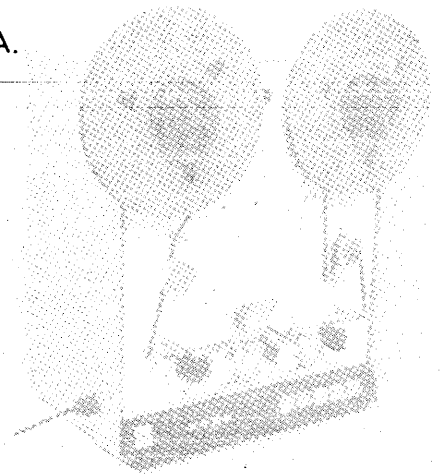
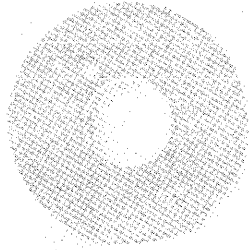


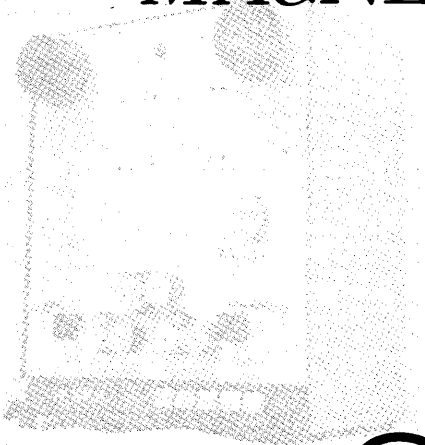
KYBE* CORPORATION

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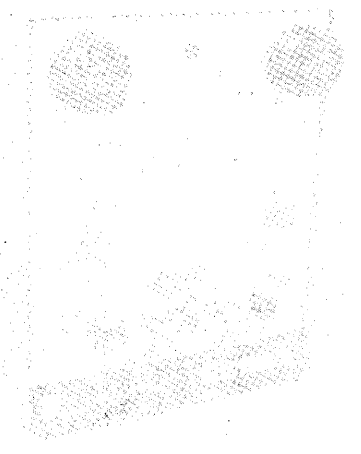
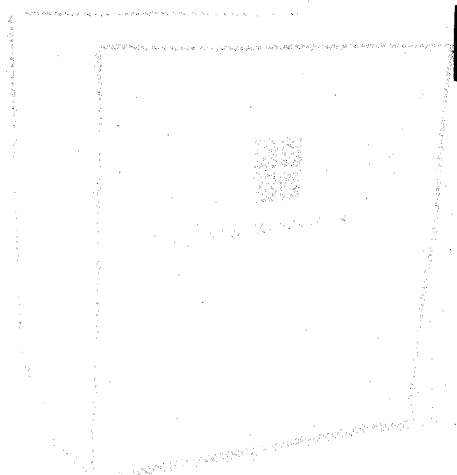


E24

MAGNETIC TAPE CLEANER



OPERATION and MAINTENANCE MANUAL



MANUAL NO. 3108-A
ISSUE DATE - May 1969

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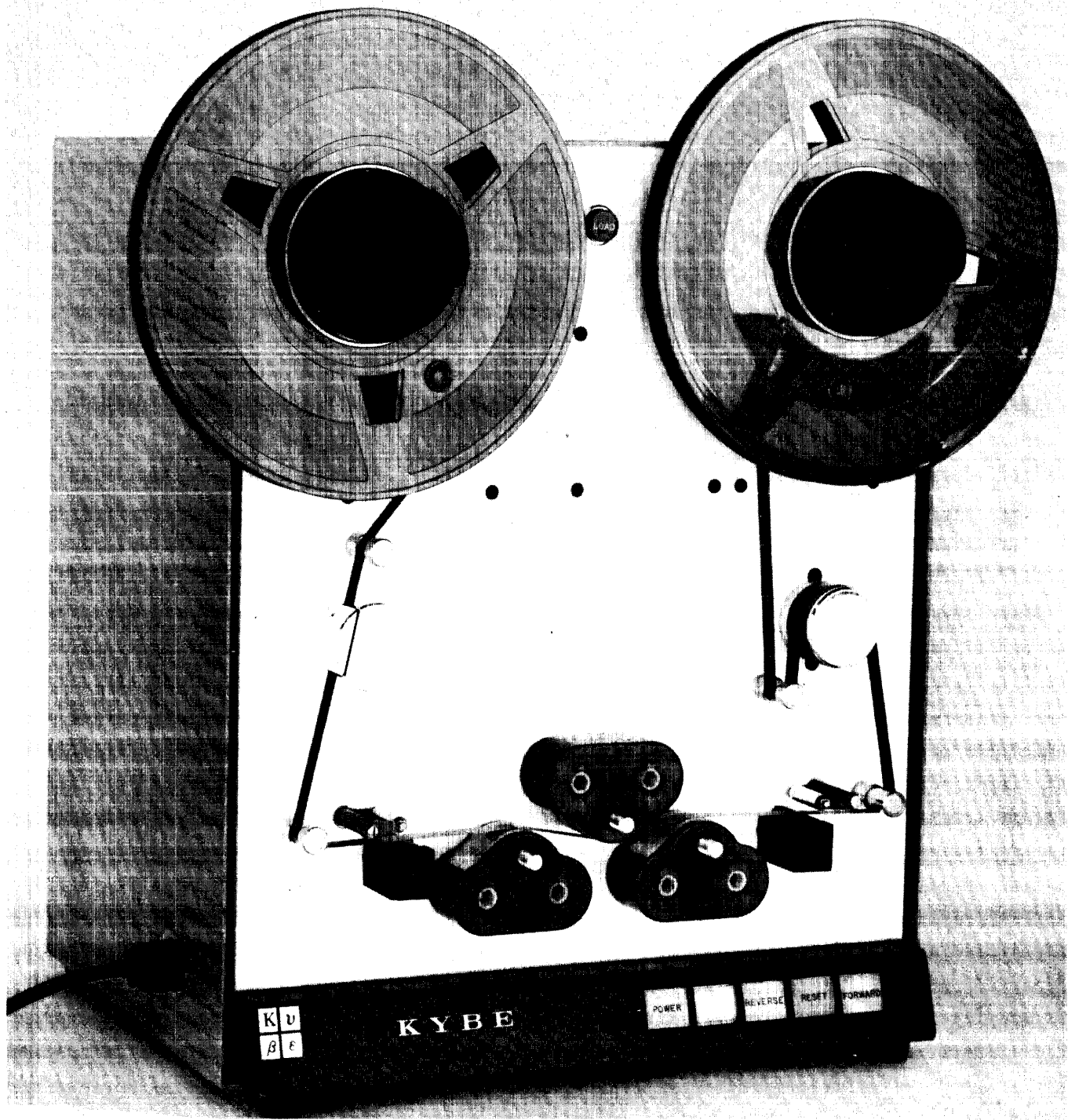
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SECTION 1

1.0 INTRODUCTION

This manual is prepared to acquaint both the operator and service personnel with the Model E24 Magnetic Tape Cleaner. Contained herein are photographs, illustrations, circuit diagrams together with sufficient written matter to enable the reader to achieve an understanding of the equipment for efficient usage.

Figure 1.1 shows a typical E24 115 Volt AC 60 Hertz unit equipped with injector blade holders and ready to clean tape.



E24 CLEANER

Figure 1.1

SECTION 2

UNPACKING AND INSTALLATION

2.1 Unpacking

The E24 contains many delicate components, both electronic and mechanical. Care must be exercised during unpacking to prevent any possible damage. The following procedure should be observed:

Step 1 Place carton horizontally on floor. Cut open sealing tape. Open carton flaps.

Step 2 Remove all packing material, including the four corner pads.

Step 3 Turn carton so that unit is in upright position. Pull unit from the carton, grip on the sides of the machine only. DO NOT PULL UNIT OUT BY GRABING ANY PROTRUDING COMPONENTS, SUCH AS THE TAPE GUIDES.

Step 4 Place unit on work bench and carefully remove the clear cover, and check for any apparent shipping damages.

Step 5 Remove other contents from carton.

DO NOT ATTEMPT TO UNFOLD DUST COVER IF THE CARTON HAS BEEN LEFT AT BELOW FREEZING TEMPERATURES. Allow sufficient time for the plastic dust cover to come up to room temperature before use.

Step 6 Verification of contents: Each cleaner contains a shipping kit see parts list in Appendix-I for itemized contents.

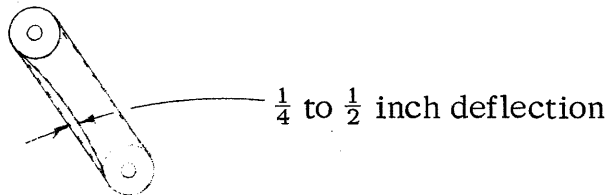
Step 7 Open hinged rear door, REMOVE ALL PACKING MATERIAL AND TAPE FROM INSIDE OF UNIT.

Step 8 Check to see that all relays, connectors, blade containers, and printed circuit board are firmly seated in their respective sockets. Inspect drive belts and chain and ascertain that they are properly seated on their respective gears.

Step 9 Sign and mail warranty card to insure proper registration for service bulletins.

2.2 Belt Adjustment

On receipt of your tape cleaner check the tension on the three (3) gear belts in back. Tension should allow $\frac{1}{4}$ " to $\frac{1}{2}$ " deflection of belts when squeezed lightly between the fingers. If belt is too tight or too loose, adjustment must be made.



Adjustment of belt tension is made by loosening 4 nuts holding motor plate and tapping motor in proper direction to loosen or tighten belt. Retighten nuts after making this adjustment.

Too loose a belt will cause excessive rumbling noise in operation. Too tight a belt will cause cleaner to slow down and will cause bearings to wear excessively.

If machine slows down check the brakes for dragging. See Section 5.2.4 of manual.

2.3 Installation

The E24 is designed to operate at 115 Volts AC (2.2 amperes), 60 Hz single phase.* While voltage variations as much as $\pm 10\%$ may be tolerated, the best performance is obtained at the rated voltage. It is recommended that an auto-transformer be used whenever the voltage is borderline. One end of the power cord is to be plugged to the power - disconnect on the side of the cabinet, and the other into any grounded outlet or use a two-prong adapter. However, if the latter is used, be sure the ground lug is properly attached to the center screw of the outlet cover plate. NOTE: Unit is equipped with a safety interlock, rear door must be fastened securely shut for proper operation.

*Or 230 VAC 50 Hz., check label on rear of deck.

SECTION 3

OPERATING INSTRUCTIONS

3.1 Prior to Operation

The E24 should never be used unless it has been thoroughly cleaned. Dirt particles left on the machine can easily recontaminate a tape as it is being cleaned. See Section 5.1 for good housekeeping hints.

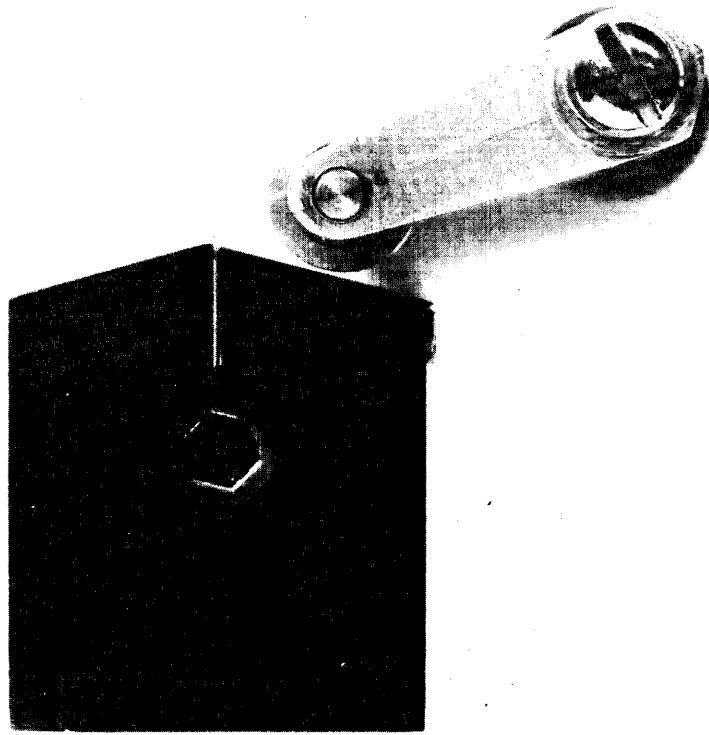
3.2 Selection of Cleaning Blade

A choice must be made as to which of the two cleaning blade types is to be used. The selection is to be based on the age and condition of the tape to be cleaned (See Section 4.4.1). Each of the four Permaceram (TM) blade edges will last for as many as 250 cleanings of full reel tapes. Whereas a new edge of the "injector" type blade must be used for each reel of tape. Install the proper blade holders on each side of the machine by using the wrench supplied to remove and replace the mounting screw (Figure 3.2).

3.3 Mounting Blade Holders

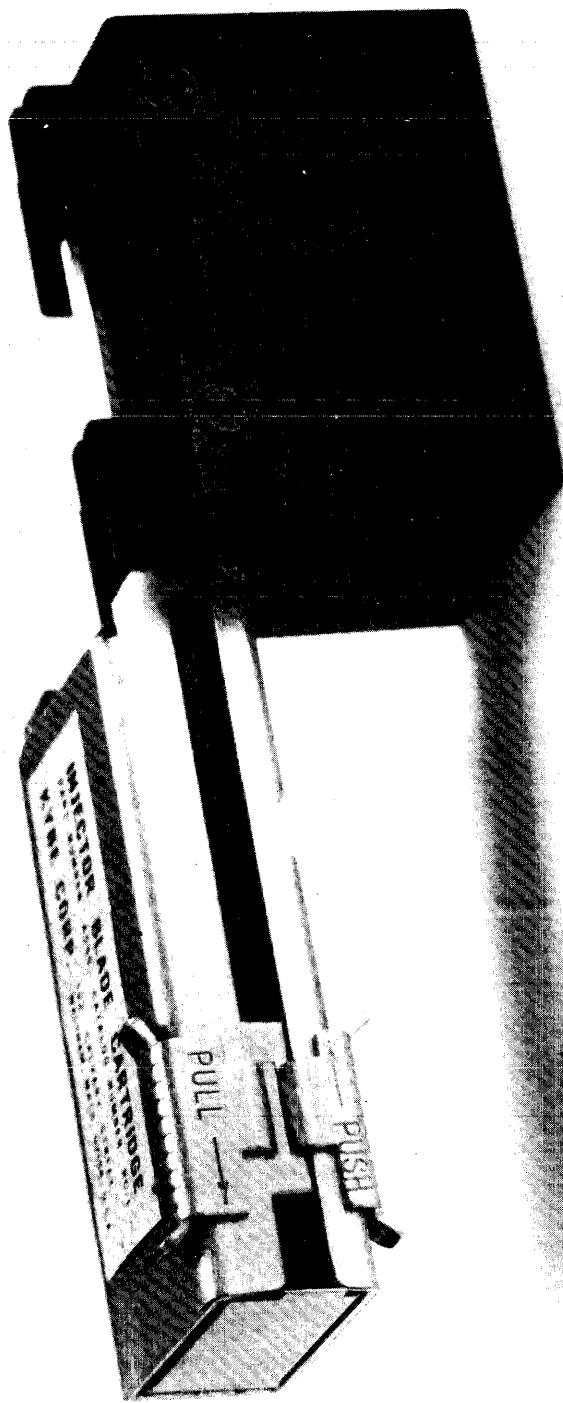
"Injector" Razor Blade - mount holder with Allen screw in place, but not fully tightened. Twist blade holder toward tape depressor to maximum point and tighten screw.

"Permaceram" Blade Holder - should be positioned so that tape does not hit top of blade when depressor is down. To accomplish this put blade holder on with Allen screw in place but not fully tightened, load tape, press Reset button. With tension on tape hold down tape depressor and twist blade holder until only the edge of blade toward the tape depressor touches tape. Tighten Allen screw with blade into this position.



