BBC
BROWN BOVERI

IB - 8602

TRAVEL RECORDER KIT

FOR

VHK, VACUUM CIRCUIT BREAKERS

(INSTALLATION AND OPERATION)

TABLE OF CONTENTS

A. INTRODUCTION

This travel recorder kit is made for checking the opening and closing speeds of VHK vacuum circuit breakers.

This kit is to be used in conjunction with a cathode ray storage oscilloscope or recording oscillograph.

For proper application, the following instructions should be followed for installation of the kit and checking of speeds.

The general instruction book for the circuit breaker should be referred to when using the travel recorder kit. The book is available upon request and is listed below.

15VHK500 & 750 IB 6.2.7.7-1

B. INSTALLING THE TRAVEL RECORDER

Travel Recorder Kit No. 160202-T5

CAUTION:

When the breaker is closed and/or when the closing springs are charged, make sure the breaker is not inadvertently closed or tripped when installing or adjusting the travel recorder.

See Figure 1.

1. Open the breaker. Remove the front cover from the breaker truck.

2. Loosely install the travel recorder assembly in front of the center pole of the breaker with two (2) screws and hardware thru existing holes in the top plate.

3. Loosen the #¼-20 hex nut holding the travel recorder to the mounting bracket.

4. Attach the threaded drive pin to the front bolt on the lower terminal clamp and tighten.

5. Adjust the travel recorder so that the moving rod is free to slide. Check to see that there is no binding anywhere to ensure that the travel recorder will not be damaged during operation.

6. Tighten the #¾-20 hex nut holding the travel recorder to the mounting bracket.

7. Tighten the two (2) mounting screws.

C. ELECTRICAL CONNECTIONS

Connect to the storage oscilloscope or recording oscillograph as shown in Figure 2.

Note that if a low impedance recording oscillograph is used, it will be necessary to also use an amplifier.

A second trace is needed on the oscilloscope or oscillograph to indicate contact continuity. This can be accomplished by connecting as shown in Figure 3.

D. SPEED RECORD

The oscilloscope or oscillograph should be adjusted and set so that the curve obtained will be similar to that shown in Figure 4. Note that when the potentiometer is driven by the pushrod, the pushrod and contact will move together except at the time when the contact is closed and the contact spring is being compressed or decompressed. This pushrod movement is that portion of the speed trace above the point where the contact touch line intersects the speed trace. This portion of the speed trace is not considered when checking speeds since the contact is closed.

