# MOD 10

# MAGNETIC TAPE TRANSPORT

# OPERATION & MAINTENANCE MANUAL

200237

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## PREFACE

This manual has been prepared to permit separation of the first three sections, which then form an operator's manual. Material for these sections has been scaled to the requirements and training of computer and off-line system operators.

Sections IV and following are addressed to the engineer responsible for setting up and maintaining this equipment on site. Material covered includes:

- Installation of the tape system in system cabinets
- Checkout procedures and requirements
- Interconnection of the tape and data systems
- Principles of design and operation
- Module replacement and adjustment.

Users of WANGCO equipment may reproduce this manual to any extent necessary to satisfy their own requirements.

MOD 10
REVISION LEVEL

REV. LETTER	DESCRIPTION	DATE	APPROVAL
REV. LETTER  A B C D E	Original publication  To reflect basic product re-design  Update all sections with particular emphasis on Section VI and Appendix B  Update all Sections  Changed pages - Title Page,	DATE  5/70  9/70  10/71  2/72  6/72	APPROVAL
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### SECTION I

# GENERAL DESCRIPTION

This manual describes the operation and maintenance of the WANGCO Mod 10 digital magnetic tape transport system.

### 1. PURPOSE

The system provides the equipment necessary to:

- A. Move half-inch magnetic tape across a read-write head in response to commands from remote equipment or to signals generated from the operator's control panel located on the transport;
- B. Read or write data on magnetic tape and transfer this data between the transport and the controller.

# 2. DESCRIPTION

The Mod 10 is shown in Figures 1 - 3 of this section.

In a computer or other data processing system, the magnetic tape units are used to store very large amounts of data. Recovery of the data without errors depends on proper installation and maintenance of the tape units and the tape itself. The Mod 10 has been designed to permit easy operation and simple maintenance; it also has ample safeguards to protect the tape from damage during its use with the tape unit.

In its standard versions, the Mod 10 uses half-inch computer-grade tape, on reels up to 10-1/2 inches in diameter. The file or supply reel mounts on a hold-down knob that is the same size as the knobs on IBM units. Data on the tape is written so that it may be read

by IBM systems; tapes written with IBM equipment may also be read on the Mod 10. Seven or nine tracks of data are written on the tape at densities of 200, 556, 800, or 1600 characters per inch. In the Mod 10, two NRZI densities are provided in the following combinations of the three standard formats: 200 and 556, 556 and 800, 200 and 800 for the seven-track format, and 800 for the nine-track format. When data is written on tape at a density of 1600 characters per inch, it is phase encoded and only the single density is provided in the system.

Tape speeds that are standard to the Mod 10 are 10, 12.5, 18.75, 25, 37.5 and 45 inches per second. With all the combinations of tape speed and data densities considered, data may be transferred into or out of the tape system at rates from 2000 to 72,000 characters per second.

During normal operation of the tape unit with the data system, tape motion and the reading or writing of data are controlled by the system. When the tape system is not under computer control (i.e., when it is off line), tape motion can be controlled by the operator through pushbuttons on the front of the machine. Indicator lights are also provided to show the conditions under which the equipment is operating. Complete details about these functions and indications are provided in Section II.

When the system is operating, the speed and direction of the tape are determined by the capstan. As it turns, the capstan pulls the tape past the head assembly so that it may be either written or read. For the tape system to operate efficiently, the tape must be started and brought up to speed as quickly as possible. The weight of the tape on the reels prevents the reels from starting as rapidly as the capstan, so a small length of tape is held by buffer arms near the supply and takeup reels. When the capstan starts quickly, the buffer arms are either pulled in or released by the tape motion. Changes in the position of these arms result in the supply and takeup reels either feeding tape to the capstan or taking up the slack created by the capstan motion.

Reflective markers at either end of the tape prevent it from being pulled completely from either the supply or takeup reels, except when the operator wants to change the reel. A sensing post near the read/write head assembly illuminates the tape and issues a stop signal when the marker reflects the light into a photocell. Markers for the beginning and end of the tape are on opposite sides, providing to the computer or data system an indication of which end of the tape has been reached.

To provide the greatest assurance that data on the tape will be read correctly, the tape is cleaned just before it gets to the head assembly. The tape cleaner has small holes into which loose dirt or oxide is deposited as the tape is drawn across the cleaner. For best system operation, the dirt must be removed from the cleaner periodically, as described in Section III for the important operator maintenance functions of head assembly and tape guide cleaning.

# 3. <u>SPECIFICATIONS</u>

Transport specifications are listed in Table 1.

## Table 1. Mod 10 Specifications

Data Density: 9-track--800 cpi, 1600 cpi

7-track--800/556, 556/200, 800/200 cpi

Tape Velocity: 10, 12.5, 18.75, 25, 37.5, 45 ips

Rewind Speed: 150 ips Nominal

Total Speed Variation:  $\pm 4\%$  maximum

Start/Stop Distance: start distance =  $.17 \pm .02$  in.

stop distance =  $.19 \pm .02$  in.

Start/Stop Time:  $37.5 \pm 2.5$  millisec at 10 ips

 $30.0 \pm 2.0$  millisec at 12.5 ips  $20.0 \pm 1.3$  millisec at 18.75 ips  $15.0 \pm 1.0$  millisec at 25 ips  $10.0 \pm 0.7$  millisec at 37.5 ips

8.3 + 0.6 millisec at 45 ips

Head: dual gap or single gap

Number of Tracks: 7 IBM-compatible

9 USASCII-compatible

Recording Mode: NRZI or PE - IBM and USASCII compatible

# Table 1. Mod 10 Specifications, cont'd.

Static Skew, WRITE: electronic skew compensation

supplied on dual gap units

Static Skew, READ: 100 micro-inches, maximum

Dynamic Skew: 75 micro-inches, maximum

Tape Specifications: computer grade, 0.5" wide, 1.5 mil

thick Mylar base

Reel Size: up to 10.5-inch diameter, IBM hub

compatible

Tape Tension:  $8.0 \pm 0.5$  oz.

Electronics: silicon solid state and 930 series

DTL logic

Tape Unit Interface: DTL logic (low true)

Weight: 100 lbs.

Height: 24"

Width: 19"

Depth: 11" (from mounting surface)

Power: 110-125 VAC + 10%,

2.3 amps/220-250 VAC + 10%,

1.2 amps, 48-60 Hz

Operating Environment

Temperature:  $60^{\circ}$  to  $90^{\circ}$  F.

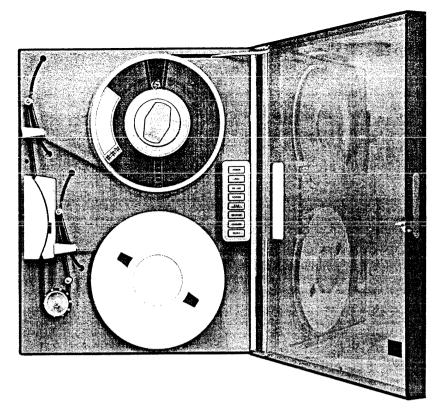
Relative Humidity: 20 - 80%, non-condensing

Non-Operating Environment

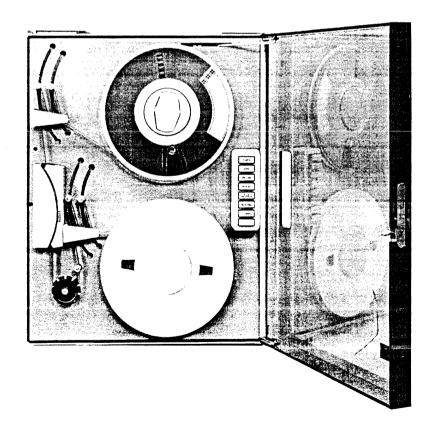
Temperature:  $-30^{\circ}$  to  $140^{\circ}$  F.

Relative Humidity: 15 - 95%, non-condensing

Altitude: 0 - 20,000 feet



(A) Tape System for Speeds of 25 IPS or Less



(B) Tape System for Speeds of 37.5 and 45 IPS
Figure 1. Mod 10 Tape System - Front View

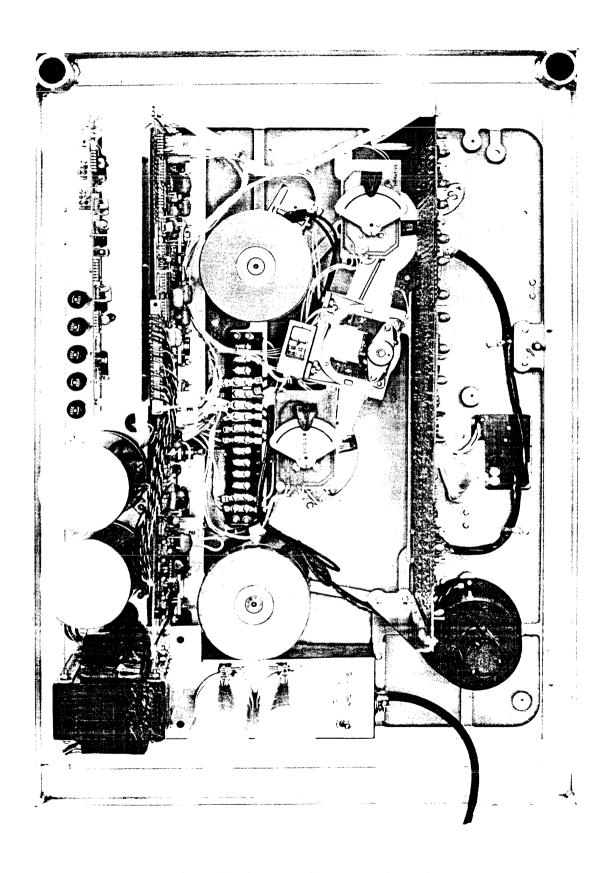


Figure 2. MOD 10 Tape System - Rear View

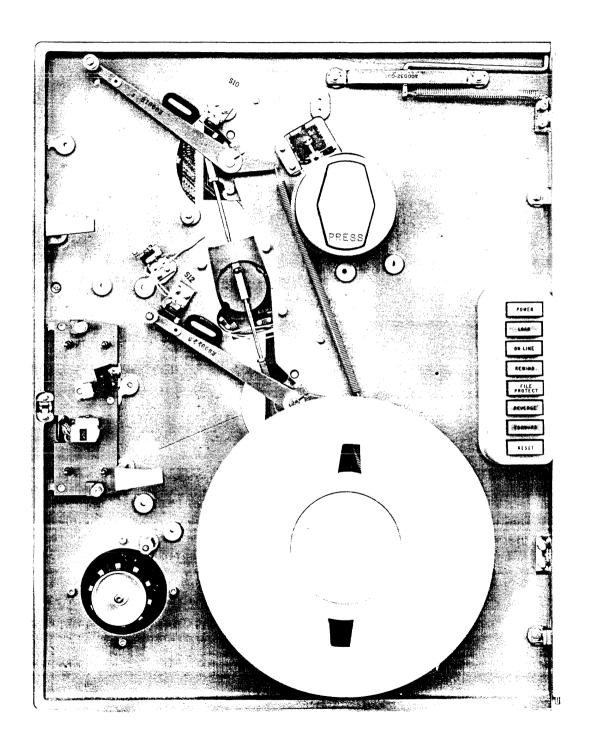


Figure 3. Front View with Overlay Removed

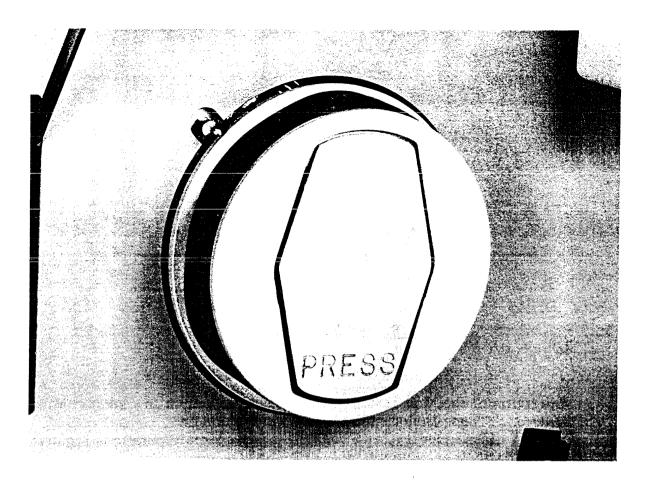
### SECTION II

### SYSTEM OPERATION

Operation of the Mod 10 tape system requires only a few simple procedures. These include tape loading and unloading, manual rewind, power failure recovery, and possible other special operations required by the data processing system using the tape equipment.

TAPE LOADING is made particularly easy by the toggle-action holddown knob (Figure 4) designed for the Mod 10. Positive indication is provided by the knob for installation of the reel and for the locked condition. To prepare the knob for installation of the reel, depress the toggle at the end marked PRESS. It will remain in that position. Place the tape reel on the knob, with the write enable ring, or the slot provided for it, toward the tape unit. This will automatically position the end of the tape on the reel for proper threading. After pressing the reel firmly against the knob, using the fingertips against the REEL HUB ONLY, press the extended end of the toggle tab until it is flush with the face of the hold-down knob. The snap action of the knob will be distinctly felt, and the knob is then firmly locked. It is not necessary to hold the reel against the knob when the knob is being locked. Care should also be taken to avoid pressing the reel flanges against the tape pack when loading the tape or locking the knob. Pressure of the flange against the tape edges causes two types of damage: oxide is dislodged from the film, causing potential read errors; deformity of the edge of the tape results in misalignment of the tape as it passes the head, with an increased possibility of errors.

To thread tape on 10, 12.5, 18.75 or 25 ips Mod 10 systems (Figure 5), follow this procedure:



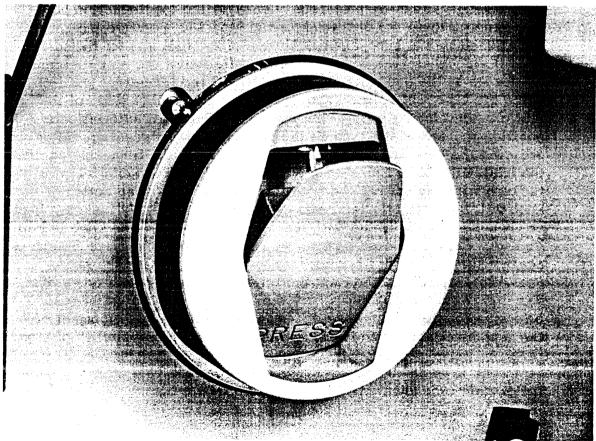
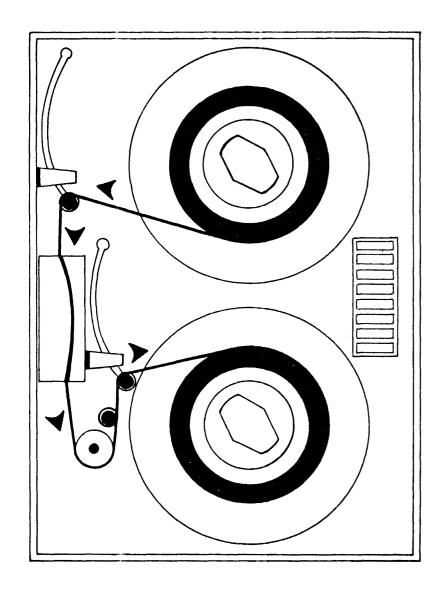


Figure 4. File Reel Mounting Hold-Down Knob in Locked (Top) and Unlocked (Bottom) Positions



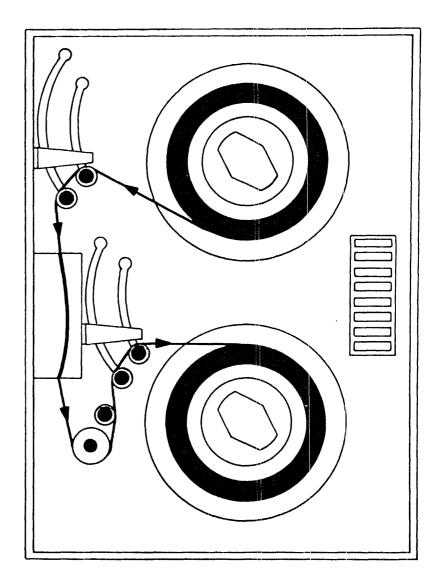


Figure 5. Tape Threading Path for 25 IPS or Less System (Left) and 37.5 and 45 IPS System (Right)

- 1. Lead the end of the tape over the buffer arm guide and down through the slot guide in the head assembly cover. The passage of the tape through the slot causes the small shield over the head assembly to move away from the head. The tape then tracks properly over the read/write heads and other elements in the head assembly.
- At the capstan end of the head cover slot, lead the tape around the capstan and over the top of the other buffer guide.
- Pass the tape over the top of the fixed takeup reel.
- 4. Press the end of the tape against the hub through one of the openings in the reel flange.
- 5. Holding the tape against the hub, turn the reel until the end of the tape is overlapped and secured by the next tape layer.
- 6. By hand, wind three full turns of tape onto the takeup reel.
- 7. To complete the loading operation, firmly press the LOAD pushbutton on the operator's control panel (Figure 6). Both buffer arms will move to their normal operating positions and the capstan will pull the tape forward until the beginning-of-tape (BOT) marker reaches the photosense assembly. Control of the tape system will then be turned over to the data system tape controller automatically, and the ON-LINE indicator and LOAD indicator will light up. No operator action is needed to put the tape system on line.
- 8. If the on-line mode is not desired, the tape unit may be taken off line, for control from the operator's control panel, by pressing the RESET pushbutton.

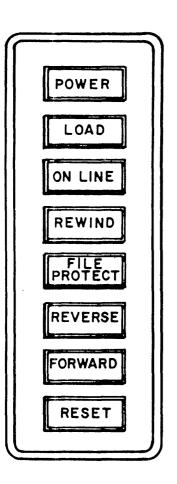
To thread tape on 37.5 ips or 45 ips Mod 10 systems (Figure 5), follow the previously described procedure for 25 ips units, except that the tape must be led across both rollers of each buffer arm guide assembly.

At the conclusion of a tape system operation with the computer, or at other times when it is necessary, the tape will be rewound onto the supply reel. Normally, the computer or data system will issue a rewind command without operator participation. Other conditions will sometimes require the operator to rewind the tape by pressing the REWIND pushbutton on the operator control panel. This will result in high-speed reverse operation. When the beginning-of-tape marker reaches the photosense unit, the rewind will be ended, and the tape unit will advance the tape until the reflective marker is at the photosense head.

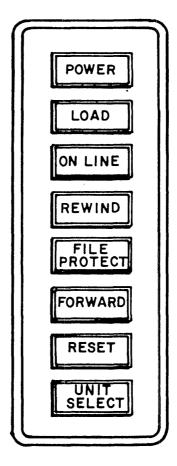
TO UNLOAD THE TAPE, push the REWIND pushbutton again. The tape will be pulled through the tape path and returned to the supply reel. The tape reel may then be removed from the machine by pressing the knob toggle to the unlocked position. Again, care should be taken to avoid damage caused by pressing the reel flanges against the sides of the tape.

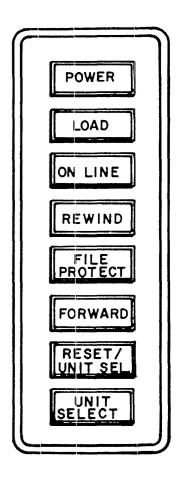
In the event of power failure while the system is on line, the buffer arms will extend and tension on the tape will be relaxed, preventing any possible tape damage. When power has been restored, tape system operations may be resumed by first taking up the tape slack and then pressing the LOAD pushbutton. When the buffer arms have returned to their operating positions, press the RESET pushbutton to stop tape motion. Then press the REWIND or ON-LINE pushbutton, depending on the requirements of the system with which the Mod 10 is operating.

In the following list, the other operator control functions and indicators (Figure 6) are described, with a review of those already mentioned:



POWER LOAD ON LINE REWIND FILE DENSITY FORWARD RESET





(A) Standard

(B) Density Option

(C) Unit Select Option

(D) Phase Encoding

POWER

This is a combination pushbutton switch and indicator. The indicator is on when regulated power has been supplied to the Mod 10. For the convenience of the maintenance or customer engineer, a power switch is provided on the power supply chassis at the rear of the machine. It is accessible only when the tape unit is swung open for service.

LOAD

After threading the tape, press this combination pushbutton switch and indicator to complete the tape loading operation. Tape is automatically advanced to the load point, or beginning-of-tape marker, and then the tape system goes on line. LOAD and ON LINE will be lit when the action is completed. The LOAD light will go out when the tape is advanced from the load point or rewound. The LOAD light will be lit any time that the tape is positioned at the load point. After this sequence of operations is completed the switch becomes functionally disabled and can only be re-enabled by loss of tape tension.

ON LINE

This is a combination pushbutton switch and indicator. As previously mentioned, it is lit when the system is under control of the computer or data system. If the system is off line and if control is to be turned over to the computer, press the ON-LINE pushbutton. The system will be returned to the OFF-LINE mode if the system interlocks are lost, an OFF-LINE controller command is sensed, or the RESET pushbutton is depressed.

FILE PROTECT This is an indicator that is let when a write enable ring is not installed on the file reel. When a supply reel is put on the machine with the write enable ring in place in the slot at the back of the reel, the FILE PROTECT light will be off. This indicates that data may be written on the tape. With the ring in place, protective circuits in the tape system prevent data from being written on the tape.

REWIND

Pressing this pushbutton switch will result in rewind of the tape at high speed. The operator can stop this reverse motion by pressing the RESET pushbutton. If REWIND (cont'd.)

RESET is not pressed, the tape will go beyond the beginning-of-tape marker, stop, and then automatically return to the load point. If the REWIND pushbutton is then again pressed, the tape will be drawn out of the tape path and the unload sequence will be completed. If the tape system is under computer control, the REWIND pushbutton is disabled. This safety feature prevents accidental tape damage.

**FORWARD** 

This is a combination pushbutton switch and indicator. The pushbutton will function only when the machine is off line. If the ON-LINE indicator is on, pressing the FORWARD pushbutton will have no effect. If the ON-LINE indicator is off and the FORWARD pushbutton is pressed, the indicator will light up and the tape unit will move tape in the forward direction at the normal tape speed. To stop the machine, when it is running in this mode, press the RESET pushbutton.

REVERSE

If the ON-LINE indicator is <u>on</u>, the REVERSE pushbutton is disabled. If the tape unit is off line, pressing this combination pushbutton switch and indicator will light the light and move the tape in reverse at the normal tape speed. To stop the machine when it is running in this mode, press the RESET pushbutton.

RESET

This switch is used only on NRZI units. All tape motion, except UNLOAD, will stop when the RESET pushbutton is pressed. Pressing RESET clears all read, write and control functions. It also removes the tape unit from on-line operation with the computer or data system and turns off the ON-LINE indicator.

RESET/UNIT SELECT

This switch is used only on all Phase Encoding units and replaces the normal RESET switch described above. This switch performs all the functions of the RESET switch but in addition, it houses the UNIT SELECT INDICATOR. This indicator is illuminated if the unit has been selected. See Figure 6-D.

#### UNIT SELECT

This switch is standard on all Phase Encoding units and optional on NRZI units. When this switch is used, the REVERSE switch is not installed. This is a 4-position switch used to make the transport assignment in a daisy chain configuration. A particular drive in the daisy chain is automatically selected if the switch identification number corresponds to the controller select line which has been conditioned TRUE. See Figures 6-C and 6-D.

# DENSITY SELECT

This alternate action switch is optional for NRZI units. When it is used, the REVERSE switch is not installed. When depressed to select High Density, it conditions the data electronics to operate at the high data transfer rate and also causes the indicator to light. When the switch is again depressed, the lower data rate capability is selected and the light is extinguished. See Figure 6-B.

### SECTION III

### OPERATOR MAINTENANCE FUNCTIONS

Proper and regular maintenance of the Mod 10 tape handler will assure operation at the high levels of data and mechanical reliability that have been designed into the system. Particularly important are the operator maintenance functions that are intended to keep the system free of dirt and contaminants. At the high densities of data on tapes written or read with the Mod 10, extremely small particles of dust or oxide from the tape are capable of causing data errors. Careful attention to the cleaning procedures described in this section will assure the greatest possibility of trouble-free operation.

TRANSPORT AND HEAD CLEANING should be performed after every eight hours of system use. Following are the steps to be carried out:

- 1. Remove tape from the tape unit, as described in Section II.
- 2. Remove the head covers by pulling both pieces, one at a time, directly away from the front of the machine. The covers will come off with a gentle, steady pull.
- 3. Moisten a soft, lint-free cloth or Q-tip applicator with isopropyl alcohol. After the head surfaces, including the surface of the erase head, have been carefully swabbed, they should be dried with a separate clean and lint-free cloth. See Figure 7.

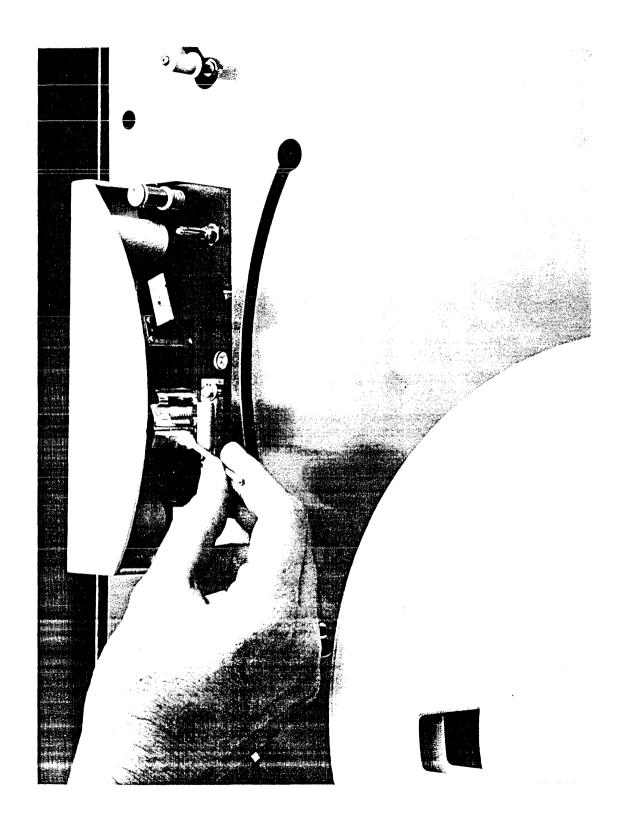


Figure 7. Cleaning the Read/Write Head Assembly

- 4. Clean the face of the tape cleaner, following the same procedure described in step 3.
- 5. Clean the head guides and head guide blocks, shown in Figure 7. The guide blocks are immediately in back of the guides. Dry all parts with a clean, lint-free cloth.
- 6. Clean the roller guides (Figure 8), rotating them to be sure all surfaces are cleaned. Dry with a clean, lint-free cloth.
- 7. If it has been removed, replace head cover by aligning the holes in the cover with the mounting pins on the transport and pressing firmly into place.

CAPSTAN CLEANING should be performed after <u>every eight hours</u> of use, following this procedure:

- 1. Moisten a cloth with water.
- 2. Rotate the capstan slowly with one hand, without touching the rubber surface.
- 3. At the same time, clean the surface of the capstan with the moistened cloth. Make a visual inspection of the capstan surface for abrasion or polish; if defects are observed, contact the maintenance engineer.
- 4. Dry the capstan with a separate clean and lint-free cloth.

Additional cleaning requirements are carried out at longer intervals.

Every four months the entire surface of the tape unit should be cleaned, making sure that accumulations of dust around the hold-down knobs and in the head area are removed. Head covers should be removed and cleaned on the inside and outside, making sure that all deposits of dust and other possible tape contaminants are removed.

Any periodic maintenance functions beyond those described here are suggested for performance by customer  $\epsilon$  .gineers. Details of these additional procedures are described in Section VI.

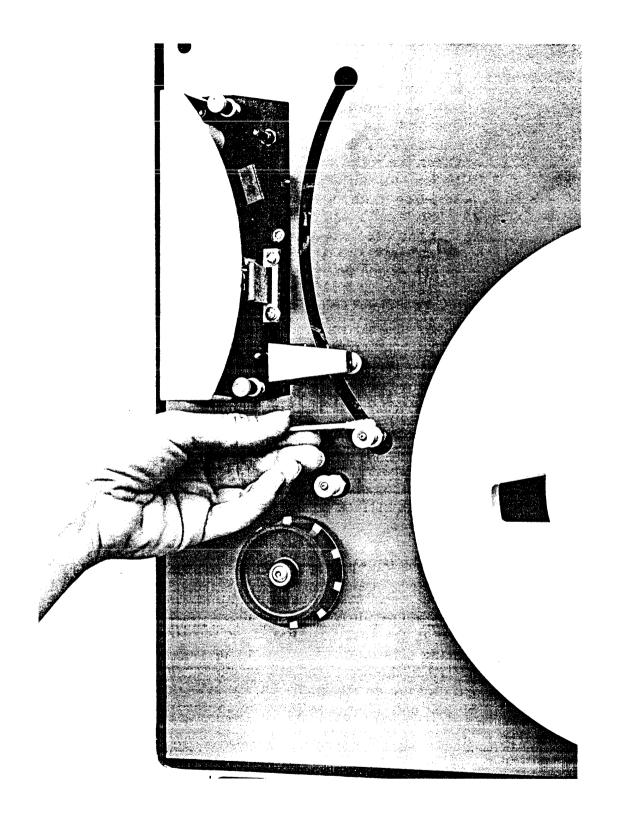


Figure 8. Cleaning the Roller Guides

### SECTION IV

### INSTALLATION AND INITIAL CHECKOUT

This section provides installation instructions for the Mod 10 magnetic tape system. Information on unpacking the system and on the procedure for electrically connecting and checking out the system is included.

### 1. UNPACKING AND INSPECTION

Inspect the shipping container for evidence of in-transit damage. Contact the carrier and manufacturer if damage is evident. Specify nature and extent of damage.

Open shipping container and remove contents. Check items removed from the shipping list to verify container contents. Contact a company representative in the event of a packing shortage.

Remove protective padding and covering from the tape system. Verify that the serial number of the unit corresponds to that shown on the shipping invoice.

Visually inspect the exterior of the enclosure for evidence of physical damage that may have occurred in transit.

Check major component assemblies to determine if any assemblies or screws have been loosened. Tighten any loose screws or mounting hardware. Inspect input/output connectors.

# 2. <u>INITIAL CHECKOUT PROCEDURES</u>

To check the proper operation of the transport before placing it in the system, follow the specified procedure.

- 1. For applications not employing 115 VAC line power, verify that the appropriate primary power transformer wiring is correct. This can be accomplished by swinging out the power supply chassis and checking the wiring against the voltage decal mounted on the deck of the transport. See Figure 43.
- 2. Turn the transport power on by setting the power switch located on the power supply chassis to the ON position and pressing the POWER pushbutton switch located on the operator's control panel. At this point the POWER indicator should light up.
- 3. Load tape on the transport as described in Section II.
- 4. Press the LOAD pushbutton to initiate the load sequence. The tape will move forward until it reaches the BOT tab. The ON-LINE indicator should light when the BOT reaches the photosensor. At this point, there will be no action when the LOAD pushbutton is pressed. To remove the system from the on-line mode, press the RESET pushbutton. The system is now in the off-line mode.
- 5. With the transport off line (ON LINE indicator not illuminated), press the FORWARD pushbutton. Run several feet of tape onto the takeup reel and press the RESET pushbutton to stop the tape. Be sure that when the transport is on line, the action of the FORWARD pushbutton is inoperative.
- 6. Press the REVERSE pushbutton. Tape will move backward until the BOT tab reaches the photosensor. Be sure that the action of the control is inoperative when the transport is on line.
- 7. Using the FORWARD pushbutton, run several feet of tape onto the takeup reel. Press the REWIND pushbutton to initiate the rewind mode. The tape will rewind past the BOT tab, return to the BOT tab, and stop with the LOAD indicator lit. If the REWIND pushbutton is now pressed, the tape will rewind until tape tension is lost. This action is used to unload tape. The reel can be removed as outlined in Section II.

# 3. INTERFACE REQUIREMENTS

The interface for NRZI only is given in this section. Phase Encoding interface information will be incorporated in a special Addendum.

### 3.1 CABLING

The interface cables shall be twisted pairs with returns grounded. Wire shall be #24 or #26 AWG conductor with minimum insulation thickness. Cable twist shall be approximately 30 twists per foot. Maximum cable length shall be 20 feet. The ground side of each pair shall terminate within a few inches of the line receiver or transmitter ground. Connectors shall be Transitron 600-061-18-SL or equivalent. Cables should be wired and strain relieved as shown on Figure 9.

### 3.2 RACK MOUNTING THE TRANSPORT

The transport may be mounted in a standard 19 inch RETMA or Universal rack with a minimum panel space of 24 inches. A depth of 11 inches minimum is required behind the rack mounting surface. The procedure for mounting (see Figures 10 & 11) is as follows:

- 1. Remove safety blocks from below hinges then lift transport off shipping frame.
- 2. Remove hinge-half off shipping frame and install same on rack in desired position.
- Hang transport on rack and lock in the closed position by tightening catch screw in front of the deck.
- 4. Replace safety blocks.

### 3.3 INPUT REQUIREMENTS

Input voltage requirements, a diagram of input load configuration, and a list of input control and data functions are shown below:

# Input Requirements

FALSE (Logic 0)	+2.5 to +5.5 v
TRUE (Logic 1)	0.0 to +0.5 v

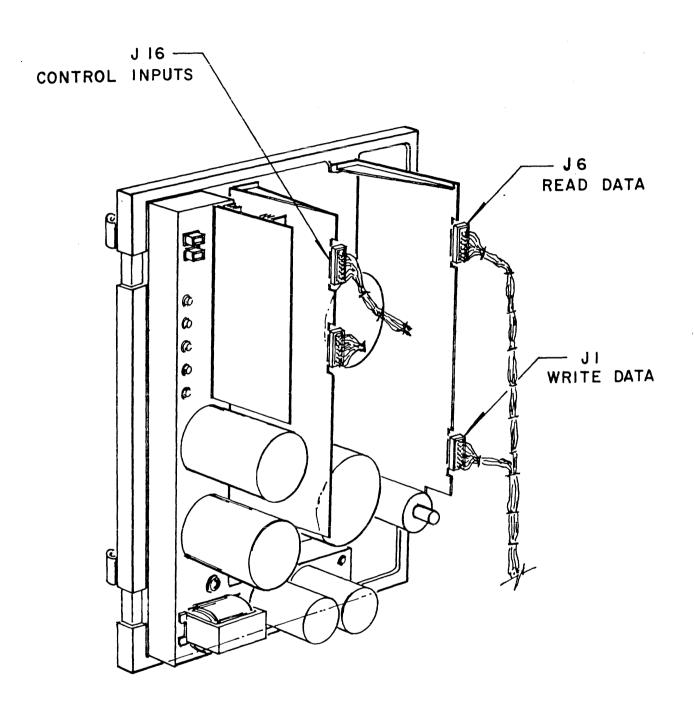


Figure 9. Tape System Interface Cable Installation

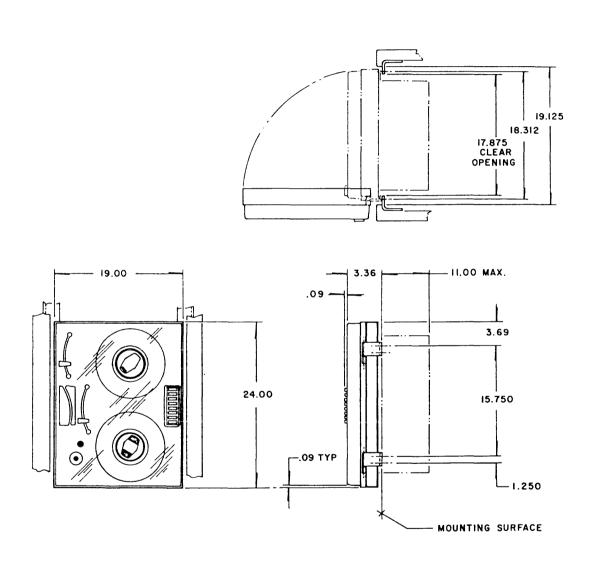


Figure 10. Tape System Rack Mounting

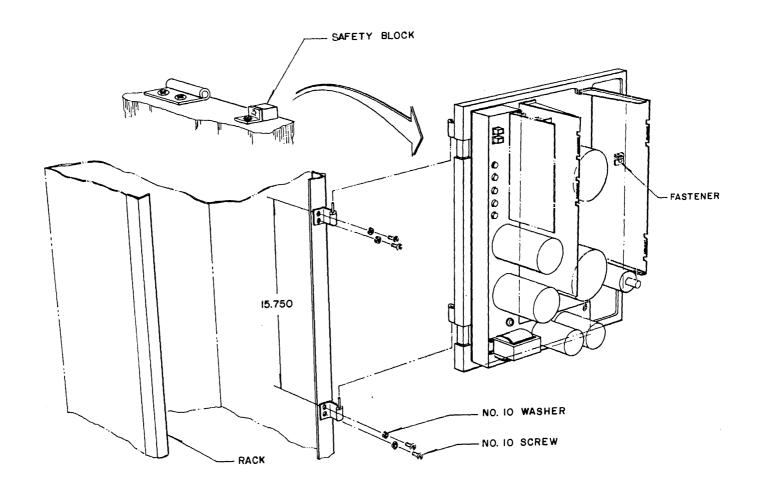


Figure 11. Tape System Installation

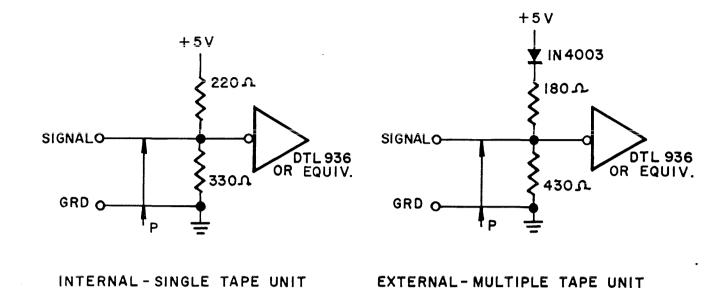


Figure 12. Input Termination Configuration

Input Functions				
Input Control	Input Control Lines			
Select	(1 Line)	Write Data (7 or	9 Lines)	
Unit Select (Option)	(4 Lines)	Write Data Strobe	(1 Line)	
Forward/Reverse	(l Line)	Write Reset Read Permit	(1 Line)	
Run/Stop	(1 Line)	Write Permit	(1 Line)	
Rewind  Density Select	(1 Line)	Low Read Threshold Select*	(1 Line)	
Off-line*	(1 Line)	20200	(1 2110)	

<sup>\*</sup>these functions are not required for proper operation; therefore, they may be left disconnected.

The following on-line input signals (sections 3.4 and 3.5) control operation of the Mod 10 tape transport only after power is on, the on-line mode has been initiated, ready status has been established, and the unit has been selected. (Table 2 shows the pin connections required to achieve correct interface with the tape controller.)

#### 3.4 INPUT CONTROL FUNCTIONS

- 3.4.1 <u>Select (1 Line)</u>. When this becomes TRUE, it enables all the write and read circuitry, the on-line transport control commands, and the status output lines <u>if</u> the ready status line is TRUE <u>and if</u> the unit is in the on-line mode. When the level goes FALSE, the above transport functions are disabled.
- 3.4.2 <u>Unit Select (option 4 Lines)</u>. Four Select lines are provided such that when the one which is TRUE corresponds to the unit select switch position, the unit will be selected.
- Forward/Reverse (1 Line). The state of this line will determine the direction of tape motion upon receipt of a run command. When TRUE, the unit will be conditioned for forward motion. When FALSE, it will be conditioned for reverse motion. A transition shall not occur on this line while the Run/Stop signal is TRUE, but may occur simultaneously to a change on it.
- 3.4.4 Run/Stop (1 Line). A TRUE level on this line will cause tape motion in the direction conditioned by the Forward/Reverse line. A FALSE level on this line will stop tape motion.
- Rewind (1 Line). A 2 µsec minimum pulse on this line shall cause the tape transport to drive tape, at 150 ips, in the reverse direction and stop at the Load Point, illuminating the Load Indicator. The transport will remain in the On-Line mode. If already at Load Point when the rewind command is given, the command will be ignored. All other motion commands are inhibited until the rewinding sequence is complete.
- 3.4.6 <u>Density Select (1 Line)</u>. A TRUE level on this line conditions the MTT to operate at the higher packing density. A FALSE level selects the lower data packing density. This line is internally tied TRUE for 9-track systems. This line is inoperative when the Density Switch option is used.

Table 2. Input/Output Pin Assignments

ELCO	ector # -00-6007-036-980- uivalent)	002 Signal Nomenclature	Signal Pin	Ground Pin
J-16	CONTROL INPUTS FROM CUSTOMER	SELECT 0 SELECT 1 SELECT 2 SELECT 3 SELECT FORWARD/REVERSE RUN/STOP REWIND OFF-LINE DENSITY SELECT READY STATUS ON-LINE STATUS	J 8 7 9 J C E H L D T M	- - - 8 3 5 7 10 4 16
	STATUS OUTPUTS TO CUSTOMER	REWINDING STATUS EOT STATUS BOT STATUS WRITE ENABLE STATUS HI/LO DENSITY STATUS +5 v. TERMINATOR POWER (Option)	N U R P F	12 17 14 13 6
J-1	WRITE DATA INPUT CONNECTOR	WRITE PERMIT READ PERMIT LOW READ THRESHOLD WRITE DATA STROBE WRITE RESET WRITE DATA PARITY WRITE DATA 0 WRITE DATA 1 WRITE DATA 2 WRITE DATA 3 WRITE DATA 4 WRITE DATA 5 WRITE DATA 6 WRITE DATA 7 +5 v. TERMINATOR POWER (Option)	B E D A C L M N P R S T U V	2 5 4 1 3 10 11 12 13 14 15 16 17 18
J-6	READ DATA OUTPUT CONNECTOR	READ STROBE READ DATA PARITY READ DATA 0 READ DATA 1 READ DATA 2 READ DATA 3 READ DATA 4 READ DATA 5 READ DATA 6 READ DATA 7	2 1 3 4 8 9 14 15 17	B A C D J K R S U V

3.4.7 Off-Line (1 Line). This is a level or a 2 µsec minimum pulse which resets the On-Line flip-flop to the ZERO state, placing the transport under manual control. It is gated only by Select in the transport logic, allowing an Off-Line command to be given while a Rewind is in progress.

#### 3.5 INPUT DATA FUNCTIONS

- 3.5.1 Write Data (9 or 7 Lines). One line is required for each bit in a character. The write data lines establish the controlling condition for the NRZI write register. When TRUE, the state of the corresponding flip-flop will be changed at the time of the write data strobe. This will change the direction of the current through the write head and establish a flux reversal (ONE) on the tape. When FALSE, the state of the flip-flop will not be changed at the time of the write data strobe. This will result in no change in the direction of write head current, hence no flux reversal (ZERO) will be on tape. These data lines must be held steady through the time interval from 0.5 μsec before to 0.5 μsec after the write data strobe. A minimum of one data line must be TRUE for every strobe.
- 3.5.2 Write Data Strobe (1 Line). A 2 μsec pulse on this line causes a change in the state of any NRZI write register cell for which the corresponding write data line is TRUE. One pulse is required for each character to be recorded. The recording density is determined by the tape speed and the frequency of the pulses. The frequency will be stable within 0.25 per cent.
- 3.5.3 <u>Write Reset (1 Line)</u>. A 2  $\mu$ sec pulse on this line resets the NRZI write register. This pulse is used to write the longitudinal parity check (LPC) character at the end of each block of data, creating an even number of flux reversals (ONE's) in each track of the block.

In a seven-track system, this pulse occurs four character times after the last write data strobe of every block of data.

In a nine-track system, this pulse occurs eight character times after the last write data strobe of every block of data.

Read Permit (1 Line). The read permit line is used to enable all the read circuitry. When this line goes FALSE, the strobe generator is disabled and the read register is DC reset. This line can be tied permanently TRUE.

- 3.5.5 Write Permit (1 Line). When a write enable ring is on the file reel and write permit is TRUE, the tape transport is placed in the write mode.
- Low Read Threshold Select (1 Line). A TRUE level on this line selects a low threshold level (12 per cent) for the read signals, allowing for the detection of marginal areas of tape. A FALSE level on this line selects the normal read signal threshold level (25 per cent). This line is active only in the read mode on dual gap machines since the threshold level in the write mode is fixed at 45 per cent.

# 3.6 OUTPUT REQUIREMENTS

Output requirements, output current levels, and a list of output control and data functions are displayed below.

#### Output Requirements

FALSE (Logic 0)	User terminates line as shown in Fig. 12-A.		
TRUE (Logic 1)	0.0 to +0.5 v.		

# Output Current Level

FALSE Level	Open Collector
TRUE Level	Open Collector
TROE rever	40 milliamp max. sink

#### Output Functions

Output Control Status Lines				Output Data Lines		
Ready Status	(1	line	)		Read Data	(7 or 9 lines)
On-Line Status	(	11	)		Read Strobe	(1 line)
Rewinding Status	(	н	)			
EOT Status	(	н	)			
BOT Status	(	н	)			
Write Enable Status	(	н	)			
Hi/Low Density Statu	ıs(	**	)			

The following on-line output signals (sections 3.7 and 3.8) provide the data functions when the unit is ready and selected. The Control Status functions are activated when on-line and selected. (Refer to Table 2 for pin connections.)

#### 3.7 OUTPUT CONTROL FUNCTIONS

- 3.7.1 Ready Status (1 Line). This line is TRUE when the transport interlocks are made and the unit is on-line.
- 3.7.2 On-Line Status (1 Line). When TRUE, this line indicates that the on-line flip-flop is set and the transport is under remote control.
- 3.7.3 Rewinding Status (1 Line). When TRUE, this line indicates that the tape transport is rewinding. The rewinding function is completed when the tape stops at the Load Point.
- 3.7.4 <u>EOT Status (1 Line)</u>. When TRUE, this line indicates that the tape transport is sensing the EOT reflective marker.
- 3.7.5 <u>BOT Status (1 Line)</u>. When TRUE, this line indicates that the tape transport is sensing the BOT reflective marker.
- 3.7.6 <u>Write Enable Status (1 Line)</u>. A TRUE level on this line indicates that a write enable ring has been installed on the supply reel.

- 3.7.7 <u>Hi/Low Density Status (1 Line)</u>. When this line is TRUE, the transport has been set for low-density operation, and the read circuitry has been conditioned accordingly. This line is used only for seven-channel systems.
- 3.8 OUTPUT DATA FUNCTIONS
- 3.8.1 Read Data (9 or 7 Lines). One for each bit in a character. The data is in the form of pulses occurring simultaneously and coincident with the Read Strobe pulse. The presence of a pulse indicates a ONE and the absence of a pulse indicates a ZERO. These pulses shall be 2 usec wide.
- 3.8.2 Read Strobe Pulse (1 Line). The Read Strobe line shall provide a pulse of 2 usec for each data character read from tape. This pulse shall be coincident with the data pulses.

#### SECTION V

# PRINCIPLES OF OPERATION

For best understanding of the principles of operation of the Mod 10 tape system, the major subassemblies are described separately. The functional separation of system operations relates conveniently to the actual physical packaging of the subassemblies. Following are the major subassemblies, in the sequence in which their operation is explained:

- 1. Power supply
- Capstan drive and servo system
- 3. Reel drive and servo systems
- 4. Control electronics
- 5. Data electronics

#### 1. POWER SUPPLY

A single assembly supplies power to the entire system, handling the needs of the capstan and reel drive systems, the data electronics and the option electronics. As shown in Figure 13, AC power to the system is controlled by a double-pole, single-throw switch on the power supply chassis and by a single-pole, single-throw pushbutton switch on the operator's control panel. The switch on the power supply chassis must be switched on to use the operator's control panel switch to control power. A three-wire cord is used with the ground line connected directly to the power supply chassis. A circuit breaker is provided in the hot side of the primary power line.

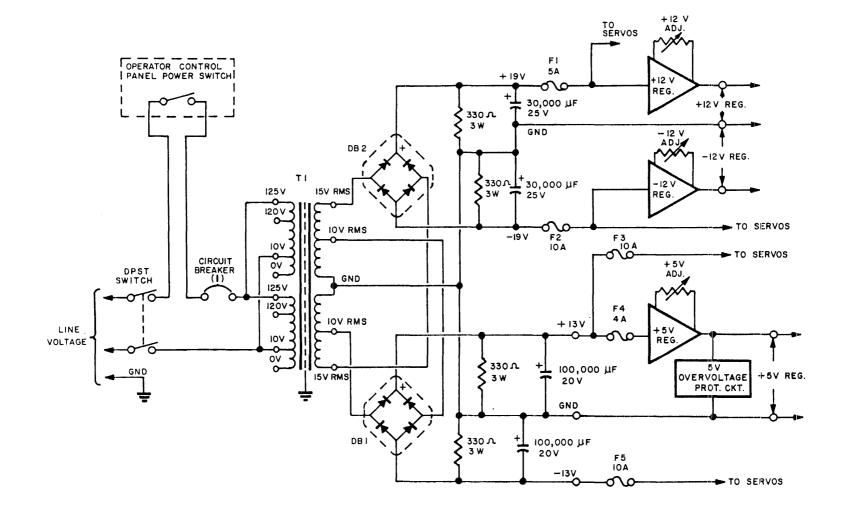


Figure 13. Mod 10 Power Supply

Unregulated DC from the power supply is sent to the regulators, which are on a separate printed circuit board mounted to the power supply chassis; this DC is also used to drive the capstan and reel motors. Voltages supplied unregulated are +19 volts, -19 volts, +13 volts, and -12, and +5 voltages.

Each voltage regulator consists of a linear integrated circuit amplifier plus power output transistors. The output voltage tolerance for the regulators is  $\pm 5$  per cent and each is potentiometer adjustable. The +12 and -12 volt regulators can supply up to 1.5 amperes and the +5 volt regulator, up to 3.5 amperes.

The output level of the +5 volt regulator is prevented from rising above +8 volts to protect the integrated circuits used in the system from overvoltage stress that could occur under abnormal conditions. If the voltage on the +5 volt line goes above +8 volts, an SCR will conduct, shorting the +13 volt unregulated input line to ground until the fuse opens, thus protecting the circuits.

### 2. CAPSTAN DRIVE AND SERVO SYSTEM

All tape motion in the Mod 10 is initiated by the capstan, which is driven by a DC motor. When the motor is running, a tachometer generates a DC voltage that is used to control the tape velocity through the capstan servo system (see Figure 14.)

The strobe disc will be on the front of the capstan and will have two patterns, one for 50 Hz and one for 60 Hz. The inner pattern will be for 60 Hz. It is to be viewed with the corresponding AC light (such as fluorescent) the pattern on this disc appears to stand still when the capstan motor of the tape transport is operating at the correct speed. The strobe pattern will be present only on machines operating at 12.5, 25, or 37.5 inches per second. Thus, proper operation of this component of the tape transport can be under continuous visual inspection by the operator. Any departure from a stationary pattern (i.e., precession of the strobe lines in either a clockwise or counterclockwise direction) indicates a speed variance of the capstan drive. (See Section VI for calculating the percentage of such variance.)

Two ramp generators are used in the capstan servo. One controls the forward and reverse speeds at nominal velocity, and the other controls the rewind speed. The forward/reverse ramp generator uses a Zener diode as a precise voltage reference. The rewind ramp generator uses the regulated +5 volt level as a voltage reference. Resistors R1 and R2 in Figure 14 in combination with R3 and R4 , function as a

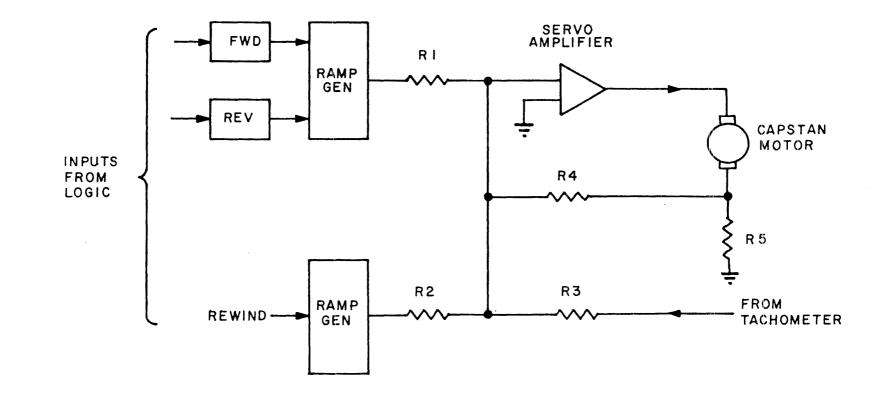


Figure 14. Capstan Drive and Servo System

summing network to control the capstan speed. Current through R3 is generated in the tachometer, and R4 provides feedback from the capstan motor, proportional to the motor current. The current feedback is generated by sensing the voltage across a 0.1 ohm resistor (R5) in series with the motor. When the motor is running, the sum of currents in R3 and R4 is equal to the sum of the currents in R1 and R2.

Either a forward or reverse command to the ramp generator preceding R1 establishes tape motion, in the appropriate direction. The distances traveled during acceleration or deceleration are such that an IBM-compatible interrecord gap is generated. Forward and reverse commands generate currents through R1 having opposite polarities. Symmetry of the start and stop times and distances is readily achieved through the potentiometers in the forward and reverse inputs to the ramp generator. A potentiometer is also used to adjust the capstan drive servo amplifier offset so that no tape motion occurs unless the tape transport has received a motion command.

Figure 15 shows the relative timing of commands to the capstan servo, the ramp function generated, and the resulting tachometer output seen by the servo amplifier.

In the rewind ramp generator, the rise time has nominally a 1 second time constant. This provides a time interval that permits the tape to accelerate to 150 ips without exceeding the storage capacity of the servo arms. Fall time is nominally a 0.5 second ramp and it assures that the storage arm capacity is not exceeded as the tape slows and halts.

When the system is in the ready state, the tape is held motionless by the balanced tension (eight ounces) in the storage arms and the friction in the capstan drive motor. Although the wrap on the capstan varies slightly with the arm position for the takeup reel, it is nominally 180 degrees. The area of tape in contact with the capstan and the tension on the tape prevent any relative motion between capstan and tape.

#### 3. REEL SERVO SYSTEM

Two identical servo systems control the supply and takeup reels in the Mod 10. Storage of appropriate lengths of tape to permit acceleration and deceleration is provided by the buffer arms, which permit the capstan to start and stop the tape without having to start and stop the reels in the same short time. Storage of tape by the arms is sufficient to permit the system to operate at the nominal tape speed without program restrictions.

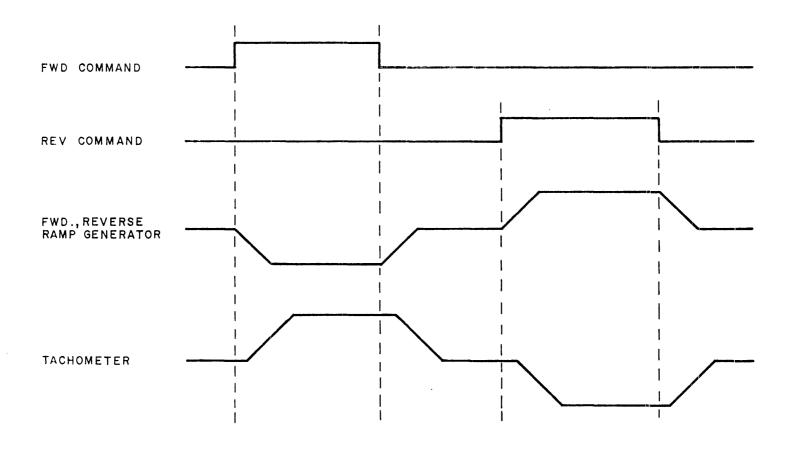


Figure 15. Timing Diagram of Commands to Capstan Servo

Operation of the reel servo system is diagrammed in Figure 16. A light-sensing circuit provides arm-position information to the servo amplifier, which drives the reel motor. As tape is delivered to the arm or taken from it, the arm moves up or down and the position of the mask between the light source and the light-sensing element changes. When the mask is at the appropriate position, the output of the light-sensing circuitry no longer provides an error signal to the amplifier. Enclosure of the light source prevents ambient light from affecting system performance.

Reel motors are driven by linear amplifiers, stablized for all operating situations and sequences. During the Rewind mode the amplifier gain is increased and the output stage operating voltage is raised to offset the increase in back emf generated by the reel motors at higher rpm. An offset signal is fed to each servo amplifier during the unload cycle to bias each servo swing arm close to its respective stop. This assures gentle handling of tape as it unloads from the fixed reel. It also prevents violent impact of the arms against their stops.

Spring tension on the servo arms is balanced at all times by torque in the reel motors. Should power fail or servo operation be interrupted, the springs pull the arms out and into contact with limit switches that turn off all reel servo and capstan functions. If power fails during high-speed rewind, the reel motors are shorted by contacts on the ready relay. The resulting strong dynamic braking effect stops the reels without damage or spilling of the tape.

Potentiometer adjustments are provided on the transport board to permit proper setting of each swing arm position. A potentiometer adjustment is also provided to set the gain of each reel servo amplifier, compensating for the normal manufacturing tolerances in components.

### 4. CONTROL ELECTRONICS

The control portion of the transport electronics printed circuit board (see Figure 17) receives its primary inputs from the operator's control panel or the remote controller. In addition, it responds to control signals from the photosense assembly and from the servo amplifiers (during the rewind sequence).

The internal control circuitry outputs signals to the remote tape controller and to the operator's control panel (in the form of indicator lights). Within the transport, it provides signals to the servo amplifiers and to the data electronics printed circuit board.

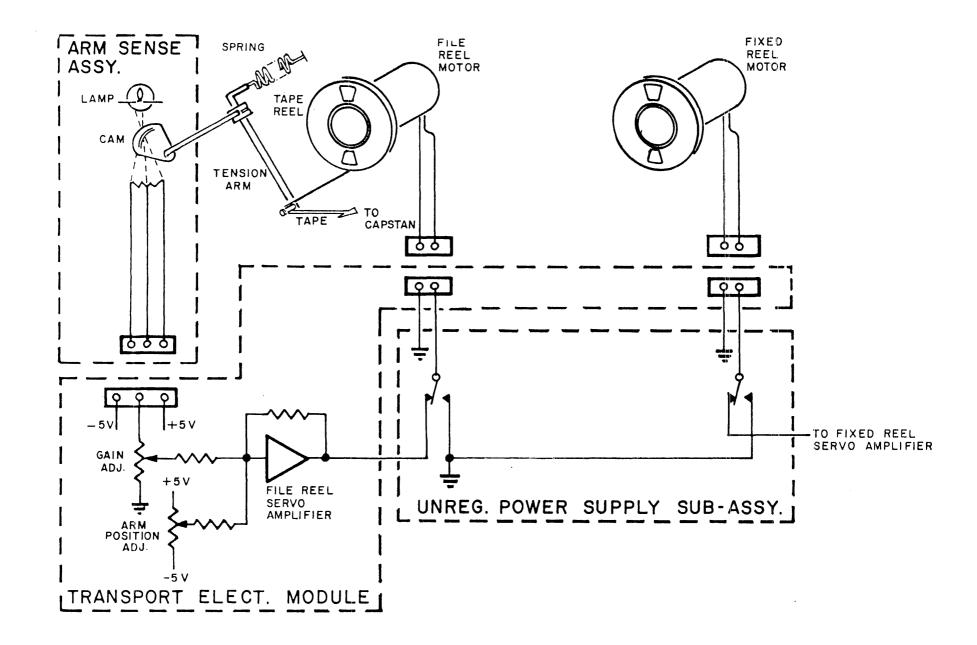


Figure 16. Reel Servo System

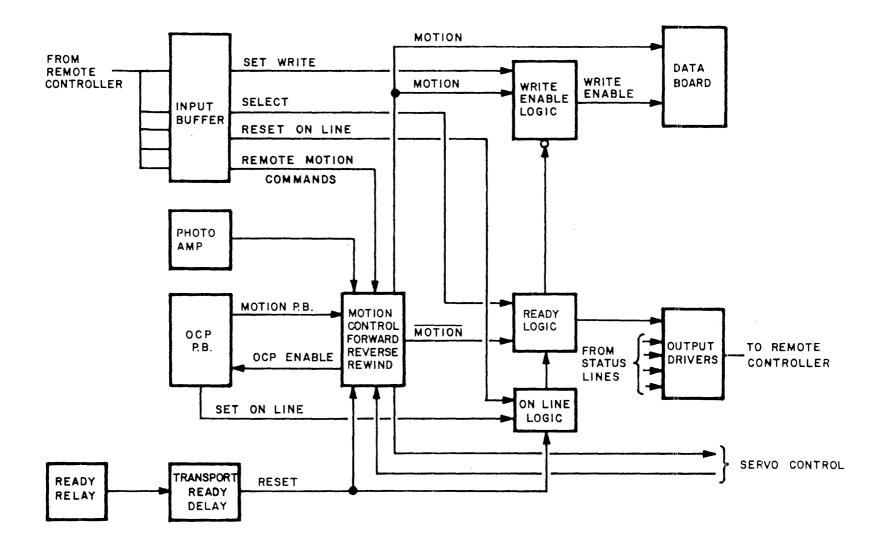


Figure 17. Transport Control Electronics

### 4.1 BRING-TO-READY SEQUENCE & SYSTEM INTERLOCK

When power is applied to the tape transport, it activates the arm retract motor, returning the servo arms to the load position. With the arms in the load position, the ready relay (K1) is unenergized and all three servo motors are shorted to ground. Interlock switches, S11 and S13, are also open, thus preventing latching of the ready relay (see Figure 18). The operator may then mount tape on the reel as specified in the instructions in Section II. When the operator pushes the LOAD pushbutton at the control panel, he initiates the following automatic load sequence (see Figure 19).

The retract motor is energized; its motion releases the servo arms from their retract position, and the series string of interlock switches (S10, S11, S12, S13) will be in their N.C. position. As the retract motor continues to turn, the load cam detent will be seen by the load cam switch S14, and a momentary ground will be transmitted to the ready relay terminal, K1-10. This energizes the ready relay, thus providing power to the servo motors which then maintain tension on the servo arms. The series string of interlock switches provide an unbroken circuit to ground for the ready relay Kl, thus holding the ready relay energized. If any one of the switches S10 through S13 is opened, the ready relay (K1) is deenergized. When the ready relay is energized, it sends a ground signal to the ready delay circuitry, which -- after timing out -gives an internal ready signal. (This signal does not reach the tape controller unit.) If the tape is not already at BOT, a set forward and on-line command is generated that sets the forward and on-line flip-flops. The tape moves forward, seeking BOT, and the ON-LINE indicator at the operator's control panel is illuminated. (Ready status to the tape controller unit is still inhibited.)

If the tape is already at BOT (or when it reaches BOT, after searching):

Tape motion stops (or is not initiated if at BOT)

A delay network times out and then the ready status line to the tape controller unit goes TRUE.

The LOAD indicator at the operator's control panel is illuminated.

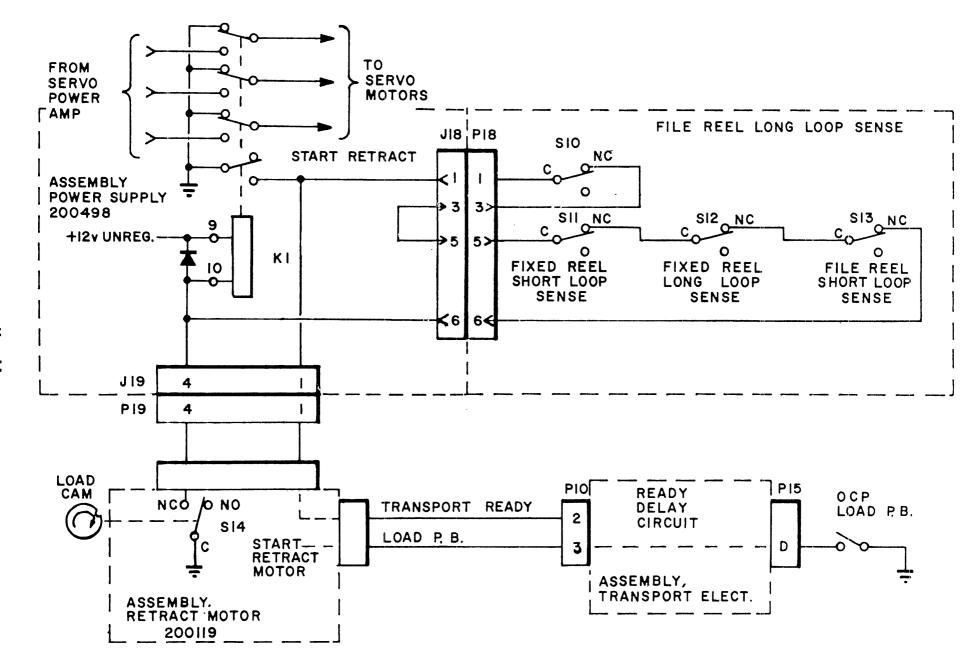


Figure 18. System Interlock Diagram

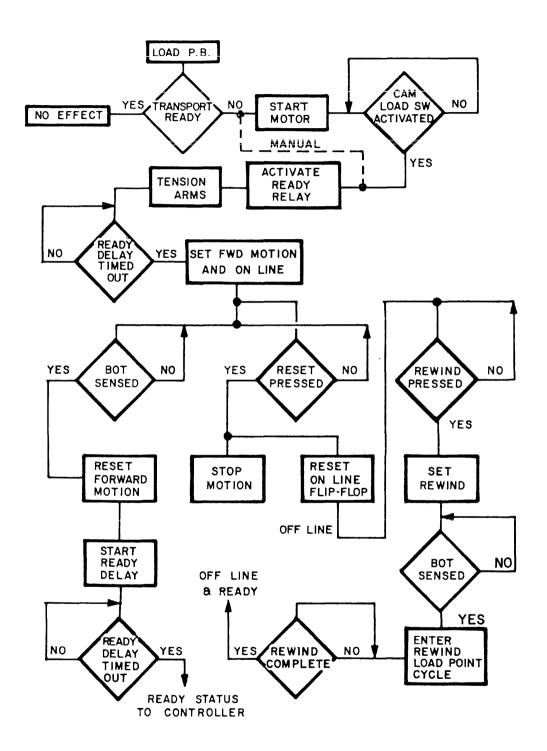
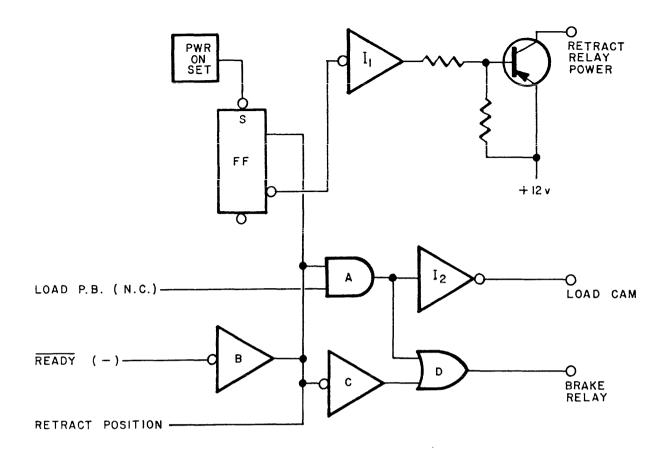


Figure 19. Flow Diagram of Auto Load Sequence

In summary, ready status output to the tape controller will not be TRUE, unless there is no locally initiated forward or reverse motion, there is no rewind in progress, and mechanical ready, on-line status, and selected status are all TRUE.

#### 4.2 BRAKE LOGIC (OPTIONAL)

Figure 19A diagrams the brake logic. When power is initially turned on and if the retract position input is high (open), the flip-flop is set, and the retract relay driver  $I_1$  is held off. The load cam driver  $I_2$  and the brake relay driver D are also held off at this time if the input term Load P.B. is at ground. (Under normal system operation this input is depressed). When the Load P.B. input is High gate A is enabled and turns on  $I_2$ , which initiates a load cycle. Gate A also enables gate D which releases the brakes. If the load operation is successful, the Ready (-) input will go High and the power on flip-flop will be reset. If during the power on cycle, the retract position input is Low, the power on flip-flop is held reset. When the power on flip-flop is in the reset state, only the retract relay driver I, is on. This allows normal loading and unloading with the arms retracting automatically.



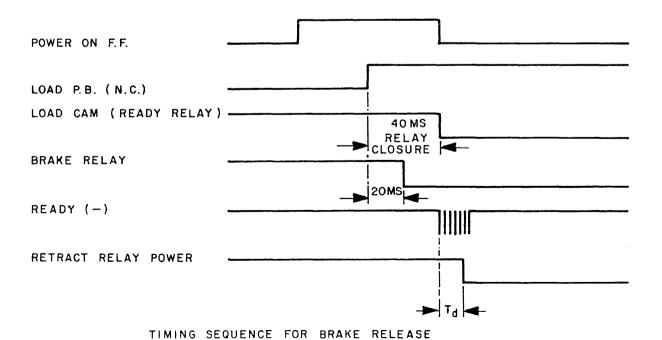


Figure 19A. Simplified Diagram of Brake Logic

In summary, ready status output to the tape controller will not be TRUE unless there is no locally initiated forward or reverse motion, there is no rewind in progress, and mechanical ready, on-line status, and selected status are all TRUE.

#### 4.3 RESET AND ON-LINE LOGIC

When on-line status is TRUE, all pushbutton switches at the operator's control panel are disabled except RESET.

Pressing RESET at the control panel DC resets the terms Rewind, Motion (Forward or Reverse), and On-Line to FALSE. Remote control of the transport can be restored after a RESET action by pressing the ON-LINE pushbutton. The on-line command from the operator's control panel is gated through two cross-coupled OR-gates, and the transport is then ready to accept any remote command.

The transport can always be put in the off-line state by the remote off-line command if the tape unit is selected.

# 4.4 MOTION LOGIC (FORWARD AND REVERSE)

A diagram of the logic governing forward and reverse motion is given in Figure 20. Forward and reverse motion commands to the servos are initiated locally from the operator's control panel when the transport is in the off-line mode or from the remote controller when the transport is on-line.

The OCP-enable line must be TRUE (low) to initiate local motion from the operator's control panel. When the FORWARD pushbutton is pressed, the motion latch is set (U207A, U207B, and U208 in Figure 20), and the output of U207A will be TRUE (low). This output is transmitted through NOR-gate U213B, which OR's the local and remote forward commands and presents a forward (+) signal to the capstan servo.

Local reverse motion is initiated by pressing the REVERSE pushbutton on the operator's control panel. The reverse switch is interlocked in such a way that a reverse command cannot be initiated simultaneously with a forward command. With the motion latch set by the REVERSE pushbutton, the output of U207B will be TRUE (low). This output is transmitted through NOR-gate U214, which OR's the local and remote reverse commands and presents a reverse (+) signal to the capstan servo.

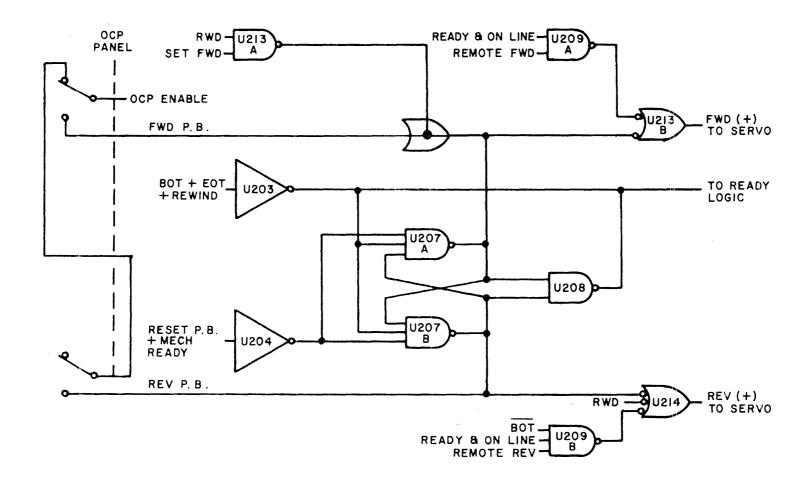


Figure 20. Simplified Logic of Motion Control (Forward and Reverse)

Local reverse or forward motion is terminated if a RESET ACTION is taken, if the transport is mechanically not ready, or if the terms EOT, BOT, or Rewind are TRUE.

When the transport is in the on-line mode, the OCP-enable line will be FALSE (high), thus disabling the FORWARD and REVERSE pushbutton inputs to the motion latch. The NAND-gates labeled U209A and U209B in Figure 20 are enabled by the terms Ready and On-Line, and any subsequent forward or reverse motion commands from the remote controller will be transmitted to the capstan servo control through U213B or U214.

The NAND-gate labeled U209B has an additional term (NOT BOT) on its input. This term prevents reversing off the BOT marker during the on-line mode of operation.

#### 4.5 REWIND AND UNLOAD LOGIC

The rewind sequence is not internally different, whether it stems from an action at the operator's control panel or from a remote command. A logic diagram of this function is given in Figure 21.

The rewind sequence is mechanized with a series of three flip-flops, U210A, U210B, and U211A. The flip-flop labeled U210A in the diagram is set initially either by the REWIND pushbutton through NANDgate U208, or by the remote rewind command through NAND-gate U209. The NAND-gate labeled U212 decodes the outputs of flip-flops U210A and U210B and presents a rewind (-) command to the capstan rewind ramp generator. A reverse-for-rewind is also sent to the capstan servo control through U214. When the capstan servo receives the rewind(-) and reverse-for-rewind signals, the tape drive ramps to rewind speed and runs until either BOT is reached or a RESET pushbutton action is taken at the operator's control panel. If no RESET action is taken, the leading edge of the BOT tab loads flip-flop U211A and the trailing edge loads flip-flop U210B. With U210B set, the inputs to U212 are no longer TRUE, and the rewind signals to the capstan servo are terminated. The capstan ramps to a stop, a set-forward pulse is generated, and the tape drive begins searching forward for BOT. When BOT is reached, the series of three flip-flops (U210A, U210B, and U211) is reset and tape motion ceases.

At this point, two actions may be used to unload the tape. A RESET action takes the transport off-line, and a subsequent REWIND action causes tape to rewind until tape tension and mechanical interlocks are lost. During the process of unloading, a regular rewind command

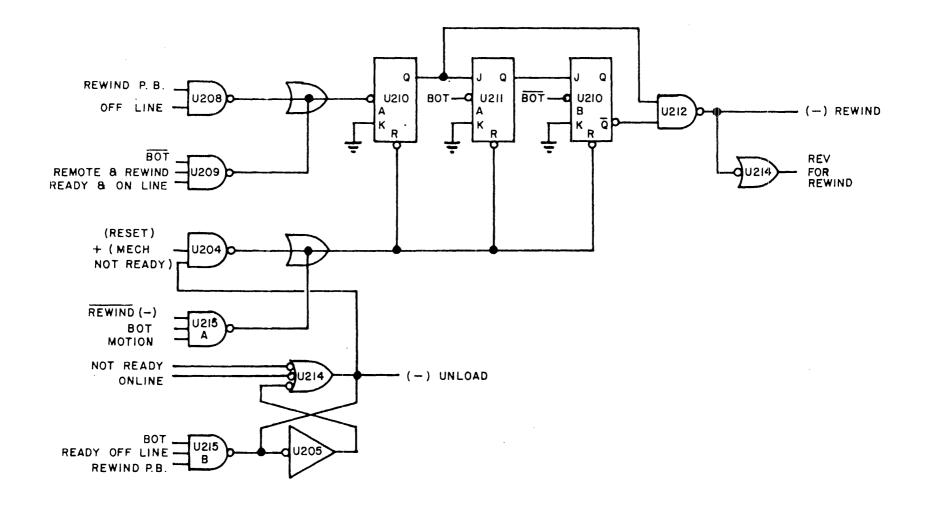


Figure 21. Simplified Logic of Rewind and Unload Control

is distinguished from a rewind-to-unload command by the gating together at U215B of the terms Off-Line and Ready, BOT, and Rewind. Under these conditions, the easy unload latch, comprising U205 and U214, is set, and an unload (-) signal is sent to the fixed reel servo. The fixed reel servo is biased to a position very close to the stop, and the shortened stroke of the servo arms when tape tension is lost prevents accidental damage to the tape as it unloads. The unload latch is reset only by the term Not Mechanically Ready; thus, once an unload is initiated, it must complete its cycle. (Note: If a second BOT tab is sensed during an unload cycle, the tape drive will attempt a search for load point cycle, and will in most cases loop-out, causing the ready relay to drop out.)

