



FEB 26 1975

208 STORAGE MONITOR OPERATORS

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WARRANTY

All TEKTRONIX instruments are warranted against defective materials and workmanship for one year. Any questions with respect to the warranty should be taken up with your TEKTRONIX Field Engineer or representative.

All requests for repairs and replacement parts should be directed to the TEKTRONIX Field Office or representative in your area. This will assure you the fastest possible service. Please include the instrument Type Number or Part Number and Serial Number with all requests for parts or service.

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SAFETY INFORMATION

The 208 Storage Monitor has fully isolated ECG circuitry and is suitable for use with electrically susceptible patients when operated from either the internal batteries or the external AC Adapter. When using these power supplies, the ECG leakage current does not exceed 5 μ A RMS at 120 V, 60 Hz.

Electrical appliances applied to a patient can create hazards for both patient and operator unless the equipment is suitable for the application and the operator is skilled in its use. Several appliances used simultaneously can compound the hazards. Follow the instructions in this manual carefully to insure safe operation of the 208 Storage Monitor.

See Section 5 for a list of Tektronix-approved patient cables and accessories.

WARNING

The monitor is not explosion proof. When used in locations with flammable anesthetics, the monitor must be at least five feet above the floor. See NFPA No. 56A, Standard for the use of Inhalation Anesthetics, articles 24114(c) and 24032.¹

WARNING

If the monitor is dropped or severely abused, it should be checked by qualified personnel to ensure that the safety features are intact.

High voltage inside. Do not remove covers. Operating voltages can cause injurious or fatal electric shock. Refer servicing to qualified personnel.

DO NOT STERILIZE. See Section 7 for cleaning and maintenance procedures.

¹ Safety Documents: Additional safety information can be found in the following documents:
 National Fire Protection Association, 60 Batterymarch Street, Boston, Massachusetts, 02110
 NFPA No. 76B-T, Safe Use of Electricity in Hospitals, 1973.
 NFPA No. 56A, Standard for the Use of Inhalation Anesthetics, 1972.
 NFPA No. 70, National Electrical Code (Article 517), 1971.
 Underwriters' Laboratories, Inc.
 UL 544, Standard for Safety, Medical and Dental Equipment.

POWER SOURCE

The 208 Storage Monitor is designed to operate from internal batteries and need not be connected to an ac power source. It can also be operated from the AC Adapter or with the optional Battery Charger connected to an ac power source. Both the AC Adapter and the optional Battery Charger are intended to be operated from a single-phase earth-referenced power source having one current-carrying conductor (the Neutral Conductor) near earth potential. Operation from power sources where both current-carrying conductors are live with respect to earth (such as phase-to-

phase on a three-phase system) is not recommended, since only one Conductor has fuse protection within the AC Adapter and the Battery Charger.

The monitor is compatible with isolated power systems such as used in Operating rooms.

The construction of the monitor provides protection for both patient and operator. The only precaution necessary during operation is to make sure that the AC Adapter or Battery Charger (when used) is connected to a safety ground.

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208 FEATURES

The 208 is a small, battery-powered, physiological monitor that is suitable for use with electrically susceptible patients. It is small enough to be hand-held during normal operation.

The 208 provides full screen or dual, split-screen ECG or pulse displays. Displays can be saved temporarily for detailed waveform comparison, etc. The display is automatically positioned vertically for the FULL and SPLIT modes.

The power is primarily supplied by two rechargeable Nickel Cadmium D-Cells. The Ac Adapter provides sufficient power to recharge the batteries and operate the monitor simultaneously.

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POWER

The 208 Storage Monitor is designed exclusively for operation from two NiCd D cells (General Electric XGCW3.5SB to Tektronix specification, Tektronix part 146-0005-00). The operating time is approximately 2 hours (with properly charged batteries) when operated in an ambient temperature range of +20°C to +55°C. Refer to Table 1-1 on Battery Charging. The operating time will be slightly longer when the optional pulse sensor is used. The NiCd D Cells have good operating characteristics at high ambient temperatures. Use of other D cells will significantly shorten operating time.

The AC Adapter provides enough power to operate the 208 Storage Monitor and recharge the batteries at the same time. The AC Adapter is designed to operate on line voltages from 100 volts to 270 volts RMS, 50 to 400 hertz (cycles per second).

The optional Battery Charger provides only enough power to charge the batteries. However, the operating time can be extended approximately 15% when the optional Battery Charger and the 208 Storage Monitor are on simultaneously. Approximately 8 hours of charging time with either the AC Adapter or the battery charger are required for each hour of operation from the batteries alone.

LOW BATTERY INDICATOR

When the LOW BATT indicator, Fig. 1-1, lights, the battery voltage is low, but the monitor will continue to operate for at least 10 minutes before the monitor shuts itself off.

The LOW BATT indicator will light when the power is first turned on. If the light stays on or blinks for more than a few seconds and the monitor shuts itself off, the batteries need recharging.

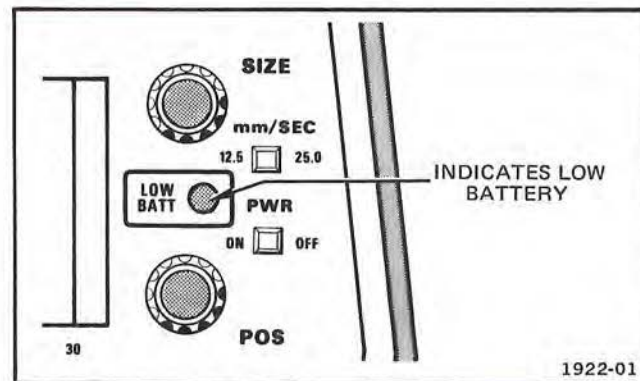


Fig. 1-1. Low-battery indicator.

If the LOW BATT indicator light flashes several times a minute when using the AC Adapter, the Battery Access door is ajar or the batteries are not present. Also when the LOW BATT indicator light is on, the SIG OUT may contain artifacts generated by the monitor.

To resume monitor operation, set the POWER pushbutton to the off position and either recharge the batteries, connect the AC Adapter, or replace the batteries.

NOTE

The Monitor is equipped with an automatic shut down feature which requires that the monitor be off for at least 2 seconds before it will restart. If the monitor power switch is ON and there is no display, turn the monitor OFF for 2 seconds and then ON again. If there is still no display, check the control settings.

If batteries that have been stored for a long time are placed in the 208, the AC Adapter may require several minutes to attain a battery voltage sufficient to operate the monitor. If the AC Adapter is connected as soon as the LOW BATT indicator lights, the monitor will work immediately. The batteries must be in place for the monitor to operate from the AC Adapter. Operating the monitor with the AC Adapter connected and the batteries removed or the Battery

Access door open, will cause the LOW BATT indicator light to blink. Also if the MONITOR switch is in the MONITOR position, the speaker will emit several tones each minute. No display will be visible in this mode.

BATTERY CHARGING

Batteries accept the maximum rated charge only when charging is done in a temperature range between +5°C and +30°C. See table 1-1.

TABLE 1-1
Typical Derating of Operating Time for Various Charge and Operating Temperatures (+20°C to +30°C reference)

Charge Temperature	Percentage of Operating Time at the Reference Temperature for Operating Temperatures of:	
	-15°C	+20°C to +55°C
+5°C to +30°C	85%	100%
+40°C	65%	80%
+55°C	45%	55%

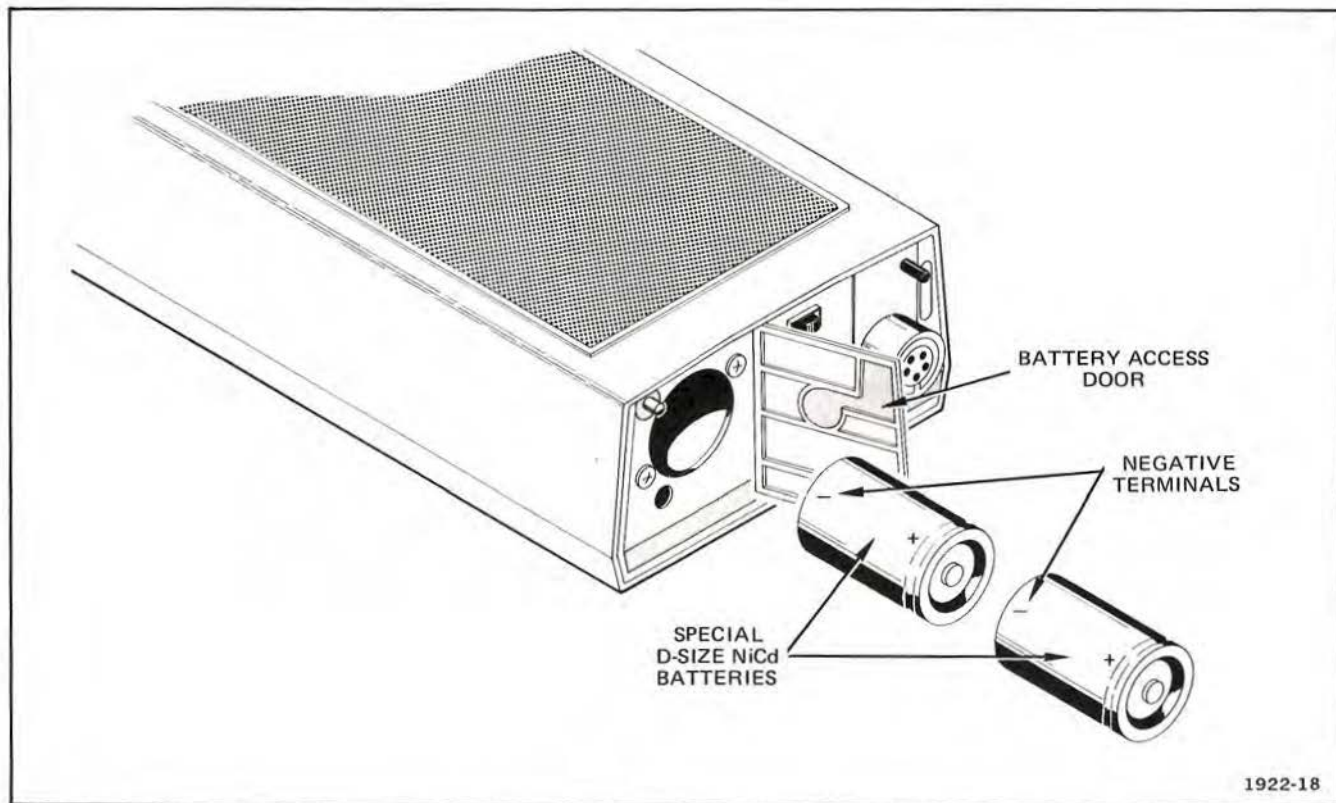


Fig. 1-2. Battery replacement.

