

TECHNICAL MANUAL

OPERATOR AND ORGANIZATIONAL MAINTENANCE MANUAL

FOR

COUNTER, ELECTRONIC,

DIGITAL READOUT

AN/USM-257A

(NSN 6625-00-935-14571

HEADQUARTERS, DEPARTMENT OF THE ARMY

MAY 1977

**OPERATOR AND ORGANIZATIONAL MAINTENANCE MANUAL
 FOR
 COUNTER, ELECTRONIC, DIGITAL READOUT
 AN/USM-257A
 (NSN 6625-00-935-1457)**

REPORTING OF ERRORS

You can improve this manual by recommending improvements using DA Form 2028-2 (Test) located in the back of the manual. Simply tear out the self addressed form, fill it out as shown on the sample, fold it where shown, and drop it in the mail.

If there are no blank DA Forms 2028-2 (Test) in the back of your manual, use the standard DA Form 2028 (Recommended Changes to Publications and Blank Forms) and forward to the Commander, US Army Electronics Command, ATTN: DRSEL-MA-Q, Fort Monmouth, New Jersey 07703.

In either case a reply will be furnished directly to you.

TABLE OF CONTENTS

	Paragraph	Page
CHAPTER 1. INTRODUCTION		
Section I. General		
Scope	1-1	1-1
Indexes of publications	1-2	1-1
Forms and records	1-3	1-1
Administrative storage	1-4	1-1
Destruction of Army electronics materiel	1-5	1-1
Reporting equipment improvement recommendations (EIR)	1-6	1-1
II. Description and data		
Purpose and use	1-7	1-1
Description	1-8	1-2
Tabulated data	1-9	1-2
Items comprising an operable equipment	1-10	1-4
CHAPTER 2. SERVICE UPON RECEIPT AND INSTALLATION		
Initial inspection	2-1	2-1
Installation	2-2	2-1
Power requirements	2-3	2-1
CHAPTER 3. OPERATING INSTRUCTIONS		
Section I. Controls, indicators, and connectors		
Operator controls	3-1	3-1
Preliminary adjustments	3-2	3-1
II. Operation under usual conditions		
Preliminary starting procedures	3-3	3-4
Initial adjustments	3-4	3-4
Operating procedures	3-5	3-5
Accuracy of measurements	3-6	3-6
Measurement procedures	3-7	3-10
Extended frequency range measurements with Converter, Frequency, Electronic CV-23501U	3-8	3-12
Time interval measurements with Converter, Frequency, Electronic CV-23491U	3-9	3-15
Section III. Operation under unusual conditions		
Operation in arctic climates	3-10	3-22
Operation in desert climates	3-11	3-22
Operation in tropical climates	3-12	3-22
CHAPTER 4. OPERATOR'S AND ORGANIZATIONAL MAINTENANCE INSTRUCTIONS		
Section I. Tools and equipment		
Special tools and test equipment	4-1	4-1
Materials required	4-2	4-1
II. Preventive maintenance checks and services		
General	4-3	4-1

