GENERAL: This group contains information on the holding tanks and drainage system. It also covers any waste destruction equipment applied to the coach.

SPECIFICS: As applicable

...Drain Hoses

...Drain Hose Storage

...Holding Tanks

...Sink and Shower Strainers

...Valves

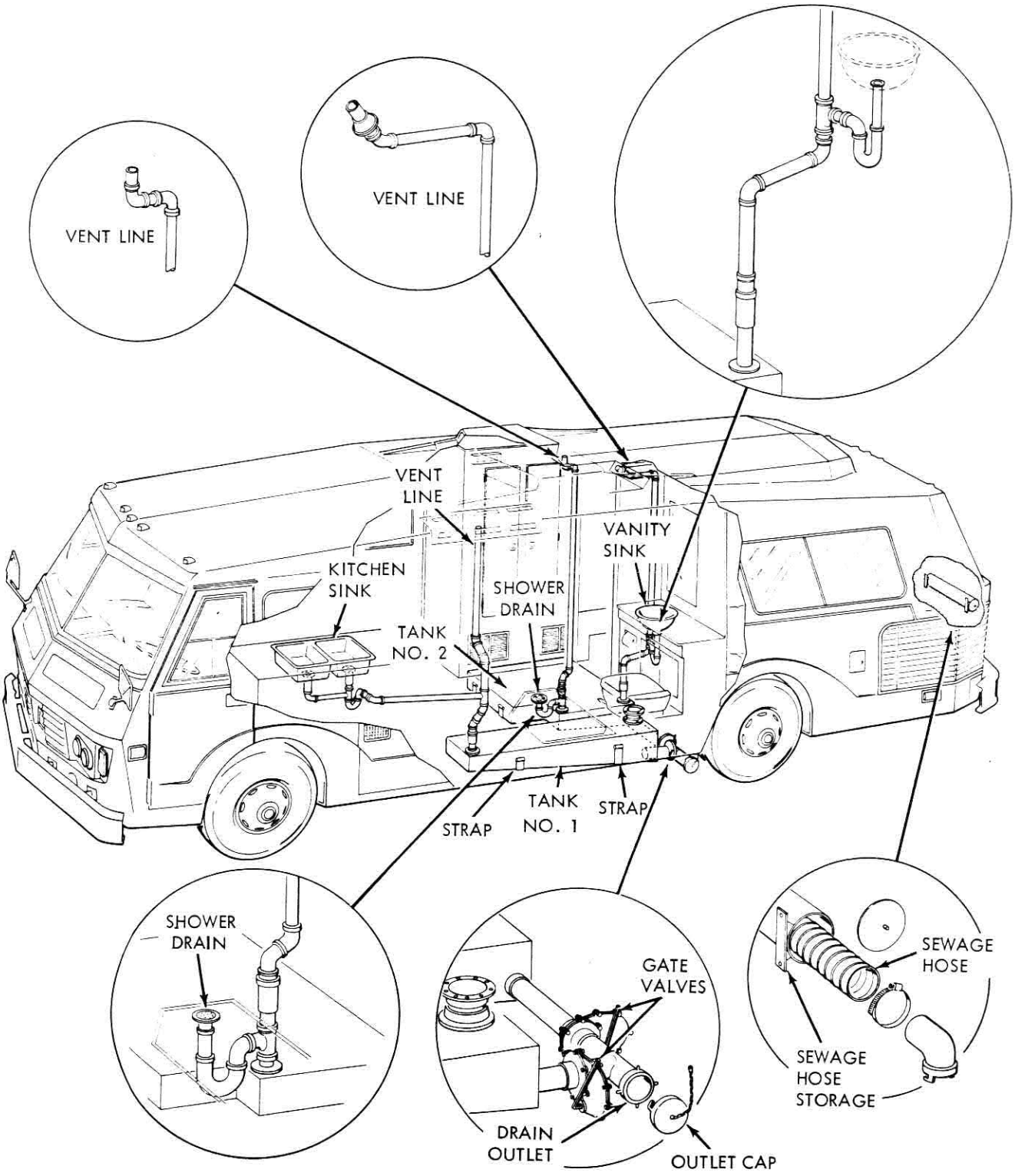
...Ventilation Pipes and Fittings

...Waste Destruction Pump, Injector, Sensor, and Probes

GROUP 35

DRAINAGE SYSTEM

TABLE OF CONTENTS



SD-160

Figure 35-1. Drainage System

GROUP 35

DRAINAGE SYSTEM

35-1. DESCRIPTION (fig. 35-1)

a. General. The drainage system on the coach is designed for both self-containment and sewage hook-up as the camping situation dictates. It includes plumbing for kitchen and vanity sinks, a toilet, and a shower module all connected to plastic holding tanks under the coach. Holding tank No. 1 receives sewage from the kitchen sink and the toilet; tank No. 2 receives waste water from the vanity sink and the shower. Each tank is connected through separate gate valves to a common drain outlet. The drain outlet cap can be removed, and a drain hose (stowed in rear engine compartment) connected to the outlet for draining the tanks. A 2-inch vent line connects the No. 1 tank to a roof outlet and two 1-1/4-inch vent lines are installed into tank No. 2.

NOTE

For details of the shower, see Group 31; for details of toilet and sink, see Group 34; for details of tank level sensors and wiring, see Group 39.

Added to the system as an option is a Waste-Destruct System that will burn off the contents of the holding tanks using the heat of the engine exhaust system (fig. 35-2).

A lamp and switch on the domestic panel (next to driver's seat) indicates the level of fluids in each holding tank. When coach is equipped with a Waste-Destruct System, indicator lamps on the domestic panel light for waste-destruct system conditions. These lamps are: "ready" (RDY), "reaction" (RCT), and "empty" (ETY). A single "Waste-Destruct" switch is used to activate the system.

b. Operational Summary. In operation, the system routes waste water from the kitchen sink and toilet to holding tank No. 1 which has a 37 gallon capacity. All other wastes go to holding tank No. 2 which has a 29-gallon capacity (fig. 35-1). Vent pipes at each tank discharge odors and gasses to the atmosphere above the roof level. Sewage in both tanks is normally agitated by coach motion, which helps to break down the solids to finer particles.

If the coach is equipped with a Waste-Destruct System (fig. 35-2), the sewage is pumped into the waste injector mounted in the right exhaust pipe. The hot exhaust gasses burn the tank contents into harmless particles which are then discharged into the atmosphere. When required, or if coach is not equipped with a Waste-Destruct System, sewage can be drained through the gate valves and drain hose (fig. 35-1) into suitable receivers such as local sewer facilities or camp drainage holes.

