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 system and check fuses.
- 2. Check circuit connections to transmitter and slave receiver(s) (if used), and check for open circuits in junction boxes between transmitter and receiver.
- 3. If meter 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 meter".

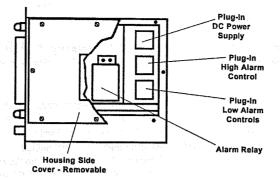


Fig. 12 Inside of Primary Receiver with Two Alarms and Master Alarm

Troubl	е	Locat	ing	Chart
		Evidence	ofTr	ouble

Evidence of Trouble	Probable Cause	Corrective Action		
1. No power indication, power light, meter,	2A Fuse on Panel "OPEN"	Replace fuse*		
alarm lights inoperative with power switch	No. 115 VAC Input	Correct		
"ON"	Power Switch faulty	See Note 1		
a salabara ancha ne ancha a contra de la contra del contra de la contra del la contra d	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*		
2. No meter deflection with power switch at	Power supply inoperative	Check and replace power supply module* (Fig. 12)		
"ON" or "FULL REF"	Slave meter or cable open (If used)	Check and replace meter* or cable		
	Receiver circuitry inoperative	See Note 1		
	Jumper removed from unused slave meter connection	Replace jumper		
3. Meter reads "FULL" regardless of tank	Transmitter or cable faulty or miswired	Check cable for "OPENS" and replace cable or transmitter* (See Note 2)		
level with receiver power switch "ON"	Receiver faulty	See Note 1		
Meter "PINS" beyond max. deflection with	System calibration incorrect	Recalibrate - See "Calibrating The System"		
	Power supply faulty	Replace power supply module* (Fig. 12)		
power switch at "ON" or "FULL REF"	Circuit to transmitter "OPEN"	Check all transmitter wiring for "open" circuits		
	Receiver circuitry faulty	See Note 1		
5. High level alarm light inoperative when	Light burned out	Replace light bulb*		
meter reads at or above actuation point	High level alarm setting incorrect	Correct - See "Calibrating Alarm Controls"		
Stage Section 1997 and 1997	High level control faulty	Replace related control module* (Fig. 12)		
6. Low level alarm light inoperative when	Light burned out	Replace light bulb*		
meter reads at or below actuation point	Low level alarm setting incorrect	Correct - See "Calibrating Alarm Controls"		
	Low level control faulty	Replace related control module* (Fig. 12)		
7. Audible alarm circuit inoperative when	Cable or remote power source faulty	Replace cable or correct power source		
	Alarm silencing switch faulty	See Note 1		
meter reads at or beyond high or low level	Alarm control faulty	Replace power supply - alarm module* (Fig. 12)		
actuation points and lights function normally	Audible alarm faulty	Replace remote alarm		
Slave meter inoperative, primary meter operating	Jumper not removed at primary receiver receptacle	Remove jumper		
operating	Slave meter faulty 4/6/14/5	Replace meter*		

*Recommended Spare Parts

Note 1: See appropriate receiver schematic diagram or replace complete receiver and return faulty unit to Factory for

Note 2: DO NOT ATTEMPT TO REPAIR TRANSMITTERS IN THE FIELD. Remove and carefully package transmitter unit and return it to Gems Sensors Inc.. 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 43540 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.

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.

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

For hazardous area application, such as, but not limited to ignitable

The tank level indicator system has been designed to be shock and

vibration-resistant. However, shock and vibration should be minimized.

mixtures, combustible dust and flammables, the use of an approved

intrinsically safe device is strongly recommended. Consult Factory.

One Cowles Road Plainville, CT 06062.1198

tel 860.747.3000 fax 860.747.4244

Gems Sensors Inc.



General Information

A Gems 36000 Series Modular Primary Receiver contains indicating meter. all controls and adjustments, alarm relays and regulated D.C. power supply for one Gems TLI system in a single, modular type housing. The in-tank transmitter, modular secondary receiver and all other system components connect to the primary receiver. The "one-design" housing is panel or bulkhead mounted in an accessory rack - singly or ganged as many as 6 per

Installation

Important: Read the following instructions completely before installing, operating or maintaining Gems 36000 Series Modular Receivers.

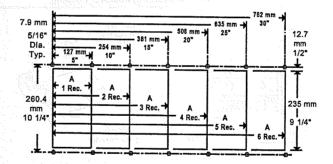
Warning

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.

Installing Receiver(s) in Panel

1. Provide proper panel opening and 5/16" dia, mounting holes for installation of Gems receiver mounting rack as

Note: Allow for cable clearance beneath receiver(s) when locating mounting rack (See Fig. 3).



