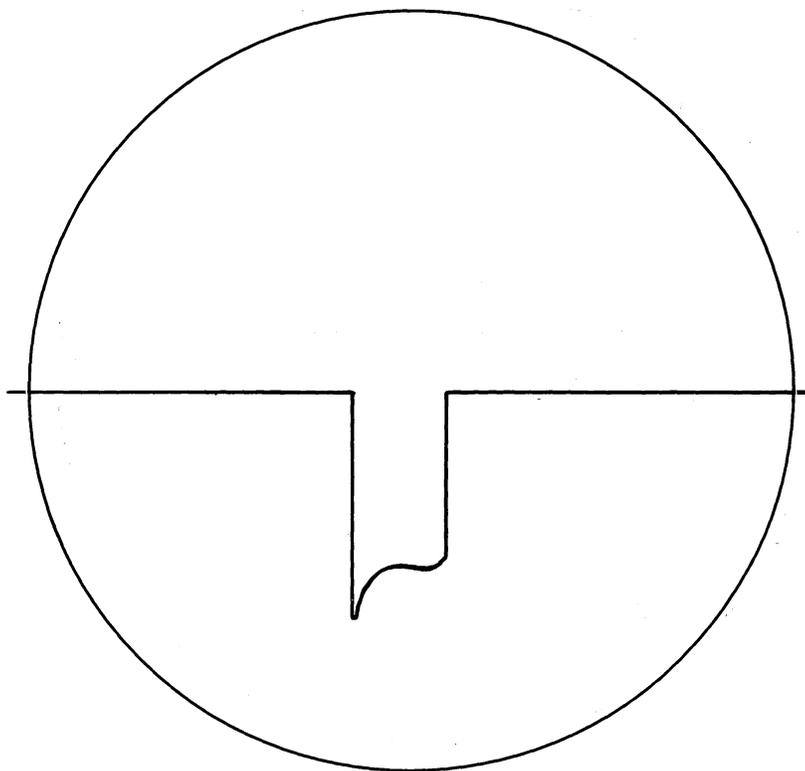


Figure 8

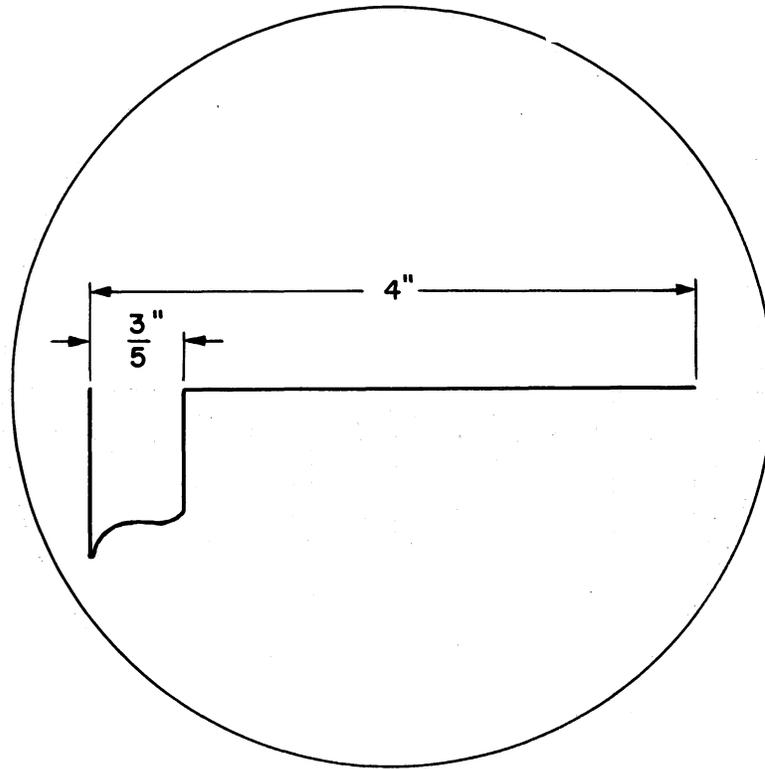


Figure 9

(e) Set the SPEED SEL switch to 75. Set the SWEEP VERNIER to obtain the trace indicated in Figure 9. The negative pulse shall be approximately  $3/5$  inch.