Large particles of sewage remain in the bottom of the No. 1 tank until broken down or flushed from the system, although flushing is not normally required. With the drain outlet cap in place, both drain valves should be opened at once, thus interconnecting the two holding tanks to receive any overflow from either tank.

The coach toilet, unlike home facilities, does not use a large volume of water for each flush. Therefore, if waste liquids are allowed to drain immediately, the solids will settle to the bottom of the tank. By keeping the valves closed during use, the solids will be suspended in more liquid; then, during the draining operations, more solids can be carried out with the liquid as the gate valves are opened.

c. Vent System (fig. 35-1). The No.1 holding tank (for sewage water) has a 2-inch air vent that opens to the roof on the left side of the coach. The kitchen sink 1-1/2-inch drain connects to the vent at a tee above the tank. The No. 2 holding tank (for waste water has two 1-1/4-inch air vents with their upper openings to the right of the No. 1 tank vent and further to the rear of the coach roof. A 1-1/4-inch pipe connects the shower pan to the forward vent outlet and the vanity basin to the rear vent outlet. The base sections of the two vents on holding tank No. 2 are made of 1-1/2-inch pipe. The vents supply atmospheric air to aid the water flow down into the holding tanks, and to vent the gasses and "boiled-off" moisture from the tanks.

d. Holding Tanks (fig. 35-1). The holding tanks are made of a seamless plastic, and therefore are completely free of corrosion problems. Each tank is on the underside of the coach and secured by two straps. The drain outlet for both tanks is in front of the coach left rear wheel (fig. 35-3).

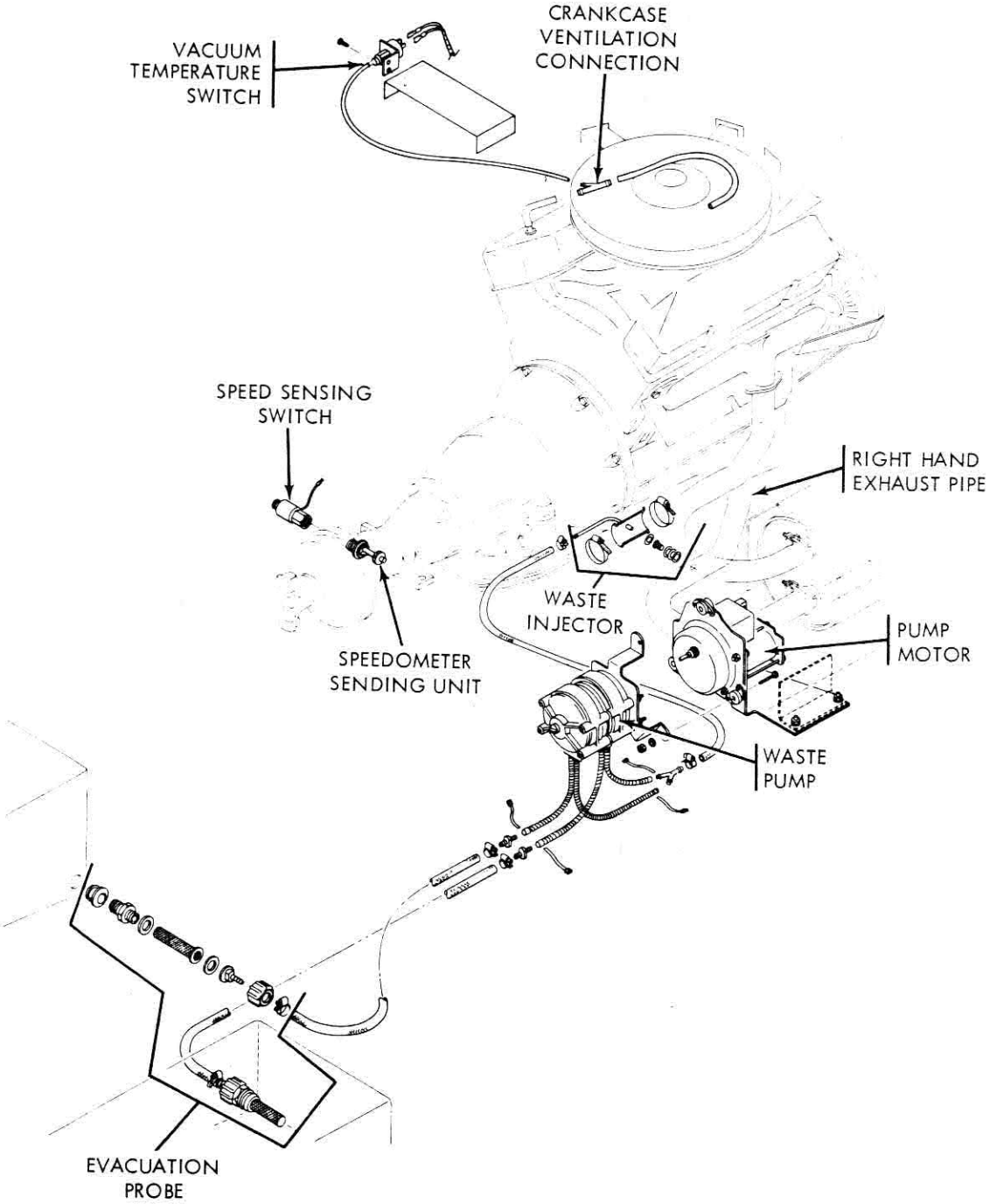


Figure 35-2. Waste-Destruct System

The waste water of the bathroom sink and shower can be drained separately from the sewage water of the kitchen sink and bathroom toilet, but only one connection is required to drain both tanks. This dual-tank feature permits continued drainage of waste water, while sewage water can be retained for later disposal. One holding tank will fill faster than the other (usually tank No. 2 fills first). In an emergency or special situation, both tanks can be interconnected to allow a greater holding capacity. The holding tanks are interconnected by tightly securing the outlet cap, then opening both valves to allow the tank fluids to reach a common level.

> ***Caution***
>
> Avoid discarding paper products with "wet strength" (Kleenex and napkins) and cloth articles into tanks. Over-filling of tanks results in liquids backing up into the piping system.

