



RUDDER REPEATBACK/RUDDER ANGLE TRANSMITTER
(SPERRY 1887158)
INSTALLATION AND ONBOARD MAINTENANCE MANUAL

DESCRIPTION

The Rudder Repeatback/Rudder Angle Transmitter contains a torque synchro which generates a rudder position signal for driving rudder angle indicators and a rudder repeatback potentiometer which is used with other steering equipment to position the rudder to a predetermined angle. The rudder repeatback signal is connected to an amplifier in the steering control equipment where it is compared to a rudder order signal; when the rudder order and repeatback signals are equal, rudder movement stops. The Rudder Repeatback unit has no synchro transmitter for driving rudder angle indicators. Both units include limit switches to limit rudder travel. See Figure 1 for additional information.

INSTALLATION

See Figure 1.

MAINTENANCE

LUBRICATION

Moving parts of the Rudder Repeatback/Rudder Angle Transmitter, except for the shouldered shaft assembly (4, Figure 1), are lifetime-lubricated by the manufacturer; hence, no further lubrication will be required. This assembly is equipped with a grease fitting (7) which must be filled with grease (general purpose lubricant) at periodic intervals (recommended every 6 months).

REPLACEMENT OF SYNCHROS

To replace the synchro transmitter, disconnect power to unit and proceed as follows (see Figure 1).

1. Remove cover (37) from the unit.
2. Disconnect electrical leads from synchro (11) terminals S1, S2, S3, R1, and R2.

3. Remove the mounting clamp (13) securing synchro (11) to bracket (12).
4. Gently disengage gear (10) from lever gear (44), and withdraw synchro from unit.
5. Remove gear (10) from rotor shaft of synchro (11) by removing set screws (9).
6. Install gear (10) on shaft of new synchro (11) using set screws (9) removed above.
7. Carefully mesh gear (10) on synchro (11) with lever gear (44). Install the mounting clamp (13) to secure synchro (11) to housing.
8. Zero synchro (11) as directed in the following procedure. Reconnect electrical leads, and replace cover plate (37) on unit.

ZEROING SYNCHRO

Perform the following procedure to set the synchro to electrical zero (see Figure 1):

CAUTION

While performing the following procedure, make certain the rudder is positioned amidship at all times.

1. Loosen the mounting clamp (13) sufficiently to allow synchro body (11) to be rotated.
2. Disconnect electrical wiring from synchro, and connect a 115-volt a-c power source to terminals R1 and R2.
3. Place jumper between synchro terminals R2 and S3; connect an a-c voltmeter (set to 250-volt scale) between terminals R1 and S2.
4. Apply power and rotate synchro body in either direction until meter reads approximately 37 volts. This is the approximate zero setting.
5. Remove power source to synchro. Remove jumper from terminals R2 and S3; connect voltmeter between terminals S1 and S3.
6. Apply power to synchro. Turn synchro body (11) slowly until a null (minimum reading) is indicated on the meter. Final setting should be made on low meter scale. Null should be less than 0.25 volt rms.
7. Remove power to synchro. Tighten mounting clamp screws (17) to hold synchro securely in place on housing. Recheck null voltage as in Step 6.
8. Remove power and meter leads from synchro terminals. Reconnect electrical leads for normal operation.

REPEATBACK POTENTIOMETER REPLACEMENT (See Figure 1)

1. With the front cover (37) removed, tag for identification and unsolder the three leads connected to the potentiometer (25).
2. Loosen setscrew on the flexible shaft coupling(24) and remove pin (40) that secures coupling to the potentiometer shaft.
3. Loosen setscrew (27) that secures potentiometer (25) to the potentiometer bracket (26) and remove potentiometer (25).
4. Set the replacement potentiometer (25) to approximate zero by turning the shaft until the resistances between the wiper (P2) and each of the terminals (P1 and P3) are within ± 25 ohms of the same value.
5. Insert the potentiometer shaft into the potentiometer bracket (26) and the flexible shaft coupling (24). (Do not move the potentiometer shaft with respect to the potentiometer body.)
6. Secure the coupling (24) to the potentiometer shaft with the setscrew and repin.
7. Position the rudder to amidships.
8. Measure the resistances between potentiometer terminals P1 and P2 and between terminals P2 and P3. Rotate the potentiometer (25) body until the two resistances are equal (within 25 ohms). Secure the potentiometer (25) body to the potentiometer bracket (26) with setscrew (27). Recheck zero after setscrew (27) is tightened.
9. Solder leads to the appropriate potentiometer (25) terminals, and replace cover (37).

