# 2B PROCESSOR—TAPE DATA FACILITY MAINTENANCE PROCEDURES NO. 2B ELECTRONIC SWITCHING SYSTEM

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## 1. GENERAL

**1.01** This section contains procedures for maintaining the Tape Data Controller Unit (TDC) used by the 3A central control (3A CC) of the No. 2B Electronic Switching System (ESS).

**1.02** This section is reissued to:

(a) Revise the cartridge tape transport maintenance schedule from quarterly to monthly

(b) Add a procedure for cleaning capstan puck

(c) Change general purpose cleaner from KS-20406 to isopropyl alcohol

(d) Add references to repair procedures for cartridge tape transport.

**1.03** Before any maintenance procedures are performed on the TDC, maintenance personnel should read Sections 232-309-305 "2B Processor Tape Data Facility Operating Procedures" and 032-173-301 "Testing, Replacing, Handling, Storing, and Shipping Circuit Packs and Semiconductor Devices."

**1.04** In a No. 2B ESS office, tape data facility maintenance procedures are initiated in response to the following:

(a) System detected troubles via the teletypewriter (TTY) and the SYSTEM STATUS AND CONTROL section of the system status panel

(b) Scheduled routine maintenance.

**1.05** The TDC is duplicated and operated in a mate arrangement for increased reliability. A backup image of the program generic and translation data is kept on tape in case a system failure should mutilate the store contents.

**1.06** A letter a, b, c, etc. added to a step number in a procedure indicates an action which may or may not be required. When a condition does not require the action designated by a lettered step, all steps designated by that letter should be omitted.

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## 2. TAPE DATA CONTROLLER (TDC) MAINTENANCE

**2.01** There is no scheduled maintenance for the TDC. The TDC replacement procedures in this section include the TDC POWER switch, the circuit packs, and the cartridge tape transport unit. ◗Replacement procedures for components within the cartridge tape transport are found in Section 034-362-801.◖

**2.02** Circuit packs and the power lamp are replaced as follows:

| STEP | ACTION | VERIFICATION |
|---|---|---|
| 1 | At maintenance TTY—<br>Type in:<br>RMV:TAPE a!<br>a=TDC to be removed from service (0 or 1). | Response:<br>OK<br>At cartridge tape transport—<br>REW and UNLD keys enabled.<br>At SYSTEM STATUS AND CONTROL section of the system status panel—<br>TDC light emitting diode lighted. |
| 2 | At cartridge tape transport—<br>Depress REW key. | Tape rewinds to its beginning-of-tape (BOT) mark and then moves in its forward direction to its load point. |
| 3 | Depress UNLD key. | Tape rewinds to its load BOT mark. |
| 4 | At cartridge tape transport—<br>Remove the tape cartridge. | |
| 5 | Operate TDC POWER key. | TDC POWER lamp extinguished.<br>Power removed from TDC. |
| 6 | Remove faulty circuit pack or power lamp and replace it with an identical circuit pack or power lamp that is known to be good. See Section 032-173-301.<br><br>***Caution: Unnecessary handling of circuit cards should be avoided to reduce the chance of possible damage or contamination. Circuit cards should be handled either by edges or faceplate to avoid scratching or contaminating the gold-plated contacts. If dust, dirt, or other contaminates are present on the contacts, it may be removed with a lint free cloth (KS-2423 or equivalent). Exercise extreme care to prevent solvents from touching the acryloid finish of the circuit cards. After cleaning, the contacts should be rewaxed with a lubricating wax (KS-19416 L2 lubricant). See Section 032-173-301 for a more detailed procedure for handling circuit cards.*** | |

