CONDENSED OPERATING INSTRUCTIONS FOR TYPE 1607-A

(For complete details, refer to Operating Instructions for Type 1607-A.)

MEASUREMENTS WITH TRANSFER-FUNCTION INDICATOR

Set the generator, local oscillator, and susceptance standard to desired frequencies. If network is nonlinear or active, trap out local-oscillator signal by reversing generator and detector connections and adjusting trap for null. Then restore normal connections. Connect low-frequency extensions if necessary.

FORWARD TRANSADMITTANCE. (Y_{21}) (OUTPUT SC)

1. Set <u>MULTIPLIER</u> to ∞, A to 1.5 and B to 0. Connect WN5 to OUTPUT, and adjust OUTPUT LINE for null.

2. Connect U between INPUT and OUTPUT. Adjust INPUT LINE for null (about same setting as OUTPUT LINE).

3. Connect network input to INPUT, output to OUTPUT, using suitable mount.

4. Apply biases if needed - input to INPUT BIAS, output to OUTPUT BIAS.

5. Adjust arms for null.

6. Transconductance = – A setting x MULTIPLIER x 20 mmhos.

   Transsusceptance = – B setting x MULTIPLIER x 20 mmhos.

REVERSE TRANSADMITTANCE. (Y_{12}) (INPUT SC)

Same as forward transadmittance except reverse connections in steps 3 and 4.

FORWARD TRANSIMPEDANCE. (Z_{21}) (OUTPUT OC)

1. Set <u>MULTIPLIER</u> to ∞, A to 1.5 and B to 0. Connect WO5 to OUTPUT, and adjust OUTPUT LINE for null.

2. Connect U between INPUT and OUTPUT. Adjust INPUT LINE for null (about same setting as OUTPUT LINE).

3. Connect network input to INPUT, output to OUTPUT, using suitable mount.

4. Apply biases if needed - input to INPUT BIAS, output to OUTPUT BIAS.

5. Adjust arms for null.

6. Transresistance = –A setting x MULTIPLIER x 50 ohms.

   Transreactance = –B setting x MULTIPLIER x 50 ohms.

REVERSE TRANSIMPEDANCE. (Z_{12}) (INPUT OC)

Same as forward transimpedance except reverse connections in steps 3 and 4.

FORWARD TRANSFER VOLTAGE RATIO. $\left(\dfrac{E_2}{E_1}\right)$ (OUTPUT OC)

1. Set <u>MULTIPLIER</u> to ∞, A to 1.5 and B to 0. Connect WN5 to OUTPUT, and adjust OUTPUT LINE for null.

2. Connect U between INPUT and OUTPUT. Adjust INPUT LINE for null (about same setting as OUTPUT LINE).

3. Connect WO5 to OUTPUT, set OUTPUT LINE for nearest null.

4. Connect network input to INPUT, output to OUTPUT, using suitable mount.

5. Apply biases if needed - input to INPUT BIAS, output to OUTPUT BIAS.

6. Adjust arms for null.

7. If OUTPUT LINE length is shorter than INPUT LINE setting, real value = + B setting x MULTIPLIER; imaginary value = ⁻A setting x MULTIPLIER.

8. If OUTPUT LINE length is longer than INPUT LINE setting, real value = ⁻B setting x MULTIPLIER; imaginary value = +A setting x MULTIPLIER.

REVERSE TRANSFER VOLTAGE RATIO. $\left(\dfrac{E_1}{E_2}, h_r\right)$ (INPUT OC)

Same as forward transfer voltage ratio except reverse connections in steps 4 and 5.

FORWARD TRANSFER CURRENT RATIO. $\left(\dfrac{I_2}{I_1}, -\alpha, h_f\right)$ (OUTPUT SC)

1. Set <u>MULTIPLIER</u> to ∞, A to 1.5 and B to 0. Connect WO5 to OUTPUT, and adjust OUTPUT LINE for null.

2. Connect U between INPUT and OUTPUT. Adjust INPUT LINE for null (about same setting as OUTPUT LINE).

3. Connect WN5 to OUTPUT, set OUTPUT LINE for nearest null.

4. Connect network input to INPUT, output to OUTPUT, using suitable mount.

5. Apply biases if needed - input to INPUT BIAS, output to OUTPUT BIAS.

6. Adjust arms for null.

7. If OUTPUT LINE length is shorter than INPUT LINE setting, real value = + B setting x MULTIPLIER; imaginary value = ⁻A setting x MULTIPLIER.

8. If OUTPUT LINE length is longer than INPUT LINE setting, real value = ⁻B setting x MULTIPLIER; imaginary value = +A setting x MULTIPLIER.

REVERSE TRANSFER CURRENT RATIO. $\left(\dfrac{I_1}{I_2}\right)$ (INPUT SC)

Same as forward transfer current ratio except reverse connections in steps 4 and 5.

DIRECT (UNGROUNDED) ADMITTANCE.

Procedure same as for transadmittance except:

3. Connect ungrounded terminals of component to ungrounded terminals on 1607-P601 Component Mount. If guard terminal is present, connect to ground.

4a. If bias is to be connected between ungrounded terminals, use red INPUT BIAS and OUTPUT BIAS binding posts.

DIRECT (UNGROUNDED) IMPEDANCE.

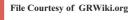Reciprocal of complex direct admittance measured above.

NOTE

WN3 = Type 874-WN3 Short-Circuit Termination   WO3 = Type 874-WO3 Open-Circuit Termination
WN5 = Type 874-WN5 Short-Circuit Termination   WO5 = Type 874-WO5 Open-Circuit Termination
U = Type 874-U U-Line Section

Set the generator, local oscillator, and susceptance standard to desired frequencies. If network is nonlinear or active, trap out local-oscillator signal by reversing generator and detector connections and adjusting trap for null. Then restore normal connections. Connect low-frequency extensions if necessary.

