# OPERATION AND MAINTENANCE MANUAL FOR SWR AUTOTESTERS AND BRIDGES

## 1. INTRODUCTION

This manual provides product descriptions and specifications for ANRITSU Series 59, 63, and 97 SWR Autotesters and Series 58, 60, 62, and 87 SWR Bridges. It also includes procedures for measuring the directivity of these components.

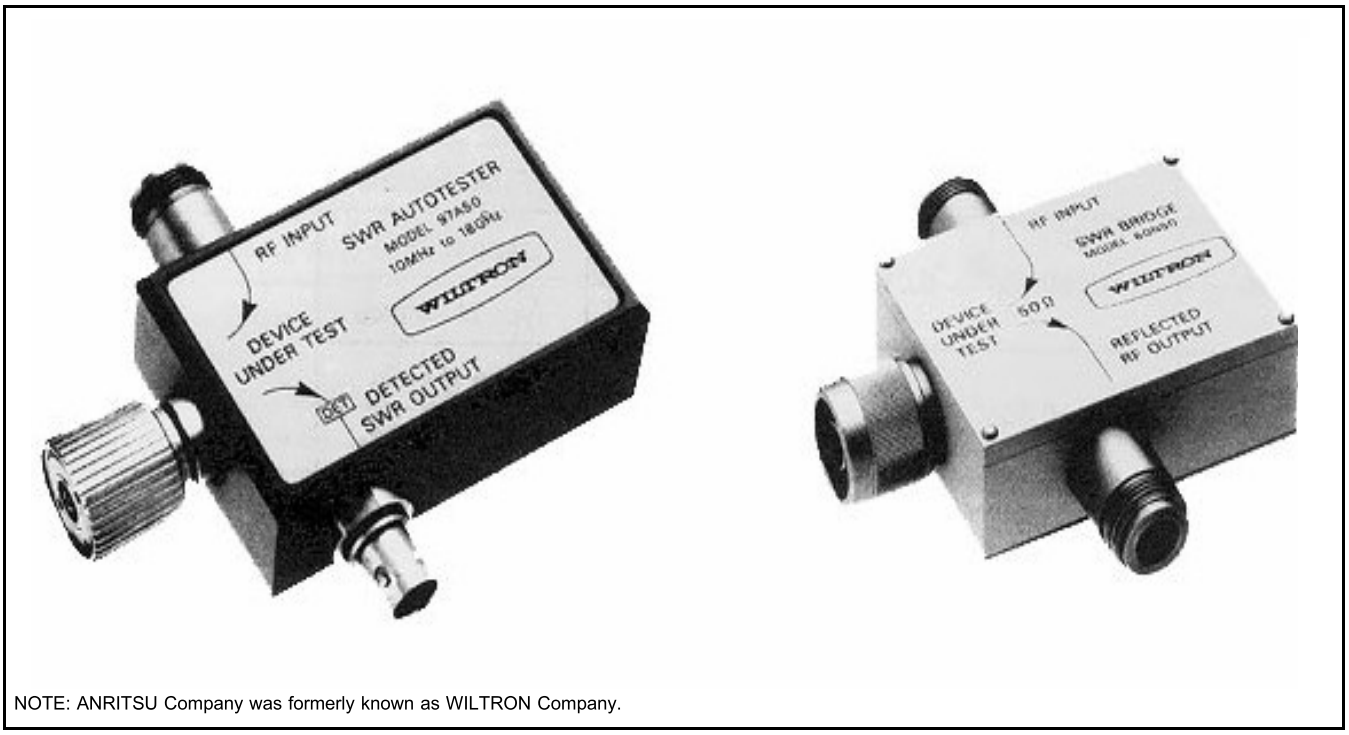
## 2. GENERAL DESCRIPTION

The SWR Autotesters and bridges (Figure 1) are broadband microwave measurement instruments. They are used with other test instruments for making fixed- and swept-frequency return loss (SWR) measurements over a wide range of radio frequencies. Return loss measurements are made to check the performance of systems, subsystems, and microwave components such as amplifiers, directional couplers, attenuators, filters, splitters, and terminations.

