

Troubleshooting

Gems 37000 Series Multi-Meter Receivers and TLI Systems

If trouble should develop: first, perform the following preliminary checks and then refer to the "Trouble Locating Chart" to isolate the cause.

1. Check power input to receiver and check fuse. (See Fig. 1 and 4.)
2. Check circuit connections to transmitter and secondary receiver(s) (if used), and check for open circuits in junction box between transmitter and receiver in TLI systems showing evidence of trouble. (See Figs. 4 and 5.)

3. If meter in any one system does not follow transmitter float travel, check for damaged or sticking meter movement, using float simulator as in "Calibrating Alarm Controls", or move float up and down in tank. Check meter adjustment as in "Zero-adjusting Indicating Meters".
4. If tank transmitters appear to be inoperative, refer to "Gems 36000 Series TLI Transmitters" instruction bulletin for troubleshooting information.

Trouble Locating Chart

1. No power indication, power light, meter, alarm lights inoperative with power switch "ON"	2A Fuse on Panel "OPEN"	Replace fuse
	No. 115 VAC Input to Receiver	Correct
	Power Switch faulty	Replace switch (Fig. 1)
2. No meter deflection with power switch at "ON" or "FULL REF"	Transmitter on cable faulty or miswired	Replace cable or transmitter (See Note 2)
	Zener Barrier (If Incl.) faulty or miswired	Check and replace
	Meter faulty	Replace meter
	Power supply inoperative	Check and replace power supply module (Fig. 2)
	Slave meter or cable open (If used)	Check and replace meter or cable
	Receiver circuitry inoperative	Replace related control module (Fig. 2)
	Jumper removed from unused slave meter connection	Replace jumper
3. Meter reads "FULL" regardless of tank level with receiver power switch "ON"	Transmitter or cable faulty or miswired	Check cable for "OPENS" and replace cable or transmitter (See Note 2)
	Receiver faulty	Replace related control module (Fig. 2)
4. Meter "PINS" beyond max. deflection with power switch at "ON" or "FULL REF"	System calibration incorrect	Recalibrate - See "Calibrating Individual Systems"
	Power supply faulty	Replace power supply module (Fig. 2)
	Circuit to transmitter "OPEN"	Check transmitter wiring for "OPEN" circuit between red & black leads
	Receiver circuitry faulty	Replace related control module (Fig. 2)
5. High level alarm light inoperative when related meter reads at or above actuation point	Light burned out	Replace light bulb
	High level alarm setting incorrect	Correct - See "Calibrating Alarm Controls"
	High level control faulty	Replace related control module (Fig. 2)
6. Low level alarm light inoperative when meter reads at or below actuation point	Light burned out	Replace light bulb
	Low level alarm setting incorrect	Correct - See "Calibrating Alarm Controls"
	Low level control faulty	Replace related control module (Fig. 2)
7. Audible alarm circuit inoperative when meter reads at or beyond high or low level actuation points and lights function normally	Open circuit to remote alarm	Correct as required
	Alarm silencing switch faulty	Replace switch (Fig. 1)
	Alarm control faulty	Replace power supply - alarm module (Fig. 2)
	Audible alarm faulty	Replace alarm (Fig. 1)
8. Slave meter inoperative, primary meter operating	Jumper not removed at related control module terminal block (Fig. 4)	Remove jumper (Fig. 4)
	Slave meter faulty or short circuit in wiring.	Replace meter (Fig. 4) or correct wiring

Note 1: See appropriate receiver schematic diagram when replacing any receiver components.

Note 2: Refer to "Gems 36000 Series Transmitters" instruction bulletin for troubleshooting information. **DO NOT ATTEMPT TO REPAIR TRANSMITTERS IN THE FIELD.** Remove and carefully package transmitter unit and return it to Gems Sensors. Call 860-747-3000 for proper shipping instructions and return authorization number.

Gems Zener Barrier SAFE-PAK

See "TESTING INSTALLED BARRIER SAFE-PAK" in Zener Barrier SAFE-PAK P/N 54805 instruction bulletin for troubleshooting procedures. These procedures must be strictly followed in order to preserve the intrinsic safety of the system. Zener Barrier units are not repairable and if found faulty as a result of these tests, they must be replaced.