| STEP | ACTION | VERIFICATION |
|---|---|---|
| 7a | If the power lamp is to be replaced—<br>Remove the cap from the TDC POWER switch by grasping its edges and pulling. | The TDC POWER switch lamp is exposed. |
| 8a | Remove old lamp and replace with a new one. | |
| 9a | Replace TDC POWER switch cap. | |
| 10 | Release TDC POWER key. | TDC POWER lamp lighted.<br>Power restored to the TDC. |
| 11 | Insert tape cartridge. | |
| 12 | At maintenance TTY—<br>Type in:<br>INIT:TAPE!<br><br>***Note:*** Repeat Step 12 four times to restore proper tape tension. Inactive tape cartridges tend to lose tape tension which will increase error rates. | Output message:<br>INIT TAPE COMPL |
| 13 | At maintenance TTY—<br>Type in:<br>DGN:TAPE a! | Output message:<br>DGN TAPE a ATP |
| 14 | At maintenance TTY—<br>Type in:<br>ALW:TAPEUTIL! | Output message:<br>ALW TAPEUTIL COMPL<br>At the SYSTEM STATUS AND CONTROL section of the system status panel—<br>ATI light emitting diode lighted. |
| 15 | At maintenance TTY—<br>Type in:<br>AUDIT:TAPE (b,a);CORR!<br>b = TDC in service (0 or 1)<br>a = Other TDC | Output message:<br>AUDIT TAPE MATCH 0<br>TAPEUTIL STOPPED |
| 16 | At maintenance TTY—<br>Type in:<br>RST:TAPE a! | Output message:<br>OK<br>At the SYSTEM STATUS AND CONTROL section of the system status panel—<br>TDC light emitting diode is extinguished. |

## 3. TAPE CARTRIDGE MAINTENANCE

**3.01** There is no automatic maintenance for the tape cartridge. When maintenance procedures require removal or insertion of the tape cartridge, it is removed or replaced per Section 232-309-305. If removal of the tape cartridge is required, the tape cartridge should be completely removed from the machine, allowing the head access door to close and protect the tape from contamination.

***Caution: Never touch the surface of the magnetic tape. Permanent damage to the tape will result.***

**3.02** A tape cartridge should be retired from service if it exhibits any of the following faults:

- Interference between rotating members and any stationary surface
- Permanent write errors
- Previous operation in a known contaminated atmosphere
- Previous operation for 72 hours or more at an ambient temperature of 120°F or greater.

## 4. CARTRIDGE TAPE TRANSPORT MAINTENANCE

**4.01** ▸Scheduled maintenance for the cartridge tape transport is as follows:

| *Operation* | *Schedule* |
|---|---|
| General Cleaning | Monthly |
| Clean Tape Path | Monthly |
| Check Head | Monthly |
| Check Capstan Puck | Monthly |

***Warning: To prevent tape damage, clean the tape path (see paragraph 4.03) each time the tape cartridge is removed from the cartridge tape transport.***

Cleaning materials required are as follows:

Isopropyl Alcohol

Lint Free Cloths KS-2423

L5 Vacuum Cleaner KS-14377◂

**4.02** For ***general cleaning,*** moisten a cleaning cloth with isopropyl alcohol. Wipe the soiled or contaminated surfaces with the moistened cloth. Follow by wiping these surfaces dry with a dry cleaning cloth. None of the active elements except the tape path surfaces should need to be cleaned. Using the L5 vacuum cleaner, remove all loose matter inside the cartridge tape transport.

***Caution: Avoid body contact with any surface which the tape contacts. Body oils will contaminate the tape and cause oxidation. Do not clean the drive capstan, EOT/BOT sensor, or the cartridge sensor microswitches. Do not reinsert the cartridge tape into the cartridge tape transport until isopropyl alcohol has evaporated.***

**4.03** ▸The tape path consists of the read/write head, the drive capstan, and all other surfaces touched by the tape. To clean the tape path proceed as follows:

(a) Remove the TDC from service and the cartridge tape from the cartridge tape transport per 4.06, Steps 1 through 4.

(b) Remove the top cover by spreading the sides of the top cover where shown in Fig. 1.

***Note:*** If access to the top cover is blocked, the following steps may be performed with the aide of a lint free cloth attached to one end of a slender rod.

(c) Moisten a lint free cloth with isopropyl alcohol.

(d) Clean capstan puck as follows:

(1) Actuate capstan by depressing cartridge in place (CIP) microswitch (see Fig. 1)

***Warning: Avoid wedging finger between the puck and either the EOT/BOT sensor or the head when performing Steps 2 and 3.***

(2) Without causing noticeable slowing of capstan motor, hold moistened cloth against rotating capstan puck for about five seconds.