The ANRITSU SWR Autotesters and bridges are precision-balanced Wheatstone bridges. Except for the two 4-port comparison-type instruments (Models 59A50 and 58A50) that use an offset termination in the reference arm, every model has an internal precision reference termination included in one arm of its bridge. The major difference between the SWR Autotester and the SWR bridge is that the SWR Autotester contains a built-in RF detector.

## 3. PERFORMANCE SPECIFICATIONS

Performance specifications for SWR Autotesters are listed in Table 1; specifications for SWR bridges are listed in Table 2.




NOTE: ANRITSU Company was formerly known as WILTRON Company.

**Figure 1.** Typical ANRITSU SWR Autotester and SWR Bridge

490 JARVIS DRIVE ● MORGAN HILL, CA 95037-2809

P/N: 10100-00008
REVISION : N
PRINTED: OCTOBER 1997

**Table 1.** SWR Autotester Performance Specifications

| Models | Directivity (dB) | Accuracy① | Input Z (ohms) | Test Port Connector | Physical |
|---|---|---|---|---|---|
| ***59 Series Comparison SWR Autotester, 10 MHz to 18 GHz*** | | | | | |
| 59A50 | 36 | *0.01–8 GHz:* $0.016 \pm 0.06\rho^2$ ②③<br>*8–18 GHz:* $0.016 \pm 0.1\rho^2$ | 50 | GPC–7 | *Dimensions:*<br>7.6 x 5.1 x 2.8 cm<br>(3 x 2 x 1 ⅛ in.)<br>plus connectors<br>*Weight:*<br>340 g (12 oz) |
| ***63 Series SWR Autotesters, 10 MHz to 4 GHz*** | | | | | |
| 63A50 | 40④ | $0.01 \pm 0.06\rho^2$ | 50 | GPC7 | *Dimensions:*<br>6.7 x 5.1 x 2.54 cm<br>(2 ⅝ x 2 x 1 in.)<br>plus connectors<br>*Weight:*<br>340 g (12 oz) |
| 63N50 | | | | Type N Male | |
| 63NF50 | | | | Type N Female | |
| ***97 Series SWR Autotesters, 10 MHz to 18GHz*** | | | | | |
| 97A50 | 36 | *0.01–8 GHz:* $0.016 \pm 0.06\rho^2$<br>*8–18 GHz:* $0.016 \pm 0.1\rho^2$ | 50 | GPC–7 | *Dimensions:*<br>7.6 x 5.1 x 2.8 cm<br>(3 x 2 x 1 ⅛ in.)<br>plus connectors<br>*Weight:*<br>340 g (12 oz) |
| 97A50-1 | 40 | $0.01 \pm 0.06\rho^2$ $0.01 \pm 0.1\rho^2$ | | | |
| 97S50 | 35 | $0.018 \pm 0.08\rho^2$ $0.018 \pm 0.12\rho^2$ | | WSMA Male | |
| 97SF50 | | | | WSMA Female | |
| 97S50-1 | 38 | $0.013 \pm 0.08\rho^2$ $0.013 \pm 0.12\rho^2$ | | WSMA Male | |
| 97SF50-1 | | | | WSMA Female | |
| 97N50 | 35 | $0.018 \pm 0.08\rho^2$ $0.018 \pm 0.12\rho^2$ | | Type N Male | |
| 97NF50 | | | | Type N Female | |
| 97N50-1 | 38 | $0.013 \pm 0.08\rho^2$ $0.013 \pm 0.12\rho^2$ | | Type N Male | |
| 97NF50-1 | | | | Type N Female | |

All Models

Insertion Loss (from input to test port): 6.5 dB nominal
Detector Output Polarity: Negative
Output Time Constant: 2 μs
Maximum Power Input: 0.5 watts (+27 dBm)
Input Connector: Type N Female
Detector Output Connector: BNC Female

① Where ρ is the reflection coefficient being measured. Accuracy includes the effects of test port reflections and directivity.

