ELECTRIC RECEIVER FOR TYPE WM55 RECORDER AND TYPE WM53 INDICATOR (ASSEMBLY AND COMPONENTS)

INDEX

One to four Electric Receivers may be mounted in a Type WM55 Recorder, or Type WM53 Indicator (maximum of two indicating in WM53) Each Receiver comprises the receiving portion of one lectrical measuring or calculating circuit, and contains

(1) a wiring board assembly,
(2) an amplifier, plugged into the wiring board;
(3) a motor driven slidewire disc and cam assembly, which positions a drive arm

rive arm may be used to operate recording, indicating, integrating, and control devices

Instruction Section covers Receiver parts and accessories that are standard for most circuit

1) Receiver Case
3) Motor driven slidewire disc and cam
) Accessories

(a) Retransmitting slidewire
(b) Retransmitting movable core transformer
(c) Alarm contacts

› Cross References, page 2, for listing of Instruction Sections covering circuit variations
.vers, and the Type WM55 Recorder

WARNING

DO NOT INSTALL MAINTAIN OR OPERATE THIS EQUIPMENT WITHOUT READING UNDERSTANDING AND FOLLOWING PROPER Bailey Babcock & Wilcox INSTRUCTIONS AND MANUALS OTHERWISE INJURY OR DAMAGE MAY RESULT

CROSS REFERENCES

Instrument or Equipment	Instruction Section
Class B1 and B2 Telemeter Receivers (AC Voltage Balance Circuit)	E12 16
Class B3, B4, and B5 Flow Receivers (AC Voltage Balance Circuit)	E12 17
Class BL and BN Telemeter Receivers (AC Voltage Balance Circuit)	E12 73
Class E1 and E2 Telemeter Receivers (DC Potentiometer Circuit, Low Level)	E12 22
Class E3 and E4 Temperature Receivers (DC Potentiometer Circuit)	E51 32
Class E7 and E8 Telemeter Receivers (DC Potentiometer Circuit)	E12 24
Class EA and EB Telemeter Receivers (DC Potentiometer Circuit, Low Level)	E12-77
Class EF and EG Temperature Receivers (DC Potentiometer Circuit)	E12 78
Class G1 and G2 Smoke Density Receivers	E66 4
Class G3, G5, and G6 Gas Analysis Receivers	E65 12
Class G4 Gas Analysis Receiver (Factory Mutual Approved)	E65-13
Class G7 Temperature Receiver	E12-28
Class G8 Electric Receiver (For OD10 Gas Analyzer)	E65 4
Class G9 Temperature Receiver (For Type UR Radiation Bolometer)	E51-73
Class GC, GD, and GE Gas Analysis Receivers	E65 17
Class GF Gas Analysis Receiver	E65 18
Class GG Electric Receiver (For OD10 Gas Analyzer)	E65 14
Class GL and GN Smoke Density Receivers	E71 6
Class GR Temperature Receiver (For Type UR Radiation Bolometer)	E51 74
Class H1, H2, and H3 AC Potentiometer Receivers (Computer Functions)	E12 66
Class H4 Electric Receiver (For Magnetic Flow Meter)	E12 67
Class HA, HB, and HC Electric Receivers (Computer Functions)	E12 75
Class J1 and J2 Telemeter Receivers (AC Voltage Ratio Circuit)	E12 13
Class JL and JN Telemeter Receivers (AC Voltage Ratio Circuit)	E12-19
Class L1, L2, L3, L4, L5, and L6 Electrolytic Conductivity Receivers	E67 2
Class LA, LB, LC, LF, LG, and LH Electrolytic Conductivity Receivers	E64 1
Class QA, QB, and QC Temperature Receivers (AC Wheatstone Bridge)	E51 3
Class QN, QQ, and QW Temperature Receivers (AC Wheatstone Bridge)	E51 4
Class QD and QE Electric Receiver (AC Wheatstone Bridge)	E12 26
Class QF and QV Temperature Receiver (AC Wheatstone Bridge)	E12 76
Class TA Program Controller	E99 71
Class TB Running Time Recorder	E26-2
Class W1 and W2 Electric Retransmitter (AC Output)	E99-8
Class W5, W6, and W7 Electric Retransmitter (DC Output)	E12-6

