

**INSTRUCTION MANUAL
FOR
MODEL TTS 46A
DIAL PULSE TEST SET**



NORTHEAST ELECTRONICS CORPORATION

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OPERATING ADDENDUM

The portable version of this instrument has been calibrated with the meter in the horizontal position and the rack-mounted version with the meter in the vertical position. To obtain the specified accuracy, the instrument must be operated in the same position in which it was calibrated. If it is desired to operate the instrument in another position, the instrument must be recalibrated while the meter is in the desired position.

NORTHEAST ELECTRONICS CORPORATION
AIRPORT ROAD
CONCORD, New Hampshire

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MODEL TTS 46A DIAL PULSE TEST SET

OPERATING INSTRUCTIONS

1.0 GENERAL

1.01 The Model TTS 46A is a portable, battery operated, dial pulse test set designed to measure the % break and speed of both "dry" and "wet" loop pulses generated by a telephone dial or by a pulsing relay. It also can be used to measure DC current. It is particularly useful for checking the dial and loop current at a subscriber's location, or for testing dials in a repair shop.

1.02 A highly damped measuring circuit includes a rugged $4\frac{1}{2}$ " precision meter which has three scales calibrated to read:

- a. % break in 1% divisions from 0 to 100%.
- b. Pulse speed in 1 pps divisions from 0 to 25 pps.
- c. DC current in 5 mA divisions from 0 to 100 mA.

The response of the measuring circuit is fast enough to permit the measurement of the % break and speed of pulses generated by a dial when the digit is dialed.

1.03 Calibration adjustments are provided to permit calibrating the measuring circuits for different supply voltages and for the resistance of the circuit under test. A rotary switch is used to select the various measurements or calibrating functions.

1.04 The unit is powered by a self-contained battery to facilitate use in the field, or by 48V central office battery for continuous use in a central office or repair shop. When the 48 volts is plugged in the 48V jack, the internal battery is disconnected.

1.05 The Model TTS 46A is housed in a rugged aluminum case with a cover and carrying handle.

2.0 PERFORMANCE DATA

2.01 Meter. A $4\frac{1}{2}$ " meter with three scales is provided. The % BREAK scale is calibrated from 0 to 100% in 1% divisions. The PPS scale is calibrated from 0 to 25 pps in 1 pps divisions. Damping circuits permit proper reading of the standard % break when the digit 0 is dialed on a 10 Hz dial; they also reduce pointer vibration to about ± 1 division on 10 pps signals. The mA scale is calibrated in 5 mA divisions from 0 to 100 mA.

2.02 Impedance of Measuring Circuit

For % Break Measurements

Meter circuit: approximately 7,500 Ω

For speed measurements: approximately 4,300 Ω

2.03 Calibration. Adjustable calibration controls permit the operation of the set on battery voltages from approximately 40 to 55 volts and eliminate the need to apply correction factors for different battery voltages and loop resistances.

2.04 Power Requirements

a. Battery operation: requires one 45V Eveready #455 or NEDA #201 battery or equivalent. Current drain is approximately 15 mA.

b. 48V operation: requires 48 volt central office battery. Current drain is 15 mA.

2.05 Size

6" x 8" x 5 $\frac{7}{8}$ "

2.06 Weight

4 $\frac{1}{4}$ lb.

3.0 CIRCUIT DESCRIPTION

3.01 A schematic diagram of the Model TTS 46A is shown in Fig. 1. A description of the circuit is presented below.

3.02 The measuring circuit provides means for measuring the speed or % break of pulses received from loop circuits. The function switch is used to set up the measuring circuit for different modes of operation.

3.03 The measuring circuit includes a $4\frac{1}{2}$ " meter with a 1 mA movement. A % BREAK scale calibrated from 0 to 100% in 1% divisions is used to facilitate reading % break. The R-C time constants of the meter circuit have been designed to permit proper reading of the % break when the digit 0 is dialed on an external dial. This damping is also sufficient to keep the angular vibration of the meter pointer to within approximately ± 1 division on the meter scale when a pulse rate of 10 pps is measured.

3.04 A PPS scale calibrated from 0 to 25 in 1 pps divisions is used to read pulse speed.

3.05 A calibration control in series with the meter permits setting an accurate full scale reading (i. e. 0% break) for battery voltages from approximately 40 to 55 volts.

3.06 A calibration control in the pulse speed measuring portion of the circuits sets an accurate full scale reading (i. e. 25 pps) for battery voltages from approximately 40 to 55 volts.

