



**BIRD**  
**INSTRUCTION**  
**book**

for

MODELS 8785/87

INSTRUCTION BOOK  
for  
MODEL 8785/8787 TERMALINE  
COAXIAL LOAD RESISTOR



SUMMARY SPECIFICATIONS

Model 8787 TERMALINE  
Coaxial Load Resistor

Power Rating	
Continuous Input . . . . .	7.5 kW
RF Input Impedance . . . . .	50 ohms or 51.5*
Input Connectors	
8787A . . . . .	3-1/8" EIA Flanged - Swivel
8787B . . . . .	3-1/8" Unflanged - 51.5 ohms
8787C . . . . .	3-1/8" Unfl. - Flush Cen. Cond.
8787D . . . . .	3-1/8" Unfl. - Recess Cen. Cond.
Frequency Range. . . . .	DC to 1.0 GHz
VSWR . . . . .	1.1 max. DC to 500 MHz 1.20 max. 500 to 1000 MHz
Modes. . . . .	CW, AM, FM, SSB and TV signals
Ambient Temp. . . . .	-40° to +45°C
Operating Position . . . . .	Vertical only
Cooling liquid, DC-200 . . . . .	4-1/3 gal (16.4 liters)
Dimensions - with Dolly. . . . .	24 x 20 x 63-5/8 high (610mm x 508mm x 1616mm)
Weight - as above. . . . .	215 pounds (97kg)
Finish . . . . .	Lusterless Black Enamel (TT-E-527)

\*51.5 ohms on "B" suffix models only

Operating and Maintenance Manual  
for  
5.0/7.5 KW RF Load Resistors

The Bird Model 8785 Series RF Load, Figure 1, is a TERMALINE Load Resistor of 5 kW rating for 3-1/8 inch coaxial lines, and its intended for operation in a frequency range from DC to 1.5 GHz, and is also useful above this region, with slightly higher VSWR's. The Model 8787 (7.5 kW) is intended for use to 1.0 GHz only. See Summary Page 1 for VSWR values. For test purposes, this unit may be connected to either transmitter output, the filter-plexer output, or any point in the transmission system where power absorption is desired, up to continuous load rating of the respective units.

By requiring no blower or circulating water the Models 8785/8787 Load Resistors are particularly useful for remote or automated operation of broadcast transmitters. As a reject load for emergency situations, it is always ready for service, as installed. The Model 8785 is designed for use with paralleled TV transmitters of 33 kW peak power, and the 8787 for 50 kW TV installations.

a. Power Dissipating Section

The Model 8785 Load equipment consists of the load resistor, an intermediate coolant, and a radially finned cooling system (See Figure 1), which is mounted on a wheeled truck (if ordered) or on a fixed mounting plate.

The load resistor is attached to the lower end of a length of dry transmission line which projects through the top plate of the radiator member, and into the dielectric coolant contained in the aluminum radiator tank. This terminating resistor component

and the center conductor of the line are supported by a teflon disc or "window", which seals off the input transmission line from the dielectric fluid while offering but very slight interference to the coaxial conductivity of the termination. In this terminating section, the outer conductor of the transmission line is exponentially tapered down to the end of the resistor to provide a reduction of surge impedance directly proportional to distance. Thus, at the high end of the resistor the characteristic impedance is 50.0 ohms. Half-way down the resistor the impedance is 25 ohms, to compensate for the resistance already passed over. At the lower end of the resistor the transmission line outer conductor joins the inner (zero ohms).

The intermediate coolant DC-200, which has been chosen for its chemical, thermal, and electrical characteristics, to prevent damage to the resistor, carries heat away from the resistor and provides a uniform dielectric constant for the termination. With RF power applied, the coolant is heated by the resistor, causing the coolant to circulate inside the tapered coaxial housing and enter the heat exchanger (radiator tank) thru ample holes in the coaxial shell. The heated oil tends to rise to the top of the tank, and the oil in contact with the walls of the tank is cooled and flows toward the bottom of the radiator system. This induced convection materially assists the transfer of heat from the resistor to the radiator shell and the projecting fin-bursts transfer this heat to the surrounding air. The level of the coolant is well below the top of the tank, but expansion of the liquid by heating will bring the Thermoswitch (Item 16)\* in contact with it.

