

AMP-100

Area Monitor Probe

High Range GM Probe Unit

Operating & Maintenance Manual

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REVISION LOG: AMP-100 Area Monitor Probe Operating Manual

| Revision # | Date | Revised Pages | Comments |
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|---|----------|---------------------------------------|--|
| 0 | 05/22/95 | N/A | Original Issue: based upon Rotem document # Pwir02a6, Edition 2.1, February 1998. |
| 1 | 06/29/98 | 2, 3, 13 – 15 | <ul style="list-style-type: none"> • Updated Calibration section to reflect the use of three cal factors (corresponds to firmware version # 5D1D). • Corrected Table of Contents and updated this log. |
| 2 | 08/05/98 | 2 – 4, 7, 9, 12 – 15, 18 – 30, 33, 34 | <ul style="list-style-type: none"> • Title changed to incorporate maintenance section. • Imported Electronic Block Diagrams, Troubleshooting section, Drawings. • Clarified calibration factors, procedure (Eliminated Calibration Option 1). • Modified Specifications to indicate R/h units only. • Eliminated all references to “accumulated dose” features (functionality eliminated in firmware version #5D1D). • Corrected Table of Contents and updated this log. |
| 3 | 3/8/00 | Page 33 | Revised version and schematics drawings |
| 4 | 10/16/00 | Page 9 & 13 | Added sections on new firmware update and instructions for using accumulated dose function (ON/OFF). |
| 4 | 10/16/00 | Appendix 5 | Added diagram and instructions for new firmware jumper for detector disconnect. |

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AMP-100

1.1. General Description

The Area Monitor Probe (AMP-100), a GM tube based rate meter, is a state-of-the-art microprocessor-based instrument. It is designed for highly stable and accurate measurements of dose rate from gamma radiation. The AMP-100 covers a measuring range of 0.005 R/h up to 1000 R/h.

The AMP-100 is a lightweight and compact instrument with a large, four 7-segment LCD display.

The AMP-100's sophisticated software offers special features and optimal performance. The wide dynamic range is obtained by automatic dead time correction, according to the preset calibration. A special averaging function smoothes the readout and maintains fast response time, while keeping the standard deviation at a minimum.

An automatic self-diagnostic procedure continuously checks both meter and detector and reports any case of detector failure. The meter also alarms if the reading exceeds the threshold value, the probe is in a field greater than 1000 R/h or the battery potential drops below an acceptable value. The threshold can be selected from a list of 11 preset values. When the meter is turned off, the last threshold value, and the calibration factor are retained in memory and will be recalled the next time the instrument is turned on.

The AMP-100 may be used one of three ways: by locally reading the smoothed digital display via the hand held meter display, by connecting the meter to an AM-16 Area Monitor (wired) or by connecting the meter to an external WRM transmitter (wireless).

The AMP-100 system contains four components (see Figure 1-1 - block diagram): meter, cable, probe head and communication interface. Connection between the meter and the detector is accomplished via a four-wire shielded cable of up to 100 meters length. An optional WRM transmitter may be connected via standard four-wire telephone cable.

The meter includes two boards: HV board and CPU board including ratemeter and display. A built-in RS-232 connection is used with the area monitor or WRM.

The detector includes an energy compensated GM tube, an amplifier and driver.

The AMP-100's connections and probe head feature watertight sealing to allow for use in underwater applications. Quick disconnect detectors allow customization of cable length and facilitate easy de-contamination.

1.2. Applications

- Real time monitor applications include any area with radiation levels up to 1000 R/h. For example, the probe head may be placed *directly onto* a filter housing or against a resin tank for the purpose of providing survey data or resin transfer results.
- Replacement of traditionally “difficult to calibrate” underwater instruments.
- Provides a rugged detector for environments where the use of an electronic dosimeter is undesirable.
- Provides real-time, remote monitoring in geometry’s developed for extendible “pole” rate meters (TelePole, Teletector, etc.).
- Local readout of hand-held meter allows its use as a portable survey instrument.

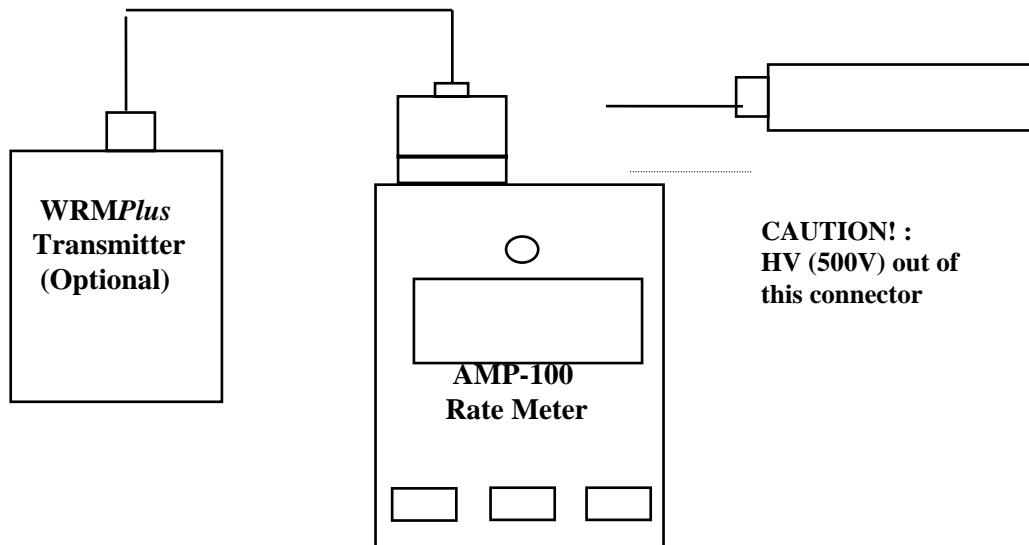


Fig. 1-1. The AMP-100 System Block Diagram

1.3. AMP-100 WRM Communication

The AMP-100 meter may be connected to an external WRM transmitter through an adapter. In this mode, the AMP-100 meter transmits its dose rate data using the same format as a dosimeter. Data is displayed on the computer screen, as appropriate for the application (i.e. SMARTS OnLine, TeleView, WinWRM, etc.). The dose function of the software displays “888888.88,” since no accumulated dose function exists on the instrument.

Each AMP-100 unit has a different identification number (ID#) that consists of six digits. When the first digit of the ID# is (6), which indicates to the monitoring software that the transmitting instrument is of AMP-100 type. The last 3 digits represent the instrument serial number.

2. Specifications

| | |
|---------------------------------------|---|
| Display | LCD readout showing: - Four digits for accurate and easy readout - Detector failure - Low battery - Overflow - Threshold |
| Audio | Internally mounted piezo-electric element (used for alarm and “chirp” functions) |
| Measuring unit | R/h |
| Controls | - ON/OFF push-button - RESET push-button - SPEAKER push-button |
| Power source | One 9-volt cell battery or external 9V power supply - 50 hours minimum continuous operation, using an alkaline battery (speaker off) - Automatic battery check under full load |
| Detector | Energy compensated GM tube (ZP1301 or equivalent) |
| Sensitivity (¹³⁷Cs) | 0.3 counts-per-second per milliRem-per-hour |
| Accuracy | ±10% of reading within the measuring range |
| Energy range | 70 keV to 2.0 MeV |
| Energy dependence | ±20% related to ¹³⁷ Cs |
| Angular dependence | Less than ±20% for 45° from centerline indicator |
| Measuring range | 0.005 R/h to 1000 R/h |
| Display range | 0.001 R/h to 1000 R/h |
| Temperature range | Operation: -10°C to +50°C (15°F to 122°F) Storage: -20°C to +60°C (-5°F to 140°F) |
| Humidity range | 40% to 95% RH (non condensing) |

| | |
|-------------------|---|
| Casing | Meter: Aluminum Detector: Aluminum, waterproof to 20 meters |
| Dimensions | Meter: 12 cm x 7.2 cm x 3.4 cm (4.72" x 2.83" x 1.34") Detector: 2.45 cm x 14.3 cm (0.96" x 5.71") without cable |
| Weight | Meter: 340 g (0.76 lbs) including battery Detector: 131 g (0.29 lbs) without cable |

3. Operating Instructions

3.1. Preparation for Use

Remove the instrument from the shipping container and check for physical damage. In case of damage, report it immediately to the carrier.

Do not attempt to install or operate damaged equipment since safety and performance may be affected

3.2. Starting-up

Before connecting the detector cable to the detector side, perform the following:

1. Clean the cable connector from any dust, using air blast and alcohol.
2. Spread a thick layer of silicone grease on the o-ring.
3. Connect the cable connector to the detector connector.

Ensure the detector connection to the meter. **CAUTION:** Beware the HIGH VOLTAGE (500 Volts) on the meter's connector (see Figure 1-1).

Press the ON/OFF push-button. When the meter is turned on, it carries out a short self-test procedure indicated by displaying all the segments on the display, and emitting a beep for a short period. Following the test, the meter is ready for use.

Display on Start-Up: When the unit is turn ON the display read: EPROM Ver. (Date), Unit WRM serial # and Dose status.

NOTE: This is only for the AMP-100s in production as of October 2000, firmware version: 000803. Call MGPI for firmware update information.