3.07 When the PWR switch is in the REC B&G % BK position, the internal batteries or external power through the 48V jack is eliminated, and the meter circuit is powered by the circuit under test. The % break of wet circuits may be measured in this position of the PWR switch by connecting the tip and ring to the positive and negative side of the circuit under test respectively.

4.0 CONTROLS AND JACKS

4.01 The following controls are included in the TTS 46A:

a. CAL % BRK and CAL PPS. Separate % Break and PPS calibration controls are provided to allow full scale calibration of the meter for different supply voltages and for external circuits with different loop resistances. The two controls are provided so that the % break and pps circuits may be calibrated individually to allow the use of either circuit without recalibration.

b. FUNCTION Switch. Provides the following modes of operation in clockwise sequence:

1. MA - For measuring current in milliamps on circuit under test.
2. CAL % BREAK - Shorts input for full scale deflection of 0 % break.
3. MEAS % BREAK - For measuring the % break of dry loop pulses.
4. MEAS PPS - For measuring the speed of pulses.
5. CAL-PPS - Switches meter circuit to calibrate for measuring of speed pulses.

5.0 OPERATION

Initial Steps

5.01 The following steps should be taken to prepare the set for operation:

- a. Unlatch and open cover. The cover can be easily removed by sliding it upward.
- b. Check the position of the meter pointer; it should be on the 100 line of the % BREAK scale. If it is not on 100, adjust the screw on the meter casing to properly position the pointer. After the adjustment has been made, back off the adjustment screw slightly to remove mechanical contact between the adjustment screw and the meter mechanism.
- c. For 48V operation connect a cord (tip negative 48V, sleeve to positive ground) to the 48 volt jack in the TTS 46A and the other end of the cord to a 48V supply jack. In the event that the battery is reversed, the TTS 46A will not be damaged because an internal protective diode is provided; however, it will not be possible to calibrate or use the unit in this condition.
- d. Turn PWR switch to ON. Set is now ready for use.

To Measure % Break

5.02 The following procedure is used for measuring the % break of open and closure of dry (no potential) contacts:

- a. Complete the initial steps as outlined in 5.01 above.
- b. Connect one end of a tip and ring cord to the REC jack (or to the REC binding posts) and the other end of the cord to the circuit under test.
- c. Set the FUNCTION switch to CAL % BREAK and adjust the CAL % BREAK control until the meter reads 0% break. If the set cannot be calibrated, it may be necessary to replace the internal battery. If 48V operation is used, check to be sure voltage is not below 40V.
- d. Set the FUNCTION switch to the % BREAK position and read the results on % BREAK scale. If a dial is being tested, the digit 0 must be dialed to allow sufficient time for the meter pointer to reach the proper % break reading.

CAUTION: If there is loop resistance present in the circuit under test, an "off hook" should be sent from the pulsing contacts (a closure), and the CAL % BRK control adjusted until a 0% break reading is observed while the function switch is in the % BREAK position.

5.03 The following procedure is used for measuring the % break of wet (battery and ground) contacts:

- a. Complete initial steps as outlined in 5.01 above.
- b. Position the PWR switch to the OFF or REC B&G % BK position.
- c. Connect one end of a tip and ring cord to the REC jack (or to the REC binding posts) and the other end of the cord to the circuit under test, making sure to connect the tip and ring to the positive and negative sides respectively.
- d. Set the FUNCTION switch to the % BREAK position and read results on the % BREAK scale. If a dial is being tested, the digit 0 must be dialed to allow sufficient time for the meter pointer to reach the proper % break reading.

CAUTION: If there is loop resistance present in the circuit under test, then an "off hook" should be sent from the pulsing contacts (battery negative on ring, ground on tip) and the CAL % BREAK control adjusted while the FUNCTION switch is in the % BREAK position.

To Measure Speed

5.04 The following procedure is used for measuring the speed of dry (no potential) contacts:

- a. Complete initial steps as outlined in 5.01 above.
- b. Connect one end of a tip and ring cord to the REC jack (or to the REC binding posts) and the other end of the cord to the circuit under test.
- c. Set the FUNCTION switch to the CAL PPS position and adjust the CAL PPS control so the meter reads 25 pps. If the set cannot be calibrated, replace battery or check 48V source if it is used.

d. Turn the FUNCTION switch to the PPS position and observe the reading on the PPS scale. When testing the speed of dials, a 0 must be dialed to allow sufficient time for the meter pointer to reach the proper pps reading.