The batteries can be charged by using the AC Adapter supplied with the monitor or the optional battery charger. To fully charge the batteries requires 12 to 16 hours at 350 mA. Also charging the batteries at temperatures above 25° C reduces the amount of charge the batteries will accept. Longer charging time does not compensate for the higher temperature.

BATTERY REPLACEMENT

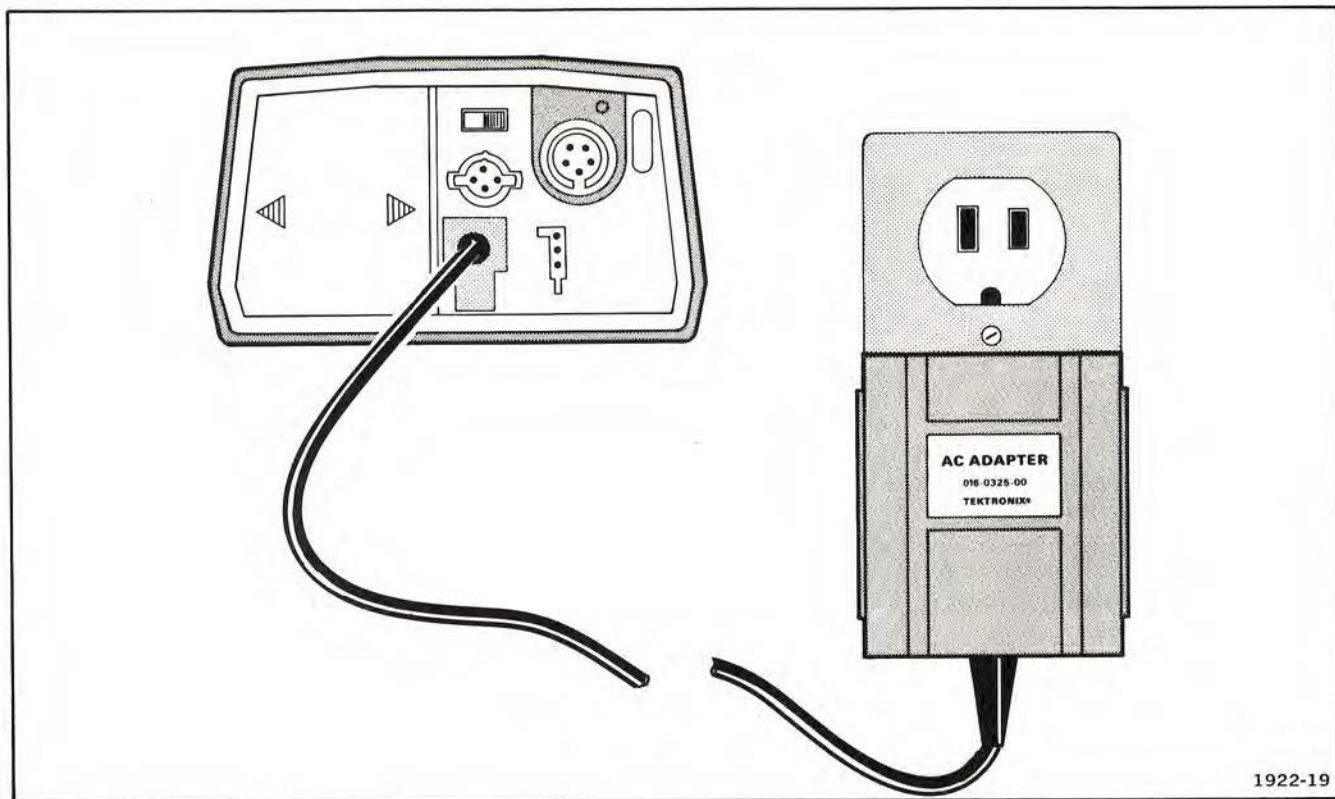
The batteries are removed through an access door at the rear of the monitor (see Fig. 1-2). To open the Battery Access door, press inward on the arrow nearest the ECG connector. To close the door, press inward on the arrow furthest from the ECG connector. Replace batteries with the negative terminals toward the front of the monitor (see Fig. 1-2).

The buttons (positive electrodes) on the batteries will be toward the rear of the monitor. Use of NiCd batteries other than General Electric XGCW3.5SB to Tektronix specification, Tektronix part 146-0005-00, will significantly shorten instrument operating time. Since NiCd batteries are self-discharging over a period of weeks, they should be recharged for at least eight hours every two weeks.

NOTE

The Monitor will not operate properly from the AC Adapter with the Battery Access door open or the batteries removed.

The AC Adapter is connected to the monitor and the power source as shown in Fig. 1-3. The optional Battery Charger is connected in the same manner.



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Fig. 1-3. AC Adapter connected to monitor and power source.

OPERATION

FUNCTIONS OF CONTROLS AND CONNECTORS

This section explains the function of each external control, connector and indicator that appears on the external surfaces of the monitor and is used during normal operation. Controls located inside the instrument covers should be adjusted only during instrument calibration. Display function push-buttons have yellow bands to indicate when they are set out.

Front Panel (Fig. 2-1)

- ① **SAVE Δ** —Saves the upper segment of the crt display when in the split-screen mode or both segments when in the full-screen mode. Set in for save. Set out (yellow band showing) for non-save.
- ② **SAVE ∇** —Saves the lower segment of the crt display when in the split-screen mode or both segments when in the full-screen mode. Set in for save. Set out (yellow band showing) for non-save.
- ③ **FULL-SPLIT**—Selects either a split-screen or a full-screen display. Set in for full-screen display. Set out (yellow band showing) for split-screen display.

- ④ **PULSE-ECG**—Selects either the pulse or the ECG input. Push in for pulse. Set out (yellow band showing) for ECG.
- ⑤ **LEAD FAULT**—This indicator lights to indicate a problem in the ECG input circuit. Several possibilities are:
 - a. An open circuit (break) in the patient cable or in the electrodes or electrode wires.
 - b. Insufficient gel or paste in the electrode(s).
 - c. One or more electrodes or electrode wires disconnected (three electrodes are required for proper operation).
 - d. Excessive dc offset in one or more electrodes (refer to Section 5 for a list of recommended electrodes).
 - e. The SIZE control is set so far clockwise that the waveform will not fit on the display screen.
 - f. The Cardiosensor is not making proper contact with the patient (electrode gel or water on the skin