WARNING

For hazardous area application, such as, but not limited to ignitable mixtures, combustible dust and flammables, the use of an approved intrinsically safe device is strongly recommended. Consult Factory. The tank level indicator system has been designed to be shock and vibration-resistant. However, shock and vibration should be minimized. Consult Factory for assistance. Elastomer seals in the sensor and cable are subject to deterioration and aging and therefore need to be checked regularly. Their life

expectancy varies with the application. Troubleshooting and maintenance of the tank level indicator system must be in strict compliance with the procedure set forth in the troubleshooting and maintenance section of the technical catalog and instruction bulletin. Transmitters and cables must not be field repaired. All other field repairs must be performed by qualified personnel only.

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Rev. D



37000 Series Tank Level Indicating Multi-Meter Receivers

Instruction Bulletin No. 78807

General Information

Gems 37000 Series Multi-Meter Primary Receivers contain individual primary indicating meters and related high and low level alarm lights for up to 15 independent tank level indicating systems in one housing (See Fig. 1) Individual control modules (one for each meter and system) within the housing include all system adjustments (Fig. 2). Power switch and light, 2 amp fuse, audible alarm and alarm silencing switch are common to all systems. The front panel hinges open for access to all components within the housing.

Installation

Important: Read the following instructions completely before installing, operating or maintaining these products.

Warning

Product must be installed, used and maintained in strict accordance with Gems technical catalog and instruction bulletins. Failure to observe this warning could result in serious injuries or damages.

Mounting Receiver on Surface

Provide 9/16" dia. holes in mounting surface as in Fig. 3 and bolt receiver to surface.

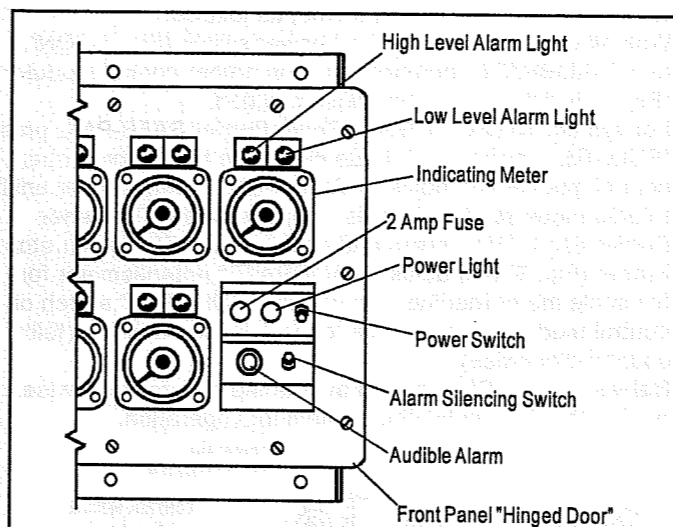
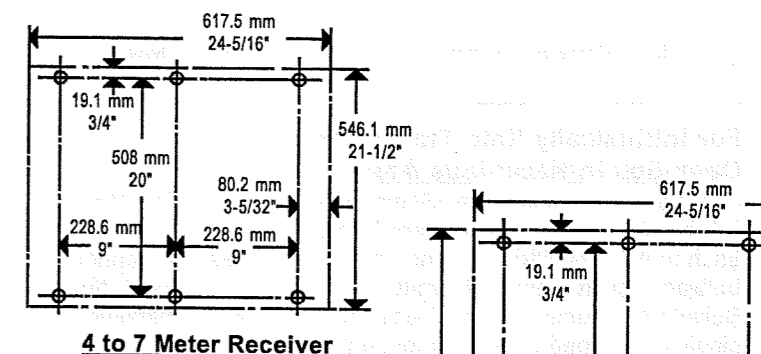
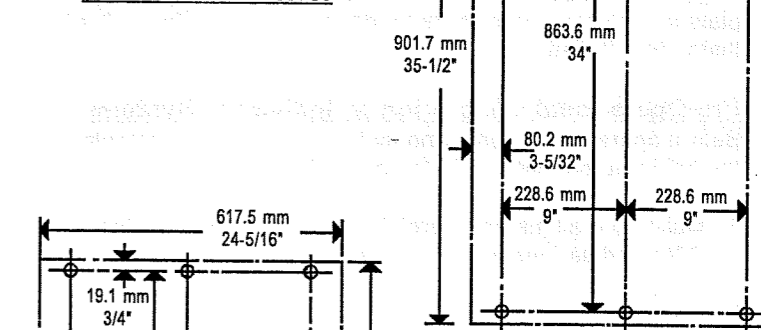


