

TECHNICAL MANUAL

**GENERAL SUPPORT
MAINTENANCE MANUAL**

STROBOSCOPES

**TS-805B/U (NSN 6625-00-752-7992),
TS-805C/U (NSN 6625-00-752-7992), AND
TS-805D/U (NSN 6625-00-196-2858)**

TECHNICAL MANUAL

NO. 11-6625-396-40

HEADQUARTERS
DEPARTMENT OF THE ARMY
WASHINGTON, DC 27 July 1977

**GENERAL SUPPORT MAINTENANCE MANUAL
STROBOSCOPES TS-805B/U (NSN 6625-00-752-7992),
TS-805C/U (NSN 6625-00-752-7992),
TS-805D/U (NSN 6625-00-196-2858,
AND TS-805E/U (NSN 6625-01-155-4538)**

REPORTING ERRORS AND RECOMMENDING IMPROVEMENTS

You can help improve this manual. If you find any mistakes or if you know a better way to improve the procedures, please let me know. Mail your letter, DA Form 2028 (Recommended Changes to Publications and Blank Forms), or DA Form 2080-2 located in the back of this manual direct to: Commander, US Army Communications-Electronics Command and Fort Monmouth, ATTN: DRSEL-ME-MP, Fort Monmouth, New Jersey 07703-5007.

In either case, a reply will be furnished direct to you.

Paragraph Page

CHAPTER 1.	INTRODUCTION		
Section I.	General		
	Scope	1-1	1-1
	Consolidated Index of Army Publications and Blank Forms.	1-2	1-1
	Reporting equipment improvement recommendations (EIR)	1-3	1-1
	Administrative storage	1-4	1-1
	Destruction of Army electronics material.	1-5	1-1
II.	Description and data		
	Description	1-6	1-1
	Tabulated data	1-7	1-1
CHAPTER 2.	FUNCTIONING OF EQUIPMENT		
	General	2-1	2-1
	TS-805B/U block diagram description	2-2	2-1
	TS-805C/U block diagram description	2-3	2-1
	TS-805D/U block diagram description.	2-4	2-3
	TS-805B/U multivibrator circuit description.	2-5	2-4
	TS-805C/U multivibrator circuit description.	2-6	2-7
	TS-805D/U multivibrator circuit description.	2-7	2-8
	TS-805B/U flasher circuit description	2-8	2-10
	TS-805C/U flasher circuit description	2-9	2-13
	TS-805D/U flasher circuit description	2-10	2-15
	TS-805B/U reed circuit description.	2-11	2-17
	TS-805C/U reed circuit description.	2-12	2-17
	TS-805D/U reed circuit description.	2-13	2-19
	TS-805B/U power supply circuit description.	2-14	2-19
	TS-805C/U power supply circuit description.	2-15	2-21
	TS-805D/U power supply circuit description	2-16	2-21