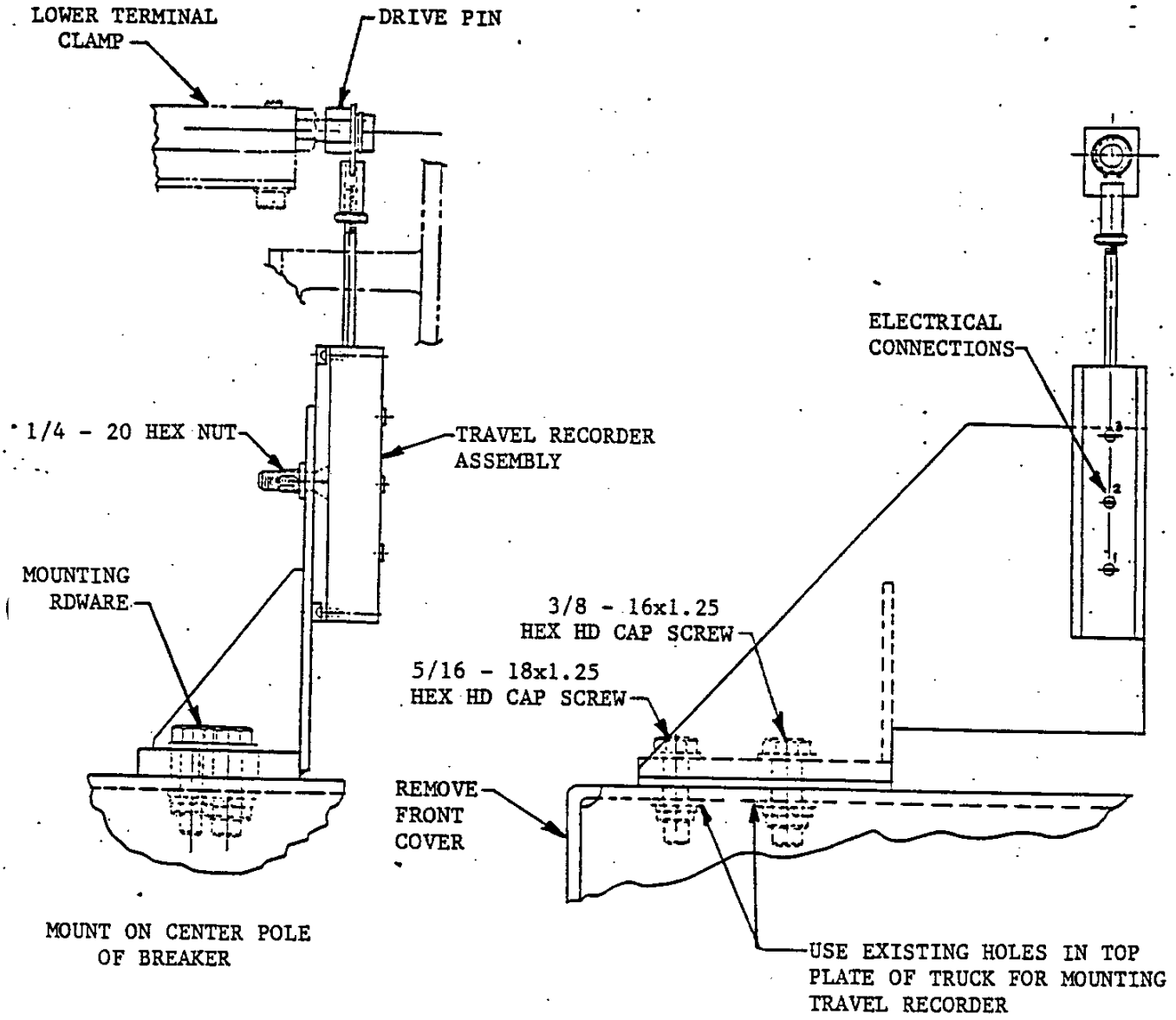
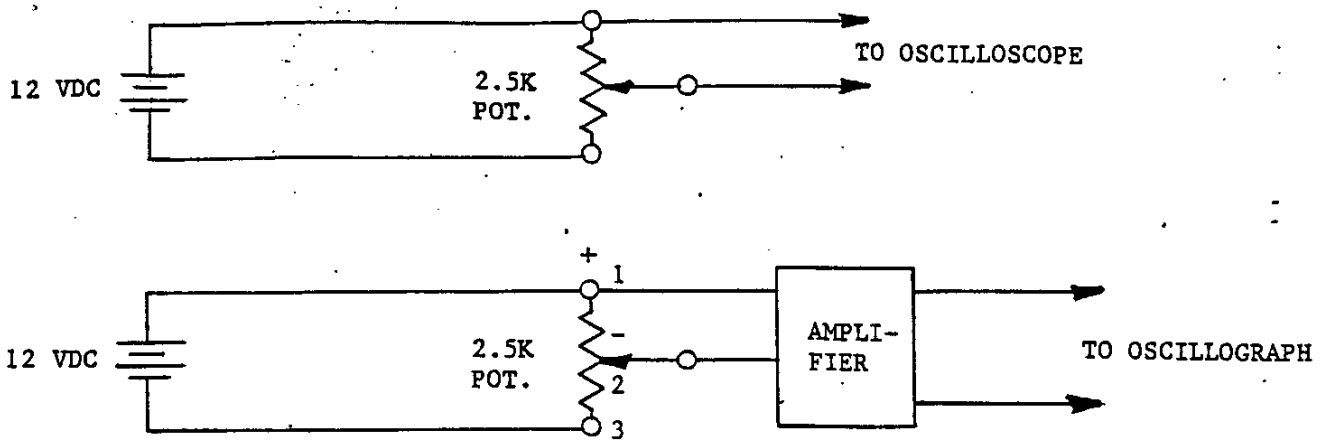
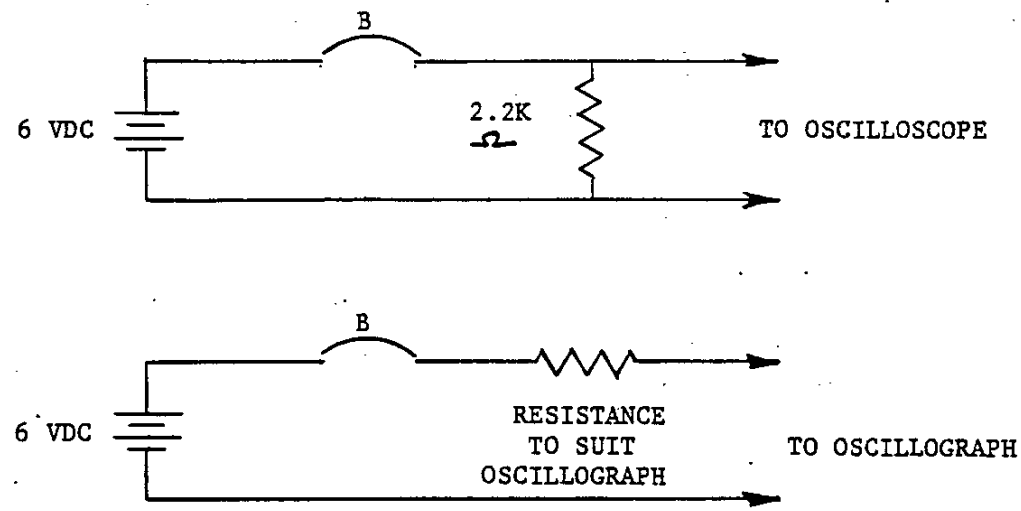

