Bailey

SECTION
M22-10

TYPE CE RECORDER OR INDICATOR

INDEX

The Type CE Diaphragm Operated Air or Gas Flow Recorder or Indicator (Figure 1) measures a pressure drop across an orifice or boiler and records or indicates the measurement in terms of flow on a uniformly graduated chart or scale

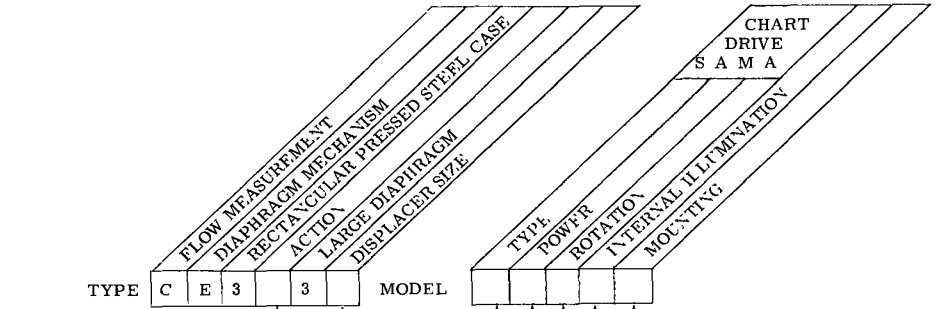
The Recorder or Indicator consists of a diaphragm mechanism connected to the pivot point of a beam by linkage One end of the beam is attached to a yoke which is connected to the recording pen or indicating pointer A parabolic displacer suspended from the other end of the beam extracts the square root function

An increase in differential pressure applied to the diaphragm mechanism moves the diaphragm This motion is transmitted thru linkage to the balance beam and causes the beam to rotate Movement of the beam is transmitted thru linkage to position the recording pen or indicating pointer

CROSS REFERENCE

Instrument or Equipment	Instruction Section
Installation of Orifices and Flow Nozzles	G22 1

EXPLANATION OF NOMENCLATURE



3	Indicator (Sector Scale)
5	Recorder

1	Small Parabolic Displacer
2	Large Parabolic Displacer

E	Electrical
M	Mechanical
N	None

F	Flush Mounting
W	Wall Mounting

0	No Illumination
1	Fluorescent 115v, 50 60c
3	Fluorescent 115v, 25c

	Electrical	Mechanical	None
1	115v 60c	Spring	None
2	115v, 50c		
3	115v, 25c		

	Rotation	Electrical	Mechanical	None
0	None			0
0	24 Hours	0	0	
1	12 Hours	1	1	
2	8 Hours	2	2	
4	4 Minutes	4		
5	24 Minutes	5		
7	7 Days	7	7	

An 'X' in any Nomenclature position indicates that the variation is special. An 'X' as a suffix indicates that the Recorder or Indicator includes a special feature not covered by Nomenclature.

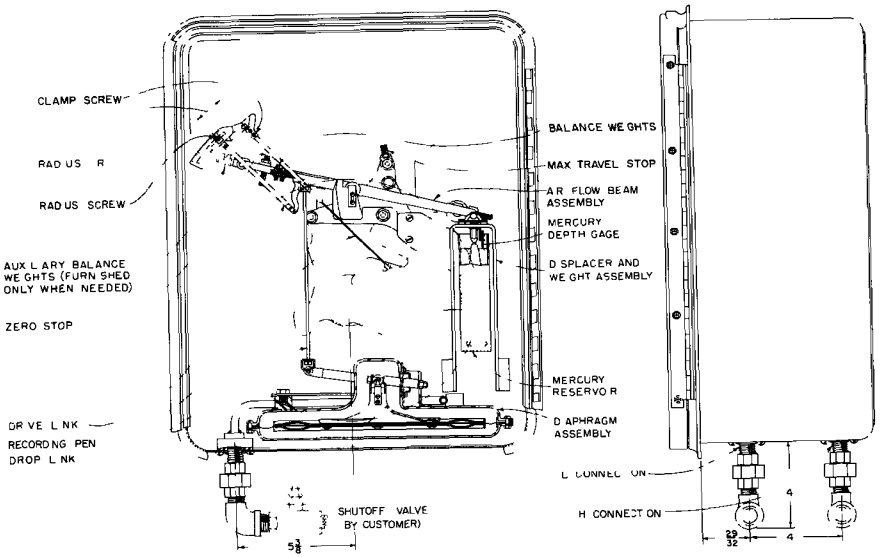


FIGURE 1 Typical Assembly of Type CE Air Flow Meter

INSTALLATION

The parabolic displacer assembly and air flow beam (Figure 6) are factory calibrated and marked with the Recorder or Indicator serial number before shipment. The displacer is packed in a separate carton. The air flow beam and all remaining parts are packed inside the Recorder or Indicator case. After installing the Recorder or Indicator, check calibration as outlined on page 5