I This manual supersedes TM 11-6625-396-35, 3 May 62

Change 1 i

		Paragraph	P a g e
CHAPTER 3.	GENERAL SUPPORT MAINTENANCE		
Section I.	General		
	Scope of maintenance	3-1	3-1
	Voltage and resistance measurements	3-2	3-1
	Continuity test	3-3	3-1
	Dc resistance of transformers and coils	3-4	3-1
	Bench testing	3-5	3-4
II.	Tools and equipment		
	Test equipment	3-6	3-5
	Special tools and equipment	3-7	3-5
III.	Troubleshooting		
	General	3-8	3-9
	Troubleshooting procedures.. . . .	3-9	3-9
IV.	Stroboscope maintenance		
	General support maintenance techniques	3-10	3-12
	Tube testing	3-11	3-12
	Replacement of flasher tube	3-12	3-13
	TS-805B/U dial lamp replacement	3-13	3-14
	TS-805C/U dial lamp replacement	3-14	3-15
	TS-805D/U dial lamp replacement	3-15	3-16
	Reflector assembly replacement.. . . .	3-16	3-17
	Reed assembly replacement,	3-17	3-18
	TS-805B/U dial-scale control assembly replacement.	3-18	3-19
	TS-805C/U dial-scale control assembly replacement.	3-19	3-20
	TS-805D/U dial-scale control assembly replacement.	3-20	3-22
	TS-805B/U and TS4305D/U switch S101 replacement.	3-21	3-23
	TS-805C/U switch S103 replamment	3-22	3-24
	TS-805B/U and TS-805D/U replacement of adjustment controls R109and R111	3-23	3-27
	TS-805C/U replacement of adjustment controls R113 and R109	3-24	3-27
	TS-805C/U backlash adjustment of dial-scale control.	3-25	3-29
	TS-805D/U backlash adjustment of dial-scale control.	3-26	3-30
V.	General Support testing procedures		
	General	3-27	3-31
	Test equipment, tools, and materials.	3-28	3-31
	Fabrication of test leads	3-29	3-31
	Physical tests and inspections	3-30	3-31
	TS-805B/U frequency test	3-31	3-32
	TS-805C/U frequency test	3-32	3-32
	TS-805D/U frequency test	3-33	3-35
CHAPTER 4.	FUNCTIONING OF STROBOSCOPE TS-805E/U		
	General	4-1	4-1
	TS-805E/U block diagram description	4-2	4-1
	Variable frequency generator description	4-3	4-2
	Flasher circuit description	4-4	4-3
	Frequency counter circuit description	4-5	4-4
	Line frequency calibration circuit.. . . .	4-6	4-5
	Power supply circuit	4-7	4-6
CHAPTER 5.	GENERAL SUPPORT MAINTENANCE STROBOSCOPE TS-805E/U		
Section I.	General		
	Scope of maintenance	5-1	5-1
	Voltage and resistance measurements	5-2	5-1
II.	Tools and equipment		
	Tools and test equipment	5-3	5-1
	Special tools and test equipment	5-4	5-1
III.	Troubleshooting		
	General	5-5	5-1
	Troubleshooting procedures	5-6	5-1
	Voltage measurements for active devices	5-7	5-4
	Test point and resistance measurements.	5-8	5-5
	Terminal to terminal voltage and resistance measurements.	5-9	5-7
	Typical waveform measurements.. . . .	5-10	5-8

	Paragraph	Page
IV. Stroboscope maintenance		
General Support maintenance techniques.	5-11	5-10
Replacement of printed wiring board assembly A1.	5-12	5-10
Replacement of printed wiring board assembly A2.	5-13	5-10
Replacement outrigger module assembly A3.	5-14	5-11
Replacement of flashtube V1	5-15	5-14
Alignment of rate adjust trimmer A2R17.	5-16	5-14
V. General Support testing procedures		
General	5-17	5-15
Test equipment, tools and materials.	5-18	5-15
Physical tests and inspections	5-19	5-15
TS-805E/U frequency test	5-20	5-16

LIST OF ILLUSTRATIONS

Figure	Title	Page
2-1	TS-805E/U block diagram	2-2
2-2	TS-805C/U block diagram	2-3
2-3	TS-805D/U block diagram	2-4
2-4	TS-805B/U multivibrator V101, schematic diagram	2-6
2-5	TS-805C/U multivibrator V103, schematic diagram	2-9
2-6	TS-805D/U multivibrator V101, schematic diagram	2-11
2-7	TS-805B/U flasher circuit, schematic diagram	2-14
2-8	TS-805C/U flasher circuit, schematic diagram	2-16
2-9	TS-805D/U flasher circuit, schematic diagram	2-17
2-10	TS-805B/U power supply and reed circuit, schematic diagram.	2-18
2-11	TS-805C/U power supply and reed circuit, schematic diagram	2-19
2-12	TS-805D/U power supply and reed circuit, schematic diagram.	2-20
3-1	TS-805B/U tube socket and resistance diagram	3-2
3-2	TS-805B/U front resistor board voltage and resistance diagram.	3-3
3-3	TS-805B/U rear resistor board voltage and resistance diagram	3-4
3-4	TS-805C/U tube socket voltage and resistance diagram	3-5
3-5	TS-805C/U terminal board voltage and resistance diagram	3-6
3-6	TS-805D/U tube socket and resistance diagram.	3-7
3-7	TS-805D/U terminal board and resistance diagram	3-8
3-8	TS-805B/U and TS-805D/U stroboscope front view	3-13
3-9	TS-805C/U stroboscope front view.	3-14
3-10	TS-805B/U stroboscope rear view.	3-15
3-11	TS-805C/U stroboscope rear view.	3-16
3-12	TS-805B/U stroboscope top view.	3-17
3-13	TS-805C/U stroboscope top view.	3-18
3-14	TS-805D/U stroboscope top view.	3-19
3-15	TS-805E/U stroboscope front-panel and chassis assembly	3-20
3-16	TS-805C/U stroboscope, front-panel and chassis assembly	3-21
3-17	TS-805D/U stroboscope front-panel and chassis assembly	3-22
3-18	TS-805B/U stroboscope side view.	3-23
3-19	TS-805C/U stroboscope side view.	3-24
3-20	TS-805D/U stroboscope side view.	3-25
3-21	TS-805B/U dial scale control disassembled.	3-26
3-22	TS-805B/U stroboscope bottom view	3-27
3-23	TS-805C/U stroboscope bottom view	3-28
3-24	TS-805D/U stroboscope bottom view	3-29
3-25	TS-805C/U and TS-805D/U dial-scale control disassembled.	3-30
3-26	TS-805B/U stroboscope frequency test connection diagram.	3-33
3-27	TS-805C/U stroboscope frequency test connection diagram.	3-34
3-28	TS-805D/U stroboscope frequency test connection diagram	3-36
4-1	TS-805E/U block diagram	42
5-1	Active device terminal designation.	5-5
5-2	Printing wiring board assembly A1, parts location	5-6