REPEATBACK POTENTIOMETER ZEROING

To check repeatback potentiometer for proper adjustment, remove the front cover and perform steps 7 and 8 of "Repeatback Potentiometer Replacement."

REPLACEMENT OF LIMIT SWITCHES (See Figure 1)

Disconnect the two leads from the defective switch (28). Remove the two threaded rods (29) holding the switch (28) in place, remove the defective switch (28). Install and connect new switch (28). Replace threaded rods (29), lockwashers (30), and nuts (31). Adjust cam (23) for the replacement switch (28) using the following procedure.

OUTSIDE LIMIT SWITCH ADJUSTMENT (See Figure 1)

Set the rudder to the desired outside limit and loosen the two setscrews (9) on the cam (23). Rotate the cam (23) until the limit switch (28) opens at slightly before this rudder setting; then tighten the setscrews (9). Repeat procedure for opposite outside limit.

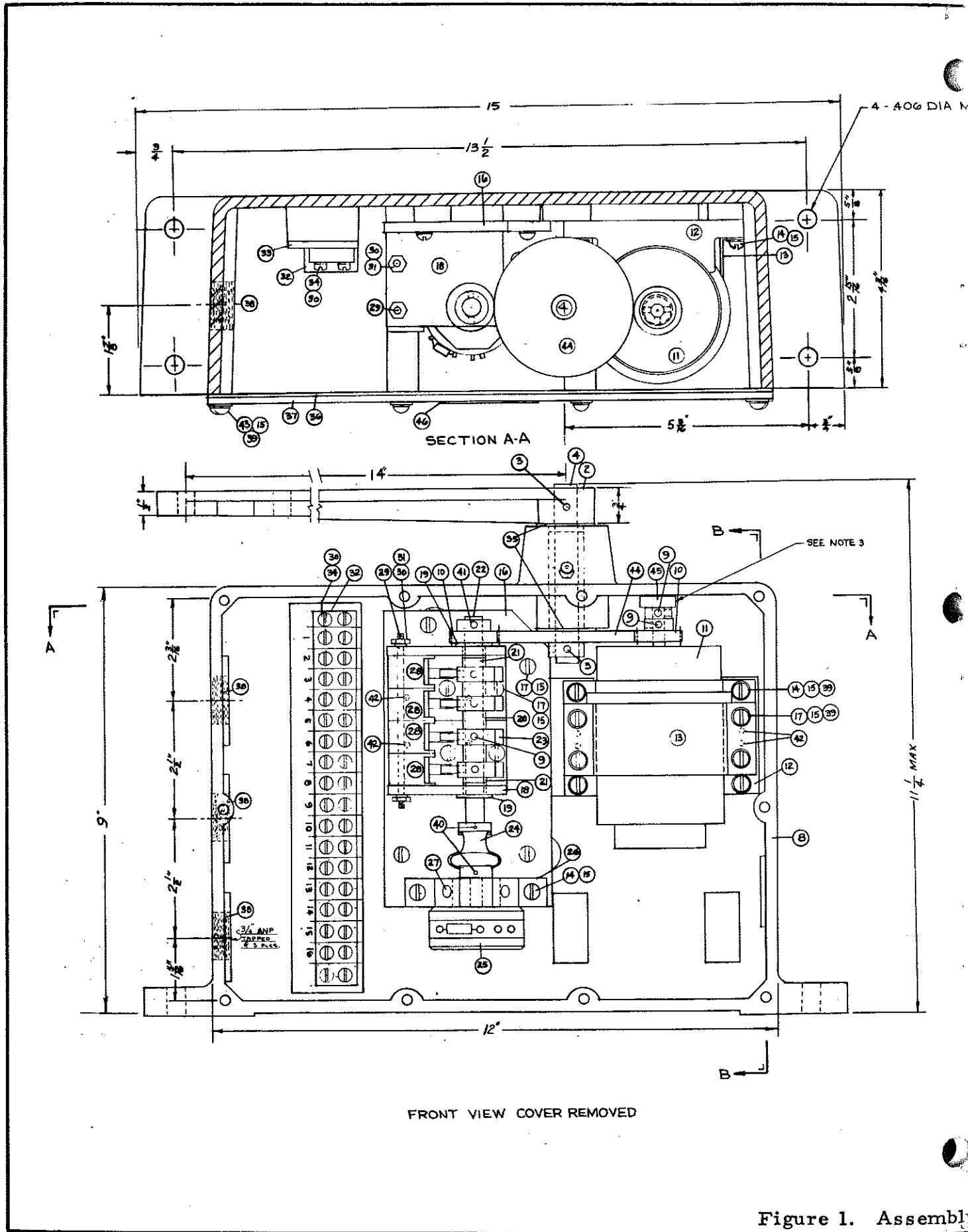
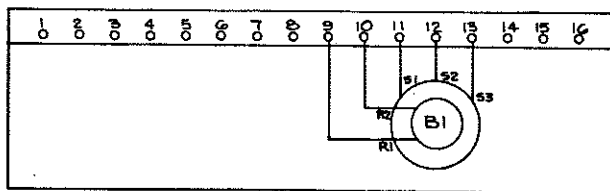