- Eprom Ver. (Date) Epr. 000- -803 (000803)
- Unit WRM serial # Id. 600- -698 (600698)
- Dose status: d-0 (without Dose function)d -1(including Dose function)

If the Dose status is 0 (without Dose function) then in the WRM protocol the meter will send 888888.8 instead of the dose value.

If the detector is disconnected (at least 1 sec) Error Alarm will be activated .

Err. Display blink and audio alarm This Alarm is activated only if the signal and/or ground wires are disconnected .

Automatic shutdown of the meter in case the detector is disconnected for more than 1 minute (this will help to prevent connecting the detector when the meter power is on).

3.3. General Functions

Readout: The measuring units are R/h for dose rate. The meter utilizes an autoranging display.

0.001 - 9.999 R/h

10.00 - 99.99 R/h

100.0 - 999.9 R/h

Reading reset: To reset the reading press the RESET push-button. The reset function provides a rapid means of discharging the display reading and enables accurate measurement of low level count rate.

Audible alarm: In the case of threshold alarm or instrument failure, the audible alarm is activated. To mute the audible alarm press the SPEAKER push-button.

3.4. Threshold Selection

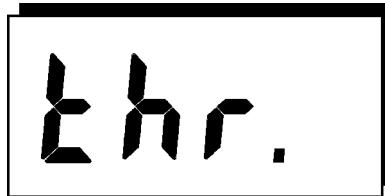
The threshold value can be selected from a list of 11 programmed values. The selected value is also kept in memory after the meter is turned off.

The following threshold values may be selected:

0.050, 0.200, 5.000, 10.000, 25.00, 50.00, 100.0, 250.0, 500.0, 750.0, 999.9 R/h

To choose the required threshold value, proceed with the following steps:

- 3.4.1 Enter threshold mode by pressing the RESET push-button for two seconds. The reading will be zero, after which the **thr.** LCDs will be displayed to indicate that the threshold setting mode is activated.



- 3.4.2 Pressing the SPEAKER push-button displays the existing threshold value.
- 3.4.3 Each additional press on the SPEAKER push-button advances the display to the next threshold value, according to the order described in section 3.4.
- 3.4.4 To exit set threshold mode and to save the new threshold value, press the RESET push-button for two seconds. Saving will be verified by blinking of the new threshold value.
- 3.4.5 To exit the set threshold mode without saving new value (cancel threshold change), press RESET push-button for a very short period (less than two seconds). Saving will be verified by blinking of the “old” threshold value

3.5. Alarms

a. Detector alarm: If the detector is defective or disconnected, after 15 minutes the **Err.** LCDs will blink on the display and an interrupted audible alarm will be activated. To mute the audible alarm press the SPEAKER push-button. **NOTE: The detector must be disconnected for at least fifteen (15) minutes for the alarm to activate.**



b. **Battery alarm:** If battery voltage decreases below 6.2 Volts, the **bAt.** LCDs blink on the display and an interrupted audible alarm is activated.



To display the measured readings and mute the audible alarm, press the SPEAKER push-button. After the SPEAKER push-button is pressed the **bAt.** LCDs will reappear every five minutes for two seconds, and every 30 minutes accompanied by an audible beep to remind users of the low battery condition.

c. **Overflow alarm:** If the displayed count rate is over 999 R/h, the **OFLO** LCDs blink on the display and an interrupted audible alarm is activated. To mute the audible alarm press the SPEAKER push-button.



d. **Threshold alarm:** If the reading exceeds threshold value, the **ALr.** LCDs and the reading are displayed alternately, accompanied by an audible beep.



Pressing the SPEAKER push-button mutes the audible alarm, but the **ALr.** LCDs and the reading are continuing to be displayed alternately, until the reading decreases to 75% of the threshold value. If the reading exceeds threshold value and then quickly decreases to below 75% of the threshold value the **ALr.** LCDs and the beep are automatically canceled, even though the SPEAKER push-button has not been pressed.

3.6. Push-button Functions

| Function | Pressing mode | Push-button |
|---|---------------------------|--|
| Meter on/off | | ON / OFF |
| Instantaneous reading reset | | RESET |
| Mutes audible alarm | | SPEAKER |
| In / out threshold mode | Long press | RESET |
| Displays / advances threshold | | SPEAKER (within threshold mode) |
| Out of threshold mode saving new threshold | Long press | RESET (within threshold mode) |
| Displays and enables calibration factors settings | Simultaneously | RESET + SPEAKER (within calibration mode) |
| Decreases calibration factor in single steps Decreases calibration factor successively | Short press Long press | RESET (within calibration mode) |
| Increases calibration factor in single steps Increases calibration factor successively | Short press Long press | SPEAKER (within calibration mode) |

3.6.1 Accumulated Dose Function Mode

Procedure to select Dose status d-0 (no Dose, 888888.8 will be displayed on telemetry software) or d -1 (including Dose)

NOTE: This is only for the AMP-100s in production as of October 2000, firmware version: 000803. Call MGPI for firmware update information.

Long press on the MODE push bottom (5 second) – Enter to **thr.** (set threshold)

Long press on the MODE push bottom (5 second) – Exit setting threshold.

Short press on the MODE push bottom – Enter to select Dose status

Short press on the SPK push bottom – switch between d-0 (no Dose)
and d -1(including Dose)

Short press on the MODE push bottom- Return back to measuring mode.

Note: To add items 2 and 3 for old units you will need to add one jumper plus EPROM change. See Appendix 5 for jumper placement.

3.7 Battery Replacement

The battery compartment is located at the instrument back. To replace the battery, slide out the battery compartment cover carefully. Use one 9-volt alkaline battery; be sure to connect it with the right polarity.

External Power Supply

The AMP-100 is equipped with an external DC input, may be operated either with a 9V battery or an external 9V DC power supply. The battery can be used in conjunction with the external power supply. In case of external power failure the battery supplies the current. The DC voltage should be 10 to 12 volts, to avoid drain current from the battery.
The internal battery remains connected to function as a back-up power supply.

4. Calibration

To improve linearity, the AMP-100 includes three calibration factors.

The calibration factors are displayed in the **CAL.** mode by pressing the RESET push-button.

F1, the first calibration factor, is used to compensate the Geiger sensitivity tolerance.

F2, the second calibration factor and

F3, the third calibration factor, are used as the dead time correction factors.

Calibration of the AMP-100 requires the checking of each of the three factors. In addition, as the factors are checked, one or more may need to be adjusted.

F1 should be checked / adjusted at $10 \text{ R/h} \pm 2 \text{ R/h}$

F2 should be checked / adjusted at $200 \text{ R/h} \pm 60 \text{ R/h}$

F3 should be checked / adjusted at $600 \text{ R/h} \pm 100 \text{ R/h}$

Measured (displayed) readings are calculated by one of the following two formulas, depending on the intensity of the radiation field:

Up to 300 R/h: $N(\text{R/h}) = [n * F1 + \text{dead time correction } \{n * F2\}] / 300$

Over 400 R/h: $N(\text{R/h}) = [n * F1 + \text{dead time correction } \{n * F3\}] / 300$,

Where

n is the detector frequency obtained in the radiation field

N is the updated measurement reading

Between 300 R/h to 400 R/h, a weighted average of F2 and F3 is used as the dead time correction factor. The calculation of the “averaged factor” and the corresponding measurement formula follow:

$$x = (\text{last } N(\text{R/h}) - 300) / 100$$

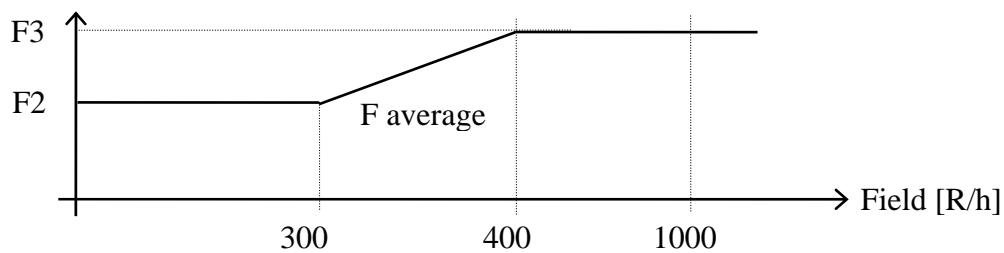
Last N = previous measurement reading

F average = $(1-x) * F2 + x * F3$

$$N(\text{R/h}) = [n * F1 + \text{dead time correction } \{n * F \text{ average}\}] / 300$$

The following graph illustrates the ranges over which F2, F3 and F average are used as the AMP-100's dead time correction factor:

Dead time correction factor



4.1. Calibration Procedure

- 4.1.1. Open the AMP-100 battery compartment cover and turn the internal dip switch 4 (the right dip-switch) to the ON (calibration) position. The dip switch position is specified by a label Cal. inside the battery compartment.

