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**AMPEX**

**AUDIO-VIDEO  
SYSTEMS DIVISION**

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**MM-1100  
RECORDER/REPRODUCER**

**DESCRIPTION  
INSTALLATION  
OPERATION  
MAINTENANCE**

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# DESCRIPTION

## GENERAL

This manual contains installation, operation, and maintenance instructions for the Ampex Model Master Maker 1100 Tape Recorder/Reproducer, Ampex part no. 4010210. The standard model MM-1100 provides 16 channels of audio recording/reproducing capabilities, using 2-inch magnetic tape on reels up to 16 inches in diameter. Eight-channel and 24-channel recorder/reproducer systems are available on special order. Any machine may be converted to an alternate configuration (e.g. 16 to 24-channel) by installing a conversion kit. The MM-1100 provides the capability of recording on any or all 16 channels simultaneously, or of monitoring a previously recorded channel while recording in synchronization on additional channels(s). The selective synchronization (SEL SYNC\*) feature is enabled by using the record head(s) of the prerecorded channel as playback head(s).

The MM-1100 recorder/reproducer consists of a tape transport assembly; a transport control assembly, a frame assembly; a motor drive amplifier assembly; a head assembly; four electronics assemblies (for 16-channel systems); a control box assembly; a meter panel assembly; two power supplies; a fan assembly; an external connector panel assembly; an input/output adapter panel assembly; and a circuit breaker assembly. Connectors are used extensively between units to allow easy removal of components and assemblies.

## TAPE TRANSPORT ASSEMBLY

The tape transport assembly, Figure 1, consists of supply and takeup reel assemblies; a capstan drive assembly; a capstan pinch roller assembly; a tension sensor assembly; an end-of-tape arm and housing assembly; a tape lifter assembly; and an optional tape timer assembly; Also mounted on the tape transport, but not considered part of the tape transport, are the erase, record, and reproduce heads comprising the head assembly.

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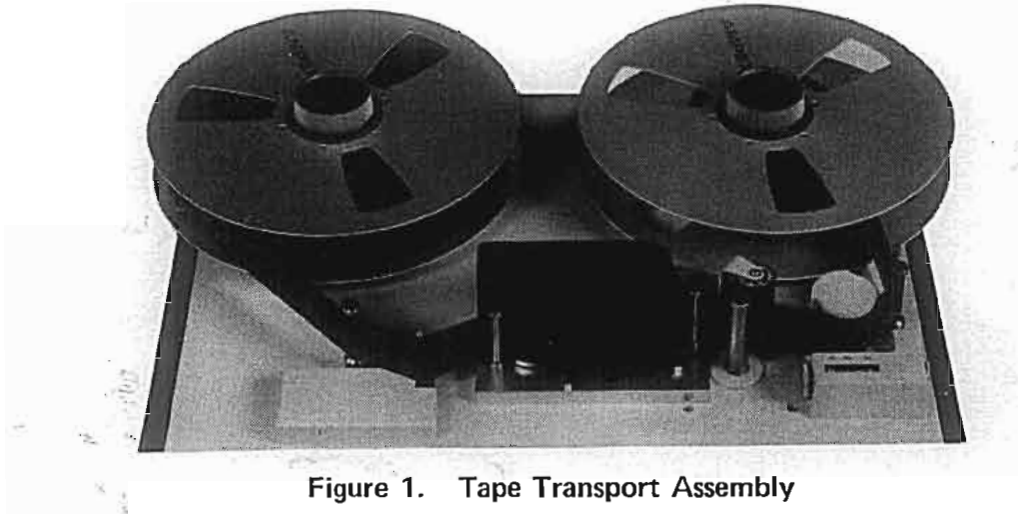


Figure 1. Tape Transport Assembly

## SUPPLY AND TAKEUP REEL ASSEMBLIES

The supply and takeup reel assemblies each consist of a split phase, four-pole ac torque motor and brake assembly. The motors drive the tape reel turntables. A motion sense assembly is mounted on the bottom of the supply reel drive motor and shares the turntable shaft. These assemblies can be removed through the top of the transport deck for servicing.

## CAPSTAN DRIVE ASSEMBLY

The capstan drive assembly consists of a dc servo-controlled motor and a tachometer wheel. The shaft of the motor is the capstan for the tape transport. The tachometer wheel assembly consists of a pickup coil and inner and outer tach (gear) wheels mounted on the motor shaft and housing. The use of both inner and outer tachs minimizes flutter introduced by tach irregularities.

## CAPSTAN PINCH ROLLER

The capstan pinch roller consists of a solenoid-operated, shaft-mounted arm. The arm supports a rubber pinch roller fitted with ball bearings at each end of the pinch roller shaft. An adjustable pressure spring is used to maintain the necessary force of the pinch roller against the capstan.

## TENSION SENSOR ASSEMBLY

The tension sensor assembly consists of two selenium photovoltaic cells and an incandescent lamp mounted on a fixed bracket. The three active components are wired to a connector plug

that interconnects with the transport harness. A moving window is fixed to a tension arm in the tape path which passes an amount of light proportional to the tape tension from the lamp to the photocells.

### **END-OF-TAPE ARM**

The end-of-tape arm is contained in a housing and consists of a spring-loaded tension arm assembly fitted with a tape guide at the free end. The post to which the tension arm is attached extends through the transport chassis and is mechanically coupled to a dashpot to dampen the spring-loaded effect. The tension arm post is also equipped with an actuator that trips a microswitch which signals that there is no tape pressure against the tension arm.

### **TAPE LIFTER ASSEMBLY**

The tape lifter assembly is a solenoid-operated, spring-return pivoted assembly. The tape lifter pins extend up through the head assembly mounting block and are moved forward of the head assembly when the solenoid is actuated. Unless defeated by the operator, the tape lifters function during the fast forward and rewind modes.

### **TAPE TIMER ASSEMBLY (OPTIONAL)**

The tape timer assembly consists of a tape-driven idler assembly attached to a mounting boss. The timer idler drives a gear train arrangement, which, in turn, drives a mechanical time counter. The counter indicates tape travel time in hours, minutes and seconds. If the tape timer option is not used, a fixed post is fitted in its place.

## **TRANSPORT CONTROL ASSEMBLY**

The transport control assembly is an enclosed chassis with a hinged lift-up cover, which contains two separate printed circuit board assemblies and an extender board. The transport control board and the capstan servo board plug into 56-pin connector receptacles J1 and J2, respectively. The extender board plugs into spare receptacle J3. The board receptacles are hard-wired to a connector cable harness that interconnects with the transport assembly, the electronics assembly, the remote control connector on the input power panel, and the tachometer. The transport control assembly is mounted to the rear of the meter panel assembly, adjacent to the control box assembly.

## MOTOR DRIVE AMPLIFIER ASSEMBLY

The motor drive amplifier (MDA), is a completely enclosed chassis that mounts on the right side of the rear panel. The MDA assembly contains a printed circuit board mounted on the chassis with five heatsinks for power transistors. A chassis connector is provided for interconnection of power and control signals. Three separate MDA's are enclosed, two for the reel motors and one for the capstan motor.

## HEAD ASSEMBLY

The head assembly (Figure 2) contains three 16-channel head stack assemblies: the erase head, the record head, and the reproduce head. The head assembly accepts 2-inch wide recording tape to provide 16-channel record, reproduce, and erase capabilities. The record and reproduce head stacks are magnetically shielded with laminated mu-metal. A hinged head shield cover is block-mounted in front of the record and reproduce heads. In addition, two precision tape guides are mounted adjacent to the erase head on one end and the reproduce head at the other end. The record and reproduce heads are identical, and are of a design which provides Sel-Sync response comparable to that of conventional reproduce heads.

## ELECTRONICS ASSEMBLIES

Four electronics assemblies are required to make up the total complement of 16 channels. Each electronics assembly (Figure 3) comprises four channels of the 16-channel recorder and

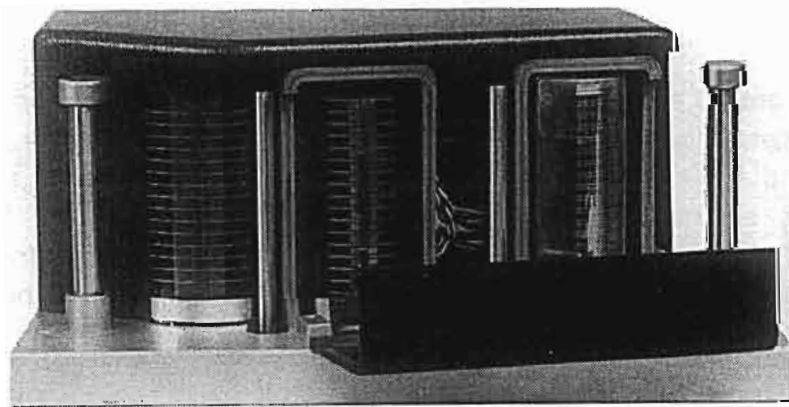
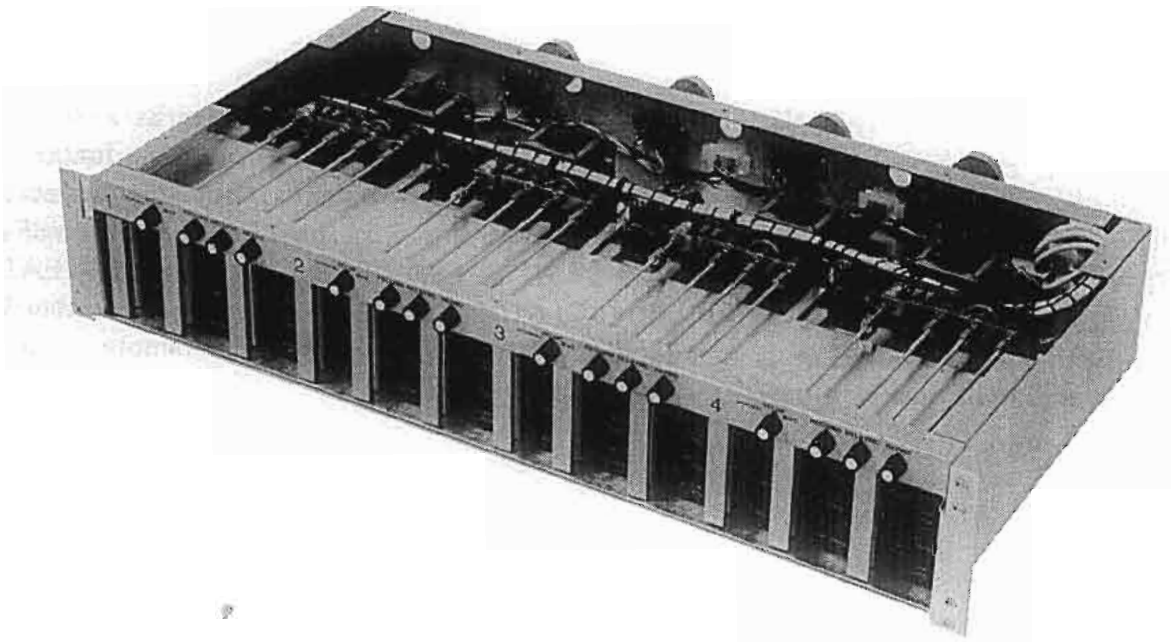


Figure 2. Head Assembly





**Figure 3. Electronics Assembly**

consists of four audio switching printed circuit boards. Each audio switching board contains three 24-pin printed board receptacles. The bias amplifier, record amplifier, and reproduce amplifier boards plug into the receptacles on the audio switching board. A 30-pin connector connects each audio switching board with the rest of the electronics. Three potentiometers and a switch on each audio switching board are mechanically coupled by shaft extenders to the front panel to provide switching and adjustment of Sel-Sync, reproduce, and record levels. Normally, knobs are provided for these controls. However, if desired, the knobs may be removed and the exposed shafts recessed for screwdriver adjustment only. Protrusion of the shafts is governed by adjusting the shaft coupler.

Each record and reproduce board contains a 10-pin printed circuit board receptacle for a plug-in equalization board. The equalization boards plug in at right angles to the record and reproduce boards so that the board adjustment controls are accessible at the front panel of the electronics assembly. The rear panel contains all necessary input/output connectors. Each electronics assembly (4 channels) is fitted with an individual 2A slow blow fuse for protection of the 39-V supply, located on the rear of the assembly. A line bridging transformer is provided and is inserted in the INPUT ACCESSORY socket on the rear panel of the electronics assembly.

## CONTROL BOX ASSEMBLY

The control box assembly (Figure 4) is a removable assembly that doubles as a remote control unit. The control box contains the controls and indicators for all operating functions of the recorder. There are 16 SAFE/READY rocker switches which select the particular channel(s) to record on or reproduce from. Other control box assembly switches are: SEL SYNC/REPRO, INPUT MON/NORM MON, TAPE SPEED 15/30, LIFTER DEFEAT, RECORD, PLAY, REWIND, FAST FORWARD, and STOP. When the control box assembly is used as a remote control unit, it is connected by a cable assembly to the remote control connector on the input power panel on the rear of the recorder.

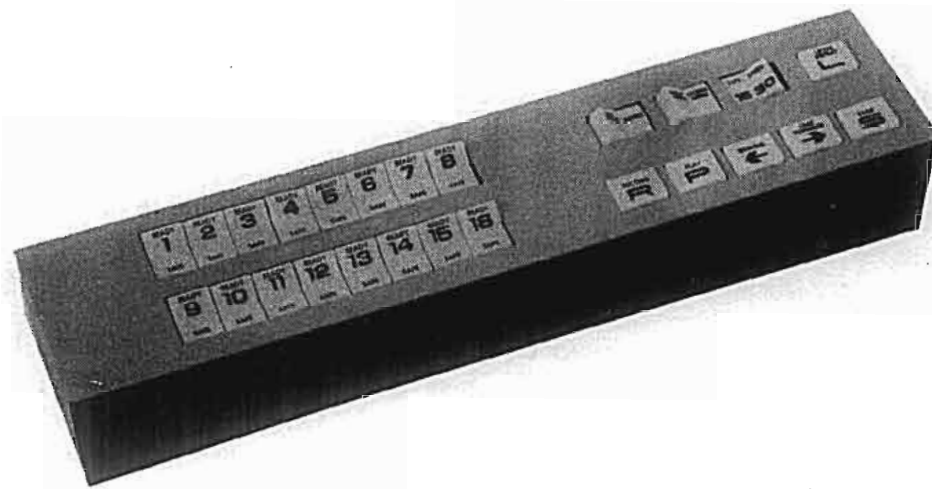


Figure 4. Control Box Assembly

## METER PANEL ASSEMBLY

The meter panel assembly is comprised of 16 individual vu meters, one meter per channel. The meter panel tilts into three different positions, the last of which is with the meters tilted down for lamp replacement. A cable harness provides interconnection to the electronics assembly.

## POWER SUPPLIES

A 15/27-volt power supply and a 39-volt power supply are mounted on the rear panel of the recorder, with the 39-volt supply on top. Basically, each power supply consists of a transformer, filter capacitors, transistors with heatsinks, a regulator board, and output connectors. In addition, the 39-volt supply contains a bias/erase oscillator for the electronics. The main difference between the units is the regulator printed circuit board which plugs into the power supply chassis.

## SPECIFICATIONS

Specifications for the MM-1100 are presented in Table 1.

Table 1. Specifications

| PARAMETER    | SPECIFICATION   |
|--------------|---|
| Tape Widths  | 1 inch for 8-track systems<br>2 inch for 16 or 24-track systems   |
| Tape Speeds  | 15 and 30 in/s  |
| Reel Size    | NAB hub up to 16-inch diameter  |
| Inputs       | 20 kilohms balanced input. Accepts line levels from -17 dBm to produce recommended operating level.                                 |
| Outputs      | 600-ohm load balanced or unbalanced with nominal output level of +4 dBm and maximum output of +27 dBm, nominal.                     |
| Equalization | Automatically switched with speed change, using NAB plug-in equalization circuits [IEC (CCIR) plug-in circuits available on order]. |
| Electronics  | All electronics are solid-state. Plug-in printed circuit boards for record, reproduce, equalization, and bias amplifiers.           |

Table 1. Specifications (Continued)

| PARAMETER   | SPECIFICATION  |
|---|--|
| Power Supplies  | 39 vdc regulated (electronic system)<br>+27 vdc, +15 vdc and +5 vdc (servo and control system)   |
| Electronic Overload Margin  | Record Amplifier: Overload greater than 28 dB above normal operating level   |
| Overall Frequency Response, Sel-Sync and Reproduce Modes  | 30 in/s: $\pm 2$ dB, from 50 Hz to 18 kHz<br>15 in/s: $\pm 2$ dB, from 30 Hz to 15 kHz   |
| Signal-to-Noise Ratio<br><br>Using Ampex 406 tape or equivalent at 15 or 30 in/s<br><br>Using Ampex 404 tape or equivalent at 15 or 30 in/s | 8 or 16 channels, 63 dB; 24 channels, 58 dB; peak record level to unweighted (30 Hz to 18 kHz) noise; includes bias, erase, and reproduce amplifier noise. (Peak record level corresponds to a tape flux of 520 nWb/m.)<br><br>8 or 16 channels, 60 dB; 24 channels, 55 dB; peak record level to unweighted (30 Hz to 18 kHz) noise; includes bias, erase, and reproduce amplifier noise. (Peak record level corresponds to a tape flux of 370 nWb/m.) |
| Third Harmonic Distortion   | 30 or 15 in/s: 1000 Hz<br><br>1. Using Ampex 406 tape or equivalent, $\leq 1.0\%$ at recorded flux level 3 dB above 185 nWb/m (Ampex operating level).<br><br>2. Using Ampex 404 tape or equivalent, $\leq 1.0\%$ at recorded flux level of 185 nWb/m (Ampex operating level).   |
| Even Order Harmonic Distortion  | At 1000 Hz, $\leq 0.3\%$ at a recorded level corresponding to 6 dB above a tape flux of 185 nWb/m.   |
| Bias/Erase Frequency  | 150 kHz $\pm 2\%$  |
| Erase Depth   | At 1000 Hz, peak record level signal erased to -75 dB minimum on channel(s) selected   |

Table 1. Specifications (Continued)

| PARAMETER            | SPECIFICATION  |                       |                 |                       |            |                 |            |                 |
|----------------------|--|-----------------------|-----------------|-----------------------|------------|-----------------|------------|-----------------|
| Flutter              | 15 and 30 in/s: 0.08% peak weighted per ANSI S4.3/DIN 45507, in a band 0.5 to 200 Hz, while reproducing a 3150 Hz signal. (0.08% NAB unweighted; 0.1% peak unweighted.)  |                       |                 |                       |            |                 |            |                 |
| Crosstalk            | -50 dB minimum for 8 or 16 channels at 500 Hz<br>-45 dB minimum for 24 channels at 500 Hz  |                       |                 |                       |            |                 |            |                 |
| Timing Accuracy      | ±0.1% (1.8 seconds in a 30-minute record time) for tape recorded, rewind, and reproduced on the same unit  |                       |                 |                       |            |                 |            |                 |
| Tape Position Index  | Reads hours, minutes, and seconds, with repeat accuracy of ±0.1% at 15 ips.  |                       |                 |                       |            |                 |            |                 |
| Tape Speed Accuracy  | Within ±0.05% from beginning to end of reel. Tape speed unaffected by line voltage or line frequency fluctuations (per NAB Standard on Magnetic Recording and Reproduction, 1965, Section 2.02.01)   |                       |                 |                       |            |                 |            |                 |
| Reference Oscillator | ±0.01%, 0 degrees C to 65 degrees C  |                       |                 |                       |            |                 |            |                 |
| Heads                | 8, 16, and 24 tape stacks are non-adjustable precision-mounted   |                       |                 |                       |            |                 |            |                 |
| Start Time           | Full speed within 0.5 seconds at 15 ips  |                       |                 |                       |            |                 |            |                 |
| Rewind Time          | 2.0 minutes for 10.5-inch reel of 1.5-mil tape   |                       |                 |                       |            |                 |            |                 |
| Power Requirements   | <p>105 to 125 vac, 48 to 62 Hz</p> <table data-bbox="711 1465 1458 1570"> <tr> <td>MM-1100-8</td> <td>8.0 kVA maximum</td> <td rowspan="3">} without accessories</td> </tr> <tr> <td>MM-1100-16</td> <td>1.0 kVA maximum</td> </tr> <tr> <td>MM-1100-24</td> <td>1.2 kVA maximum</td> </tr> </table> | MM-1100-8             | 8.0 kVA maximum | } without accessories | MM-1100-16 | 1.0 kVA maximum | MM-1100-24 | 1.2 kVA maximum |
| MM-1100-8            | 8.0 kVA maximum  | } without accessories |                 |                       |            |                 |            |                 |
| MM-1100-16           | 1.0 kVA maximum  |                       |                 |                       |            |                 |            |                 |
| MM-1100-24           | 1.2 kVA maximum  |                       |                 |                       |            |                 |            |                 |

# **INSTALLATION**

## **EQUIPMENT SITING**

The installation site for the MM-1100 should be free of strong electromagnetic and electrostatic fields which could interfere with or degrade system operation. The environment should be reasonably dust-free; ambient temperature should be from 32 to 122 degrees F (0 to 50 degrees C); relative humidity should be 10 to 90 percent; and no less than six inches of ventilation space should be left behind the machine. The system requires 28 by 27 inches of floor space, plus access and reel clearances.

## **UNPACKING**

Upon receipt, examine the shipping crate for any signs of damage. Unpack the equipment and inspect for physical damage. Check the packing list to determine that all items have been received. Immediately report any damages (retain the shipping carton) and shortages to the Ampex distributor and the transportation company. Remove all materials (adhesive tape, rubber bands, etc.) used to secure tape-handling and other moving components during shipment.

## **POWER REQUIREMENTS**

The MM-1100 requires 115 volts at 50 or 60 Hz. Power is connected by a grounding-type (three-prong) plug.

### **CAUTION**

**BE SURE THE POWER PLUG IS PROPERLY GROUNDED  
BY MEANS OF THE CENTER PRONG.**

## CABLE CONNECTIONS

Audio signals are connected to and from the MM-1100 by the rear panel connectors shown in Figure 5. The connectors are three-conductor XLR-type; females are used for the input connections, while males are used for the output connections. The mating plugs are user-supplied, XLR-type, and should be used with shielded-pair audio cable to provide input and output connections to the MM-1100. Refer to Table 1 for input and output level and impedance specifications.

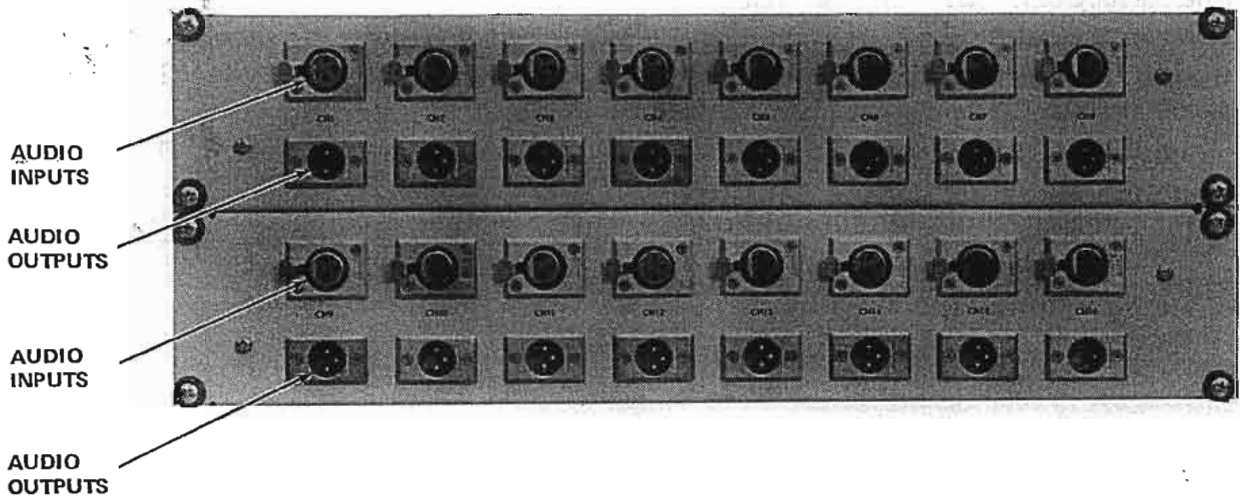


Figure 5. MM-1100 Input and Output Connectors

# OPERATION

## CONTROLS AND INDICATORS

Operator controls and indicators are provided on the system control box, the individual electronics assemblies, and the meter panel. (Refer to Figure 6.) The control box is shown in Figure 7 and described in Table 2. The electronics controls are shown in Figure 8 and described in Table 3.

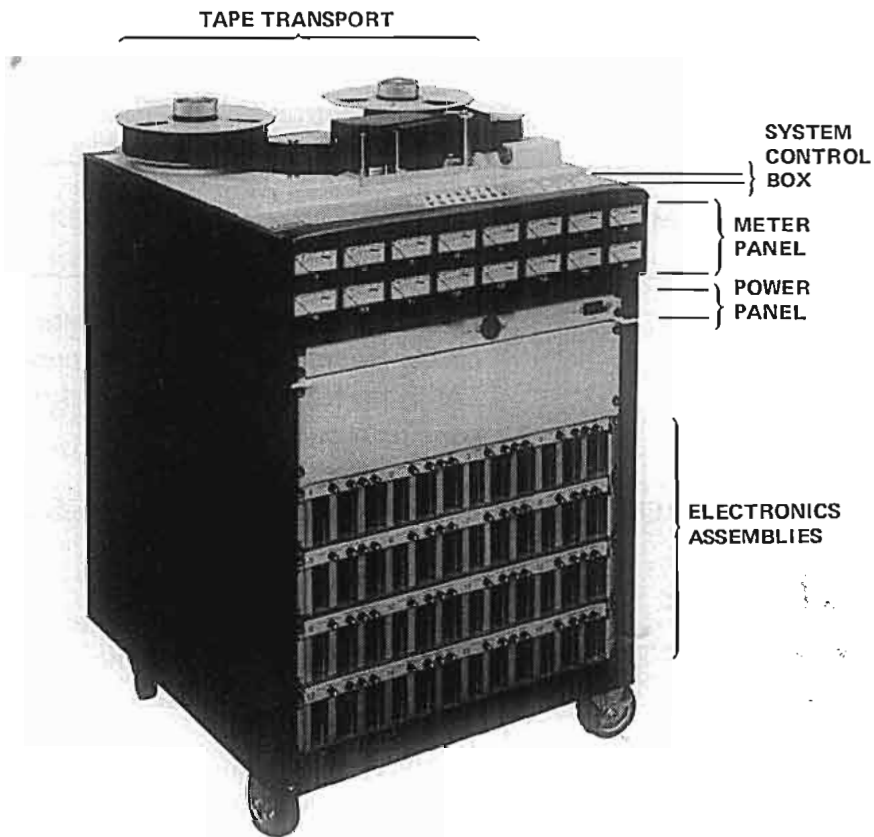


Figure 6. Location of System Components



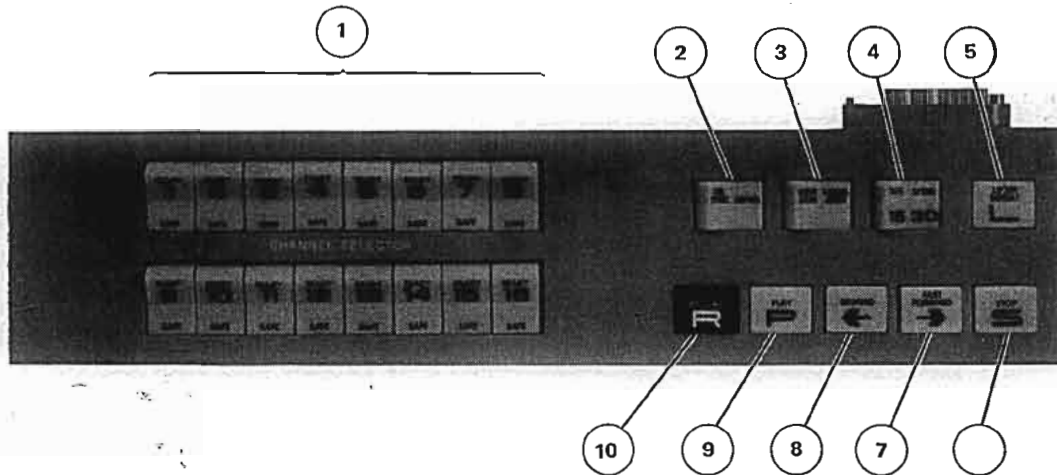


Figure 7. System Control Box, Controls and Indicators

Table 2. System Control Box, Controls and Indicators

| FIG. 7<br>INDEX NO. | NAME                               | FUNCTION   |
|---------------------|------------------------------------|--|
| 1                   | READY/SAFE rocker switches         | Permit channel selection for recording. In READY, enable recording on the corresponding channel. In SAFE, no recording is permitted on the corresponding channel.  |
| 2                   | SEL SYNC/REPRO rocker switch       | In SEL SYNC, causes all channels to reproduce from the record heads.<br><br>In REPRO, causes all channels to reproduce from the reproduce heads. (Sel Sync operation is described later in this section.)                  |
| 3                   | INPUT MON/NORMAL MON rocker switch | In INPUT MON, causes the audio input to be connected directly to the audio output of those channels with their READY/SAFE switches set to READY. In NORMAL MON, causes all audio outputs to be derived from off-tape only. |

Table 2. System Control Box, Controls and Indicators (Continued)

| FIG. 7<br>INDEX NO. | NAME                                 | FUNCTION   |
|---------------------|--------------------------------------|--|
| 4                   | TAPE SPEED 15/30<br>rocker switch    | Permits selection of tape speed.   |
| 5                   | LIFTER DEFEAT push-<br>button switch | Defeats operation of the tape lifters so that the tape may be monitored during the fast forward and rewind modes, and lifted from the heads in play and stop modes   |
| 6                   | STOP pushbutton switch               | Stops the transport from any operating mode. Also used to halt the recording of all channels without stopping the transport if the RECORD pushbutton is held while the STOP pushbutton is momentarily pressed  |
| 7                   | FAST FORWARD<br>pushbutton           | Causes the tape to move forward in the fast mode   |
| 8                   | REWIND pushbutton<br>switch          | Causes the tape to reverse in the fast mode  |
| 9                   | PLAY pushbutton switch               | Places the system in the reproduce mode  |
| 10                  | RECORD pushbutton<br>switch          | Pressed simultaneously with the PLAY pushbutton to place the system in the record mode. Only those channels with their READY/SAFE switches set to READY will record; those with the switch in the SAFE position will reproduce using the head selected by the SEL SYNC/NORMAL switch |

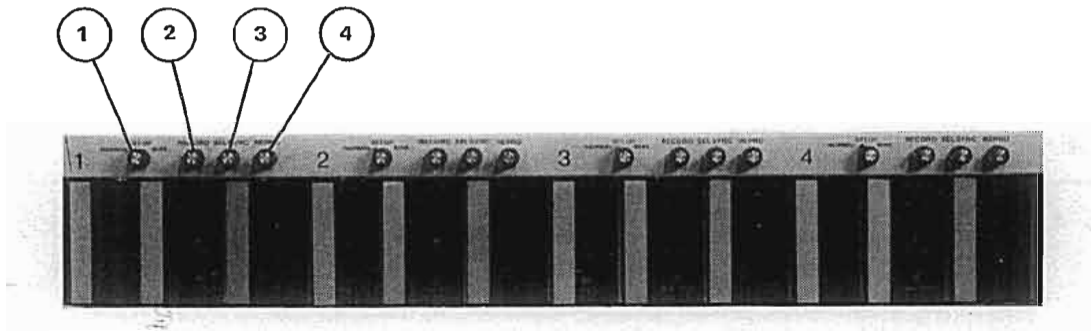


Figure 8. Electronics Module Controls

Table 3. Electronics Module Controls

| FIG. 8<br>INDEX NO. | NAME                         | FUNCTION   |
|---------------------|------------------------------|--|
| 1                   | NORMAL/SET UP/BIAS<br>switch | In NORMAL, vu meter monitors the reproduce out-<br>put; in the record mode, vu meter monitors the input.<br><br>In SET UP, causes the system to reproduce while<br>in the record mode with the reproduced audio<br>output connected to the vu meter.<br><br>In BIAS, connects the output of the bias amplifier<br>to the vu meter. |
| 2                   | RECORD control               | Adjusts the level of the signal being recorded   |
| 3                   | SEL SYNC control             | Adjusts the level of the reproduced signal when<br>the SEL SYNC/REPRO switch is in the SEL SYNC<br>position (Sel Sync mode).   |
| 4                   | REPRO control                | Adjusts the level of the reproduce signal when<br>the SEL SYNC/REPRO switch is in the REPRO<br>position (normal reproduce mode)  |

## OPERATING PROCEDURES

### MAKING A RECORDING – WITHOUT SEL SYNC

To make a recording without using the Sel-Sync feature, proceed as follows:

1. If necessary, clean and demagnetize the tape path as described in the Maintenance section.
2. To apply power to the system, open the cabinet front doors and place the POWER switch (in the upper right corner) to ON.
3. If not previously done, calibrate the reproduce amplifier levels as described in the Maintenance section.
4. Thread a bulk-erased reel of tape onto the transport as shown in Figure 9, and close the head gate.

#### NOTE

It is good practice to bulk-erase all tape prior to using it for recording.

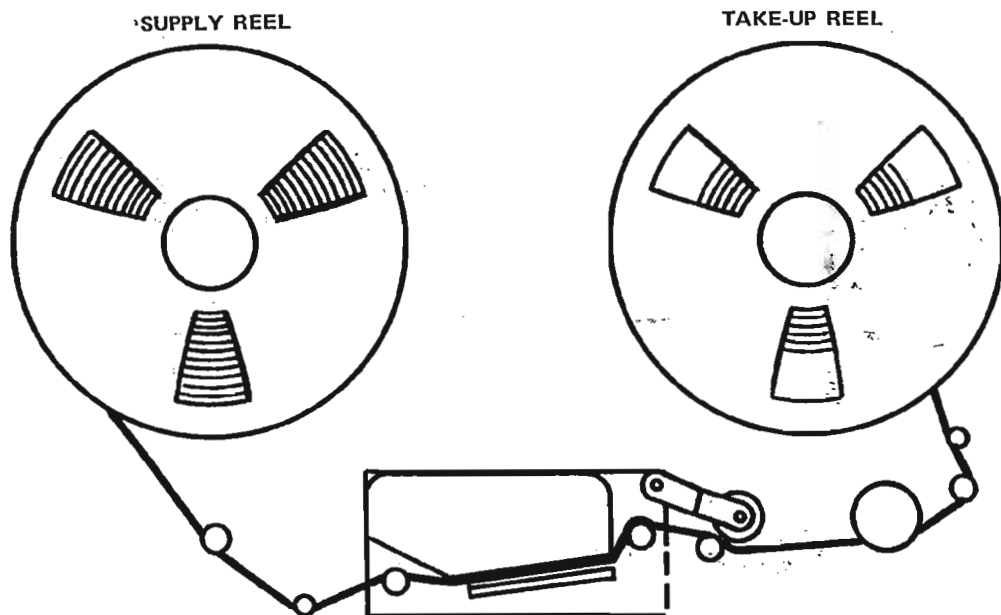


Figure 9. Tape Threading Path

5. On the system control box:
  - a. Set the TAPE SPEED switch to the desired recording speed.
  - b. Set the INPUT MON/NORM MON switch to NORM MON.
  - c. Set the SEL SYNC/REPRO switch to REPRO.
  - d. Set the READY/SAFE switches of those channels to be recorded to the READY position; all others to SAFE.
6. Open the front cabinet doors and set the NORMAL/SET UP/BIAS switch of the channels to be recorded to the SET UP position.
7. With the audio sources connected to the appropriate channel inputs, perform a test or rehearsal run by simultaneously pressing the PLAY and RECORD switches. During this test run, adjust the appropriate individual RECORD level controls (on the electronics assemblies) to obtain audio peaks of 0 vu on the corresponding vu meters.
8. When each of the RECORD level controls has been properly adjusted, press the STOP switch to halt the transport.
9. On the electronics modules, set the NORMAL/SET UP/BIAS switches to NORMAL.
10. Re-cue the tape at the beginning and initiate the record mode by pressing the PLAY and RECORD switches simultaneously.
11. The record mode can be halted by any of the following methods:
  - a. If it is desired to halt recording on all channels without stopping the transport, hold the RECORD switch and momentarily press the STOP switch.
  - b. If it is desired to halt recording on a selected channel(s), place the corresponding READY/SAFE switch(es) in the SAFE position.
  - c. If it is desired to halt the transport, press the STOP switch.

#### **MAKING A RECORDING – WITH SEL SYNC**

To make a recording using the Sel-Sync Feature, proceed as follows (Sel-Sync operation is described later in this section).

