

RCA

# Broadcast Equipment



Tape  
Editing  
Programmer  
Maintenance



any mode. Edit cue pulses may be manually generated by pressing the CUE pushbutton.

#### SET EDIT MODE

This mode is entered by setting the TEP mode switch to SET EDIT. The in and out-splice points are selected by pressing the IN and OUT buttons, respectively. Pressing the CUE ERASE button places the recorder in the PLAY mode (initiates tape motion) and erases any information on the tape cue track. If cue marks have previously been recorded, tape motion may be started without erasing the cue track by pressing the recorder PLAY button. After headwheel lockup occurs, the CUE button may be pressed. This activates the TEP frame counter and the recorder cue mark oscillator. A 2.5 second cue mark is recorded on the cue track. At the beginning of the desired splice, the IN button is pressed to store the in-splice point, and at the end of the desired splice the OUT button is pressed to store the out-splice point in the TEP memory. An inhibit circuit prevents in-splice point selection sooner than 14 seconds after the cue mark is recorded. Four seconds after the OUT button is pressed, the recorder enters the FAST REWIND mode, and the tape recorder is stopped upon detection of the cue mark previously recorded.

#### SET OUT MODE

This mode is entered by setting the TEP mode switch to SET OUT. It is used when the exact splice duration is not known; the out splice point is selected while previewing the material to be recorded. In this mode the in-splice point established in the SET EDIT mode is used. An advance cue for another program source is selected 2, 4, or 8 seconds before the in-splice point by the PRE-ROLL CUE control on the TEP front panel. Pressing the CUE ERASE button will start the recorder containing the tape into which material is to be inserted, (recorder No. 1) but will not cause erasure of any information on the cue track. The monitor will display the information on this tape. At the selected pre-roll cue time, the remote source containing the splice information will start; when the in-splice point is detected, the monitor will automatically switch to the auxiliary source output. The out splice point may be selected as desired by pressing the OUT button. Four seconds later, the recorder will enter the FAST REWIND mode, and stop when the cue mark is detected.

#### PREVIEW MODE

The PREVIEW mode is entered by setting the TEP mode switch to PREVIEW. It is used to check the

timing selected before the new information has been added onto or inserted into the original tape. In the manual mode the timing is that set on the EDIT TIME thumbwheels; in the automatic mode the timing is that selected in the SET EDIT mode by pressing the IN and OUT buttons. If desired, the INPUT and OUTPUT SHIFT thumbwheels may be used to move the in and out splice points by  $\pm 2$  seconds 29 frames in increments of 1 frame ( $\pm 2$  secs 24 frames in 625-line.) The in and out splice points are independent; moving one will not affect the other.

The PRE-ROLL CUE switch is used to setup an advance cue for the splice source. Pressing the CUE ERASE button places the recorder in the PLAY mode. When the advance cue is detected, the auxiliary source is activated, and at the in splice point the monitor switches to the auxiliary source. At the out-splice point, the monitor switches back to recorder No. 1, and four seconds later the recorder goes into FAST REWIND.

#### EDIT MODE

The EDIT mode is selected by setting the TEP mode switch to EDIT and pressing the EDIT button. In this mode, new material is added onto or set into the existing tape. The splice duration is determined by the in and out-splice points as selected in the SET EDIT mode, or as modified by the INPUT and OUTPUT SHIFT thumbwheels in the PREVIEW mode. The splice points trigger the electronic splicer to control the erasing and recording of video or audio material. Pressing the EDIT button places the recorder in the PLAY and SWITCHLOCK mode. An in-edit trigger pulse, the position of which is dependent upon the tape speed and line standard in use, activates the recorder splice circuits. An out-edit trigger pulse, occurring a predetermined number of frames ahead of the out-splice point (the number of frames depends upon tape speed and line standard) terminates the splice. At the out splice point the recorder returns to the PLAY mode, four seconds later it goes to FAST REWIND, and then to STOP when the recorded cue mark is detected. During the EDIT mode, special in and out cues are recorded; these pulses are used in the RE-EDIT mode.