LOWER TERMINAL CLAMP
DRIVE PIN
1/4 - 20 HEX NUT
TRAVEL RECORDER ASSEMBLY
MOUNTING RDWARE
MOUNT ON CENTER POLE OF BREAKER
ELECTRICAL CONNECTIONS
3/8 - 16x1.25 HEX HD CAP SCREW
5/16 - 18x1.25 HEX HD CAP SCREW
REMOVE FRONT COVER
USE EXISTING HOLES IN TOP PLATE OF TRUCK FOR MOUNTING TRAVEL RECORDER

Fig. 1



WIRING DIAGRAM FOR SPEED TRACE

FIG. 2



WIRING DIAGRAM FOR CONTINUITY TRACE

FIG. 3

B - MAIN BREAKER CONTACT OF POLE BEING MEASURED FOR SPEED

NOTE: D.C. VOLTAGE & RESISTANCE VALUES MAY BE CHANGED TO SUIT CONDITIONS

1. Drawing the Speed Line (See Figure 4)

   a. Draw a vertical line through the point where the breaker contact touches or breaks.

   b. Draw the speed line through two points; one point is the intersection of the vertical contact touch or part line and the speed trace; and the other point is a point on the speed trace a vertical distance 1/2y on the close curve or 3/4y on the open curve from the first point.

2. Determining Contact Gap

   a. The contact gap is the distance between the stationary and moving contacts when the breaker is in the open position. Check the contact gap on the same pole being measured for speed.

   b. See Figure 5 for determining contact gap.

3. Speed Calculations

   See Table I for requirements.

TABLE I

Breaker Type	Speed Requirements	
	Closing FT/SEC	Opening* FT/SEC
5,7.5 & 15 VHK	2.0 - 3.2	3.28 - 4.92
* 7.0 FT/SEC MAX ALLOWABLE		

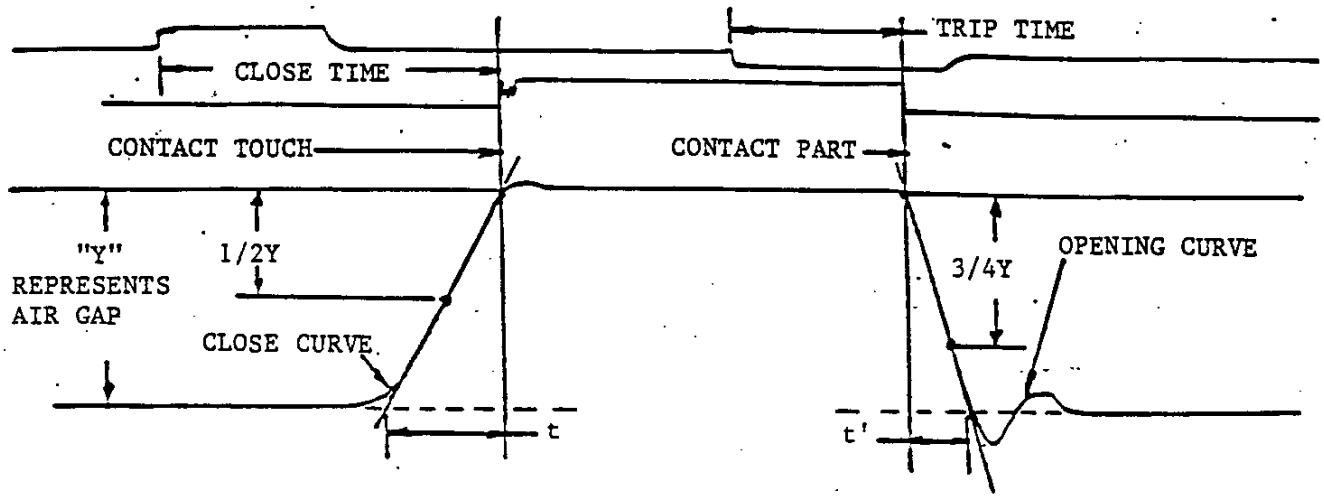
$$\text{Speed } \left(\frac{\text{Ft}}{\text{Sec}}\right) = \frac{\text{Actual Air Gap (In.)}}{\text{t (sec)} \times 12 \left(\frac{\text{In}}{\text{FT}}\right)}$$