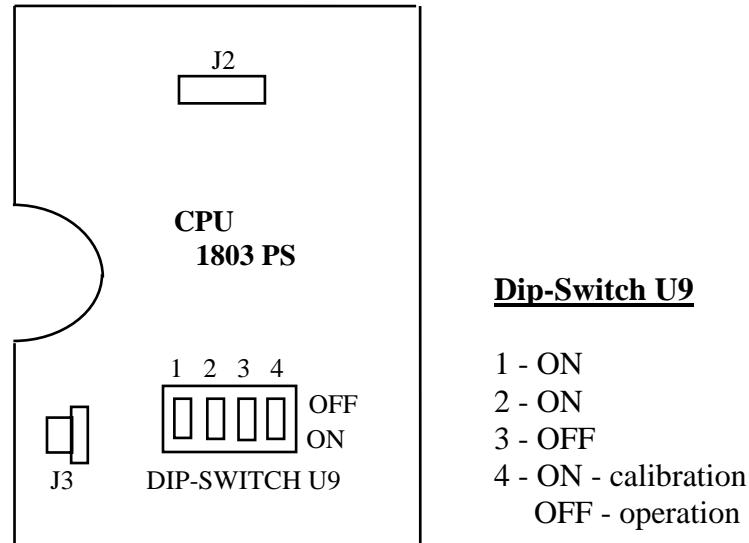


Figure 4-1. CPU Card

- 4.1.2. The **Cal.** LCDs are displayed.

- 4.1.3. To display the current calibration factors, press the SPEAKER and RESET push-buttons simultaneously.

$\xrightarrow{\quad}$ F1 \rightarrow 1.07F \rightarrow F2 \rightarrow 0.99F \rightarrow F3 \rightarrow 0.96F \rightarrow 0.000
 \uparrow _____ \downarrow

In a field higher than 10 mR/h, the meter automatically enables only the display and setting of the appropriate factor, depending on the field intensity.

F1 if the probe head is in a field higher than 10 mR/h and lower than 50 R/h.

F2 if the probe head is in a field higher than 50 R/h and lower than 350 R/h.

F3 if the probe head is in a field higher than 350 R/h.

- 4.1.4. Expose the detector to a radiation field of $10 \text{ R/h} \pm 2 \text{ R/h}$.

Press the RESET + SPEAKER push-buttons simultaneously.

The display will show:

$\xrightarrow{\quad}$ F1 \rightarrow F (factor) \rightarrow R/h (reading) \rightarrow
 \uparrow _____ \downarrow

Change the factor by pressing the RESET or SPEAKER push-button to obtain the desired reading.

- 4.1.5. Expose the detector to a radiation field of $300 \text{ R/h} \pm 60 \text{ R/h}$.

The display will show:

$\rightarrow F2 \rightarrow F \text{ (factor)} \rightarrow R/h \text{ (reading)} \rightarrow$
 $\uparrow \quad \quad \quad \quad \downarrow$

Change the factor by pressing the RESET or SPEAKER push-button to obtain the desired reading.

- 4.1.6. Expose the detector to a radiation field of $600 \pm 100 \text{ R/h}$.

The display will show:

$\rightarrow F3 \rightarrow F \text{ (factor)} \rightarrow R/h \text{ (reading)} \rightarrow$
 $\uparrow \quad \quad \quad \quad \downarrow$

Change the factor by pressing the RESET or SPEAKER push-button to obtain the desired reading.

- 4.1.7. When the required reading (factor) is obtained, turn the internal switch back to the measuring position and the meter will enter the measuring mode. The calibration factors values are between 0.60 to 1.40 and are stored in the EPROM.

4.2. CPU Unit Pulser Check

NOTE: Although it is possible to “calibrate” the AMP-100 using a series of input pulses (from a pulser), MGPI strongly recommends against this. Checking instrument response to input pulses ensure that the meter’s CPU is operating properly, *but indicates nothing about the detector*. MGPI recommends that the instrument is calibrated according to the previous section (4.1 Calibration Procedure), by exposing the probe head to known radiation fields and adjusting factors appropriately, which ensures that both the detector and the CPU are operating properly.

The instrument’s CPU counts input pulses, calculates dead time correction, averages the calculation results and displays the reading. The CPU may (optionally) be checked by the following procedure

- Disconnect the detector D-type connector from the meter.
- Adjust the output pulser to obtain a five Volts amplitude and 10 μ sec width pulse.
- Connect the output pulser as follows: (+) to pin 1 and (-) to pin 6.
- First, turn the meter on, and then turn the pulser on. Ensure that the meter reads (within $\pm 10\%$) according to the following table:

| Input Frequency <Hz> | Display <R/h> |
|----------------------|---------------|
| 30 | 0.100 |
| 300 | 1.000 |
| 3200 | 10.73 |
| 10.000 | 39.26 |
| 30.000 | 196 |
| 40.000 | 329 |
| 50.000 | 525 |
| 60.000 | 815 |
| 75.000 | OFLO |

These results are valid only when all three factors (F1, F2, F3) are equal to 1.

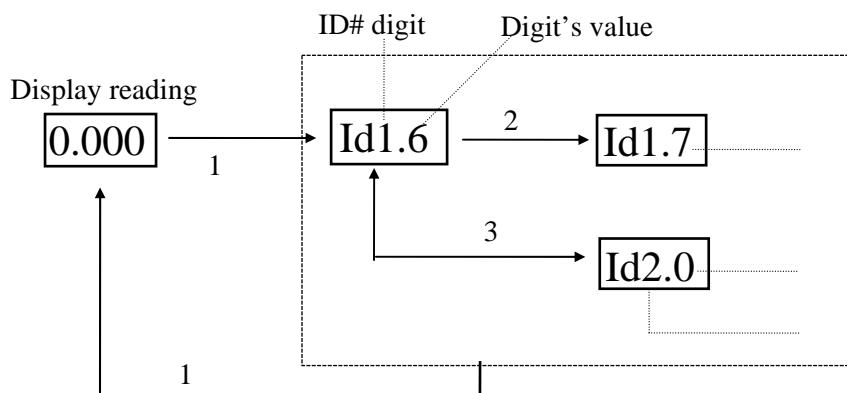
5. Setting ID Number

Note: Setting the ID # must be done only by an authorized user.

The ID # includes six digits.

The first digit in the ID # indicates the instrument type. By default, the AMP-100's first digit is always equal to 6.

Setting and Checking the ID #:

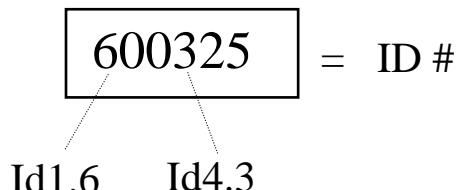


1 - Long press on SPEAKER push-button (five sec.) – In / out display and set ID #.

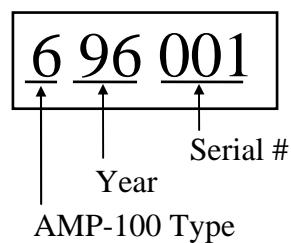
2 - Short press on SPEAKER push-button - Increases displayed digit value.

3 - Short press on RESET push-button - Displays next digit value.

For example:



The default ID# is:



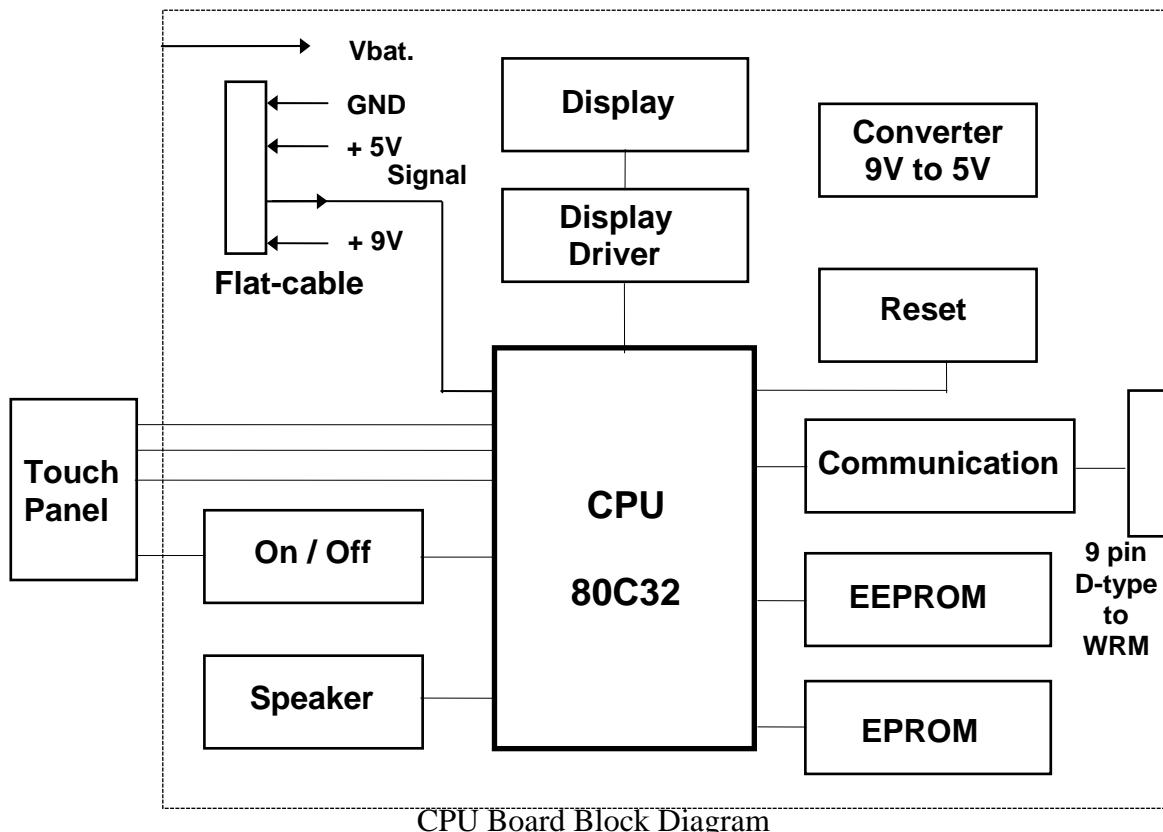
6. Electronic Block Diagrams Description

See block & wiring diagram DRW# 12730-50-03.