② When used with 28A50-1 Precision Termination. The effective directivity of the SWR Autotester can be increased to 60 dB by using the Ripple Extraction return loss measurement technique with the 18A50 Air Line and 29A50-20 Offset Termination.

③ See paragraph 4 for explanation of accuracy and other terms.

④ 46 dB directivity available as Option 1. Option 1 accuracy: $0.005 \pm 0.06\rho^2$.

**Table 2.** SWR Bridge Performance Specifications

| Models | Directivity (dB) | Accuracy① | Input Z (ohms) | Test Port Connector | Physical |
|---|---|---|---|---|---|
| ***58 Series Comparison SWR Bridge, 2 to 18 GHz*** | | | | | |
| 58A50 | 35 | *2–3 GHz:* 0.018 ±0.32$\rho^2$ ② ③<br>*3–4 GHz:* 0.018 ±0.2$\rho^2$<br>*4–18 GHz:* 0.018 ±0.13$\rho^2$ | 50 | GPC–7 | *Dimensions:*<br>6.7 x 5.1 x 2.2 cm<br>(2 5/8 x 2 x 7/8 in.) plus connectors<br>*Weight:*<br>340 g (12 Oz) |
| ***60 Series SWR Bridges, 5 MHz to 2 GHz*** | | | | | |
| 60A50 | 40④ | 0.01 ±0.09$\rho^2$ | 50 | GPC–7 | *Dimensions:*<br>6.7 x 5.1 x 2.54 cm<br>(2 5/8 x 2 x 1 in.) plus connectors<br>*Weight:*<br>340 g (12 oz) |
| 60N50 | | | | Type N Male | |
| 60NF50 | | | | Type N Female | |
| ***62 Series SWR Bridges, 10 MHz to 1GHz*** | | | | | |
| 62N75⑤ | 40 | 0.01 ±0.12$\rho^2$ | 75 | Type N Male | *Dimensions:*<br>6.7 x 5.1 x 2.54 cm<br>(2 5/8 x 2 x 1 in.) plus connectors<br>*Weight:*<br>170 g (6 Oz) |
| 62NF75 | | | 75 | Type N Female | |
| 62B75 | | | 75 | BNC Male | |
| 62BF75 | | | 75 | BNC Female | |
| ***87 Series SWR Bridges, 2 to 18 GHz*** | | | | | |
| 87A50 | 35 | *2–3 GHz:* 0.018 ±0.32$\rho^2$<br>*3–4 GHz:* 0.018 ±0.2$\rho^2$<br>*4–18 GHz:* 0.018 ±0.13$\rho^2$ | 50 | GPC–7 | *Dimensions:*<br>7.3 x 5.1 x 2.86 cm<br>(2 5/8 x 2 x 1 1/8 in.) plus connectors<br>*Weight:*<br>340 g (12 Oz) |
| 87A50-1 | 38 | *2–3 GHz:* 0.013 ±0.32$\rho^2$<br>*3–4 GHz:* 0.013 ±0.2$\rho^2$<br>*4–18 GHz:* 0.013 ±0.13$\rho^2$ | | | |
| All Models<br><br>Insertion Loss (from input to test port): 6.5 dB nominal<br>Maximum Power Input: 0.5 watts (+27 dBm)<br>Input Connector: Type N Female, stainless steel, except 67B and 67F Series that have BNC Female | | | | | |

① Where ρ is the reflection coefficient being measured. Accuracy includes the effects of test port reflections and directivity.

② When used with 28A50-1 Precision Termination. The effective directivity of the bridge can be increased to 60 dB by using the Ripple Extraction return loss measurement technique with the 18A50 Air Line and 29A50-20 Offset Termination.

③ See paragraph 4 for explanation of accuracy and other terms.

④ 46 dB directivity available as Option 1. Option 1 accuracy: 0.005 ±0.09$\rho^2$.

⑤ 75Ω Type N Female connectors will withstand occasional mating with 50Ω connectors without damage.