Even with usual operation of the waste-destruct system, occasional draining of the holding tanks (using conventional sewer hookups) is recommended. Tanks should be drained a minimum of once each year to remove any foreign particles that may remain. To reduce chance of a frozen holding tank, it is recommended that an approved antifreeze solution (such as Thetfords Aqua-Thaw) be added to the tanks.

The fluid level in each holding tank is checked by moving the toggle switch on the domestic panel upward. Three conditions are indicated: "1/4," "1/2," and "FULL." The toggle switch returns to the off (down) position when released. If false indications appear for holding tank level, check main tank sending unit wiring (Group 39).

e. Waste Valves/Hose (fig. 35-3). The closest gate valve handle to the drain outlet controls the drainage of tank No. 1 (kitchen sink and toilet), and the other valve controls tank No. 2 (vanity sink and shower). The waste valves control the discharge of waste material from the holding tanks. The control levers can be easily reached for operation. Each spring-loaded valve can be locked in either the open or closed position and each waste valve handle can be removed for safekeeping. To remove either handle, release the cotter pin (at the secured end of the handle) and pull the handle from the socket. The 3-inch internal diameter flexible drain hose connects between the main drain outlet and the disposal station facilities to permit safe and sanitary drainage of all waste materials. The drain hose has a universal connector that should fit all standard installations. The hose is stored in the rear engine compartment and is easily accessible. Because the output from the two gate valves connects into a single discharge pipe, only one drain connection is required for both tanks.

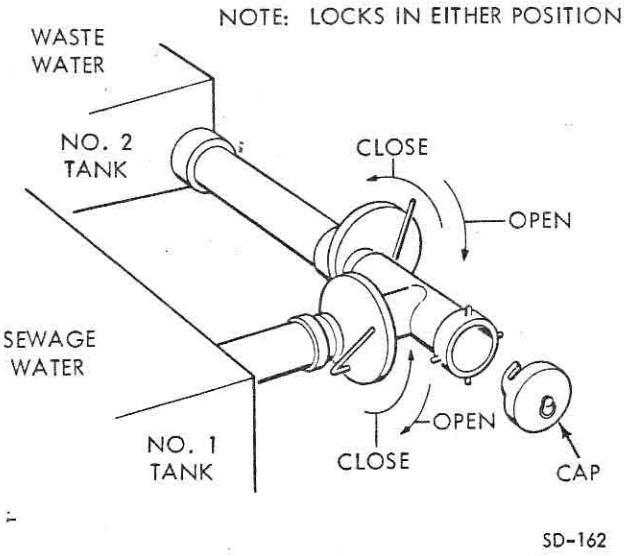


Figure 35-3. Drain Outlet and Valves

f. Waste-Destruct System. The Waste-Destruct System (optional) of the drainage system consists of a waste pump, injector, evacuation probes, tubing and switches. A speed-sensing switch (mounted on the speedometer sending unit) in conjunction with a vacuum-temperature switch (mounted in the rear engine compartment) allow the Waste-Destruct System to be activated when coach speed and exhaust pipe temperature requirements are just right. The system will not activate unless the coach speed exceeds 35 miles/hour, and the exhaust pipe temperature is high enough to completely burn off the contents of the holding tanks. The vacuum-temperature switch is piped into the engine crankcase ventilation lines and thereby senses both engine vacuum and engine temperature. Engine temperature is then correlated to exhaust pipe temperature and if high enough the system is activated; if not the system will not go on. Holding tank sensors send signals to the domestic panel to indicate that the system has completed the burning and can be turned off.

Within the holding tanks a chemical-biochemical reaction is developed by the action of water, air, and waste matter. By setting the Waste-Destruct switch on the domestic panel the system is ready to begin its burning cycle. If the coach is moving above 35 miles/hour and the exhaust temperature is high enough, the contents of the tanks will be pumped into the injector at the right hand exhaust pipe. The stainless steel injector screens and

sprays the contents into the exhaust pipe where they are destroyed by the heat of combustion. All of this material is rendered invisible, bacteria free and harmless.

NOTE

The speed sensor may react (RCT) at a higher road speed (about 10%) during the winter months. This is due to a greater heat loss at the exhaust pipe.

35-2. TROUBLESHOOTING

a. General. Troubles in the drainage system include Waste-Destruct System malfunctions, plumbing leaks and blockage, and failure of waste-destruct parts or the waste valves. Troubles could occur from misuse, freezing, improper maintenance, or defects in parts.

b. Troubleshooting Drainage System. Troubleshoot problems in the drainage system in accordance with table 35-1.

Table 35-1. Troubleshooting Drainage System

Malfunction (symptoms)	Probable causes	Corrective action (remedies)
Overflow of waste water	Holding tanks full	Drain and flush; refer to paragraph 35-4f.
	Drain blockage	Remove blockage; refer to paragrpah 35-4c.
Slow draining of waste water	Drain or vent blockage	Clear drain or vent, refer to paragraphs 35-4c and 35-4d. If weather is freezing; refer to paragraph 35-6f.
Waste water leakage in coach	Damaged pipes or loose connections	Check and tighten threaded joints (sleeves on drains, and sink strainer connections). If necessary, install new teflon tape thread sealant; refer to paragraphs 35-3b. and 34-3c. Replace damaged pipes; refer to paragraph 35-5c.
Waste water leakage below coach	Damaged tanks or plumbing parts, loose connections	If joints at holding-tank bosses leak, remove tank and tighten connection; refer to paragraphs 35-3h and 35-3i. Repair or replace damaged tanks or plumbing pipes as required; refer to paragraphs 35-3 and 35-5.
Waste valve sticks in open or closed position	Clogged or damaged valve	Clean or replace valve; refer to paragraph 35-4e.
Excessive odors in coach	Odor-control chemical needed	Add odor-control chemical to each tank through shower and toilet