#### 4.6 WRITE ENABLE LOGIC

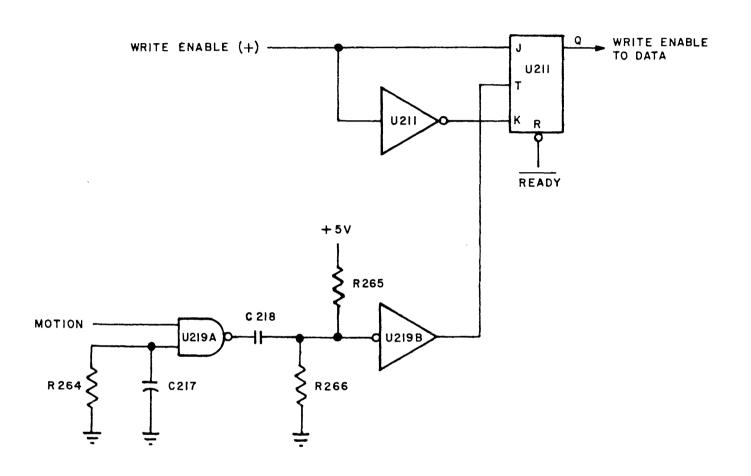
Figure 22 diagrams the write enable logic which comprises a flip-flop (U211) and a positive pulse generator (U219A and U219B). The flip-flop is set when the write enable line from the controller is TRUE (high), enabling the J input of U211, and when either a forward or reverse motion command is initiated. The T input positive pulse is generated by U219A and U219B. The pulse is generated when motion goes TRUE (high). The output of U219A goes to ground after a time delay set by R264 and C217. This negative transition initiates a positive pulse at the output of U219B. The trailing edge of this pulse causes the flip-flop to change states. The pulse width is determined by R265, R266, and C218. When the write enable flip-flop is set, the transport is conditioned to write.

The write enable flip-flop is reset when the write enable line from the controller is FALSE (i.e., when the K input of U211 goes high after inversion by U201), and when either a forward or reverse motion command is initiated.

#### 4.7 FILE PROTECT LOGIC

The file protect logic is mechanized such that there will be a minimum of scraping of the write enable ring during the initial loading cycle of the transport.

The mechanization is shown in Figure 23. When a reel of tape is initially loaded, the file protect switch is closed, and the logic latches the write enable solenoid, thus retracting the solenoid pin to prevent scraping of the write enable ring.



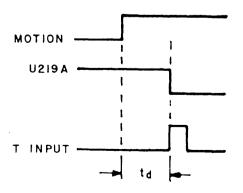


Figure 22. Simplified Logic of Write Enable Control

Figure 23. File Protect Logic

When the LOAD pushbutton is pressed, the logic releases the solenoid. This is done to sample if there truly is a write enable ring in place, and that the solenoid was not accidentally energized. When the loading cycle is completed, the transport ready signal is the holding signal.

#### 4.8 READY LOGIC

The ready logic, diagrammed in Figure 24, provides three basic ready signals:

- a) <u>Select & Ready (+)</u> from U205, which conditions the data electronics to accept and transmit information to the controller.
- b) Ready & On Line from U201, which is transmitted to the controller via an output driver. This line informs the controller that the transport is ready and not rewinding, and therefore able to accept any command from the controller.
- c) Ready & Off Line from U208. This is an internal ready signal that enables the operator control panel so that any motion command generated by the operator control panel will be accepted by the transport.

The ready signal is generated by the following logic equation:

READY = (DELAYED MOTION) · (REWIND) (RESET + MECH. READY + RESET REWIND)

and is mechanized by U215. If all the inputs to U215 are TRUE (high) the output will be low. This low signal is inverted by U205A and gated with the terms Select & On-Line by U212 to provide the Select & Ready term. The low output of U215 is also inverted by U205B and gated with the term Off-Line by U208 to provide the Ready & Off-Line term. U205A and U201 are collector-OR'd to provide the Ready & On-Line term.

# 5. DATA ELECTRONICS

Data electronics described in this manual pertain to NRZI mode recording only. Phase encoding requires additional special data electronics and is described in a separate manual.

In the NRZI mode of recording, a "1" is represented by a change of direction of magnetization between positive and negative saturation levels, and a "0" is represented by no change of magnetization. The data electronics subsystem provides a format that is compatible with the IBM 727-729, 7-track format, at data densities of 200, 556, and 800 cpi. The subsystem also provides compatibility with the IBM 2400 series, USASCII-compatible 9-track format at data densities of 800 cpi. Figures 25 and 26 present the 7 and 9-track location and space specifications.

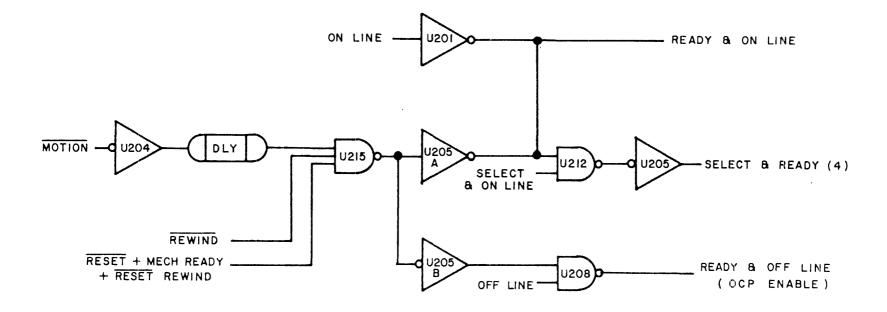


Figure 24. Simplified Logic of Ready Control

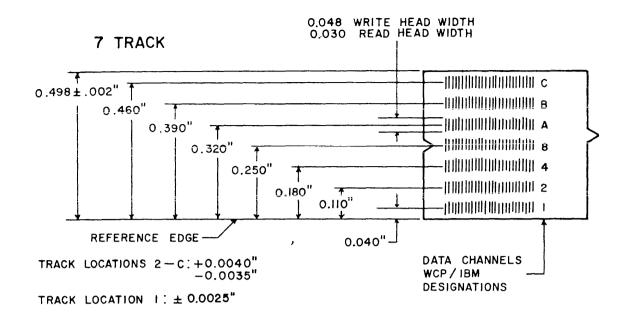


Figure 25. Track Locations and Spacing, 7-Track System

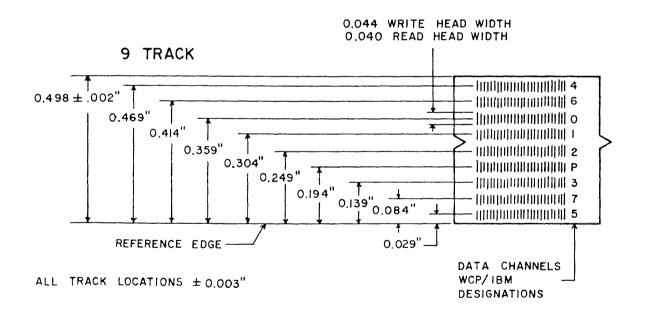


Figure 26. Track Locations and Spacing, 9-Track System

At the end of each data record, check characters must be recorded and an inter-record gap inserted. Figures 27 and 28 present the 7-and 9-track IBM inter-record gap and tape mark formats. As indicated by these figures, in the 7-track format the longitudinal redundancy check character (LRCC) only is written, whereas in the 9-track format, both a cyclic redundancy check character (CRCC) and an LRCC are written.

The CRC character is supplied together with a single write data strobe signal by the customer to the transport interface. It is separated by four character spaces from the last data character of the previous record. In the 9-track system, the LRC character is written four character spaces after the CRCC character, whereas in the 7-track system, the LRC character is written four character spaces after the last data character of the previous record. The LRC character is written by the customer transmitting the WRITE AMPLIFIER RESET signal, (leading edge) at the proper time. This signal resets the write flip-flops causing the total number of magnetization transitions in any track to be an even number.

The Inter-record Gap (IRG) displacement is nominally 0.6 inch for 9-channel systems and 0.75 inch for 7-channel systems. The IRG is established by the sum of the following component distances:

<u>Stop Distance</u> - Stop distance is the distance traveled by a point on the tape from the time a stop command is issued until the tape velocity is zero.

Stop Delay Distance - Stop delay distance is the distance traveled by a point on the tape from the time the LRCC character is placed on tape until a stop command is issued. In dual gap systems, if the read data is used to sense the end of the record, the stop delay distance is the distance traveled from the time the LRCC is sensed at the read bus until the stop command is issued. The stop delay time is generated in the customer's controller.

<u>Start Distance</u> - This is the distance traveled by a point on the tape from the time a forward command is issued until the first data character is placed on tape. The Write Delay time appropriate to the start distance is generated in the customer's controller.

A tape mark is used to separate files of information recorded on tape. The tape mark configuration for 7- and 9-track systems is shown in Figures 27 and 28 respectively. Tape mark timing is established and provided by the customer's controller. The command sequence for inserting a tape mark is as follows: a forward command is issued, followed

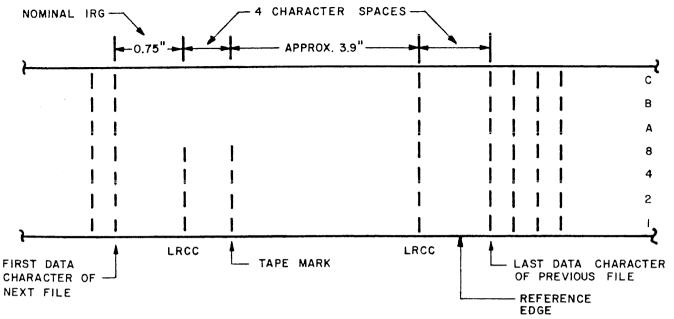
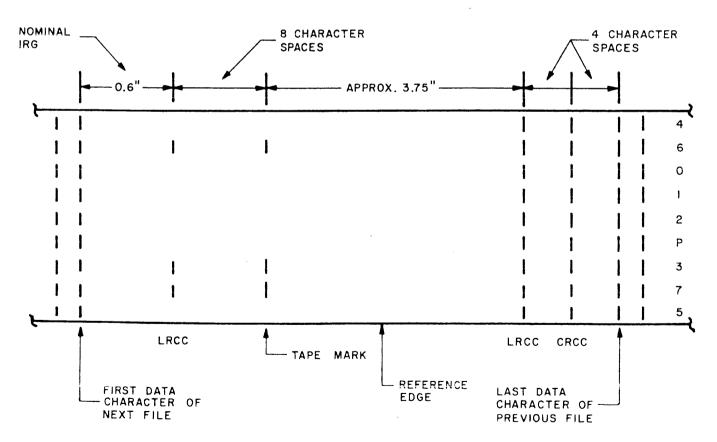


Figure 27. 7-Track File Gap Format



NOTE: TAPE VIEWED FROM MYLAR SIDE.

Figure 28. 9-Track File Gap Format

at the proper time by the tape mark character together with its write data strobe, which in turn is followed by the LRC character written four character spaces later in a 7-track system and 8 character spaces later in a 9-track system.

# 5.1 DATA ELECTRONICS, DUAL GAP SYSTEMS

#### 5.1.1 Read-After-Write Head Assembly

A dual-gap read-after-write head is optionally available in either a nine-channel or a seven-channel format. A full-width erase head is located on the oxide side of the tape, positioned 0.34 inch from the write stack head gaps. The write stack is center-tapped and it operates at 50 milliamps of current per leg. The voltage output of the read stack is proportional to the speed of the tape; at 25 ips, it provides 18 to 20 millivolts peak to peak. The erase head operates at 50 milliamps.

Two auxiliary components are mounted adjacent to the read/write head on a common base—the photocell and lamp assembly that detects beginning and end of tape, and the tape cleaner. The photosense assembly is a self-contained unit that is directly cable—connected to the transport electronics printed circuit board. The tape cleaner, whose operation is entirely mechanical, is ideally positioned adjacent to the head so that the cleaned tape passes directly to the read/write head, minimizing the chance of contamination that might result in deterioration of data reliability.

# 5.1.2 Write Data Flow

Figures 29 and 30 present a block diagram and timing diagram of the flow of write data through the system. (Only one data line is shown. The components for the channel represented schematically in these diagrams are, of course, duplicated for each of the other write data channels.) Data enters through line receivers whose function is to invert the low-TRUE levels. Each receiver has a terminating impedance of 130 ohms.

A pulse on the write strobe line clocks information from the data lines into the system. If a given data line is TRUE, the write strobe pulse passes data on that line through the data strobe reset logic gates, which consist of two NAND-gates, OR'd together (see the block labeled A in the figure). If a given data line is FALSE, the pulse is gated out.

At the block labeled B (Figure 29), electronic correction is made for the static skew characteristics of the write head. The leading edge of the gated data pulse triggers the write deskew single-shot, whose pulse width

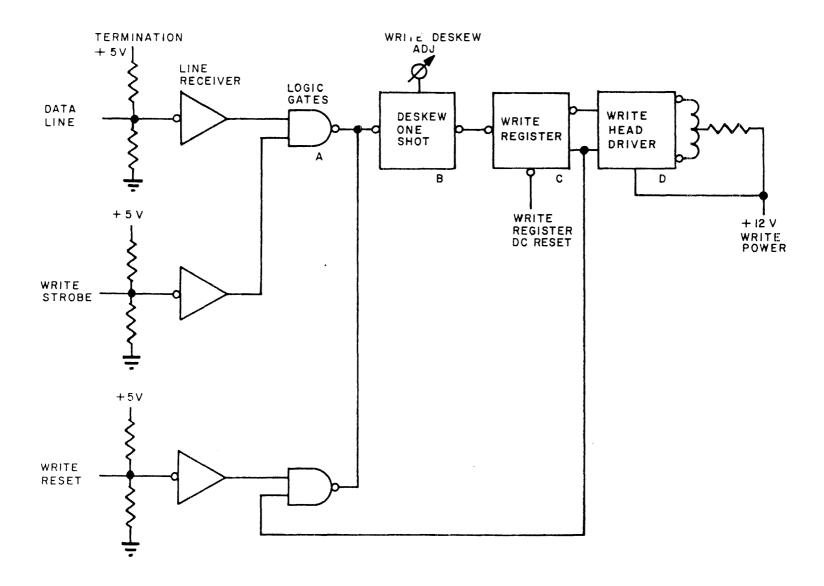


Figure 29. Write Data Flow, Dual Gap Systems

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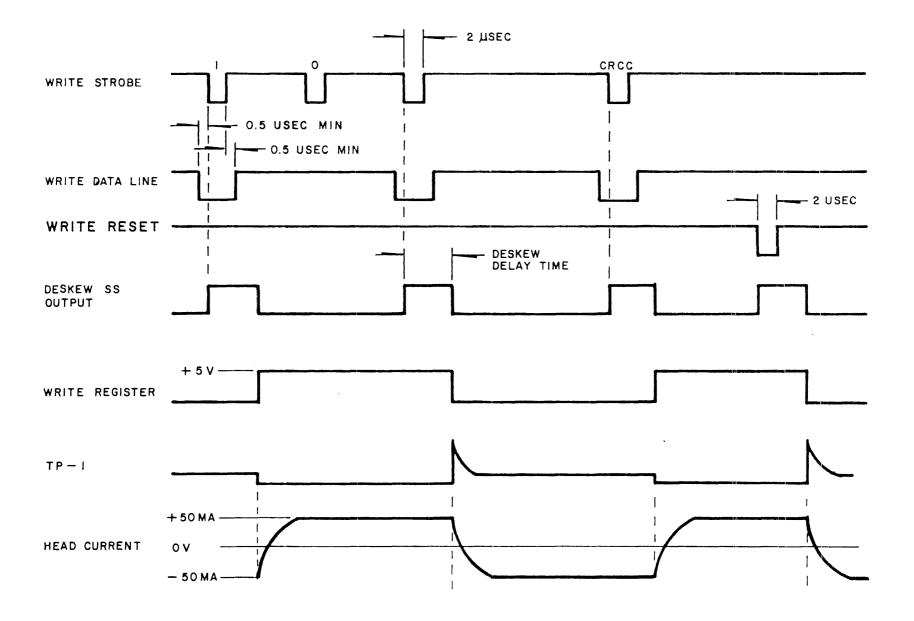


Figure 30, Write Data Flow Timing Diagram, Dual Gap Systems

has been preset and is adjustable by means of a potentiometer. The trailing edge of the pulse loads the write register, whose contents are then converted into currents by the head drivers. The head drivers operate the write heads, which put the data on tape.

At the end of each block of data, a write reset pulse enters the system. In the nine-channel configuration, this pulse enters eight character times after the last strobe of the data block; in the seven-channel configuration, it enters four character times after the last strobe. The function of this pulse is to reset any head drivers remaining in the set state at the end of a data block, thereby generating the longitudinal redundancy check character on tape.

The write register is DC reset at certain times and under certain conditions to ensure that information is not recorded on tape unless recording is deliberately intended. The logic created for this is such that if any one of the terms Motion, Write Enable, Select, and Ready is FALSE, the write register will be DC reset.

The flow of power to the write heads is controlled through the write power gate (see Figure 31). This is an AND-gate function that comprises the terms Write Enable (or Write Permit), Select & Ready, and File Protect. (Write power enters the data electronics printed circuit board from the transport electronics printed circuit board if the file protect switch on the deck has been energized.)

# 5.1.3 Read Data Flow

Figure 32 presents a block diagram of the flow of read data through the system. (As in Figure 29, only one channel is indicated.) The read head generates a low-level analog signal of approximately 10 to 20 millivolts peak to peak. The read amplifier, which has a differential input and single-ended output, picks up this signal and amplifies it to a suitable level, then sends it to a phase splitter, which generates the complementary signals required for full-wave rectification. The phase splitter output signal level is adjusted to 12 volts peak to peak by the attenuator control potentiometer at the output of the read amplifier. A clipping level DC bias is fed into the input of the full-wave rectifier with the result that positive peaks above the clip-level threshold are observed at the output of the circuit. This signal is then sent to the peak detector, which in turn generates a digital pulse whose trailing edge is synchronous with the peak of the analog signal and is used to load the read register at that time. The contents of the read register are sent to the output driver and then to the customer's data line.

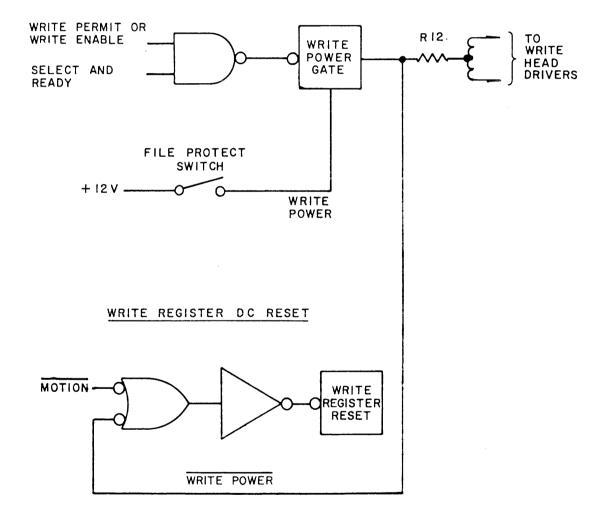


Figure 31. Write Power Gate and Write Register DC Reset, Dual Gap Systems

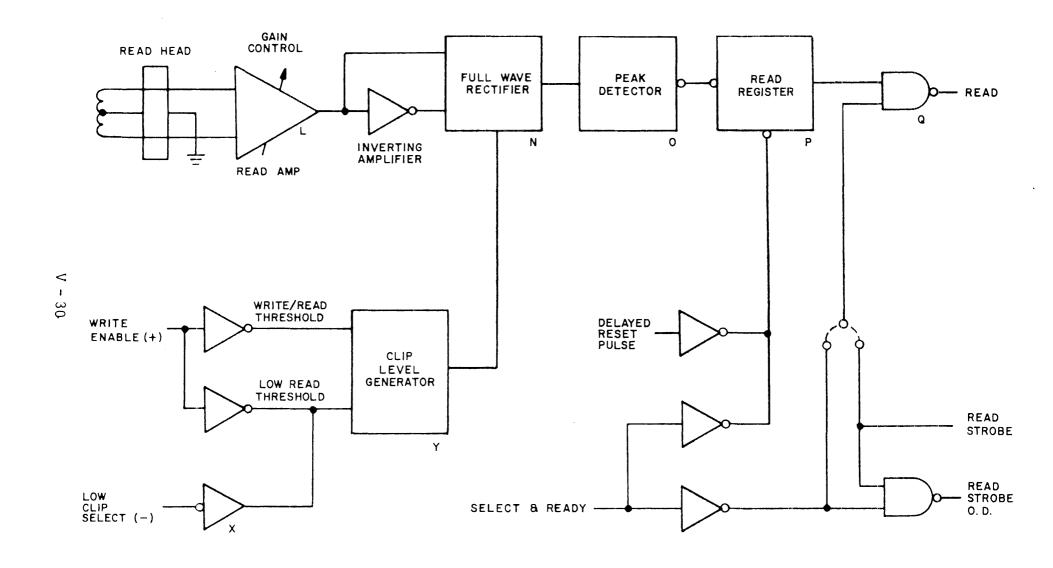


Figure 32. Read Data Flow, Dual Gap Systems

Auxiliary to this general flow of read data, several other functional circuits complete and control the read data generation and transfer process. These auxiliary functions are described in the subsections following.

Strobe Generation Circuitry. As in most other NRZI read systems, the OR'd data method of read strobe pulse generation is used in the Mod 10 (see Figure 33). The first arriving bit sensed at the read register is used to trigger the read strobe delay single-shot. This is implemented by taking the complement outputs of the read register and feeding them into a nine-way OR-gate whose output goes to the single-shot. The pulse width of the single-shot is controlled by adjusting a potentiometer and is set to approximately one-half frame time.

At the end of the variable time delay period, a read strobe pulse is generated (see the block labeled T in the diagram) and sent to the tape controller. The leading edge of this pulse also triggers the read register delayed reset pulse network, allowing 500 nanoseconds for scanning of the data lines by the controller before the read registers are reset. A summing function (data staircase) is provided at the output of the read registers so that interchannel time displacement can be measured.

A timing diagram for both read data flow and strobe generation is given in Figure 34.

<u>High-Low Density Select.</u> Data can be recorded on tape at either a high or low density (more or fewer characters per inch). An input from the high-low density select function changes the pulse width of the read strobe delay single-shot to correspond to the density of character generation.

Read Permit. This system function allows the remote tape controller unit to enable or inhibit read data at any time. Read permit is conditioned by the terms Select and Ready. If either of the two terms is FALSE, the read registers and output drivers are disabled.

Clipping Level Circuitry. This circuitry, shown in Figure 32, generates the clipping levels through which the read signals must pass before reaching the peak detectors. In the write enable mode, approximately 45 per cent of the read signal amplitude is clipped. In the read-only mode, the level is decreased so that only 24 per cent of the read signal amplitude is clipped. A provision has been implemented via the low threshold select remote input line so that an even lower threshold level (12 per cent) can be selected when reading marginal output tapes. The state of this line has no effect on the clipping level while in the write mode of operation.

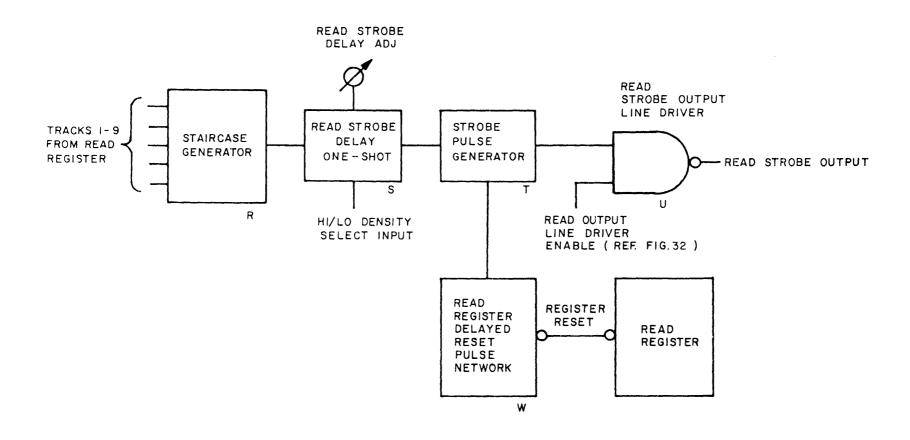


Figure 33. Read Strobe Generation Circuitry, Dual Gap Systems

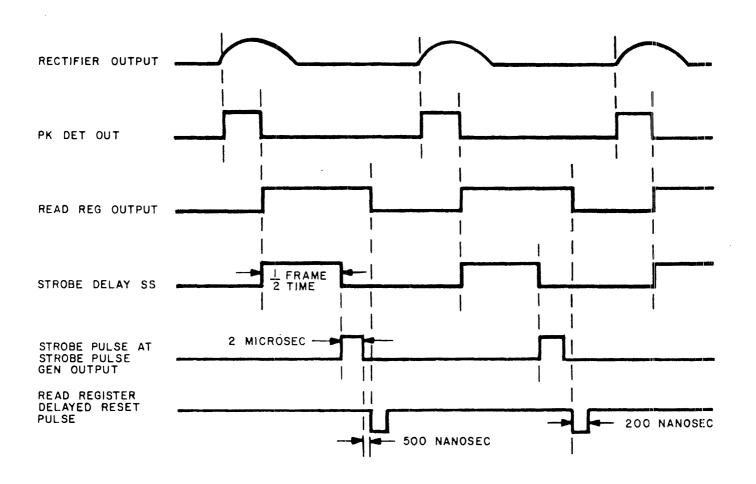


Figure 34. Timing Diagram of Read Data Flow and Strobe Generation, Dual Gap Systems

Rewind Inhibit. This system function prevents the reading of data if the tape is rewinding. The relevant circuitry prevents current flow in the phase splitter, disabling its operation during rewinding.

### 5.2 DATA ELECTRONICS, SINGLE GAP SYSTEMS

# 5.2.1 Read/Write Head Assembly

A single-gap read/write head is optionally available in either a nine-channel or a seven-channel format. The head assembly is illustrated in Figure 8. A full-width erase head is located on the oxide side of the tape, positioned 0.34 inch from the head gaps. The stack has a center tap configuration and is operated at 20 milliamps of current per leg. The voltage output of the stack is proportional to the speed of the tape; at 25 ips, it operates at 14 to 18 millivolts peak to peak. The erase head operates at 50 milliamps.

Two auxiliary components are mounted adjacent to the read/write head on a common base—the photocell and lamp assembly that detects beginning and end of tape, and the tape cleaner. The photosense assembly is a self—contained unit that is connected by cable to the transport electronics printed circuit board. The tape cleaner, whose operation is entirely mechanical, is ideally positioned so that the cleaned tape passes directly to the read/write head, minimizing the chance of contamination that might result in deterioration of data reliability.

# 5.2.2 Write Data Flow

Figure 35 presents a block diagram of the flow of write data through the system. (Only one data line is shown. The channel components represented schematically in this diagram are, of course, duplicated for each write data channel.) Figure 36 presents a write data flow timing diagram.

Data enters through line receivers whose function is to invert the low-TRUE levels. Each receiver has a terminating impedance of approximately 130 ohms. The output of the data line receiver is used to condition the J-K inputs of the write register cells. The write strobe signal is sent to the clock inputs of the write register. If the data line is TRUE at the time the write strobe pulse arrives, the write register will switch states at the trailing edge of the pulse. This in turn changes the state of the head driver which causes the current in the head to reverse its direction.

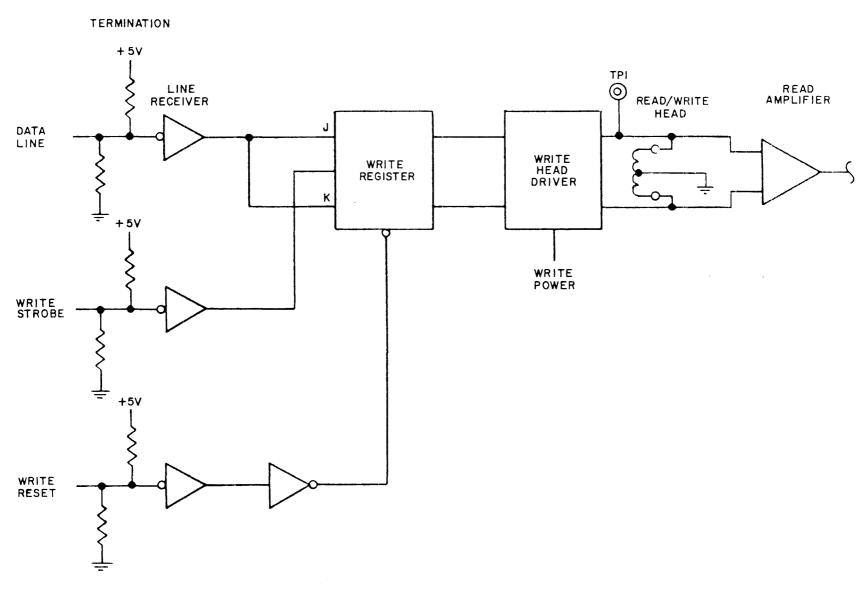


Figure 35. Write Data Flow, Single Gap Systems

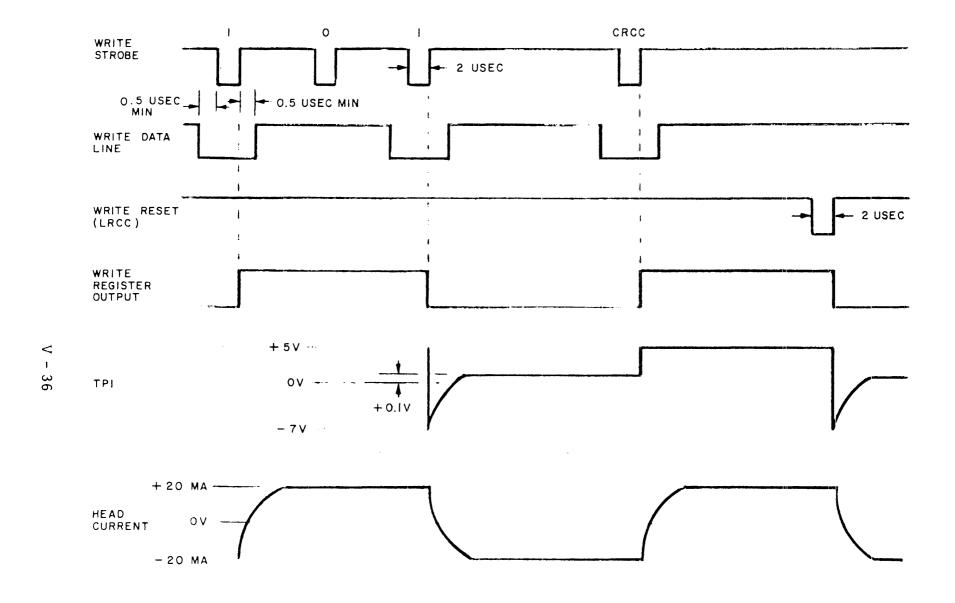


Figure 36. Write Data Flow Timing Diagram, Single Gap Systems

If the data line is FALSE at the time of write strobe, since this causes both the J and the K inputs to be false, the register will not change states; hence, no current reversal will occur at the head. Current reversals at the heads cause data to be recorded on tape.

At the end of each block of data, a write reset pulse enters the system and DC resets the write register. In the nine-channel configuration, this pulse enters eight character times after the last strobe of the data block; in the seven-channel configuration, it enters four character times after the last strobe. The function of this pulse is to reset any head drivers remaining in the set state at the end of a data block, thereby generating the longitudinal redundancy check character on tape.

The write register is DC reset at certain other times to ensure that information is not recorded on tape unless recording is deliberately intended. The logic created for this is such that if any one of the terms Motion, Write Enable, Select, and Ready is FALSE, the write register will be DC reset.

The flow of power to the write heads is controlled via the Write Enable and Select & Ready NAND-gate which sends a signal to the DC set inputs of the write register. When either signal goes FALSE, the write register is both DC set and DC reset, causing both its outputs to go to a high level. This in turn disables both head driver outputs, hence removing both current paths to the head. If both inputs are TRUE, the DC set input to the register goes FALSE, allowing the head driver to drive current into the head. (Write power enters the data electronics printed circuit board from the transport electronics printed circuit board only if the file protect switch on the deck has been energized (see Figure 37.)

# 5.2.3 Read Data Flow

Figure 38 presents a block diagram of the flow of read data through the system. (As in Figure 35, only one channel is indicated.) A timing diagram for read data flow and strobe generation is given in Figure 39.

Input diodes protect the read amplifier during write operations. The read head generates a low-level analog signal of approximately 14 to 18 millivolts peak to peak. The read amplifier, which has a differential input and single-ended output, picks up this signal and amplifies it to a suitable level, then sends it to an inverting amplifier which generates the converted signal required for the full-wave rectifier. The amplifier output signal level is adjusted to 12 volts peak to peak by the gain control potentiometer. A clipping level DC bias is fed into the input of the

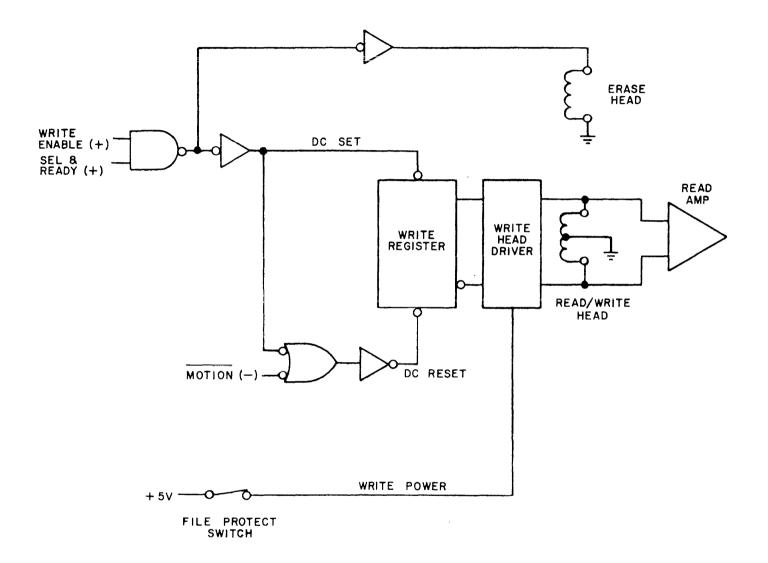


Figure 37. Write Power Gate and Write Register DC Reset, Single Gap Systems

Figure 38. Read Data Flow, Single Gap Systems

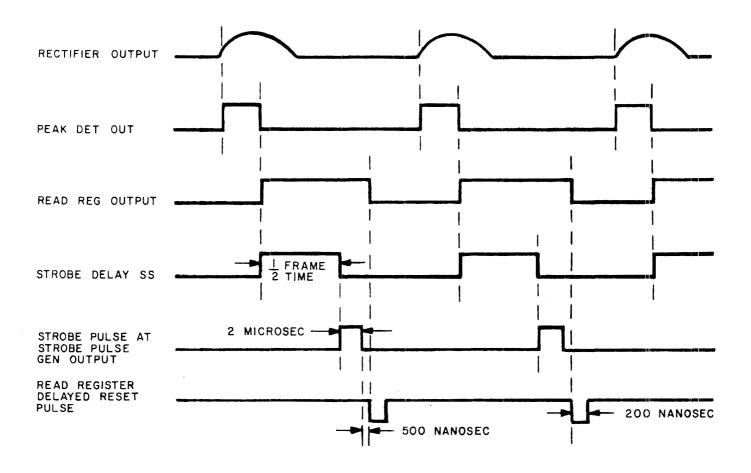


Figure 39. Timing Diagram of Read Data Flow and Strobe Generation, Single Gap Systems

full-wave rectifier with the result that positive peaks above the clip-level threshold are observed at the output of the circuit. This signal is then sent to the peak detector, which in turn generates a digital pulse whose trailing edge corresponds to the peak of the analog signal and is used to load the read register at that time. The contents of the read register are sent to the output driver and thence to the customer's data line.

Auxiliary to this general flow of read data, several other functional circuits are implemented to complete and control the read data generation and transfer process. These auxiliary functions are described in the subsections following.

Strobe Generation Circuitry. As in most other NRZI read systems, the OR'd data method of read strobe pulse generation is used in the Mod 10 (see Figure 40). The first arriving bit sensed at the read register is used to trigger the read strobe delay single-shot. This is implemented by taking the complement outputs of the read register and feeding them into a nine-way OR-gate whose output goes to the single-shot. The pulse width of the single-shot is controlled by adjusting a potentiometer and is set to approximately one-half frame time.

At the end of the variable time delay period, a read strobe pulse is generated (see the block labeled T in the diagram) and sent to the tape controller. The trailing edge of this pulse also triggers the read register delayed reset pulse network, allowing 500 nanoseconds for scanning of the data lines by the controller before the read registers are reset. A summing function (data staircase) is provided at the output of the read registers so that interchannel time displacement can be measured.

<u>High-Low Density Select</u>. Data can be recorded on tape at either a high or low density (more or fewer characters per inch). An input from the high-low density select function changes the pulse width of the read strobe delay single-shot to correspond to the density of character generation.

Clipping Level Circuitry. This circuitry, shown in Figure 38, generates the clipping levels through which the read signals must pass before reaching the peak detectors. If the Read Threshold line is TRUE, approximately 45 per cent of the read signal amplitude is clipped. When this line is FALSE, the level is decreased so that only 25 per cent of the read signal amplitude is clipped. A provision has been implemented via the low-read-threshold remote input line so that an even lower threshold level (12 per cent) can be selected when reading marginal output tapes. The state of this line has no effect on the clipping level while the Read Threshold line is TRUE.

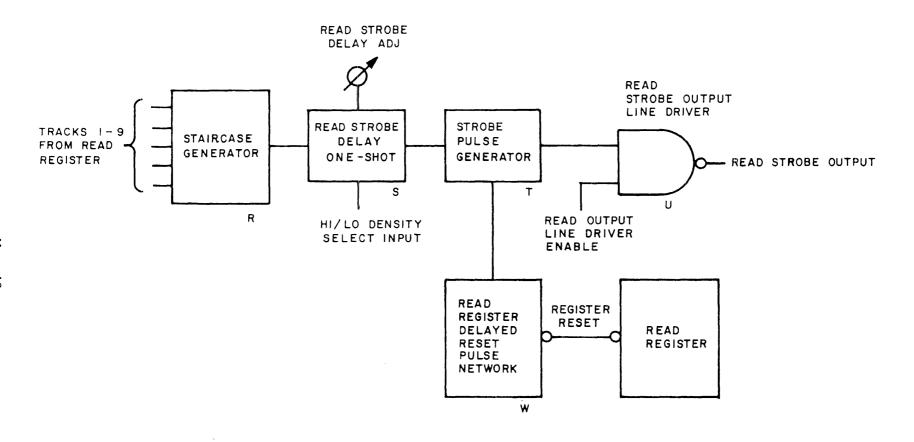


Figure 40. Read Strobe Generation, Single Gap Systems

## 6.0 KEY TO LOGIC SYMBOLS

In several portions of this Manual, primarily in this section and in Appendix B, logic symbols are used to represent certain logical functions or integrated circuit elements. The accepted integrated circuit manufacturer's industry standard symbols are used here.

Since DTL and TTL logic is being employed, it is of the typical inverting type, utilizing NAND-NOR elements rather than AND-OR devices.

Although the same device is used to implement both the NAND and the NOR function, the symbol is shown to correspond to the particular functional operation.

The input/output lines to the device are shown for the TRUE (active) state of the function. A state indicator, shown as a small circle at the input or output of the device, means that if that line is in the TRUE state, it will be at zero volts. Lack of a state indicator means that the TRUE state of the line is at +5 volts. The following symbol and explanation will serve as a clarification and example:

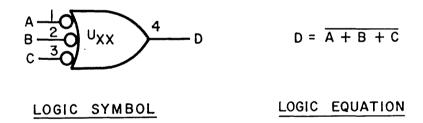


Figure 41. Logic Symbol Example

Figure 41 shows a logical NOR element that says that D will be at +5 volts (TRUE state) if any one, or any combination of A,B, or C, is at zero volts. Typically, the designation number of that particular chip in the assembly is shown within the symbol, and the corresponding chip pin numbers are shown on the lines external to the symbol.

Table 3 shows all of the logic symbols used in this Manual with their corresponding names and logical equations. The equations shown are defined by the TRUE level of the input signal. The single shot produced a positive going pulse at the "1" output and a negative going pulse at the "0" output and these are initiated at the time that the input pulse transitions to its TRUE state.

The flip-flops are of the J-K type and their input/output functions are as follows:

Designation	<u>Function</u>
J	Synchronous set input
K	Synchronous reset input
T	Clock input
$S_{\mathcal{D}}$	Direct set input
$C_{D}^{D}$	Direct clear (or Reset) input
1	Set output
0	Reset output

The following truth tables are applicable to these devices:

# SYNCHRONOUS OPERATION

BEFORE CLOCKS		AFTER CLOCK			
	PUTS	INPU	JTS	OUT	PUTS
1	0	J	K	1	0
L	Н	L	Х	L	Н
L	Н	Н	Χ	Н	L
Н	L	X	L	Н	L
Н	L	X	Н	L	Н

# ASYNCHRONOUS OPERATION

INPUTS		OUTPUTS	
SD	CD	1	0
L	L	Н	Н
L	Н	Н	L
Н	L	L	H
Н	Н	Synch Opera	ronous tion

TABLE 3

SYMBOL	NAME	LOGICAL EQUATION
A B	NEGATIVE INVERTER	B = A
<u>A</u> <u>B</u>	POSITIVE INVERTER	B = A
A D	POSITIVE NAND GATE	D = ABC
A B C	NEGATIVE NOR GATE	D = A + B + C
A O D D C O	NEGATIVE WIRED OR GATE	D = A+B+C
J S I  K C D	FLIP-FLOP (J-K)	SEE TRUTH TABLE
ss o	SINGLE SHOT	SEE EXPLANATION
A DLY B	TIME DELAY NETWORK	B = A • [DLY]

#### SECTION VI

# MAINTENANCE ON SITE

Before any Mod 10 tape transport leaves the factory, each of its components has been thoroughly tested and all adjustments have been made to ensure reliable operation. However, injudicious handling in transit or the effect of long use may necessitate the replacement of some parts or the readjustment of some components.

Table 4 lists a basic set of maintenance tools and supplies required for servicing the Mod 10. As the table suggests, some supplies should also be available to the operator for daily or shift-end cleaning.

Table 5 offers a suggested schedule for preventive maintenance. Again, some of these functions are the responsibility of the tape transport operator. Procedures for performing them have been specified in Section III. The remainder—preventive maintenance tasks that must be performed by a service engineer—are described in connection with the repair procedures for the subassembly to which they pertain.

In the pages that follow, instructions are provided for replacements, readjustments, and trouble shooting aids that can effectively be made while the tape transport remains installed in the customer's computer system. Some tasks of repair require test equipment not normally available in the field, or special alignment and adjustment tools that are not available to field engineers. Instructions for repairs of this more complex kind are NOT included in this section.

As in the preceding sections, the maintenance instructions are organized in terms of subassembly units.

Table 4. Maintenance Tools and Supplies

# FOR THE OPERATOR

Lint-free cloth Cotton swabs Isopropyl alcohol

# FOR THE SERVICE ENGINEER

Equipment	Model or Type
Socket wrench set	For 4-40, 6-32, 8-32, and 10-32 cap screws
Socket wrench set	For 4-40, 6-32, and 10-32
	set screws
Open-end wrench	For 7/16-in. bolts
Long-nose pliers	
Screwdriver set	Phillips
Screwdriver set	Standard blade
Soldering aid	·
Soldering iron	
Tape Tracking Fixture	Wang P/N T-00010
Voltmeter	Triplett Model 800 or equivalent
Reel hub alignment fixtures	Wang P/N T-00002
Oscilloscope	Tektronix 547 or equivalent
Dual trace plug-in	Tektronix 1A1 or equivalent
X10 scope probes (3)	Tektronix
Guide shims (as required)	Wang P/N 200203
Master alignment tape	IBM #432640 or 432641
Standard-level output tape	IBM #461108 or 432152
Scratch tape	·
Pulse generator or TCU	

Table 5. Suggested Schedule for Preventive Maintenance

	Maintenance Task	Interval (in operating hours)	Procedure Described in:
PERFORMED	Clean Head, Tape Cleaner Face, Head Guides, & Head Guide Blocks	8 (Daily)	Section III
BY	Clean and Check Roller Guides	8 (Daily)	Section III
OPERATOR	Clean and Check Capstan	8 (Daily)	Section III
OFERATOR	Clean Entire Tape Unit Surface	(Approx. 4 months)	Section III
	Clean Tape Cleaner Unit	(as required)	Section VI, par. 7.2
PERFORMED	Check Tape Tracking	2,000	Section VI, par. 12.3
BY			
SERVICE	Replace Reel Motor Brushes	5,000	
ENGINEER	Replace Reel Motors	10,000	Section VI, par. 10
	Replace Capstan Drive Assembly	10,000	Section VI, par. 9.2

# 1. POWER SUPPLY MAINTENANCE

#### 1.1 CHECKING UNREGULATED POWER SUPPLY

A check may be made of the unregulated power supply by testing with a voltmeter at test points provided on the transport board. The table below shows the voltages and corresponding test points. The voltages should be within  $\pm 20$  per cent of the nominal specified. (See Figure B17 for test point locations.)

Voltage	Test Point
+19 V	TP 419
-19 V	TP 422
+13 V	TP 420
-13 V	TP 421

## 1.2 CIRCUIT BREAKER RESET

In the event of malfunction, an automatic circuit breaker prevents damage to the tape transport. The circuit breaker reset button is located adjacent to the power switch on the power supply chassis. The circuit breaker button will be in the OUT position after an automatic circuit break has occurred. Pushing in the button remakes the circuit.

### 1.3 FUSES

Five fuses, in the unregulated power supply lines, are located on the power supply subassembly. F1 is a 5 amp fuse in the +19 volt line. F2 is a 10 amp fuse in the -19 volt line. F3 is a 10 amp fuse in the +13 volt line supplying all loads except the +5 volt regulator. F4 is a 4 amp fuse in the +13 volt line supplying current to only the +5 volt regulator. F5 is a 10 amp fuse in the -13 volt line. All fuses are fast-blow types.

#### 1.4 TRANSFORMER TAPS

The Mod 10 tape transport can accept power from sources of varying voltage, depending on the power transformer primary terminal connection chosen. Figure 42 shows the color coding of the transformer primary wires attached to the terminal strip TB1 under the power supply chassis.

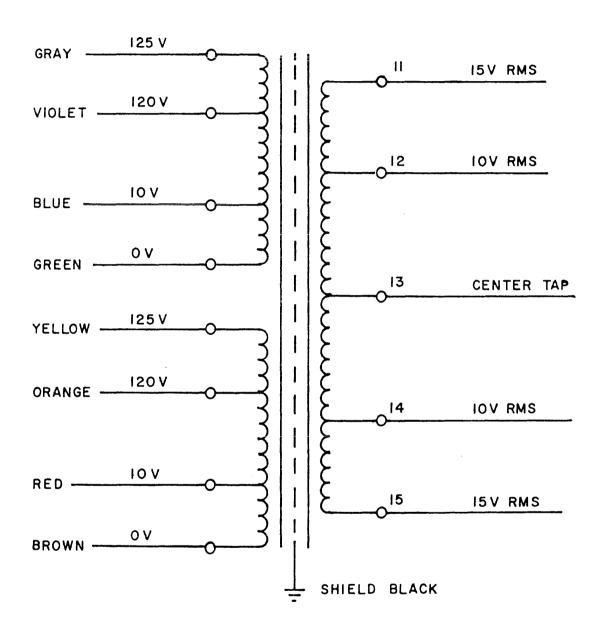


Figure 42. Mod 10 Power Transformer Lead Identification

For example, parallel connection to standard 115V power (plus or minus 10 per cent) is made by connecting the gray and yellow wires to one side of the line voltage and the blue and red wires to the other side. Series connection to a 220V power source is made by connecting the violet wire to one side of the line voltage, connecting the blue to the orange wire on the terminal strip, and connecting the red wire to the other side of the line. Unused wires should be left attached to the terminal strip.

#### 2. OPENING OF POWER SUPPLY ASSEMBLY

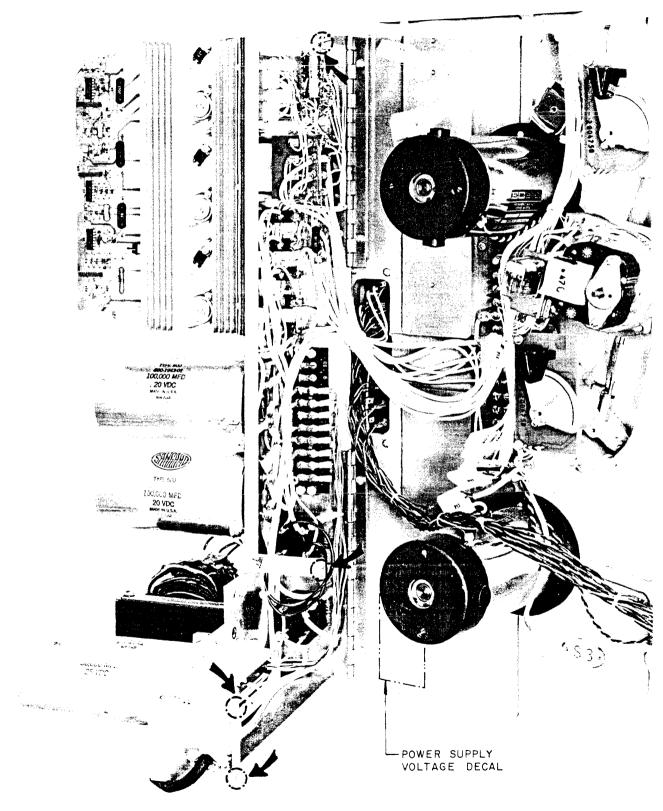
The opening of the power supply is necessary when trouble shooting and component replacement is required in this area. It is also required when it is desired to access TBl to change power transformer taps. The following procedure shall be used:

- 1. Turn power off of the unit with the toggle switch on the power supply and disconnect the power cord from the wall.
- 2. Swing out the transport.
- 3. Remove the 4 Phillips screws fastening the assembly to the deck. These screws are shown flagged in the photograph of Figure 43.
- 4. Swing assembly open.

## 3. TRANSPORT MODULE REPLACEMENT

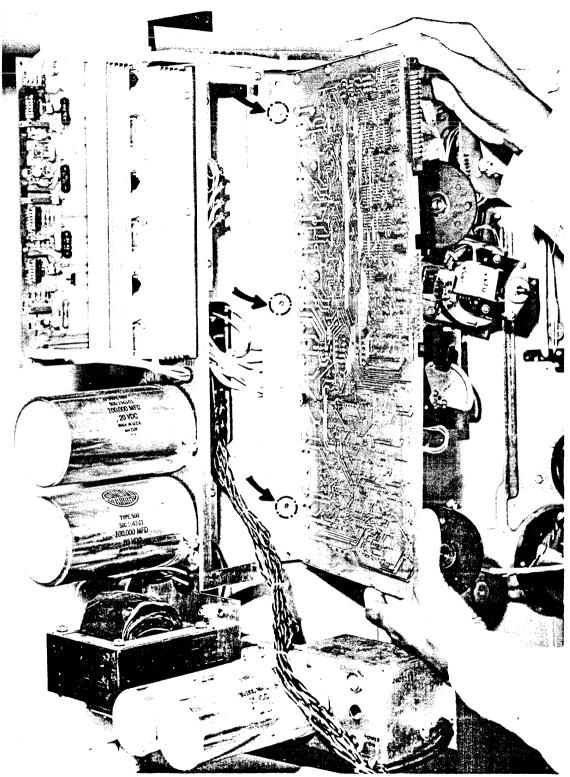
The transport module which houses all the servo and control logic electronics can be removed by following the steps below:

- 1. Turn power off of the unit with the toggle switch on the power supply and disconnect the power cord from the wall.
- 2. Remove all the connectors from the module using care to avoid damaging connector pins on the module.
- 3. Swing open power supply assembly as described in subsection 2.
- 4. Remove the 3 screws on the heatsink fastening the module to the deck. These screws are shown in the photograph of Figure 44. Be sure to support the assembly



POWER SUPPLY ASSY. MOUNTING SCREWS.

Figure 43. How To Open Power Supply



TRANSPORT ELECTRONICS PWB ASSY. MOUNTING HOLES.

Figure 44. Transport Circuit Module Removal

to prevent damage when screws are removed. The module is now free to remove.

5. After installation of the new module, perform the transport module adjustments described in subsection 15.

# 4. DATA ELECTRONICS MODULE REPLACEMENT

The Data Electronics module which houses all of the record and read electronics can be removed by following the steps below:

- 1. Turn main power off either at the control panel or the power supply.
- 2. Remove connectors P3 and P4.
- 3. Remove the Winchester head cable connectors from the module. IMPORTANT use an appropriate size screwdriver on the jackscrew fasteners. Loosen the connectors evenly, alternating turns on each screw. Attempting to loosen one side at a time will cause the connectors to bind and possibly bend the pins. Use of fingers instead of a screwdriver risks the possibility of breaking wires on the connectors.
- 4. While supporting the module to prevent damage, remove the 4 Phillips screws, holding the module mounting brackets to the deck. The location of the bracket screws are shown in the photograph of Figure 45.
- 5. After replacement of the new module, perform the adjustments described in the appropriate data electronics alignment subsection.

# 5. OCP SWITCH REPLACEMENT

The operator's control panel pushbutton switches and indicators are sealed assemblies. If either the switch or the indicator fails, the whole sealed assembly must be replaced. (See the photograph in Figure 46.)

1. Put the utility power switch at the back of the transport chassis in the OFF position.

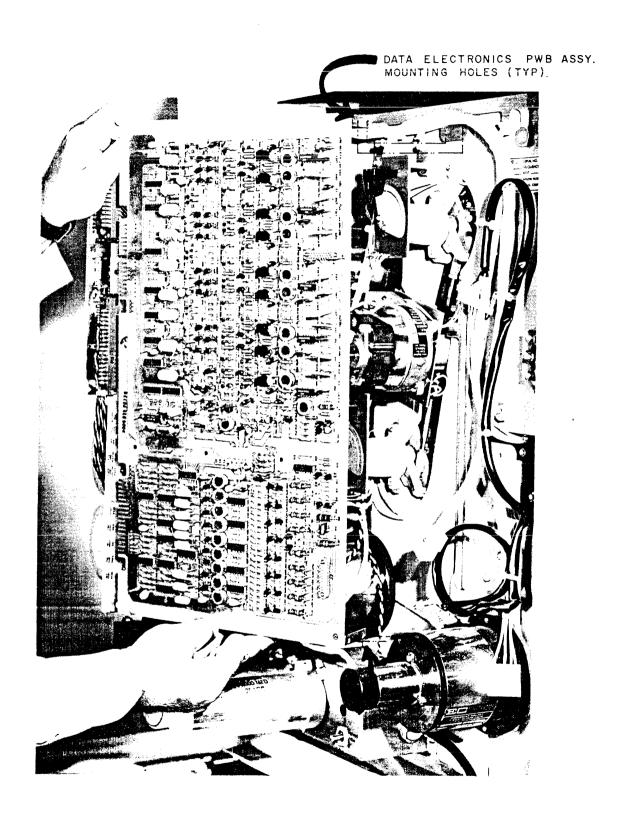


Figure 45. Data Module Removal

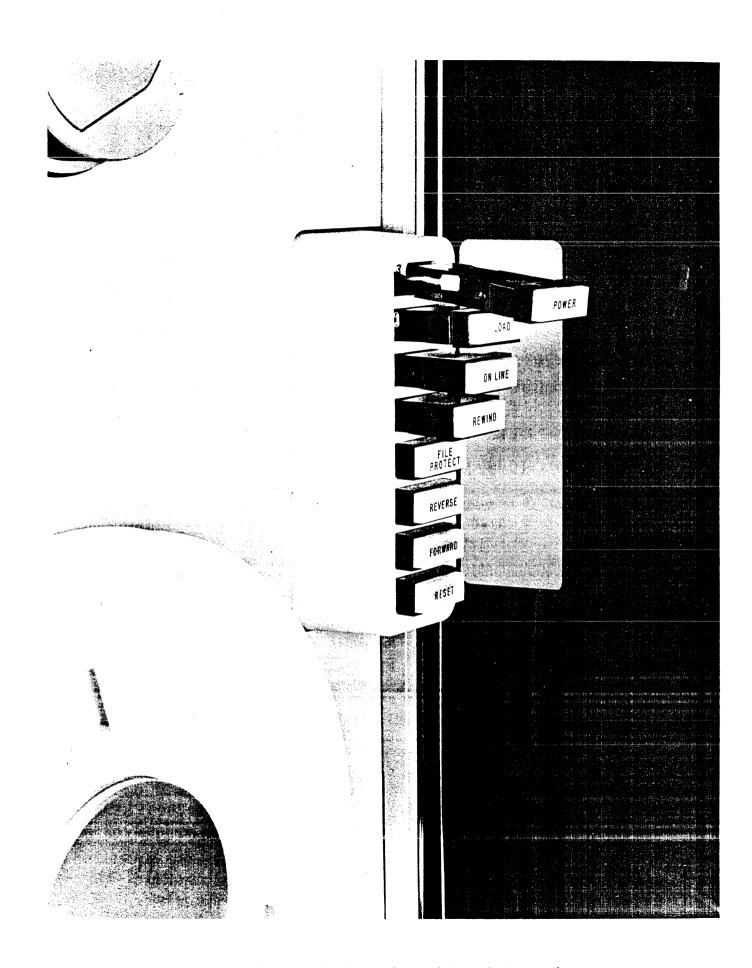


Figure 46. Control Panel Switch Removal

- 2. Grasp the pushbutton at either side and pull it directly away from the deck, rocking it gently from side to side, using care that the attached wires are not damaged.
- 3. Note the position of the push-on lugs before removing them from their terminals.
- 4. Connect the push-on lugs to the replacement switch in the noted positions.
- 5. Push the switch firmly into position.

# 6. ARM SENSE LAMP AND CELL REPLACEMENT

#### 6.1 LAMP REPLACEMENT

The lamp and holder assembly is a plug-in unit. To replace the lamp disconnect holder from module. If the assembly is not the plug-in type, unsolder the lamp lead joints at top of shroud and break glyptol to free lamp. Solder and glyptol leads of new lamp. Perform the adjustments of section VI-14.

# 6.2 CELL REPLACEMENT

It is required to remove the arm sense module in order to replace the photocell. The following steps specify the mechanical procedure for removal:

- Loosen the Allen screw on the collet clamp and rotate the cam and clamp assembly until it is free of the shaft.
- 2. Cut the cable harness tie wraps to separate the cable from the rest of the harness.
- 3. Remove the three Phillips screws securing the module to the main frame.
- 4. Remove the connector at the end of the module cable located on the transport module. This will be P12 for the file side or P13 for the fixed side.
- 5. Perform the arm sense module adjustments in subsection 14 after replacement is completed.

## 7. HEAD ASSEMBLY REPLACEMENT

Read/Write head assemblies may be removed and replaced in the field by using the following procedure.

CAUTION: SYSTEM POWER MUST BE TURNED OFF
PRIOR TO DISCONNECTING OR CONNECTING
THE HEAD ASSEMBLY.

- 1. Remove the head connectors from the data electronics module located at the rear of the machine using an appropriate size slot screwdriver. Do not use fingers for this purpose so that the possibility of damaging connector wires is eliminated.
- Remove both pieces of head cover and remove the three large Allen screws fastening the head plate assembly to the deck. These screws are shown in the photograph of Figure 47.
- 3. Since it is not desirable to replace the photosense assembly due to its cable dressing configuration, disconnect this subassembly from the baseplate by removing the two Phillips screws at the rear of the plate.
- 4. Remove head assembly.
- 5. Following the procedure in reverse, install the new head assembly.
- 6. Perform the tape tracking check described in Section 12.3.
- 7. Perform the data electronics alignments described in Section 16 for dual gap heads or Section 17 for single gap heads.

## 7.1 REPLACING THE PHOTOSENSE UNIT

The EOT/BOT photosense unit is a sealed component. If either lamp or photocell fails, the unit must be replaced in its entirety, as follows:

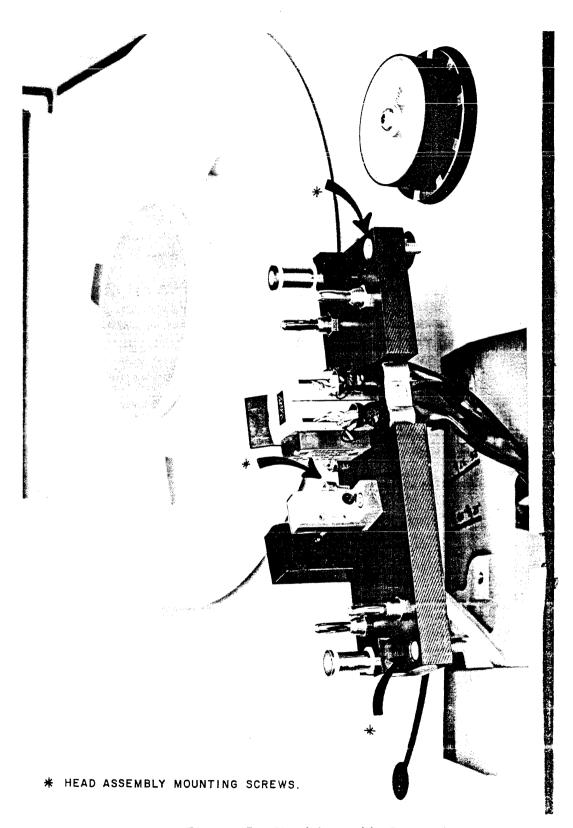


Figure 47. Head Assembly Removal

- 1. Perform step 2 of paragraph 7.
- Remove both screws holding photosense unit to read/write head assembly base plate, and move it to rear of deck. Cut the cable harness so that this cable is free. Disconnect P11 connector.
- 3. Replace photosense unit and reinstall read/write head assembly. Adjust R215 as described in paragraph 15.1 to ensure proper operation of the photosense unit.

## 7.2 CLEANING THE TAPE CLEANER

A jet of air directed into the perforations of the tape cleaner face will force the accumulation of particles through a vent hole provided on the back of the tape cleaner.

- 1. Remove read/write head assembly covers (both sides).
- 2. Shield read/write head by inserting a piece of paper or cloth between the tape cleaner and the head.
- 3. Blow into the face of the cleaner.
- 4. Clean the tape cleaner, magnetic head, and base plate according to regular maintenance instructions (Section III).
- 5. Replace head covers.

If necessary, the tape cleaner can be removed from the head assembly so that a more forceful air jet can be applied. It is suggested, however, that frequent gentle cleaning is preferable to infrequent forceful cleaning.

- 1. Remove read/write head assembly covers.
- 2. Remove the screw holding the tape cleaner to the assembly base plate, and remove tape cleaner.
- Clean by forcing air through the face perforations.
- 4. Replace tape cleaner and tighten screw. (Action of the roll pin in conjunction with the screw will correctly reposition the tape cleaner.)
- 5. Replace head covers.

## 8. DECK OVERLAY REMOVAL

Removal and replacement of many components requires the removal of the deck overlay. The following procedures must be followed:

## 8.1 REMOVAL OF FIXED REEL

- 1. For fixed reel hub assemblies whose configuration does not have three screws on the hub cover, insert a flat blade screwdriver behind the chamfered edge of the hub cover and pry it up; this releases the three spring clips holding the cover in place. (See Figure 48.) Remove the three screws holding the reel in place and remove the reel.
- 2. For assemblies whose configuration have the three screws through the cover, ignore step 1 and remove these screws holding the reel in place. Remove reel.

#### 8.2 REMOVAL OF FIXED GUIDE POST ASSEMBLIES

CAUTION: Identify the top and bottom assemblies prior to removal in order to return them to their correct location upon re-assembly.

1. Remove each guide post by unscrewing two Phillips screws accessible from the rear of the deck. Under no circumstances should the small set screw that holds the roller guide assembly be removed. Removal of this screw destroys an adjusted setting and necessitates laboratory or factory re-tracking.

## 8.3 REMOVAL OF OVERLAY

- Remove covers from the read/write head assembly by pulling in the direction perpendicular to the head plate.
- 2. Loosen, but do not remove, the four overlay screws accessible from the rear of the machine. These screws are shown marked by arrows in the photograph of Figure 49.
- 3. Support the overlay prior to total removal of the screws to eliminate the falling hence possible damage to it.
- 4. Lift off overlay.

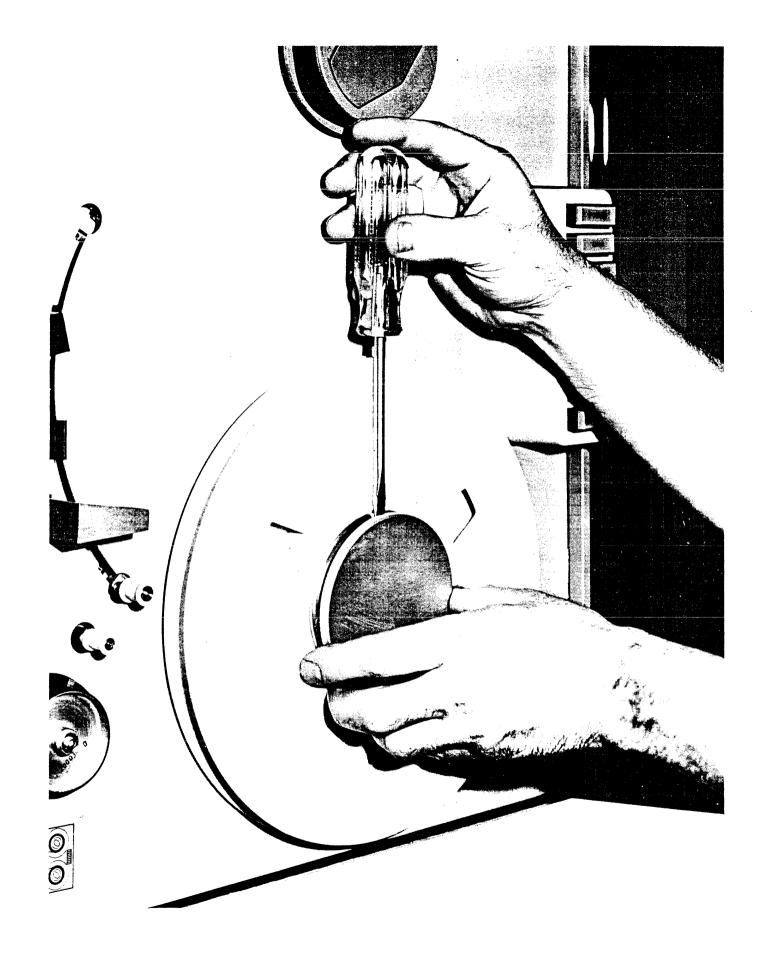


Figure 48. Fixed Reel Removal

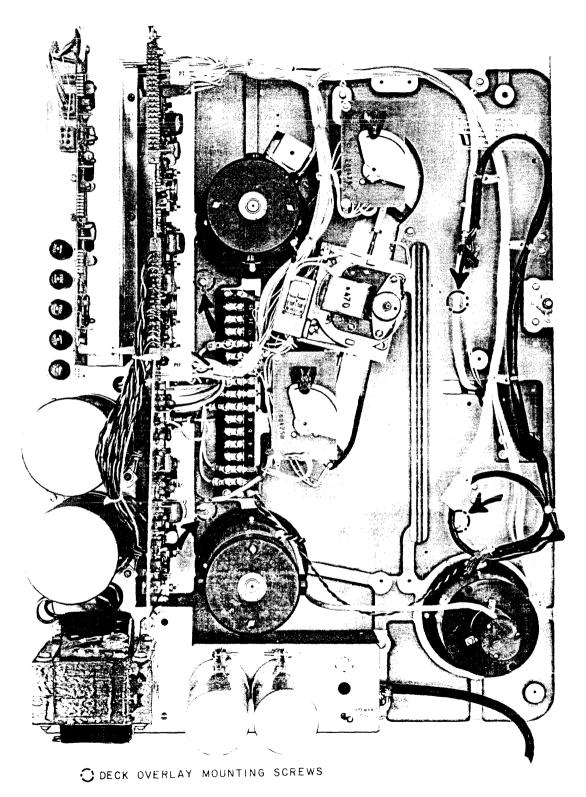


Figure 49. Dock Overlay Removal

# 9. CAPSTAN AND CAPSTAN MOTOR REPLACEMENT

## 9.1 CAPSTAN ONLY

The capstan can be removed and replaced by releasing the Allen screw on the top of the capstan motor shaft, holding the shaft by the flats provided. Note the orientation of the capstan before removing it, and ensure that it is replaced in the same position. Capstan speed adjustments are specified in a later section.

## 9.2 CAPSTAN DRIVE ASSEMBLY

Replacement of the entire capstan drive assembly (capstan and capstan motor) should be done in accordance with the following procedure:

- 1. Remove capstan (see 9.1).
- 2. Remove motor and tachometer leads at terminal board at rear.
- 3. Remove four screws holding motor to transport deck.
- 4. Replace capstan drive assembly.
- 5. Replace capstan (see 9.1).
- 6. Perform the adjustments for speed and start/stop ramps as described in subsections 15.2.2 15.2.4.

#### 9.3 CALCULATING CAPSTAN SPEED ERROR

The 50/60 Hz strobe disc is inserted into each capstan. The inner strobe is for 60 Hz and is marked such. It is to be viewed with the corresponding AC light (such as fluorescent). The 50 Hz disc operates with a 100 Hz source whereas the 60 Hz disc requires 120 Hz source. The disc image will appear stationary at 12.5, 25 and 37.5 ips only. The error from nominal for the mentioned speeds is:

$$E = \frac{624}{T \times V} \%;$$

where V is nominal speed in ips, and T is the time in seconds for the image to drift one revolution. If the error exceeds 1% re-adjust speed per section VI-15.2.

#### 10. REEL MOTOR REPLACEMENT

The preventive maintenance schedule (Table 5) suggests that reel motors be replaced after 10,000 hours of operation. Replacement is as follows:

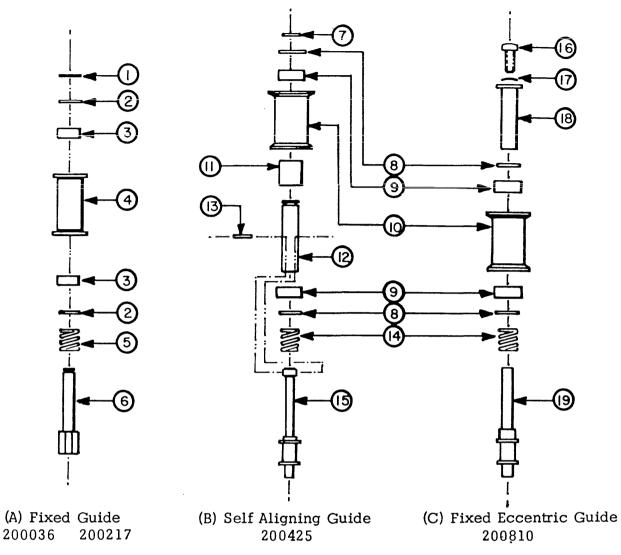
- 1. Remove overlay.
- 2. Remove hub of motor to be replaced (two set screws). NOTE: if WCP fixture # P/N T-00002 is not available, measure and record the distance from the reference boss to the hub outer flange prior to removal.
- 3. Remove motor leads at terminal board at rear.
- 4. Remove four screws holding motor to transport deck.
- 5. Screw new motor into place.
- 6. Replace motor hub using reel hub alignment fixture, which sets the position of the outer flange to a distance 0.727 inch above the adjacent reference boss. If fixture is not available, re-position the hub to the distance measured in step 2. Tighten the two set screws against the flats on the motor shaft.
- 7. Replace overlay.

## 11. GUIDE ROLLER BEARING REPLACEMENT

Roller guide bearings, with the exception of those on the file reel swing arm guide, which control tape motion to the head, can be replaced whithout destroying preset tracking adjustment if appropriate care is exercised. (See Figures 50-A & B.)

- Note the position of the guide roller with respect to its shaft. (The roller guide must be replaced with the same flange nearest the overlay panel that it originally occupied.)
- 2. Remove retaining ring at the shaft end and remove the guide roller.
- 3. Insert new bearing(s).
- 4. Replace guide roller.
- 5. Replace retaining ring.

Figure 50. Guide Bearing Replacement



Item No.	Description	WCP Part No.
1	Ring, Retaining Ext.	100132-001
2	Washer, Shim	200077-001
3	Bearing, Roller	100006-001
4	Drum	200023
5	Spring	200156
6	Shaft	200037
7	Ring, Retaining Ext.	100132-002
8	Washer, Shim	200077-003
9	Bearing, Roller	100006-002
10	Drum	200419
11	Sleeve, Pin Retaining	200423
12	Sleeve, Bearing	200420
13	Pin	200422
14	Spring	200421
15	Shaft	200418
16	Screw, Button Hd 2-56 $\times$ 3/16	100039-903
17	Washer, Belleville	100256
18	Sleeve, Bearing	200752
19	Shaft	200 <b>7</b> 66

77 71

Replacement of the file reel swing arm roller guide bearings requires that the guide be re-set as described in paragraph 12.1.1. The bearings are changed by removing the locking screw and withdrawing the eccentric guide assembly from the shaft. (See Figure 50-C.)

# 12. TAPE TRACKING ALIGNMENT

Tape tracking is the mechanical adjustment of elements in the tape path which contribute to the static and dynamic skew of the tape over the read/write head. Also the proper alignment of the tape edges between the file and fixed reels consistent with proper tape handling (i.e., without damaging the tape.) If retracking is found to be required, it is necessary to afterwards re-check the Read Stack Azimuth alignment per the procedure described in sections 16.7 or 17.4.

Forward tape tracking is controlled by guiding elements between the file reel and the capstan. Reverse tape tracking is controlled by guiding elements between the fixed reel and the capstan (see Figure 51).

The following tracking procedure assumes that there is no gross misalignment of guiding elements which would cause tape edge damage. Initially all roller guides are set such that the inner guiding edge is .837 inch from the transport component mounting surface.