Mounting

1 Remove all parts and packing from Recorder or Indicator case.

2. Mount Recorder or Indicator as shown in Figure 2 Level instrument from left to right and from front to back Then fasten securely.

3 Assemble drop link to beam as shown in Figure 1 Moving parts must be free of friction.

4. Make certain reservoir is free from dirt or dust accumulations Correct amount of mercury is shipped in a plastic container and tagged with Recorder or Indicator serial number Slowly pour mercury into reservoir. Do not spill mercury during this operation

5 Insert displacer in reservoir (see Figure 1).

Chart and Recording Pen (Type CE35 Recorder)

1 Remove chart clamp nut (Figure 9) and raise pen lifter.

2. Place chart on chart plate so edges fit under chart plate tabs. Make certain that correct chart is used. (Chart number is listed on nameplate inside Recorder case and on the Specification Sheet in front of this Instruction Book)

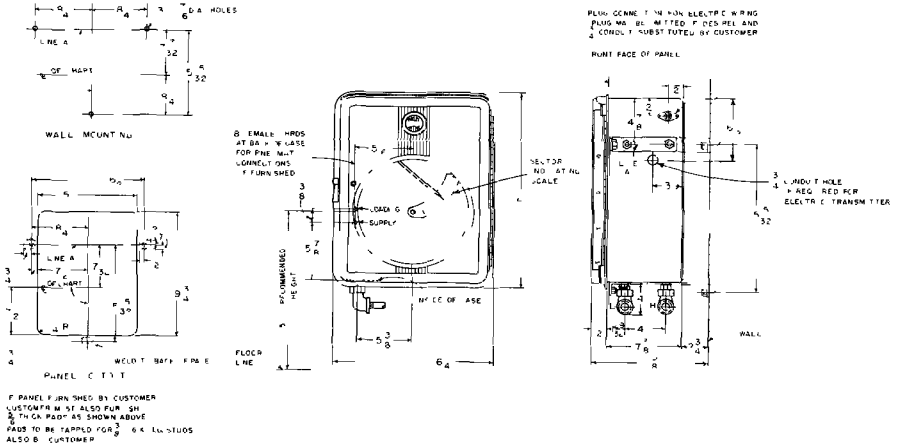


FIGURE 2 Mounting Dimensions

3. Replace chart clamp nut and lower pen lifter

4. Make certain pen bears lightly on chart If necessary, bend pen arm outward slightly until pen just touches chart.

Pen or Pointer Zero

1 With mercury in reservoir and beam resting at zero stop, check that recording pen (Type CE35) or indicating pointer (Type CE33) reads zero If pen or pointer does not read zero, loosen two clamp screws (Figure 1) holding pen or pointer arm to yoke and set pen or pointer zero, tighten screws Do not change zero stop position

2. Make certain beam knife edges are clean, sharp, and seat properly and that beam is free from friction at all points.

Placing Pens in Service (Type CE35 Recorder)

1 Fill Recording pen with Bailey Special Recorder Ink DO NOT USE OTHER INKS Pen arm is enameled the color of ink to be used in pen.