1. If necessary, clean and demagnetize the tape path as described in the Maintenance section.
2. To apply power to the system, open the cabinet front doors, and place the POWER switch (in the upper right corner) to ON.
3. If not previously done, calibrate the reproduce amplifier levels as described in the Maintenance section.
4. Thread the master tape onto the transport as shown in Figure 9 and close the head gate.
5. On the system control box:
  - a. Set the TAPE SPEED switch to the desired recording speed.
  - b. Set the INPUT MON/NORM MON switch to NORM MON.
  - c. Set the SEL SYNC/REPRO switch to SEL SYNC.
  - d. Set the READY/SAFE switches of the channel(s) to be recorded to the READY position; all others to SAFE.
6. Connect monitoring facilities (headphones or loudspeaker) to the outputs of the channel(s) to be monitored. Refer to Table 1 for output specifications.
7. Open the front cabinet doors and set the NORMAL/SET UP/BIAS switches of the channel(s) to be recorded to the SET UP position.
8. With the audio sources connected to the appropriate channel inputs, perform a test or rehearsal run by simultaneously pressing the PLAY and RECORD switches. During this test run, adjust the appropriate individual RECORD level controls (on the electronics assemblies) to obtain audio peaks of 0 vu on the corresponding vu meters.
9. When each of the RECORD level controls has been properly adjusted, press the STOP switch to halt the transport.
10. On the electronics assemblies, set the NORMAL/SET UP/BIAS switches to NORMAL.
11. Re-cue the tape at the beginning of the master tape and initiate the recording mode by simultaneously pressing the PLAY and RECORD switches. In this mode, the audio reproduced is in exact sync with that being recorded.

12. The record mode can be halted by any of the following methods:
  - a. If it is desired to halt recording on all channels without stopping the transport, hold the RECORD switch and momentarily press the STOP switch.
  - b. If it is desired to halt recording on a selected channel(s), place the corresponding READY/SAFE switch(es) in the SAFE position.
  - c. If it is desired to halt the transport, press the STOP switch.

## REPRODUCING A PREVIOUSLY RECORDED TAPE

Reproduce tape as follows:

1. If necessary, clean and demagnetize the tape path as described in the Maintenance section.
2. To apply power to the system, open the cabinet front doors and place the POWER switch (in the upper right corner) to the ON position.
3. Thread the tape to be reproduced onto the transport as shown in Figure 9, and close the head gate.
4. On the system control box:
  - a. Set the TAPE SPEED switch to the required tape speed.
  - b. Set the INPUT MON/NORM MON switch to NORM MON.
  - c. Set the SEL SYNC/REPRO switch to REPRO.
  - d. Set all READY/SAFE switches to SAFE.
  - e. Press the PLAY switch.
5. Adjust the appropriate REPRO level controls (on the electronics assemblies) to obtain the desired audio level.
6. Press the STOP switch to terminate the reproduce operation. If the tape supply is exhausted before the operator halts operation, the transport will automatically halt.

## FAST WINDING

For tape editing or cueing, the tape is rapidly wound by pressing the REWIND or FAST FORWARD switch. The switches can be pressed alternately without first stopping tape motion. When the desired point on the tape is reached, press the STOP switch to halt the tape. If the tape runs off either reel, the transport will automatically stop. The REWIND and FAST FORWARD switches can be pressed while in the record or reproduce modes without first stopping the tape; however, the PLAY switch must be pressed in order to enter the record mode (i.e., pressing the PLAY and RECORD switches simultaneously).

A tape-lifter mechanism, which automatically lifts the tape off the heads during fast winding, can be prevented from operating by means of the LIFTER DEFEAT switch. Holding the LIFTER DEFEAT switch permits monitoring of the reproduced audio during the fast wind modes for cueing purposes. It is good practice to avoid unnecessary use of this feature to minimize head wear. Alternatively, during play or stop modes holding the LIFTER DEFEAT switch will cause the tape to be lifted away from the heads.

## SEL SYNC OPERATION

The main function of the Sel-Sync feature is to enable the recording of material precisely in step with previously recorded material. In conventional multi-track recorder/reproducer systems, the different physical locations of the record and reproduce heads along the tape path cause a timing error between material being reproduced on one channel and material being recorded on another. This set-up is shown in the upper diagram of Figure 10 where the material is recorded a fraction of a second before it is reproduced. The result is that the listener who is reproducing one channel (refer to the center diagram of Figure 10) while recording another in step, ends up with the newly recorded track slightly behind the previously recorded track.

The solution to this problem is the Sel-Sync mode of operation. As shown in the lower diagram of Figure 10, a channel placed in the Sel-Sync mode causes the previously recorded audio to be reproduced by the record head and fed to the audio output, thereby eliminating the timing error caused by a displaced reproduce head. When a pre-recorded channel is monitored in this mode, the listener can record on another channel (or channels) while maintaining synchronism.



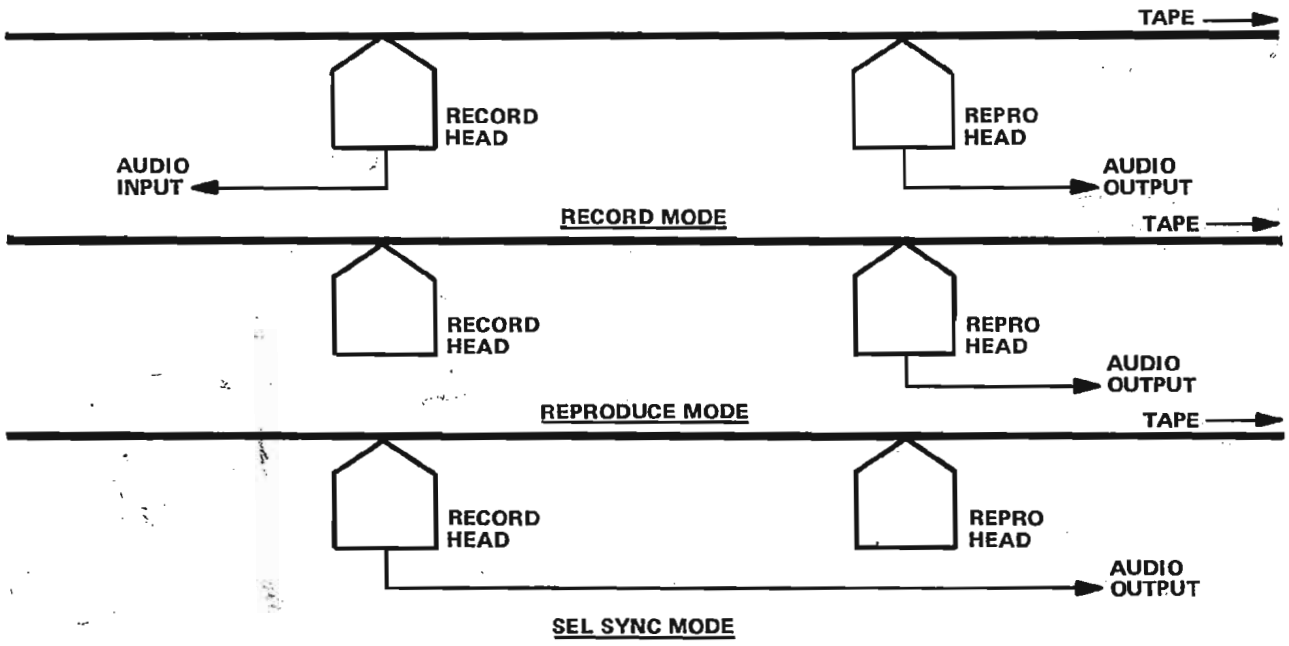


Figure 10. Head Usage for Different Operating Modes

# **MAINTENANCE**

## **CLEANING**

All components in the tape path should be cleaned every eight hours of transport operation, or more often as required by visual inspection, to remove accumulations of oxide deposited by the recording tape. Excess oxide deposits can cause degradation of equipment performance. Proceed as follows to perform periodic cleaning procedures:

### **CAUTION**

**USE RECOMMENDED SOLVENTS WHEN CLEANING TAPE PATH COMPONENTS, AND DO NOT USE METAL TOOLS FOR CLEANING. DO NOT ALLOW TAPE HEAD CLEANER TO COME IN CONTACT WITH THE RUBBER IDLER ROLLER OR PLASTIC FINISHES. FAILURE TO OBSERVE THIS CAUTION MAY RESULT IN DAMAGE TO TAPE PATH COMPONENTS.**

1. Clean tape heads with a cotton-tipped wooden applicator moistened in Ampex Head Cleaner (4010823 or 087-007). Do not allow tape cleaning fluid to come in contact with capstan idler roller; the cleaning fluid will damage the rubber tire and cause tape slippage.
2. Clean tape guides, the capstan, and the capstan idler with isopropyl alcohol. Take care to remove fingerprints from the rubber idler roller and capstan, and immediately remove any oil deposits from the rubber idler roller.

### **CAUTION**

**DO NOT USE COMPRESSED AIR FOR CLEANING TRANSPORT MECHANISMS. THE AIR PRESSURE CAN FORCE DIRT PARTICLES INTO BEARINGS AND CAUSE DAMAGE TO TRANSPORT COMPONENTS.**

## DEMAGNETIZATION

Tape heads and other components in the path can acquire permanent magnetization which increases signal noise and distortion, and partially erases high frequencies on recorded tapes. Demagnetize tape path components after each eight hours of operation, using Ampex Head Demagnetizer 4010820 or equivalent as follows:

1. Turn equipment power off, and remove any recorded tape near the transport (tape could be partially erased by the demagnetizer).
2. Cover the demagnetizer tips with pressure-sensitive tape (to prevent scratching the heads).
3. With the demagnetizer at least three feet from the recorder, connect it to a 110-120-volt ac power source.
4. Slowly move the demagnetizer toward the head stack.
5. Simultaneously and lightly touch the two demagnetizer tips to both faces of the head stack.
6. Hold the tips perfectly parallel to the stack face at all times. With a slow, even motion, move the tips up and down the stack several times. Slowly withdraw the demagnetizer (slow withdrawal is required for effective demagnetization).
7. Repeat steps 4 through 6 at each head stack and tape guide (including the one on the tape tension arm).
8. Move the demagnetizer at least three feet from the recorder, then de-energize it.

## LUBRICATION

The MM-1100 requires no periodic lubrication. All moving parts are permanently lubricated at the factory prior to shipment.

# CAPSTAN SERVO

## SPEED PAIR SELECTION

The control panel SPEED switch permits selection of high or low-speed operation (normally 30 and 15 in/s) of the transport. These speeds are determined by two shorting plugs on the capstan servo card, as detailed in Table 4.

Table 4. Speed Strap Positions

| SPEED STRAPPING |          |          |            |
|-----------------|----------|----------|------------|
| RANGE           | 60 in/s  | 30 in/s  | 15 in/s    |
|                 | 30 in/s  | 15 in/s  | 7-1/2 in/s |
| HI              | E5 to E6 | E5 to E3 | E5 to E4   |
| LOW             | E2 to E3 | E2 to E4 | E2 to E1   |

## VARIABLE SPEED TAPE MODE

Using a dummy plug in J4 on the rear of the machine causes the capstan motor to run locked to a crystal-controlled reference of 9600 Hz. To operate the system at variable speeds, it is necessary only to remove the plug and insert a variable frequency oscillator (square or sine wave) into pins 2 (HIGH) and 3 (COMM). A frequency of 9600 Hz will correspond to the speed indicated on the control box (speed switching and equalization switching still function in the variable speed mode). Varying this frequency will vary the capstan speed. Input voltage to J4 should be greater than 3 vp-p but must not exceed 30 vp-p.

## SERVO GAIN ADJUSTMENT

Servo gain adjustment R19 on the capstan servo pwa is normally adjusted to mid-range; however, to minimize flutter, it may be adjusted by observing the servo error signal at TP2 on the card and advancing R19 clockwise for minimum jitter. A 9600-Hz square wave at TP1 indicates that the crystal reference oscillator is functioning properly.

# TRANSPORT CONTROL

## SETUP PROCEDURE

### Preliminary Procedure

1. Place transport control card (4050706-01) into the extender card provided, ensuring that the component side of the card is facing outward toward the meter panel, and re-insert card into the transport control chassis.
2. Position potentiometers R1 through R8 fully ccw, and R9 at mid-range. Secure the end-of-tape arm out of the tape path using masking tape.

### Normalizing Reel Servos

1. Energize the equipment in stop mode, hold the tension sensor arm all the way in toward the center of the transport, and adjust supply gain potentiometer R7 until torque on the supply reel just reduces to zero (Figure 11).
2. Again, while holding the tension sensor arm all the way in, place the machine in rewind mode and adjust takeup gain potentiometer R8 until torque on the takeup reel just reduces to zero.
3. De-energize the machine and thread a tape of the largest reel size expected to be used on the machine (up to 16 inches).

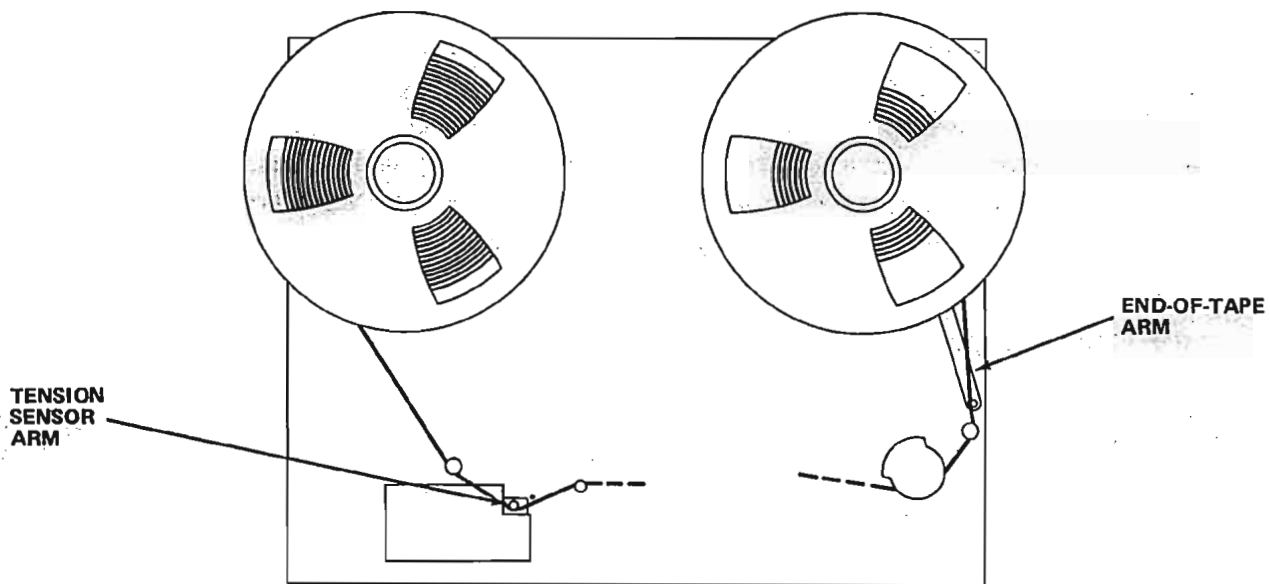


Figure 11. Normalizing Reel Servos

## TENSION ADJUSTMENTS

### Stop Tension

1. While holding the takeup reel securely, energize the machine and adjust supply stop tension potentiometer R3 until the edge of the tension sensor arm just lines up with the center-punch mark on the transport deck (Figure 12), indicating 10 ounces of supply tension.

#### NOTE

If the transport exhibits a tendency to oscillate during these adjustments, overall gain adjustment R9 should be rotated ccw until the oscillations just stop. This adjustment should be made with a minimum tape pack on the supply reel, using the smallest available reel.

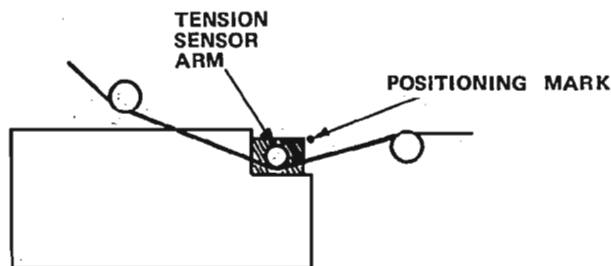


Figure 12. Positioning Tension Sensor Arm

2. With approximately equal packs on the supply and takeup reels, adjust stop takeup potentiometer R6 until tension on the takeup reel just equals that on the supply reel. This is indicated when there is no tendency for the machine to "creep" in stop mode.

#### NOTE

The above adjustments result in relatively high tension in stop mode. For ease of tape handling and editing purposes, R3 and R5 may be adjusted so that tension is approximately one-half of normal or less. Check that balance is maintained to prevent creeping.

## Play Tension

1. Remove the masking tape from the end-of-tape arm and push the arm toward the center of the transport against the stop. This will release reel tensions and apply the brakes. Now loop the tape around the outside of the capstan, and take up the slack in the tape until the brakes release.
2. Push the PLAY button while holding the takeup reel securely, and adjust play supply potentiometer R2 until the tension sensor arm lines up with the center punch mark (Figure 12). Now release the takeup reel and adjust play takeup potentiometer R5 until tensions are approximately equal on both reels.
3. At 30 in/s, record a 3-kHz test signal at normal operating level at the beginning of a reel. A recording time of 90 seconds is sufficient. Rewind the tape.
4. Monitor the 3-kHz output of the channel just recorded. Press the PLAY and STOP pushbuttons alternately. When you press PLAY, the reproduced signal will normally rise to the correct tone. If, however, play tension is too high, the tape may overspeed for a moment before settling to the correct tone.
5. If the tape does overspeed, adjust R5 to the point just below where overspeed occurs.

## Shuttle Tension

1. With all the pack on the supply reel, push the REWIND button and adjust rewind takeup potentiometer R4 so that the tape just begins to rewind.
2. With all the pack on the takeup side, push the FAST FORWARD button and adjust fast forward supply potentiometer R1 so that the tape just begins to move forward.

These settings will result in optimum tape pack on a reel and maximum accuracy of the tape timer; however, for more rapid fast forward and rewind shuttling, R4 and R5 may be adjusted for less holdback tension.

## 15/27-VOLT AND 39-VOLT POWER SUPPLIES

The MM-1100 power supplies feature both over-voltage and over-current protection. In addition, the 39-volt supply (4050658-01) contains the 150-kHz bias and erase oscillator. The 15/27-volt supply is normally mounted on the bottom of the frame. As indicators of supply operation, the meter panel lamps are powered by the 39-volt supply; the control box is powered by the 27-volt supply.

## VOLTAGE ADJUSTMENTS

Voltage adjustments are made by means of access holes in the rear of the machine. Pin jacks are provided to accommodate meter probes, in accordance with Table 5.

Table 5. Voltage Test Points

| VOLTAGE       | TEST POINT | CONTROL | SUPPLY     |
|---------------|------------|---------|------------|
| 15 ±0.5 volts | TP2        | R2      | 4050699-02 |
| 27 ±0.5 volts | TP1        | R1      | 4050699-02 |
| 39 ±0.5 volts | TP1        | R1      | 4050658-01 |

Measurements in Table 5 are from the appropriate test point to TPG (ground). The erase/bias oscillator is tuned through an access hole in the side of the frame, which is reached by removing the right side panel.

Line voltage fuse F1 (5 A, slow-blow) and over-voltage protection fuse F2 (10 A, fast-blow) are on the back of the machine. The over-current protection circuit can be reset by turning the machine off for approximately 20 seconds, then re-energizing it.

## CONTROL BOX

The control box can be removed from the transport for servicing by pulling the meter panel fully forward and forcing the control box up to disengage the "snap" fasteners on its base.

There is no active circuitry in the control box, and servicing will consist primarily of changing lamps.

## BULB REMOVAL

Pushbutton bulbs (no. 327) are removed by pulling the button directly up and out, as shown in Figure 13, and removing the bulbs from the barrel of the button.

The rocker switch bulbs (Ampex part no. 060-471) are removed by putting the particular switch in READY and the adjacent switches in SAFE, then removing the switch with pliers, thus exposing the bulb, as shown in Figure 14.



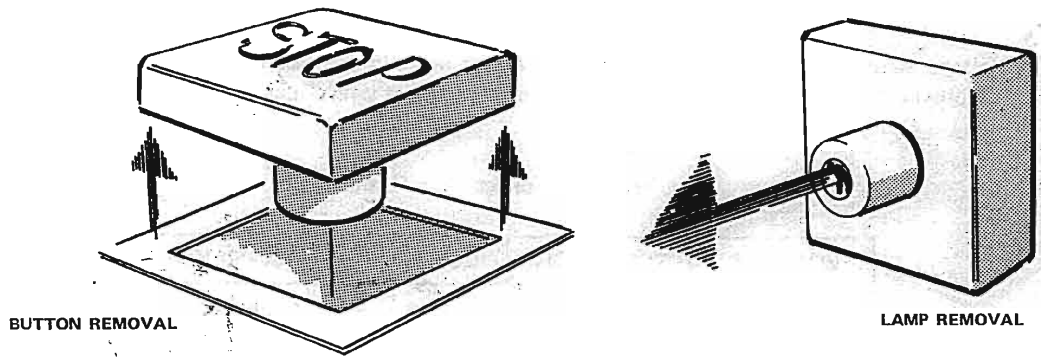


Figure 13. Button and Lamp Removal

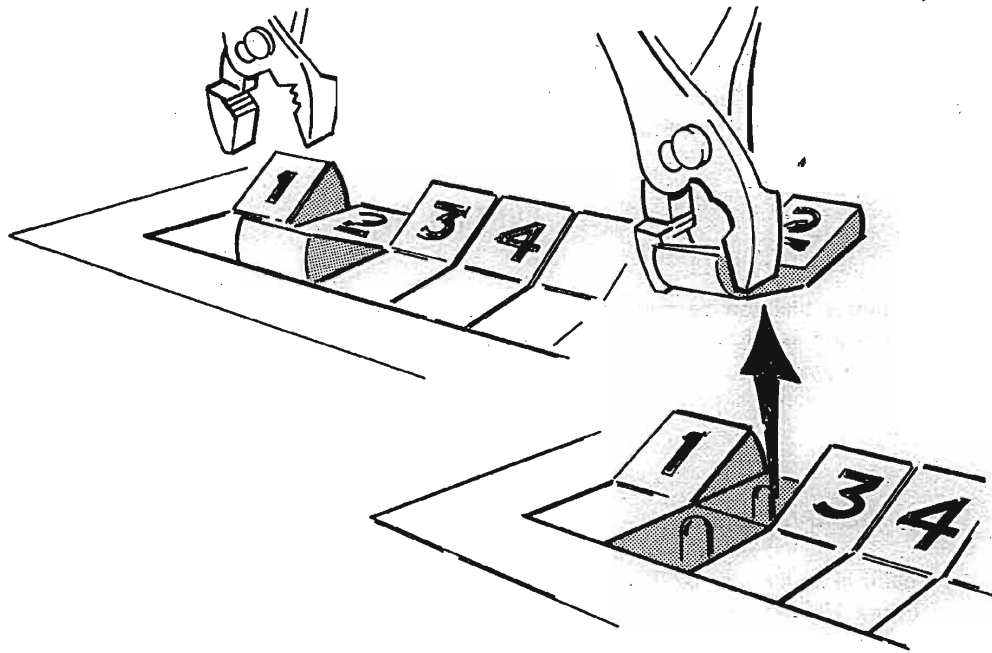


Figure 14. Rocker Switch Bulb Removal

## **REMOTE CONTROL AND TRANSPORT-ONLY CONTROL**

A remote control cable is required for remote operation. For remote control, the control box assembly is removed, as described earlier in this section, and connected to the remote control connector on the rear of the frame via the remote control cable. In addition, a "transport only" control box is available as an option to fit in the original control box position, if desired.

## **MDA ASSEMBLY**

The MDA assembly consists of three separate motor-drive amplifiers, one for each reel motor, and one for the capstan. The reel MDA's are unique in that they use optical couplers to isolate the low-level (27-volt) signal from the transport control to the high-level (117-vac) drivers to the reel motors. No adjustments are necessary on the MDA. However, under failure conditions where full torque is applied to a reel regardless of transport mode, the isolators (A1, A2) should immediately be checked.

## **METER PANEL ASSEMBLY**

Meter panel servicing should be limited to bulb replacement. Bulbs are wired in series/parallel, and may be replaced by pulling the panel out to its extreme forward position (ensuring that doors are closed). Be careful to prevent lamp sockets from shorting to the panel itself.

## **HEAD ASSEMBLY**

The head assembly can be quickly changed to convert from two-inch to one-inch format. To remove the head assembly, lift off the moulded head cover and back out the large jackscrew. Reverse this procedure when replacing the head assembly. When changing formats, ensure that the two quick-change guides on the transport are also switched. A shorting bar is included on all two-inch erase head assemblies to properly program tensions on the transport; thus, tension changes are automatically effected when the format is changed.

## TAPE LIFTER ADJUSTMENT

Tape lifter positions can be adjusted by removing the tension sensor cover, exposing two hex socket cap screws. These screws may be loosened and repositioned to adjust lifter positions.

## TEST EQUIPMENT

Test equipment required for checkout and adjustment is listed in Table 6.

**Table 6. Test Equipment Required for Checkout and Adjustment**

| DESCRIPTION                           | IDENTIFICATION  | USED FOR  |
|---------------------------------------|---|---|
| Spring gauge,<br>0-30 ounces          | Model LO-2M, Hunter Spring<br>Co., Lansdale, Penn. (Ampex<br>650-105)   | Tape Tension checkout   |
| Spring gauge, 0-10<br>pounds          | Gauge-R, Chatillon, N.Y.<br>(Ampex 650-104)   | Idler roller pressure and brake force<br>checkout                                       |
| Nylon line or cord,<br>30 inches long | N/A   | Idler roller pressure checkout  |
| Vacuum Tube<br>Voltmeter              | Model 400D, Hewlett Packard<br>Co., Palo Alto, California   | Tape tension potentiometer adjustment<br>and general purpose electronic<br>measurements |
| Flutter Bridge                        | Model 8155-01 or 8100-W,<br>Mincom, a Division of 3M,<br>Camarillo, California; or<br>Model ME102B, Gotham<br>Audio, New York, New York | Flutter check   |
| Wave Analyzer                         | Model 302A, Hewlett Packard<br>Co.  | Harmonic distortion checkout  |

Table 6. Test Equipment Required for Checkout and Adjustment (Continued)

| DESCRIPTION       | IDENTIFICATION                                      | USED ON                                |
|-------------------|---|--|
| Frequency Counter | Model 5216A, Hewlett Packard Co.                    | Reference oscillator checkout          |
| Signal Generator  | Model 204C or 209D, Hewlett Packard Co.             | Record/reproduce electronics alignment |
| Test Tape         | Ampex (refer to Table 8 for applicable part number) | Record and reproduce alignment         |

## BRAKE ADJUSTMENT

(See Figure 15.) The brake system stops reel rotation and maintains tape tension when the equipment power is removed while in any operating mode. A brake differential is necessary to

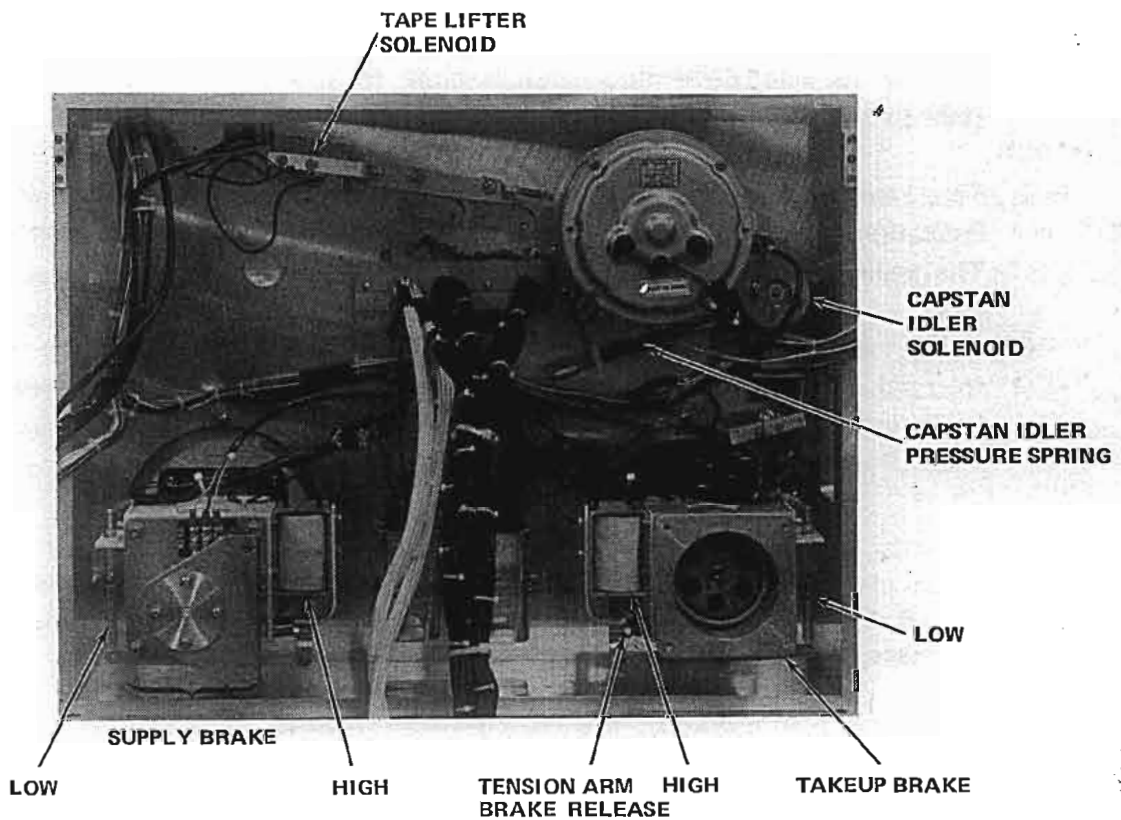


Figure 15. Transport Adjust Points

maintain tension while stopping; the brake force is therefore higher for the tape-feeding reel in every case. Braking functions are checked with power off and no tape installed.

## TAKEUP REEL BRAKES

Adjust the takeup reel brakes as follows:

1. Wrap all of 4-foot nylon cord ccw on takeup reel and insert hook of the 0 to 30-ounce scale in a cord loop.
2. Hold scale parallel to floor and as close as possible to reel, then pull scale (takeup turntable rotates ccw).
3. Tap reel to ensure a correct reading, then pull cord steadily and read scale indication. Repeat this procedure until scale reading has been the same several times. The scale should indicate the value given in Table 7.
4. If the reading is not within limits, slightly turn takeup reel brake adjustment nut (cw increases braking), then repeat procedures beginning with step 2.
5. Wrap all of the cord cw on reel, and insert hook of the 1 to 10-lb scale in cord loop.
6. Hold scale parallel to floor and as close as possible to reel, then pull the scale (takeup turntable rotates cw).
7. Tap reel, to ensure a correct reading, then pull cord steadily and read scale indication. Repeat this procedure until scale reading has been the same several times. The scale should indicate the value given in Table 7.
8. If the reading is not within limits, slightly adjust nuts on each side of brake solenoid an equal number of turns (cw increases braking), then repeat procedures beginning with step 6.

### NOTE

If the tension varies while the cord is being pulled at a steady rate, the tensions of the springs may be unequal.

**Table 7. Transport Brake Torques**

| SUPPLY REEL |                        | TAKEUP REEL            |               |
|-------------|------------------------|------------------------|---------------|
| REWIND (CW) | FORWARD (CCW)          | REWIND (CW)            | FORWARD (CCW) |
| 14 – 18 oz. | 4-1/2 ( $\pm 1/4$ ) lb | 4-1/2 ( $\pm 1/4$ ) lb | 14 – 18 oz.   |

**SUPPLY REEL BRAKES**

(See Figure 15.) Adjust the supply reel brakes as follows:

1. Wrap all of nylon cord cw on reel and insert hook of the 0 to 30 ounce scale in cord loop.
2. Hold scale parallel to floor and as close as possible to reel, then pull scale (supply turntable rotates cw).
3. Tap reel to ensure a correct reading, then pull cord steadily and read scale indication. Repeat this procedure until scale reading has been the same several times. The scale should indicate the value given in Table 7.
4. If the reading is not within limits, slightly turn takeup reel brake adjustment nut (cw increases reading), then repeat procedures beginning with step 2.
5. Wrap all of the cord ccw on reel, and insert hook of the 1 to 10-lb scale in cord loop.
6. Hold scale parallel to floor and as close as possible to reel, then pull the scale (supply turntable rotates ccw).
7. Tap reel to ensure a correct reading, then pull cord steadily and read scale indication. Repeat this procedure until scale reading has been the same several times. The scale should indicate the value given in Table 7.
8. If the reading is not within limits, slightly adjust nuts on each side of brake solenoid an equal number of turns (cw increases braking), then repeat procedures beginning with step 6).

## NOTE

If the tension varies while the cord is being pulled at a steady rate, the tensions of the springs may be unequal.

10. Remove scale and cord from transport.

## CAPSTAN IDLER

The capstan idler force against the moving capstan is determined by the capstan idler pressure spring. The force is adjusted by a locknut which compresses the capstan idler spring shown in Figure 15.

As the solenoid temperature rises, its resistance also rises. When power line regulation is poor, allow 30 minutes or more for warmup (operating in the reproduce mode) before adjusting the capstan idler force. At the factory, the solenoid is checked to be sure it will bottom at line voltages of 90 volts (cold) and 105 volts (hot).

1. Wrap a 12-inch knotted piece of lacing, nylon cord, or twine around pinch roller yoke as shown in Figure 16. Insert hook of 0 to 10-lb scale in cord loop.
2. Tape or block end-of-tape arm in on position.
3. Press PLAY button and pull on scale to pull pinch roller off capstan.
4. The force required to just eliminate pinch roller/capstan contact (pinch roller will stop rotating) is 8-3/4 to 9-1/4 pounds.
5. Press STOP button.

## DASH POT ADJUSTMENT

The dash pot adjustments, Figure 17 are set at the factory and do not require readjustment unless tension arm parts or dash pot are replaced, or a malfunction develops. Proceed as follows to check out and adjust dash pot.

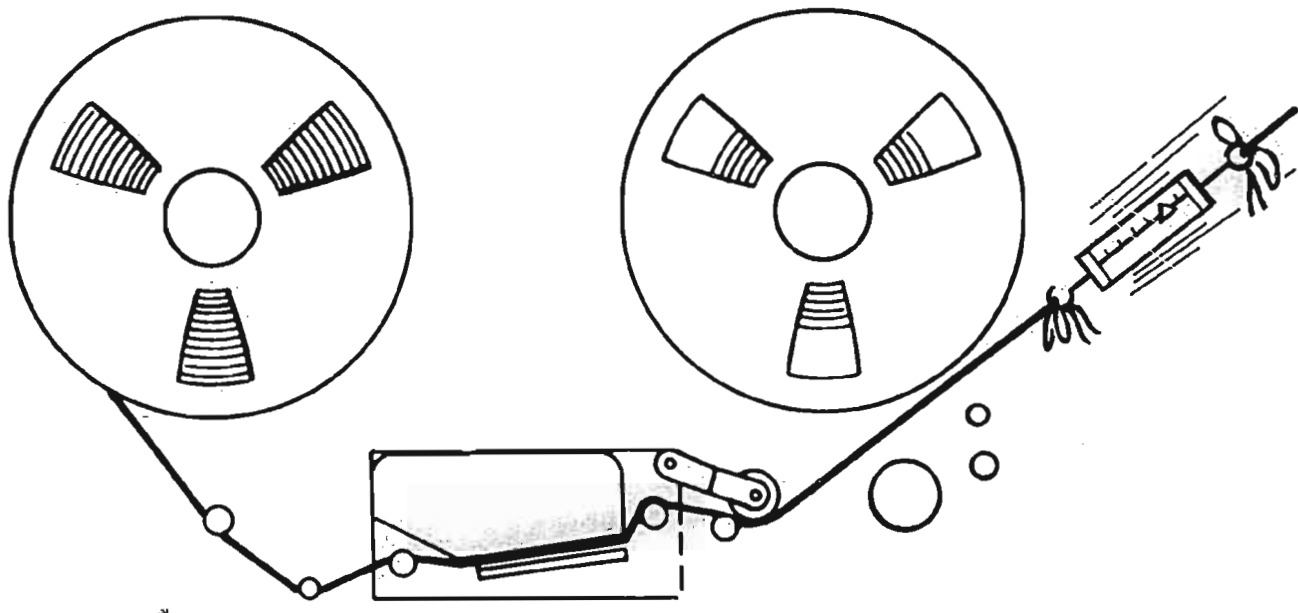


Figure 16. Pinch Roller Adjustment

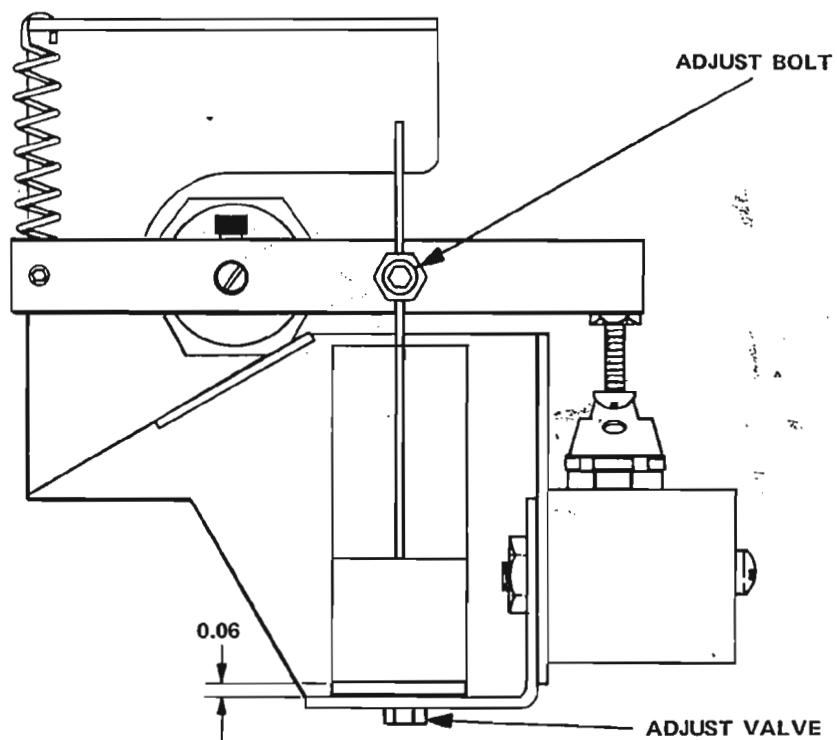


Figure 17. Tension Arm Dash Pot Adjustment



1. With tension arm in released position (safety switch actuated), measure clearance between bottom of plunger and bottom of cylinder. Clearance should be 0.06 inch.
2. If clearance is not as specified, loosen adjust bolt and move plunger up or down as required.
3. Tighten adjust bolt.
4. If end-of-tape switch is not actuated as soon as desired when end-of-tape condition is reached, rotate adjust valve ccw. Switch should actuate in 1/2 to 1-1/2 seconds after end-of-tape.