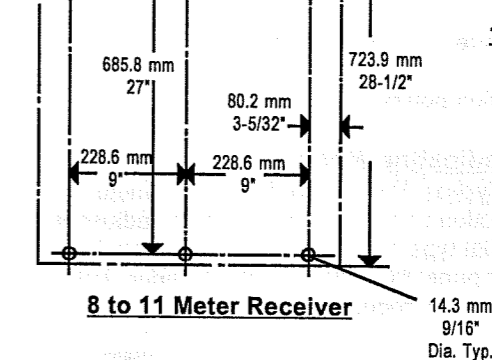
Fig. 1: Partial Front Panel . . . Typical



4 to 7 Meter Receiver



12 to 15 Meter Receiver



8 to 11 Meter Receiver

Connecting Cables

Bring cables from individual tank transmitters and 115 VAC, 50-60 Hz power source (and remote alarms and secondary receivers, if included) into housing through stuffing tubes. Connect cables to proper terminal blocks as in Fig. 4. **Note:** Control module terminal block for one tank system is shown typically in Fig. 4. All other systems are connected to their related control module terminal blocks in the same manner.

Connect cabling at J-Box between transmitter and receiver for individual tank system as in Fig. 5 for either normal or interface indication, as required. If secondary (slave) meter is to be used, remove jumper from terminals 4 and 5 before connecting meter. Jumper must be in place between terminals 4 and 5 if a slave meter is not used.