#### RE-EDIT MODE

The RE-EDIT mode enables the operator to locate splices precisely at previously recorded cues. The RE-EDIT pushbutton, an alternate action switch, is effective when the TEP is in the SET EDIT, PREVIEW, or EDIT modes only. The desired mode is selected by the TEP mode switch before pressing the RE-EDIT button.

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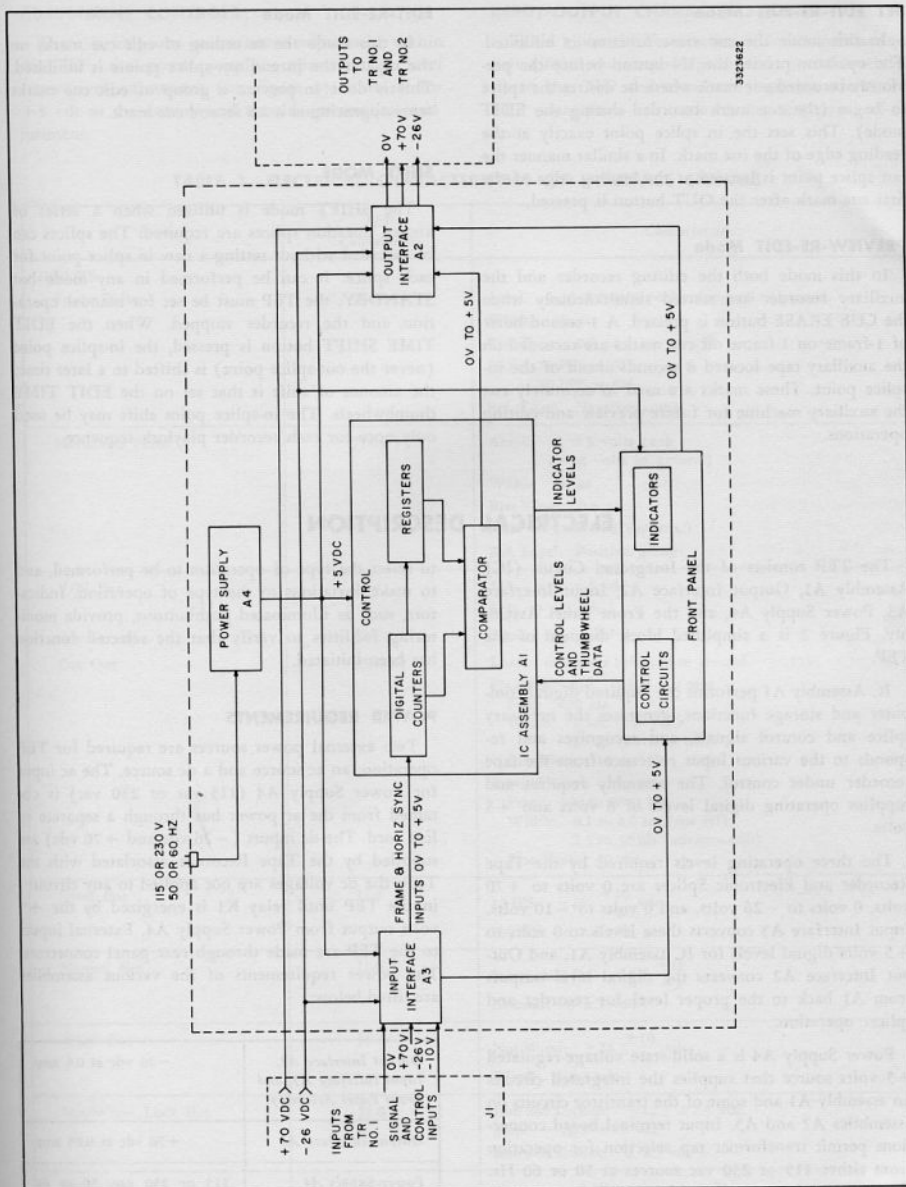


Figure 2—Tape Editing Programmer, Simplified Block Diagram

### SET EDIT-RE-EDIT Mode

In this mode the cue erase function is inhibited. The operator presses the IN button before the previously recorded cue mark where he desires the splice to begin (the cue mark recorded during the EDIT mode). This sets the in splice point exactly at the leading edge of the cue mark. In a similar manner the out splice point is located at the leading edge of the first cue mark after the OUT button is pressed.