200	No. of Receivers	Mtg. Rack No.	Dim. "A"	No. of 5/16" Dia. Holes	المرابع المراب
-	1	31304	5*	4	
	2	31305	10"	6	
	3	31306	15"	8	
	4	31307	20"	10	1 Unit Ra
	5	31308	25"	12	1 0
1	6	31309	30"	14	

Fig. 1: Panel Openings for Receiver Racks

- 2. Insert rack in panel opening and fasten with 1/4" X 20 bolts, nuts, flat washers, and lockwashers (furnished).
- 3. Mount receiver(s) in rack with four No. 10-32 screws and lockwashers.

Installing Receiver(s) on Surface

1. Provide proper holes in mounting surfaces as in Fig. 2 for installing surface rack.

Gems 36000 Series **Tank Level Indicating Modular Receivers**

Instruction Bulletin No. 78806

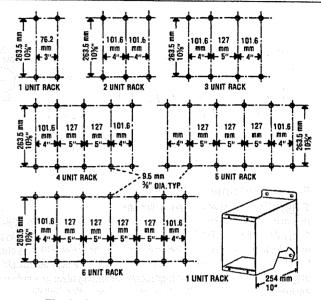


Fig. 2: Surface Rack Mounting Holes

- 2. Mount rack on surface with 5/16" X 18 bolts, flat washers, lockwashers, and nuts (furnished).
- 3. Mount receiver(s) in rack with four No. 10-32 screws and lockwashers.

Connecting Cables

Connect cabling to proper receptacles (labeled) on underside of receiver(s) (Fig. 3), using mating connectors furnished with receivers. See Fig. 5 or 6 for typical connection diagrams. See Fig. 4 for connection of "receiver-totransmitter" cabling in J-box at transmitter for normal or interface indication.

When connecting secondary (slave) receiver cabling, remove jumper (located under protective cap) from jumper receptacle on primary receiver. DO NOT REMOVE JUMPER FROM RECEPTACLE IF SLAVE METER IS NOT USED. Maximum cable length between system components is 1,000 feet.

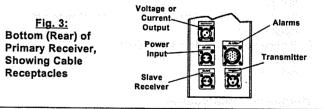


Fig. 4 Connection of Cabling to Receiver in J-Box at Tank Transmitter. Do Not Use Green Wire.

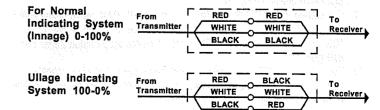
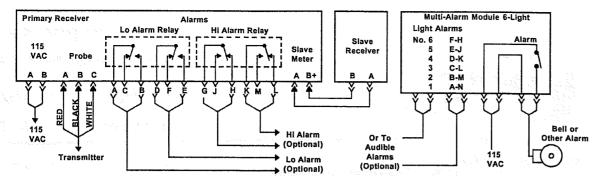
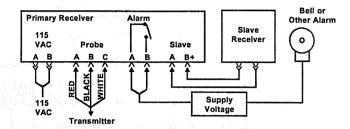




Fig. 5 Connection Diagram - Primary Receiver with HI-LO alarms, Typical.





For Intrinsically Safe Transmitter Operation in Hazardous Areas

See Instruction bulletin for Gems Zener Barrier SAFE-PAK, P/N 43540. 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 System Calibration

Before operating the system, complete the following procedures in the order listed:

- Make sure meter "zeroes" (normally factory-adjusted).
 "Zero-adjust" meter, if necessary.
- 2. Calibrate the level indicating system.
- 3. Mark meter face in required increments.
- 4. Adjust alarm actuation points (if system is so equipped).

"Zero-Adjusting" Indicating Meters

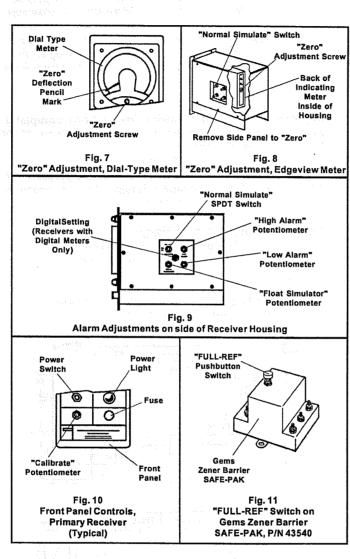
(Dial and Edgeview Types) With power "OFF", set meter needle on "zero" point by means of "zero" adjustment screw (see Fig. 7 for dial type meter or Fig. 8 for edgeview meter).

To zero-adjust edgeview meter, see Fig. 8 and proceed as follows:

- Disconnect cables, remove receiver from rack and remove side panel.
- With receiver in normal operating attitude, "zero" meter with offset screwdriver.
- Replace side panel. Make sure "NORMAL-SIMULATE" switch is on "NORMAL, reinstall receiver in rack and reconnect cables.

