DEPARTMENT OF THE ARMY TECHNICAL BULLETIN

INSPECTION REQUIREMENTS FOR REPAIRED ELECTRICAL INDICATING INSTRUMENTS

Headquarters, Department of the Army, Washington, D.C.
8 November 1965

1. Purpose and Scope. *a. Purpose.* This bulletin outlines the procedures and requirements for inspecting repaired electrical indicating instruments.

b. Scope. The instruments covered in this bulletin are primarily panel meters normally mounted in operating and test equipments.

2. Index of Publications. Refer to the latest issue of DA Pam 310-4 to determine whether there are new editions, changes, or additional publications pertaining to this equipment. DA Pam 310-4 is an index of current technical manuals, technical bulletins, supply manuals (types 7, 8, ad 9), supply bulletins, lubrication orders, and modification work orders.

3. Reporting of Equipment Manual Improvements. The direct reporting by the individual user of errors, omissions, and recommendations for improving this bulletin is authorized and encouraged. DA Form 2028 (Recommended Changes to DA Publications) will be used for reporting these improvement recommendations. This form will be completed using pencil, pen, or typewriter and forwarded direct to Commanding General, U.S. Army Electronics Command, ATTN: AMSEL-MR-(NMP)-MA, Fort Monmouth, NJ., 07703.

4. Test and Associated Equipment. The following equipments or suitable equivalents of known accuracy will be employed in determining compliance with the requirements of this bulletin.

a. Test Equipment.

Equipment	Block number	Number used
Audio Oscillator TS-382/U	6625-192-5094	1
Frequency Meter AN/TSM-16	6625-542-1666	1
Meter Test Set TS-682A/GSM-1	6625-669-0747	1

b. Associated Equipment.

Equipment	Block number	Number used
Amplifier, Audio Frequency AM-424A/PFP-1	5835-224-6192	1
Transformer	5950-250-1740	1

5. Requirements. *a. General Test Conditions.* Meters will be checked at normal room temperature.

*This bulletin supersedes REP-85, Issue No. 4, 24 May 1954, including Amendment No. 1, 26 August 1957.

b. Visual and Mechanical Requirements.

(1) *Windows.* The window should not be loose, cracked, or scratched to the extent that visibility is impaired.

(2) *Zero corrector.*

(*a*) The action of the mechanical zero corrector should provide a range of adjustment above and below the zero point of not less than plus or minus 2 percent of the total scale length.

(*b*) The zero corrector assembly should have sufficient friction to prevent it from shifting due to vibration or shock.

(3) *Cleaning.*

(*a*) Parts of the assembled instrument should show no signs of rust, corrosion, or fungus growth.

(*b*) The case should be removed and the internal parts inspected for presence of lint, metallic particles, or other foreign matter which might impair operation.

(*c*) Meters having sealed cases should be opened for inspection purposes only.

(4) *Terminals.*

(*a*) The instrument should be complete with terminal nuts, lockwashers, and mounting hardware.

(*b*) Terminal threads should not be crossed, scarred, or damaged in any way.

(*c*) Solder lug terminals should be cleaned of excess solder and eyes in terminals should be open,

(5) *Dials.* The dial should not be discolored or damaged to the extent readability is impaired. All calibration markings should be legible.

(6) *Case and base.* The case and base should not be bent, dented, or cracked.

(7) *Brush contact.* Instruments having a brush contact bonding the metallic bezel ring to other parts should be inspected to insure proper contact of the brush with the bezel ring.

(8) *Appearance and finish.* The external appearance of a repaired instrument should compare favorably with a new instrument. Touching up of finish is permitted.

(9) *Balance.* The pointer should be set to zero. With the meter held in such a position that the dial is vertical to the ground plane, the meter should be rotated 360° by making 4 successive turns of 90° each. The pointer should not deflect more than 1° from zero for portable instruments, 2° for 4 1/2-inch and larger switchboard instruments, nor more than 2 percent of he total scale length for 2 1/2- and 3 1/2-inch instruments.

(10) *Friction.* The zero corrector should be turned until the pointer hits the stop below zero. The direction of turning should be reversed until the pointer barely leaves the stop. The pointer should not come to rest above zero with the zero corrector in this position.

(11) *Sealed and ruggedized meters.* The following requirements should be applicable to repaired, sealed, ad ruggedized meters:

(*a*) After installing the movement in its case, the unit should be thoroughly dehydrated at a temperature of approximately 65° C. for not less than 4 hours.

(*b*) The meters will be sealed after repair at existing temperature and humidity conditions immediately after the dehydrating cycle.

c. Electrical Requirements.

(1) *Friction.* Following the calibration, untapped readings should be taken on both ascending and descending scale to observe and determine the change in indication due to friction.

(2) *Position.* Instruments should be tested in the position in when they are normally used.