## AUDIO ALIGNMENT PROCEDURES

These procedures are based on the use of low-noise, high-output tapes (Ampex 406 or equivalent) and reflect the higher saturation levels of these tapes. A new operating level, referred to as "Ampex Mastering Level", is used. This level corresponds to a recorded flux 3 dB higher than the original Ampex operating level. (Ampex Operating Level is 185 nWb/m; hence, Ampex Mastering Level is 260 nWb/m at 500 Hz.)

### REPRODUCE ALIGNMENT

1. Degauss and clean heads and other components in the tape path. Use Ampex head cleaner on all components except the pinch roller, which should be cleaned with isopropyl or denatured alcohol.
2. Thread the appropriate alignment tape on the machine (see Table 8).
3. Place all RECORD/SAFE switches to SAFE, INPUT MON/NORMAL MON switch to NORMAL MON, SEL SYNC/REPRO switch to REPRO, and NORMAL/SET UP/BIAS switches on electronics panel to SET UP.
4. Place machine in PLAY mode and on the 700-Hz Ampex operating level section, adjust all REPRO LEVEL controls so that the vu meters read -3 vu (this corresponds to a line output level of +1 dBm).
5. Place the SEL SYNC/REPRO switch in SEL SYNC and repeat step 4, adjusting the SYNC LEVEL controls.

Table 8. Ampex Test Tapes

| TYPE                 |                     | AMPEX<br>PART NUMBER |
|----------------------|---------------------|----------------------|
| NAB, 1-inch          | 15 in/s, 8-track    | 4690006-01           |
|                      | 15 in/s, full-track | 4690005-01           |
| IEC (CCIR), 1-inch   | 15 in/s, 8-track    | 4690020-01           |
|                      | 15 in/s, full-track | 4690031-01           |
| NAB, 2-inch          | 15 in/s, 16-track   | 4690018-01           |
|                      | 15 in/s, full-track | 4690024-01           |
| IEC (CCIR), 2-inch   | 15 in/s, 16-track   | 4690033-01           |
|                      | 15 in/s, full-track | 4690035-01           |
| 17.5 $\mu$ s, 1-inch | 30 in/s, 8-track    | 4690042-01           |
|                      | 30 in/s, full-track | 4690048-01           |
| 17.5 $\mu$ s, 2-inch | 30 in/s, 16-track   | 4690039-01           |
|                      | 30 in/s, full-track | 4690047-01           |

6. Place the SEL SYNC/REPRO switch back to REPRO. Adjust the reproduce high frequency equalization for the speed in use on the 10-kHz section of the tape for -3 vu on the vu meter.
7. Adjust the reproduce low frequency equalization to give -4 vu at 50 Hz and 30 in/s, and -3 vu at 30 Hz and 15 in/s. (This adjustment is approximate only and must be confirmed by overall record/reproduce.)
8. Check the response at all frequencies on the alignment tape. Specifications are:

30 in/s:  $\pm 2$  dB at 50 Hz to 100 Hz,  $\pm 1$  db at 100 Hz to 18 kHz  
 15 in/s:  $\pm 2$  dB at 30 Hz to 100 Hz,  $\pm 1$  db at 100 Hz to 15 kHz

**NOTE**

Low-frequency equalizers cannot be adjusted correctly on reproduce only unless an alignment tape recorded to the track format of the machine being aligned is used.

9. Repeat step 8 with SEL SYNC/REPRO switch in SEL SYNC position.
10. Connect a band-limiting filter (Figure 18) between line output and a vtm to measure reproduce standby noise. The vtm reading should be less than -58 dBm at either speed for 8 or 16-channel systems, or less than -54 dBm for 24-channel systems.

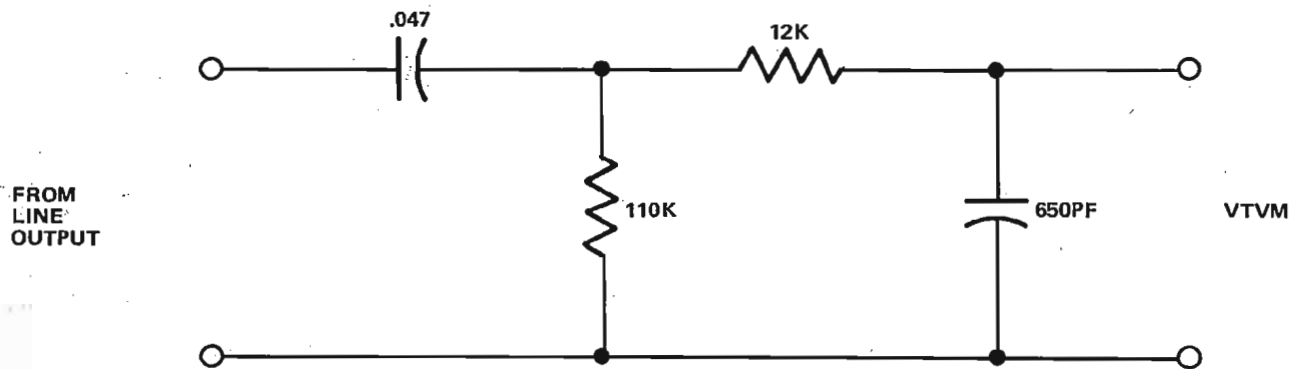


Figure 18. 30 Hz - 18 kHz Band-Limiting Filter

## RECORD ALIGNMENT

Do not start record alignment unless the reproduce alignment either has just been done or is known to be correct.

1. Prepare the machine for alignment as follows:
  - a. Thread a reel of blank tape of the type to be used (Ampex 406 or equivalent) onto the transport.
  - b. Connect an oscillator to the line inputs and set it to 1 kHz with a level of +4 dBm.
  - c. Set the READY/SAFE switches of the appropriate channels to be aligned to READY.
  - d. Place the INPUT MON/NORMAL MON switch in the NORMAL MON position.
  - e. Place the NORMAL/SETUP/BIAS switches on the electronics panels to BIAS.

2. Place the machine in the record mode. Observe that all channels in ready mode go into record mode, and that on-scale readings appear on the vu meters. Then do one of the following steps according to the proper system configuration:
  - a. For 8 or 16 channel systems, adjust the ERASE PEAK preset on each bias electronics card to give a maximum reading on the respective vu channel meter. If necessary, adjust the BIAS CAL controls to obtain on-scale readings.
  - b. For 24 channel systems, turn the ERASE PEAK preset fully counterclockwise and then turn this preset slowly clockwise. The bias level indication on the vu meter will change very slowly at first. Then the vu meter will indicate a sudden 2 to 3 dB drop. Continue turning the preset clockwise until the vu meter reading is reduced another 0.5 to 1 dB below the initial drop.
3. Reset all NORMAL/SET UP/BIAS switches to the SET UP position. Adjust RECORD LEVEL controls to give a mid-scale indication on the vu meters.
4. Carefully adjust the BIAS LEVEL control on each record amplifier card to give maximum output as indicated on the vu meters. Then reset the RECORD LEVEL controls until the vu meters indicate 0 vu.
5. Change the oscillator frequency to 15 kHz at +4 dBm output and adjust the appropriate record equalizer to give 0 vu indication on the vu meter (HI SPEED for 30 in/s, LOW SPEED for 15 in/s).
6. Change the oscillator frequency to 50 Hz at +4 dBm output and adjust the reproduce low frequency equalization for the speed in use to achieve a minimum deviation from 0 vu meter indication for frequencies between 30 Hz and 100 Hz at 15 in/s and between 50 Hz and 100 Hz at 30 in/s.
7. Sweep the oscillator through the band 30 Hz to 15 kHz at 15 in/s and 50 Hz to 18 kHz at 30 in/s. With a constant oscillator output level, the vu meter should remain within  $\pm 2$  dB (-2 vu to +2 vu) of 0 vu.
8. Set the oscillator to 1 kHz at +4 dBm level and then place the INPUT MON/NORMAL MON switch to INPUT MON. Adjust the REC CAL control on each record electronics card to give 0 vu indication on the vu meter.
9. Place the NORMAL/SET UP/BIAS switch on the electronics panel to the BIAS position and adjust the BIAS CAL control on the bias amplifier card to give 0 vu indication on the vu meter. Return the NORMAL/SET UP/BIAS switch to the SET UP position.

10. Perform the bias trap adjustment as follows:

- a. Place the SEL SYNC/REPRO switch in SEL SYNC. Place the INPUT MON/NORMAL MON switch in NORMAL MON.
- b. Place READY/SAFE switches of channels adjacent to channel to be set in READY position; set switch of channel to be set in SAFE position.
- c. Remove tape from machine and hold the end-of-tape arm in on position with an elastic band or pressure-sensitive tape.
- d. With system power off, mount the record electronics card of the channel to be set on an extender card.
- e. Connect a vtvm to the channel line output, switch system power on, and place machine in record mode.
- f. Adjust the bias trap inductor for minimum reading on the vtvm. (The bias trap inductor is accessible with a long, insulated core turning tool; it is on the switching card at the rear of the card cage in line with the extended record card.)

## OVERALL NOISE AND DISTORTION MEASUREMENTS

A wave analyzer is recommended for making distortion measurements, and is necessary for making erasure depth measurements. An oscillator with less than 0.1% distortion is also required for making distortion measurements. Correct record and reproduce alignment is assumed.

### Distortion Measurement

1. Set up the system for distortion measurement as follows:
  - a. Thread a reel of degaussed tape of the type to be used (Ampex 406 or equivalent) onto the transport.
  - b. Place all READY/SAFE switches to READY.
  - c. Select NORMAL MON and REPRO settings.
  - d. Connect an oscillator to the line inputs. Adjust oscillator frequency to 1 kHz and level to +4 dBm.

2. Place the machine in the record mode. Ensure that all vu meters read 0 vu. Adjust RECORD LEVEL controls as required to achieve the indication.
3. Connect the wave analyzer to the line outputs and normalize its full-scale reading at 1 kHz. Measure the second harmonic component; this should not exceed 0.3% or -50 dB with respect to the fundamental. Similarly, measure the third harmonic component; this should not exceed 1% or -40 dB with respect to the fundamental. Repeat this procedure for each channel.
4. If the second harmonic component is high, degauss heads and tape guides thoroughly, and repeat the measurement. A continuing high reading may indicate either a faulty record amplifier output capacitor or a misadjusted bias amplifier. Check the ERASE PEAK adjustment (previously described) initially. The record card may be checked by substitution with another channel. If the record card is not at fault, refer to the Bias Amplifier Alignment.
5. If the third harmonic component is high, the two most likely reasons are that the record level is set too high (reproduce calibration incorrect), or the bias level is incorrectly set. These levels can be reset as previously described.

#### Noise and Erasure Depth

1. Prepare the machine as follows:
  - a. Thread a reel of tape of the type to be used (Ampex 406 or equivalent) on the transport.
  - b. Connect an oscillator to the line inputs. Set oscillator to 1 kHz and +4 dBm output level.
  - c. Place all NORMAL/SET UP/BIAS switches to SET UP. Place SEL SYNC/REPRO switch in REPRO. Place INPUT MON/NORMAL MON in NORMAL MON.
  - d. Set all READY/SAFE switches to READY.
2. Place machine in record mode and adjust record level controls to give 0 vu indication on vu meters (reproduce calibration should be aligned correctly). Increase oscillator level to +10 dBm. Record at this level for two or three minutes.
3. Rewind the tape to the beginning of the recorded section and remove the oscillator input signal. The inputs should be terminated with a low impedance (600 ohms) or shorted. Connect a vtm to the line output via a bandpass filter (see Figure 18).

- Place the machine in the record mode once again and read the residual noise of the vtvm for each channel. For 8 and 16-track systems, the meter should read less than -53 dBm, and for 24-track systems, less than -48 dBm. If the ASA "A" weighted filter (Figure 19) is used, after correction for the insertion loss of the filter, the meter should read -55 dBm or greater for 8 and 16-track systems or -51 dBm or greater for 24-track systems.

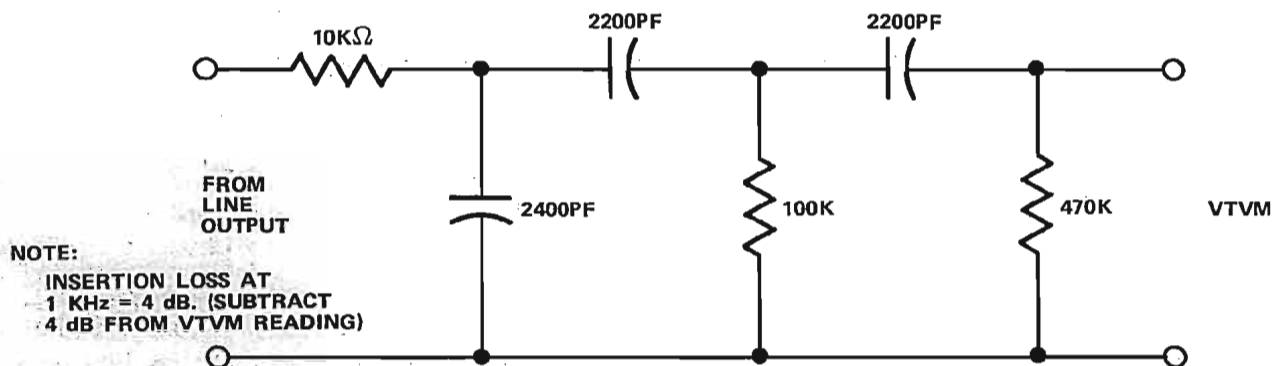


Figure 19. ASA "A" Weighted Filter

NOTE

The figures in step 4 are absolute noise levels. When referred to the peak signal level of +10 dBm, the signal-to-noise ratio is obtained; i.e., meter reads -55 dBm noise using bandpass filter, therefore signal-to-noise ratio is 65 dB unweighted.

- If a wave analyzer is connected to the line output, the erasure depth may also be determined. Measure the residual level of the 1000-Hz signal; the level should not exceed -65 dBm.

BIAS AMPLIFIER ALIGNMENT FOR 8 OR 16 CHANNEL SYSTEMS

NOTE

This adjustment should normally be required only if a bias amplifier card is used in a channel in which it was not previously used or if failure of the card requires component replacement. Operational indications that adjustment may be required are excessive second harmonic noise or noise when all other possible sources of the noise or distortion (e.g., magnetized heads or guides or faulty record amplifiers) have been eliminated.

1. Prepare the machine as follows:
  - a. Place the bias amplifier card of the channel to be aligned on an extender board (Ampex part no. 4020153-01).
  - b. Place the NORMAL/SET UP/BIAS switch in BIAS.
  - c. Place the channel READY/SAFE switch in READY.
  - d. Remove tape from the transport and temporarily secure the end-of-tape switch in the on position.
  
2. Place the transport in record mode and proceed as follows:
  - a. Adjust the BIAS CAL preset on the bias amplifier card to obtain a 2/3-scale reading on the vu meters.
  - b. Adjust the core of T3 (nearest connector) to achieve maximum reading on vu meter.
  - c. Repeat this procedure for the core of T4 (furthest from connector).
  
3. Adjust the ERASE PEAK preset for maximum output and proceed as follows:
  - a. Slowly adjust the core of T4 and note that there are two distinct peaks in the vu meter indication with a slight dip in the meter reading. Set the core of T4 so that the meter is reading at the center of the dip.
  - b. Repeat step a for T3.
  - c. Check that ERASE PEAK is still set to give maximum output.
  
4. The bias level should now be reset (as described in Record Alignment Produce), together with the BIAS CAL preset.

#### NOTE

If a large readjustment to the bias level is necessary, step 3 should be repeated.



5. Remove the extender card and replace the bias amplifier in the electronics chassis.
6. If necessary, recheck the second harmonic distortion at this time.

## **BIAS AND ERASE AMPLIFIER ADJUSTMENT FOR 24 CHANNEL SYSTEMS**

1. Prepare the machine as follows:
  - a. Place the bias amplifier card of the channel to be aligned on an extender board (Ampex part no. 4020153-01).
  - b. Place the NORMAL/SET UP/BIAS switch in BIAS.
  - c. Place the channel READY/SAFE switch in READY.
  - d. Remove tape from the transport and temporarily secure the end-of-tape switch in the on position.
2. Place the transport in record mode and proceed as follows:
  - a. Adjust the BIAS CAL preset on the bias amplifier card to obtain a 2/3-scale reading on the vu meter.
  - b. Adjust the core of T3 (nearest connector) to achieve maximum reading on the vu meter.
  - c. Repeat this procedure for the core of T4 (furthest from connector).
3. Turn the ERASE PEAK preset fully counterclockwise and proceed as follows:
  - a. Turn the ERASE PEAK preset slowly clockwise. The bias level indication will change very slowly at first. Then the vu meter will indicate a sudden 2 to 3 dB drop. Continue turning the preset clockwise until the vu meter reading is reduced another 0.5 to 1 dB below the initial drop.
  - b. Leave T3 and T4 cores in their peaked positions as per step 2.
4. The bias level should now be reset (as described in record alignment), together with the BIAS CAL preset.

## NOTE

If a large readjustment to the bias level is necessary, step 3 should be repeated.

5. Remove the extender card and replace the bias amplifier in the electronics chassis.
6. -If necessary, recheck the second harmonic distortion at this time.

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| Reproduce Equalizer PWA              | 4020270C    | 57   |
| Head Assembly, 1 Inch                | 4020334-    | 59   |
| Transport Assembly                   | 4020360-    | 61   |
| Capstan Idler Housing                | 4030369-    | 63   |
| Reel Motor Assembly                  | 4030375-    | 65   |
| Solenoid Assembly                    | 13954D      | 67   |
| Reel Hold Down Assembly              | 1243031D    | 69   |
| End-of-Tape Arm and Housing Assembly | 4030377-    | 71   |
| Tape Lifter Assembly                 | 4030379A    | 73   |
| Tension Sensor Assembly              | 4030384A    | 75   |
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| Cable Assembly, Reproduce Head       | 4050687-    | 79   |
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| Harness Assembly, Tape Transport     | 4050708-    | 83   |
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| Harness, Head and Input Cabling      | 4050704-    | 97   |
| Head Assembly, 2 Inch                | 4020372-    | 99   |
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| Frame Assembly                       | 4030383A    | 113  |
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| Meter Panel Cable Assembly                      | 4050682-           | 127         |
| Input/Output Connector Panel (24-Channel)       | 4050715-           | 129         |
| Motion Sense Assembly                           | 4952610D           | 131         |
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| 4020379-           | Fan Assembly                         | 111         |
| 4030369-           | Capstan Idler Housing Assembly       | 63          |
| 4030375-           | Reel Motor Assembly                  | 65          |
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| 4050688-    | Cable Assembly, Record Head                        | 81   |
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| 4050691-    | Harness, Electronics Chassis                       | 95   |
| 4050692B    | ✓ Capstan Servo PWA                                | 103  |
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| 4952610D    | Motion Sense Assembly                              | 131  |

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|----------|-------------|--|------------|--------------------------|-----|-----|---------|
|          |             |  |            | -01                      | -02 | -03 | -04     |
| 1        | 4020334-01  | HEAD ASSY, 8 CHANNEL                   |            | 1                        | -   | -   | -       |
| 2        | 4020263-06  | REC'D EQUALIZER, CEA (EC)              |            | -                        | -   | 8   | 16 24   |
| 3        | 4020360-01  | TRANSPORT ASSY                         |            | 1                        | -   | -   | -       |
| 4        | 4020360-02  | TRANSPORT ASSY                         |            | -                        | -   | -   | -       |
| 5        | 4020360-03  | TRANSPORT ASSY                         |            | -                        | -   | -   | -       |
| 6        | 4020269-08  | REC'D EQUALIZER, UAG                   |            | 8                        | 16  | 24  | -       |
| 7        | 4020371-02  | ELECTRONICS ASSEMBLY                   |            | 2                        | 4   | 6   | 2 4 6   |
| 8        | 4020279-02  | REPRODUCE EQUALIZER, UAG               |            | 8                        | 16  | 24  | 8 16 24 |
| 9        | 4020372-01  | HEAD ASSY, 16 CHANNEL                  |            | -                        | -   | -   | -       |
| 10       | 4020372-02  | HEAD ASSY, 24 CHANNEL                  |            | -                        | -   | -   | -       |
| 11       | 4292955-01  | COVER, POWER SUPPLY                    |            | 1                        | 1   | 1   | 1       |
| 12       | 4020373-01  | TRANSPORT CONTROL ASSY, 8 - 16 CH.     |            | 1                        | 1   | 1   | 1       |
| 13       | 4020373-02  | TRANSPORT CONTROL ASSY, 24 CH.         |            | -                        | -   | -   | -       |
| 14       |             |  |            |                          |     |     |         |
| 15       | 4020374-01  | MOTOR DRIVE AMPLIFIER ASSY             |            | 1                        | 1   | 1   | 1       |
| 16       |             |  |            |                          |     |     |         |
| 17       | 4020379-01  | FAM ASSY                               |            | 1                        | 1   | 1   | 1       |
| 18       |             |  |            |                          |     |     |         |
| 19       | 4020381-01  | FRAME ASSEMBLY                         |            | 1                        | 1   | 1   | 1       |
| 20       |             |  |            |                          |     |     |         |
| 21       | 4020387-01  | DOOR ASSY                              |            | 1                        | 1   | 1   | 1       |
| 22       | 4020387-02  | DOOR ASSY                              |            | 1                        | 1   | 1   | 1       |
| 23       |             |  |            |                          |     |     |         |
| 24       | 4050646-01  | CONTROL BOX ASSY, 8 CH.                |            | 1                        | -   | -   | -       |
| 25       | 4050646-02  | CONTROL BOX ASSY, 16 CH.               |            | -                        | -   | -   | -       |
| 26       | 4050646-03  | CONTROL BOX ASSY, 24 CH.               |            | -                        | -   | -   | -       |
| 27       |             |  |            |                          |     |     |         |
| 28       | 4050647-02  | CIRCUIT BREAKER ASSY                   |            | 1                        | 1   | 1   | 1       |
| 29       | 4050654-01  | POWER SUPPLY, 20 VOLT                  |            | 1                        | 1   | 1   | 1       |
| 30       | 4050654-02  | POWER SUPPLY, 15/27 VOLT               |            | 1                        | 1   | 1   | 1       |
| 31       |             |  |            |                          |     |     |         |
| 32       | 4050685-01  | INPUT/OUTPUT CONN. PANEL ASSY, CH 1-8  |            | 1                        | -   | -   | -       |
| 33       | 4050685-02  | INPUT/OUTPUT CONN. PANEL ASSY, CH 1-16 |            | -                        | -   | -   | -       |
| 34       |             |  |            |                          |     |     |         |
| 35       | 4050707-01  | METER PANEL ASSY, 8 CH                 |            | 1                        | -   | -   | -       |
| 36       | 4050707-02  | METER PANEL ASSY, 16 CH                |            | -                        | -   | -   | -       |
| 37       | 4050707-03  | METER PANEL ASSY, 24 CH                |            | -                        | -   | -   | -       |

4010210C  
Master Maker Assembly

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|----------|-------------|--|------------|--------------------------|-----|-----|-----|
|          |             |  |            | -01                      | -02 | -03 | -04 |
| 38       |             |  |            |                          |     |     |     |
| 39       | 4050709-01  | CABLE ASSY, ELECTRONICS PWR & CONTROL      |            | 1                        | 2   | 3   | 2 3 |
| 40       |             |  |            |                          |     |     |     |
| 41       | 4050710-01  | DUMPT PLUG ASSY, REMOTE CONTROL            |            | 1                        | 1   | 1   | 1   |
| 42       |             |  |            |                          |     |     |     |
| 43       | 4050715-01  | INPUT/OUTPUT CONN. PANEL ASSY, CH 1-24     |            | -                        | -   | -   | -   |
| 44       |             |  |            |                          |     |     |     |
| 45       | 4090014-01  | MISCELLANEOUS PARTS KIT                    |            | 1                        | -   | -   | -   |
| 46       | 4090014-02  | MISCELLANEOUS PARTS KIT                    |            | -                        | -   | -   | -   |
| 47       | 4090014-03  | MISCELLANEOUS PARTS KIT                    |            | -                        | -   | -   | -   |
| 48       | 4170309-01  | LABEL, ELECTRONICS CHASSIS, CH 1-4         |            | 1                        | 1   | 1   | 1   |
| 49       | 4170309-02  | LABEL, ELECTRONICS CHASSIS, CH 5-8         |            | 1                        | 1   | 1   | 1   |
| 50       | 4170309-03  | LABEL, ELECTRONICS CHASSIS, CH9-12         |            | -                        | -   | -   | -   |
| 51       | 4170309-04  | LABEL, ELECTRONICS CHASSIS, CH13-16        |            | -                        | -   | -   | -   |
| 52       | 4170309-05  | LABEL, ELECTRONICS CHASSIS, CH 17-20       |            | -                        | -   | -   | -   |
| 53       | 4170309-06  | LABEL, ELECTRONICS CHASSIS, CH 21-24       |            | -                        | -   | -   | -   |
| 54       |             |  |            |                          |     |     |     |
| 55       | 4290825-05  | PANEL, SIDE                                |            | 1                        | 1   | 1   | 1   |
| 56       | 4290825-06  | PANEL, SIDE                                |            | 1                        | 1   | 1   | 1   |
| 57       | 4290825-07  | PANEL, SIDE, 24 CHANNEL                    |            | -                        | -   | -   | -   |
| 58       | 4290825-08  | PANEL, SIDE, 24 CHANNEL                    |            | -                        | -   | -   | -   |
| 59       |             |  |            |                          |     |     |     |
| 60       | 4290836-01  | PANEL, BLANK 4" (24")                      |            | 2                        | 2   | 2   | 2   |
| 61       | 4290836-02  | PANEL, BLANK 8 1/4" (24")                  |            | 1                        | -   | -   | -   |
| 62       | 4290917-01  | PANEL, FILLER, REAR                        |            | 1                        | 1   | 1   | 1   |
| 63       | 4290917-01  | PANEL, FILLER, 24 CH                       |            | -                        | -   | -   | -   |
| 64       |             |  |            |                          |     |     |     |
| 65       | 4303119-01  | PLATE, SPACER                              |            | 1                        | 1   | 1   | 1   |
| 66       |             |  |            |                          |     |     |     |
| 67       |             |  |            |                          |     |     |     |
| 68       |             |  |            |                          |     |     |     |
| 69       |             |  |            |                          |     |     |     |
| 70       | 4352812022  | INSTRUCTION MANUAL                         |            | 1                        | 1   | 1   | 1   |
| 71       |             |  |            |                          |     |     |     |
| 72       |             |  |            |                          |     |     |     |
| 73       | 4110272-77  | LABEL, IDENTIFICATION                      |            | 1                        | 1   | 1   | 1   |
| 74       |             |  |            |                          |     |     |     |
| 75       |             |  |            |                          |     |     |     |
| 76       |             |  |            |                          |     |     |     |
| 77       |             |  |            |                          |     |     |     |
| 78       |             |  |            |                          |     |     |     |
| 79       |             |  |            |                          |     |     |     |
| 80       | 470-029     | SCREW, #8-32 X .50 LG, CAP HEX SOCKET HD   |            | 4                        | 4   | 4   | 4   |
| 81       | 470-040     | SCREW, #10-32 X .75 LG, CAP, HEX SOCKET HD |            | 3                        | 3   | 3   | 3   |
| 82       |             |  |            |                          |     |     |     |

4010210C

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| ITEM NO. | PART NUMBER | DESCRIPTION                                    | REF. DISK | QTY REQD PER DASH NUMBER |     |     |     |     |     |     |     |     |     |     |     |  |  |  |  |  |
|----------|-------------|--|-----------|--------------------------|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|--|--|--|--|--|
|          |             |  |           | -01                      | -02 | -03 | -04 | -05 | -06 | -07 | -08 | -09 | -10 | -11 | -12 |  |  |  |  |  |
| 83       | 471-069     | SCREW, #6-32 X .75 LG, PAN HD, ZNCR            |           | 5                        | 5   | 5   | 5   | 5   | 5   |     |     |     |     |     |     |  |  |  |  |  |
| 84       | 471-080     | SCREW, #8-32 X .50 LG, PAN HD, ZNCR            |           | 6                        | 6   | 6   | 6   | 6   | 6   |     |     |     |     |     |     |  |  |  |  |  |
| 85       | 471-462     | SCREW, #12-24 X .75 LG, PAN HD, ZNCR           |           | 4                        | 4   | 4   | 4   | 4   | 4   |     |     |     |     |     |     |  |  |  |  |  |
| 86       |             |  |           |                          |     |     |     |     |     |     |     |     |     |     |     |  |  |  |  |  |
| 87       |             |  |           |                          |     |     |     |     |     |     |     |     |     |     |     |  |  |  |  |  |
| 88       | 472-578     | SCREW, #10-32 X .75 LG, OVAL HD, ZNCR, RHL PLD |           | 44                       | 44  | 44  | 44  | 44  | 44  |     |     |     |     |     |     |  |  |  |  |  |
| 89       | 473-624     | SCREW, #10-32 X 1.25 LG, FLAT HD, ZNCR         |           | 4                        | 4   | 4   | 4   | 4   | 4   |     |     |     |     |     |     |  |  |  |  |  |
| 90       |             |  |           |                          |     |     |     |     |     |     |     |     |     |     |     |  |  |  |  |  |
| 91       |             |  |           |                          |     |     |     |     |     |     |     |     |     |     |     |  |  |  |  |  |
| 92       |             |  |           |                          |     |     |     |     |     |     |     |     |     |     |     |  |  |  |  |  |
| 93       | 501-009     | WASHER #6 PLAIN                                |           | 5                        | 5   | 5   | 5   | 5   | 5   |     |     |     |     |     |     |  |  |  |  |  |
| 94       | 501-205     | WASHER #8 PLAIN                                |           | 10                       | 10  | 10  | 10  | 10  | 10  |     |     |     |     |     |     |  |  |  |  |  |
| 95       | 501-702     | WASHER #10 FINISHING, NYLON, BLACK             |           | 44                       | 44  | 44  | 44  | 44  | 44  |     |     |     |     |     |     |  |  |  |  |  |
| 96       |             |  |           |                          |     |     |     |     |     |     |     |     |     |     |     |  |  |  |  |  |
| 97       | 502-805     | WASHER #10, LOCK, SPRING                       |           | 3                        | 3   | 3   | 3   | 3   | 3   |     |     |     |     |     |     |  |  |  |  |  |
| 98       | 502-825     | WASHER #6, LOCK, INTL TOOTH                    |           | 5                        | 5   | 5   | 5   | 5   | 5   |     |     |     |     |     |     |  |  |  |  |  |
| 99       | 502-826     | WASHER #8, LOCK, INTL TOOTH                    |           | 10                       | 10  | 10  | 10  | 10  | 10  |     |     |     |     |     |     |  |  |  |  |  |
|          |             |  |           |                          |     |     |     |     |     |     |     |     |     |     |     |  |  |  |  |  |
|          |             |  |           |                          |     |     |     |     |     |     |     |     |     |     |     |  |  |  |  |  |
|          |             |  |           |                          |     |     |     |     |     |     |     |     |     |     |     |  |  |  |  |  |
|          |             |  |           |                          |     |     |     |     |     |     |     |     |     |     |     |  |  |  |  |  |

| ITEM<br>NO. | PART NUMBER | C | DESCRIPTION                         | REF<br>DESC | QTY REQD PER DASH NUMBER |     |     |     |     |     |     |     |   |   |
|-------------|-------------|---|-------------------------------------|-------------|--------------------------|-----|-----|-----|-----|-----|-----|-----|---|---|
|             |             |   |                                     |             | -01                      | -02 | -03 | -04 | -05 | -06 | -07 | -08 |   |   |
| 1           | 4500109-02  |   | PRINTED WIRING BOARD                |             | 1                        | 1   | 1   | 1   | 1   | 1   | 1   | 1   | 1 | 1 |
| 2           | 4500153-01  |   | RESISTOR, VARIABLE (100K OHMS)      | R108        | 1                        | 1   | 1   | 1   | 1   | 1   | 1   | 1   | 1 | 1 |
| 3           | 4500314-02  |   | CAPACITOR TRIMMER (50-380PF)        | C54         | 1                        | 1   | 1   | 1   | 1   | 1   | 1   | 1   | 1 | 1 |
| 4           | 4500314-03  |   | CAPACITOR TRIMMER (1700-780PF)      | C53         | 1                        | 1   | 1   | 1   | 1   | 1   | 1   | 1   | 1 | 1 |
| 5           | 4500314-01  |   | CAPACITOR TRIMMER (1700-780PF)      | C54         | 1                        | 1   | 1   | 1   | 1   | 1   | 1   | 1   | 1 | 1 |
| 6           | 4500314-04  |   | CAPACITOR, TRIMMER (100-1180PF)     | C53         | 1                        | 1   | 1   | 1   | 1   | 1   | 1   | 1   | 1 | 1 |
| 7           | 037-634     |   | CAPACITOR, TANT. (3.3UF, 35V, 20%)  | C52         | 1                        | 1   | 1   | 1   | 1   | 1   | 1   | 1   | 1 | 1 |
| 8           | 037-664     |   | CAPACITOR, TANT. (3.3UF, 35V, 20%)  | C56         | 1                        | 1   | 1   | 1   | 1   | 1   | 1   | 1   | 1 | 1 |
| 9           | 4800189     |   | SCHEMATIC                           | REF REF REF | 1                        | 1   | 1   | 1   | 1   | 1   | 1   | 1   | 1 | 1 |
| 10          | 055-164     |   | CAPACITOR, MYLAR, .0022AL, 50V, 10% | C57         | 1                        | 1   | 1   | 1   | 1   | 1   | 1   | 1   | 1 | 1 |
| 11          | 041-436     |   | RESISTOR, FIXED, 12K, 1/4W, 5%      | R109        | 1                        | 1   | 1   | 1   | 1   | 1   | 1   | 1   | 1 | 1 |
| 12          | 037-634     |   | CAPACITOR, TANT. (3.3UF, 35V, 20%)  | C56         | 1                        | 1   | 1   | 1   | 1   | 1   | 1   | 1   | 1 | 1 |
| 13          | 4500314-01  |   | CAPACITOR, TRIMMER (50-380PF)       | C54         | 1                        | 1   | 1   | 1   | 1   | 1   | 1   | 1   | 1 | 1 |
| 14          | 4500314-02  |   | CAPACITOR, TRIMMER (50-380PF)       | C53         | 1                        | 1   | 1   | 1   | 1   | 1   | 1   | 1   | 1 | 1 |
| 15          | 4500156-01  |   | PRINTED WIRING BOARD                |             | 1                        | 1   | 1   | 1   | 1   | 1   | 1   | 1   | 1 | 1 |
| 16          | 4800259     |   | SCHEMATIC                           | REF REF REF | 1                        | 1   | 1   | 1   | 1   | 1   | 1   | 1   | 1 | 1 |
| 17          | 4500156-02  |   | PRINTED WIRING BOARD                |             | 1                        | 1   | 1   | 1   | 1   | 1   | 1   | 1   | 1 | 1 |
| 18          | 4500153-07  |   | POTENTIOMETER, RECORD CALIBRATION   | R108        | 1                        | 1   | 1   | 1   | 1   | 1   | 1   | 1   | 1 | 1 |
| 19          | 4800357     |   | SCHEMATIC                           | REF REF REF | 1                        | 1   | 1   | 1   | 1   | 1   | 1   | 1   | 1 | 1 |

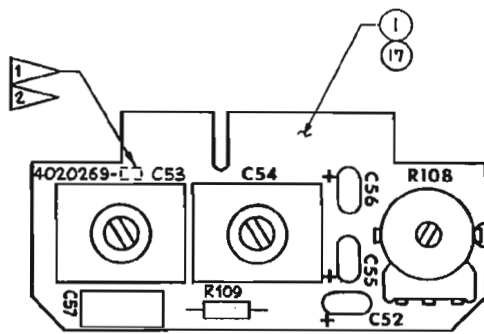
Sheet 1 of 2

4020269G

Record Equalizer PWA

Next Assy: 4010210





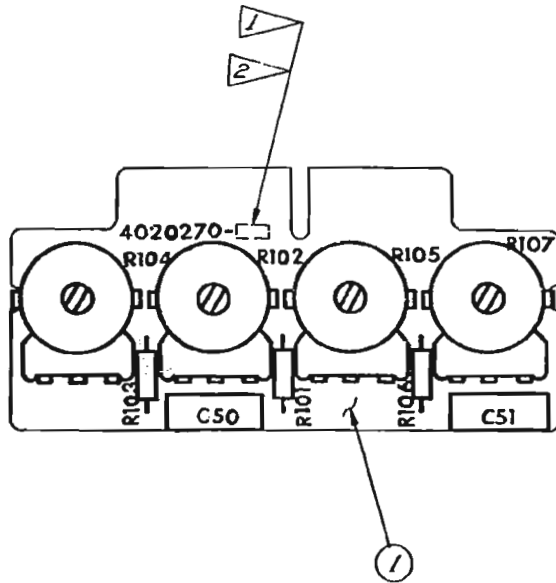
NOTES:

- 1 ASSEMBLY NUMBER TO BE 4020269 - XX.
- 2 MARK DASH NUMBER PER BDI-1.