### PREVIEW-RE-EDIT Mode

In this mode both the editing recorder and the auxiliary recorder are started simultaneously when the CUE ERASE button is pressed. A 1 second burst of 1-frame on 1-frame off cue marks are recorded on the auxiliary tape located 8 seconds ahead of the in-splice point. These marks are used to accurately cue the auxiliary machine for future preview and editing operations.

### EDIT-RE-EDIT Mode

In this mode the recording of edit cue marks on the tape at the in and out-splice points is inhibited. This is done to prevent a group of edit cue marks from appearing as a 2.5 second cue mark.

### SHIFT MODE

The SHIFT mode is utilized when a series of known duration splices are required. The splices can be cascaded without setting a new in splice point for each splice. It can be performed in any mode but STANDBY, the TEP must be set for manual operation and the recorder stopped. When the EDIT TIME SHIFT button is pressed, the in-splice point (never the out-splice point) is shifted to a later time; the amount of shift is that set on the EDIT TIME thumbwheels. The in-splice point shift may be used only once for each recorder playlock sequence.

## ELECTRICAL DESCRIPTION

The TEP consists of the Integrated Circuit (IC) Assembly A1, Output Interface A2, Input Interface A3, Power Supply A4, and the Front Panel Assembly. Figure 2 is a simplified block diagram of the TEP.

IC Assembly A1 performs the required digital computer and storage functions, generates the necessary splice and control signals, and recognizes and responds to the various input reference from the tape recorder under control. The assembly requires and supplies operating digital levels of 0 volts and +5 volts.

The three operating levels required by the Tape Recorder and Electronic Splicer are 0 volts to +70 volts, 0 volts to -26 volts, and 0 volts to -10 volts. Input Interface A3 converts these levels to 0 volts to +5 volts digital levels for IC assembly A1, and Output Interface A2 converts the digital level outputs from A1 back to the proper level for recorder and splicer operation.

Power Supply A4 is a solid-state voltage-regulated +5 volts source that supplies the integrated circuits on assembly A1 and some of the transistor circuits on assemblies A2 and A3. Input terminal board connections permit transformer tap selection for operation from either 115 or 230 vac sources at 50 or 60 Hz. The output voltage is adjustable.

The Front Panel Assembly permits the operator

to select the type of operation to be performed, and to make variations to the type of operation. Indicators, such as illuminated pushbuttons, provide monitoring facilities to verify that the selected function has been initiated.

### POWER REQUIREMENTS

Two external power sources are required for TEP operation; an ac source and a dc source. The ac input for Power Supply A4 (115 vac or 230 vac) is obtained from the ac power bus through a separate ac line cord. The dc inputs (-26 vdc and +70 vdc) are supplied by the Tape Recorder associated with the TEP; the dc voltages are not applied to any circuitry in the TEP until relay K1 is energized by the +5 volts output from Power Supply A4. External inputs to the TEP are made through rear panel connectors. The power requirements of the various assemblies are listed below:

|  |  |
|--|--|
| <i>Output Interface A2,<br/>Input Interface A3, and<br/>Front Panel Assembly</i> | -26 vdc at 0.6 amp   |
| <i>Output Interface A2</i>   | +70 vdc at 0.05 amp  |
| <i>Power Supply A4</i>   | 115 or 230 vac, 50 or 60 Hz, single-phase, three-wire, at 65 watts |

## ADJUSTMENT CONTROLS

There is only one maintenance adjustment within the TEP; the power supply output voltage level screwdriver adjustment (see figure 3). It is set for +5 vdc at the factory and should not require readjustment.