Table 35-1. Troubleshooting Drainage System – Continued

Malfunction (symptoms)	Probable causes	Corrective action (remedies)
Excessive odors in coach (continued)	Blocked vents	Unblock vents; refer to paragraph 35-4d. In snowy weather; remove any snow blockage.
Indicator lamp inoperative or in error	Bulb burned out, defective circuit or switch	Replace bulb, or check and repair as necessary; refer to Group 39
RCT light flickers on and off	Faulty speed sensor	Replace; refer to paragraphs 35-3r and 35-3s
ETY light is off, but holding tanks are empty	ETY bulb burned our to loose	Replace defective bulb, tighten loose bulb
ETY light is off, but holding tanks are empty (continued)	Poor circuit connections	Remove any terminal corrosion on outside connections and tighten loose ground wiring connections
	Faulty wiring or connections in holding tank sensor circuit	Repair circuit with either one of the sensor leads shorted, the empty light will not operate
	Open ETY indicator circuits or shorted	Repair circuit; refer to Group 39
	Open or shorted ETY indicator circuit	Repair circuit; refer to Group 39
Noticeable odors outside of coach with waste destruction system operating	Worn or damaged waste-destruct hoses	Replace; refer to figure 35-2.
	Injector junction leak	Remove injector and replace asbestos gaskets; refer to paragraph 35-3n. and 35-3o
	Defective injector	Replace; refer to paragraph 35-3n and 35-3o
	Vacuum switch and speed sensor switch not controlling	Inspect and correct Waste-Destruct System operation; refer to paragraph 35-3g and 35-3h
RDY or RCT indicators do not light	Poor circuit connections	Remove any corrosion and tighten loose wiring connections and harness connector
	Blow inline fuse	Replace inline (5 amp) fuse. If fuse blows again, check and repair shorts; DO NOT INCREASE RATING OF FUSE; refer to Group 39

Table 35-1. Troubleshooting Drainage System – Continued

Malfunction (symptoms)	Probable causes	Corrective action (remedies)
RDY or RCT indicators do not light (continued)	Worn or defective switch	Replace waste-destruct switch on domestic panel; refer to Group 39.
RDY light on but RCT does not light after coach exceeds 35 mi/hr	Burned out or loose RCT bulb	Replace or tighten
	Poor circuit connections	Remove any corrosion and tighten loose wiring connections
RDY light on but RCT does not light after coach exceeds 35 mi/hr – continued	Defective REACTION circuits on domestic panel	Ground blue lead of sensor; if RCT lamp does not light; repair/replace transistor or biasing circuits; refer to Group 39
	Faulty vacuum temperature switch or speed sensor	After performing above three remedies satisfactorily, ground lead to speed sensor, then run engine up to 1500 rpm. If RCT light does not turn on, replace vacuum switch; refer to paragraph 35-3t. and 35-3u. If light turns on, replace sensor switch; refer to paragraphs 35-3r and 35-3s
With RCT light on, RDY does not light, but system operates	Poor circuit connections	Remove any corrosion and tighten loose wiring connections
	Burned our RDY bulb	Replace
RDY and RCT lamps indicate operation, but system is not reducing tank contents	Pump not working	Remove any terminal corrosion and tighten loose wiring connections
	Pump working, but waste not being injected into exhaust pipe because of clogged screen in holding tank	Remove holding tank evacuation probes and inspect for a clogged screen; flush screen as required, then replace probe
	If pump is working and screen cleaned, hoses may be constricted or clogged	Remove constriction, unclog hose, or replace hose as necessary
	Loose hose clamps and/or evacuation probe	Tighten loose clamps and/or secure evacuation probe firmly into tank grommet (so system pumps waste only)
RCT light remains on during engine deceleration	Defective vacuum temperature switch	Replace; refer to paragraphs 35-3t and 35-3u

Table 35-1. Troubleshooting Drainage System – Continued

Malfunction (symptoms)	Probable causes	Corrective action (remedies)
RDY and RCT light intermittently	Poor ground wiring connections or battery negative connection	Remove any terminal corrosion and tighten loose connections.
RDY and RCT light at a constant rate	Poor battery terminal connections	Clean and tighten battery terminals (especially negative post) as necessary; refer to Group 0

35-3. REMOVAL/INSTALLATION

a. General. This paragraph contains procedures for removal and installation of plumbing, holding tanks, waste valves, drain traps, strainers, and parts of the waste destruct system. See figures 35-2, 35-3, and 35-4.

b. Drain Strainer Removal.

(1) Shower drain strainer is removable by placing a wire, screwdriver, or similar tool in a hole of the strainer, then lifting out with a slight lever action.

(2) Either kitchen sink strainer is removable by unscrewing the treaded metal sleeve directly below sink, then unscrewing strainer upward.

c. Drain Strainer Installation. To install any drain strainer, reverse removal procedures given in paragraph 35-3b.

d. Toilet/Plumbing Removal. To remove the toilet plumbing, proceed as follows:

(1) Remove toilet; refer to Group 34.

(2) Unscrew closet flange and pipe nipple as a unit.

(3) If defective, remove spacer seal.

e. Toilet/Plumbing Installation.

(1) If removed, install spacer seal.

(2) If replacing nipple and/or flange, cement them together; refer to paragraph 35-5c,(8), but cement flange to nipple (instead of coupling to pipe).

(3) Screw nipple flangeunit into mounting boss in holding tank; use teflon tape on external threads.

(4) Wrap some tape on upper threads of nipple, then screw toilet flange on nipple.

(5) Install toilet; refer to Group 34.

f. Plumbing Pipe Removal. To remove drain and vent pipes, follow procedures in steps (1) through (5) of paragraph 35-5c. The pipe is permanently fuzed together by the solvent cement, so must be sawed apart except at threaded sleeve joints on traps and threaded bosses in holding tanks.

g. Plumbing Pipe Installation. To install drain or vent pipe, follow procedudures in steps (6) through (11) of paragraph 35-5c.

h. Holding Tank Removal. To remove either holding tank, proceed as follows:

(1) If tank contains liquid, drain it; refer to paragraph 35-4e.

(2) If holding tank No. 1 is to be removed, remove toilet; refer to paragraph 35-3d.

(3) Gain access to base of plumbing stack(s) at top of holding tank.

(4) Cut pipe at lowest point where it can conveniently be rejoined with a pipe section and two repair couplings. Remove a section at least 4 inches long (for clearance of couplings). Retain pipe section for reinstallation.

(5) On holding tank No. 2, gain access to shower trap and disconnect it at threaded sleeve closest to pipe stack.

(6) Unscrew plumbing from tank boss(es).

(7) Loosen trunnion nut on each of the two tank-support straps.

(8) Remove nut, washer, and bolt from one end of each strap, then lower tank and remove it.

i. Holding Tank Installation. To install a holding tank, proceed as follows:

(1) Position tank under vehicle, then mount free end of strap with bolt, washer, and new locknut.

(2) Install and tighten new trunnion locknut to secure tank in position.

(3) On lower end of pipe section(s) to be reinstalled, wrap external threads with teflon tape.

(4) Screw pipe section(s) securely into boss(es) of holding tank.