BLADE HOLDER AND TAPE DEPRESSOR

Figure 3.2



RAZOR BLADE INJECTION

Figure 3. 4

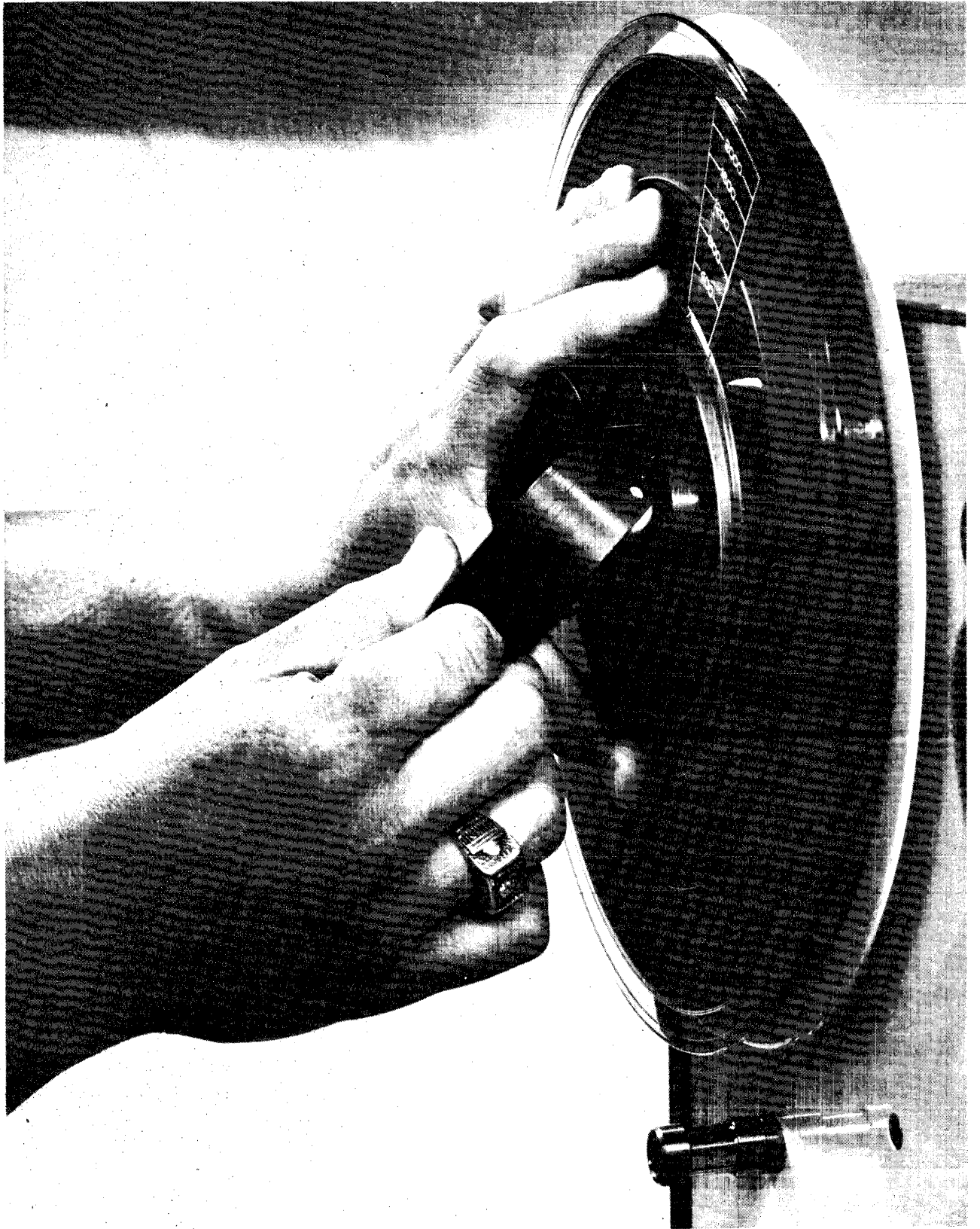
3.4 Razor Blade Injection

1. Insert razor blade cartridge into "T" slot in front of razor blade holder.
2. Engage razor blade with slide on the side of the cartridge.
3. Slowly push the slide forward until the blade is fully inserted, See Figure 3.4.

NOTE - If there is a jam preventing insertion of the blade DO NOT FORCE. Retract the blade cartridge $\frac{1}{4}$ inch and gently wiggle the cartridge as the blade is being pushed home. Push cartridge tight against block to insure complete insertion of blade before removing the cartridge.

3.5 Permaceram (TM) Blades - Each edge of the Permaceram (TM) blade will remain sharp for at least 250 reels of tape. All four edges of the blade may be used one at a time by rotation. The blade is clamped in its holder by spring action.* When a change is indicated, grasp the lower half of the holder and squeeze the two flat surfaces toward each other. The jaw of the holder will open slightly to release the blade. The holder need not be removed from the machine for this operation. A used edge can be readily identified by a soiled adjacent surface. Loose oxide and dirt particles may adhere and imbed themselves in the slightly porous surface of the blade. While this effect will in no way impair the blades efficacy, it does serve to differentiate between used and unused edges.

3.6 Tissue Cartridges - Each cartridge contains two spools: a supply and a take-up. The latter is a motor driven; tissue is advanced whenever the tape is in motion. A set of three cartridges will be sufficient to clean approximately 250 reels of tape. When the tissue is exhausted, the spent cartridges are disposed of and new ones installed. Remove the thumb screw which attaches the cartridge to the deck and pull the cartridge away from the machine. The new cartridge can be installed just as readily. Align the hexagon shaped holes of the spools with the hexagon shaped shafts and allow the shafts to engage the holes. Push cartridge to the deck and reattach the thumb screw. Take up slack in tissue by burning the supply spool using an allen wrench supplied with unit.



MOUNTING THE REEL
Figure 3.7

When a cartridge runs out of tissue while a tape is being cleaned, replace all three cartridges at once and reclean the tape. ALWAYS ROTATE BOTH PERMACERAM (TM) BLADES EACH TIME THE CARTRIDGES ARE REPLACED.*

(*Always rotate the blades in a clockwise direction to prevent inadvertent reuse of an used edge.)

3.7 Loading the Reel

The tape reels are attached by a pair of cam actuated quick release knobs. Loosen both knobs by lifting the cams. Slip the reel of tape to be cleaned over the left-hand hub with the "file-protect" groove nearest to the machine. Press the reel firmly against the rim of the hub with the fingers of the left hand and close the cam with the right hand (See Figure 3.7). Install the empty take-up reel supplied over the right-hand hub in a similar fashion. If cam is difficult to close (Too tight), or reels are loose on their hubs refer to Section 5.2.1 for adjustment.

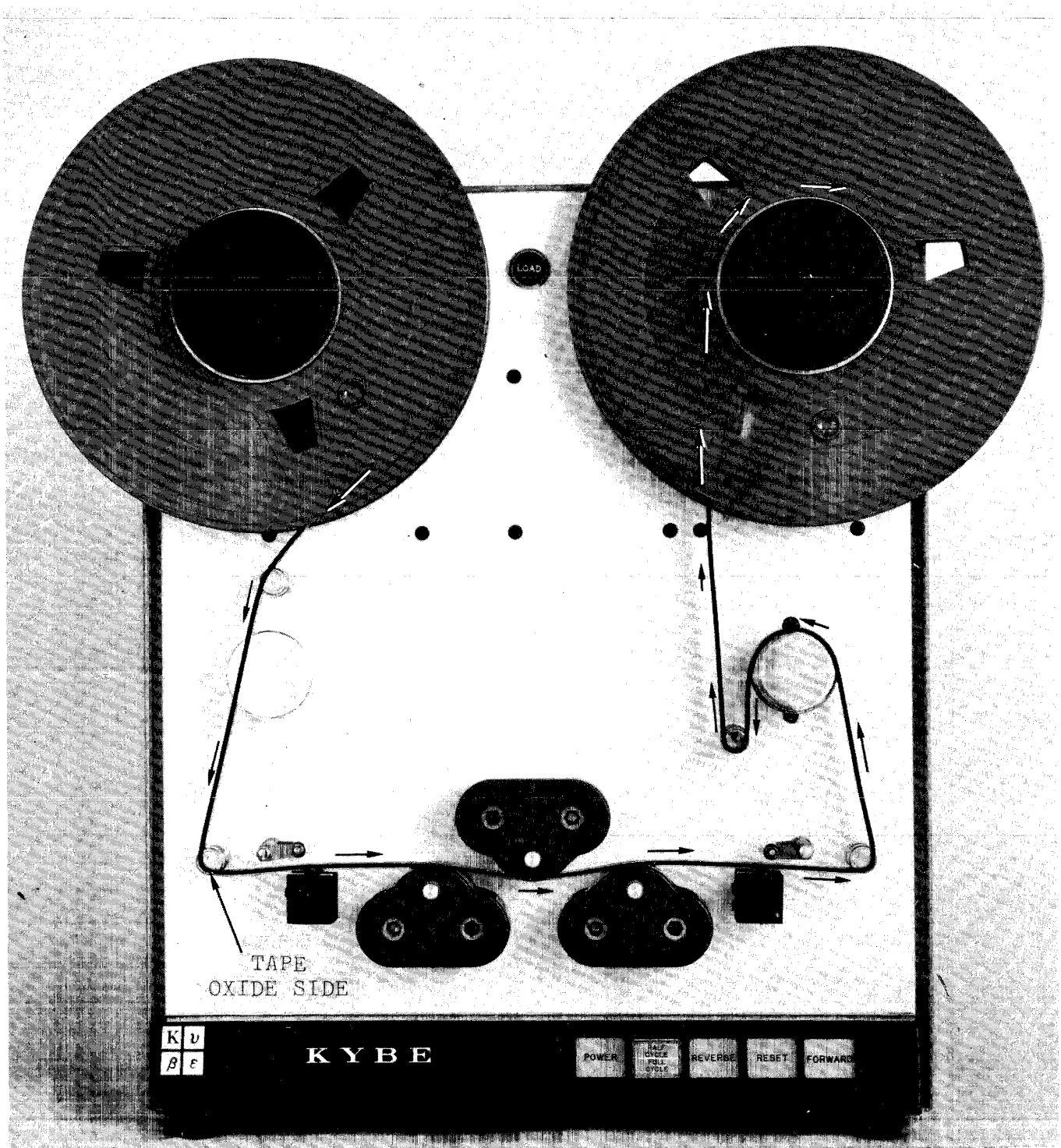
3.8 Threading the Tape

Depress the "Power" switch to turn on the E24. Depress "Load" switch to release both brakes. Grasp the end of the tape and thread it through the machine according to the tape threading dia. shown in Figure 3.8. Wind and capture the leader on the take-up reel. Be sure the tapes passes through the photocell cover slot and over the various guides. Depress "Load" button again to actuate the brakes and extinguish the light.

3.9 Cycle Selection

Normally, the E24 should operate in the "Full Cycle" mode; i. e. the tape is cleaned while it is being transported from left to right and automatically reverses at the end of tape such that it is cleaned again going from right to left. This is accomplished by depressing the cycle selector switch either once or twice until the words "Full Cycle" are illuminated.

Occasionally, a tape may need rewinding as well as cleaning (the EOT marker is out near the rim of the reel while the BOT marker is near the core), or to replace a damaged reel. This is accomplished by selecting the "Half-Cycle" mode.



TAPE THREADING DIAGRAM

Figure 3.8

3.10 Cleaning the Tape

Depress "Reset" button to enable the machine. Depress "Forward" button to initiate cleaning cycle. This machine will come to a stop automatically when the cleaning is completed. Remove tape reel from the E24 by raising the left-hand cam.

SECTION 4

FUNCTIONAL DESCRIPTION

4.0 Introduction

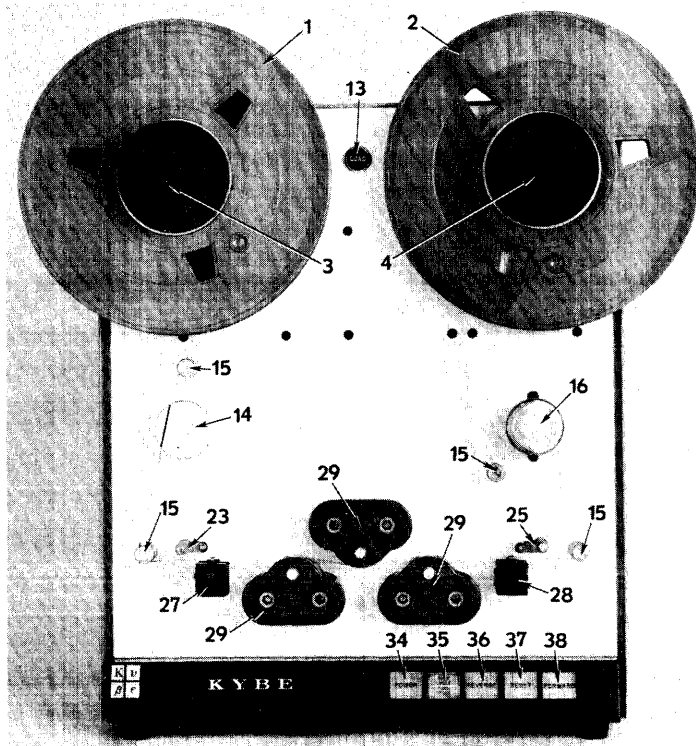
The E24 Magnetic Tape Cleaner is a table-top machine housed in a metal cabinet 21" high by 18" wide and 12" deep (Figure 1.1). The shipping weight is approximately 80 pounds. It is designed for $\frac{1}{2}$ inch computer tape on standard IBM compatible reels up to $10\frac{1}{2}$ inches in diameter.

The major components of the unit are: the tape deck, containing the take-up and supply reel drives, capstan and capstan drive, EOT sensing and appropriate tape guides, wiping and cleaning stations; the control chassis, containing all the wired logic and necessary circuitry to implement the control of tape motion; and the control turret, containing the necessary operator controls. A brief description of each of the above is given below:

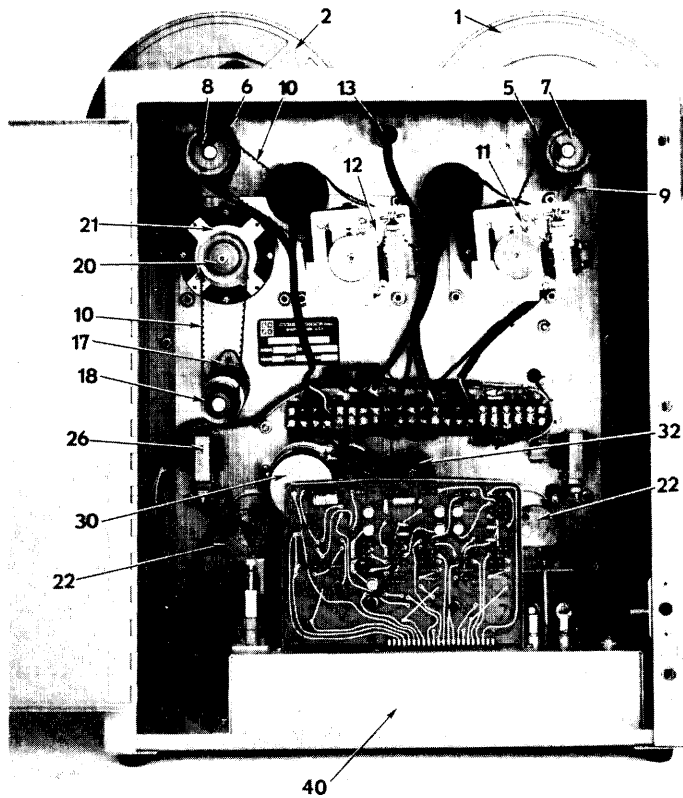
4.1 The Reel Drives

There are two reel drive assemblies in the E24. To transport the tape forward during the first half of the cleaning cycle, the forward reel motor is powered while the reverse reel motor supplies the necessary drag to produce the proper tension. Referring to Figures 4.1 and 4.2, the tape is transferred from the supply reel (1) to the take-up reel (2). Conversely, when the tape motion is in reverse, during the second half of the cleaning cycle, the reverse reel motor is powered and the forward reel motor supplies the drag, and the tape is returned to the supply reel (1).