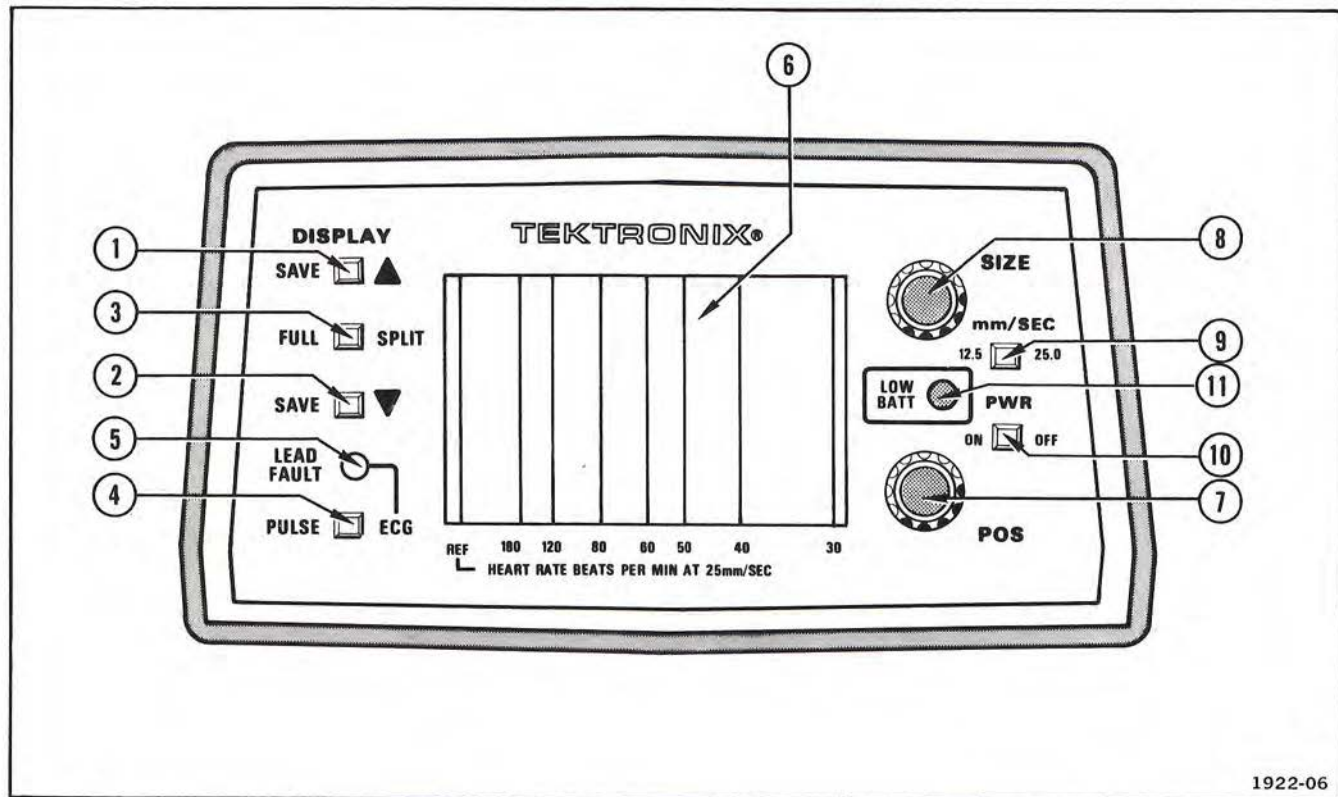
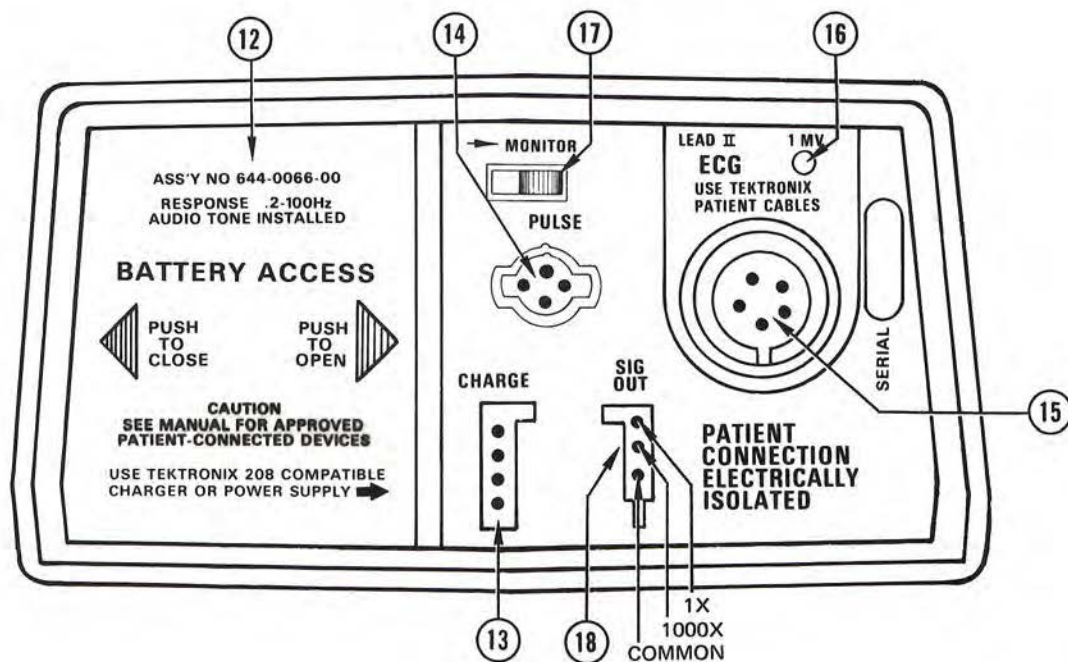


Fig. 2-1. Front-panel controls, connectors, and indicators.

Rear Panel (Fig. 2-2)

- ⑫ **BATTERY ACCESS Door**—Two special rechargeable D-cells (Tektronix part 146-0005-00) are housed behind this door. Press appropriate arrow to open or close door.
- ⑬ **CHARGE**—Provides input for the standard AC Adapter or the optional Battery Charger accessory.
- ⑭ **PULSE**—Provides input for an optional pulse sensor.
- ⑮ **ECG**—Provides input for an ECG patient cable or Cardiosensor.
- ⑯ **ECG 1 mV cal pushbutton**—Pressing this pushbutton inserts a 1 mV step in the ECG input which is displayed on the crt. This results in a 1 V step and a 1 mV step at the SIG OUT connector which can be used to calibrate chart recorders and other instruments.
- ⑰ **MONITOR**—Selects audio signal in the MONITOR position. In instruments without audio (Option 31), the MONITOR switch selects a low frequency cutoff of either 0.05 Hz¹ or 0.2 Hz. Use the MONITOR position with the Cardiosensor in instruments without audio.
- ⑱ **SIG OUT**—This connector provides an output signal of either 1 times or 1000 times the ECG electrode signal and an output signal of similar amplitude from the optional pulse sensors.

¹ 0.05 Hz to 100 Hz (cycles per second) bandwidth from "Recommendations for Standardization of Instruments in Electrocardiography and Vectorcardiography", by the American Heart Association Instrumentation Committee on Electrocardiography. I.E.E.E. TRANSACTIONS ON BIOMEDICAL ENGINEERING, Jan, 1967.



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Fig. 2-2. Rear-panel controls and connectors.

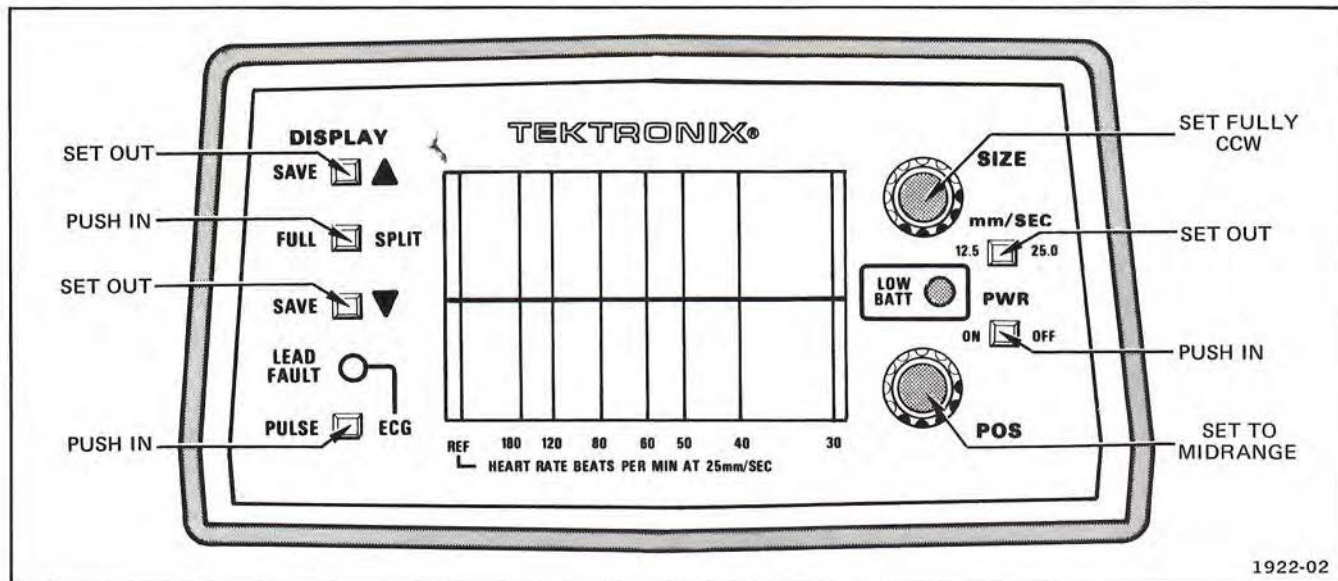


Fig. 2-3. Obtaining a baseline trace.

INITIAL OPERATION

Single Trace

A baseline trace can be displayed on the monitor screen by setting the front-panel controls as shown in Fig. 2-3 without any sensors connected to the monitor.

Dual Trace

Two baseline traces can be displayed by setting the FULL/SPLIT switch out (yellow band showing) without any sensors connected to the monitor. Set all other controls as shown in Fig. 2-3.

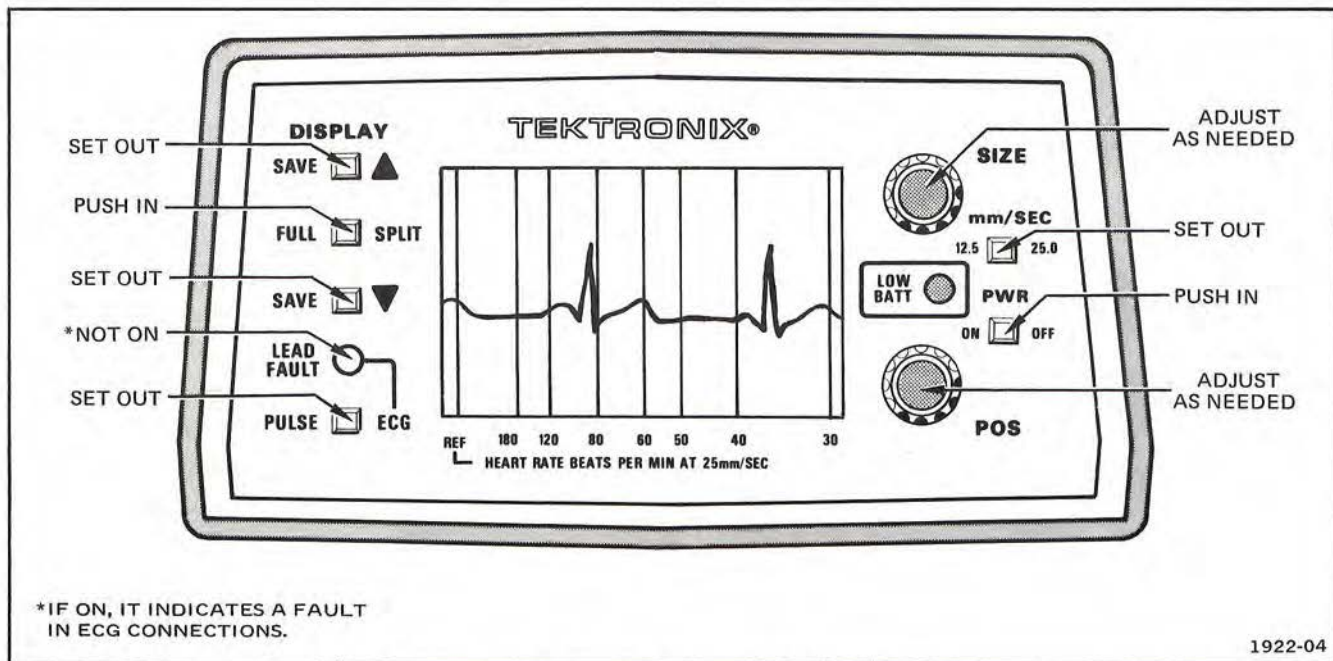


Fig. 2-4. Obtaining an ECG display.