**4020269G**  
**Record Equalizer PWA**

**Sheet 2 of 2**

**Next Assy: 4010210**



NOTES:

- 1 PART NO. IS 4020270-LX
- 2 INK STAMP DASH NO. PER MIL. STD. 130.

|                   |     |         |              |                                   |            |
|-------------------|-----|---------|--------------|-----------------------------------|------------|
| REF               | -   | 9       | 4840259      | SCHEMATIC                         |            |
| 2                 | -   | 8       | 055-889      | CAPACITOR, .0033 MFD, MYLAR       | C50, 51    |
| -                 | REF | 7       | 4840169      | SCHEMATIC                         |            |
| -                 | 2   | 6       | 055-222      | CAPACITOR, .0047 MFD, MYLAR       | C50, 51    |
| 1                 | 1   | 5       | 049-527      | RESISTOR, 2.2 K, 1/8 W, 10%       | R101       |
| 2                 | 2   | 4       | 049-528      | RESISTOR, 220K, 1/8 W, 10%        | R103, 106  |
| 2                 | 2   | 3       | C-4520152-02 | POTENTIOMETER, 2.5 MEG.           | R102, 107  |
| 2                 | 2   | 2       | C-4520152-01 | POTENTIOMETER, 50 K               | R104, R105 |
| 1                 | 1   | 1       | D-4500110-01 | PRINTED WIRING BOARD, REP. EQUAL. |            |
| -02               | -01 | ITEM NO | PART NUMBER  | DESCRIPTION                       |            |
| LIST OF MATERIALS |     |         |              |                                   |            |

4020270C  
Reproduce Equalizer PWA

Sheet 1 of 1

Next Assy: 4010210



| ITEM NO. | PART NUMBER | DESCRIPTION                        | REF. DESIG. | QTY. REQD PER DASH NUMBER |
|----------|-------------|------------------------------------|-------------|---------------------------|
| 1        | 4020228-05  | CAPSTAN DRIVE ASSY                 |             | 1                         |
| 2        | 4020285-01  | CAPSTAN IDLER HOUSING ASSY         |             | 1                         |
| 3        | 4020325-01  | TAPE UP REEL ASSY                  |             | 1                         |
| 4        | 4020325-02  | SUPPLY REEL ASSY                   |             | 1                         |
| 5        | 4020377-01  | DRUM-UP TAKE-UP ARM & HOUSING ASSY |             | 1                         |
| 6        | 4020379-01  | TAPE LIFTER ASSY                   |             | 1                         |
| 7        | 4021160-01  | TOP PLATE ASSY                     |             | 1                         |
| 8        | 4020380-01  | TENSION SENSOR ASSY                |             | 1                         |
| 9        | 4020208-01  | WARRISS, TAPE TRANSPORT            |             | 1                         |
| 10       | 4100068-01  | CAP. TENSION ARM                   |             | 1                         |
| 11       | 4110285-01  | OPERATOR TRANSPORT                 |             | 1                         |
| 12       |             |                                    |             |                           |
| 13       | 4021141-01  | ARM ASSY, TENSION SENSOR           |             | 1                         |
| 14       | 4220128-01  | BLOCK, MOUNTING, TENSION SENSOR    |             | 1                         |
| 15       | 4210253-01  | GUIDE, 1 INCH FIXER                |             | 2                         |
| 16       | 4220257-01  | SPACER, TRANSPORT                  |             | 3                         |
| 17       | 4210253-02  | GUIDE, 2 INCH FIXER                |             | 2                         |
| 18       | 4220148-01  | ARM, PHOTOCELL COVER               |             | 1                         |
| 19       | 4220254-01  | SPACER, HEAD CABLE CLAMP           |             | 2                         |
| 20       | 4220205-01  | SPACER, TRANSPORT                  |             | 2                         |
| 21       | 4250229-01  | RING, SPACER, SERVO MOTOR          |             | 1                         |
| 22       |             |                                    |             |                           |
| 23       | 41471-01    | BRACKET, SPRING P...               |             | 1                         |
| 24       | 59102-05    | TAPE TINDER ASSY                   |             | 1                         |
| 25       | 1024-01     | SPRING, TAKE UP TENSION            |             | 1                         |
| 26       | 4270131-01  | SPRING, SENSOR                     |             | 1                         |
| 27       | 4290797-01  | COVER, TENSION SENSOR              |             | 1                         |
| 28       | 4290819-01  | SHIELD, TRANSPORT                  |             | 1                         |
| 29       | 11871-02    | ARM, SOLENOID                      |             | 1                         |
| 30       | 4220206-02  | SOLENOID COIL                      |             | 1                         |
| 31       | 4020206-01  | SOLENOID COIL                      |             | 1                         |
| 32       | 4020206-03  | SOLENOID COIL                      |             | 1                         |
| 33       | 4130312-01  | PLATE, BACKING                     |             | 1                         |
| 34       |             |                                    |             |                           |
| 35       | 4590012-01  | DASHPOD                            |             | 1                         |
| 36       | 474-052     | SCREW, SHOULDER #10-32 X .250 LG   |             | 2                         |
| 37       |             |                                    |             |                           |

4020360—  
Transport Assembly

Next Assy: 4010210

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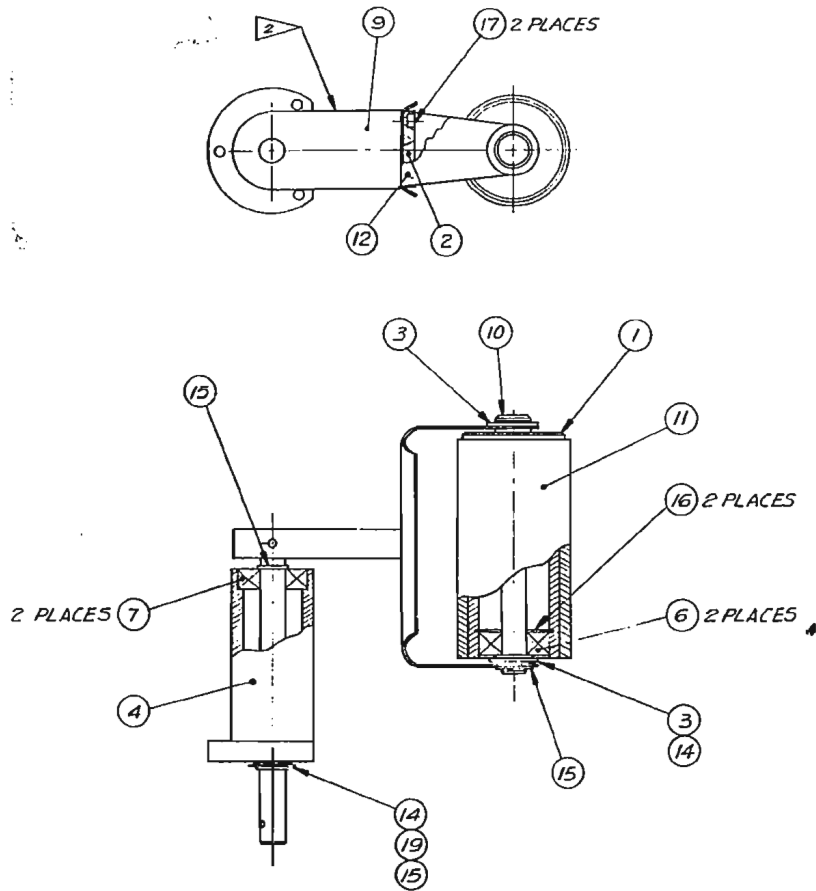
| ITEM NO. | PART NUMBER | DESCRIPTION                                 | REF. DESIG. | QTY. REQD PER DASH NUMBER |
|----------|-------------|---|-------------|---------------------------|
| 38       | 4020285-01  | CAPSTAN IDLER HOUSING ASSY                  |             | 1                         |
| 39       | 4020325-01  | TAPE UP REEL ASSY                           |             | 1                         |
| 40       |             |   |             |                           |
| 41       | 6000035-02  | LABEL, IDENTIFICATION                       |             | 1                         |
| 42       | 50115-04    | SLEEVE, BUMPER, TAPE TENSION ARM            |             | 2                         |
| 43       | 55670-04    | CAPSTAN SOLENOID ASSY                       |             | 1                         |
| 44       |             |   |             |                           |
| 45       | 4600153-01  | CLAMP, HEAD CABLE                           |             | 1                         |
| 46       | 4600153-03  | CLAMP, HEAD CABLE                           |             | 1                         |
| 47       | 4600153-05  | CLAMP, HEAD CABLE                           |             | 1                         |
| 48       | 4600153-02  | CLAMP, HEAD CABLE                           |             | 1                         |
| 49       | 4600153-04  | CLAMP, HEAD CABLE                           |             | 1                         |
| 50       | 4600153-06  | CLAMP, HEAD CABLE                           |             | 1                         |
| 51       | 032-084     | BOOT, CAPACITOR                             |             | 2                         |
| 52       | 036-126     | CAPACITOR, FIXED, 10 uF, 130V               |             | 2                         |
| 53       |             |   |             |                           |
| 54       | 180-042     | SWITCH, SENSITIVE LEVER                     |             | 1                         |
| 55       | 120-074     | SWITCH, SENSITIVE PUSHBUTTON                |             | 1                         |
| 56       | 290-111     | BRACKET, CAPACITOR, BE #027065P21           |             | 2                         |
| 57       | 235-353     | TAPE, ADHESIVE, DBL SIDE, .031 THK X .500 V |             | 2                         |
| 58       |             |   |             |                           |
| 59       | 406-030     | PIN, SPRING, ROLL .125 DIA X .625 LG        |             | 1                         |
| 60       |             |   |             |                           |
| 61       | 302-365     | CLAMP, CABLE                                |             | 8                         |
| 62       |             |   |             |                           |
| 63       |             |   |             |                           |
| 64       |             |   |             |                           |
| 65       | 470-181     | SCREW, CAP HEX SOC, #10-24 X 1.50 LG        |             | 4                         |
| 66       | 470-021     | SCREW, CAP, #6-32 X .62 LG, HEX SOC.        |             | 5                         |
| 67       | 470-089     | SCREW, CAP, #10-32 X .50 LG, HEX SOC.       |             | 12                        |
| 68       | 470-028     | SCREW, CAP, #8-32 X .44 LG, HEX SOC.        |             | 8                         |
| 69       | 470-019     | SCREW, CAP, #6-32 X .48 LG, HEX SOC.        |             | 4                         |
| 70       | 470-160     | SCREW, CAP, #6-32 X 1.25 LG, HEX SOC.       |             | 2                         |
| 71       | 470-016     | SCREW, CAP, #6-32 X .25 LG, HEX SOC.        |             | 1                         |
| 72       | 470-503     | SCREW, CAP, #8-32 X .37 LG, HEX SOC.        |             | 1                         |
| 73       | 471-119     | SCREW, PAN HD #6-32 X .37 LG, XREC          |             | 8                         |
| 74       | 471-117     | SCREW, PAN HD #6-32 X .25 LG, XREC          |             | 1                         |
| 75       | 471-119     | SCREW, PAN HD #10-32 X .50 LG, XREC         |             | 4                         |
| 76       | 470-039     | SCREW, CAP, #6-32 X .42 LG, HEX SOC.        |             | 3                         |
| 77       | 471-119     | SCREW, PAN HD #8-32 X .25 LG, XREC          |             | 2                         |
| 78       | 471-119     | SCREW, PAN HD #8-32 X .50 LG, XREC          |             | 4                         |
| 79       | 471-119     | SCREW, PAN HD #8-32 X .50 LG, XREC          |             | 4                         |
| 80       | 480346      | SCHEMATIC, TRANSPORT                        |             | REF                       |
| 81       |             |   |             |                           |
| 82       |             |   |             |                           |

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4020360—

| ITEM NO. | PART NUMBER | DESCRIPTION                | REF. DESIG. | QTY. REQD PER DASH NUMBER |     |     |
|----------|-------------|----------------------------|-------------|---------------------------|-----|-----|
|          |             |                            |             | -01                       | -02 | -03 |
| 83       |             |                            |             |                           |     |     |
| 84       | 501-009     | WASHER, #6 PLAIN           |             | 21                        | 21  | 21  |
| 85       | 501-070     | WASHER, #10 PLAIN          |             | 13                        | 13  | 13  |
| 86       | 501-205     | WASHER, #8 PLAIN           |             | 11                        | 11  | 11  |
| 87       | 501-631     | WASHER, #8 PLAIN           |             | 4                         | 4   | 4   |
| 88       |             |                            |             |                           |     |     |
| 89       |             |                            |             |                           |     |     |
| 90       |             |                            |             |                           |     |     |
| 91       |             |                            |             |                           |     |     |
| 92       |             |                            |             |                           |     |     |
| 93       | 502-003     | LOCKWASHER, #6 SPRING      |             | 12                        | 12  | 12  |
| 94       | 502-004     | LOCKWASHER, #8 SPRING      |             | 9                         | 9   | 9   |
| 95       | 502-005     | LOCKWASHER, #10 SPRING     |             | 9                         | 9   | 9   |
| 96       |             |                            |             |                           |     |     |
| 97       |             |                            |             |                           |     |     |
| 98       | 502-025     | WASHER #6, INTERNAL TOOTH  |             | 9                         | 9   | 9   |
| 99       | 502-026     | WASHER #8, INTERNAL TOOTH  |             | 6                         | 6   | 6   |
| 100      | 502-027     | WASHER #10, INTERNAL TOOTH |             | 4                         | 4   | 4   |
| 101      |             |                            |             |                           |     |     |
| 102      |             |                            |             |                           |     |     |
| 103      |             |                            |             |                           |     |     |
| 104      | 4050686-01  | CABLE ASSY, ERASE HEAD     |             | 1                         | 1   | 1   |
| 105      | 4050686-02  | CABLE ASSY, ERASE HEAD     |             | -                         | -   | -   |
| 106      | 4050686-03  | CABLE ASSY, ERASE HEAD     |             | -                         | -   | -   |
| 107      |             |                            |             |                           |     |     |
| 108      | 4050687-01  | CABLE ASSY, REPRO HEAD     |             | 1                         | 1   | 1   |
| 109      | 4050687-02  | CABLE ASSY, REPRO HEAD     |             | 1                         | 1   | 1   |
| 110      | 4050687-03  | CABLE ASSY, REPRO HEAD     |             | -                         | -   | -   |
| 111      |             |                            |             |                           |     |     |
| 112      |             |                            |             |                           |     |     |
| 113      | 4050688-01  | CABLE ASSY, RECORD HEAD    |             | 1                         | 1   | 1   |
| 114      | 4050688-02  | CABLE ASSY, RECORD HEAD    |             | -                         | -   | -   |
| 115      | 4050688-03  | CABLE ASSY, RECORD HEAD    |             | -                         | -   | -   |





4030369—  
 Capstan Idler Housing Assembly

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Next Assy: 4020360

| ITEM NO. | PART NUMBER | DESCRIPTION                      | REF. DESIG. | QTY. RECD PER DASH NUMBER |     |
|----------|-------------|----------------------------------|-------------|---------------------------|-----|
|          |             |                                  |             | -01                       | -02 |
| 1        | 4250234-01  | TURNTABLE                        |             | 1                         | 1   |
| 2        | 13954-01    | SOLENOID ASSY                    |             | 1                         | 1   |
| 3        | 13958-01    | PLATE, BRAKE SPRING              |             | 1                         | 1   |
| 4        | 13959-01    | LEVER, BRAKE SPRING              |             | 1                         | 1   |
| 5        | 13964-01    | RAZ, TURNTABLE                   |             | 1                         | 1   |
| 6        | 13966-01    | DRUM, BRAKE                      |             | 1                         | 1   |
| 7        | 13968-01    | LINK, SOLENOID                   |             | 2                         | 2   |
| 8        | 14311-01    | BRAKE BAND ASSY                  |             | 1                         | 1   |
| 9        | 14319-01    | MOTOR, TORQUE                    |             | 1                         | 1   |
| 10       | 14418-01    | HOUSING, BRAKE                   |             | 1                         | 1   |
| 11       | 14935-04    | STOP, SOLENOID                   |             | 1                         | 1   |
| 12       | 20530-01    | PIN, BRAKE LOOP                  |             | 1                         | 1   |
| 13       | 20530-02    | PIN, BRAKE LOOP                  |             | 1                         | 1   |
| 14       | 1242031-04  | REEL HOLD DOWN ASSY              |             | 1                         | 1   |
| 15       | 21172-01    | SPRING, BRAKE ADJ                |             | 1                         | 1   |
| 16       | 21173-01    | PIN, LINK                        |             | 1                         | 1   |
| 17       | 21174-01    | PIN, LINK                        |             | 1                         | 1   |
| 18       | 21174-01    | BOLT, EYE                        |             | 1                         | 1   |
| 19       | 4220283-01  | FLANGE, REEL MOUNTING            |             | 1                         | 1   |
| 20       | 145-012     | CONNECTOR, 6 PIN, LOCKING, MALE  |             | 1                         | 1   |
| 21       | 302-007     | CLAMP, CABLE - 1/4" ID - PLASTIC |             | 1                         | 1   |
| 22       | 400-009     | PIN, CLEVIS, 1/8" DIA X 17/32 LG |             | 1                         | 1   |
| 23       | 401-007     | PIN, CUTTER, 1/16" DIA X 1/2 LG  |             | 1                         | 1   |
| 24       | 406-012     | PIN, ROLLPIN, .094" DIA X 1.0 LG |             | 2                         | 2   |
| 25       | 530-004     | RING, RETAINING                  |             | 2                         | 2   |
| 26       | 670-029     | SCREW, CAP, #8-32 X 1/2 LG       |             | 5                         | 5   |
| 27       | 171-009     | CONNECTOR, SOLDERLESS, KNIFE     |             | 4                         | 4   |
| 28       | 570-039     | SCREW, CAP, #10-32 X 5/8 LG      |             | 4                         | 4   |
| 29       | 472-038     | SCREW, SET, #8-32 X 5/16 LG      |             | 2                         | 2   |
| 30       | 477-037     | SCREW, SET, #8-32 X 1/4 LG       |             | 4                         | 4   |
| 31       | 493-008     | NUT, SELF LOCK #10-32            |             | 1                         | 1   |
| 32       | 491-009     | NUT, SELF LOCK #4-32             |             | 2                         | 2   |
| 33       | 501-010     | WASHER, FLAT #8                  |             | 3                         | 3   |
| 34       | 502-005     | WASHER, LOCK, SPRING #10         |             | 8                         | 8   |
| 35       | 476-040     | SCREW, CAP, #10-32 X 3/4 LG      |             | 4                         | 4   |
| 36       | 507-004     | LOCK WASHER, SPRING #8           |             | 4                         | 4   |
| 37       |             |                                  |             |                           |     |

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4030375-  
Reel Motor Assembly

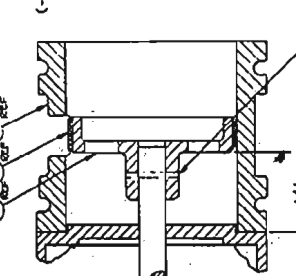
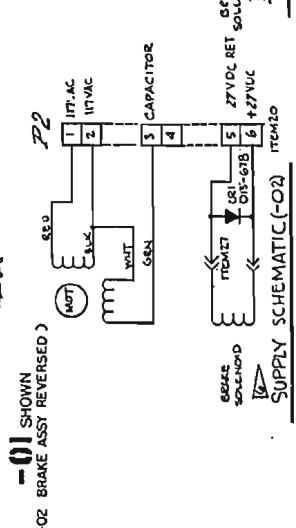
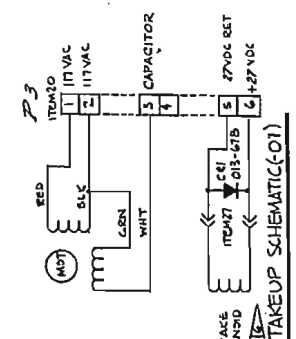
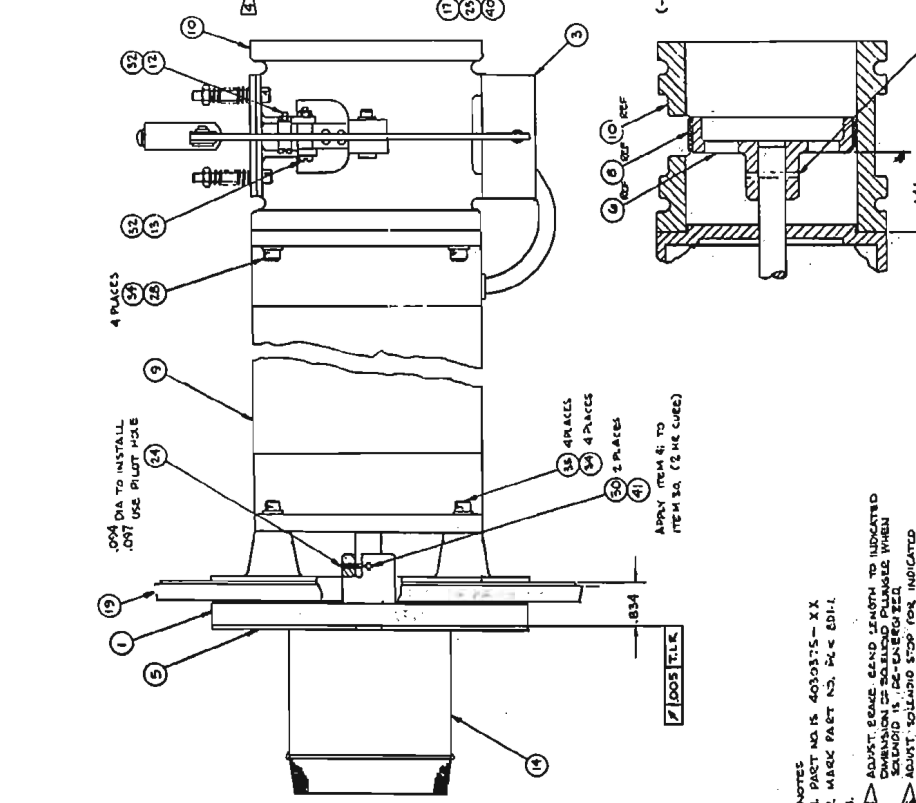
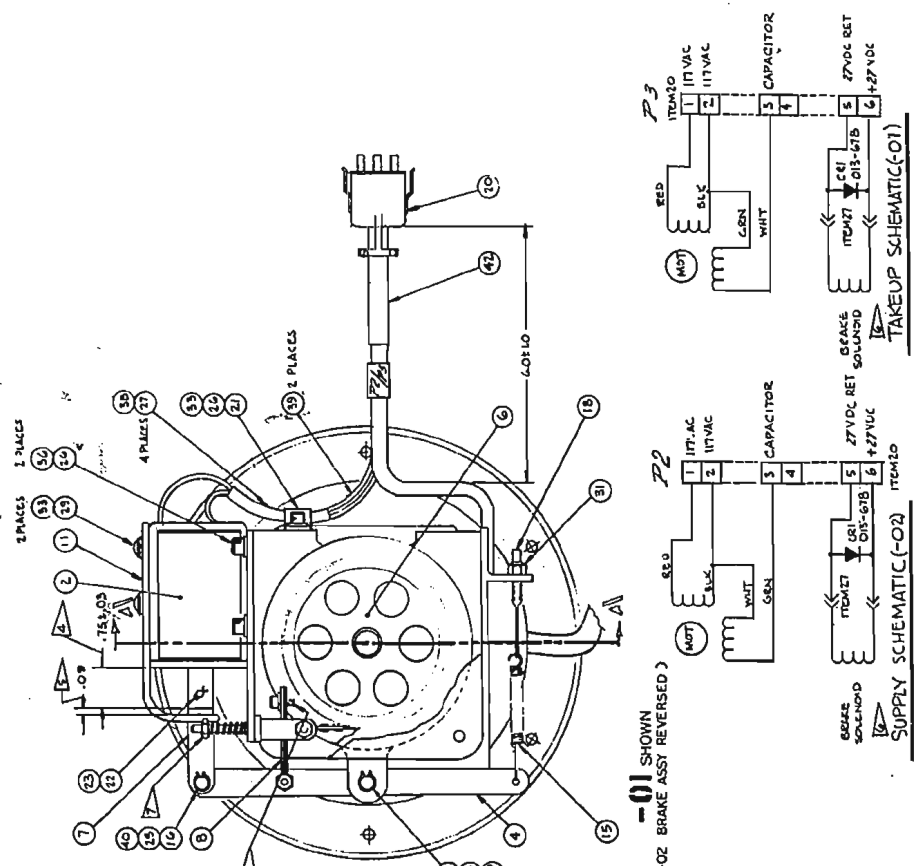
Next Assy: 4020360

| ITEM NO. | PART NUMBER | DESCRIPTION                      | REF. DESIG. | QTY. RECD PER DASH NUMBER |     |
|----------|-------------|----------------------------------|-------------|---------------------------|-----|
|          |             |                                  |             | -01                       | -02 |
| 38       | 600-011     | TUBING #6 (.166 ID) BLK, PLASTIC |             | A/A/A/R                   |     |
| 39       |             |                                  |             |                           |     |
| 40       | 087-062     | GREASE-AVIATION #1 STD OR EQUIV. |             | A/A/A/R                   |     |
| 41       | 018-107     | ADHESIVE BASE POLYESTER RESIN    |             | A/A/A/R                   |     |
| 42       | 600-061     | TUBING, FLEXIBLE, .261 OD, BLK   |             | A/A/A/R                   |     |
| 43       | 013-578     | DIPOL, CR451                     | CR1         | 1                         | 1   |

4030375-

Sheet 2 of 3



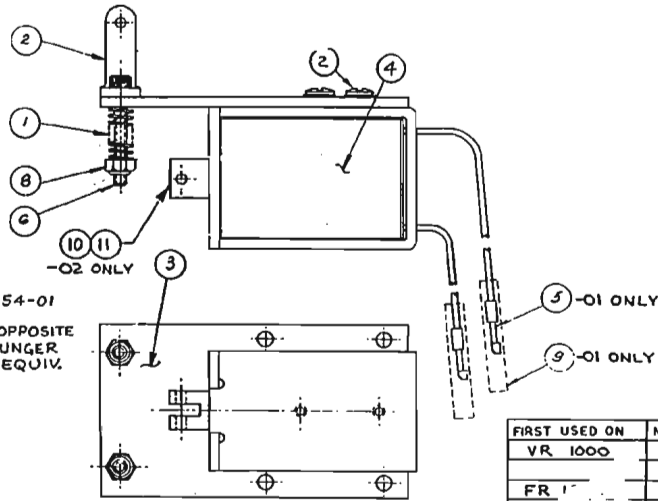


- NOTES
1. PART NO. 4030375 - XX
  2. MARK PART NO. 84 E 8011
  3. ADJUST BRAKE BAND LENGTH TO INDICATED DIMENSION OF SOLID PLUNGER WHEN PLUNGER IS DE-ENERGIZED.
  4. DIMENSIONS IN PARENTHESES INDICATED DIMENSIONS WHICH SHOULD BE USED WHEN SOLID PLUNGER IS DE-ENERGIZED.
  5. SUPPLY AND TAKEUP SCHEMATICS DIFFER ONLY IN MOTOR TO ITEM 40 CONNECTIONS.
  6. ADJUST SPRINGS FOR BRAKE ACTION. HIGH 7 1/2 LB. ± 1/2 LB., LOW 1 1/2 LB. ± 1/2 LB. MEASURED AT AN EMPTY REEL HUB.

Sheet 3 of 3

4030375-  
Reel Motor Assembly  
Next Assy: 4020360

| MATERIALS LIST |      |            |         |  |          |  |
|----------------|------|------------|---------|--|----------|--|
| QTY            | ITEM | AMPER      | QTY. OR | DESCRIPTION                              | UNLESS   |  |
| -02            | -01  | PART NO.   | NO.     |  | REF. NO. |  |
| 2              | 1    | B-1387-01  |         | SPRING                                   |          |  |
| 1              | 2    | B-13955-01 |         | BRACKET, BRAKE LIMIT                     |          |  |
| 1              | 3    | A-13957-02 |         | PLATE, SOLENOID BASE                     |          |  |
| 1              | 4    | C-14415-01 |         | SOLENOID                                 |          |  |
| -              | 2    | 171-009    |         | CONNECTOR, SOLDERLESS                    |          |  |
| 2              | 6    | 470-124    |         | SCREW, CAP #8-32 x 1/2 LAG               |          |  |
| 4              | 7    | 475-035    |         | SCREW, (SEM) #8-32 x 3/8 LAG             |          |  |
| 2              | 8    | 483-007    |         | NUT, SELF LOCKING #8-32                  |          |  |
| -              | 9    | 600-000    |         | TUBING, $\phi$ 1/200 I.D. BLK. PLASTIC   |          |  |
| 1              | 10   | 503-030    |         | WASHER, NYLON 1/4 ID x 1/2 OD x 1/32 THK |          |  |
| A/R            | -    | 018-015    |         | ADHESIVE                                 |          |  |



**NOTES:**  
 1. ASSY NO. TO BE 13954-01 OR 13954-02.  
 2. MOUNT ITEM 10 TO OPPOSITE END OF SOLENOID PLUNGER USING ITEM 11 OR EQUIV.

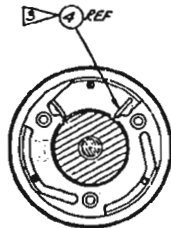
| FIRST USED ON | NEXT ASSY | VEESKON |
|---------------|-----------|---------|
| VR 1000       | 13950     | -01     |
|               | 13960     | -01     |
| FR 1          | 1220303   | -01     |
|               | 1220304   | -02     |
| VR 1100       | 52110     | -01     |
|               | 52111     | -01     |
| VR 2000       | 1210959   | -01     |
|               | 52110     | -01     |

**13954D**  
**Solenoid Assembly**

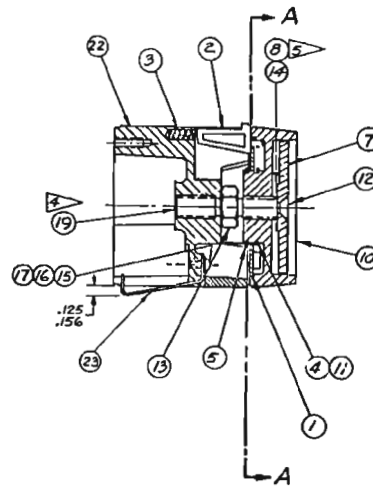
Sheet 1 of 1

Next Assy: 4030375

|                  |    |    |    |    |            |  |
|------------------|----|----|----|----|------------|--|
| 1                |    |    |    | 23 | 1365171-01 | SPRING, REEL                               |
| 1                |    |    |    | 22 | 1243035-02 | HUB, REEL                                  |
| -                | 1  |    |    | 21 | 1161321-01 | SPRING, REEL                               |
| -                | 1  |    |    | 20 | 1243035-02 | HUB, REEL                                  |
| 1                |    |    |    | 19 | 1243032-01 | SHAFT, KNOB                                |
| -                | 1  |    |    | 18 | 1360109-4  | SPRING, REEL                               |
| 1                |    |    |    | 17 | 471-061    | SCREW, PAN HD, PH. DR, 4-40 x 5/16 LG.     |
| 1                |    |    |    | 16 | 501-008    | WASHER, FLAT, #4                           |
| AR               | AR | AR | AR | 15 | 018-030    | ADHESIVE, THREAD LOCKING, LOCKTITE GRADE C |
| AR               | AR | AR | AR | 14 | 018-019    | ADHESIVE                                   |
| -                | 1  |    |    | 13 | 492-452    | NUT, JAM HEX, 1/16-14                      |
| 1                |    |    |    | 12 | 471-979    | SCREW, FLAT HD, HEX SOC, 10-32 x 3/4 LG    |
| AR               | AR | AR | AR | 11 | 081-057    | GREASE, MOLYLUDE                           |
| 1                |    |    |    | 10 | 1243036-01 | KNOB-REEL                                  |
| -                | 1  |    |    | 9  | 1243035-01 | HUB-REEL                                   |
| 1                |    |    |    | 8  | 1243034-01 | WASHER                                     |
| 1                |    |    |    | 7  | 1243033-01 | RETAINER                                   |
| -                | 1  |    |    | 6  | 1243032-01 | SHAFT-KNOB                                 |
| 1                |    |    |    | 5  | 52391-01   | SPRING-CAM                                 |
| 1                |    |    |    | 4  | 1243068-01 | SPRING-ENERGIZING                          |
| 3                | 5  | R  | S  | 3  | 52386-01   | SPRING-FINGER, HOLD DOWN                   |
| 3                | 5  | R  | S  | 2  | 52378-01   | FINGER-HOLD DOWN                           |
| 1                |    |    |    | 1  | 1243069-01 | CAM-ACTUATOR                               |
| 04-22-92-01-54   |    |    |    |    |            | DESCRIPTION                                |
| PER ENG. V. HALL |    |    |    |    |            | LIST OF MATERIALS                          |



SECTION A-A



NOTES:

1. PART NO. IS 1243031-04.
2. MARK PART NO. WITH PREFIX "ASSY" PER 601-1.
3. COAT CIRCULAR PORTION OF ITEM 4 LIGHTLY WITH ITEM 11 & INSTALL IN ITEM 10. INSTALL ITEM 1 WITH BOSSES OUTSIDE OF THE SPRING LEGS & INSTALL ITEM 5.
4. COAT EXPOSED THDS ON ITEM 19 LIGHTLY WITH ITEM 11.
5. COAT ROUGH SIDE OF ITEM 3 WITH ITEM 14 AND ASSEMBLE TO ITEM 7.