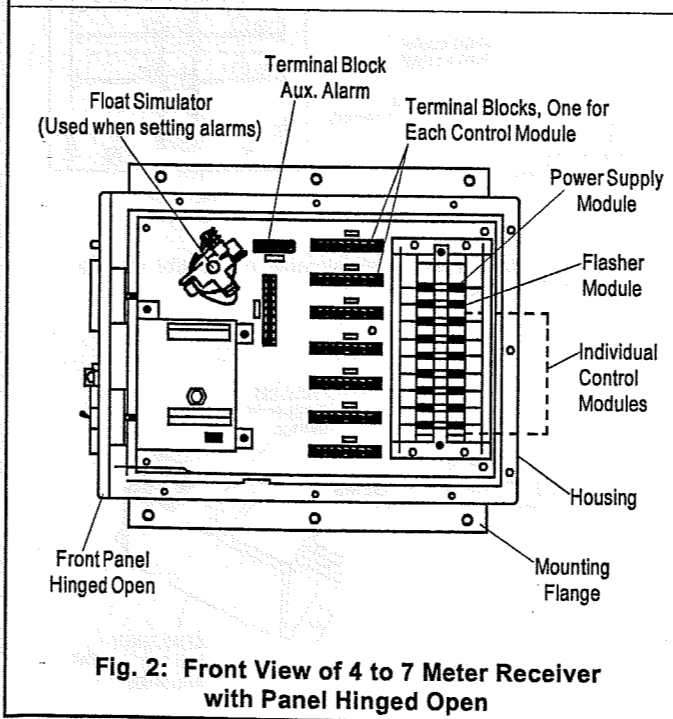


Fig. 2: Front View of 4 to 7 Meter Receiver with Panel Hinged Open

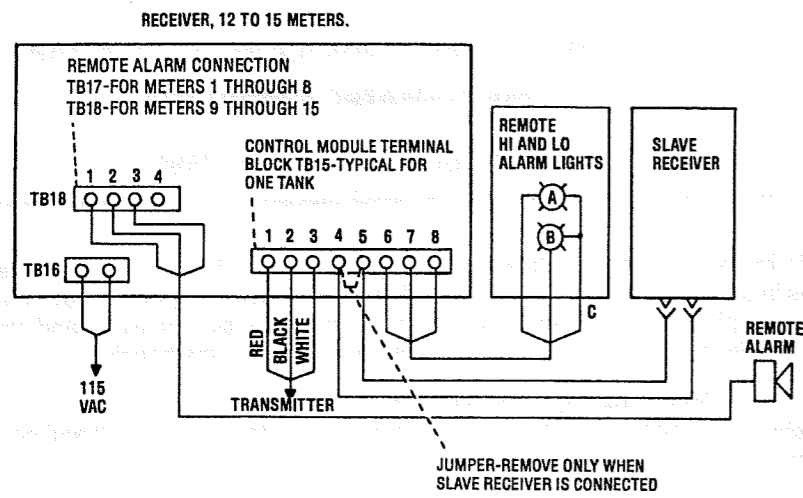


Fig. 4. Cable connections, 12 to 15 meter receiver... typical.

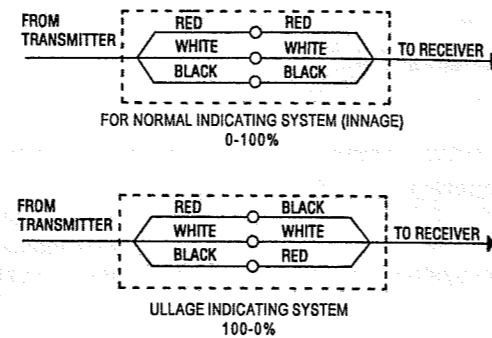


Fig. 5. Connection of cabling to receiver in J-box at tank transmitter. Do not use green wire.

For Intrinsically Safe Transmitter Operation in Hazardous Areas

See Instruction bulletin for Gems Zener Barrier SAFE-PAK, P/N 57803. Install Gems Zener Barrier SAFE-PAKS - one for each tank transmitter - in a non-hazardous area and connect between receiver and transmitter as shown in the Instruction Bulletin mentioned above. Zener barriers may be installed singly or grouped on a common, earth-grounded mounting plate in a common enclosure as described in the Zener Barrier Instruction Bulletin.

Pre-Operational Calibration of Individual Systems

Before operating systems and multi-meter receiver, complete the following procedures in the order listed:

1. Make sure all meters "zero" (normally factory-adjusted). "Zero-adjust" meters, if necessary.
2. Calibrate each TLI system.
3. Mark meter faces in required increments.
4. Adjust alarm actuation points.

"Zero-Adjusting" Indicating Meters

(Dial and Edgeview Types) With power "OFF", set meter needle on "zero" deflection point by means of "zero" adjustment screw (see Fig. 6 for dial type meter and Fig. 7 for edgeview meter). Open receiver panel for access to rear of edgeview meter. Repeat for all meters requiring "zero" adjustment.

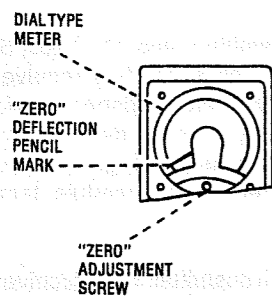


Fig. 6. "Zero" adjustment, dial type meter.

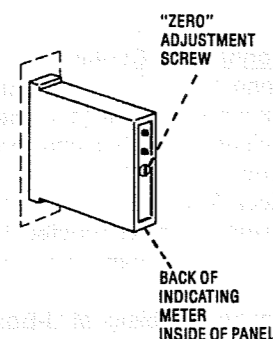


Fig. 7. "Zero" adjustment, edgeview meter

Calibrating Individual Systems

Calibrate TLI Systems, one at a time, as follows:

1. With all cables connected and power switch (Fig. 1) "ON", turn "CALIBRATE" potentiometer on proper control module (Fig. 8) to full counter-clockwise position.
2. For system WITHOUT Gems Zener Barrier SAFE-PAK, press "FULL-REF" switch and rotate clockwise to hold on proper control module and adjust "CALIBRATE" potentiometer until related meter reads full scale. For systems WITH Zener Barrier SAFE-PAK, press and hold "FULL-REF" switch atop Barrier (Fig. 9) and adjust "CALIBRATE" potentiometer for full-scale meter reading. Do not use "FULL REF" switch on control module. It should be left in released position (fully counter-clockwise).
3. Release "FULL REF" switch by rotating counter-clockwise, putting that tank indicating system into operation.