(3) Repeat Step 2 using dry lint free cloth.

(e) Using moistened cloth remove all accumulations of tape oxide and dust from tape head and other surfaces touched by tape except the EOT/BOT sensor.

(f) Wipe all parts dry with lint free cloth.

(g) Replace top cover.

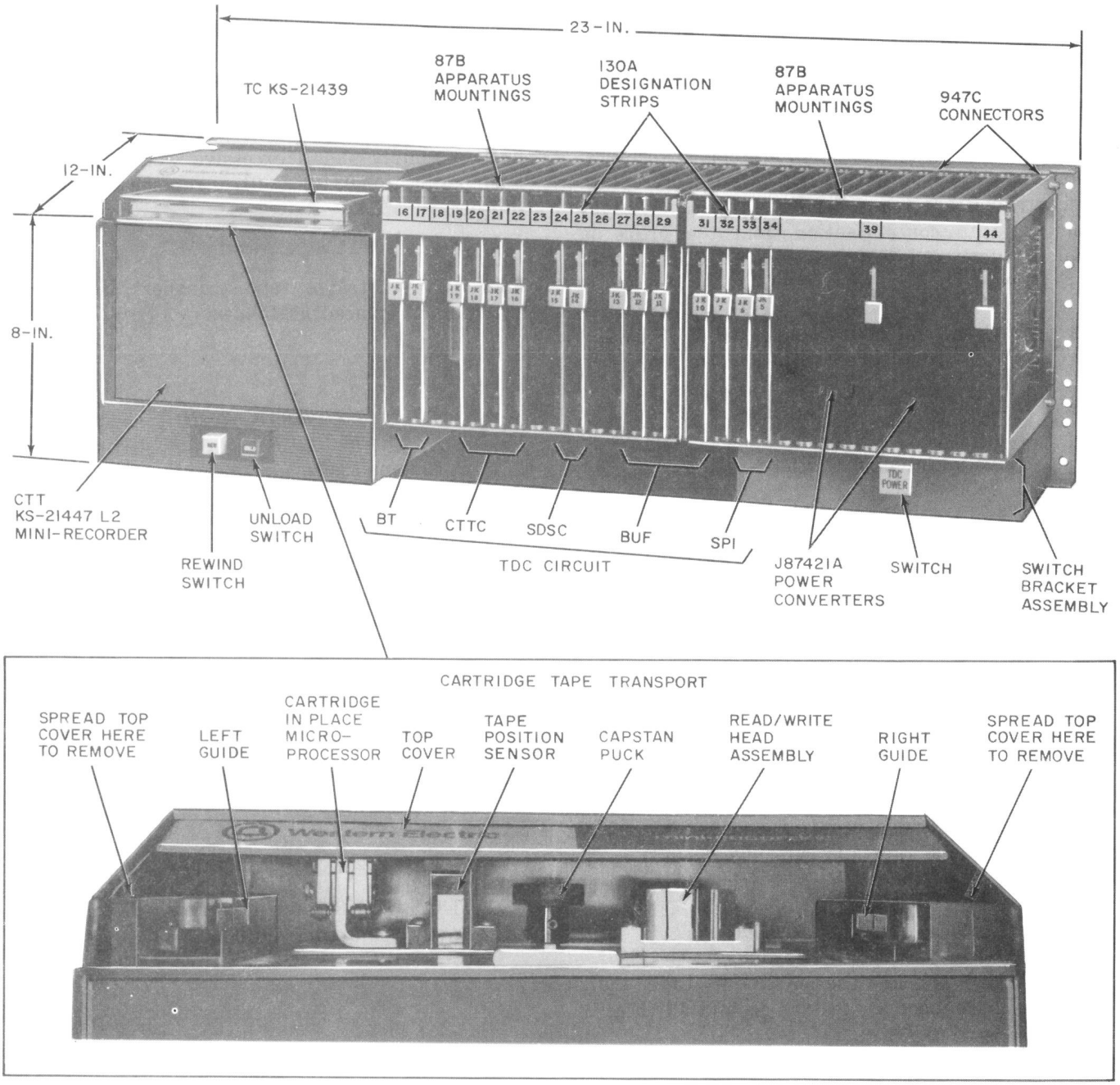
(h) Return the TDC to service and the cartridge tape to the cartridge tape transport per 4.06, Steps 14 through 19.