LIST OF ILLUSTRATIONS (Cent'd)

Figure	Title	Page
5-3	Printed wiring board assembly A2, parts location.	5-7
5-4	Typical waveforms (sheet 1 of 2).....	5-8
5-4	Typical waveforms (sheet 2 of 2)	5-9
5-5	Stroboscope rear view	5-11
5-6	Stroboscope interior view from rear	5-12
5-7	Stroboscope interior view from front	5-13
I 5-8	Stroboscope frequency test connection diagram	5-17
FO-1	TS-805B/U stroboscope, schematic diagram	(Locate in rear of manual)
FO-2	TS-805C/U stroboscope, schematic diagram	(Locate in rear of manual)
FO-3	TS-805D/U stroboscope, schematic diagram	(Locate in rear of manual)
1 FO-4	TS-805E/U stroboscope, schematic diagram	(Locate in rear of manual)

CHAPTER 1

INTRODUCTION

Section 1. GENERAL

I-I. Scope

a. This technical manual describes stroboscopes TS-805B/U, TS-805C/U, TS-805D/U, and TS-805E/U and covers their general support maintenance.

b. Throughout this manual, the word stroboscope refers to all models of the equipment.

c. Appendix A contains references.

1-2. Consolidated Index of Army Publications and Blank Forms.

Refer to the latest issue of DA PAM 310-1 to determine whether there are new editions, changes, or additional publications pertaining to the equipment.

NOTE

Refer to TM 11-6625-396-12 for applicable forms and records.

1-3. Reporting Equipment Improvement Recommendations (EIR).

If your stroboscope needs improvement, let us know. Send us an EIR. You, the user, are the only one who can tell us what you don't like about your equipment. Let us know why you don't like the design. Put it on an SF 368 (Quality Deficiency Report). Mail it to Commander, US Army Communications-Electronics Command and Fort Monmouth, ATTN: DRSEL-ME-MP, Fort Monmouth, New Jersey 07703-5007. We'll send you a reply.

1-4. Administrative Storage

Administrative storage of equipment issued to and used by Army activities shall be in accordance with TM-740-90-1.

1-5. Destruction of Army Electronics Materiel.

Destruction of Army electronics materiel to prevent enemy use shall be under direction of the commander and in accordance with TM 750-244-2.

Section II. DESCRIPTION AND DATA

1-6. Description

Refer to TM 11-6625-396-12 for the description of the stroboscope.

1-7. Tabulated Data

Refer to TM 11-6625-396-12 for the technical characteristics of the stroboscope.

CHAPTER 2

FUNCTIONING OF EQUIPMENT

2-1. General

Functional circuit descriptions are provided in this chapter for the TS-805B/U, TS-805C/U, and TS-805D/U stroboscopes.