Both reels are attached to their respective hubs by cam-actuated, quick release knobs (3) and (4). Motive power is supplied by motor assemblies (11) and (12) transmitted via "timing belts" (9) and (10) to the driven sprockets (7) and (8) which are mounted on bearing blocks (5) and (6). Each motor assembly consist of a torque motor and a band brake which is actuated to prevent tape dumping at the end of the cleaning cycle. To facilitate tape threading, the brakes may be released manually by depressing the "Load" button (13).



E24 Front
Figure 4.1



E24 Rear
Figure 4.2

4.2 The Photocell

The photocell assembly is housed within a circular cover (14) and consists of a photocell and suitable light sources. The E24 will not operate when there is no tape in the slot of the cover. When the machine is operating in the Full Cycle mode, the photocell will sense the reflective end-of-tape (EOT) marker at the end of the first pass: i. e. when all but approximately 15 feet of tape is wound on the take-up reel. The signal will automatically reverse the motion of the tape and rewind it on the original supply reel. When this is completed, the end of the tape passes the photocell and it senses a "no tape" condition, where upon the machine is stopped and the brakes are actuated to prevent the reels from further spinning.

In the Half Cycle mode of operation, the photocell will also sense the EOT marker as in the Full Cycle mode. However, the machine will not reverse and continue to operate; thus the tape remains on the take-up reel.

4.3 The Capstan

A single capstan (16) is used to regulate both the tape speed and the winding tension. It is driven both during forward and reverse passes. The capstan is belt driven by a capstan motor (21); its mechanical components are similar to the reel drive assemblies: i. e. bearing block (17), driven sprocket (18), belt (19) and motor sprocket (20).

4.4 The Cleaning Station

The Cleaning Station consists of three major components: forward and reverse pass blades, forward and reverse tape depressors and three wiping tissue cartridges.

4.4.1 The Tape Cleaning Blades - There are two different types of cleaning blades available for the E24. The choice of type depends on the nature and age of the tape being cleaned. Tapes which are relatively new or recently cleaned can use the long-life Permaceram (TM) ceramic blade. Each edge of the four sided Permaceram (TM) blade will maintain its sharpness for minimum of 250 full reels of approximately 1000 reels of tape per blade.

Older tapes or those that have not been cleaned recently should be cleaned with the high performance "Injector" type blade. Both blades are mounted in their respective holders (27) and (28) as shown in Figure 4.1.

- 4.4.2 The Tape Depressors - While there are two tape cleaning blade holders present, only one is used at any time. When the tape is not in motion, it is in contact with neither blade. When the tape is going forward, the left hand tape depressor (23) swings downward by the activation of a solenoid (24). The action of the depressor forces the tape to come in contact with the left hand blade (27).

Conversely when the tape is in reverse motion the right hand depressor (25) swings downward by the action of the right hand solenoid (26) and the tape comes in contact with the right hand blade (28). Both depressors are never down simultaneously while tape is in motion.

- 4.4.3 The Tissue Cartridges - There are three wiping tissue cartridges (29). Each cartridge contains sufficient tissue to wipe approximately 250 full reels of tape. These cartridges are disposable when exhausted. The take-up spool within each cartridge is motor driven through a series of sprockets (31 and 32) and chains (33) by a timing motor (30).

4.5 Circuits and Controls

There are six push button control switches on the E24. The "Load" button is located between the reels on the deck (13) while all other buttons (34, 35, 36, 37 and 38) are located in the control turret mounted below the deck. The control circuitry is built into the control chassis (40) containing a plug in printed circuit board (39). A circuit diagram is shown in Figures 4.5 and 4.5.A. A brief description of each of the various controls and their associated circuitry is given below: -

- 4.5.1 Load Control - The load control circuit is shown in Figure 4.5.1. When the "Load" button (Item 13, Figure 4.1) is depressed and illuminated, the brakes (Items 11 and 12, Figure 4.2) are energized and therefore released. All drive and drag voltages to the various motors and solenoids are off.

Thus the reels are free to rotate to facilitate easy tape threading. The load Lamp, L-6, is illuminated by the AC line voltage in series with resistors R-12 mounted on the deck terminal board, TB-4, Pins 10 and 12. Lamps L-3, L-4 and L-5 are now all de-energized.

- 4.5.2 Reset Mode - In the operation of the E24 (See Section 3), the reset control is selected first in order to allow the forward and reverse controls to be enabled. The forward motion control initiates the first half cycle of operation and the second half cycle is selected by the reverse pushbutton except when the full cycle mode is selected in which case the reversal becomes automatic. All modes of operation may be interrupted by depressing the reset control pushbutton.

The reset mode circuit is shown in Figure 4.5.2. When the reset pushbutton is depressed and illuminated, relay K2 is energized. Drag voltage is applied to both the forward motor (through R2 a resistor and D8) and reverse motor (through R1 and D9) via contacts on K2. The diodes D8 and D9 produce a half wave rectified voltage to both motors for drag, and allows both reels to pull against each other to keep the tape under tension. The two lamps L3 and L5 have no voltage to illuminate the forward and reverse pushbuttons. However, the reset lamp L4 receives power from contacts on K3 and is illuminated only when K3 is energized. If there is no tape in the photocell block the reset lamp will not be turned on. Tape must be threaded through the photocell block before K3 will energize when the reset button is pushed and illuminated.

- 4.5.3 Forward Control - The forward control circuit is shown in Figure 4.5.3. When forward pushbutton is depressed and illuminated relays K1 and K4 are energized and K2 is de-energized. The full line voltage is applied directly to the forward motor through contacts of relays K1 and K2. The drag voltage is applied to the reverse motor through resistors R1 and diode D9 via contacts on K1 and K2. Relay K4 is used to supply full AC line voltage to the capstan drive motor making the capstan rotate in a counter-clockwise direction. The forward solenoid SL-2 is also energized by relay K1 to depress the tape on the left hand scraper blade as described in Section 4.4.2.

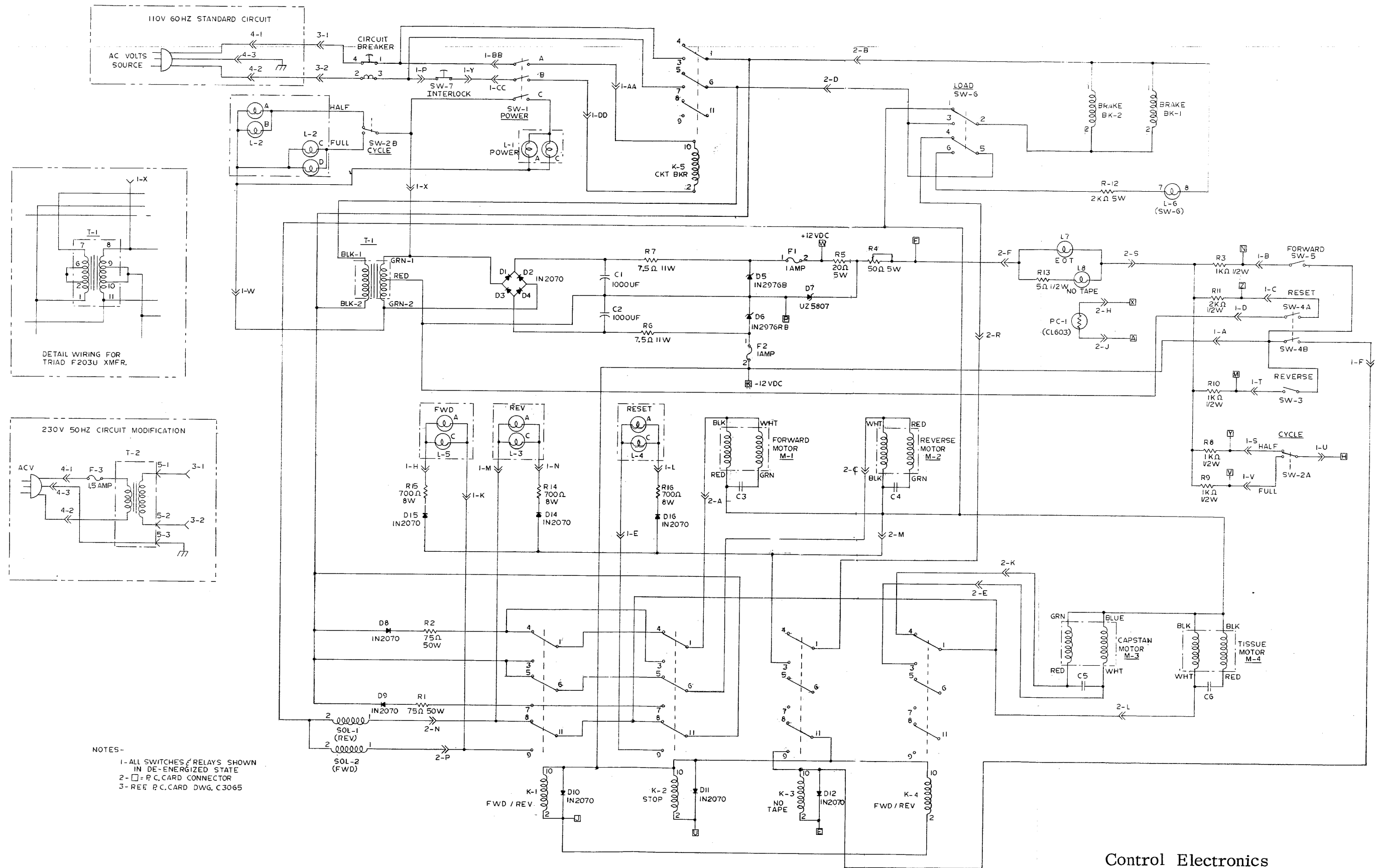
The reverse lamps L3 and reset lamp L4 have no voltage applied to them for illumination, however, the forward lamp L5 is illuminated using the AC line voltage across the solenoid SL-2 and in series with resistor R15 and diode D15.

4.5.4 Reverse Control - The reverse control circuit is shown in Figure 4.5.4. When the "reverse" pushbutton is depressed and illuminated, relays K1, K2, and K4 are de-energized. The full line voltage is now applied to the reverse motor through contacts on K1 and K2. The forward motor receives drag voltage through resistor R2 and diode D8 also through contacts on K1 and K2. Relay K4 is used to supply full AC line voltage to the capstan motor making it rotate in a CW direction. The lamps L4 and L5 are now de-energized, however, L3 is illuminated via line voltage supplied from solenoid S1-1 and in series with resistor R16 and diode D14. The solenoid SL-1 is now energized to depress the tape onto the right hand scraper blade as described in section 4.4.2.

4.5.5 Tissue Drive - The tissue drive motor is always energized whenever the tape is in motion as can be seen in Figures 4.5.3 and 4.5.4; thus a fresh portion of the tissue is always available for wiping.

4.5.6 Interlock Switch

The E24 cabinet is equipped with an AC interlock switch which is activated by the rear door. Upon opening of the rear door the AC interlock switch breaks power to circuit breaker relay K5's coil thus inhibiting power to R11 electrical components. This renders the cleaner safe for personnel to change blade containers or make any required adjustments to components located inside the cabinet. Figure 4.5.6. shows the interlock switch circuit.