\*See Parts List, Section V, page for parts identification.

In this position the Thermoswitch, set to open at 225°C, will be actuated when the heated oil requires it. Expansion and contraction of the coolant, due to operation, is allowed for by a Breather (Item 5) installed on the top plate of the tank.

b. The Model 8787 is substantially the same as the 8785 in its overall construction, and is just the same in principle. The 8787 has an extra section of short radiator attached and sealed to the top of the usual base radiator. The coolant level within is raised proportionally and the input transmission line lengthened accordingly.

## SECTION II - INSTALLATION

1. The Model 8785/8787 equipment is shipped in a single box - the truck dolly being included according to order (for example, Part number 8785-001-2 is with the dolly, -1 is without it).
2.
  - a. Place a dolly-attached equipment as is in desired location.
  - b. Unit without dolly should be fixed mounted to the station floor or to a platform, using the (8) 3/8 in. holes in the base plate of the radially finned vertical heat dissipator. Use 5/16 in. bolts and nuts, or suitable wood screw fasteners. Mounting hole layout and other dimensions of this unit are given in Outline Dwg., Fig. 1.
  - c. Select a position to allow convenient attachment of 3-1/8 RF line and where good ventilation, particularly above the unit, is available.
3.
  - a. Remove the Shipping Plug, Item 9, (painted red) from the top plate of the radiator. Use a 3/4-inch wrench if needed. Do not discard this Plug or its O-Ring, Item 8.
  - b. Check fluid level. It should be approx. 11 inches below (19 in. for 8787) top face of radiator tank. Refer to Maintenance, Section IV for addition of fluid if level is appreciably lower than specified.
  - c. Install the Breather Vent, Item 5 with its O-Ring, Item 4 in this hole.  
Special Caution - Be sure Shipping Plug (solid hex) is never installed when the unit is used. Such operation of the Load is dangerous and could cause damage to equipment and surroundings.



4. Connect the Thermoswitch, Item 16 (in series) with the transmitter Interlock circuit. Use the Connector Fitting Item 17.

- a. Unscrew the larger knurled ring-nut at the lower end of the coupling assembly and pull off from the Thermoswitch jack. Unscrew small knurled cover fitting from base plug of the connector to release the base.
- b. Thread interlock wires thru the clamp (with washers inside) and with its threaded fitting in place. Service the interlock wire with short tips, use spaghetti sleeves over wire ends if needed, then securely solder the interlock leads to lugs of the connector base. Note:- be sure that the large captive clamping nut is in place over the base plug with the knurled end down. Screw on cover ring first and then the cable clamp in place, tighten the two yoke screws on cable. Push plug back on Thermoswitch, Item 16, and tighten captive knurled ring. Do not attempt to operate the equipment without interlock attached.

5. Make RF power transmission connection to the unit. The 8785 and 8787 Models are designed for direct connection to standard rigid 3-1/8 inch 50-ohm transmission line, either EIA flanged or unflanged. Connection to the EIA (flanged line) can be made with standard coupling parts (Comm. Prods. #12-318-50 Bullet and 14-318-50 O-Ring, or Andrew #15093A and 10683-405, with respective hardware) or use of Bird 3-1/8 Coupling Kit #4600-020. Connection to the unflanged 3-1/8 coaxial line (flush face) is with Coupling Kit such as RCA #MI-27791-K4A or Bird P/N #5-726. In attaching this coupling, be sure center bullet is inserted into

the center conductor up to the dimples and also to push the outside sleeve over the line until the lances bottom. Have both hose clamps in place over the sleeve before inserting the transmission line. After snugly bottoming the inserted line, position the clamps centrally about 2 inches apart and tighten with a screwdriver. Connection may also be made to 51.5 ohm unflanged flush transmission line with the adapter type coupling kit, i.e., RCA #MI-27791-K4D or Bird P/N #5-289.