### 12.1 FORWARD TAPE TRACKING

## 12.1.1 File Reel Swing Arm Roller Guide

Basic mechanical alignment of this guide is simplified through the use of a special tool, WCP # T-00010, the use of which is illustrated in Figure 52. Alignment is as follows:

- 1. Remove the overlay (see subsection 8 for procedure).
- 2. Fasten the alignment tool to the head guides making sure the outer surface of the tool is against the fixed guide outer edges, with all shims removed from head guides.
- 3. Adjust the position of the swing arm at the supporting shaft (#8 screw) such that the roller guide trough mates with the alignment tool.

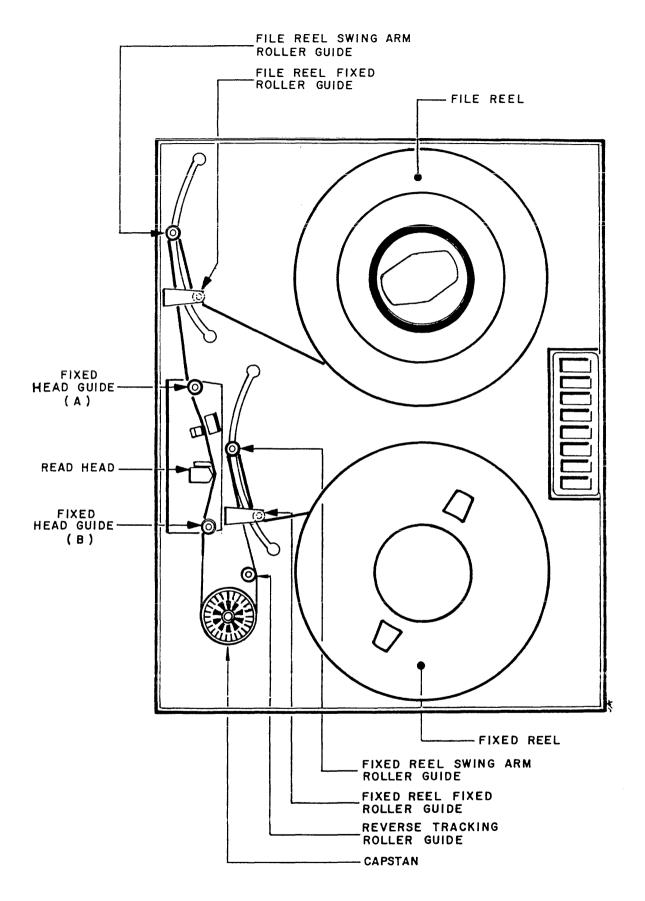


Figure 51. Tape Guide Diagram

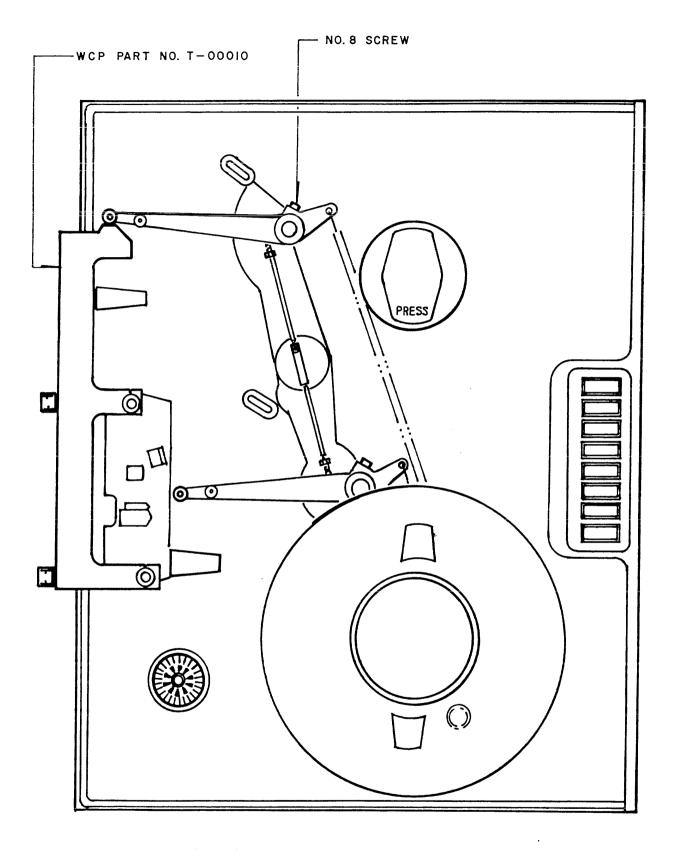


Fig. 52 File Reel Arm Guide Alignment

- 4. Adjust the tilt of the roller guide such that the width of the drum is parallel to the alignment tool. This is accomplished by slackening the roller guide locking screw 1/2 turn and rotating the eccentric guide by means of the hexagon. (See Figure 53.) For the purpose of this adjustment the drum should be presented to the alignment tool by pressing against the roller guide as this simulates the effect of tape tension on the arm.
- 5. Shims should be replaced as required under Paragraph 16.7 or 17.4.

## 12.1.2 File Reel Fixed Roller Guide

This guide must be aligned to the swing arm roller guide. This may be done visually by rotating the file reel counterclockwise against the servo, using old tape, under tape tension, until the file reel swing arm reaches a point where the tape disengages the file reel fixed roller guide (see Figure 54). At this point any misalignment between the rollers is seen as a curling or scuffing of the tape edge against one of the file reel fixed guide flanges. This may be corrected by adjusting the file reel fixed guide, using the screw at the side of the guide support for this purpose.

### 12.2 REVERSE TAPE TRACKING

## 12.2.1 Reverse Tracking Roller Guide

- 1. Remove the reverse tracking roller guide by means of the screw at the side of the guide support.
- 2. Run the tape forward and observe the lateral position of the tape on the capstan. Now run in reverse and see that there is no "tape walk".
- 3. If this condition is observed, adjust the position of the fixed reel swing arm at its pivot (#8 screw) and align the adjacent fixed roller guide to the swing arm roller guide. The procedure is the same as that for the file reel fixed guide. Capstan "tape walk" between forward and reverse should not be greater than .01 inch with the reverse tracking guide removed.
- 4. Replace the reverse tracking guide and adjust the forward/reverse "tape walk" as close to zero as possible by means of this guide only.
- 5. Now that all the alignments are complete, check the results by following the procedure in the next section.

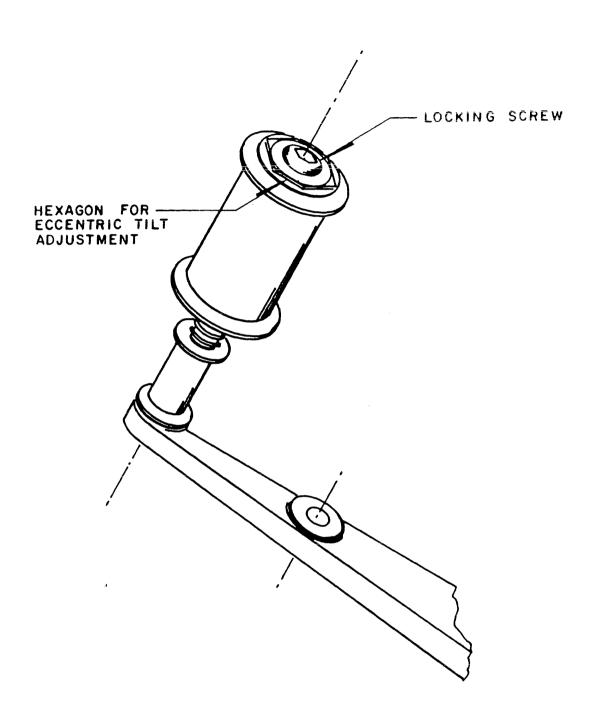


Figure 53. Tilt Adjustment - File Reel Arm Guide

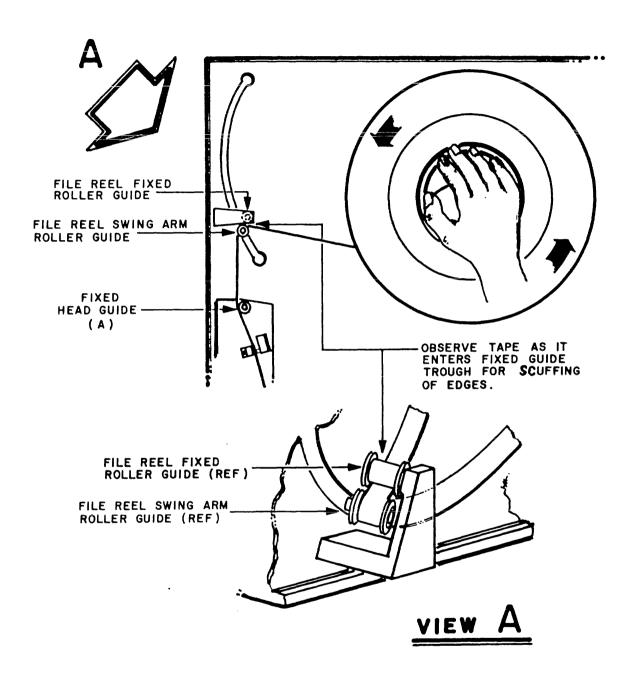


Figure 54. File Reel Fixed Guide Adjustment

### 12.3 CHECKING TAPE TRACKING

This procedure provides an electrical check to verify that tape is tracking in the reverse direction within acceptable limits with respect to the forward direction. The procedure compares the time displacements of the analog signal peaks of the two outside channels while running tape forward with the time displacement of those peaks while running tape in reverse. If the transport is perfectly tracked, the time displacements in both directions will be the same, but the phase relationship between the two peaks will be opposite. Since the accuracy of tape tracking is directly dependent upon mechanical alignments and mechanical tolerance build-ups, perfect tracking is usually not achieved; however, limits are established that will guarantee reliable operation in both directions.

Equipment required includes an oscilloscope, a dual trace plugin, and three 10X probes (see Table 4); also required is a scratchpad tape having all ones recorded on the outside channels. Procedural steps are as follows:

- 1. Scope controls:
  - a) Mode--Chop, AC.
  - b) Sensitivity—as required to get good resolution of the peak time displacement.
  - c) Trigger--External (+), AC, trigger mode.
  - d) Sweeptime--5 sec/cm.
- 2. Place Channel 1 scope probe and trigger probe on the test point corresponding to the head edge track located closest to the transport. This test point is 602 for nine-channel systems and 102 for seven-channel systems.
- 3. Place Channel 2 probe on the test point corresponding to the channel farthest from the transport. This test point is 702 for nine-channel systems and 902 for seven-channel systems.
- 4. Load the scratch-pad tape and run tape in the forward direction under manual control. Record  $T_1$  ( $\mu$ sec). Run tape in the reverse direction and record  $T_2$ . (See Figure 55). Since the read head azimuth angle can be in either direction, the actual phase relation between the reference channel and the other outside channel may be opposite to that depicted in Figure 55.

5. The value of  $T_2$  should be related to  $T_1$  by the following equation:

$$T_2 = T_1 \pm \frac{75}{V} \sqrt{sec}$$
.

where V represents the transport speed. If this condition is not met, then either there is tape walk on the capstan, or the file reel swing arm guide is improperly set. Retrack the unit per the procedure described in subsection 12.1 and 12.2

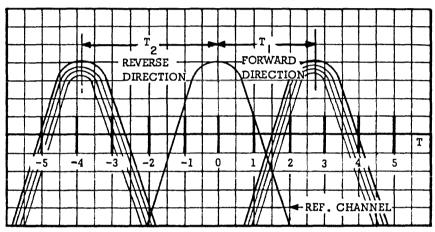


Figure 55. Checking Tape Tracking, Desired Waveform

# 13. REGULATED POWER SUPPLY ADJUSTMENTS

Three potentiometer adjustments are required to adjust the power supply regulators to the proper operating voltage levels. These potentiometers are located on the regulator subassembly module (See Figure B6). A voltmeter having an accuracy of at least 2 per cent should be used to make the adjustments. Each adjustment should be made according to the following table:

Adjust Voltage To:	By Potentiometer	Connect Meter Between Test Points	
+ 5 Volts	R2	TP1(+) & TP4(-)	
+12 Volts	R14	TP2(+) & TP4(-)	
-12 Volts	R21	TP3(-) & TP4(+)	

#### 14. ARM SENSE MODULE ADJUSTMENTS

Correct adjustment of the arm sense module position, cam position, and two potentiometers is necessary to ensure the correct operation of each servo swing arm. The adjustments must be made in the order in which they are specified below. (Either arm may be adjusted first.)

The power must be ON and the transport must be RESET at the control panel before starting the adjustment procedure. No tape should be loaded on the machine.

### 14.1 FIXED REEL ADJUSTMENTS

- 1. Mechanically position the swing arm in the center of its normal operating arc and verify that the center of the cam arc lines up with the photocell and lamp housing. If the cam is improperly positioned, reposition cam as specified in subsection 6.
- 2. Connect a voltmeter between test point 424 and ground on the transport board. (See Figure B23.)
- 3. Loosen the three screws that secure the arm sense module to the main frame and adjust the position of the module on the slotted holes until the voltmeter reads  $0 \pm 0.2$  volts. Tighten the three mounting screws locking the assembly in place.
- 4. Adjust the fixed reel servo gain potentiometer R462 and the swing arm position potentiometer R465 as outlined in subsection 15.3.

### 14.2 FILE REEL ADJUSTMENTS

- 1. Perform Step 1 in 14.1 above.
- 2. Connect a voltmeter between test point 425 and ground on the transport board. (See Figure B23.)
- 3. Perform Step 3 in 14.1 above.
- 4. Adjust the file reel servo gain potentiometer R503 and the swing arm position potentiometer R508 as outlined in subsection 15.3.

## 15. TRANSPORT MODULE ADJUSTMENTS

#### 15.1 EOT/BOT PHOTOSENSE ADJUSTMENT

- 1. Connect a voltmeter between test point 201 and ground. (Reference Figure B23.)
- Adjust potentiometer R215 so that the voltmeter reads 0.0V ± 0.15V while tape is loaded on the transport but neither photosense tab is being sensed.

#### 15.2 CAPSTAN SERVO ADJUSTMENT

Five adjustments are required to ensure correct operation of the capstan drive. The order in which these adjustments are given below must be carefully followed since there is interrelationship between some adjustments. Adjustments should be performed with tape loaded on the transport. Ramp adjustments require that the transport be under program control so that the tape repeatedly starts and stops. (See Figure B23 for potentiometer and test point locations.)

## 15.2.1 Offset

- 1. Press RESET pushbutton.
- 2. Connect a voltmeter between test point 408 and ground.
- Adjust potentiometer R438 for zero volts, ±100 mv.

# 15.2.2 Forward Motor Speed

The strobe disc is mounted on the front of the capstan and has two patterns. The inner pattern is used for 60 Hz units and the outer pattern is used for 50 Hz units.

- For standard speed units (see VI-9.3) containing a strobe disc, while running the unit in the forward direction under manual control, adjust R415 until the strobe pattern appears stationary.
- For all other speed units, using an IBM skew tape, adjust the potentiometer for a pulse repetition period shown below. This will be observed at TP3 (D/G module) or TP5 (S/G module).

$$P = \frac{1250}{S} \mu sec$$

where S is machine speed.

### 15.2.3 Reverse Motor Speed

- 1. Repeat the procedure of step 1 while running in reverse using potentiometer R411.
- 2. Duplicate the procedure of step 2 while running in reverse using potentiometer R411.

### 15.2.4 Start/Stop Ramp Time

The start/stop ramp times can be properly adjusted only after the forward-reverse speeds have been set up. Only the forward and reverse stop ramps will be adjusted since adjusting the stop ramp for one direction also adjusts the start ramp for the opposite direction. The ramps will be observed at the capstan tachometer output.

# Forward Stop Ramp Time:

- 1. Initiate a start/stop forward motion program.
- 2. Trigger oscilloscope sweep on external negative at the Motion test point 204 and observe tach signal of TP406. In order to maintain a clean tach signal, pick up scope probe ground on TP403. Use sufficient vertical sensitivity on scope to cleanly measure where the signal reaches the zero axis.
- 3. Adjust potentiometer R423 so that the time for the tach signal to reach zero output is as follows:

$$T = \frac{340}{S}$$
 milliseconds

where T is the stop ramp in milliseconds and S is the operating speed of the transport in ips (see Figure 56). For example, a 25 ips transport would have a stop ramp time as follows:

$$T = \frac{340}{25} = 13.5 \text{ milliseconds}$$

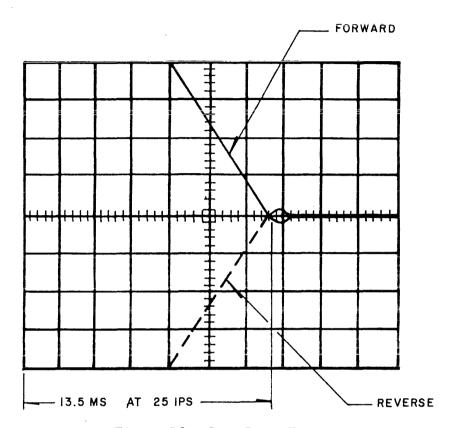


Figure 56. Stop Ramp Time

## Reverse Stop Ramp Time:

- 1. Initiate a start/stop reverse motion program.
- 2. Using the same procedure as outlined in step 2 of the Forward Stop Ramp Time paragraph above, adjust potentiometer R426 for the same stop ramp time established in step 3 of the procedure.

# 15.3 REEL SERVO ADJUSTMENTS

Two potentiometer adjustments are required in each reel servo to provide proper servo gain and swing arm operating position. These adjustments vary depending upon the transport operating speed and are specified below.

### 15.3.1 Gain

- 1. Mark off four inches of arc along the path traveled by the swing arm tip.
- 2. Connect an oscilloscope to the servo amplifier output test point 418 for file reel or test point 410 for the fixed reel. (Reference Figure B23.)
- 3. With tape loaded and holding tension, move the tip of the swing arm back and forth between the end points of the four-inch arc marked off in step 1. (This can be most easily accomplished by moving the reel back and forth by hand rather than the swing arm.)
- 4. Adjust the gain potentiometer so that the four-inch arm movement in step 3 produces a total voltage change on the oscilloscope as specified below. Potentiometer R503 adjusts the file reel servo gain and R462 the fixed reel servo gain.
  - a) For 45 ips machines adjust for a total voltage change of 6.0 volts.
  - b) For 37.5 ips machines adjust for a total voltage change of 5.0 volts.
  - c) For 25 ips and slower machines adjust for a total voltage change of 3.5 volts.

## 15.3.2 <u>Swing Arm Position</u>

The swing arm position must be adjusted with tape loaded and the machine operating at the proper speed. Both file and fixed reel arm positions must be adjusted with minimum pack (less than 1/16-inch of tape on reels). The file reel arm position is adjusted by potentiometer R508 while running forward and the fixed reel arm position is adjusted by R465 while running in reverse. The correct operating arm positions for each speed machine is as follows:

- 1. 45 and 37.5 ips machines should have the swing arm adjusted so that the center of the outermost roller guide on the swing arm is 3/16 of an inch above (measured vertically) the top edge of the fixed roller guide support bracket.
- 2. 25 ips and slower machines should have the swing arm position adjusted according to the table below. The distances given in the table are measured vertically from the center of the swing arm roller guide to the top edge of the fixed roller guide support bracket.

Machine Speed	Swing Arm Position Above Fixed Guide Bracket
25 ips	1/2 inch
18.75 ips	1.0 inch
12.5 ips	1-1/2 inches
10 ips	1-1/2 inches

## 16. DATA ELECTRONICS DUAL GAP SYSTEMS ADJUSTMENTS

## 16.1 ADJUSTMENT SEQUENCE

All alignments are made at the factory prior to shipment of equipment. Verify alignments if either subassembly has been replaced, or if data electronics or heads seem to malfunction. Before performing the adjustments, verify that the scope probes, plug-in unit, and time base are calibrated.

All potentiometer and test point locations are identified by a silkscreened designator adjacent to the component on the module. (See FigureB32 for the physical board location of test points and adjustments.)

WARNING: SYSTEM POWER MUST BE TURNED OFF
BEFORE DISCONNECTING OR CONNECTING
EITHER THE DATA ELECTRONICS MODULE
OR THE HEAD ASSEMBLY.

Tape transport and power supply adjustments must be verified before performing the data electronics adjustments. Because of the inter-relationship among the circuits, the adjustments must be made in the following sequence:

- 1. Phase splitter quiescent level adjustment
- 2. Read amplifier gain adjustment
- Crossfeed shield
- 4. Read strobe delay adjustment
- 5. Read stack azimuth measurement and correction
- 6. Write stack deskew
  - a) Read stack profile measurement
  - b) Write deskew single-shot adjustment
- 7. Verification--staircase measurement.

### 16.2 PHASE SPLITTER QUIESCENT LEVEL

The following prescribes the adjustment procedure for nine-channel tape transports. The levels at test points 202 and 302 need not be correct for seven-channel systems.

- 1. Scope controls:
  - a) Mode--Channel 1; DC.
  - b) Sensitivity--0.05 V/cm.
  - c) Trigger--Internal, automatic stability.
- 2. Connect Channel 1 probe to test point 102.
- Without running tape, adjust potentiometer R27 until+ 1.0 VDC is observed at test point 102.

- 4. Scan test points 202 to 902 to ensure that the quiescent point of all the phase splitters falls within  $+1.0 \pm 0.3$  VDC.
- 5. If this condition cannot be attained, readjust R27 until the condition is satisfied.

# 16.3 READ AMPLIFIER GAIN

The following prescribes the adjustment procedure for nine-channel tape transports. For seven-channel systems, set R218 and R318 fully counterclockwise.

- 1. Scope controls:
  - a) Mode--Channel 1; AC.
  - b) Sensitivity--0.2 V/cm.
  - c) Trigger--Internal, automatic stability.
- 2. Load <u>Standard Level Output Tape</u> on the transport and set the tape controller for a continuous write mode at a frequency corresponding to 800 cpi and ones written on all channels.
- 3. Connect Channel 1 scope probe to test point 102 and run tape forward. Adjust R118 so that the analog signal has a 12-volt peak to peak amplitude. (See Figure 57.)
- 4. Repeat for all channels. See Table 6 for correct potentiometers and test points.

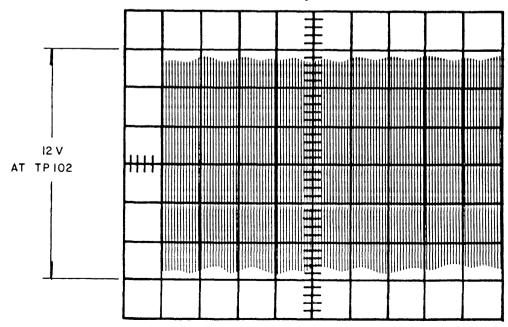


Figure 57. Read Amplifier Gain Adjustment, Dual Gap Systems

Table 6. Data Electronics Adjustment Points - Dual Gap Systems

	Alignment Section				
Channel	Read Am	Amp Gain Write Deskew		Comments	
	Test Point	Pot. No.	Test Point	Pot. No.	
Р	TP-102	R-118	TP-103	R-104	
0	TP-202	R-218	TP-203	R-204	Not used in 7-Channel systems.
1	TP-302	R-318	TP-303	R-304	Not used in 7-Channel systems.
2	TP-402	R-418	TP-403	R-404	
3	TP <b>-</b> 502	R-518	TP-503	R-504	
4	TP <b>-</b> 602	R-618	TP-603	R-604	
5	TP-702	R-718	TP-703	R <b>-7</b> 04	
6	TP-802	R-81.8	TP-803	R-804	
7	TP-902	R-918	TP <b>-</b> 903	R-904	

#### 6.4 CROSSFEED SHIELD

This is a mechanical alignment on the head gate assembly necessary to minimize the write-to-read crossfeed signal. If the complete head assembly has been replaced, proceed starting with Step 1. If only the crossfeed shield has been replaced, or if only a check is being performed, skip Step 1.

- 1. Turn all write deskew single-shot potentiometers (R104 to R904) so that all nine head drivers switch simultaneously. This can be observed by scoping test points 101 to 901.
- 2. Place Channel 1 scope probe on test point 602 and Channel 2 scope probe on test point 702. If this is a seven-channel system, place Channel 1 scope probe on 102 and Channel 2 scope probe on 902. With scope plug-in mode on alternate, set both scope channel vertical gains to 0.01 V/cm.
- 3. Remove tape from capstan so that the tape will not move when a run command is given. This is to be done by threading the tape, such as to wrap the guide adjacent to the capstan, onto the fixed reel swing arm.

4. Set the tape controller unit for a continuous write mode, all ones on all channels. Run transport and observe crossfeed on the two edge channels. If the peak to peak amplitude of the crossfeed is less than the following, no adjustment is required.

Null Voltage (MV - P-P)	Speed (IPS)		
<b>7</b> 50	10		
600	12.5		
500	18.75		
400	25 and above		

See Figure 59 for typical head gate wave forms.

5. If the amplitude is greater than the voltage resulting from the table in item 4, loosen the two head gate screws and reposition the gate by moving it in the plane shown in Figure 58 until a null voltage is reached. The edge of the ferrite should be approximately opposite the Write gap. Be sure that the shield housing is resting on the head block at front and back.

### 16.5 READ STROBE DELAY

- 1. Scope controls:
  - a) Mode--Channel 1, DC.
    - b) Sensitivity--0.1 V/cm.
    - c) Trigger--Internal (+) trigger mode.
- Connect Channel 1 scope probe to test point 3.
- 3. Verify that the transport is selected for high density operation and write all ones as described in paragraph 16.4, step 2.
- 4. A positive pulse will be observed at test point 3. See Figure 60. Adjust R49 for a pulse width of approximately one-half frame time. At 25 ips this should be 25  $\mu$ sec. A frame time is defined as 1, where V is the transport velocity and D is the operating data density.

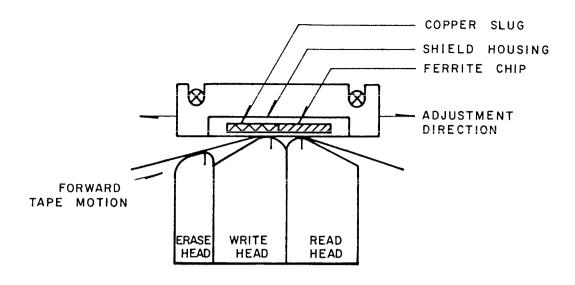


Figure 58. Head Gate Adjustment, Dual Gap Systems

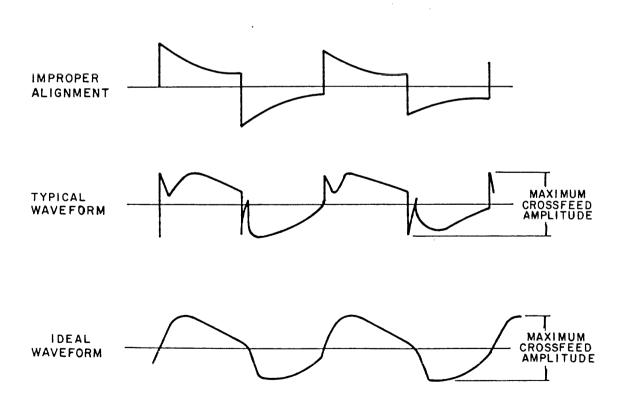


Figure 59. Head Gate Adjustment Waveforms, Dual Gap Systems

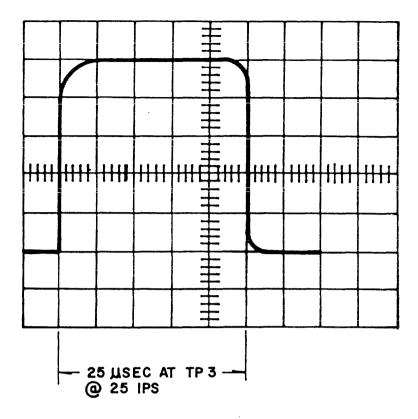


Figure 60. Read Strobe Delay Adjustment, Dual Gap Systems

### 16.6 READ STACK AZIMUTH MEASUREMENT AND CORRECTION

This adjustment is required only when the read/write head assembly has been replaced. Its purpose is to ensure that the read stack is perpendicular to the tape path. This is a mechanical adjustment and is accomplished by shimming either (but only one) of the two guides mounted on the head assembly base plate. The shims are mounted by removing the guide, inserting a shim on the guide shaft, and re-assembling the guide on the base plate. The shims are 0.0002 inch thick and one shim will correct for 15 micro-inches of skew.

## 1. Scope controls:

- a) Mode--Chop.
- b) Sensitivity--0.2 V/cm, DC, both channels.
- c) Trigger--External (+) AC trigger mode.
- d) Sweeptime--Sufficient resolution so that the positive-going edges of each trace can be accurately measured.

- 2. Place Channel 1 scope probe and trigger probe on the test point corresponding to the head edge track located closest to the transport. This test point is 603 for nine-channel systems and 103 for seven-channel systems.
- 3. Place Channel 2 probe on the test point corresponding to the channel farthest from the transport. This test point is 703 for nine-channel systems and 903 for seven-channel systems.
- 4. Load a master skew alignment tape, making sure that the write enable ring is removed. Place the tape controller unit in a read mode and observe the time displacement between leading edges (see Figure 61). If the time displacement corresponds to a distance less than 25 microinches (1 μsec at 25 ips), no shimming is required:

Distance ( $\mu$ inch) = Velocity (ips) X Time ( $\mu$ sec).

If the time displacement corresponds to a distance greater than 25 micro-inches, the guide on the file reel side of the head assembly must be shimmed. The number of shims can be calculated as follows, where N represents the number of shims:

$$N = \frac{\text{(Tape Speed) (Time)}}{15}$$

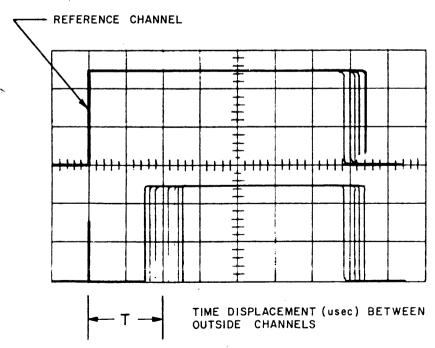


Figure 61. Head Stack Shimming, Dual Gap Systems

Number of	Time Displacement for Speed Indicated (µsec)			
Shims	12.5 ips	25 ips	37.5 ips	45 ips
1 2 3 4 5 6 7 8	0.7 - 1.8 1.9 - 3.0 3.1 - 4.2 4.3 - 5.4 5.5 - 6.6 6.7 - 7.8 7.9 - 9.0 9.1 - 10.2	0.4 - 0.9 1.0 - 1.5 1.6 - 2.1 2.2 - 2.7 2.8 - 3.3 3.4 - 3.9 4.0 - 4.5 4.6 - 5.1	1.1 - 1.4 1.5 - 1.8 1.9 - 2.2 2.3 - 2.6	0.2 - 0.5 0.6 - 0.9 1.0 - 1.2 1.3 - 1.5 1.6 - 1.8 1.9 - 2.2 2.3 - 2.5 2.6 - 2.8

Shim Table for Standard Tape Speeds

- 5. If the leading edge of the trace being triggered is seen but not that of the other channel, place the scope trigger probe on the opposite channel and observe the time displacement between pulse leading edges. In this case, the tape guide on the capstan side of the head assembly must be shimmed according to the instructions in step 4.
- 6. After the guide is shimmed, verify that the time displacement between the outside channels corresponds to a distance less than 25 microinches.
- 7. Measure and record the static data staircase using the master skew tape utilizing the method described in subsection 16.8. This data will later be used to compare with the results of that section.

# 16.7 WRITE STACK DESKEW

The method used to ensure proper Write head deskewing is first to plot the read stack gap scatter in the forward direction, referencing each track to the leading track, and using an IBM Master Skew Tape. Then the gap scatter plot is duplicated while writing all ones on a scratch-pad tape by adjusting the potentiometers of the Write Deskew single shots.

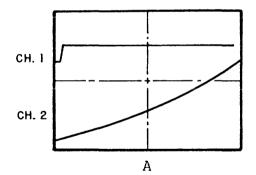
### 16.7.1 Read Head Stack Profile

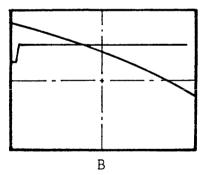
The method used to measure and record the gap scatter is first to locate the leading track and then to measure the time displacement of each of the other tracks with respect to this track.

### 16.7.1.1 How to Locate the Leading Track:

The leading track will be located by comparing all the tracks to each other in the method described below. The digital data compared, will be only that which corresponds to the negative peaks of the analog signals observed at TP102 - TP902. By taking this precaution, error due to the effect of the pulse pairing phenomenon is eliminated.

- 1. Scope Controls
  - a) Mode--Chop
  - b) Sensitivity--0.2 V/cm, DC, both channels
  - c) Trigger--External (+) AC mode connected to CH1 Trigger out jack.
- 2. Using the IBM Skew Tape, run the transport in the forward direction in the ON-LINE mode.
- 3. Set Channel 1 scope probe on TP103 and the Channel 2 probe on TP102. Set the scope sweeptime at  $1 \mu \sec/cm$ . One of the patterns shown in Figure 62 will be observed on the screen:





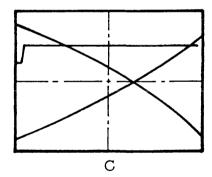


Figure 62. Triggering Method

- 4. If the display of Figure 62-A is observed, proceed to step 5, since this indicates that correct triggering of alternate bits generated by the negative analog signal peaks has been achieved.
  - a) If the display of Figure 62-B is observed, triggering is on alternate bits but created by the wrong polarity analog signal peak. To correct the triggering, lift and re-apply Channel 1 probe to TP103. Normally, after one or two tries, triggering will switch to the correct polarity.

- b) If the display of Figure 62-C is observed, triggering again is incorrect because it is occurring on every bit. To correct this condition, change to a faster or slower scope sweep speed.
- Once the display of Figure 62-A is obtained,
  do not change the sweep speed for the remainder of the procedure. If greater sweep
  speed resolution is required, use the Horizontal
  Magnifier. Correct triggering will be maintained as long as the trigger probe is not moved
  to another point or if the tape does not change
  direction.
- 5. Move Channel 2 probe to TP203.
  - a) If it is observed that the positive going pulse of TP203 follows the trigger pulse, move Channel 2 probe to TP303 since TP103 is the leading of the two tracks, and it is required to maintain the Channel 1 probe on the leading track. Repeat the process until the signal on Channel 2 is not observed.
  - b) If the signal on TP203 is not observed on the screen, it is the leading track. Move Channel 1 probe to TP203. Since the trigger probe has now changed location, verify that triggering is still correct, following the method described in step 4 by observing TP102 with Channel 2. Move Channel 2 to TP303.
- 6. Repeat the process described in step 5 until all the tracks have been scanned, making sure correct triggering is maintained every time the Channel 1 probe is moved to the newly-found leading track.
- 7. To verify that the leading track has truly been located, keep the Channel 1 probe fixed on that track and scan the remainder of the tracks with Channel 2 probe. The leading edge of the positive pulse will be observed at all of the test points.

#### 16.7.1.2 Profile Plot:

Keeping Channel 1 probe on the Read register test point corresponding to the leading track, use Channel 2 probe on TP103 through TP903. Record the time displacement between the leading edges of both pulses for each track, making sure that the proper triggering method is used.

# 16.7.2 Write Single-Shot Deskew

This adjustment is performed while the transport is loaded with a scratch tape for writing all ones on all tracks at 800 cpi.

- 1. While running the transport continuously, display the reference track on Channel 1 and the test track using Channel 2 of the scope. Set the reference track potentiometer to approximately one-third turn from the counterclockwise position. Adjust the corresponding write deskew potentiometer so that the read profile of paragraph 16.7.1.2 is duplicated, making sure that the proper triggering method is used.
- 2. Repeat for all tracks. See Table 6 for correct test point and potentiometer.

#### 16.8 VERIFICATION--STAIRCASE MEASUREMENT

A quick verification of all the foregoing adjustments can be made by checking the width of the data staircase when the transport is running in the forward direction.

- 1. Scope controls:
  - a) Mode--Channel 1, DC.
  - b) Sensitivity--0.1 V/cm.
  - c) Trigger--External (+) AC, Trigger mode.
- 2. Connect scope trigger probe to test point 3 and Channel 1 probe to test point 2.

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3. While writing continuous ones, the waveform should resemble that shown in Figure 63. Time T should approximate the results of subsection 16.6, step 7 and should not exceed:

$$\frac{100}{\text{Tape Speed}}$$
  $\mu \text{sec}$  (T < 4  $\mu \text{sec}$  at 25 ips)

Time T shall not include the effects of dynamic skew.

4. If this condition is not met, repeat the procedures specified in paragraphs 16.6 through 16.7.

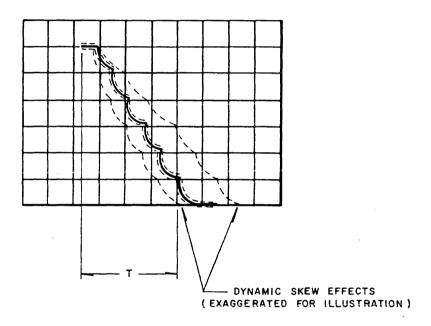


Figure 63. Staircase Waveform, Dual Gap Systems

# 17. DATA ELECTRONICS SINGLE GAP SYSTEMS ADJUSTMENTS

# 17.1 ADJUSTMENT SEQUENCE

All alignments are made at the factory prior to shipment of equipment. Verify alignments if either subassembly has been replaced, or if data electronics or heads seem to malfunction. Before performing the adjustments, verify that the scope probes, plug-in unit, and time base are calibrated.

All potentiometer and test point locations are identified on the module by a silk-screened designator adjacent to the component. See Figure B28for the location of test points and adjustments on the module. WARNING: SYSTEM POWER MUST BE TURNED OFF
BEFORE DISCONNECTING OR CONNECTING
EITHER THE DATA ELECTRONICS MODULE
OR THE HEAD ASSEMBLY.

Tape transport and power supply adjustments must be verified before performing the data electronics adjustments. Because of the interrelationship among the circuits, the adjustments must be made in the following sequence:

- 1. Read amplifier gain adjustment
- 2. Read strobe delay adjustment
- 3. Read stack azimuth measurement and correction
- 4. Verification--staircase measurement.

#### 17.2 READ AMPLIFIER GAIN

The following prescribes the adjustment procedure for nine-channel tape transports. For seven-channel systems, Set R211 and R311 fully counterclockwise.

- 1. Scope controls:
  - a) Mode--Channel 1; AC
  - b) Sensitivity--0.2 V/cm.
  - c) Trigger--internal, automatic stability.

NOTE: BE CAREFUL TO USE A <u>STANDARD LEVEL</u> <u>OUTPUT TAPE</u> FOR THE READ AMPLIFIER GAIN ADJUSTMENT.

- 2. Load standard level output tape on the transport and set the tape controller for a continuous write mode at a frequency corresponding to 800 cpi and ones written on all channels.
- 3. Rewind and then run forward in a Read mode.
- 4. Connect Channel 1 scope probe to test point 103 and run tape forward. Adjust R111 so that the analog signal has a 12-volt peak to peak amplitude. (See Figure 64.)
- 5. Repeat for all channels. See Table 7 for correct potentiometers and test points.

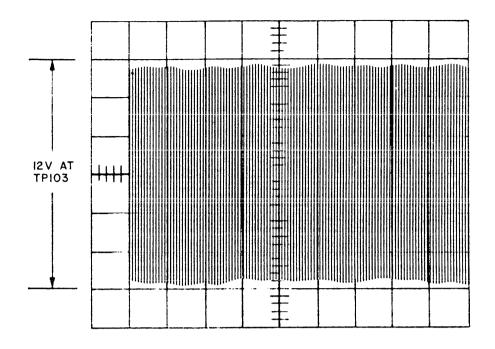


Figure 64. Read Amplifier Gain Adjustment, Single Gap System

Table 7. Data Electronics Adjustment Points - Single Gap System

Alignment Section Read Amp Gain				
Channel	Test Point	Pot. No.	Comments	
P	TP-103	R-111		
0	TP-203	R-211	Not used in 7-channel systems	
1	TP-303	R-311	Not used in 7-channel systems	
2	TP-403	R-411	7-Chamier systems	
3	TP-503	R-511		
4	TP-603	R-611		
5	TP-703	R-711		
6	TP-803	R-811		
7	TP-903	R-911		

### 17.3 READ STROBE DELAY

- 1. Scope controls:
  - a) Mode--Channel 1, DC.
  - b) Sensitivity--0.1 V/cm.
  - c) Trigger--Internal (+) trigger mode.
- 2. Connect Channel 1 scope probe to test point 5.
- 3. Verify that the transport is selected for high density operation and read all ones.
- 4. A positive pulse will be observed at test point 5. (See Figure 65.) Adjust R28 for a pulse width of approximately one-half frame time. At 25 ips this should be 25  $\mu$ sec, at 37.5 ips, 17  $\mu$ sec, and at 45 ips, 14  $\mu$ sec. A frame time is defined as  $\frac{1}{VD}$ , where V is the transport velocity and D

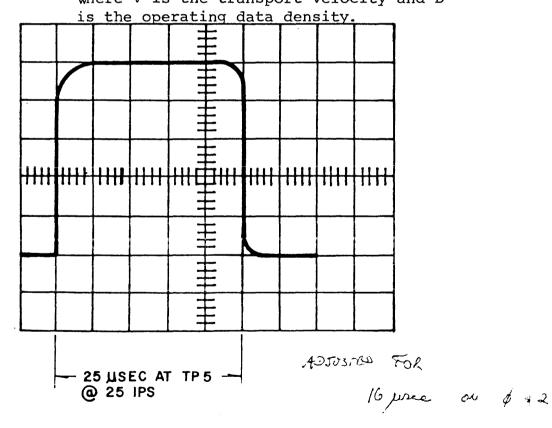


Figure 65. Read Strobe Delay Adjustment, Single Gap Systems

#### 17.4 HEAD STACK AZIMUTH MEASUREMENT AND CORRECTION

This adjustment is required only when the read/write head assembly has been replaced. Its purpose is to ensure that the stack is perpendicular to the tape path. This is a mechanical adjustment and is accomplished by shimming either (but only one) of the two guides mounted on the head assembly base plate. The shims are mounted by removing the guide, inserting a shim on the guide shaft, and reassembling the guide on the base plate. The shims are 0.0002 inch thick and one shim will correct for 15 microinches of skew.

## 1. Scope controls:

- a) Mode--Chop.
- b) Sensitivity--0.2 V/cm, DC, both channels.
- c) Trigger--External (+) AC trigger mode.
- d) Sweeptime--Sufficient resolution so that the positive-going edges of each trace can be accurately measured.
- Place Channel 1 scope probe and trigger probe on the test point corresponding to the head edge track located closest to the transport. This test point is 605 for nine-channel systems and 105 for seven-channel systems.
- 3. Place Channel 2 probe on the test point corresponding to the channel farthest from the transport. This test point is 705 for nine-channel systems and 905 for seven-channel systems.
- 4. Load a master skew alignment tape, making sure that the write enable ring is removed. Place the tape controller unit in a read mode and observe the time displacement between leading edges. (See Figure 66.) If the time displacement corresponds to a distance less than 25 microinches, no shimming is required.

Distance ( $\mu$ inch) = Velocity (ips) X Time ( $\mu$ sec.)

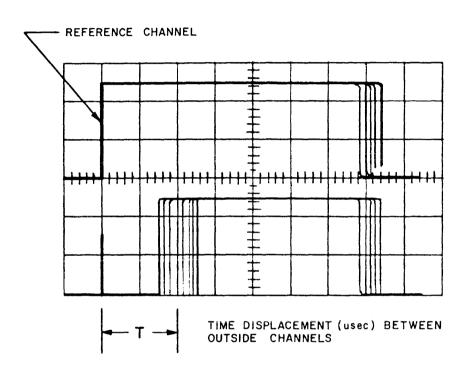


Figure 66. Head Stack Shimming, Single Gap System

If the time displacement corresponds to a distance greater than 25 microinches, the guide on the file reel side of the head assembly must be shimmed. The number of shims can be calculated as follows, where N represents the number of shims:

$$N = \frac{\text{(Tape Speed) (Time)}}{15}$$

Number of	Time Displacement for Speed Indicated (µsec)				
Shims	12.5 ips	25 ips	37.5 ips	45 ips	
1 2 3 4 5 6 7 8	0.7 - 1.8 1.9 - 3.0 3.1 - 4.2 4.3 - 5.4 5.5 - 6.6 6.7 - 7.8 7.9 - 9.0 9.1 - 10.2	0.4 - 0.9 1.0 - 1.5 1.6 - 2.1 2.2 - 2.7 2.8 - 3.3 3.4 - 3.9 4.0 - 4.5 4.6 - 5.1	1.5 - 1.8 1.9 - 2.2	0.2 - 0.5 0.6 - 0.9 1.0 - 1.2 1.3 - 1.5 1.6 - 1.8 1.9 - 2.2 2.3 - 2.5 2.6 - 2.8	

- 5. If the leading edge of the trace being triggered is seen but not that of the other channel, place the scope trigger probe on the opposite channel and observe the time displacement between pulse leading edges. In this case, the tape guide on the capstan side of the head assembly must be shimmed according to the instructions in step 4.
- 6. After the guide is shimmed, verify that the time displacement between the outside channels corresponds to a distance less than 25 microinches.

#### 17.5 VERIFICATION--STAIRCASE MEASUREMENT

A quick verification of all the foregoing adjustments can be made by checking the width of the data staircase when the transport is running in the forward direction.

### 1. Scope controls:

- a) Mode--Channel 1, DC.
- b) Sensitivity--0.1 V/cm.
- c) Trigger--External (+) AC, trigger mode.

- 2. Connect scope trigger probe to test point 5 and Channel 1 probe to test point 6.
- 3. While reading continuous ones that have just been recorded, the waveform should resemble that shown in Figure 67. Time T should not exceed:

$$\frac{100}{\text{Tape Speed}}$$
 µsec. (T<4 µsec at 25 ips)

Time T shall not include the effects of dynamic skew.

4. If this condition is not met, repeat the procedures specified in paragraph 17.4.

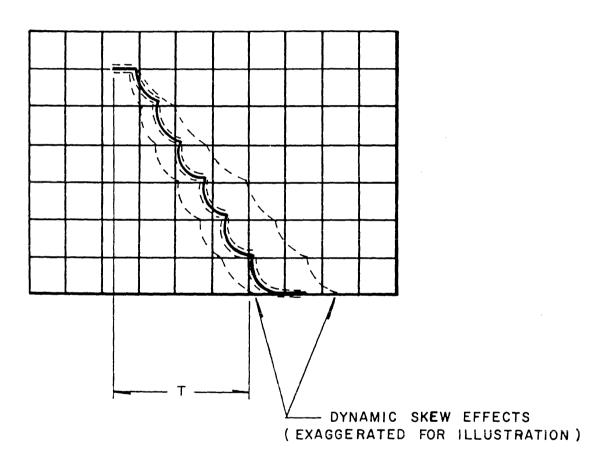


Figure 67. Staircase Waveform, Single Gap Systems

#### 18.0 TROUBLESHOOTING

The following System Troubleshooting Chart provides a means of isolating faults by citing symptoms, providing probable causes and remedies and referencing descriptive sections within the text. This chart in general must be used in conjunction with applicable schematics, assembly drawings and wiring diagrams. Refer to the system photographs in Figure 68 and Figure 69 to help locate the various subassemblies.

# TROUBLESH OTING GUIDE

Symptom	Probable Cause	Remedy	Reference
Power indicator light does not work when switch is pressed on front panel.	Sl power switch in OFF position.	Switch S1 to ON position located by AC cord input.	Section 1, Figure 2
pressed on from paner.	+5 volts missing.	Check +5 volts at TP1 on regulator circuit board which is mounted on the power supply.	Section 6, Paragraph 13
	CB1 Thermo breaker open.	Push in thermo breaker button located by AC cord input.	Section 1, Figure 2
	Power Indicator Lamp burnt out.	Check the two outside terminals for lamp continuity. You can pull the switch out from the front.	Section VI, Paragraph 5
	No AC voltage to transport.	Check outlet with voltmeter for the proper AC voltage.	
When the LOAD button is pressed swing arms	Electro-mechanical retract assembly not working.	S16 micro switch open on cam retract assembly.	B13
do not move.	+13V unregulated is missing.	Check J19 Pin 2 for +13V.	В3
	P19 connector not seated.	Check connection.	
	Kl relay coil open.	Pull out relay and measure for continuity between pins 1 and 4.	Sec. VI Figure 49

#### TROUBLESHOOTING GUIDE

Symptom	Probable Cause	Remedy	Reference
When the LOAD button Tape threaded incorrectly is pressed the swing arms		Check threading diagram.	Sec. II., Fig. 5
travel to their upper limits and retract to the load position.	Electro-mechanical retract assembly not working.	S14 micro switch not closing during a load cycle.	B13
load position.	Kl power relay not picking.	Check J19 Pin 2 for +13V.	В3
	+13 volt missing13 volt missing.	Check TP 420. Check TP 421.	Sec. VI Para. 1.1
When the LOAD button is pressed tape tensions and	Tape not threaded correctly.	Check threading diagram.	Sec. II., Fig. 5
moves forward at a fast speed.	Fixed reel amplifier defective.	Remove tape, press load button when swing arms reach their upper limit, turn power OFF & ON. Now the swing arms can be cycled by hand and the voltages can be checked.	Sec. VI. Para. 15.3.
When the LOAD button is pressed tape tensions and	Tape not threaded correctly.	Check threading diagram.	Sec. II., Fig. 5
travels at a fast reverse speed.	File reel amplifier defective.	Remove tape, press load button when swing arms reach their upper limit, turn power OFF & ON. Now the swing arms can be cycled by hand and the plus and minus voltages at TP425 and TP418 can be measured.	Sec. VI. Para. 15.3.

# TROUBLESHOOTING GUIDE

Symptom	Probable Cause	Remedy	Reference
When the LOAD pushbutton is pressed, tape tensions,	No forward motion (forward lamp not lit.)	Check TP402 for +5 volts.	В23 & В24
but tape does not move forward.	Ramp generator circuit not working.	Check TP404 for voltage output.	в23 & в24
	Capstan amplifier not working.	Check TP408 for voltage output.	в23 & в24
When the LOAD pushbutton	BOT tab dirty or tarnished.	Clean with IBM cleaner.	
is pressed, tape tensions and the tape moves for- ward but does not stop at	Photosense lamp burnt out.	Remove head cover and check.	
the BOT marker.	Photosense assembly not adjusted correctly.	With tape loaded and not at BOT . TP 201 should be zero volts.	Sec. VI. Para. 15.1.
Swing arms continually cycle up and down after unloading the tape.	Microswitch on cam re- tract not opening.	Remove overlay and check S15 microswitch by pressing LOAD button and visually watching for make and break action.	B13
	Defective microswitch.	Test microswitch with power OFF using an ohmmeter.	В13

#### TROUBLESHOOTING GUIDE

Symptom	Probable Cause	Remedy	Reference
Tape does not respond to a forward or reverse com- mand in an ON LINE condition.	No ready status from trans- port.	Check ready status J16 Pin T for zero volts (low TRUE interface.)	B22 & B23
	Interface cable fault.	Check at controller cable and for Ready Status zero volt level input.	B22 & B23
	No forward input command.	Check forward level J16 Pin C for zero volts input.	B22 & B23
j		Check J16 Pin J for zero volts input. Check H and J jumper for +5 volts.	B22 & B23
Write command given but no data being recorded.	File protect logic not working.	Remove tape. Turn Power OFF. Turn power ON and push in solenoid plunger; it should stay in. Press the LOAD button. The plunger should now come out.	B12 Fig. 23.
	No write power.	Check TP6 for +12V. (Dual Gap) Check TP3 for +5V. (Single Gap)	B31 & B32 B27 & B28
	No write enable command.	Check TP207 for +5 volts.	B22 & B23
Missing write clock.		Check J1 Pin A for negative going clock.	B27 & B28 (S/G) B31 & B32 (D/G)
Heads not plugged in correctly.		Check J2 connector	B27 & B28 (S/G)
	contectry.		B31 & B32 (S/G)

# TROUBLEST DTING GUIDE

Symptom	Probable Cause	Remedy	Reference
Written data is not correct.	Failure of one Write circuit.	Write all one's and check TP101 through TP901 for Write signals.	B31 & B32 (D/G) B27 & B28 (S/G)
	Intermittent Write power, motion, or write reset.	Monitor Write TP6, (D/G) or TP3 (S/G) motion TP204, Write reset Jl Pin C. Look for level changes.	B31 & B32 (D/G) B27 & B28 (S/G)
Correct written data cannot be read.	One of the read channels is dead.	On dual gap units real all one's and check TP102 through TP902 for proper analog waveforms. Check TP103 through TP903 for proper digital waveforms.	в31 & в32 (D/G)
		On single gap units, read all one's and check TP103 through TP903 for proper analog waveforms. Check TP105 through TP905 for proper digital waveforms.	B27 &B28 (S/G)
	Tape tracking is not adjusted correctly.	Check staircase.	Sec. VI. Par. 16.8 (Dual Gap) Sec. VI. Par. 17.5 (Single Gap)

# TROUBLESHOOTING CHART

Symptom	Probable Cause	Remedy	Reference
Correct written data cannot be read, cont'd.	The state of the s		Sec. VI. Par. 16.3 (Dual Gap) Sec. VI. Par. 17.2 (Single Gap)
	Read Strobe Delay adjustment not correct.	Check read strobe delay adjustment.	Sec. VI. Par. 16.5 (Dual Gap) Sec. VI. Par. 17.3 (Single Gap)
	Head & guides need cleaning.	Clean head & guides.	
	Head cable not plugged in.	Plug in head cable.	B28 & B32
	Tape cleaner needs	Empty head cleaner.	Sec. VI. Par. 7.2.

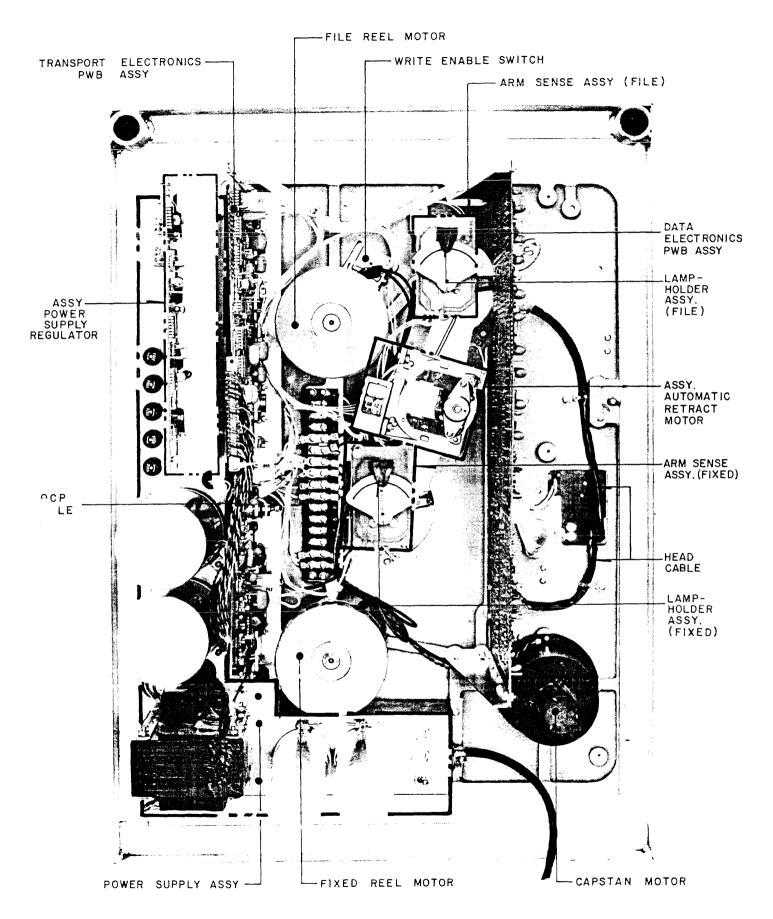


Figure 68. MOD 10 Tape System - Rear View

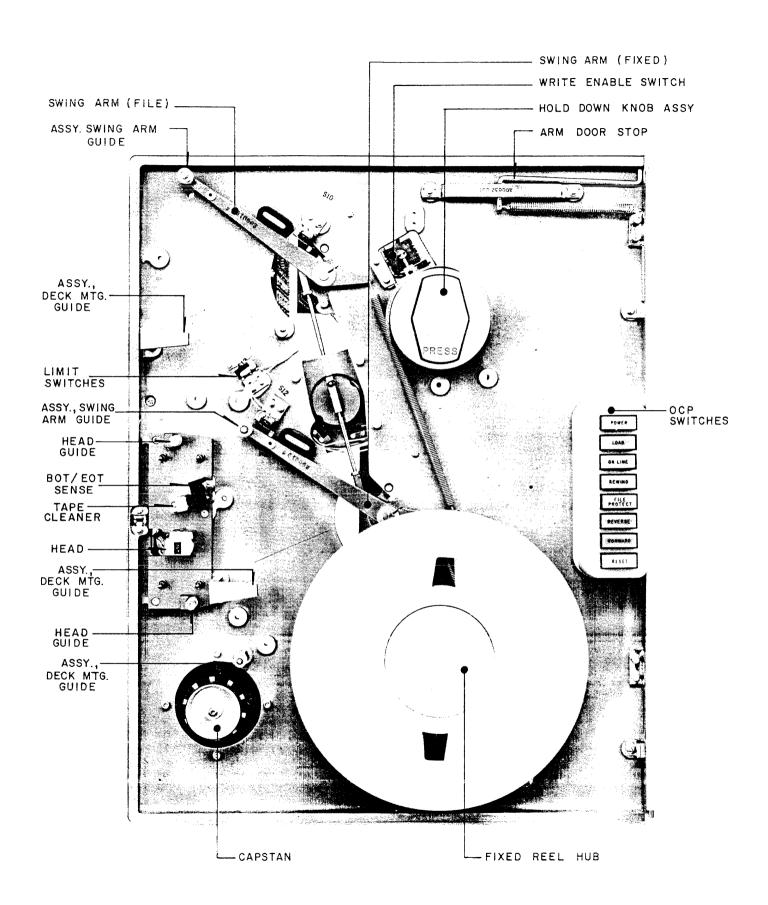


Figure 69. Front View with Overlay Removed

#### Appendix A

#### Recommended Spare Parts List

For resistors, capacitors, small hardware and other items not included in the following list, any equivalent in type, value, size, tolerance, and quality may be substituted.

# RECOMMENDED SPARE PARTS LIST

# WANG MOD 10 TAPE SYSTEM (DUAL- AND SINGLE-GAP, 25 IPS)

Description	Wangco Number	Qty.	Commercial Equivalent
SUBASSEMBLIES			
Head Plate Assembly, 9 Ch., D/G Head Plate Assembly, 9 Ch., S/G	200043-001 200227-001	1 1	
Head Plate Assembly, 7 Ch., D/G Head Plate Assembly, 7 Ch., S/G	200115-001 200226-001	1 ]	
Photosense Assembly	200057	1	
Reel Motor Assembly	200063	1	
Retract Motor Assembly	200119	1	
Capstan Motor/Tach. Assembly	200547	1	
Write Enable Switch Assembly	200378	1	
Arm Sense PWB Assembly	200475	1	
Lamp Holder Assembly	200794	1	
Regulator, PWB Assembly Assembly, Regulator Cable	200495 200858	1 1	
Transport Electronics, PWB., Assy. D/G Transport Electronics, PWB., Assy. S/G	200488-004 200488-016	1 1	
Data Electronics, PWB., Assy. D/G Data Electronics, PWB., Assy. S/G	200521-004 200347-002	1 1	
Self Aligning Guide Assembly	200425	1	
Deck Mounting Guide Assembly	200036	1	
File Reel Roller Guide Assembly	200810	1	
Deck Mounting Guide Assembly	200217	1	
FAB. PARTS & PROC. SPECS.			
Arm, Door Stop	200031	1	
Bracket, Door Stop	200032-001	1	
Bracket, Door Stop	200032-002	1	
Capstan	200039	1	

Description	Wangco Number	Qty.	Commercial Equivalent
Door Front	200030	1	
Transformer, Power	200011	1	
Cam, Arm Sense	200021	1	
Cap, Head Tape Guide	200045	1	
Washer, Head Tape Guide	200046	2	,
Shim, Head Tape Guide	200203	24 00	12-3075
Spring, Head Tape Guide	200047	2 00	12-4672
Brush, Reel Motor	100190	2	
Drum, Head Tape Guide	200096	1	
Brush, Capstan Motor	100186	2	
ELECTRO-MECHANICAL CO	MPONENTS		
Capacitor	100020-008	1	Sangamo 500-1943-01
Capacitor	100020-014	1	Sangamo 500-1949-01
Circuit Breaker	100014	1	Wood Electric, 375-205-1
Fuse, 4 amp	100028-023	1	Littlefuse, 311004
Fuse, 5 amp	100028-024	1	Littlefuse, 311005
Fuse, 10 amp	100028-027	1	Littlefuse, 311010
Indicator, File Protect	100105-002	1	
Relay, Power Supply	100030	1	
Relay, Arm Retract	100215	1	
Switch, Snap Action	100012	1	Micro 15MI-T/J55 Actuator
Switch & Indicator, Forward	100104-001	1	
Switch & Indicator, Load	100104-002	1	
	•		

	Description	Wangco Number	Qty.	Commercial Equivalent
_#				n dari arone
	Switch & Indicator, On-Line	100104-003	1	
	Switch & Indicator, Reverse	100104-004	1	
	Switch & Indicator, Power	100179-001	1	
	Switch & Indicator, Density	100179-005	1	
	Switch, Rewind	100130-001	1	
	Switch, Reset	100130-002	1	
	ELECTRONIC COMPONENTS			
	IC Hex Inverter	100084	2	Motorola MC-836P
	IC Quad. 2 Input NAND	100085	2	TI SN15846N
	IC Quad. 2 Input NAND	100086	1	TI. SN15858N
	C 10 Input NAND	100087	1	Motorola MC-1804P
	IC Dual Flip-Flop	100088	2	TI SN158093N
	IC Operational Amplifier	100089	1	Fairchild, U6A7739393
	IC Monostable	100090	1	Fairchild, U6A960159X
	IC Dual Flip-Flop	100095	2	Motorola MC-852P
	IC Triple Input NAND	100107	1	Motorola MC-862P
	IC Voltage Regulator	100108	1	Fairchild, U6A7723393
	IC Operational Amplifier	100109	1	Fairchild, U6A7741393
	IC Operational Amplifier	100167	2	Motorola, MC-1437L
	Transistor, NPN	100080	6	2N4123
	Transistor, PNP	100081	2	2N4125
	Transistor, Dual NPN	100082	2	TD 101, Sprague

······································	Description	Wangco Number	Qty.	Commercial Equivalent
	Transistor, PNP	100083	1	Motorola, MPS-U51
	Transistor, NPN	100112	1	TI P29
	Transistor, PNP	100113	1	TI P30
	Transistor NPN	100125	1	2N2219
	Transistor, PNP	100158	1	2N3053
	Transistor, NPN	100159	1	2N3055
	Transistor, PNP	100160	1	2N4037
	Transistor, NPN	100173	1	2N3771
	Semiconductor, SCR	100162	1	RCA 40654
	Diode, Rectifier Bridge	100018	1	Motorola MDA 962-1
	Diode, Signal	100091	6	1N914
	Diode, Zener	100118	1	1N752
	Diode, Rectifier	100127	1	1N4003
	Diode, Zener	100161	1 .	1N4736A
	Diode, Power	100174	1	1N3208
	Resistor, Variable, 50 ohm	100069-500	1	CLPA 50
	Resistor, Variable, 20 K	100069-203	2	CLPA 20K
	Resistor, Variable, 5K	100069-502	2	CLPA 5K
	Resistor, Variable, 500 ohm	100163-501	1	Dale P/N 2487
	Resistor, Variable, 1K	100163-102	1	Dale P/N 2487
	Resistor, Variable, 5K	100163-502	1	Dale P/N 2487
	Resistor, Variable, 10 K	100163-103	1	Dale P/N 2487
	Resistor, Variable, 20K	100163-203	1	Dale P/N 2487

# SPARES REQUIRED FOR SPEEDS OTHER THAN 25 IPS

	Wangco		Commercial
Description	Number	Qty.	Equivalent
S/G Data Electronics PWB., Assy.			
5/G Data Liectionics FWB., Assy.			
12.5 ips	200347-001	1	
37.5 ips	200347-003	1	
45 ips	200347-004	1	
D/B Data Electronics PWB., Assy.			
10-13 ips	200521-001	1	
13-17 ips	200521-002	1	
17-23 ips	200521-003	1	
30-40 ips	200521-005	1	
40-45 ips	200521-006	1	
S/G Transport Electronics, PWB, Assy.			
10 ips	200488-013	. 1	
12.5 ips	200488-014	ī	
18.75 ips	200488-015	1	
37.5 ips	200488-017	1	
45 ips	200488-024	1	
D/G Transport Electronics, PWB. Assy	•		
10 ips	200488-001	1	
12.5 ips	200488-002	1	
18.75 ips	200488-003	1	
37.5 ips	200488-005		
45 ips	200488-006	1	
Transformer, Power Supply			
37.5 - 45 ips	200487	1	

# Appendix B

# Schematic Drawings

#### APPENIDX B

# List of Drawings

B-1	Material List, Power Supply 115V, 60Hz
B-2	Schematic, Power Supply 115V, 60Hz
B-3	Assembly, Power Supply 115V, 60Hz
B-4	
B-5	Assembly, Power Supply Regulators
B-6	Schematic, Power Supply Regulators
B-7	Component Zoning Chart
	Power Supply Regulators
B-7	Assembly, Regulator Input Cable
B-9	Assembly, Cable O.C.P.
B-10	Assembly, Photsense, PWB
B-10a	Assembly Photosense
B-11	Assembly, Arm Sense
B-12	Assembly, Write/Enable Switch
B-13	Assembly, Retract Motor
B-14	Schematic, Retract Motor
B-15	Assembly, Retract Motor
	Brake Option
B-16	Schematic, Retract Motor
	Brake Option
B-17	Assembly, Brake Logic
B-18	Schematic, Brake Logic
B-19	Assembly, Data Control Cable
B-20	Assembly, Micro Switch Harness
B-21	Material List, Transport Electronics, PWB
B-22	Schematic, Transport Control Logics, PWB
B-23	Assembly, Transport Electronics, PWB
B-24	Schematic Servo Amplifiers
B-25	Component Zoning Chart
	Transport Electronics, PWB
B-26	Material List, Data Electronics, Single Gap, PWB
B-27	Schematic, Data Electronics, Single Gap PWB
B-28	Assembly, Data Electronics, Single Gap, PWB
B-29	
B-30	Material List, Data Electronics, Dual Gap, PWB
B-31	Schematic, Data Electronics, Dual Gap PWB
B-32	Assembly, Data Electronics, Dual Gap PWB
B-33	
B-34	Wiring Diagram Magnetic Tape Transport, Single Gap
B-35	Wiring Diagram Magnetic Tape Transport, Dual Gap

MATERIAL LIST 200511 ASSY. 115v. 60Hs. MODEL NO. \_\_\_\_ DATE 8/11/70 SHEET 1 OF 3 POWER SUPPLY. 25 ips. ITEM DRAWING TITLE NO. REQ. DWG NO REMARKS ON CKT. DESIG. ī Chassis, Pewer Supply. 200509 1 2 Spec. Pewer Transformer. 200011 1 n. 3 100011 CB-1 h Breaker, Circuit. 1 100015 1 Sl. 5 Switch, Teggle. DPST. Bridge, Rectifier. 100018 DB-1. DB-2. 2 6 100020-008 C3.C4. Remove Terminal Screws 2 7 Capaciter, Elect. 100,000uf. Cl.C2.) and replace with Item 47. 8 Capacitor, Elect. 30,000uf. 100020-014 2 Block, Terminal. 100023-010 TB.1. 1 9 100025-003 Use with item 8. 10 . Clamp, Capacitor. 2" Dia. 2 100025-007 Use with item 7. Clamp, Capacitor. 3" Dia. 2 11 Holder, Pase. 100027 5 12 4 amp. 100028-023 13 Pass. 1 FL. 5 mp. 100028-024 n. **1**h Pase. 1 10 amp. 100028-027 F2.F3.F5. 15 Puse. 3 Relay. 100030 1 Kl. 16 Grownet. 100227-005 2 17 100927-009 1 18 Groumet. Strip, Marker. 100048-010 1 19 100149-007 2 TB.3. TB.4. Strip, Terminal. 20 21 Jumper, 2 Terminal. 100150 Clamp, Cable. 100152-001 Power Cord. 22 1 Cord, Power. 100076 23 2h Terminal, Ins. Stand-off. 100178-001 2 Diode, Rectifier. 100127 9 Ch.1. thru CR.9. 25 200af. 100183 C5\_C6\_ 26 Capacitor. 2 27 Resistor. 15%. 5w. 0.10 100111-0R1 RS. Resistor. " 100068-331 Rl. thru Ri. 3₩. 330 s Connector, Female. 29 100010-005 P21. 100010-007 2 J18. J19. 30 Connector, Female. Connector, Female. 100010-009 Plh. IJ 1 12017-020

Om rector, kamalu.

320.

Wire 33 3**l**ı Wire 35 Wire Wire 36 37 Term 38 Term 39 Term 10 Term 41 Lag, 42 Term 43 Scre Lh Scre Sore Scr Sere Wast 49 Wast Was 52 53 Wasl 54 Wasi Wasi 56 57 Nut. Nut 59 Mut 60 61 Asc:

63

I4s

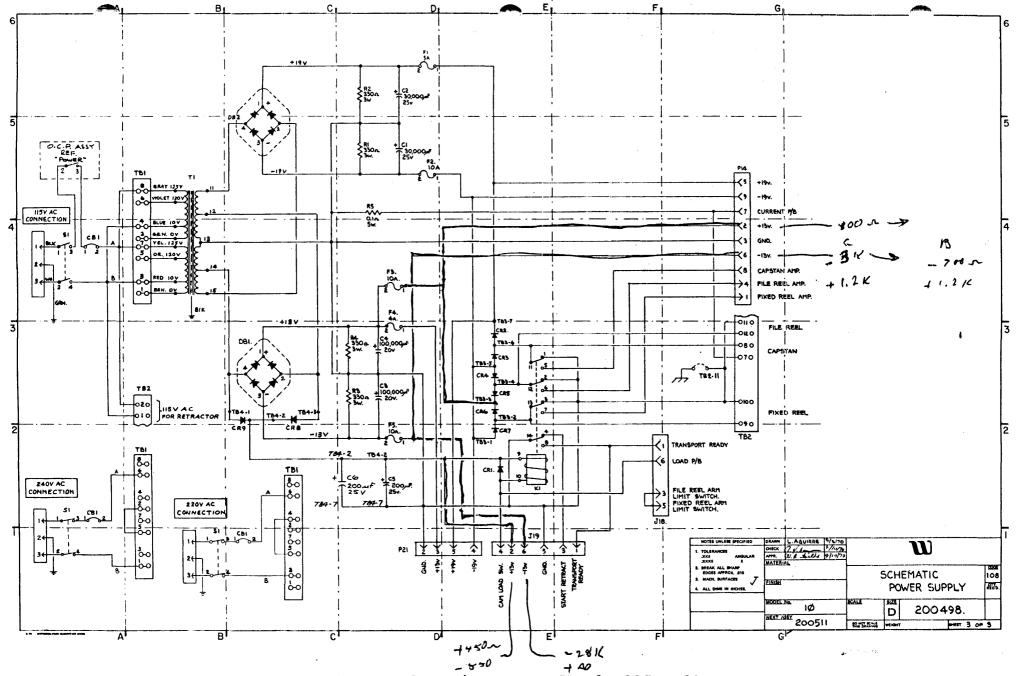
DRAWING NO.

REV.