1243031D  
Reel Hold Down Assembly

Sheet 1 of 1

Next Assy: 4030375

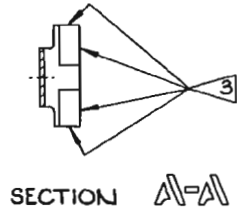
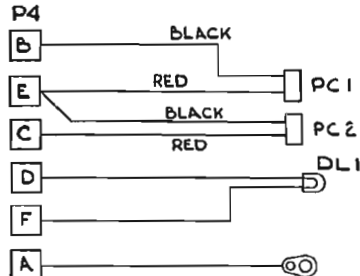
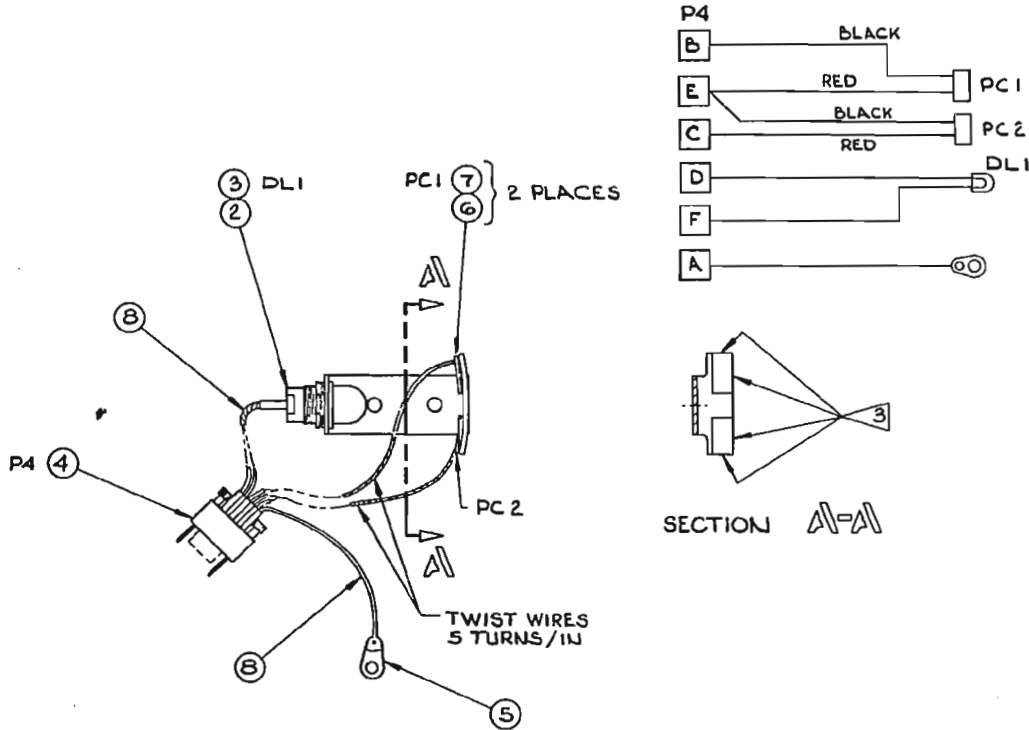
| ITEM NO. | PART NUMBER | DESCRIPTION                    | REF DESG | QTY | REQD PER DASH NUMBER |
|----------|-------------|--------------------------------|----------|-----|----------------------|
| 1        | 51101-01    | HOUSING ASSY, TAPE TENSION ARM | -01      | 1   |                      |
| 2        |             |                                |          |     |                      |
| 3        | 4011163-01  | TENSION ARM ASSY               |          | 1   |                      |
| 4        |             |                                |          |     |                      |
| 5        |             |                                |          |     |                      |
| 6        |             |                                |          |     |                      |
| 7        | 087-072     | SILICONE COMPOUND              | A/R      | A/R |                      |
| 8        |             |                                |          |     |                      |
| 9        |             |                                |          |     |                      |
| 10       | 430-006     | RING, RETAINING                |          | 1   |                      |
| 11       | 498-018     | NUT, 3/4 - 16, HEX             |          | 1   |                      |
| 12       |             |                                |          |     |                      |
| 13       | 501-045     | WASHER, SHIM .002 THK          | A/R      | A/R |                      |
| 14       | 501-052     | WASHER, SHIM .003 THK          | A/R      | A/R |                      |
|          |             |                                |          |     |                      |
|          |             |                                |          |     |                      |
|          |             |                                |          |     |                      |
|          |             |                                |          |     |                      |
|          |             |                                |          |     |                      |
|          |             |                                |          |     |                      |
|          |             |                                |          |     |                      |
|          |             |                                |          |     |                      |
|          |             |                                |          |     |                      |
|          |             |                                |          |     |                      |
|          |             |                                |          |     |                      |
|          |             |                                |          |     |                      |
|          |             |                                |          |     |                      |

4030377-  
End-of-Tape Arm and Housing Assembly

Sheet 1 of 1

Next Assy: 4020360

| ITEM NO. | PART NUMBER | DESCRIPTION                                 | REF. QTY | REF. DASH | QTY REQ PER DASH NUMBER |
|----------|-------------|---|----------|-----------|-------------------------|
| 1        | 4041162-01  | ARM, BLOCK ASSY                             |          | -01       |                         |
| 2        |             |   |          |           |                         |
| 3        | 4220291-01  | STOP, SOLENOID                              | 1        |           |                         |
| 4        |             |   |          |           |                         |
| 5        | 4230284-01  | LINK, TAPE LIFTER                           | 1        |           |                         |
| 6        | 4330202-01  | MOUNTING PLATE, SOLENOID                    | 1        |           |                         |
| 7        |             |   |          |           |                         |
| 8        | 4440312-04  | WASHER, FELT                                | 2        |           |                         |
| 9        |             |   |          |           |                         |
| 10       | 022-179     | SOLENOID, 2W                                | 1        |           |                         |
| 11       | 013-678     | DIODE, SILICON                              | 1        |           |                         |
| 12       | 181-023     | TERMINAL STRIP                              |          | TBA       |                         |
| 13       | 352-362     | SPRING, .250 OD X 1.00 LG                   | 1        |           |                         |
| 14       |             |   |          |           |                         |
| 15       | 421-343     | BEARING SLEEVE, .192 ID X .253 OD X .250 LG | 2        |           |                         |
| 16       | 406-284     | PIN, SPRING ROLL .094 DIA X .50 LG          | 1        |           |                         |
| 17       |             |   |          |           |                         |
| 18       |             |   |          |           |                         |
| 19       |             |   |          |           |                         |
| 20       | 490-090     | RETAINING RING                              | 2        |           |                         |
| 21       | 501-032     | WASHER, .515 ID X .87 OD X .032 THK         | 1        |           |                         |
| 22       | 501-736     | WASHER, NYLON, .253 ID X .031 THK           | 4        |           |                         |
| 23       | 471-345     | SCREW, FLAT HD #8-32 X .37 LG               | 4        |           |                         |
| 24       | 471-342     | SCREW, FLAT HD #6-32 X 1.00 LG              | 2        |           |                         |
| 25       | 471-078     | SCREW, PAN HD #8-32 X .37 LG                | 2        |           |                         |
| 26       | 501-009     | WASHER, PLAIN #8                            | 2        |           |                         |
| 27       | 501-003     | WASHER, LOCK #6                             | 2        |           |                         |
| 28       | 501-205     | WASHER, PLAIN #8                            | 2        |           |                         |
| 29       | 502-026     | WASHER, LOCK #8                             | 2        |           |                         |
| 30       | 492-008     | NUT, PLAIN #6-32                            | 2        |           |                         |



| WIRE LEAD LENGTHS |        |     |
|-------------------|--------|-----|
| FROM              | DL 1   | 2.5 |
| P4                | PC 1   | 5.0 |
| TO                | PC 2   | 3.5 |
|                   | ITEM 5 | 2.0 |

NOTES:

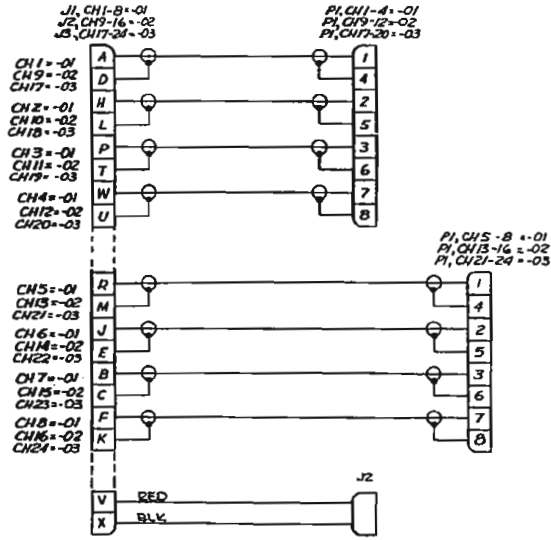
1. PART NO. IS 4030384-01.
2. MARK PART NO. WITH PREFIX "ASSY" PER BDI-1.
3. MOUNT ITEM 7 TO EXTREME EDGES OF ITEM 1 AS SHOWN USING ITEM G.
4. WIRE LEAD LENGTHS FROM P4 (ITEM 4) SHOWN IN TABLE.

|     |   |            |                                       |
|-----|---|------------|---------------------------------------|
| A/R | 8 | 611-316    | WIRE, INS. STRANDED, 22 AWG, BLK      |
|     | 2 | 581-204    | DIODE, PHOTOVOLTAIC, SELENIUM         |
| A/R | 6 | 225-316    | TAPE, DOUBLE-SIDED, VINYL FOAM        |
|     | 1 | 172-010    | TERMINAL LUG, SOLDER, #6              |
|     | 1 | 139-514    | CONNECTOR, RECT. PPLUG, 8 PIN         |
|     | 1 | 132-313    | LAMP FIXTURE, INDICATOR, INCANDESCENT |
|     | 1 | 060-373    | LAMP, INCANDESCENT, 28 V, .06 AMP     |
|     | 1 | 4260143-01 | BKT, MTG., LAMP AND PHOTOCELL         |

4030384A  
Tension Sensor Assembly

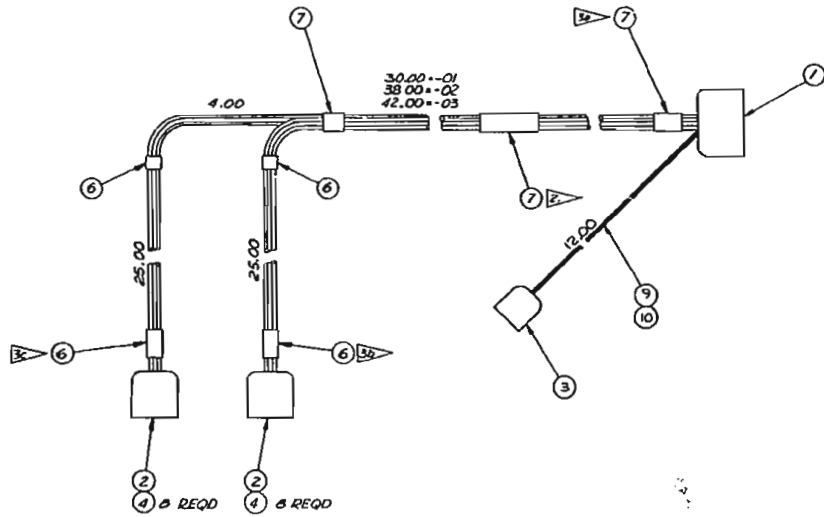
Sheet 1 of 1

Next Assy: 4020360



WIRING DIAGRAM

| QTY | SIZE | LENGTH | PART NO | DESCRIPTION                                |
|-----|------|--------|---------|--|
| -   | 1/16 | 10     | 617-050 | WIRE, STRANDED, INSUL, 20 AWG RED          |
| -   | 1/16 | 9      | 611-256 | WIRE, STRANDED, INSUL, 20 AWG BLK          |
| 1/2 | 1/8  | 8      | 616-303 | CABLE, COAX, 24AWG                         |
| 1/2 | 1/8  | 7      | 606-257 | SLEEVING, SHRINKABLE, .500 I.D.            |
| 1/2 | 1/8  | 6      | 600-256 | SLEEVING, SHRINKABLE, .375 I.D.            |
|     |      | 5      |         |  |
| 16  | 16   | 4      | 187-037 | TERMINAL, QUICK-DISCONNECT, FEMALE         |
| -   | 1    | 3      | 145-023 | CONNECTOR, CIRCULAR, 2 PIN LATCHING        |
| 2   | 2    | 2      | 165-085 | CONNECTOR PART,BODY, RECT RECP, 9 CONTACTS |
| 1   | 1    | 1      | 146-129 | CONNECTOR, RECT RECP, 20 SOCKET            |
| 03  | 02   | 01     |         |  |



NOTES:

- PART NO. IS 4050686-XX.
  - MARK PART NO. PER BDI-1.
  - MARK REF DES PER BDI-1.
1. -01, MARK "J1, CH1-8" -02, MARK "J2, CH9-16" -03, MARK "J3 CH17-24."  
 2. -01, MARK "P1, CH1-4" -02, MARK "P1, CH9-12" -03, MARK "P1, CH17-20."  
 3. -01, MARK "P1, CH5-8" -02, MARK "P1, CH13-16" -03, MARK "P1, CH21-24."

4050686A  
Erase Head Cable Assembly

Sheet 1 of 1

Next Assy: 4020360

| ITEM NO. | PART NUMBER | DESCRIPTION                                      | REF   |     | QTY REQD PER DASH NUMBER |     |
|----------|-------------|--|-------|-----|--------------------------|-----|
|          |             |  | DESIG | QTY | -01                      | -02 |
| 1        | 4700573-01  | CABLE, HEAD                                      |       | A/A | A/A                      | A/A |
| 2        |             |  |       |     |                          |     |
| 3        | 166-954     | CONNECTOR PART BODY, RECT. RECPT, 18 PIN         |       | 2   | 2                        |     |
| 4        | 166-129     | CONNECTOR SIGNAL CIRCUIT, RECT RECPT, 20 SOCKETS |       | 1   | 1                        | 1   |
| 5        |             |  |       |     |                          |     |
| 6        | 159-689     | CONNECTOR PART, CONTACT PIN, 14-18 AWG           |       | 16  | 16                       | 16  |
| 7        | 199-086     | CONNECTOR PART, CONTACT PIN, 24 AWG              |       | 16  | 16                       | 16  |
| 8        | 172-803     | TERMINAL Lug, SOLDER, SING TONGUE, #6            |       | 1   | 1                        | 1   |
| 9        |             |  |       |     |                          |     |
| 10       | 600-212     | SLEEVING, SHRINKABLE, .155 ID                    |       | A/A | A/A                      | A/A |
| 11       | 600-215     | SLEEVING, SHRINKABLE, .250 ID                    |       | M/A | M/A                      | M/A |
| 12       | 600-218     | SLEEVING, SHRINKABLE, .375 ID                    |       | M/A | M/A                      | M/A |
| 13       | 600-217     | SLEEVING, SHRINKABLE, .500 ID                    |       | M/A | M/A                      | M/A |
| 14       | 600-216     | SLEEVING, SHRINKABLE, .750 ID                    |       | M/A | M/A                      | M/A |
| 15       |             |  |       |     |                          |     |
| 16       | 611-208     | WIRE, 24 AWG, BLK                                |       | M/A | M/A                      | M/A |

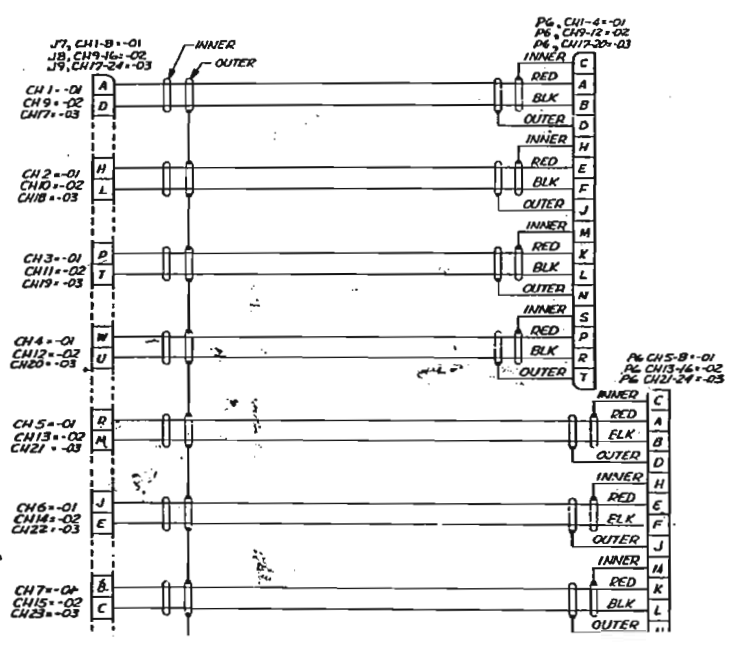
4050687-

Reproduce Head Cable Assembly

Sheet 1 of 2

Next Assy: 4020360



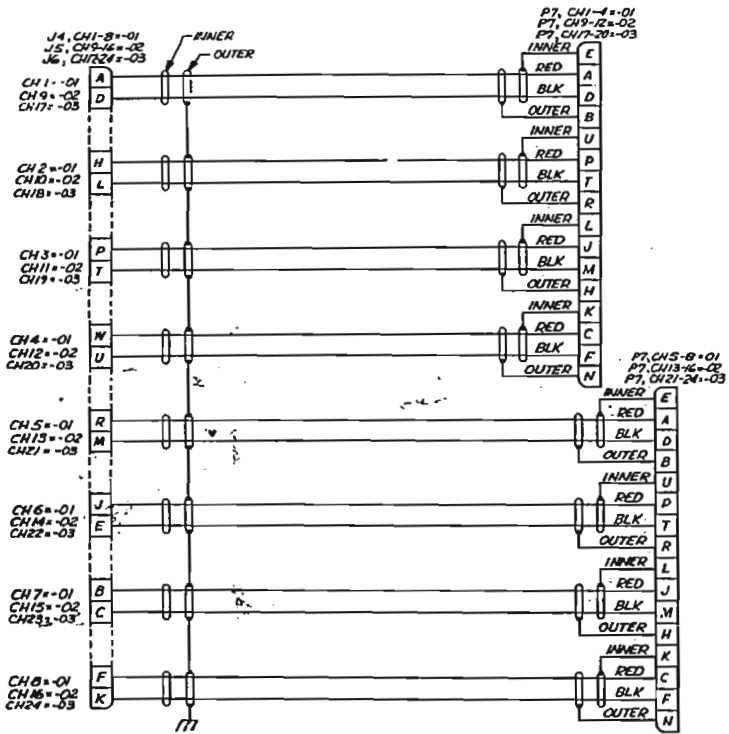


| ITEM NO. | PART NUMBER | DESCRIPTION                                      | REP | QTY REQ PER DASH NUMBER |     |     |  |
|----------|-------------|--|-----|-------------------------|-----|-----|--|
|          |             |  |     | 91                      | 02  | 03  |  |
| 1        | 8700573-01  | CABLE HEAD                                       | M/A | M/A                     | M/A | M/A |  |
| 2        | 145-170     | CONNECTOR PART BODY, RECT PLUG, 20 POSITIONS     | 2   | 2                       |     |     |  |
| 3        | 144-139     | CONNECTOR, SIGNAL CIRCUIT, RECT RECP, 20 SOCKETS | 1   | 1                       | 1   |     |  |
| 4        | 169-089     | CONNECTOR PART, CONTACT PIN 14-16 AWG            | 16  | 16                      | 16  |     |  |
| 5        | 169-086     | CONNECTOR PART, CONTACT PIN 24 AWG               | 16  | 16                      | 16  |     |  |
| 6        | 172-003     | TERMINAL LUG, SOLDER, RING TONGUE, #6            | 1   | 1                       | 1   |     |  |
| 7        | 600-253     | SLEEVING, SHRINKABLE, .185 ID                    | M/A | M/A                     | M/A |     |  |
| 8        | 600-255     | SLEEVING, SHRINKABLE, .275 ID                    | M/A | M/A                     | M/A |     |  |
| 9        | 600-256     | SLEEVING, SHRINKABLE, .375 ID                    | M/A | M/A                     | M/A |     |  |
| 10       | 600-257     | SLEEVING, SHRINKABLE, .500 ID                    | M/A | M/A                     | M/A |     |  |
| 11       | 600-258     | SLEEVING, SHRINKABLE, .750 ID                    | M/A | M/A                     | M/A |     |  |
| 12       | 611-200     | WIRE, 24 AWG, BLK                                | M/A | M/A                     | M/A |     |  |

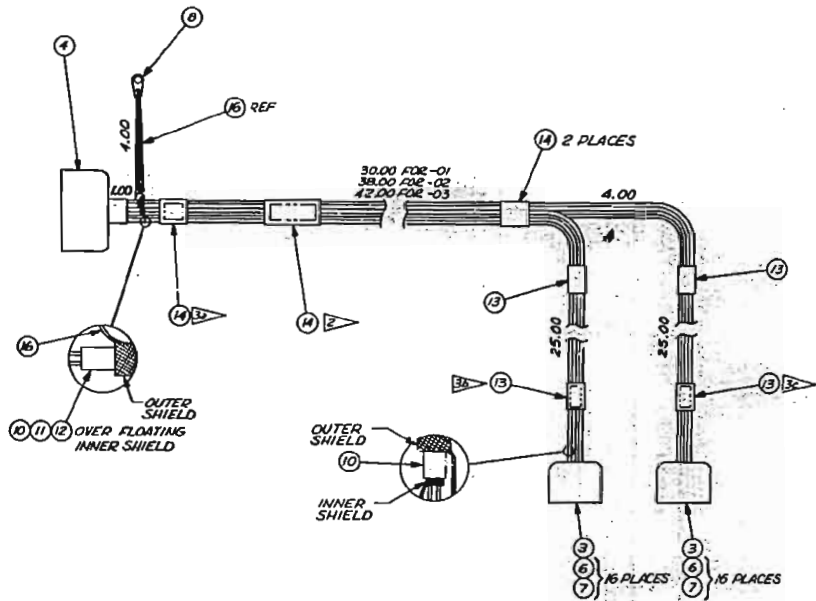
4050688A

Record Head Cable Assembly

Next Assy: 4020360



WIRING DIAGRAM



NOTES:

- 1. PART NO. IS 4050688-XX
- 2. MARK PART NO. PER BDI-1.
- 3. MARK REF DES PER BDI-1.
- 4. -01, MARK "J4, CH 1-01" -02, MARK "J5, CH 9-12" -03 MARK "J6, CH 17-20"
- 5. -01, MARK "P7, CH 1-4" -02, MARK "P7, CH 9-12" -03 MARK "P7, CH 17-20"
- 6. -01, MARK "P7, CH 5-8" -02, MARK "P7, CH 13-16" -03 MARK "P7, CH 21-24"

4050688A  
 Record Head Cable Assembly

Sheet 2 of 2

Next Assy: 4020360

| ITEM NO. | PART NUMBER | DESCRIPTION                          | REF DESG | CITY REQ PER DASH NUMBER |
|----------|-------------|--------------------------------------|----------|--------------------------|
| 1        | 480346      | DIAGRAM, HARNESS                     | REF      |                          |
| 2        | 420473-01   | CABLE, DOUBLE-SHIELDED, TWISTED PAIR | A/N      |                          |
| 3        | 4260481-01  | BRACKET, CONNECTOR MOUNTING          | 1        |                          |
| 4        | 139-515     | CONNECTOR, 8 SOC, FEMALE             | J4       |                          |
| 5        | 144-013     | CONNECTOR, 6 SOC, FEMALE             | J2,3     |                          |
| 6        | 144-030     | CONNECTOR, 15 SOC, FEMALE            | P6       |                          |
| 7        | 144-037     | CONNECTOR, 3 SOC, FEMALE             | P2       |                          |
| 8        | 145-020     | CONNECTOR, 10 PIN, MALE              | P3,A     |                          |
| 9        | 144-003     | CONNECTOR, 8 SOC, FEMALE             | J1       |                          |
| 10       |             |                                      |          |                          |
| 11       | 166-863     | CONNECTOR, 36 SOC, FEMALE            | P5       |                          |
| 12       | 171-009     | TERMINAL, QUICK-DISCONNECT, KNIFE    | 2        |                          |
| 13       | 171-117     | TERMINAL, CRIMP, SPADE TONGUE        | 5        |                          |
| 14       | 171-238     | TERMINAL, QUICK-DISCONNECT, FEMALE   | 8        |                          |
| 15       | 171-001     | TERM. CRIMP, SPADE LUG               | 2        |                          |
| 16       | 187-037     | CONTACT, CONNECTOR, SOCKET           | 36       |                          |
| 17       | 171-043     | TERMINAL, QUICK-DISCONNECT, FEMALE   | 2        |                          |
| 18       | 600-256     | SLEEVING, PTC, SHRINKABLE, .375 ID   | A/N      |                          |
| 19       | 600-258     | SLEEVING, PTC, SHRINKABLE, .75 ID    | A/N      |                          |
| 20       |             |                                      |          |                          |
| 21       | 611-358     | WIRE, INS. STANDED, 18 AWG, BLK      | A/N      |                          |
| 22       | 611-159     | WIRE, INS. STANDED, 18 AWG, ST       | A/N      |                          |
| 23       | 611-363     | WIRE, INS. STANDED, 18 AWG, RED      | A/N      |                          |
| 24       | 611-364     | WIRE, INS. STANDED, 18 AWG, W/O      | A/N      |                          |
| 25       | 611-498     | WIRE, INS. STANDED, 18 AWG, GRN      | A/N      |                          |
| 26       | 611-510     | WIRE, INS. STANDED, 18 AWG, ORN      | A/N      |                          |
| 27       | 611-511     | WIRE, INS. STANDED, 18 AWG, YEL      | A/N      |                          |
| 28       | 611-512     | WIRE, INS. STANDED, 18 AWG, BU       | A/N      |                          |
| 29       | 613-024     | CABLE, SHIELDED, WHT/RED             | A/N      |                          |
| 30       | 613-030     | CABLE, SHIELDED, WHT/GRN             | A/N      |                          |
| 31       | 613-055     | CABLE, SHIELDED, WHT/YEL             | A/N      |                          |
| 32       | 614-333     | CABLE, SHIELDED, WHT/ORN             | A/N      |                          |
| 33       | 616-115     | CABLE, SHIELDED, TWISTED PAIR        | A/N      |                          |
| 34       | CD569       | WIRE, INS. STANDED, 16 AWG           | A/N      |                          |
| 35       | CD569       | WIRE, INS. STANDED, 18 AWG           | A/N      |                          |
| 36       | CD569       | WIRE, INS. STANDED, 20 AWG           | A/N      |                          |
| 37       | CD569       | WIRE, INS. STANDED, 22 AWG           | A/N      |                          |

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Tape Transport Harness Assembly

Sheet 1 of 1

Next Assy: 4020360

| ITEM NO. | PART NUMBER | DESCRIPTION                          | REF. DESC. | QTY. REQD PER DASH NUMBER |
|----------|-------------|--------------------------------------|------------|---------------------------|
| 1        | 4840346     | DIAGRAM, HARNESS                     | REF        |                           |
| 2        | 4700473-01  | CABLE, DOUBLE-SHIELDED, TWISTED PAIR | A/R        |                           |
| 3        | 4700481-01  | BRACKET, CONNECTOR MOUNTING          | 1          |                           |
| 4        | 137-515     | CONNECTOR, 8 SOC, FEMALE             | J4         |                           |
| 5        | 144-013     | CONNECTOR, 6 SOC, FEMALE             | J2,3       |                           |
| 6        | 144-030     | CONNECTOR, 15 SOC, FEMALE            | P6         |                           |
| 7        | 144-037     | CONNECTOR, 2 SOC, FEMALE             | P2         |                           |
| 8        | 145-020     | CONNECTOR, 10 PIN, MALE              | P3,4       |                           |
| 9        | 146-003     | CONNECTOR, 8 SOC, FEMALE             | J1         |                           |
| 10       |             |                                      |            |                           |
| 11       | 166-863     | CONNECTOR, 36 SOC, FEMALE            | P5         |                           |
| 12       | 171-009     | TERMINAL, QUICK-DISCONNECT, KNIFE    | 2          |                           |
| 13       | 171-117     | TERMINAL, CRIMP, SPADE TONGUE        | 5          |                           |
| 14       | 171-238     | TERMINAL, QUICK-DISCONNECT, FEMALE   | 8          |                           |
| 15       | 171-001     | TERM. CRIMP, SPADE LUG               | 2          |                           |
| 16       | 187-037     | CONTACT, CONNECTOR, SOCKET           | 36         |                           |
| 17       | 171-043     | TERMINAL, QUICK-DISCONNECT, FEMALE   | 2          |                           |
| 18       | 600-256     | SLIDING, PVC, SHRINKABLE, .375 ID    | A/R        |                           |
| 19       | 600-258     | SLIDING, PVC, SHRINKABLE, .75 ID     | A/R        |                           |
| 20       |             |                                      |            |                           |
| 21       | 611-158     | WIRE, INS. STRANDED, 14 AWG, BLK     | A/R        |                           |
| 22       | 611-159     | WIRE, INS. STRANDED, 18 AWG, SY      | A/R        |                           |
| 23       | 611-263     | WIRE, INS. STRANDED, 18 AWG, RED     | A/R        |                           |
| 24       | 611-264     | WIRE, INS. STRANDED, 14 AWG, Y/O     | A/R        |                           |
| 25       | 611-098     | WIRE, INS. STRANDED, 14 AWG, GRN     | A/R        |                           |
| 26       | 611-510     | WIRE, INS. STRANDED, 14 AWG, ORN     | A/R        |                           |
| 27       | 611-511     | WIRE, INS. STRANDED, 14 AWG, YEL     | A/R        |                           |
| 28       | 611-512     | WIRE, INS. STRANDED, 14 AWG, BLU     | A/R        |                           |
| 29       | 611-024     | CABLE, SHIELDED, WHT/RED             | A/R        |                           |
| 30       | 611-055     | CABLE, SHIELDED, WHT/YEL             | A/R        |                           |
| 31       | 611-933     | CABLE, SHIELDED, WHT/GRN             | A/R        |                           |
| 32       | 611-933     | CABLE, SHIELDED, WHT/GRN             | A/R        |                           |
| 33       | 611-915     | CABLE, SHIELDED, TWISTED PAIR        | A/R        |                           |
| 34       | CD669       | WIRE, INS. STRANDED, 16 AWG          | A/R        |                           |
| 35       | CD669       | WIRE, INS. ST ENDED, 18 AWG          | A/R        |                           |
| 36       | CD669       | WIRE, INS. STRANDED, 20 AWG          | A/R        |                           |
| 37       | CD668       | WIRE, INS. STRANDED, 22 AWG          | A/R        |                           |

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Tape Transport Harness Assembly

Next Assy: 4020360

| ITEM NO. | PART NUMBER | DESCRIPTION                               | REF DESIG | QTY REQD PER DASH NUMBER |     |
|----------|-------------|---|-----------|--------------------------|-----|
|          |             |   |           | -01                      | -02 |
| 1        |             |   |           |                          |     |
| 2        |             |   |           |                          |     |
| 3        | 405013-05   | BIAS PWA                                  |           |                          |     |
| 4        | 405013-01   | RECORD PWA                                |           |                          |     |
| 5        | 405013-08   | REPRODUCE PWA                             |           |                          |     |
| 6        | 405009-03   | PRINTED WIRING ASSY. AUDIO SWITCHING      |           |                          |     |
| 7        |             |   |           |                          |     |
| 8        |             |   |           |                          |     |
| 9        | 405071-01   | WIRESS. HEAD AND INPUT CABLING            |           |                          |     |
| 10       |             |   |           |                          |     |
| 11       |             |   |           |                          |     |
| 12       |             |   |           |                          |     |
| 13       |             |   |           |                          |     |
| 14       |             |   |           |                          |     |
| 15       |             |   |           |                          |     |
| 16       |             |   |           |                          |     |
| 17       | 432023-01   | GUIDE, P.C. BOARD, VERTICAL               |           |                          |     |
| 18       |             |   |           |                          |     |
| 19       |             |   |           |                          |     |
| 20       |             |   |           |                          |     |
| 21       |             |   |           |                          |     |
| 22       | 4580100-01  | INPUT TRANSFORMER                         |           |                          |     |
| 23       | 455017-0A   | CAPACITOR, ALUM. ELECT. 1500 UFD, 50VDC   | C1        |                          |     |
| 24       | 4840327     | INTERCONNECT DIAGRAM, ELECTRONICS ASSY    |           |                          |     |
| 25       | 4840357     | SCHEMATIC, ELECTRONICS                    |           |                          |     |
| 26       | 063-091     | CLAMP, CAPACITOR                          |           |                          |     |
| 27       |             |   |           |                          |     |
| 28       |             |   |           |                          |     |
| 29       | 070-019     | FUSE, 125V, 2 AMP, S10-B10                |           |                          |     |
| 30       | 085-001     | FUSE, HOLDER                              |           |                          |     |
| 31       |             |   |           |                          |     |
| 32       | 139-211     | CONNECTOR, BODY, RECT F. IUC. 12 CONTACTS |           |                          |     |
| 33       | 150-023     | ELECTRON TUBE SOCKET, OCTAL               |           |                          |     |
| 34       |             |   |           |                          |     |
| 35       | 165-093     | CONNECTOR, BODY, RECT. 9 PIN              |           |                          |     |
| 36       | 165-146     | CONNECTOR, BODY, RECT RECP. 15 CONTACTS   |           |                          |     |
| 37       | 166-154     | CONNECTOR, BODY, RECT PLUG. 15 PIN        |           |                          |     |

4020371C

Electronics Assembly

Next Assy: 4010210

| ITEM NO. | PART NUMBER | DESCRIPTION                           | REF DESIG | QTY REQD PER DASH NUMBER |     |
|----------|-------------|---------------------------------------|-----------|--------------------------|-----|
|          |             |                                       |           | -01                      | -02 |
| 38       | 164-862     | CONNECTOR, BODY, RECT PLUG. 35 PIN    |           |                          |     |
| 39       | 164-867     | CONNECTOR, BODY, RECT 18 SOCKET       |           |                          |     |
| 40       | 169-083     | CONNECTOR, BODY, RECT. 20 SOCKET      |           |                          |     |
| 41       |             |                                       |           |                          |     |
| 42       |             |                                       |           |                          |     |
| 43       | 230-099     | KNOB                                  |           |                          |     |
| 44       | 251-019     | BUTTON, PLUG                          |           |                          |     |
| 45       | 471-066     | SCREW, PAN HD XREC. 4-40 X 3/4 L2     |           |                          |     |
| 46       | 471-064     | SCREW, PAN HD. XREC 4-40 X 1/2 LG     |           |                          |     |
| 47       | 501-008     | WASHER, PLAIN F/A                     |           |                          |     |
| 48       | 502-002     | LOCK WASHER, SPRING F/A               |           |                          |     |
| 49       | 495-00A     | MUT. KEYS F/A                         |           |                          |     |
| 50       | 530-159     | GUIDE, P.C. BOARD, EDGE               |           |                          |     |
| 51       | 530-164     | GUIDE, P.C. BOARD, EDGE               |           |                          |     |
| 52       |             |                                       |           |                          |     |
| 53       | 041-406     | RESISTOR, COMP. 22K OHMS. 1/2W, 5%    | R1,2,3,4  |                          |     |
| 54       |             |                                       |           |                          |     |
| 55       | 405061-02   | WIRESS. ELECT. CHASSIS                |           |                          |     |
| 56       | 430007-02   | PANEL REAR, ELECT                     |           |                          |     |
| 57       | 430008-02   | PANEL TOP, ELECT                      |           |                          |     |
| 58       | 430012-02   | CHASSIS, ELECT                        |           |                          |     |
| 59       | 430019-01   | TRANSFORMER, OUTPUT                   |           |                          |     |
| 60       |             |                                       |           |                          |     |
| 61       | 031-126     | CAPACITOR, ALUM. 250 UFD, 50VDC       |           |                          |     |
| 62       | 063-191     | CAPACITOR, QUAD. ALUM. 500 UFD, 50VDC | C2        |                          |     |
| 63       | 180-039     | TERMINAL STRIP                        |           |                          |     |
| 64       |             |                                       |           |                          |     |
| 65       | 421050-03   | SHAFT, EXTENDER                       |           |                          |     |
| 66       | 421050-04   | SHAFT, EXTENDER                       |           |                          |     |
| 67       | 421012-01   | COIL, I.C.                            |           |                          |     |
| 68       | 265-065     | CUSHING, SNAP, NYLON, BLK             |           |                          |     |

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| ITEM NO. | PART NUMBER | D | DESCRIPTION                           | REF DESIG | QTY REQD PER DASH NUMBER |     |     |     |     |
|----------|-------------|---|---------------------------------------|-----------|--------------------------|-----|-----|-----|-----|
|          |             |   |                                       |           | -01                      | -02 | -03 | -04 | -05 |
| 1        | 4500104-01  | D | PRINTED WIRING BOARD, BIAS AMPLIFIER  |           |                          |     |     |     |     |
| 2        | 4500972-01  | C | BRACKET, BIAS EQUALIZATION            |           |                          |     |     |     |     |
| 3        | 4110219-01  | B | LABEL, BIAS MODULE                    |           |                          |     |     |     |     |
| 4        | 4330211-01  | C | FRONT PLATE, BIAS MODULE              | 044       |                          |     |     |     |     |
| 5        | 4500104-01  | C | POT, BIAS CALIBRATE 750 OHMS          | 060       |                          |     |     |     |     |
| 6        | 4500104-20  | B | POT, BIAS ADJUST 15K OHMS             | 073, 5    |                          |     |     |     |     |
| 7        | 4500103-01  | C | COIL, OSCILLATOR                      |           |                          |     |     |     |     |
| 8        |             |   |                                       |           |                          |     |     |     |     |
| 9        | 417-508     |   | WIRE, #24 GA, BUNCH TYPED, BROWN      | A/A       | A/A                      | A/A | A/A | A/A |     |
| 10       | 417-509     |   | WIRE, #24 GA, BUNCH TYPED, RED        | A/A       | A/A                      | A/A | A/A | A/A |     |
| 11       | 417-510     |   | WIRE, #24 GA, BUNCH TYPED, ORANGE     | A/A       | A/A                      | A/A | A/A | A/A |     |
| 12       | 417-511     |   | WIRE, #24 GA, BUNCH TYPED, YELLOW     | A/A       | A/A                      | A/A | A/A | A/A |     |
| 13       | 417-512     |   | WIRE, #24 GA, BUNCH TYPED, GREEN      | A/A       | A/A                      | A/A | A/A | A/A |     |
| 14       | 417-513     |   | WIRE, #24 GA, BUNCH TYPED, BLUE       | A/A       | A/A                      | A/A | A/A | A/A |     |
| 15       | 034-891     |   | CAPACITOR, MICA, .00167, 500V, 5%     | C39       |                          |     |     |     |     |
| 16       |             |   |                                       |           |                          |     |     |     |     |
| 17       |             |   |                                       |           |                          |     |     |     |     |
| 18       | 816-319     |   | TRANSISTOR, 2N2102                    | Q14, 17   | 2                        | 2   | 2   | 2   |     |
| 19       | 816-553     |   | TRANSISTOR, 6N6                       | Q18, 19   | 2                        | 2   | 2   | 2   |     |
| 20       | 911-190     |   | CAPACITOR, ELEC, 500PF, 50V           | C44       | 1                        | 1   | 1   | 1   |     |
| 21       | 034-275     |   | CAPACITOR, MICA, 5000PF, 500V, 5%     | C41       | 1                        | 1   | 1   | 1   |     |
| 22       | 034-280     |   | CAPACITOR, MICA, 5000 PFD, 100V, 5%   | C45       | 1                        | 1   | 1   | 1   |     |
| 23       |             |   |                                       |           |                          |     |     |     |     |
| 24       | 041-031     |   | RESISTOR, FIXED, 1 RES OHM, 1/2W, 10% | R60, 61   | 2                        | 2   | 2   | 2   |     |
| 25       | 041-033     |   | RESISTOR, COMP, 22 OHMS, 1/2W, 10%    | R67       | 1                        | 1   | 1   | 1   |     |
| 26       | 041-345     |   | RESISTOR, COMP, 51 OHMS, 1/2W, 5%     | R63       | 1                        | 1   | 1   | 1   |     |
| 27       | 041-352     |   | RESISTOR, FIXED, 1.6K OHMS, 1/2W, 5%  | R66       | 1                        | 1   | 1   | 1   |     |
| 28       | 041-475     |   | RESISTOR, COMP, 3K OHMS, 1/2W, 5%     | R64, 85   | 2                        | 2   | 2   | 2   |     |
| 29       | 041-519     |   | RESISTOR, FIXED, 20K OHMS, 1/2W, 5%   | R62, 89   | 2                        | 2   | 2   | 2   |     |
| 30       | 055-106     |   | CAPACITOR, MTLAB, 100PF, 100V, 10%    | C41, 51   | 2                        | 2   | 2   | 2   |     |
| 31       | 055-017     |   | RESISTOR, V.V, 180 OHMS, 5W, 5%       | R62       | 1                        | 1   | 1   | 1   |     |
| 32       | 250-131     |   | TRANSISTOR, PNP, 200 BIA,             |           |                          |     |     |     |     |
| 33       | 475-006     |   | SCREW, #4-40 x 1/2 LB, SEN, PAN HD    |           |                          |     |     |     |     |
| 34       | 504-046     |   | NUT, HEX 1/4-28                       |           |                          |     |     |     |     |
| 35       | 504-078     |   | NUT, HEX 3/8-32                       |           |                          |     |     |     |     |
| 36       | 501-008     |   | WASHER, FLAT, 1/4"                    |           |                          |     |     |     |     |
| 37       | 502-028     |   |                                       |           |                          |     |     |     |     |