ECG DISPLAY

Set front-panel controls as shown in Fig. 2-4. Connect an ECG patient cable or cardiosensor to the ECG input at the rear of the monitor. Connect the patient cable to an ECG signal source. See ECG section for patient cable and electrode attachment instructions and information.

PULSE DISPLAY

Set front-panel controls as shown in Fig. 2-5. Connect an optional pulse sensor to the PULSE input at the rear of the monitor. Connect the pulse sensor to a patient to produce the following display.

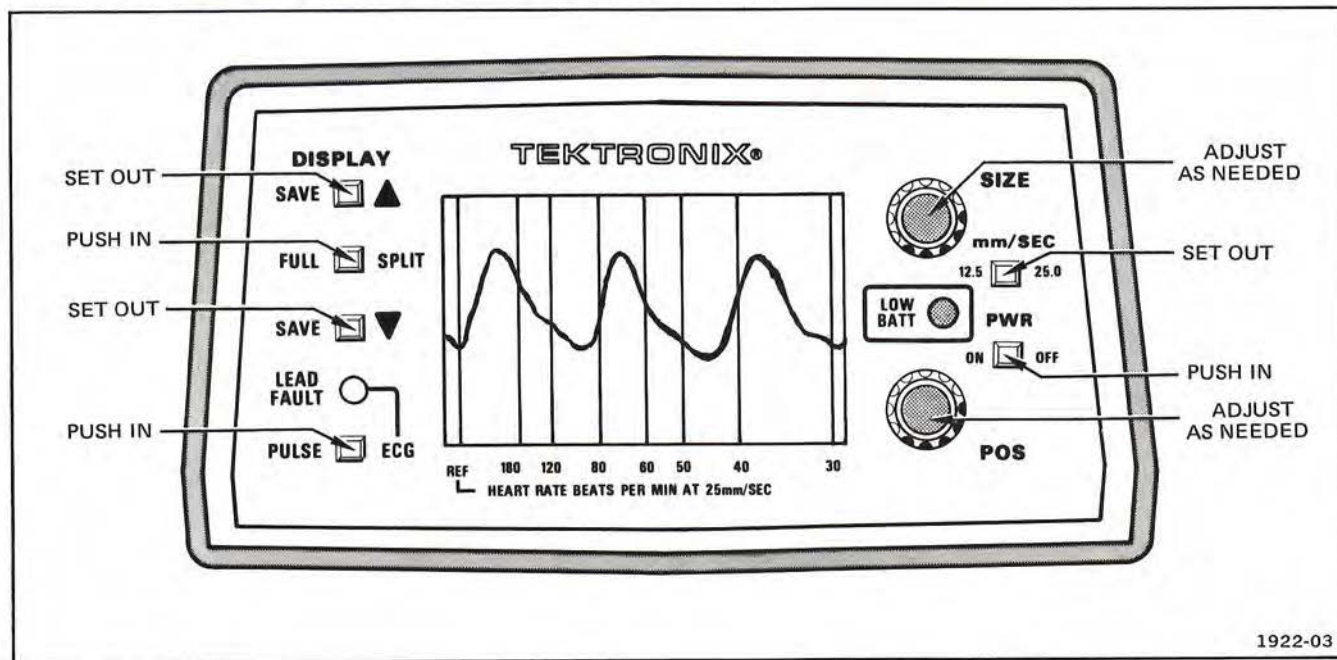


Fig. 2-5. Obtaining a pulse display.

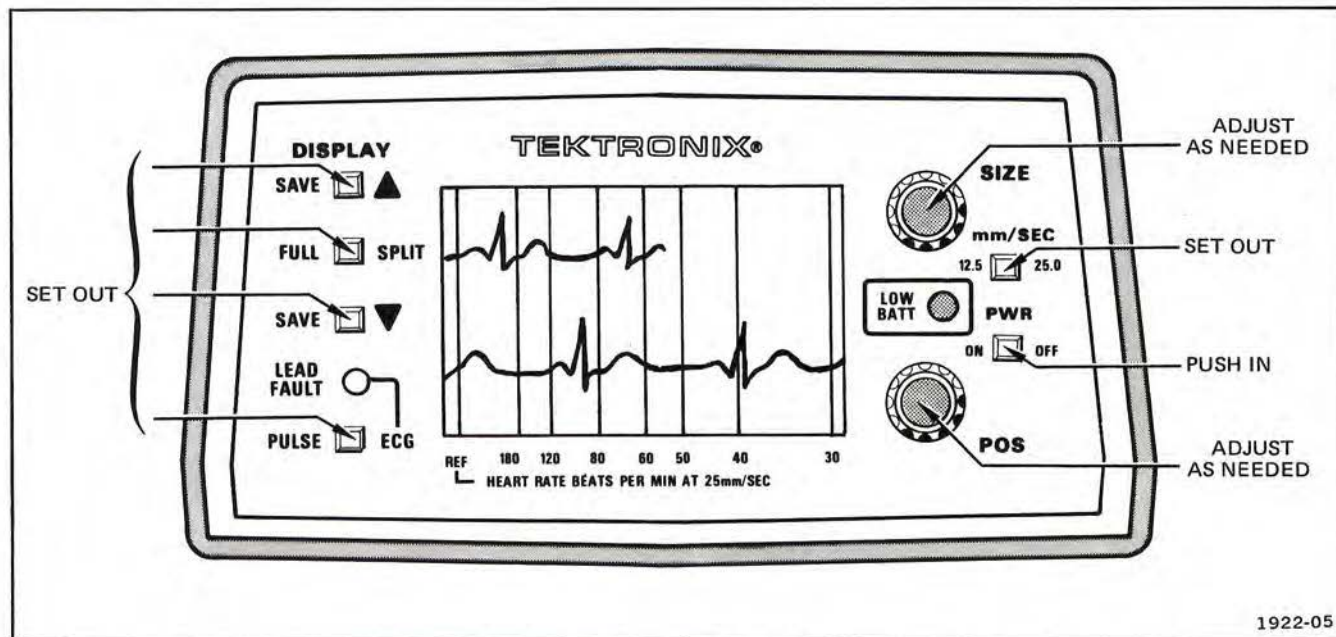


Fig. 2-6. ECG waveform in SPLIT mode.

DISPLAY MODES

Full Display

The waveform is stored as the trace moves across the screen. The stored display is erased at the start of each sweep with the controls set for non-save. In the FULL mode, pressing either SAVE pushbutton saves the display.

Split Display

In the SPLIT mode, a pulse or ECG waveform is displayed alternately on the upper and lower halves of the screen. When the display is switched from FULL to SPLIT, the display amplitude is automatically reduced by one half to compensate for the reduced screen area. In the SPLIT mode, the display on either or both screen halves can be saved by pressing their respective SAVE pushbutton. When one half of the screen is in the SAVE mode, the waveform will continue being displayed on the other screen as normal. This feature is useful for comparison of ECG waveforms. The saved display will remain indefinitely as long as the power is ON. Fig. 2-6 shows an ECG waveform displayed in the SPLIT mode.

OPERATING TEMPERATURES

The 208 Storage Monitor will operate and meet all specifications over a range of -15°C to $+50^{\circ}\text{C}$ when using the NiCd D cells (General Electric XGCW3.5SB to Tektronix specifica-

tion, Tektronix part 146-0005-00), except that battery operating time will be less below $+20^{\circ}\text{C}$. The D cells used with the monitor have good performance characteristics over the specified temperature range. While the monitor can be operated using other types of NiCd D cells, the operating time will be significantly reduced. Since the batteries retain less charge when recharged at temperatures above 30°C , operating time will be less than when the batteries are recharged at temperatures below 30°C . See Table 1-1 on battery recharging.

HUMIDITY

A warm, humid environment may cause condensation within the case of a cool monitor. This condensation may create discharge paths on the circuit boards. The monitor should be allowed to dry thoroughly before using. The appearance of condensation on the outside of the monitor case is a good indication that moisture has been drawn into the case.

ECG

The input characteristics of the monitor and the electrodes supplied reduce the need for skin preparation. If the ECG monitoring is primarily for heart rate measurement, as

opposed to diagnosis, electrodes can be placed to reduce muscle artifacts and maximize signal amplitude (refer to Fig. 3-1). Experimentation with electrode placement is recommended.

The placement shown in Fig. 3-2 is the one most likely to give maximum signal and minimum muscle artifacts. Always properly connect all three electrodes. Verify that the gel-filled sponge is still in the electrode-cup prior to attaching the electrode. The 208 monitor is permanently wired for the lead II configuration (+ input to LL connection and — input to RA connection). Connection of the LA (reference electrode) is required to operate the 208 Storage Monitor.