2-2. TS-805B/U Block Diagram Description (fig. 2-1)

The stroboscope is a portable electronic tachometer that provides a rapid and accurate means of directly measuring the speed of rotating or oscillating equipment without mechanical contact with the device being measured. The stroboscope consists of a multivibrator, a control circuit, a flasher circuit, and a power supply circuit. A reed circuit is provided for calibration.

a. Multivibrator. The multivibrator produces a square-wave output, the frequency of which can be varied over a wide range by the dial scale control and the control circuit. The selected multivibrator output frequency is used to drive the flasher circuit.

b. Flasher. The flasher circuit consists of a pulse shaper, a blocking oscillator, and a flash tube. This tube flashes at a rate determined by the multivibrator output frequency with the flashing light directed at the rotating device to be measured. The rotational speed of the device can be determined by operation of the dial scale control to vary the frequency output of the multivibrator, which in turn, varies the flashing rate of the flasher circuit. When the flashing rate of the flasher circuit is in coincidence with the rotational speed of the device being measured, the device appears to be stationary; then by observing the reading on the calibrated dial scale, the exact rotational speed of the device can be read directly. If additional light is required to view the device being measured, an external high-intensity flasher lamp can be connected to the flasher circuit.

c. Control Circuit. The control circuit consists of switches S101 and S104 and extends the facilities of the stroboscope. Switches S101 and S104 permit selection of various frequency ranges and also provide the means for converting the multivibrator to a two-stage amplifier so that an external contractor circuit can be used to control the flasher circuit. By use of an external contactor (which is attached to the rotating device), the flashing rate of the flash tube is automati-

cally synchronized with the speed of the rotating device.

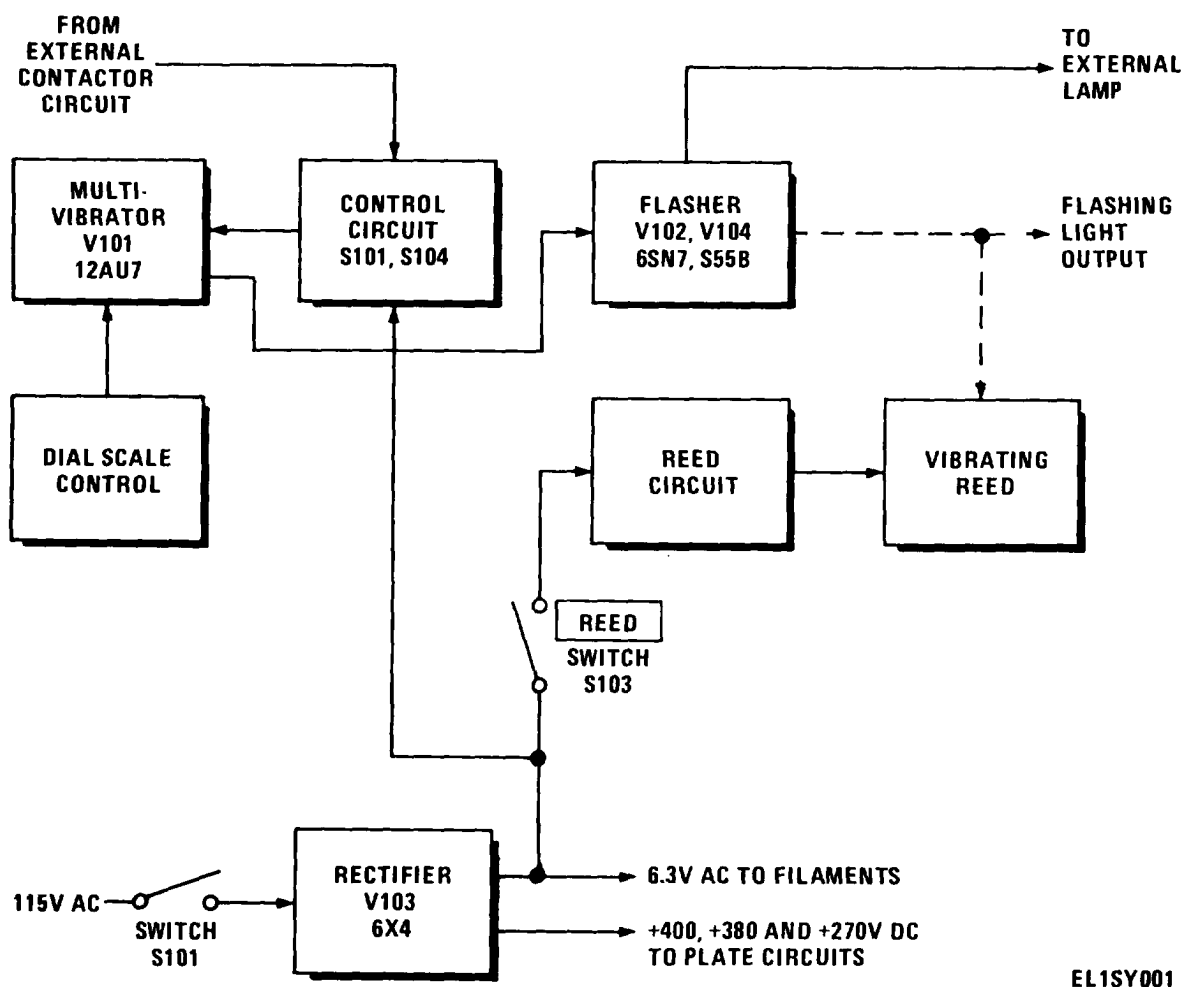
d. Reed Circuit. The reed circuit permits calibration of the multivibrator frequency by use of the 60-Hz power source frequency as the reference. Such calibration compensates for minor drifts in the multivibrator frequency caused by aging of components or power source voltage variations. The reed circuit consists of a coil-operated reed. The reed is located near the light path of the flash tube. When the reed coil is energized by turning on switch S103, the reed vibrates 120 times per second (7,200 vibrations per minute). When the flash tube flashing rate corresponds to the vibrating rate of the reed (or to multiple or submultiple of it), the reed appears to be stationary. If the dial scale reading is 7,200 rpm (or a multiple or submultiple of 7,200) it can be assumed that the stroboscope is properly calibrated. If the dial scale reading is in error by more than one percent, the stroboscope requires calibration. By use of the multiples or submultiple of the reed vibrating rate, the complete dial scale range can be checked at these various points for accuracy and, in turn, calibrated if necessary.