6. Re-check that Breather Vent, 3c above, is in place. Unit is ready for operation.

## SECTION III OPERATION

Connect the Load Resistor to 3-1/8" 50-ohm transmission line (EIA Flanged or Unflanged) as described in Installation Section preceding. Make the transmission line length as short as possible. Make sure all coaxial line connections are properly tightened. Avoid the use of adapters and elbows whenever possible. Proceed according to the instructions pertaining to the specific transmitting equipment.

The 8785/or 8787 Model is intended primarily as a reject load when two identical transmitters are used with a combiner. The Load Resistor is connected to a fourth port of the combiner, and in normal operation (when both phase and level are matched) there is little power directed into it. However if one transmitter fails, the remaining transmitter splits its output equally between this load and the antenna so that signal transmission continues with reduced power. This emergency condition requires a reject load capable of absorbing 25% of the installation's total average visual power, and another one for 25% of the total aural power. The loads must be continually ready without requiring attention or service to moving parts.

The 8785 type load is particularly well adapted for this type of use, as it requires no input of cooling water or AC line power to support its operations. Be sure that RF connections are in good order and ventilation is not impaired.

## SECTION IV MAINTENANCE

Bird Model 8785 Load Resistor will require little in the way of regular maintenance. Routine cleaning and reasonable care in handling are about all that will be generally required.

1. The outside surface of the instrument should be wiped free of dust when necessary. Place a covering over the input connector when equipment is not attached to transmission line. Keep the coaxial connector parts clean; if they should become grimy or dirt coated, clean carefully with a dry solvent on a cotton swab stick. Clean the metal contact surfaces especially. Preferably, use Inhibisol\* or trichloroethylene. If carbon tetrachloride must be used, carefully observe precautions to avoid excessive skin contact or any inhalation of fumes.
2. Accurate measurement of the dc resistance between the inner and outer conductor of the rf input will provide a good indication of the condition of the load resistor. Check this condition occasionally, when convenient, or when there may be evidence of mismatch (in termination). For this measurement, use a resistance bridge with an accuracy of one percent or better at 50 ohms, such as Leeds and Northrup Series 5300. Connect with short, low resistance leads tightly clipped to conductors. When the load unit is at room temperature, the measured resistance should be within one ohm of the value stamped on the nameplate. Results beyond this indicate possible damage to the resistor.

If it should become necessary to replace the load resistor, the complete input and load assembly located within the finned aluminum

\*A non-toxic, non-flammable dry cleaning agent, manufactured by the Penetone Company, Tenafly, New Jersey.

cylinder must be removed, since the resistor is released from the lower part of this assembly.

3. To remove the load resistor assembly, disconnect the coaxial power transmission line from the load, and detach the transmitter interlock wires by uncoupling the Thermoswitch Connector, Item 17, from its socket. Refer to Replaceable Parts List, Section V at back of manual and Parts Call-out, Fig.2. Using a 1/2 in. wrench, unscrew the eight (8) 5/16-18 hex head cap screws on the periphery of the round top plate of the load.

a. When these eight screws and flat washers are all removed, the entire internal load assembly may be lifted out. Pull the load out carefully to minimize dripping of coolant outside the radiator tank and avoid contact with hands, etc. Also, watch that the Tank Seal O-Ring, Item 13, remains seated in the top flange of the radiator tank. Lay the unit in a convenient place, and use 9/16" and 5/8" wrenches to remove the six (6) 3/8-16 hex screw and nut sets that fasten the RF Resistor Section. Item 1, to the Outer Cond of RF Input, Item 2. Be sure to retain all the parts of these hardware sets, including lockwashers and the O-Ring Seal, Item 12. After the Resistor Section has been removed, inspect the O-Ring Seal, Item 12, on the 3-1/8 in. flange. Re-use the ring only if it is not deformed, and not cut or chipped. When re-joined, this seal must be intact. Entry of fluid into the coaxial input jeopardizes the RF termination characteristics of the equipment. Carefully pull the RF Section away from the input assembly, disconnecting the Center Conductor Bullet,