INPUT ADMITTANCE (Y_{11}) (OUTPUT SC)*

1. Set MULTIPLIER to ∞, REAL to 1 & IMAGINARY to 0. Connect WN5 to OUTPUT. Adjust OUTPUT LINE for null.

2. Connect U between INPUT and OUTPUT. Adjust INPUT LINE for null.

3. Connect network input to OUTPUT, output to INPUT, using suitable mount.

4. Apply biases if needed - input to OUTPUT BIAS, output to INPUT BIAS.

5. Adjust arms for null.

6. Conductance = REAL setting x MULTIPLIER x 20 mmhos.

Susceptance = IMAGINARY setting x MULTIPLIER x 20 mmhos.

OUTPUT ADMITTANCE. (Y_{22}) (INPUT SC)

Same as input admittance except reverse connections in steps 3 and 4.

INPUT IMPEDANCE. (Z_{11}) (OUTPUT OC)*

1. Set MULTIPLIER to ∞, REAL to 1 & IMAGINARY to 0. Connect WO5 to OUTPUT. Adjust OUTPUT LINE for null.

2. Connect U between INPUT and OUTPUT. Adjust INPUT LINE for null.

3. Connect network input to OUTPUT, output to INPUT, using suitable mount.

4. Apply biases if needed - input to OUTPUT BIAS, output to INPUT BIAS.

5. Adjust arms for null.

6. Resistance = REAL setting x MULTIPLIER x 50 ohms.

Reactance = IMAGINARY setting x MULTIPLIER x 50 ohms.

OUTPUT IMPEDANCE. (Z_{22}) (INPUT OC)

Same as input impedance except reverse connections in steps 3 and 4.

HYBRID OUTPUT ADMITTANCE. (h_o) (INPUT OC)*

1. Set MULTIPLIER to ∞ REAL to 1 & IMAGINARY to 0. Connect WO5 to OUTPUT. Adjust OUTPUT LINE for null.

2. Connect U between INPUT and OUTPUT. Adjust INPUT LINE for null.

3. Connect WN5 to OUTPUT, set OUTPUT LINE for null.

4. Connect network input to INPUT, output to OUTPUT, using suitable mount.

5. Apply biases if needed - input to INPUT BIAS, output to OUTPUT BIAS.

6. Adjust arms for null.

7. Conductance = REAL setting x MULTIPLIER x 20 mmhos.

Susceptance = IMAGINARY setting x MULTIPLIER x 20 mmhos.

HYBRID INPUT ADMITTANCE (OUTPUT OC).

Same as hybrid output admittance except reverse connections in steps 4 and 5.

HYBRID INPUT IMPEDANCE. (h_i) (OUTPUT SC)*

1. Set MULTIPLIER to ∞, REAL to 1 & IMAGINARY to 0. Connect WN5 to OUTPUT. Adjust OUTPUT LINE for null.

2. Connect U between INPUT and OUTPUT. Adjust INPUT LINE for null.

3. Connect WO5 to OUTPUT, set OUTPUT LINE for null.

4. Connect network input to OUTPUT, output to INPUT, using suitable mount.

5. Apply biases if needed - input to OUTPUT BIAS, output to INPUT BIAS.

6. Adjust arms for null.

7. Resistance = REAL setting x MULTIPLIER x 50 ohms.

Reactance = IMAGINARY setting x MULTIPLIER x 50 ohms.

HYBRID OUTPUT IMPEDANCE. (INPUT SC)

Same as hybrid input impedance except reverse connections in steps 4 and 5.

ADMITTANCE OF GROUNDED 2-TERMINAL COMPONENTS.

1. Set MULTIPLIER to ∞, REAL to 1 & IMAGINARY to 0. Connect WN3 to OUTPUT. Adjust OUTPUT LINE for null.

2. Insert component in 874-ML Mount.

3. Connect 874-ML Mount to OUTPUT.

4. Apply bias, if necessary, to OUTPUT BIAS.

5. Adjust arms for null.

6. Conductance = REAL setting x MULTIPLIER x 20 mmhos.

Susceptance = IMAGINARY setting x MULTIPLIER x 20 mmhos.

IMPEDANCE OF GROUNDED 2-TERMINAL COMPONENTS.

1. Set MULTIPLIER to ∞, REAL to 1 & IMAGINARY to 0. Connect WO3 to OUTPUT. Adjust OUTPUT LINE for null.

2. Insert component in 874-ML Mount.

3. Connect 874-ML Mount to OUTPUT.

4. Apply bias, if necessary, to OUTPUT BIAS.

5. Adjust arms for null.

6. Resistance = REAL setting x MULTIPLIER x 50 ohms.

Reactance = IMAGINARY setting x MULTIPLIER x 50 ohms.

REFLECTION COEFFICIENT AND VSWR.

1. Connect the 1607-P4 Conductance Standard in place of susceptance standard. Leave conductance arm open.

2. Set REAL arm to 0, MULTIPLIER to 1.

3. Connect line under test to OUTPUT.

4. Apply bias, if necessary, to OUTPUT BIAS.

5. Set IMAGINARY arm to +1.0 and record output in db.

6. Shift IMAGINARY arm to −1.0 and record output in db.

7. Enter db difference ($A_1 - A_2$) in table in manual to determine reflection coefficient and VSWR.

*Alternate procedure for greater accuracy with low admittances or impedances (i.e. < 20 mmhos or < 50 ohms) given in instruction manual

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