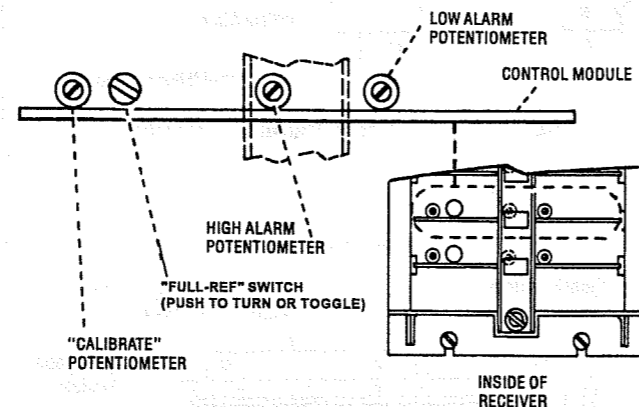


Fig. 8. Individual system adjustments on control module within receiver.

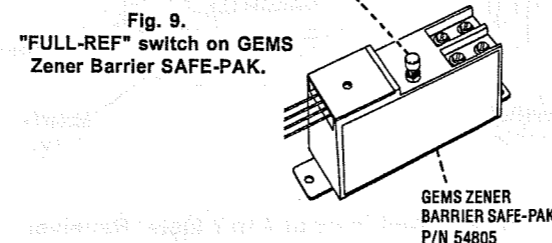


Fig. 9. "FULL-REF" switch on GEMS Zener Barrier SAFE-PAK.

MARKING METER FACES

Dial & Edgeview Type Meters (If faces have not been factory-marked.)

Note: Before proceeding with marking, observe that power light (Fig. 1) is energized with power switch at "ON", indicating fuse is good. Check calibration of each TLI system of full scale reading and readjust if necessary (see "Calibrating Individual Systems"). Make sure power switch is "ON".

To mark meter face: Remove glass and frame from meter (4 screws). Use either the "Tank Capacity Table" or "Liquid-in-tank" methods to determine increments for marking. Temporarily and lightly mark each increment indicated on meter face using sharp pencil.

"Tank Capacity Table" Method (Tank Dry)

Two men equipped for intercommunication are required, one at the meter; the other in the tank to position the floats. Heights of float positions from the tank bottom, in dimensional equivalents for the gallonage marks desired, are interpolated from the capacity table for that particular tank.

Procedure:

1. Select gallonages to be marked and list equivalent dimensions from the tank bottom in feet and inches, as interpolated from the capacity table.
 2. With power switch "ON" (Fig. 1), suspend sounding tape vertically alongside transmitter so that the dimensional equivalent for the gallonage at 100% tank capacity (from the table) is at top of tank. Read the tape dimension at the center of the lowest transmitter float at bottom rest position. Interpolate the equivalent gallonage from the table and mark meter face at the "zero" deflection mark. This is the lowest level indicated.
 3. Manually raise float along sounding tape until the center aligns with the dimensional equivalent of the next higher desired gallonage increment (from table). Mark meter face. Repeat for each increment to the highest indicated level (max. deflection).
- Note:** With multiple transmitters when lower unit float reaches height of next higher transmitter float, move both floats together until lower float reaches its top limit. Continue raising upper float after replacing lower float at bottom rest position. (Do not allow float to fall to bottom rest.) Lower float should never be higher than the upper float. Equivalent float heights for high or low alarm points may be interpolated from the tank capacity table and the meter face so marked at this time, as in Steps 1, 2 and 3.
4. After completing pencil marking, carefully remove meter face and mark it permanently with ink. Carefully replace face, glass and frame, and recheck system calibration.