Hand-Held Electrode Set

The Cardiosensor Electrode Set provides a method of quickly obtaining ECG signals from the patient.

WARNING

Do not sterilize Cardiosensor.

Fig. 3-3 shows the approximate Cardiosensor position which provides the maximum ECG signal. Maximum signal occurs

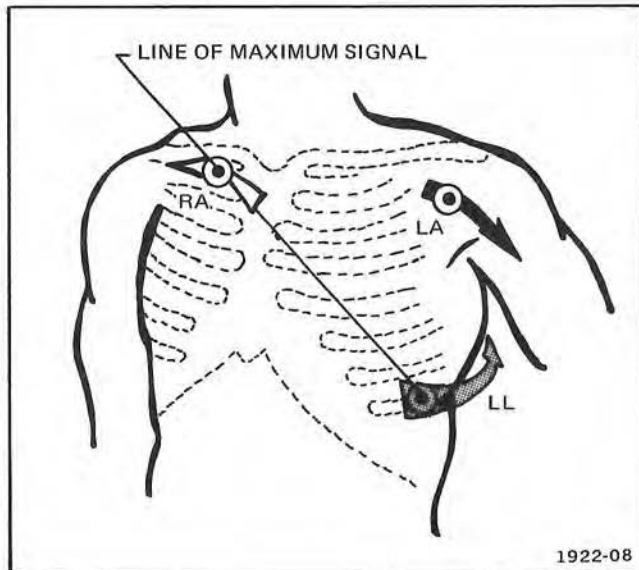


Fig. 3-1. Torso-electrode placement range.

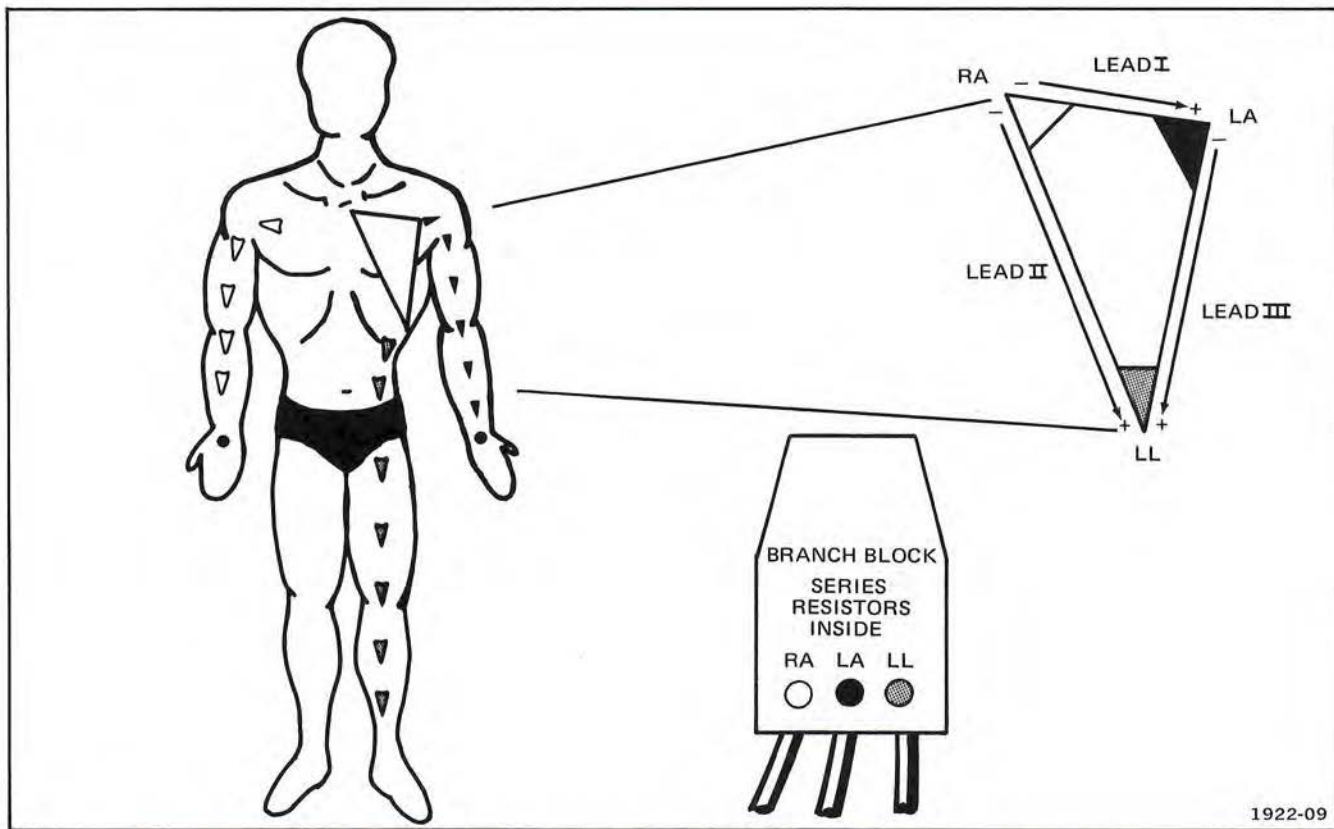


Fig. 3-2. Limb-electrode placement range.

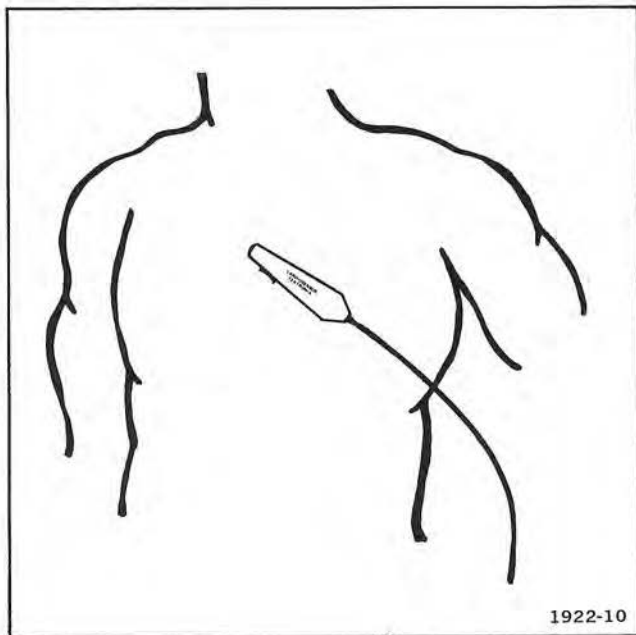


Fig. 3-3. Cardiosensor placement.

when there is an electrode on either side of the heart area. The Cardiosensor also can be placed on the chest rotated 180° from the position shown on the drawing. A switch on the side of the Cardiosensor selects ECG waveform polarity. All three electrodes must be held firmly in contact with the skin to keep the LEAD FAULT indicator off and a waveform displayed. If the skin is extremely dry, moisten the electrodes with water or electrode paste.

WARNING

For operator's safety, do not use the cardiosensor during defibrillation.

The electrodes on the Cardiosensor may be moved to accommodate children and infants. Electrode A on the Cardiosensor (refer to Fig. 3-4) may be moved to any one of three positions by pulling the electrode out of its connector and slipping it into another one. Electrodes B and C must always be firmly in position for proper operation of the Cardiosensor. A damaged electrode can be replaced without replacing the other two.

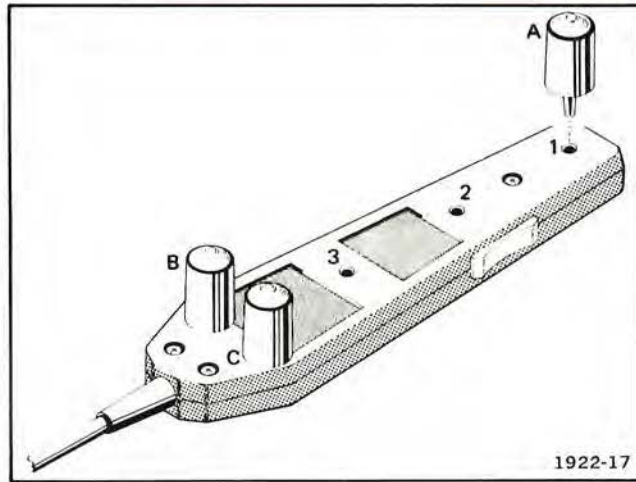


Fig. 3-4. Position of electrodes on Cardiosensor.

Limb Cable

The limb cable provides access to the "classical" ECG electrode sites on the arms and legs. The limbs provide a consistent ECG signal over a wide variation of electrode locations.

The limb cable is not recommended for monitoring purposes unless access to the torso is not available. Susceptibility to interference and muscle artifacts is greater when the electrodes are on the limbs. Also the limb cable is cumbersome and more likely to become tangled. The permanently attached electrode wires require complete cable replacement if damaged.

Torso Cable

Use the torso cable whenever possible. A shorter distance between electrode sites includes fewer skeletal muscles to produce artifacts and permits shorter electrode wires to be used, reducing power-line (50-60 Hz) interference. The shorter electrode wires are less likely to tangle and may be stored separately.

Electrode Wires

Broken or frayed electrode wires or loose snap fittings may cause interference or loss of signal. Frequent electrical and visual checks should be made on cables and electrode wires.

Inspect the point at which the wire enters the terminal since flexing at this point can cause wires to break. Defective wires or connectors will cause the LEAD FAULT indicator to light.