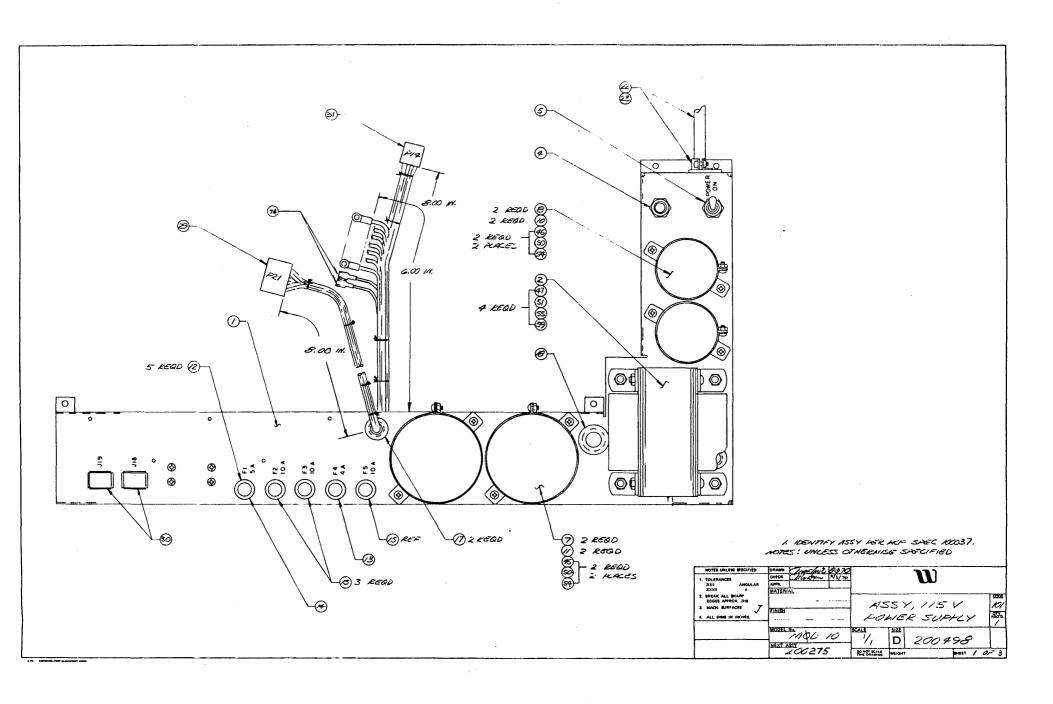
MATERI	AL LIST		ML DRAWING NO. REV.
<b>.</b> .			
1ps.	_ MODEL NO	16	DATE 8/11/70 SHEET 1 OF 3
. E	DWG. NO.	NO. REQ.	REMARKS ON CKT. DESIG.
<b>y</b> .	200509	1	
mer.	200011	. 1	n.
	100014	1	CB-1
3 <b>T.</b>	100015	1	S1.
	100018	.2	DB-1. DB-2.
00,000uf.	100020-008	2	C3.C4. Remove Terminal Screws
30,000af.	100020-014	2	Cl.C2.) and replace with
	100023-010	1	TB.1.
* Dia.	100025-003	2	Use with item 8.
" Dia.	100025-007	2	Use with item 7.
	100027	5	
lı amp.	100028-023	1	Fl4.
<b>(</b> p.	100028-024	1	rı.
10 amp.	100028-027	3	F2.F3.F5.
7-1	100030	1	Kl.
	100227-005	2	
	100227-009	1	
	100048-010	1	
	100149-007	2	TB.3. TB.4.
	100150	2	
	100152-001	1	Power Cord.
	100076	1	
d-off.	100178-001	2	
	100127	9	CE.1. thru CR.9.
200af.	100183	2	C5.C6.
0.10	100111-0R1	1	R5.
330 n	100068-331	þ	Rl. thru Rk.
	100010-005	1	P21.
	100010-007	2	J18. J19.
	100010-009	1	PIL.
	מנושיוניים	1	ડુંગ <b>ે</b>

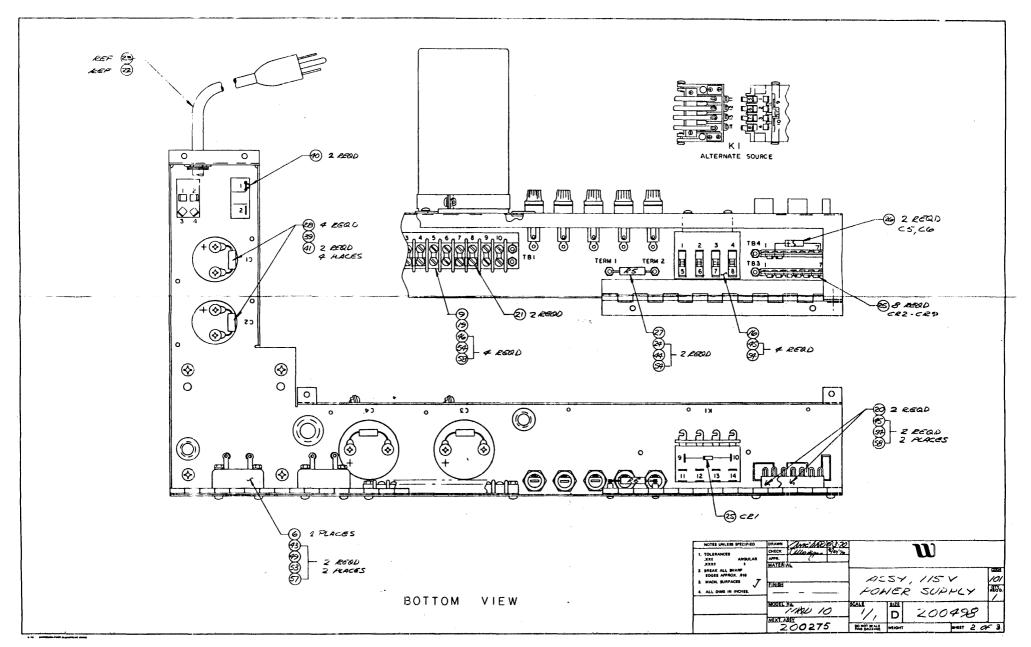
J.	MATER	IAL LIST	_	ML DRAWING NO. REV.
- T	ASST. 115v. 60Hs.			200311
DRAW	POWER SUPPLY, 25 ips.	MÔĐĒL NO	<b>7</b> \$	DATE 8/1/70 SHEET 2 OF 3
ITEM		· · · · · · · · · · · · · · · · · · ·	·	T
NO.	DRAWING TITLE	DWG. NO.	NO. REQ.	REMARKS ON CKT. DESIG.
.33	Wire, Insulated.	100053-012	A/R	
34	Wire, Insulated.	100053-014	A/R	
35	Wire, Insulated.	100053-016	A/R	
36	Wire, Insulated.	100053-024	A/R	
37	Terminal, Ins. Ring Tongue.	100055-004	19	Yel. No.10.
38	Terminal, " " "	100057-004	16	Red. No.6.
39	Terminal, " " "	100057-008	3	Red.Ne.10.
40	Terminal, Quick Disconnect.	100139-001	2	
41	Lug, Selder.	100138-004	- 8	
42	Terminal, Ins. Ring Tongue.	100055-002	4	Yel. No.6.
43	Screw, Pan Head.	100036-214	4	4 - 40 x 7/8"
抻	Screw, Pan Head.	100036-303	2	6 - 32 x 3/16"
45	Sorew, Pan Head.	100036-304	16	6 = 32 x 4 =
46	Screw, Pan Head.	100036-310	4	6 = 32 x 5/8"
47	Screw, Pan Head.	100036-508	12	10 - 32 x ½"
48				
49	Washer, Flat.	100047~200	4	No.4.
50	Washer, Flat.	100047-300	8	No.6.
51	Washer, Flat.	100047-500	Ł,	No.10.
52				
53	Washer, Int. Tooth Lock.	100059-200	4	No.4.
54	Washer, Lat. Tooth Lock.	100059-300	22	No.6.
55	Washer, Int. Tooth Lock.	100059-500	4	No.10.
56				
57	Nut, Hex.	100043-200	4	жо. <b>4.</b>
58	Nut, Hex.	100043-300	8	No.6.
59	Mut, Hex.	100043-500	14	No.10.
60				
61	Asey. Power Supply.	200498	Ref.	Drawing only.
62		1		
63	List, Wire.	200514	Ref.	
64				

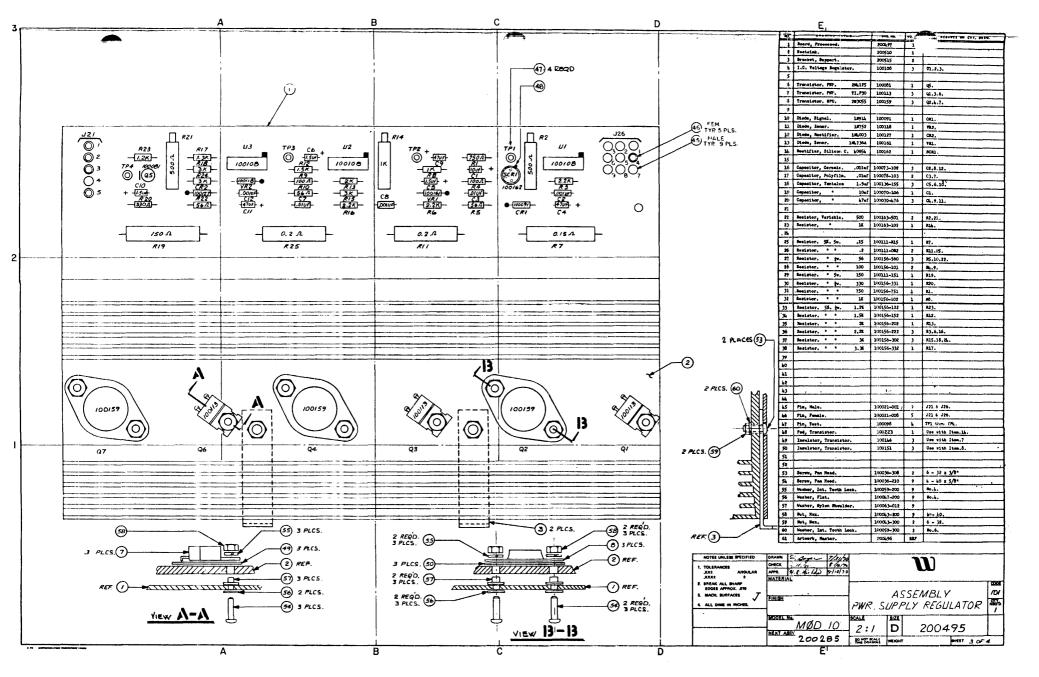
	J.	<b>]</b> ]	MATERI	AL LIST		MĽ	DRAWING 1	N 0.	REY.
	DRAW	ASSY. 115v. 60H	t. Sips.	_ MODEL NO	1 <b>4</b> .	DATE A	200311 2/70 SHEET _	2 of.	3
	ITEM NO.	DRAWING TI	TLE	DWG. NO.	NO. REQ.	REMA	RKS ON CKT.	DESIG.	
Ī	<del>८</del> ५	Pin, Connector.	Mele.	100021-003	4				
	.66		: ಛಾರ್ಚಿ	1000214103	3				
Ī	67	Pin, "	Female.	100021-005	7				
	68	Pin, " !	Female.	100021-006	11				
	69	Pin, "	Male.	100021-007	2				
	70	Pin, "	Male.	100021-010	3				
	71	Wire, Insulated.		100053-018	A/R				
-[	72	Strap, Cable		100171-001	2				
	73	Strap, Cable		100171-002	6				
	74	Terminal, Quick Dis	connect	100139 - 002	2				
									1
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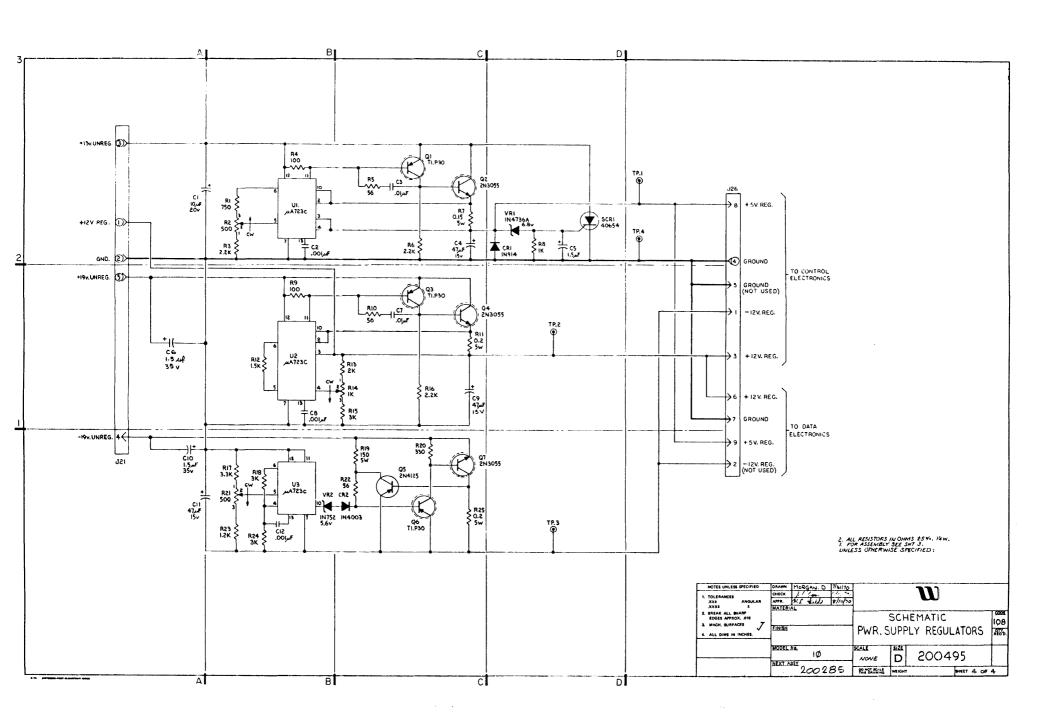
B-2 Schematic, Power Supply 115V, 60Hz







B-5 Assembly, Power Supply Regulators



Schematic, Power Supply Regulators

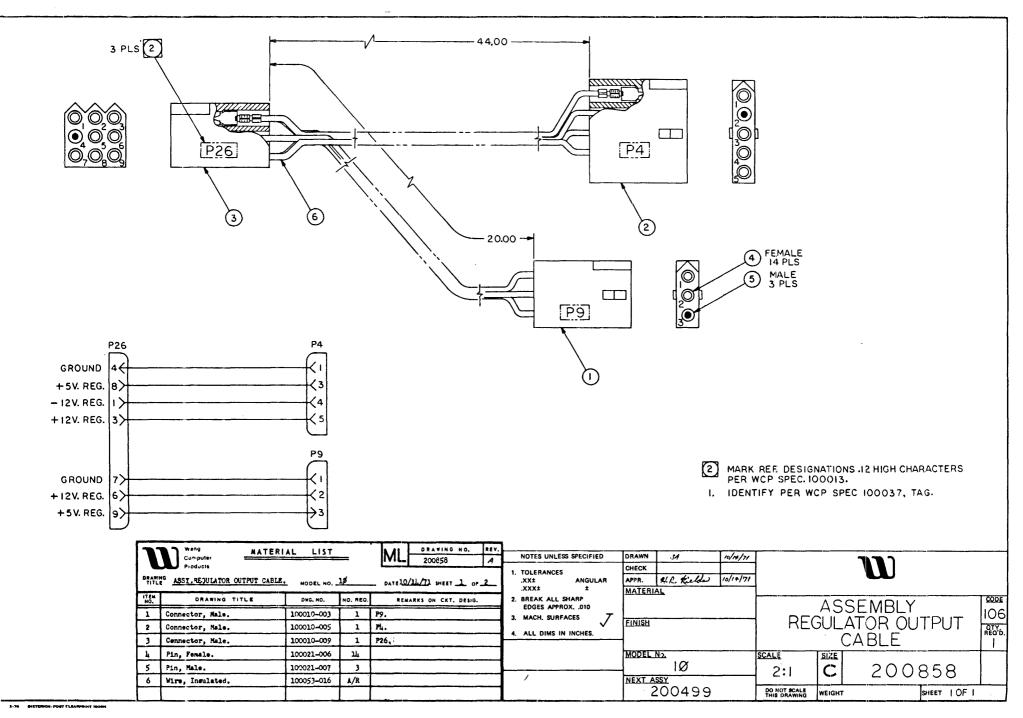
B-6

# ASSY. POWER SUPPLEX REGULATORS. P/N 200495

REF	COMPO NENT	WCP		ZONE		COMPONENT	WCP	ZONE	 C
DES	TYPE	PART NO.	SCHEM	ASSY	DES	TYPE	PART NO.	SCHEM	ASS
777	T () W-34 D	7,007,00	D 2	D 0	7.2				
Ul	I.C. Voltage R.	100108	B-3	D-3	R1	Resistor.	100156-751	B-3	C
U2	I.C. Voltage R.	100108	B-2	B-3	R2	" Var.		B-3	D-
ช3	I.C. Voltage R.	100108	B-1	B-3	R3	. 11	100156-222	B-3	D-
07	m	200220			RJ	11	100156-101	B-3	C-
QI OC	Transistor.	100113	C-3	D-2	R5	11:	100156-560		C-
Q2	11	100159	C-3	D-2	R6	11:	100156-222		C-
93 95 95 96	11	100113	C-2	C-2	R7	11	100111-R15		D-
OH.		100159	C-2	B-2	R8	t?	100156-102		C-
Q5	11	100081	C-1	A-3	R9	n	100156-101	B-2	B-
	11	100113	C-1	A-2	R10	. "	100156-560	C-2	B-
<b>Q7</b>	Transistor.	100159	C-1	A-2	Rll	11	100111-0R2	C-2	C-
					R12	11	100156-152	B-2	B-
CRl	Diode, Signal	100091	D-3	D-3	R13	11	100156-202	C-2	В-
CR2	Diode, Rect.	100127	C-1	A-3	R14	" Var.	100163-102	C-2	C-
				Į.	R15	11	100156-302	C-2	В-
VRI	Diode, Zener	100161	D-3	C-3	R16	n .	100156-222	C-2	В-
VR2	Diode, Zener	100118	B-1	B-3	R17	и .	100156-332	B-1	A-
					R18	10:	100156-302	B-1	A-
SCRL	S.C.R.	100162	D-3	D-3	R19	n n	100111-151	C-1	A-
					R20	181	100156-331	C-1	A-
Cl	Capacitor.	100072	A-3	C-3	R21	" Var.		B-1	A-
C2	17	100073-102	B-3	D-3	R22	11	100156-560	C-1	A-
C3	11	100078-103	C-3	C-3	R23	th:	100156-222	B-1	A-
C4	11	100135-476	C-3	D-3	R24	11	100156-302	B-1	A-
C5	11	100136-155	D-3	C-3	R25	11	100156-0R2	C-1	B-
C6	18	100136-155	A-2	B-3			100170-0162	0-1	
C7	31	100078-103	C-2	B-3				Ì	
c8	10	100073-102	B-2	C-3					
C9	11	100135-476	C-2	C-3					
C10	<b>1</b> #	100136-155	A-1	A-3				[	
Cll	11	100135-476	A-1	B-3					
C12	. Ht	100073-102	B-1	A-3	1	1			ŀ

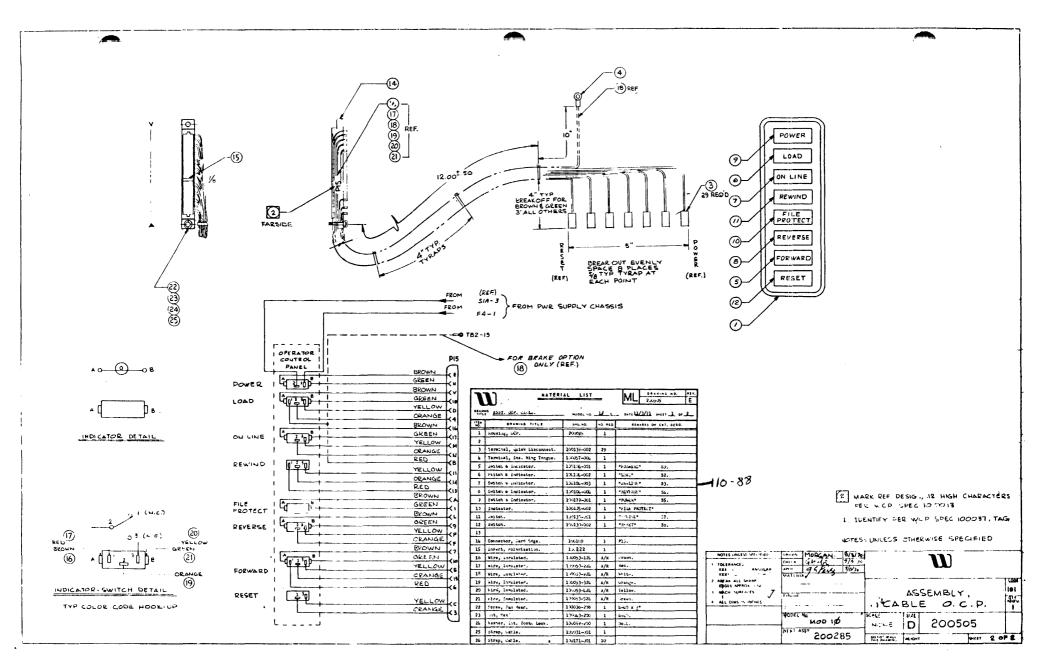
B-7 Component Zoning Chart

Power Supply Regulators

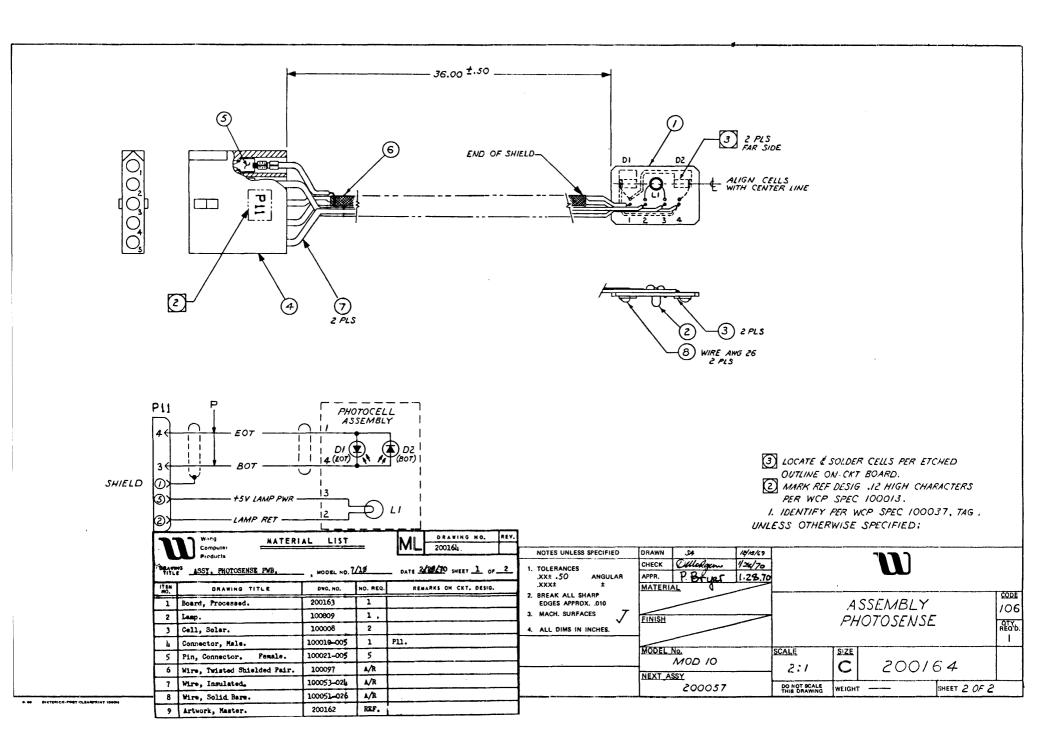


Assembly, Regulator Input Cable

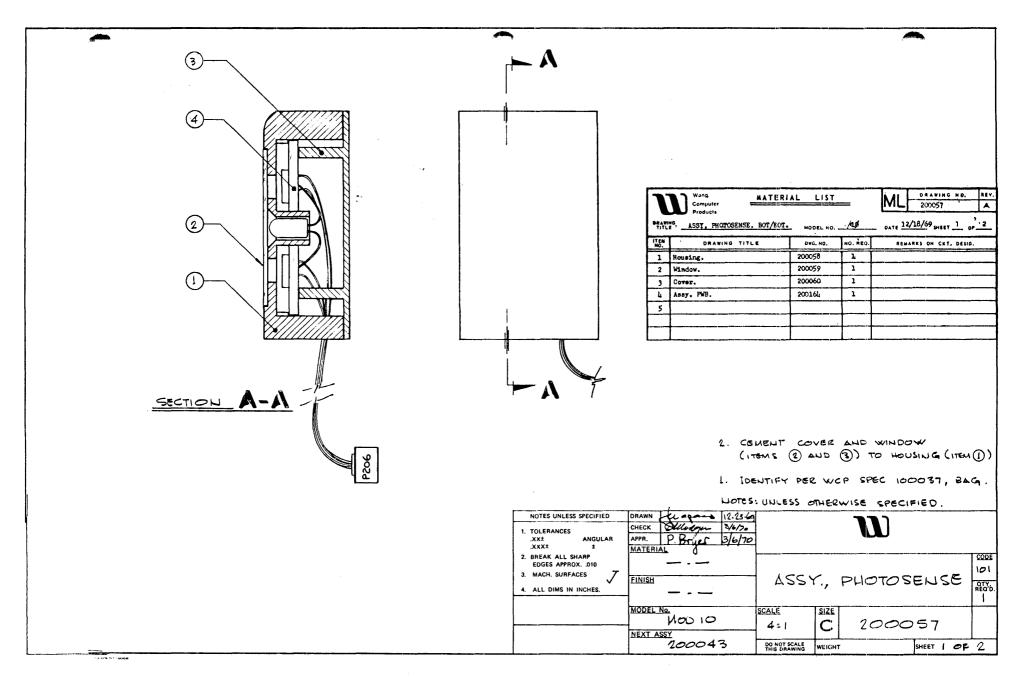
B-8



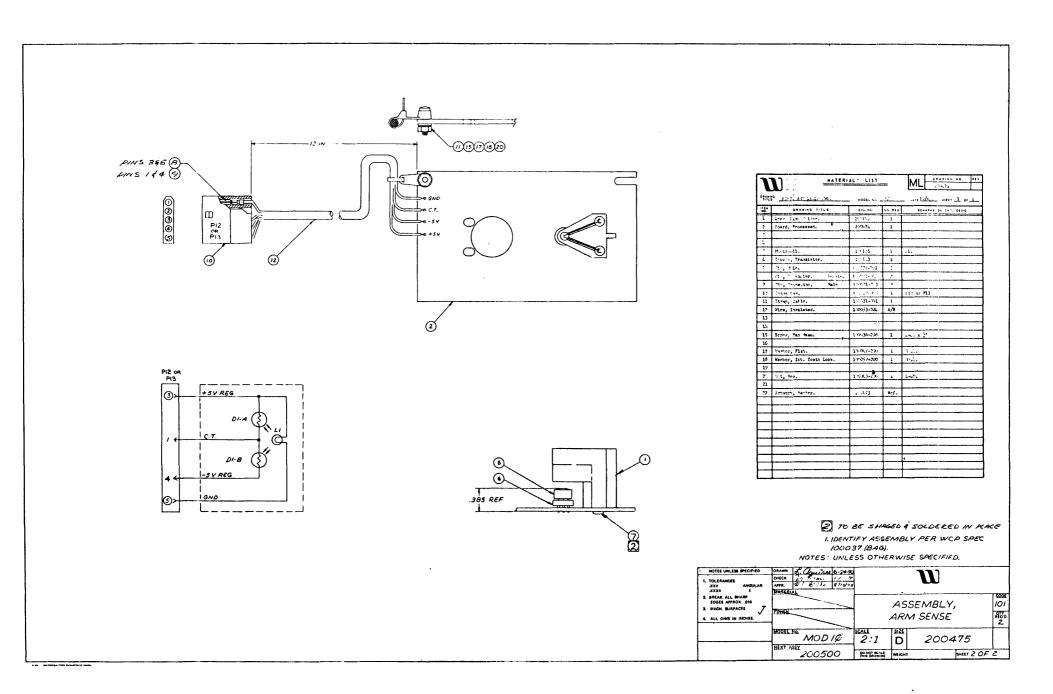
B-9 Assembly, Cable O.C.P.

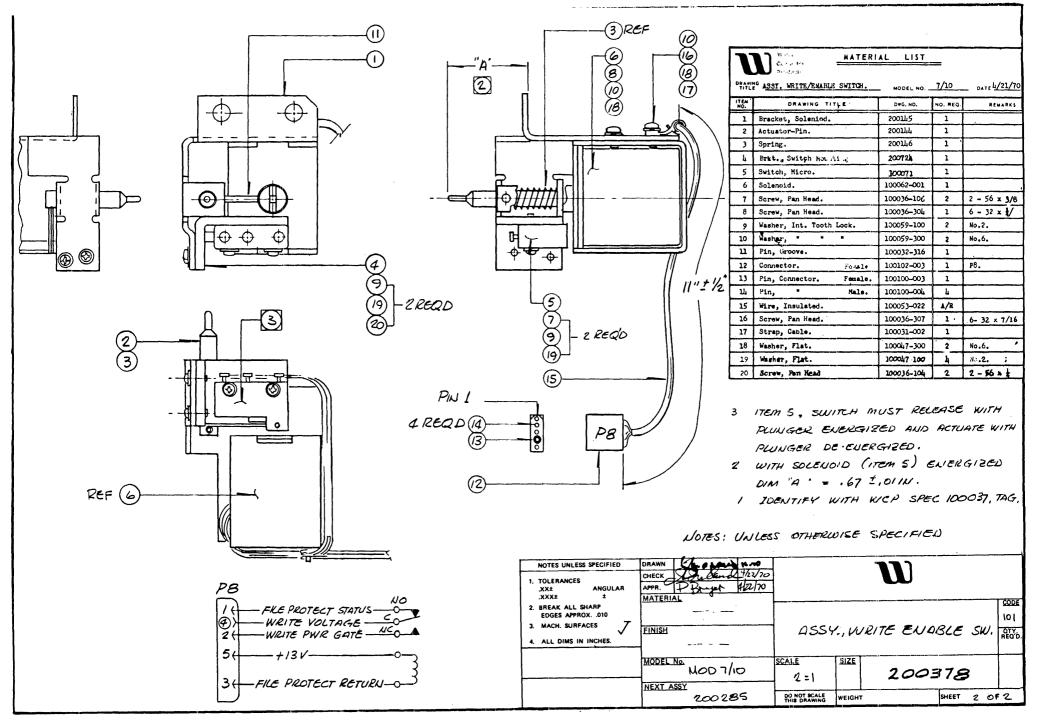


B-10 Assembly. Photosense. PWB

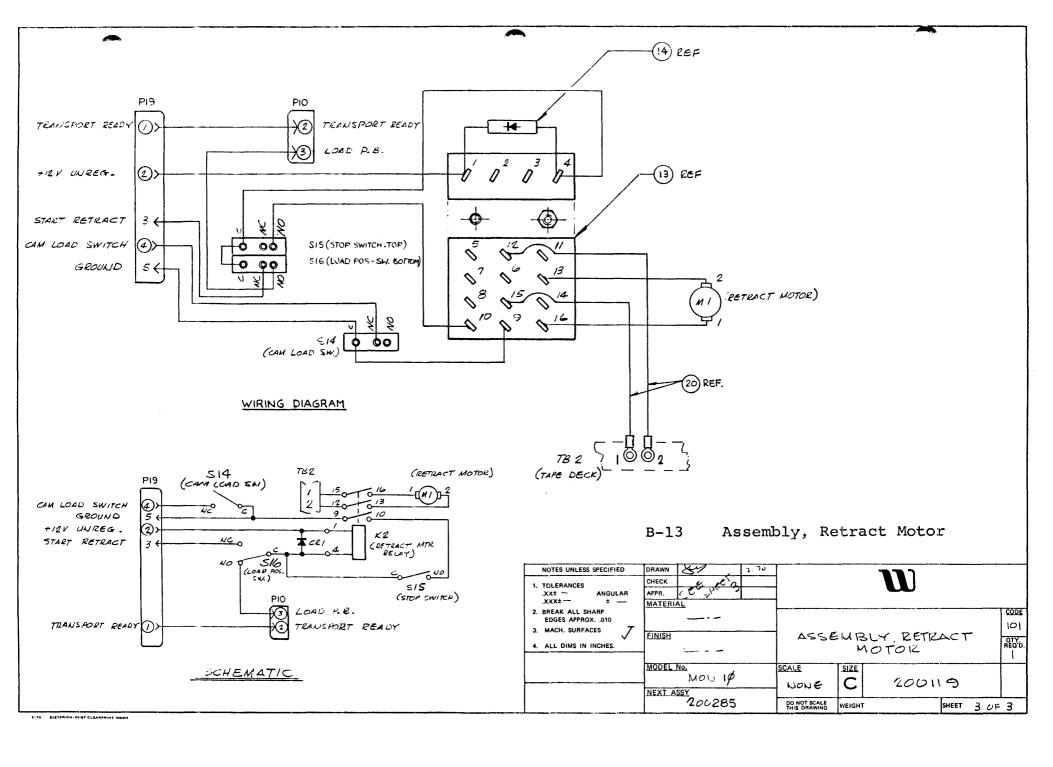


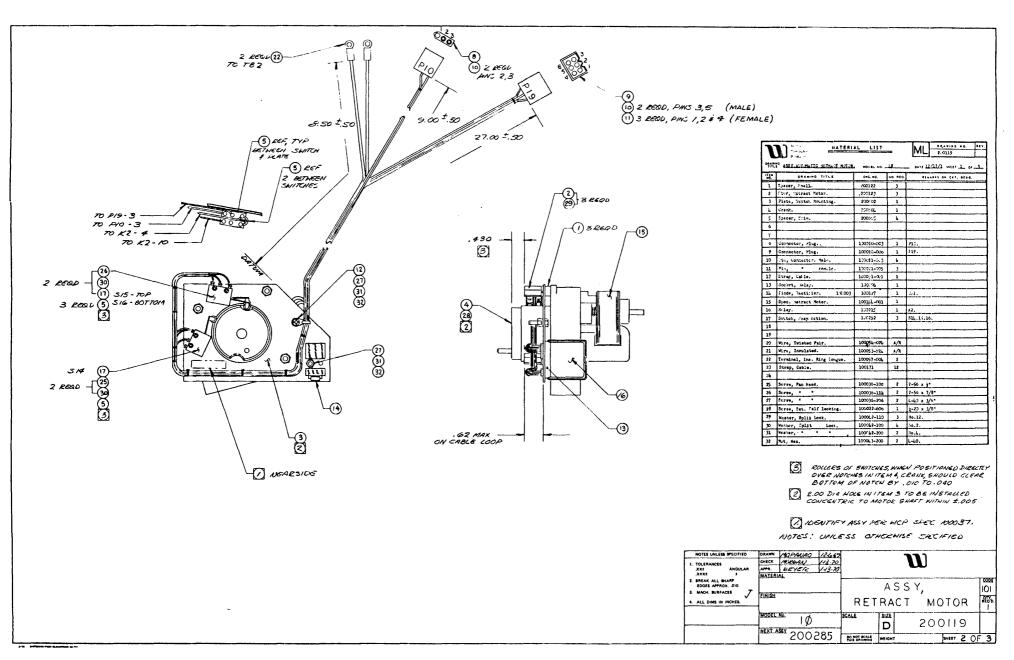
B-10a Assembly, Photosense

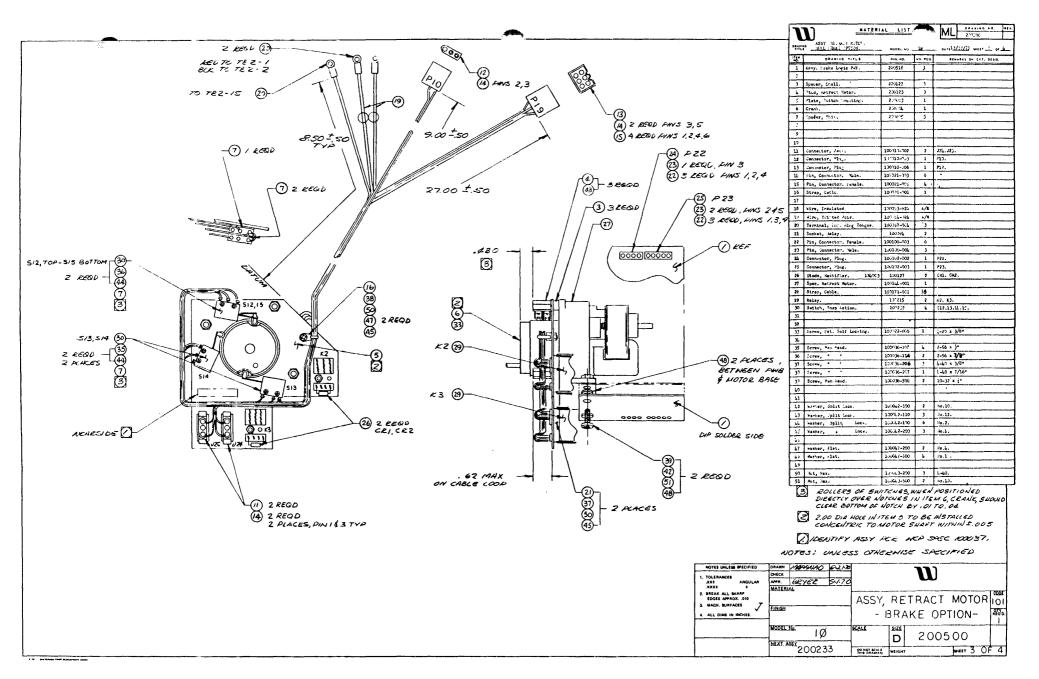




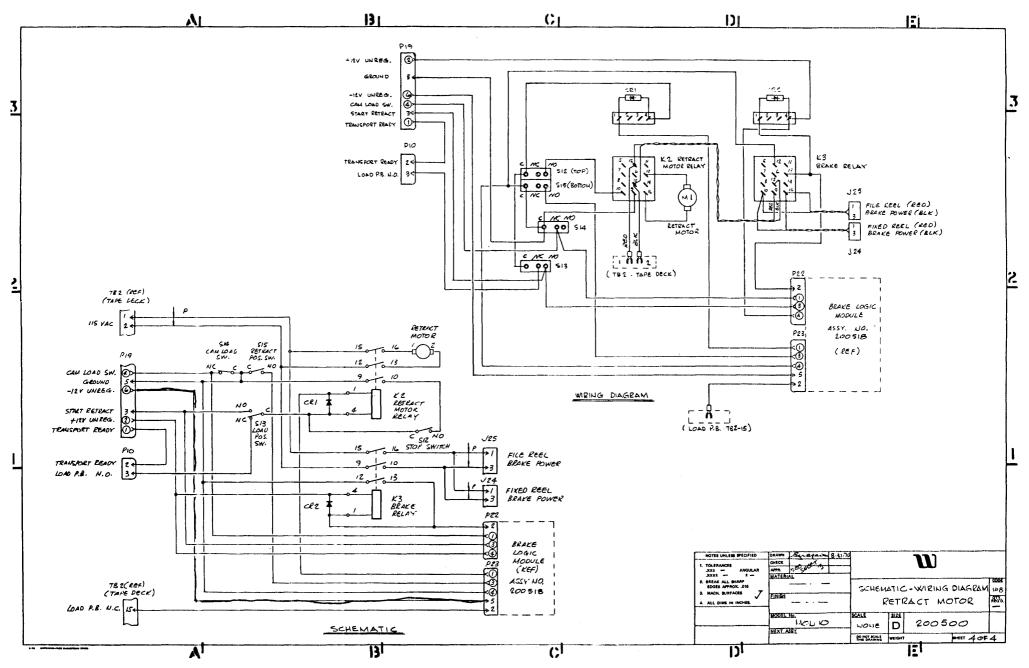
B-12 Assembly, Write/Enable Switch





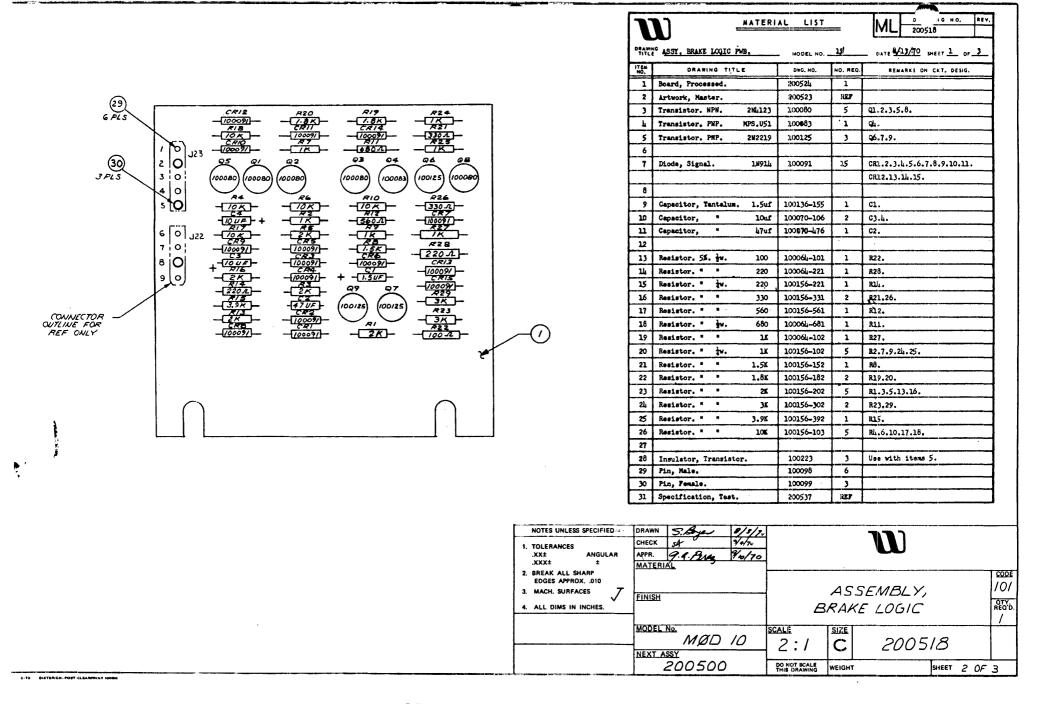


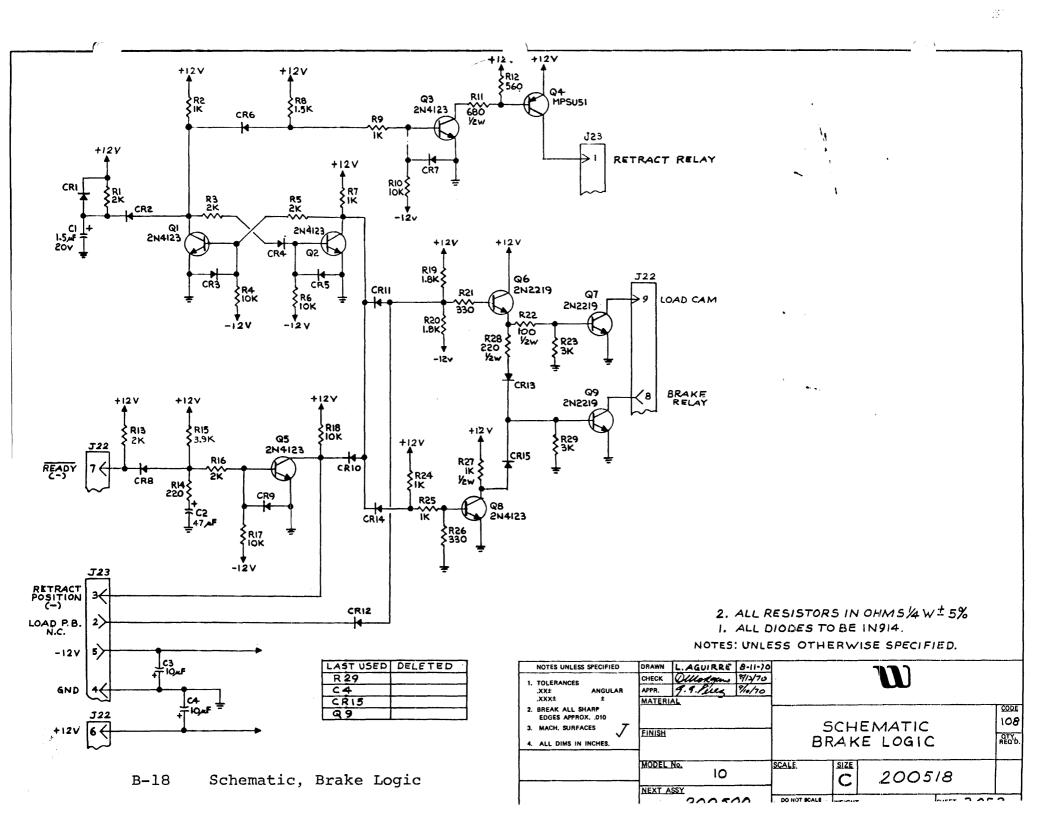
B-15 Assembly, Retract Motor
Brake Option

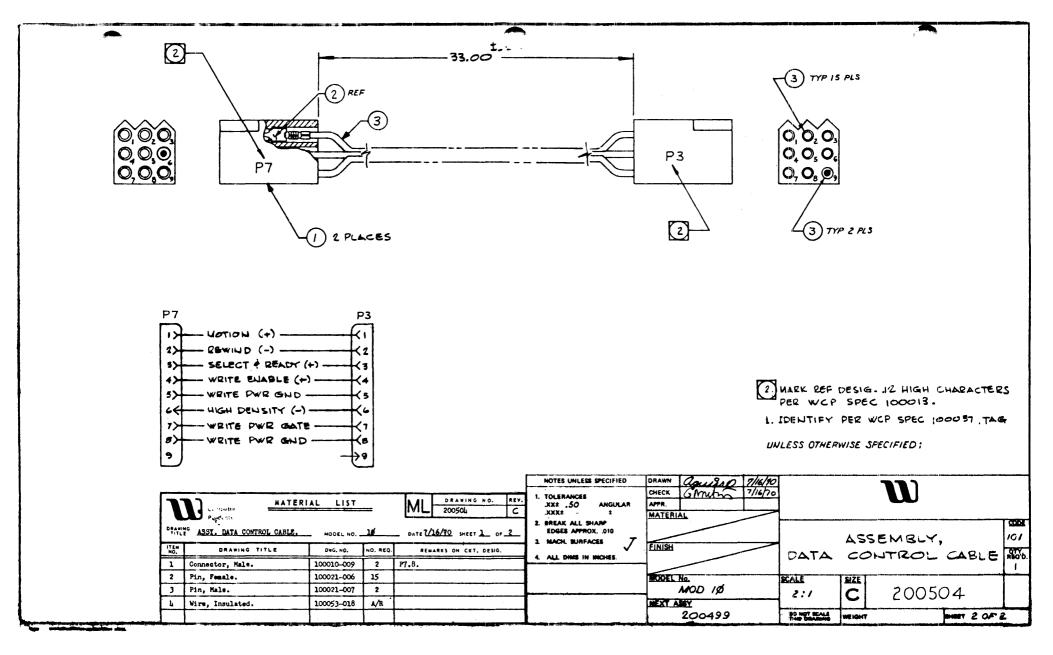


B-16 Schematic, Retract Motor

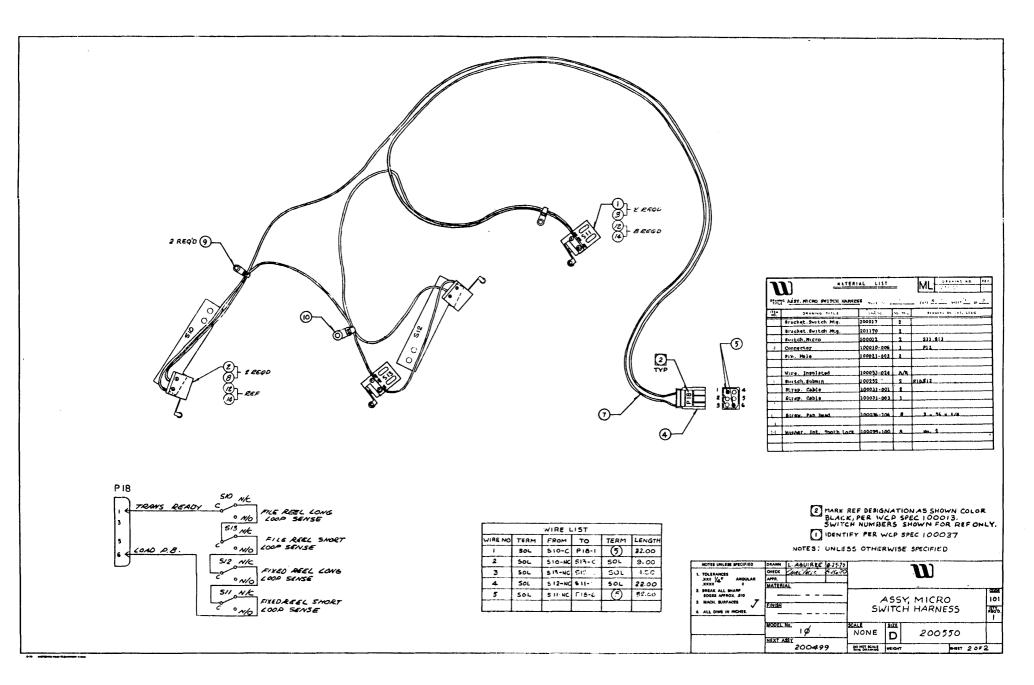
Brake Option







B-19 Assembly, Data Control Cable



Assembly, Micro Switch Harness

B-20

	ML 200488 - 000	ML 200L88 - 000	ML 200486 - 002	ML 200h88 - 00h
	BHANNING ASSY.TRANSPORT ELECTRONICS TILE PMB. BASIC BOARD. MODEL NO. 10 DATE 11/17/11 SHEET 1 OF	DRAWING ASSI.TRANSPORT ELECTRONICS	ASSY. TRANSPORT FLECTRONICS	ASSY_TRANSPORT_ELECTRONICS
			TITLE PHB. Type Pt 121ips, 1/0, 9Ch MODEL NO. 1 DATE 1/18/71 SHEET 7 OF	TITLE FAB. TYDE 191 25108. D/G, 90h. MODEL NO. 15 DATE 11/18/71 SHEET 9 OF
=	STEM DRAWING TITLE DWG. NO. NO. REQ. REMARKS ON CKT. DESIG.	NO. DRAWING TITLE DWG. NO. REQ. REMARKS ON CKT. DESIG.	ITEM DRAWING TITLE: DWG. NO. REQ. REMARKS ON CKT. DESIG.	ITEM DRAWING TITLE DWG. NO. REQ. REMARKS ON CKT. DESIG.
	50 Resistor. 5%. 2w. 2.7 100156-287 2 R260,261. 51 Resistor. " 3w. 47 100068-470 1 R271.	99 Pin, Connector. Male. 100021-007 30	131 Capacitor, Tantalum. 10uf 100070-106 1 C204.	131 Capacitor, Tantalum. 1.5uf 100136-155 1 C20h.
	72 Resistor. 100 100156-101 18 R213.255.256.257.258.427.440.	100   Pin, Connector. Female.   100021-008   14	132	132
	ություն (ա. 1001)0-101 10 հույլ, 255, 250, 250, 250, 250, 250, 250, 250	102	133 Resistor, 5%. iv. 750 100156-751 1 R234.	133 Resistor, 5%. 1w. 750 100156-751 1 R234.
	R483.489.528.529.	103 Pad, Transistor. 100223 5 Q210.h17.h18.h40.hh3.	134 Resistor, " 3w. L7 100068-470 1 R2L8.	134 Resistor, " 3w. 47 100068-470 1 R248.
	53 Resistor. 5%. 3w. 150 100068-151 1 R496.	104 Insulator, Transistor. 100151 7 70-3.	135 Resistor, " 4w. 750 100156-751 1 R268.	135 Mesister, * tu. 750 100156-751 1 R268,
	54 Resistor, * w. 200 100156-201 6 R473.474.479.480.519.520.525.	105		136 Resistor, " " 15K 100156-153 1 RL21.
	R526.	106 Wire, Insulated. 100053-916 A/R From item 21 to hole B.	137   Resistor, " "   100K   130156-104   1   Rt 31.	137 Resistor, " " 51X 100156-513 1 R431.
	55 Resister. 5%. 2w. 220 100156-221 11 R200,202.204.206.208.210.212.	107 Wire, Selid Insulated. 100248-924 A/R Jumper Jl2. From SS to IT.	139 Resistor, " " 680% 129156-684 1 R466.	138   Resistor, " "   13K   100156-133   1   RL32.
	R235.239.269.273.	108 Screw, Pan Head. 100036-206 10 4-40 x 3/8"	140 Recistor, * 150 180156-151 1 Ref	
	56 Resistor. 5%. tw. 300 100156-301 1 Rt10.	109 Screw, Pan Head. 100036-215 16 4-40 x 5/8"	141 Resistor, " 390K 100156-394 1 2468.	140 Resistor, " 390K 100156-394 1 R468.
1.	57 Resister. '" " 330 100156-331 9 R201.203.205.207.209.211.213.	110	lh2 Resistor, " " 1.5M 100156-155 1 R509.	112 Resistor, " 1.5M 100156-155 1 R509.
1. 5. 28.	R218.219.	111 Washer, Flat. 100047-200 26 No.4.	143 decicion, 4 4 150 10056 152 2 1512.	143 Residents 1 250 400256-452 2 R5801
28.	58 Resistor. 5%. 3w. 330 100068-331 1 RS02.	112 Washer, Int. Tooth Lock. 100059-200 26 No.4.	144 Recistor, " " 390K 100156-394 1 R511.	lluk Resister, " " 390K 100156-394 1 R511.
٠5.	59 Resistor. * 14. 360 100156-361 2 Riuh2.446.	113 Washer, Nylon Shoulder. 100063-012 14	145 Resistor, 5%. in. 3.3M 100156-335 1 R536.	145 Resistor, 5%. iv. 3.3M 100156-335 1 R536.
	60 Resistor. " " 430 100156-431 2 R251.252.	114 Wakher, Nylon Shoulder. 100063-008 1 Use with CR432.	11,6	146
X4.	61 Resistor. * 3w. 470 100068-471 4 Rt34.435.436.437.	115 Mut, Hex. 100043-200 26 4-40.	11.7 Wire, Solid Insulated. 10021,5-921 A/R Jumper Jl. From JJ to KK.	147 Wire, Solid Insulated. 100248-924 A/R Jumper Jl. Free JJ to IK.
31.	62 Resistor. * 1w. 510 100156-511 2 R533.534.	116	Jumper J2. " U " V.	Jumper J2 " U 2 V.
	63 Resistor. " " 560 100156-561 3 R214.216448.	117	Jumper Ji. " PP " RR.	Jumper Ji . PP " RR.
-	64 Recistor. " 1X 100156-102 20 R240.278.401.402.449.472.477.	118 Specification, Test. 200532 Ref.	Jumper J5. " F " G.	Jumper J5. * F * G.
	R478.481.485.491.494.497.501.	119	Jumper J6. " GG " HH.	Jumper J6. 9 QG = HH.
	RS13.515.518.522.524.527.	120	Jumper J7. " H " J	Jumper J7. " H " J.
	65 Recistor. 5%. hv. 1,2K 100156-122 1 R217.	121	Jumper J8. * EE * FF.	Jumper J8. * EL * F7.
-			Juiper J9. D E.	Jumper J9. " D " E.
:5.	66 Resistor, 1 1.5% 100156-152 1 R270.	123	Jumper J10. " AA " CC.	Jumper J10. * AA * CC.
	67 Resistor. " 2K 100156-202 3 Rul8.463.504. 68 Resistor. " 2.2X 100156-222 6 R224.225.231.237.265.493.	124 125	Jusper Jll. " W " X.	Jumper Jll. " W " I.
- 1	68 Registor. * 2.2K 100156-222 "6 R224.225.231.237.265.493.	125	Jumper J19. " DD " TP208.	Jumper J19. " DD " TP208;
	69 Recistor. 5%. jw. 3K 100156-302 4 R408.458.495.535.	127		
	70 Resistor. " 3.6K 100156-362 5 R222,223,232,238,266.	128		
	71 Resistor. " " 3.9K 100156-392 6 Rk19.k39.k41.k90.k98.k99.	129		
		130		
				<u></u>
AEV.	MATERIAL LIST MI DRAWING NO. REV.	MATERIAL LIST MI DRAWING NO. REV.	MATERIAL LIST MI DRANING NO. REY.	MATERIAL LIST AND DRAWING NO. SEV.
AEV.	ML 200668 000	ML 200468 - 001	ML 200468 - 003 &	ML 200488 - 005
	MAICKIAL LISI IN IL	M	MATERIAL LIST  ML DRAWING NO. REV.  DRAWING NO. PEV.  200468 - 003 1.  DRAWING NO. PEV.  DRAWING NO. P	MATERIAL LIST  ML DRAVING NO. SEV.  200488 - 005  DRAVING NO. SEV.  200488 - 005  DATEL 18 TYPE 17 11 12 JULY 18 JULY
	DEATING ASSISTANSPORT ELECTRONICS TITLE PMB. BASIC BOARD. MODEL NO. 16 DATE 11/17/71 SHEET L OF	ML 200468 - 001	DRAWING ASSY. TRANSPORT ELECTRONICS TITLE FMB. Type P 18 1ps, D/G, 9Ch. Model No. 10 DATE 11/18/11 SHEET 8 OF	DRAWING ASSI-TRANSPORT ELECTRONICS TITLE THE TYPE P' 171101/19, 9Ch. MODEL NO. 15 DATELL/18/71 SHEET 10 OF
	DRAWING ASSI.TRANSPORT ELECTRONICS THE PAS BASIC BOARD.  MATERIAL LIST  ML 200685 - 000 -	DRAWING ASSY, TRANSPORT ELECTRONICS THE PART TYPE 1P1 10108, D/G, 9Ch. MODEL NO. 16 DATE 11/18/T1 SMEET 6 OF	DRAWING ASSY. TRANSPORT ELECTRONICS TITLE PMB. TYDE 19 19 19E. D. G., 9Ch. MODEL NO. 10 DATE 11/18/71 SHEET 8 OF  ITOM DRAWING TITLE DWG. NO. NO. REO. REMARKS ON CKT. DESIG.	DRAWING ASSI.TRANSPORT ELECTRONICS TITLE PAB. Type P1 37 tags. D/G. 9Ch. Model No. 16 DATE 1/18/71 SMEET 10 OF  ITEM DRAWING TITLE DWG. NO. NO. REQ. REMARKS ON CKT. DESIG.
206.	ML 200k86 - 000	DRAWING ASSY. TRANSPORT ELECTRONICS TITLE PMR. Type 'P' 1010s. D/G. 9Ch. MODEL NO. 16 DATE 11/18/71 SHEET 6 OF	DRAWING ASSY. TRANSPORT ELECTRONICS TITLE THB. Type P 18 ipe. D/G. 9Ch. MODEL NO. 10 DATE 11/18/11 SHEET 8 OF  ITEM DRAWING TITLE DWG. NO. NO. REO. REMARKS ON CKT. DESIG.  131 Capacitor, Tantalum. 10uf 100070-106 1 C204.	DRAWING ASSI.TRANSPORT ELECTRONICS TITLE PMB. Type P' 17tips_D/O. 9Ch. MODEL NO. 15 DATEL1/18/71 SMEET 10 of  ITEM DRAWING TITLE DWG. NO. NO. REQ. REMARKS ON CKT. DESIG.  131 Capacitor, Tantalua. 1.5uf 100136-155 1 C20L.
206. -03. -10.	ASSI.TRANSPORT ELECTRONICS PMB. BASIC BOARD.  MODEL NO. 16  DATE 11/17/71 SHEET L OF  TITLE NO. DRAWING TITLE  DWG. NO. NO. REQ. , REMARKS ON CKT. DESIG.  72 Restistor. 5%. 1v. 1.3% 100156-132 1 8129.	DRAWING ASSY. TRANSPORT ELECTRONICS TITLE PMR. Type 'P' 1010s. D/G. 9Ch. MODEL NO. 16 DATE 11/18/71 SHEET 6 OF	200468 - 003   1     200468 - 003   2     200468 - 00368 - 00368   2     200468 - 00368 - 00368   2     200468 - 00368 - 00368   2     200468 - 00368 - 00368   2     200468 - 00368 - 00368   2       2     2     2     2     2     2     2     2	ASSI-TRANSPORT ELECTRONICS TITLE PMB. TYPE P TITLE DWG. NO. NO. REQ. REMARKS ON CKT. DESIG.  131 Capacitor, Tantalum. 1.5uf 100136-155 1 C204.
206. -03. -10.	ML   200686 - 000	200168 = 001     200168 = 001     200168 = 001     200168 = 001     200168 = 001     200168 = 001     200168 = 001     200168 = 001     200168 = 001     200168 = 001     200168 = 001     200168 = 001     200168 = 001     200168 = 001     200168 = 001     200168 = 001     200168 = 001     200168 = 001     200168 = 001     200168 = 2001   200168 = 2001   200168 = 2001     200168 = 200168 = 200168   200168   200168 = 200168   200168 = 200168   200168 = 200168   200168 = 200168   200168	DRAWING ASSY. TRANSPORT ELECTRONICS TITLE FIB. Type P 18 ipe. D/G. 9Ch. MODEL NO. 10 DATE 11/18/11 SHEET 8 OF  ITEM DRAWING TITLE DWG. NO. NO. REO. REMARKS ON CKT. DESIG.  131 Capacitor, Tantalum. 10uf 100070-106 1 C204.	DRAWING TITLE DWG. NO. NO. REQ. REMARKS ON CKT. DESIG.  131 Capacitor, Tantalum. 1.5uf 100136-155 1 C201.
206. -03. -10.	ML   200686 - 000	200168 - 001   200168 - 00168   200168 - 00168 - 00168   200168 - 00168 - 00168   200168 - 00168 - 00168   200168 - 00168 - 00168   200168 - 00168 - 00168 - 00168   200168 - 00168 - 00168 - 00168   200168 - 00168 - 00168 - 00168 - 00168   200168 - 00168 - 00168 - 00168   200168 - 00168	200468 - 003   1   200468 - 003   2   200468 - 003   2   200468 - 003   2   200468 - 003   2   200468 - 003   2   200468 - 003   2   200468 - 003   2   200468 - 003   2   200468 - 003   2   200468 - 003   2   200468 - 003   2   200468 - 003   2   200468 - 003   2   200468 - 20046	ASSI-TRANSPORT ELECTRONICS TITLE PMB. Type P 17th Da.IM 9. 9Ch. MODEL NO. 15 DATELL/18/71 SMEET 10 OF  ITEM DRAWING TITLE DWG. NO. NO. REQ. REMARKS ON CKT. DESIG.  131 Capacitor, Tantalum. 1.5uf 100136-155 1 C2Q1.  132  133 Resistor, 5%. 4w. 750 100156-751 1 R234.
206. -03. 410. -17. 42h. 431.	ASSI.TRANSPORT ELECTRONICS   MODEL NO. 16   DATE 11/17/11/3MEET L OF   MODEL NO. 16   DATE 11/17/11/3MEET L OF   MODEL NO. 17/2   Resistor. 5%. 1w. 1.3K   100156-132   1   Ri29.   Resistor. ** 1.7K   100156-172   2   Ri12.116.   Resistor. ** 5.1K   100156-512   21   R230.233.236.253.254.259.262.   R263.264.267.272.279.107.109.   R113.114.124.125.128.1664.505.	200168 - 001   200168 - 001   200168 - 001   200168 - 001   200168 - 001   200168 - 001   200168 - 001   200168 - 001   200168 - 001   200168 - 001   200168 - 001   200168 - 001   200168 - 001   200168 - 001   200168 - 001   200168 - 200168 - 200168	200468 - 003   1   200468 - 003   200468 - 003   200468 - 003   200468 - 003   200468 - 00368 - 0	ASSI-TRINSPORT ELECTRONICS TITLE PMB. Type: P' 17th px.11/0. 9Ch. MODEL NO. 15 DATELL/18/71 SMEET 10 OF  ITEM DRAWING TITLE DWG. NO. NO. REQ. REMARKS ON CKT. DESIG.  131 Capacitor, Tantalum. 1.5uf 100136-155 1 C201.  132  133 Resistor, 5%. 4w. 750 100156-751 1 R234.  134 Resistor, " 3w. 17 100068-170 1 R218.
206. -03. 410. -17. 42h. 431.	ASSI.TRANSPORT ELECTRONICS   MODEL NO. 16   DATE 11/17/11/3MEET L OF	200168 - 001   200168 - 001   200168 - 001   200168 - 001   200168 - 001   200168 - 001   200168 - 001   200168 - 001   200168 - 001   200168 - 001   200168 - 001   200168 - 200168 - 2	200468 - 003   1   200468 - 003   2   200468 - 003   3   2   200468 - 2003   3   3   3   3   3   3   3   3   3	ASSI-TRANSPORT ELECTRONICS   TYPE: 1715   TYPE: 17   TYPE: 1715   TY
206. 203. 410. -17. -21. 431.	ASSI.TRANSPORT ELECTRONICS   MODEL NO. 16   DATE 11/17/715MEET L OF   MILE	200168 - 001   200168 - 001   200168 - 001   200168 - 001   200168 - 001   200168 - 001   200168 - 001   200168 - 001   200168 - 001   200168 - 001   200168 - 001   200168 - 001   200168 - 001   200168 - 001   200168 - 001   200168 - 001   200168 - 200168 - 200168 -	DRAWING   ASSY.TRANSPORT ELECTRONICS   TITLE   DWG.NO.   NO. REO.   DATE   11/18/11 SHEET 8 OF	DRAWING   ASSI-TRANSPORT ELECTRONICS   THE TYPE P
206. 206. 203. 410. -17. -24. 431.	Marterial   Mart	200168 - 001   200168 - 001   200168 - 001   200168 - 001   200168 - 001   200168 - 001   200168 - 001   200168 - 001   200168 - 001   200168 - 001   200168 - 001   200168 - 20016   200168 - 20016   200168 - 200	DRAWING   ASSY.TRANSPORT ELECTRONICS   TITLE   DWG.NO.   NO. REO.   DATE   11/18/11 SHEET 8 OF	ASSI-TRANSPORT ELECTRONICS TYPE. Type: P. 17th ps.11/9, 9Ch. Model No. 15 DATELL/18/71 SMEET 10 of    TYPE   DRAWING TITLE   DWG. NO. NO. REQ.   REMARKS ON CKT. DESIG.
206. -03. ul0. -17. -2lı. 431.	Marterial   Mart	200168 - 001   200168 - 001   200168 - 001   200168 - 001   200168 - 001   200168 - 001   200168 - 001   200168 - 001   200168 - 001   200168 - 001   200168 - 001   200168 - 001   200168 - 001   200168 - 001   200168 - 001   200168 - 001   200168 - 001   200168 - 20018 - 200168 - 20018 - 200168 - 20018 - 200168 - 20018 - 200168 - 20018 - 200168 - 20018 - 200168 - 200168 - 20018 - 200168 - 20018 - 200168 - 20018 - 200168 - 20018 - 200168 - 20018 - 200168 - 20018 - 200168 - 20018 - 200168 - 200168 - 20018 - 200168 - 20018 - 200168 - 20018 - 200168 - 20018 - 200168 - 20018 - 200168 - 200	DRAWING ASSY.TRANSPORT ELECTRONICS THLE PMB. Type'P' 18 ips, D/G, 9Ch. MODEL NO. 10 DATE 11/18/T1 SHEET 8 OF	ASSI-TRANSPORT ELECTRONICS PMB. Type P* 17ting. D/G. 9Ch. MODEL NO. 15 DATE 1/18/71 SHEET 10 OF  TYPE NO. DRAWING TITLE DWG. MO. REQ. REMARKS ON CKT. DESIG.  131 Capacitor, Tantalum. 1.5uf 100136-155 1 C204.  132  133 Resistor, 5%. 4w. 750 100156-751 1 R234.  134 Resistor, " 3w. h7 100068-470 1 R2h8.  135 Resistor, " 4w. 750 100156-751 1 R268.  136 Resistor, " 4w. 750 100156-103 1 R421.  137 Resistor, " " 33K 100156-333 1 R431.  138 Resistor, " " 15K 100156-153 1 R432.  139 Resistor, " " 300K 100156-100 1 R466.  1h0 Resistor, " " 300K 100156-100 1 R466.
206. -03. ul0. -17. -2lı. 431.	Mainternal   Mai	200168 - 001   200168 - 00	DRAWING ASSY.TRANSPORT ELECTRONICS THLE PMB. Type'P' 18 ips, D/G, 9Ch. Model No. 10 DATE 11/18/T1 SHEET 8 OF	ASSI-TRINSPORT ELECTRONICS   TYPE: 17 11   TYPE: 19   TYPE: 17 11   TYPE: 19   TYPE: 17 11   TYPE: 19   TYPE: 17 11   TYPE: 18   T
206, _03, _d10, 17, 22b, 431,	ASSI.TRANSPORT ELECTRONICS  PMS. BASIC BOARD.  DRAWING TITLE  DWG. NO. NO. NO. NO. REC.  REMARKS ON CKT. DESIG.  1 Relator. S. Iv. l. 3K 100156-l.12 2 Rl.12.l.16.  Resistor. " 5.1K 100156-512 21 R230.233.236.253.254.259.262.  Resistor. 5K. Iv. 6.8K 100156-682 5 R226.228.229.247.ls50.  Resistor. " 8.2K 100156-622 1 R277.  Resistor. " 10K 100156-103 10 R2ls5.276.ls03.lo4.ls20.ls22.ls52.  Resistor. " 10K 100156-113 2 Rl.86.ls8.  Resistor. " 11K 100156-113 1 Rl.30.	200168 - 001   200168 - 00	ASSY.TRANSPORT ELECTRONICS   MADOEL NO.   10	ASSI-TRANSPORT ELECTRONICS   TYPE: 17 11   TYPE: 19   TYPE: 17 11   TYPE: 19   TYPE: 17 11   TYPE: 19   TYPE: 17 11   TYPE: 18   T
206, 03, 10, 17, 21, 431,	Maintenance	200168 - 001     200168 - 00168 - 00168     200168 - 00168	DRAWING   ASSY.TRANSPORT ELECTRONICS   MODEL NO.   10   DATE   11/18/71 SHEET 8 OF   ITLE   DWG.NO.   NO. REO.   REMARKS ON CKY. DESIG.	ASSI-TRANSPORT ELECTRONICS   PMB. Type P* 17ting. M/G. 9Ch. Model No.   15   Date 1/18/71 SHEET 10 or   17ting. M/G. 9Ch. Model No.   Reg.   REMARKS ON CKT. DESIG.   131   Capacitor, Tantalum.   1.5uf   100136-155   1   C20L.   132     133   Resistor, 5%. \frac{1}{4}v.   750   100156-751   1   R23L.   134   Resistor, " 3v.   17   100068-170   1   R218.   135   Resistor, " \frac{1}{4}v.   750   100156-751   1   R268.   136   Resistor, " \frac{1}{4}v.   750   100156-103   1   R121.   137   Resistor, " "   10K   100156-103   1   R121.   138   Resistor, " "   33K   100156-333   1   R131.   138   Resistor, " "   30K   100156-153   1   R132.   139   Resistor, " "   30K   100156-30L   1   R166.   116   Resistor, " "   390K   100156-39L   1   R166.   116   Resistor, " "   390K   100156-39L   1   R168.   116   Resistor, " "   680K   100156-68L   1   R509.   113   Resistor, " "   680K   100156-109   2   R5187.
206, 03, 10, 17, 21L, 431,	Maintenance	ASSY.TRANSPORT ELECTRONICS   DATE   11/19/71 SHEET 6	DRAWING ASSY.TRANSPORT ELECTRONICS THILE FMB. Type'P' 18 ips.R/G. 9Ch. MODEL NO. 10 DATE 11/18/T1 SMEET 8 OF	ASSI-TRINSPORT ELECTRONICS   TYPE
206, 03, 10, 17, 28, 431,	Maintenant   Mai	ASSY.TRANSPORT ELECTRONICS   DATE   11/19/71 SHEET 6	DRAWING   ASSY.TRANSPORT ELECTRONICS   MODEL NO.   10   DATE   11/18/71 SHEET 8 OF	ASSI-TRINSPORT ELECTRONICS   TYPE
206, 03, 10, 17, 28, 431,	Maintenant   Mai	ASSY.TRANSPORT ELECTRONICS   DATE   11/19/71 SHEET 6 OF	DRAWING   ASSY.TRANSPORT ELECTRONICS   MODEL NO.   10	DRAWING   TYPE   P. 171102.11/0. 9Ch. MODEL NO. 15   DATE   1/18/71 SMEET   10 or
206, 03, _d10, 17, 22b, 431,	ASSI.TRANSPORT ELECTRONICS   MODEL NO.   16	ASSY.TRANSPORT ELECTRONICS   DATE   11/19/71 SHEET 6	CRANING   ASSY.TRANSPORT ELECTRONICS   MODEL NO.   10   DATE   11/18/71 SMEET 8   OF	ASSI-TRINSPORT ELECTRONICS   TYPE: 17 11   TYPE: 10   TYPE: 17 11   TYPE: 10   TYPE: 17 11   TYPE: 10   TYPE: 17 11   TYPE: 18   TYPE:
206, 03, 	ASSI.TRANSPORT ELECTRONICS   MODEL NO. 16   DATE 11/17/1715HEET   Mr.   DRAWING TITLE   DWG. NO.   NO.   NO.   REMARKS ON CKT. DESIG.	200168 - 001     200168 - 001   200168 - 001     200168 - 00168     200168 - 00168     200168 - 00168     200168 - 00168     200168 - 00168     200168 - 00168     200168 - 00168     200168 - 00168     200168 - 00168     200168 - 00168     200168 - 00168     200168 - 00168     200168 - 00168     200168 - 00168     200168 - 00168     200168 - 00168     200168 - 00168     200168 - 00168     200168 - 00168     20	DRAWING   ASSY.TRANSPORT ELECTRONICS   MODEL NO.   10	ASSI-TRINSPORT ELECTRONICS   TYPE
206, -03, -010, -17, -221, -431,	ASSI.TRANSPORT ELECTRONICS   MODEL NO. 16   DATE 11/17/1715HEET   Mr.	200168 - 001     200168 - 001   200168 - 001     200168 - 00168 - 00168     200168 - 00168 - 00168     200168 - 00168 - 00168 - 00168     200168 - 00168 - 00168 - 00168     200168 - 00168 - 00168 - 00168     200168 - 00168 - 00168 - 00168     200168 - 00168 - 00168 - 00168     200168 - 00168 - 00168 - 00168     200168 - 00168 - 00168 - 00168     200168 - 00168 - 00168 - 00168 - 00168     200168 - 00168 - 00168     200168 - 00168 - 00168     200168 - 00168 - 00168 - 00168     200168 - 00168 - 00168     200168 - 00168 - 00168     200168 - 00168     200168 - 00168     200168 - 00168     200168 - 00168     200168 - 00168     2001	CRANING   ASSY.TRANSPORT ELECTRONICS   MODEL NO.   10   DATE   11/18/71 SMEET 8   OF	ASSI-TRINSPORT ELECTRONICS   TYPE   Triby   MODEL NO.   15   DATE   16   MODEL NO.   15   DATE   16   MODEL NO.   16   DATE   16   MODEL NO.   17   MODEL NO.   18   DATE   18   MODEL NO.   NO. REQ.   REMARKS ON CKT. DESIG.
206, 03, ulto, 17, 2li, 431,	ASSY.TRANSPORT ELECTRONICS   MODEL NO. 16   DATE 11/17/17 SHEET   L OF	200168 - 001     200168 - 001   200168 - 001     200168 - 00168     200168 - 00168	DRAWING   ASSY.TRANSPORT ELECTRONICS   MODEL NO.   10	ASSI-TRINSPORT ELECTRONICS   TYPE   Triby   MODEL NO.   15   DATE   16   MODEL NO.   15   DATE   16   MODEL NO.   16   DATE   16   MODEL NO.   17   MODEL NO.   NO. REQ.   REMARKS ON CKT. DESIG.
206, 206, 203, 210, 217, 221, 231,	ASSY.TRANSPORT ELECTRONICS   MODEL NO.   16   DATE   11/17/171 SHEET   L OF	ASSY.TRANSPORT ELECTRONICS   DATE   11/19/71 SMEET   6 OF	CRAMMIC   ASSY.TRANSPORT ELECTRONICS   MODEL NO.   10   DATE   11/18/71 SMEET 8   OF	ASSI-TRANSPORT ELECTRONICS   TYPE
206, -03, -010, -17, -221, -431, 	ASSY.TRANSPORT ELECTRONICS   MODEL NO.   16   DATE   11/17/17   SHEET   L. OF	DRAWING   ASSY.TRANSPORT ELECTRONICS   PART Type 'P' 10ing. D/G, 9Ch. Model No. 16   Date 11/18/71 meet 6 of	DRAWING   ASSY.TRANSPORT ELECTRONICS   MODEL NO.   10	ASSI-TRINSPORT ELECTRONICS   TYPE   Triby   MODEL NO.   15   DATE   16   MODEL NO.   15   DATE   16   MODEL NO.   16   DATE   16   MODEL NO.   17   MODEL NO.   NO. REQ.   REMARKS ON CKT. DESIG.
206, -03, -010, -17, -221, -431,	Note	DRAWING   ASSY.TRANSPORT ELECTRONICS   PARL Type 'P' 10ing. D/G, 9Ch. Model No. 16   Date 11/18/71 smeet 6 of	ASSY.TRANSPORT ELECTRONICS   MODEL NO.   10   DATE   11/18/11 SHEET 8 OF   MODEL NO.   10   DATE   11/18/11 SHEET 8 OF   MODEL NO.   10   DATE   11/18/11 SHEET 8 OF   MODEL NO.   MO. MED.   REMARKS ON CKT. DESIG.	DRAWING   TYPE   TYPE   TYPE   DOC   NO. REQ.   REMARKS ON CKT. DESIG.     131   Capacitor, Tantalum.   1.5uf   100136-155   1   C201.     132
206, 206, 203, 210, 217, 221, 231, 15, 12,	Note	DEANING   ASSY.TRANSPORT ELECTRONICS   DWG. NO. 16   DATE   11/18/11   DWG. 17   DWG. 17   DWG. 17   DWG. 17   DWG. 17   DWG. 17   DWG. NO. NO. REO.   REMARKS ON CKT. DESIG.	ASSY.TRANSPORT ELECTRONICS   THE TYPE   TO   10   10   10   10   10   10   10   1	DRAWING   THE   Type   Thirs   DWG   NO.   NO.   REQ.   REMARKS ON CKT. DESIG.
206, 03, 	DRAWING   PMS. MSTC BORD.   MODEL NO.   15   DATE   11/17/11=MET   L. OF	DEARING   ASSY.TRANSPORT ELECTRONICS   DATE   11/18/71   SHEET   6   OF	ASSY.TRANSPORT ELECTRONICS   THE TYPE   TO   10   10   10   10   10   10   10   1	DRAWING   THE   Type   Third   DWG   NO.   NO.   REQ.   REMARKS ON CET. DESIG.
206. -03. -010. -17. -21b. -331. 	DRAWING   PMS. MST. TRANSPORT ELECTRONICS   MODEL NO.   15   DATE   11/17/11=MEET   16   OF	ASSY.TRANSPORT ELECTRONICS   DATE 11/18/71 sweet 6 or   DATE 11/18/71 swe	ASSY.TRANSPORT SLECTRONICS   DOLL NO.   NO. NO. NO. NO. NO. NO. NO. NO. NO. NO.	ASST.TRANSPORT REDUTCHICS   DWG. NO. NO. REG.   BEMARKS ON CKT. DESIGN.
206. -03. -010. -17. -21b. -331. 	ASSY.TRANSPORT ELECTRONICS   DATE 11/17/11-MEET   DOC. NO. NO. NO. NO. NO. NO. NO. REO.   REMARKS ON CKY. DESIG.	DEARING   ASSY.TRANSPORT ELECTRONICS   DATE   11/18/71   SHEET   6   OF	ASSY.TRANSPORT SLECTRONICS   DOLL NO.   NO. NO. NO. NO. NO. NO. NO. NO. NO. NO.	ASST.TRANSPORT REDUTCORICS   Darel   18
206. -03. -010. -17. -21b. -331. 	ASSY.TRANSPORT RIECTRORICS   MODEL NO.   16	DEARING   ASSY.TRANSPORT ELECTRONICS   DATE   11/18/71   SHEET   6   OF	ASSY.TRANSPORT SLECTRONICS   DOLL NO.   NO. NO. NO. NO. NO. NO. NO. NO. NO. NO.	ASST.TRANSPORT REDUTCORICS   Darel   18
206, -03, -010, -17, -12b, -431, 	ASSY.TRANSPORT ELECTRONICS   DATE 11/17/11-MEET   DOC. NO. NO. NO. NO. NO. NO. NO. REO.   REMARKS ON CKY. DESIG.	DEARING   ASSY.TRANSPORT ELECTRONICS   DATE   11/18/71   SHEET   6   OF	ASSY.TRANSPORT SLECTRONICS   DOLL NO.   NO. NO. NO. NO. NO. NO. NO. NO. NO. NO.	ASST.TRANSPORT REDUTCORICS   Darel   18