"Liquid-in-tank" Method

1. With receiver power switch "ON" (Fig. 1), fill related tank with known quantities of liquid. Starting with lowest indicated level ("zero" mark on meter face), mark needle positions on meter face as each desired level is attained. If the system has high or low alarms, actuation points may also be marked on meter face as desired levels are reached.
2. Mark face permanently as in Step 4 of "Tank Capacity Table" method.

For Interface Indication in Tank Containing Two Different Liquids

For tanks where the lighter of two interfaced liquids is to be indicated, meter travel must be reversed. See Step 1 below. Since transmitter floats ride on the surface of the heavier (lower) liquid, meter should read "empty" of the lighter (upper) liquid when all floats are at top limits, and tank is filled with the heavier liquid. Conversely, meter should read "full" when all floats are at bottom rest and tank is filled with the lighter liquid (or empty of all liquid).

To mark meter face:

1. Make sure meter travel has been reversed electrically by reversing red and black wire connections between receiver and transmitter (Fig. 5) or, if Zener Barrier is used, by reversing connections at terminals 4 and 5 of Barrier. **DO NOT** reverse connections at terminals 1 and 2 of Barrier.

2. Starting with tank completely filled with the heavier liquid, and meter at "zero", remove a known amount until needle just begins to move. Mark face at "zero" with gallonage removed (lowest gallonage of lighter liquid indicated).
3. Continue removing known quantities from tank and marking needle positions on meter face as each desired level of lighter liquid is reached. As level of heavier liquid decreases, indicated increments should increase toward full deflection.
4. If system has high or low alarms, their actuation points may be marked as desired levels are reached.
5. Mark face permanently as in step 4 of "Tank Capacity Table" method.

CALIBRATING ALARM CONTROLS CAUTION:

Be sure power is "OFF" when disconnecting or connecting any components or wiring within receiver.

1. Disconnect transmitter wiring from terminals 1, 2 and 3 on related control module terminal block in receiver (Fig. 4) and connect FLOAT SIMULATOR cable (Fig. 10) in its place. (Remove wing nut to release SIMULATOR cable.)
2. With power switch "ON" (Fig. 1), set high and low alarms as in "A" through "D" below.
 - A. Adjust "FLOAT SIMULATOR" potentiometer (Fig. 10) until meter indicates desired low-level alarm setting (Previously marked).
 - B. Adjust "LOW ALARM" potentiometer on related control module (Fig. 8) until low alarm control just actuates alarm. Repeat steps A and B once more to verify adjustment.
 - C. Adjust "FLOAT SIMULATOR" potentiometer (Fig. 10) until meter indicates desired high-level setting.
 - D. Adjust "HIGH-ALARM" potentiometer (Fig. 8) until high alarm control just actuates alarm. Repeat steps C and D once more to verify adjustment.
3. Turn off power, disconnect FLOAT SIMULATOR and replace transmitter wiring on terminal block.
4. Repeat steps 1 through 3 (above) for each individual system. Replace cable on FLOAT SIMULATOR and secure with wing nut when all alarms are set. Turn power "ON", putting all related TLI systems into operation.

OPERATION

With all cabling connected and power turned "ON", operation of the GEMS Multi-meter Receiver and related TLI systems is completely automatic except for silencing the audible alarm (Fig. 1) when required.

High and low level alarm lights with related meters on receiver panel will remain "ON" as long as levels in related tanks are at or beyond preset actuation points. The built-in audible alarm (and remote audible alarm, if included) will actuate when any one alarm light of any one system is actuated. Audible alarm(s) will remain "ON" until silenced by momentarily pressing alarm silencing switch on receiver panel (Fig. 1).

If receiver is equipped with a flasher module (Fig. 2), all alarm lights (panel and remote) will flash at 80 Hz \pm 10% until the audible alarm is silenced. All lights will then revert to steady "ON".

Calibration of individual tank systems can be checked at any time by depressing FULL-REF. switches on related control modules (Fig. 8) or FULL-REF. switches on related Zener Barriers as in Fig. 9 (if included in systems).

MAINTENANCE

Periodic recalibration of meter movements in accordance with standard practice is the only maintenance normally required.