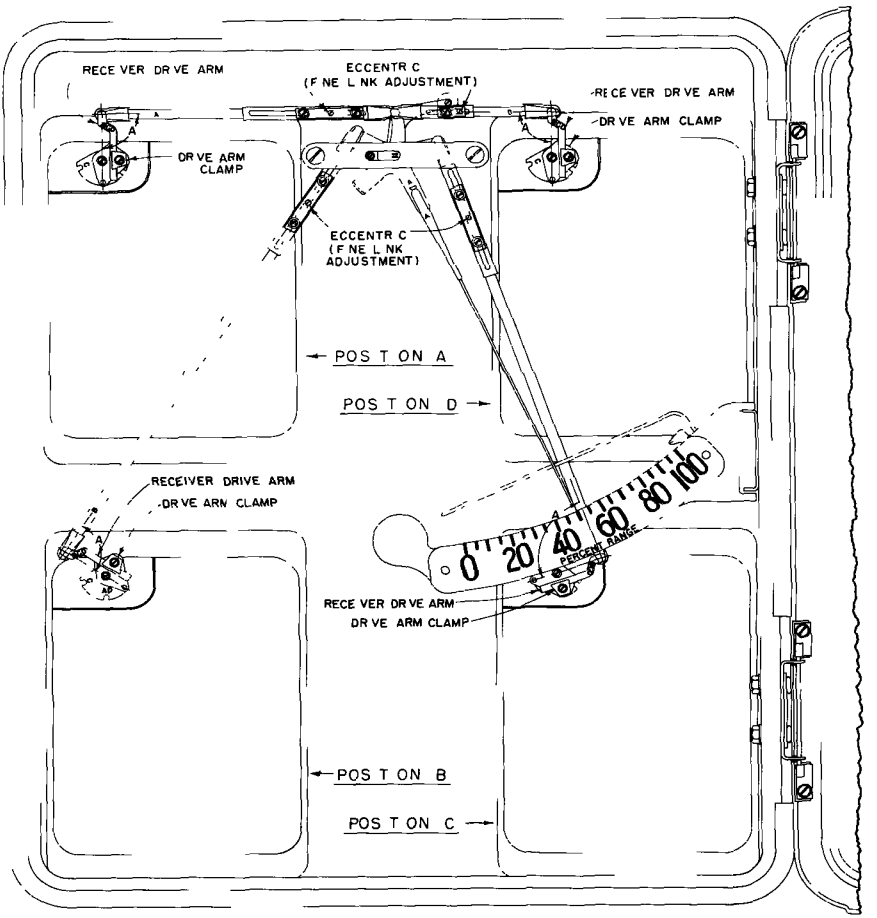


FIGURE 1 - Type WM55 Recorder with Four Electric Receivers

INSTALLATION

An Electric Receiver can be mounted in the Type WM55 Recorder in any of the four component positions A, B, C, or D as shown in Figure 1. In a Type WM53 Indicator, indicating Receivers can be mounted in positions A and B, Integrators or retransmitting auxiliaries in C and D Each unit is secured to the rear of the Recorder by four captive mounting screws, which are accessible when the amplifier cover is removed. These screws are shown in Figure 3.

An adjustable link transmits the motion of the Receiver drive arm to its corresponding pen yoke The Receiver requires a different link for each Recorder Case position Each link is stamped with the letter of the position for which it is intended

The method for connecting and disconnecting adjustable links is illustrated under 'Installation of Additional Components' in Instruction Section E12 3

To install the Receiver in the Recorder refer to the Instruction Section covering the specific Receiver (see Cross References on page 2)

Wiring

The power supply connections to the Recorder are described in Instruction Section E12-3

Connections to the Receivers are made in the central wiring channel on the rear of the Recorder (Figure 3)

Note that the polarized Receiver power plugs are inserted in the power socket assembly in the center of the Recorder wiring channel 7 8 inch and 1 1 8 inch holes are provided at the top and bottom of the wiring channel for external measuring circuit and auxiliary circuit cables, and the Recorder power supply

Connect measuring circuit leads as shown in the Instruction Section covering the Receiver s specific circuit application

If the Receiver is equipped with accessories, such as alarm contacts, retransmitting slide wire, or retransmitting movable core transformer, make external connections to the auxiliary circuit terminals as shown in Figure 2 (This illustration does not apply to Class G Receivers for Factory Mutual Approval See Cross References on page 2)