6.1. Meter

The meter unit includes the CPU and high voltage (HV) boards.

6.1.1. CPU Board Description



CPU Board

DRW #12730-43-00, PC #1938.

On /Off Circuit (Q1, Q3, Q4)

A momentary short between pin J2/1 and J2/2 switches Q1 and Q4 on.

The battery voltage powers the LM2931 converter.

U5/8 is set to "1" (in software), Q1 is switched on, and as a result the meter is turned on. An additional momentary short between J2/1 and J2/2 sets U5/9 to "0" through Q3. U5/8 is set to "0" and the meter is turned off.

Reset

When the meter is turned on, the CPU receives a reset signal via C13.

Speaker Circuit (U3)

The speaker circuit is activated in the following cases:

- a. Meter reading exceeds threshold level.
- b. Instrument malfunction.
- c. Indication of pressing push-button.

In each of the above cases U5/15 is set to 5 VDC, a 3 KHz signal on pin U3/3 activates the speaker.

Touch Panel

The touch panel push-buttons are directly connected to the micro-controller chip in the CPU board, except the on/off push-button, which is connected to the on-off circuit.

Display (U4, U8)

The display shows the meter readings.

The display driver (U4) receives serial data and clock from the CPU and transmits it in parallel to the display.

U8 - LCD, 4-character 7-segment, three decimal points and two column points.

EPROM Circuit (U6, U7)

U6 - 74HC 373, Address A₀ - A₇, latch from AD₀ - AD₇.

U7 - 27C 256, EPROM contains software code.

CPU Circuit (U5)

The micro-controller circuit manages all of the meter's activities.

EEPROM Back up Memory

The X2C04 is a 512-byte serial EEPROM (Electrically Erasable Prom).

The EPROM stores threshold values, ID number and calibration factors values.

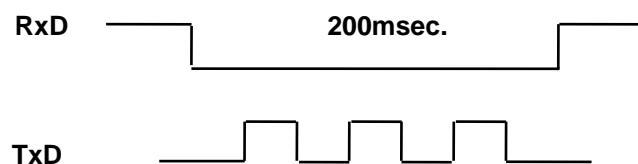
External Communication Circuit

J4/3 TxD - This is the serial data line transmitted from the AMP-100. The logic level swings are 0 to 5 Volts, and can be described as RS-232 TTL level. This circuit is able to drive TTL, LSTTL, and CMOS inputs.

J4/2 RxD - This is the serial data line received in the AMP-100. The AMP-100 accepts serial data either in RS-232 signal levels (low: -3 to -15 Volts , high: +3 to 15 Volts) or TTL levels (low: 0.8 Volts, high: 2.0 Volts).

J4/7 – ground, J4/3 + - 5V

The communication port receives a trigger from the WRM transmitter and transmits the data to the WRM system.

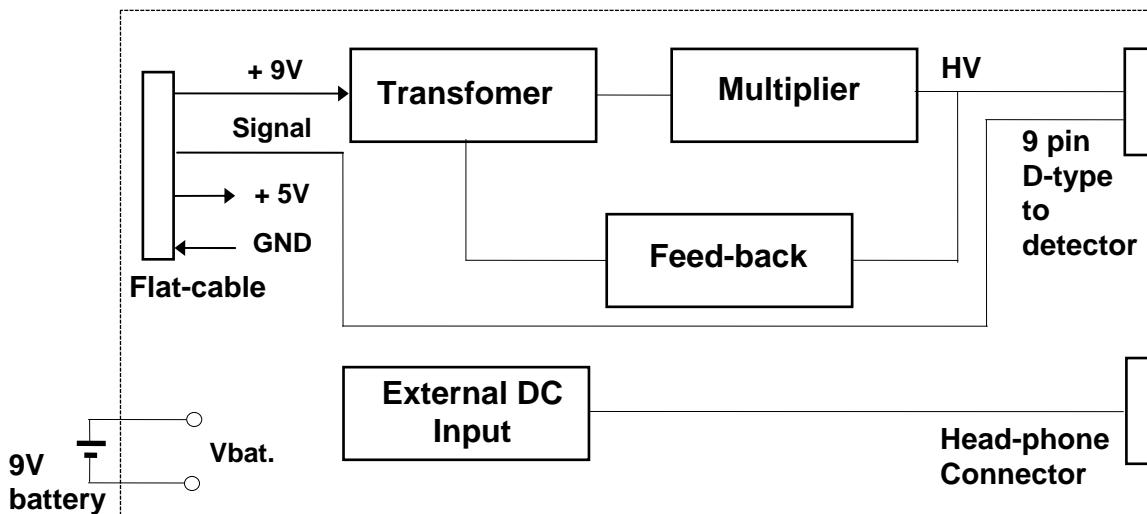


Converter

The U2 - LM2931 - AZ 5.0 and two $4.7\mu F$ capacitors convert the 9V battery voltage to 5V. The input voltage range is from 5.6V to 26V.

6.1.2. High Voltage Board

DRW #12730-42-00.



HV Board Block Diagram

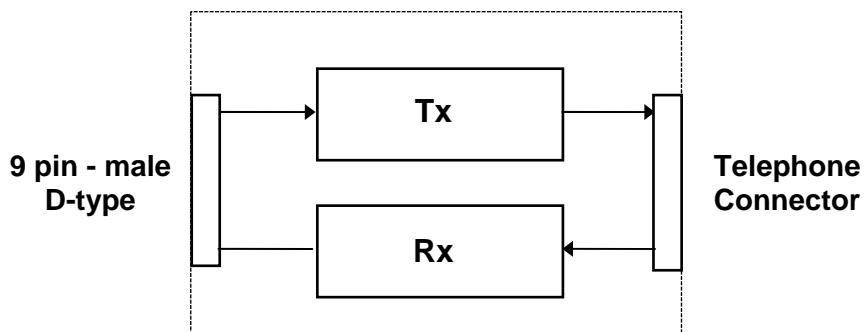
High Voltage Board

The HV board includes an 8075 transformer, a voltage multiplier (D1, D2, D3, C2, C3), and an RV4192 switching regulator.

R10 and R1 are voltage feed-back for the switching regulator.

6.2. WRM Adapter

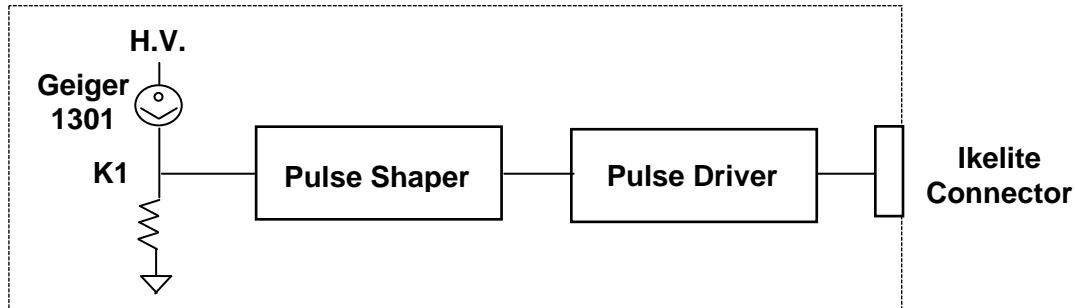
DRW #12730-40-00.



Adaption between the WRM transmitter and AMP-100 voltage levels.

6.3. Detector

DRW #12730-41-00.



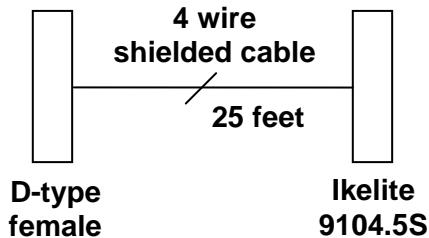
Detector Block Diagram

The high voltage, $500V \pm 5\%$ generated in the HV board is transmitted to the detector via the meter's cable. When the detector is positioned in a radiation field, positive pulses are obtained on pin K1 of the geiger. These pulses are shaped and amplified by Q1, Q2 and RC components. Q3 and Q4 drive these pulses in the meter's direction.

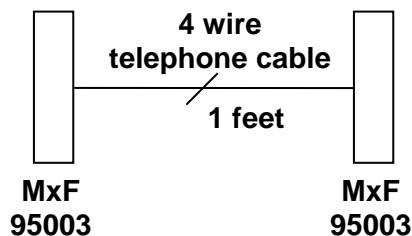
6.4. Cables

DRW #12730-50-00.