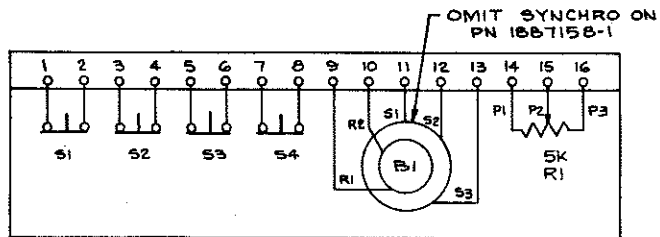
Figure 1. Assembly

A MOUNTING HOLES

PARTIAL SECTION B-B



SCHEMATIC FOR 1887158-4 ONLY



SCHEMATIC

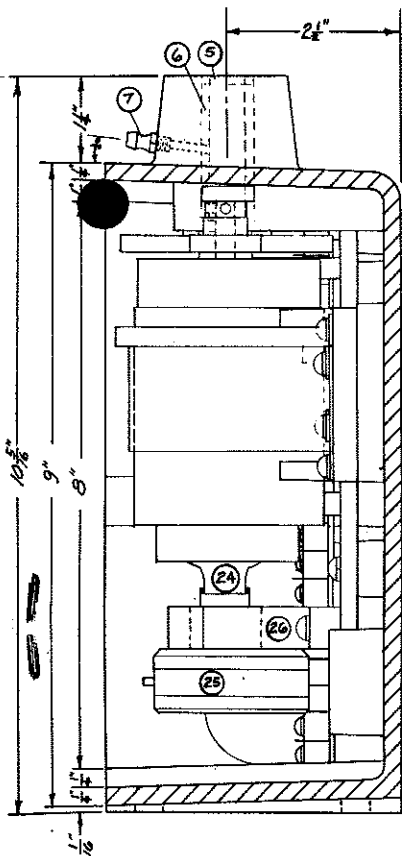


TABLE OF VARIABLES

PART NO.	RATIO	RUDDER TRAVEL	TYPE
1887158-1	3 TO 1	± 47° MAX	RRB
1887158-2	3 TO 1	± 47° MAX	RRB/RAT
1887158-3	4 TO 1	± 35° MAX	RRB/RAT
1887158-4	3 TO 1	± 50° MAX	RAT
1887158-5	4 TO 1	± 35° MAX	RAT

SEE NOTE 3

NOTES:

1. WEIGHT 17.5 LBS.
2. EACH ASSY TO BE WATER TIGHT.
3. BOTH GEARS, ITEM 10 AND ITEM 45 ARE SUPPLIED TO CONVERT -2 TO -3 OR -4 TO -5 (OR VICE VERSA) INTERCHANGE ITEM 10 WITH ITEM 45 ON SYNCHRO, ITEM 11. FOLLOW INSTRUCTIONS FOR SYNCHRO REMOVAL AND REPLACEMENT IN INSTRUCTION MANUAL, JA-19-1109. MARK NAMEPLATE ITEM 46 WITH PROPER DASH NUMBER AFTER CONVERSION.

INSIDE LIMIT SWITCH ADJUSTMENT (See Figure 1)

Set the rudder at the desired maximum limit for automatic steering (usually 10 degrees to 15 degrees) in either direction; loosen the two setscrews (9) on the cam (23). Rotate the cam (23) until the limit switch (28) opens at exactly this rudder setting; then tighten the setscrews (9). Repeat this procedure for the other inside limit switch with the rudder in the opposite direction.

PARTS LIST

See Figure 1 to locate index numbers.