Calibrating The System (Dial and Edgeview Type Meters)

- With all cables connected to receiver and "NORMAL-SIMULATE" switch on "NORMAL" (Fig. 13) turn "CALIBRATE" potentiometer to full counterclockwise position. (Fig. 10)
- For system WITHOUT Gems Zener Barrier SAFE-PAK, move power switch to "FULL-REF". For system WITH Zener Barrier, place power switch at "ON", and depress and hold "FULL-REF." switch atop related Zener Barrier unit (Fig. 11).
- Turn "CALIBRATE" pot. clockwise until meter reads full scale (100%) deflection. If meter "pegs" or does not go to 100%, check for open circuits or miswiring between receiver and transmitter.



 Move power switch to "ON" (or release "FULL-REF" switch on Zener Barrier), putting the system into normal operation. Set locknut on "CALIBRATE" pot. to hold adjustment.

Digital Meters

Digital meters are factory set for "FULL REF" readings of 1000. To change this setting:

- Disconnect cables, remove receiver from mounting rack and reconnect all cables.
- 2. With power switch on "FULL REF" (Fig. 10) . . . or with switch at "ON" and Zener Barrier "FULL-REF" switch (Fig. 11) depressed:
- a. Adjust "CALIBRATE" pot. (Fig. 10) for 995-1005 meter reading.
- Adjust "DIGITAL SETTING" (Fig. 9) for desired "FULL-REF" reading (1999 Max.).

 Turn off power switch, disconnect cables and reinstall receiver Reconnect cables and place power switch at "ON".

No further adjustment of the system should be necessary. To check at any time, hold power switch on "FULL-REF" (or depress Zener Barrier switch) ... meter should read "full scale".

NOTE: Using receiver Barrier in system will not harm circuit, but will cause a meter reading error of up to 20%. The Barrier "FULL-REF" switch compensates for series resistance of Barrier for a true maximum indication (full-scale meter reading) without compromising system intrinsic safety in any way. See "Instruction Bulletin for Gems Zener Barrier SAFE-PAK, P/N 43540" for complete explanation.

MARKING METER FACE . . .

Dial and Edgeview Type Meters (If face has not been factory-marked.)

Note: Before proceeding with marking, observe that power light (Fig. 10) is energized with power switch at "ON", indicating fuse is good. Check calibration for full scale reading and readjust if necessary (see "Calibrating the System"). Make sure power switch is "ON".

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

"Tank Capacity Table" Method (Tank Dry)

Two men equipped for intercommunication are required; one at the meter, and 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:

- Select gallonages to be marked and list equivalent dimensions from the tank boftom in feet and inches, as interpolated from the capacity table.
- 2. With power switch "ON" (Fig. 1 0), 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 transmifter 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.
- Manually raise float along sounding tape until its 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 meterface so marked at this time, as in Steps 1, 2 and 3.

 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:

 With receiver power switch "ON", fill tank with known quantities of liquid. Starting with lowest indicated level ("zero" mark on meter face), mark needle positions 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. 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 boftom rest and tank
is filled with the lighter liquid (or empty of all liquid).

To Mark Meter Face:

- Make sure meter travel has been reversed electrically by reversing red and black wire connections between receiver and transmitter (Fig. 4) 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.
- 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).
- Continue removing known quantities from tank and marking needle positions as each desired level of lighter liquid is reached. As level of heavier liquid decreases, indicated increments should increase toward full deflection.
- 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...

Dial, Edgeview and Digital Type Meters

Disconnect cables, remove receiver from mounting rack and reconnect cables before calibration. Position unit in normal operating attitude during alarm adjustment. The following procedure assumes that meter system has been calibrated, meter face marked and that the alarm device is cable-connected to receiver. See Fig. 9 for alarm control locations.

- With power switch (Fig. 10) at "ON", place "NORMAL-SIMULATE" switch on "SIMULATE".
- Adjust "FLOAT SIMULATOR" potentiometer until meter indicates desired low level alarm setting.
- 3. Adjust "LOW ALARM" Pot.' until low alarm control just actuates alarm.
- Adjust "FLOAT SIMULATOR" Pot. until meter indicates desired high level setting.
- 5. Adjust "HIGH-ALARM" Pot. until high alarm control just actuates alarm.
- 6. Return "NORMAL-SIMULATE" switch to "NORMAL" and power switch to "OFF"
- 7. Disconnect cables, reinstall receiver in rack and reconnect cables. Return power switch to "ON", putting the system into automatic operation.

OPERATION

With all cabling connected, power "ON" and all calibration adjustments completed, operation of Gems TLI receivers and the system is completely automatic. Alarm lights (if included) will remain "ON" as long as levels are at or above corresponding actuation points. Remote alarms are silenced by a momentary contact, cut-off switch (if included) on receiver panel. Calibration can be checked at any time by momentarily moving the power switch to "FULL-REF".

MAINTENANCE

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