Monitor Internal Protection

The patient cable furnished protects the monitor from damage by defibrillators and electrocauterizers. The recommended cables can be identified by the "SERIES RESISTORS INSIDE" identification on the branch block. See Fig. 3-2. In rare, severe cases, these resistors will fail, requiring cable replacement. For example, the resistors can fail during defibrillator discharge if the paddles are partially covering the ECG electrodes, thereby making ineffective paddle contact with the patient. Such a cable failure would automatically be indicated by LEAD FAULT lamp lighting.

Alternate Cables and Wires

Use of other cables without the series resistors during defibrillation or electrocautery may result in damage to the monitor.

If the application does not involve electrocauterizers or defibrillators, other manufacturers' cables may be used interchangeably. However, other cables may introduce substantially more cable motion artifacts.

Interference

The torso cable, the Cardiosensor cable, the limb cable, and the electrode wires on the limb cable are shielded.

Skin Preparation

Skin preparation can often be omitted. However, some skin conditions, such as excessive oil, will require cleansing or other suitable preparation. A saline solution or a small amount of electrode paste rubbed into the skin, then wiped off, provides a good signal path between the body fluids and skin surface. When skin preparation is omitted, baseline drift may occur during the first ten to fifteen minutes, until the electrode paste (gel) from the electrode permeates the skin.

Poor skin preparation may result in signal distortion, noise, or other interference.

Electrodes

A good electrode contains Ag/AgCl (silver/silver chloride). Saline completes the circuit between the electrode button and the fluid system of the body. For optimum signal, the saline must permeate the skin.

The preferred electrodes are disposable Ag/AgCl electrodes with adhesive foam pads. Each electrode also contains a

small gel-filled sponge. The electrodes are easily attached to the skin and will function correctly for several days (until the electrode paste dehydrates).

Reusable Ag/AgCl electrodes and various electrode adapters are available from Tektronix, Inc.

Precautions

Skin reaction to some types of electrode paste may appear, especially on infants. Check for reddening of the skin.

Removal of the disposable electrodes during the first few hours after application may be difficult as the adhesive sticks tightly. One method is to "roll" the electrode as opposed to peeling. The skin may be cleaned with rubbing alcohol.

ECG LEAD FAULT Indicator

The LEAD FAULT indicator lights to indicate one of the following:

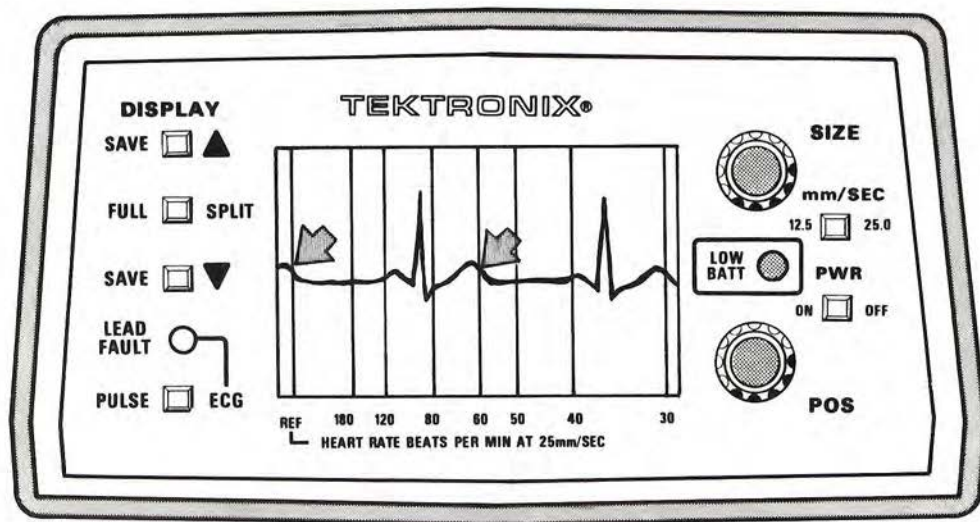
- a. An open circuit (break) in the patient cable or in the electrodes or electrode wires.
- b. Insufficient gel or paste in the electrode(s).

- c. One or more electrodes or electrode wires disconnected (three electrodes are required for proper operation).
- d. Excessive dc offset in one or more electrodes (refer to Section 5 for a list of recommended electrodes).
- e. The SIZE Control is set so far clockwise that the waveform will not fit on the display screen.
- f. The Cardiosensor is not making proper contact with the patient (electrode gel or water on the skin will insure better contact between the Cardiosensor and the patient).

HEART RATE

To read the display at the 25 mm/SEC sweep speed, note the point on the waveform which crosses the reference line, then note the scale reading where the first similar point on the waveform occurs. To read the rate at the 12.5 mm/SEC sweep speed, locate the second similar point on the waveform and read the rate from the scale.

Fig. 3-5 shows a heart rate of about 60 beats per minute at the 25.0 mm/SEC sweep speed.



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Fig. 3-5. Beats per minute scale.

PULSE

The pulse sensor is an optional accessory. The primary use of all peripheral pulse sensors is to monitor heart rate. Figures 4-1 through 4-6 show pulse sensor placement. The sensors are light operated and require unrestricted capillary action. The finger and radial sensors transmit light into the tissue. The light reflected to the sensor depends on the amount of blood in the capillaries at any one moment. The lobe sensors transmit light through the tissue rather than relying on reflection.



Fig. 4-1. Placement of finger sensor.

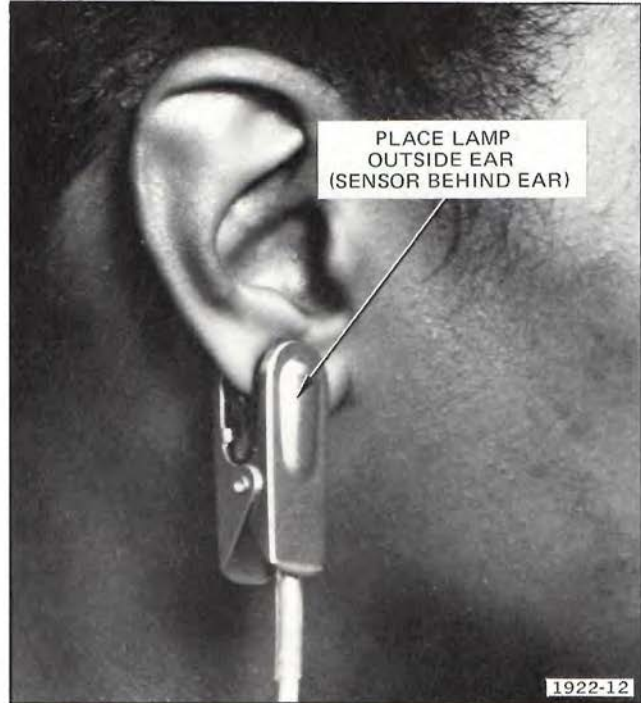


Fig. 4-2. Lower-ear placement of lobe sensor.

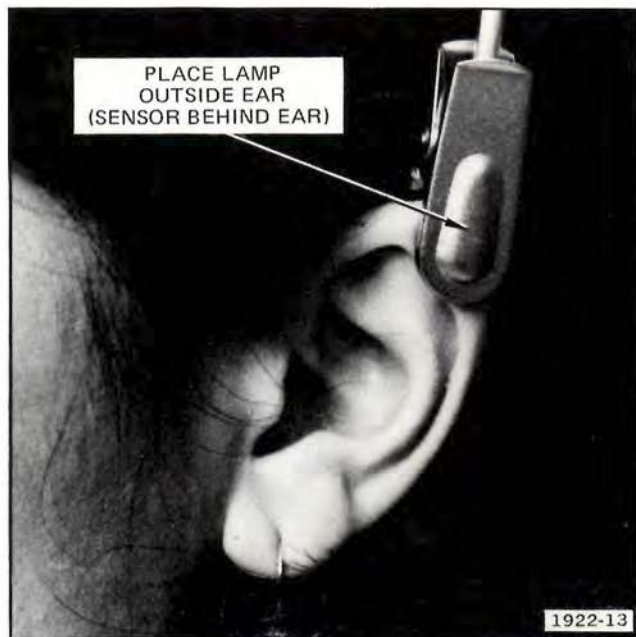


Fig. 4-3. Upper-ear placement of lobe sensor.

It may be necessary to shield the sensors from undesirable light, such as fluorescent lamps, with an opaque material such as a heavy towel, etc.

While skin pigmentation appears to have no effect on the usefulness of the sensors, heavy calluses may disrupt the optical path to such an extent that little or no signal is obtained.

Pulse sensors using a light-emitting diode for the light source have an isolated case. Those using an incandescent light source have exposed metal that is connected to the common ground of the monitor.

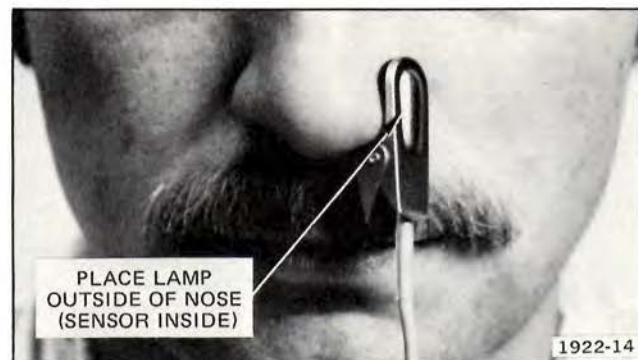


Fig. 4-4. Nostril placement of lobe sensor.

LOBE SENSORS

The lobe sensor may be used on the ear or nose primarily to monitor heart rate. Refer to Fig. 4-2, 4-3 and 4-4.

Finger or radial sensors may lose the pulse signal with vasoconstriction, while the ear lobe and nostril areas are less affected.