6.4.1. Meter to Detector



6.4.2. WRM Adapter to WRM Transmitter



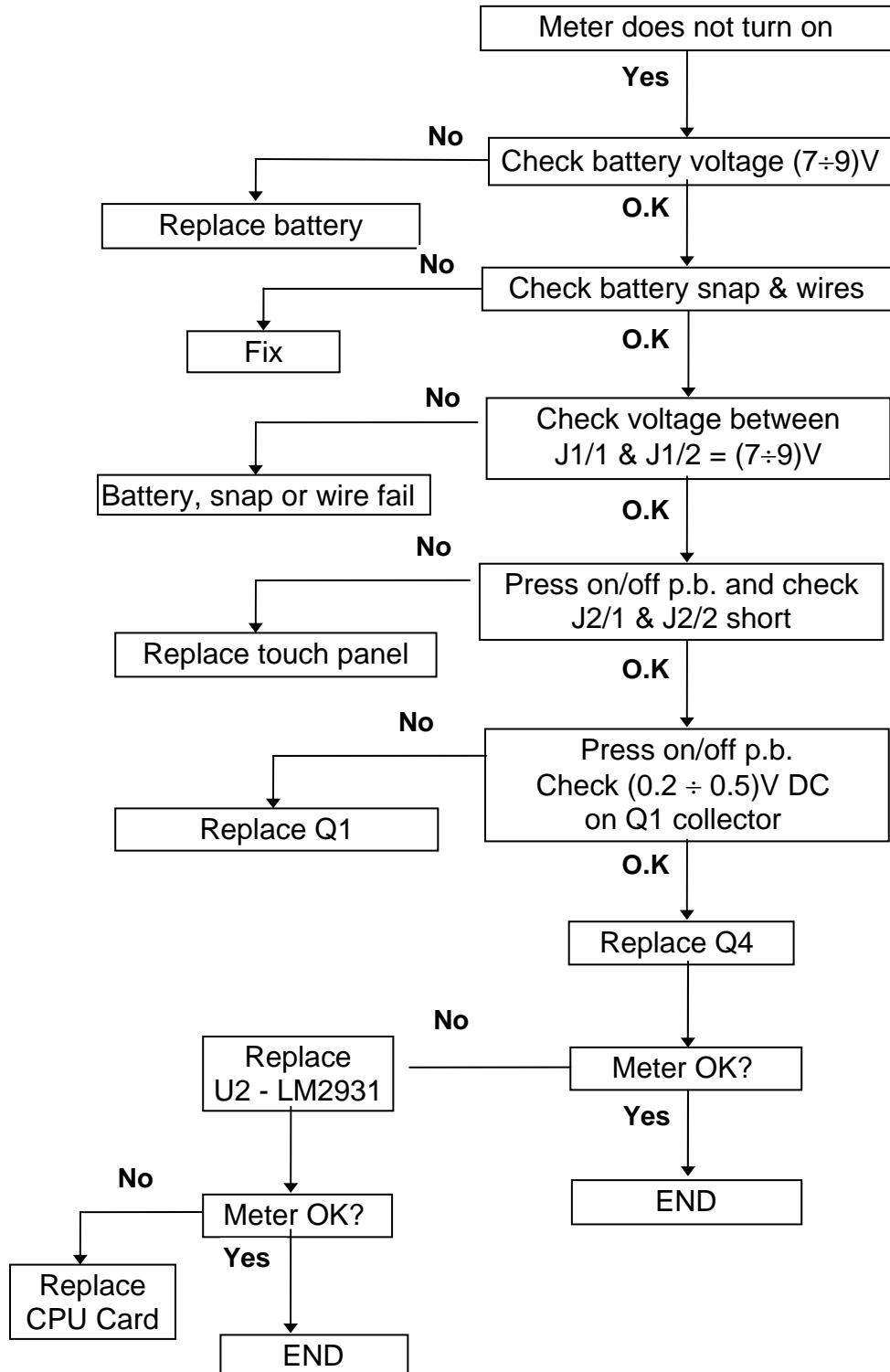
6.5. Power Supply

There are two ways to power the meter on:

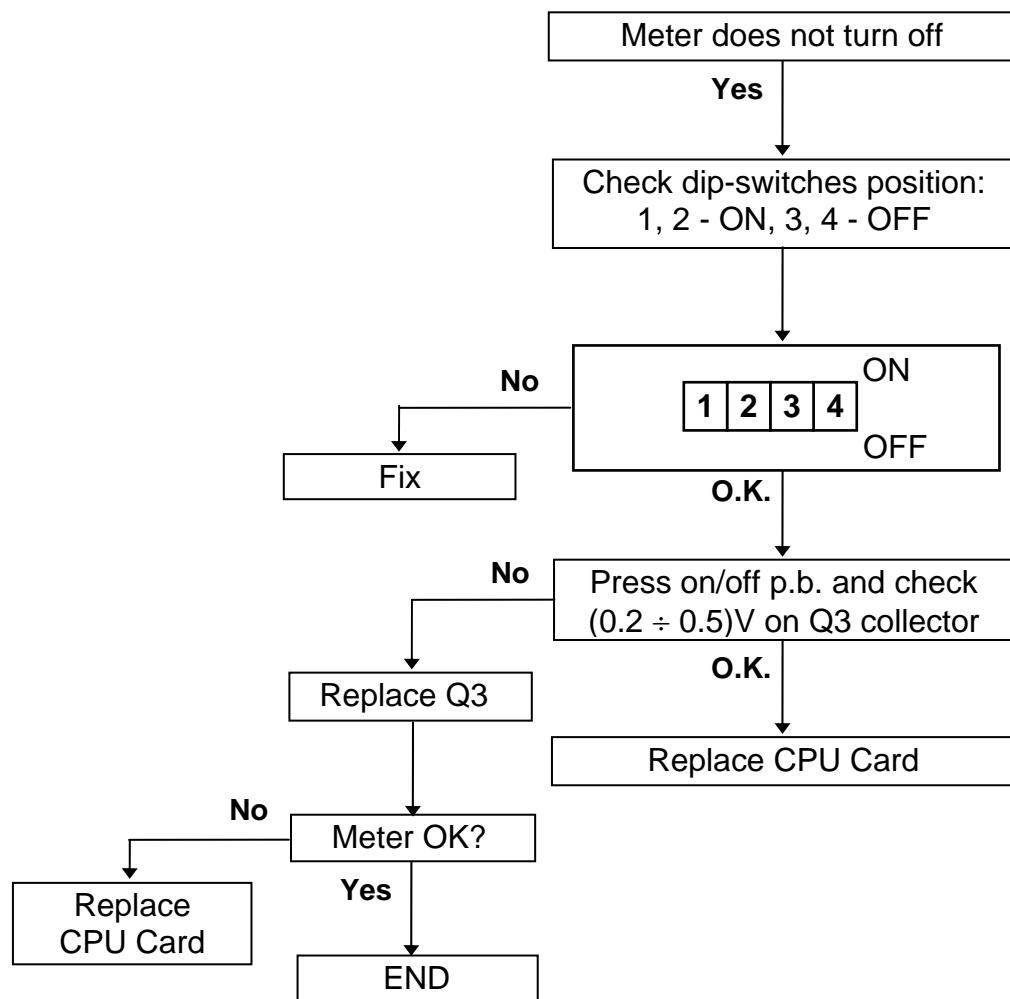
- 9V battery.
- External DC voltage (8V ÷ 10V DC).