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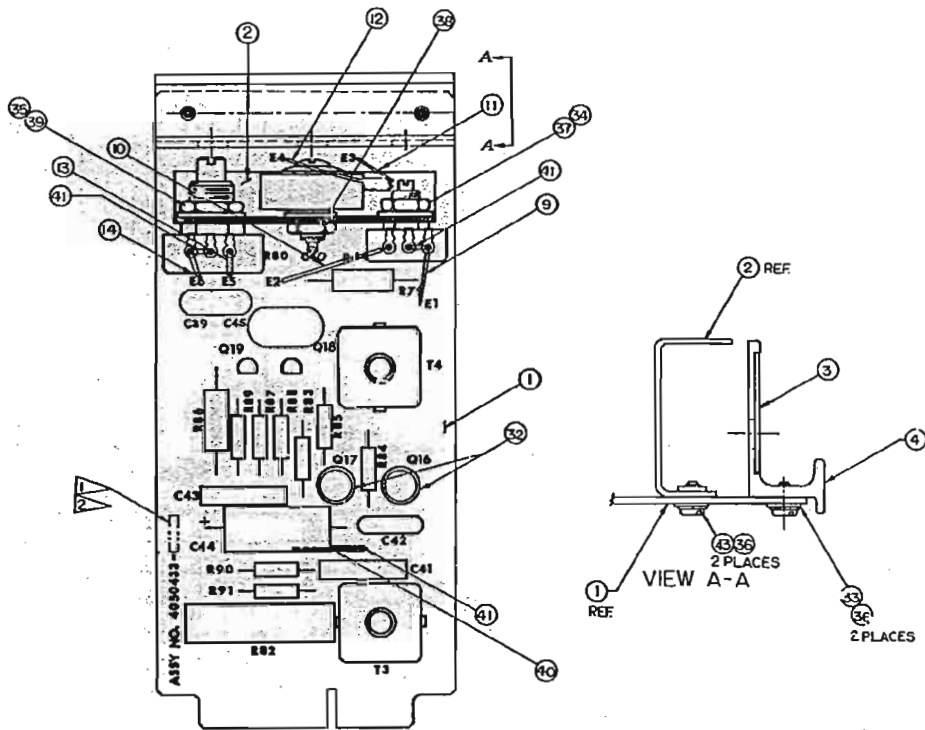
Bias Amplifier PWA

Next Assy: 4020371

| ITEM NO. | PART NUMBER | D | DESCRIPTION                                      | REF DESIG | QTY REQD PER DASH NUMBER |     |     |     |     |
|----------|-------------|---|--|-----------|--------------------------|-----|-----|-----|-----|
|          |             |   |  |           | -01                      | -02 | -03 | -04 | -05 |
| 38       | 502-559     |   | WASHER, FLAT, INT TOOTH #12                      |           |                          |     |     |     |     |
| 39       | 502-083     |   | WASHER, FLAT, INT TOOTH #18                      |           |                          |     |     |     |     |
| 40       | 502-016     |   | TUBING, TIFCON                                   | A/R       | A/R                      | A/R | A/R | A/R |     |
| 41       | 615-002     |   | WIRE, BARE, SOLID #22 AWG                        | A/R       | A/R                      | A/R | A/R | A/R |     |
| 42       | 034-928     |   | CAPACITOR, MICA, 520 PF, 500V, 5%                | C19       |                          |     |     |     |     |
| 43       | 475-007     |   | SCREW, #4-40 x 5/16 LB, PAN HD, SCH              |           | 2                        | 2   | 2   | 2   |     |
| 44       | 038-011     |   | CAPACITOR, VARIABLE, 1-500 - 3,055 PF, 350V, C40 |           |                          |     |     |     |     |
| 45       |             |   |  |           |                          |     |     |     |     |
| 46       |             |   |  |           |                          |     |     |     |     |
| 47       |             |   |  |           |                          |     |     |     |     |
| 48       |             |   |  |           |                          |     |     |     |     |
| 49       |             |   |  |           |                          |     |     |     |     |
| 50       |             |   |  |           |                          |     |     |     |     |
| 51       |             |   |  |           |                          |     |     |     |     |
| 52       |             |   |  |           |                          |     |     |     |     |
| 53       |             |   |  |           |                          |     |     |     |     |
| 54       |             |   |  |           |                          |     |     |     |     |
| 55       |             |   |  |           |                          |     |     |     |     |
| 56       |             |   |  |           |                          |     |     |     |     |
| 57       |             |   |  |           |                          |     |     |     |     |
| 58       |             |   |  |           |                          |     |     |     |     |
| 59       |             |   |  |           |                          |     |     |     |     |
| 60       |             |   |  |           |                          |     |     |     |     |
| 61       |             |   |  |           |                          |     |     |     |     |
| 62       |             |   |  |           |                          |     |     |     |     |
| 63       |             |   |  |           |                          |     |     |     |     |
| 64       |             |   |  |           |                          |     |     |     |     |
| 65       |             |   |  |           |                          |     |     |     |     |
| 66       |             |   |  |           |                          |     |     |     |     |
| 67       |             |   |  |           |                          |     |     |     |     |
| 68       |             |   |  |           |                          |     |     |     |     |
| 69       |             |   |  |           |                          |     |     |     |     |
| 70       |             |   |  |           |                          |     |     |     |     |
| 71       |             |   |  |           |                          |     |     |     |     |
| 72       |             |   |  |           |                          |     |     |     |     |
| 73       |             |   |  |           |                          |     |     |     |     |
| 74       |             |   |  |           |                          |     |     |     |     |
| 75       |             |   |  |           |                          |     |     |     |     |
| 76       |             |   |  |           |                          |     |     |     |     |
| 77       |             |   |  |           |                          |     |     |     |     |
| 78       |             |   |  |           |                          |     |     |     |     |
| 79       |             |   |  |           |                          |     |     |     |     |
| 80       |             |   |  |           |                          |     |     |     |     |
| 81       | 4050169     | D | SCHEMATIC  | REF       |                          |     |     |     |     |

4050433H

Sheet 2 of 3



NOTES:

- ▽ ASSY NUMBER TO BE 4050433-XX
- ▽ MARK PART NO PER BCI-1.

**4050433H**  
**Bias Amplifier PWA**

Sheet 3 of 3

Next Assy: 4020371



| ITEM NO. | PART NUMBER | DESCRIPTION                            | REF. DESIG. | QTY REQD PER DASH NUMBER |
|----------|-------------|--|-------------|--------------------------|
| 1        | 4000107-01  | PRINTED WIRING BOARD                   |             |                          |
| 2        | 4110062-01  | FRONT PLATE, RECORD MODULE             |             |                          |
| 3        | 4000000-01  | CONNECTOR, SILICON, CD552              |             |                          |
| 4        | 4000000-01  | CONNECTOR, SILICON, CD552              |             |                          |
| 5        | 01-146      | CAPACITOR, ELECT. (10UF, 25V)          | C28         | 1                        |
| 6        | 01-146      | CAPACITOR, TANT. (15UF, 15V, 20%)      | C29         | 1                        |
| 7        | 01-146      | CAPACITOR, TANT. (5UF, 5V, 10%)        | C30         | 3                        |
| 8        | 01-146      | CAPACITOR, TANT. (.68UF, 25V, 5%)      | C31, C32    | 2                        |
| 9        | 01-106      | CAPACITOR, MYLAR (.1UF, 100V, 10%)     | C33         | 2                        |
| 10       | 01-012      | RESISTOR, FIXED (6.3K OHMS, 1/2W, 5%)  | R55, R56    | 2                        |
| 11       | 01-012      | RESISTOR, FIXED (10K OHMS, 1/2W, 5%)   | R57, R58    | 2                        |
| 12       | 01-018      | RESISTOR, FIXED (100 OHMS, 1/2W, 10%)  | R59         | 2                        |
| 13       | 01-094      | RESISTOR, FIXED (3.3K OHMS, 1/2W, 10%) | R60         | 1                        |
| 14       | 01-060      | RESISTOR, FIXED (10K OHMS, 1/2W, 10%)  | R61, R62    | 2                        |
| 15       | 01-064      | RESISTOR, FIXED (22K OHMS, 1/2W, 10%)  | R63, R64    | 2                        |
| 16       | 01-067      | RESISTOR, FIXED (33K OHMS, 1/2W, 10%)  | R65, R66    | 2                        |
| 17       | 01-068      | RESISTOR, FIXED (47K OHMS, 1/2W, 10%)  | R67         | 1                        |
| 18       | 01-069      | RESISTOR, FIXED (68K OHMS, 1/2W, 10%)  | R68         | 1                        |
| 19       | 01-070      | RESISTOR, FIXED (82K OHMS, 1/2W, 10%)  | R69         | 1                        |
| 20       | 01-072      | RESISTOR, FIXED (100K OHMS, 1/2W, 10%) | R70         | 2                        |
| 21       | 01-078      | RESISTOR, FIXED (330K OHMS, 1/2W, 10%) | R71         | 1                        |
| 22       | 01-080      | RESISTOR, FIXED (470K OHMS, 1/2W, 10%) | R72         | 1                        |
| 23       | 01-082      | RESISTOR, FIXED (680K OHMS, 1/2W, 10%) | R73         | 1                        |
| 24       | 01-261      | RESISTOR, FIXED (150 OHMS, 1/2W, 10%)  | R74         | 1                        |
| 25       | 01-161      | RESISTOR, FIXED (7.5K OHMS, 1/2W, 5%)  | R75         | 2                        |
| 26       | 01-177      | RESISTOR, FIXED (1.5 OHMS, 1/2W, 5%)   | R76         | 1                        |
| 27       | 01-098      | RESISTOR, FIXED (1.1 OHMS, 1/2W, 5%)   | R77         | 1                        |
| 28       | 280-131     | TRANSISTOR, PNP                        |             | 2                        |
| 29       | 472-006     | SCRIB, BR, PWR BR, (6-10 X 1/4)        |             | 2                        |
| 30       | 501-008     | WASHER, FLAT #4                        |             | 2                        |
| 31       | 402070-01   | CONNECTOR, ASSY, 10 PIN                |             | 1                        |
| 32       | 4110270-01  | LABEL, RECORD MODULE                   |             | 1                        |
| 33       | 01-178      | TRANSISTOR, SILICON, CD562             |             | 1                        |
| 34       | 01-178      | TRANSISTOR, SILICON, CD513             |             | 1                        |
| 35       | 01-178      | TRANSISTOR, SILICON, CD58              |             | 1                        |

Sheet 1 of 3

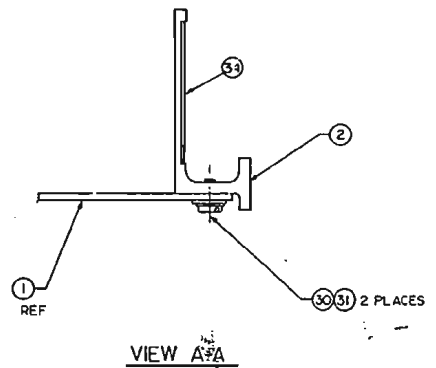
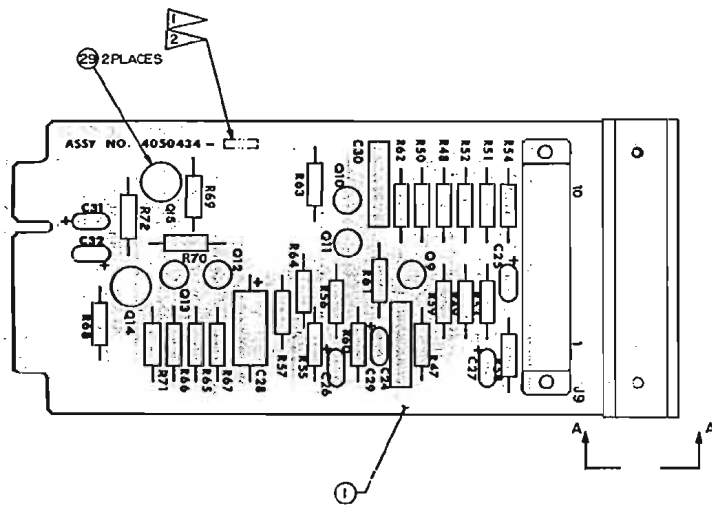
4050434G  
Record Amplifier PWA

Next Assy: 4020371

| ITEM NO. | PART NUMBER | DESCRIPTION                | REF. DESIG. | QTY REQD PER DASH NUMBER |
|----------|-------------|----------------------------|-------------|--------------------------|
| 38       | 01-498      | TRANSISTOR, SILICON, CD552 |             |                          |

4050434G

Sheet 2 of 3



NOTES:

- 1 ASSEMBLY NUMBER TO BE 4050434-01
- 2 INK STAMP DASH NUMBER PER *201-1*

**4050434G**  
**Record Amplifier PWA**

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Next Assy: 4020371

| ITEM NO. | PART NUMBER | QTY | REF | DESCRIPTION                              | REF | QTY | REF | DESCRIPTION | REF | QTY | REF |
|----------|-------------|-----|-----|--|-----|-----|-----|-------------|-----|-----|-----|
| 1        | 500108-02   | 1   |     | PRINTED WIRE BOARD - REPRODUCE AMPLIFIER |     | 1   |     |             |     | 1   |     |
| 2        | 501210-02   | 1   |     | CONNECTION ASSY. IO CONTACT              |     | 1   |     |             |     | 1   |     |
| 3        | 511971-01   | 1   |     | LABEL - REPRODUCE MODULE                 |     | 1   |     |             |     | 1   |     |
| 4        | 531023-01   | 1   |     | FRONT PLATE, REPRODUCE MODULE            |     | 1   |     |             |     | 1   |     |
| 5        | 540199-01   | 1   |     | TRANSFORMER INPUT                        |     | 1   |     |             |     | 1   |     |
| 6        | 513-559     | 3   |     | DIODE                                    |     | 3   |     |             |     | 3   |     |
| 7        | 014-247     | 1   |     | TRANSISTOR, 2N4037                       |     | 1   |     |             |     | 1   |     |
| 8        | 014-523     | 1   |     | TRANSISTOR, CD524                        |     | 1   |     |             |     | 1   |     |
| 9        | 014-704     | 2   |     | TRANSISTOR, CD562                        |     | 2   |     |             |     | 2   |     |
| 10       | 014-508     | 1   |     | TRANSISTOR, NPN, CD562                   |     | 1   |     |             |     | 1   |     |
| 11       | 014-706     | 2   |     | HEAT SINK, TRANSISTOR                    |     | 2   |     |             |     | 2   |     |
| 12       | 014-723     | 1   |     | TRANSISTOR, 2N4037                       |     | 1   |     |             |     | 1   |     |
| 13       | 014-329     | 1   |     | TRANSISTOR, 2N102                        |     | 1   |     |             |     | 1   |     |
| 14       | 031-187     | 1   |     | CAPACITOR, ELEC. (50MFD, 50V)            |     | 1   |     |             |     | 1   |     |
| 15       | 031-190     | 1   |     | CAPACITOR, ELEC. (50MFD, 50V)            |     | 1   |     |             |     | 1   |     |
| 16       | 034-181     | 2   |     | CAPACITOR, NICA (57MFD, 500V, 5%)        |     | 2   |     |             |     | 2   |     |
| 17       | 037-524     | 2   |     | CAPACITOR, TANT. (1.5MFD, 35V, 20%)      |     | 2   |     |             |     | 2   |     |
| 18       | 037-446     | 6   |     | CAPACITOR, TANT. (15MFD, 15V, 20%)       |     | 6   |     |             |     | 6   |     |
| 19       | 037-494     | 2   |     | CAPACITOR, TANT. (5MFD, 4V, 20%)         |     | 2   |     |             |     | 2   |     |
| 20       | 041-012     | 1   |     | RESISTOR, COMP. (4.7K OHMS, 1/2W, 5%)    |     | 1   |     |             |     | 1   |     |
| 21       | 041-533     | 2   |     | RESISTOR, FIXED (24 OHMS, 1/2W, 5%)      |     | 2   |     |             |     | 2   |     |
| 22       | 041-573     | 2   |     | RESISTOR, FIXED (370 OHMS, 1/2W, 5%)     |     | 2   |     |             |     | 2   |     |
| 23       | 041-045     | 2   |     | RESISTOR, FIXED (680 OHMS, 1/2W, 10%)    |     | 2   |     |             |     | 2   |     |
| 24       | 041-048     | 1   |     | RESISTOR, FIXED (1K OHMS, 1/2W, 10%)     |     | 1   |     |             |     | 1   |     |
| 25       | 041-019     | 1   |     | RESISTOR, FIXED (2.0 K OHMS, 1/2W, 5%)   |     | 1   |     |             |     | 1   |     |
| 26       | 041-054     | 1   |     | RESISTOR, FIXED (5.1 K OHMS, 1/2W, 10%)  |     | 1   |     |             |     | 1   |     |
| 27       | 041-056     | 1   |     | RESISTOR, FIXED (4.7 K OHMS, 1/2W, 10%)  |     | 1   |     |             |     | 1   |     |
| 28       | 041-058     | 1   |     | RESISTOR, FIXED (6.8 K OHMS, 1/2W, 10%)  |     | 1   |     |             |     | 1   |     |
| 29       | 041-061     | 2   |     | RESISTOR, FIXED (12 K OHMS, 1/2W, 10%)   |     | 2   |     |             |     | 2   |     |
| 30       | 041-062     | 2   |     | RESISTOR, FIXED (15 K OHMS, 1/2W, 10%)   |     | 2   |     |             |     | 2   |     |
| 31       | 041-067     | 2   |     | RESISTOR, FIXED (49 K OHMS, 1/2W, 10%)   |     | 2   |     |             |     | 2   |     |
| 32       | 041-069     | 1   |     | RESISTOR, FIXED (1/4 K OHMS, 1/2W, 10%)  |     | 1   |     |             |     | 1   |     |
| 33       | 041-072     | 3   |     | RESISTOR, FIXED (100 K OHMS, 1/2W, 10%)  |     | 3   |     |             |     | 3   |     |
| 34       | 041-076     | 2   |     | RESISTOR, FIXED (220 K OHMS, 1/2W, 10%)  |     | 2   |     |             |     | 2   |     |
| 35       | 041-075     | 1   |     | RESISTOR, FIXED (180K OHMS, 1/2W, 10%)   |     | 1   |     |             |     | 1   |     |
| 36       | 041-080     | 1   |     | RESISTOR, FIXED (470K OHMS, 1/2W, 10%)   |     | 1   |     |             |     | 1   |     |
| 37       | 041-081     | 1   |     | RESISTOR, FIXED (660K OHMS, 1/2W, 10%)   |     | 1   |     |             |     | 1   |     |

4050435U

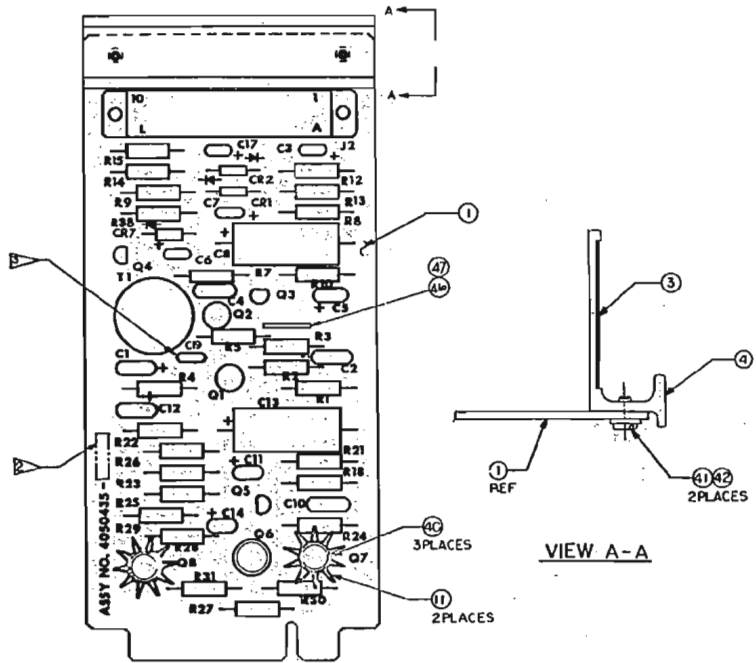
Reproduce Amplifier PWA

Sheet 1 of 3

| ITEM NO. | PART NUMBER | QTY | REF | DESCRIPTION                        | REF | QTY | REF | DESCRIPTION | REF | QTY | REF |
|----------|-------------|-----|-----|------------------------------------|-----|-----|-----|-------------|-----|-----|-----|
| 38       | 041-004     | 1   |     | RESISTOR, COP (510 OHMS, 1/2W, 5%) |     | 1   |     |             |     | 1   |     |
| 39       | 500-135     | 1   |     | TRANSISTOR, 2N4104                 |     | 1   |     |             |     | 1   |     |
| 40       | 280-180     | 3   |     | TRANSISTOR, PNP (.200 DIA.)        |     | 3   |     |             |     | 3   |     |
| 41       | 575-007     | 2   |     | SCREW, #4-40 x 5/16, STEEL, PAN HD |     | 2   |     |             |     | 2   |     |
| 42       | 501-008     | 2   |     | WASHER, #4 FLAT                    |     | 2   |     |             |     | 2   |     |
| 43       | 031-180     | 1   |     | CAPACITOR, NICA, 500V, 39PF, 5%    |     | 1   |     |             |     | 1   |     |
| 44       | 014-698     | 1   |     | TRANSISTOR, NPN, CD 562            |     | 1   |     |             |     | 1   |     |
| 45       | 041-046     | 1   |     | RESISTOR, 680 OHMS, 1/2W, 10%      |     | 1   |     |             |     | 1   |     |
| 46       | 615-012     | 1   |     | WIRE, SOLID, BARE, 20 AWG          |     | 1   |     |             |     | 1   |     |
| 47       | 600-287     | 1   |     | SLEEVING, TEFLON                   |     | 1   |     |             |     | 1   |     |
| 48       |             |     |     |                                    |     |     |     |             |     |     |     |
| 49       | 280-130     | 1   |     | HTC PNP TRANSISTOR                 |     | 1   |     |             |     | 1   |     |
| 50       | 4580044-01  | 1   |     | TRANSFORMER INPUT                  |     | 1   |     |             |     | 1   |     |
| 51       |             |     |     |                                    |     |     |     |             |     |     |     |
| 52       |             |     |     |                                    |     |     |     |             |     |     |     |
| 53       |             |     |     |                                    |     |     |     |             |     |     |     |
| 54       |             |     |     |                                    |     |     |     |             |     |     |     |
| 55       |             |     |     |                                    |     |     |     |             |     |     |     |
| 56       |             |     |     |                                    |     |     |     |             |     |     |     |
| 57       |             |     |     |                                    |     |     |     |             |     |     |     |
| 58       |             |     |     |                                    |     |     |     |             |     |     |     |
| 59       |             |     |     |                                    |     |     |     |             |     |     |     |
| 60       |             |     |     |                                    |     |     |     |             |     |     |     |
| 61       |             |     |     |                                    |     |     |     |             |     |     |     |
| 62       |             |     |     |                                    |     |     |     |             |     |     |     |
| 63       |             |     |     |                                    |     |     |     |             |     |     |     |
| 64       |             |     |     |                                    |     |     |     |             |     |     |     |
| 65       |             |     |     |                                    |     |     |     |             |     |     |     |
| 66       |             |     |     |                                    |     |     |     |             |     |     |     |
| 67       |             |     |     |                                    |     |     |     |             |     |     |     |
| 68       |             |     |     |                                    |     |     |     |             |     |     |     |
| 69       |             |     |     |                                    |     |     |     |             |     |     |     |
| 70       |             |     |     |                                    |     |     |     |             |     |     |     |
| 71       |             |     |     |                                    |     |     |     |             |     |     |     |
| 72       |             |     |     |                                    |     |     |     |             |     |     |     |
| 73       |             |     |     |                                    |     |     |     |             |     |     |     |
| 74       | 4840259     | 1   |     | SCHEMATIC                          |     | 1   |     |             |     | 1   |     |
| 75       | 4840214     | 1   |     | SCHEMATIC                          |     | 1   |     |             |     | 1   |     |
| 76       |             |     |     |                                    |     |     |     |             |     |     |     |
| 77       |             |     |     |                                    |     |     |     |             |     |     |     |
| 78       |             |     |     |                                    |     |     |     |             |     |     |     |
| 79       | 4840209     | 0   |     | SCHEMATIC                          |     | 0   |     |             |     | 0   |     |
| 80       | 4952429     | 0   |     | SCHEMATIC                          |     | 0   |     |             |     | 0   |     |
| 81       | 4840119     | 0   |     | SCHEMATIC                          |     | 0   |     |             |     | 0   |     |

4050435U

Sheet 2 of 3



NOTES:

1 PART NUMBER IS 4050435-XX.

▷ MARK DASH No. PER EBI-1.

▷ NOT USED ON -03.

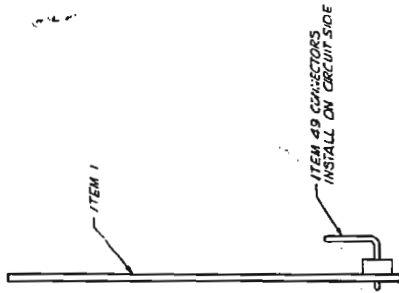
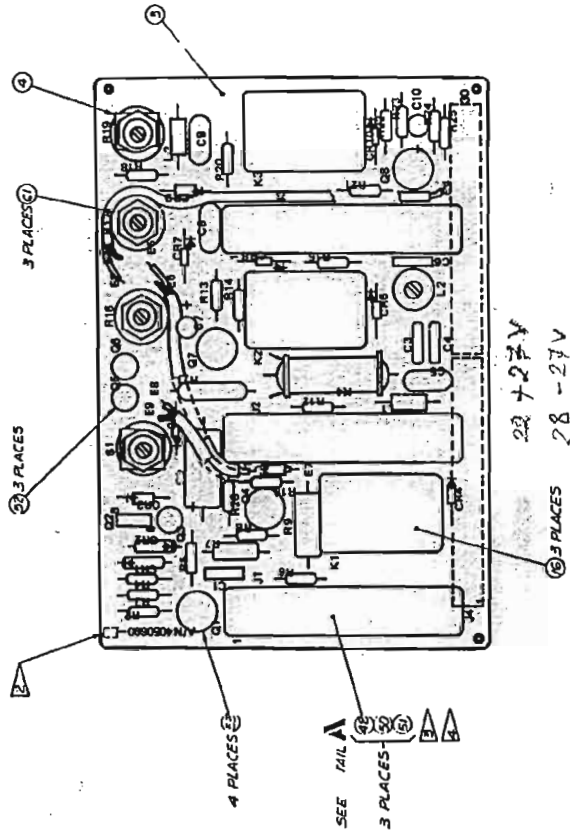
4050435U  
 Reproduce Amplifier PWA

Sheet 3 of 3

Next Assy: 4020371

| ITEM NO. | PART NUMBER | DESCRIPTION                                       | REF DESG     | QTY REQD PER DASH NUMBER |     |
|----------|-------------|---|--------------|--------------------------|-----|
|          |             |   |              | -02                      | -03 |
| 38       | 051-360     | INDUCTOR, FIXED A.7 MH                            | L1           | 1                        |     |
| 39       | 057-759     | RESISTOR, METAL FILM, 3.57K OHMS, 1/4W, 1% R11    |              | 1                        |     |
| 41       | 058-838     | RESISTOR, VAR. CARBON, 10K OHMS, 1/2W, 10% R17,19 |              | 2                        |     |
| 42       | 058-837     | RESISTOR, VAR. CARBON, 100K OHMS, 1/2W, 10% R16   |              | 1                        |     |
| 43       |             |   |              |                          |     |
| 44       |             |   |              |                          |     |
| 45       | 037-980     | CAPACITOR, TANT. 10 UF, 50 VDC                    | CZ           | 1                        |     |
| 46       |             |   |              |                          |     |
| 47       | 122-465     | SWITCH, ROTARY, 3P3T                              | S1           | 1                        |     |
| 48       | 139-512     | CONNECTOR, PC RECP, 12 CONTACTS                   | J1,22,J3     | 3                        |     |
| 49       | 139-513     | CONNECTOR, WAFER, RIGHT ANGLE                     | J4           | 2                        |     |
| 50       | 166-818     | CONNECTOR, PMT., POLARIZING KEY                   |              | 3                        |     |
| 51       | 225-304     | TAPE, ADHESIVE, TEFLON                            | REF:J1,J2,J3 | 2                        |     |
| 52       | 280-130     | MTE. PAD, TRANSISTOR (T0-18)                      | REF:Q2,5,6   | 3                        |     |
| 53       | 280-998     | MTE. PAD, TRANSISTOR (T0-5)                       | REF:Q1,4,7,8 | 4                        |     |
| 54       |             |   |              |                          |     |
| 55       |             |   |              |                          |     |
| 56       | 540-055     | INDUCTOR, 10 MH                                   | L3           | 1                        |     |
| 57       | 541-133     | INDUCTOR, VAR, 220 MH                             | L2           | 1                        |     |
| 58       | 580-394     | TRANSISTOR, SILICON PNP, 2N5193                   | Q2           | 1                        |     |
| 59       |             |   |              |                          |     |
| 60       |             |   |              |                          |     |
| 61       | 613-055     | CABLE, SHED, JACKETED, 1 COND, 25 AWG             |              | 2                        |     |

| ITEM NO. | PART NUMBER | DESCRIPTION                                      | REF DESG            | QTY REQD PER DASH NUMBER |     |
|----------|-------------|--|---------------------|--------------------------|-----|
|          |             |  |                     | -02                      | -03 |
| 1        | 4900314     | SCHEMATIC  |                     |                          |     |
| 2        | 4900308-02  | PWA AUDIO SWITCHING                              |                     |                          |     |
| 3        | 4260511-02  | STRAP, POT SUPPORT                               |                     |                          |     |
| 4        |             |  |                     |                          |     |
| 5        |             |  |                     |                          |     |
| 6        |             |  |                     |                          |     |
| 7        | 013-599     | DIPDE, SILICON, SMALL SIGNAL, CD458              | CR1,2,4,5, 6,7,8,10 | 8                        |     |
| 8        | 013-578     | DIPDE, SILICON, LARGE SIGNAL, CD451              | CR3,9               | 2                        |     |
| 9        |             |  |                     |                          |     |
| 10       | 01A-247     | TRANSISTOR, SILICON, NPN, CD38                   | Q1,4                | 2                        |     |
| 11       | 01A-248     | TRANSISTOR, SILICON, NPN, CD37                   | Q5,6                | 2                        |     |
| 12       | 01A-364     | TRANSISTOR, SILICON, PNP, CD438                  | Q7,8                | 2                        |     |
| 13       | 01A-389     | TRANSISTOR, SILICON, NPN, CD441                  | Q3                  | 1                        |     |
| 14       |             |  |                     |                          |     |
| 15       | 020-623     | RELAY, ARMATURE, A PDT FORM D                    | R1,2,3              | 3                        |     |
| 16       | 020-754     | SOCKET, RELAY WITH RETAINING SPRING              |                     | 5                        |     |
| 17       | 020-932     | RELAY, REED, SPST                                | R4                  | 1                        |     |
| 18       |             |  |                     |                          |     |
| 19       | 03A-213     | CAPACITOR, MICA, 150 pF, 500V, 5% C8             |                     | 1                        |     |
| 20       | 03A-240     | CAPACITOR, MICA, 220 pF, 500V, 5% C5             |                     | 1                        |     |
| 21       | 03A-935     | CAPACITOR, MICA, 110 pF, 500V, 5% C9             |                     | 1                        |     |
| 22       | 035-730     | CAPACITOR, PTLAR, 4700 pF, 50V, 5% C6            |                     | 1                        |     |
| 23       | 035-888     | CAPACITOR, PTLAR, .022 UF, 50V, 5% C1,3,4        |                     | 3                        |     |
| 24       |             |  |                     |                          |     |
| 25       | 017-908     | CAPACITOR, TANT. A.7 UF, .35V, 20% C7,10         |                     | 2                        |     |
| 26       |             |  |                     |                          |     |
| 27       | 041-011     | RESISTOR, COMP, 4.7K OHMS, 1/2W, 5% R7           |                     | 1                        |     |
| 28       | 041-102     | RESISTOR, COMP, 1K OHMS, 1/4W, 5% R9             |                     | 1                        |     |
| 29       | 041-405     | RESISTOR, COMP, 22K OHMS, 1/4W, 5% R12           |                     | 1                        |     |
| 30       | 041-408     | RESISTOR, COMP, 10K OHMS, 1/4W, 5% R3,4,8        |                     | 3                        |     |
| 31       | 041-394     | RESISTOR, COMP, 100K OHMS, 1/4W, 5% R6,21,25     |                     | 3                        |     |
| 32       | 041-411     | RESISTOR, COMP, 47K OHMS, 1/4W, 5% R10           |                     | 1                        |     |
| 33       | 041-437     | RESISTOR, CO-UP, 1.4K OHMS, 1/4W, 5% R26         |                     | 1                        |     |
| 34       | 041-518     | RESISTOR, COMP, 33K OHMS, 1/4W, 5% R4,5,18       |                     | 3                        |     |
| 35       | 041-561     | RESISTOR, COMP, 5.1K OHMS, 1/4W, 5% R14,15,23,24 |                     | 4                        |     |
| 36       | 041-570     | RESISTOR, COMP, 2.4K OHMS, 1/4W, 5% R13,22       |                     | 2                        |     |
| 37       | 041-636     | RESISTOR, C-RE, 18K, 1/4W, 5% R20                |                     | 1                        |     |



COMPONENTS OMITTED FOR CLARITY

DETAIL A

CUT OFF THIS PORTION TO FLUSH SURFACE A ON BOTH ENDS

NOTES:

1. PART NO. IS 4050690-03
2. MARK DASH NO. PER BDI-1
3. PUT ITEM 51 IN BETWEEN ITEM 46 AND ITEM 1 PRIOR SOLDERING
4. CONNECTOR KEY POLARIZING
  - U1 POLARIZE PIN # 5
  - U2 POLARIZE PIN # 9
  - U3 POLARIZE PIN # 3