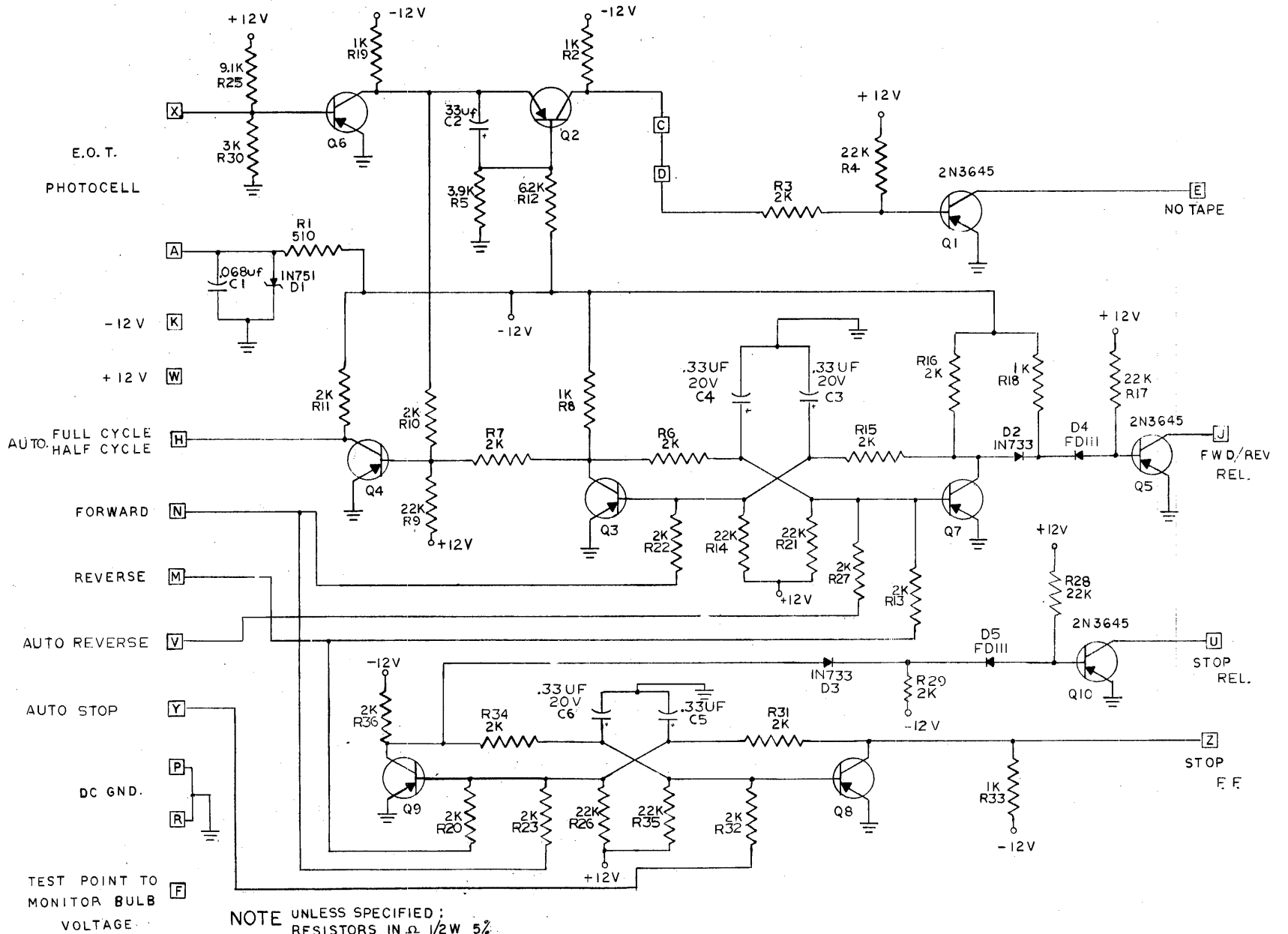
NOTES-

- 1- ALL SWITCHES / RELAYS SHOWN IN DE-ENERGIZED STATE
- 2- □ = P.C. CARD CONNECTOR
- 3- REF P.C. CARD DWG. C3065

Control Electronics
Figure 4.5

PRINTED CIRCUIT BOARD ELECTRONICS

Figure 4.5.A



NOTE UNLESS SPECIFIED;
RESISTORS IN Ω 1/2W 5%
ALL TRANSISTORS 2N1305
PCB ASSY DWG NO. 3066

LOAD CONTROL CIRCUIT

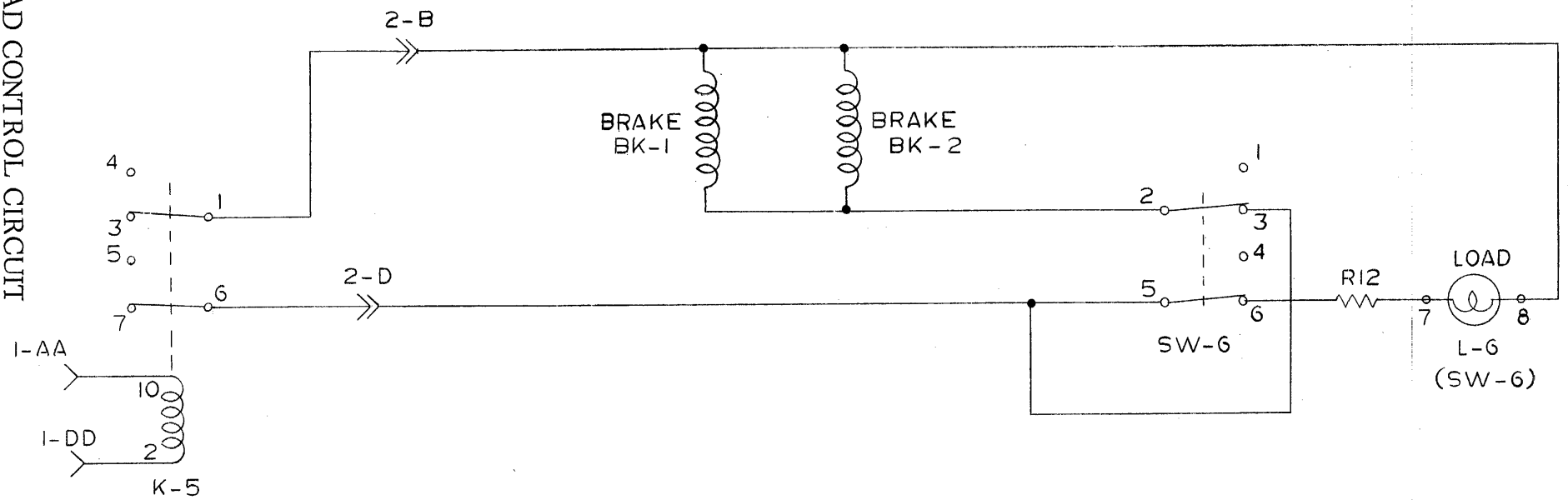
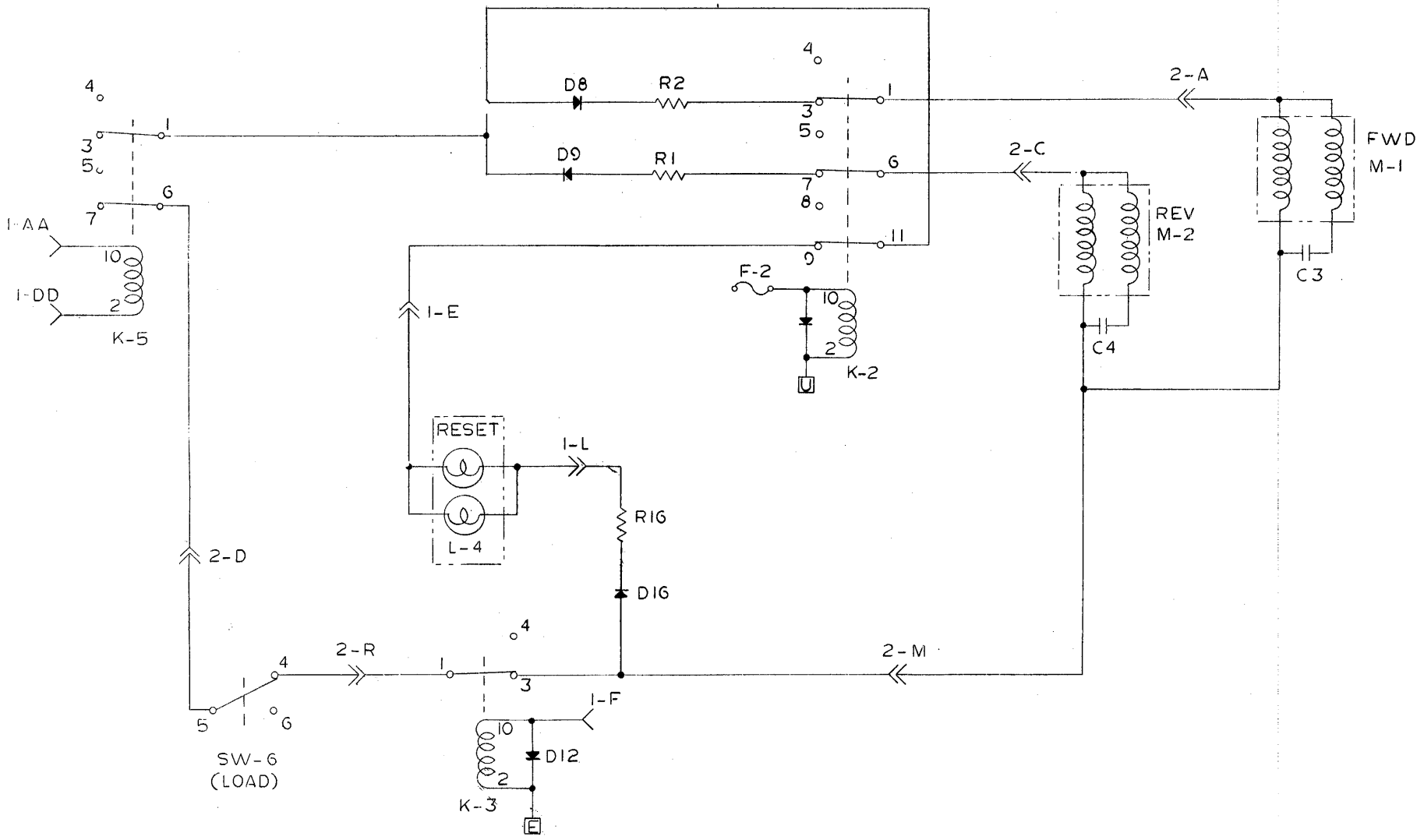
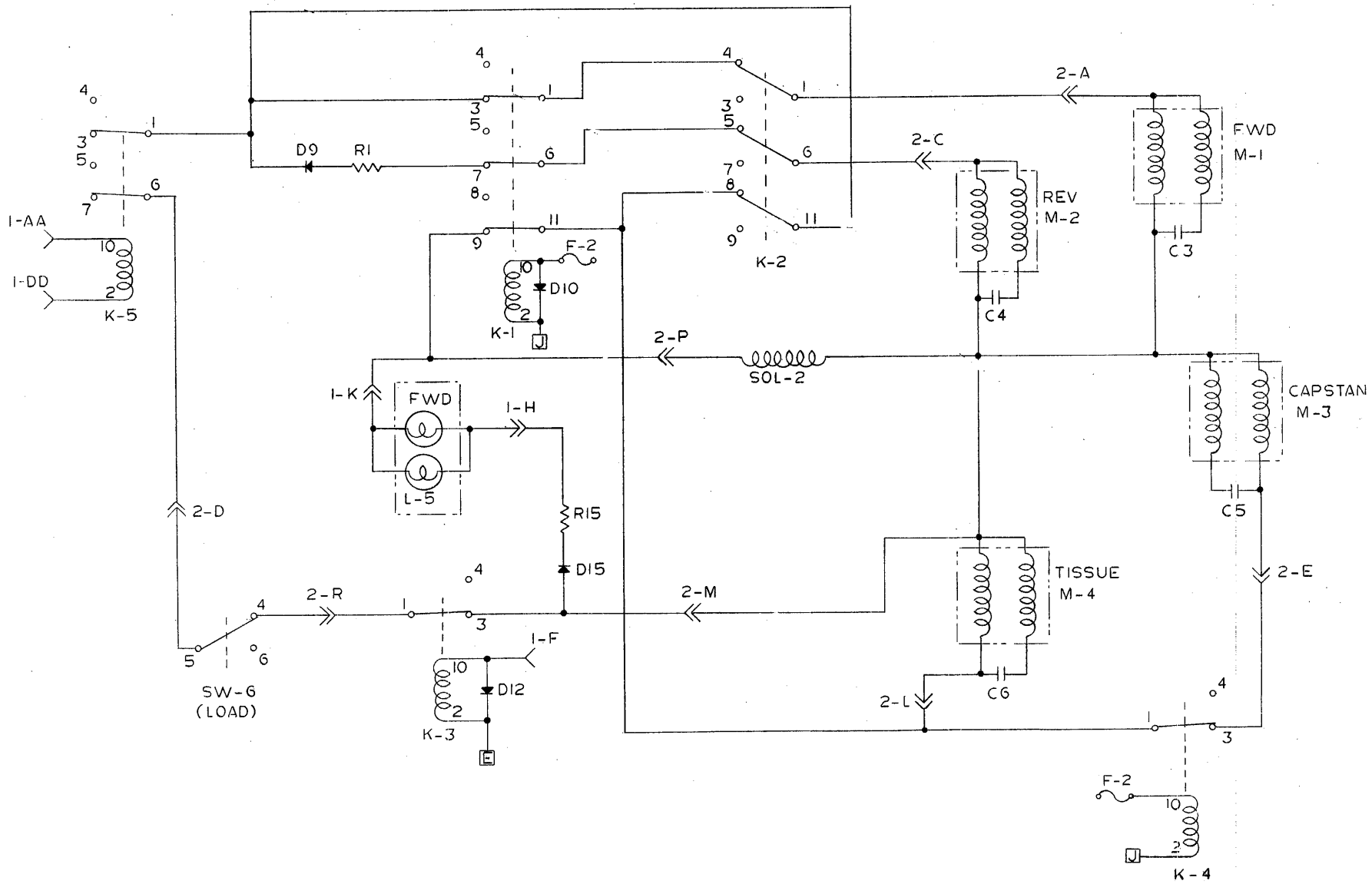


Figure 4.5.1

RESET CONTROL CIRCUIT

Figure 4.5.2



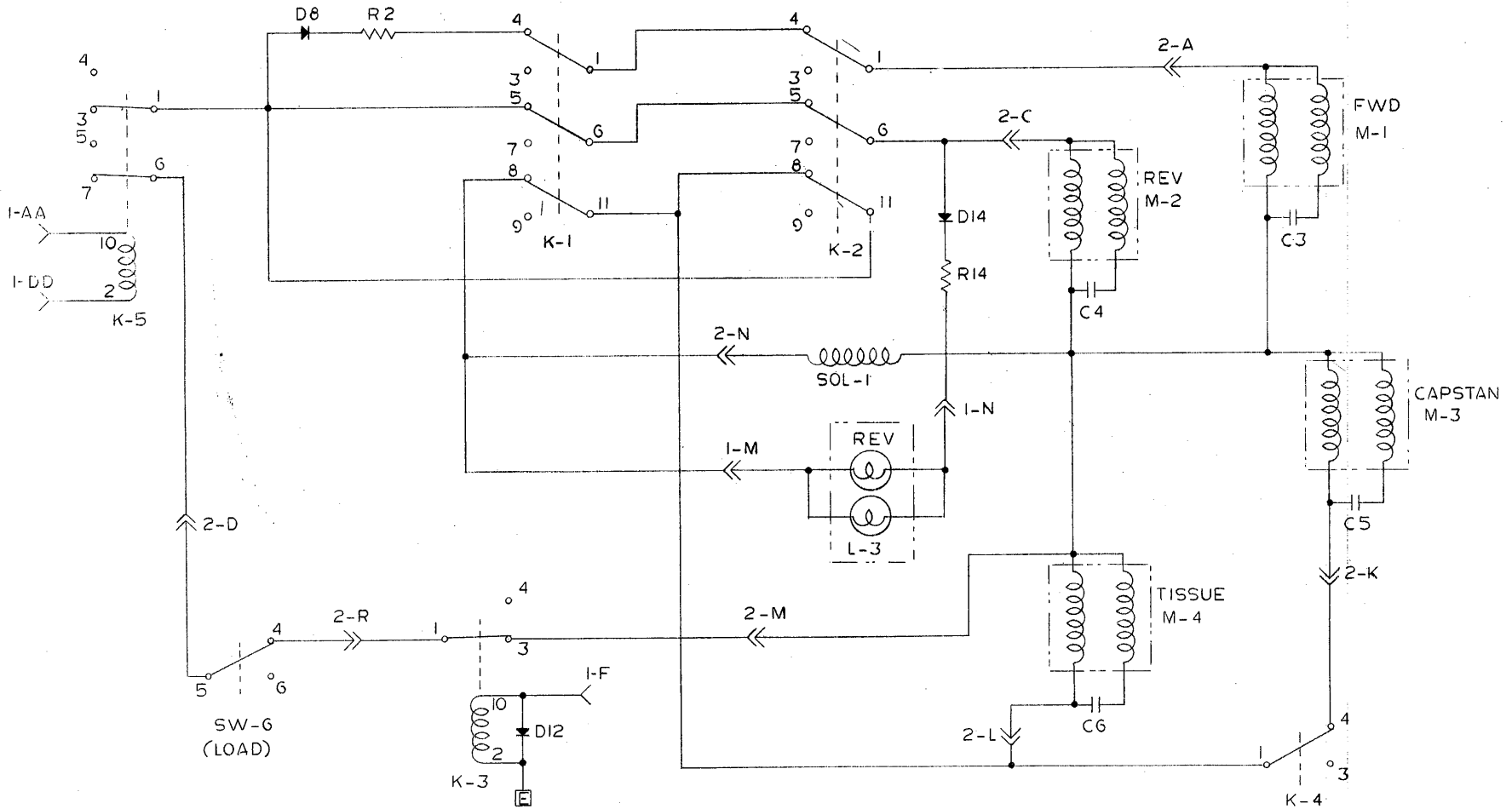


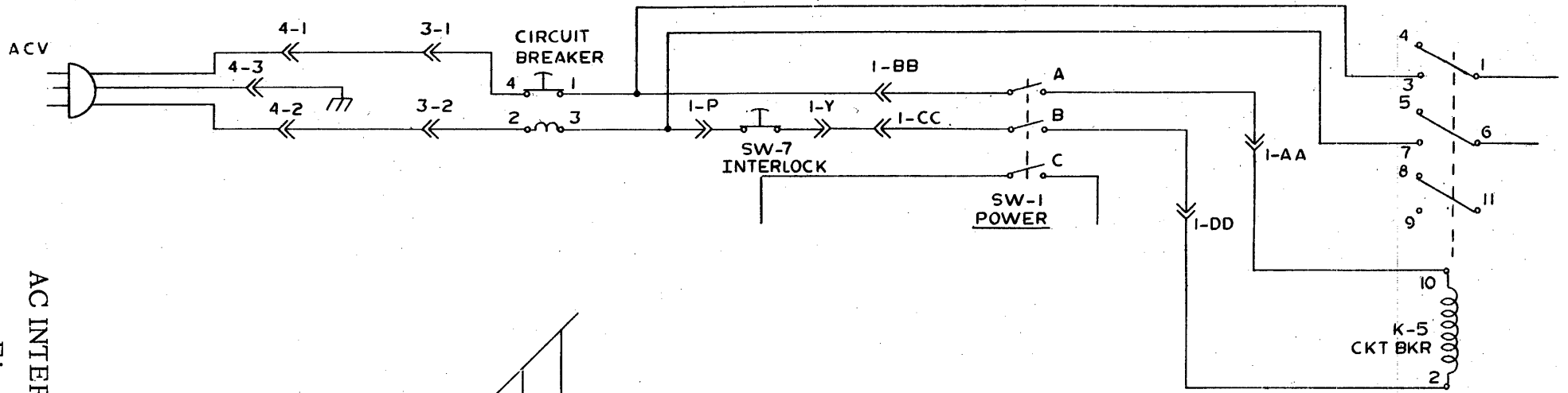
FORWARD CONTROL CIRCUIT

Figure 4.5.3

REVERSE CONTROL CIRCUIT

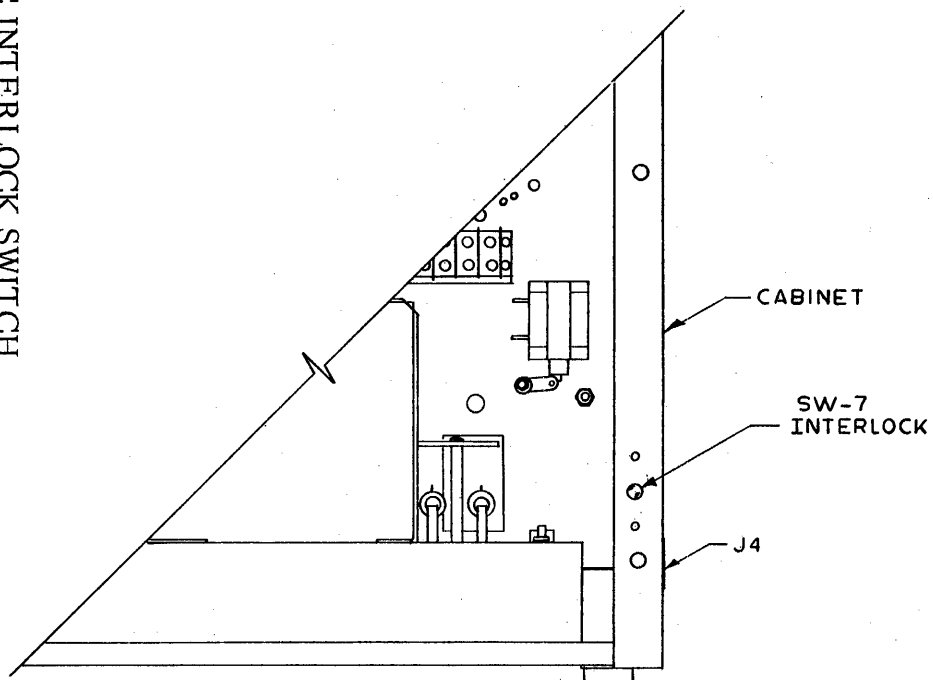
Figure 4.5.4





AC INTERLOCK SWITCH

Figure 4.5.6



SW-7 INTERLOCK ASSEMBLY DETAIL

SECTION 5

MAINTENANCE

5.1 Good Housekeeping Hints

It is suggested that the following good housekeeping practices be observed to insure best operations.