2 If pen does not start inking quickly, squeeze top and bottom of ink reservoir between thumb and index finger to force ink thru spout Another method is to work a fine wire back and forth in pen spout A package of wire pen cleaners is furnished with the Recorder Do not alter shape of spout to facilitate inking

Piping Connections

1. Install unions (and shut off valves if provided) below Recorder or Indicator case (see Figure 1)

2 Make certain all air connections to the diaphragm mechanism are tight

3 If flow is measured thru a boiler or duct, make draft and pressure connections at boiler as shown in Figure 3 If flow is measured thru a pipe line, refer to Instruction Section G22 1. Make piping connections from boiler or duct to Recorder or Indicator as shown in Figure 4

Power Supply

1 Make power connection to Recorder (or Indicator if electrical components are included) at plug connection (on side of case shown in Figure 2)

2. Attach mating plug to a cord from power source.

3 If Recorder or Indicator is located in a damp or dusty location, remove plug and make power connection at terminal blocks inside case near conduit hole Use 3/4-inch flexible conduit Install a switch to turn power off and on

Internal Illumination

1 If Recorder or Indicator is equipped with fluorescent lighting, the starter and lamp are packed separately For best results, operate lighting system within voltage limits specified on ballast

2. Insert starter in receptacle provided in lamp socket (Figure 8). Securely place lamp in holder. If lamp starts slowly, reverse starter poles

3. If lamp fails to light, check for loose connections before replacing starter or lamp

ADJUSTMENT AND CALIBRATION

The Type CE Diaphragm Operated Air or Gas Flow Recorder or Indicator is factory calibrated and should require no further adjustment. However, before placing in service, check calibration as outlined below Refer to Figure 1.

Calibration Check

1 Close shut off valves (if provided) and disconnect unions at connections H and L Pen or pointer should read zero chart or scale. If not, check that beam rests against zero stop

a Make certain displacer does not rub against sides of reservoir

b If beam rests against stop, loosen two clamp screws (Figure 1) holding pen or pointer arm to yoke and set pen or pointer on zero chart or scale line Tighten screws

c If beam is not resting against stop, check beam and linkage mechanism for friction (Do not change zero stop setting to correct pen or pointer reading)

2 Connect Recorder or Indicator H connection to a calibration outfit similar to that shown in Figure 5

3. Check pen or pointer readings at three or four points over the given differential pressure range (such as 30, 50, 70, and 90%). To check readings between zero and 100% chart or scale, determine the applied differential pressure required to obtain desired chart or scale readings as follows

(% chart or scale reading desired) ^{2} x maximum differential pressure range value applied differential pressure

EXAMPLE To check pen or pointer reading at 40% chart or scale when the maximum range value is 5" H_2O, apply .8 ' H_2O.

$(.4)^2$ x 5" H_2O .8" H_2O

4. Apply correct differential pressure (determined in step 3) and note chart or scale readings.

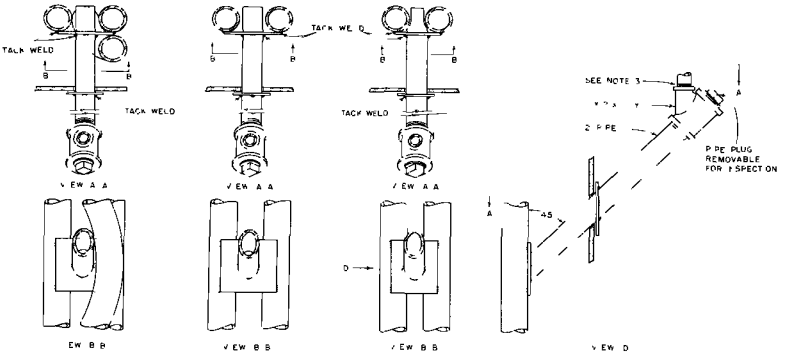
a. If average up and down readings below 50% chart or scale are incorrect, turn balance weights IN slightly to decrease reading or OUT to increase reading Then apply zero differential and check that pen or pointer returns to zero chart or scale (refer to steps 1b and 1c)

b. If average up and down reading at 50% chart or scale is incorrect, ADD a few drops of mercury (with eye dropper) to reservoir to increase reading or REMOVE a few drops to decrease reading Then apply zero differential and check that pen or pointer returns to zero chart or scale (refer to step 1b and 1c)

c If average up and down readings between 70 and 100% chart or scale are incorrect, it is necessary to make a range adjustment using the radius arm as outlined in step 5. Then repeat entire step 4 until correct chart or scale readings are obtained

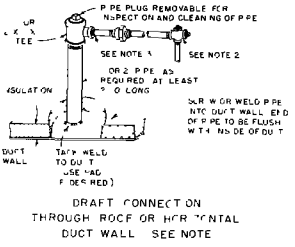
NOTE The radius R was established during factory calibration and set to give the correct pen or pointer travel for the instrument differential pressure range (see Specification Sheet in front of this Instruction Book).