ML 200488 - 000

ML 200488 - 000

1	<b>J</b>				VIL 200488 - 008
DRAW	ASSY.TRANSPORT ELL PWB. Type'A' 1211	ECTRONICS ps. D/O,	gCh <sub>-model</sub> no	16	DATE 11/18/71 SHEET 13 OF
ITEM NO.	DRAWING TITL	Ε	DWG. NO.	NO. REQ.	REMARKS ON CKT. DESIG.
131					
132					
133	Resistor. 5%. 4w.	750	100156-751	1	R234.
134	Resistor. " 3w.	47	100068-470	1	R21,8.
	Resistor. " iw.	750	100156-,51	1	R268.
136	Resistor. " "	27K	100156-273	1	R421.
137	Resister. " "	12K	100156-123	1	RL32.
139	Resistor. " "	680K	100156-684	1	RL66.
140	Restatory " "	150	100156-151	-	Rigid? v
141	Resistor. " "	390K	100156-394	1	RL,68.
142	Resistor. " "	1.51	100156-155	1	R\$09.
143	Rectator. 1	-250	100156-151	-	<del>1520-</del>
144	Resistor. " "	390K	100156-394	1	R\$11.
145 146	Resistor. " "	3.3H	100156-335	1	8536.
146	Wire, Solid Insulated.		1002118-9214	A/R	Jumper Jl. From JJ to KK.
441	-ALTO COLIG INSULACED.		200,40-724	~~	Jumper J2. " T " V.
					Jumper J3. " L " M.
					Jumper J5. * F * G
					Jumper J7. " H " J.
					Jumper J8. " EE " FF.
					Jumper J9. " D " E. Jumper J10. " AA " CC.
					Jumper Jll. W W X. Jumper Jl3. W W P.
					Jumper Jlk. " R * S.
				·	Jumper J19. " DD " TP208.
		, –			
		•			
		,			
		MATERI	TIST IA		DRAWING NO. R
<i>]</i>	<b>N</b> ) =	MATERI	AL LIST		ML DRAWING NO. RE 2004,86 - 009
<b>D</b>	ASSY.TRANSPORT ELE	CTRONICS	<del></del>	18	ML 200488 - 009
DRAWIII TITEM	ASSI.TRANSPORT ELE	CTRONICS	9Ch -MODEL NO		ML 200488 - 009
ITEM NO.	ASSY.TRANSPORT ELE PWB, Type'A' 18 in	CTRONICS	9Ch -MODEL NO	19 NO. REQ.	ML 200488 - 009
ITEM	ASSI.TRANSPORT ELE	CTRONICS	9Ch -MODEL NO		ML 200488 - 009
17EM NO.	ASSY.TRANSPORT ELE PWB, Type'A' 18 in	CTRONICS	9Ch -MODEL NO		ML 200488 - 009
131 132	ASSY.TRANSPORT ELE PMB. Type'A' 18 ip	cctronics be, D/G,	9Ch -MODEL NO DWG. NO.	NO. REQ.	DATE 1/18/71 SHEET 14 OF REMARKS ON CKT, DESIG.
131 132 133	ASSY.TRANSPORT ELE PWB, Type'A' 18 in  DRAWING TITLE  Resistor. 5%. 4w.  Resistor. " 3w.	CCTRONICS 08. D/G.	9Ch -MODEL NO DWG. NO. 100156-751	NO. REQ.	DATE 1.18/71 SHEET 14 OF REMARKS ON CKT. DESIG.
131 132 133 134	ASSY.TRANSPORT ELE PWB, Type'A' 18 in  DRAWING TITLE  Resistor. 5%. 4w. Resistor. " 3w. Resistor. " 4w. Resistor. " 4w. Resistor. " 1 4w.	750 18k	PCh -MODEL NO DNG. NO.  100156-751 100068-470 100156-751	1 1 1	200188 - 009  DATE 1/18/71 SHEET 14 OF REMARKS ON CKT. DESIG.  R234.  R248.  R268.  R121.
131 132 133 134 135 136	ASSY.TRANSPORT ELEPHOP. Type'A' 18 in  DRAWING TITLE  Resistor. 5%. 4w.  Resistor. " 3w.  Resistor. " 4w.  Resistor. " 1 w.  Resistor. " 1 w.  Resistor. " 1 w.	750 18, 66K	2Ch -MODEL NO DWG. NO.  100156-751 100068-470 100156-751 100156-183	1 1 1 1	200188 - 009  DATE 1/18/71 SHEET 11 OF  REMARKS ON CKT. DESIG.  R231.  R218.  R268.  R121.  R131.
131 132 133 134 135 136 137	ASSY.TRANSPORT ELEPMB. Type'A' 18 in  DRAWING TITLE  Resistor. 5%. 4w.  Resistor. " 3w.  Resistor. " 4w.  Resistor. " "  Resistor. " "  Resistor. " "  Resistor. " "	750 18, 68k	PCh -MODEL NO DWG. NO.  100156-751 100068-1,70 100156-751 100156-183 100156-683 100156-133	1 1 1 1 1	2001.88 - 009  DATE 1/18/71 SHEET 11 OF  REMARKS ON CKT. DESIG.  R231.  R218.  R268.  R121.  R131.  R132.
131 132 133 134 135 136 137 138 139	ASSY.TRANSPORT ELEPHO. Type'A' 18 in  DRAWING TITLE  Resistor. 5%. iv.  Resistor. " iv.	750 L7 750 L8K 68K L3K 680K	2Ch +MODEL NO DWG. NO.  100156-751 100068-1470 100156-751 100156-183 100156-633 100156-684	1 1 1 1 1 1	2001.88 - 009  DATE 1.18/71 SHEET 11 OF  REMARKS ON CKT. DESIG.  R231.  R218.  R268.  R121.  R131.  R132.  R166.
131 132 133 13k 135 136 137 138 139 140	ASSY.TRANSPORT ELEPHOR. Type'A' 18 in  DRAWING TITLE  Resistor. 5%. iv.  Resistor. " iv.	750 47 750 18K 68K 13K 680K 156	PSC. NO. 100156-751 100156-751 100156-751 100156-183 100156-683 100156-684 100156-684	1 1 1 1 1 1	2001.88 - 009  DATE: 18/71 SHEET 11 OF  REMARKS ON CKT. DESIG.  R231.  R248.  R268.  R121.  R1.31.  R1.32.  R166.
131 132 133 134 135 136 137 138 139 140 141	ASSY.TRANSPORT ELEPHOP. Type'A' 18 in  DRAWING TITLE  Resistor. 5%. in.  Resistor. " in.	750 1750 18, 19, 19, 19, 19, 19, 19, 19, 19, 19, 19	PSC. NO. 100156-751 100156-751 100156-751 100156-183 100156-683 100156-684 100156-684 100156-394	1 1 1 1 1 1 1	2001.88 - 009  DATE 1.18/71 SHEET 11 OF  REMARKS ON CKT. DESIG.  R231.  R248.  R268.  R121.  R1.31.  R1.32.  R166.
131 132 133 13k 135 136 137 138 139 140	ASSISTANSPORT ELE PMB. Type'A' 18 in  DRAWING TITLE  Resistor. 5%. 4w. Resistor. " 3w. Resistor. " 4w. Resistor. " "	750 47 750 18K 68K 13K 680K 156	PSC. NO. 100156-751 100156-751 100156-751 100156-183 100156-683 100156-684 100156-684	1 1 1 1 1 1	2001.88 - 009  DATE 1.18/71 SHEET 11 OF  REMARKS ON CKT. DESIG.  R231.  R248.  R268.  R121.  R1.31.  R1.32.  R166.
131 132 133 134 135 136 137 138 139 140 141 142 143	ASSY.TRANSPORT ELF PMB. Type'A' 18 in  DRAWING TITLE  Resistor. 5%. 4w.  Resistor. " 3w.  Resistor. " 4w.	750 177 750 188 688 138 6808 159 3908	2Ch -MODEL NO DWG. NO.  100156-751 100068-170 100156-183 100156-683 100156-684 100156-684 100156-394 100156-55	1 1 1 1 1 1 1	2001.88 - 009  DATE 1.8/71 SHEET 11 OF  REMARKS ON CKT. DESIG.  R231.  R218.  R268.  R1:21.  R1:31.  R1:32.  R1:66.  R1:68.
131 132 133 134 135 136 137 138 139 140 141 142 143	ASSY.TRANSPORT ELF PMB. Type'A' 18 in  DRAWING TITLE  Resistor. 5%. 4w.  Resistor. " 3w.  Resistor. " 4w.  Resistor. " 4w.	750 47 759 18k 68k 13k 68ok 150 39ok 1.5H	2Ch -MODEL NO DWG. NO.  100156-751 100068-470 100156-183 100156-683 100156-684 100156-684 100156-334 100156-394	1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	200188 - 009  DATE 118/71 SHEET 11 OF  REMARKS ON CKT. DESIG.  R231.  R248.  R268.  R121.  R131.  R132.  R166.  R169.
131 132 133 134 135 136 137 138 139 140 141 141 142	ASSY.TRANSPORT ELF PMB. Type'A' 18 ip  DRAWING TITLE  Resistor. 5%. 4w.  Resistor. " 4w.  Resistor. " 4w.  Resistor. " "	750 1750 184 134 680 134 680 159 159 159 159 159 159 159	2Ch -MODEL NO DWG. NO.  100156-751 100068-1,70 100156-751 100156-183 100156-683 100156-684 100156-51 100156-394 100156-155 100156-394	1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	2001.88 - 009  DATE 18/71 SHEET 11 OF  REMARKS ON CKT. DESIG.  R231.  R248.  R268.  R121.  R131.  R132.  R166.  R169.  R509.  R511.
131 132 133 134 135 136 137 138 139 140 141 142 143 1143	ASSY.TRANSPORT ELEPHO. Type'A' 18 in  DRAWING TITLE  Resistor. 5%. 4w.  Resistor. " 3w.  Resistor. " 4w.  Resistor. " "	750 47 750 18k 68k 13k 680k 15h 390k 1.5h	2Ch MODEL NO	1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	2001.86 - 009  DATE 18/71 SHEET 11 OF  REMARKS ON CKT. DESIG.  R231.  R248.  R268.  R121.  R132.  R166.  R169.  R509.  R511.  R536.
131 132 133 134 135 136 137 138 139 140 141 142 143 114 145	ASSY.TRANSPORT ELEPHO. Type'A' 18 in  DRAWING TITLE  Resistor. 5%. 4w.  Resistor. " 3w.  Resistor. " 4w.  Resistor. " "	750 47 750 18k 68k 13k 680k 15h 390k 1.5h	PCh -MODEL NO DWG. NO.  100156-751 100068-470 100156-751 100156-683 100156-683 100156-684 100156-684 100156-394 100156-395 100156-395	1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	2001.86 - 009  DATE 1/18/71 SHEET 11 OF  REMARKS ON CKT. DESIG.  R231.  R248. R268. R121. R131. R132. R166. R467. R168. R509. R511. R536.  Jumper J1. From JJ to KK. Jumper J2. " T " V.
131 132 133 134 135 136 137 138 139 140 141 142 143 114 145	ASSY.TRANSPORT ELEPHO. Type'A' 18 in  DRAWING TITLE  Resistor. 5%. 4w.  Resistor. " 3w.  Resistor. " 4w.  Resistor. " "	750 47 750 18k 68k 13k 680k 15h 390k 1.5h	PCh -MODEL NO DWG. NO.  100156-751 100068-470 100156-751 100156-683 100156-683 100156-684 100156-684 100156-394 100156-395 100156-395	1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	2001.86 - 009  DATE 1/18/71 SHEET 11 OF
131 132 133 134 135 136 137 138 139 140 141 142 143 114 145	ASSY.TRANSPORT ELEPHO. Type'A' 18 in  DRAWING TITLE  Resistor. 5%. 4w.  Resistor. " 3w.  Resistor. " 4w.  Resistor. " "	750 47 750 18k 68k 13k 680k 15h 390k 1.5h	PCh -MODEL NO DWG. NO.  100156-751 100068-470 100156-751 100156-683 100156-683 100156-684 100156-684 100156-394 100156-395 100156-395	1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	2001.86 - 009  DATE 1/18/71 SHEET 14 OF  REMARKS ON CKT. DESIG.  R234.  R234.  R248.  R268.  R421.  R431.  R432.  R466.  R467.  R466.  R509.  R511.  R536.  Jumper J1. From JJ to KK.  Jumper J2. " T " V.  Jumper J3. " L " M.  Jumper J3. " F " G.
131 132 133 134 135 136 137 138 139 140 141 142 143 114 145	ASSY.TRANSPORT ELEPHO. Type'A' 18 in  DRAWING TITLE  Resistor. 5%. 4w.  Resistor. " 3w.  Resistor. " 4w.  Resistor. " "	750 47 750 18k 68k 13k 680k 15h 390k 1.5h	PCh -MODEL NO DWG. NO.  100156-751 100068-470 100156-751 100156-683 100156-683 100156-684 100156-684 100156-394 100156-395 100156-395	1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	2001.86 - 009  DATE 1/18/71 SHEET 14 OF  REMARKS ON CKT. DESIG.  R234.  R234.  R248.  R268.  R421.  R431.  R432.  R466.  R467.  R466.  R509.  R511.  R536.  Jumper J1. From JJ to KK.  Jumper J2. " T " V.  Juaper J3. " L " M.  Juaper J3. " F " G.  Jumper J7. " H " J.
131 132 133 134 135 136 137 138 139 140 141 142 143 114 145	ASSY.TRANSPORT ELEPHO. Type'A' 18 in  DRAWING TITLE  Resistor. 5%. 4w.  Resistor. " 3w.  Resistor. " 4w.  Resistor. " "	750 47 750 18k 68k 13k 680k 15h 390k 1.5h	PCh -MODEL NO DWG. NO.  100156-751 100068-470 100156-751 100156-683 100156-683 100156-684 100156-684 100156-394 100156-395 100156-395	1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	NL   200k86 - 009
131 132 133 134 135 136 137 138 139 140 141 142 143 114 145	ASSY.TRANSPORT ELEPHO. Type'A' 18 in  DRAWING TITLE  Resistor. 5%. 4w.  Resistor. " 3w.  Resistor. " 4w.  Resistor. " "	750 47 750 18k 68k 13k 680k 15h 390k 1.5h	PCh -MODEL NO DWG. NO.  100156-751 100068-470 100156-751 100156-683 100156-683 100156-684 100156-684 100156-394 100156-395 100156-395	1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	NL   2001.86 - 009
131 132 133 134 135 136 137 138 139 140 141 142 143 114 145	ASSY.TRANSPORT ELEPHO. Type'A' 18 in  DRAWING TITLE  Resistor. 5%. 4w.  Resistor. " 3w.  Resistor. " 4w.  Resistor. " "	750 47 750 18k 68k 13k 680k 15h 390k 1.5h	PCh -MODEL NO DWG. NO.  100156-751 100068-470 100156-751 100156-683 100156-683 100156-684 100156-684 100156-394 100156-395 100156-395	1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	NL   2001.86 - 009
131 132 133 134 135 136 137 138 139 140 141 142 143 114 145	ASSY.TRANSPORT ELEPHO. Type'A' 18 in  DRAWING TITLE  Resistor. 5%. 4w.  Resistor. " 3w.  Resistor. " 4w.  Resistor. " "	750 47 750 18k 68k 13k 680k 15h 390k 1.5h	PCh -MODEL NO DWG. NO.  100156-751 100068-470 100156-751 100156-683 100156-683 100156-684 100156-684 100156-394 100156-395 100156-395	1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	NL   2001.86 - 009
131 132 133 134 135 136 137 138 139 140 141 142 143 114 145	ASSY.TRANSPORT ELEPHO. Type'A' 18 in  DRAWING TITLE  Resistor. 5%. 4w.  Resistor. " 3w.  Resistor. " 4w.  Resistor. " "	750 47 750 18k 68k 13k 680k 15h 390k 1.5h	PCh -MODEL NO DWG. NO.  100156-751 100068-470 100156-751 100156-683 100156-683 100156-684 100156-684 100156-394 100156-395 100156-395	1 1 1 1 1 1 1 1 1 1	NL   200186 - 009

C \* TP208.

ITEM	PWB, Type'A' 251ps			,	DATE]1/18/71 SHEET 15 OF
NO.	DRAWING TITLE		DWG. NO.	NO. REQ.	REMARKS ON CKT. DESIG.
131		:	_		
132		- 4			
133	<del></del>	750	100156-751	1	R23L.
134	Resistor. " )w.	47	100068-470	1	R248.
135	Resistor. " iw.	750	100156-751	1	R268.
136	16313001.	15K	100156-153	1	RL21.
137	Resistor. " "	51K	100156-513	1	RL31.
138	resistor.	13K	100156-133	1	RL32.
139		680K	100156-684	1	RL66.
140	Rectators " *	150	100156-151	1	<del>1667.</del>
141	Resistor. " "	390K	100156-394	1	a468.
142	RESISTOI.	1.5M	100156-155	1	R\$09.
143		150	100156-151	-	2510
144	Resistor. " "	390K	100156-394	1	R511.
145	Resistor. " "	3.3H	100156-335	1	R536.
146				- /-	
147	Wire, Solid Insulated.		100248-924	A/R	Jumper Jl. From JJ to KK.
					Jumper J2. " T " V.
					Jumper J3. " L " M.
					Jumper J5. " F "G.
					Jumper J7. " H " J.
					Jumper J6. " EE "FF. Jumper J9. " D " E.
					Jumper J11. " W " X. Jumper J13. " N " P.
	<u> </u>				
					Jumper Jll. " R " S.
_					Jumper J19. " DD " TP208.

ASSY. TRANSPORT ELECTRONICS
TITLE PHB. Type'A' 3781DE. D/U. 90h MODEL NO. 19 DATEIJ/18/71 SHEET 16 OF

750 100156-751 1 R234.

47 100068-470 1 R248.

750 100156-751 1 R268.

10K 100156-103 1 RL21.

33K 100156-333 1 RL31. 15K 100156-153 1 RL32.

300K 100156-304 1 R466.

390K 100156-394 1 R468.

680K 100156-684 1 R509.

390K 100156-394 1 R511.

1002h8-92h A/R Jumper Jl. From JJ to KK.

Jumper 2. " T " V.

Jumper J3. " L " M.

Jumper J5. " F " Q.

Jumper J7. " H " J.

Jumper J6. " EE " FF.

Jumper J9. " D " E.

Jumper J10. " AA " CC.

Jumper J11. " W " X. Q.

Jumper J13. " M " P.

Jumper Jli. " R "S.

Jumper J19. " DD " TP208.

REMARKS ON CKT. DESIG.

DRAWING TITLE DWG, NO. NO. REQ.

131 132

133 Resistor. 5%. iw.

134 Resistor. \* 3w.

135 Resistor. " iw.

136 Resistor. " "

138 Resistor. " "
139 Resister. " "

140 Resistor. " "

1h2 Resistor. "

11/3 Rootstore

llu Resistor. " "

147 Wire, Solid Insulated.

145 146

Jumper J19. " DD " TP208.

ITEM	<del></del>			DAT611/18/71 SHEET 17 OF	ITEM	T
NO.	DRAWING TITLE	DWG. NO.	NO. REQ.	REMARKS ON CKT. DESIG.	NO.	Ł
131			<b></b>		131	Ľ
132	Resistor, 5%, 1w. 750	100156-751	1	R2 34.	132	╀
					134	╀
134		100068-470	1	R2L8.	+	╀
135 136	Resistor. * 1 9.1K	100156-912	1	Rh21.	135	١.
137	Resistor. * * 27K	100156-273	1	RL31.	137	Ľ
136	Resistor. " " 15K	100156-153	1 .	RL 32.	138	
139	Resistor. " 300K	100156-304	1	R466.	139	1
140	Resister: 150	100156-151		N.67.	140	1
141	Resistor. " " 330K	100156-334	1	RL 68.	141	,
142	Resistor. " " 680K	100156-684	1	R\$09.	142	1
143	Resistore 1 1 150	100156-151	<b></b>	9510	143	١.
244	Resistor. " " 330K	100156-334	1	R511.	144	1
145					145	1
146		·			. 146	r
147	Wire, Solid Insulated.	100246-924	A/R	Jumper Jl. From JJ to KK.	147	1
		i		Jumper J2. " T " V.		Г
				Jumper J3. " L " H.		Γ
				Jumper JS. * F * G.		
		1		Jumper J7. * H * J.		
				Jumper J8. " EE "FF.		
		:		Jumper J9. * D * E.		
				Jumper J10. H AA H CC.		
				Jumper Jll. " W " X.		
				Jumper Jl3. * N * P.		
				Jumper JlL. " R "S.		
				Jumper J19. " DD " TP208.		L

DRAW!	ASSY.TRANSPORT ELECT			== 	DATE 11/18/12 SHEET 18 OF
ITEM NO.	DRAWING TITLE		DWG. NO.	NO. REQ.	REMARKS ON CKT. DESIG.
131	Capacitor, Tantalum.	10uf	100070-106	1	C2OL.
132					
133					
134					
135					
136	Resistor. 5%. iw.	33K	100156-333	1	Rl;21.
137	Resistor. " "	120K	100156-124	1	RL31.
138	Resistor. " "	12K	100156-123	1	ત્યા 32.
139	Resistor. " "	680K	100156-664	1	RL66.
140	Recistery " "	150	100156-151	1	-ithéte
141	Resistor. " "	390K	100156-394	1	RL68.
142	Resistor. " "	1.5M	100156-155	1	R509.
143	Reciptor	150	100156-151	1	<del>10101</del>
144	Resistor. " "	390K	100156-394	1	R511.
145	Resistor. " "	3.3M	100156-335	1	R536.
11,6					
147	Wire, Solid Insulated.		100248-924	A/R	Jumper Jl. From KK to LL.
					Jumper J2. " U " V.
					Jumper Jl. * PP * RR.
					Jumper J5. * F * G.
					Jumper J6. " GG " HH.
					Jumper J7. " H " J.
					Jusper J8. * EE * FF.
					Jumper J9. " D " E.
				-	Jumper J10. * AA * CC.
					Jumper Jll. " W " X.  Jumper Jl5. " A " C.
					Jumper J15. " A " C.

DRAWI	ASSY.TRANSPORT ELECT			18	DATE 11/18/21 SHEET 19 OF
ITEM NO.	DRAWING TITLE		DWG. NO.	NO. REQ.	REMARKS ON CKT. DEMG.
131	Capacitor, Tantalum.	10uf	100070-106	1	C204.
132					
133					
134					
135					
136	Resistor. 5%. jw.	27K	100156-273	1	BU: ET.
137	Resister. * *	1000	100156-104	1	Ri31.
138	Resistor. "	12K	100156-123	1	RI432.
139	Resistor. " "	680K	100156-684	1	RL66.
140	Resistory * *	150	100156-151	1	ALGT -
141	Resistor. " "	390K	100156-394	1.	RL68.
142	Resistor. " "	1.5M	100156-155	1	R509.
143	Restator. * *	-250	100156-151		2520-
144	Resister. " "	390K	100156-394	1	RS11.
145	Resistor. " "	3.3H	100156-335	1	R536.
146					
147	Wire, Solid Insulated.		100248-924	A/R	Jumper Jl. Frem IX to LL.
					Jumper J2. " U " V.
					Jumper Jh. " PP " RR.
	**************************************				Jumper 35. " F .G.
					Jumper J6. * GG * HM.
					Jumper J7. " H " J.
					Jumper J8. * EE * FF.
					Jumper J9. " D " E.
-	<del> i i</del>				Jumper JlO. " AA " CC.
					Jumper Jll. " W " I.
					Jumper J15. " A " C.
$\dashv$					Jumper J16. " UU " VV.
					Jumper J17. " W " XX.
		-			Jumper J19. " DD " 7720

T	<b>M</b>	ATERI	AL LIST	_	ML 200488 - 015
DRAWING	ASSY.TRANSPORT ELECT	Tronics S/O.	2Ch - MODEL NO	<u>10</u>	DATE 11/18/71 SHEET 20 OF_
TEM NO.	DRAWING TITLE		DWG. NO.	NO. REQ.	REMARKS ON CKT. BESIG.
131	Capacitor, Tantalum.	10uf	100070-106	1	C204.
132					
133				L	
134					<u> </u>
135					
136	Resistor. 5\$. tw.	18K	100156-183	1	RL:21.
137	Resistor. " "	68x	100156-683	1	RI431.
138	Resistor. " "	13K	100156-133	1	RL32.
139	Resistor, " "	680 <b>K</b>	100156-68h	1 .	則66。
770 -	Restricter. " "	150	100156-151	1	nl_67
141	Resister. " "	390K	100156-394	1	R1468.
142	Resistor. " "	1.54	100156-155	1	R\$09.
143	Resistor.	150	100156-151	<u> </u>	85101-
144	Resistor. " "	390K	100156-394	1	R511.
145	Resistor. " "	3.3H	100156-335	1	R536.
146				<u> </u>	
147	Wire, Solid Insulated.		100248-924	A/R	Jumper Jl. From KK to LL.
					Jumper J2. " U " V.
					Jumper Ju. " PP "RR.
					Jumper J5. " F "G.
				<u> </u>	Jumper J6. " GG " HH.
				<u> </u>	Jumper J7. " H " J.
				<u> </u>	Jumper J8. " EE "FF.
				<u> </u>	Jumper J9. " D " E.
				<del> </del>	Jumper JlO. " AA " CC.
			ļ	ļ	Jumper Jll. " W " X.
				<u> </u>	Jumper 515. " A " C.
				<u> </u>	Jumper J16. " UU " VV.
				<u> </u>	Jumper J17. " W " IX.
				ļ	Jumper J19. " DD " TP208
					<u> </u>

131   Capacitor, Tantalum.   1.5uf.   100136-155   1   C204.     132   133   134   135   136   Resistor.   55. 2w.   9.1K   100156-912   1   Ri.21.     137   Resistor.   27K   100156-273   1   Ri.31.     138   Resistor.   15K   100156-153   1   Ri.32.     139   Resistor.   300K   100156-304   1   Ri.66.     140   Resistor.   300K   100156-334   1   Ri.68.     141   Resistor.   680K   100156-334   1   Ri.68.     142   Resistor.   680K   100156-684   1   R509.     143   Resistor.   300K   100156-334   1   R512.     144   Resistor.   300K   100156-334   1   R512.     145   Resistor.   300K   100156-334   1   R512.     146   Resistor.   300K   100156-334   1   R512.     147   Wire, Solid Inculated.   100248-924   A/R   Jumper J1. From KK to LL.     148   Jumper J2.   U Y.     149   Jumper J3.   F G.   G.   R1.     149   Jumper J4.   PP RR.     149   Jumper J5.   F G.     150   Jumper J1.   W Y.     150   Jumper J1.   W XI.     150   Jumper J1.   E D T22     150   Jumper J1.   E D T22     151   Jumper J1.   E D T22     152   Jumper J1.   E D T22     153   Jumper J1.   R1.21   R1.21   R1.21     151   Jumper J1.   R1.21   R1.21   R1.21   R1.21     152   Jumper J1.   R1.21   R	_     \	=	MA I E R I	<u> </u>	=	ML 200488 - 018
131   Capacitor, Tantalum.   1.5uf.   100136-155   1   C20L.     132   133   134   135   135   136   Resistor. * * * * * * * * * * * * * * * * * * *		TLE PWB. Type P' LSips	s. 15/0. 9	Ch. MODEL NO.	16	
132   133   134   135   136   Resistor. 5%. 2w. 9.1K   100156-912   1   Ri.21.   137   Resistor. "   27K   100156-273   1   Ri.31.   138   Resistor. "   15K   100156-153   1   Ri.32.   139   Resistor. "   30K   100156-30k   1   Ri.66.   140   Resistor. "   330K   100156-30k   1   Ri.68.   140   Resistor. "   330K   100156-30k   1   R509.   141   Resistor. "   680K   100156-60k   1   R509.   141   Resistor. "   330K   100156-33k   1   R509.   141   Resistor. "   330K   100156-33k   1   R512.   141   R509.	1TE MO	DRAWING TITL	E	DWG. NO.	NO. REQ.	REMARKS ON CKT. DESIG.
133   134   135   136   137   138   138   138   138   138   138   138   138   138   138   138   138   138   138   138   138   139   130	. 13	l Capacitor, Tantalum.	1.5uf.	100136-155	1	C2O4 ·
134  135  136 Resistor, SA, 3w. 9.1K 100156-912 1 Ri21.  137 Resistor. " 27K 100156-273 1 Ri32.  138 Resistor. " 15K 100156-153 1 Ri32.  139 Resistor. " 300K 100156-304 1 Ri66.  110 Resistor. " 330K 100156-334 1 Ri68.  112 Resistor. " 330K 100156-334 1 Ri68.  112 Resistor. " 330K 100156-334 1 Ri68.  113 Resistor. " 330K 100156-334 1 Ri68.  114 Resistor. " 330K 100156-334 1 Rife.  114 Resistor. " 330K 100156-334 1 Rife.  115 100156-334 1 Rife.  116 117 Vire, Solid Insulated. 100218-921 A/R Jumper J1. From KK to LL.  116 117 Vire, Solid Insulated. 100218-921 A/R Jumper J2. " U "V.  118 Jumper J2. " U "V.  119 Jumper J3. " F "G.  119 Jumper J6. " OG " Rif.  119 Jumper J1. " W " X.  119 Jumper J1. " W " X.  119 Jumper J1. " W " X.  110 Jumper J1. " W " X.  111 Jumper J1. " W " X.  111 Jumper J1. " W " X.  112 Jumper J1. " UU " VV.  114 Jumper J1. " UU " VV.  115 Jumper J1. " UU " VV.  115 Jumper J1. " UU " VV.  116 Jumper J1. " UU " VV.  117 Jumper J1. " UU " VV.  117 Jumper J1. " UU " VV.  118 Jumper J1. " UU " VV.  119 Jumper J1. " UU " VV.  119 Jumper J1. " UU " VV.  119 Jumper J1. " UU " VV.  110 Jumper J1. " UU " VV.  110 Jumper J1. " UU " VV.  111 Jumper J1. " UU " VV.  111 Jumper J1. " UU " VV.  112 Jumper J1. " UU " VV.  114 Jumper J1. " UU " VV.  115 Jumper J1. " UU " VV.  115 Jumper J1. " UU " VV.  116 Jumper J1. " UU " VV.  117 Jumper J1. " UU " VV.  117 Jumper J1. " UU " VV.  118 Jumper J1. " UU " VV.  119 Jumper J1. " UU " VV.  119 Jumper J1. " UU " VV.  110 Jumper J1. " UU " VV.  111 Jumper J1. " UU " VV.  112 Jumper J1. " UU " VV.  113 Jumper J1. " UU " VV.  114 Jumper J1. " UU " VV.  115 Jumper J1. " UU " VV.  115 Jumper J1. " UU " VV.  116 Jumper J1. " UU " VV.  117 Jumper J1. " UU " VV.  118 Jumper J1. " UU " VV.  118 Jumper J1. " UU " VV.  118 Jumper J1. " U	13	2				
136   Resistor. SK. W.   9.1K   100156-912   1   Ri.21.     137   Resistor. "   27K   100156-273   1   Ri.31.     138   Resistor. "   15K   100156-153   1   Ri.32.     139   Resistor. "   300K   100156-30k   1   Ri.66.     140   Resistor. "   330K   100156-30k   1   Ri.68.     141   Resistor. "   330K   100156-30k   1   Ri.68.     142   Resistor. "   680K   100156-68k   1   R509.     143   Resistor. "   150   100256-152   1   R512.     144   Resistor. "   330K   100156-33k   1   R512.     145   Resistor. "   330K   100156-33k   1   R512.     146   Resistor. "   330K   100156-33k   1   R512.     146   Resistor. "   330K   100156-33k   1   R512.     147   Wire, Solid Inculated.   100258-92k   A/R   Jumper Jl. From EK to LL.     Jumper Jl. " PP " RR.     Jumper Js. " F " G.     Jumper Js. " EE " FF.     Jumper Js. " A " C.     Jumper Js. " A " C.     Jumper Js. " MW " XL.     Jumper Js. " ID " TP2	13	3				
136 Resistor. SK. 2w. 9.1K 100156-912 1 Ri21.  137 Resistor. " 27K 100156-273 1 Ri32.  138 Resistor. " 15K 100156-153 1 Ri32.  139 Resistor. " 300K 100156-304 1 Ri66.  110 Resistor. " 300K 100156-304 1 Ri66.  111 Resistor. " 330K 100156-31 1 Ri68.  112 Resistor. " 680K 100156-681 1 R509.  113 Resistor. " 150 100156-681 1 R512.  114 Resistor. " 330K 100156-31 1 R512.  115 Li6 Li7 Wire, Solid Insulated. 100218-921 A/R Jumper J1. From KK to LL.  Jumper J2. " U " V.  Jumper J5. " F " G.  Jumper J6. " GG " RH.  Jumper J7. " H " J.  Jumper J8. " EE " FF.  Jumper J10. " AA " C.  Jumper J11. " W " X.  Jumper J17. " M " XX.  Jumper J19. " ID " TP2  MATERIAL LIST  MAT	1 12	4				
137 Resistor. " 27K 100156-273 1 Bi.31.  138 Resistor. " 15K 100156-153 1 Ri.32.  139 Resistor. " 300K 100156-304 1 Ri.66.  140 Resistor. " 300K 100156-304 1 Ri.66.  141 Resistor. " 300K 100156-334 1 Ri.68.  142 Resistor. " 680K 100156-684 1 R509.  143 Resistor. " 300K 100156-334 1 Ri.68.  144 Resistor. " 300K 100156-334 1 R512.  145 146 147 Wire, Solid Insulated. 100248-924 A/R Jumper J1. From KK to LL.  Jumper J2. " U "V.  Jumper J4. " PP " RR.  Jumper J5. " F " G.  Jumper J6. " GG " RH.  Jumper J7. " H " J.  Jumper J1. " W " X.  Jumper J1. " W "	13	5			<u> </u>	
138   Resistor. "	13	Resistor, 5%, 2w.	9.1K	100156-912	1	RL 21.
139   Resistor. " "   300K   100156-30k   1   2166.     110   Resistor. " "   150   100164   151   1   2167.     111   Resistor. " "   330K   100156-33k   1   2168.     112   Resistor. " "   680K   100156-68k   1   2509.     113   Resistor. " "   330K   100156-33k   1   2168.     114   Resistor. " "   330K   100156-33k   1   217.     115                               116                                     116	13	Resistor. " "	27K	100156-273	1	趾31.
110   Resistor. "   330K   100156-33k   1   Rk68.     112   Resistor. "   660K   100156-68k   1   R509.     113   Resistor. "   150   100156-15k   1   R5287     114   Resistor. "   330K   100156-33k   1   R512.     115   116	13	Resistor. * *	15K	100156-153	1	RL32.
1h1   Resistor. "   330K   100156-33h   1   Rh68.     1h2   Resistor. "   680K   100156-68h   1   R509.     1h3   Resistor. "   330K   100156-15h   1   R519.     1h4   Resistor. "   330K   100156-33h   1   R512.     1h5	υ	Resistor. " "	300K	100156-304	1	趾66.
11/2   Resistor. "   680K   100156-68L   1   8509.     11/3   Resistor. "   330K   100156-151   2   8518.     11/5   Resistor. "   330K   100156-33L   1   8512.     11/6	14	Restator, " "	250	100126-151	-1-1-	01.67-
11.3   Resistor.   150   100156-151   R518.	14	Resistor. " "	330K	100156-334	1	RL68.
11.1   Resistor. "   330K   100156-33L   1   R512.     11.6	14	Resistor. " "	680K	100156-684	1	R509.
115	14	Mesistor.	150	100156-151	1	<del>8510 r</del> .
11.6	14	Resistor. " "	330K	100156-334	1	RSIX.
1002L8-92L   A/R   Jusper J1. From KK to LL.	14	3				
Jusper J2. " U " V.  Jusper JL. " PP " RR.  Jusper J5. " F " G.  Jusper J6. " OG " MR.  Jusper J6. " OG " MR.  Jusper J7. " H " J.  Jusper J9. " L " E.  Jusper J10. " AA " CC.  Jusper J11. " W " X.  Jusper J11. " W " X.  Jusper J15. " UU " VV.  Jusper J17. " WW " XX.  Jusper J17. " WW " XX.  Jusper J19. " ID " TP20  MATERIAL LIST  ML DRAWING NO.  200488 - 019  DRAWING PMB. Typer'A' 10108. S/G. 9Ch. MODEL NO.  DATE 11/22/T1 MEET 2L OF	114					
Junper Ji. " PP " RR.  Junper J5. " F " G.  Junper J6. " OG " MH.  Junper J7. " H " J.  Junper J8. " EE " FF.  Junper J10. " AA " CC.  Junper J11. " W " X.  Junper J11. " W " X.  Junper J15. " A " C.  Junper J17. " WW " XX.  Junper J17. " WW " XX.  Junper J19. " ID " TP20  MATERIAL LIST  ML DRAWING NO.  200468 - 019  DRAWING NO.  DRAWING NO.	14	Wire, Solid Insulated.		100248-924	A/R	Jumper Jl. From KK to LL.
Jumper J5. " F " G.  Jumper J6. " GG " RH.  Jumper J7. " H " J.  Jumper J8. " EE " FF.  Jumper J10. " AA " CC.  Jumper J10. " AA " CC.  Jumper J11. " W " I.  Jumper J16. " UU " VV.  Jumper J17. " MW " II.  Jumper J19. " ID " TP20  MATERIAL LIST  ML DRAWING NO.  200488 - 019  DRAWING NO.  DR						Jumper J2. " U " V.
Jumper J6. " OG " NH.  Jumper J7. " H " J.  Jumper J8. " EE " FF.  Jumper J10. " AA " CC.  Jumper J11. " W " X.  Jumper J15. " A " C.  Jumper J16. " UU " VV.  Jumper J17. " WW " XX.  Jumper J17. " WW " XX.  Jumper J19. " ID " TP20  MATERIAL LIST  ML DRAWING NO.  200468 - 019  DRAWING NO.  DRAWING NO.  DRAWING NO.  DRAWING NO.  DATE 11/22/11 MEET 2L OF						Jumper Ju. " PP " RR.
Jusper J7. " H " J.  Jusper J8. " EE " FF.  Jusper J9. " L " E.  Jusper J10. " AA " CC.  Jusper J11. " W " X.  Jusper J15. " A " C.  Jusper J16. " UU " VV.  Jusper J17. " WW " XX.  Jusper J17. " WW " XX.  Jusper J19. " ID " TP20  MATERIAL LIST  ML DRAWING NO.  200468 - 019  DRAWING NO.  DRA						Jumper J5. " F "G.
Jumper J8.						Jumper J6. " GG " MH.
Jumper J9. " L "E.  Jumper J10. " AA " CC.  Jumper J11. " W " X.  Jumper J15. " A " C.  Jumper J16. " UU " YV.  Jumper J17. " WW " XX.  Jumper J17. " WW " XX.  Jumper J19. " ID " TP20  MATERIAL LIST  ML DRAWING NO.  200488 - 019  DRAWING NO.  DRAWING N						Jumper J7. * H * J.
JURDET J10. " AA " CC.  JURDET J11. " W " X.  JURDET J15. " A " C.  JURDET J16. " UU " VV.  JURDET J17. " WW " XX.  JURDET J17. " WW " XX.  JURDET J19. " ID " TP20  MATERIAL LIST  ML DRAWING NO.  200488 - 019  DRAWING PMB. Type'A' 1010B. S/U. 9Ch. MODEL NO. 16  DATE 11/22/T1 MEET 2L OF						Jumper Jô. " EE "FF.
JURDET J11. " W " X.  JURDET J15. " A " C.  JURDET J16. " UU " VV.  JURDET J17. " WM " XX.  JURDET J17. " WM " XX.  JURDET J19. " ID " TP20  MATERIAL LIST  ML DRAWING NO.  200468 - 019  DRAWING PMB. Type'4' 1010a, S/U, 9Ch. MODEL NO.  DATE 11/22/T1 MEET 24. OF						Jumper J9. " D " E.
JURDET J15. " A "C.  JURDET J16. " UU " VV.  JURDET J17. " WM " XX.  JURDET J17. " WM " XX.  JURDET J19. " ID " TP20  MATERIAL LIST  ML DRAWING NO.  200488 - 019  DRAWING NO.  DATE 11/22/T1 MEET 24. OF						Jumper JlO. " AA " CC.
Jumper J16. " UU " VV.  Jumper J17. " MM " IX.  Jumper J19. " ID " TP20  MATERIAL LIST  ML DRAWING NO.  200488 - 019  DRAWING PMB. Type/4 1010g. S/G. 9Ch. MODEL NO.  DATE: 11/22/T1 MEET 24 OF						Jumper J11. " W " X.
JUMPET J17. " WW " IX.  JUMPET J19. " ID " TP20  MATERIAL LIST ML DRAWING NO.  200488 - 019  ASSI, TRANSPORT ELECTRONICS TITLE PMB. Type'A' 101pg. S/G. 92h. MODEL NO.  DATE: 11/22/11 MEET 24 OF						Jumper J15. " A " C.
JUMPET J19. " ID " TP20  MATERIAL LIST ML DRAWING NO. 200468 - 019  DRAWING PHB. TYPE'A' 10108. S/d. SCh. MODEL NO. 18 DATE 11/22/T1 MEET 24 OF						Jumper J16. " UU " VV.
MATERIAL LIST ML DRAWING NO. 200488 - 019  DRAWING NO. 200488 - 019  DRAWING NO. 200488 - 019  DATE 11/22/11 MEET 24 OF						Jumper J17. " WW " XX.
ASSY. TRANSPORT ELECTRONICS TITLE PHE. Type A' 101ps. S/G. 9Ch. MODEL NO. 10 DATE 11/22/11 SMEET 24 OF						Jumper J19. * DD * TP208.
ASSY. TRANSPORT ELECTRONICS TITLE PHB. Type 4' 101ds. S/G. 9Ch. MODEL NO. 16 DATE 11/22/71 SHEET 24 OF						
ASSY. TRANSPORT ELECTRONICS TITLE PHB. Type'A' 1010s. S/G. 9Ch. MODEL NO. 16 DATE 11/22/71 SHEET 24 OF						
MATERIAL LIST ML 200488 - 019  DRAWING ASST.TRANSPORT ELECTRONICS TITLE PHE Type'A' 1010s. S/U. 9Ch. MODEL NO. 10 DATE 11/22/71 SHEET 24 OF						
TITLE PNB. Type'A' 101ps. S/G. 9Ch. MODEL NO. 16 DATE 11/22/11 SHEET 24 OF	1		MATERIA	LL LIST	=	
ITEM DRAWING TITLE DWG. NO. NO. REQ. REMARKS ON CKT. DESIG.	- DRAY	ASSY.TRANSPORT ELE PMB. Type 'A' 1010s	CTRONICS S/G. 9	Ch. MODEL NO	<u> </u>	DATE 11/22/71 SHEET 24 OF
	ITEM NO.	DRAWING TITLE	1	DWG. NO.	NO. REQ.	REMARKS ON CKT, DESIG.
131	-	<del></del>				

DRAWI	ASSY.TRANSPORT ELECT	RONICS	N/4	1.6	200488 - 020
TITL	E PWE. TYDE'A' 1251DS.	5/0.	Ch . MODEL NO		DATE 11/22/71 SHEET 25 OF
NO.	DRAWING TITLE		DWG. NO.	NO. REQ.	REMARKS ON CKT. DESIG.
131					
1 32					
133					
134					
135					
136	Resistor. 5%. W.	27K	100156-273	1	સં-21.
137	Resistor. " "	100K	100156-104	1	RL31.
138	Resistor. " "	12K	100156-123	1	RL32.
139	Resistor. " "	680K	100156-684	1	RL66.
170	Reciptor. " "	150	100156-151	1	RL67
141	Resistor. " "	390K	100156-394	1	R468.
142	Resistor. " "	1.5M	100156-155	1	R509.
143	Resistory * *	150	100156-151	-	açao
144	Remistor. " "	390K	100156-394	1	R511.
145	Resistor. " "	3.3M	100156-335	1	R536.
146					
147	Wire, Solid Insulated.		100248-924	A/R	Jumper Jl. From JJ to KK.
					Jumper J2. " T " V.
					Jumper J3. " L " M.
					Jumper J5. " F " G.
					Jumper J7. " H " J.
					Jumper J8. " EE "FF.
					Jumper J9. " D " E.
					Jumper J10. " AA " CC.
					Jumper Jll. " W " X.
					Jumper J13. " N " P.
					Jumper Jili. * R * S.
					Jumper J19. " DD " TP208.

DRAW	ASSY.TRANSPORT ELEC PWB. Type'A' 251ps.			10	DATE 11/22/71 SHEET 27 OF
ITEM NO.	DRAWING TITLE		DWG. NO.	NO. REQ.	REMARKS ON CKT. DESIG.
131					
132					
133					
134					
135					
136	Resistor. 5%. 1w.	15K	100156-153	1	R421.
137	Resistor. * *	51K	130156-513	ì	RL31.
138	Resistor. " "	13K	100156-133	1	KL32.
139	Resistor. " "	680 <b>K</b>	100156-68/	1	iil.66.
140	Restator, 4.4	150	100156 151	1	<del>11.67.</del>
141	Resistor. " "	390K	100156-394	1	RL:66.
11,2	Resistor. * *	1.5%	100156-155	1	R509.
143	Hesieter.	150	100156-151	1	PC10.
144	Resistor. " "	390K	100156-394	1	R511.
145	Resistor. " "	3.3M	100156-335	1	R536.
146					
147	Wire, Solid Insulated.		100248-924	A/R	Jumper Jl. From JJ to KK.
					Jumper J2. " T " V.
					Jumper J3. " L " M.
					Jumper J5. " F "G.
					Jumper J7. " H " J.
					Jumper J8. * EE * FF.
					Jumper J9. " D " E.
					Jumper JlO. " AA " CC.
					Jumper Jll. " W " X.
					Jumper J13. " N " P.
					Jumper Jlh. " R "S.
					Jumper J19. " DD " TP20

ITEM NO.	DRAWING TITLE		DWG, NO.	NO, REQ.	REMARKS ON CKT. DESIG
131					
132					
133					
134					
135					
	Resistor. 5%. tw.	9.1K	100156-912	1	R421.
-	Resistor. " "	27K	100156-273	1	RL31.
	Resistor. " "	15K	100156-153	1	RL32.
139	Resistor. " "	300K	100156-304	1	Ri,66.
140	Resistory -	150	100156-151		1467.
	Resistor. " "	330K	100156-334	1	RL68.
142	Recistor. " "	680K	100156-684	1	R509.
143	Resister.	150	1001/6-1/1	1	10101
144	Resistor. " "	330K	100156-334	1	RS11.
145					
146					
147	Wire, Solid Insulated.		100248-924	A/R	Jumper Jl. Frem JJ to KK
					Jumper J2. " T ". W.
					Jumper J3. L N.
					Jumper 35. " F " C,
					Jumper J7. # # 4.
					Jumper J8. " EE "FF
					Jumper J9. D " E.
					Jumper.JlO. * AA * CC
					Jumper Jll. " W " X.
					Jumper Jl3. " N " F.
					Jumper Ill: " R " 8.
					Jumper J19. " DD " TP:
			1	1	ļ .

- 017 REV.	MATE	RIAL LIST	=	ML 200488 - 019
22 or DRAW	ASSY.TRANSPORT ELECTRON	IICS	3.6	DATE 11/22/71 SHEET 24 OF_
DESIG. ITEM	DRAWING TITLE	DWG, NO.	NO. REQ.	<del>~</del>
131			<del>†</del>	
132			†	
133			1	· · · · · · · · · · · · · · · · · · ·
134				
135		+	1	
136	Resistor. 5%. jw.	3K 100156-333	1	RL 21.
137	Resistor. " " 12	OK 100156-12h	1	RI:31.
138	Resistor. " "	2K 100156-123	1	RL32.
139	Resistor. " " 66	OK 100156-684	1	RI:66.
140	Reciptory # #	50 100156-151	1	RI.67.
141	Resistor. " " 39	OK 100156-394	1	R468.
142	Resistor." " 1.	5M 100156-155	1	R509.
143	Restore	50 100156 151	1	-N510-t
144	Resistor. " " 39	OK 100156-39L	1	R511.
145	Resistor. " " 3.	3M 100156-335	1	R536.
146			1	
o LL. 147	Wire, Selid Insulated.	100248-924	A/R	Jumper Jl. From JJ to KK.
· v.				Jumper J2. * T * V.
* RR.				Jumper J3. " L " M.
• G.				Jumper J5. * F 4 G.
• ин.				Jumper J7. * H * J.
* J.				Jumper J8. " EE " FF.
· FF.				Jumper J9. " D " E.
:				Jumper JlO. " AA " CC.
· N.				Jumper Jll. " W " X.
· I.				Jumper J13. " N " P.
* c.				Jumper Jli. " R "S.
· vv.				Jumper J19. " DD " TP208
• ш.				

1	MATER	IAL LIST		ML 200488 - 021
DRAWN	ASSY.TRANSPORT ELECTRONICS PWB. Type'A' 18 ips.S/G.		1ø	
ITEM NO.	DRAWING TITLE	DWG. NO.	NO. REQ.	REMARKS ON CKT. DESIG.
131		T		
132				
133				
134				
135				
136	Resistor. 5%. 181	100156-183	1	RL21.
137	Resistor. " " 688	100156-683	1	RL31.
138	Resistor. " " 13	100156-133	1	RL32.
139	Resistor. " " 680	100156-684	1	RL66.
πо	Resistory 150	100156-151	1	1467
11.1	Resistor. " " 3904	100156-394	1	нц68.
142	Resistor. " " 1.58	100156-155	1	R509.
11.3	Resistery 4 4 150	100156-151	-	RELET
144	Resistor. " " 3908	100156-394	1	R511.
145	Resistor. * * 3.3	100156-335	1	R536.
146				
147	Wire, Solid Insulated.	10021.8-924	A/R	Jumper Jl. From JJ to KK.
				Jumper J2. " T " V.
				Jumper J3. " L " M.
				Jumper J5. " F "G.
				Jumper J7. " H " J.
				Jumper 18. " EE " FF.
				Jumper J9. " D " E.
				Jumper J10. * AA * CC.
				Jumper Jll. " W " I.
				Jumper J13. * N * P.
				Jumper Jih. " R "S.
				Jumper J19. " DD " TP208.

J	<b>1</b> ] <u>"</u>	ATERI	AL LIST	=	ML 200488 - 023
DRAW!	ASSY.TRANSPORT ELEC	Tronics .s/0.9	h. MODEL NO.	1ø	DATE 11/22/71 SHEET 28 OF_
ITEM NO.	DRAWING TITLE		DWG, NO.	NO. REQ.	REMARKS ON CKT. DESIG.
131					
132					
133				I	
134					
135		-			
136	Resistor. 5%. 2w.	108	100156-103	1	Ri,21.
137	Resistor. " "	33K	100156-333	1	HL31.
138	Resistor. * *	15K	100156-153	1	RL 32.
139	Resistor. " "	300K	100156-304	1	RL66.
140	Restrictory " "	10K	2001/6-103		ni.67.
141	Resistor, " "	390K	100156-394	1	R468.
142	Resistor. " "	680K	100156-684	1	R509.
143	Restricte	106	100156-103	-	R510.
144	Resistor. " "	390K	100156-394	1	R511.
145					
146					
11.7	Wire, Solid Insulated.		100248-924	A/R	Jumper Jl. From JJ to KK.
					Jumper J2. " T " V.
					Jumper J3. " L " M.
					Jumper J5. " F "G.
					Jumper J7. " H " J.
_					Jumper J8. * EE * FF.
					Jumper J9. " D " E.
					Jumper JlO. " AA " CC.
					Jumper Jll. * W * X.
					Jumper Jl3. " N " P.
					Jumper Jlh. " R " S.
					Jumper J19. " DD " TP208.
_					

				<u></u>	<u> </u>
Ī	<b>.</b>	MATERI	AL LIST	=	ML 200488 - 025
DRAWN	ASSY TRANSPORT ELL	CTRONICS D/G. 70	Ch. MODEL NO.	10	DATE 11/18/71 MEST 30
NO.	DRAWING TITL	E	DWG, NO.	NO. REQ.	REMARKS ON CHT. DENS
131	Capacitor, Tantalum.	10uf	100070-106	1	C204.
132					
133	Resistor, 5%. iv.	750	100156-751	1	R234.
134	Resistor, * 3w.	47	100068-470	1.	R2h8.
135	Resistor, " tv.	750	100156-751	1:	R268.
136	Resistor, " "	33K	100156-333	1	RL21.
137	Resistor, " "	120K	100156-124	1	34.31.
138	Resistor, " "	12K	100156-123	1	RL32.
139	Resistor, " "	680 <b>K</b>	120156-684	1	RL66.
170	wester, "	150	100156-151	1	Riot.
141	Resistor, " "	390K	130156-394	1	R468.
142	Resistor, " "	1.5M	100156-155	1	R\$09.
143	desistery	150	100156-151		11510.
144	Resistor, " "	33°0K	199156-394	1	R511.
145	Remistor, 5%. (v.	3.3H	100150-335	1	R536.
146					
147	Wire, Solid Insulated		190242-924	A/R	Jumper Jl. From JJ to KK.
					Jumper J2. " U " V.
					Jumper Ji. PP BR.
					Jumper J5. " I " 0.
					Jumper J6. " GG " EH.
				ļ	Jumper J7. " H " J.
					Jumper J8. * EE * FF.
					Jumper J9. " I E.
					Jumper J10. " AA " CC.
				L	Jumper Jll. W. X.
					Jumper J3. * L * K.
			·		
			<del></del>		