## INPUT-OUTPUT CHARACTERISTICS

Table 1 lists the characteristics for all interface signals (input and output signals and control levels between the TEP and associated tape recorders). All TEP connections are made on the rear panel of the unit.

**TABLE 1. ELECTRICAL CHARACTERISTICS OF INTERFACE SIGNALS**

| <i>Item</i>           | <i>TEP Connections</i> | <i>Characteristics</i>  |
|-----------------------|------------------------|---|
| <b>INPUTS</b>         |                        |   |
| Frame Pulse           | J1-27-11               | Ampl: $-10 \pm 2$ volts peak referenced to ground.<br>Width: 70 $\mu$ s<br>Rise Time: 0.6 $\mu$ s<br>PRF: 25 PPS at 625<br>30 PPS at 525<br>Ref. Edge: Negative going   |
| Horizontal Pulse      | J1-19-3                | Ampl: $18 \pm 3$ volts peak<br>( $-18$ volts to ground)<br>Width: 30 $\mu$ s<br>Rise Time: 0.6 $\mu$ s<br>PRF: 15,750 PPS (approx.)<br>Ref. Edge: Positive going  |
| V/N Bus               | J1-4                   | 525: $-20 \pm 6$ vdc<br>625: $0 \pm 3$ vdc  |
| Cue In and<br>Cue Out | J2-2-3-1<br>J3-2-3-1   | Type: Sinusoidal<br>Load: 600 ohms balanced to ground.<br>Playback-Ampl: 1.4 V p-p min.<br>Freq: 400 Hz<br>Width: 2 sec (cue ref.)<br>33 ms (advance edit)<br>Rise Time: 10 ms<br>Rewind Ampl: 2 v p-p<br>Freq: 400 to 8000 Hz<br>Width: 0.1 to 2.0 sec (cue ref.)<br>1.5 to 30 ms (advance edit)<br>Rise Time: 10 ms |
| Speed Bus             | J1-5                   | 15 IPS: $-26 \begin{matrix} +10 \\ -2 \end{matrix}$ vdc<br>7½ IPS: $0 \pm 3$ vdc  |
| Normal Bus            | J1-6                   | Insert/Add On: $+26 \begin{matrix} +10 \\ -2 \end{matrix}$ vdc<br>Normal: $0 \pm 3$ vdc   |
| Wind Bus              | J1-7                   | Not Wind: $-26 \begin{matrix} +10 \\ -2 \end{matrix}$ vdc<br>Wind: $0 \pm 3$ vdc  |
| Headwheel Lock Bus    | J1-8                   | Run and Lockup: $-12.5 \pm 2.5$ vdc<br>Stop: $-12.5 \pm 2.5$ vdc<br>Run and Unlock: $0 \pm 3$ vdc   |
| Splice Bus            | J1-9                   | Off: $-26 \begin{matrix} +10 \\ -2 \end{matrix}$ vdc<br>On: (Splice Play) $0 \pm 3$ vdc   |

TABLE 1. ELECTRICAL CHARACTERISTICS OF INTERFACE SIGNALS (Continued)