(f) Set the SPEED SEL switch to 60. Set the SWEEP VERNIER to obtain the trace indicated in Figure 9. The negative pulse shall be approximately  $3/5$  inch.

### 3.04 Element Timer

(a) Connect the oscilloscope Y-axis input to pin 6 of V1 electron tube, set the SPEED SEL switch to 100, and adjust the oscilloscope sweep (without locked-in synchronization) to show a stationary trace as indicated in Figure 3.

(b) Leaving the oscilloscope sweep adjustments unchanged, connect the oscilloscope Y-axis input to pin 6 of V3 electron tube. The trace indicated in Figure 10 should appear. Note that the stop pulse is longer than the other pulses.

(c) Reset the SPEED SEL switch to 200 and note that two cycles of the above trace appear.

(d) Reset the SPEED SEL switch to 100/200 and note that the alternate cycles displayed in (c) drop out.

(e) Reset the SPEED SEL switch to 75, reduce the sweep rate, and note the same pattern as indicated in Figure 10.

(f) Reset the SPEED SEL switch to 60, reduce the sweep rate, and note the same pattern as indicated in Figure 10.

### 3.05 Read-in Pulses (Using Test Probe Described in 1.04).

(a) Connect terminal 1 of the test probe (at the tail of the arrow) to pin 3 of electron tube V2. Connect terminal 2 of the test probe to the Y-axis input. The positive pulse appearing on the oscilloscope shall be  $13 \pm 4$  volts.

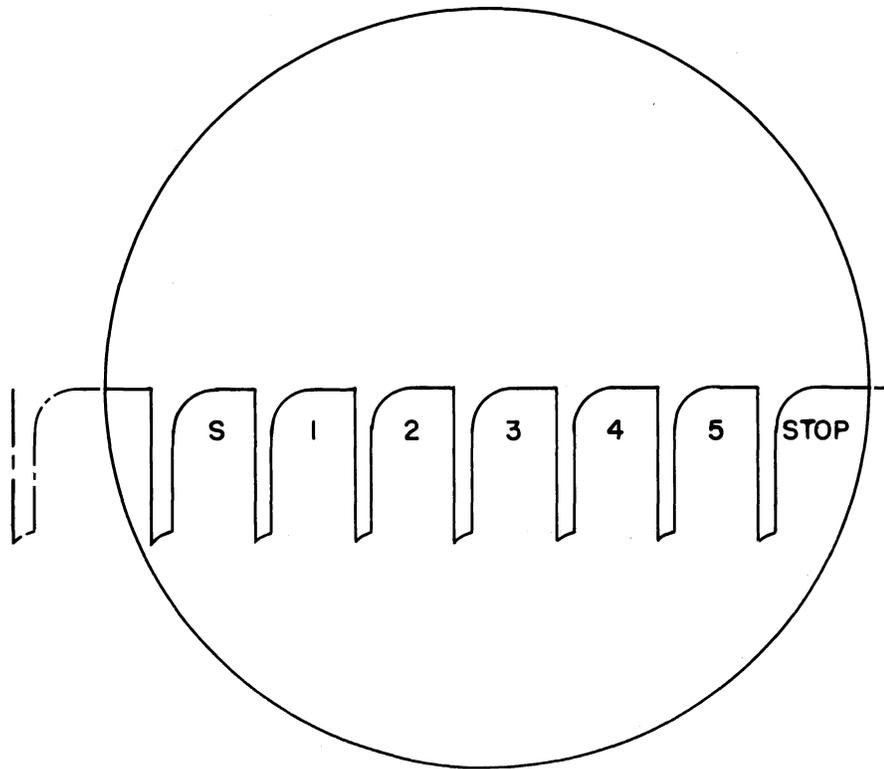


Figure 10

(b) Connect terminal 2 of the test probe to pin 1 of electron tube V4. Connect terminal 1 of the test probe to the Y-axis input. Adjust the SWEEP VERNIER to show one or two negative pulses on the oscilloscope face. The pulse shall be  $60 \pm 15$  volts.