(5) Join severed ends of pipe with two new sleeves and the pipe section previously cut out.

j. Waste Valve Removal. To remove a waste valve, refer to figure 35-3 and proceed as follows:

NOTE

If waste valve is clogged, refer to paragraph 35-4e.

(1) Remove six screws from each of the two waste valve flanges.

(2) Remove outlet sanitary tee as a unit with attached parts.

(3) Remove two seals.

k. Waste Valve Installation. To install a waste valve, proceed as follows:

(1) Install two seals between each flange and waste valve.

(2) Secure outlet tee to each valve with six screws in each valve flange.

(3) Check for free operation of valve lever and attached gate.

l. Drain Trap Removal. To remove a drain trap, proceed as follows:

(1) Gain access to trap (open doors below sink or vanity basin).

(2) On shower or basin trap, unscrew both threaded sleeves and remove trap.

(3) On kitchen sink trap, unscrew threaded sleeve on trap; then remove both strainers; refer to paragraph 35-3n(2).

m. Drain Trap Installation. To install a drain trap, reverse removal procedures given in paragraph 35-31.

n. Waste-Destruct Injector Removal. To remove the injector from the right exhaust tail pipe, proceed as follows:

(1) Loosen hose clamps on red tubing attached to the injector.

(2) Remove red tubing from injector.

(3) Remove two clamps securing injector assembly to exhaust pipe.

(4) Remove injector from exhaust pipe.

o. Waste-Destruct Injector Installation. To install injector into exhaust tail pipe, proceed as follows:

(1) Insert screen end of injector into hole in right exhaust pipe.

(2) Wrap band clamps around each end of injector assembly and secure with locking bolt.

(3) Attach red rubber hose from pump onto injector.

Caution

Route hose so that it is clar of hot exhaust pipes. If any hose does not allow a minimum of 2 inches clearance around hot exhaust pipes, replace hose.

p. Waste-Destruct Pump Removal. To remove the waste pump, proceed as follows:

(1) Remove two grey plastic hoses (pump to holding tanks), and mark hoses for proper installation of new pump.

(2) Remove red rubber hose (pump to injector), and mark hose for new pump.

(3) Disconnect pump wiring harness.

(4) Remove two bolts holding pump to coach frame.

(5) Remove waste pump.

q. Waste-Destruct Pump Installation. To install the waste destruct pump, proceed as follows:

(1) Insert two bolts through base of pump and coach frame, and secure with mating washers and nuts.

(2) Attach red rubber hose to injector in right exhaust pipe.

NOTE

If the proper procedure was performed during pump removal, the hose should be marked.

(3) Attach grey hoses to waste holding tanks.

(4) Connect pump wiring harness.

(5) Inspect hoses for leaks and deterioration; repair and/or replace as required.

r. Speed Sensor Switch Removal. To remove speed sensor switch from forward end of transmission, proceed as follows:

(1) Disconnect one lead to sensor.

(2) Disconnect speedometer cable from speed sensor.

(3) Remove speed sensor from speedometer sender unit on transmission.

s. Speed Sensor Switch Installation. To install speed sensor switch, proceed as follows:

(1) Install on speedometer sender unit on transmission.

(2) Connect speedometer cable onto speed sensor.

(3) Connect sensor lead to wire which is routed to vacuum temperature switch.

t. Vacuum Temperature Switch Removal. To remove vacuum temperature switch gain access through right rear right engine service door and proceed as follows:

(1) Pull wiring clips from vacuum switch.

(2) Slip ventilating hose from end of switch.

(3) Hold switch housing firmly, then remove brass nut.

(4) Remove vacuum switch from mounting bracket.

u. Vacuum Temperature Switch Installation. To install the vacuum switch

(1) Position switch into mounting bracket.

(2) Secure vacuum switch with mating brass nut.

(3) Slip exhaust ventilating hose on brass end of switch.

(4) Connect wiring clips on rear end of switch.

(5) Inspect "Y" fitting in ventilating hose for leaks and hose deterioration.

v. Evacuation Probe Removal. To remove evacuation probe from holding tank, proceed as follows:

(1) Drain and flush system.

(2) Remove grey hose from probe to be removed (holding tank No. 1 or 2).

(3) Unscrew and remove probe assembly from coach.

w. Evacuation Probe Installation. To install evacuation probe into holding tank, proceed as follows:

(1) Carefully insert probe into tank, and tighten 1/4 turn beyond finger tight.

(2) Connect gray hose to probe, and secure with hose clamp.

35-4. INSPECTION/CLEANING

a. General. This paragraph contains procedures for inspection, cleaning, and special maintenance (winterization) of the drainage system. Cleaning includes flushing of the system and removal of any blockage.

b. Inspection. To inspect plumbing for serviceability, proceed as follows:

(1) Check each plumbing unit for clogged drains by running 1 to 2 quarts of water into each one and observing water for free flow through drain trap of each unit. Remove any blockage; refer to paragraph 35-5c.

(2) Observe holding tanks and visible plumbing under counter tops and coach for signs of leakage. Repair leaks; refer to paragraph 35-5.

(3) With both drain valves closed, place a bucket under outlet, then slowly remove drain outlet cap. Check for (and remove) any outlet obstructions.

(4) Connect drain hose to drain outlet, then open drain valves and observe hose end for free flow of drainage. If there is no drainage flow, close both valves, and clean drain outlet; refer to paragraph 35-4c.

(5) Inspect basin, sink, showerpan, and toilet for damage and proper caulking. Repair and recaulk as necessary; refer to paragraph 35-5b.

(6) Inspect the two straps securing each holding tank for serviceability and tightness. If necessary, replace or tighten strap; refer to paragraph 35-3h and 35-3i.

c. Removing Drain Blockage. To remove drain blockage, proceed as follows:

(1) Use a plunger at drain opening to push out blockage. Add water to drain as necessary for flushing out blockage.

Caution

Do not use solvents, acids, or cleaning chemicals on plumbing; they could soften, crack, or dissolve the plastic pipes.

(2) If blockage remains, use a small-wire hand-operated plumbers "snake" in clogged pipe. If drain is at sink or shower, remove strainer for access. To remove metal stopper from vanity basin, refer to Group 34.

(3) To aid removal of blockage, use plumbers tool through roof plumbing vents if feasible.

Caution

Use plumbers tool carefully to avoid damage to pipe, and especially at elbows and other bends.

(4) If blockage is apparently only loosened, add water to fill trap in blocked line, then use plunger again.