5. To re-establish radius R ' (Figure 1) to give correct pen or pointer travel for instrument range.

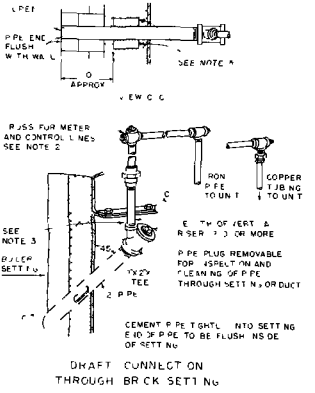


CONNECTING PIPING TO UNIT TO BE THE SAME AS SHOWN FOR CONNECTION THROUGH BRICK SETTING

DRAFT CONNECTION THROUGH WATER WALL SETTING



DRAFT CONNECTION THROUGH ROOF OR HORIZONTAL DUCT WALL SEE NOTE



DRAFT CONNECTION THROUGH BRICK SETTING

NOTE 1

FOR INSTALLATION IN ROOF, HORIZONTAL WALL OR INCLINED WALL, INSTALL PIPE SLEEVE PERPENDICULAR TO WALL AS SHOWN IN LOWER RIGHT ILLUSTRATION.

FOR INSTALLATION IN VERTICAL DUCT WALL, INSTALL PIPE SLEEVE AT 45° TO WALL AS SHOWN AT VIEW D.

NOTE 2

WHEN IT IS DESIRABLE TO CONNECT TWO INSTRUMENTS OR ONE INSTRUMENT AND ONE CONTROLLER TO ONE CONNECTION, CONNECT THE SECOND LINE TO THE CROSS SHOWN.

DO NOT RUN A SINGLE LINE DOWN AND THEN TEE OFF AT OR NEAR THE INSTRUMENTS.

NOTE 3

INSERT WHATEVER BUSHING IS REQUIRED TO REDUCE OUTLET TO SIZE OF COUPLING IN PIPING USED IN THE INSTALLATION.

NOTE 4

THE PIPING FROM CONNECTIONS SHOWN SHOULD RUN AS DIRECT AS POSSIBLE TO METER (Gauge OR CONTROLLER) AND MUST HAVE NO BRANCH CONNECTIONS TO OTHER EQUIPMENT.

NOTE 5

2 X 4 X 1/8 PLATES WELDED TO PIPE SLEEVE TO KEEP SLEEVE FROM TURNING IN BOILER SETTING WHEN PLUG AT END OF SLEEVE IS REMOVED FOR CLEANING. PLATES TO BE FURNISHED AND WELDED TO SLEEVE IN FIELD BY CUSTOMER.

FIGURE 3 Recommended Piping Connections at Boiler Settings and Ducts

a Loosen maximum travel stop. Apply differential corresponding to slightly more than maximum differential range value. Set stop so it just touches beam, tighten stop screw.

b As a starting point, loosen radius screw and set radius "R" to equal 1 1/2 inches

c Apply differential corresponding to maximum range value Loosen radius screw and position drive link to increase or decrease radius "R" until correct chart or scale reading is obtained at 100% chart or scale, tighten stop screw

d. Repeat steps 4 and 5 until correct chart readings are obtained.

6 With beam resting against zero stop, the mercury depth gage should just touch surface of mercury without denting it. If not, adjust mercury depth gage (shown in Figure 1) to desired setting for a future reference point.

7 To place instrument in service, connect unions (and open shut-off valves if provided) below Recorder or Indicator case (Figure 1)