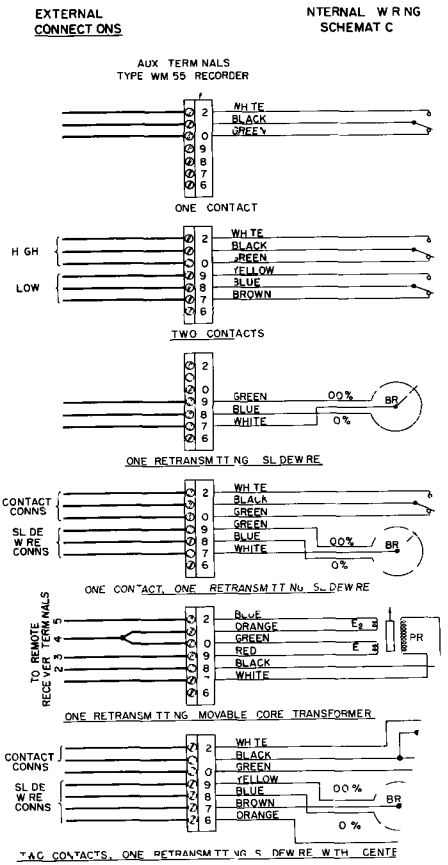


FIGURE 2 - Auxiliary Circuit External Connections (Contact Positions at 0% Ch

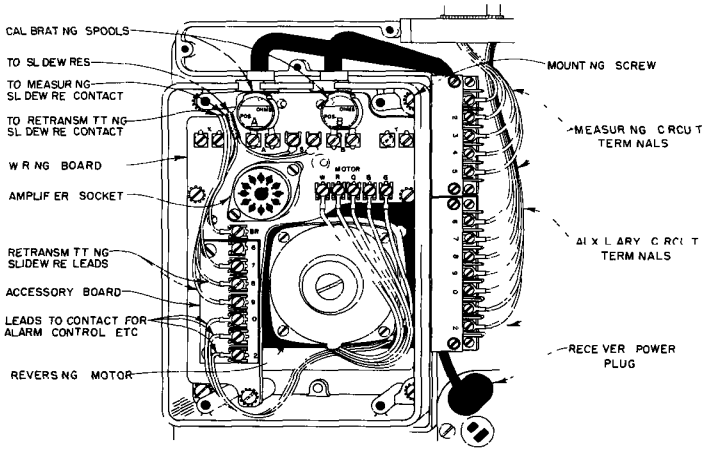


FIGURE 3 - Rear View of Electric Receiver Mounted in WM55 Recorder (Amplifier Removed)

Wiring Board

Each circuit class has a separate wiring board assembly. General component locations and connections are shown in Figure 3

Motor Driven Slidewire Disc and Cam

The slidewire disc and cam are shown removed from the Receiver in Figure 4 The disc and cam shaft is driven by an ac induction type reversing motor with an internal gear reduction housing mounted within the Receiver Figure 7 shows two styles of reversing motors, either of which may be mounted in any standard Receiver for the Type WM55 Recorder

The slidewire disc is mounted on a disc hub which, in turn, is mounted on the disc and cam shaft Shaft motion is transmitted to the disc through a spring key Any backlash in the reduction gearing is eliminated by the backlash spring, which engages with the disc hub to put a small counterclockwise torque on the disc

The molded slidewire disc is secured to the hub by the disc clamp whose mounting screws are accessible through the larger holes of the pen drive arm

The desired relation between slidewire motion and recording pen travel is obtained by shaping the pen drive cam during factory