(c) Connect the test probe as in (a) to the junction of the RID inductor and the R16 capacitor on socket turret V4 in the electronic distributor unit. The negative pulse appearing on the oscilloscope shall be  $7 \pm 1.5$  volts.

### 3.06 Shift Pulse (Using Test Probe Described in 1.04)

(a) Connect terminal 1 of the test probe to pin 8 of electron tube V3, and terminal 2 of the test probe to the Y-axis input. The positive pulse appearing on the oscilloscope shall be  $11 \pm 2$  volts.

(b) Connect terminal 2 of the test probe to the junction of capacitors AR3 and AR4 on socket turret AV6 in the electronic distributor unit, and terminal 1 of the test probe to the Y-axis input. The negative pulse appearing on the oscilloscope shall be  $10 \pm 2$  volts.

(c) The same negative pulse shall be observed when the test probe is moved successfully to the junction of the BR3 and BR4, CR3 and CR4, DR3 and DR4, ER3 and ER4, and FR3 and FR4 capacitors on socket turrets BV6, CV6, DV6, EV6, and FV6, respectively, in the electronic distributor unit.

### 3.07 Transmitted Character

(a) Set the SPEED SEL switch to 200 and connect the oscilloscope Y-axis input to the tip of the UNBIASED SIGS OUT jack in the electronic output unit of the test equipment.

(b) The trace on the oscilloscope shall indicate signal elements in accordance with those shown in Figure 11.

3.08 Recheck of Oscillator and Character Timer: (Omit this test if no troubles have been found.) If wiring errors have been found and corrected or defective components replaced, recheck the oscillator at the four speeds as in 3.01 and the character timer at 100 speed only as in 3.02 and 3.03.

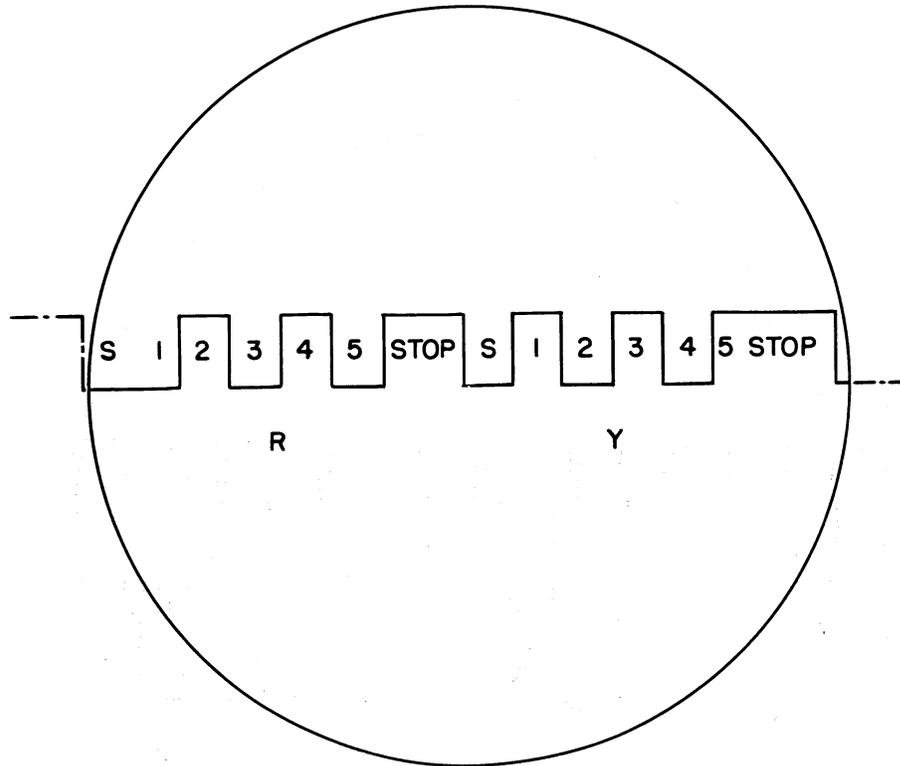


Figure 11

### 3.09 Element Timer

(a) Set the 164C2 transmission measuring set controls to measure 60-milliampere signals at 200 speed. Set the electronic distributor unit at 200 speed. Patch from the 164C2 set INPUT jack to the UNBIASED SIGS 60 jack in the electronic output unit. Adjust the EL ADJ 200 potentiometer for minimum distortion as read on the 164C2 set.