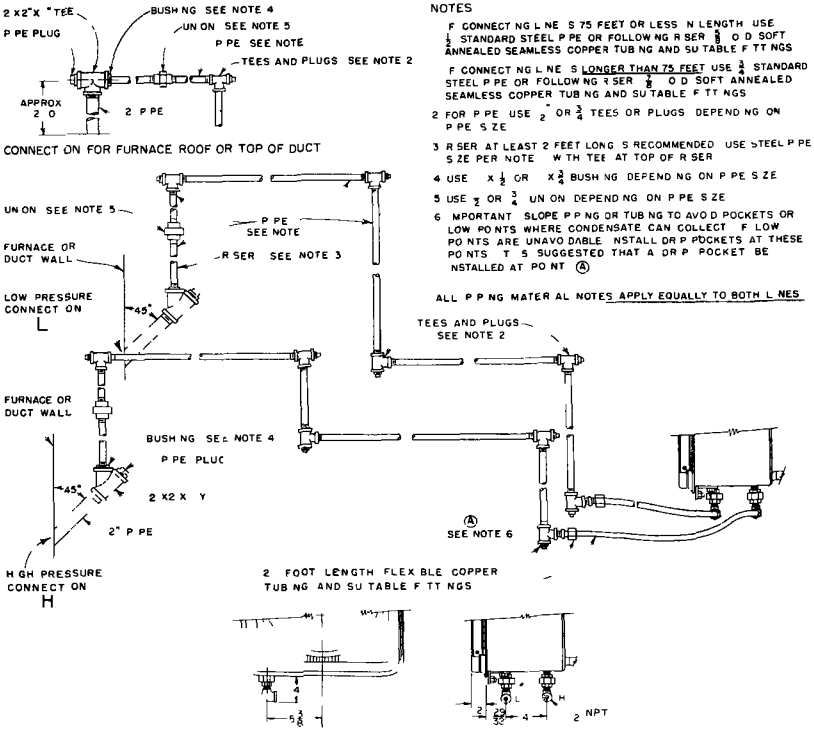


FIGURE 4 Recommended Piping Connections from Boiler or Duct to Recorder or Indicator

REPLACEMENT PARTS

Spare Parts Kits

The Spare Parts Kits shown in Figures 7 and 8 should be carried in stock. Specify the Spare Parts Kit part number to order a complete kit.

Ordering Individual Parts

Figures 6, 7, 8, and 9 are Parts Drawings of the Type CE Diaphragm Operated Gas Flow Recorder mechanism and case. Normally these drawings will apply to the instrument furnished. However, there may be individual differences in specific instruments because of:

a design changes made since the printing of this Instruction Section, or

b special design of equipment furnished to make it suitable for specific application

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

1 complete nomenclature and serial number (stamped on instrument nameplate) of equipment for which parts are desired, and