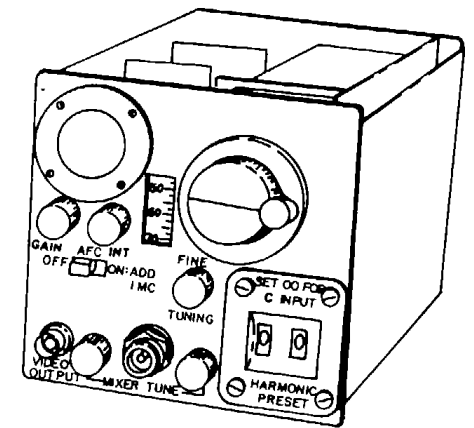
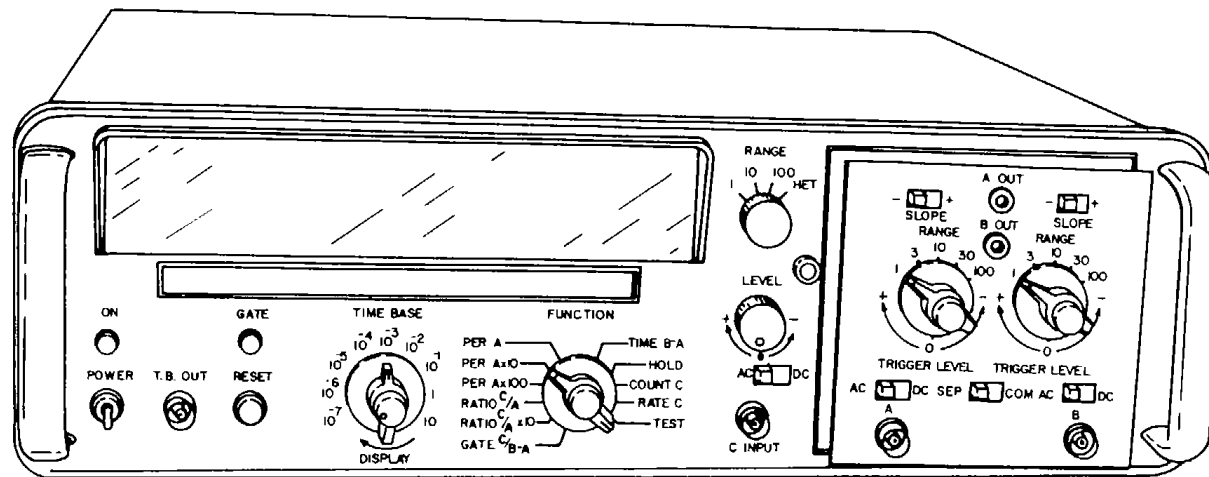
	Paragraph	Page
Defects	4-4	4-1
Operational checks	4-5	4-1
III. Troubleshooting		
Visual inspection	4-6	4-2
Troubleshooting procedure	4-7	4-2
IV. Maintenance		
Cleaning	4-8	4-3
Touchup painting instructions	4-9	4-3
Replacement of fuses	4-10	4-3
Replacement of indicator lamps	4-11	4-3
Repair of defective cables and cords	4-12	4-3
APPENDIX A. REFERENCES	A-1	
B. BASIC ISSUES ITEMS LIST (BILL) AND ITEMS TROOP INSTALLED OR AUTHORIZED LIST (ITAL) (Not applicable)		
C. MAINTENANCE ALLOCATION		
Section I. INTRODUCTION		C-1
II. Maintenance allocation chart		C-3

LIST OF ILLUSTRATIONS

<i>Figure</i>	<i>Title</i>	<i>Page</i>
1-1	Counter, Electronic, Digital Readout AN/USM-257A	1-0
3-1(1)	Controls and indicators, Counter, Electronic, Digital Readout TD-875A(P)/U, front panel (Sheet 1 of 2)	3-1
3-1(2)	Controls and indicators, Counter, Electronic Digital Readout TD-875A(P)/U, rear panel (Sheet 2 of 2)	3-1
3-2	Controls and indicators, Converter, Frequency Electronic CV-2349/U	3-2
3-3	Controls and indicators, Converter, Frequency, Electronic CV-2350/U	3-2
3-4	Gating ambiguity	3-5
3-5	Trigger level	3-6
3-6	Effect of signal shape on triggering	3-7
3-7	Accuracy of period versus rate measurements	3-8
3-8	How noise produces triggering error	3-9
3-9	Typical sensitivity versus frequency curve	3-10
3-10	Typical 1:1 Lissajous pattern.....	3-13
3-11	CW zero beat display	3-15
3-12	Zero beat positioning	3-16
3-13	Typical zero beat patterns near fm zero beat	3-16
3-14	Typical pattern near rf zero beat	3-17
3-15	Typical pattern at rf zero beat	3-17
3-16	Converter, Frequency, Electronic CV- "49/U connected for setting triggering point	3-18
3-17	Triggering at positive peak of sine wa	3-18
3-18	Triggering adjusted to occur at positive-going zero cross-over	3-19
3-19	Time interval measurements	3-19
3-20	Frequency ratio measurements	3-20
3-21	GATE C/B-A function	3-21