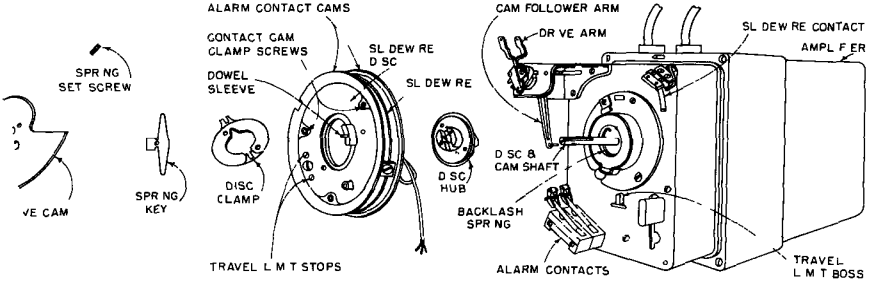


FIGURE 4 Receiver with Slidewire Disc and Cam Removed

calibration The cam is attached to the disc hub and is located in proper relation with the slide wire disc by means of a dowel sleeve. This cam actuates the pen drive arm The drive arm support is shown in Figure 5 Note that the drive arm support pin must be in the lever assembly notch marked with the letter of the Recorder Case position occupied by the Receiver To change the pin to a different notch, remove the support screw. reposition the support, and replace the screw

The slidewire disc is arranged to support either one flat tapered slidewire or one or two round slidewires

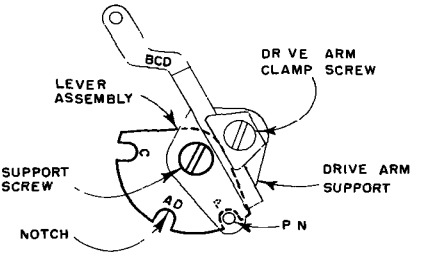


FIGURE 5 Drive Arm Support

ADJUSTMENT AND CALIBRATION

Electric Receivers are furnished precalibrated by the Bailey Meter Company When the Receivers are factory mounted in Type WM55 Recorders, the pens are calibrated as well Calibration of the recording pen is necessary when the Receiver's position in the Recorder Case is changed, when a Receiver is added to a previously furnished Recorder, after parts replacement, etc.

Recording Pen Calibration (Refer to Figure 4)

1 With Recorder power switch OFF, manually rotate slidewire disc against zero travel limit stop

2 If pen does not read zero chart, make a fine adjustment of adjustable link between Receiver drive arm and pen yoke (Figure 1), to position the pen exactly at zero (Linkage adjustments are described under Adjustment and Calibration" in Instruction Section E12 3)

NOTE For units with thermocouple or signal failure protection, pen is calibrated with 2% offset

3 Turn Recorder power switch ON and energize transmitter Make zero adjustment at transmitter, if necessary, to bring pen reading back to zero

4 Using the calibration data furnished on the Specification Sheets in the front of this Instruction Book, check other points within chart range Readings should be within the accuracy guaranteed for the instrument

5. The length of the Receiver drive arm is set at the factory and should not be changed.

Travel Limit Stops

These stops, consisting of eccentric screws mounted on the slidewire disc, engage a boss on the Receiver case (Figure 4) They permit travel of the slidewire contact to the extremes of the wound portion of the slidewire The zero stop is adjusted during factory calibration, and should not be changed

Slidewire Contact

The slidewire contact should engage the slide wire lightly over its entire travel, with a pressure of 30 ± 5 grams. This pressure assures proper electrical contact and minimum slide wire wear. Make certain that slidewire contact pressure is correct

Never allow the contact to spring back onto the slidewire, for it will nick the slidewire windings, and cause rapid contact wear and premature failure

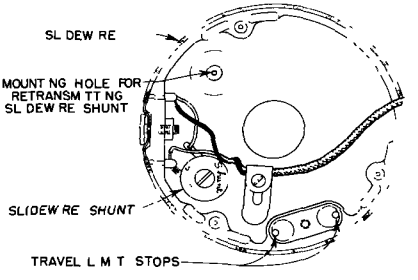


FIGURE 6 Rear View of Slidewire U

MAINTENANCE

Receiver Disassembly

1 Removing Receiver from Recorder Case

a Disconnect adjustable link from Receiver drive arm (Figure 1)

b On back of Recorder, remove (1) the central wiring channel cover and (2) the wiring cover plate that is directly above the Receiver

c Pull Receiver power plug (Figure 3)

d Remove numbered designation strip(s) from Receiver terminal block(s), and disconnect leads to the Receiver from the terminal block

e Remove terminal block(s) from their support, to free the fanning strip(s), which should be left on the Receiver leads

f Remove amplifier cover from rear of Receiver and loosen the four retained Receiver mounting screws (Figure 3)

g. Carefully withdraw Receiver from the Recorder Case, tipping slightly so that Receiver drive arm will not strike the Case

2 Removing Motor from Receiver

a Pull Receiver power plug (Figure 3)

b Turn slidewire disc until it hits 100% travel limit stop (follower at low point of cam)

c Loosen four amplifier mounting screws and carefully unplug amplifier from wiring board

d Remove four (or five) motor leads from wiring board (Figure 3)

e Loosen three retained screws on motor mounting plate, and remove motor with mounting plate.