(5) If blockage remains, and is apparently in a trap, remove (clean) and then install trap; refer to paragraph 34-3l and 35-3m.

(6) If blockage is not removed, cut blocked section out and replace it; refer to paragraph 35-5c.

d. Removing Vent Blockage. To remove vent blockage, proceed as follows:

(1) Probe blocked vent from its open end on roof to determine how far down the blockage is and, if possible, nature of the blocking material.

(2) If possible, use wire with a hook on end to pull out blockage.

(3) If blockage is not removed with wire, insert a small-wire hand-operated plumbers "snake" in vent and turn it until it is felt to engage blockage. Pull tool out of vent. If blockage doesn't come out, repeat use of tool to drive blockage down into holding tank.

NOTE

In rear two vents, blockage should be felt to move more freely where the 1-1/4 inch vent pipe joins the 1-1/2 inch pipe.

(4) If necessary, flush holding tank to remove blockage; refer to paragraph 35-4e.

NOTE

Tank outlet tubing is about 3 inches in diameter and should not be fouled by blockage.

(5) If blockage is not removed, cut out blocked section and replace it; refer to paragraph 35-5c.

e. Removing Waste Outlet Blockage. To remove blockage at the coach waste outlet, proceed as follows:

(1) With both waste valves closed, if possible, place a bucket under drain outlet.

(2) Slowly remove outlet cap to allow any trapped fluids to flow into bucket.

(3) Visually check that there are no obstructions between outlet opening and waste valves. Remove any obstructions.

(4) Slowly open each gate valve a small amount to check for flow of fluids. If a valve is constricted, use a stiff wire (with hooked end) to probe through partially open waste valve. Be ready to close valve immediately in case blockage is suddenly removed.

> ***Caution***
>
> Avoid damaging plumbing or valves with wire or other probe.

(5) If blockage cannot be removed, remove all screws from flanges of valve that works correctly and slightly loosen screws on other valve to permit tank to drain gradually into suitable container.

(6) After tank drains, remove screws from flanges of defective valve, then remove drain outlet pipes as a unit.

(7) Remove defective valve, and remove blockage or replace valve.

(8) Check that there is no further blockage in tank outlet to valve that was clogged.

(9) Install waste valves; refer to paragraph 34-k.

(10) Flush tank connected to valve that was clogged; refer to paragraph 35-4e.

f. Drain/Flush Holding Tanks. To drain and flush either or both holding tanks, proceed as follows:

(1) If sewage water system has been allowed to drain continuously into a sewage facility (since the last time it was flushed), solid wastes remaining in holding tank No. 1 should be reduced to smaller suspended particles as follows:

(a) Check that waste valves are closed, then pour water through toilet to half fill tank.

(b) Agitate material in tank by driving coach several miles.

(2) With both valves closed, place a bucket under drain outlet, then slowly remove cap to release any trapped water (between valves and cap) into bucket.

(3) Remove drain hose from stowage container.

(4) Insert hose fitting in outlet, then turn hose clockwise for secure engagement. Position hose so entire length is level or leads downward (without sags).

(5) Place (or connect) open end of drain hose at opening of sewer facility.

(6) Open both drain valves.

(7) After tanks drain completely, close both drain valves.

(8) At toilet or shower drain, add about 20 gallons of water to tank, to insure flushing loose all settled material.

(9) Open both waste valves.

(10) When tank is drained, close both valves.

(11) Add about 1/2 gallon of water, with an odor-control chemical, to each tank through shower or toilet.

(12) Remove drain hose, flush it clean, then place it in stowage tube.

(13) Securely install drain outlet cap.

(14) Wipe up any spilled fluids.

g. Waste Destruct System Checkout (fig. 35-2). Inspect the injection pump, evacuation probes, injector probe, tubing, and sensors during system operation. Check the system for clogged lines, leaks, and system deterioration, and all electrical connections. Be especially watchful of tube connectors (injector) around the right hand exhaust pipe. Holding tank odors may be caused by a faulty injector probe gasket or hose leak. If all gaskets and clamps are tight, add a chemical deodorizer such as "Aqua Aire" or "Aqua Kem" to the holding tanks. Aqua Aire is used to control bacterial odors that may occur in the holding tanks and associated piping. Aqua Kem helps to emulsify wastes and aids in a more sanitary and odor free operation.

To prepare for functional operation, completely flush and drain both holding tanks and refill with approximately 2 gallons of fresh water and a suitable deodorizer. Ground the lead of the speed sensor (at coach transmission) and remove injector from the right exhaust pipe. Turn on switch

on domestic panel and start coach engine. Accelerate engine slowly up to 2000 rpm and measure quantity of fluid being pulsed through the injector. The volume should be about 3 to 5 gallons/hour.

35-5. REPAIR

a. General. This paragraph contains procedures for repair of the Waste-Destruct System, plumbing repair, and caulking of the kitchen sink.

b. Plumbing Pipe Repair. To repair damaged or blocked sections of the plumbing vent or drain piping, proceed as follows:

(1) Gain access to defective plumbing pipe or, if applicable, open access at bottom of sink or vanity basin.

(2) If applicable, disconnect plumbing at threaded sleeve or sink trap (all traps are connected by one or more threaded sleeves).

(3) If plumbing unit (trap and pipes) below kitchen sink is to be removed, use wrench to loosen sleeve nut at sink strainer. Screw out each strainer, then remove as a unit.

(4) With a fine tooth saw, cut out section of defective pipe with ends as perpendicular as possible to sides of pipe. Remove defective section.

(5) Use defective pipe section to measure and mark new section on same size and type of pipe.

(6) Use a fine-tooth saw in a mitre box to cut perpendicular ends at marks on new pipe. Remove any burrs or sharp edges, then wipe ends of pipe clean.

NOTE

Remove any oil or grease with a clean cloth soaked in paint thinner. If inside of coupling has a pipe stop shoulder, cut coupling in half and remove shoulder. Use each coupling half as a separate coupling in repair procedures. If coupling half is too short, remove shoulder from a coupling for use in repair.

(7) Wipe inside of the two couplings clean, then check pipe for full engagement with couplings.

(8) Bond pipe and couplings in place with solvent cement such as GSR No. 945.

NOTE

For bonding PVC pipe to ABS pipe use cement such as GSR No. 955.

(a) Remove one coupling and coat inside with an even, moderately thick, coating of solvent. Apply solvent to ends of pipes, coating entire mating surfaces.