**4.04** To check the drive capstan (Fig. 1), visually inspect the capstan puck located at the end at the capstan shaft. The capstan puck shall be free of pits and rips, with no evidence of fraying. If capstan puck shows any of these characteristics, replace capstan per Section 034-362-801, or replace the cartridge tape transport. If early tape failure occurs due to contamination, and the office is generally clean and dust free, inspect capstan puck for failure.◀

**4.05** To check the tape head assembly, visually inspect the read/write head assembly (Fig. 1) for any deep grooves, pits, scratches, or inclusions. A read/write head that has been in use for some time will appear shiny and slightly recessed in the area of tape contact. This is normal and will not degrade the systems ability to read or write tapes. However, sharp edges at the boundaries of tape contact may cause read errors and create contamination through edge wear of the tape. ▶If the read/write head assembly shows excessive wear, replace the head per Section 034-362-801, or replace the cartridge tape transport.◀

**4.06** The cartridge tape transport is removed and replaced as follows:

| STEP | ACTION | VERIFICATION |
|---|---|---|
| 1 | At maintenance TTY—<br>Type in:<br>RMV:TAPE a!<br>a = TDC to be removed from service (0 or 1) | Output message:<br>OK<br>At cartridge tape transport—<br>REW and UNLD keys enabled.<br>At SYSTEM STATUS AND CONTROL section of the system status panel—<br>TDC light emitting diode lighted. |
| 2 | At cartridge tape transport—<br>Depress REW key. | Tape rewinds to its beginning-of-tape mark and then moves in its forward direction to its load point. |
| 3 | Depress UNLD key. | Tape rewinds to its BOT mark. |
| 4 | At cartridge tape transport—<br>Remove the tape cartridge. | |
| 5 | At TDC—<br>Operate the TDC POWER key. | TDC POWER lamp extinguished.<br>Power removed from TDC. |
| 6 | At rear of the cartridge tape transport disconnect connectors J5 and J6 (Fig. 2).<br><br>***Note:*** Two persons are required, one to remove or install the screws, and one to support the cartridge tape transport from the front. | |
| 7 | Remove eight screws, (four at the top and four at the bottom, see Fig. 2), that secure the cartridge tape transport to the mounting plate. | |




ABBREVIATIONS

BUF - BUFFER
BT - BUS TERMINATOR
CTT - CARTRIDGE TAPE TRANSPORT
CTTC - CARTRIDGE TAPE TRANSPORT CONTROLLER
SDSC - SYNCHRONOUS DATA SET CONTROLLER
SPI - SERIAL PERIPHERAL INTERFACE
TC - TAPE CARTRIDGE

**Fig. 1—Cartridge Tape Transport**

| STEP | ACTION | VERIFICATION |
|---|---|---|
| 8 | At front of the maintenance frame—<br>Remove the cartridge tape transport from the frame. | |
| 9 | Transfer mounting flanges from the removed cartridge tape transport to the new cartridge tape transport. | |
| 10 | At front of the maintenance frame—<br>Insert new cartridge tape transport into the frame. | |
| 11 | At rear of the maintenance frame—<br>Secure cartridge tape transport to its mounting plate with eight screws, (four at the top and four at the bottom, see Fig. 2). | |
| 12 | Connect connectors J5 and J6, (see Fig. 2). | |
| 13 | At TDC—<br>Operate TDC POWER key. | TDC POWER lamp lighted. |
| 14 | At cartridge tape transport—<br>Insert tape cartridge. | |
| 15 | At maintenance TTY—<br>Type in:<br>INIT:TAPE!<br><br>***Note:*** Repeat Step 15 four times to restore proper tape tension. Inactive tape cartridges tend to lose tape tension which will increase error rates. | Output message:<br>INIT TAPE COMPL |
| 16 | At maintenance TTY—<br>Type in:<br>DGN:TAPE a! | Output message:<br>DGN TAPE a ATP |
| 17 | At maintenance TTY—<br>Type in:<br>ALW:TAPEUTIL! | Output message:<br>ALW TAPEUTIL COMPL<br>At the SYSTEM STATUS AND CONTROL section of the system status panel—<br>ATI light emitting diode lighted. |
| 18 | At maintenance TTY—<br>Type in:<br>AUDIT:TAPE (b,a);CORR!<br>b = TDC in service (0 or 1)<br>a = Other TDC | Output message:<br>AUDIT TAPE MATCH 0<br>TAPEUTIL STOPPED |