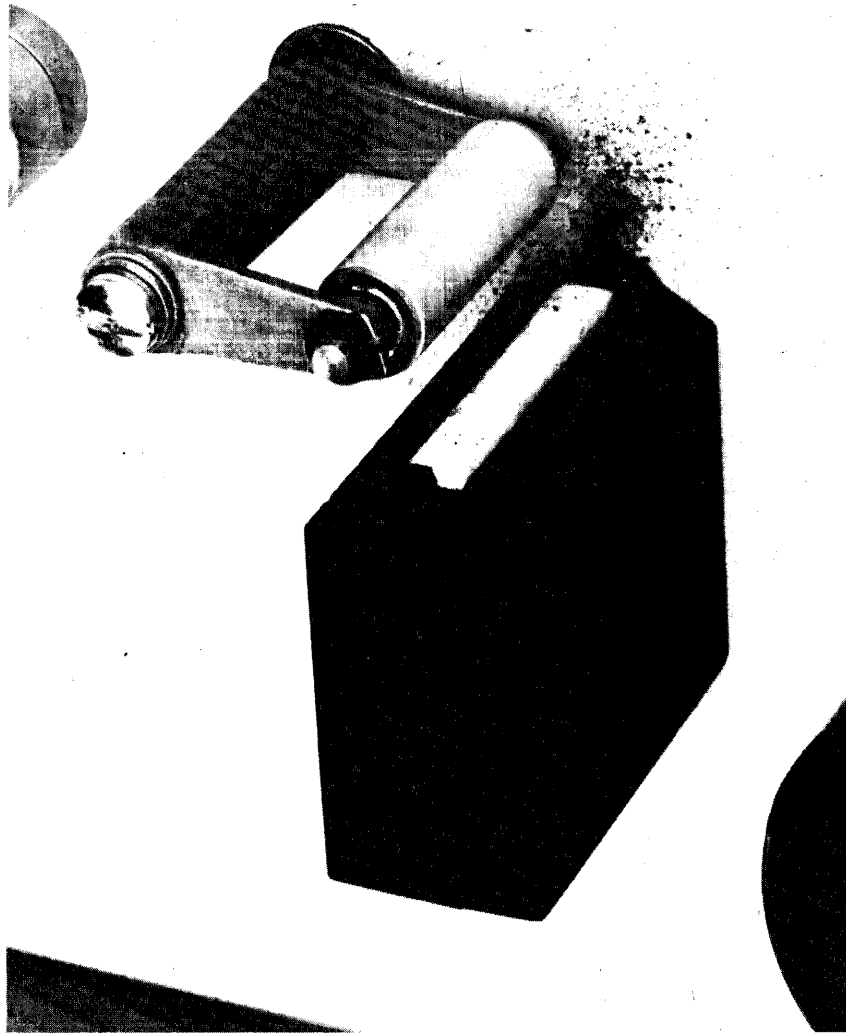
5.1.1 Each Morning Before Power "ON"

1. Blow into photocell cover slot to dislodge any dirt or dust.
2. Use damp chamois or any lint-free material to wipe all exterior surfaces of the E24 EXCEPT THE CORK SURFACE OF THE CAPSTAN.
3. Saturate the tip of a cotton swab (such as Q-Tip) with Tape Transport Cleaner and wipe the grooves of all tape guides.
4. Inspect blade containers, remove and replace when containers are approx. half full.

- 5.1.2 During the Day - If the tapes cleaned are exceptionally dirty, the deck, tape depressors and other elements in contact with the tape may be soiled as seen in Figure 5.1.2. Clean the machine before further use.

Wipe the surface behind each cartridge whenever the tissue cartridges are changed.

- 5.1.3 At the End of the Day - Clean the machine and replace the dust cover. ALWAYS KEEP MACHINE COVERED WHEN NOT IN USE.



SOIL ACCUMULATION

Figure 5.1.2

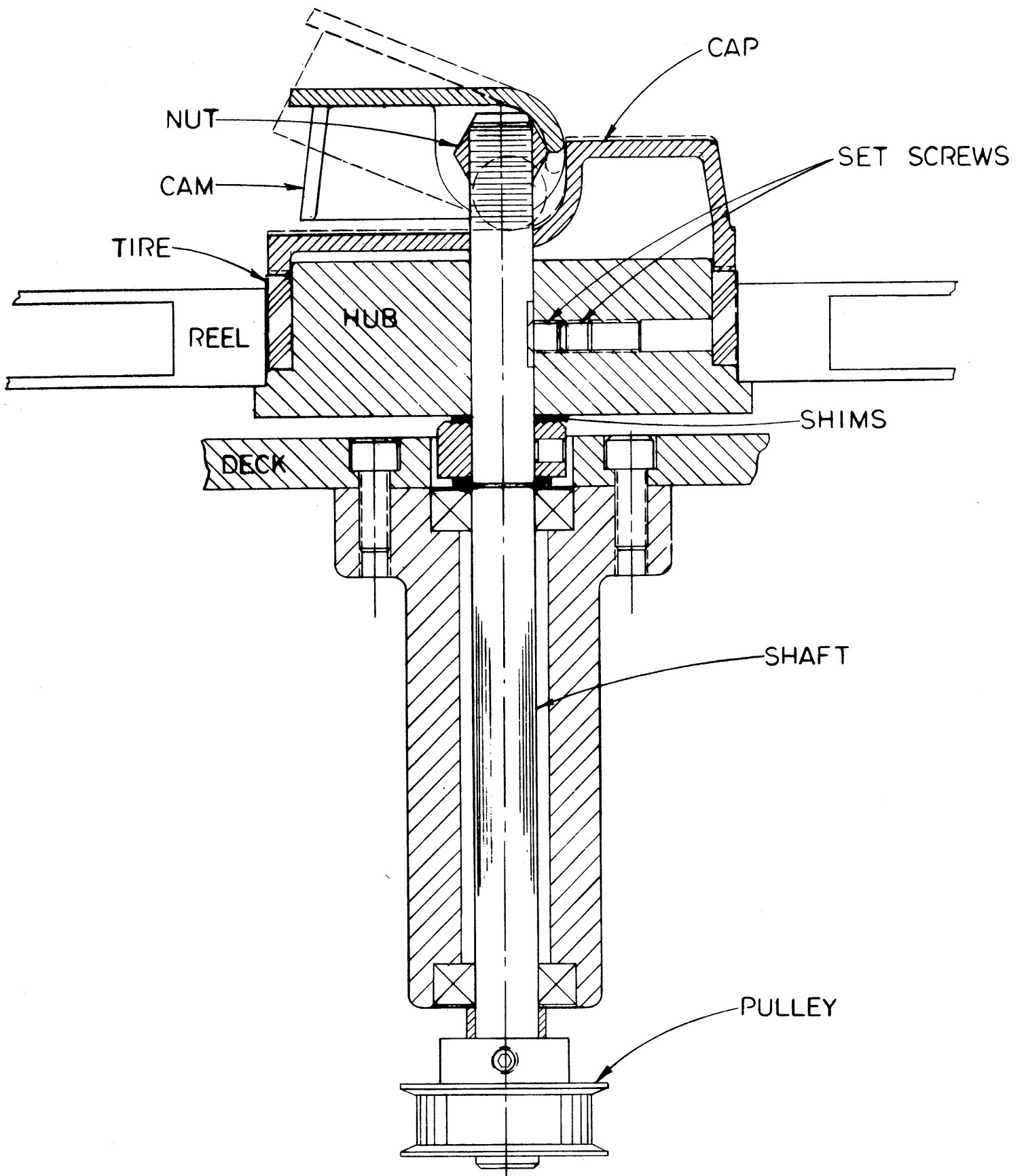
5.2 Trouble Shooting and Adjustment Procedures

The E24 was completely adjusted at the factory and it should be operational after installation. However, certain minor adjustments at the site may still be required for best operation if the unit was subjected to undue shocks and vibration in transit. It is therefore suggested that a trial tape be cleaned and tested to determine if the machine is operating properly.

5.2.1 Reel Hold-down Adjustment - The cam actuated knob holds the reel by compressing a rubber tire (See Figure 5.2.1). If the tire were worn or if an all-plastic reel with an oversized hole were used, the clamping action of the cam may be insufficient. Additional holding power may be had by a simple adjustment: grasp the rubber tire with one hand and rotate the entire knob assembly (without any reels in place) clockwise with the other hand. A quarter of a turn should be adequate. Over tightening will render the cam difficult to actuate.

5.2.2 Hub Alignment - Occasionally when worn all-plastic reels are used instead of the conventional metal cored ones, one may find that the hubs should be re-aligned. Normally, the tape should enter the take-up reel during its forward pass without touching either flanges of the reel. Similarly, it should clear the flanges of the supply reel during the reverse pass. If the tape should rub against any flange in either direction, then the hub (or hubs) must be adjusted. Do not make any adjustments, if the rubbing is caused by warped reels.

Both hubs may be moved either toward or away from the surface of the deck by adding or subtracting shim washers. These washers are shown in Figure 5.2.1. In making the adjustment, first remove the knob by unscrewing counter clockwise until the nut becomes disengaged. Next, remove the cam and the cap and the rubber tire. Use the hex wrench supplied with the shim kit to loosen the set screws. There are two set screws in each hub; the outer one must be removed completely before the inner one can be loosened. The inner set screw should be turned two full turns to clear the step on the shaft. Remove hub by pulling it away from the deck.



CROSS SECTION THRU HUB AND KNOB

Figure 5.2.1

The shim washers are now exposed to view. Add shim if the front flange was rubbing; conversely, remove one or two shims if the tape was rubbing against the flange nearest to the deck. Reverse the sequence to reassemble the hub.

Adjust cam action as outlined in section 5.2.1.

- 5.2.3 Tape Depressors - As mentioned in Section 4.4.2 the left hand tape depressor should push the tape to engage the left hand cleaning blade when the tape is moving forward. The right hand depressor, in this mode, should be clear of the tape. The converse is true when the tape is going in the reverse direction. The optimum position of the tape depressor is shown in Figure 3.2, i.e. the roller of the depressor barely missed hitting the blade holder. This will provide the maximum depressing effect without possibly damaging the roller.
- 5.2.4 Brake Shoes - If the machine slows down visibly near the end of the reel, it is very likely that the brakes are improperly adjusted. Each brake has a brake shoe whose purpose is to keep the brake band away from the drum while the reel motors are running. Figure 5.2.4 shows both a properly and an improperly adjusted brake shoe. The arc of the shoe should be concentric with the drum. Adjustment can be made by loosening the two screws shown and reposition the shoe.
- 5.2.5 EOT and No Tape Lamp Adjustment Procedure - The "EOT" and "No Tape" lamp voltages are adjusted simultaneously by potentiometer R4 located on the control chassis. Place a dc voltmeter between terminals No. 16 and 18 on TB-4, observing correct polarity. Adjust R4 located on top of the control chassis in the proper direction to obtain a reading of four (4) volts. **CAUTION: DO NOT EXCEED FIVE (5) VOLTS.** Place voltmeter between terminals 16 and 17 on TB-4 and meter should now read 3.6 volts.

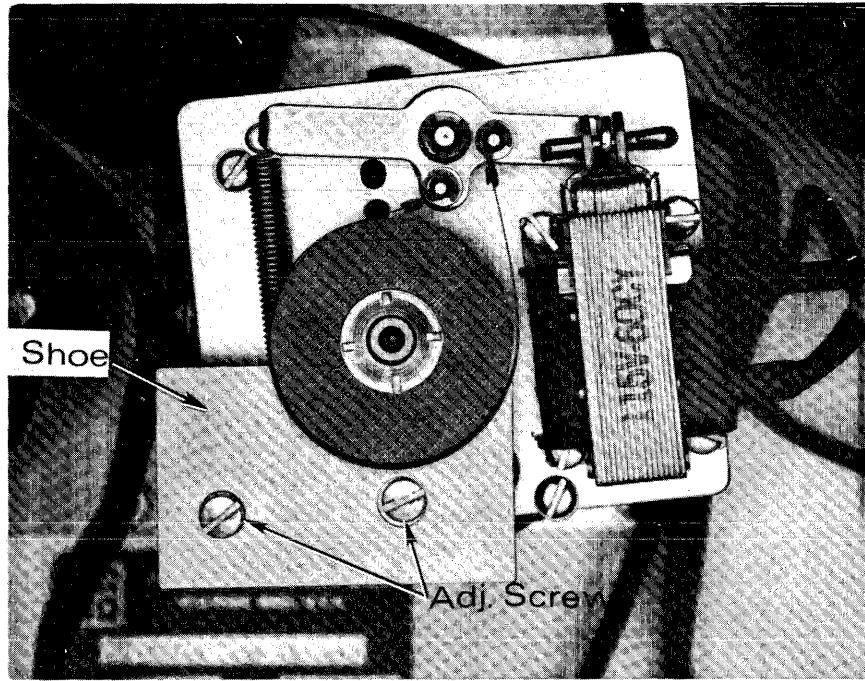
NOTE: R4 adjustment stud has a locking nut securing it from unwanted movement. This nut must be loosened for adjustment.