DERMING THE DIG. NO. NO. REG. REMARKS ON CKT. DESIG.		_ 1	
но.	TITLE PHE Type IP ISIDE DIG TON WORLD DATE 11/19/71 MEET 35 OF		PAR TIPLE PAR Type A' 251ps. D/0, 70h. MODEL NO. 15 DATE11/18/71 SHEET
	ITEM DRAWING TITLE DEC. NO. NO. REQ. REMARKS ON CKT. DESIG.	ITEM DRAWING TITLE DIG. NO. NO. REQ. REMARKS ON CKT. DESIG.	THE DRAWING TITLE DIG. NO. HEQ. REMARKS ON CKT
131 Capacitor, Tantalum. 1.50f 100136-155 1 0204.	131 Capacitor, Tantalum. 1.5uf 100136-155 1 C204.	131	131
132	132	. 132	132
133 Refintor, 51. av. 750 100156-751 1 R234.	133 Registor. 5%. aw. 750 100156-751 1 R234.	133 Resistor. 5%. av. 750 100156-751 1 R234.	133 Resistor, 5%, in. 750 100156-751 1 -R234.
134 Resistor, * 3w. L7 100068-470 1 R2L8.	134 Resistor. " 3w. 47 100068-470 1 R248.	134 Resistor 3v. 47 100066-470 1 R248.	134 Recistor. " 3v. 47 100068-479 1 R248.
135 Hasistor, " ;w. 750 100156-751 1 8266.	135 Ressistor. * ;w. 750 100156-751 1 R268.	135 Resistor. " w. 750 100156-751 1 R268.	135 Resistor, " iw. 750 100156-751 1 8268.
136 Resistor, " " 15K 199156-253 1 8621.	136 Resistor. " " 9.1K 100156-912 1 RL21.	136 Resistor. " 27K 100156-273 1 RL21.	136 Resistor. " " 15K 100150-153 1 R421.
	137 Resistor. " " 27K 190156-273 1 RL31.	137 Resistor. 100K 130156-104 1 R431.	137 desistor. " 51K 100156-513 1 R431.
		138 Resistor. " " 12% 100156-123 1 Rt.32.	
139 Resistor, " " 680K 100156-68L 1 Ru66.	139 Resistor. " " 300K 100156-304 1 R466.	139 Resistor. " 680K 100156-664 1 R466.	139 desister. " " 680K 100154-66L 1 R466.
140 Econotor, " 150 100156 151 1 1 1463.	140 decietor * * 250 200156 153 - 2   8467-	140 Bardotor, # 4 150 100156 151 1 0167-	140 Horistor, 4 150 100156 152 2 8467
11/1 Resistor, " " 390K 100156-3#4 1 M468.	1h1 Resistor. " " 330K 100156-33L 1 Rho8.	141 Resistor. " " 390K 10°156-394 1 R468.	141 Resistor. 9 390K 100156-394 1 2468.
112 Remistor, " " 1.5M 190156-155 1 R509.	142 Resistor. " " 680K 100156-684 1 R509.	11.2 Resistor. " " 1.5M 139156-155 1 R509.	11:2 demintor " " 1.5M 100156-155 1 R509.
11.3 Besieten, # # 150 100156 151 1 1810	143 Backeton " " 150 10015- 151 1 0510-	1h3 Resister, # # 150 30015- 153 3 0530-	14.) 2001-1-1-
11th Hesistor, " * 390K 100156-39L 1 R511.	1hh Resistor. " " 333% 190156-334 1 R511.	114 Resistor. " 390K 109156-394 1 R511.	114 Resistor. " " 390K 100156-394 1 R511.
	145	11.5 Resistor. " " 3.3M 100156-335 1 R536.	145 kesistor. " " 3.3M 100156-335 1 8536.
		11.5 Resistor. " 3.3A 100150-335 1 103.50.	
146	116		146
1h7 Wire, Solid Insulated. 1.50215-921 A/R Jumper Jl. From JJ to KK.	11.7 Wire, Solid Insulated. 100216-921 A/R Jumper Jl. From JJ to KK.	1h7 Wire, Solid Insulated. 1002h6-92h A/R Jumper Jl. From JJ to KK.	107 Vire, Solid Insulated. 100248-924 A/R Jumper J1. From JJ
Jumper J2 " U 2 V.	Jumper J2. " U " V.	Jumper J2. " T " V.	Jumper J2. " T
Jumper JL " PP " RR.	Jumper Ji. * PP * RR.	Jumper J3. " L " M.	Jumper J3. " L
Jumper J5. " F "G.	Jumper J5. 4 of 4 G.	Jumper J5. " F " G.	Jumper J5. " F
Jumper J6. " GG " HH. 1	Jumper 36, " OG " HH	Jumper J7. " H " J.	Jumper J7. " H
Jumper J?. " H " J.	Jusper J7. " H " J.	Jumper J&. " EE " FF.	Junper J6. " EE
Junper Jö. " EE " FF.	Jusper J8. * EE * FF.	Jumper J9. " D "E.	Jumper J9, " D
Jumper J9. " D " E.	Jumper J9. " D " E.	Jusper J10. " AA " CC.	Jumper J10. " AA
dumper JLO. * AA * CC.		Junper Jll. " W " X.	Jumper Jil. " W
	Jumper J10. " AA " CC.		<b>₫ }</b>
Jumper Jll. " W " X.	Jusper Jll. " W " I.	Junçer J13. " H " P.	Jumper J13. " M
Jumper J3. " L "K.	Jumper J3 " L " K.	Jumper Jli. " R "S.	Jusper Jlk. A = R
			<b>!</b>
DEATHOR ASSY. TRANSPORT SLECTROSTICS TITLE THE TYPE THE TYPE TO THE TOTAL TOTAL PROPERTY OF THE TYPE TYPE THE TYPE THE TYPE THE TYPE TYPE TYPE TYPE TYPE TYPE TYPE TYP	ASSI, TRANSPORT ELECTRONICS TITLE PRE Type'A' 101ps, D/G. 7Ch. MODEL NO. 10 DATE 11/19/71 SMEET 36 OF		ORASHIG ASSY. TRANSPORT ELECTRONICS ORASHIG TITLE PRD TYDE'A 17 stus. DAY. 7Ch . MODEL NO. 10 DAYBIJ/18/71 SMEET
TEM DRAWING TITLE DWG. NO. REQ. REMARKS ON CKT. DESIG.	ITEM DRAWING TITLE DWG. NO. NO. REQ. REMARKS ON CKT. DESIG.	TEM DRAWING TITLE DWG. NO. NO. 9EQ REMARKS ON CKT. DESIG.	TIEM DRAWING TITLE DEG. NO. NO. REQ. REMARKS ON CHT
131 Capacitor, Fantalum 1.5uf 10:136-155 1 C2O4.	131	131	131
132	132	132	132
	133 Recistor. 5%. tw. 750 130156-751 1 R234.		
133 Remistor, 5% iw. 750 100156-751 1 R23L.	120 1 200 100 100 100 100 100 100 100 10	133 desistor. 5%. 7%. 750 100156-751 1 R234.	133 Resistor. 5%. tw. 750 100156-751 1 R234.
	134 Resistor. " 3w. 47 100068-470 1 R248.	133 Resistor. 5%. (w. 750 100156-751 1 R234. 134 Resistor. 3w. 47 100068-470 1 R248.	133 Resistor. 5%. zw. 750 100156-751 1 R234.  134 Resistor. 3w. 47 100068-470 1 8248.
134 Resistor, " 3w. 47 100068-470 1 R248.	134 Resistor. " 3w. 47 100066-470 1 R248.	134 Heristor. * 3w. 47 100068-470 1 R248.	134 Resistor. * 3w. 47 100068-470 1 2248.
134 Recistor, " 34. 47 100068-470 1 R248.  135 Resistor, " 44. 750 100156-751 1 R268.	134 Resistor. " 3w. 47 100068-470 1 R248. 135 Resistor. " 2w. 750 100156-751 1 R268.	134 Resistor. * 3w. 47 100068-470 1 R248. 135 Resistor. * 4w. 750 100156-751 1 R268.	134 Resistor. " 3w. 47 100068-470 1 8248. 135 Resistor. " 4w. 750 100156-751 1 R268.
134 Resistor, " 34. 47 100065-470 1 R248.  135 Resistor, " 44. 750 100156-751 1 R268.  136 Resistor, " " 10% 100156-103 1 R421.	134     Resistor. " 3w.     47     100068-470     1     R248.       135     Resistor. " 2w.     750     100156-751     1     R268.       136     Resistor. " 33K     100156-333     1     R421.	134   Resistor. " 3w. 47   199368-479   1   R248.	134 Resistor. " 3w. 47 100068-470 1 8248. 135 Resistor. " 4w. 750 100156-751 1 R268. 136 Resistor. " " 10K 100156-103 1 R421.
13k     Resistor, " 3w.     47     100068-470     1     R2k8.       135     Resistor, " 4w.     750     100156-751     1     R268.       136     Resistor, " " 10%     100156-103     1     Rk21.       137     Resistor, " " 33%     100156-333     1     Rk31.	13L     Resistor.     " 3w.     L7     100068-L70     1     R2L8.       135     Resistor.     " 2w.     750     100156-751     1     R268.       136     Resistor.     " 33K     100156-333     1     RL21.       137     Resistor.     " 120K     100156-12L     1     RL31.	134   Refistor. " 3w.   17   100068-170   1   R248.     135   Resistor. " 4w.   750   100154-751   1   R268.     136   Resistor. " "   16k   100154-183   1   R121.     137   Resistor. " "   60K   100154-663   1   R131.     131.	134 Resistor. " 3w. 47 100068-470 1 8248.  135 Resistor. " 4w. 750 100156-751 1 R268.  136 Resistor. " " 10% 100156-103 1 R421.  137 Resistor. " " 33% 100156-333 1 R431.
134 Resistor, " 34. 47 100066-470 1 R248.  135 Resistor, " 24. 750 100156-751 1 R268.  136 Resistor, " " 10% 100156-103 1 R421.  137 Resistor, " " 33% 100156-333 1 R431.  138 Resistor, " " 15% 100156-253 1 R432.	13h     Resistor.     " 3w.     h7     100068-470     1     R2h8.       135     Resistor.     " 2w.     750     100156-751     1     R268.       136     Resistor.     " 33K     100156-333     1     R421.       137     Resistor.     " 120K     100156-12h     1     R431.       138     Resistor.     " 12K     100156-123     1     R432.	134   Meristor. " 3w.   17   199368-179   1   R248.	134   Resistor. " 3w.   17   100066-170   1   8248.     135   Resistor. " 4w.   750   100156-751   1   R268.     136   Resistor. " "   10%   100156-103   1   R421.     137   Resistor. " "   33K   100156-333   1   R431.     138   Resistor. " "   15K   100156-153   1   R432.
134 Resistor, " 34. 47 100065-470 1 R248.  135 Resistor, " 24. 750 100156-751 1 R268.  136 Resistor, " " 10% 100156-103 1 R421.  137 Resistor, " " 33% 100156-333 1 R431.  138 Resistor, " " 15% 100156-253 1 R432.  139 Resistor, " " 300% 100156-304 1 R466.	13L     Resistor.     " 3w.     L7     100068-L70     1     R2L8.       135     Resistor.     " w.     750     100156-751     1     R268.       136     Resistor.     " 33K     100156-333     1     RL21.       137     Resistor.     " 120K     100156-12L     1     RL31.       138     Resistor.     " 12K     100156-123     1     RL32.       139     Resistor.     " 680K     100156-6tL     1     RL66.	134   Resistor. * 3w.	134 Remistor. " 3w. 47 100066-470 1 8248.  135 Resistor. " 4w. 750 100156-751 1 8268.  136 Resistor. " " 10% 100156-103 1 R421.  137 Resistor. " " 33% 100156-333 1 R431.  138 Resistor. " " 15% 100156-153 1 R432.  139 Resistor " " 300% 100156-304 1 R466.
134 Resistor, " 3x. 47 100068-470 1 Rh8.  135 Resistor, " 4x. 750 100156-751 1 R268.  136 Resistor, " " 10X 100156-103 1 Rd21.  137 Resistor, " " 33X 100156-333 1 Rd31.  138 Resistor, " " 15X 100156-33 1 Rd32.  139 Resistor, " " 300X 100156-304 1 Rd66.  140 Resistor, " " 300X 100156-103 1 Rd67.	13h     Resistor.     " 3w.     h7     100068-470     1     R2h8.       135     Resistor.     " iw.     750     100156-751     1     R268.       136     Resistor.     " 33K     100156-333     1     Rh21.       137     Resistor.     " 120K     100156-12h     1     Rh31.       138     Resistor.     " 12K     107156-123     1     Rh32.       139     Resistor.     " 680K     103156-6th     1     Rh66.       1h0     Resistor.     " 150     100156-151     3     Rh67.	134   Meristor. * 3w.	134 Resistor. " 3w. 47 100066-470 1 8248.  135 Resistor. " 4w. 750 100156-751 1 8268.  136 Resistor. " " 10% 100156-103 1 R421.  137 Resistor. " " 33% 100156-333 1 R431.  138 Resistor. " " 15% 100156-153 1 R432.  139 Resistor " " 300% 100156-304 1 R466.  140 Resistor " " 10% 100156-103 1 R466.
134 Resistor, " 3x. 47 100068-470 1 Rh8.  135 Resistor, " 4x. 750 100156-751 1 R268.  136 Resistor, " " 10X 100156-103 1 Rd21.  137 Resistor, " " 33X 100156-333 1 Rd31.  138 Resistor, " " 15X 100156-33 1 Rd32.  139 Resistor, " " 300X 100156-304 1 Rd66.  140 Resistor, " " 10X 100156-103 1 Rd67.	13L     Resistor.     " 3w.     L7     100068-L70     1     R2L8.       135     Resistor.     " w.     750     100156-751     1     R268.       136     Resistor.     " 33K     100156-333     1     RL21.       137     Resistor.     " 120K     100156-12L     1     RL31.       138     Resistor.     " 12K     100156-123     1     RL32.       139     Resistor.     " 680K     100156-6tL     1     RL66.	134   Resistor. * 3w.	134 Resistor. " 3w. 47 100066-470 1 8248.  135 Resistor. " 4w. 750 100156-751 1 8268.  136 Resistor. " " 10% 100156-103 1 R421.  137 Resistor. " " 33% 100156-333 1 R431.  138 Resistor. " " 15% 100156-153 1 R432.  139 Resistor " " 300% 100156-304 1 R466.  140 Resistor. " " 390% 100156-394 1 R468.
13k Resistor, " 3k. 47 100068-470 1 R2h8.  135 Resistor, " ku. 750 100156-751 1 R268.  136 Resistor, " " 10K 100156-103 1 R421.  137 Resistor, " " 33K 100156-333 1 R431.  138 Resistor, " " 15K 100156-333 1 R432.  139 Resistor, " " 300K 100156-304 1 R466.  140 Resistor, " " 300K 100156-103 1 R467.  141 Resistor, " " 320K 100156-34 1 R467.	13h     Resistor.     " 3w.     h7     100068-470     1     R2h8.       135     Resistor.     " iw.     750     100156-751     1     R268.       136     Resistor.     " 33K     100156-333     1     R421.       137     Resistor.     " 120K     100156-12h     1     R431.       138     Resistor.     " 12K     107156-123     1     R432.       139     Resistor.     " 680K     100156-6th     1     Rh66.       1h0     Desistor.     " 150     100156-151     2     Ph67.	134   Resistor. * 3w.	134   Resistor.   3w.   17   100066-170   1   8218.     135   Resistor.   1   2   2   3     136   Resistor.     2   4   100156-1751   1   1268.     137   Resistor.     2   3   100156-103   1   11421.     138   Resistor.     334   100156-333   1   11431.     138   Resistor.     155   100156-153   1   11432.     139   Resistor.     3004   100156-304   1   11666.     140   Resistor.     3904   100156-394   1   11468.     141   Resistor.     3905   100156-394   1   11468.     142   Resistor.     6605   100156-684   1   18509.
13k Resistor, " 3k. 47 100068-470 1 Rh8.  135 Resistor, " ku. 750 100156-751 1 R268.  136 Resistor, " " 10K 100156-103 1 Rk21.  137 Resistor, " " 33K 100156-333 1 Rk31.  138 Resistor, " " 15K 100156-333 1 Rk32.  139 Resistor, " " 300K 170156-304 1 Rk66.  1k0 Resistor, " " 300K 100156-103 1 Rk67.  1k1 Resistor, " " 320K 100156-34 1 Rk68.  1k2 Resistor, " " 320K 100156-34 1 Rk68.	13h     Resistor.     " 3w.     h7     100068-470     1     R2h8.       135     Resistor.     " iw.     750     100156-751     1     R268.       136     Resistor.     " 33K     100156-333     1     R421.       137     Resistor.     " 120K     100156-12h     1     R431.       138     Resistor.     " 12K     100156-12h     1     R432.       139     Resistor.     " 680K     100156-6th     1     R466.       1h0     Desistor.     " 390K     100156-151     3     8462.       1h1     Resistor.     " 390K     100156-39h     1     R468.	134   Resistor. * 3w.	134 Resistor. " 3w. 47 100066-470 1 8248.  135 Resistor. " 4w. 750 100156-751 1 8268.  136 Resistor. " " 10% 100156-103 1 R421.  137 Resistor. " " 33% 100156-333 1 R431.  138 Resistor. " " 15% 100156-153 1 R432.  139 Resistor " " 300% 100156-304 1 R466.  140 Resistor " 390% 100156-394 1 R468.
134 Resistor, " 3x. 47 100068-470 1 Rh8.  135 Resistor, " 4x. 750 100156-751 1 R268.  136 Resistor, " " 10X 100156-103 1 Rh21.  137 Resistor, " " 33X 100156-333 1 Rh31.  138 Resistor, " " 15X 100156-333 1 Rh32.  139 Resistor, " " 300X 100156-304 1 Rh66.  1h0 Resistor, " " 300X 100156-103 1 Rh67.  1h1 Resistor, " " 300X 100156-334 1 Rh68.  1h2 Resistor, " " 300X 100156-84 1 R607.  1h3 Resistor, " " 680X 100156-684 1 R607.	13h     Resistor.     " 3w.     h7     100068-470     1     R2h8.       135     Resistor.     " w.     750     100156-751     1     R268.       136     Resistor.     " 33K     100156-333     1     R421.       137     Resistor.     " 120K     100156-12h     1     R4.31.       138     Resistor.     " 12K     100156-12h     1     R4.32.       139     Resistor.     " 680K     100156-64h     1     Rh66.       1h0     Desistor.     " 390K     100156-39h     1     Rh68.       1h2     Resistor.     " 390K     100156-155     1     R509.	134   Resistor. * 3w.	134   Resistor.   3w.   17   100066-470   1   8248.     135   Resistor.   2w.   750   100156-751   1   R268.     136   Resistor.       1000   100156-103   1   R421.     137   Resistor.       334   100156-333   1   R431.     138   Resistor.       158   100156-153   1   R432.     139   Resistor.       3004   100156-153   1   R466.     140   Resistor.       1004   100156-304   1   R466.     141   Resistor.       3904   100156-394   1   R468.     142   Resistor.       6808   100156-684   1   R509.     143   Resistor.                                       Resistor.
13k Resistor, " 3k. 47 100066-470 1 R248.  135 Resistor, " k. 750 100156-751 1 R268.  136 Resistor, " " 10K 100156-103 1 R421.  137 Resistor, " " 33K 100156-333 1 R431.  138 Resistor, " " 15K 100156-333 1 R432.  139 Resistor, " " 300K 100156-304 1 R466.  140 Resistor, " " 300K 100156-103 1 R467.  141 Resistor, " " 300K 100156-684 1 R509.  143 Resistor, " " 680K 100156-684 1 R509.  144 Resistor, " " 300K 100156-103 1 R510.	13h       Resistor.       " 3w.       h7       100068-470       1       R248.         135       Resistor.       " w.       750       100156-751       1       R268.         136       Resistor.       " 33K       100156-333       1       R421.         137       Resistor.       " 120K       100156-12h       1       R431.         138       Resistor.       " 12K       100156-123       1       R432.         139       Resistor.       " 680K       100156-04h       1       Rh66.         1h0       Desistor.       " 390K       100156-39h       1       R468.         1h2       Resistor.       " 159       100156-155       1       R509.         1h3       Resistor.       " 390K       100156-39h       1       R511.	134   Resistor. * 3w.	134   Resistor.   3w.   17   100066-470   1   8248.     135   Resistor.   2w.   750   100156-751   1   R268.     136   Resistor.       100066-4103   1   R421.     137   Resistor.       334   100156-103   1   R431.     138   Resistor.       154   100156-153   1   R432.     139   Resistor.       3004   100156-304   1   R466.     140   Resistor.       100456-403   1   R466.     141   Resistor.       3904   100156-394   1   R468.     142   Resistor.       6804   100156-684   1   8509.     143   Resistor.       164   100156-199   1   R510.     144   Resistor.       3906   100156-394   1   R511.
13k Resistor, " 3k. 47 100066-470 1 R248.  135 Resistor, " ku. 750 100156-751 1 R268.  136 Resistor, " " 10K 100156-103 1 R421.  137 Resistor, " " 33K 100156-333 1 R431.  138 Resistor, " " 15K 100156-353 1 R432.  139 Resistor, " " 300K 100156-304 1 R466.  140 Resistor, " " 300K 100156-103 1 R467.  141 Resistor, " " 370K 100156-384 1 R468.  142 Resistor, " " 680K 100156-884 1 R509.  143 Resistor, " " 300K 100158-103 1 R510.  144 Resistor, " " 300K 100158-394 1 3511.	13h       Resistor.       " 3w.       h7       100068-470       1       R248.         135       Resistor.       " w.       750       100156-751       1       R268.         136       Resistor.       " 33K       100156-333       1       R421.         137       Resistor.       " 120K       100156-12h       1       R431.         138       Resistor.       " 12K       100156-12h       1       R432.         139       Resistor.       " 680K       100156-04h       1       R466.         140       Besistor.       " 390K       100156-39h       1       R468.         142       Resistor.       " 15M       190156-151       1       R509.         143       Resistor.       " 390K       100156-39h       1       R511.         145       Resistor.       " 390K       100156-39h       1       R511.         145       Resistor.       " 3.3M       100156-335       1       R536.	134   Resistor. * 3w.	134   Resistor.   3w.   17   100066-470   1   8248.     135   Resistor.   1w.   750   100156-751   1   8268.     136   Resistor.
134 Resistor, " 3w. 47 100068-470 1 Rh8.  135 Resistor, " iw. 750 100156-751 1 R268.  136 Resistor, " " 10K 150156-103 1 Rh21.  137 Resistor, " " 33K 100156-333 1 Rh31.  138 Resistor, " " 15K 100156-333 1 Rh31.  139 Resistor, " " 300K 100156-304 1 Rh66.  140 Resistor, " " 300K 100156-103 1 Rh66.  141 Resistor, " " 320% 100156-384 1 Rh68.  142 Resistor, " 10K 100156-384 1 Rh69.  143 Resistor, " 10K 100156-303 1 Rh69.  144 Resistor, " 300K 100156-394 1 S511.  145 Lb6	134 Resistor. " 3w. 47 100068-470 1 R248.  135 Resistor. " w. 750 100156-751 1 R268.  136 Resistor. " " 33K 100156-333 1 R421.  137 Resistor. " " 120K 100156-124 1 R4.31.  138 Resistor. " " 12K 100156-123 1 R4.32.  139 Resistor. " " 680K 100156-644 1 R4.66.  140 Resistor. " " 680K 100156-641 1 R4.66.  141 Resistor. " 390K 100156-394 1 R468.  142 Resistor. " 1.54 100156-155 1 R509.  143 Resistor. " 390K 100156-394 1 R510.  144 Resistor. " 390K 100156-394 1 R511.  145 Resistor. " 390K 100156-394 1 R511.  146 Resistor. " 3.34 100156-335 1 R536.	134   Resistor. * 3w.	134 Resistor. " 3w. 47 100066-470 1 8248.  135 Resistor. " 4w. 750 100156-751 1 R268.  136 Resistor. " " 100 100156-103 1 R421.  137 Resistor. " " 33K 100156-333 1 R431.  138 Resistor. " " 15K 100156-153 1 R432.  139 Resistor. " 100 100156-304 1 R466.  140 Resistor. " 100 100156-304 1 R466.  140 Resistor. " 390K 100156-394 1 R468.  141 Resistor. " 680K 100156-684 1 R509.  143 Resistor. " 680K 100156-684 1 R509.  143 Resistor. " 390K 100156-394 1 R510.  144 Resistor. " 390K 100156-394 1 R510.
134 Resistor, " 3w. 47 100068-470 1 Rh8.  135 Resistor, " w. 750 100156-751 1 R268.  136 Resistor, " " 10K 100156-103 1 Rh21.  137 Resistor, " " 33K 100156-333 1 Rh31.  138 Resistor, " " 15K 100156-353 1 Rh32.  139 Resistor, " " 300K 100156-304 1 Rh66.  1h0 Resistor, " " 300K 100156-103 1 Rh66.  1h1 Resistor, " " 370K 100156-384 1 Rh68.  1h2 Resistor, " " 680K 100156-884 1 Rh09.  1h3 Resistor, " " 10K 100158-103 1 Rh16.  1h4 Resistor, " " 370K 100158-304 1 Rh09.  1h5 Resistor, " " 370K 100158-304 1 Rh16.  1h7 Resistor, " " 370K 100158-394 1 Rh16.	134 Resistor. " 3w. 47 100068-470 1 R248.  135 Resistor. " w. 750 100156-751 1 R268.  136 Resistor. " " 33K 100156-333 1 R421.  137 Resistor. " " 120K 100156-124 1 R4.31.  138 Resistor. " " 12K 100156-124 1 R4.32.  139 Resistor. " " 680K 100156-644 1 R4.66.  140 Resistor. " " 680K 100156-644 1 R4.66.  141 Resistor. " 390K 100156-394 1 R4.68.  142 Resistor. " 1.54 100156-155 1 R509.  143 Resistor. " 1.55 100156-151 1 R510.  144 Resistor. " 390K 100156-394 1 R511.  145 Resistor. " 3.34 100156-335 1 R536.  146  147 Wire, Solid Insulated. 100248-924 A/R Jumper Jl. From JJ to KK.	134   Resistor. * 3w.	134 Resistor. " 3w. 47 100066-470 1 8248.  135 Resistor. " 4w. 750 100156-751 1 R268.  136 Resistor. " " 10% 100156-103 1 R421.  137 Resistor. " " 33% 100156-333 1 R431.  138 Resistor. " " 15% 100156-153 1 R432.  139 Resistor. " " 15% 100156-153 1 R432.  139 Resistor. " 10% 100156-304 1 R466.  140 Resistor. " 390% 100156-304 1 R467.  141 Resistor. " 390% 100156-394 1 R468.  142 Resistor. " 680% 100156-684 1 R509.  143 Resistor. " 680% 100156-684 1 R509.  144 Resistor. " 390% 100156-394 1 R518.  145 Resistor. " 390% 100156-394 1 R511.
13k Resistor, " 3k. UT 100068-470 1 R2h8.  135 Resistor, " iv. 750 100156-751 1 R268.  136 Resistor, " " 10K 160156-103 1 Rk21.  137 Resistor, " " 33K 100156-333 1 Rk31.  138 Resistor, " " 15K 100156-333 1 Rk31.  139 Resistor, " " 300K 270156-304 1 Rk66.  1k0 Resistor, " " 300K 100156-103 1 Rk67.  1k1 Resistor, " " 300K 100156-384 1 Rk67.  1k2 Resistor, " " 680K 100156-384 1 R509.  1k3 Resistor, " 300K 100156-394 1 R510.  1k4 Resistor, " 300K 100156-394 1 R510.  1k5 L66 L77 Resistor, " 300K 100156-394 1 R510.  1k6 Resistor, " 300K 100156-394 1 R511.	134 Resistor. " 3w. 47 100068-470 1 R248.  135 Resistor. " w. 750 100156-751 1 R268.  136 Resistor. " " 33K 100156-333 1 R421.  137 Resistor. " " 120K 100156-124 1 R4.31.  138 Resistor. " " 12K 100156-123 1 R4.32.  139 Resistor. " " 680K 100156-644 1 R4.66.  140 Resistor. " " 680K 100156-644 1 R4.66.  141 Resistor. " 390K 100156-394 1 R4.68.  142 Resistor. " 1.54 100156-155 1 R509.  143 Resistor. " 390K 100156-394 1 R510.  144 Resistor. " 390K 100156-394 1 R511.  145 Resistor. " 390K 100156-394 1 R511.  146 Resistor. " 3.3M 100156-335 1 R536.  146 Ih7 Wire, Solid Insulated. 1002h8-924 A/R Jumper Jl. From JJ to KK.  Jumper J2. " T " V.	134   Resistor. * 3w.	134 Resistor. " 3w. 47 100066-470 1 8248.  135 Resistor. " 4w. 750 100156-751 1 R268.  136 Resistor. " " 10% 100156-103 1 R421.  137 Resistor. " " 33% 100156-333 1 R431.  138 Resistor. " " 15% 100156-153 1 R432.  139 Resistor. " " 15% 100156-153 1 R432.  139 Resistor. " 10% 100156-304 1 R466.  140 Resistor. " 10% 100156-304 1 R468.  141 Resistor. " 390K 100156-394 1 R468.  142 Resistor. " 680K 100156-394 1 R509.  143 Resistor. " 10% 100156-103 1 R530.  144 Resistor. " 390K 100156-394 1 R511.  145  146 /-  147 Wire, Solid Insulated. 100248-924 A/R Jumper J1. From J3 (100156-924) A/R Jumper J2. " T
134 Resistor, " 3w. 47 100068-470 1 Rh8.  135 Resistor, " w. 750 100156-751 1 R268.  136 Resistor, " " 10K 100156-103 1 Rh21.  137 Resistor, " " 33K 100156-333 1 Rh31.  138 Resistor, " " 15K 100156-333 1 Rh31.  139 Resistor, " " 300K 100156-304 1 Rh66.  140 Resistor, " " 300K 100156-103 1 Rh66.  141 Resistor, " " 320K 100156-384 1 Rh68.  142 Resistor, " 680K 100156-884 1 Rh09.  144 Resistor, " 10K 100158-303 1 Rh10.  145 Resistor, " 300K 100158-304 1 S511.  146 Resistor, " 300K 100158-304 1 S511.  147 Wire, Solid Insulated. 100216-924 A/R Junper J1. From JJ to KK.  Junper J2. " U " V.  Junper J4. " PP * RR.	134 Resistor. " 3w. 47 100068-470 1 R248.  135 Resistor. " w. 750 100156-751 1 R268.  136 Resistor. " " 33K 100156-333 1 R421.  137 Resistor. " " 120K 100156-124 1 R4.31.  138 Resistor. " " 12K 100156-124 1 R4.32.  139 Resistor. " " 680K 100156-644 1 R4.66.  140 Decision " " 680K 100156-644 1 R4.66.  141 Resistor. " " 390K 100156-394 1 R4.68.  142 Resistor. " " 1.54 170156-155 1 R509.  143 Resistor. " 1.55 100156-151 1 R510.  144 Resistor. " 390K 100156-394 1 R511.  145 Resistor. " 3.34 100156-335 1 R536.  146  147 Wire, Solid Insulated. 100248-924 A/R Jumper Jl. From JJ to EK.  Jumper J2. " T "V.  Jumper J3. " " L " M.	134   Resistor. * 3w.	134 Resistor. " 3w. 47 100066-470 1 8248.  135 Resistor. " 4w. 750 100156-751 1 R268.  136 Resistor. " " 10% 100156-103 1 R421.  137 Resistor. " " 33% 100156-333 1 R431.  138 Resistor. " " 15% 100156-153 1 R432.  139 Resistor. " " 15% 100156-153 1 R432.  139 Resistor. " 10% 100156-304 1 R466.  140 Resistor. " 10% 100156-304 1 R468.  141 Resistor. " 390K 100156-394 1 R468.  142 Resistor. " 680K 100156-684 1 R509.  143 Resistor. " 10% 100156-103 1 R510.  144 Resistor. " 390K 100156-394 1 R511.  145  146 / 100156-394 1 R511.
13k Resistor, " 3k. 47 100066-470 1 R2k8.  135 Resistor, " kw. 750 100156-751 1 R268.  136 Resistor, " " 10K 100156-103 1 Rk21.  137 Resistor, " " 33K 100156-333 1 Rk31.  138 Resistor, " " 15K 100156-373 1 Rk31.  139 Resistor, " " 300K 100156-304 1 Rk66.  140 Resistor, " " 300K 100156-103 1 Rk67.  141 Resistor, " " 320K 100156-384 1 Rk67.  142 Resistor, " 680K 100156-884 1 R509.  143 Resistor, " 300K 100156-304 1 R510.  144 Resistor, " 300K 100156-394 1 R510.  145 LL6  147 Mire, Solid Insulated. 100248-924 A/R Junper J1. From JJ to KK.  Junper J2. " U " V.  Junper J3. " F " G.	134 Resistor. " 3w. 47 100068-470 1 R248.  135 Resistor. " w. 750 100156-751 1 R268.  136 Resistor. " " 33K 100156-333 1 R421.  137 Resistor. " " 120K 100156-124 1 R4.31.  138 Resistor. " " 12K 100156-124 1 R4.32.  139 Resistor. " " 680K 100156-644 1 R4.66.  140 Desister. " " 680K 100156-644 1 R4.66.  141 Resistor. " " 390K 100156-394 1 R4.68.  142 Resistor. " " 1.54 100156-155 1 R509.  143 Resistor. " 1.55 100156-151 1 R510.  144 Resistor. " 390K 100156-394 1 R511.  145 Resistor. " 3.34 100156-394 1 R511.  146 Resistor. " 3.34 100156-335 1 R536.  146 L17 Wire, Solid Insulated. 100248-924 A/R Jumper J1. From JJ to EK.  Jumper J2. " T "V.  Jumper J3. " " L "M.  Jumper J5. " F " G.	134   Resistor. * 3w.	134 Resistor. " 3w. 47 100066-470 1 8248.  135 Resistor. " 4w. 750 100156-751 1 R268.  136 Resistor. " " 10% 100156-103 1 R421.  137 Resistor. " " 33% 100156-333 1 R431.  138 Resistor. " " 15% 100156-153 1 R432.  139 Resistor " " 15% 100156-304 1 R466.  140 Resistor. " " 300% 100156-304 1 R466.  141 Resistor. " " 390% 100156-394 1 R468.  142 Resistor. " " 680% 100156-684 1 R509.  143 Resistor. " " 680% 100156-684 1 R509.  144 Resistor. " " 390% 100156-394 1 R518.  145 Resistor. " " 390% 100156-394 1 R511.  145 This Resistor. " 390% 100156-394 1 R511.  146 This Resistor. " 390% 100156-394 1 R511.  147 Wire, Solid Insulated. 100248-924 A/R Jumper J1. From JJ Jumper J2. " T Jumper J3. " L Jumper J3. " L
13k Resistor, " 3k. 47 100066-470 1 R248.  135 Resistor, " iv. 750 100156-751 1 R268.  136 Resistor, " " 10K 100156-103 1 Rk21.  137 Resistor, " " 33K 100156-333 1 Rk31.  138 Resistor, " " 15K 100156-304 1 Rk32.  139 Resistor, " " 300K 170156-304 1 Rk66.  140 Resistor, " " 370% 100156-103 1 Rk67.  141 Resistor, " " 370% 100156-38 1 Rk67.  142 Resistor, " 680K 100156-88 1 R509.  143 Resistor, " 390K 100156-30 1 R510.  144 Resistor, " 390K 100156-30 1 R510.  145 Resistor, " 390K 100156-394 1 S511.  146 Inf Aire, Solid Insulated. 100246-92L A/R Junper Jl. From JJ to KK.  Junper J2. " U "V.  Junper J4. " PP * RR.	134 Resistor. " 3w. 47 100068-470 1 R248.  135 Resistor. " w. 750 100156-751 1 R268.  136 Resistor. " " 33K 100156-333 1 R421.  137 Resistor. " " 120K 100156-124 1 R4.31.  138 Resistor. " " 12K 100156-124 1 R4.32.  139 Resistor. " " 680K 100156-644 1 R4.66.  140 Decision " " 680K 100156-644 1 R4.66.  141 Resistor. " " 390K 100156-394 1 R4.68.  142 Resistor. " " 1.54 170156-155 1 R509.  143 Resistor. " 1.55 100156-151 1 R510.  144 Resistor. " 390K 100156-394 1 R511.  145 Resistor. " 3.34 100156-335 1 R536.  146  147 Wire, Solid Insulated. 100248-924 A/R Jumper Jl. From JJ to EK.  Jumper J2. " T "V.  Jumper J3. " " L " M.	134   Resistor. * 3w.	134 Resistor. " 3w. 47 100066-470 1 8248.  135 Resistor. " 4w. 750 100156-751 1 R268.  136 Resistor. " " 12% 100156-103 1 R421.  137 Resistor. " " 33% 100156-333 1 R431.  138 Resistor. " " 15% 100156-153 1 R432.  139 Resistor " " 300% 100156-304 1 R466.  140 Resistor. " 10% 100156-304 1 R466.  141 Resistor. " 390% 100156-394 1 R468.  142 Resistor. " 660% 120156-684 1 R509.  143 Resistor. " 660% 120156-684 1 R511.  145  146 /-  147 Wire, Solid Insulated. 100248-924 A/R Jumper J1, From JJ Jumper J3. " L Jumper J3. " L Jumper J3. " L Jumper J3. " L Jumper J5. " F Jumper J7. " H
13k Resistor, " 3k. 47 100066-470 1 R248.  135 Resistor, " iv. 750 100156-751 1 R268.  136 Resistor, " " 10K 100156-103 1 Rk21.  137 Resistor, " " 33K 100156-333 1 Rk31.  138 Resistor, " " 15K 100156-333 1 Rk31.  139 Resistor, " " 300K 100156-304 1 Rk66.  140 Resistor, " " 300K 100156-103 1 Rk67.  141 Resistor, " " 360K 100156-384 1 Rk67.  142 Resistor, " 680K 100156-884 1 R509.  143 Resistor, " 10K 100156-303 1 R510.  144 Resistor, " 300K 100156-394 1 S511.  145  146  147 Wire, Solid Insulated. 100218-924 A/R Junper JI. From JJ to KK.  Junper J2. " U "V.  Junper J3. " F " G.	134 Resistor. " 3w. 47 100068-470 1 R248.  135 Resistor. " w. 750 100156-751 1 R268.  136 Resistor. " " 33K 100156-333 1 R421.  137 Resistor. " " 120K 100156-124 1 R4.31.  138 Resistor. " " 12K 100156-124 1 R4.32.  139 Resistor. " " 680K 100156-644 1 R4.66.  140 Desister. " " 680K 100156-644 1 R4.66.  141 Resistor. " " 390K 100156-394 1 R4.68.  142 Resistor. " " 1.54 100156-155 1 R509.  143 Resistor. " 1.55 100156-151 1 R510.  144 Resistor. " 390K 100156-394 1 R511.  145 Resistor. " 3.34 100156-394 1 R511.  146 Resistor. " 3.34 100156-335 1 R536.  146 L17 Wire, Solid Insulated. 100248-924 A/R Jumper J1. From JJ to EK.  Jumper J2. " T "V.  Jumper J3. " " L "M.  Jumper J5. " F " G.	134   Resistor. * 3w.	134 Resistor. " 3w. 47 100066-470 1 8248.  135 Resistor. " 4w. 750 100156-751 1 R268.  136 Resistor. " " 12% 100156-103 1 R421.  137 Resistor. " " 33% 100156-333 1 R431.  138 Resistor. " " 15% 100156-153 1 R432.  139 Resistor " " 300% 100156-304 1 R466.  140 Resistor. " 10% 100156-304 1 R466.  141 Resistor. " 390% 100156-394 1 R468.  142 Resistor. " 660% 120156-684 1 R509.  143 Resistor. " 660% 120156-684 1 R511.  145  146 /-  147 Wire, Solid Insulated. 100248-924 A/R Jumper J1, From JJ Jumper J3. " L Jumper J3. " L Jumper J3. " L Jumper J3. " L Jumper J5. " F Jumper J7. " H
13k Resistor, " 3w. ht 100066-470 1 R248.  135 Resistor, " iw. 750 100156-751 1 R268.  136 Resistor, " " 10K 100156-103 1 R421.  137 Resistor, " " 39K 100156-333 1 R431.  138 Resistor, " " 15K 100156-333 1 R431.  139 Resistor, " " 300K 100156-103 1 R466.  140 Resistor, " " 300K 100156-103 1 R467.  141 Resistor, " " 300K 100156-103 1 R467.  142 Resistor, " " 680K 100156-103 1 R467.  143 Resistor, " " 680K 100156-103 1 R509.  144 Resistor, " " 300K 100156-394 1 R510.  145 Resistor, " " 300K 100156-394 1 R511.  146 Resistor, " " 300K 100156-394 1 R511.  147 Mre, Solid Insulated. 100246-924 A/R Junper J1. From JJ to KK.  Junper J2. " U " V.  Junper J3. " F " G.  Junper J5. " F " G.  Junper J6. " GG " MH.	134 Resistor. " 3w. 47 100068-470 1 R248.  135 Resistor. " w. 750 100156-751 1 R268.  136 Resistor. " " 33K 100156-333 1 R421.  137 Resistor. " " 120K 100156-124 1 R4.31.  138 Resistor. " " 12K 100156-124 1 R4.32.  139 Resistor. " " 680K 100156-644 1 R4.66.  140 Secietes " " 150 100156-14 1 R4.66.  141 Resistor. " " 390K 100156-394 1 R468.  142 Resistor. " " 1.5M 100156-155 1 R509.  143 Resistor. " 390K 100156-151 1 R510.  144 Resistor. " 390K 100156-394 1 R511.  145 Resistor. " 390K 100156-394 1 R511.  146 Resistor. " 3.3M 100156-335 1 R536.  146 Ih6 Ih7 Wire, Solid Insulated. 100248-924 A/R Jumper J1. From JJ to EK.  Jumper J2. " T "V.  Jumper J3. " " K.  Jumper J5. " F " G.  Jumper J7. " K " J.	134   Resistor. * 3w.	134 Resistor. " 3w. 47 100066-470 1 8248.  135 Resistor. " 4w. 750 100156-751 1 R268.  136 Resistor. " " 10% 100156-103 1 R421.  137 Resistor. " " 33% 100156-333 1 R431.  138 Resistor. " " 15% 100156-153 1 R432.  139 Resistor " " 30% 100156-304 1 R466.  140 Resistor. " 10% 100156-304 1 R466.  141 Resistor. " 390% 100156-394 1 R468.  142 Resistor. " 680% 100156-684 1 R509.  143 Resistor. " 680% 100156-684 1 R509.  144 Resistor. " 390% 100156-394 1 R511.  145  146 /-  147 Wire, Solid Insulated. 100248-924 A/R Jumper J1, From JJ Jumper J3. " L Jumper J7. " H Jumper J7. " H Jumper J7. " H
13k Resistor, " 3w. ht 100066-k70 1 R2k8.  135 Resistor, " iw. 750 100156-751 1 R268.  136 Resistor, " " 10K 100156-103 1 Rk21.  137 Resistor, " " 39K 100156-333 1 Rk31.  138 Resistor, " " 15K 100156-353 1 Rk32.  139 Resistor, " " 300K 100156-103 1 Rk66.  1k0 Resistor, " " 300K 100156-103 1 Rk67.  1k1 Resistor, " " 300K 100156-103 1 Rk67.  1k2 Resistor, " " 300K 100156-304 1 Rk69.  1k3 Resistor, " " 680K 100156-304 1 R509.  1k4 Resistor, " " 300K 100156-304 1 R510.  1k5 Resistor, " 300K 100156-304 1 R511.  1k6 Hre, Solid Insulated. 1002k6-92k A/R Junper J1. From JJ to KK.  Junper J2. " U " V.  Junper J5. " F " G.  Junper J6. " GG " MR.  Junper J7. " K " J.	134 Resistor. " 3w. 47 100068-470 1 R248.  135 Resistor. " w. 750 100156-751 1 R268.  136 Resistor. " " 33K 100156-333 1 R421.  137 Resistor. " " 120K 100156-124 1 R4.31.  138 Resistor. " " 12K 100156-124 1 R4.32.  139 Resistor. " " 680K 100156-644 1 R4.66.  140 Desister. " " 680K 100156-644 1 R4.66.  141 Resistor. " " 390K 100156-394 1 R4.68.  142 Resistor. " " 1.54 100156-155 1 R509.  143 Resistor. " 1.55 100156-151 1 R510.  144 Resistor. " 390K 100156-394 1 R511.  145 Resistor. " 3.34 100156-394 1 R511.  146 Resistor. " 3.34 100156-335 1 R536.  146 Jumper J2. " T "V.  Jumper J2. " T "V.  Jumper J3. " " M.  Jumper J5. " F " G.  Jumper J7. " H " J.  Jumper J7. " H " J.  Jumper J8. " EE " FF.	134   Resistor. * 3w.	134 Resistor. " 3w. 47 100066-470 1 8248.  135 Resistor. " 4w. 750 100156-751 1 R268.  136 Resistor. " " 12% 100156-103 1 R421.  137 Resistor. " " 33% 100156-333 1 R431.  138 Resistor. " " 15% 100156-153 1 R432.  139 Resistor. " " 300% 100156-304 1 R466.  140 Resistor. " 10% 100156-304 1 R466.  140 Resistor. " 390K 100156-394 1 R468.  141 Resistor. " 680K 120156-684 1 R509.  143 Resistor. " 10% 100156-103 1 R510.  144 Resistor. " 390K 100156-394 1 R509.  145 Resistor. " 390K 100156-394 1 R511.  145 Junear F. Solid Insulated. 100248-924 A/R Junear J1, From JJ Junear J3. " L Junear J3. " L Junear J3. " L Junear J3. " EE Junear J9. " D
134 Recistor, " 3w. 17 100066-170 1 R218.  135 Resistor, " iw. 750 100156-751 1 R268.  136 Resistor, " " 10K 100156-103 1 R421.  137 Resistor, " " 39K 100156-333 1 R431.  138 Resistor, " " 15K 100156-353 1 R432.  139 Resistor, " " 300K 100156-304 1 R466.  140 Resistor, " " 300K 100156-103 1 R467.  141 Resistor, " " 300K 100156-103 1 R467.  142 Resistor, " " 680K 100156-384 1 R509.  143 Resistor, " " 680K 100156-384 1 R509.  144 Resistor, " " 300K 100156-394 1 R510.  145 Resistor, " " 300K 100156-394 1 R511.  146  147 Aire, Solid Insulated. 100246-924 A/R Jumper J1. From JJ to KK.  Jumper J2. " U " V.  Jumper J3. " F " G.  Jumper J6. " GG " HR.  Jumper J6. " GG " HR.  Jumper J6. " GG " HR.  Jumper J8. " EE " FF.  Jumper J8. " EE " FF.  Jumper J8. " EE " FF.	134 Resistor. " 3w. 47 100068-470 1 R248.  135 Resistor. " w. 750 100156-751 1 R268.  136 Resistor. " " 33K 100156-333 1 R421.  137 Resistor. " " 120K 100156-124 1 R4.31.  138 Resistor. " " 12K 100156-124 1 R4.32.  139 Resistor. " " 680K 100156-644 1 R4.66.  140 Resistor. " " 390K 100156-394 1 R4.68.  141 Resistor. " " 390K 100156-155 1 R509.  141 Resistor. " " 390K 100156-394 1 R510.  143 Resistor. " " 390K 100156-394 1 R511.  144 Resistor. " " 390K 100156-394 1 R511.  145 Resistor. " " 390K 100156-394 1 R511.  146 Resistor. " " 3.3M 100156-335 1 R536.  146 Jumper J2. " T " V.  Jumper J3. " " L " M.  Jumper J3. " " L " M.  Jumper J5. " F " G.  Jumper J7. " H " J.  Jumper J9. " D " E.  Jumper J10. " AA " CC.	134   Resistor. * 3w.	134 Resistor. " 3w. 47 100068-470 1 8248.  135 Resistor. " 4w. 750 100156-751 1 R268.  136 Resistor. " " 10K 100156-103 1 R421.  137 Resistor. " " 33K 100156-333 1 R431.  138 Resistor. " " 15K 100156-153 1 R432.  139 Resistor " " 30K 100156-304 1 R466.  140 Resistor. " 10K 100156-304 1 R468.  141 Resistor. " 390K 100156-304 1 R468.  142 Resistor. " 680K 100156-304 1 R468.  143 Resistor. " 680K 100156-684 1 R509.  144 Resistor. " 10K 100156-193 1 R510.  145 Resistor. " 390K 100156-394 1 R511.  145 Resistor. " 390K 100156-394 1 R511.  146 / Jusper J2. " T Jusper J2. " T Jusper J3. " E Jusper J3. " E Jusper J7. " R Jusper J9. " D
134 Recistor, " 3w. 17 100066-170 1 R218.  135 Resistor, " iw. 750 100156-751 1 R268.  136 Resistor, " " 10K 100156-103 1 R421.  137 Resistor, " " 39K 100156-333 1 R431.  138 Resistor, " " 15K 100156-353 1 R432.  139 Resistor, " " 300K 100156-304 1 R466.  140 Resistor, " " 300K 100156-103 1 R467.  141 Resistor, " " 300K 100156-103 1 R467.  142 Resistor, " " 300K 100156-324 1 R609.  143 Resistor, " " 680K 100156-384 1 R609.  144 Resistor, " " 300K 100156-394 1 R510.  145 Resistor, " " 300K 100156-394 1 R511.  146  147 Aire, Solid Insulated. 100246-92L A/R Jumper J1. From JJ to KK.  Jumper J2. " U " V.  Jumper J5. " F " G.  Jumper J5. " F " G.  Jumper J6. " GG " RH.  Jumper J6. " GG " RH.  Jumper J7. " H " J.  Jumper J8. " EE " FF.  Jumper J9. " D " E.  Jumper J10. " AA " CC.	134 Resistor. " 3w. 47 100068-470 1 R248.  135 Resistor. " w. 750 100156-751 1 R268.  136 Resistor. " " 33K 100156-333 1 R421.  137 Resistor. " " 120K 100156-124 1 R4.31.  138 Resistor. " " 127 100156-124 1 R4.31.  139 Resistor. " " 680K 100156-644 1 R4.66.  140 Resistor. " " 390K 100156-394 1 R4.68.  141 Resistor. " " 390K 100156-155 1 R509.  141 Resistor. " " 390K 100156-394 1 R511.  143 Resistor. " " 390K 100156-394 1 R511.  144 Resistor. " " 390K 100156-394 1 R511.  145 Resistor. " " 390K 100156-394 1 R511.  146 Resistor. " " 3.3M 100156-335 1 R536.  146 Jumper J2. " T " V.  Jumper J3. " " L " M.  Jumper J3. " " L " M.  Jumper J5. " F " G.  Jumper J7. " H " J.  Jumper J9. " D " E.  Jumper J10. " AA " CC.  Jumper J10. " AA " CC.  Jumper J11. " M " X.	134   Resistor. * 3w.	134   Resistor.   3w.   47   100068-470   1   8248.     135   Resistor.   2w.   750   100156-751   1   R268.     136   Resistor.
13k Resistor, " 3w. ht 100066-470 1 R248.  135 Resistor, " iw. 750 100156-751 1 R268.  136 Resistor, " " 10K 150156-103 1 R421.  137 Resistor, " " 39K 100156-373 1 R431.  138 Resistor, " " 15K 100156-373 1 R432.  139 Resistor, " " 300K 170156-30h 1 R466.  140 Resistor, " " 300K 100156-103 1 R467.  141 Resistor, " " 300K 100156-103 1 R467.  141 Resistor, " " 300K 100156-30h 1 R668.  142 Resistor, " " 680K 100156-68L 1 R609.  143 Resistor, " " 300K 100156-30h 1 R510.  144 Resistor, " 300K 100156-30h 1 R510.  145 Resistor, " 300K 100156-30h 1 R510.  146 Life Life Life Life Life Life Life Life	134 Resistor. " 3w. 47 100068-470 1 R248.  135 Resistor. " w. 750 100156-751 1 R268.  136 Resistor. " " 33K 100156-333 1 R421.  137 Resistor. " " 120K 100156-124 1 R4.31.  138 Resistor. " " 127 100156-124 1 R4.31.  139 Resistor. " " 680K 100156-644 1 R4.66.  140 Resistor. " " 390K 100156-351 1 R509.  141 Resistor. " " 1.54 100156-151 1 R509.  141 Resistor. " " 390K 100156-394 1 R509.  143 Resistor. " " 390K 100156-394 1 R511.  144 Resistor. " " 390K 100156-394 1 R511.  145 Resistor. " " 3.3M 100156-335 1 R536.  146 147 Wire, Solid Insulated. 100248-924 A/R Jumper J1. From JJ to EK.  Jumper J2. " T " V.  Jumper J3. " " L " M.  Jumper J5. " F " G.  Jumper J9. " D " E.  Jumper J10. " AA " CC.  Jumper J11. " M " I.  Jumper J11. " M " I.	134   Resistor. * 3w.	134 Resistor. " 3w. 47 100068-470 1 8248.  135 Resistor. " 2w. 750 100156-751 1 R268.  136 Resistor. " " 10K 100156-103 1 R421.  137 Resistor. " " 33K 100156-333 1 R431.  138 Resistor. " " 15K 100156-153 1 R432.  139 Resistor " " 300K 100156-304 1 R466.  140 Resistor. " " 390K 100156-304 1 R468.  141 Resistor. " " 390K 100156-394 1 R468.  142 Resistor. " 680K 100156-394 1 R468.  143 Resistor. " 680K 100156-684 1 R509.  143 Resistor. " 10K 100156-100 1 R511.  145  146  147 Wire, Solid Insulated. 100248-924 A/R Jumper J1. From JJ Jumper J2. " T Jumper J3. " L Jumper J3. " E E Jumper J7. " R Jumper J7. " R Jumper J9. " D Jumper J9. " D Jumper J1. " M
13k Resistor, " 3k. 47 100068-470 1 R2k8.  135 Resistor, " k. 750 100156-751 1 R268.  136 Resistor, " " 10K 150156-103 1 Rk21.  137 Resistor, " " 33K 100156-333 1 Rk31.  138 Resistor, " " 15K 100156-333 1 Rk32.  139 Resistor, " " 300K 170156-304 1 Rk66.  140 Resistor, " " 300K 100156-103 1 Rk67.  141 Resistor, " " 300K 100156-384 1 R609.  142 Resistor, " " 680K 100156-384 1 R509.  143 Resistor, " " 300K 100156-394 1 R510.  144 Resistor, " " 300K 100156-394 1 R511.  145  146  147 Aire, Solid Insulated. 100248-924 A/R Jumper J1. From JJ to KK.  Jumper J2. " U " Y.  Jumper J3. " F " G.  Jumper J6. " G G " RH.  Jumper J6. " G G " RH.  Jumper J7. " H " J.  Jumper J8. " EE " FF.  Jumper J9. " D " E.  Jumper J9. " D " E.  Jumper J10. " AA " CC.	134 Resistor. " 3w. 47 100068-470 1 R248.  135 Resistor. " w. 750 100156-751 1 R268.  136 Resistor. " " 33K 100156-333 1 R421.  137 Resistor. " " 120K 100156-124 1 R4.31.  138 Resistor. " " 12K 100156-124 1 R4.32.  139 Resistor. " " 680K 100156-644 1 R4.66.  140 Resistor. " " 390K 100156-394 1 R4.68.  141 Resistor. " " 390K 100156-155 1 R509.  141 Resistor. " " 390K 100156-394 1 R511.  143 Resistor. " " 390K 100156-394 1 R511.  144 Resistor. " " 390K 100156-394 1 R511.  145 Resistor. " " 390K 100156-394 1 R511.  146 Resistor. " " 3.3M 100156-335 1 R536.  146 Jumper J2. " T " V.  Jumper J3. " " L " M.  Jumper J3. " " L " M.  Jumper J5. " F " G.  Jumper J7. " H " J.  Jumper J9. " D " E.  Jumper J10. " AA " CC.  Jumper J10. " AA " CC.  Jumper J11. " M " X.	134   Resistor. * 3w.	134 Resistor. " 3w. 47 100068-470 1 8248.  135 Resistor. " 4w. 750 100156-751 1 R268.  136 Resistor. " " 10K 100156-103 1 R421.  137 Resistor. " " 33K 100156-333 1 R431.  138 Resistor. " " 15K 100156-153 1 R432.  139 Resistor. " " 15K 100156-304 1 R466.  140 Resistor. " 10K 100156-304 1 R468.  141 Resistor. " 390K 100156-394 1 R468.  142 Resistor. " 680K 100156-84 1 R509.  143 Resistor. " 680K 100156-684 1 R509.  144 Resistor. " 390K 100156-394 1 R511.  145 Resistor. " 390K 100156-394 1 R511.
13k Resistor, " 3k. 47 100065-470 1 R2h8.  135 Resistor, " k. 750 100156-751 1 R268.  136 Resistor, " " 10K 150156-103 1 Rk21.  137 Resistor, " " 33K 100156-333 1 Rk31.  138 Resistor, " " 30K 100156-333 1 Rk31.  139 Resistor, " " 30K 100156-304 1 Rk66.  140 Resistor, " " 300K 100156-103 1 Rk67.  141 Resistor, " " 300K 100156-103 1 Rk67.  141 Resistor, " " 300K 100156-384 1 R609.  142 Resistor, " " 680K 100156-304 1 R510.  143 Resistor, " " 300K 100156-394 1 R511.  145 Resistor, " " 300K 100156-394 1 R511.  145 Resistor, " " 300K 100156-394 1 R511.  146 Resistor, " " 300K 100156-394 1 R511.  147 Wire, Solid Insulated. 100246-924 A/R Jumper J1. From JJ to KK.  Jumper J2. " U " Y.  Jumper J3. " F " G.  Jumper J6. " GG " RH.  Jumper J6. " GG " RH.  Jumper J7. " H " J.  Jumper J9. " D " E.  Jumper J10. " AA " CC.  Jumper J11. " W-" X.	134 Resistor. " 3w. 47 100068-470 1 R248.  135 Resistor. " w. 750 100156-751 1 R268.  136 Resistor. " " 33K 100156-333 1 R421.  137 Resistor. " " 120K 100156-124 1 R4.31.  138 Resistor. " " 127 100156-124 1 R4.31.  139 Resistor. " " 680K 100156-644 1 R4.66.  140 Resistor. " " 390K 100156-351 1 R509.  141 Resistor. " " 1.54 100156-151 1 R509.  141 Resistor. " " 390K 100156-394 1 R509.  143 Resistor. " " 390K 100156-394 1 R511.  144 Resistor. " " 390K 100156-394 1 R511.  145 Resistor. " " 3.3M 100156-335 1 R536.  146 147 Wire, Solid Insulated. 100248-924 A/R Jumper J1. From JJ to EK.  Jumper J2. " T " V.  Jumper J3. " " L " M.  Jumper J5. " F " G.  Jumper J9. " D " E.  Jumper J10. " AA " CC.  Jumper J11. " M " I.  Jumper J11. " M " I.	134   Resistor. * 3w.	134 Resistor. " 3w. 47 100068-470 1 8248.  135 Resistor. " 2w. 750 100156-751 1 R268.  136 Resistor. " " 10K 100156-103 1 R421.  137 Resistor. " " 33K 100156-333 1 R431.  138 Resistor. " " 15K 100156-153 1 R432.  139 Resistor " " 300K 100156-304 1 R466.  140 Resistor. " " 390K 100156-304 1 R468.  141 Resistor. " " 390K 100156-394 1 R468.  142 Resistor. " 680K 100156-394 1 R468.  143 Resistor. " 680K 100156-684 1 R509.  143 Resistor. " 10K 100156-100 1 R511.  145  146  147 Wire, Solid Insulated. 100248-924 A/R Jumper J1. From JJ Jumper J2. " T Jumper J3. " L Jumper J3. " E E Jumper J7. " R Jumper J7. " R Jumper J9. " D Jumper J9. " D Jumper J1. " M
134 Resistor, " 3w. 17 100068-170 1 R2h8.  135 Resistor, " w. 750 100156-751 1 R268.  136 Resistor, " " 10% 100156-103 1 R121.  137 Resistor, " " 33% 100156-333 1 R131.  138 Resistor, " " 300% 200156-333 1 R131.  139 Resistor, " " 300% 200156-304 1 R166.  140 Resistor, " " 300% 200156-384 1 R569.  141 Resistor, " " 300% 100156-384 1 R569.  142 Resistor, " " 680% 100156-303 1 R510.  143 Resistor, " " 300% 100156-394 1 R510.  144 Resistor, " 300% 100156-394 1 R511.  145 Resistor, " 300% 100156-394 1 R511.  146 Resistor, " 300% 100156-394 1 R511.  147 Aire, Solid Insulated.  148 Jumper J1. From JJ to KK.  Jumper J2. " U " Y.  Jumper J5. " F " G.  Jumper J5. " F " G.  Jumper J5. " EE " FF.  Jumper J9. " D " E.  Jumper J1. " M-" I.	134 Resistor. " 3w. 47 100068-470 1 R248.  135 Resistor. " w. 750 100156-751 1 R268.  136 Resistor. " " 33K 100156-333 1 R421.  137 Resistor. " " 120K 100156-124 1 R4.31.  138 Resistor. " " 127 100156-124 1 R4.31.  139 Resistor. " " 680K 100156-644 1 R4.66.  140 Resistor. " " 390K 100156-351 1 R509.  141 Resistor. " " 1.54 100156-151 1 R509.  141 Resistor. " " 390K 100156-394 1 R509.  143 Resistor. " " 390K 100156-394 1 R511.  144 Resistor. " " 390K 100156-394 1 R511.  145 Resistor. " " 3.3M 100156-335 1 R536.  146 147 Wire, Solid Insulated. 100248-924 A/R Jumper J1. From JJ to EK.  Jumper J2. " T " V.  Jumper J3. " " L " M.  Jumper J5. " F " G.  Jumper J9. " D " E.  Jumper J10. " AA " CC.  Jumper J11. " M " I.  Jumper J11. " M " I.	134   Resistor. * 3w.	134 Resistor. " 3w. 17 100066-470 1 8248.  135 Resistor. " 2w. 750 100156-751 1 R268.  136 Resistor. " " 10% 100156-103 1 R421.  137 Resistor. " " 33% 100156-333 1 R431.  138 Resistor. " " 15% 100156-153 1 R432.  139 Resistor " " 30% 100156-304 1 R466.  140 Resistor. " " 39% 100156-304 1 R468.  141 Resistor. " " 39% 100156-394 1 R468.  142 Resistor. " 660% 100156-684 1 R509.  143 Resistor. " 10% 100156-100 1 R511.  145  146  147 Wire, Solid Insulated. 100248-924 A/R Jumper J1. From JJ Jumper J2. " I Jumper J3. " L Jumper J3. " L Jumper J3. " E Jumper J9. " D Jumper J9. " D Jumper J9. " D Jumper J9. " D Jumper J9. " A Jumper J1. " W

DRAWING NO. REV.

200488 - 042

\_\_ DATEL1/22/71 SHEET LT. OF \_\_

MATERIAL LIST

DRAWING TITLE DIG, NO, NO. NEG. REMARKS ON CKT. DESIS.

ASSY. TRANSPORT ELECTRONICS
PWB. Type P L51ps. 5/0. 7Ch. Model No. 19

132

136 Resistor. 56. gw.

137 desistor. \* "

138 Resistor. " "

139 Resistor. " " 110 Recistor. 141 Resistor. " "

142 Resistor. " "

ILL Mesistor. " "

147 Fire, Solid Insulated.

143 Perinter.

131 Capacitor, Tantalum. 1.5uf. 100136-155 1 C20h.

132										
Dearwork   ASST. THAYSPORT ELECTRONICS   PRE. T.NE'A'   ISIDE. IM'A. TCh. MODEL NO.   16   DATA1/18/71 SHEET   11 OF	1	<b>N</b> )	MATERI	AL LIST		М		-	10	1
Title	<b>Q</b>	<b>X</b> U					200488 - 036	-	1	L
131   132   133   134   135   132   133   132   133   134   135   136   137   138   138   139	DRAW	ASSY. TRANSPORT E	LECTRONICS	n. MODEL NO	25	_ 047,611/	/18/72 SHEET 11 OF	-	DRAWI	NG E
132   133   Resistor. 56. 30. 1750   100156-751   1   R236.   134   135   136   13	ITEM NO.	DRAWING TIT	LE	DWG. NO.	NO. REQ.	REM	ARKS ON CKT. DESIG.		ITEM MO.	
133 Resistor. *5. av. 750 100156-750 1 R23i. 133  134 Resistor. *3v. 17 100068-170 1 R2h8. 134  135 Resistor. *av. 750 10C156-751 1 R268. 135  136 Resistor. *av. 750 10C156-751 1 R268. 135  137 Resistor. *av. 750 100156-912 1 R121. 136  138 Resistor. *av. 150 100156-130 1 R132. 136  139 Resistor. *av. 150 100156-304 1 R166. 139  140 Resistor. *av. 150 100156-304 1 R166. 139  141 Resistor. *av. 150 100156-304 1 R168. 141  142 Resistor. *av. 150 100156-304 1 R168. 141  143 Resistor. *av. 150 100156-304 1 R509. 142  144 Resistor. *av. 150 100156-884 1 R509. 142  145 Resistor. *av. 150 100156-884 1 R509. 142  145 Resistor. *av. 150 100156-334 1 R510. 143  144 Resistor. *av. 150 100156-334 1 R510. 143  145 Resistor. *av. 150 100156-334 1 R510. 143  146 Resistor. *av. 150 100156-334 1 R510. 143  147 Wire, Solid Insulated. 100248-924 A/R Jumper J1. From JJ te KK. 147  147 Jumper J2. *av. 7av. 7av. 7av. 7av. 7av. 7av. 7av. 7	131		•					]	131	Cap
136   Recistor.   3w.   17   100068-1/70   1   R2h8.   13s.   135   Recistor.   2w.   750   100156-751   1   R268.   135   136   Recistor.	132								132	
135   Resistor.   1	133	Resister. 5%. qu.	750	100356-753	1	R2311.			133	
135 Resistor. " iw. 750 10C156-751 1 R268. 135 136 Resistor. " " 9411 100156-912 1 Rh21. 136 137 Resistor. " " 27K 100156-273 1 Rh31. 137 138 Resistor. " " 15K 100156-353 1 Rh32. 135 139 Resistor. " " 30K 100156-304 1 Rh66. 139 140 Resistor. " " 30K 100156-304 1 Rh66. 139 140 Resistor. " " 30K 100156-304 1 Rh68. 140 141 Resistor. " " 30K 100156-304 1 Rh69. 141 142 Resistor. " " 680K 100156-68H 1 R509. 141 143 Resistor. " 680K 100156-68H 1 R509. 142 143 Resistor. " 330K 100156-33h 1 R510. 143 144 Resistor. " " 330K 100156-33h 1 R511. 145 145	134	Resistor, " Jw.	. 47	100068-470	1	B21,8.			13.	
136 Hamistor. " " 941x 100156-912 1 Rh21. 136  137 Hamistor. " " 27K 109156-273 1 Rh31. 137  138 Resistor. " " 15K 100156-153 1 Rh32. 135  139 Resistor. " " 300K 100156-304 1 Rh66. 139  140 Hamistor. " " 300K 100156-304 1 Rh66. 139  140 Hamistor. " " 300K 100156-304 1 Rh68. 140  141 Resistor. " " 680K 100156-684 1 R509. 140  142 Resistor. " " 680K 100156-684 1 R509. 140  143 Hamistor. " " 330K 100156-334 1 R511. 140  144 Resistor. " " 330K 100156-334 1 R511. 140  145 Hamistor. " " 330K 100156-334 1 R511. 140  145 Hamistor. " " 330K 100156-334 1 R511. 140  146 Hamistor. " " 300K 100156-151 3 R520  146 Hamistor. " " 300K 100156-151 3 R520  147 Hamistor. " " 300K 100156-151 3 R520  148 Hamistor. " " 300K 100156-151 3 R520  149 Hamistor. " " 300K 100156-151 3 R520  140 Hamistor. " " 300K 100156-151 3 R520  141 Hamistor. " " 300K 100156-151 3 R520  142 Hamistor. " " 100248-924 A/R Jumper Jl. From JJ te KK. 147  141 Hamistor. " " 100248-924 A/R Jumper Jl. From JJ te K. 147  141 Hamistor. " " 100248-924 A/R Jumper Jl. From JJ te K. 147  142 Hamistor. " " 100248-924 A/R Jumper Jl. From JJ te K. 147  143 Hamistor. " " 100248-924 A/R Jumper Jl. From JJ te K. 147  143 Hamistor. " " 100248-924 A/R Jumper Jl. From JJ te K. 147  144 Hamistor. " " 100248-924 A/R Jumper Jl. From JJ te K. 147  145 Hamistor. " " 100248-924 A/R Jumper Jl. From JJ te K. 147  145 Hamistor. " 100248-924 A/R Jumper Jl. From JJ te K. 147  146 Hamistor. " 100248-924 A/R Jumper Jl. " N " N " N " N " N " N " N " N " N "	135	Resistor. " jw.	750	100156-751	1	R268.			135	Г
138 Resistor. " 15K 100156-153 1 RL32. 136 139 Resistor. " 300K 100156-304 1 RL66. 139 1k0 Resistor. " 150 100156-314 1 RL67. 140 1k1 Resistor. " 530K 100156-334 1 RL68. 141 1k2 Resistor. " 680K 100156-684 1 R509. 142 1k3 Resistor. " 150 100156-151 3 R510. 143 1k4 Resistor. " 330K 100156-334 1 R511. 144 1k5 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	136		9.11	100156-912	1	RL:21.		_]	136	. Res
136 Resistor. " 15K 100156-153 1 Rh32. 136  139 Resistor. " 300K 100156-30h 1 Rh66. 139  1h0 Resistor. " 150 100156-171 1 Rh67. 110  1h1 Resistor. " 330K 100156-33h 1 Rh68. 1141  1h2 Resistor. " 680K 100156-68h 1 R509. 1142  1h3 Resistor. " 150 100156-151 1 R519. 1143  1h4 Resistor. " 330K 100156-33h 1 R511. 1145  1h5 1 145 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	137	Resistor. " "	27K	100156-273	1	Ri 31.			137	Res
139 Resistor. " " 300K 100156-304 1 8466. 139 140 Resistor. " 159 100156-324 1 8467. 140 141 Resistor. " 330K 100156-334 1 8468. 141 142 Resistor. " 680K 100156-684 1 8509. 142 143 Resistor. " 330K 100156-684 1 8519. 143 144 Resistor. " " 330K 100156-334 1 8511. 144 145 146 147 Wire, Solid Insulated. 100248-924 A/R Jumper Jl. From JJ te KK. 147 148 149 Jumper J2. " T " V. Jumper J3. " L " M. Jumper J3. " L " M. Jumper J5. " F " G. Jumper J7. " H " J. Jumper J8. " EE " FF. Jumper J9. " D " E. Jumper J9. " D " E. Jumper J10. " AA " CG. Jumper J11. " M " X. Jumper J11. " M			15K	100156-153	1	R432.			138	Res
140   Resistor. "   150   100156-121   1   Ric6T.   140     141   Resistor. "   330K   100156-33k   1   Ric68.   141     142   Resistor. "   680K   100156-68k   1   R509.   143     143   Resistor. "   330K   100156-33k   1   R510.   145     144   Resistor. "   330K   100156-33k   1   R511.   145     145   146   1002k8-92k   A/R   Jumper Jl. From JJ te KK.   146     147   Wire, Solid Insulated.   1002k8-92k   A/R   Jumper J2. " T " V.     146   Jumper J3. " L " M.   147     147   Jumper J5. " F " G.   148     148   Jumper J7. " H " J.   148     149   Jumper J9. " D " E.   149     140   Jumper J10. " AA " CG.   149     140   Jumper J11. " M " X.   149     141   Jumper J11. " M " X.   149     141   Jumper J11. " M " X.   149     141   Jumper J11. " M " X.   149     142   Jumper J11. " M " X.   149     143   Jumper J11. " M " X.   149     144   Jumper J11. " M " X.   149     145   Jumper J11. " M " X.   149     145   Jumper J11. " M " X.   149     146   Jumper J11. " M " X.   149     146   Jumper J11. " M " X.   149     147   Jumper J11. " M " X.   149     148   Jumper J11. " M " X.   149     149   Jumper J11. " M " X.   149     140   Jumper J111. " M " X.   149     140   Jumper			300K	100156-304	1	<b>Р</b> Ц66.		J	139	Res
11-2   11-2	140	Neelsbox. "	150	100156-151	1	<del>1467</del> .			140	Ree
11/2       Resistor. " " 680K 100156-68h 1 R509.       11/2         11/3       Resistor. " " 330K 100156-33h 1 A511.       11/4         11/5       11/6       11/6         11/7       Wire, Solid Insulated.       1002h8-92h A/R Jumper Jl. From JJ te KK.       11/6         11/7       Jumper J2. " T " V.       11/7         11/7       Jumper J3. " L " M.       11/7         11/7       Jumper J5. " F " G.       11/7         11/7       Jumper J7. " H " J.       11/7         11/8       Jumper J1. " AA " CG.       11/8         11/8       Jumper J1. " M " I.       11/8	141	Resistor. " "	<b>30K</b> ز	100156-334	1	RL68.			141	Res
1	142	Resistor. " "	680K	100156-684	1	R509.			21,2	ries
145 146 147 Wire, Solid Insulated. 1002h8-92h A/R Jumper Jl. From JJ te KK. 1147 1447 1448 1448 1449 1449 1449 1449 1449 1449	143	Nontator, " " ,	350	100156-151	<b>—</b>	R510+		J	143	ممت
11.6  11.6  11.7  11.6  11.7	144	Resistor. '" "	330X	100:156-33h	1	it511.			144.	ites
1h6     1h6       1h7     Wire, Solid Insulated.     1002h8-92k     A/R     Jusper Jl. From JJ te KK.     1k7       1h7     Jusper J2. " T " Y.     1k8       1h8     Jusper J2. " T " Y.     1k7       1h9     Jusper J3. " L " M.     1k8       1h9     Jusper J5. " F " G.     1k8       1h9     Jusper J7. " H " J.     1k8       1h9     Jusper J9. " D " E.     1k9       1h9     Jusper J10. " AA " CC.     1k9       1h9     Jusper J11. " M " Y.     1k9       1h9     Jusper J13. " N " P.     1k9	145								145	Res
1h7     Wire, Solid Insulated.     1002h8-92h     A/R     Jusper Jl. From JJ te KK.     11.7       Jusper J2.     T * Y.     11.7       Jusper J3.     L * M.     11.7       Jusper J5.     F * G.     11.7       Jusper J7.     H * J.     11.7       Jusper J8.     EE * FF.     11.7       Jusper J9.     D * E.     11.7       Jusper J10.     AA * CC.     11.7       Jusper J11.     W * Y.     11.7       Jusper J13.     N * P.     11.7		- <del></del>						$\Box$	11:6	
Jumper J2. " T " V.  Jumper J3. " L " H.  Jumper J5. " F " G.  Jumper J7. " H " J.  Jumper J8. " EE "FF.  Jumper J9. " D " E.  Jumper J10. " AA " CC.  Jumper J11. " W " I.  Jumper J13. " N " F.		Wire, Solid Insulate	ed.	100248-924	A/R	Jumper J			11.7	Wir
Jumper J5. " F " G.  Jumper J7. " H " J.  Jumper J8. " EE " FF.  Jumper J9. " D " E.  Jumper J10. " AA " CC.  Jumper J11. " M " X.  Jumper J13. " N " F.					[	Jumper Ja	2. * T * V. <			
Jumper J7. " H " J.  Jumper J8. " EE " FF.  Jumper J9. " D " E.  Jumper J10. " AA " CC.  Jumper J11. " M " X.  Jumper J13. " N " F.					i -	Jumper J	3. " L " M.			
Jusper J8. * EE * FF.  Jusper J9. * D * E.  Jusper J10. * AA * CC.  Jusper J11. * W * X.  Jusper J13. * N * F.						Jumper J	5. * F *G.	3		
Jumper J9. " D " %.  Jumper J10. " AA " CG.  Jumper J11. " W " Y.  Jumper J13. " N " P.						Jumper J	7. " И " J.	]		
Jumper J10. " AA " CG.  Jumper J11. " W " X.  Jumper J13. " N " P.						Jumper J	B. EE F7.			
Jumper Jll. " W " I.  Jumper Jl3. " N " P.						Jumper J	9. " D " <b>%</b> .	]		
Juspor J13. " N " P.						Jumper J	10. " AA " CC.			_
						Jumper J	11." W " X.	7		
Jumper Jlh. " R " S.						Jumper J	13. " N " P.	7	$\vdash$	_
						Jumper J	14. * R * S.			
								3		
	_							J	$\vdash$	
				· · · · ·				]		
		<u> </u>								_

TITL	DRAWING TITLE	9/41	DWG. NO.	NO. REQ.	DATE 11/16/71 MEET 13 OF	TITEM NO.
131	Capacitor, Tantalum.	10uf	100070-106	1	C204.	131
132	.,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,			1		132
133						133
٠3.						134
135						135
136	Resistor. 5%. Tw.	27K	130156-273	1	到,21.	136
137	Resistor. * *	100%	100150-10k	1	aL31.	137
138	Resistor. " "	12K	130156-123	1	R432.	138
139	Resistor. "	660K	100156-684	1	RL66.	139
40	-Resistor, " 1	150	100156-151	1	il <sub>s</sub> e?.	טית
141	Resistor. " "	390K	100156-354	:	RL65.	1/11
142	desistor. " "	1.5M	130156-155	1	R509.	11:2
143	Hobiotor, I I	150	200156-352	-	- موروط	14.3
ш.	Resistor. * *	390K	100156-394	1	H511.	11/1
145	Resistor. " "	.3.3H	100156-335	1	R\$36.	145
11:6						146
14.7	Wire, Solid Insulated.		100243-924	A/R	Jumper Jl. Frem KK to LL.	147
					Jumper J2. " U " V.	
					Jumper Jh. " PP " RR.	
					Jumper J5. " F "G.	
_				L	Jumper J6. * GG * hH.	
					Jumper J7. " H " J.	<u> </u>
_					Jumper J8. EE FF.	
				-	Jumper J9. " D "E.	
_				<u> </u>	Jumper JlO. " AA " CC.	<u> </u>
_					Jumper Jll. " W "l.	_
_			· · · · · · · · · · · · · · · · · · ·		Jumper J15. " A "C.	
			<del></del>	<b></b>	Jumper Jlo. " UU " VV.	·
					Jumper J17. " W " XX.  Jumper J3. " L " K	

J.	•	MATERI	AL LIST	=	ML	200486 - OLI	
•	ASSY.TRANSPORT SLO	SUIVORTS			<u> </u>		
TITLE	PWP. Tyme 111 251nn	. s/G. 7	Ch. wode_ wo	2.0	_ DATE 114	22/71 WEET 15	or
ITEM NO.	DRAWING TITLE	:	DWG. NO.	NO. REQ.	REMA	RKS ON CRT. DES	.)G.
131	Capacitor, Tanta um.	1.50f	1 <13:-155	1	C20L.		
132							
133							
134							
135							
136	Husistor. 51. 20.	158	1002-6-153	1	mu21.		
137	Resistor. " "	514	100156-513	1	HL31		
133	Resistor. " "	1.3K	170156-153	1	:4:32.		
139	Hasistor " "	600k	110156-et4	1	51.60.		
טית		وزد	100151 151.		<del>ldi67+</del>		
וו	Resistor. " "	390K	100156-394	ı	RL68.		
11:2	Resistor. " "	1.5M	100150-155	2.	150%		
143	Hondroor.	<u></u>	10:156-151	- 1	<del>115201</del>		
개	Resistor. ' "	39º1K	190156-394	1	<b>1511.</b>		
145	Relistor. " "	بر. برو.ور	1,275,50-335	1	жэ <b>ў</b> ба		
146	·						
147	Mrs, Joli: far lated.		200245-924	:./R	Jumier J1	From M. to U	
					Jummer J2.	. • U • V	
					dumper J.	. PP "RI	₹.
					Jumper JS.	. " F. " G	·
					Jumper Jó	. " Сы "HI	۱.
					Jumper 37.	. • н • а.	
					Jumper J9	. " 5E "F	7.
					Jumper 19.	. " ⊃ " E.	
					Jumper J1	. " AA " C	٥
					Jumper J1	l. " W "X	<u>.                                    </u>
					Jumper J1	5. " A "C	
					Jumper Jl	6. " UU " V	<i>.</i>
					Jumper Jl	7. " WW " X	١.
					Jumper J3	. " L " K.	
			<b></b>				
				1.	1	• .	

<del></del>	<del>1</del>		<del></del>			•
J.	<b>]</b> ]] =	MATERI	AL LIST	<del></del>	ML 200188 - 037	1
DRAWN 717L	ASSY.TRANSPORT ELE PWB. Type'P' 10ips		The MODEL NO.	16	DATE 11/18/12 SHEET 42 OF	1
ITEM NO.	. DRAWING TITLE		DWG, NO.	NO. REQ.	REMARKS ON CKT. DESIG.	1
131	Capacitor, Tantalum.	19uf	100070-106	1.	C204.	1
132						1
133						]
13k:						]
135						1
136	Resistor, 5%, aw.	33K	10:15(-333	1	.Ri,21.	]
137	Resistor. " "	120K	100156-124	1	此.31.	Į
138	Resistor. " "	12%	100156-123	1	ત્રધુ32.	Ì
139	Resistor. " "	680K	100156-684	1	RL66.	1
140	Resistant	159	100156-151	-	1467.	Ī
141	Resistor. " "	390£	100156-394	1	RL68.	Ţ
142	Resistor. " "	1.5M	100156-155	1	R509.	1
143	Rentreer- 4 - 4	-340	100156-151	1	N;20-	1
114:	Resistor. " "	390K	100156-394	1	R\$11.	1
145	Hesistor, " "	3.3H	100156-335	1	R536.	1
146						1
147	Wire, Solid Insulated.		100246-924	A/R	Jumper Jl. From KK to LL.	1
					Jumper J2. * U * ₹.	1
					Jumper Jis. * PP. * RR.	1
					Jumper J5. " P = G	1
					Jumper J6. " CO " HH.	1
					Jumper J7. " H " J.	1
					Jumper JR. * EZ * FF.	1
					Jumper J9. " D " E.	]
					Jumper J10. * AA * CC.	1
				1	Jumper Jll. " W " X.	1
					Jumper J15. " A " C.	ĺ
					Jumper J16. " UU " VV.	1
		·-			Jumper Jl?. " WW " XX.	1
					Jumper J3. " L " K.	1
				· · · · · · ·		4

J.	<b>1</b> ] <u></u>	ATERI	AL LIST	_	ML	\$00488 -		٧.
PRAVILE TITLE	ASSI.TRANSPORT ELEC	TRONICS	Ch., MODEL NO.	าฮ	DATE 11/	18/71 sheet	<del></del>	
TEM NO.	DRAWING TITLE		DWG, NO.	NO. REQ.		RS ON CKT.		_
131	Capacitor, Tantalum.	10uf	100079-106	1	C20L.			=
132				<del>                                     </del>				_
133								_
194					f			_
135	<del></del>							_
136	Resistor. 5%. iv.,	18K	100156-183	1	RL21.			_
137	Remistor. " "	68K	100156-683	1	9431.			_
138	Resistor. " "	13K	100156-133	1	RL32.			_
139	Resistor. " "	660K	100156-684	1	RL66.			_
υо	Resister, I I	350	100156 151	-	DL67.			_
141	Resistor. "	390K	100156-394	1	RL68.	·		
U.2	Resistor, " "	1.5%	100150-155	1	R509.			
143	Resistor. * *	150	100154 151	$\rightarrow$	R520-			_
144	Resistor. " "	390K	100156-394	ì	8511.			_
145	Resistor. " "	3.3H	100120-335	1	R536.			_
146	· · · · · · · · · · · · · · · · · · ·							٦
147	Wire, Solid Limilated.		100243-924	A/R	Jumper Jl.	From KK to	LL.	
	····				Jumper J2.		٧.	7
$\dashv$					Jumper Ju.	• PP •	HR.	٦
$\neg$		1			Jumper J5.	• F	ů.	٦
					Jumper J6.	" GG "	H6H •	٦
					Jumper J7.	" н "	J.	٦
					Jumper J8.	· EE ·	F7.	٦
					Jumper J9.	• <u>ó</u> •	Е.	٦
Ì		Ì			Jumper J10.	" AA "	cc.	٦
_					Jumper Jl1.		x.	٦
$\neg$					Jumper J15.		¢.	٦
					Jumper J16.		W.	٦
		Î			Jumper J17.	• w •	n.	٦
	·····				Jumper J3.		κ.	٦

7	<b>N</b> ) .	MATERI	AL LIST		М	DRAWIN		RE
J					[[V.]	200188	- 041	
DRAWN   TITL	ASSY. TRANSPORT EL			10	DATE 11.	/22/71 she E	т_46 о	·
HO.	DRAWING TITL	E	DWG. NO.	NO. REO.	REMA	ARKS ON CK	T. DESIG	
131	Capacitor, Tantalum.	1.5uf.	100136-155	1	C204.			
132								
133								•
134				L				
135				<u> </u>				
136	Resistor. 5%. iv.	10K	100156-103	1	RL21.			
137	Resistor. " "	33 <b>X</b>	100156-333	1	RL31.			
138	Resistor. " "	15K	100156-153	. 1	RL32.			
139	Resistor. " "	300K	107156-304	1	RL:66.			
<b>14</b> 0	Resistor, I.I.	10K	100156 103	- 2	DL67.			
141	Resistor. " "	390K	100156-394	1	RL68.			
142	Resistor. " "	680k	100156-684	1	R509.			
143	Resistory	10K	100156-103	1	9510.			
7/1/	Resistor. " "	390K	100156-394	1	R511.			
145								
146								
147	Wire, Solid Insulated	•	100248-924	A/R	Jumper J1.	From KK	to LL.	
					Jumper J2.	. * 0	• Y.	
					Jumper Ju.	. PP	" RR.	
					Jumper J5.	, " F	* 0.	
					Jumper J6.	. " 60	* HH.	
					Jumper J7.	. • н	• J.	
					Jumper 18.	· EE	· FF.	
					Jumper J9.	D	* 1.	
					Jumper J10	. * AL	CC.	
					Jumper Jll	. * ¥	• X.	
					Jumper J15	i. * A	• c.	
					Jumper Jl6	. • ຫ	• W.	
					Jumper J17	. W	· XX.	
					Jumper J3.	• L	" K.	

	<del> </del>	<del>-</del>	+	Jumper J3, * L *K.
		<del> </del>	<del> </del>	
	<u></u>	<u> </u>	1	<u> </u>
1	MATERI	AL LIST		ML DRAWING NO. RE
TITLE	ASSY.TRANSPORT ELECTRONICS Php. Type'A' 101pa. S/G. 1	S Ch . MODEL NO.	_1ø	
M M	DRAWING TITLE	DWG. NO.	NO. REQ.	REMARKS ON CKT, DESIG.
31				`
32				
33				
3L				
35		<u> </u>	ļ	
36		100156-333	1	R421.
37	Resistor. " 120K	100156-124	1	ñĿ31.
33	Resistor. " " 12K	<del></del>	1	RL32.
39	Resistor. " " 680%		1	RL66.
10	Herister 150	160156-151		PL67.
11	Resistor, " " 390K	100156-394	1	R468.
12	Resistor. " 1.54		1	R509.
13	Restator 1 1 100	100156 151		N510-
14	Resistint. Jyon		1	R511.
15	Reeistor. " " 3.3M	100156-335	1	R536.
16	wire, Solid Inmulated.	30001 4 001	1.6	h 12 P 11 h- 47
17	wire, Sollo Inscieted.	100214-924	A/R	Jumper Jl. From JJ/to KK.  Jumper J2. * T * J.
-				Jumper J3. " L " M.
				Jumper J5. * F * Q.
				Jumper J7. A H = J.
-				Jumper Jô. " EE " FF.
-				Jumper J9. " D " E.
_				Jumper JlO. " AA " CC.
$\dashv$				Jumper Jll. " W % X.
_		•		Jumper J13. " N " P.
				Jumper Jli. * R * S.
7				

MATERIAL LIST DRAWING NO. RE DRAWING NO. REV DRAWING NO. MATERIAL LIST MATERIAL LIST MATERIAL LIST 200488 - 046 2001.88 -01.1 200488 - 048 ASSI, TRANSPORT ELECTRONICS ASSY.TRANSPORT ELECTRONICS ASSY.THANSPORT ELECTRONICS TITLE PUB. MANUAL DENSITY SELECT. ASSY.TRANSPORT ELECTRONICS MODEL NO. \_\_\_\_\_\_ TITLE PRB. TYDE'A' 25109. S/G. 7Ch. MODEL NO. 10 DRAWING PAR Type'A' 151ps S/G. 7Ch. MODEL NO. 11 DATE 11/22/71 SHEET 51 OF TITLE PATE TYPE'A' 128107. 5/0.7Ch. MODEL NO 11 LATE 11/22/71 SHEET 49 OF \_\_\_ DATE 11/22/71 SHEET . 53 OF. DRAWING TITLE ITEM DRAWING TITLE DRAWING TITLE D#4. NO. NO. REQ. REMARKS ON CKT. DESIG. DeG. NO. NO. REQ. REMARKS ON CKT. DESIG. DRAWING TITLE DWG. NO. NO. REQ. REMARKS ON CKT. DESIG. Use the appropriate sheet 131 showing the combination of 132 1 32 speed; type 'A' or 'P'; and 133 133 7 or 9 Ch. Then change the 134 124 first digit of the dash No. 135 135 to letter A. 156 17/150-153 136 Resistor. 5%. av. 136 Resistor, 51. 2w. 100156-912 1 30.21. 136 Gentrier, St. W. 27K 100156-273 1 EXAMPLE: - 200488 - A06 51K 17:156-513 1 10.31. 137 Resistor. " " RL31. 137 Resistor. " " 27K 100156-277 RL31. 10.8 100156-104 1 137 Sectator, # # defines a Type 'P' 45ips. D/G. 138 Resistor. " " 13K 150156-133 1 84:32 138 Resistor. " " 138 kesirtor. " " 12K 19/156-123 1 14:32. 15K 100156-153 1. RL 32. 9Ch. Transport PWB with the 139 Registor. " " 650K 100156-63L 1 R466. 680K 10015t-6F4 1 RL66. 139 Resistor. " " 300K 100156-304 1 RU66. 139 desistor. " " Manual Density Select Option 11:0 mesteter 91.67 140 Restatory <del>136156-151</del> RL66. 141 Resistor. " " 1:0150-394 390K 100156-394 1 RL68. 390K 14: Resistor. " " 330K 100156-33L Fh68. Mil Mesistor. " " -10tA R509. · 112 Hosistor. " " 1.5M 100156-155 1 4509. 1.5% 1001%-155 1 142 Registor. " " 680K 100196-681 142 Resistor. " " 1 R509. Jumper J8. From EE to FF. 1001-1-1-1 143 11:3 Kerteter ... 153 Summer Jumper J8. " DD " FF. 1kb Resistor. " " 14 Resistor. " " 330K 101156-33L 1 8511. 3.40K 1:K0156-394 1 390s 100150-39/ 1 R511. Ild meristor. " " 145 Refistor. " " 3.3M 100150-335 1 R530. 3.3M 100156-335 1 R536. 145 145 Resistor. " " Jumper J10. From AA to CC. 11.6 11.6 Jumper JlO. " AA "BB. 117 Wire, Solid Insulated. 1002L6-92L A'R Jumper Jl. From JJ to KK. 197 Wire, Solid Limitates 1002hd-92L A/R Jumper Jl. From JJ to KK. 1:X218-924 A/R Jumper Jl. From JJ to KK. 147 Mire, Solid Insulated. Jumper J2. " T " V. Jumper J2. " T " V. Jumper J2. " T " V. Jumper Jll. From W to Y. Jumper J3. " L " M. Jumper J3. " L " M. Jumper J3. " L " M: Jumper Jll. " W " Y. Jumper J5. " F " G. Juncer 35. " F " 3. Jumper J5. \* F \* G. Jumper J7. " H " J. Jumper J7. " H " J. Jumper J7. " H = J. Jumper J191 From DD to TP208. Jumper JS. " EE "FF. Jumper J8. " EE "FF. Jumoer JA. " EE " FF. Jumper J9. " D " E. Jumper J9. " D " E. Jumper J9. " D " E. Jumper JlO. " AA " CC. Jumper J10. " AA " CC. Jumper J19. " AA " C Jumper J11. " W " I. Jumper Jll. " W " X. Jumper Jll. " W " X. Jumper J13. " N " P. Jumper J13. " N " P." Junper J13. " N " P Jumper J14. " R "S. Jumper Jlis. " R "S. Jumper Jil:. " R "S DRAWING HO. REV DRAWING NO. REV. DRAWING NO. MATERIAL LIST MATERIAL LIST MAYERIAL LIST 200488 - 045 2001/88 - 01/7 200k88 - XXX ASSY.TRANSPORT ELECTRONICS ASSY.TRANSPORT ELECTRONICS ASSY, TRANSPORT ELECTRONICS TITLE PWB. Type A' 18 10= 5/G. 7Ch. MODEL NO. 10 DRAWING THE TYDE A TRIDE SALTCH. MODEL NO. 1 DRAWING PWB. MAYUAL ON-LINE. DATE 11/22/71 SHEET 52" OF \_\_\_ DATE 11/22/71 SHEET 50 OF. MODEL NO. \_18/\_ \_\_\_ DATE 11/23/71 SHEET 55 DWG. NO. NO. REQ. DRAWING TITLE REMARKS ON CKT. DESIG. DRAWING TITLE DWG. NO. NO. REQ. REMARKS ON CKT., DESIG. DRAWING TITLE NO. REQ. REMARKS ON CKT. DESI DWG. NO. 131 131 Use the appropriate sheet 132 showing the combination of 133 133 speed; type 'A' or 'P', and 134 134 7 or 9 Ch. Then change the 135 135 first digit of the dash No. 10K 100156-103 1 RL21. 136 Recistor. Sf. iv. 18K 100156-183 1 136 Hesistor. 5%. 2w. RL21. to letter B. 137 Memistor. " " 58K 100156-683 1 33K 100156-333 1 Rh31. EXAMPLE: 200488 - 506 RL 31. 137 Resistor. " " 138 Recistor. " " 13K 100156-133 1 1 RL32. ₩32. 138 Remistor. " " 15K 100156-153 defines a Type 'P' 45ips D/G. 139 Resistor. " " 680K 100156-58L RL66. 139 Resistor. " " 300K 100156-30L 1 Ri66. 9Ch. Transport PWB with the 14.0 140 Bookston Manual On-Line Option. 11.1 Sesistor. " " 390K 100156-394 1 141 Resister. " " 390К 100156-394 1 R468. 11.2 Resistor. " " 1.5M 100156-155 1 R509. 142 Resistor. " " 680K 100156-68L 1 R509. Also:-11.3 Herteten H. H. 150 | 100154 151 | 1 Jumper J9. From D to E.

