AUTOTRANSFORMERS CONTINUOUSLY TAPPED TYPE MOTOR DRIVEN AND MANUAL

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1. GENERAL

1.1 Scope

1.11 This section covers requirements for manually-operated and motor-driven continuously tapped autotransformers. Information is included on the following units:

Manual	Motor-Driven
KS-5657	KS-15680
KS 15594	KS-15682
KS-15646	KS-15683
KS-15814	KS-15684
KS-15831	KS-15685
KS-15843	KS-15779

1.12 BSP Section A401.544 covers manually operated types and BSP Section A401.543 the motor-driven types.

1.2 Associated Information

1.21 For information on the motors used with these units refer to the section in this Handbook on "Motors and Motor Starters-General" if not covered herein.

1.22 Coordinate information in this section with test of the power plant in Handbook 21.

1.3 Precautions

1.31 Before working on equipment in service follow precautions in Handbook 0 in regard to cooperation with the customer, prevention of service interruptions and protection of personnel and working equipment.

1.32 Disconnect ac input to the autotransformer before working on it. If this is impossible, cover adjacent parts of opposite polarity with insulating material such as sheet fiber or R-3154 Protective Sheeting to prevent accidental contact.

1.33 Never pry the brushes away from contact with the winding or slip ring with a load on the autotransformer. This action will produce an arc when the circuit is opened and damage will result.

1.34 On those units driven by a gear motot disconnect the motor coupling before attempting to turn the rotating shaft by hand. Otherwise, damage will result to the gear train in the motor.

1.35 After cleaning contact surfaces of windings or brushes, be sure that all carbon dust or copper filings are removed and that none of this material becomes imbedded in the windings.

1.4 Inspection

1.41 Inspect each unit for physical conditions such as damaged parts and defects before operating. Report any damage or defects in accordance with the Job Clerical Handbook.

1.5 Description

1.51 These autotransformers have a circular core with a single winding on it. The winding is continuously tapped by having a part of the conductors exposed, which functions as a commutator, with a rotating brush which makes contact with any of the conductors. By this arrangement a variable voltage output is obtained. If the input voltage is connected across the whole winding the output voltage cannot exceed the input voltage; if the input voltage is connected across part of the winding, an output voltage can be obtained that is higher than the input voltage.

1.52 Some of these autotransformers have a fuse wire running over the whole winding. This fuse wire is connected in series with the input and will melt to open the input circuit in case the winding overheats.

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1.53 Certain autotransformers have two or three assemblies stacked to produce two or three-phase variable output voltages.

1.54 Motors used for autotransformer drive are generally split-phase, 115 volt with capacitors across one-phase. In case motor input voltage is 230 volts a step-down transformer will be furnished.

2. INSTALLING EQUIPMENT

2.1 Tools

2.11 Sufficient tools for installation will be found in tool kits already on the job.

2.2 Supplies

Code	Description
R-3163	Paper, Abrasive 4/0
KS-2423	Cloth, Twill Jean
KS-7470	Oil, Mineral, Medium
KS-7471	Grease, 260-300P

3. MOUNTING

3.1 The autotransformer and its associated parts shall be securely mounted. Tighten as necessary.

4. LUBRICATION

4.1 Autotransformer and drive motor bearings require no relubrication at time of installation.

4.2 Relubricate motor gear case gears and motor gear case bearings if the autotransformer has been in storage a year or more.

4.21 For these operations it will be necessary to disconnect the motor leads and remove the motor. Refer to BSP A401.544 for the relubrication procedure.

5. FREEDOM OF OPERATION

5.1 The brush assembly shall rotate without bind throughout its entire range of travel. This can be checked in normal operation of the plant.

NOTE: Do not turn the shaft by hand on an autotransformer with gear case motor drive before disconnecting the motor coupling from the shaft.

6. CONTACT SURFACES

6.1 Contact surfaces of the brush and the winding shall be clean and smooth. Gauge by eye.

6.2 If visible sparking is present, inspect the commutator or slip ring and clean or smoothe as necessary.

NOTE: Slight sparking is not objectionable

6.3 Clean surfaces by a wiping with a dry cloth. If necessary, add a few drops of KS 7860 petroleum spirits to the cleaning cloth and then wipe dry with a dry cloth. Be sure that no spirits touch the brushes.

6.4 Smoothe any rough copper surfaces with R-3163 4/0 Abrasive Paper, or 8/0 Abrasive Paper if available. Wrap the paper around a flat stick and remove the roughness, taking care to leave the surface as flat as possible. Remove brushes before this operation and blow copper dust after cleaning. If surfaces are pitted or otherwise too rough to be smoothed in this manner, replace the autotransformer.

NOTE: Rhodium plated surfaces (silvery color) must not be smoothed. If the plated surface is rough enough to cause excessive sparking replace the autotransformer.

6.5 Brush contact surfaces may be cleaned by wiping with a clean dry cloth.

7. OPERATION

7.1 The motor shall have sufficient torque to move the autotransformer from any position to any other position and operate any limit switches provided.

7.2 The motor should be replaced if it does not have the necessary torque. However, improper operation of a limit switch may be due to the limit switch, itself.

8. LIMIT SWITCHES

8.1 Motor-driven autotransformers have limit switches at each end. These are set to operate as follows:

KS-15680	As leading edge of brush reaches fifth conductor from end
KS-15682	As brush reaches tenth turn
KS-15683 and KS-15684	D or L limit switch opens 1-3 turns from end, minimum voltage between terminals 1-3 A or R limit switch opens 1-3 turns from end, maximum voltage between terminals 1-3
KS-15685	As leading edge of brush is on fifth turn from end
KS-15779	R operates five turns from end, maximum voltagebetween terminals 1-3 L operates five turns from end, minimum voltage between terminals 1-3

8.2 Setting of limit switches R and L is such that the drive motor is stopped before the brush reaches the last bar at the end of the commutator.

8.3 Adjustment of the operating point is usually provided. The switch position can be shifted in some cases or the position of the switch actuator may be shifted in other cases.

8.4 Replace all limit switches which stick, or do not operate reliably, or which appear to be worn.

9. CAM SWITCHES

9.1 The KS-15683 autotransformer has switches operated by cams. They shall be so positioned and adjusted that the switch "B" is operated when the voltage between terminals 1 and 3 is 138 to 142 volts and switch "C" is operated when the voltage between terminals 1 and 3 is 82 to 92 volts.

No arrows are shown due to extensive changes.

Vertical lines at side of paragraphs indicates requirements.

10. SHAFT LOCKNUT

10.1 Autotransformers KS-15831 and KS-15843 have locknuts provided to lock the shaft in a desired position. This shall securely lock the shaft.

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Engineer of Installation

Reason for Reissue:
(1) To list KS-15814, 15831, 15843 and 15779 Autotransformers
(2) To remove information on motor torque and brush pressures.
(3) To make general revisions.

Replaces Section 6 dated 10-6-55.