5.2.6 Trouble and Remedy Chart

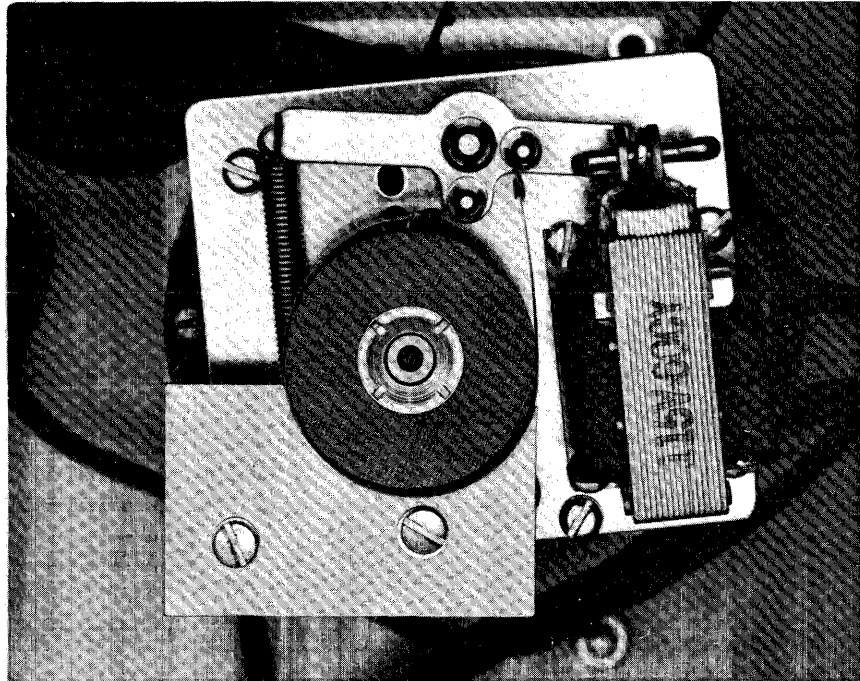
<u>Symptom</u>	<u>Possible Cause</u>	<u>Solution</u>
Right tape depressor does not move down in forward direction of motion.	a. Relay K1 is bad b. Solenoid is bad	a. Replace relay K1 on control chassis b. Replace solenoid S1-1
Left tape depressor does not move down in reverse direction of motion.	a. Relay K1 is bad b. Solenoid is bad	a. Replace relay K1 on control chassis b. Replace solenoid SL-2 on deck
Tissue does not advance when tape is in motion on one cartridge.	a. Cartridge not seated properly b. Spool is stuck in cartridge c. Tissue broken	a. Seat cartridge properly b. Replace tissue cartridge c. Replace tissue cartridge
Tissue does not advance when tape is in motion on all cartridges.	a. Driving chain is broken, or off gears b. Relay K2 is bad c. Tissue motor is bad	a. Replace, or reposition driving chain on rear deck b. Replace relay K2 on control chassis c. Replace tissue motor
FWD motor has proper drag voltage in reset but will not drive forward.	a. Relay K1 is bad b. Relay K3 is bad	a. Replace relay K1 on control chassis b. Replace relay K3 on control chassis
FWD motor has improper tension in test and will not drive forward	Relay K2 is bad	Replace relay K2 on control chassis
FWD motor in reset mode has too much creep voltage.	Diode D9 is shorted	Replace diode under control chassis

<u>Sympton</u>	<u>Possible Cause</u>	<u>Solution</u>
Same as preceding but FWD motor has no voltage	<ul style="list-style-type: none"> a. Relay K2 is bad b. Diode D9 is open 	<ul style="list-style-type: none"> a. Replace A. C. relay K2 on control chassis b. Replace diode D9 under control chassis
REV motor has proper drag voltage in reset but no voltage in forward mode.	<ul style="list-style-type: none"> a. Relay K1 is bad b. Relay K3 is bad 	<ul style="list-style-type: none"> a. Replace relay K1 on control chassis b. Replace relay K3 on control chassis
REV motor has no voltage in reset mode or has too much voltage	<ul style="list-style-type: none"> a. Relay K2 is bad b. Diode D9 is shorted c. Diode D9 is open 	<ul style="list-style-type: none"> a. Replace relay K2 on control chassis b. Replace diode D9 under control chassis c. Replace diode D9 under control chassis
Reset mode is in-operative.	<ul style="list-style-type: none"> a. Tape is not in photocell block b. Dirt in photocell or lamp in block c. Relay K3 is bad d. No tape lamp not adjusted 	<ul style="list-style-type: none"> a. Thread tape through photocell block b. Clean dirt out of photocell block apertures c. Replace relay K3 d. Readjust no tape lamp on control chassis (See Par. 5.2.5)
REV motor has proper drag in reset mode but does not drive in reverse direction.	<ul style="list-style-type: none"> a. Relay K1 is bad b. Relay K3 is bad 	<ul style="list-style-type: none"> a. Replace relay K1 on control chassis b. Replace relay K3 on control chassis
Capstan motor does not run FWD or REV and Tissue motor will not turn when tape is in motion.	<ul style="list-style-type: none"> a. Relay K4 is bad b. Relay K2 is bad 	<ul style="list-style-type: none"> a. Replace relay K4 on control chassis b. Replace relay K2 on control chassis

<u>Sympton</u>	<u>Possible Cause</u>	<u>Solution</u>
E24 will not reverse automatically in full cycle mode.	<ul style="list-style-type: none"> a. No EOT marker on tape b. Dirt in EOT lamp aperture c. EOT lamp out of adjustment d. EOT lamp is burned out e. Control chassis P.C. board is bad 	<ul style="list-style-type: none"> a. Place EOT marker on tape b. Clean lamp or photocell aperture c. Adjust EOT lamp voltage (See Par. 5.2.5) d. Replace photocell block e. Replace P.C. Board
E24 fails to detect no tape or broken tape.	<ul style="list-style-type: none"> a. Dirt in no tape lamp aperture b. No tape lamp is out of adjustment c. Control chassis P.C. board is bad d. No tape lamp is burned out 	<ul style="list-style-type: none"> a. Clean lamp or photocell aperture b. Adjust No tape lamp voltage (See Par. 5.2.5) c. Replace P.C. board on control chassis d. Replace photocell block assembly
E24 stops intermittently during normal operation.	<ul style="list-style-type: none"> a. No tape lamp is too bright 	<ul style="list-style-type: none"> a. Readjust the no tape lamp (See Par. 5.2.6)



PROPER



IMPROPER

Brake Shoe Adjustment

Figure 5.2.4

SECTION 6

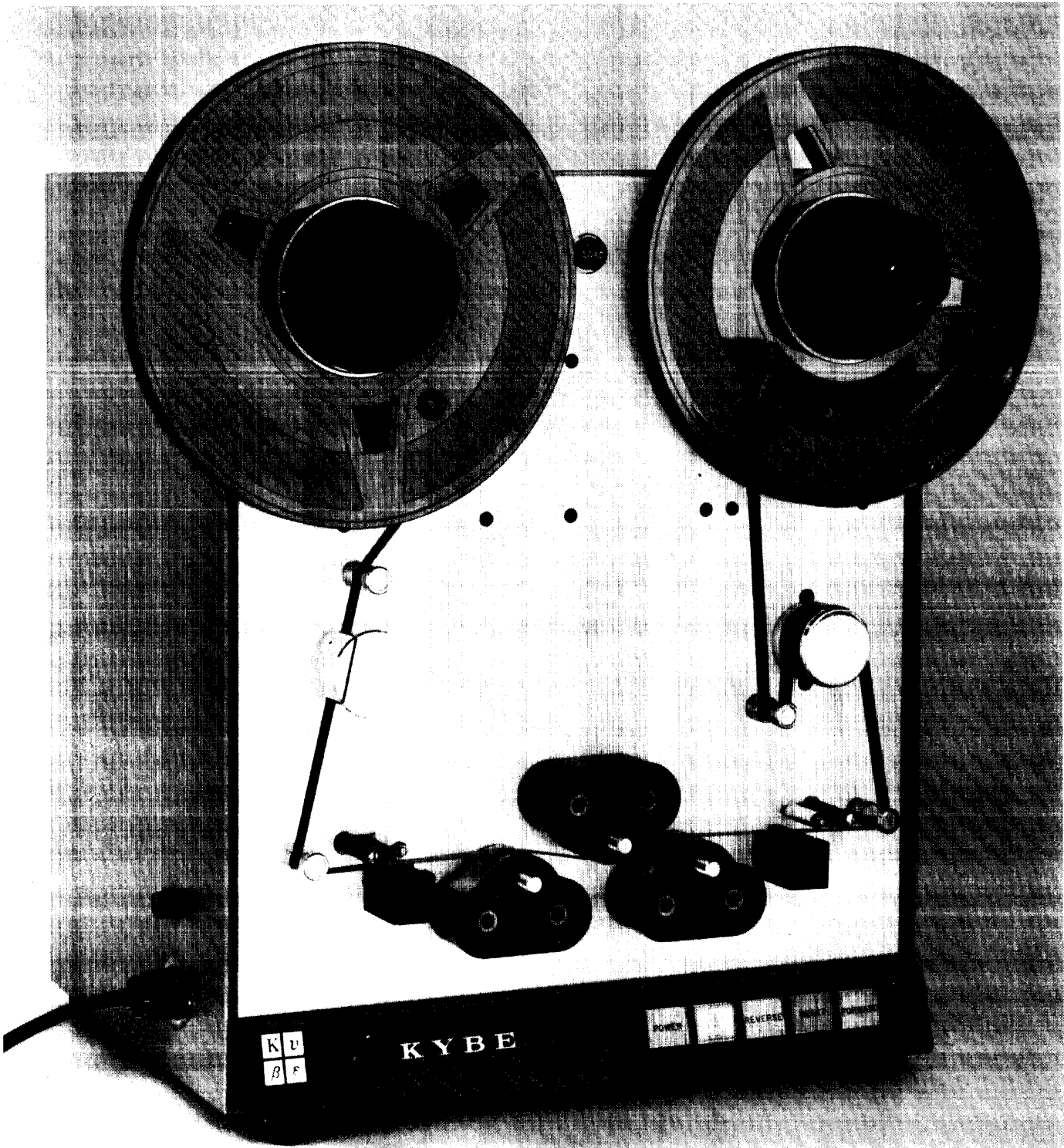
230 VAC 50 HZ CLEANER

6.0 Introduction

The 50 hertz E24 cleaner is mechanically the same as described in the preceding text. Operation, adjustment and maintenance may be performed as described therein. The electronic circuitry controlling the cleaner is also basically the same. Functions and controls may be referenced in Section 4.5 with the following modification to allow for use of 230 VAC 50 Hz power.

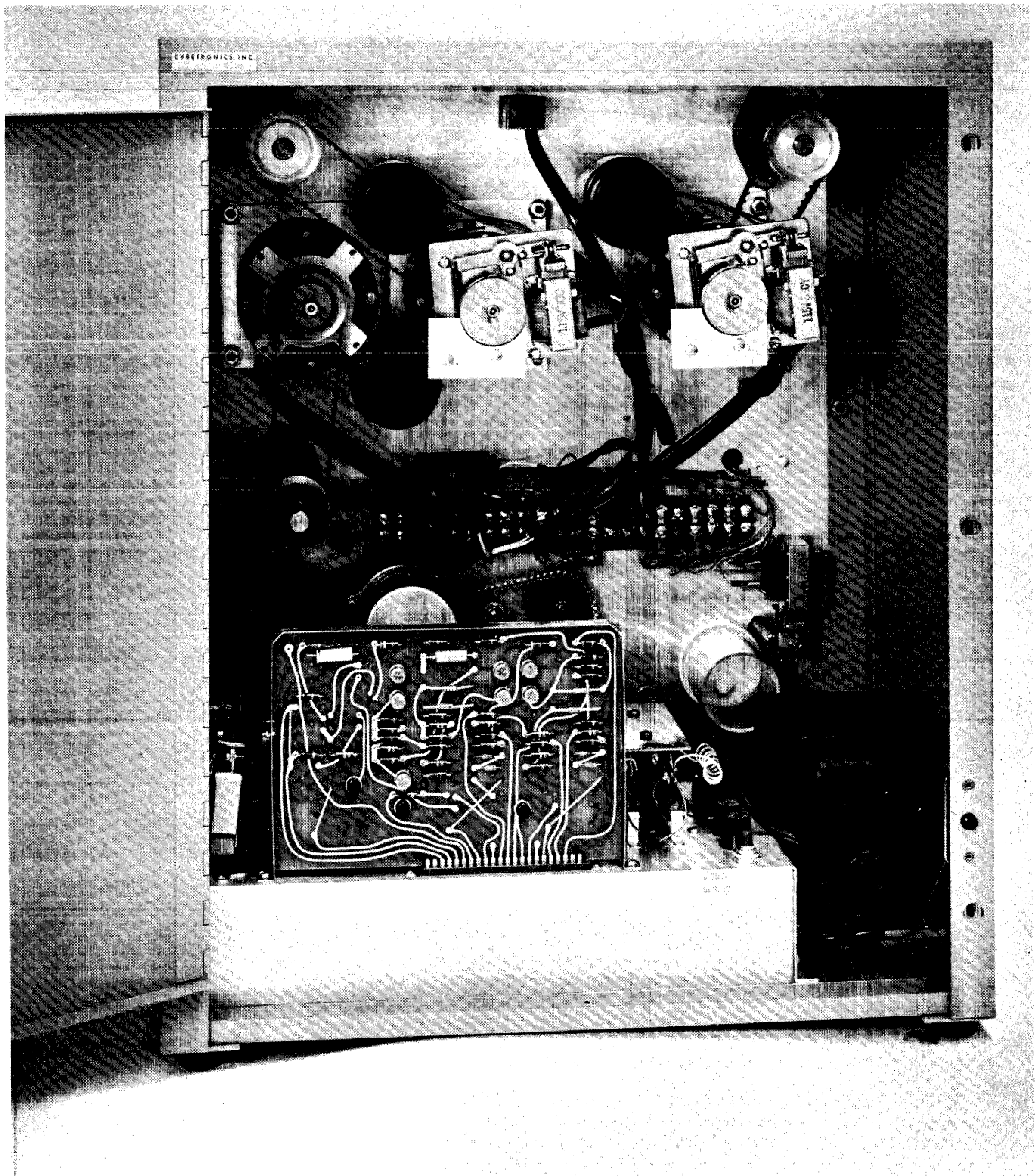
6.1 Power Source

The 50 Hz cleaner power is regulated by a fused isolation transformer. The 1.5 amp transformer fuse is located directly above the AC inlet connector or the side of the cabinet and is easily accessible from the outside (See Figure 6.0). The isolation transformer is located between the AC inlet and the control chassis (See Figure 6.1), and provides 115 Volts AC to the control electronics see Figure 6.1.A.



