

TECHNICAL MANUAL

**OPERATOR'S, ORGANIZATIONAL, DIRECT SUPPORT,
AND GENERAL SUPPORT MAINTENANCE MANUAL:**

**MICROWAVE
OSCILLATOR SYNCHRONIZER,
SAGE MODEL 243C**

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**Operator's Organizational, Direct Support, and General
SUPPORT MAINTENANCE MANUAL,
INCLUDING REPAIR PARTS AND SPECIAL TOOLS LIST:
MICROWAVE OSCILLATOR SYNCHRONIZER, SAGE MODEL 243A-C
(NSN 4931-00-763-0762)**

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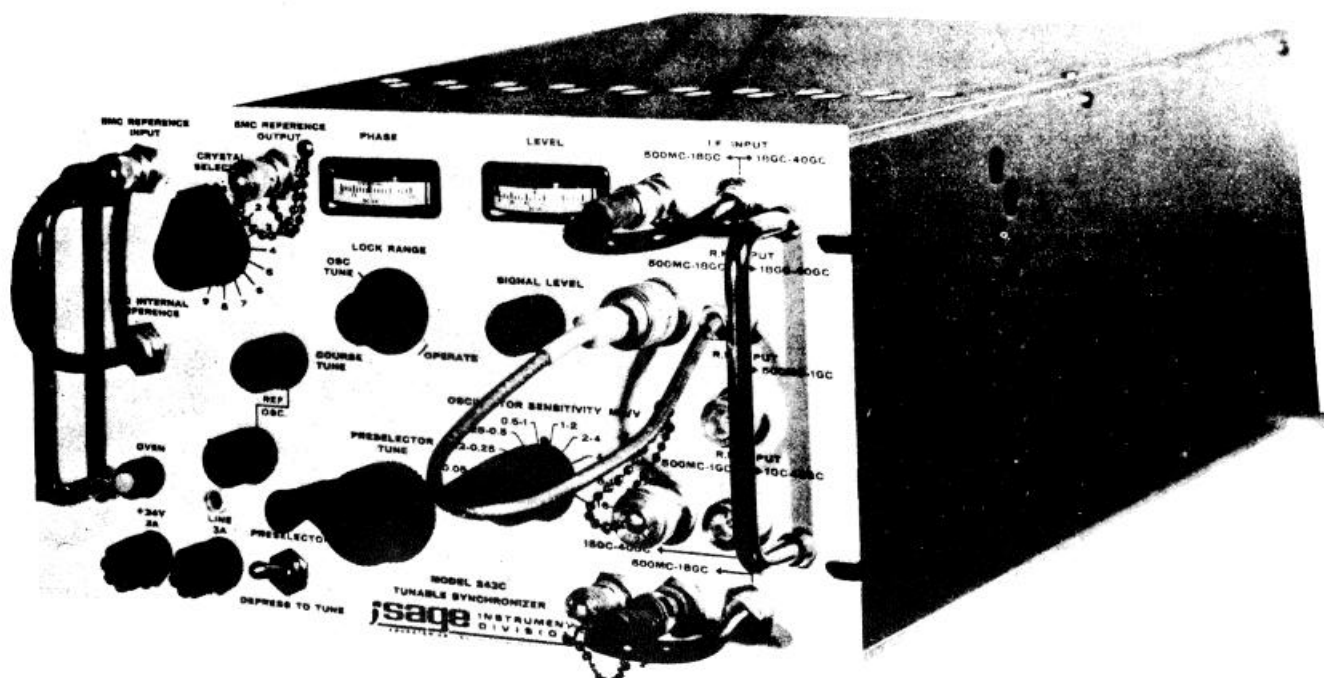


Figure 1-1. Microwave Oscillator Synchronizer Model 243C

Figure 1-1. Microwave Oscillator Synchronizer Model 243C.

SECTION 0

INTRODUCTION

0.1 Scope

The manual includes installation and operation instructions and covers organizational, direct support (DS), and general support (GS) maintenance. It describes Microwave Oscillator Synchronizer, Sage Model 243C. The basic issue items list appears in appendix B.

0.2 Indexes of Publications

a. *DA Pam 310-4*. Refer to the latest issue of DA Pam 310-4 to determine if there are any new editions, changes, or additional publications pertaining to the equipment.

b. *DA Pam 310-7*. Refer to DA Pam 310-7 to determine whether there are Modification Work Orders (MWO) pertaining to the equipment.

0.3 Forms and Records

a. *Reports of Maintenance and Unsatisfactory Equipment*. Use equipment forms and records in

accordance with instructions given in TM 38-750.

b. *Report of Packaging and Handling Deficiencies (DP Form 6)*. Fill out and forward DD Form 6 as prescribed in AR 700-58 (Army), NAVSUP Pub 378 (Navy), AFR 71-41 (Air Force), and MCO P4030.29 (Marine Corps).

c. *Discrepancy in Shipment Report*. Fill out and forward Discrepancy in Shipment Report (SF 361) as prescribed in AR 55-38 (Army), NAV SUPINST 4610.33 (Navy), AFM 75-18 (Air Force), and MCO P4610.19A (Marine Corps).

d. *Reporting of Equipment Publication Improvements*. The reporting of errors, omissions, and recommendations for improving this publication by the individual user is encouraged. Reports should be submitted on DA Form 2028 (Recommended Changes to Publications) and forwarded direct to: Commander, US Army Missile Command, ATTN: AMSMI-MFM, Redstone Arsenal, AL 35809.

SECTION 1

GENERAL INFORMATION

SYSTEM CONSIDERATIONS

The Model 243C Microwave Oscillator Synchronizer provides an economical and versatile method for phase locking a voltage-tunable microwave source to a frequency which is related to harmonics of a tunable-crystal reference. Klystrons, backward-wave oscillators, (BWO), voltage-tunable magnetrons (VTM's and other voltage-tunable microwave sources may thus be provided with stability associated with crystals.

The ability to handle the higher helix current and a positive means for selecting each desired lock point is a requisite for phase locking BWO tubes in addition to Klystrons. The Model 243C has a 25 ma. current-carrying capability and a variable lock range control. By being able to vary the lock range, the operator may either disable the phase lock loop or open up the lock range enough to phase lock to the correct harmonic.

Klystrons and BWO tubes also differ in modulation sensitivity. The BWO tube has a much higher MHz per volt rating. For example, a 4 MHz/volt tube and a 40 volt lock range results in a 160 MHz frequency range. With lock points at every 50 MHz there is a probability that the wrong line may be captured unless a narrower lock range is used. However, a wide lock range is

desirable in order to compensate for drift due to wide temperature variations. With the Model 243C, the operator may narrow the lock range, center about the desired lock point, capture the line, and then expand the lock range without unlocking. This gives the maximum correction capability without sacrificing frequency resolution.

With the crystal and oven provided in the Model 243C Synchronizer, long term stability is held to 1 part in 10^7 per 1/2 hour. The phase sensitive discriminator, high gain amplifier and optimized band-width gives a high degree of FM noise reduction about the carrier.

A nine position phase lag network allows for optimum noise reduction by optimizing loop stability. An external reference (1 or 5 MHz) may be substituted for the crystal reference, in which case locking will be achieved at discrete fixed frequencies.

This manual provides a description and instructions for installation, operation and maintenance of the Model 243C.

The Microwave Oscillator Synchronizer Model 243C is illustrated in Figure 1-1.