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

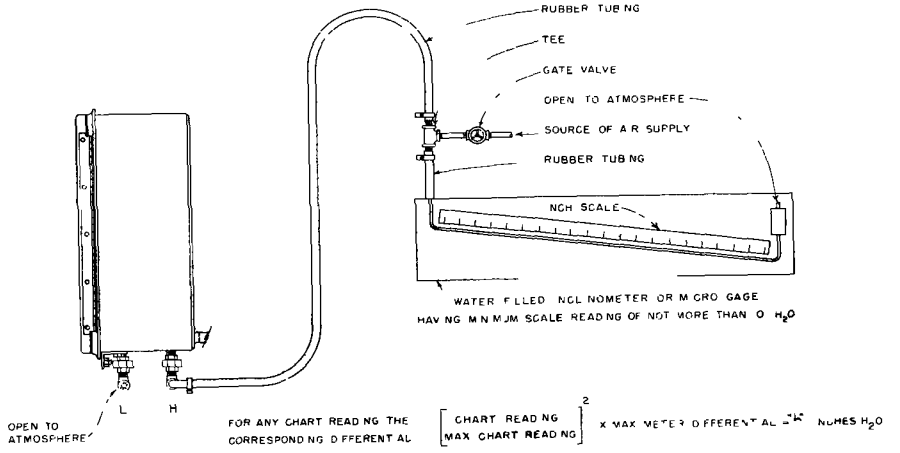


FIGURE 5 Typical Calibration Outfit

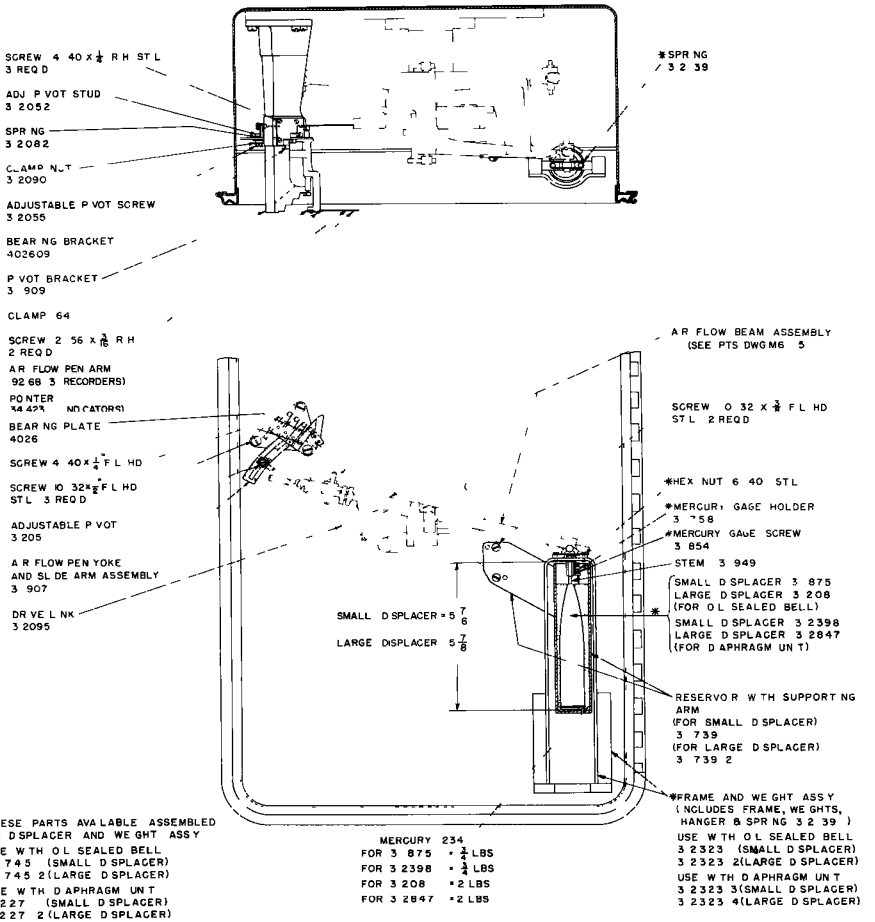


FIGURE 6 Parts Drawing M61 5, Type CE Displacer Mechanism

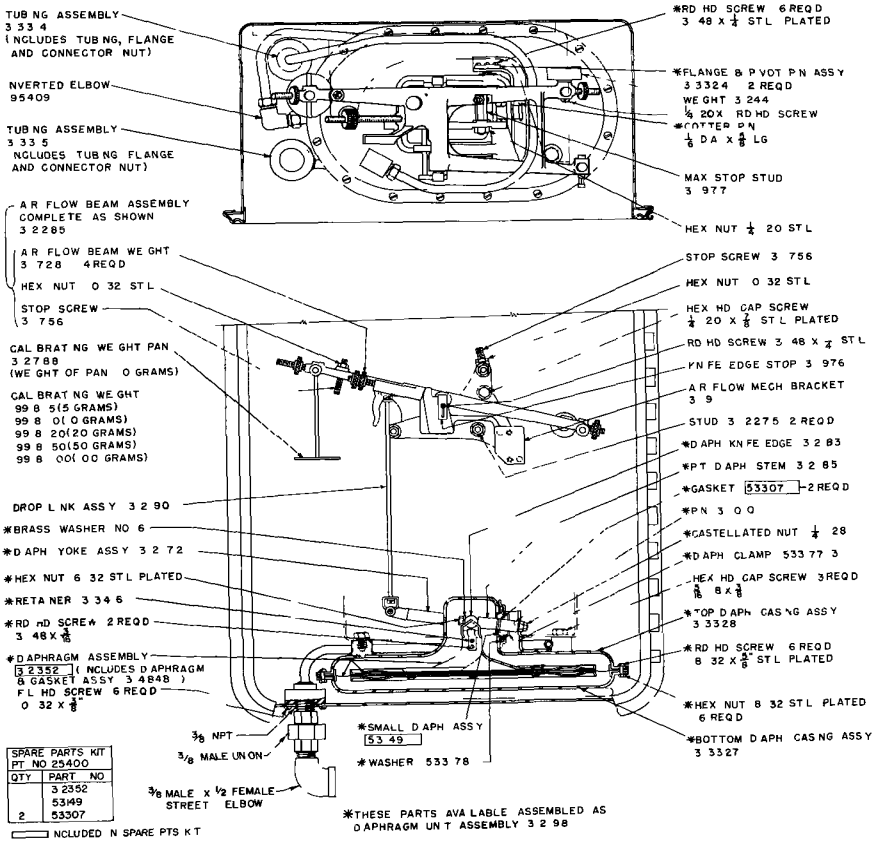