Sheet 3 of 3

4050690A  
Audio Switching PWA

Next Assy: 4020371

| ITEM NO. | PART NUMBER | DESCRIPTION                             | REF. DESC. |     | QTY. REQD. PER DASH NUMBER |   |   |   |   |   |   |   |   |    |  |  |  |  |  |  |
|----------|-------------|---|------------|-----|----------------------------|---|---|---|---|---|---|---|---|----|--|--|--|--|--|--|
|          |             |   | -02        | -01 | 1                          | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |  |  |  |  |  |  |
| 1        | 166-876     | CONTACT, COMM. SPRING TYPE              |            |     | 120                        |   |   |   |   |   |   |   |   |    |  |  |  |  |  |  |
| 2        | 166-862     | CONNECTOR, RECT., 36 PIN                | J2         |     | 1                          |   |   |   |   |   |   |   |   |    |  |  |  |  |  |  |
| 3        | 187-036     | PIN, MALE MOLEX #1560                   |            |     | 83                         |   |   |   |   |   |   |   |   |    |  |  |  |  |  |  |
| 4        | 187-037     | SOCKET, FEMALE MOLEX #1561              |            |     | 14                         |   |   |   |   |   |   |   |   |    |  |  |  |  |  |  |
| 5        | 166-868     | CONNECTOR HOUSING                       | PA-1,2,3,4 |     | 8                          |   |   |   |   |   |   |   |   |    |  |  |  |  |  |  |
| 6        | 166-099     | CONNECTOR, RECT., 5 PIN                 | J1         |     | 1                          |   |   |   |   |   |   |   |   |    |  |  |  |  |  |  |
| 7        | 614-931     | CABLE, SHIELDED 24 AWG, WHT/BRN         |            |     | A/N                        |   |   |   |   |   |   |   |   |    |  |  |  |  |  |  |
| 8        | 614-932     | CABLE, SHIELDED 24 AWG, WHT/GRN         |            |     | A/N                        |   |   |   |   |   |   |   |   |    |  |  |  |  |  |  |
| 9        | 614-933     | CABLE, SHIELDED 24 AWG, WHT/ORN         |            |     | A/N                        |   |   |   |   |   |   |   |   |    |  |  |  |  |  |  |
| 10       | 614-934     | CABLE, SHIELDED 24 AWG, WHT/YEL         |            |     | A/N                        |   |   |   |   |   |   |   |   |    |  |  |  |  |  |  |
| 11       | 614-935     | CABLE, SHIELDED 24 AWG, WHT/GRN         |            |     | A/N                        |   |   |   |   |   |   |   |   |    |  |  |  |  |  |  |
| 12       | 614-936     | CABLE, SHIELDED 24 AWG, WHT/ALU         |            |     | A/N                        |   |   |   |   |   |   |   |   |    |  |  |  |  |  |  |
| 13       | 614-937     | CABLE, SHIELDED 24 AWG, WHT/Y10         |            |     | A/N                        |   |   |   |   |   |   |   |   |    |  |  |  |  |  |  |
| 14       | 614-938     | CABLE, SHIELDED 24 AWG, WHT/RY          |            |     | A/N                        |   |   |   |   |   |   |   |   |    |  |  |  |  |  |  |
| 15       | 26-146      | CONNECTOR, RECT., 15 PIN                | J5         |     | 1                          |   |   |   |   |   |   |   |   |    |  |  |  |  |  |  |
| 16       | 616-383     | CABLE, TWISTED PAIR, BELGIM B451        |            |     | A/N                        |   |   |   |   |   |   |   |   |    |  |  |  |  |  |  |
| 17       | 616-303     | CABLE, HEAD SHIELDED, MICRODOT 275-3533 |            |     | A/N                        |   |   |   |   |   |   |   |   |    |  |  |  |  |  |  |
| 18       | 179-511     | CONNECTOR, RECT., 12 PIN                | J4         |     | 1                          |   |   |   |   |   |   |   |   |    |  |  |  |  |  |  |
| 19       |             |   |            |     |                            |   |   |   |   |   |   |   |   |    |  |  |  |  |  |  |
| 20       | CD568       | WIRE, STRANDED, 22 AWG                  |            |     | A/N                        |   |   |   |   |   |   |   |   |    |  |  |  |  |  |  |
| 21       | CD568       | WIRE, STRANDED, 24 AWG                  |            |     | A/N                        |   |   |   |   |   |   |   |   |    |  |  |  |  |  |  |





| ITEM NO. | PART NUMBER | DESCRIPTION                            | REF. DESG. | QTY. REQ'D PER DASH NUMBER |     |
|----------|-------------|--|------------|----------------------------|-----|
|          |             |  |            | -01                        | -02 |
| 1        | A120023-01  | CLIP, COVER                            |            | 1                          | 1   |
| 2        | 5120070-01  | HANDLE, HEAD PLATE LIFTER              |            | 1                          | 1   |
| 3        | 6511184-02  | SHIELD COVER BRACKET                   |            | 1                          | 1   |
| 4        | 8200881-01  | COVER, HEAD ASSY                       |            | 1                          | 1   |
| 5        | 5130107-01  | PLATE, HEAD MOUNTING                   |            | 1                          | 1   |
| 6        | 4001900-01  | BUSHING, HEAD PLATE LIFTER             |            | 1                          | 1   |
| 7        |             |  |            |                            |     |
| 8        | 5350101-02  | STALK ASST, ERASE 16 CH                |            | 1                          | -   |
| 9        | 5350102-04  | STACK ASSY, REC/REPRD 16 CH            |            | 2                          | -   |
| 10       |             |  |            |                            |     |
| 11       | 5120100-03  | STACK ASSY, REC/REPRD 24 CH            |            | -                          | 2   |
| 12       | 4952327-01  | STACK ASSY, ERASE 24 CH                |            | -                          | 1   |
| 13       | 4952316-01  | MIRRE BLOCK, HEAD SHIELD COVER         |            | 2                          | 2   |
| 14       | 4952329-03  | SHIELD, CAN 2"                         |            | 1                          | 1   |
| 15       | 4952329-04  | SHIELD, CAN 2"                         |            | 1                          | 1   |
| 16       | 4952400-07  | COVER, SHIELD 2"                       |            | 1                          | 1   |
| 17       | 4952400-06  | COVER, SHIELD 2"                       |            | 1                          | 1   |
| 18       | 4952408-02  | GUIDE, TRACE UP                        |            | 2                          | 2   |
| 19       | 4952762-01  | SPRING, HEAD SHIELD                    |            | 4                          | 4   |
| 20       |             |  |            |                            |     |
| 21       | 6000035-02  | LABEL, IDENTIFICATION                  |            | 1                          | 1   |
| 22       | D18-019     | ADHESIVE, EASTMAN 910                  | A/R A/R    |                            |     |
| 23       | 652-247     | SPRING, EXTENSION, .125 OD X 1.500 LG  |            | 1                          | 1   |
| 24       | 172-113     | SCREW, SET, HEX SOCKET, #6-32 X.168 LG |            | 2                          | 2   |
| 25       |             |  |            |                            |     |
| 26       | 470-004     | SCREW, #2-56 X .37 LG, CAP HD HEX SOC  |            | 4                          | 4   |
| 27       | 470-011     | SCREW, #4-40 X .62 LG, CAP HD HEX SOC  |            | 2                          | 2   |
| 28       | 470-002     | SCREW, #2-56 X .35 LG, CAP HD HEX SOC  |            | 2                          | 2   |
| 29       | 470-021     | SCREW, #4-32 X .62 LG, CAP HD HEX SOC  |            | 2                          | 2   |
| 30       |             |  |            |                            |     |
| 31       |             |  |            |                            |     |
| 32       | 471-335     | SCREW, #10-32 X .50 LG, FLAT HD X REC  |            | 1                          | 1   |
| 33       | 471-338     | SCREW, #10-32 X .75 LG, FLAT HD X REC  |            | 2                          | 2   |
| 34       | 471-615     | SCREW, #6-32 X .69 LG, FLAT HD X REC   |            | 4                          | 4   |
| 35       |             |  |            |                            |     |
| 36       |             |  |            |                            |     |
| 37       |             |  |            |                            |     |

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4020372-  
Two Inch Head Assembly

Next Assy: 4010210

| ITEM NO. | PART NUMBER | DESCRIPTION             | REF. DESG. | QTY. REQ'D PER DASH NUMBER |     |
|----------|-------------|-------------------------|------------|----------------------------|-----|
|          |             |                         |            | -01                        | -02 |
| 38       | 492-015     | NUT, #6-32 PLAIN        |            | 1                          | 1   |
| 39       | 493-168     | NUT, #2-56 SELF LOCKING |            | 12                         | 18  |
| 40       |             |                         |            |                            |     |
| 41       |             |                         |            |                            |     |
| 42       | 501-409     | WASHER #6 PLAIN         |            | 1                          | 1   |
| 43       | 501-155     | WASHER #2 PLAIN         |            | 12                         | 18  |
| 44       |             |                         |            |                            |     |
| 45       | 502-002     | WASHER, #4, SPRING LOCK |            | 2                          | 2   |
| 46       | 502-003     | WASHER, SPRING LOCK #6  |            | 1                          | 1   |

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Sheet 2 of 2

| ITEM NO. | PART NUMBER | DESCRIPTION                               | REF DESG    | QTY REQD PER DASH NUMBER |
|----------|-------------|---|-------------|--------------------------|
| 1        | 405092-02   | PRINTED WIRING ASSY, CAPSTAN SERVO        | 1 1         |                          |
| 2        | 405096-01   | PRINTED WIRING ASSY, TRANSPORT CONTROL    | 1 1         |                          |
| 3        | 405095-01   | PRINTED WIRING ASSY, EXTENDER CARD        | 1 1         |                          |
| 4        | 405094-01   | PRINTED WIRING ASSY, TRANSPORT CONTROL    | 1 1         |                          |
| 5        | 401117-01   | COVER ASSY, TRANSPORT CONTROL CHASSIS     | 1 1         |                          |
| 6        | 429096-02   | CHASSIS, TRANSPORT CONTROL                | 1 1         |                          |
| 7        | 480318      | WIRING DIAGRAM, TRANSPORT CONTROL CHASSIS | REF -       |                          |
| 8        | 480319      | WIRING DIAGRAM, TRANSPORT CONTROL CHASSIS | REF -       |                          |
| 9        |             |   |             |                          |
| 10       | 143-804     | CONNECTOR, P.C. DUAL, SR. PIN             | J1-2, 4, 3  |                          |
| 11       | 146-257     | CONNECTOR, 104 PLUG, HDAC-104S            | P1          |                          |
| 12       | 146-258     | CONNECTOR, 104 SOC, HDAC-104S             | J4          |                          |
| 13       | 147-036     | CONNECTOR, CLIMCH-JONES, 4 PIN MALE       | J3          |                          |
| 14       |             |   |             |                          |
| 15       | 166-864     | CONNECTOR, MOLEX, PLUG, 36 PIN            | J5          |                          |
| 16       | 166-863     | CONNECTOR, MOLEX, RECEPT, 36 SOC          | J6          |                          |
| 17       | 189-144     | CONTACT, CONNECTOR, SOC, 22 AWG,          | REF: J6, P1 | 140 108                  |
| 18       | 189-318     | REF, POLARIZING, P.C. CONN.               | REF: J1, 2  | 2 2                      |
| 19       |             |   |             |                          |
| 20       | 187-038     | CONTACT, CONNECTOR, PIN                   | REF: J5     | 36 36                    |
| 21       | 187-037     | CONTACT, CONNECTOR, SOC                   | REF: J6-10  | 72 108                   |
| 22       | 282-007     | WASHING, FLANGED, .750 I.D.               |             | 1 1                      |
| 23       | 471-060     | SCREW, MACH, PAN HD XREC, 4-40 X 1/4 LG   |             | 6 6                      |
| 24       | 471-061     | SCREW, MACH, PAN HD XREC, 6-32 X 1/4 LG   |             | 4 4                      |
| 25       | 495-005     | NUT, KEPS, 6-32                           |             | 2 2                      |
| 26       |             |   |             |                          |
| 27       | 501-008     | WASHER, FLAT, #1                          |             | 6 6                      |
| 28       | 501-009     | WASHER, FLAT, #6                          |             | 2 2                      |
| 29       | 502-011     | WASHER, LOCK, INT STAR, #1                |             | 6 6                      |
| 30       | 502-015     | WASHER, LOCK, INT STAR, #6                |             | 2 2                      |
| 31       |             |   |             |                          |
| 32       | 530-159     | GUIDE, P.C.                               |             | 6 6                      |
| 33       | 600-258     | SLEEVING, PVC, HEAT SHRINKABLE, .750 I.D. | A/R A/R     |                          |
| 34       | 611-024     | CABLE, SHIELDED, WHT/RED                  | A/R A/R     |                          |
| 35       | 611-040     | CABLE, SHIELDED, WHT/GRN                  | A/R A/R     |                          |
| 36       | 611-055     | CABLE, SHIELDED, WHT/TEL                  | A/R A/R     |                          |
| 37       | 614-933     | CABLE, SHIELDED, WHT/GRN                  | A/R A/R     |                          |

4020373A

Transport Control Chassis

Next Assy: 4010210

| ITEM NO. | PART NUMBER | DESCRIPTION                        | REF DESG | QTY REQD PER DASH NUMBER |
|----------|-------------|------------------------------------|----------|--------------------------|
| 38       | 616-115     | CABLE, SHIELDED, TWISTED-PAIR      | A/R A/R  |                          |
| 39       | 616-038     | WIRE, BARE, SOLID, 20 AWG          | A/R A/R  |                          |
| 40       | 60558       | WIRE, INS., STRANDED, 22 AWG       | A/R A/R  |                          |
| 41       | 60559       | WIRE, INS., STRANDED, 20 AWG       | A/R A/R  |                          |
| 42       | 60559       | WIRE, INS., STRANDED, 18 AWG       | A/R A/R  |                          |
| 43       | 60559       | WIRE, INS., STRANDED, 16 AWG       | A/R A/R  |                          |
| 44       |             |                                    |          |                          |
| 45       |             |                                    |          |                          |
| 46       |             |                                    |          |                          |
| 47       |             |                                    |          |                          |
| 48       |             |                                    |          |                          |
| 49       |             |                                    |          |                          |
| 50       |             |                                    |          |                          |
| 51       |             |                                    |          |                          |
| 52       | 429095-01   | CONNECTOR PANEL, TRANSPORT CONTROL | 1 1      |                          |

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Sheet 2 of 3

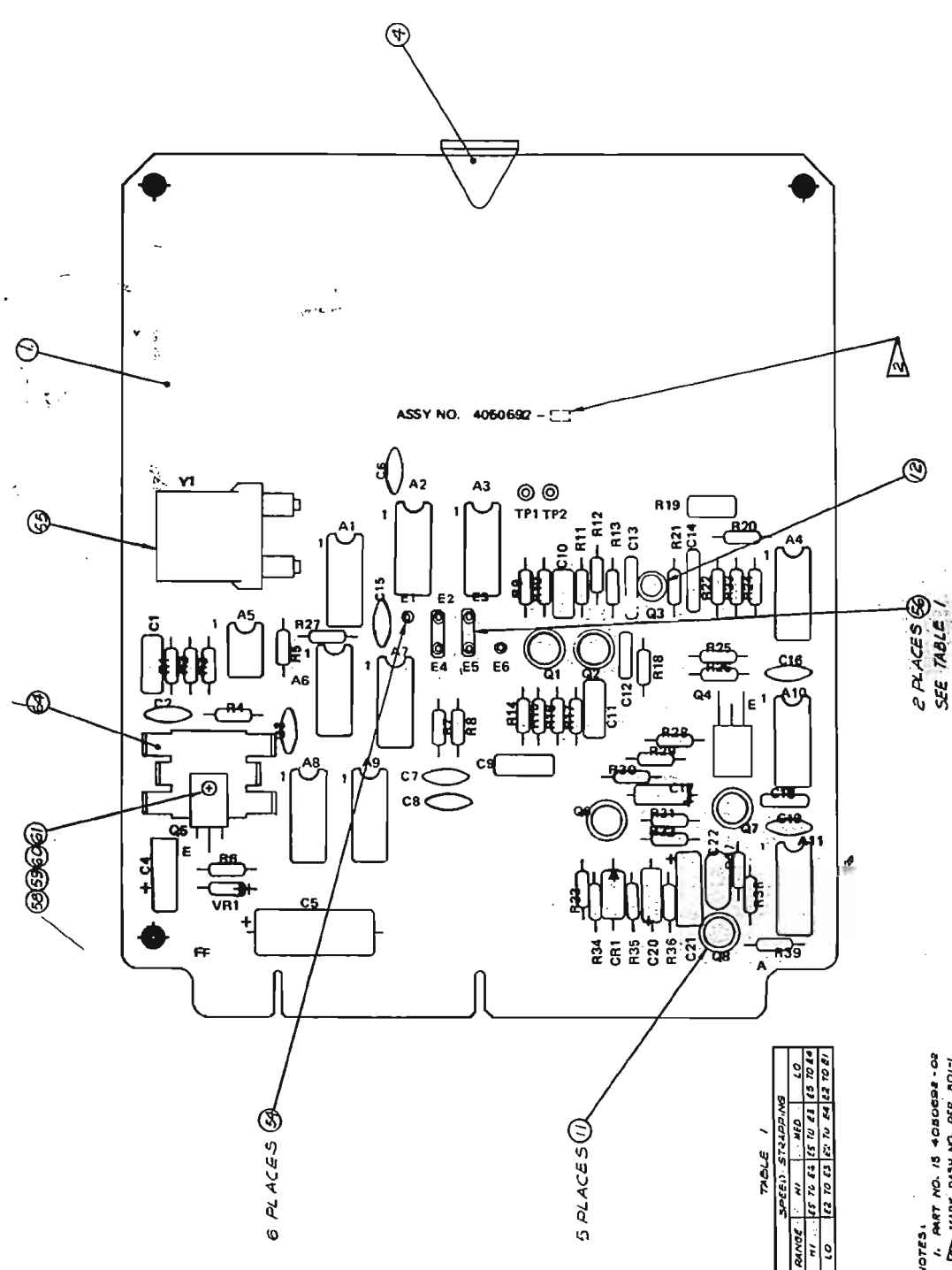


TABLE 1

| SPEED - STRIDING |                            |
|------------------|----------------------------|
| RANGE            | HI - MED - LO              |
| HI               | E5 TO E3 E5 TO E4          |
| LO               | E2 TO E3 E2 TO E4 E2 TO E1 |

NOTES:  
 1. PART NO. IS 4060692-02  
 2. MARK DASH NO. PER 201-1

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4020373A  
 Transport Control Chassis

Next Assy: 4010210

| ITEM NO. | PART NUMBER | ID | DESCRIPTION                         | REF. DESC.  | QTY REQD PER DASH NUMBER |
|----------|-------------|----|-------------------------------------|---|--------------------------|
| 1        | 450309-52   |    | PRINTED CIRCUIT BOARD               |   |                          |
| 2        | 450315      |    | SCHEMATIC                           | REF   |                          |
| 3        |             |    |                                     |   |                          |
| 4        | 450321      |    | WASHER                              |   |                          |
| 5        |             |    |                                     |   |                          |
| 6        | 011-578     |    | DIBEL, 6051                         | 60  |                          |
| 7        | 011-981     |    | DIBEL, ZEMER, 4x, 5.8V, C033        | WV  |                          |
| 8        |             |    |                                     |   |                          |
| 9        | 011-652     |    | TRANSISTOR, PNP, 6054               | 08, 17  |                          |
| 10       | 011-698     |    | TRANSISTOR, NPN, C0562              | 01, 2, 5, 6   |                          |
| 11       | 011-793     |    | MTB, PWA, TRANSISTOR                | REF: 01, 2, 5, 7, 8   |                          |
| 12       | 280-130     |    | MTB, PWA, TRANSISTOR                | REF: 03   |                          |
| 13       | 011-112     |    | CERAMIC, RESISTOR, PROTECTS         | Y1  |                          |
| 14       |             |    |                                     |   |                          |
| 15       | 010-007     |    | CAPACITOR, CER, D100, 100V, 20K     | C1, 3, 6, 8, 15, 14, 19   |                          |
| 16       | 010-417     |    | CAPACITOR, KORG, 0.1uF, 25V         | C1, 9   |                          |
| 17       |             |    |                                     |   |                          |
| 18       | 011-195     |    | CAPACITOR, MYLAR, 0.0001uF, 50V, 5% | C18   |                          |
| 19       |             |    |                                     |   |                          |
| 20       | 011-283     |    | CAPACITOR, NICA, 200P, 300V, 5%     | C22   |                          |
| 21       | 011-288     |    | CAPACITOR, MYLAR, 0.01uF, 50V, 5%   | C11   |                          |
| 22       | 011-353     |    | CAPACITOR, MYLAR, 0.05uF, 50V, 5%   | C13   |                          |
| 23       | 011-393     |    | CAPACITOR, MYLAR, 0.1uF, 50V, 5%    | C14   |                          |
| 24       |             |    |                                     |   |                          |
| 25       |             |    |                                     |   |                          |
| 26       | 011-167     |    | CAPACITOR, TANT, 2.2uF, 20V, 10%    | R17, 20   |                          |
| 27       | 011-680     |    | CAPACITOR, TANT, 100uF, 20V, 10%    | C5  |                          |
| 28       | 011-894     |    | CAPACITOR, TANT, 100uF, 10V, 5%     | C4, 11  |                          |
| 29       | 011-482     |    | RESISTOR, COMP, 1200, 1/4W, 5%      | R17   |                          |
| 30       | 011-666     |    | RESISTOR, COMP, 2200, 1/4W, 5%      | R18   |                          |
| 31       | 011-687     |    | RESISTOR, COMP, 3.300, 1/4W, 5%     | R1, 8, 9, 21, 22, 23, 24, 25, 26, 27, 28, 29, 30, 31, 32, 33, 34, 35, 36, 37, 38, 39, 40, 41, 42, 43, 44, 45, 46, 47, 48, 49, 50, 51, 52, 53, 54, 55, 56, 57, 58, 59, 60, 61, 62, 63, 64, 65, 66, 67, 68, 69, 70, 71, 72, 73, 74, 75, 76, 77, 78, 79, 80, 81, 82, 83, 84, 85, 86, 87, 88, 89, 90, 91, 92, 93, 94, 95, 96, 97, 98, 99, 100 |                          |
| 32       | 011-608     |    | RESISTOR, COMP, 1000, 1/4W, 5%      | R5, 11, 20  |                          |
| 33       | 011-510     |    | RESISTOR, COMP, 1000, 1/4W, 5%      | R2  |                          |
| 34       | 011-411     |    | RESISTOR, COMP, 4700, 1/4W, 5%      | R16   |                          |
| 35       | 011-412     |    | RESISTOR, COMP, 4.700, 1/4W, 5%     | R16   |                          |
| 36       | 011-413     |    | RESISTOR, COMP, 6800, 1/4W, 5%      | R11   |                          |
| 37       | 011-443     |    | RESISTOR, COMP, 395.0, 1/4W, 5%     | R1  |                          |

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4050692B  
Capstan Servo PWA

Next Assy: 4020373

| ITEM NO. | PART NUMBER | DESCRIPTION                          | REF. DESC.             | QTY REQD PER DASH NUMBER |
|----------|-------------|--------------------------------------|------------------------|--------------------------|
| 38       | 041-483     | RESISTOR, COMP, 2700, 1/4W, 5%       | R15                    |                          |
| 39       | 041-495     | RESISTOR, COMP, 8.200, 1/4W, 5%      | R3                     |                          |
| 40       | 041-602     | RESISTOR, COMP, 240, 1/4W, 5%        | R26                    |                          |
| 41       | 041-203     | RESISTOR, COMP, 270, 1/4W, 5%        | R6                     |                          |
| 42       | 041-204     | RESISTOR, COMP, 510, 1/4W, 5%        | R25                    |                          |
| 43       | 041-518     | RESISTOR, COMP, 9.100, 1/4W, 5%      | R20                    |                          |
| 44       | 041-230     | RESISTOR, COMP, 15, 1/4W, 5%         | R29                    |                          |
| 45       | 041-264     | RESISTOR, COMP, 1500, 1/4W, 5%       | R36                    |                          |
| 46       | 041-294     | RESISTOR, COMP, 10000, 1/4W, 5%      | R33, 39                |                          |
| 47       | 041-453     | RESISTOR, COMP, 390, 1/4W, 5%        | R31                    |                          |
| 48       | 055-133     | CAPACITOR, MYLAR, 0.0025uF, 50V, 5%  | C10                    |                          |
| 49       | 055-168     | CAPACITOR, MYLAR, 0.0050uF, 50V, 5%  | C12                    |                          |
| 50       | 041-262     | RESISTOR, COMP, 43K OHMS, 1/4W, 5%   | R28                    |                          |
| 51       | 057-137     | RESISTOR, METAL FILM, 5100, 1/4W, 5% | R12, 13, 15, 17, 21, 5 |                          |
| 52       | 041-447     | RESISTOR, 3300, 1/4W, 5%             | R38                    |                          |
| 53       | 058-254     | RESISTOR, VAR, 500K, 100P, 1W, 20%   | R39                    |                          |
| 54       | 149-981     | CONNECTOR, JACK                      | E1-6                   |                          |
| 55       | 150-106     | MTB BRACKET, CRISTAL                 | REF: Y1                |                          |
| 56       | 166-628     | PLUG, SHORTING BLOCK, MILK           |                        |                          |
| 57       |             |                                      |                        |                          |
| 58       | 471-462     | SCREW, XREQ PAN HD, 4-40 X .375 L3   |                        |                          |
| 59       | 492-008     | NUT, FLAIN, HEX, 4-40                |                        |                          |
| 60       | 501-008     | WASHER, FLAT, #4                     |                        |                          |
| 61       | 502-024     | WASHER, LOCK #4                      |                        |                          |
| 62       |             |                                      |                        |                          |
| 63       |             |                                      |                        |                          |
| 64       | 504-338     | HEATSHIELD                           | REF: 55                |                          |
| 65       | 500-395     | TRANSISTOR, NPN, 2N1590              | Q4, 5                  |                          |
| 66       |             |                                      |                        |                          |
| 67       |             |                                      |                        |                          |
| 68       | 504-553     | INTERMEDIATE CIRCUIT, PCB44F         | A7                     |                          |
| 69       | 504-668     | INTERMEDIATE CIRCUIT, PCB41C         | A4                     |                          |
| 70       | 504-883     | INTERMEDIATE CIRCUIT, PCB493H        | A1                     |                          |
| 71       | 504-309     | INTERMEDIATE CIRCUIT, PCB4901        | A10                    |                          |
| 72       | 504-445     | INTERMEDIATE CIRCUIT, PCB35P         | A2, 3                  |                          |
| 73       | 504-698     | INTERMEDIATE CIRCUIT, PCB4950        | A4, 8, 9               |                          |
| 74       | 507-066     | INTERMEDIATE CIRCUIT, 8 PIN, DUAL IN | A5, ...                |                          |
| 75       | 507-680     | INTERMEDIATE CIRCUIT, PCB413J        | A11                    |                          |

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Sheet 2 of 2

| ITEM NO. | PART NUMBER | D | DESCRIPTION                             | REF. DISC.                 | QTY REQD PER DASH NUMBER |
|----------|-------------|---|---|----------------------------|--------------------------|
| 1        | 450000-02   |   | PAINTED WIRING BOARD                    |                            |                          |
| 2        | 480015      |   | SPHERICAL                               | REF                        |                          |
| 3        |             |   |   |                            |                          |
| 4        | 480015      |   | SPHERICAL                               |                            |                          |
| 5        |             |   |   |                            |                          |
| 6        | 011-578     |   | DIODE, CH31                             |                            |                          |
| 7        | 011-581     |   | DIODE, ZENER, .4V, 5.0V, C032           |                            |                          |
| 8        |             |   |   |                            |                          |
| 9        | 011-551     |   | TRANSISTOR, PNP, C924                   |                            |                          |
| 10       | 011-608     |   | TRANSISTOR, MPN, C0662                  |                            |                          |
| 11       | 011-793     |   | MTL. PNL. TRANSISTOR                    | REF: Q1, 2, 6, 7, 8        |                          |
| 12       | 200-130     |   | MT, PNP, TRANSISTOR                     | REF: Q3                    |                          |
| 13       | 017-132     |   | CRYSTAL, RESONATOR, PROJECTS.           | Y1                         |                          |
| 14       |             |   |   |                            |                          |
| 15       | 000-007     |   | CAPACITOR, CER. DISC., .01UF, 100V, 20% | C1, 3, 4, 5, 15, 16, 19, 9 |                          |
| 16       | 000-017     |   | CAPACITOR, KROM, 0.1UF, 25V             | C1, 9                      |                          |
| 17       |             |   |   |                            |                          |
| 18       | 055-195     |   | CAPACITOR, MYLAR, .00066UF, 50V, 5%     | C10                        |                          |
| 19       |             |   |   |                            |                          |
| 20       | 091-583     |   | CAPACITOR, MYLAR, 200PF, 300V, 5%       | C21                        |                          |
| 21       | 015-298     |   | CAPACITOR, MYLAR, .007UF, 50V, 5%       | C11                        |                          |
| 22       | 015-553     |   | CAPACITOR, MYLAR, .056UF, 20V, 5%       | C13                        |                          |
| 23       | 015-593     |   | CAPACITOR, MYLAR, 0.1UF, 50V, 5%        | C14                        |                          |
| 24       |             |   |   |                            |                          |
| 25       |             |   |   |                            |                          |
| 26       | 037-087     |   | CAPACITOR, TANT, 2.2UF, 20V, 10%        | 217, 20                    |                          |
| 27       | 037-680     |   | CAPACITOR, TANT, 100UF, 20V, 10%        | C5                         |                          |
| 28       | 037-894     |   | CAPACITOR, TANT, 100UF, 10V, 5%         | C4, 21                     |                          |
| 29       | 041-482     |   | RESISTOR, COMP., 1200, 1/4W, 5%         | R7                         |                          |
| 30       | 041-495     |   | RESISTOR, COMP., 2200, 1/4W, 5%         | R18                        |                          |
| 31       | 041-607     |   | RESISTOR, COMP., 3.3K, 1/4W, 5%         | R7, 8, 27, 31              |                          |
| 32       | 041-608     |   | RESISTOR, COMP., 1000, 1/4W, 5%         | R9, 10, 21, 23, 31         |                          |
| 33       | 041-610     |   | RESISTOR, COMP., 1000, 1/4W, 5%         | R5, 15, 30                 |                          |
| 34       | 041-611     |   | RESISTOR, COMP., 5700, 1/4W, 5%         | R2                         |                          |
| 35       | 041-612     |   | RESISTOR, COMP., 4.700, 1/4W, 5%        | R14                        |                          |
| 36       | 041-613     |   | RESISTOR, COMP., 6800, 1/4W, 5%         | R11                        |                          |
| 37       | 041-643     |   | RESISTOR, COMP., 3950, 1/4W, 5%         | R1                         |                          |

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Capstan Servo PWA

Sheet 1 of 2

Next Assy: 4020373

| ITEM NO. | PART NUMBER | D | DESCRIPTION                            | REF. DISC.          | QTY REQD PER DASH NUMBER |
|----------|-------------|---|--|---------------------|--------------------------|
| 38       | 041-603     |   | RESISTOR, COMP., 2700, 1/4W, 5%        | R15                 |                          |
| 39       | 041-605     |   | RESISTOR, COMP., 8.200, 1/4W, 5%       | R3                  |                          |
| 40       | 041-602     |   | RESISTOR, COMP., 2400, 1/4W, 5%        | R26                 |                          |
| 41       | 041-603     |   | RESISTOR, COMP., 2700, 1/4W, 5%        | R6                  |                          |
| 42       | 041-604     |   | RESISTOR, COMP., 5100, 1/4W, 5%        | R25                 |                          |
| 43       | 041-511     |   | RESISTOR, COMP., 9.100, 1/4W, 5%       | R20                 |                          |
| 44       | 041-530     |   | RESISTOR, COMP., 1500, 1/4W, 5%        | R29                 |                          |
| 45       | 041-604     |   | RESISTOR, COMP., 1500, 1/4W, 5%        | R16                 |                          |
| 46       | 041-594     |   | RESISTOR, COMP., 10000, 1/4W, 5%       | R03, 39             |                          |
| 47       | 041-553     |   | RESISTOR, COMP., 390, 1/4W, 5%         | R11                 |                          |
| 48       | 055-133     |   | CAPACITOR, MYLAR, .0022UF, 50V, 5%     | C10                 |                          |
| 49       | 055-108     |   | CAPACITOR, MYLAR, .0050UF, 50V, 5%     | C12                 |                          |
| 50       | 041-562     |   | RESISTOR, COMP., 31K OHMS, 1/4W, 5%    | R28                 |                          |
| 51       | 057-137     |   | RESISTOR, METAL FILM, 5100, 1/4W, 2%   | R12, 13, 15, 17, 21 |                          |
| 52       | 041-607     |   | RESISTOR, 3300, 1/4W, 5%               | R18                 |                          |
| 53       | 058-754     |   | RESISTOR, VAR., CER MET, 1000, 1V, 20% | R19                 |                          |
| 54       | 143-981     |   | CONNECTOR, JACK                        | ET-6                |                          |
| 55       | 150-104     |   | MTG BRACKET, CRYSTAL                   | REF: Y1             |                          |
| 56       | 166-028     |   | PLUG, SHORTING BLOCK, BLK              |                     |                          |
| 57       |             |   |  |                     |                          |
| 58       | 471-042     |   | SCRUB, XEC PAN NO. 4-40 X .375 L3      |                     |                          |
| 59       | 495-008     |   | MT, FLAIN, RES, 4-40                   |                     |                          |
| 60       | 501-008     |   | WASHER, FLAT, #4                       |                     |                          |
| 61       | 502-024     |   | WASHER, LOCK #4                        |                     |                          |
| 62       |             |   |  |                     |                          |
| 63       |             |   |  |                     |                          |
| 64       | 500-332     |   | HEATING                                | REF: Q5             |                          |
| 65       | 500-395     |   | TRANSISTOR, MPN, 2N5190                | Q6, 5               |                          |
| 66       |             |   |  |                     |                          |
| 67       |             |   |  |                     |                          |
| 68       | 504-153     |   | INTEGRATED CIRCUIT, MC806P             | A7                  |                          |
| 69       | 504-168     |   | INTEGRATED CIRCUIT, UCN1C              | A4                  |                          |
| 70       | 504-483     |   | INTEGRATED CIRCUIT, SN7403N            | A1                  |                          |
| 71       | 504-309     |   | INTEGRATED CIRCUIT, U48501             | A10                 |                          |
| 72       | 504-425     |   | INTEGRATED CIRCUIT, MC853P             | A2, 3               |                          |
| 73       | 504-698     |   | INTEGRATED CIRCUIT, U640950            | A6, 9, 9            |                          |
| 74       | 507-066     |   | INTEGRATED CIRCUIT, 6 PIN, LM311N      | A5...               |                          |
| 75       | 508-680     |   | INTEGRATED CIRCUIT, SN7413J            | A11                 |                          |

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| ITEM NO. | PART NUMBER | DESCRIPTION                         | QTY REQD PER DASH NUMBER       |  | REF DESC |
|----------|-------------|-------------------------------------|--------------------------------|--|----------|
|          |             |                                     | -01                            |  |          |
| 1        | 4500220-01  | PRINTED WIRING BOARD                |                                |  |          |
| 2        | 52528-01    | HANDLE, SWAP ON                     | 1                              |  |          |
| 3        |             |                                     |                                |  |          |
| 4        | 4820345     | SCHEMATIC                           | REF                            |  |          |
| 5        | 013-983     | DIODE, ZENER, 5.6V, CD32            |                                |  |          |
| 6        | 013-999     | DIODE, SILICON CD508                | CR1-23                         |  |          |
| 7        | 014-847     | TRANSISTOR, NPN, CD38               | Q1-14, 20, 21                  |  |          |
| 8        | 070-077     | CAPACITOR, CER, .01UF, 100V         | C2-4, 9, 11                    |  |          |
| 9        | 070-077     | CAPACITOR, CER, 0.1UF, 25V, 400-20X | C10, 13, 14, 18, 20, 21        |  |          |
| 10       | 031-891     | CAPACITOR, ELECT, 0.1UF, 50V, 50X   | C5                             |  |          |
| 11       | 077-109     | CAPACITOR, TANT, 10UF, 20V          | C15, 16                        |  |          |
| 12       | 077-287     | CAPACITOR, TANT, 2.2UF, 20V         | C19                            |  |          |
| 13       | 077-489     | CAPACITOR, TANT, 33UF, 25V          | C22, 23                        |  |          |
| 14       | 077-778     | CAPACITOR, TANT, 27UF, 20V          | C12                            |  |          |
| 15       | 077-794     | CAPACITOR, TANT, 47UF, 20V          | C17                            |  |          |
| 16       | 077-790     | CAPACITOR, TANT, 68UF, 20V          | C1                             |  |          |
| 17       | 041-536     | RESISTOR, COMP, 4700, 1/2W, 5X      | R12, 13                        |  |          |
| 18       | 041-594     | RESISTOR, COMP, 2200, 1/4W, 5X      | R20, 20                        |  |          |
| 19       | 041-609     | RESISTOR, COMP, 15K, 1/4W, 5X       | R10, 24, 26, 31-34             |  |          |
| 20       |             |                                     |                                |  |          |
| 21       | 041-449     | RESISTOR, COMP, 250K, 1/4W, 5X      | R21, 35, 40                    |  |          |
| 22       | 041-487     | RESISTOR, COMP, 27K, 1/4W, 5X       | R5, A1                         |  |          |
| 23       | 041-501     | RESISTOR, COMP, 3300, 1W, 5X        | R17                            |  |          |
| 24       | 041-551     | RESISTOR, COMP, 5.1K, 1/4W, 5X      | R16                            |  |          |
| 25       | 041-746     | RESISTOR, COMP, 500K, 1/4W, 5X      | R27, 28                        |  |          |
| 26       | 041-772     | RESISTOR, COMP, 1.2 MEG O, 1/4W, 5X | R23                            |  |          |
| 27       | 041-782     | RESISTOR, COMP, 3.3 MEG O, 1/4W, 5X | R10, 17                        |  |          |
| 28       | 041-408     | RESISTOR, COMP, 4700, 1/4W, 5X      | R10                            |  |          |
| 29       | 055-146     | CAPACITOR, MYLAR, .001UF, 50V       | 57                             |  |          |
| 30       |             |                                     |                                |  |          |
| 31       | 058-662     | RESISTOR, VAR, 500, 1/2" .80X       | R5-8                           |  |          |
| 32       | 058-662     | RESISTOR, VAR, 1000, 1W, 1.0X       | R1-4                           |  |          |
| 33       | 058-655     | RESISTOR, VAR, 1.0 MEG, 1/2W, 20X   | R9                             |  |          |
| 34       |             |                                     |                                |  |          |
| 35       | 280-998     | RTG PAD, TMB, 1000 (T05)            | REF: 01-10, 20, 21, 23, 26, 18 |  |          |
| 36       | 580-464     | TRANSISTOR, SILICON, PNP, NFE 1000  | Q22, 25                        |  |          |
| 37       | 580-467     | TRANSISTOR, SILICON, NPN, NFE 1100  | Q10, 18                        |  |          |

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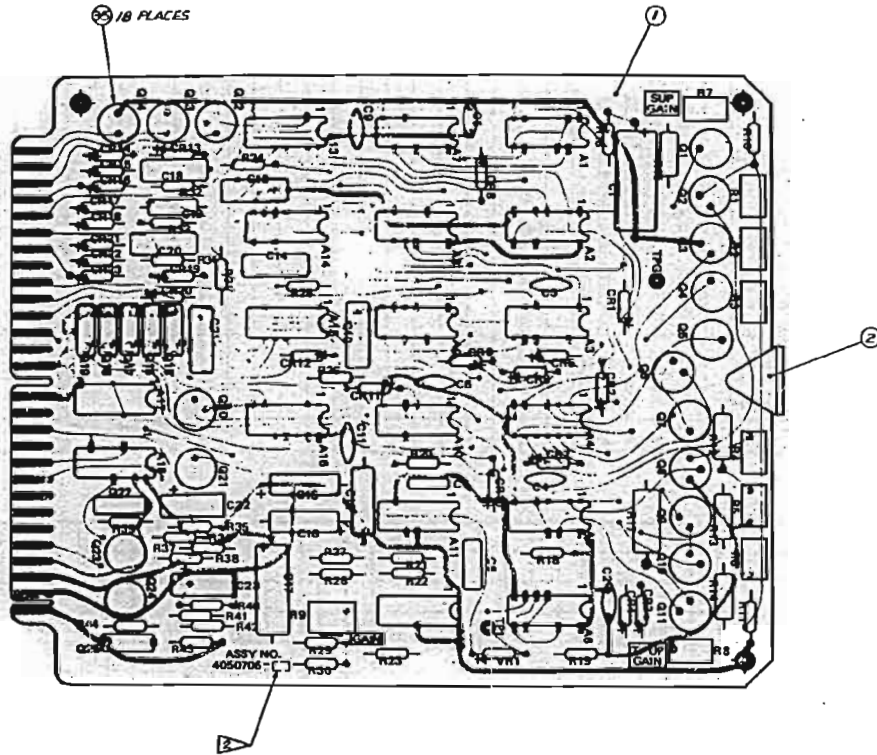
4050706-  
Transport Control PWA

Next Assy: 4020373

| ITEM NO. | PART NUMBER | DESCRIPTION                         | REF DESC               | QTY REQD PER DASH NUMBER |  |
|----------|-------------|-------------------------------------|------------------------|--------------------------|--|
|          |             |                                     |                        | -01                      |  |
| 38       | 586-268     | INTEGRATED CIRCUIT, UN741           | A11, 12                |                          |  |
| 39       | 597-101     | INTEGRATED CIRCUIT, MC680           | A6, 5, 13, 16          |                          |  |
| 40       | 597-101     | INTEGRATED CIRCUIT, MC681           | A2, 9, 14              |                          |  |
| 41       | 597-102     | INTEGRATED CIRCUIT, MC688           | A1, 3, 6-8, 10, 15, 17 |                          |  |
| 42       | 586-792     | INTEGRATED CIRCUIT, MC665           | A1, 8                  |                          |  |
| 43       |             |                                     |                        |                          |  |
| 44       | 041-560     | RESISTOR, COMP, 2K OHMS, 1/4W, 5X   | R11, 18, 43            |                          |  |
| 45       | 041-518     | RESISTOR, COMP, 200 OHMS, 1/2W, 5X  | R14, 15                |                          |  |
| 46       | 041-408     | RESISTOR, COMP, 100 OHMS, 1/4W, 5X  | R19, 29, 44            |                          |  |
| 47       | 041-518     | RESISTOR, COMP, 33K OHMS, 1/4W, 5X  | R22                    |                          |  |
| 48       | 041-413     | RESISTOR, COMP, 5.8K OHMS, 1/4W, 5X | R32, 42                |                          |  |
| 49       |             |                                     |                        |                          |  |
| 50       | 014-678     | TRANSISTOR, NPN, CD511              | Q23, 24                |                          |  |

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NOTES:

- 1. PART NO. IS 4050706-01.
- △ MARK DASH NO. PER BDI-1.