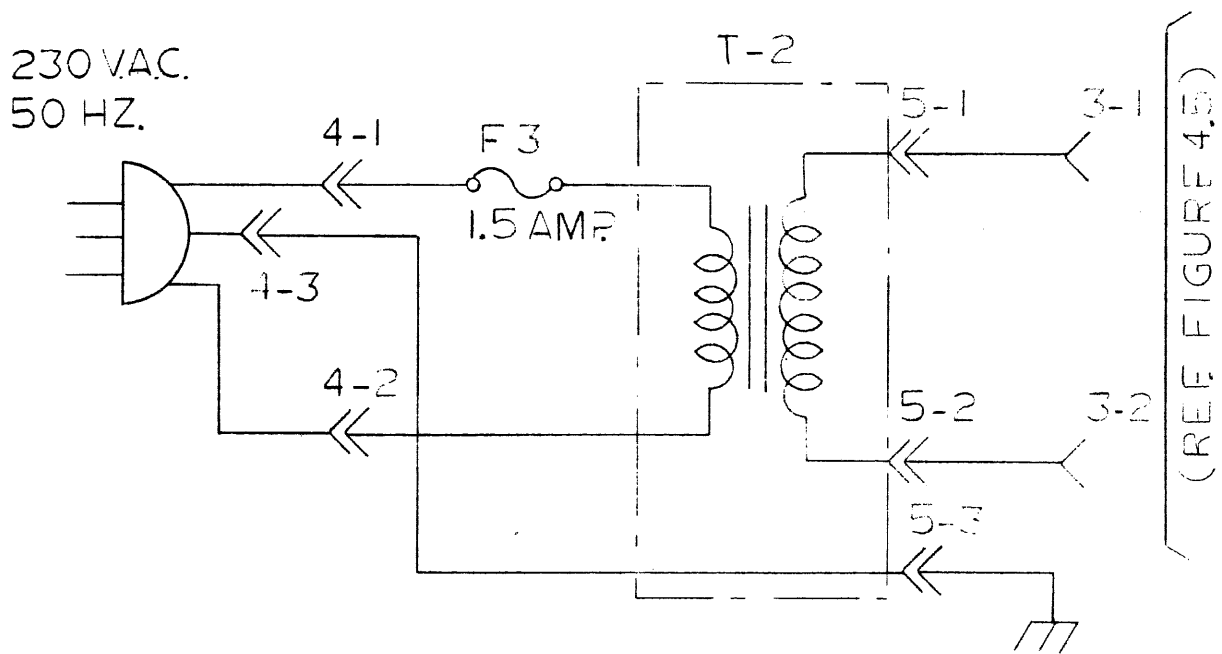
230 VAC 50 HERTZ CLEANER

Figure 6.0



230 VAC 50 HZ CLEANER-REAR

Figure 6.1



230 VAC 50 HZ ELECTRONICS

Figure 6.1.A

APPENDIX I

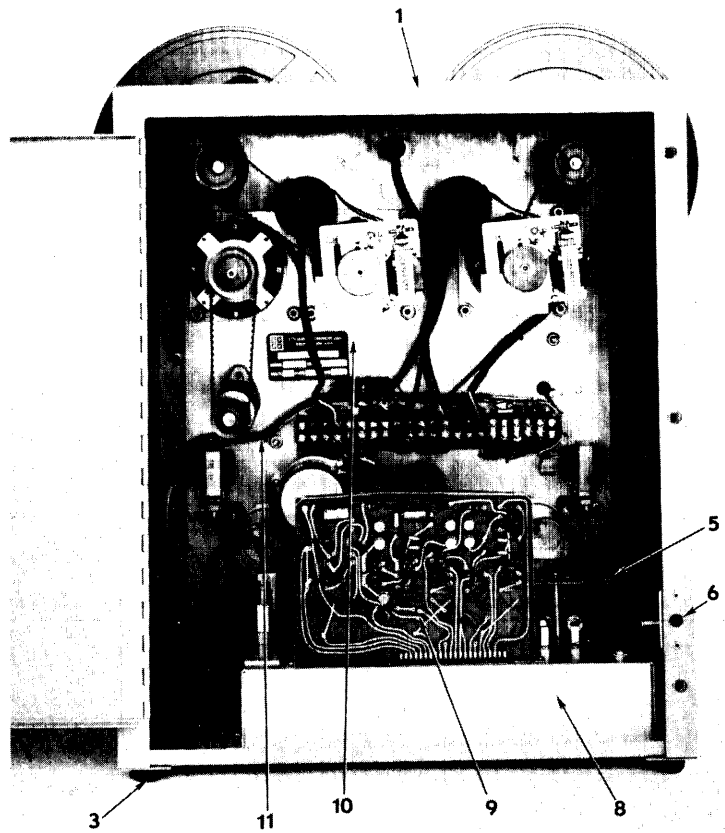
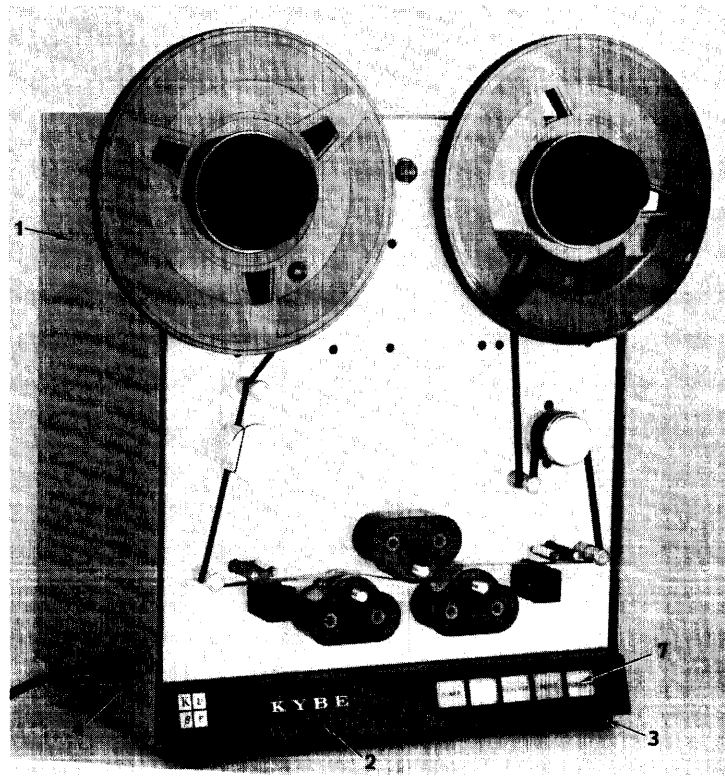
PARTS LIST

E24 Shipping Kit

Figure I-1

SHIPPING KIT ASSEMBLY

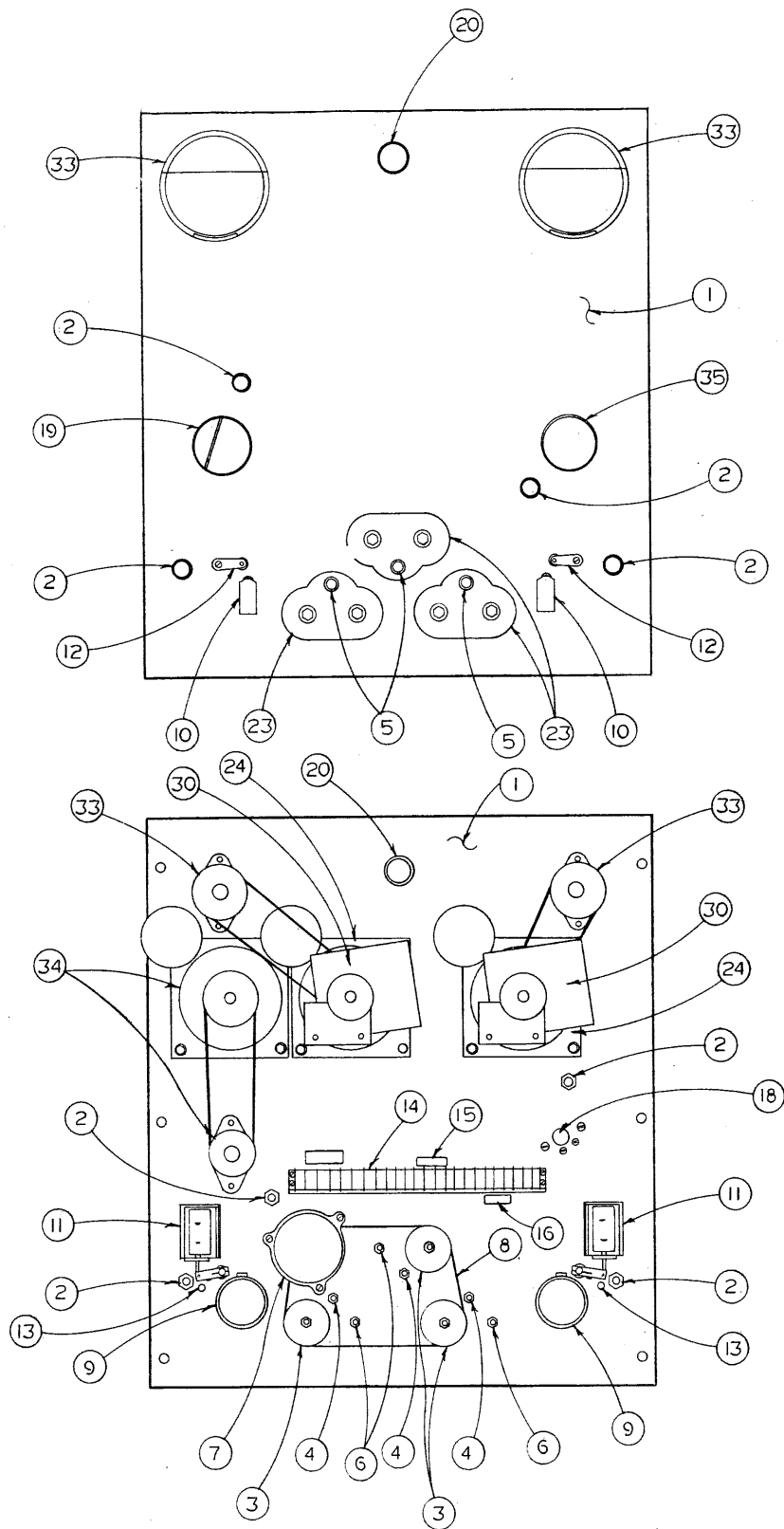
REFERENCE NUMBER	SCH. REF. NUMBER	NOMENCLATURE	PART NUMBER	QTY.
1		Operation and Maintenance Manual	3108-A	
2		Warranty Card		1
3		Take-up reel 10½ inch diameter		1
4		Tissue Cartridges	TC-1	3
5		Injector Blade Cartridge	RC-1	4
6		Injector Blade Holders	C742	2
7		Tape Control Labels Type B		10
8		Power Cord	B3097-17	1
9		Dust Cover	C674	1
10		Reel Hub Rubber Tire	A727	1
11		Shim Kit		1
12		Wrenches (Hex Allen Type)		3
		1. for removing blade holders		
		2. for removing reel hubs		
		3. for aligning tissue spools		
13		Price List		1
14		Label Literature		1



E24 Final Assembly
Figure I-2

Cabinet Final Assembly E24 115 VAC 60 Hz

REFERENCE NUMBER	SCH. REF. NUMBER	NOMENCLATURE	PART NUMBER	QTY.
Ref		E24 Assembly	F3096	
1		Cabinet	B3097-1	1
2		Turret	B3097-2	1
3		Feet	B3097-3	4
4	J4	Connector 3 pin male twist lock	B3097-5	1
5		P3 Cable	B3097-11	1
	P3	Connector 2 pin female	B3097-12	1
6	SW-7	Interlock Switch	B3097-18	1
7		Control Switch Assembly	B3097-23	
	SW-3,5	Switch (FWD, Rev) SPDT Mom. Act.	B3081-1	2
	SW-4	Switch (reset) DPDT Mom. Act.	B3081-2	1
	SW-2	Switch (half-full cycle) DPDT Alt. Act.	B3081-3	1
	SW-1	Switch (power) TPDT Alt. Act.	B3081-4	1
	L1, 2, 3, 4	Lamp 28 VAC	B3081-5	10
	L1, 3, 4, 5	Display Screen white one piece	B3081-6	4
	L2	Display Screen white longitudinal split	B3081-7	1
		Mounting Barrier	B3081-8	6
	L1, 3, 4, 5	Indicator Housing	B3081-9	4
	L2	Indicator Housing	B3081-10	1
	P1	Connector	B3081-11	1
8		Control Chassis Assembly	B3097-24	
9		Printed Circuit Card Assembly	B3097-25	
10		Deck Assembly	B3097-26	



Deck Assembly

Figure I-3

DECK ASSEMBLY

REFERENCE NUMBER	SCH. REF. NUMBER	NOMENCLATURE	PART NUMBER	QTY.
Ref		Deck Assembly	D3084	
1		Deck	B3085-1	1
		Helicoil 10-24 x .285	B3085-2	4
		Bushing FB-68-8	B3085-3	2
		Bushing B35-3	B3085-4	6
2		Tape Guide	B3085-5	4
3		Tissue Drive Shaft	B3085-8	3
		Retaining ring	B3085-9	3
		Nut 10-24	B3085-10	9
		Lock Washer #10 int tooth	B3085-11	6
		Gear 30-3	B3085-12	3
4		Adapter	B3085-16	3
		Nylon washer	B3085-15	3
5		Thumb Screw	B3085-17	3
6		Tissue Drag Shaft	B3085-18	3
		Lock Washer	B3085-19	3
		Spring	B3085-20	3
		Flat Washer	B3085-21	3
		Nut ESNA	B3085-22	3
7	M4	Tissue Motor	B3085-25	1
		Gear 10-3	B3085-23	1
		Roll Pin	B3085-24	1
		Spacer	B3085-26	3
		Screw	B3085-27	3
8		Tissue Drive Chain	B3085-29	1
9		Blade Container	B3085-33	2
		Vial Lid	B3085-30	2
		Vial Backing	B3085-31	2

DECK ASSEMBLY Continued

REFERENCE NUMBER	SCH. REF. NUMBER	NOMENCLATURE	PART NUMBER	QTY.
		Retaining Screw	B3085-32	2
10		Blade Holder Alsimag	B3085-35	2
11	Sol-1, 2	Tape Depressor Solenoid	B3085-39	2
		Solenoid bracket	B3085-36	2
		Link	B3085-46	2
		Roll pin	B3085-45	2
		Clamp link	B3085-41	2
		Shaft	B3085-42	2
		Retaining ring	B3085-47	4
12		Tape Thumb	B3085-49	2
		Screw	B3085-50	2
		Pin	B3085-52	2
		Roller	B3085-53	2
		Bearing	B3085-54	4
13		Linkage Stop	B3085-55	2
14	TB-4	Barrier Strip	B3085-57	1
		Marker Strip	B3085-58	1
	C6	Capacitor Supplied with Tissue motor	B3085-61	1
15	R12	Resistor 2K Ω 5W 5%	B3085-65	1
16	R13	Resistor 5.1K Ω $\frac{1}{2}$ W 5%	B3085-66	1
17		Jumper	B3085-68	1
18		Photocell Block	B3085-69	1
	PC	Photocell	B3085-70	1
	L7	Lamp	B3085-71	1
19		Photocell Cover	B3085-75	1
	L8	Lamp	B3085-76	1
20	SW-6	Load Switch	B3085-80	1
		Mounting Kit	B3085-81	1

DECK ASSEMBLY continued

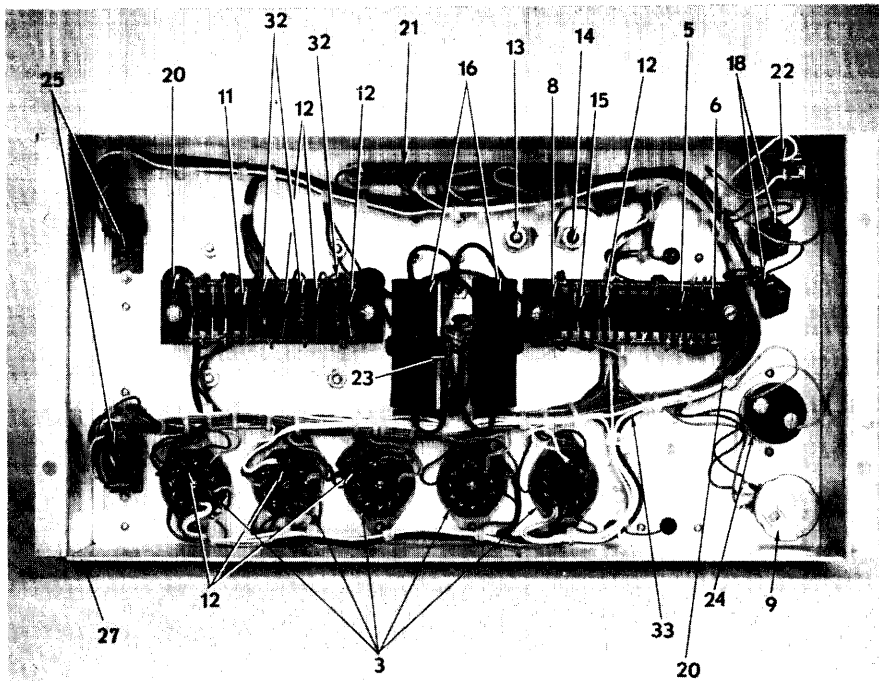
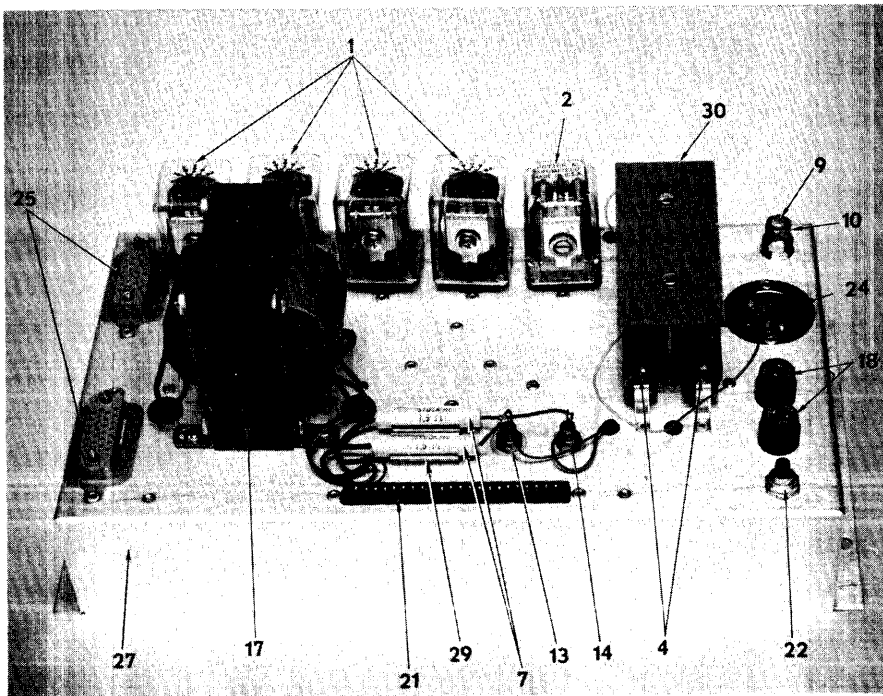
REFERENCE NUMBER	SCH. REF. NUMBER	NOMENCLATURE	PART NUMBER	QTY.
	L6	Lamp	B3085-82	1
		Cable	B3085-83	1
21		Deck Mounting Screw	B3085-86	5
22		Deck Mounting Screw	B3085-87	1
		Nut	B3085-88	6
23		Tissue Cartridge TC-1	B3085-89	3
24		Reel Drive Assembly	B3085-90	Ref
25	M1, 2	Motor Fwd. Drive, Rev. Drive	B3100-1	2
	C3, 4	Capacitor Supplied with motor	B3100-2	
26		Slotted Motor Plate	B3100-3	2
27		Pulley	B3100-6	2
28		Drive Belt Fwd Motor (M-1)	B3100-7	1
29		Drive Belt Rev. Motor (M-2)	B3100-8	1
30	BK-1, 2	Brake	B3100-11	2
		Spacer 1" Long	B3100-10	2
		Spacer 1" Long	B3100-12	4
		Spacer 5/8" Long	B3100-15	4
31		Brake Shoe	B3100-20	2
32		Socket Head cap screw	B3100-24	8
		Nut	B3100-25	8
33		Reel Hub Assembly	B3085-91	Ref
		Bearing block	B3102-1	2
		Bearing	B3102-2	4
		Shaft	B3102-3	2
		Steel Collar	B3102-4	2
		Retaining Ring	B3102-5	2
		Spacer	B3102-6	2
		Pulley	B3102-7	2