7. Troubleshooting

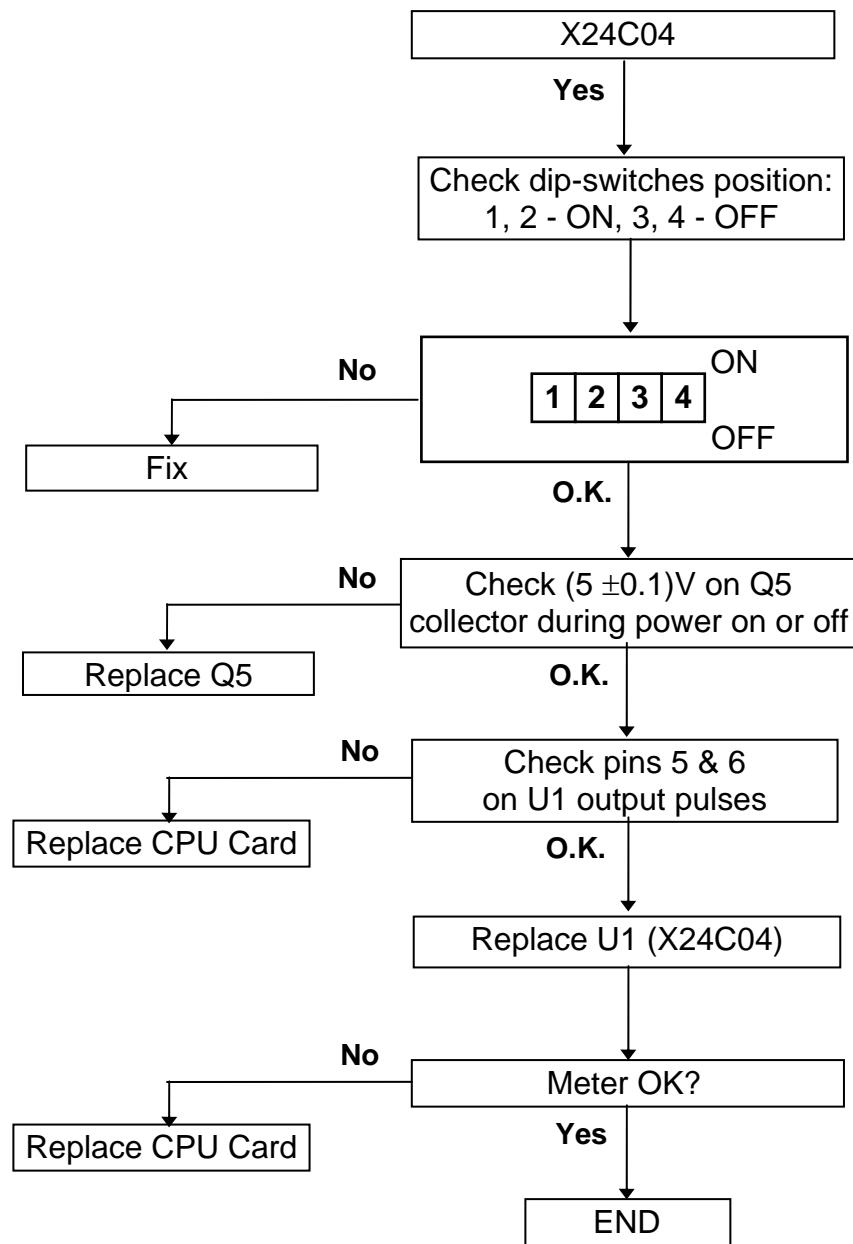
7.1. Meter does not turn on



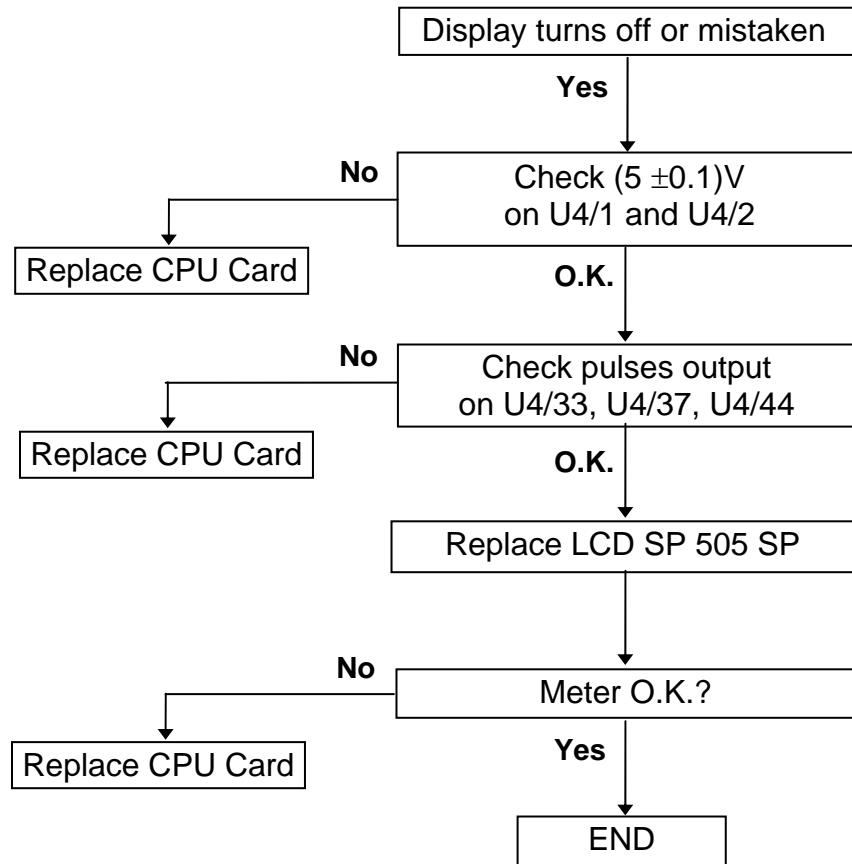
7.2. Meter does not turn off



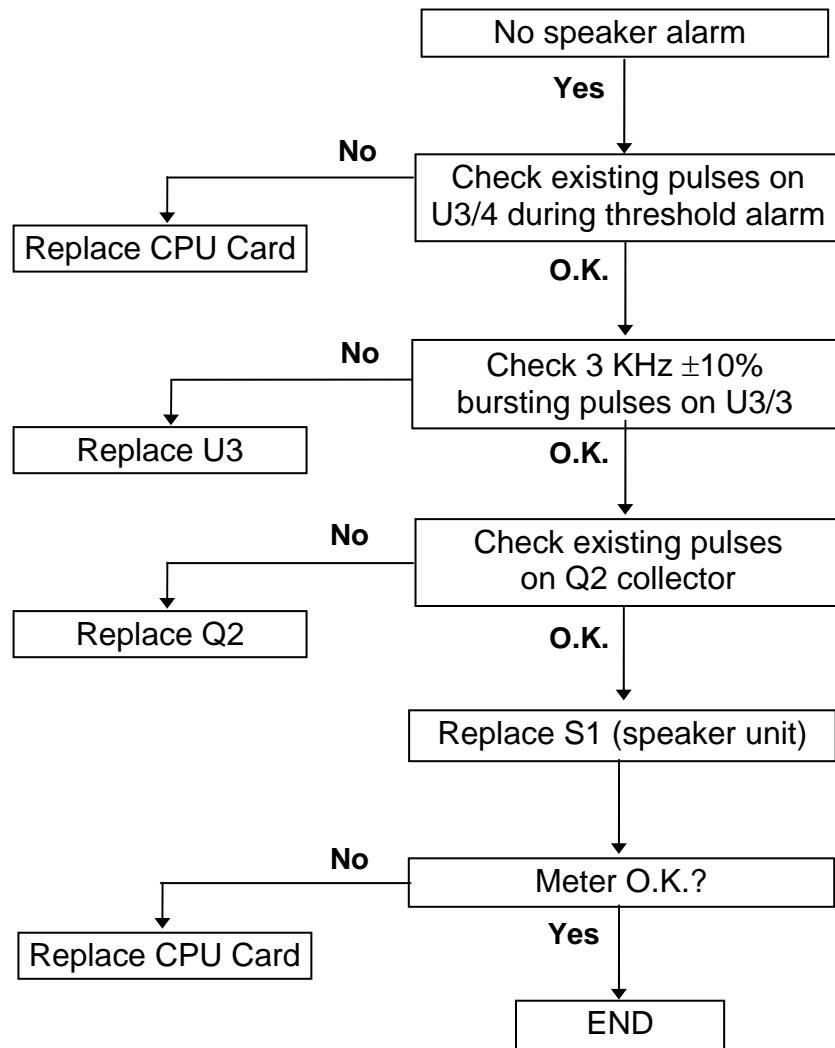
7.3. Meter parameters are not saved in the internal memory