e. Power Supply. The power supply provides the required potentials for operating the stroboscope. Positive potentials of 410 volts, 400 volts and 270 volts are provided for the flash tube and the tube plates; a low magnitude alternating current (ac) potential of 6.3 volts is provided for the tube heaters, the reed coil, and for driving the flasher at the 60-Hz power line frequency (selector switch in LINE position).

2-3. TS-805C/U Block Diagram Description (fig. 2-2)

The stroboscope is a portable electronic tachometer that provides a rapid and accurate means of directly measuring the speed of rotating or oscillating equipment without mechanical contact with the device being measured. The stroboscope consists of a multivibrator, a control circuit, a flasher, and a power supply circuit. A reed circuit is provided for calibration.

a. Multivibrator. The multivibrator produces a square-wave output, the frequency of which can be varied over a wide range by the dial scale control and the control circuit. The selected multivibrator output frequency is used to drive the flasher circuit through



EL1SY001

Figure 2-1. TS-805B/U Block Diagram.

the control circuit.

b. Flasher. The flasher circuit consists of a flasher tube and associated circuit parts. This tube flashes at a rate determined by the multivibrator output frequency with the flashing light directed at the rotating device to be measured. The rotational speed of the device can be determined by operation of the dial scale control to vary the frequency output of the multivibrator, which in turn, varies the flashing rate of the flasher tube. When the flashing rate of the flasher tube is in coincidence with the rotational speed of the device being measured, the device will appear to be stationary; then, by observation of the reading on the calibrated scale associated with the dial scale control, the exact rotational speed of the device can be read directly. If the flashing rate of the flasher tube is so low that it prevents enough light output to occur, an external high-intensity flasher lamp can be connected to the flasher circuit.

c. Control Circuit. The control circuit consists of switches S103 and S104 and extends the facilities of the stroboscope. Switches S103 and S104 permit selec-

tion of various frequency ranges and also provide the means for disconnection of the multivibrator from the stroboscope circuit so that in external contactor can be used to energize the flasher tube. By use of an external contactor (which is attached to the rotating device), the flashing rate of the flasher tube can be synchronized with that of the rotating device.

d. Reed Circuit. The reed circuit permits calibration of the multivibrator frequency by use of the 60-cycle-per-second (Hz) power source frequency as the reference. Such calibration compensates for minor drifts in the multivibrator frequency caused by aging of components or power source voltage variations. The reed circuit consists of a coil-operated reed. The reed is located near the light path of the flasher tube. When the reed coil is energized by turning S102 to the on position, the reed vibrates. When the flasher tube flashing rate corresponds to the vibrating rate of the reed (or to a multiple or submultiple of it), the reed appears to be stationary. The source voltage frequency is 60 Hz; therefore, the reed vibrates 120 times a second (two alternations for each cycle) or 7,200 times a minute. If