LIST OF TABLES

<i>Number</i>	<i>Title</i>	<i>Page</i>
1-1	Items Comprising an Operable Counter, Electronic, Digital Readout AN/USM-257A	1-4
3-1	Operator Controls and Indicators for Counter, Electronic, Digital Readout TD-875A(P)/U	3-2
3-2	Operator Controls and Indicators for Converter, Frequency, Electronic CV-2349/U	3-3
3-3	Operator Controls and Indicators for Converter, Frequency, Electronic CV-2350/U	3-4
3-4	Voltage Input and Output levels	3-4
3-5	Test Function - Correct Indications	3-5
3-6	Effect of Signal Shape on Triggering	3-8
3-7	Time Base Resolution	3-10
3-8	f_2/f_1 Ratio Display	3-11
4-1	Operator's Daily Preventive Maintenance Checks and Services	4-1
4-2	Operator's Weekly Preventive Maintenance Checks and Services	4-2
4-3	Organizational Preventive Maintenance Checks and Services	4-2
4-4	Troubleshooting	4-2



EL2DN001

Figure 1-1. Counter, Electronic, Digital Readout AN/USM-257A.

CHAPTER 1 INTRODUCTION

Section I. GENERAL

1-1. Scope

This manual describes Counter, Electronic, Digital Readout AN/USM-257A (fig. 1-1) and provides instructions for operation, applications, and organizational maintenance. Throughout this manual Counter, Electronic, Digital Readout AN/USM-257A will be referred to as the AN/USM-257A. References to components of the AN/USM-257A, will be as follows: Counter, Electronic, Digital Readout TD-875A(P)/U will be referred to as the TD-875A(P)/U; Converter, Frequency, Electronic CV-2349/U will be referred to as the CV-23491U; and Converter, Frequency, Electronic CV-2350/U will be referred to as the CV-23501U.

1-2. Indexes of publications

a. *DA Pam 310-4*. Refer to latest issue of DA Pam 310-4 to determine whether there are 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's) pertaining to the equipment.

1-3. Forms and Records

a. *Reports of Maintenance of Unsatisfactory Equipment*. Maintenance forms, records, and reports which are to be used by maintenance personnel at all levels are listed in and prescribed by TM 38-750.

1-7. Purpose and Use

a. The AN/USM-257A is an all-solid state instrument capable of direct frequency measurements (with the CV-2350/U) up to 15 GHz, and period measurements (utilizing the CV-2349/U) with 0.1 micro-second resolution. The basic modes of measurement with either converter installed include: Rate (frequency), count (totalizing), and ratio. Eight digit in-line indicators display the measured quantity with annunciation of unit and autopositioned decimal point.

b. Accuracy of measurement is ± 1 count \pm time base stability. The interval oscillator signal frequency is

b. *Report of Packaging and Handling Deficiencies*. (ment Report) as prescribed in AR 700-581 NAVSUPINST 4030.29/AFR 71-13/MCO P4030.29A, and DSAR 4145.8.

c. *Discrepancy in Shipment Report (DISREP) (SF361)*. Fill out and forward Discrepancy in Shipment Report (DISREP) (SF361) as prescribed in AR 55-38/NAVSUPINST 4610.33A/AFR 75-18/MCO P4610-19B, and DSAR 4500.15.

1-4. Administrative Storage

For procedures, forms, records, and inspections required during administrative storage of this equipment, refer to TM 740-90-1.

1-5. Destruction of Army Electronics Materiel

Demolition and destruction of Army electronics materiel to prevent enemy use shall be in accordance with TM 750-244-2.

1-6. Reporting Equipment Improvement Recommendations (EIF)

EIR's will be prepared using DA Form 2407, Maintenance Request. Instructions for preparing EIR's are provided in TM 38-750, The Army Maintenance Management System. EIR's should be mailed directly to Commander, US Army Electronics Command, ATTN: DRSEL-MA-Q, Fort Monmouth, New Jersey 07703. A reply will be furnished directly to you.

Section II. DESCRIPTION AND DATA

also available as an output, either as the fundamental (1 MHz) or scaled ($1 \text{ MHz}/10^4$). Increased stability may be obtained by using an external standard (which may be connected to the instrument by a jack on the rear panel).

c. The AN/USM-257A can be employed for measurement, analysis, and counting of both periodic and random signal pulses of arbitrary waveshape within the rated frequency characteristics of the instrument. It is commonly used for calibration of transmitting and receiving equipment, oscillators, tuned circuits, crystals, etc. Because of its accuracy and stability, it can also be