| Item                                       | TEP Connections                       | Characteristics   |
|--|---------------------------------------|---|
| Operating Voltages                         | J1-25<br>J1-22<br>Power Plug<br>J1-23 | -26 vdc at 0.6 amp<br>+70 vdc at 0.05 amp<br>115 or 230 vac, 50 or 60 Hz, Three wire, at 65 watts<br>Frame Ground   |
| OUTPUTS TO TR NO. 1<br>Cue Mark Osc. No. 1 | J1-31-15                              | On-Ampl: -26 v peak through 340 ohms.<br>Width: 2.5 sec (Ref. cue)<br>33 ms (Adv. cue)<br>Position: Leading edge 100 $\mu$ s behind leading edge of ref. frame.<br>Off: 0 vdc   |
| Cue Mark Bias No. 1                        | J1-32-16                              | On: 0 vdc<br>Off-Ampl: -26 v peak<br>Width: 2.5 sec (Ref. Cue)<br>33 ms (Adv. Cue)<br>Position: leading edge 100 $\mu$ s behind leading edge of ref. frame.   |
| Cue Erase                                  | J1-24                                 | On: 0 vdc<br>Off: -26 vdc   |
| Wind Trigger                               | J1-26                                 | Ampl: +70 $\frac{+1}{-7}$ vdc<br>Width: 33 ms min.<br>Position: 4 sec after out edit  |
| Wind Variac                                | J1-10                                 | On: 0 vdc<br>Off: -26 vdc<br>Position: From leading edge of wind trigger to leading edge of stop trigger  |
| Stop Trigger                               | J1-20                                 | Ampl: -26 vdc<br>Width: 33 ms<br>Position: Dependent on tape speed  |
| Preview Control                            | J1-28                                 | On: 0 vdc<br>Off: -26 vdc<br>Duration: 17 frames to 9 min, 59 sec, and 29 frames  |
| In Splice Trigger (RECORD)                 | J1-29                                 | Ampl: +70 $\frac{+1}{-7}$ vdc<br>Width: 33 ms min.<br>Position: Leading edge coincident with leading edge of ref. frame pulse in advance of in-edit point as follows:<br>525/15 IPS — 18 frames<br>525/7 $\frac{1}{2}$ IPS — 35 frames<br>625/15 IPS — 17 frames<br>625/7 $\frac{1}{2}$ IPS — 34 frames     |
| Out Splice Trigger (PLAY)                  | J1-30                                 | Ampl: +70 $\frac{+1}{-7}$ vdc<br>Width: 33 ms min.<br>Position: Leading edge coincident with leading edge of ref. frame pulse and in advance of in-edit point as follows:<br>525/15 IPS — 18 frames<br>525/7 $\frac{1}{2}$ IPS — 35 frames<br>625/15 IPS — 17 frames<br>625/7 $\frac{1}{2}$ IPS — 34 frames |

**TABLE 1. ELECTRICAL CHARACTERISTICS OF INTERFACE SIGNALS (Continued)**

| <i>Item</i>  | <i>TEP Connections</i> | <i>Characteristics</i>   |
|--|------------------------|--|
| TEP On   | J1-21                  | On: 0 vdc (All modes except STANDBY)<br>Off: -26 vdc   |
| Remote EDIT  | J1-2                   | EDIT: 0 vdc<br>Not EDIT: -26 vdc   |
| RE-EDIT  | J1-12                  | EDIT-DE-EDIT: 0 vdc<br>All other Modes: -26 vdc  |
| Vacuum Guide Control   | J1-13                  | Engage: 0 vdc<br>Disengage: -26 vdc (EDIT only)  |
| OUTPUT TO TR NO. 2<br>(or other program source)<br>Advance Cue | J4-7                   | On: 0 vdc<br>Off: -26 vdc<br>Duration: 8, 4, or 2 sec prior to in-edit point, until out-edit point |
| Cue Mark Bias No. 2  | J4-3                   | Same as cue mark bias No. 1 except for position and width  |
| Cue Mark Osc. No. 2  | J4-4                   | Same as cue mark osc. No. 1 except for position and width  |
| Play Trigger No. 2   | J4-9                   | On: +70 vdc<br>Off: 0 vdc<br>Width: 33 ms min.   |
| Wind Trigger No. 2   | J4-1                   | On: +70 vdc<br>Off: 0 vdc<br>Width: 33 ms min.   |
| Ground   | J4-11                  | Frame Ground   |

## MECHANICAL DESCRIPTION

The TEP consists of major assemblies and a front panel mounted on an aluminum chassis (see figures 3 and 4). A cable harness, that provides interconnection between the assemblies, is incorporated in the chassis. The physical characteristics of the TEP are as follows:

|         |                     |
|---------|---------------------|
| Length: | 17.5 in.            |
| Width:  | 19.0 in.            |
| Height: | 7.0 in.             |
| Weight: | 38.0 lbs. (approx.) |