3 Removing Slidewire Disc (see Figure 4)

a Rotate slidewire disc counterclockwise against the stop

b Remove cam(s) by taking out cam mounting screws (dowel sleeve remains attached to the slidewire disc)

c Remove set screw from end of disc and cam shaft, and take out spring key (tension exerted on disc hub by backlash spring should turn disc and hub assembly counterclockwise against stop as soon as spring key is removed)

d. Take out two screws securing disc clamp to hub, and remove disc from disc hub.

e Turn disc hub counterclockwise until all backlash spring tension is removed Slip disc hub off shaft, taking care that backlash spring is not pulled with it (Backlash spring should be left in its mounting unless absolutely necessary to remove it for inspection or renewal)

f. Do not attempt to remove slidewire from molded disc Always handle this assembly with care, in order not to damage the windings.

Receiver Reassembly

Replace slidewire disc as follows (see Figure 4)·

1 Place disc hub on shaft so that one of its rear notches engages backlash spring

2 Wind slidewire lead wires counterclockwise around narrow part of hub for two turns, and place disc on the hub (When positioning disc, hold slidewire contact away from slide wire, and then carefully let it down on the wire)

3 Place disc clamp in position and insert disc clamp screws Turn screws only partway into the disc hub, so that disc can still be turned with respect to the hub

4 Rotate disc and hub one complete turn, from zero to maximum travel limit stop, to check that slidewire leads allow full, free travel of disc

5 Fasten spring key in position with spring key set screw

6 While holding the disc motionless, rotate key, disc clamp, and disc hub two turns clockwise, to set proper tension on backlash spring

7 Tighten disc clamp screws just enough to keep backlash spring from unwinding, yet still allowing disc to be turned with respect to the disc hub

8 Rotate disc with respect to hub so that position of dowel sleeve (on the disc) with

respect to cam screw holes (on the hub) approximately corresponds to positions of the dowel and cam screw holes on the pen drive arm (look at etched side of cam)

9 Place pen drive cam in position and install two cam screws

10 Tighten disc clamp screws (accessible through holes in the cam)

11 Manually, rotate slidewire disc and check contact position on slidewire, action of backlash spring, motion of follower on pen drive cam, and operation of the travel limit stops

To replace the motor in the Receiver, and to remount the Receiver in the Recorder Case, follow disassembly instructions in reverse order When positioning motor in the Receiver, be sure pinion gear engages drive gear properly Do not force fit The two dowels on inside of Receiver case should fit snugly into dowel holes on motor mounting plate before the three mounting screws are tightened

After Receiver has been mounted in Recorder Case, check reading of recording pen when slidewire is against its minimum stop

Slidewire

Maintenance of slidewire is limited to removal and replacement If slidewire or contact becomes dirty wipe assembly with clean cloth

Motors

If the action of the motor becomes sticky, as indicated by a stepping chart record, some exercising of the motor is recommended This should always be done after new oil has been added to the gearbox For Receiver applications where the measured variable changes slowly or not at all over long periods of time, the motor should be exercised through full range in both directions about once each week This may be done by turning off the Recorder or Indicator power supply and turning the slidewire by hand

Failure of the motor to respond to a change in variable may be from causes other than frozen motor bearings Failure of the amplifier or some other part of the circuit may be the reason for lack of response Electrical power to the motor is indicated on an unbalance of measuring circuit by voltage across the motor capacitor (read at the motor test jacks on the Amplifier Unit by means of an ac voltmeter) The circuit can be unbalanced in the case of Class Q resistance thermometer circuits by shorting or opening the measuring element at the Receiver terminal board, and in a similar manner on other applications A large unbalance of this type will produce a voltage of around 90 to 150 volts between these terminals, and will indicate that electrical torque is being developed If the motor does not respond, the bearings obviously are frozen, and the following procedure should be followed to restore operation

NOTE The following procedure does not apply to oil sealed motors If bearings are frozen in oil sealed motors, the entire motor assembly must be replaced

