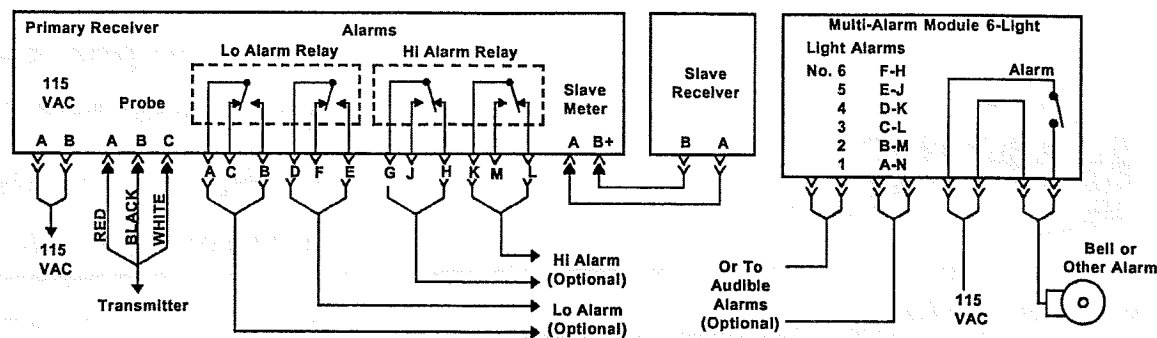


**Ullage Indicating
System 100-0%**

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



- 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 bottom in feet and inches, as interpolated from the capacity table.
- With power switch "ON" (Fig. 10), 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.
- 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.

- 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 bottom 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.
- 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.
- Adjust "LOW ALARM" Pot. until low alarm control just actuates alarm.
- Adjust "FLOAT SIMULATOR" Pot. until meter indicates desired high level setting.
- Adjust "HIGH-ALARM" Pot. until high alarm control just actuates alarm.
- Return "NORMAL-SIMULATE" switch to "NORMAL" and power switch to "OFF".
- 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.

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.
- Calibrate the level indicating system.
- Mark meter face in required increments.
- 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).

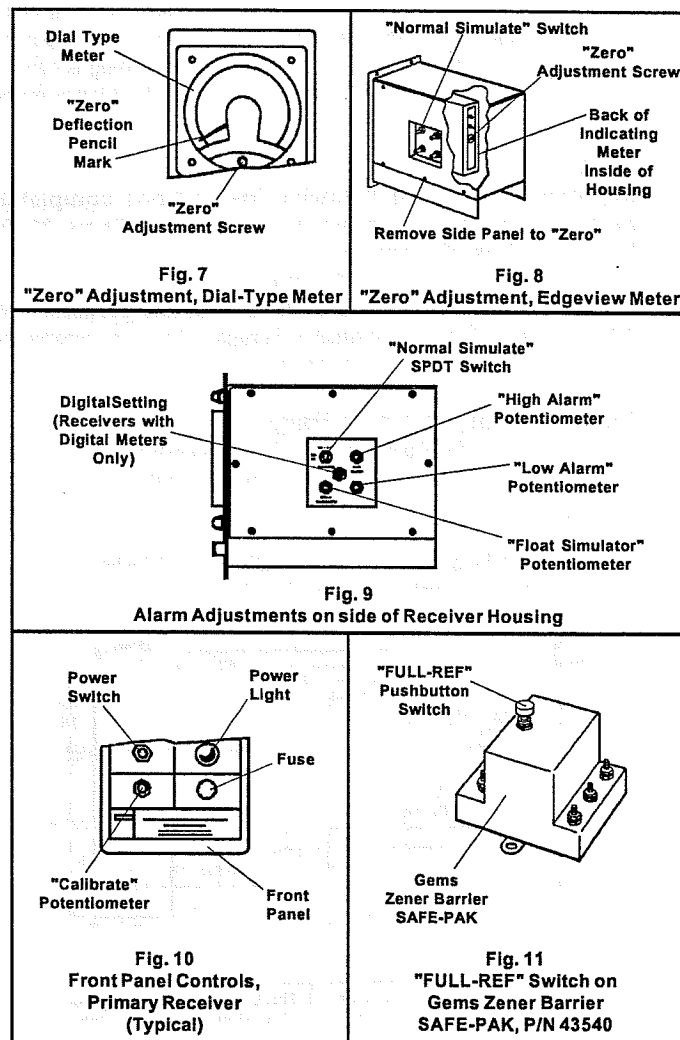
To zero-adjust edgeview meter, see Fig. 8 and proceed as follows:

- 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 counter-clockwise 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.
- With power switch on "FULL REF" (Fig. 10) . . . or with switch at "ON" and Zener Barrier "FULL-REF" switch (Fig. 11) depressed:
 - Adjust "CALIBRATE" pot. (Fig. 10) for 995-1005 meter reading.
 - Adjust "DIGITAL SETTING" (Fig. 9) for desired "FULL-REF" reading (1999 Max.).