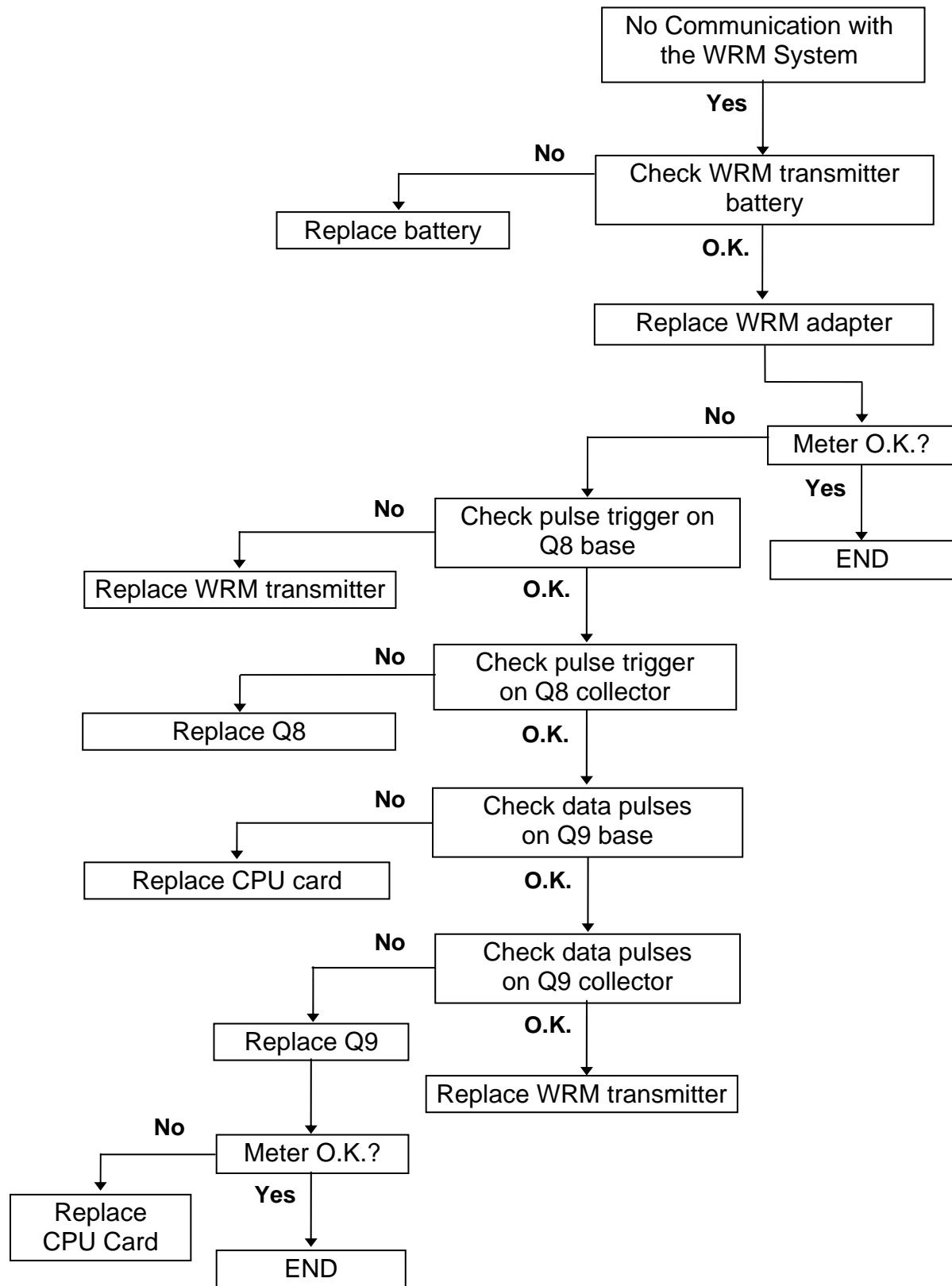
7.4. Display turns off or is incorrect



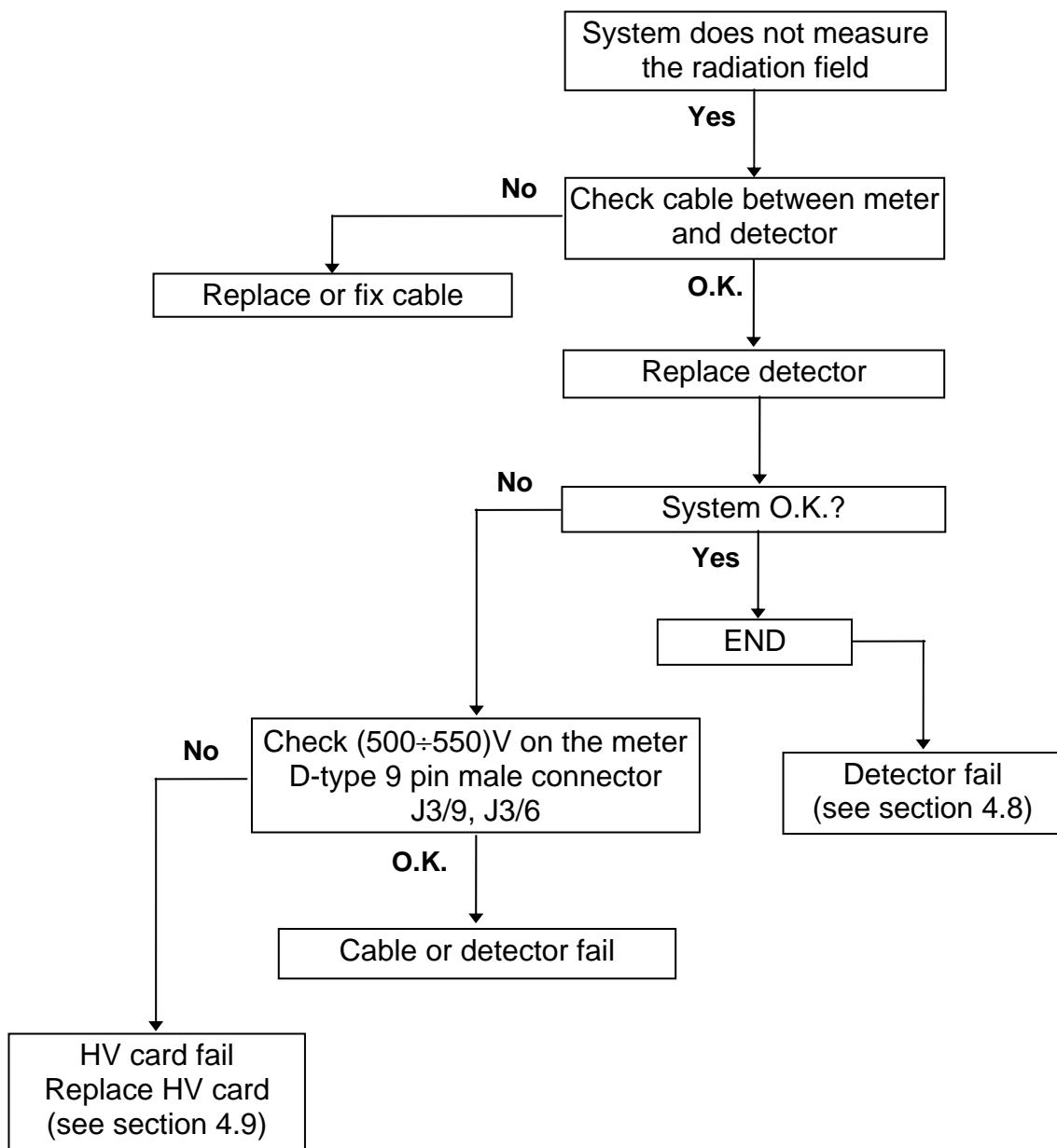
7.5. Speaker does not alarm



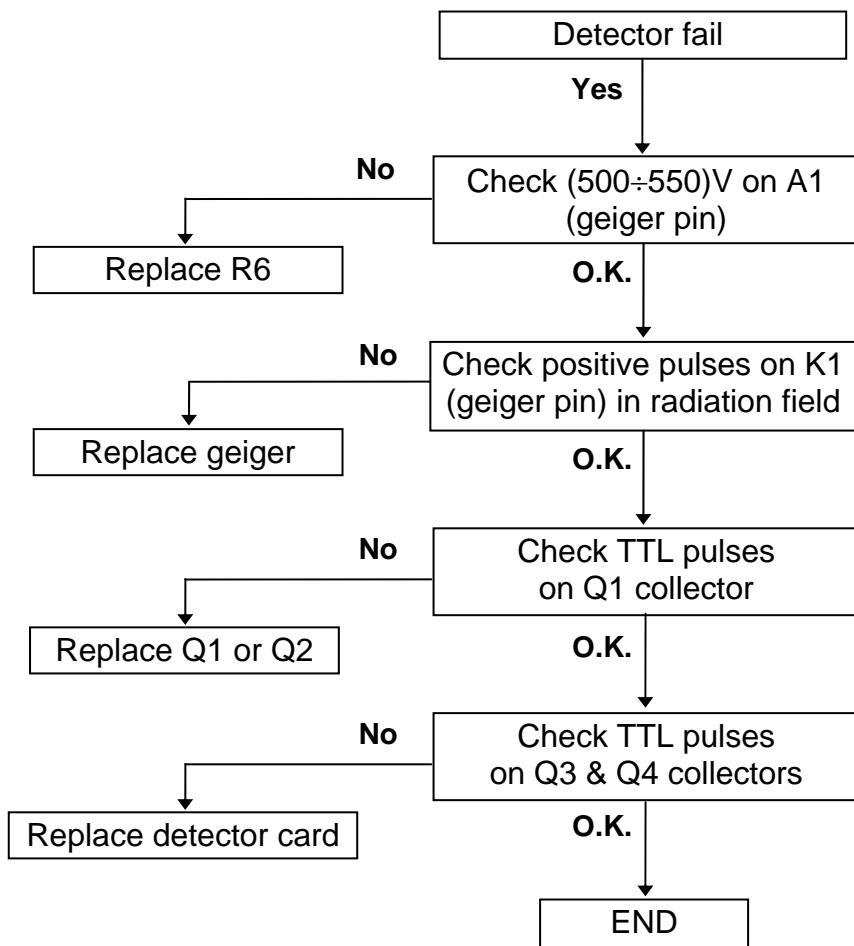
7.6. No communication with the WRM system



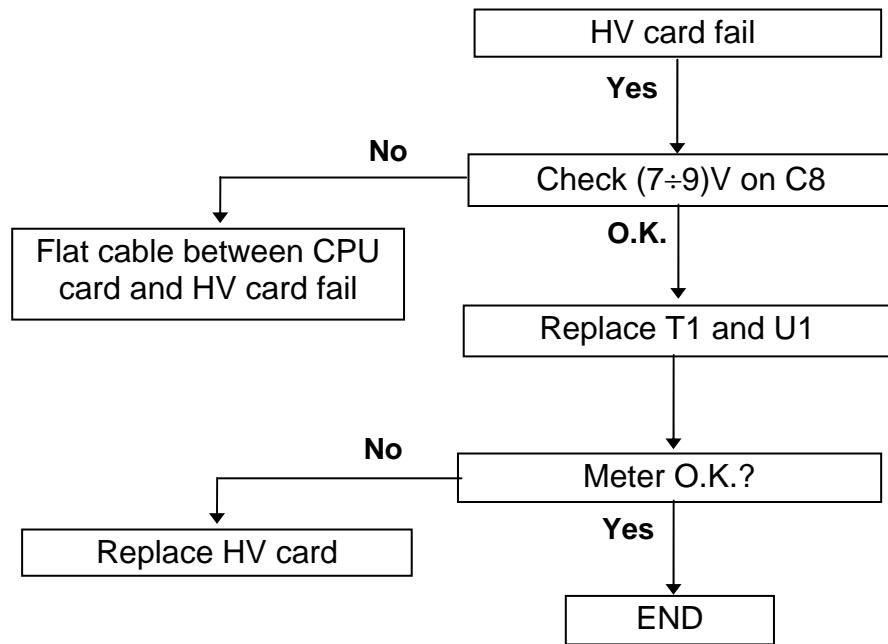
7.7. Instrument does not measure radiation