If the motor is completely stuck or frozen and will not break loose, proceed as follows

1 Remove motor assembly from Receiver case as outlined under "Receiver Disassembly"

2 Remove four screws from motor assembly (Drive pinion need not be removed on Holtzer Cabot motors Allow motor mounting plate to hang loose on shaft Bodine motors only Drive out groov pin holding pinion gear to shaft and remove pinion gear See Figure 7)

3 Break seals between gearcase, motor propel, and bearing plates by placing a knife blade in external grooves and striking blade lightly with a mallet

4 Break seal at A, Figure 7, to remove gearcase (In Bodine motors, then remove inner plate from gearcase)

5. Clean all residual oil out of gearcase by flushing with kerosene

6 Break seals at B and C, Figure 7, to remove rotor and bearings (If rear bearing cannot readily be removed from Holtzer-Cabot motors, loosen setscrew that bears on rotor endplay adjustment screw, remove rotor end play adjustment screw and, if necessary, drive bearing out of bearing plate with a large diameter wooden dowel)

7 Clean all residual grease from bearings with naptha Repack bearings with Beacon 325 grease (available from the Bailey Meter Company in 2 oz containers, Part No 199113A1) Use just enough grease to fill wells in bearings

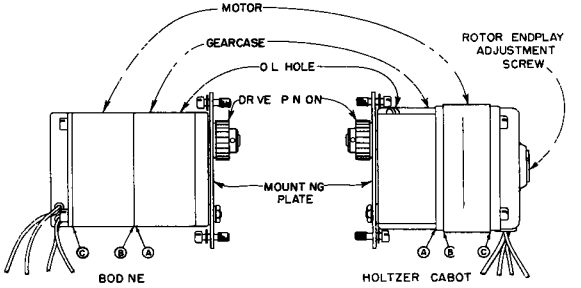


FIGURE 7 - Interchangeable Reversing Motors, Pt. No. 666239-1

Bodine motors only: Place 1 to 1-1/2 teaspoons of Lubriplate 907 grease in gear case.

8. Reassemble motor. Do not force any parts into place, they should fit together easily. Tighten four screws evenly to prevent gears from binding.

9. Lubricate motor as described under "Motor Lubrication".

10. Bench test motor, as shown in Figure 8. (In Holtzer-Cabot motors if rotor end play adjustment screw was removed, reset its position by running motor and turning screw in until motor stalls, and then backing screw out one-half turn. Tighten setscrew.) Starting voltages are shown in Figure 8. Also check motor operation in opposite direction by reversing connections to red and white leads. If time permits, operate motor for about 24 hours and check for excessive noise and/or erratic operation.

11. Replace motor in Receiver case as outlined under "Receiver Reassembly".

Motor Lubrication

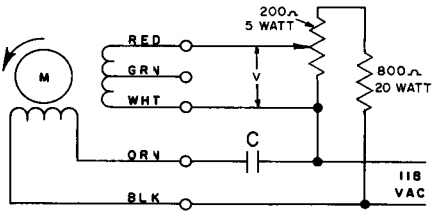
The special lubricants used in these motors are suitable for ambient temperatures of not more than 120F.

STANDARD MOTORS - HOLTZER-CABOT MOTORS MUST BE FILLED WITH LUBRICANT PRIOR TO PLACING IN SERVICE. These motors are emptied of lubricant prior to shipment, and must be refilled. Special lubricant and container is included for this purpose ("LUBSAC", Pt. No. 199287-1). To lubricate Holtzer-Cabot motor remove screws from oil fill hole and overflow hole (Figure 7), insert plastic tube on Lubsac into filler hole and squeeze lubricant from Lubsac. Fill until lubricant runs out of overflow hole.

BODINE MOTORS are shipped full of lubricant sufficient for 3 months operation. To lubricate Bodine motors, remove yellow screw from oil fill hole and insert 20 drops of oil (LUBSAC", Pt. No. 199287-1). Replace screw, exercise motor by hand, and place in service.

NOTE: Lubricate both Bodine and Holtzer-Cabot motors every three months.

Lubrication requirements for each motor assembly are given under "Motor Specifications" on page 10.