DECK ASSEMBLY Continued

REFERENCE NUMBER	SCH. REF. NUMBER	NOMENCLATURE	PART NUMBER	QTY.
34	M3 C5	Socket head cap screw	B3102-8	4
		Shims $\frac{1}{2}$ " I.D.	B3102-9	AR
		Hub	B3102-10	2
		Socket Set screw	B3102-11	2
		Socket Set Screw	B3102-12	2
		Tire	B3102-13	2
		Cam Knob	B3102-14	2
		Cam Roller	B3102-15	2
		Cam Knob Pin	B3102-16	4
		Cam Bar	B3102-17	2
		Cam Bar Pin	B3102-18	4
		Retaining ring	B3102-19	4
		Capstan and Motor Assembly	B3085-92	Ref
		Motor	B3099-1	1
		Capacitor Supplied with motor	B3099-2	1
		Slotted Motor Plate	B3099-3	1
		Socket head cap screw	B3099-6	4
		Nut	B3099-7	4
		Pulley mount on motor	B3099-8	1
		Drive Belt	B3099-9	1
		Bearing Housing	B3099-10	1
		Bearing	B3099-11	2
		Shaft	B3099-12	1
Retaining ring	B3099-13	1		
Steel Collar	B3099-14	1		
Spacer	B3099-15	1		
Pulley mount on capstan shaft	B3099-16	1		
35		Capstan	B3099-18	1

DECK ASSEMBLY Continued

REFERENCE NUMBER	SCH. REF. NUMBER	NOMENCLATURE	PART NUMBER	QTY.
36	P2	Deck Cable	B3085-93	Ref
		Connector	B3103-1	1
		Cable Clamp	B3103-3	1



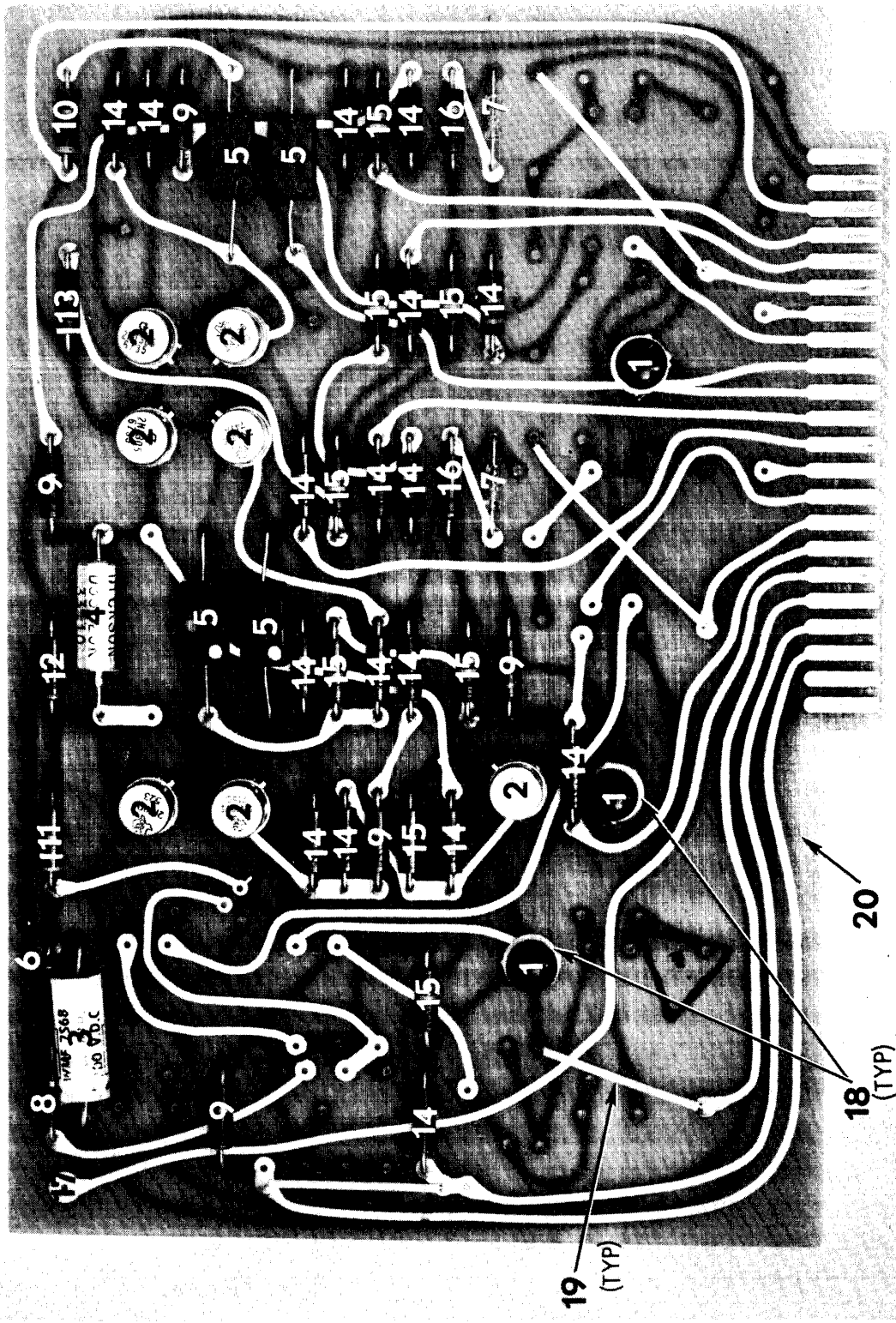
Control Chassis Assembly
Figure I-4

Control Chassis Assembly

REFERENCE NUMBER	SCH. REF. NUMBER	NOMENCLATURE	PART NUMBER	QTY.
Ref		Control Chassis Ass'y	C3078	
1	K1, 2, 3, 4	Relay 12 VDC 5 amp 3 PDT	B3076-1	4
2	K5	Relay 110 VAC 5 amp 3 PDT	B3076-2	1
3		Relay Socket (K1 thru K5)	B3076-26	5
4	R1, 2	Resistor 75 Ω 50W	B3076-3	2
5	R3, 8, 9, 10	Resistor 1K Ω 1/2W 5%	B3076-4	4
6	R11	Resistor 2K Ω 1/2W 5%	B3076-5	1
7	R6, 7	Resistor 7.5 Ω 11W	B3076-6	1
8	R5	Resistor 20 Ω 5W	B3076-8	1
9	R4	Potentiometer 50 Ω 5W	B3076-7	1
10	R4	Lock Nut & Bushing	B3076-43	1
11	D1, 2, 3, 4	Diode 1N2070	B3076-9	4
12	D8, 9, 10, 11 12, 14, 15, 16	Diode 1N2070	B3076-10	8
13	D5	Diode 1N2976-B 10W Zener	B3076-11	1
14	D6	Diode 1N2976-RB 10W Zener	B3076-12	1
15	D7	Diode UZ5807 Zener	B3076-13	1
16	C1, 2	Capacitor 1000 ufd 25 VDC	B3076-15	2
17	T-1	Transformer	B3076-14	1
18	F1, 2	Fuse holder Bayonet T type	B3076-25	2
19	F1, 2	Fuse 1 Amp 125 VAC	B3076-16	2
20	TB1, 2	Component Strip	B3076-17	2
21	J5	Connector (P. C. Card)	B3076-18	1
22	CKT. BKR.	Circuit Breaker 2 Amp	B3076-19	1
23	TB-3	Terminal Board	B3076-20	1
24	J3	Connector male	B3076-21	1
25	J1, J2	Connector 26 pin female	B3076-23	2
	J1, 2	Mounting bracket	B3076-22	2

CONTROL CHASSIS Continued

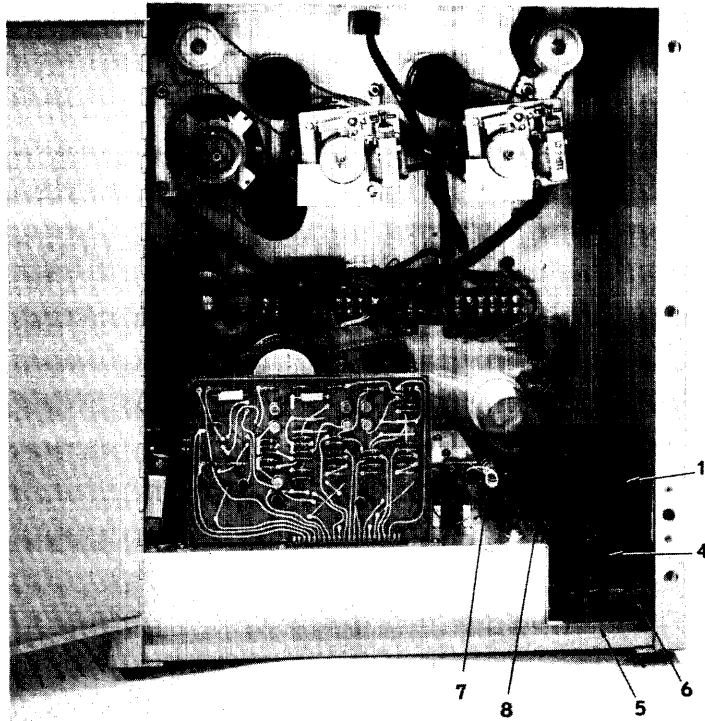
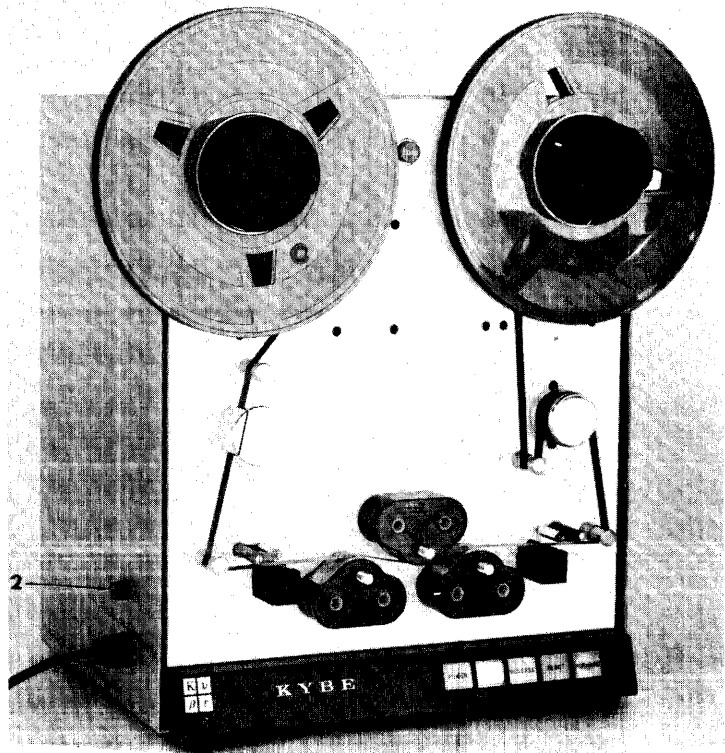
REFERENCE NUMBER	SCH. REF. NUMBER	NOMENCLATURE	PART NUMBER	QTY.
26		Capacitor Clips C1, C2	B3076-27	2
27		Chassis	B3076-28	1
28		Printed Circuit Board Clamp (Not Shown)	B3076-29	1
29		Mounting Clips (R6, R7)	B3076-30	2
30		Resistor Shield (R1, R2)	B3076-37	1
		Spacer	B3076-38	2
31		Spacers (TB1, TB-2)	B3076-41	4
32	R14, 15, 16	Resistor 700 Ω 8W	B3076-47	3
33		Control Chassis Cable	B3076-51	1
34		Schematic	D3087	



Printed Circuit Card Assembly
 Figure I-5

Printed Circuit Card Assembly

REFERENCE NUMBER	SCH. REF. NUMBER	NOMENCLATURE		PART NUMBER	QTY.
Ref		P. C. Card Ass'y		C3066	
1	Q1, 5, 10	Transistor	2N3645	B3067-1	3
2	Q2, 3, 4, 6, 7, 8, 9	Transistor	2N1305	B3067-2	7
3	C1	Capacitor	.068 uf 100VDC 10% Paper	B3067-3	1
4	C2	Capacitor	33 uf 20 VDC 10% Tant.	B3067-4	1
5	C3, 4, 5, 6	Capacitor	0.33 uf 20 VDC 10% Tant.	B3067-5	4
6	D1	Diode	1N751 Zener	B3067-6	1
7	D2, 3	Diode	1N773	B3076-7	2
8	R1	Resistor	510 Ω 1/2W 5%	B3067-8	1
9	R2, 8, 18, 19, 33	Resistor	1K Ω 1/2W 5%	B3067-9	5
10	R30	Resistor	3K Ω 1/2W 5%	B3067-10	1
11	R5	Resistor	3.9K Ω 1/2W 5%	B3067-11	1
12	R12	Resistor	6.2K Ω 1/2W 5%	B3067-12	1
13	R25	Resistor	9.1K Ω 1/2W 5%	B3067-13	1
14	R3, 6, 7, 10, 11, 13, 15, 16, 20, 22, 23, 27, 31, 32, 34, 36, 29,	Resistor	2K Ω 1/2W 5%	B3067-14	17
15	R4, 9, 14, 17, 21, 26, 28, 35	Resistor	22K Ω 1/2W 5%	B3067-15	8
16	D4, 5	Diode	FD111	B3067-21	2
17	TP-1	Turret Terminal		B3067-20	1
18	Q1 thru Q10	Transistor Pads		B3067-17	10
19		Jumpers		B3067-18	AR
20		Printed Circuit Board		B3067-16	1
21		Schematic		C3065	



E24 50 Hertz Assembly
Figure I-6

E-24 230V 50 HZ Assembly

REFERENCE NUMBER	SCH. REF. NUMBER	NOMENCLATURE	PART NUMBER	QTY.
Ref		E-24 Assembly	D3096	
1	T-2	Transformer	B3118-1	1
2	F-3	Fuse Holder Bayonet Type	B3118-2	1
3	F-3	Fuse 1.5 Amp Slo-Blo	B3118-3	1
4	P5	Plug	B3118-4	1
5		Base Plate	B3118-7	1
6		Transformer Plate	B3118-7	1
7	P3	Plug	B3118-12	1
8		Transformer Cable	B3118-11	1