



FIG. 3. Cardiotape Recording System in use during an operative procedure.

to eliminate the 2-3 volt common mode voltage present at the O.R.M. (Electronics for Medicine, White Plains, New York) "recorder" output jack. The gain of approximately 30 of this module is determined by the 680K re-

sistors in the amplifier circuit in conjunction with the 22K output resistances of the O.R.M. The ten-turn potentiometer provides for balancing differential d.c. signals appearing in the O.R.M. circuit. The O.R.M. "recorder" jack ECG signal source was selected to provide maximum flexibility and to provide maximal patient isolation from electrical hazard.

An additional design consideration was the direct coupling of the ECG signal from the d.c. amplifier to the oscilloscope (fig. 1). This arrangement facilitates continuous remote visual monitoring of the "live time" ECG tracing during recording intervals and permits the comparison of recorded tracings with the "live time" ECG. This feature has been particularly useful when comparing pre- and post-therapy ECG configurations.

The total cost of the caster-equipped, rack-mounted system (fig. 3), including engineering and technical costs, was approximately \$1,000, a figure which could be reduced appreciably by utilizing a less sophisticated tape deck and oscilloscope.

In practice the Cardiotape System has proven to be a versatile, reliable, relatively inexpensive unit for the dynamic recording and replay of ECG abnormalities. The voice channel has proven acceptable and quite useful for patient identification, event-sequences, therapeutic techniques and other commentary relative to changes in the ECG patterns. When a sufficient spectrum of both normal and abnormal ECG tracings has been obtained and appropriately edited, it will be made available as a comprehensive library for ECG training.

Surgery

THROMBOPHLEBITIS Postinfusion thrombophlebitis is often due to the 3- to 5-pH range of the most commonly-used glucose solutions. Neutralization is believed to be the most important factor in reducing the incidence of phlebitis. Because of the instability of glucose solutions maintained in a neutral or basic environment for prolonged periods, it is recommended that bicarbonate be added to the infusion solution immediately prior to use. (Fonkalsrud, E. W., and others: *Reduction of Infusion Thrombophlebitis with Buffered Glucose Solutions*, *Surgery* 63: 280 (Feb.) 1968.)