111

145

146

Remistor. " "

Resistor. " "

147 Wire, Solid Insulated.

390K 100156-39L 1

3.3M 100156-335 1

R511.

R536.

1002Lb-92L A/R Jumper Jl. From JJ to KK.

Jumper J2. " T . " V. Jumper J3. \* L \* M.

Jumper J5. " F \* G.

Jumper J7. " H " J.

Jumper J8. . EE " FF. Jumper J9. \* D \* E.

Jumper JlO. " AA " CC.

Jumper Jll. " W " I.

Jumper J13. " N \* P.

Jumper'Jlh. " R " S.

Ild. Resister. " "

147 Wire, Solid Insulated.

390K 100156-394 1 R511.

100248-924 A/R Jumper Jl. From Jd to KK.

Jumper J2. " T " V.

Jumper J3, " L " M.

Jumper J5. " F " G.

Jumper J7. " H " J. Jumper J8. \* EE \* FF.

Jumper J9. " D " E.

Jumper J19. " AA " CC.

Jumper Jll. " W " X.

Jumper J13. " N " P.

Jumper Jlh. " R " S.

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$\dashv$ $\vdash$		1	1	
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_		<del>                                     </del>	<del>  -  </del>	
<b>→</b> ト		<del> </del>	1	
_   -	<u> </u>	<del> </del>	1	
_		<del> </del>	11	
	#	<del> </del>	1	
		TO SOSTBOLLES		
71-	MATERI	AL LIST		ML 200488 - XXI
$\neg$			<del></del>	VIL 200488 - XXI
_	ASSY.TRANSPORT ELECTRONIC	S MODEL NO	10	DATE 11/23/71 SHEET 56 OF
1 L			NO. REQ.	REMARKS ON CKT. DESIG.
7 1	EN DRAWING TITLE	DWG, NO.	NO. WEG.	REMARKS ON CKT. DESIG.
コト	Use the appropriate sheet	ļ <u>.</u>	<del>}                                    </del>	
コレ	showing the combination of	ļ		
$\neg \vdash$	speed; type 'A' or 'P', and	<b></b>	$\longmapsto$	
ヿL	7 or 9 Ch. Then change the	ļ		
コレ	first digit of the dash No.	L	$\longrightarrow$	
ヿL	to letter C.	ļ	$\longrightarrow$	
7 L	EXAMPLE: - 200488 - 006	L	$\longrightarrow$	
7 L	defines a Type 'F' 45ips. P/G.		$\sqcup \sqcup$	
<b>-1</b>	9Ch. Transport PWB with the		<b></b>	
$\dashv$ $\sqcup$	5v. to the Controller Option.			
7 L				
ヿL	Also:-		-	
-1 L	Jumper J18. From NN t - MM.			Add .
H L		L		
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		7	1	

DRAWING NO. REV.

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REMARKS ON CKT. DESIG

NO. REQ.

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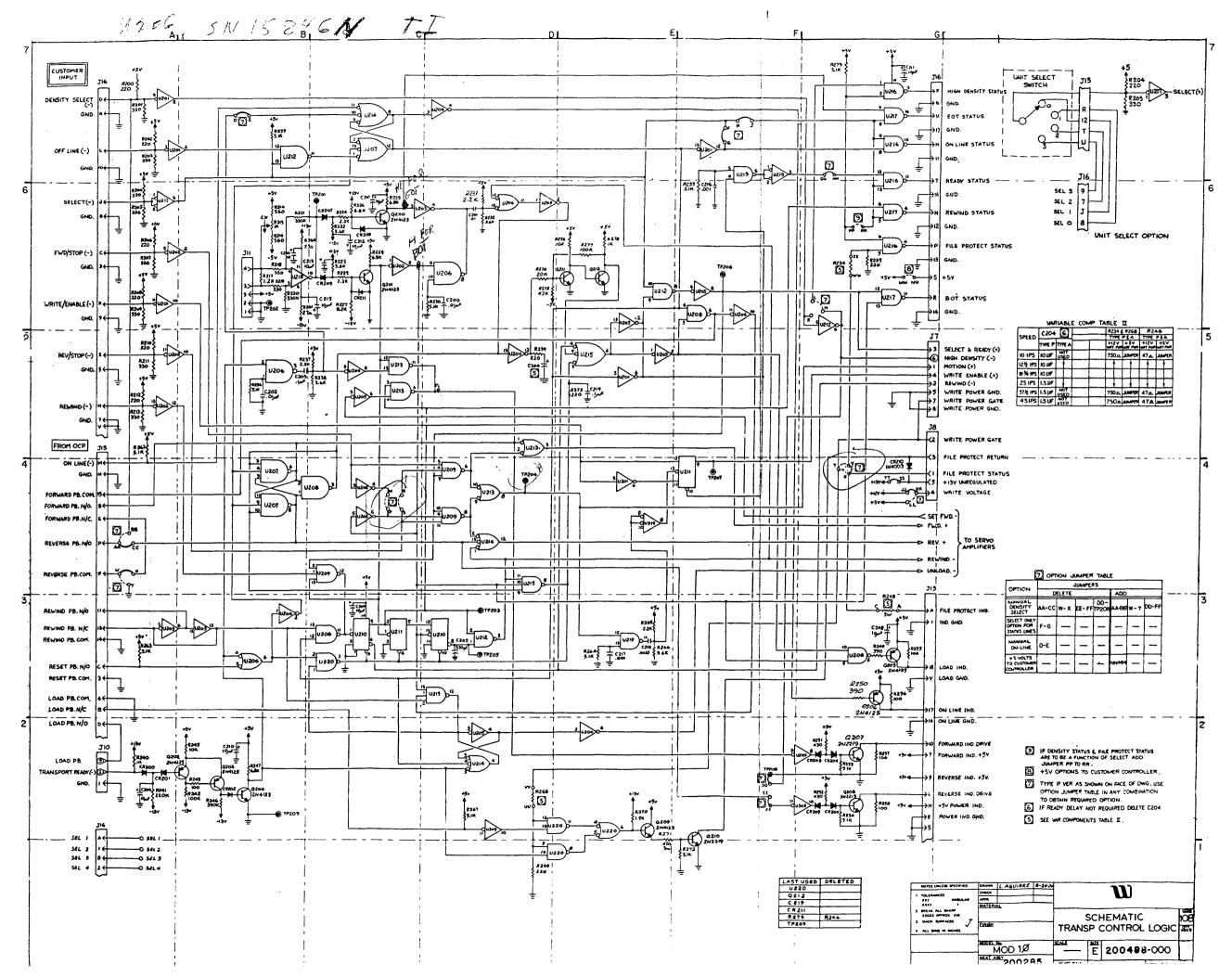
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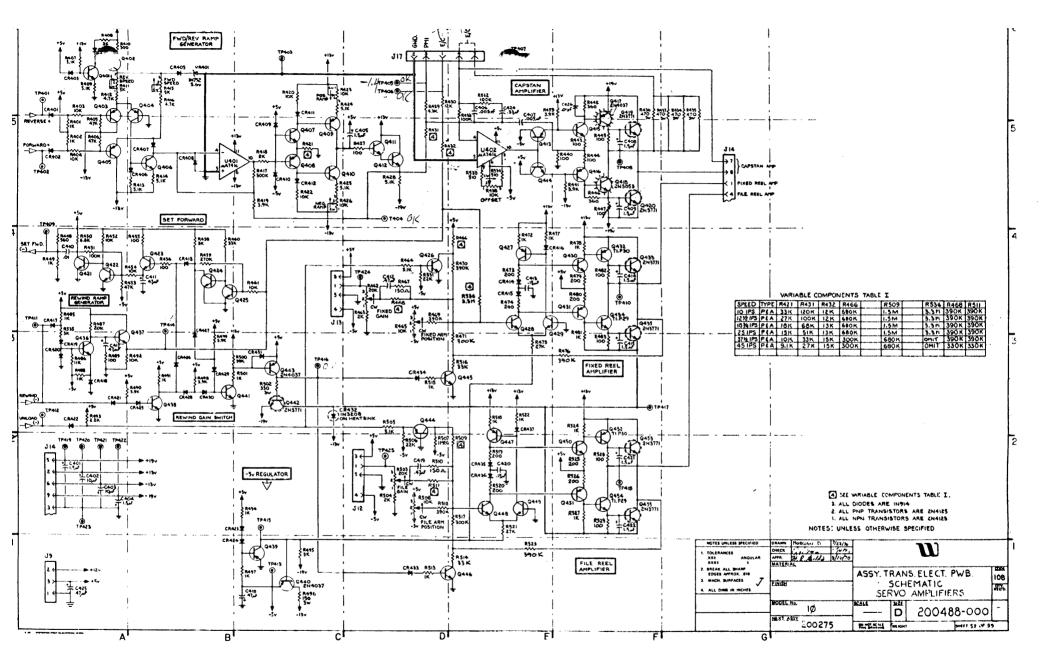
Add.



Schematic, Transport Control Logics, PWB

22

B-23 Assembly, Transport Electronics, PWB



B-24 Schematic, Servo Amplifiers

REF.	COMPONENT	WCP.	7	ONE	REF.	COMPONENT	WCP.	Z	ONE	REF.	COMPONENT	WCP.	20	NE	REF.	COMPONENT	WCP	ZON		REF.	COMPONE
DES.	TYPE	PART NO.	SCHEN		DES.	TIPE.	PART NO.	SCHEM	ASST	DES.	TIPE.	PART NO.	SCHEM	ASST	DES.	TYPE.		SCHEM	ASSY	DES.	TYPE.
0201	IC.Mex.Inv.	100084	A-6	J-6	0219	IC.Quad.2 In.	100085	E-3	H-6	01,37	Transistor.	100080	A-3	CT.	CRL27	Diode, Signal	100091	B-3	D-5 D-5	CL20	Capacito
			A-? E-L	1				E-4 F-7	i	QL38	:	100080	B-3 C-1	D-5	CRL 28 CRL 29	: :	100091	B-3	D-5	Ci.22	:
			E-5		1220	IC.Quad.2 In.	100085	G-3	J-6	0110		100160	C-1	D-4	CRL 30		100091	B-3	D-5	CL23	Missing.
		:	F-7	1	3220	101402011 2011		E-1	1	3FP1	•	100080	B-3	D-4:	CRL31	Diode, Power	100091	C-3 C-3	0—1; 0—3	CL25	Capacito
0505	IC.Hex.Inv.	100084	A-5	H-6			100109	E-2 B-5	B-6	Ohit-3		100173 100160	C-3 C-3	D-3 D-4	CRL32 CRL33	Diode, Power Diode, Signal	100091	D-1	H-5	Gazz	Capacito
			C-4		07'05	IC.Op.Amp. IC.Op.Amp.	100109	E-5	B-5	OIL.	-	100081	D-3	J-5	CRL 31.		100091	D-3	F-5	R200	Resistor
			C-6		1					0.45	:	100080	D-3 D-1	0-5 J-5	CRL 35 CRL 36	: :	100091	E-2 E-2	J-4:	R201 R202	
0203	IC.Hex.Inv.	100084	B-3	G-6	0200 0201	Transistor.	100080	A-2 C-6	F-6	Out 6		100081	F-2	3-2	CRL37		100091	E-3	J-4.	R203	
			C-6		0202		100081	B-2	G-5	QLL 8	•	100080	E-2	K-d;	1	<b>-</b>	100118	8-6	3-6	R20L R205	:
			D-6		Q203	:	100081	B-2	H-5	9119	:	100060 100080	8-2 F-2	J-41 J-21	VRLO1	Diode, Zener	100116	5-0	5=0	9206	
11204	IC.Hex.Inv.	100084	G-2	G-6	9204 9205	. :	100080	G-3	H-7	QL50		100081	F-2	K-L	C200	Capacitor.	100178-103	D-6	F-6	R207	•
			C-5		Ç206		100081	G-3	H-7	0152	•	100113	F-2	H-L	C201	-	100178-103	D-6 B-5	F-6	R206 R209	:
			D-5		Q207 Q208	:	100125	G+2	F-7	Q453		100173	F-2	H-3	C2O2		100078-104	B-5	F-6	3210	-
			E-2		2209		100080	E-2	J-5	0.55	•	100173	F-2	J-3	C20L	101ps	100070-106	D-5	F-6	R211	•
			F+6	1	9210	•	100125	F-1	J-5 F-6	CR200	Diode, Signal	100091	A-2	F-5	C20L	12 ips	100070-106	D-5	F-6 F-6	R212 R213	
U205	IC.Hex.Inv.	100084	D-2	J-6	Q211 Q212	:	100080	E-6	F-6	CR201	Diode, Signal	100091	A-2	0-5	C204	* 25ips	100136-155	D-5	F-6	R214	•
			E-5		1 1				1	CR202	: :	100091	B+2	H-5	C20L	* 37gips * 45ips	100136-155	D-5 D-5	F-6 F-6	R215 R216	:
i			E-6	+	2401	Transistor.	100080	A-6	B-6	CR203	: :	100091	G-2 G-2	G-7 F-7	C204	45159	100073-331	D-3	H-0	R217	
II206	IC. Dasd.2 In.	100085	B-3	F-6	QL02	-	100081	à-5	C-6	CR205		100091	G-2	G-7	C206	2	100070-106	A-2	û-5	R218	-
			B-5		Ch Oh	•	100081	B-5	C-6	CR206		100091	G-2	F-7	C207	:	100070-106	G-6 G-3	E-7 H-7	R219	:
11207	   TO Town - 3 To	100107	D-6	G-6	QL05	:	100081	B-5	C-6 B-5	CR207	• : :	100091	C-6	E-6 F-6	C208 C209		100070-106	C-3	J-6	R221	
0201	IC.Trip.) In.	100151	B-7		0407		100080	C-5	A-6	CR209	- •	100091	C-6	E-7	C210	•	100070-106		K-5 J-7	R222	•
0298	IC.Quad.2 In.	100085	C-3	<b>3–6</b>	GF08	•	100081	C-5	A-6	CR210 CR211	Rectifier Signal.	100127	G-Li C-6	J-5 F-6	C211		100070-106		E-6	R223	:
			C-4		QL09		100081	C-5	1 4-6	Custi	- Signal.	100051		120	C213	-	100070-106	C6	F-6	3225	-
			0-3		3,11	•	100060	D-5	4-5	CRUO1	Diode, Signal.	100091	A-5	D-6	CSIT	:	100070-106	B-6 C-6	F-7	B226	:
0209	IC.Triple.3 In.	100107	C-b	H-6	Oh13		100080	D-5 E-5	2-5 C-L	CRLO2 CRLO3		100091	A-5	D-6 E-6	C215 C216		100073-102	F-6	J-5	R228	
U210	IC.Dual F/F.	100088	C-3	H-6	9515		100080	E-5	B-5	CBLOL		100091	4-6	B-6	C217	:	100073-102	E-3 E-3	H-6	R229	:
		200000	D-3		0,15	:	100080	F-5	C-4.	CRLO5 CRLO6	: :	100091	B-6 B-5	E-5 C-6	C218 C219	Capacitor.	100073-222 100078-104		0-5	R230 R231	
0511	IC.Dual F/F.	100088	C-3	J-6	Qu16		100081	7-5	C-L	CRLO7		100091	B-5	B-5				1		3232	•
0212	IC.Quad.2 In.	100085	B-7	J-6	0.18	•	100158	F-5	B-4	C81108		100091	B-5	B-5	ChOl	Capacitor.	100136-155	A-2	E-4	R233	101pe
			D-3	1	OP 50	:	100173	F-5	C-3 B-3	CRLO9	: :	100091 100091	C-5	B-6	CF03		100070-106		E-L	R234	12ipe
			G-6	•	01.21		100080	F-L	C-6	CRL11		100091	C-6	B-6	ChOL	•	100136-155	A-2	£-4; B-6	R234	1510
U213	IC.Quad.2 In.	100085	C-5	H-6	QL22	•	100080	1-1	C-6	CRL12	: :	100091	G-5 B-4	B-6 C-5	C1,05		100136-155	D-5 E-6	B-4	R234 R234	37.51;
			D-4 D-5		QL23	:	100080	B-4 B-4	C-5	CRL13	: :	100091	E-4	G-L	CL07	•	100073-502	E-5	3-4	B234	151ps
0214	IC.Triple.3 In.	100107	C-7	G-6	0425	•	100080	B-4	C-5	CRI-15	: :	100091	E-4	H-4	C1-08	:	100136-155	F-5	B-4	R235	Resistor
			D-2 D-h		QL26 QL27	:	100080 100081	D-da E-da	F-5	CRL16	: :	100091	E-4	F-L C-5	Ch09		100078-103	A-4	C-6	9237	:
U215	IC.Triple.3 In.	100107	D-3	G-6	0128	•	100080	E-la	H-L	CRL18		100091	A-3	C-4	CL11	•	100135-476	B-4	C-5	R238	
- 1			D-4	1	0429	:	100080	B-4	G-ts F-ts	CBL20	: :	100091	A-3	C-5	Ch12 Ch13	:	100128-174	54	G-L	R239 R240	:
0216	IC.Quad.2 In.	100086	E-5	K-6	QL30 QL31	:	100080 100081	7-4	H-h	CR420	: :	100091	A-3	D-6	CPTP	•	100136-155	F-L	F-4	R2L1	
- 1			G-7		QL32	•	100113	P-4	F-4	CR1,22		100091	A-3	D-5	CL15	*	100136-155	F-3	C-4	R242	:
0217	IC.Quad.2 In.	100086	4-6 G-6	J-6	GF33	:	100173	File	F-3	CRL23	: :	100091	C-2	D-5	Ch16 Ch17	Missing Capacitor.	100135-476	A-3	C-L	R2L3	Missing.
ì			G-7	1	04.35	•	100173	F-h	G-3	CR1,25		100091	B-3	D-5	Cl:18		200135-476	C-1	J-4	R245	Resistor
0218	IC.Op.Amplifier	100109	B-6	F-7	0436	Transistor.	100080	A-3	C-F	CB\$126	Diode, Signal.	100091	B-3	D-5	CL19	•	100128-474	D-2	3-4	R2L6 R2L7	:
- 1	i		í			ı	·	ŧ	1	•	1		1	1	•	1	•		•	· neut	!
		1	7		T		100	1		T	COMPONENT	WCP	7 7	ONE	REF	COMPONENT	I WCP	ZON	<u> </u>		
DES	COMPONENT	PART NO.	SCHEM	ASSY	DES	COMPONENT TYPE	PART NO.	SCHEM		REF.	COMPONENT	PART NO.	SCHEM		DES.	TIPE	PART NO.	SCHEM	ASSY		
RI459	Resistor 270K	100156-27	+	C-5	R506	Resistor 22K	100156-223	D-2	H-4	R2L8	Res. 10ips h7	100068-470		P-5	B1 17	2-1-1-2-2	200256 221	100	- ·		
RL60	• 33K	100156-33	3 B-4	C-5	R507	* 1 Meg	100156-105	D-2	H-L	R248	1231ps 47	100068-470	G-3	F-5	RL17	Resistor 300K	100156-304	C-5	B-6 3-6		
RL61 RL62		100156-10		C-5	R508 R509	10K Res_10ips 1.5M	100156-163	D-2	D-7	R258	181pe 47	100068-li70	0-3	F-5	RL19	3.98	100156-392	C-5	B-5		
				D-7				D-2		R248	* 25ips 47		G-3	F-5	P420		100156-103	C-6	B-6		

REI	1 000	ONENT	. 7	WCP	20		REF	COMPONE		WCP	201		REF.	COMPONEN	7	WCP	ZO	ONE.	REF	COMPONENT	MCF	ZON	<u> </u>
DES		PE.	'i		SCHEM	ASSY	DES	TYPE			SCHEM		DES.	TIPE		PART NO.	SCHEM		DES.	TYPE	PART NO.	SCHEM	ASSY
<u> </u>			-		-	1	+						1	+		<del></del>		+	<del> </del>	<del> </del>	<del> </del>	-	-
Rig			770K	100156-274		C-5	R506	Resistor		100156-223	D-2	. H-4	R248	Res. 101ps	47	100068-470	G-3	F-5	RL17	Resistor 300K	100156-304	C-5	B-6
Ru			33K	100156-333		C-5	R50?	1		100156-105	D-2	H-4	R248	12212	47	100068-470	G-3	F-5	R418	2 ZX	1100156-202	1 C-5	3-6
RL			O K	100156-103		C-5	R508			100156-163		D_7	R21,8	* 181pe		100068-h70	0-3	F-5	R419	3.9%	100156-392	C-5	B-5
Risc			20K	100163-203		D-7	R509			100156-155	D-2	J-4	R248	" 25ipe		100068-470	G-3	F-5	R420	* 10K	100156-103	C-6	B-6
Rh(		_	2K	100156-202		D-6	R509	1291pe		100156-155	D-2	J-b	R21.8	37 1 pe		100068-170	G-3	F-5	R421	Res.10ips 33K	100156-333	C-5	A-6
Ri <sub>s</sub> é Ri <sub>s</sub> é			.1K	100156-512		F-5 C-7	B509			100156-155	D-2	J-b	R248	151pe		100068-470	G-3	F-5	Pb 21	* 12 ips 27K	100156-273	C-5	A-6
34.6			100	100156-684		6-4	R509	251ps	4.00	100156-155		1-4	R249	Resistor	560	100156-561	0-3	6-7	R421	18ips 18K	100156-183	C-5	A-6
Rha		ipe 6		100156-684		5	R509			100156-684		1-	R250	1 :	560	100156-561	G-3	H-7	RL21	251ps 15K	100156-153	C-5	A-6
Rho		ipe 6		100156-684		0-1	1 1,507	451ps		100156-684	D-2	3-6	R251 R252	1 :	430 430	100156-431	G-2	F-?	Rh21 Rh21	3731ps 10K	100156-103	C-5	1-6
Ruc		ips 6		100156-684		G-L	R510	Resis tor	150	100156-151	D-2	J-6	R251	1 :	5-1K		G-2	F-7	RL22	Resistor 10K			A-6
RL		ips 3		100156-304		G-1	R511		390K	100156-394	D-2	1-5	R254		5.1K		0-2	F-7	RL23	10K	100163-103	C-5	B-7
Rho		ips 3		100156-30h		0-4	R512		390K	100156-396	D-2	J-5	B255		100	100156-101	G-3	G-7	Rh2h	5.1K	100156-512	C-6	A-6
1.7	1 ~					1 7	8513	•	11	100156-102		J-5	R256		100	100156-101	G-3	G-7	RL 25	" 5.1K	100156-512	C-5	A-6
Rije	7 - 10	tpe 1	150	100156-151	D-la	0-4	R511	j •	33%	100156-333		1-5	B257		100	100156-101	0-2	7-7	RL 26	10K	100163-103	C-5	A-7
RLC		ips 1		100156-151		G-da	R515		1K	100156-102	D-3	F-5	B258		100	100156-101	G-2	F-7	RL27		100156-101	D-5	A-5
Risc		ipe l		100156-151		0-k	R516		33X	100156-333	2-3	0-5	R259		5.1K	100156-512	B-7	J-7	BL28		100156-512	D-5	B-L
I RL		1pe 1	150	100156-151		G-4	R517	•	300K	100156-304	E-2	X-k	R260	•	2.7	100156-227	B6	F-7	RL29		100156-432	D-6	B-5
TO A		1pe		100156-103		G-b	R518	i •	2K ;	100156-102		Jels	R261		2.7	100156-227	B-6	E-7	RL 30	" 12K	100156-123	D-6	B-5
Black	7 " 15	ips l	150	100156-151	D-b	G-b	R519		200	100156-201	E-2	July	R262			100156-512	1-5	0-7	34.31	Res.101ps 120X		D-5	B-5
				200256 201	.,		R520		200 '	100156-201	E-2	K-5	R263			100156-512	A-3	F-6	Rb 31	* 12 ips 100K		D-5	B-5
Rh C			90K	100156-39L		G-5	R521		27K	100156-273		. J-b	R264			100156-512	E-3	H-6	R431	181ps 68K		D-5	B-5
RL			90K	100156-394		G-5	R522 R523	; :	TK	100156-102		H-F	R265	1 :		100156-222	E-3	11-6	Rh31	251ps 51K		D-5	B-5
Rh			DOOK I	100156-30h		H-h	R524		390K	100156-394		H-6	R266 R267	1 :		100156-362	E-3 D-2	H-6	RL31 RL31		100156-333	D-5	8-5
RL			"IK	100156-102		F-L	R525		200	100156-201		1-4	8268	Res. 10ips		100156-751	D-2	K-6	10,01	- apips 2/k	100150-275	D-5	B-5
RL		2	00	100156-201		F-L	R526		200	100156-201		K-L	3268	121120		100156-751	D-2	X-6	Rh 32	* 101pe 12K	200156-122	D-5	B-5
R4.7	<u> </u>	2	00	100156-201	E-4	H-5	R527	•	2K	100156-102	F-2	J-1	3268	181ps		100156-751	D-2	E-6	RL32	* 1251ps 12K		0-5	B-5
RL7			27K	100156-273	E-3	P-le	R528		100	100156-101		H-L	R268	25ips		100156-751	D-2	K-6	RL 32	" 18ips 13K		0-5	B-5
347		3	90K	100156-394		H-5	R529	•	100	100156-101	F-2	J-b	R268	" 3791pe		100156-751	D-2	¥-6	Rb 32	* 251ps 13K		D-5	8-5
RL.			18	100156-102		F-4	R530	Hissing.				;	R268	* h51pe	750	100156-751	D-2	K-6	RL32	* 37 ips 15K	100156-153	D-5	B-5
RL7		_	2.6	100156-102		F-b	R531	Resistor	22K	100156-223	D-4	P-b	.9269	Resistor	220	100156-221	D-1	J-6	RL 32	451ps 15K	100156-153	0-5	8-5
24.7			00	100156-201	F-4	F-4	8532	•	100K	100156-106	E-6	B-4	R270			100156-152	E-2	J-5	ļ	ļ			ł
RLS RLS			1X	100156-201	F-4. F-3	H-b G-b	R533		510	100156-511	E-5	A-5	R271	•	47	100068-470	E-1	J-5	RL 33	Resistor 100K	100156-104	E-6	8-5
RLS		,	00	100156-101	7-1	F-li	R534 R535		510 34	100156-511	E-5	A-5	8272	1 :		100156-512	F-1	H-5	肚头	470	100068-471	0-6	A-5
RLE				100156-101	r-3	G-A	R536	Res.101ps		100156-335	A-3 E-4	Hada	R273	1 :		100156-221	0-6	G-5 F-6	RL35 RL36		100068-471	0-6	A-4
RL S				1001,0101	,	1	R536	123105		100156-335	E-L	11-1	R275			100156-433	D-6	E-6	RL 37	470	100068-471 100068-471	F-6	A-4
B6,8			38	100156-102	A-k	C-5	R536	181ps	1. 11	100156-335	E-4		R276	• •		100156-103	E-6	F-6	RL38	100	100163-103	E-5	C-7
Rt. 6	6 *		111	100156-113	4-3	C-b	R536			100156-335	E-4		R277			100156-10h	E-6	F-6	RL39	3.9K	100156-392	F-6	C-L
Ph. S			20K	100156-203		C-L	1					,	B278	-		100156-102	E-6	F-6	RILLO	100	100156-101	7-5	B-L
RLS				100156-113		C-b		ŀ	- 1				R279	-		100156-512	G-7	J-7	RLL		100156-392	F-5	B-5
R46				100156-101		C-4				:			1	l			1	ł	RI <sub>1</sub> I <sub>1</sub> 2		100156-361	7-6	CŪ
RL9		3		100156-392	A-3	D-6			- 1	1			RLO1	Resistor		100156-102		D-6	Risk 3	* 100	100156-101	F-5	0-4
1845			10K	100156-102		D-5	[		- 1				RL02			100156-102	A-5	0-6	ALLLL		100156-101	F-5	C-la
BLS			2K	100156-222		D-5	1		- 1				RL03		108	100156-103	A-5	C-6	RLL15		100156-101	F-5	B-L
MAS		•	18	100156-102		D-5	1		- 1				RLOS	1 :	108	100156-103	4-5	C-6	Bhh6		100156-361	F-5	B-4,
RLS				100156-302	C-1	D-1			i				RLO6				A-5	C-6	Right 7		100156-101	F-5	B-4
REAS		,		100068-151	¢-1	D-b	1		!				RL07	1 .		100156-512	A-6	B-6	Phi b		100156-561 100156-102	A-1	D-6 C-6
RL9		-	ix	100156-102		24	1		- 1	,			RLOS			100156-302	A-6	8-6	Rh50		100156-682	A	c-6
24,9		3		100156-392		D-5	1						RLO9	i -		100156-512	1-6	B-6	R451		100156-104	A-1	C-5
R49				100156-392		D-5	l i		ı				RL10			100156-301	A-6	B-6	RL52		100156-103	4-4	C~6
R50			39K	100156-393		الما	1						Ri.11			100163-502	A-6	B-7	R453		100156-473	A-4	C-5
R50				100156-102		D-4	1		!				Rb12	•	4.7X	100156-472	A-6	C-6	RL54		100156-103	B-4	c-ś
RSC		3	30	100068-331	C-3	D-4	1 1						RL13			100156-512	B5	C-6	RL55		100156-101	B-la	C-5
RS0			20K	100156-203	D-2 D-2	D-7	l '		- 1				Rhll			100156-512	B-5	8-5	RL56		100156-101	B-4	C-5
RSO		•		100156-512		D-6							RL15			100163-502	B-6	B-7	RL57	Missing			
,,00	1	,		2000012	,_,	4->	ı						RL16		4.7K	100156-472	B6	C-6	R458	Resistor 3K	100156-302	B-4	C-5

7	1)	MATER	IAL LIST		ML 200347 - 0000	1	1)
D#A4	ASSY. DATA ELECT	rnonics	MODEL NO.	15	DATE 1/5/71 SHEET 1 OF 10	URA. Titt	ANSY, DATA EN
NO.	DRAWING TIT	LE	D+G. NO.	NO. REO	REMARKS ON CKT. DESIGJ	ITEM NO.	DRAWING
1	Board, Processed.		200254	1		51	Resistor, 1%, av.
٠,	Bracket, Support.		2004,62-001	1		52	Resistor, " "
ſ	Bracket, Support.		200162-002	1		53	Resistor. 5%. "
<b>4</b>			İ		1	1 🗀	
5	I.C.Hex. Inverter.		100084	3	U1.2.29.		
6	I.C.Quad.2 Input Nam	id.	100085	1	U31.	54	Serietor. 5%. jw.
7	I.C.Quad.2 Input Pow	er.	100086	5	U23.24.25.26.30.	55	Resistor. " "
8	I.C.10 Input Namd.		100087	1	U27.	56	Resistor, " ."
ッ	I.C.Dual Flip-Flop.		100088	5	U18.19.20.21.22.	57	Resistor. " "
10	I.C.Monostable.		100090	1	U28.	58	Resistor. " "
11	I.C.Dual Flip-Flop.		190095	5	U3.4.5.6.7.	59	Resistor. 11. 4w.
12	I.C.Operational Ampl	ifier.	100167.	10	U8.9.10.11.12.13.14.	60	Resistor, 5%. "
					U15.16.17.	61	Resistor. " "
13						ω2	Resistor. 1%. "
ı),	Transistor. MPN.	2NI,123	100080	50	Q2.3.4.6.7. Q103-903.	63	<u> </u>
•					\$104-904. Q106-906.	64	Resistor. 5%. 4w.
					0107-907. 0108-908.	65	Resistor. " "
15	Transistor. PNP.	2N4125	100081	29	4.5. 9201-991.	66	
					J102-902. Q105-905.	67	Wire, Insulated.
16						68	
17	Diode, Signal.	1N914	100091	117	CR101-901. CR103-903.	69	Artwork, Master.
					CR105-905. CR106-906.	70.	Specification, Te
_					CR107-907. CR108-908.	71	Procedure, Test.
_					CR109-909. CR110-910.	72	
					CR111-911. CR112-912.	73	Connector, Head.
					CR113-913.CR114-914. CR115-915.	74	Pin, Connector.
18	Capacitor, Ceramic.	10pf.	200073-100	9	C107-907.	75	Connector.
19	Capacitor, Mica.	68pf.	100243-68	1	CB.	76	Connector.
20	Capacitor, Mylar.	.9015uf	100165-152	1	c6.	77	Pin, Connector.
21	Capacitor, Polyfilm.	_0015uf	100225-152	1.1	c7.	78	Pin, Connector.
22	Capacitor, Polyfilm.	.47uf	100128-474	1	C1.	79	120 0.33
ľ	`	لــــــــــــــــــــــــــــــــــــــ	•				Strap, Cable.
J.	ASSY. DATA ELECT	HONICS	AL LIST	=	ML 200317 - 0000	1	ASSY. DATA EL
TITL	E PWE, BASIC SOARD		·		DATE 4/8/71 SHEET 2 OF 10	l	PWH. AASIC DO
NO.	Capacitor, Ceramic		DWG. NO.	NO. REQ.		HO.	DRAWING
24	<del></del>		100157-332	1	C4.	81	<del> </del>
25 26	Capacitor, Polyfilm.		300005-472	9	C106-906.	83	<del> </del>
_	Capacitor, Ceramic.	820pf	<del>                                     </del>	<del>}</del>	C106-908.	<b> </b>	Samet Par Paris
27	Capacitor, Polyfilm.	.01uf	100188-103	9	C103-903.	84	Screw, Pan Head.
28	Consolten Tent-2	7 5 6	200126 255	+,-	Cla	85	Screw, Pan Head.
29	Capacitor, Tantalum.		100136-155	1	CL1.	86	Washer, Int. Too
30	Capacitor, "	10uf	100070-106	33	.2.3.9.10.11.12.13.11.15.	99	Westen Stat
	ļ		<del> </del>	<del> </del>	C16.17.18.19. 21.22.23.24.	88	Washer, Fint.

75 100156-750 9 R131-931.

5K 100069-502 9

20K 100069-203 1

91 100156-910 1

2.7 100156-2R7 2

240 100156-241 19

309 100155-240 1

511 100155-261 1 RIO.

634 100155-270 1 R12.

1x 100155-289 1 R13.

180 100156-181 1 R38.

1K 100064-102 1 R14.

1K 100156-102 3 R8.2h.3h.

33

32 Resistor. 5%. 1w.

M. Resistor,

35 Resistor. 5%. 2w.

36 Resistor, 5%, 4w.

37 Resistor. " "

38 Resistor. " "

39 Resistor. 15. "

40 Resistor. 5%. "

41 Resistor. 5%. iw.

42 Resistor. 15. "

45 Resistor, 5%, tw.

46 Resistor. 5%. iw.

47 Resistor. 5%. jw.

48 Resistor. \* jw.

esistor. " "

Resistor. " "

33 Resistyr, Variable.

C25.26.27.28.29.30.31.32.33. C34.35.36.37.38.39.40.

R23. R105-905. R106-906.

R111-911.

R28.

R39.

R11.

1.5% 100156-152 45 R123-923. R103-903. R104-904.

R102-902.

220 100156-221 13 R1.4.15.17. R101-901.

330 100156-331 15 R2.5.9.16.18. .ho.

470 100156-471 11 R22.37.R121-921.

RL1.L3.

60	Resistor, 5%, " 12K	100156-123	18	R117-917. R117-919.
61	Resistor. " # 27K	100156-273	9	R109-909.
62	Resistor. 15. " 34.9K	100155-437	9	R112-912.
63				
64	desistor. 5%. 4w. 100K	100156-104	18	R12L-92h. R127-927.
65	Resistor. " " Mag.	100156-105	9	3122-922.
66				
67	Wire, Insulated.	100053-022	A/R	
68				
69	Artwork, Master.	200253	Ref.	
70.	Specification, Test.	200436	Ref.	
71	Procedure, Test. Test Station	<del></del>	Ref.	
72	110000016, 1630 1630 50001511	2001.50		
73	Connector, Head.	100137	1	J2.
		100096		••••
74	Pin, Connector. Male.		53	11
75	Connector.	100010-004	1	Jl <sub>4</sub> .
76	Connector.	100010-009	1	P7.
77	Pin, Connector.	100021-005	5	<u> </u>
78	Pin, Connector.	100021-003	-4	
79		100001 000		
60	Strap, Cable.	100031-003	1	
ı	MATERI MATERI			VIL 200347 - 000
DP A PHI	ASSY. DATA ELECTROMICS PROB. MASIC COARD.		<del>, ,</del>	DATE 4/8/71 SHEET 4
	ASSY. DATA ELECTROMICS	MODEL NO D#G, NO.	1 <b>4</b> NO. REQ.	
TEM NO.	ASSY. DATA ELECTROMICS PROB. MASIC COARD.		<del>, ,</del>	DATE 4/8/71 SHEET 4
TEM NO. E1	ASSY. DATA ELECTROMICS PROB. MASIC COARD.		<del>, ,</del>	DATE 4/8/71 SHEET 4
TEM NO. E1	ASSY. DATA ELECTROMICS PROB. MASIC COARD.		<del>, ,</del>	DATE 4/8/72 SMEET 4
81 82	ASSY. DATA ELECTROMICS PROB. MASIC COARD.		<del>, ,</del>	DATE 4/8/71 SHEET 4
TEM NO. 21 22 33	ASSY. DATA SLECTHOMICS FROM HASIC TOARD.  DRAWING TITLE	DWG. NO.	NO. REQ.	DATE 4/8/72 SHEET 4  REMARKS ON CKT. DE  4-40 x 3/8"  4-40 x 5/8"
81 82 83 84 85	ASSY. DATA SLECTHOMICS FROM HASIC TOARD.  DRAWING TITLE  Screw, Pan Head.	D#G, NO.	NO. REQ.	DATE 4/8/72 SHEET 4  REMARKS ON CKT. DE  L-40 x 3/8"
81 82 83 84 85	ASSY. DATA SLECTHOMICS FROM HASIC TOARD.  DRAWING TITLE  Screw, Pan Head.  Screw, Pan Head.	100036-206 100036-210	NO. REQ.	DATE 4/8/72 SHEET 4  REMARKS ON CKT. DE  4-40 x 3/8"  4-40 x 5/8"
81 82 83 84 85 86	ASSY. DATA SLECTHOMICS FROM HASIC TOARD.  DRAWING TITLE  Screw, Pan Head.  Screw, Pan Head.	100036-206 100036-210	NO. REQ.	DATE 4/8/72 SHEET 4  REMARKS ON CKT. DE  4-40 x 3/8"  4-40 x 5/8"
81 82 83 84 85 86 67	ASSY. DATA SLECTHOMICS FIGH. MUSIC MODEL.  DRAWING TITLE  Screw, Pan Head. Screw, Pan Head. Washer, Int. Tonth Lock.	13036-206 13036-219 13059-200	3 1	DATE 4/8/71 SHEET 4  REMARKS ON CKT. DE  L-10 x 3/8"  L-10 x 5/8"  Posl.
81 82 83 84 85 86 57 88	ASSY. DATA SLECTHOMICS FROM. MUSIC MODEL.  DRAWING TITLE  Screw, Pan Head. Screw, Pan Head. Washer, Int. Tooth Look.  Washer, Fint.	170936-206 170936-219 170957-299	3 1 4	DATE 4/8/71 SHEET 4  REMARKS ON CKT. DE  L-10 x 3/8"  L-10 x 5/8"  Posl.
81 82 83 84 85 86 57 88 89 90	ASSY. DATA SHEOTHORICS FROM HOSIC MORRIS  DRAWING TITLE  Screw, Pan Head. Screw, Fan Head. Waster, Int. Tonth Look.  Waster, Fint. Waster, Flat Mylon.	10036-206 10036-210 10036-210 100067-200 110067-200	3 1 4 !.	DATE 4/8/72 SHEET 4  REMARKS ON CKT. DE  L-LIO x 3/8"  L-LIO x 5/8"  Posl
81 82 83 84 85 86 57 88	ASSY. DATA SHEOTHORICS FROM HOSIC MORRIS  DRAWING TITLE  Screw, Pan Head. Screw, Fan Head. Waster, Int. Tonth Look.  Waster, Fint. Waster, Flat Mylon.	10036-206 10036-210 10036-210 100067-200 110067-200	3 1 4 !.	DATE 4/8/72 SHEET 4  REMARKS ON CKT. DE  L-LIO x 3/8"  L-LIO x 5/8"  Posl
81 82 83 84 85 86 57 88	ASSY. DATA SHEOTHORICS FROM HOSIC MORRIS  DRAWING TITLE  Screw, Pan Head. Screw, Fan Head. Waster, Int. Tonth Look.  Waster, Fint. Waster, Flat Mylon.	10036-206 10036-210 10036-210 100067-200 110067-200	3 1 4 !.	DATE 4/8/72 SHEET 4  REMARKS ON CKT. DE  L-LIO x 3/8"  L-LIO x 5/8"  Posl
81 82 83 84 85 86 57 88	ASSY. DATA SHEOTHORICS FROM HOSIC MORRIS  DRAWING TITLE  Screw, Pan Head. Screw, Fan Head. Waster, Int. Tonth Look.  Waster, Fint. Waster, Flat Mylon.	10036-206 10036-210 10036-210 100067-200 110067-200	3 1 4 !.	DATE 4/8/72 SHEET 4  REMARKS ON CKT. DI  L-10 x 3/8"  L-10 x 5/8"  Posl
81 82 83 84 85 86 17 88	ASSY. DATA SHEOTHORICS FROM HOSIC MORRIS  DRAWING TITLE  Screw, Pan Head. Screw, Fan Head. Waster, Int. Tonth Look.  Waster, Fint. Waster, Flat Mylon.	10036-206 10036-210 10036-210 100067-200 110067-200	3 1 4 !.	DATE 4/8/72 SHEET 4  REMARKS ON CKT. DE  L-LIO x 3/8"  L-LIO x 5/8"  Posl
81 82 83 84 85 86 57 88	ASSY. DATA SHEOTHORICS FROM HOSIC MORRIS  DRAWING TITLE  Screw, Pan Head. Screw, Fan Head. Waster, Int. Tonth Look.  Waster, Fint. Waster, Flat Mylon.	10036-206 10036-210 10036-210 100067-200 110067-200	3 1 4 !.	DATE 4/8/72 SHEET 4  REMARKS ON CKT. DI  L-10 x 3/8"  L-10 x 5/8"  Posl
81 82 83 84 85 86 7 88 88	ASSY. DATA SHEOTHORICS FROM HOSIC MORRIS  DRAWING TITLE  Screw, Pan Head. Screw, Fan Head. Waster, Int. Tonth Look.  Waster, Fint. Waster, Flat Mylon.	10036-206 10036-210 10036-210 100067-200 110067-200	3 1 4 !.	DATE 4/8/72 SHEET 4  REMARKS ON CKT. DI  L-10 x 3/8"  L-10 x 5/8"  Posl
81 82 83 84 85 86 57 88	ASSY. DATA SHEOTHORICS FROM HOSIC MORRIS  DRAWING TITLE  Screw, Pan Head. Screw, Fan Head. Waster, Int. Tonth Look.  Waster, Fint. Waster, Flat Mylon.	10036-206 10036-210 10036-210 100067-200 110067-200	3 1 4 !.	DATE 4/8/72 SHEET 4  REMARKS ON CKT. DI  L-10 x 3/8"  L-10 x 5/8"  Posl
81 81 82 83 84 85 86 87	ASSY. DATA SHEOTHORICS FROM HOSIC MORRIS  DRAWING TITLE  Screw, Pan Head. Screw, Fan Head. Waster, Int. Tonth Look.  Waster, Fint. Waster, Flat Mylon.	10036-206 10036-210 10036-210 100067-200 110067-200	3 1 4 !.	DATE 4/8/72 SHEET 4  REMARKS ON CKT. DI  L-10 x 3/8"  L-10 x 5/8"  Posl
81 82 83 84 85 86 7 88 88	ASSY. DATA SHEOTHORICS FROM HOSIC MORRIS  DRAWING TITLE  Screw, Pan Head. Screw, Fan Head. Waster, Int. Tonth Look.  Waster, Fint. Waster, Flat Mylon.	10036-206 10036-210 10036-210 100067-200 110067-200	3 1 4 !.	DATE 4/8/72 SHEET 4  REMARKS ON CKT. DI  L-10 x 3/8"  L-10 x 5/8"  Posl
81 81 82 83 84 85 86 87	ASSY. DATA SHEOTHORICS FROM HOSIC MORRIS  DRAWING TITLE  Screw, Pan Head. Screw, Fan Head. Waster, Int. Tonth Look.  Waster, Fint. Waster, Flat Mylon.	10036-206 10036-210 10036-210 100067-200 110067-200	3 1 4 !.	DATE 4/8/72 SHEET 4  REMARKS ON CKT. DI  L-10 x 3/8"  L-10 x 5/8"  Posl
81 82 83 84 85 86 57 88	ASSY. DATA SHEOTHORICS FROM HOSIC MORRIS  DRAWING TITLE  Screw, Pan Head. Screw, Fan Head. Waster, Int. Tonth Look.  Waster, Fint. Waster, Flat Mylon.	10036-206 10036-210 10036-210 100067-200 110067-200	3 1 4 !.	DATE 4/8/72 SHEET 4  REMARKS ON CKT. DE  L-LIO x 3/8"  L-LIO x 5/8"  Posl
81 82 83 84 85 86 17 88	ASSY. DATA SHEOTHORICS FROM HOSIC MORRIS  DRAWING TITLE  Screw, Pan Head. Screw, Fan Head. Waster, Int. Tonth Look.  Waster, Fint. Waster, Flat Mylon.	10036-206 10036-210 10036-210 100067-200 110067-200	3 1 4 !.	DATE 4/8/72 SHEET 4  REMARKS ON CKT. DI  L-10 x 3/8"  L-10 x 5/8"  Posl
81 82 83 84 85 86 57 88	ASSY. DATA SHEOTHORICS FROM HOSIC MORRIS  DRAWING TITLE  Screw, Pan Head. Screw, Fan Head. Waster, Int. Tonth Look.  Waster, Fint. Waster, Flat Mylon.	10036-206 10036-210 10036-210 100067-200 110067-200	3 1 4 !.	DATE 4/8/72 SHEET 4  REMARKS ON CKT. DI  L-10 x 3/8"  L-10 x 5/8"  Posl
81 82 83 84 85 86 57 88	ASSY. DATA SHEOTHORICS FROM HOSIC MORRIS  DRAWING TITLE  Screw, Pan Head. Screw, Fan Head. Waster, Int. Tonth Look.  Waster, Fint. Waster, Flat Mylon.	10036-206 10036-210 10036-210 100067-200 110067-200	3 1 4 !.	DATE 4/8/72 SHEET 4  REMARKS ON CKT. DI  L-10 x 3/8"  L-10 x 5/8"  Posl
81 82 83 84 85 86 57 88	ASSY. DATA SHEOTHORICS FROM HOSIC MORRIS  DRAWING TITLE  Screw, Pan Head. Screw, Fan Head. Waster, Int. Tonth Look.  Waster, Fint. Waster, Flat Mylon.	10036-206 10036-210 10036-210 100067-200 110067-200	3 1 4 !.	DATE 4/8/72 SHEET 4  REMARKS ON CKT. DI  L-10 x 3/8"  L-10 x 5/8"  Posl
81 82 83 84 85 86 57 88	ASSY. DATA SHEOTHORICS FROM HOSIC MORRIS  DRAWING TITLE  Screw, Pan Head. Screw, Fan Head. Waster, Int. Tonth Look.  Waster, Fint. Waster, Flat Mylon.	10036-206 10036-210 10036-210 100067-200 110067-200	3 1 4 !.	DATE 4/8/72 SHEET 4  REMARKS ON CKT. DI  L-10 x 3/8"  L-10 x 5/8"  Posl.

MATERIAL LIST

1.62K 100155-309

1.95K 100155-317

2.7K 100156-272

1.8K 100156=132

2.2K 100156-222

4.7K 100156-472

6.8K 100156-682

8.2X 100156-822

10K 120155-385

D+G. NO.

NO. REQ.

1 R31.

9 R118-918.

9 3116-916.

9 R113-913.

12K 100156-123 18 H117-917. H117-919.

4 R25.27.29.36.

18 8111-911. 8115-915.

ANSY, DATA ELECTRONICS
PMH, PASIC BOARD.

51 Resistor. 1%. av.

DRAWING TITLE

DRAFING NO. REY

ML 2003L7 - 2000 ,

REMARKS ON CAT, DESIG.

2128-928. 2126-726.

MODEL NO. 10 DATE 4/8/71 SHEET 3 OF 10

18 H107-907. R108-908.

29 H3.6.7.19.20.21.26.30. R32,33.46.

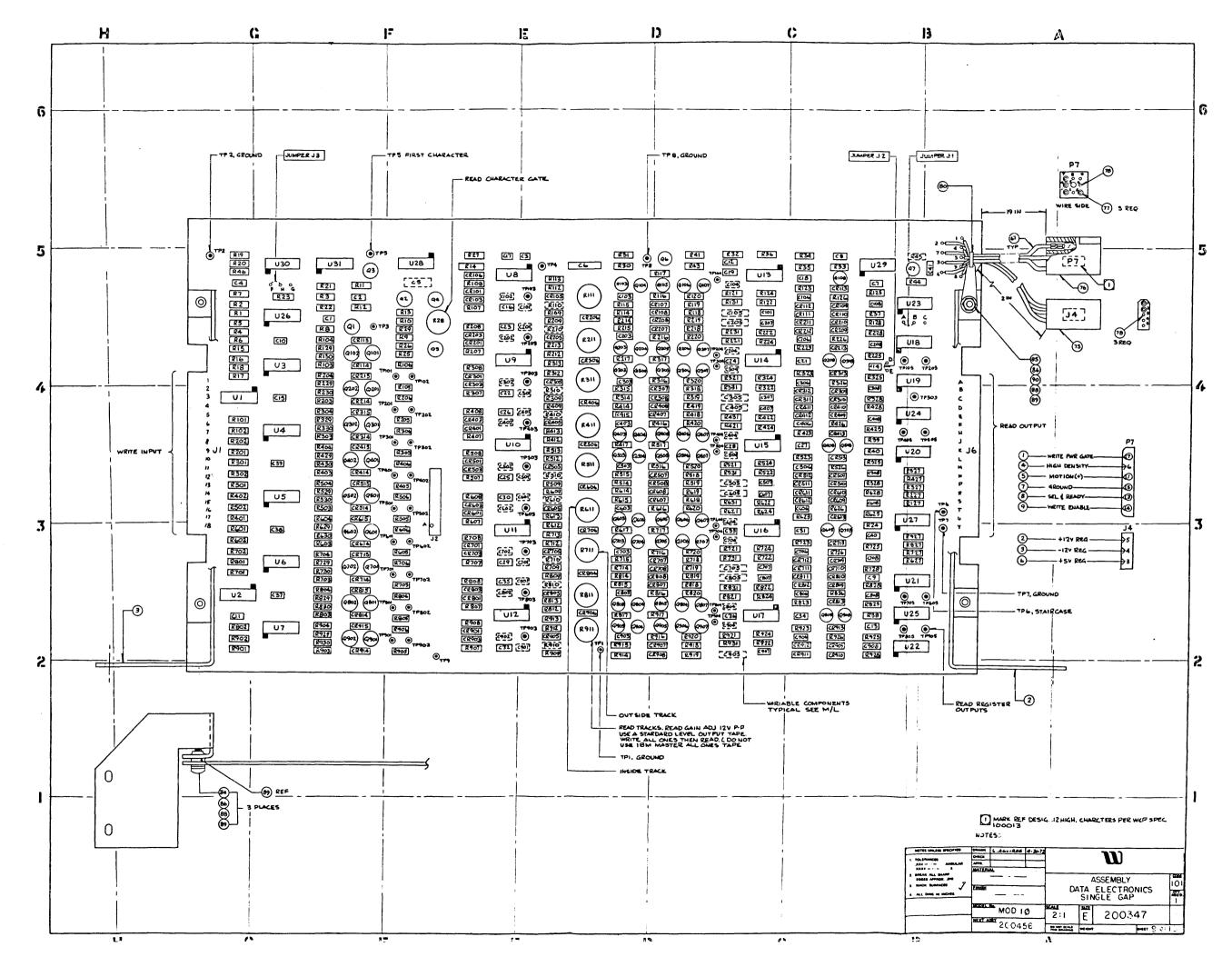
20 R35.14. R1204920. R125-925.

I	<b>J</b> U =		AL LIST	==	ML 200347 - 001
DRAMP TITLE	ASSY. DATA ELECTRON.	E/G.	_ MODEL NO .	12	CATE 4/3/71 SHEET 5 OF 10
NO.	DRAWING TITLE		5#G. NO.	NO. REQ.	REMARKS ON CKT. DESIG.
113	Capacitor, Mylar.	.Oluf	100165-103	1	C5.
114	Capacitor, Tantalum.	22uf	100168-226	9	C101-901.
115	Capacitor, Ceramic.	6€p <b>f</b>	100073-660	9	0102-902.
116	Capacitor, Polyfilm.	.Oluf	100188-103	5.	C104-904.
117	Capacitor, Mylar.	.0068uf	177165-682	9	0105-905.
118					
119					
120	Hesistor. 5%. įw.	12K	1.0156-123	1	સાદ.
121	desistor, L. ".	178K	100155-505	9	พบ-910.
122					
123					
12կ	aire, Golid Insulated.		100248-924	A/R	Jumper Jl. From A to B.
					Jumper J2. Not used.
					Jumper J3. Fr.m F t H.
$\Box$ I					
I					
$\Box$					
I		1			

						Jumper J3. Fr.m F t H.
	М					
		<u> </u>				
	М				1	
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	$\vdash$					
					L	
NO. REV.	-	١,	ATERI	AL LIST		DRAWING NO. REV.
0000		<b>\</b>     =	AICKI	AL C131	=	ML 200347 - 002
i or 10	DRAWIN	ASSY. DATA ELECTHON PWB.Type P. 25ips.	ics s/0.	_ MODEL NO	1ø	DATE 4/8/71 SHEET 6 OF 10
. DESIG.	ITEM NO.	DRAWING TITLE		D#G. NO.	NO. REQ.	REMARKS ON CKT. DESIG.
	113			100165-822	1	cs.
	7.4	Capacitor, Tantalum.	L.7uf		9	C101-901.
	115	Capacitor, Ceramic.	68pf		9	C102-972.
	116	Capacitor, Polyfilm.			9	C101-904.
	117		,0033uf	100165-332	9	0105-905.
	113					
	119					
	-	D-4-4 <b>C4</b> i	6.8K	100156-682	1	RL5.
	120	Resistor. 5%. 4w. Resistor. 15. "	90.9K	100155-477	9	R110-910.
	121	Resistor. 13.	90.74	1001))-411	-	1110-710-1
	122					<u> </u>
	123	Wire Solid In-Jahra		20021.9 221	1/2	Jumper Jl. Fr m A to P.
	124	Wire, Solid Insulated.		100248-924	A/R	
						Jumper J2, Not used.
	$\vdash$				-	Juaper J3. From F to H.
	<b> </b>					
	<u> </u>				<del></del>	
;		, 				
f					1	
:						

	<b>1</b> ] =	MATERI	AL LIST		ML	2003L7 - 003	REV
D#Amil fifti	ASSY. DATA ELECTR P.P.Type P. 373ip	ONICS s. 5/G.	MODEL NO	1/8	DATE 4/		10
ITEM NO.	DRAWING TITL	E	DWG, NO.	NO. REQ	REMA	IRKS ON CAT. DESIG.	_
113	Capacitor, Wylar.	.0047uf	120165-472	1	C5.		
114	Capacitor, Tantalum.	4.7u£	100070-475	9	0101-901.		
115	Capacitor, Ceramic.	130pf	100073-101	9	C102-902.		
116	Capacitor, Polyfilm.	.0033uf	170168+332	9	0104-904.		
117	Capacitor, Mylar.	.0022uf	100165-222	9	c105-905.		
118							
119							
120	Resiston. 5%. jw.	6°6K	100156-682	1	RL15.		
121	Resistor. 12. "	68.1K	100155-465	•	R110-910.		
122				,		-	
123							
124	Wire, Solid Insulated		10021.8-924	A/R	Jumper Jl	. From A to B.	
					Jumper J2	. Not used.	
					Jumper J3	From F to H.	
1							

T	MATERI	AL LIST	=	ML 200347 - 004
DRAWN T) [L]	ASSY. DATA ELECTRONICS PWE. Type 'P' L5ips. S/G.	_ MODEL NO	10	<u> </u>
ITEM NO.	DRAWING TITLE	DWG. NO.	NO. REQ.	REMARKS ON CKT. DESIG.
113	Capacitor, Mylar0047uf	100165-472	1	C5.
114	Capacitor, Tantalum. 4.7uf	100070-475	9	C101-901.
115	Capacitor, Ceramic. 100pf	100073-101	9	C102-9022
116	Capacitor, Polyfilm0022uf	100188-222	9	C10կ-90կ.
117	Capacitor, Mylar0018uf	100165-182	9	C105-905.
118				
119				
120	Resistor. 5%. iw. 6.8K	100156-682	1	RL5.
121	Resistor. 15. " 51.1K	100155-453	9	R110-910.
122				
123				
124	Wire, Solid Insulated.	100248-924	A/R	Jumper Jl. From A to B.
				Jumper J2. Not used. 1
				Jumper J3. From F to H.
_				
_				



Assembly, Data Electronics, Single Gap, PWB

DRAW	ASSY, DATA BLECTRONICS PWE		10	3/2/71 3
TITE	BASTE BOARD, DUAL GAP,	DWG, NO.	NO. REQ.	DATE \$2/71 SHEET 1 OF 20
===		<u> </u>	1	REMARKS ON CAT, DESIG.
1 2	Beard, Processed.	200167	2	
	Bracket, Mounting.	300010	<del>                                     </del>	
3 h	I.C.Hex. Inverter.	12008L	5	U1.2.6.9.31.
5	I.C.Quad. 2 Input Nand.	127085	6	13.4.5.6.7.15.
<u></u>	I.C.Quad. 2 Input Power.	100086	3	U26.27.28.
7	I.C.10 Input Nand.	100087	1	729
B	I.C. Dual Flip-Flop.	100088	10	U10,11,12,13,14,21.
-	<del> </del>	†	·	U22.23.2h.25.
9.	I.C.Operetional Amplifier,	100089	5	U16.17.18.19.20.
10	I.C.Manostable.	100090	1	U30.
11	<del></del>			<del>}</del>
12	Transistor, NPN. 2Nul23	100080	72	Q1.2.5.8.9.11.13.14.15.
				Q101-901. Q102-902.
				U103-903. Q105-905.
				Q106-906. Q107-907. Q109-909.
ນ	Transistor. PNP. 2Mil25	100081	14	41.6.7.10.12. Q108-908.
<b>1</b> Jı				
15	Transister, Dual NPN, TD101.	100082	9	Q104-904.
16	Transistor, PNP. MPS-U51.	100083	1	<b>ು</b> .
17				
10.	Diede, Signal. 18914.	100091	40	CRI.CRI01-901. 102-903.
				CR103-903. 104-904.
				CR105-995.
19				
20	Capacitor, Ceramic. 33pf	100073-330	9	C109-909.
21.	Capacitor, MICA 68pf	100245-680	1	C36.
22	Capacitor, CERAMIC 100pf	100073-101	9	C102-902.
B	Capacitor, * 330pf	100073-331	9	C105-905.

Oh Capacitor, Poly. .0015uf 100077-152 1 035. 25 Capacitor, Coramic. .0033uf 100073-332 9 C103-903.

MATERIAL LIST

ML 200521 - 00000 ASSI. DATA ELECTRONICS PMB.
PASIC BOARD, IVAL GAP. DATE 3/2/71/ SHEET 2 OF 20 DRAWING TITLE DWG, NO. NO. REQ. REMARKS ON CKT. DESIG. 27 Capacitor, Tantalum. 10uf. 100070-106 41 C1.2.3.4.5.6.7.9.10.11.12.13. C14.15.16.17.18.19.20.21.22.23. C2h.28.29.30.31.32.37.38.39.40. C104-904. 28 Capacitor, Tantalum. h7uf. 100135-476 1 C27. 29 30 Resistor, Variable. 50 100069-500 31 Resistor, " 5K 100069-502 9 R118-918. 32 Resistor, " 20K 100069-203 10 RL19. R104-904. 33 3h Resistor, 5%. av. 10 100156-100 9 R131-931. 35 Resistor. 15. " 61.9 100155-173 18 R121-921. R122-922. 36 Resistor. " " 75 100155-181 9 R125-925. 37 Besistor. 5%. " 120 100156-121 9 R117-917. 38 Resistor. " lw. 120 100067-121 1 R20. 39 Resistor. 1%. .w. 162 100155-213 1 R29. hO Resistor. 5%. " 220 100156-221 15 R1.3.5.7.9.51. R101-901. hl. Resistor. 2%. lw. 220 10011,2-221 10 H26. R112-912. h2 Resistor. 13. 1v. 267 100155-23h 1 R73. 43 Resistor. 5%, lw. 270 100067-271 1 R18. lik Resistor. " iw. 330 100155-331 17 R2.L.6.13.31.33.35.10. R102-902. 45 Resistor. 55. 3w. 390 100064-391 1 R28. 46 Resistor. " w. 470 100156-471 5 R15.19.40.47.52. 17 Resistor. 15 " 511 100155-261 3 38.41.72. 48 Resistor. 5% " 560 100156-561 19 R7L. 8108-908. R109-909. h9 Resister. 15 " 634 100155-270 1 R39.

2

Resister. 5%. ju.

1.2K 100156-122 37 R17.22.25.30.32.44.53.57.70.

R107-907.

R71. R103-903. R106-906.

MATERIAL LIST

ASSY. DATA ELECTRONICS PWB.
BASIC BOARD, DUAL GAP.

HO.	DRAWING TIT	LE	DWG. NO.	NO. REO.	I
5h	Resistor, 15. 4v.	1.96KA	100155-317	20	RL
55	Resistor. 5%. *	5*ff V	100156-242	33	Rì
					RI
56	Resistor. 15. iw.	3.09K n	100155-336	1	RL
57	Resistor. 5%. "	3.3Kn	100156-332	41	R2
					RI
58					
59	Resistor. 5%. 4w.	4.7Kn	100156-472	2	R3
60	Resistor. " "	5.1 <b>x</b> n	100156-512	1	R5
61	Resistor. " "	6.8Kn	100156-682	20	RL,
62	Resistor. " "	8.2Kn	100156-822	1	R2
63	Resistor. " "	10Kn	100156-103	19	RL
64					_
65	Resistor. " "	18KU	100156-183	1	R3
66	Resistor, " "	. 39Kn	100156-393	9	RI
67	Resistor. " "	68KU	100156-683	10	R3
68	Resistor. " "	100K fl	100156-104	9	R6
60	Resistor. " "	220K Ω	100156-224	9	R1
70					
71					
72					_
73	Connector, Head.	Male.	100137	2	J2.
7 <b>4</b>	Connector. 9 pin.		100247-001	:	13
75	Consector. 5 pin.		100247-005	1	ili
<b>96</b>	Pin, Male.		100098	33	Tei
77					
78					
79					_
80	Screw, Pan Head.		100036-206	6	<u>.</u> .
81.	Washer, Flat.		100047-200	6	No.
82	Washer, Int. Tooth Lo	ock.	100059-200	6	No.
83				T	

MATERIAL LIST

Ref.

DRAWING ASSY. DATA RECTRONICS PMB.
BASIC BOARD, DUAL GAP.

DRAWING NO. REV.

ITEM NO. DRAWING TITLE DWG. NO. NO. REQ. 8h Mat, Hex-1000k3-200 6 k 85 Artwork, Master. 200166