(b) Connect the Y-axis input of the oscilloscope to the FREQ ADJ pin jack and hold the FREQ TEST key operated. The oscilloscope trace should appear similar to that shown in Figure 12. Very minor adjustment of the EL ADJ 200 potentiometer may be made to cause the trace to coincide with that shown in Figure 12. Recheck the distortion on the 164C2 set with the FREQ TEST key released; the distortion shall be less than 3 per cent.

(c) Set the 164C2 set to measure signals at 100 speed and set the electronic distributor unit at 100 speed. Repeat (a) and (b) using the EL ADJ 100 potentiometer.

(d) Set the 164C2 set to measure signals at 75 speed and set the electronic distributor unit at 75 speed. Repeat (a) and (b) using the EL ADJ 75 potentiometer.

(e) Set the 164C2 set to measure signals at 60 speed and set the electronic distributor unit at 60 speed. Repeat (a) and (b) using the EL ADJ 60 potentiometer.

### 3.10 Overall Transmission

(a) Set the coding and control unit and the electronic output unit of the test equipment to send the test sentence.

(b) Measure the distortion at the UNBIASED SIGS 60 jack in the electronic output unit with the 164C2 set. The total distortion shall not exceed 3 per cent.

(c) Patch a page printer into the electronic output unit. The test sentence shall appear on the page printer without error. Verify this test by repeating once.

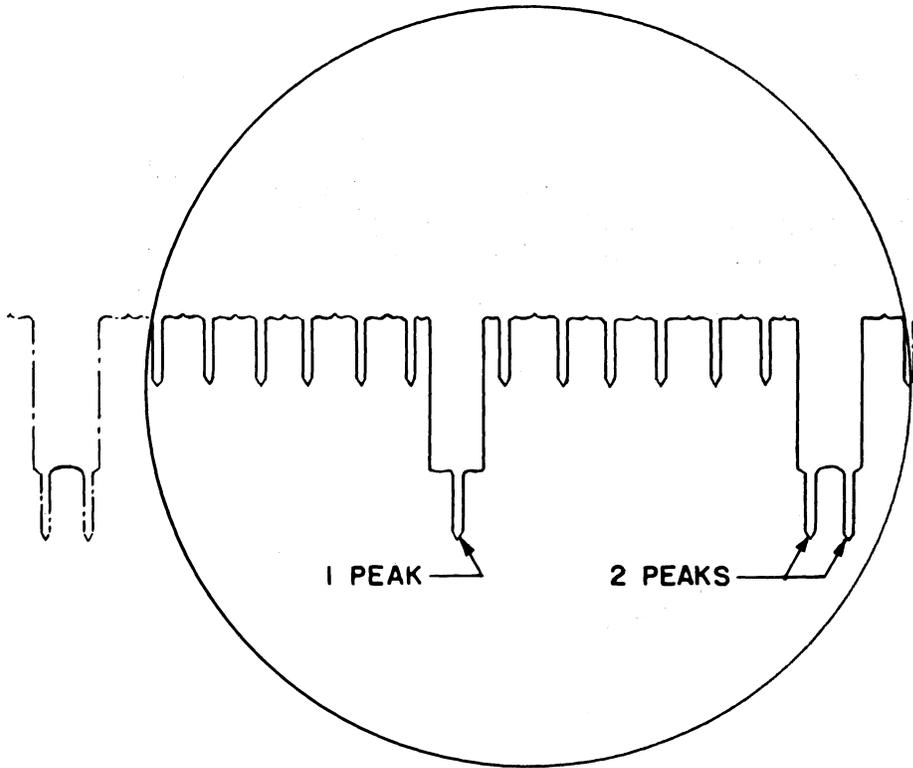


Figure 12