5.05 The following procedure is used for measuring the speed of wet (battery and ground) contacts:

a. Complete initial steps as outlined in 5.01 above.

b. Set the FUNCTION switch to the CAL PPS position and adjust the CAL PPS control so the meter reads 25 pps.

c. Connect the tip wire of a cord to the REC jack and the other end to the positive side of the circuit under test.

CAUTION: The ring of the REC jack is switched to ground when the FUNCTION switch is in the PPS position, and no connection should be made to it that would result in a blown fuse.

d. The speed of the pulses may now be observed on the PPS scale.

To Measure Current

5.06 The following procedure is used for measuring the current of a circuit from 0 to 100 milliamps:

a. Complete initial steps a. and b. as outlined in 5.01 above.

b. Set FUNCTION switch to the MA position.

c. Connect the circuit to be tested to the REC jack or binding posts (tip is +, ring is -) and read current on the MA scale.

ELECTRONIC PARTS LIST

INTRODUCTION: The following pages contain the parts list for the Model TTS 46A Dial Pulse Test Set.

FSCM Code Numbers. The Federal Supply Code of Manufacturers of each part. A list of codes and their respective manufacturers is given below.

LIST OF MANUFACTURERS

Code No.	Manufacturer
00656	Aerovox Corporation
01121	Allen Bradley
04009	Arrow-Hart & Hegeman
06819	Northeast Electronics Corporation
09653	International Electronic Industries
12697	Clarostat Manufacturing Company
13606	Sprague
25312	Eveready
71590	Centralab
75376	Kurz-Kasch
77342	Potter & Brumfield
80368	Sylvania
82389	Switchcraft
83330	H. H. Smith
94322	Tel-Labs

ELECTRONIC PARTS LIST

Ref Desig.	Description	Manufacturer (FSCM Code #)	Part Number
C1	C: fxd elect 10 μ F 50V	13606	TVA-1304
C2	C: fxd elect 1000 μ F 6V	09653	APD-122
C3	C: fxd 1.5 μ F 50V	00656	P-123ZN
R1	R: fxd comp 4.7K $\frac{1}{2}$ W 10%	01121	EB-4725
R2	R: fxd comp 22K $\frac{1}{2}$ W 10%	01121	EB-2231
R3	R: fxd comp 9.1K $\frac{1}{2}$ W 5%	01121	EB-9125
R4	R: fxd comp 4.7K $\frac{1}{2}$ W 10%	01121	EB-4725
R5	R: fxd comp 100 Ω $\frac{1}{2}$ W 10%	01121	EB-1115
R6	R: fxd comp 2K 1W 5%	01121	EB-2025
R7	R: fxd ww 0.542 Ω $\frac{1}{2}$ W 1%	94322	CR-31
R8	R: fxd comp 36K $\frac{1}{2}$ W 5%	01121	EB-3635
R9	R: fxd comp 2K $\frac{1}{2}$ W 5%	01121	EB-2025
R10	R: fxd comp 15K $\frac{1}{2}$ W 5%	01121	EB-1535
R11	R: var ww 8 Ω	12697	Series 39
P1	Resistor: var ww 25K	71590	WN-253
P2	R: var ww 500 Ω	12697	Series 39
P3	R: var ww 2K	71590	WN-202
P4	R: var ww 10 Ω	12697	Series 39
J1	Jack: RTS (with disconnect springs on tip)	82389	53B SF
J2	Jack: RTS	82389	L-12B
P	Relay: SPDT	77342	RS5D-2500
S1	S: rotary 6 pole 5 pos	71590	PA-022-1434
S2	S: toggle 2 pole 2 pos	04009	81027-CB
CR1 and CR2	Diodes	80368	1N4003
	Meter	06819	Special
	Battery: 45V	25312	455
	Binding Post	83330	137-SP
	Knob	75376	645-3-BB
	Knob	75376	648-3L-BB
	Knob	75376	645-3-BB