7.8. Detector failure

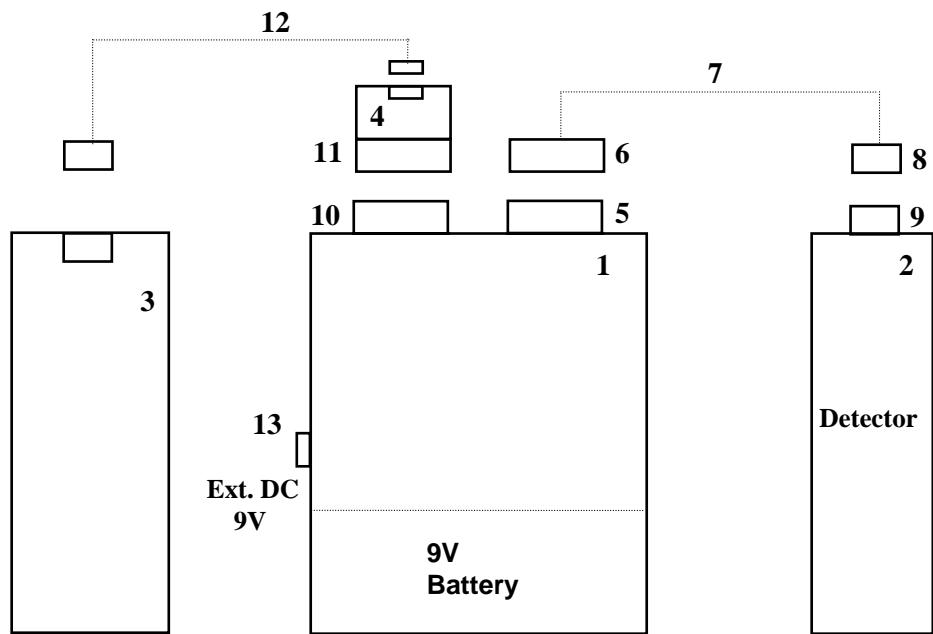


7.9. HV card failure



Appendix 1.

The AMP-100 System Parts List

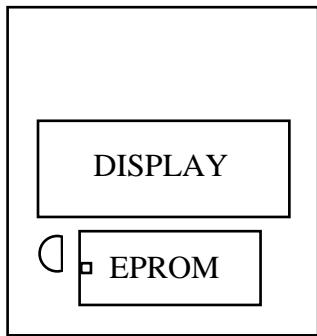


- 1 - Meter
- 2 - Detector
- 3 - WRM transmitter (optional)
- 4 - WRM adapter
- 5 - D-type male connector
- 6 - D-type female connector
- 7 - 4-wire shielded cable
- 8 - Ikelite connector II9104.15 (cable)
- 9 - Ikelite connector II9104.55 (panel)
- 10 - D-type female connector
- 11 - D-type male connector
- 12 - 4-wire telephone cable
- 13 - Audio connector 3.5 mm (external DC)

Appendix 2.

Instructions for EPROM Replacement

1. Disconnect the detector cable from the meter.
2. Disconnect the communication cable from the meter.
3. Loosen both capture screws on the battery compartment cover, take out the battery.
4. Loosen the four screws on the rear panel, turn and separate the meter's parts.
5. Disconnect the touch panel flat cable (5-pin).
6. Loosen the two PC #1938 board adjusting screws (located above the flat-cable connector).
7. Remove the EPROM.
8. Insert a new EPROM.
9. *Take care to insert the EPROM in the correct direction.*



PC 1938

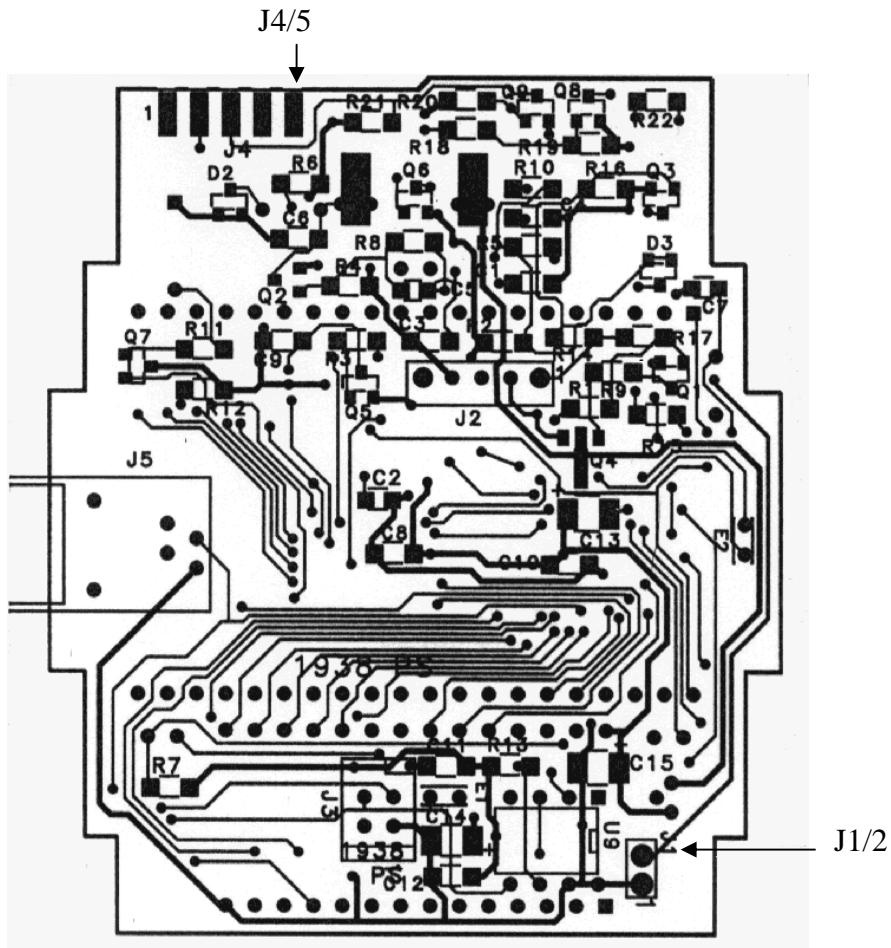
10. Assemble the meter following steps 1 to 6 in the reverse order.

Appendix 3.

External Power Supply – from AM-16 or WRM Transmitter

In order to enable direct power supply from the AM-16 or WRM Transmitter to the AMP-100, the following change has to be performed on the CPU Board - PC #1938.

- Open the AMP-100 case.
- Solder a wire between J1/2 and J4/5 on the CPU board, on the print side, as shown in the following figure:



Appendix 4.

AMP-100 Electronic Drawings

- | | |
|-----------------------|---|
| 1. DRW # 12730-50-03 | - Ver. 1.0 - Block & Wiring Diagram |
| 2. DRW # 12730-50-00 | - Ver. 1.0 Rev. 2 - External Wiring Diagram |
| 3. DRW # 12730-50-01 | - Ver. 1.0 Rev. 2- Internal Wiring Diagram |
| 4. DRW # 12730-50-02 | - Ver. 1.0 - Wiring for PC# 1938 and 2013 |
| 5. DRW # 12730-43-00 | - Ver. 2.0 Rev. 3- CPU Card, PC# 1938 |
| 6. DRW # 12730-43-01 | - Ver. 1.0 - CPU Card, Silk C.S., PC# 1938 |
| 7. DRW # 12730-43-02 | - Ver. 1.0 - CPU Card, Silk P.S., PC# 1938 |
| 8. DRW # 12730-42-00 | - Ver. 1.0 Rev. 1 - HV Card, PC# 1906 |
| 9. DRW # 12730-42-01 | - Ver. 1.0 - HV Card, Silk C.S., PC# 1906 |
| 10. DRW # 12730-42-02 | - Ver. 1.0 - HV Card, Silk P.S., PC# 1906 |
| 11. DRW # 12730-41-00 | - Ver. 1.0 Rev. 3 - Detector Card, PC# 1930 |
| 12. DRW # 12730-41-01 | - Ver. 1.0 - Detector Card, Silk P.S., PC# 1930 |
| 13. DRW # 12730-40-00 | - Ver. 1.0 - WRM Adapter, PC# 1861 |
| 14. DRW # 12730-13-01 | - Ver. 1.0 - WRM Adapter, Silk P.S., PC# 1861 |
| 15. DRW # 12730-44-00 | - Ver. 1.1 - Power Supply - WRM Adapter, PC# 1963 |

Appendix 5.

Instruction to modify AMP-100 for version 000803/5355 firmware

1. Unscrew the four screws located on the meter's back.
2. Unscrew the two screws located on the CPU's card.
3. Take out the EPROM.
4. Connect the jumper between point 1 and to point 2 (see the attached layout)
5. Insert the new EPROM (ver. 000803/5355)