Example:

Check the closing speed of a 15VHK500 circuit breaker.
The air gap is measured as .44 In. (See Figure 5).
"t" is .012 seconds (See Figure 4).

$$\text{Speed} = \frac{\text{Actual Air Gap}}{t \times 12}$$

$$\text{Speed} = \frac{.44 \text{ In.}}{.012 \text{ sec} \times 12 \frac{\text{In}}{\text{FT}}} = 3.05 \text{ FT/sec}$$



$$\text{SPEED}\left(\frac{\text{FT}}{\text{SEC}}\right) = \frac{\text{ACTUAL AIR GAP (IN.)}}{\text{t (SEC) X 12}\left(\frac{\text{IN.}}{\text{FT}}\right)}$$

SPEED CURVES

Fig. 4

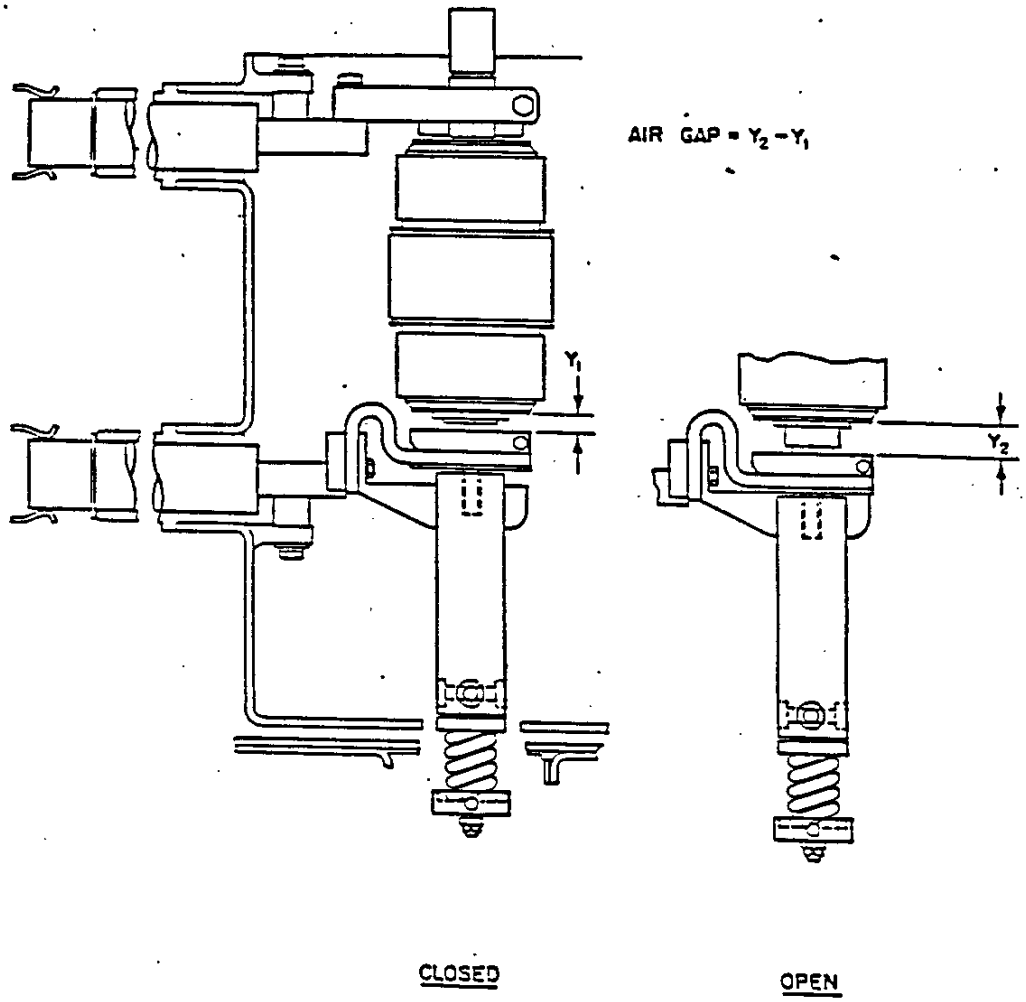


Fig. 5