Item 11, from the Load Resistor as soon as feasible.

b. The RF Section, Item 1, now released is not subject to further field disassembly. If defective, it should be returned for replacement; consult the factory. Reverse procedures above to re-attach the RF Section. In the first step, be sure the connector bullet is properly seated in the center contact of the Load Resistor. Also note, as discussed above, that the 3-1/8 EIA Flanges with the O-Ring Seal are snugly joined. After the load component has been returned to the tank and before connection of the RF transmission line, wait a few minutes, then observe inside the RF input line for any evidence of coolant leakage at the flanged joint below. In the possibility of later deterioration of the input VSWR of the load, it might be due to fluid leakage here. After attachments are complete, check that the conditions described in par. 3, Section II, Installation, are in order.

4. The method of change of any other items of this equipment are generally self-evident. Caution: Do not re-use O-Rings, particularly Item 12, that shows any evidence of cuts, chips or abrasions.

5. Check level of coolant periodically. Replenish if necessary. If coolant is added, it must be uncontaminated Dow Corning 200 (20cs) Fluid, Bird Number 5-1070. Do not use any other material. Observe carefully level requirements given in Installation, Section II, par. 3b.

## SECTION V

Model 8785 with 3-1/8-Unflanged Line (8785C)

## Replaceable Parts List

<u>Item</u>	<u>Qty.</u>	<u>Description</u>	<u>Part Number</u>
1	1	RF Section	8785-072
2	1	Outer Cond., RF Input	8785-002-3
3	1	Radiator Assy.	8785-073
4	1	O-Ring, Breather Plug	5-502
5	1	Breather, Vent	5-835
6 *	2	Caster, Fixed	5-486
7 *	2	Caster, Swivel	5-487
8	1	O-Ring, Shipping Plug	5-504
9	1	Plug, Shipping	2450-049
10	3 gals.	Coolant, Dielectric DC-200	5-1070
11	1	Bullet, RF Conn.	4600-021
12	1	O-Ring, RF Flange	5-984
13	1	O-Ring, Tank Seal	4902-022
14	1	Cen. Cond., RF Input	4600-032-9
15	6	Insulator, Cen. Cond., Support	4600-035-3
16	1	Thermoswitch Assy.	8785-016
17	1	Connector, Thermoswitch	2450-018
(Not Furnished)	(1)	50 $\Omega$ , 3-1/8 in Flush Coupling Kit**	5-726

\*Part of Dolly-equipped units only.

\*\*For use with 8785C Units

## SECTION V

Model 8787 with 3-1/8-Unflanged Line (8787C)