(3) *Calibration points.* Instruments having either uniform or nonuniform scale calibration, except frequency meters and decibel meters, should be checked at three points; preferably, one point in the upper portion of the scale, one point in the center portion, and one point in the lower portion. Meters without an external zero corrector should also be checked at zero.

(4) *Accuracy.* The calibrated accuracy should be within the following percentage limits of the full-scale value:

(*a*) AC & DC switchboard instruments 4 1/2 inches and larger, 1 percent.

(*b*) AC, DC, & RF switchboard instruments 2 1/2 inches and 3 1/2 inches, 2 percent.

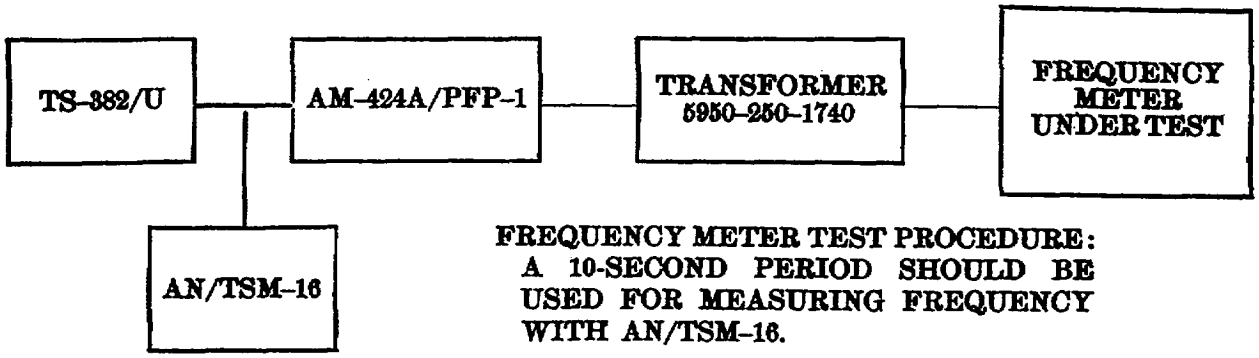
(*c*) Rectifier type instruments 2 1/2 inches and 3 1/2 inches, 5 percent.

(*d*) Sealed, ruggedized switchboard instruments 2 1/2, 3 1/2, and 4 1/2 inches, without external zero corrector, 2 percent, including zero check.

(5) *Frequency meters.*

(*a*) The basic indicating meter in a frequency meter test set should be tested for full-scale sensitivity only.

(*b*) Self-contained frequency meters of the 60-cycle and 400-cycle reed type should be inspected for accuracy at the normal indicated frequency (nominal design frequency). Accuracy should be ±0.75 percent when checked at 77° F. ±3°. Reeds above and below normal indicated frequency should resonate progressively in sequence when the frequency is raised or lowered.



(6) *Decibel meters.*

(*a*) The basic indicating meter in a decibel meter test set should be tested for full-scale sensitivity only.

(*b*) Self-contained decibel meters should be inspected for accuracy at both end scale calibration marks and at zero decibel. Defection will be obtained by applying ac voltage of 60-cycle frequency. The voltage required should be obtained from a decibel conversion chart or by applying the following formula: $V^2 = P \times R$ in which V is the required voltage, P the zero reference power level in watts, and R the resistance in ohms across which the meter is normally used. The meter should deflect to the specified calibration mark when the required voltage within plus or minus 5 percent is applied.

REFERENCES

APPENDIX

Following is a list of references applicable to the equipment used in this bulletin:

DA Pam 310-4	Index of Technical Manuals, Technical Bulletins, Supply Manuals (types 7, 8, and 9), Supply Bulletins, Lubrication Orders, and Modification Work Orders.
TM 11-2535B	Meter Test Set TS-682A/GSM-1.
TM 11-4700	Electrical Indicating and Measuring Instruments - Repair Instructions.
TM 11-6625-218-12	Organizational Maintenance Manual: Frequency Meter AN/TSM-16.
TM 11-6625-261-12	Operator's and Organizational Maintenance Manual: Audio Oscillators TS-382A/U, TS-382B/U, TS-382D/U, TS-382E/U, and TS-382F/U.
TM 11-6625-261-35	Field and Depot Maintenance Manual: Audio Oscillators TS-382A/U, TS-382B/U, TS-382D/U, TS-382E/U, and TS-382F/U.
TM 11-6730-208-10	Operator's Manual: Projector Set AN/PFP-1.
TM 11-6730-208-20	Organizational Maintenance Manual: Projector Set AN/PFP-1.
TM 11-6730-208-35	DS, GS, and Depot Maintenance Manual: Projector Set AN/PFP-1.

By Order of the Secretary of the Army:

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Chief of Staff.

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Units organized under following TOE's (2 copies each):

11-155	11-587
11-157	11-592
11-158	11-597

NG: None.

USAR: None.

For explanation of abbreviations used, see AR 320-50.

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