### INTEGRATED CIRCUIT ASSEMBLY A1

IC assembly A1 is part of a swing-away hinged panel which is normally secured by two quarter-turn fasteners (see figures 4 and 5). Both sides of the assembly are protected by clear plastic panels that are retained by four spring-loaded catches on the wiring

side, and by screws on the IC side. The assembly consists of integrated circuits (263 for units serial numbered 0001 to 0050, and 264 for units serial numbered 0051 and up) located on a mounting board, with a common ground plane printed directly on the wiring side of the board and a common voltage plane (+5 vdc) printed directly on the IC side of the board. A grid system is included to assist in the identification and location of the individual ICs. This system, and the location of each IC, is described in the theory section of this manual. The voltage plane is connected to pin 14 of each IC, and the ground plane is connected to pin 7 of each IC socket. Other connections between circuits on the IC assembly are made through individual wires that are wire-wrapped to the IC terminals. Three connectors provide connections to the rest of the TEP circuitry. Sufficient slack is provided in the cable harness to allow free movement of A1 on the hinges.



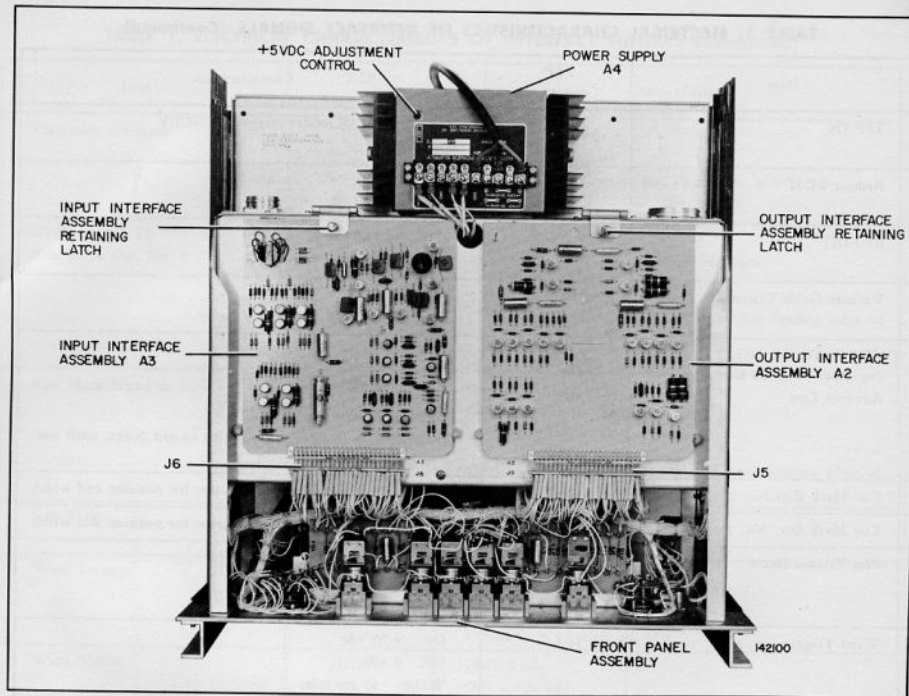


Figure 3—Tape Editing Programmer, Top View, Cover Removed

TABLE 2. TEP INTEGRATED CIRCUITS

| Type  | Function                             | Amount             |                      |
|-------|--------------------------------------|--------------------|----------------------|
|       |                                      | Units<br>0001-0050 | Units<br>0051 and up |
| 830   | Dual 4-input NAND/<br>NOR gates      | 42                 | 42                   |
| 832   | Dual 4-input NAND/<br>NOR gates      | 21                 | 21                   |
| 833   | Dual 4-input diode<br>array expander | 11                 | 12                   |
| 844   | Dual 4-input NAND<br>gate            | 19                 | 19                   |
| 845   | Clocked R-S masterslave<br>flip-flop | 103                | 103                  |
| 846   | Four 2-input NAND/<br>NOR gates      | 67                 | 67                   |
| Total |                                      | 263                | 264                  |

All of the integrated circuits used are of the medium-power diode-transistor logic (MPDTL) type. The types of ICs, the function of each type, and the amount of each mounted on A1 are listed in Table 2.