(b) Slide coupling onto pipe, insert other end of pipe in couplings, center coupling on joint, then quickly twist coupling 1/4 of a turn.

NOTE

Twisting helps to spread the solvent evenly.

(c) Because joints set up in approximately 2 minutes, perform steps above for other end of pipe.

NOTE

Setting of joints is slower in damp air.

(9) If kitchen sink drains were removed, install. To install, reverse the removal procedures outlined above.

(10) Reinstall any removed traps securely at threaded joints, using teflon tape on external threads.

(11) Reinstall coach parts removed to gain access.

c. Sink caulking Repair. To recaulk flange of kitchen sink, proceed as follows:

(1) Carefully remove all caulking, using a putty knife or similar tool.

(2) Wipe and blow caulking particles away.

(3) Apply caulking compound to fill cavities under sink flange.

(4) Wipe away excess compound to retain a neat and clean patch with old caulking.

d. Waste-Destruct System Repair. The Waste-Destruct System has been designed for minimum maintenance and all bearings are sealed and no lubrication or adjustments are required.

(1) Injector. The injector on the coach exhaust pipe is made of stainless steel and it will adhere to a rusty exhaust pipe. Any repair of the exhaust system must be done with care, particularly when removing the injector from the exhaust pipe. Take care not to damage the probe or lose any of the small washers on the probe. Keep injector clamps tight on exhaust pipe.

(2) Destruct Pump. If tubing which runs through the pump becomes damaged and must be replaced, proceed as follows:

(a) Remove pump by unscrewing two bolts holding pump to bracket.

(b) Remove four screws holding plastic housing around tubes.

(c) Remove the defective tubes. Should the roller assembly release from the pump body, push it back into position.

(d) Insert new tube between rollers and pump body. If necessary, slightly stretch the tube so that it slides easily into position.

(e) Assemble the pump and make sure pump cover fits tight against pump body.

NOTE

Make certain tube is not pinched at point of entry into pump.

(f) Tape two hoses together just below pump outlet.

(g) Place pump in coach. Make sure the grey hose is connected to the holding tanks and the red hose connected to the injector assembly. When viewed from the plastic housing end, the pump turns counterclockwise and the inlet hoses are the side nearest the coach frame.

35-6. GENERAL INFORMATION

a. General. This paragraph contains general information and summary tables of data contained in the previous paragraphs.

b. Fluids and Capacities. Fluids used in the drainage system and capacity of the holding tanks are given in table 35-2.

c. Drainage Pipe/Hose Sizes. Specifications and pipe sizes for the drainage system are shown in table 35-3.

d. Plumbing Repair Materials. Material required for repair of plumbing in the drainage system is listed in table 35-4.

Table 35-2. Fluids and Capacities

Item	Use	Capacity
Holding tank No. 1	Stores sewage water from kitchen and toilet	37 gallons
Holding tank No. 2	Stores waste water from vanity basin and shower	29 gallons
Antifreeze	Used in holding tanks	As required
Odor control chemical	Used in holding tanks	As required

Table 35-3. Drainage Pipe/Hose Sizes

Item	Location	Specifications
Drain hose	In storage compartment rear of engine compartment	3 inch ID x 10 feet long
Vent pipe	Holding tank No. 2	1-1/4 inch ID ABS-1
Vent pipe	Holding tank No. 1	2 inch ID PVC
Drain trap and pipe	Kitchen sink	1-1/2 inch ID ABS-1
Drain trap and pipe	Vanity basin	1-1/4 inch ID ABS-1
Toilet	Toilet to holding tank No. 1	3 inch ID ABS-1

Symbol Code:
ABS – Acrylonitrile Butadiene Styrene
PVC – Polyvinylchloride

Table 35-4. Plumbing Repair Materials

Item	Specifications	Application
Solvent cement	GSR #945	Joining pipe
Solvent cement	GSR #955	Bonding plastic PVC to ABS-1
Tape	Teflon	External thread lubricant
Caulking compound	Dap, Rely-On	Sealing sink flange
Pipe coupling	1-1/2 inch ABS	Pipe repair sections
	2 inch ABS	Pipe repair sections
Pipe	1-1/4 inch ABS	Vent pipe repair
	1-1/2 inch ABS	Plumbing repair
	2 inch ABS	Plumbing repair
	2 inch PVC	Forward vent pipe repair

Symbol Code:

ABS – Acrylonitrile Butadiene Styrene
PVC – Polyvinylchloride

e. Anti-Freeze Treatment. To prevent freezing of water in the drainage system during cold weather, proceed as follows:

(1) Obtain an approved anti-freeze solution, such as Thetford "Aquathaw" or equal.

(2) Add proper quantity (per label) into holding tanks through vanity basin and run about 1 quart of water through sink to move anti-freeze out of sink trap.

(3) Add proper quantity (per label) into holding tanks through vanity basin and run about 1 quart of water through basin to move anti-freeze out of basin trap.

> *Caution*
>
> Do not use a petroleum product as an anti-freeze agent. Softening, cracking, or dissolving of plastic plumbing parts might result.

f. Storage Winterization. To winterize the coach drainage system for winter storage, proceed as follows:

(1) Drain water storage tanks.

(2) Open all fresh water valves.

(3) Drain and flush both holding tanks; refer to paragraph 35-5e.

(4) To prevent freezing of residual water in traps of sink, basin, toilet, and shower, add a small amount of an approved anti-freeze, Thetford "Aquathaw" or equal, to each unit.

Motor Coach Division
333 Brokaw Road Box 664 Santa Clara California 95052

☐ MANDATORY ☒ INFORMATIONAL

Service Bulletin

DATE December 2, 1974 NUMBER 2935-40001

ATTENTION: SERVICE MANAGERS AND OWNERS

GROUP
35

SUBJECT
WASTE TANK GATE VALVES

MODEL (S) AFFECTED
2900R & 2900C

(Factory Use Only)
Information added to:

OWNER MANUAL (S)

SERVICE MANUAL (S)

PARTS MANUAL (S)

WARRANTY MANUAL (S)

OTHER

DESCRIPTION

A short time ago an irate owner called our attention to an error in the section dealing with waste tank gate valve operation in his 2900R Owners Manual. This owner remarked that "he was sorry he used the ****manual". His frustration with us is understandable and we are grateful to him for this correction. Hopefully, an error on our part will not stop our customers from reading their owners manual, as we believe that it contains much valuable information.