Pt. No.	C Value	V Voltage Reqd. to Start	
		Holtzer-Cabot	Bodine
666329-1	0.75 mfd	12V	18V
6618667-1	0.60 mfd	2.0V	2.0V

FIGURE 8 - Bench Test Connections

MOTOR SPECIFICATIONS

TUBE TYPE AMPLIFIERS

Motor Assembly Pt. No. 666329-1

Holtzer Cabot Motor (4 Leads)
Type -ac induction RPM Output--20
Model--RBC-2405 Torque--40 oz. in.
Volts--115 Watts 9
Cycles--60 Capacitor 0.75 mfd
Control Winding Balance Voltage
20-40 volts ac
Control Winding Unbalance Voltage
(Running)- 110-130 volts ac
*Power Winding Voltage- 185-200 volts ac
Winding Resistance at 75F --
Control. 800 ohms
Power. 800 ohms
ΔLubrication -Gearcase· Sohilift P48 oil
Bearings: Beacon 325 grease

Bodine Motor (4 Leads)
Type--ac induction RPM Output--20
Model--KLI 24RM or 21.7
Volts--115 Torque--46.5 oz. in.
Cycles--60 Watts 9.5
Capacitor--0.75 mfd
Control Winding Balance Voltage--
25-45 volts ac
Control Winding Unbalance Voltage--
(Running)--150-170 volts ac
*Power Winding Voltage--195-210 volts ac
Winding Resistance at 75F --
Control 580 ohms
Power: 580 ohms
Lubrication--Gearcase Lubriplate
907 grease and/or oil
Bearings· Beacon 325 grease

SOLID STATE AMPLIFIER

Motor Assembly Pt. No. 6618667-1

Bodine Motor (5 Leads)
Type ac induction RPM Output 18
Model KL1 24RM Torque--50 oz. in.
Volts- 118 Watts--9
Cycles--60 Capacitor--0.6 mfd
Control Winding Unbalance Voltage--20v ac
*Power Winding Voltage 185 200 volts ac
Lubrication- Gearcase. Sohilift P48 oil
Bearings Beacon 325 grease

Holtzer-Cabot Motor (5 Leads)
Type --ac induction RPM Output 20
Model RBC-2405 Torque -50 oz. in.
Volts-118 Watts--9
Cycles--60 Capacitor--0.6 mfd
Control Winding Unbalance Voltage -20v ac
*Power Winding Voltage 185 200 volts ac
ΔLubrication -Gearcase Sohilift P48 oil
Bearings: Beacon 325 grease

ΔAdd lubricant to motor before startup

*Can be read at motor terminals on wiring board when motor is run with amplifier removed. This arrangement requires that an eleven lead (Pt. No. 666755 1) or twelve lead (Pt. No. 666755 2) cable be connected between the amplifier plug and the socket on the wiring board.

ACCESSORIES

Alarm Contacts

When high or low limit alarm contacts are furnished with the Receiver, one or two alarm contact cams are attached to the rims of the slidewire disc. Cams and contacts are shown in Figure 4.

Factory settings are as follows:

One contact furnished: 50% of full chart.
Two contacts furnished: 25% and 75% of full chart.

To change factory settings:

1 Turn Recorder power switch OFF.

2. Check calibration of recording pen as outlined under "Adjustment and Calibration".

3 Set rear contact cam:

a Loosen hex nut on front of slidewire disc until rear cam can be rotated (Do not loosen two screws holding front cam.)

b Rotate slidewire disc until recording pen indicates desired alarmpoint. While holding slidewire disc in place, rotate alarm contact cam on disc to contact-operating position and retighten hex nut to lock rear cam in place.

4. If two contacts are furnished, set front alarm contact as follows:

a. Loosen two contact cam clamping screws on front of slidewire disc until front cam can be rotated (Do not loosen hex nut which clamps rear cam.)

b. Rotate slidewire disc until recording pen indicates desired alarmpoint. While holding slidewire disc in place, rotate front cam on disc to contact-operating position. Retighten two contact cam clamping screws.

Retransmitting Slidewire

When the Receiver is equipped with two round slidewires, the slidewire closer to the pen drive arm is the retransmitting slidewire Adjustment procedures are the same as those given for the measuring slidewire

Retransmitting Movable Core Transformer

Figure 10 shows a Receiver equipped with a retransmitting movable core transformer. The core is positioned by a follower arm that rides on the core cam mounted in front of the pen drive cam.