Additional support may be desirable for the lobe sensor to provide patient comfort and reduce sensor movement. For example, tape the cable to the skin several inches from the sensor.



Fig. 4-5. Great-toe placement of radial sensor.

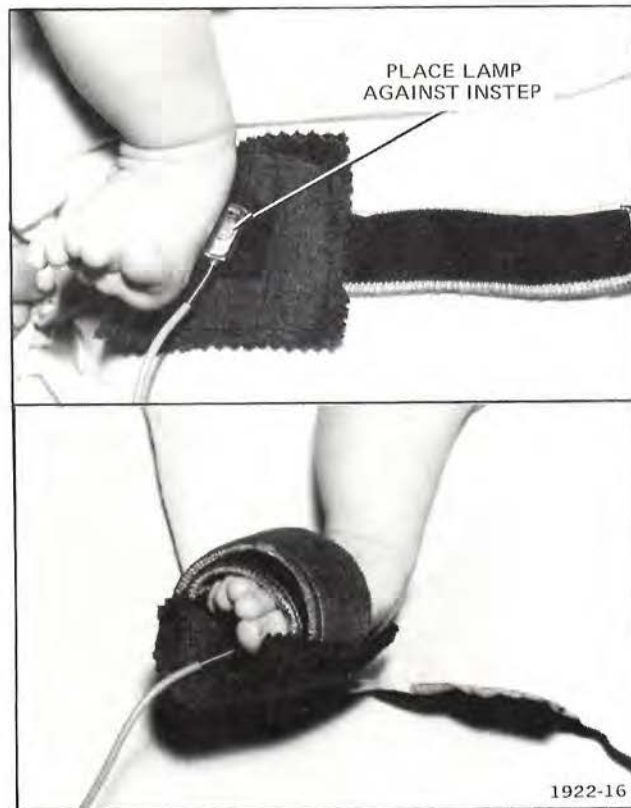


Fig. 4-6. Instep (infants only) placement of radial sensor.

FINGER AND RADIAL SENSORS

In addition to monitoring the heart rate, the finger and radial types can be used to monitor peripheral circulation so that vasoconstriction or vasodilation can be noted.

Finger Sensor

The finger sensor is generally the easiest type to install and remove. This sensor has a metal body that is connected to the SIG OUT connector common and the instrument common. **DO NOT** simultaneously use this sensor and the SIG OUT connector on electrically susceptible patients.

Radial Sensor

The radial sensor can be applied to the instep of infants to minimize motion artifacts. The radial sensor may be applied to the great toe or foot to monitor leg circulation (see Fig. 4-5 and 4-6).

PRECAUTIONS

Tissue Damage

Patients with poor circulation could sustain tissue damage from the heat generated by pulse sensors having an incandescent light source. This is least likely with the finger sensor, due to its large metal mass to dissipate heat. It is most likely with the radial sensor, since the dark-cuff acts as an insulator.

Pulse sensors using light-emitting diodes (LED) are also available. They can be identified by the red light source whereas sensors with incandescent lamps have a yellow-white light source. LED sensors offer: (a) less heat per unit of light; (b) electrically insulated sensor body; (c) longer light source life; (d) approximately one half the power consumption.

Ambient Light

Sensors are sensitive to ambient light, especially fluorescent lights. The lobe sensor light source should be placed outside the ear or nose and the sensing element inside. Additional light shielding may be needed.

Motion

Movement of sensors with respect to tissue causes blood movement which is sensed and impairs the readability of the pulse waveform.

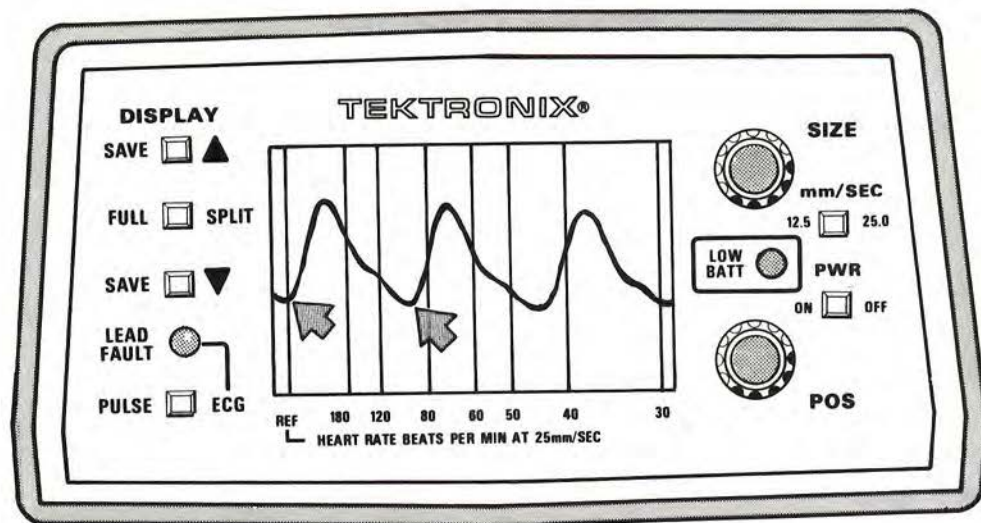
Pinching

If the sensor is allowed to pinch or apply too much pressure to the flesh, the pulse signal may be reduced or distorted due to capillary constriction.

HEART RATE

To read the display at the 25 mm/SEC sweep speed, note the point on the waveform which crosses the reference line, then note the scale reading where the first similar point on the waveform occurs. To read the rate at the 12.5 mm/SEC sweep speed, locate the second similar point on the waveform and read the rate from the scale.

Fig. 4-7 shows a heart rate of approximately 90 beats per minute at the 25.0 mm/SEC sweep speed.



1922-21

Fig. 4-7. Beats per minute scale.

ACCESSORIES AND OPTIONS

STANDARD ACCESSORIES

Included with the 208 Storage Monitor are:

1	Operators Manual	070-1922-00
1	Service Manual	070-1923-00
1	Patient cable, torso, 10 ft., straight connector at the 208	012-0445-00
2 sets	Electrode wires, set of 3	012-0502-00
3 packs	Electrodes, disposable, pack of 3	119-0353-00
1	AC Adapter	016-0325-00
1	Cardiosensor Electrode set	012-0598-00
1 tube	Electrode paste	006-2134-00
1	Carrying case for complete instrument	016-0330-00

OPTIONAL ACCESSORIES

The following is a partial list of the optional accessories available for use with the 208 Storage Monitor. For a complete list, contact your Tektronix Marketing Representative.

Pulse Sensors

Finger	015-0236-01
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Radial	015-0237-01
Lobe	015-0238-01

ECG Related Items

Patient Cable, limb	012-0495-00
Patient Cable, torso, 10 ft., straight connector at 208	012-0445-00
Patient Cable, torso, 6 ft., right angle connector at 208	012-0613-00
Electrode wires, 3 each per set with snap fittings for disposable electrodes and contact for torso cable ¹	012-0502-00
Electrode wires, with #4-40 thread for reusable electrodes and connections for torso cable:	
White (RA)	012-0449-00
Black (LA)	012-0450-00
Red (LL)	012-0451-00

¹ Available from American Hospital Supply Corp. PN 03-3982.

Electrode adapters with #4-40 thread
for limb cable (3 per limb cable)

to snap	103-0110-00
to plate	103-0079-00
to needle	103-0108-00

Electrode, disposable, package of
three¹ (sold in boxes of 10 packages
only) 119-0353-00

Electrode, reusable, silver-silver
chloride, with #4-40 thread for limb
cable (3 required per cable) 119-0197-00

Other Accessories

Battery Charger	016-0326-00
Battery, NiCd D-cell (2 required per instrument, General Electric XGCW3.5SB to Tektronix speci- fication)	146-0005-00

¹ Available from American Hospital Supply Corp. PN 65375-030.

Signal Output Cable	012-0608-00
Carrying case, Cardiosensor and 208 Monitor	016-0331-00
Mounting Kit—provides mounting point above 5 foot level	016-0110-00
Bracket—uppermost portion of Mounting Kit only	407-0393-01
Monitor Holder—interface between 208 and Mounting Kit or Bracket	015-0268-00
Pole Clamp—provides mounting point on round or square vertical pole	014-0053-00

OPTIONS

Option 12

Option 12 adds the following accessories to the 208 Storage Monitor: 6 ft. Torso Cable with a right angle connector at the monitor (012-0613-00) and a Carrying Case (016-0331-00) for the 208 Storage Monitor and Cardiosensor. Option 12 deletes the following standard accessories: 10 ft. Torso Cable with a straight connector at the monitor (012-0445-00).

Option 13

Option 13 adds the following accessories to the 208 Storage Monitor: Limb Cable (012-0459-00) and 3 snap adapters (103-0110-00) for the Limb Cable. Option 13 deletes the

following standard accessories: Torso Cable (012-0445-00) and electrode wire sets (012-0502-00).

Option 31

Option 31 modifies the 208 Storage Monitor to permit the selection of low frequency cutoff. The MONITOR switch (which selects the signal modulated audio tone) is replaced

by a switch that provides selection of either 0.05 Hz or .2 Hz. Option 31 includes the following accessories: 6 ft. Torso Cable with a right angle connector at the monitor (012-0613-00) and a Battery Charger (016-0326-00). Option 31 deletes the following standard accessories: 10 ft. Torso Cable with a straight connector at the monitor (012-0445-00) and AC Adapter (016-0325-00).

MOUNTING INFORMATION

A Monitor Holder (015-0268-00) is available as an optional accessory. It provides a holder with a mounting swivel for the 208 Storage Monitor allowing it to be mounted on either a pole or wall. Refer to Fig. 6-1.