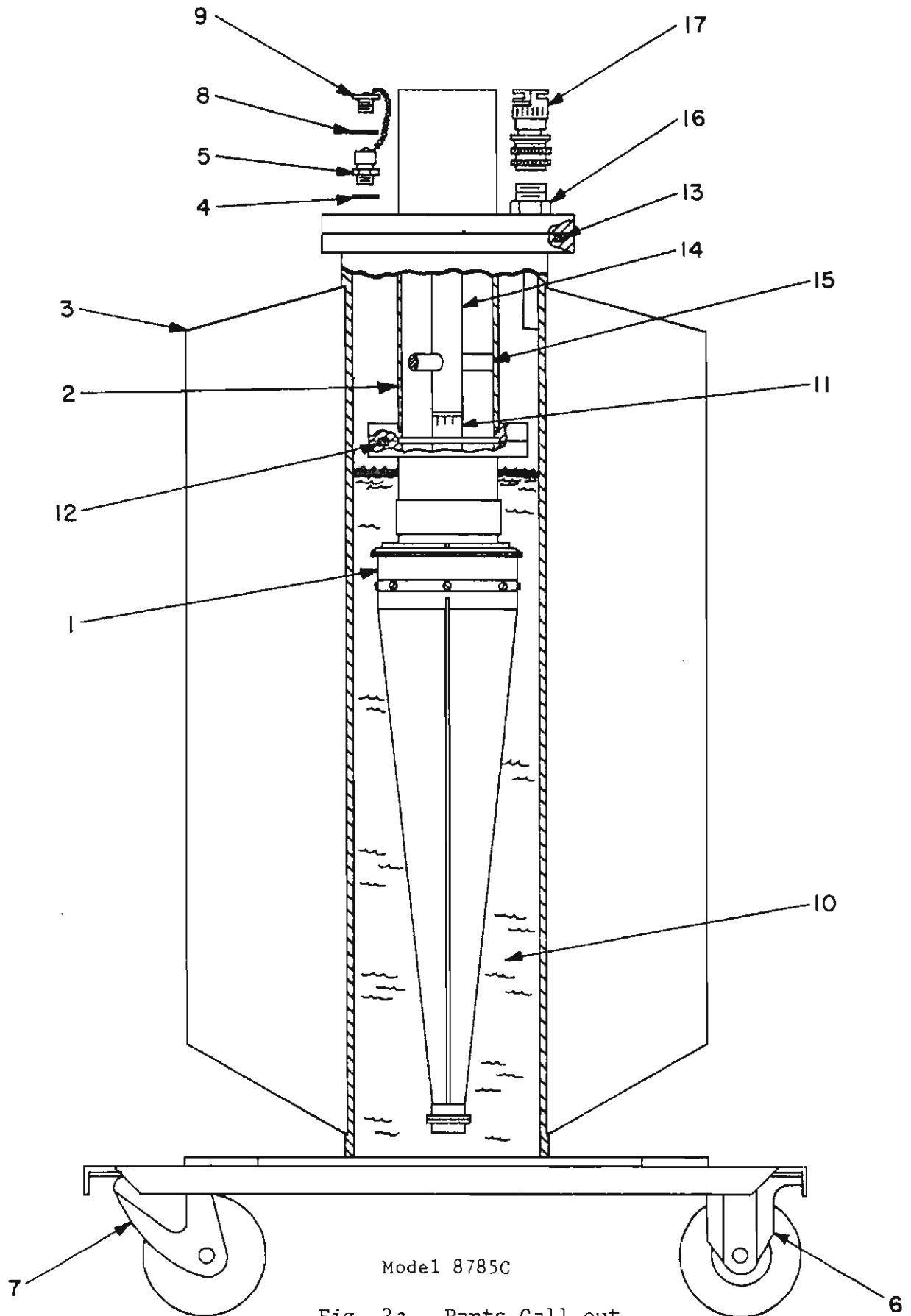
## Replaceable Parts List

<u>Item</u>	<u>Qty.</u>	<u>Description</u>	<u>Part Number</u>
3	1	Radiator Assy. (Base)	8785-073
4	1	O-Ring, Breather Plug	5-502
5	1	Breather, Vent	5-835
6*	2	Caster, Fixed	5-486
7*	2	Caster, Swivel	5-487
8	1	O-Ring, Shipping Plug	5-504
9	1	Plug, Shipping	2450-049
10	4-1/3 gals.	Coolant, Dielectric	5-1070
11	1	Bullet, RF Conn.	4600-021
12	1	O-Ring, RF Flange	5-984
13	2	O-Ring, Tank Seal	4902-022
15	6	Insulator, Cen. Cond., Support	4600-035-3
16	1	Thermoswitch Assy.	8785-016
17	1	Connector, Thermoswitch	2450-018
18	1	RF Section	8785-072
19	1	Cen. Cond., RF Input	4600-032-11
20	1	Radiator, Extension	8787-005
21	1	Outer Cond., RF Input	8785-002-4
(Not Furnished)	(1)	50 $\Omega$ , 3-1/8 in. Flush Coupling Kit**	5-726

\*Part of Dolly-equipped units only.