| STEP | ACTION | VERIFICATION |
|---|---|---|
| 19 | At maintenance TTY—<br>Type in:<br>RST:TAPE a! | Output message:<br>OK<br>At the SYSTEM STATUS AND CONTROL section of the system status panel—<br>TDC light emitting diode is extinguished. |

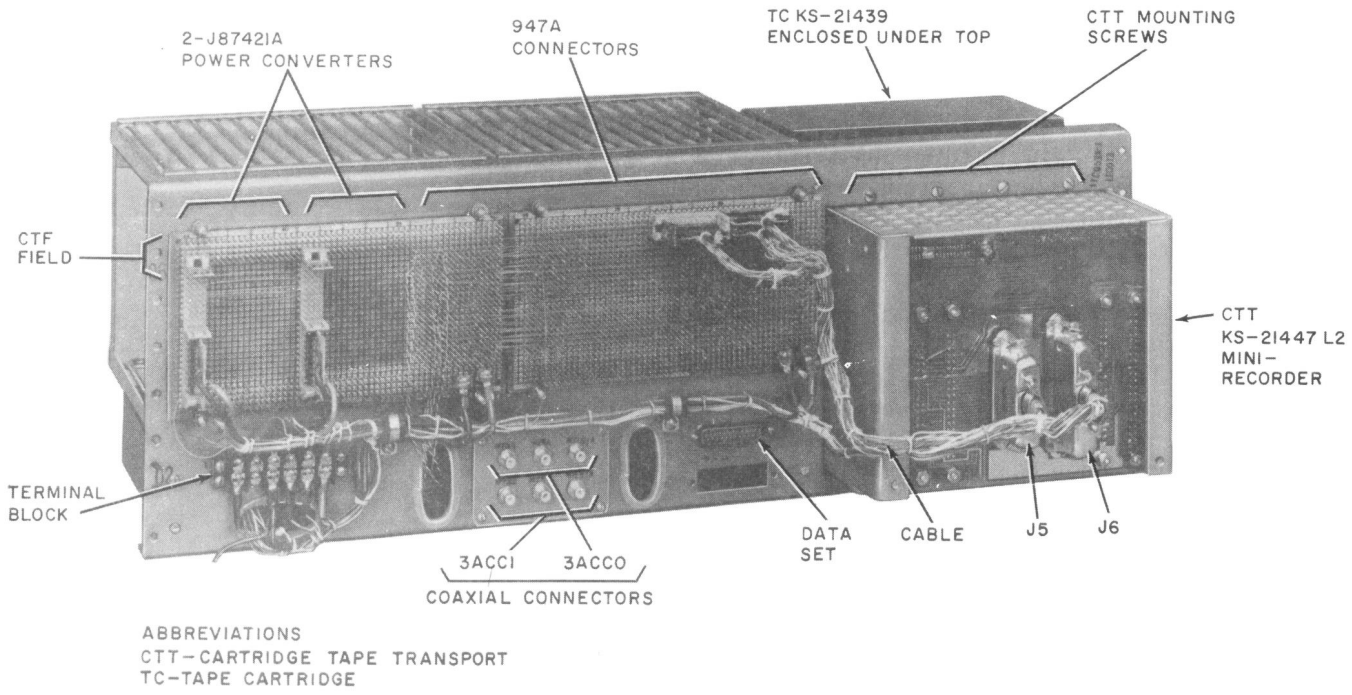



**Fig. 2—Tape Data Controller Unit "0" or "1" J1C053A Rear View**