To put the monitor in the holder, position the monitor so that the four studs fit into the screw recesses in the monitor

bottom (refer to Fig. 6-2). Close the holder cover and fasten the latch. Tug on the monitor to be sure that it is secure in the holder. The swiveling projection on the side of the holder slides into the bracket on top of Mounting Kit (016-0110-00) or into a wall mounted bracket (407-0393-01). Refer to Fig. 6-2.

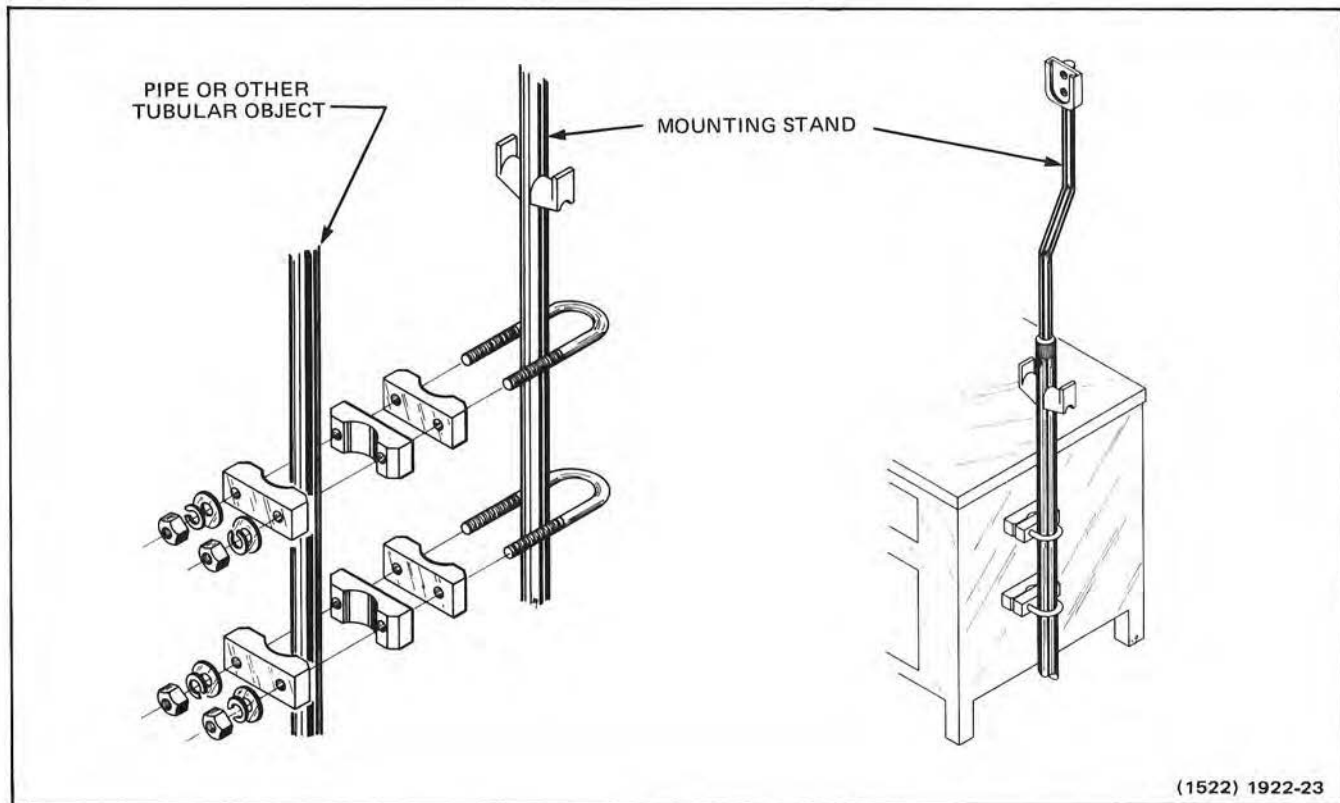


Fig. 6-1. Method of mounting to tubular object (pipe) or cabinet side.

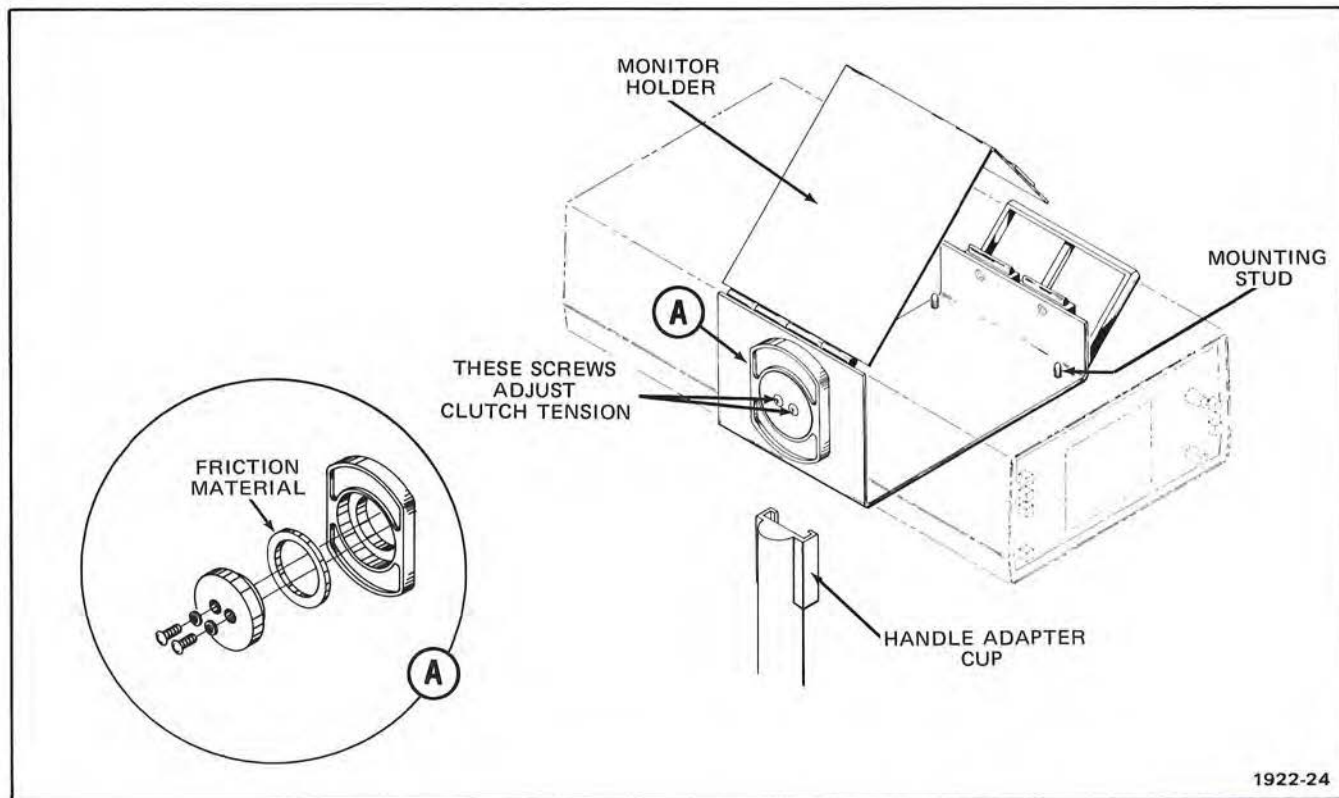


Fig. 6-2. 208 monitor mounts in the Monitor Holder and the Monitor Holder mounts onto the Mounting Kit.

MAINTENANCE

CLEANING

The operator should perform cleaning and visual inspection on a regular basis. Electrical maintenance and repair should be referred to qualified service personnel.

Clean the exterior surfaces with a cloth dampened with a warm water and mild soap solution. A cotton swab is useful for cleaning around the knobs and buttons on the front panel. Do not permit fluids to run behind the knobs and pushbuttons or into the connectors on the rear panel.

Take special care when cleaning the Cardiosensor electrodes after paste has been used on them. Wipe clean with a paper towel and store the Cardiosensor in its plastic shipping bag when not in use.

CABLES

Inspect all removable cables, wires, etc. Carefully check all points that are subjected to repeated flexing for breakage.

CALIBRATION

Calibration should be performed only by qualified service personnel. It is recommended that the 208 Storage Monitor

be recalibrated at least every two years or 2000 hours of operation. Also, the electrical safety features should be inspected and the leakage current should be measured every six months. Complete instructions are provided in the Service Manual.

WARNING

Electric shock hazard exists when the instrument covers are removed. Refer servicing to qualified personnel.

CAUTION

DO NOT STERILIZE THE MONITOR, CARDIO-SENSOR, AC ADAPTER OR BATTERY CHARGER. Severe damage to the instrument and accessories will result.

INSTRUMENT FAILURE

In the event of monitor failure or malfunction, an accurate description of the operator's observations can be of considerable value. Describe the problem and attach this information to the monitor with your name, phone number, and department to permit the service technician to contact you. For example:

1. Is the malfunction intermittent?
2. Does the malfunction affect only one function (such as SAVE Δ) or is the monitor completely inoperative?
3. If the monitor is partially operating, which of the below happens:

a) Does the screen flash once every 2 or 4 seconds?

YES NO

— —

YES NO

b) Is a trace present in the ECG mode?

— —

1) Does pushing the 1 mV Cal button cause a shift in the ECG trace?

— —

2) Does the LEAD FAULT indicator operate properly?

— —

c) Is a trace present in the Pulse mode?

— —

d) Does the Audio operate?

— —

e) Do the SIZE and POSITION controls operate properly?

— —

f) Does the SPLIT/FULL operate properly?

— —

g) Does the SAVE ∇ operate properly?

— —

h) Does the SAVE Δ operate properly?

— —

i) When in SPLIT mode, do both traces operate?

— —