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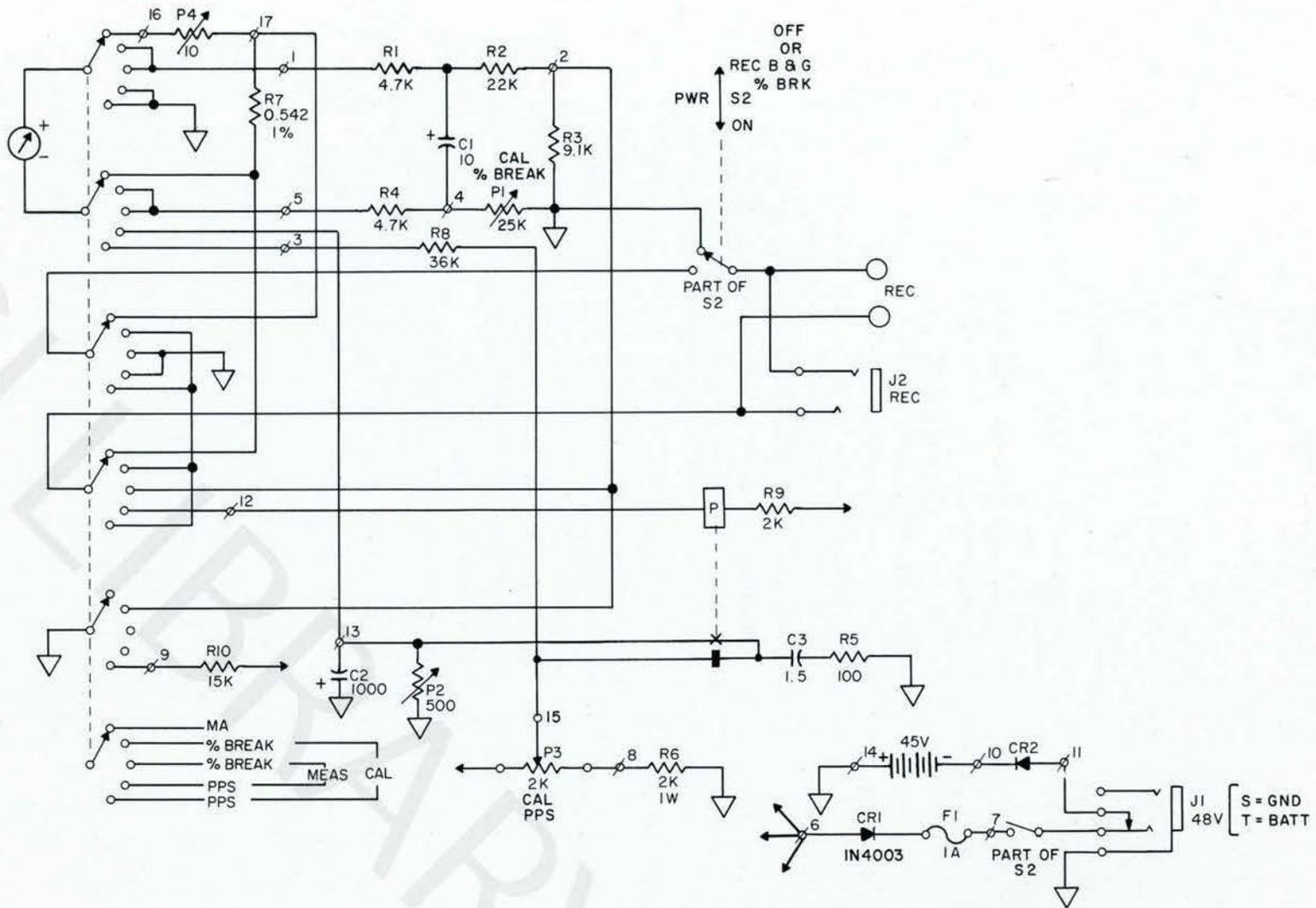


FIG 1

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES			TITLE SCHEMATIC DIAGRAM TTS-46A		NORTHEAST ELECTRONICS CORPORATION									
TOLERANCES ON FRACTIONS ± 1/64	DECIMALS ± .005	ANGLES ± 1/2°	<table border="1"> <tr> <td>UNIT</td> <td>DRAWN BY P. TRACY</td> <td>DATE 5/6/71</td> <td>SCALE NONE</td> </tr> <tr> <td>APP'D</td> <td>CHK'D</td> <td></td> <td></td> </tr> </table>		UNIT	DRAWN BY P. TRACY	DATE 5/6/71	SCALE NONE	APP'D	CHK'D			 CONCORD, N. H. U.S.A.	
UNIT	DRAWN BY P. TRACY	DATE 5/6/71			SCALE NONE									
APP'D	CHK'D													
MATERIAL FINISH—ETCH AND IRIDITE			PROJECT NO.		SIZE C 0046-10-300									
PAINT—FEDERAL SPEC. 595 COLOR 26492			REF. DWG.		ISSUE 1									
CASES—R AND S VINYL 8050, W24			APP'D		SCALE NONE									
SCREEN			DATE 5/6/71		SCALE NONE									

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