This arrangement also is used in Class B circuits, where the Receiver measuring element is a movable core transformer rather than a slidewire. However, the transformer functions as a part of the measuring circuit rather than as a retransmitter, and there is no measuring slidewire on the slidewire disc.

An eccentric (see Figure 10) is provided to zero the coil position The coil can be shifted a total of 1/8 inch along its axis To make the adjustment, loosen the coil support screws (Allen heads), turn the eccentric until coil output is at the required value for the pen reading, and retighten the support screws

The movable core transformer is described in Instruction Sections covering the Class J and Class B Telemeter Receivers (see Cross References)

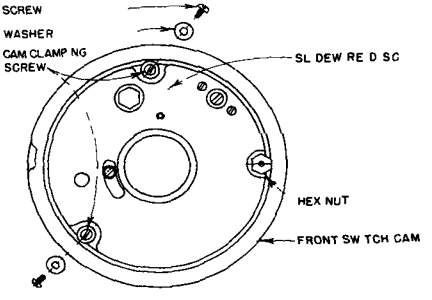


FIGURE 9 Front View of Slidewire Disc

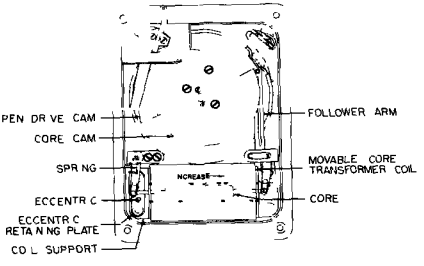


FIGURE 10 - Receiver with Retransmitting Movable Core Transformer

REPLACEMENT PARTS

Parts Drawing E12 105 (Figure 11) shows parts that are common to Electric Receivers of all circuit classes. Refer to Instruction Sections on specific circuits for additional parts drawings that apply to each class of Receiver (See "Cross References").

Although Figure 11 normally will apply to the Receivers furnished, there may be individual differences in basic Receiver assemblies be cause of:

a Design changes made since the printing of this Instruction Section.

b Special design of the Receiver furnished to make it suitable for a non-standard application

Therefore, when ordering parts, assure correct replacements by specifying on the order:

1. Complete Class identification and code number of the Receiver for which parts are desired. The code number is shown on a label below the Receiver nameplate.

2. The Parts Drawing on which each part is illustrated. (The Parts Drawing Number is given in the Figure title.)

Parts Drawings for Recorders, including pen assemblies, are shown in Instruction Section E12 3, Type KM55 or WM55 Recorder and KM53 or WM53 Indicator.

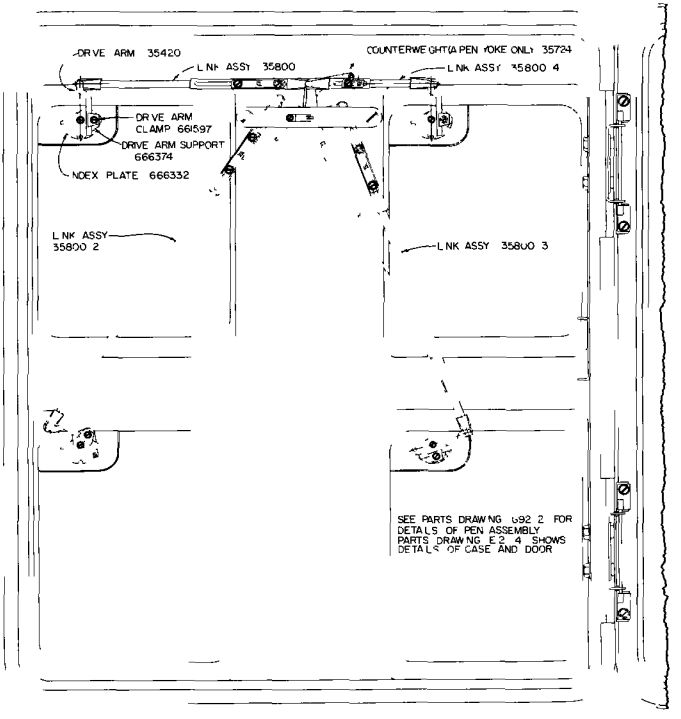


FIGURE 11 Parts Drawing E12 105, Electric Receivers in Type WM55 Recorder