\*\*For use with 8787C Units

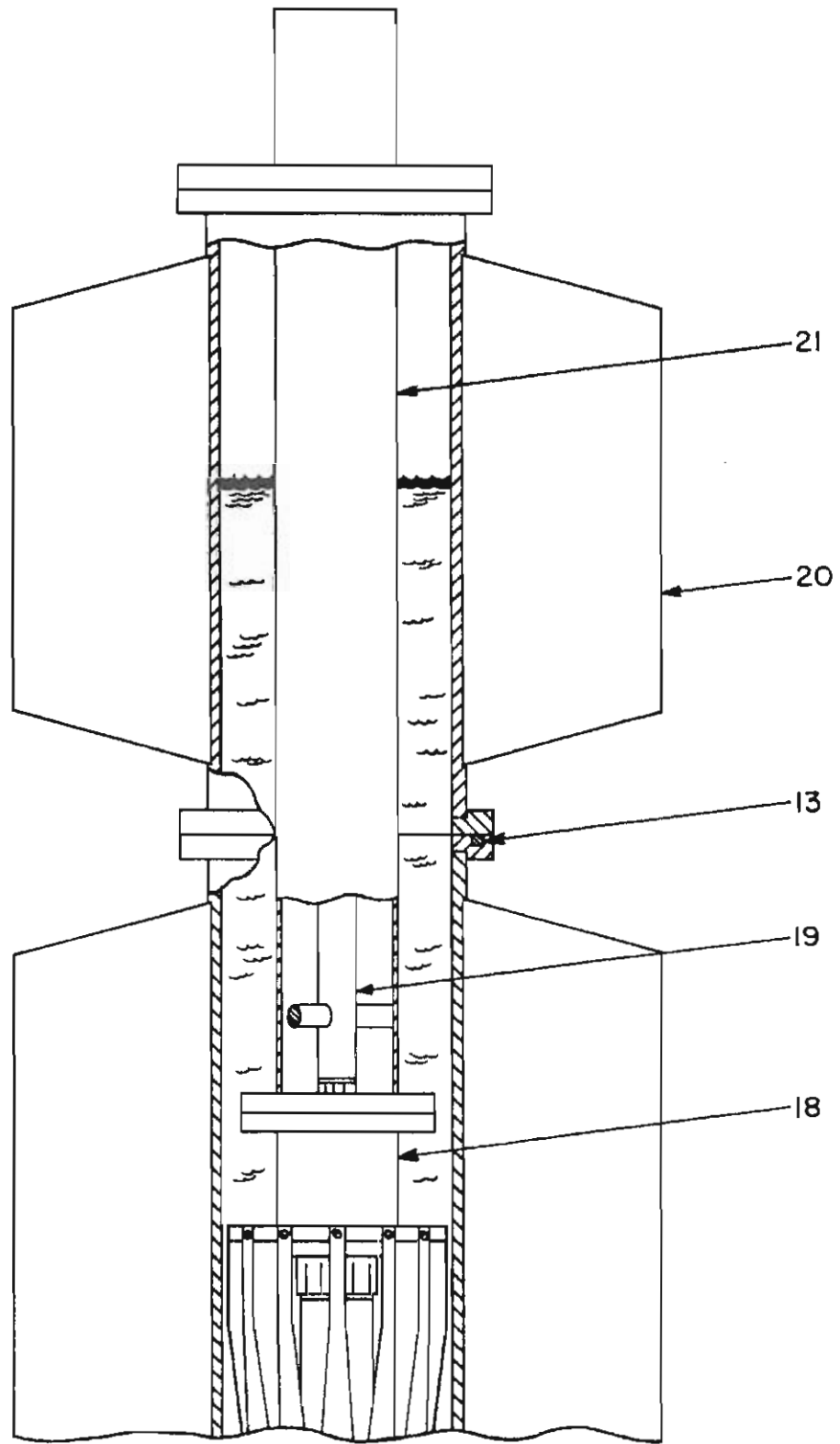




Model 8785C

Fig. 2a Parts Call-out

(Note: All External Parts  
Same as 8785)



Model 8787C

Fig. 2b Parts Different or Additional  
To 8785 Call-Out