#### INPUT AND OUTPUT INTERFACE ASSEMBLIES A2 AND A3

The interface assemblies (A2 and A3) consist of transistor circuits with discrete components mounted on single-layer printed-circuit boards. Both are plug-in type assemblies, and are mounted on the reverse side of the chassis from the IC assembly (see figure 3). The assemblies are electrically connected to the TEP through connectors (J5 for A2 and J6 for A3). Hinged retainers located at the rear of the assemblies secure them in place.

#### POWER SUPPLY A4

The power supply is mounted at the rear of the TEP chassis (see figure 3). It supplies +5 vdc at 2.4 amps for operation of all ICs and some interface cir-

cuitry. The power supply has automatic current limiting. To prevent possible injury to personnel, a removable cover is mounted over the input voltage ter-

минаl board. Instructions for converting from 115 vac operation to 230 vac operation are printed on the power supply label.

## SERVICING FEATURES

### TILT MECHANISM

The TEP is designed for mounting in either a console or a standard 19-inch rack on a slide assembly. Access to the TEP for service is obtained by withdrawing the unit on its slide assembly until it is locked in the extended position. The unit may then be positioned up to 90 degrees from its mounting plane by means of a five-position tilt and spring-lock mechanism.

### ASSEMBLY REMOVAL

Assemblies A1, A2, A3, and A4 are easily re-

movable for service. To remove the input and output interface assemblies, loosen the single knurled-edge screw which secures the latch (one for each assembly), swing back the latch, then pull the assembly free from the connector.

The hinged IC Assembly (A1) may be removed by disconnecting the three connectors and the hinge. It may be serviced without removal from the unit by releasing the two quarter-turn fasteners that secure it to the chassis, and then withdrawing it on its hinge. Mechanical locks on both sides of the chassis permit the IC Assembly to be locked in a 90 degree position for access to components (see figure 5).