FIGURE 7 Parts Drawing M61-15, Type CE Diaphragm and Air Flow Beam Assembly

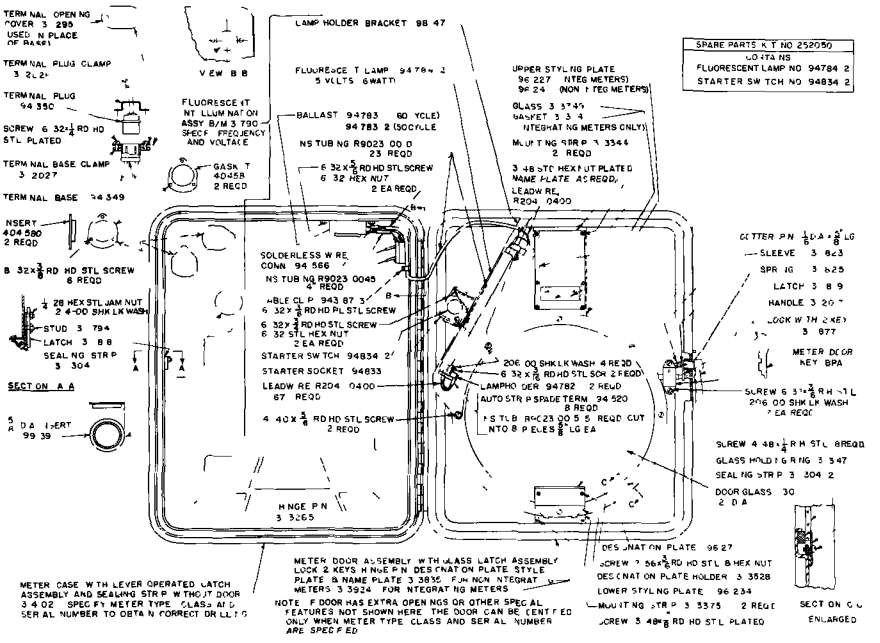


FIGURE 8 Parts Drawing G99-5, Rectangular Case Assembly

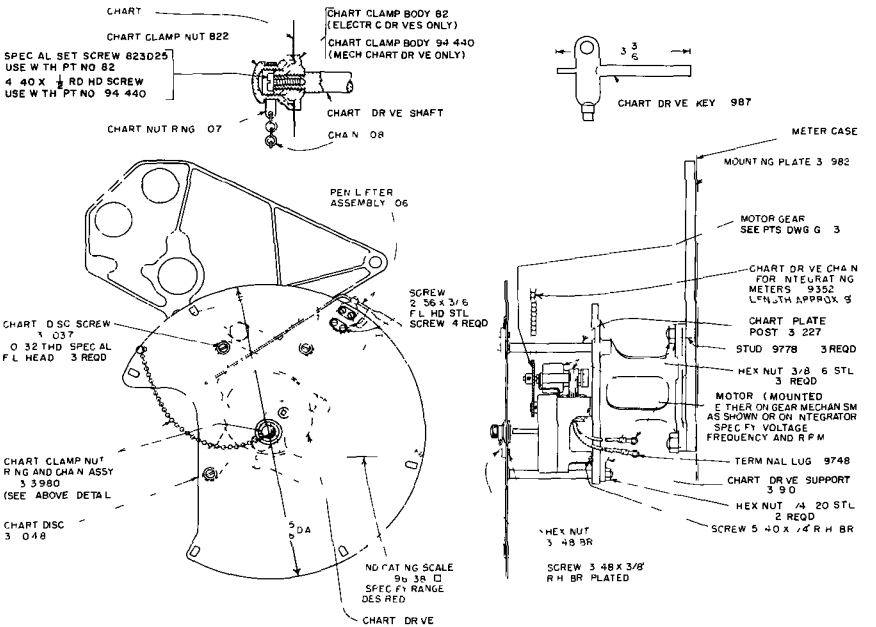


FIGURE 9 - Parts Drawing G92 35, Chart Plate and Chart Drive