MATERIAL LIST ML 200521-00000 1/4	MATERIAL LIST ML DRAWING NO. REV.	MATERIAL LIST MI DRAWING HO. REV.	MATERIAL LIST DRAWING NO. REV.
VIL 200521-00000   A	MATERIAL LIST ML DRAFING NO. REV. 200522 OO3 A	MATERIAL LIST DRAVING NO. REV.	MATERIAL LIST ML 200521-3005 K
ASSY. DATA ELECTRONICS PAB.	ASSY, DATA RIRCTRONICS PWB.	ASSY, DATA FIRCTONICS PAB.	ASSY, DATA ELECTRONICS PWB.
TITLE BASIC BOARD, DUAL GAP, MODEL NO. 1 DATE 3/2/71 SHEET 3 OF 20	TITLE 10-12-9 IPS, TIPE P. D/QAP. MODEL NO. 10 DATE 3/2/71 SHEET 5 OF 20	ORANING 17-22.9 IPS. TIPE P. D/HAP. MOCEL NO. 10 DATE 3/2/71 SHEET 7 OF 20	ASST. DATA ELECTRONICS PMB.  ORANING 30-39.9 IPS. TIPE P. D/GAP. MODEL NO. IN DATE 3/R/71 SHEET 9 OF 20
MO. DRAWING TITLE DWG, NO. MEG. REMARKS ON CKT, DESIG.	HO. DRAWING TITLE DWG.NO. NO. REQ. REMARKS ON CKT. DESIG.	NO. DRAWING TITLE DWG. NO. REQ REMARKS ON CKT. DESIG.	HEM DRAWING TITLE DWG, NO. NO. REQ. REMARKS ON CKT. DESIG.
5h Resistor. 15. 2w. 1.96Kn 100155-317 20 R42.55.E120-920. R123-923.	116 Capacitor, Mylar015uf 100165-153 1 C34.	116 Capacitor, Poly0082ef 100077-822 1 C34.	116 Capacitor, Poly00470f 100077-472 1 C%.
55 Resistor. 5%. = 2.4% 1 100156-242 33 R11.12.14.16.21.45.	227 Capacitor, FANFILM ,00184F 100225-152 1 Ch1.		117 Capacitor, FULY
			·
R105-905.R119-919.R124-924.	118 Capacitor, Poly0033uf 100077-332 9 C101-901.	118 Capacitor, Poly0022uf 100077-222 9 C101-901.	118 Capacitor, Poly001mf 100077-102 9 C101-901.
6 Resistor. 15. tw. 3.09% n 100155-336 1 R43.	119 Capacitor, Tantalum. luf 100136-105   18   C106-906. C107-907.	119 Capacitor, Tantalum68uf 100136-684 18 C106-906, C107-907.	119 Capacitor, Tantalua33uf 100136-33k 18 C106-906. C107-907.
57 Resistor. 5%. 3.3% 100156-332 41 R24.54.56.60.75.9113-913.	120 Capacitor, Polyfilm47uf 100128-474 9 C108-908.	120 Capacitor, Polyfilm33uf 100128-33u 9 C108-908.	120 Capesitor, Polyfilm18uf 100128-18u 9 C108-908.
R114-914.R129-929.R133-933.			
	121	121	121
58	122	122	122
59 Resistor. 5%. 4. 4.7Kn 100156-472 2 RM.58.	123 Recistor. 5%. tw. 750% n 100156-754 18 R115-915. R116-916.	123 Resistor. 5%. tu. 560Kn 100156-564 18 R115-915. R116-916.	123 Resistar, 5%, 4w. 350Kn 100156-33% 18 R115-915, R116-916.
	124	<del></del>	
	<u> </u>	124	124
61 Resistor. " " 6.8Kn 100156-682 20 R46.59. R110-910. R111-911.	125	125	125
62 Resistor. " " 8.2% 1 100156-822 1 R23.	126	126	126
63 Resistor. " " 10Kn 100156-103 19 RbB.R126-926.R127-937.	127 Wire, Solid Bare. 100051-024 A/R Jumper Jl. From A to C		
~ <u> </u>	<u> </u>	127 Wire, Solid Bare. 100051-02L A/R Jumper Jl. From A to C	
64	128 Tubing, Terion. 100226-022 A/R Jumper J2. From M to M	128 Tubing, Teflon. 100226-022 A/R Jumper J2. from H to H	128 Tubing, Teflen. 100226-022 A/3 Jumper J2. From M to M
65 Resistor. " " 18Kn 100156-183 1 R36;	Jumper J3. From AA to BB	Jumper J3. From AA to BB.	Jumper J3. From AA to BB.
66 Resistor. " " 39Kn 100156-393 9 R130-930.			
			:
67 Resistor. * * 68Kn 100156-683 10 R37.R132-932.			
68 Resistor. " 100K n 100156-104 9 R61.62.63.64.65.66.67.68.69.			
69 Resistor. " " 220Kn 100156-224 9 R128-928.			
~ <u> </u>			
70			
71			
72			
73 Connector, Head. Male. 100137 2 J2. J5.		<del>                                      </del>	
74 Cangector. 9 pin. 10024, -001 1 J3			
75   Consector, 5 pin.   100267-005   1   Ju			
\$\vec{q}6   Pin, Male.   100096   33   Test Points.			
77			
78			
	<del></del>		
19			
80 Screw, Pan Head. 100036-206 6 4 - 40 x 3/8"			
81 Washer, Flat. 100047-200 6 No.4.			
82 Washer, Int. Tooth Lock. 100059-200 6 Ne.4.			
8)			1 1 1 1 1 1
83			
MATERIAL LIST AND DRAWING NO. REV.	MATERIAL LIST MI DRAWING NO. REV.	MATERIAL LIST MI DRAWING NO. REV.	MATERIAL LIST ML DRAVING NO. REV.
MATERIAL LIST ML DRAWING NO. REV.	ML 200521-001	ML 200521-004	ML 200521-006
MATERIAL LIST ML DRAWING NO. REV.	ASSY_DATA ELECTRONICS PWB.	ASSY DATA ELECTRONICS PMS.	ASST. DATA ELECTRONICS PWB.
MATERIAL LIST DRAWING MO. REV.  200522-00000  ASST. DATA RECTRONICS PMB. TITLE BASIC BOARD, DUAL GAP, MODEL NO. 10 DATE 72/11 SHEET & OF 20	DRAWING 13-16.9 IPS. TIPE P. D/DAP. MODEL NO. 15 DATE 3/2/71 SHEET 6 OF 20	DRAVING 23-29.9 IPS. TIPE P. D/OAP. HODEL NO. 19 DATE 3/2/71/ SHEET 8 OF 20	ASST. DATA ELECTRONICS FMB.  ORAWING LO-65 IPS. TYPE P. D/GAP. MODEL NO. 15 DATE \$2/71 SHEET 10 or 20
MATERIAL LIST ML DRAWING NO. REV.	ASSY_DATA ELECTRONICS PWB.	ASSY DATA ELECTRONICS PMS.	ASST. DATA ELECTRONICS PWB.
MATERIAL LIST  DRAWING MO. REV.  200521-00000  DRAWING MO. REV.  D	DRAWING 13-16.9 IPS. TIPE P. D/DAP. MODEL NO. 15 DATE 3/2/71 SHEET 6 OF 20	ASST DATA ELECTRONICS PMS.  OBANING 23-29.9 IPS. TIPE P. D/OAP.  HODEL NO. 10 DATE 3/2/71/ SHEET 8 OF 20  TITM DRAWING TITLE DHG. HO. REQ. NEWARKS ON CKT. DESIG.  116 Caparitor, Poly0082uf 100077-822 1 C3k.	ASST. DATA ELECTRONICS PMB.  ORAWING LO-15 IPS. TYPE P. D/GAP. MODEL NO. 15 DATE \$2/71 SHEET 10 or 20
MATERIAL LIST  DRAWING MO. REV.  200521-00000  DRAWING MO. REV.  D	DRAWING   13-16.9   IPS. TIFE P. D/CAP.   MODEL NO.   15   DATE \$\frac{1}{2}/71 \] SHEET   6 OF 20	ASST DATA ELECTRONICS PMS.  OBANING 23-29.9 IPS. TIPE P. D/OAP.  HODEL NO. 10 DATE 3/2/71/ SHEET 8 OF 20  TITM DRAWING TITLE DHG. HO. REQ. NEWARKS ON CKT. DESIG.  116 Caparitor, Poly0082uf 100077-822 1 C3k.	ASST. DATA ELECTRONICS FWB.  ORANING LO-45 IPS. TITE P. D/GAP. MODEL NO. 15 DATE \$2/71 SHEET 10 or 20  ITEM P. DRAWING TITLE DWG. NO. NO. NO. NO. NO. NO. CKT. DESIG.  116. Capacitor, Poly
MATERIAL LIST  MATERIAL LIST  DRAWING MO. REV.  200521-00000  DATE 73/T1 SHEET & OF 20  TITEM DRAWING TITLE DWG. NO. NO. REG. REMARKS ON CKT. DESIG.  Bh. Nut, Hex. 1000h3-200 6 Ir = h0.	DRAWING   13-16.9   IPS. TIPE P. D/DAP.   MODEL NO.   15   DATE \( \frac{1}{2}/71 \) SHEET   6 OF 20	ASST DATA ELECTRONICS PMS.  OBANING 23-29.9 IPS. TIPE P. D/OAP.  NO. DRAWING TITLE DPG. NO. REQ. NEMARKS ON CKT. DESIG.  116 Caparitor, Poly0082sf 100077-822 1 C3L.  117 Capacitor, FOLY0083sf 100275-632 1 C61.	M   200521-006
MATERIAL LIST  ML DRAWING MO. REV.  200522-00000  DRAWING MO. REV.   DRAWING   13-16.9   IPS. TIPE P. D/DAP.   MODEL NO.   15   DATE \( \frac{1}{2}/71 \) SHEET   6 OF 20	ASST DATA ELECTRONICS PMS.  OBANING 23-29.9 IPS. TIPE P. D/OAP.  NO. DRAWING TITLE DPG. NO. REQ. NEMARKS ON CKT. DESIG.  116 Caparitor, Poly0082uf 100077-822 1 C3L.  117 Capacitor, FOLY0083uf 100275-82 1 Cb1.  118 Capacitor, Poly0015uf 100077-152 9 C102-901.	M   200521-006	
MATERIAL LIST  MATERIAL LIST  DRAWING MO. REV.  200521-00000  DATE 73/T1 SHEET & OF 20  TITEM DRAWING TITLE DWG. NO. NO. REG. REMARKS ON CKT. DESIG.  Bh. Nut, Hex. 1000h3-200 6 Ir = h0.	DRAWING   13-16.9 IFS. TIFE P. D/DAP.   MODEL NO.   15   DATE \$\frac{1}{2}/71\$   SHEET   6 OF 20	ASST DATA ELECTRONICS PMS.  OBANING 23-29.9 IPS. TIPE P. D/OAP.  NO. DRAWING TITLE DPG. NO. NO. REQ. NEMARKS ON CKT. DESIG.  116 Caparitor, Poly0082uf 100077-822 1 C3h.  117 Capacitor, Poly0083uf 100077-822 1 Ch1.  118 Capacitor, Poly0015uf 100077-152 9 C102-901.  119 Capacitor, Tantalum4,7uf 100136-47h 18 C106-906, C107-907.	ASST. DATA ELECTRONICS FWB.  OBANING  INC. LO-45 IPS. TITE P. D/GAP.  MODEL NO.  DATE ¥2/71 SHEET 10 or 20  TITLE  DHG. NO. NO. NO. NO. NO. NO. NO. OKT. DESIG.  116. Capacitor, Poly
MATERIAL LIST  ML DRAWING MO. REV.  200522-00000  DRAWING MO. REV.   DRAWING   13-16.9   IPS. TIPE P. D/DAP.   MODEL NO.   15   DATE \( \frac{1}{2}/71 \) SHEET   6 OF 20	ASST DATA ELECTRONICS PMS.  OBANING 23-29.9 IPS. TIPE P. D/OAP.  NO. DRAWING TITLE DPG. NO. REQ. NEMARKS ON CKT. DESIG.  116 Caparitor, Poly0082uf 100077-822 1 C3L.  117 Capacitor, FOLY0083uf 100275-82 1 Cb1.  118 Capacitor, Poly0015uf 100077-152 9 C102-901.	N   200521-0066	
MATERIAL LIST  ML DRAWING MO. REV.  200522-00000  DRAWING MO. REV.   DRAWING   13-16.9 IFS. TIFE P. D/DAP.   MODEL NO.   15   DATE \$\frac{1}{2}/71\$   SHEET   6 OF 20	ASST DATA ELECTRONICS PMS.  OBANING 23-29.9 IPS. TIPE P. D/OAP.  NO. DRAWING TITLE D=G. HO. REQ. NEHARRS ON CRT. DESIG.  116 Caparitor, Poly0082uf 100077-822 1 C3h.  117 Capacitor, Poly0085uf 100077-822 1 Ch1.  118 Capacitor, Poly0015uf 100077-152 9 C102-901.  119 Capacitor, Tantelum47uf 100136-47h 18 C106-906, C107-907.  120 Capacitor, Polyfilm27uf 100128-27h 9 C108-908.	ASST. DATA ELECTRONICS FWB.  OBANING  INC. LO-45 IPS. TYPE P. D/GAP.  MODEL NO.  DATE ¥2/71 SHEET 10 or 20  TYPE W.  DATE ¥2/71 SHEET 10 or 20  TYPE W.  DATE ¥2/71 SHEET 10 or 20  TO 2	
MATERIAL LIST  ML DRAWING MO. REV.  200522-00000  DRAWING MO. REV.   DRAWING   13-16.9   IF. TIFE P. D/DAP.   MODEL NO.   15   DATE \$\frac{1}{2}/71\$   SHEET   6 OF 20	ASST DATA ELECTRONICS PMS.  OBANING 23-29.9 IPS. TIPE P. D/OAP.  HODEL NO. 19 DATE 3/2/71/ SHEET 8 OF 20  ITEM DATE 3/2/71/ SHEET 8	ASST. DATA ELECTRONICS FWB.  OBANING  INC. LO-45 IPS. TYPE P. D/GAP.  MODEL NO.  DATE ¥2/71 SHEET 10 or 20  TYPE W.  DATE ¥2/71 SHEET 10 or 20  TYPE W.  DATE ¥2/71 SHEET 10 or 20  TO 2	
MATERIAL LIST  ML DRAWING MO. REV.  200522-00000  DRAWING MO. REV.   DRAWING   13-16.9   IFS. TIFE P. D/OAP.   MODEL NO.   15	ASST DATA ELECTRONICS PMS.  OBAMING 23-29.9 IPS. TIPE P. D/OAP.  HOLENO. 19 DATE 3/2/71/ SHEET 8 OF 20  TITLE 23-29.9 IPS. TIPE P. D/OAP.  DATE 3/2/71/ SHEET 8 OF 20  TIPE NO. NO. REQ. No. REQ	ASST. DATA ELECTRONICS FWB.    DATE   10	
MATERIAL LIST  ML DRAWING MO. REV.  200522-00000  DRAWING MO. REV.   DRAWING   13-16.9 IFS. TIFE P. D/DAP.   MODEL NO.   15   DATE \$\frac{1}{2}/71\$   SHEET   6 OF 20	ASST DATA ELECTRONICS PMS.  TITLE 23-29.9 IPS. TITE P. D/OAP.  DATE 3/2/71/ SHEET 8 OF 20  TITLE DPG. NO. NO. REQ. NETWARKS ON CAT. DESIG.  116 Caparitor, Poly0082sf 100077-822 1 C3h.  117 Capacitor, Poly0082sf 100077-822 1 C4l.  118 Capacitor, Poly0015sf 100077-152 9 C102-901.  119 Capacitor, Tantalum1/10f 100136-17h 18 C106-906. C107-907.  120 Capacitor, Polyfilm27uf 100128-27h 9 C108-908.  121  122  123 Resister, 5%. iv. 3308.0 100156-33h 18 R115-915. R116-916.	ASST. DATA ELECTRONICS FWB.  OBANING  INC. 10-15 IPS. TIPE P. D/GAP.  MODEL NO.  DATE \$2/71 SHEET 10 OF 20  ITEM P. DRAWING TITLE  DWG. NO. NO. NO. NO. NO. NO. REAL REMARKS ON CKT. DESIG.  116. Capacitor, Poly001/1sf 100077-1/72 1 C34.  117 Capacitor, Poly0015 100225-152 1 Chl.  118 Capacitor, Poly001sf 100077-102 9 C101-901.  119 Capacitor, Tantalum22uf 100136-22u 18 C106-906. C107-907.  120 Capacitor, Polyfilm15uf 100128-154 9 C108-908.  121  122  123 Resistor. 55. 4w. 330KA 100156-33k 18 R115-915. R116-916.	
MATERIAL LIST  ML DRAWING MO. REV.  200522-00000  DRAWING MO. REV.   DRAWING   13-16.9 IFS. TIFE P. D/DAP.   NO. REO.   DATE \$\frac{1}{2}/11 \] SHEET   6 OF 20     TOLE   DRAWING TITLE   DWC. NO. NO. REO.   REMARKS ON CKT. DESIG.     116   Capacitor, Poly.   .0082sf   100077-822   1   C3h.     117   Capacitor, Foly.   .0075   1000225-152   1   Chl.     118   Capacitor, Poly.   .0033sf   100077-332   9   C101-901.     119   Capacitor, Tantalum.   .68sf   100136-68h   18   C106-906. CM07-907.     120   Capacitor, Polyfilm.   .47sf   100128-47h   9   C108-908.     121   122       123   Resistor. 5%. \frac{1}{4}w.   560Kn   100156-56h   18   R115-915. R116-916.     124	ASSY DATA ELECTRONICS PMS.  TITLE 23-29.9 IPS. TITE P. D/OAP.  DATE \$\frac{12}{171/1}\$ SHEET \$\frac{8}{9}\$ of \$\frac{20}{20}\$  TITLE 23-29.9 IPS. TITE P. D/OAP.  DATE \$\frac{12}{171/1}\$ SHEET \$\frac{8}{9}\$ of \$\frac{20}{20}\$  TITLE DHG. NO. REQ. THE MARKS ON CAT. DESIG.  116 Capacitor, Poly0082sf 100077-822 1 C3h.  117 Capacitor, Poly0015sf 100077-152 9 C102-901.  118 Capacitor, Poly0015sf 100077-152 9 C102-901.  119 Capacitor, Tantalum1,7sf 100126-17h 18 C106-906. C107-907.  120 Capacitor, Polyfilm27sf 100128-27h 9 C108-908.  121  122 Resister, 5%. *** 330EA 100156-33h 18 R115-915. R116-916.	ASST. DATA ELECTRONICS FWB.  ORANING  INTLE  ASST. DATA ELECTRONICS FWB.  INTLE  ASST. DATA ELECTRONICS FWB.  NODEL NO.  DATE ¥2/71 SHEET 10 OF 20  TYPE P. D/GAP.  NODEL NO.  NO. NO. NO. NO. NO. NO. NO. OKT. DESIG.  116. Capacitor, Poly0017uf 100077-1/72 1 C34.  117. Capacitor, Poly0015uf 100225-152 1 Chl.  118. Capacitor, Poly001f 100077-102 9 C101-901.  119. Capacitor, Tantalum22uf 100136-224 18. C106-906. C107-907.  120. Capacitor, Polyfilm15uf 100128-154 9 C108-908.  121.  122.  123. Resistor. 5%. 4w. 330KA 100156-33h 18 R115-915, R116-916.	
MATERIAL LIST  ML DRAWING MO. REV.  200522-00000  DRAWING MO. REV.   DRAWING   13-16.9 IFS. TIFE P. D/DAP.   MODEL NO.   15   DATE \$\frac{1}{2}/71\$   SHEET   6 OF 20	ASSY DATA ELECTRONICS PMS.  TITLE 23-29.9 IPS. TITE P. D/OAP.  DATE \$\frac{12}{171/1}\$ SHEET \$\frac{8}{9}\$ of \$\frac{20}{20}\$  TITLE 23-29.9 IPS. TITE P. D/OAP.  DATE \$\frac{12}{171/1}\$ SHEET \$\frac{8}{9}\$ of \$\frac{20}{20}\$  TITLE DHG. NO. REQ. THE MARKS ON CAT. DESIG.  116 Capacitor, Poly0082sf 100077-822 1 C3h.  117 Capacitor, Poly0015sf 100077-152 9 C102-901.  118 Capacitor, Poly0015sf 100077-152 9 C102-901.  119 Capacitor, Tantalum1,7sf 100126-17h 18 C106-906. C107-907.  120 Capacitor, Polyfilm27sf 100128-27h 9 C108-908.  121  122 Resister, 5%. *** 330EA 100156-33h 18 R115-915. R116-916.	ASST. DATA ELECTRONICS FWB.  ORANING  INTLE  ASST. DATA ELECTRONICS FWB.  INTLE  ASST. DATA ELECTRONICS FWB.  NODEL NO.  DATE ¥2/71 SHEET 10 OF 20  TYPE P. D/GAP.  NODEL NO.  NO. NO. NO. NO. NO. NO. NO. OKT. DESIG.  116. Capacitor, Poly0017uf 100077-1/72 1 C34.  117. Capacitor, Poly0015uf 100225-152 1 Chl.  118. Capacitor, Poly001f 100077-102 9 C101-901.  119. Capacitor, Tantalum22uf 100136-224 18. C106-906. C107-907.  120. Capacitor, Polyfilm15uf 100128-154 9 C108-908.  121.  122.  123. Resistor. 5%. 4w. 330KA 100156-33h 18 R115-915, R116-916.	
MATERIAL LIST  ML DRAWING MO. REV.  200522-00000  DRAWING MO. REV.   DRAWING   13-16.9 IFS. TIFE P. D/DAP.   MODEL NO.   15   DATE \$\frac{1}{2}/71\$   SHEET   6 OF 20	ASSY DATA ELECTRONICS PMS.  TITLE 23-29.9 IPS. TITE P. D/OAP.  DATE 3/2/71/ SHEET 8 OF 20  TITLE DHG. NO. NO. REQ. NETHARKS ON CKT. DESIG.  116 Caparitor, Poly0082sf 100077-822 1 C3h.  117 Capacitor, Poly0083sf 100077-822 1 C4h.  118 Capacitor, Poly0015sf 100077-152 9 C102-901.  119 Capacitor, Tantalum1/10f 100136-17h 18 C106-906. C107-907.  120 Capacitor, Polyfilm27uf 100128-27h 9 C108-908.  121  122  123 Resister, 5%. 3w. 330Kn 100156-33h 18 R115-915. R116-916.	ASST. DATA ELECTRONICS FWB.  OBANING  INTLE  ASST. DATA ELECTRONICS FWB.  OBANING  INTLE  DWG. NO.  NO. NO. NO. NO. NO. NO. NEO.  REMARKS ON CKT. DESIG.  116. Capacitor, Poly.  OOL/Tuf  100077-1/72  1 C34.  117 Capacitor, Poly.  OOL/Tuf  100077-1/72  1 C34.  118 Capacitor, Poly.  OOL/Tuf  100077-102  9 C101-901.  119 Capacitor, Tantalum.  22uf  100136-22u  18. C106-906. C107-907.  120 Capacitor, Polyfilm.  15uf  100128-15u  9 C108-908.  121  122  123 Resistor. 5%. Tw.  330KA 100156-33u  18 R115-915. R116-916.	
MATERIAL LIST  ML DRAWING MO. REV.  200522-00000  DRAWING MO. REV.   DRAWING   13-16.9   PK. TIFE P. D/DAP.   MODEL NO.   15   DATE 1/2/71   SHEET   6 OF 20	ASST DATA ELECTRONICS PMS.   DATE 3/2/71/ SHEET 8 OF 20	ASST. DATA ELECTRONICS FWB.  OBANING  INTLE  ASST. DATA ELECTRONICS FWB.  INTLE  ASST. DATA ELECTRONICS FWB.  NODEL NO.  DATE \$2/71 SHEET 10 or 20  TYPE P. D/GAP.  NODEL NO.  DATE \$2/71 SHEET 10 or 20  REMARKS ON CKT. DESIG.  116. Capacitor, Poly001/10f 100077-1/72 1 C34.  117. Capacitor, Poly0015 100225-152 1 Chl.  118. Capacitor, Poly001s 100077-102 9 C101-901.  119. Capacitor, Tantalum22uf 100136-22u 18. C106-906. C107-907.  120. Capacitor, Polyfilm15uf 100128-15u 9 C108-908.  121.  122.  123. Resistor. 5%. 7w. 330KA 100156-33u 18. R115-915. R116-916.  124.  125.	
MATERIAL LIST  ML DRAWING MO. REV.  200522-00000  DRAWING MO. REV.   DRAWING   13-16.9   PK. TIFE P. D/DAP.   MODEL NO.   15   DATE 1/2/71   SHEET   6 OF 20	ASSY DATA ELECTRONICS PMS.  TITLE 22-29.9 IPS. TITE P. D/OAP.  DATE 3/2/71/ SHEET 8 OF 20  TITLE DEG. NO. NO. REQ.  NEHARRS ON CRT. DESIG.  116 Caparitor, Poly0082sf 100077-822 1 C3h.  117 Capacitor, Poly0083sf 100077-822 1 C4h.  118 Capacitor, Poly0015sf 100077-152 9 C101-901.  119 Capacitor, Tantalum17sf 100136-17h 18 C106-906. C107-907.  120 Capacitor, Polyfilm27sf 100128-27h 9 C108-908.  121  122  123 Resister, 5%. 3w. 330LO 100156-33h 18 R115-915. R116-916.  126  127 Wire, Solid Bare. 100051-02h A/R Jumper Jl. From A to C	ASST. DATA ELECTRONICS FWB.    DATE \$\frac{\pmathcal{2}}{\pmathcal{2}} \]    DATE \$\frac{\pmathcal{2}}{\pmathcal{2}} \]    DATE \$\frac{\pmathcal{2}}{\pmathcal{2}} \]    DATE \$\frac{\pmathcal{2}}{\pmathcal{2}} \]    OFFICIAL CONTINUE   DWG. NO. NO. NO. NO. NO. NO. REG.   REMARKS ON CKT. DESIG.	
MATERIAL LIST  ML DRAWING MO. REV.  200522-00000  DRAWING MO. REV.   DRAWING   13-16.9   PK. TIFE P. D/DAP.   MODEL NO.   15   DATE 1/2/71   SHEET   6 OF 20	ASST DATA ELECTRONICS PMS.   DATE 3/2/71/ SHEET 8 OF 20	ASST. DATA ELECTRONICS FWB.    DATE \$\frac{10}{27/11} \] SHEET \$\frac{10}{10}\$ or \$\frac{20}{20}\$    Title   DATE \$\frac{17}{27/11} \] SHEET \$\frac{10}{20}\$ or \$\frac{20}{20}\$    Title   DATE \$\frac{17}{27/11} \] SHEET \$\frac{10}{20}\$ or \$\frac{20}{20}\$    Title   DATE \$\frac{17}{27/11} \] SHEET \$\frac{10}{20}\$ or \$\frac{20}{20}\$    Title   DATE \$\frac{10}{27/11} \] SHEET \$\frac{10}{20}\$ or \$\frac{20}{20}	
MATERIAL LIST  ML DRAWING MO. REV.  200522-00000  DRAWING MO. REV.   DRAWING   13-16.9   PK. TIFE P. D/DAP.   MODEL NO.   15   DATE 1/2/71   SHEET   6 OF 20	ASSY DATA ELECTRONICS PMS.  TITLE 22-29.9 IPS. TITE P. D/OAP.  DATE 3/2/71/ SHEET 8 OF 20  TITLE DEG. NO. NO. REQ.  NEHARRS ON CRT. DESIG.  116 Caparitor, Poly0082sf 100077-822 1 C3h.  117 Capacitor, Poly0083sf 100077-822 1 C4h.  118 Capacitor, Poly0015sf 100077-152 9 C101-901.  119 Capacitor, Tantalum17sf 100136-17h 18 C106-906. C107-907.  120 Capacitor, Polyfilm27sf 100128-27h 9 C108-908.  121  122  123 Resister, 5%. 3w. 330LO 100156-33h 18 R115-915. R116-916.  126  127 Wire, Solid Bare. 100051-02h A/R Jumper Jl. From A to C	ASST. DATA ELECTRONICS FWB.    DATE \$\frac{\pmathcal{2}}{\pmathcal{2}} \]    DATE \$\frac{\pmathcal{2}}{\pmathcal{2}} \]    DATE \$\frac{\pmathcal{2}}{\pmathcal{2}} \]    DATE \$\frac{\pmathcal{2}}{\pmathcal{2}} \]    OFFICIAL CONTINUE   DWG. NO. NO. NO. NO. NO. NO. REG.   REMARKS ON CKT. DESIG.	
MATERIAL LIST  ML DRAWING MO. REV.  200522-00000  DRAWING MO. REV.  200522-00000  DATE #2/71 SHEET & OF 20  TEM. ORAWING TITLE DUG. NO. NO. REQ. REMARKS ON CKI. DESIG.  BL Nut, Hex. 100013-200 6 k- 100.	DRAWING   13-16.9   PK. TIFE P. D/DAP.   MODEL NO.   15   DATE 1/2/71   SHEET   6 OF 20	DRAFFICE  ASSY DATA ELECTRONICS PMS.  171LE  23-29,9 IPS. TIPE P. D/OAP.  DOAR 3/2/71/ SHEET 8 OF 20  116 Caparitor, Poly0082sf 100077-822 1 Cil.  117 Capacitor, Poly0082sf 100077-822 1 Cil.  118 Capacitor, Poly0015sf 100077-152 9 Cilo1-901.  119 Capacitor, Tanteluml/Tuf 100136-l/th 18 Cilo6-906. Cilo7-907.  120 Capacitor, Polyfilm27uf 100128-27lh 9 Cilo8-908.  121  122  123 Resister, 5%w. 330EA 100156-33h 18 R115-915. R116-916.  124 Wire, Solid Bare. 100051-02h A/R Jumper Jl. From A to C  128 Tubing, Tefion. 100226-022 A/R Jumper J2. From M to M	ASST. DATA ELECTRONICS FWB.    DATE \$\frac{10}{27/11} \] SHEET \$\frac{10}{10}\$ or \$\frac{20}{20}\$    Title   DATE \$\frac{17}{27/11} \] SHEET \$\frac{10}{20}\$ or \$\frac{20}{20}\$    Title   DATE \$\frac{17}{27/11} \] SHEET \$\frac{10}{20}\$ or \$\frac{20}{20}\$    Title   DATE \$\frac{17}{27/11} \] SHEET \$\frac{10}{20}\$ or \$\frac{20}{20}\$    Title   DATE \$\frac{10}{27/11} \] SHEET \$\frac{10}{20}\$ or \$\frac{20}{20}
MATERIAL LIST  ML DRAWING MO. REV.  200522-00000  DRAWING MO. REV.   DRAWING   13-16.9   PK. TIFE P. D/DAP.   MODEL NO.   15   DATE 1/2/71   SHEET   6 OF 20	DRAFFICE  ASSY DATA ELECTRONICS PMS.  171LE  23-29,9 IPS. TIPE P. D/OAP.  DOAR 3/2/71/ SHEET 8 OF 20  116 Caparitor, Poly0082sf 100077-822 1 Cil.  117 Capacitor, Poly0082sf 100077-822 1 Cil.  118 Capacitor, Poly0015sf 100077-152 9 Cilo1-901.  119 Capacitor, Tanteluml/Tuf 100136-l/th 18 Cilo6-906. Cilo7-907.  120 Capacitor, Polyfilm27uf 100128-27lh 9 Cilo8-908.  121  122  123 Resister, 5%w. 330EA 100156-33h 18 R115-915. R116-916.  124 Wire, Solid Bare. 100051-02h A/R Jumper Jl. From A to C  128 Tubing, Tefion. 100226-022 A/R Jumper J2. From M to M	ASST. DATA ELECTRONICS FWB.    DATE \$\frac{10}{27/11} \] SHEET \$\frac{10}{10}\$ or \$\frac{20}{20}\$    Title   DATE \$\frac{17}{27/11} \] SHEET \$\frac{10}{20}\$ or \$\frac{20}{20}\$    Title   DATE \$\frac{17}{27/11} \] SHEET \$\frac{10}{20}\$ or \$\frac{20}{20}\$    Title   DATE \$\frac{17}{27/11} \] SHEET \$\frac{10}{20}\$ or \$\frac{20}{20}\$    Title   DATE \$\frac{10}{27/11} \] SHEET \$\frac{10}{20}\$ or \$\frac{20}{20}	
MATERIAL LIST  ML DRAWING MO. REV.  200522-00000  DRAWING MO. REV.   DRAWING   13-16.9   PK. TIFE P. D/DAP.   MODEL NO.   15   DATE 1/2/71   SHEET   6 OF 20	DRAFFICE  ASSY DATA ELECTRONICS PMS.  171LE  23-29,9 IPS. TIPE P. D/OAP.  DOAR 3/2/71/ SHEET 8 OF 20  116 Caparitor, Poly0082sf 100077-822 1 Cil.  117 Capacitor, Poly0082sf 100077-822 1 Cil.  118 Capacitor, Poly0015sf 100077-152 9 Cilo1-901.  119 Capacitor, Tanteluml/Tuf 100136-l/th 18 Cilo6-906. Cilo7-907.  120 Capacitor, Polyfilm27uf 100128-27lh 9 Cilo8-908.  121  122  123 Resister, 5%w. 330EA 100156-33h 18 R115-915. R116-916.  124 Wire, Solid Bare. 100051-02h A/R Jumper Jl. From A to C  128 Tubing, Tefion. 100226-022 A/R Jumper J2. From M to M	ASST. DATA ELECTRONICS FWB.    DATE \$\frac{10}{27/11} \] SHEET \$\frac{10}{10}\$ or \$\frac{20}{20}\$    Title   DATE \$\frac{17}{27/11} \] SHEET \$\frac{10}{20}\$ or \$\frac{20}{20}\$    Title   DATE \$\frac{17}{27/11} \] SHEET \$\frac{10}{20}\$ or \$\frac{20}{20}\$    Title   DATE \$\frac{17}{27/11} \] SHEET \$\frac{10}{20}\$ or \$\frac{20}{20}\$    Title   DATE \$\frac{10}{27/11} \] SHEET \$\frac{10}{20}\$ or \$\frac{20}{20}	
MATERIAL LIST  ML DRAWING MO. REV.  200522-00000  DRAWING MO. REV.   DRAWING   13-16.9   PK. TIFE P. D/DAP.   MODEL NO.   15   DATE 1/2/71   SHEET   6 OF 20	DRAFFICE  ASSY DATA ELECTRONICS PMS.  171LE  23-29,9 IPS. TIPE P. D/OAP.  DOAR 3/2/71/ SHEET 8 OF 20  116 Caparitor, Poly0082sf 100077-822 1 Cil.  117 Capacitor, Poly0082sf 100077-822 1 Cil.  118 Capacitor, Poly0015sf 100077-152 9 Cilo1-901.  119 Capacitor, Tanteluml/Tuf 100136-l/th 18 Cilo6-906. Cilo7-907.  120 Capacitor, Polyfilm27uf 100128-27lh 9 Cilo8-908.  121  122  123 Resister, 5%w. 330EA 100156-33h 18 R115-915. R116-916.  124 Wire, Solid Bare. 100051-02h A/R Jumper Jl. From A to C  128 Tubing, Tefion. 100226-022 A/R Jumper J2. From M to M	ASST. DATA ELECTRONICS FWB.    DATE \$\frac{10}{27/11} \] SHEET \$\frac{10}{10}\$ or \$\frac{20}{20}\$    Title   DATE \$\frac{17}{27/11} \] SHEET \$\frac{10}{20}\$ or \$\frac{20}{20}\$    Title   DATE \$\frac{17}{27/11} \] SHEET \$\frac{10}{20}\$ or \$\frac{20}{20}\$    Title   DATE \$\frac{17}{27/11} \] SHEET \$\frac{10}{20}\$ or \$\frac{20}{20}\$    Title   DATE \$\frac{10}{27/11} \] SHEET \$\frac{10}{20}\$ or \$\frac{20}{20}	
MATERIAL LIST  ML DRAWING MO. REV.  200522-00000  DRAWING MO. REV.   DRAWING   13-16.9   PK. TIFE P. D/DAP.   MODEL NO.   15   DATE 1/2/71   SHEET   6 OF 20	DRAFFICE  ASSY DATA ELECTRONICS PMS.  171LE  23-29,9 IPS. TIPE P. D/OAP.  DOAR 3/2/71/ SHEET 8 OF 20  116 Caparitor, Poly0082sf 100077-822 1 Cil.  117 Capacitor, Poly0082sf 100077-822 1 Cil.  118 Capacitor, Poly0015sf 100077-152 9 Cilo1-901.  119 Capacitor, Tanteluml/Tuf 100136-l/th 18 Cilo6-906. Cilo7-907.  120 Capacitor, Polyfilm27uf 100128-27lh 9 Cilo8-908.  121  122  123 Resister, 5%w. 330EA 100156-33h 18 R115-915. R116-916.  124 Wire, Solid Bare. 100051-02h A/R Jumper Jl. From A to C  128 Tubing, Tefion. 100226-022 A/R Jumper J2. From M to M	ASST. DATA ELECTRONICS FWB.    DATE \$\frac{10}{27/11} \] SHEET \$\frac{10}{10}\$ or \$\frac{20}{20}\$    Title   DATE \$\frac{17}{27/11} \] SHEET \$\frac{10}{20}\$ or \$\frac{20}{20}\$    Title   DATE \$\frac{17}{27/11} \] SHEET \$\frac{10}{20}\$ or \$\frac{20}{20}\$    Title   DATE \$\frac{17}{27/11} \] SHEET \$\frac{10}{20}\$ or \$\frac{20}{20}\$    Title   DATE \$\frac{10}{27/11} \] SHEET \$\frac{10}{20}\$ or \$\frac{20}{20}	
MATERIAL LIST  ML DRAWING MO. REV.  200522-00000  DRAWING MO. REV.   DRAWING   13-16.9   PK. TIFE P. D/DAP.   MODEL NO.   15   DATE 1/2/71   SHEET   6 OF 20	DRAFFICE  ASSY DATA ELECTRONICS PMS.  171LE  23-29,9 IPS. TIPE P. D/OAP.  DOAR 3/2/71/ SHEET 8 OF 20  116 Caparitor, Poly0082sf 100077-822 1 Cil.  117 Capacitor, Poly0082sf 100077-822 1 Cil.  118 Capacitor, Poly0015sf 100077-152 9 Cilo1-901.  119 Capacitor, Tanteluml/Tuf 100136-l/th 18 Cilo6-906. Cilo7-907.  120 Capacitor, Polyfilm27uf 100128-27lh 9 Cilo8-908.  121  122  123 Resister, 5%w. 330EA 100156-33h 18 R115-915. R116-916.  124 Wire, Solid Bare. 100051-02h A/R Jumper Jl. From A to C  128 Tubing, Tefion. 100226-022 A/R Jumper J2. From M to M	ASST. DATA ELECTRONICS FWB.    DATE \$\frac{10}{27/11} \] SHEET \$\frac{10}{10}\$ or \$\frac{20}{20}\$    Title   DATE \$\frac{17}{27/11} \] SHEET \$\frac{10}{20}\$ or \$\frac{20}{20}\$    Title   DATE \$\frac{17}{27/11} \] SHEET \$\frac{10}{20}\$ or \$\frac{20}{20}\$    Title   DATE \$\frac{17}{27/11} \] SHEET \$\frac{10}{20}\$ or \$\frac{20}{20}\$    Title   DATE \$\frac{10}{27/11} \] SHEET \$\frac{10}{20}\$ or \$\frac{20}{20}	
MATERIAL LIST  ML DRAWING MO. REV.  200522-00000  DRAWING MO. REV.   DRAWING   13-16.9   PK. TIFE P. D/DAP.   MODEL NO.   15   DATE 1/2/71   SHEET   6 OF 20	DRAFFICE  ASSY DATA ELECTRONICS PMS.  171LE  23-29,9 IPS. TIPE P. D/OAP.  DOAR 3/2/71/ SHEET 8 OF 20  116 Caparitor, Poly0082sf 100077-822 1 Cil.  117 Capacitor, Poly0082sf 100077-822 1 Cil.  118 Capacitor, Poly0015sf 100077-152 9 Cilo1-901.  119 Capacitor, Tanteluml/Tuf 100136-l/th 18 Cilo6-906. Cilo7-907.  120 Capacitor, Polyfilm27uf 100128-27lh 9 Cilo8-908.  121  122  123 Resister, 5%w. 330EA 100156-33h 18 R115-915. R116-916.  124 Wire, Solid Bare. 100051-02h A/R Jumper Jl. From A to C  128 Tubing, Tefion. 100226-022 A/R Jumper J2. From M to M	ASST. DATA ELECTRONICS FWB.    DATE \$\frac{10}{27/11} \] SHEET \$\frac{10}{10}\$ or \$\frac{20}{20}\$    Title   DATE \$\frac{17}{27/11} \] SHEET \$\frac{10}{20}\$ or \$\frac{20}{20}\$    Title   DATE \$\frac{17}{27/11} \] SHEET \$\frac{10}{20}\$ or \$\frac{20}{20}\$    Title   DATE \$\frac{17}{27/11} \] SHEET \$\frac{10}{20}\$ or \$\frac{20}{20}\$    Title   DATE \$\frac{10}{27/11} \] SHEET \$\frac{10}{20}\$ or \$\frac{20}{20}	
MATERIAL LIST  ML DRAWING MO. REV.  200522-00000  DRAWING MO. REV.   DRAWING   13-16.9   PK. TIFE P. D/DAP.   MODEL NO.   15   DATE 1/2/71   SHEET   6 OF 20	DRAFFICE  ASSY DATA ELECTRONICS PMS.  171LE  23-29,9 IPS. TIPE P. D/OAP.  DOAR 3/2/71/ SHEET 8 OF 20  116 Caparitor, Poly0082sf 100077-822 1 Cil.  117 Capacitor, Poly0082sf 100077-822 1 Cil.  118 Capacitor, Poly0015sf 100077-152 9 Cilo1-901.  119 Capacitor, Tanteluml/Tuf 100136-l/th 18 Cilo6-906. Cilo7-907.  120 Capacitor, Polyfilm27uf 100128-27lh 9 Cilo8-908.  121  122  123 Resister, 5%w. 330EA 100156-33h 18 R115-915. R116-916.  124 Wire, Solid Bare. 100051-02h A/R Jumper Jl. From A to C  128 Tubing, Tefion. 100226-022 A/R Jumper J2. From M to M	ASST. DATA ELECTRONICS FWB.    DATE \$\frac{10}{27/11} \] SHEET \$\frac{10}{10}\$ or \$\frac{20}{20}\$    Title   DATE \$\frac{17}{27/11} \] SHEET \$\frac{10}{20}\$ or \$\frac{20}{20}\$    Title   DATE \$\frac{17}{27/11} \] SHEET \$\frac{10}{20}\$ or \$\frac{20}{20}\$    Title   DATE \$\frac{17}{27/11} \] SHEET \$\frac{10}{20}\$ or \$\frac{20}{20}\$    Title   DATE \$\frac{10}{27/11} \] SHEET \$\frac{10}{20}\$ or \$\frac{20}{20}	
MATERIAL LIST  ML DRAWING MO. REV.  200522-00000  DRAWING MO. REV.   DRAWING   13-16.9   PK. TIFE P. D/DAP.   MODEL NO.   15   DATE 1/2/71   SHEET   6 OF 20	DRAFFICE  ASSY DATA ELECTRONICS PMS.  171LE  23-29,9 IPS. TIPE P. D/OAP.  DOAR 3/2/71/ SHEET 8 OF 20  116 Caparitor, Poly0082sf 100077-822 1 Cil.  117 Capacitor, Poly0082sf 100077-822 1 Cil.  118 Capacitor, Poly0015sf 100077-152 9 Cilo1-901.  119 Capacitor, Tanteluml/Tuf 100136-l/th 18 Cilo6-906. Cilo7-907.  120 Capacitor, Polyfilm27uf 100128-27lh 9 Cilo8-908.  121  122  123 Resister, 5%w. 330EA 100156-33h 18 R115-915. R116-916.  124 Wire, Solid Bare. 100051-02h A/R Jumper Jl. From A to C  128 Tubing, Tefion. 100226-022 A/R Jumper J2. From M to M	ASST. DATA ELECTRONICS FWB.    DATE \$\frac{10}{27/11} \] SHEET \$\frac{10}{10}\$ or \$\frac{20}{20}\$    Title   DATE \$\frac{17}{27/11} \] SHEET \$\frac{10}{20}\$ or \$\frac{20}{20}\$    Title   DATE \$\frac{17}{27/11} \] SHEET \$\frac{10}{20}\$ or \$\frac{20}{20}\$    Title   DATE \$\frac{17}{27/11} \] SHEET \$\frac{10}{20}\$ or \$\frac{20}{20}\$    Title   DATE \$\frac{10}{27/11} \] SHEET \$\frac{10}{20}\$ or \$\frac{20}{20}	
MATERIAL LIST  ML DRAWING MO. REV.  200522-00000  DRAWING MO. REV.   DRAWING   13-16.9   PK. TIFE P. D/DAP.   MODEL NO.   15   DATE 1/2/71   SHEET   6 OF 20	DRAFFICE  ASSY DATA ELECTRONICS PMS.  171LE  23-29,9 IPS. TIPE P. D/OAP.  DOAR 3/2/71/ SHEET 8 OF 20  116 Caparitor, Poly0082sf 100077-822 1 Cil.  117 Capacitor, Poly0082sf 100077-822 1 Cil.  118 Capacitor, Poly0015sf 100077-152 9 Cilo1-901.  119 Capacitor, Tanteluml/Tuf 100136-l/th 18 Cilo6-906. Cilo7-907.  120 Capacitor, Polyfilm27uf 100128-27lh 9 Cilo8-908.  121  122  123 Resister, 5%w. 330EA 100156-33h 18 R115-915. R116-916.  124 Wire, Solid Bare. 100051-02h A/R Jumper Jl. From A to C  128 Tubing, Tefion. 100226-022 A/R Jumper J2. From M to M	ASST. DATA ELECTRONICS FWB.    DATE \$\frac{10}{27/11} \] SHEET \$\frac{10}{10}\$ or \$\frac{20}{20}\$    Title	
MATERIAL LIST  ML DRAWING MO. REV.  200522-00000  DRAWING MO. REV.   DRAWING   13-16.9   PK. TIFE P. D/DAP.   MODEL NO.   15   DATE 1/2/71   SHEET   6 OF 20	DRAFFICE  ASSY DATA ELECTRONICS PMS.  171LE  23-29,9 IPS. TIPE P. D/OAP.  DOAR 3/2/71/ SHEET 8 OF 20  116 Caparitor, Poly0082sf 100077-822 1 Cil.  117 Capacitor, Poly0082sf 100077-822 1 Cil.  118 Capacitor, Poly0015sf 100077-152 9 Cilol-901.  119 Capacitor, Tanteluml/Tuf 100136-l/th 18 Cilo6-906. Cilo7-907.  120 Capacitor, Polyfilm27uf 100128-27lh 9 Cilo8-908.  121  122  123 Resister, 5%w. 330EA 100156-33h 18 R115-915. R116-916.  124 Wire, Solid Bare. 100051-02h A/R Jumper Jl. From A to C  128 Tubing, Tefion. 100226-022 A/R Jumper J2. From M to M	ASST. DATA ELECTRONICS FWB.    DATE \$\frac{10}{27/11} \] SHEET \$\frac{10}{10}\$ or \$\frac{20}{20}\$    Title   DATE \$\frac{17}{27/11} \] SHEET \$\frac{10}{20}\$ or \$\frac{20}{20}\$    Title   DATE \$\frac{17}{27/11} \] SHEET \$\frac{10}{20}\$ or \$\frac{20}{20}\$    Title   DATE \$\frac{17}{27/11} \] SHEET \$\frac{10}{20}\$ or \$\frac{20}{20}\$    Title   DATE \$\frac{10}{27/11} \] SHEET \$\frac{10}{20}\$ or \$\frac{20}{20}	
MATERIAL LIST  ML DRAWING MO. REV.  200522-00000  DRAWING MO. REV.   DRAWING   13-16.9   PK. TIFE P. D/DAP.   MODEL NO.   15   DATE 1/2/71   SHEET   6 OF 20	DRAFFICE  ASSY DATA ELECTRONICS PMS.  171LE  23-29,9 IPS. TIPE P. D/OAP.  DOAR 3/2/71/ SHEET 8 OF 20  116 Caparitor, Poly0082sf 100077-822 1 Cil.  117 Capacitor, Poly0082sf 100077-822 1 Cil.  118 Capacitor, Poly0015sf 100077-152 9 Cilol-901.  119 Capacitor, Tanteluml/Tuf 100136-l/th 18 Cilo6-906. Cilo7-907.  120 Capacitor, Polyfilm27uf 100128-27lh 9 Cilo8-908.  121  122  123 Resister, 5%w. 330EA 100156-33h 18 R115-915. R116-916.  124 Wire, Solid Bare. 100051-02h A/R Jumper Jl. From A to C  128 Tubing, Tefion. 100226-022 A/R Jumper J2. From M to M	ASST. DATA ELECTRONICS FWB.    DATE \$\frac{10}{27/11} \] SHEET \$\frac{10}{10}\$ or \$\frac{20}{20}\$    Title   DATE \$\frac{17}{27/11} \] SHEET \$\frac{10}{20}\$ or \$\frac{20}{20}\$    Title   DATE \$\frac{17}{27/11} \] SHEET \$\frac{10}{20}\$ or \$\frac{20}{20}\$    Title   DATE \$\frac{17}{27/11} \] SHEET \$\frac{10}{20}\$ or \$\frac{20}{20}\$    Title   DATE \$\frac{10}{27/11} \] SHEET \$\frac{10}{20}\$ or \$\frac{20}{20}	
MATERIAL LIST  ML DRAWING MO. REV.  200522-00000  DRAWING MO. REV.   DRAWING   13-16.9   PK. TIFE P. D/DAP.   MODEL NO.   15   DATE 1/2/71   SHEET   6 OF 20	DRAFFICE  ASSY DATA ELECTRONICS PMS.  171LE  23-29,9 IPS. TIPE P. D/OAP.  DOAR 3/2/71/ SHEET 8 OF 20  116 Caparitor, Poly0082sf 100077-822 1 Cil.  117 Capacitor, Poly0082sf 100077-822 1 Cil.  118 Capacitor, Poly0015sf 100077-152 9 Cilol-901.  119 Capacitor, Tanteluml/Tuf 100136-l/th 18 Cilo6-906. Cilo7-907.  120 Capacitor, Polyfilm27uf 100128-27lh 9 Cilo8-908.  121  122  123 Resister, 5%w. 330EA 100156-33h 18 R115-915. R116-916.  124 Wire, Solid Bare. 100051-02h A/R Jumper Jl. From A to C  128 Tubing, Tefion. 100226-022 A/R Jumper J2. From M to M	ASST. DATA ELECTRONICS PWB.    DATE \$\frac{10}{27/11} \text{ sheet } \frac{10}{20} \text{ or } \frac{20}{20} \]    Title	
MATERIAL LIST  ML DRAWING MO. REV.  200522-00000  DRAWING MO. REV.   DRAWING   13-16.9   PK. TIFE P. D/DAP.   MODEL NO.   15   DATE 1/2/71   SHEET   6 OF 20	DRAFFICE  ASSY DATA ELECTRONICS PMS.  171LE  23-29,9 IPS. TIPE P. D/OAP.  DOAR 3/2/71/ SHEET 8 OF 20  116 Caparitor, Poly0082sf 100077-822 1 Cil.  117 Capacitor, Poly0082sf 100077-822 1 Cil.  118 Capacitor, Poly0015sf 100077-152 9 Cilol-901.  119 Capacitor, Tanteluml/Tuf 100136-l/th 18 Cilo6-906. Cilo7-907.  120 Capacitor, Polyfilm27uf 100128-27lh 9 Cilo8-908.  121  122  123 Resister, 5%w. 330EA 100156-33h 18 R115-915. R116-916.  124 Wire, Solid Bare. 100051-02h A/R Jumper Jl. From A to C  128 Tubing, Tefion. 100226-022 A/R Jumper J2. From M to M	ASST. DATA ELECTRONICS FWB.    DATE \$\frac{10}{27/11} \] SHEET \$\frac{10}{10}\$ or \$\frac{20}{20}\$    Title   DATE \$\frac{17}{27/11} \] SHEET \$\frac{10}{20}\$ or \$\frac{20}{20}\$    Title   DATE \$\frac{17}{27/11} \] SHEET \$\frac{10}{20}\$ or \$\frac{20}{20}\$    Title   DATE \$\frac{17}{27/11} \] SHEET \$\frac{10}{20}\$ or \$\frac{20}{20}\$    Title   DATE \$\frac{10}{27/11} \] SHEET \$\frac{10}{20}\$ or \$\frac{20}{20}	
MATERIAL LIST  ML DRAWING MO. REV.  200522-00000  DRAWING MO. REV.   DRAWING   13-16.9   PK. TIFE P. D/DAP.   MODEL NO.   15   DATE 1/2/71   SHEET   6 OF 20	DRAFFICE  ASSY DATA ELECTRONICS PMS.  171LE  23-29,9 IPS. TIPE P. D/OAP.  DOAR 3/2/71/ SHEET 8 OF 20  116 Caparitor, Poly0082sf 100077-822 1 Cil.  117 Capacitor, Poly0082sf 100077-822 1 Cil.  118 Capacitor, Poly0015sf 100077-152 9 Cilol-901.  119 Capacitor, Tanteluml/Tuf 100136-l/th 18 Cilo6-906. Cilo7-907.  120 Capacitor, Polyfilm27uf 100128-27lh 9 Cilo8-908.  121  122  123 Resister, 5%w. 330EA 100156-33h 18 R115-915. R116-916.  124 Wire, Solid Bare. 100051-02h A/R Jumper Jl. From A to C  128 Tubing, Tefion. 100226-022 A/R Jumper J2. From M to M	ASST. DATA ELECTRONICS PWB.    DATE \$\frac{10}{27/11} \text{ sheet } \frac{10}{20} \text{ or } \frac{20}{20} \]    Title	
MATERIAL LIST  ML DRAWING MO. REV.  200522-00000  DRAWING MO. REV.   DRAWING   13-16.9   PK. TIFE P. D/DAP.   MODEL NO.   15   DATE 1/2/71   SHEET   6 OF 20	DRAFFICE  ASSY DATA ELECTRONICS PMS.  171LE  23-29,9 IPS. TIPE P. D/OAP.  DOAR 3/2/71/ SHEET 8 OF 20  116 Caparitor, Poly0082sf 100077-822 1 Cil.  117 Capacitor, Poly0082sf 100077-822 1 Cil.  118 Capacitor, Poly0015sf 100077-152 9 Cilol-901.  119 Capacitor, Tanteluml/Tuf 100136-l/th 18 Cilo6-906. Cilo7-907.  120 Capacitor, Polyfilm27uf 100128-27lh 9 Cilo8-908.  121  122  123 Resister, 5%w. 330EA 100156-33h 18 R115-915. R116-916.  124 Wire, Solid Bare. 100051-02h A/R Jumper Jl. From A to C  128 Tubing, Tefion. 100226-022 A/R Jumper J2. From M to M	ASST. DATA ELECTRONICS PWB.    DATE \$\frac{10}{27/11} \text{ sheet } \frac{10}{20} \text{ or } \frac{20}{20} \]    Title	
MATERIAL LIST  ML DRAWING MO. REV.  200522-00000  DRAWING MO. REV.  200522-00000  DATE #2/71 SHEET & OF 20  TEM. ORAWING TITLE DUG. NO. NO. REQ. REMARKS ON CKI. DESIG.  BL Nut, Hex. 100013-200 6 k- 100.	DRAWING   13-16.9   PK. TIFE P. D/DAP.   MODEL NO.   15   DATE 1/2/71   SHEET   6 OF 20	DRAFFICE  ASSY DATA ELECTRONICS PMS.  171LE  23-29,9 IPS. TIPE P. D/OAP.  DOAR 3/2/71/ SHEET 8 OF 20  116 Caparitor, Poly0082sf 100077-822 1 Cil.  117 Capacitor, Poly0082sf 100077-822 1 Cil.  118 Capacitor, Poly0015sf 100077-152 9 Cilol-901.  119 Capacitor, Tanteluml/Tuf 100136-l/th 18 Cilo6-906. Cilo7-907.  120 Capacitor, Polyfilm27uf 100128-27lh 9 Cilo8-908.  121  122  123 Resister, 5%w. 330EA 100156-33h 18 R115-915. R116-916.  124 Wire, Solid Bare. 100051-02h A/R Jumper Jl. From A to C  128 Tubing, Tefion. 100226-022 A/R Jumper J2. From M to M	ASST. DATA ELECTRONICS PWB.    DATE \$\frac{10}{27/11} \text{ sheet } \frac{10}{20} \text{ or } \frac{20}{20} \]    Title
MATERIAL LIST  ML DRAWING MO. REV.  200522-00000  DRAWING MO. REV.  200522-00000  DATE #2/71 SHEET & OF 20  TEM. ORAWING TITLE DUG. NO. NO. REQ. REMARKS ON CKI. DESIG.  BL Nut, Hex. 100013-200 6 k- 100.	DRAWING   13-16.9   PK. TIFE P. D/DAP.   MODEL NO.   15   DATE 1/2/71   SHEET   6 OF 20	DRAFFICE  ASSY DATA ELECTRONICS PMS.  171LE  23-29,9 IPS. TIPE P. D/OAP.  DOAR 3/2/71/ SHEET 8 OF 20  116 Caparitor, Poly0082sf 100077-822 1 Cil.  117 Capacitor, Poly0082sf 100077-822 1 Cil.  118 Capacitor, Poly0015sf 100077-152 9 Cilol-901.  119 Capacitor, Tanteluml/Tuf 100136-l/th 18 Cilo6-906. Cilo7-907.  120 Capacitor, Polyfilm27uf 100128-27lh 9 Cilo8-908.  121  122  123 Resister, 5%w. 330EA 100156-33h 18 R115-915. R116-916.  124 Wire, Solid Bare. 100051-02h A/R Jumper Jl. From A to C  128 Tubing, Tefion. 100226-022 A/R Jumper J2. From M to M	ASST. DATA ELECTRONICS FWB.    DATE \$\frac{10}{27/11} \] SHEET \$\frac{10}{10}\$ or \$\frac{20}{20}\$    Title   DATE \$\frac{17}{27/11} \] SHEET \$\frac{10}{20}\$ or \$\frac{20}{20}\$    Title   DATE \$\frac{17}{27/11} \] SHEET \$\frac{10}{20}\$ or \$\frac{20}{20}\$    Title   DATE \$\frac{17}{27/11} \] SHEET \$\frac{10}{20}\$ or \$\frac{20}{20}\$    Title   DATE \$\frac{10}{27/11} \] SHEET \$\frac{10}{20}\$ or \$\frac{20}{20}

DRAWING ASSY.DATA ELECTRONICS PWB. 23-29.9 IPS. TYPE 'A' D/G.

Capacitor, Poly.

Capacitor, Poly.

119 Capacitor, Tantalum.

120 Capacitor, Tantalum.

121 Capacitor, Polyfilm.

123 Resistor, 5%. 7%.

118

122

DRAWING TITLE

DRAWING NO. REV

200521-061

DATE 3/2/71 SHEET 15 OF 20

REMARKS ON CKT. DESIG.

C101-901.

C108-908.

C106-906. C107-907.

Jumper Jl. From B to C

Jumper J2. From M to P

MATERIAL LIST

DWG. NO. NO. REO.

9

330Kn 100156-334 18 R115-915. R116-916.

A/R

A/R

.0047uf 100077-472 1 C34.

330 A 100156-331 1 R8.

100051-024

100226-022

.00luf 100077-102 9

ASST. DATA ELECTRONICS PWB.

ORANING
1111E
30-39.9 IPS. TIPE A. D/GAP. MODEL NO. 16

119 Capacitor, Tantalum. .33uf 100136-334 18

120 Capacitor, Polyfilm. .18uf 100128-184

DRAWING TITLE

116 Capacitor, Poly.

118 Capacitor. Poly.

122 Resistor. 5%. 2w.

123 Resistor. " "

127 Wire, Solid Bare.

128 Tubing, Teflen.

117

121

124

125

126

MATERIAL LIST

.0082uf 100077-822

.0015uf 100077-152

.27uf 100125-274

.47uf

.47uf

DNG, NO.

100136-474

100136-474

330 100156-331 1 R8.

	Mesistoi, 50. 4				
124	Mesistor, " "	330K	100156-334	9	R115-915.
125	Resistor, " "	330X	100156-334	9	R116-916.
126					
127					
ii.					
129	Vire, Solid Insulated		100248-924	A/R	Jumper Jl. From B to C.
					Jumper J2. " M to P. a
					Jumper JlO. " R to S.
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		MATERI	AL LIST		DRAWING NO. AEV.
1	ASSY, DATA ELECTR	MATERI RONICS PWH	·	=	ML 200521-014
	LO-45 IPS. TIPE I	NONICS PWB N. D/GAP.	MODEL NO		ML 200521-014-
ITEM NO.	DRAWING TITL	NONICS PWB A. D/GAP.	MODEL NO	40. REQ.	ML 200521-014  DATE 3/2/71 SHEET 18 OF 20.  REMARKS ON CKT. DESIG.
176# 176	DRAWING TITL Capacitor, Poly.	NONICS PWH A. D/GAP. E .001/7uf	. MODEL NO D=G, NO 100077-172	NO. REO.	DATE 3/2/71 SHEET 18 OF 20, REMARKS ON CKT. DESIG.  C34
116. 116 117	DRAWING TITL  Capacitor, Poly.  CAPACITOR, Poly.	COOLTUI	. Dec. NO 100077-472	40. REO.	ML 200521-014  DATE 3/2/71 SHEET 18 OF 20.  REMARKS ON CRT. DESIG.  C34
116 117 118	CAPACITCA, Poly.  Capacitor, Poly.  Capacitor, Poly.	COLTUS  COOLTUS  COOLTUS  COOLTUS	D+G. NO. 100077-172	NO. REO.	ML 200521-014
116 117 118 119	CAPACITOR, Poly.  Capacitor, Poly.  Capacitor, Poly.  Capacitor, Poly.  Capacitor, Tantalua.	CONICS PARA LOGAP. COLTUS CONSAS COLUS	Dec. NO Dec. NO 100077-472 100225-152 100077-102 100136-224	1 1 1 9	ML 200521-014
116 117 118 119	CAPACITCA, Poly.  Capacitor, Poly.  Capacitor, Poly.	CONICS PARA LOGAP. COLTUS CONSAS COLUS	D+G. NO. 100077-172	NO. REO.	ML 200521-014
117 118 119 120	Capacitor, Poly.  Capacitor, Poly.  Capacitor, Poly.  Capacitor, Tantalum.  Capacitor, Polyfilm.	OOLTHE . 22uf	Dec. No. 100077-472 100225-152 100077-102 100136-224 100128-154	1 1 9 18 9	DATE 3/2/71 SHEET 18 OF 20.  REMARKS ON CKT. DESIG.  C34.  C301-901.  C106-906. C107-907.  C108-908.
116 117 118 119 120 121	Capacitor, Poly. Capacitor, Poly. Capacitor, Poly. Capacitor, Tantalum. Capacitor, Polyfilm. Resistor, 5%. 1w.	conics PMB L. D/GAP. E	Dec. No. 100077-472 100225-152 100077-402 100136-224 100128-154 100156-331	1 1 9 18 9	DATE 3/2/71 SMEET 18 OF 20.  REMARKS ON CKT. DESIG.  C34.  C41.  C101-901.  C108-906. C107-907.  C108-908.
116 117 118 119 120 121 122	Capacitor, Poly.  Capacitor, Poly.  Capacitor, Poly.  Capacitor, Tantalum.  Capacitor, Polyfilm.	OOLTHE . 22uf	Dec. No. 100077-472 100225-152 100077-402 100136-224 100128-154 100156-331	1 1 9 18 9	DATE 3/2/71 SHEET 18 OF 20.  REMARKS ON CKT. DESIG.  C34.  C301-901.  C106-906. C107-907.  C108-908.
116 117 118 119 120 121 122 123 124	Capacitor, Poly. Capacitor, Poly. Capacitor, Poly. Capacitor, Tantalum. Capacitor, Polyfilm. Resistor, 5%. 1w.	conics PMB L. D/GAP. E	Dec. No. 100077-472 100225-152 100077-402 100136-224 100128-154 100156-331	1 1 9 18 9	DATE 3/2/71 SMEET 18 OF 20.  REMARKS ON CKT. DESIG.  C34.  C41.  C101-901.  C108-906. C107-907.  C108-908.
116 117 118 119 120 121 122 123 124	Capacitor, Poly. Capacitor, Poly. Capacitor, Poly. Capacitor, Tantalum. Capacitor, Polyfilm. Resistor, 5%. 1w.	conics PMB L. D/GAP. E	Dec. No. 100077-472 100225-152 100077-402 100136-224 100128-154 100156-331	1 1 9 18 9	DATE 3/2/71 SMEET 18 OF 20.  REMARKS ON CKT. DESIG.  C34.  C41.  C101-901.  C108-906. C107-907.  C108-908.
116 117 118 119 120 121 122 123 124 125	Capacitor, Poly.  Capacitor, Poly.  Capacitor, Poly.  Capacitor, Tantalum.  Capacitor, Polyfilm.  Resistor, 5%. 1%.  Resistor. "	conics PMB L. D/GAP. E	Dec. No	1 l 9 18 9 1 1 18	ML 200521-014  DATE 3/2/71 SMEET 18 07 20.  REMARKS ON CKT. DESIG.  C34.  C101-901.  C106-906. C107-907.  C108-908.  RB.  R115-915. R116-916.
116 117 118 119 120 121 122 123 124 125 127	DRAWING TITL  Capacitor, Poly.  CAPACITOR, Poly.  Capacitor, Poly.  Capacitor, Tantalum.  Capacitor, Polyfilm.  Resistor, 5%. iv.  Resistor. " "	conics PMB L. D/GAP. E	100156-334	1 1 9 18 9 1 1 18 A/R	ML 200521-014  DATE 3/2/71 SMEET 18 07 20.  REMARKS ON CKT. DESIG.  C34.  C41.  C101-901.  C106-906. C107-907.  C108-908.  BB.  R115-915. R116-916.
116 116 117 118 119 120 121 122 123 124 125	Capacitor, Poly.  Capacitor, Poly.  Capacitor, Poly.  Capacitor, Tantalum.  Capacitor, Polyfilm.  Resistor, 5%. 1%.  Resistor. "	conics PMB L. D/GAP. E	Dec. No	1 l 9 18 9 1 1 18	ML 200521-014  DATE 3/2/71 SMEET 18 07 20.  REMARKS ON CKT. DESIG.  C34.  C101-901.  C106-906. C107-907.  C108-908.  RB.  R115-915. R116-916.
116 117 118 119 120 121 122 123 124 125 127	DRAWING TITL  Capacitor, Poly.  CAPACITOR, Poly.  Capacitor, Poly.  Capacitor, Tantalum.  Capacitor, Polyfilm.  Resistor, 5%. iv.  Resistor. " "	conics PMB L. D/GAP. E	100156-334	1 1 9 18 9 1 1 18 A/R	ML 200521-014  DATE 3/2/71 SMEET 18 07 20.  REMARKS ON CKT. DESIG.  C34.  C41.  C101-901.  C106-906. C107-907.  C108-908.  BB.  R115-915. R116-916.
116 117 118 119 120 121 122 123 124 125 127	DRAWING TITL  Capacitor, Poly.  CAPACITOR, Poly.  Capacitor, Poly.  Capacitor, Tantalum.  Capacitor, Polyfilm.  Resistor, 5%. iv.  Resistor. " "	conics PMB L. D/GAP. E	100156-334	1 1 9 18 9 1 1 18 A/R	ML 200521-014  DATE 3/2/71 SMEET 18 07 20.  REMARKS ON CKT. DESIG.  C34.  C41.  C101-901.  C106-906. C107-907.  C108-908.  BB.  R115-915. R116-916.
116 116 117 118 119 120 121 122 123 124 125 127	DRAWING TITL  Capacitor, Poly.  CAPACITOR, Poly.  Capacitor, Poly.  Capacitor, Tantalum.  Capacitor, Polyfilm.  Resistor, 5%. iv.  Resistor. " "	conics PMB L. D/GAP. E	100156-334	1 1 9 18 9 1 1 18 A/R	ML 200521-014  DATE 3/2/71 SMEET 18 07 20.  REMARKS ON CKT. DESIG.  C34.  C41.  C101-901.  C106-906. C107-907.  C108-908.  BB.  R115-915. R116-916.
116 116 117 118 119 120 121 122 123 124 125 127	DRAWING TITL  Capacitor, Poly.  CAPACITOR, Poly.  Capacitor, Poly.  Capacitor, Tantalum.  Capacitor, Polyfilm.  Resistor, 5%. iv.  Resistor. " "	conics PMB L. D/GAP. E	100156-334	1 1 9 18 9 1 1 18 A/R	ML 200521-014  DATE 3/2/71 SMEET 18 07 20.  REMARKS ON CKT. DESIG.  C34.  C41.  C101-901.  C106-906. C107-907.  C108-908.  BB.  R115-915. R116-916.
116 117 118 119 120 121 122 123 124 125 127	DRAWING TITL  Capacitor, Poly.  CAPACITOR, Poly.  Capacitor, Poly.  Capacitor, Tantalum.  Capacitor, Polyfilm.  Resistor, 5%. iv.  Resistor. " "	conics PMB L. D/GAP. E	100156-334	1 1 9 18 9 1 1 18 A/R	ML 200521-014  DATE 3/2/71 SMEET 18 07 20.  REMARKS ON CKT. DESIG.  C34.  C41.  C101-901.  C106-906. C107-907.  C108-908.  BB.  R115-915. R116-916.

DRAWING NO.

200521-013

MODEL NO. 16 DATE 12/11/71 SHEET 17 OF 20

C101-901.

0106-906.

C107-907.

C108-908.

NO. REQ.

1 C34.

13	• 7	MATERI	AL LIST		DRAWING NO.	REV.
1	<b>X</b> U =				VIL 200521-009	
DRAW!	ASSI. DATA ELECTRON			19	DATE 3/2/71 SHEET 13 OF	20
ITEM NO.	DRAWING TITLE		D#G. NO.	NO. REQ.	REMARKS ON CKT. DESIG.	
116	Capacitor, Poly.	.0082uf	100077-822	1	C34.	
117						
118	Capacitor, Poly.	.0022uf	100077-222	9	C101-901.	
119	Capacitor, Tantalum.	.68uf	100136-684	18	C106-906. C107-907.	
120	Capacitor, Polyfilm.	.33uf	L00128-334	9	C108-908. %	
121						
122	Resistor. 5%. tw.	330A	100156-331	1	R8.	
123	Resistor. " "	560K OL	100156-564	18	R115-915. R116-916.	
124						
125				L		
126	<del></del>					
127	Wire, Solid Bare.		100051-024	A/R	Jumper Jl. From B to C	
128	Tubing, Teflon.		100226-022	A/R	Jumper J2. From H to P	
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DRAW	MATER  MASSI. DATA ELECTRONICS PHI	3 <b>.</b>		ML DRAWING NO. REV.	1	MATERI  ASSI. DATA ELECTRONICS PAR	AL LIST	_	ML DRAWING NO. 200521-010
TITL	13-16,9 173. TIPE A. D/GAD		,	DATE 3/2/71 SHEET 12 OF 20	DRAW TITE	23-29,9 IPS. TYPE A. D/GAP		1\$	DATE 3/2/71 SHEET 14
ITEM NO.	DRAWING TITLE	DWG, NO.	NO, REQ.	REMARKS ON CKT, DESIG.	ITEM MO.	DRAWING TITLE	DWG. NO.	NO. REQ.	REMARKS ON CKT. DESI
116	Capacitor, Poly0082ui	100077-822	1	С34.	116	Capacitor, Poly0082mf	100077-822	1	C3L.
117			<u> </u>		117				
1118	Capacitor, Poly0033ui	<del></del>	9	C101-901.	118	Capacitor, Poly0015uf	100077-152	9	C101-901.
119	Capacitor, Tantalum68ui	<del></del>	18	C106-906. C107-907.	119	Capacitor, Tantalum	100136-474	18	C106-906. C107-907.
120	Capacitor, Polyfilm	100128-674	9	C108-908.	120	Capacitor, Polyfilm. 27uf	100128-271	9	C108-908.
121		<u> </u>	<u> </u>		121				
1221	Resistor, 5%. tw. 3300	100156-331	1	R8.	122	Resistor. 5%. 4w. 330ft	100156-331	1	R8.
123	Resistor. " 560Kn	100156-564	18	R115-915. R116-916.	-123	Resistor. " 330Kn	100156-334	18	R115-915. R116-916.
124		<u> </u>			124				
125		Ĺ	1		125				
126			I		126				
127	Wire, Solid Bare.	100051-024	A/R	Jumper Jl. From B to C	127	Wire, Solid Bare.	100051-024	A/R ·	Jumper Russ Jl. From B to
128	Tubing, Teflon.	100226-022	A/R	Jumper J2. From M to P	126	Tubing Teflon.	190226-022	A/I	Jumper J2. From M to P.
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DRAWING NO. REV

200521-007

DATE 3/2/71 SHEET 11 OF 20

REMARKS ON CKT. DESIG.

MATERIAL LIST

.015uf 100165-153

.0033uf 100077-332

330 A 100156-331

750KA 100156-754

D#G. NO.

luf 100136-105 18

NO. REQ.

CN.

C101-901.

C108-908.

18 R115-915. R116-916.

100051-02k A/R Jumper Jl. From B to C

100226-022 A/R Jumper J2. From H to P

C106-906. C107-907.

ASST. DATA ELECTRONICS PWB.
10-12.9 IPS. TYPE A. D/GAP. MODEL NO. 19

120 Capacitor, Polyfilm. . . 17uf 100128-474

116 Capacitor, Mylar.

118 Capacitor, Poly.

122 Resistor, 5%, tw.

123 Resistor. " "

127 Wire, Solid Bare.

128 Tubing, Teflon.

121

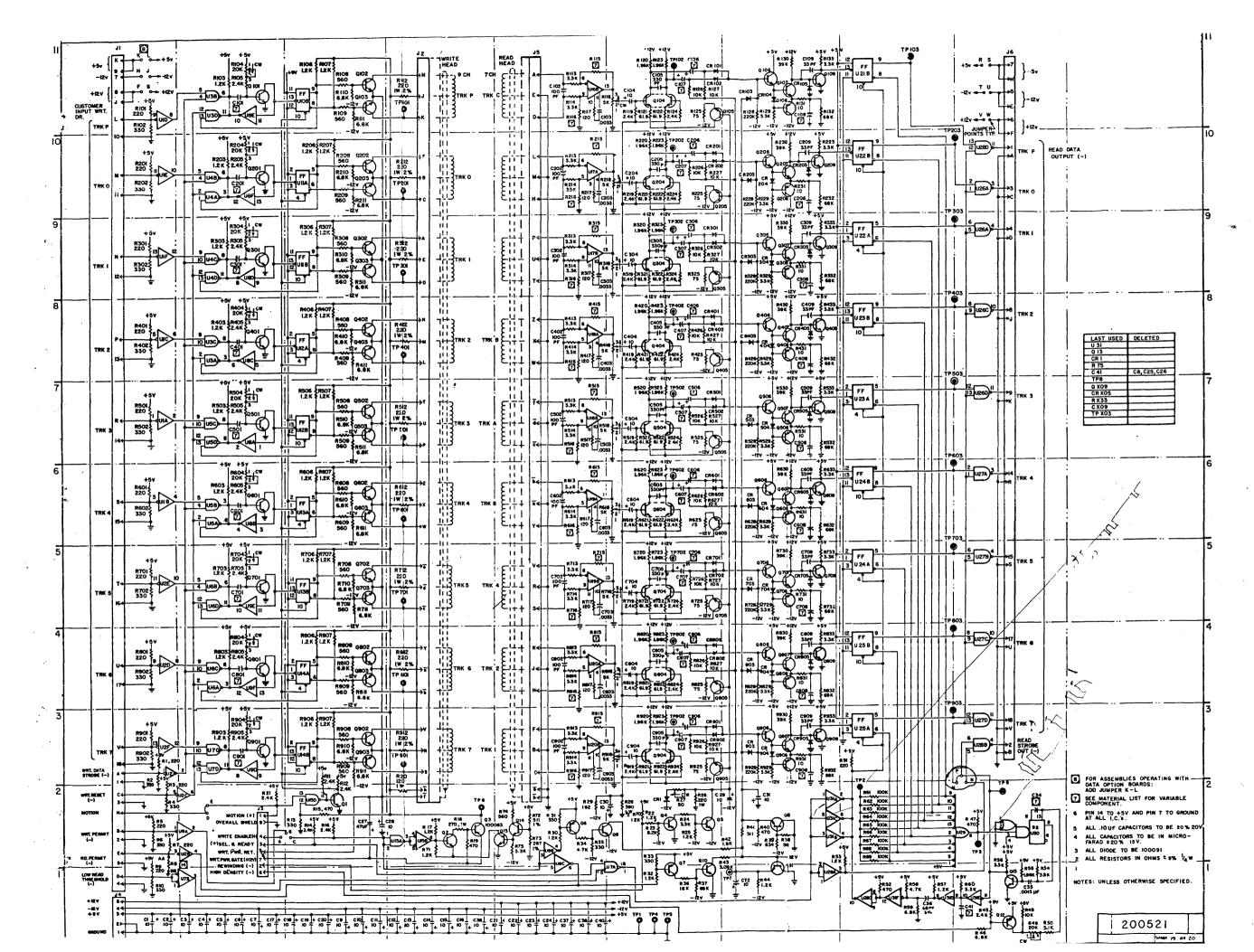
124

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126

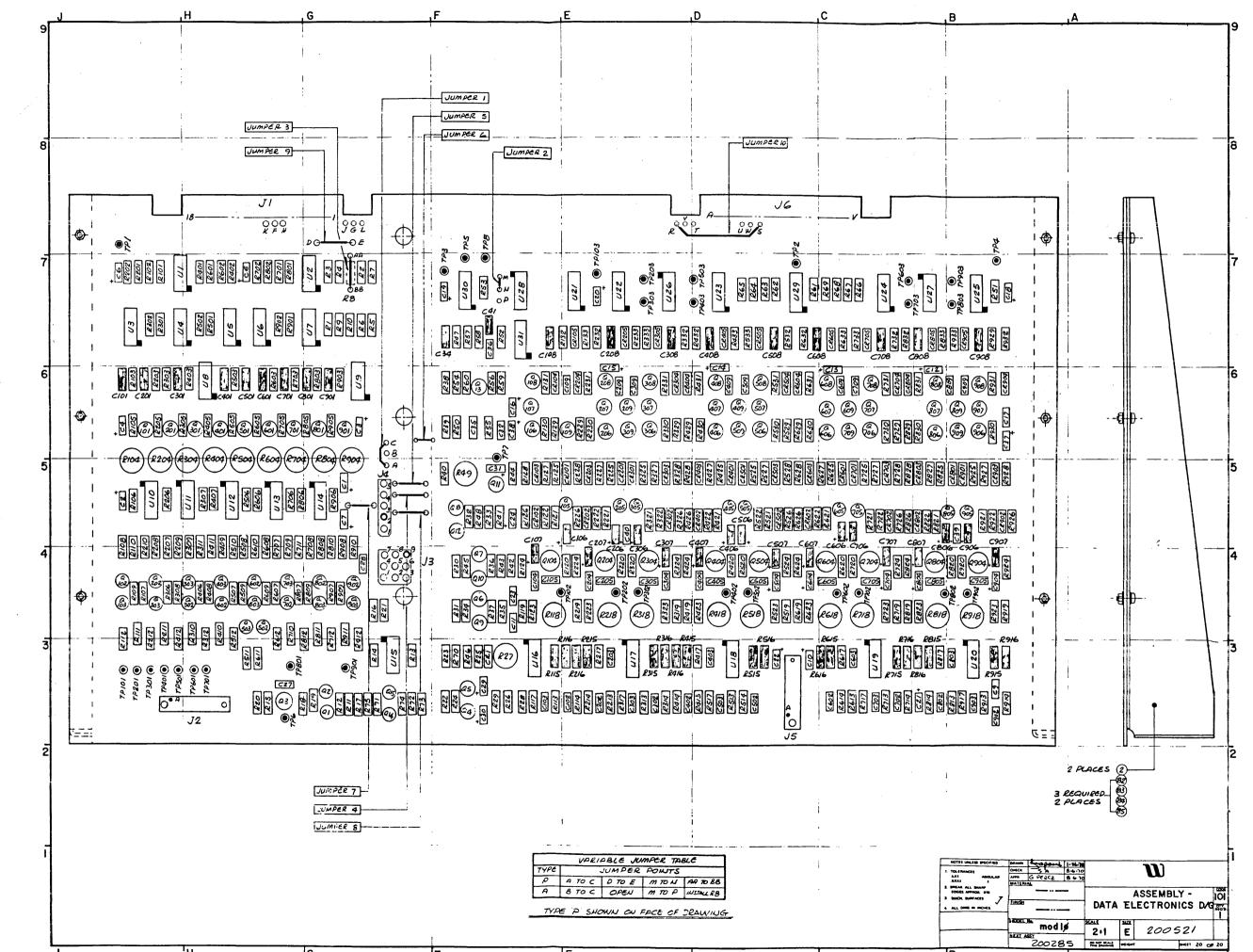
119 Capacitor, Tantalum.

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	!	<u> </u>						
ML 200521-010	1	<u> </u>	MATERI	AL LIST		ML	200521-CJZ.	REV.
DATE 3/2/71 SHEET 11 OF 20	DRAWN TITL	ASSY. DATA ELECTR	ONICS PWE . D/GAP.	MODEL NO	13	DATE 3	/2/71 SHEET 16 0	- 20
REMARKS ON CKT. DESIG.	ITEM MQ.	DRAWING TITL	E	DWG. NO.	NO. REQ.	REM	ARKS ON CKT. DESIG	
J•	116	Capacitor, Poly.	.0047uf	100077-472	1	C34.		
	117							
01-901.	118	Capacitor, Poly.	.00luf	100077-102	9	C101-901	•	
06-906. C107-907.	119	Capacitor, Tantalum.	.22uf	100136-224	18	C106-906	. C107-907.	
08-908.	120	Capacitor, Polyfilm.	.15uf	100128-154	9	C108-908	•	
	121							
	122	Resistor, 5%. 1w.	330 n	100156-331	1 ^	R8.		
5-915. R116-916.	123	Resistor. " "	330K D.	100156-334	18	R115-915	. R116-916.	
	124							
	125							
	126							
per Russ Jl. From B to C	127	Wire, Solid Bare.		100051-024	A/R		1. From B to C	
per J2. From M to P.	128	Turing, Teflon.		100226-022	A/R	Jumper J	2. From M to P	
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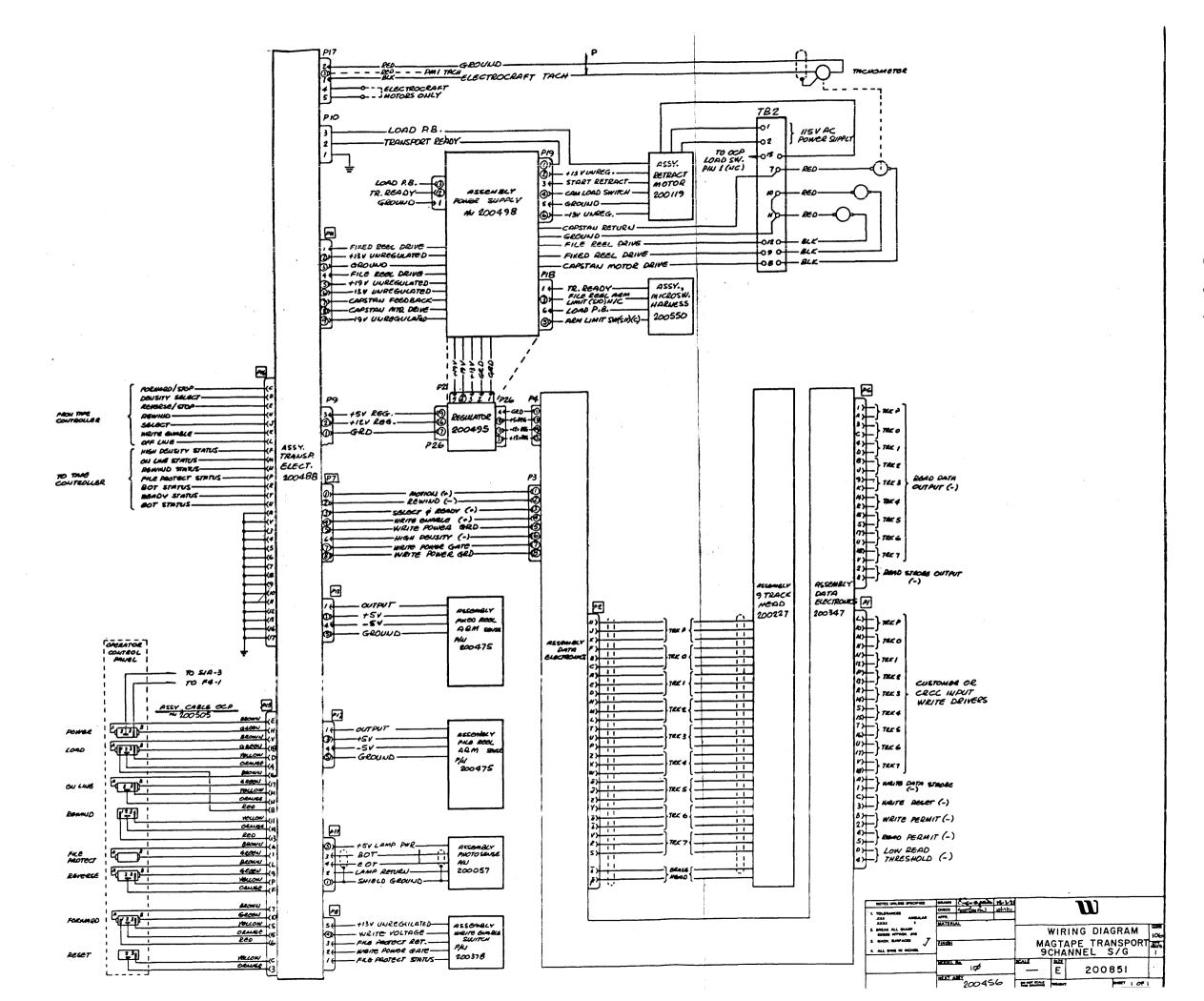


Schematic, Data Electronics, Dual Gap, PWB

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Assembly, Data Electronics, Dual Gap, PWB



Sing Tape Ö Magneti Diagram, Wiring

B-34