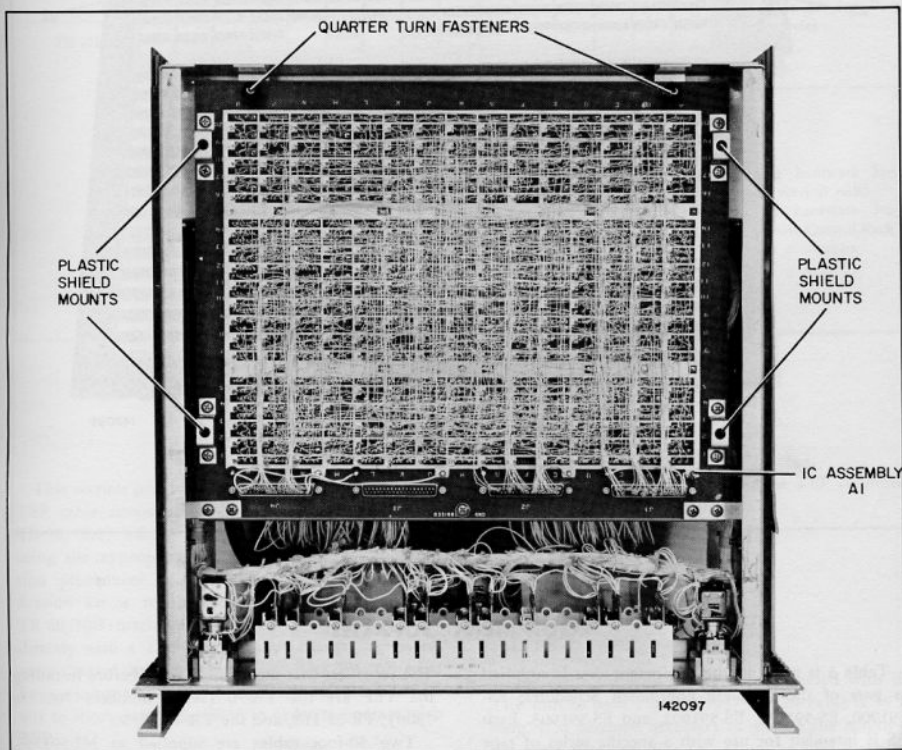


Figure 4—Tape Editing Programmer, Bottom View

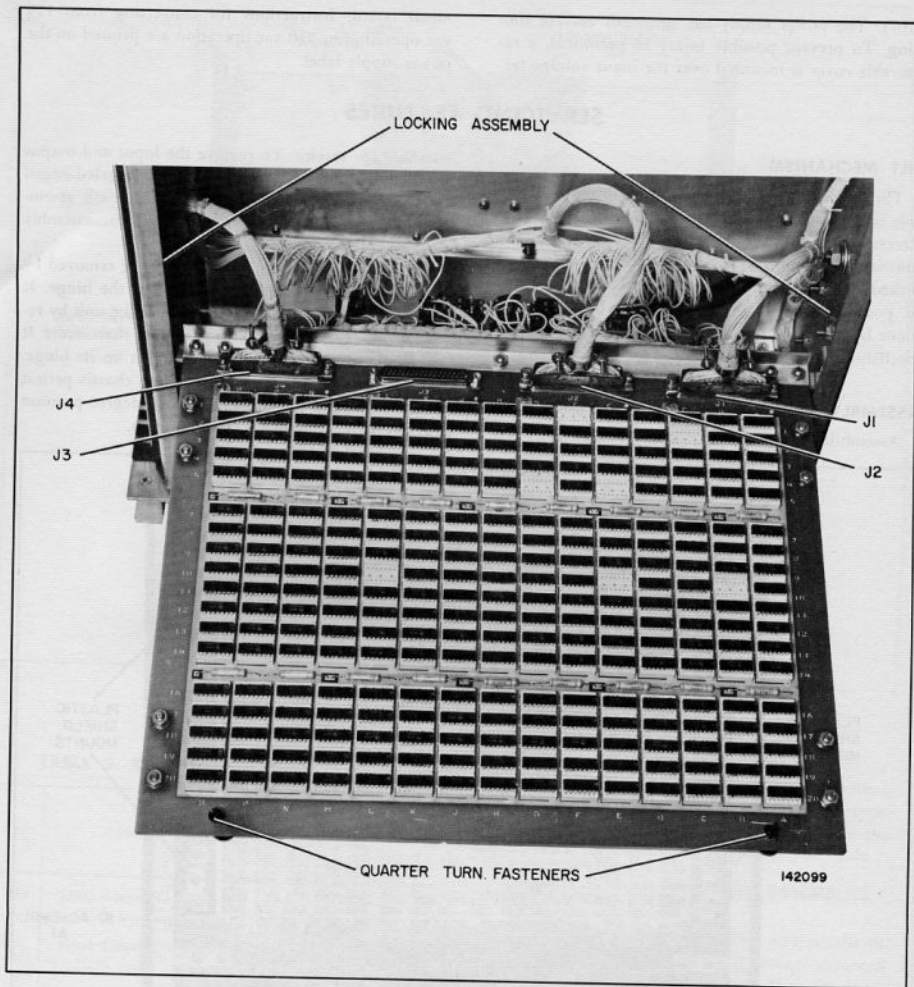


Figure 5—Tape Editing Programmer, IC Assembly A1 Extended

### EQUIPMENT SUPPLIED

Table 3 is a list of the equipment that is supplied as part of the available Equipment Schedules; ES-591900, ES-591901, ES-591902, and ES-591903. Each ES is intended for use with a specific series of tape recorders. Sufficient items are included in the kits to perform any required modifications to the recorders.

The recorders that must be modified before installing the TEP are the TR-70 (series numbers 7001 to 7300), TR-22 HB, and the TR-4 HB/50.

Two 50-foot cables are supplied as MI-591733. One is the main signal and control cable, and the other is the cue output cable.



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