CORRECTION

The operation of the gate valves in the Owners Manual (2900R Figure 5-42 and 2900C Figure 4-24) is not correct for all coaches. This is due to the different positioning of the waste gate valves on the drainage pipes. The position of the gate valve on the pipe determines the direction of movement of the handle for opening and closing each valve (see Figure Views A to D).

Before using your coach add water to each waste tank through toilet for the outboard tank and through shower drain for inboard tank. Operate the valve handle to determine OPEN and CLOSE for each tank. At same time read the indicator on the domestic panel (leave some water in one tank) to determine if holding tank "1" (inboard) or "2" (outboard) is being read.

On some coaches the wiring connections at the domestic panel were reversed. This will not affect the operation of your coach, but you should know which tank you are reading when you press the "holding tank No. 1" or "holding tank No. 2" switch on the domestic panel.

The handle to the inboard tank was changed during production, and your coach could have either an offset type of handle (view C used to approximately coach 00299) or a straight type of handle (view D used from approximately 00300 up). The offset type "hooked in" behind the valve, while the straight

[illegible]

AS OUTLINED IN THIS BULL[illegible]

RVD-84 (6-73)

333 Brokaw Road Box 664 Santa Clara California 95052

☐ MANDATORY ☒ INFORMATIONAL

Service Bulletin

DATE December 2, 1974 NUMBER 2935-40001

ATTENTION: SERVICE MANAGERS AND OWNERS

GROUP 35

SUBJECT
WASTE TANK GATE VALVES

MODEL (S) AFFECTED
2900R & 2900C

(Factory Use Only)
Information added to:

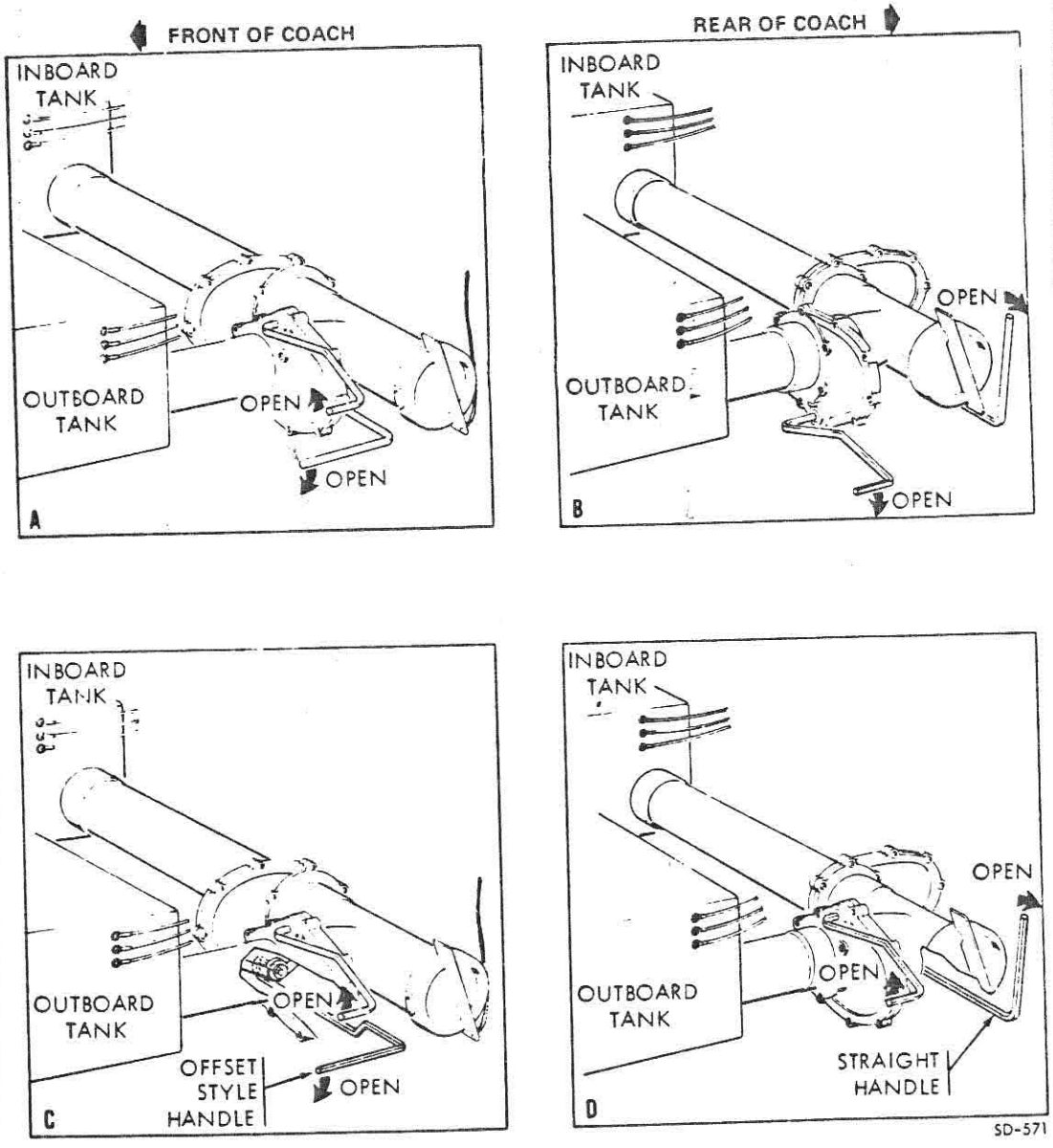
OWNER MANUAL (S)

SERVICE MANUAL (S)

PARTS MANUAL (S)

WARRANTY MANUAL (S)

OTHER



333 Brokaw Road Box 664 Santa Clara California 95052

☐ MANDATORY ☒ INFORMATIONAL

Service Bulletin

DATE December 2, 1974 NUMBER 2935-40001

ATTENTION: SERVICE MANAGERS AND OWNERS

GROUP 35

SUBJECT: WASTE TANK GATE VALVES

MODEL (S) AFFECTED: 2900R & 2900C

handle fits directly into the front of the valve.

MARKING

After you have determined the correct handle position for your coach, and which tank is No. 1 and which is No. 2 at the domestic panel, we suggest you mark these for your future use.

Max L Snavely
MAX SNAVELY
Service Manager

(Factory Use Only)
Information added to:

OWNER MANUAL (S)

SERVICE MANUAL (S)

PARTS MANUAL (S)

WARRANTY MANUAL (S)

OTHER