Index No.	Part Number	Description	Qty.	Code
1	03956-1887158-1	Rudder Repeatback, 3 to 1 Gear Ratio, ±47 Deg. Rudder Travel Max.	-	A
	03956-1887158-2	Rudder Repeatback/Rudder Angle Transmitter, 3 to 1 Gear Ratio, ±47 Deg. Rudder Travel Max.	-	B
	03956-1887158-3	Rudder Repeatback/Rudder Angle Transmitter, 4 to 1 Gear Ratio, ±35 Deg. Rudder Travel Max.	-	C
	03956-1887158-4	Rudder Angle Transmitter, 3 to 1 Gear Ratio, ±50 Deg. Rudder Travel Max.	-	D
	03956-1887158-5	Rudder Angle Transmitter, 4 to 1 Gear Ratio ±35 Deg. Rudder Travel Max.	-	E
2	-	Arm	1	ABCDE
3	-	Roll Pin 5/32 Dia x 1 Lg (Cres)	2	ABCDE
4	-	Shaft 1/2 Dia x 3-3/4 Lg (Cres)	1	ABCDE
5	11687-4912	Seal 1/2 I.D. x 3/4 O.D. x 1/8 Lg	1	ABCDE
6	-	Bushing (Oilite) 1/2 I.D. x 3/4 O.D. x 2-1/8 Lg	1	ABCDE
7	-	Grease Fitting 1/4-28 Thd	1	ABCDE
8	-	Box	1	ABCDE
9	-	Setscrew, Allen #10-24 x 3/16 (Cres)	8	A
	-	Setscrew, Allen #10-24 x 3/16 (Cres)	12	BC
	-	Setscrew, Allen #10-24 x 3/16 (Cres)	4	D
10	71041-Y2424	Gear 24T (Brass)	1	ABDE
11	56232-632482	Synchro Type 3HG	1	BCDE
12	-	Bracket, Synchro	1	BCDE
13	-	Clamp, Synchro	1	BCDE

Index No.	Part Number	Description	Qty.	Code
14	-	Screw, RD HD #10-24 x 3/4 Lg (Cres)	2	A
	-	Screw, RD HD #10-24 x 3/4 Lg (Cres)	6	BC
	-	Screw, RD HD #10-24 x 3/4 Lg (Cres)	4	D
15	-	Lockwasher (Cres) No. 10	20	A
	-	Lockwasher (Cres) No. 10	28	BC
	-	Lockwasher (Cres) No. 10	8	D
16	-	Mounting Plate	1	ABC
17	-	Screw, RD HD #10-24 x 1/2 Lg (Cres)	12	ABC
18	-	Angle Bracket	2	ABC
19	-	Bushing 3/8 I.D. x 5/16 Lg	2	ABC
20	-	Spacer 3/8 I.D. x 1/2 O.D. x 11/32 Lg	3	ABC
21	-	Spacer 3/8 I.D. x 1/2 O.D. x 3/32 Lg	2	ABC
22	-	Shaft 3/8 Dia x 4-5/8 Lg (Cres)	1	ABC
23	-	Cam	4	ABC
24	-	Coupling, Flexible Shaft	1	ABC
25	03956-1801716	Potentiometer, 5K Ohms (Beckman 6609-112-1)	1	ABC
26	-	Bracket	1	ABC
27	-	Setscrew, Allen #10-24 x 1/4 (Cres)	2	ABC
28	56232-771614-2	Switch (Microswitch WZ-2PRW822-A2)	4	ABC
29	-	Threaded Rod #6-32 x 3-3/8 Lg	2	ABC
30	-	Lockwasher (Cres) No. 6	8	ABC
31	-	Nut (Cres), No. 6-32	4	ABC
32	10651-19016	Terminal Strip	1	ABCDE
33	-	Identification Strip	1	ABCDE
34	-	Screw, RD HD #6-32 x 3/4 (Cres)	4	ABCDE
35	-	Washer, 1/2 I.D. (Nylon)	2	ABCDE
36	28708-1910	Gasket, Neoprene 1/16 x 9 x 12	1	ABCDE
37	-	Cover 1/8 x 9 x 12 (AL)	1	ABCDE
38	-	Plug, Pipe 3/4 (Plastic)	3	ABCDE
39	-	Washer, Flat No. 10 (Cres)	10	A
	-	Washer, Flat No. 10 (Cres)	18	BC
	-	Washer, Flat No. 10 (Cres)	8	DE

Index

No.	Part Number	Description	Qty.	Code
40	-	Roll Pin 3/32 Dia x 3/4 Lg (Cres)	2	ABC
41	-	Roll Pin 1/8 Dia x 3/4 Lg (Cres)	1	ABC
42	-	Roll Pin 1/8 Dia x 1/2 Lg (Cres)	4	A
	-	Roll Pin 1/8 Dia x 1/2 Lg (Cres)	8	BC
43	-	Screw, RD HD #10-24 x 5/8 (Cres)	10	ABCDE
44	71041-Y2472	Gear 72T (Brass)	1	ABCDE
45	71041-Y2418	Gear 18T (Brass)	1	CD
46	-	Marker, Identification	1	ABCDE

NOTICE
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