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Transport Control PWA

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Next Assy: 4020373

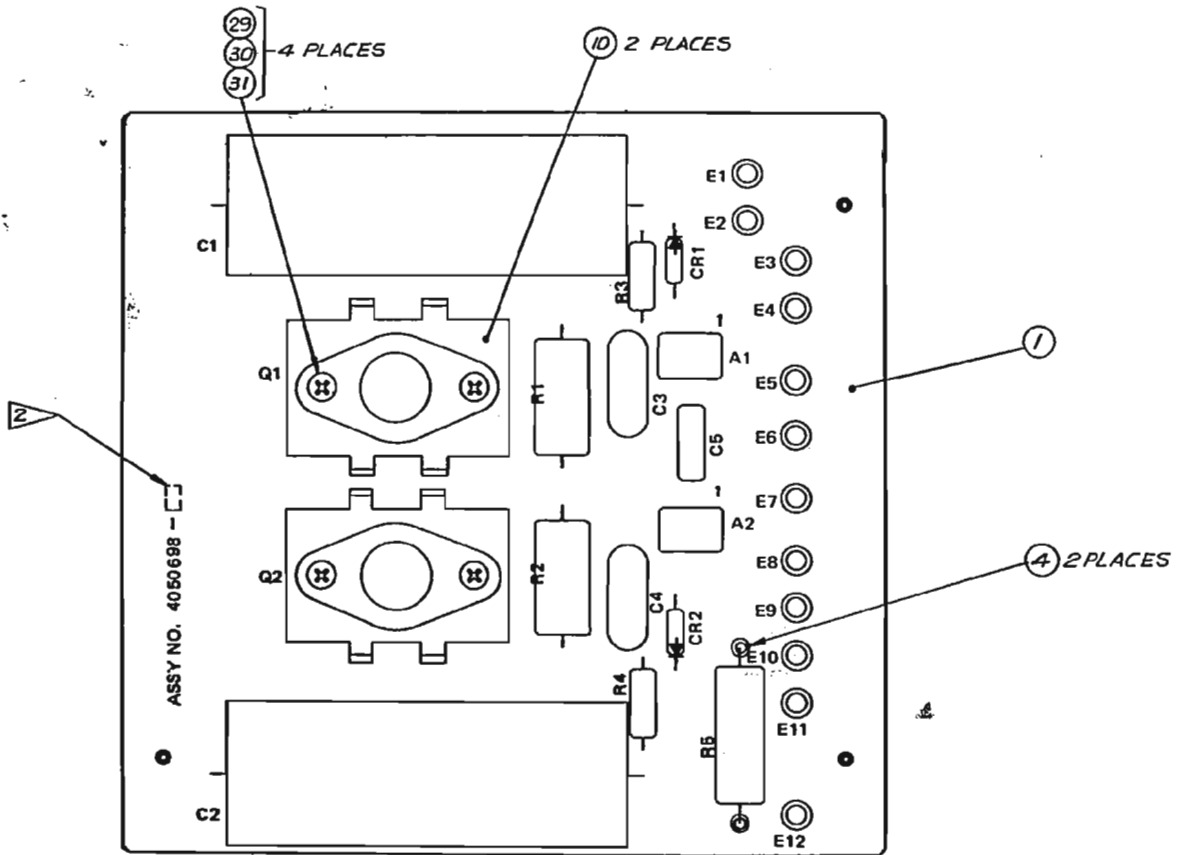
| REF. PART NUMBER | DESCRIPTION                                  | REF. DESK  | QTY REQD PER DASH NUMBER |
|------------------|--|------------|--------------------------|
| 4050098-01       | PRINTED WIRING ASSY, MOTOR DRIVE ASSEMBLY    |            | 1                        |
| 4290082-01       | CHASSIS, MOTOR DRIVE ASSEMBLY                |            | 1                        |
| 4290083-01       | COVER, MDA CHASSIS                           |            | 1                        |
| 4290094-01       | HEATING, POWER TRANSISTOR                    |            | 5                        |
|                  |  |            |                          |
| 4800336          | SCHEMATIC, MOTOR DRIVE ASSEMBLY              | REF        |                          |
|                  |  |            |                          |
|                  |  |            |                          |
| 011-614          | TRANSISTOR, POWER, MPN C0461                 | 05         | 1                        |
| 020-417          | CAPACITOR, .1 UF, 150 V, 202                 | 66.7       | 2                        |
| 150-142          | TRANSISTOR, MTR. RIT                         |            | 5                        |
| 147-007          | CONNECTOR, MALE CHASSIS MTC., 15 PIN         |            | 1                        |
| 171-021          | TERMINAL, QUICK-DISCONNECT 16-IN AWG, FEMALE |            | 8                        |
| 043-556          | RESISTOR, V.V. PWR., 1 OHM, 5W, 33           | MC-9       | 4                        |
| 280-014          | DIODE  |            | 1                        |
| 471-062          | SCREW, MACH, PAN HD, XREC 4-40 X 1/8 LG      |            | 6                        |
| 471-060          | SCREW, MACH, PAN HD, XREC, 4-40 X 1/4 LG     |            | 4                        |
| 471-048          | SCREW, MACH, PAN HD, XREC, 6-32 X 5/16 LG    |            | 1A                       |
| 471-077          | SCREW, MACH, PAN HD, XREC, 8-32 X 5/16 LG    |            | 4                        |
| 471-081          | SCREW, MACH, PAN HD, XREC, 8-32 X 5/8 LG     |            | 2                        |
| 496-004          | NUT, REPS, 4-40                              |            | 6                        |
| 496-005          | NUT, REPS, 6-32                              |            | 2                        |
| 501-008          | WASHER, PLAIN #4                             |            | 4                        |
| 501-009          | WASHER, PLAIN #6                             |            | 12                       |
| 501-010          | WASHER, PLAIN #8                             |            | 5                        |
| 502-002          | LOCK WASHER, SPRING #4                       |            | 4                        |
| 502-003          | LOCK WASHER, SPRING #6                       |            | 12                       |
| 502-004          | LOCK WASHER, SPRING #8                       |            | 5                        |
|                  |  |            |                          |
| 520-533          | TRANSISTOR, POWER NPN                        | 03-4, 6, 7 | 4                        |
| 581-095          | DIODE BRIDGE ASSY, C0665-200                 | CP3, 4     | 2                        |
| CD568            | WIRE, 18#, STRANDED, 20 AWG                  |            | A/R                      |
| CD568            | WIRE, 18#, STRANDED, 16 AWG                  |            | A/R                      |
| 615-019          | WIRE #18 AWG SOLID, BARE                     |            | A/R                      |

4020374—

Motor Drive Amplifier Assembly

Next Assy: 4010210





NOTES:

1. PART NO. IS 4050698-01.

Z MARK DASH NO. PER BDI -1.

4050698—  
Motor Drive Amplifier PWA

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Next Assy: 4020374

| ITEM NO. | PART NUMBER | DESCRIPTION                   | REF. DESIG. | QTY. REQD PER DASH NUMBER |
|----------|-------------|-------------------------------|-------------|---------------------------|
| 1        | 492097-01   | PANEL, FAN                    | 1           |                           |
| 2        |             |                               |             |                           |
| 3        | 391-053     | FAN ROTOR/WHLISPER            | 3           |                           |
| 4        |             |                               |             |                           |
| 5        | 591-207     | QUAD FAN                      | 3           |                           |
| 6        |             |                               |             |                           |
| 7        | 180-388     | STRIP TERM                    | 1           |                           |
| 8        |             |                               |             |                           |
| 9        |             |                               | 12          |                           |
| 10       |             |                               |             |                           |
| 11       | 471-071     | SCREEN, PPH, 6-32 X .500      | 4           |                           |
| 12       | 571-072     | SCREEN, PPH, 6-32 X .625      | 12          |                           |
| 13       |             |                               |             |                           |
| 14       |             |                               |             |                           |
| 15       | 496-005     | NUT, KEYS #6                  | 12          |                           |
| 16       |             |                               |             |                           |
| 17       | 501-009     | WASHER, FLAT #6               | 28          |                           |
| 18       | 492-034     | NUT, HEX 6-32, SMALL PATTERH  | 4           |                           |
| 19       | 501-188     | WASHER, FLAT #6 SMALL PATTERH | 4           |                           |
| 20       | 502-003     | WASHER, LOCK, SPRING #6       | 4           |                           |
|          |             |                               |             |                           |
|          |             |                               |             |                           |
|          |             |                               |             |                           |
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|          |             |                               |             |                           |
|          |             |                               |             |                           |
|          |             |                               |             |                           |

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Fan Assembly

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Next Assy: 4010210

| ITEM NO. | PART NUMBER | DESCRIPTION                   | REF. QTY. | QTY. REQ. PER DASH NUMBER |
|----------|-------------|-------------------------------|-----------|---------------------------|
| 1        | 590597-01   | WHEEL, FAN                    | 1         |                           |
| 2        |             |                               |           |                           |
| 3        | 591-035     | FAN MOTOR WHISPER             | 3         |                           |
| 4        |             |                               |           |                           |
| 5        | 591-507     | QUAD FAN                      | 3         |                           |
| 6        |             |                               |           |                           |
| 7        | 180-308     | STRIP TEEM                    | 3         |                           |
| 8        |             |                               |           |                           |
| 9        |             |                               | 12        |                           |
| 10       |             |                               |           |                           |
| 11       | 571-071     | SCREW, PPH, 6-32 X .500       | 4         |                           |
| 12       | 571-072     | SCREW, PPH, 6-32 X .625       | 12        |                           |
| 13       |             |                               |           |                           |
| 14       |             |                               |           |                           |
| 15       | 596-005     | NUT, SIZE #6                  | 12        |                           |
| 16       |             |                               |           |                           |
| 17       | 501-009     | WASHER, FLAT #6               | 20        |                           |
| 18       | 596-D3A     | NUT, HEX 6-32, SMALL PATTERN  | 4         |                           |
| 19       | 501-188     | WASHER, FLAT #6 SMALL PATTERN | 4         |                           |
| 20       | 502-003     | WASHER, LOCK, SPRING #6       | 4         |                           |

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Fan Assembly

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Next Assy: 4010210

| ITEM NO. | PART NUMBER | DESCRIPTION                          | REF. DESC. | QTY REQD PER DASH NUMBER |
|----------|-------------|--------------------------------------|------------|--------------------------|
| 1        | 419099-01   | FRAME IDENTIFICATION                 | 1          |                          |
| 2        |             |                                      |            |                          |
| 3        | 429095-01   | PANEL, BOTTOM                        | 1          |                          |
| 4        | 426095-01   | ANGLE, MOUNTING, REAR                | 1          |                          |
| 5        | 429081-01   | PANEL, CONNECTOR                     | 1          |                          |
| 6        | 430381-01   | PLATE, DOOR HINGE                    | 2          |                          |
| 7        | 4110021-01  | CATCH                                | 2          |                          |
| 8        |             |                                      |            |                          |
| 9        | 4260511-01  | BRACKET, DOOR HINGE                  | 1          |                          |
| 10       | 4260511-02  | BRACKET, DOOR HINGE                  | 1          |                          |
| 11       | 470-016     | SCREW CAP, HEX SOC. RD., 10-32 X 3/8 | 6          |                          |
| 12       |             |                                      |            |                          |
| 13       | 446-005     | NUT, KEPS 6-32                       | 8          |                          |
| 14       | 491-007     | NUT, KEPS, 10-32                     | 6          |                          |
| 15       | 491-009     | NUT, KEPS, 1/2-20                    | 16         |                          |
| 16       |             |                                      |            |                          |
| 17       | 497-190     | NUT, SPRING, #10-32                  | 44         |                          |
| 18       |             |                                      |            |                          |
| 19       | 501-011     | WASHER, #10                          | 6          |                          |
| 20       | 501-012     | WASHER, 1/4-20                       | 32         |                          |
| 21       |             |                                      |            |                          |
| 22       |             |                                      |            |                          |
| 23       | 082-050     | CASTER, NYLON                        | 4          |                          |
| 24       |             |                                      |            |                          |
| 25       |             |                                      |            |                          |
| 26       |             |                                      |            |                          |
| 27       | 422-016     | BEARING, NYLON                       | 2          |                          |
| 28       | 480-096     | SCREW, BOLT, 1/4-40 X 3/4 LG, HEX HD | 16         |                          |
| 29       |             |                                      |            |                          |
| 30       |             |                                      |            |                          |
| 31       |             |                                      |            |                          |
| 32       |             |                                      |            |                          |
| 33       |             |                                      |            |                          |
| 34       | 280-751     | SPACER CONNECTOR, PANEL              | 2          |                          |
| 35       | 471-093     | SCREW, PAN HD, X REC., 10-32 X 1" LG | 2          |                          |
| 36       | 495-007     | NUT, KEPS                            | 2          |                          |
| 37       | 501-011     | WASHER                               | 4          |                          |

4020383A

Frame Assembly

Next Assy: 4010210

| ITEM NO. | PART NUMBER | DESCRIPTION                                 | REF. DESCR. | -01 | -02 | QTY REQD PER DASH NUMBER |
|----------|-------------|---|-------------|-----|-----|--------------------------|
| 1        | 4290891-01  | HEATING, TRANSISTOR                         |             | 2   | 2   |                          |
| 2        |             |   |             |     |     |                          |
| 3        | 4050699-03  | PWA, 35V REGULATOR                          |             | 1   |     |                          |
| 4        | 4050699-04  | PWA, 15/27V REGULATOR                       |             | -   | 1   |                          |
| 5        | 4290819-01  | CHASSIS, POWER SUPPLY                       |             | 1   | 1   |                          |
| 6        | 4580211-01  | TRANSFORMER, POWER                          | T1          | 1   | 1   |                          |
| 7        | 4840199     | SCHEMATIC, 35V POWER SUPPLY                 | REF         | -   |     |                          |
| 8        | 4840142     | SCHEMATIC, 15/27V POWER SUPPLY              | REF         | -   |     |                          |
| 9        | 4290892-01  | SHIELD, POWER SUPPLY                        |             | 1   | 1   |                          |
| 10       | 4290921-01  | SHIELD, POWER SUPPLY                        |             | 1   | 1   |                          |
| 11       | 011-611     | TRANSISTOR, POWER, 2N3773                   | Q4          | -   | 1   |                          |
| 12       | 011-035     | TRANSISTOR, POWER, 2N3773                   | Q1,2        | 2   | 2   |                          |
| 13       | 011-833     | MTG KIT, TRANSISTOR TO-66                   |             | 1   | 1   |                          |
| 14       |             |   |             |     |     |                          |
| 15       | 031-126     | CAPACITOR, AL, 250UF, 50V                   | C4          | 1   |     |                          |
| 16       | 031-126     | CAPACITOR, AL, 250UF, 50V                   | C4          | -   | 1   |                          |
| 17       | 031-411     | CAPACITOR, AL, 500 UF, 25V                  | C3          | -   | 1   |                          |
| 18       |             |   |             |     |     |                          |
| 19       | 047-748     | RESISTOR, W.M., 25 OHMS, 25W, 3%            | R1,2        | 2   | 2   |                          |
| 20       |             |   |             |     |     |                          |
| 21       | 063-182     | CAPACITOR, AL, 10K UF, 75V                  | C1          | 1   | 1   |                          |
| 22       | 063-183     | CAPACITOR, AL, 1400 UF, 75V                 | C2          | 1   | 1   |                          |
| 23       |             |   |             |     |     |                          |
| 24       | 074-020     | FUSE, 5A, SLOW BLOW                         | F1          | 1   | 1   |                          |
| 25       | 074-034     | FUSE, 10A, FAST BLOW                        | F2          | 1   | 1   |                          |
| 26       | 085-001     | FUSE HOLDER                                 |             | 2   | 2   |                          |
| 27       |             |   |             |     |     |                          |
| 28       | 143-207     | CONNECTOR, PC RECP, 18 CONTACTS             | C5          | 1   | 1   |                          |
| 29       | 146-018     | CONNECTOR, RECT RECP, 10 SOC                | C6          | 1   | 1   |                          |
| 30       | 147-072     | CONNECTOR, TWIST-LOCK, PWR, 3 MALE CONTACTS | C7          | 1   | 1   |                          |
| 31       |             |   |             |     |     |                          |
| 32       | 150-142     | MTG KIT, TRANSISTOR TO-3                    |             | 2   | 3   |                          |
| 33       |             |   |             |     |     |                          |
| 34       |             |   |             |     |     |                          |
| 35       | 171-044     | TERMINAL LUG, CRIMP, RING TONGUE #6         |             | 4   | 4   |                          |
| 36       | 172-005     | TERMINAL LUG, SOLEDER #10                   |             | 8   | 8   |                          |
| 37       | 21-199      | TERMINAL LUG, CRIMP, DISCONNECT             |             | 4   | 4   |                          |

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4050658B

Power Supply Assembly

Next Assy: 4010210

| ITEM NO. | PART NUMBER | DESCRIPTION                             | REF. DESCR. | -01 | -02 | QTY REQD PER DASH NUMBER |
|----------|-------------|---|-------------|-----|-----|--------------------------|
| 38       | 260-075     | CRIMPET, 3/8 ID                         |             | 2   | 2   |                          |
| 39       | 260-052     | CRIMPET, CATERPILLAR                    |             | A/A | A/A |                          |
| 40       |             |   |             |     |     |                          |
| 41       | 302-062     | CLAMP, CRADLE, U-SHAPED, 1.662 ID NYLON |             | -   | 1   |                          |
| 42       | 302-067     | CLAMP, CRADLE, NYLON                    |             | -   | 1   |                          |
| 43       |             |   |             |     |     |                          |
| 44       | 470-045     | SCREW, CAP HEX SOC HD, 1/4-20 X 1/2 LG  |             | 4   | 4   |                          |
| 45       | 471-061     | SCREW, PAN HD 4-40 X 5/16 LG            |             | 10  | 12  |                          |
| 46       | 471-062     | SCREW, PAN HD 4-40 X 3/8 LG             |             | 4   | 4   |                          |
| 47       | 471-064     | SCREW, PAN HD, 4-40 X 1/2 LG            |             | 2   | 2   |                          |
| 48       | 471-067     | SCREW, PAN HD 6-32 X 1/4 LG             |             | 2   | 2   |                          |
| 49       | 471-068     | SCREW, PAN HD 6-32 X 5/16 LG            |             | 19  | 20  |                          |
| 50       | 471-073     | SCREW, PAN HD 6-32 X 5/8 LG             |             | 1   | 1   |                          |
| 51       | 471-314     | SCREW, FLAT HD, #6-32 X 1/4 LG          |             | 2   | 2   |                          |
| 52       | 496-004     | NUT, SEPS, 4-40                         |             | 12  | 14  |                          |
| 53       |             |   |             |     |     |                          |
| 54       | 501-008     | WASHER, FLAT #4                         |             | 8   | 10  |                          |
| 55       | 501-009     | WASHER, FLAT #6                         |             | 13  | 13  |                          |
| 56       | 502-002     | WASHER, LOCK, SPLIT #4                  |             | 2   | 2   |                          |
| 57       | 502-003     | WASHER, LOCK, SPLIT #6                  |             | 15  | 15  |                          |
| 58       |             |   |             |     |     |                          |
| 59       | 580-112     | TRANSISTOR, POWER 2N3767                | Q3          | 1   | 1   |                          |
| 60       | 581-351     | DIODE ASSY, POWER                       | Q4          | 1   | 1   |                          |
| 61       | 616-415     | CABLE, SHIELDED, TWISTED PAIR           |             | A/A | -   |                          |
| 62       |             |   |             |     |     |                          |
| 63       | 617-385     | WIRE, INS, 20 AWG, GRN                  |             | A/A | A/A |                          |
| 64       | 617-387     | WIRE, INS, 20 AWG, VIO                  |             | A/A | A/A |                          |
| 65       | 617-390     | WIRE, INS, 12 AWG, BLK                  |             | A/A | A/A |                          |
| 66       | 617-393     | WIRE, INS, 14 AWG, RED                  |             | A/A | A/A |                          |
| 67       | 617-394     | WIRE, INS, 16 AWG, GRN                  |             | A/A | A/A |                          |
| 68       |             |   |             |     |     |                          |
| 69       | 617-396     | WIRE, INS, 16 AWG, BLU                  |             | A/A | A/A |                          |
| 70       | 617-398     | WIRE, INS, 16 AWG, VIO                  |             | A/A | A/A |                          |
| 71       | 617-399     | WIRE, INS, 16 AWG, RED                  |             | A/A | A/A |                          |
| 72       | 617-400     | WIRE, INS, 16 AWG, BLK                  |             | A/A | A/A |                          |
| 73       | 617-401     | WIRE, INS, 16 AWG, GRN                  |             | A/A | A/A |                          |
| 74       | 4590922-01  | ENCLOSURE, TRANSFORMER                  |             | 1   | 1   |                          |
| 75       | 4590923-01  | COVER, TRANSFORMER                      |             | 1   | 1   |                          |

4050658B

Sheet 2 of 2

| ITEM NO. | PART NUMBER | DESCRIPTION                      | REF. DESK | QTY REQD PER DASH NUMBER |
|----------|-------------|----------------------------------|-----------|--------------------------|
| 1        | 4500116-01  | PRINTED WIRING BOARD             |           | 1                        |
| 2        | 4500121-01  | COIL, BIAS OSC                   | TI        | 1                        |
| 3        | 4500216-02  | PRINTED WIRING BOARD             |           | 1                        |
| 4        | 4500317     | SEMICONDUCTOR, 33V               | REF       | 1                        |
| 5        | 4500319     | SEMICONDUCTOR, 15/27V            | REF       | 1                        |
| 6        | 4500320     | SEMICONDUCTOR, 10/10V            | REF       | 1                        |
| 7        | 4500321     | SEMICONDUCTOR, 10/10V            | REF       | 1                        |
| 8        | 101107-01   | STANDARD                         |           | 1                        |
| 9        | 013-599     | DIODE, 100V, 1W, 1M7355          | C83, A    | 2                        |
| 10       | 013-578     | DIODE, 100V, 1W, 1M7355          | C81       | 2                        |
| 11       | 013-578     | DIODE, 100V, 1W, 1M7355          | C81, 2    | 2                        |
| 12       | 013-747     | DIODE, ZENER, 13V, 2W            | V86       | 1                        |
| 13       | 013-799     | DIODE, ZENER, 4.7V, 1W, 1M7355   | V82       | 1                        |
| 14       | 013-911     | DIODE, ZENER, 33V, 1W, 1M7355    | V82       | 1                        |
| 15       | 013-970     | DIODE, ZENER, 6.8V, 1W, 1M7355   | V84       | 1                        |
| 16       | 013-970     | DIODE, ZENER, 6.8V, 1W, 1M7355   | V84       | 1                        |
| 17       | 581-197     | DIODE, ZENER, 8.2V, 1W, 1M7355   | V81       | 1                        |
| 18       | 581-502     | DIODE, ZENER, 9.1V, 1W, 1M7355   | V80       | 1                        |
| 19       | 581-503     | DIODE, ZENER, 16V, 1W, 1M7355    | V85       | 1                        |
| 20       |             |                                  |           |                          |
| 21       | 014-721     | TRANSISTOR, PNP, 2N4017          | C8, 5     | 2                        |
| 22       | 014-747     | TRANSISTOR, NPN, 2N4038          | Q1        | 1                        |
| 23       | 014-555     | HEAT SINK, TRANSISTOR, T0-5      |           | 2                        |
| 24       | 014-550     | TRANSISTOR, NPN, 2N4033          | Q4        | 1                        |
| 25       | 014-550     | TRANSISTOR, NPN, 2N4033          | Q4, A     | 2                        |
| 26       | 014-653     | TRANSISTOR, NPN, 2N4033          | Q4, 7     | 2                        |
| 27       |             |                                  |           |                          |
| 28       | 580-564     | TRANSISTOR, SCR, 2N6442          | Q1, 5     | 2                        |
| 29       |             |                                  |           |                          |
| 30       | 030-057     | CAPACITOR, CER, .01uF, 50V, 20%  | C2        | 1                        |
| 31       | 030-057     | CAPACITOR, CER, .01uF, 50V, 20%  | C2, 3     | 2                        |
| 32       | 035-491     | CAPACITOR, CER, 0.1uF, 50V, 10%  | C3        | 1                        |
| 33       |             |                                  |           |                          |
| 34       | 034-597     | CAPACITOR, MICA, 500pF, 300V, 5% | C5, 6     | 2                        |
| 35       | 034-594     | CAPACITOR, MICA, 250pF, 500V, 5% | C7        | 1                        |
| 36       | 037-728     | CAPACITOR, TANT, 6.8uF, 6V, 10%  | C9        | 1                        |
| 37       | 037-363     | CAPACITOR, TANT, 330uF, 6V, 10%  | C1        | 1                        |

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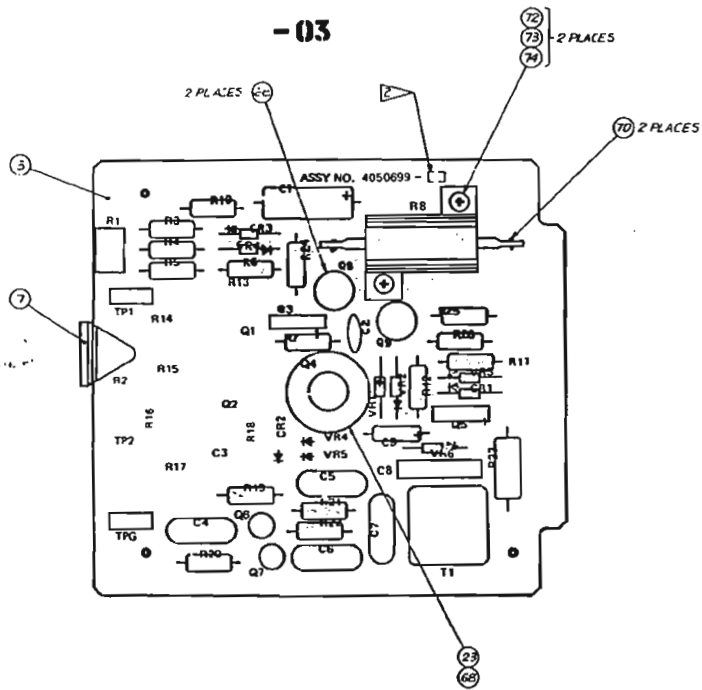
4050699A  
Regulator-Oscillator PWA

Next Assy: 4050658

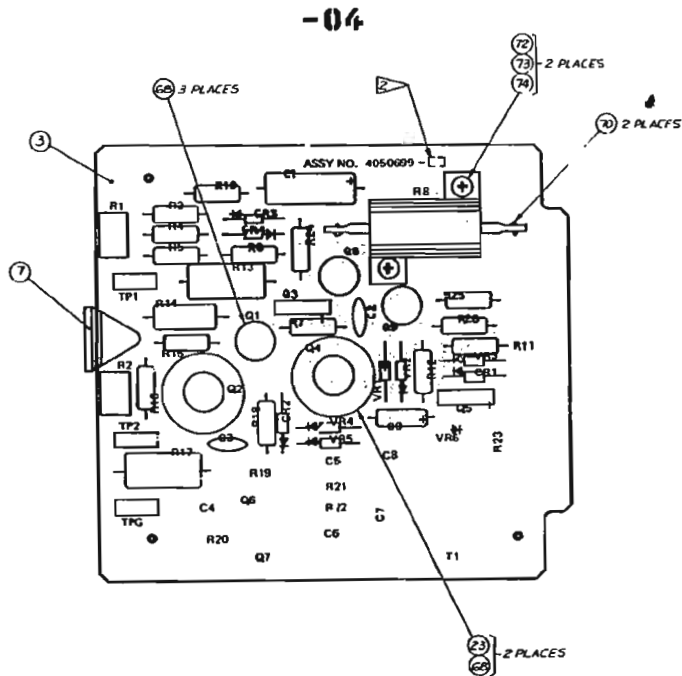
| ITEM NO. | PART NUMBER | DESCRIPTION                         | REF. DESK  | QTY REQD PER DASH NUMBER |
|----------|-------------|-------------------------------------|------------|--------------------------|
| 38       | 041-003     | RESISTOR, COMP, 100K, 1/2W, 5%      | R12        | 1                        |
| 39       | 041-008     | RESISTOR, COMP, 1.5K, 1/2W, 5%      | R10        | 1                        |
| 40       | 041-008     | RESISTOR, COMP, 1.5K, 1/2W, 5%      | R3, 15, 16 | 3                        |
| 41       | 041-010     | RESISTOR, COMP, 220, 1/2W, 5%       | R7, 11     | 2                        |
| 42       | 041-016     | RESISTOR, COMP, 220, 1/2W, 5%       | R21, 22    | 2                        |
| 43       | 041-135     | RESISTOR, COMP, 39K, 1/4, 10%       | R14        | 1                        |
| 44       | 041-147     | RESISTOR, COMP, 1.2K, 1/4, 10%      | R23        | 1                        |
| 45       | 041-199     | RESISTOR, COMP, 100K, 1/4, 10%      |            | 1                        |
| 46       | 041-277     | RESISTOR, COMP, 10K, 1/2W, 5%       | R4         | 1                        |
| 47       | 041-317     | RESISTOR, COMP, 220 OHMS, 1/2W, 5%  | R18        | 1                        |
| 48       | 041-553     | RESISTOR, COMP, 120K, 1/2W, 5%      | R6         | 1                        |
| 49       | 041-533     | RESISTOR, COMP, 24K, 1/2W, 5%       | R19, 20    | 2                        |
| 50       | 041-586     | RESISTOR, COMP, 330K, 2W, 5%        | R13        | 1                        |
| 51       | 041-245     | RESISTOR, COMP, 10K, 1/2W, 5%       | R5         | 1                        |
| 52       | 041-216     | RESISTOR, VARIOUS, 1K, 2W, 10%      | R17        | 1                        |
| 53       | 307-880     | RESISTOR, VARIOUS, 10, 25W, 3%      | R8         | 1                        |
| 54       |             |                                     |            |                          |
| 55       | 054-108     | CAPACITOR, MICA, 6800pF, 500V, 5%   | C4         | 1                        |
| 56       | 058-369     | RESISTOR, CEMENT, VAR, 200, 1W, 10% | R1         | 1                        |
| 57       | 058-369     | RESISTOR, CEMENT, VAR, 200, 1W, 10% | R1, 2      | 2                        |
| 58       | 058-369     | RESISTOR, CEMENT, VAR, 200, 1W, 10% |            | 2                        |
| 59       | 058-369     | RESISTOR, CEMENT, VAR, 200, 1W, 10% |            | 2                        |
| 60       |             |                                     |            |                          |
| 61       | 058-369     | RESISTOR, CEMENT, VAR, 200, 1W, 10% |            | 2                        |
| 62       |             |                                     |            |                          |
| 63       | 148-057     | CONNECTOR, PC TIP JACK, CRN         | TP2        | 1                        |
| 64       | 148-057     | CONNECTOR, PC TIP JACK, RED         | TP1        | 1                        |
| 65       | 148-058     | CONNECTOR, PC TIP JACK, BLK         | TP3        | 1                        |
| 66       | 280-998     | WIRE, BARE, SOLID, #18              |            | 3                        |
| 67       | 280-998     | WIRE, BARE, SOLID, #18              |            | 3                        |
| 68       | 615-024     | SCREW, XIEC PAN HD, 4-40 X 5/16 LG  |            | 2                        |
| 69       | 491-004     | NUT, NPT, 4-40                      |            | 2                        |
| 70       | 501-008     | WASHER, FLAT, #4                    |            | 2                        |
| 71       | 011-011     | RESISTOR, COMP, 10K OHMS, 1/2W, 5%  | R10        | 1                        |
| 72       | 011-283     | RESISTOR, COMP, 47 OHMS, 1/2W, 5%   | R24        | 1                        |
| 73       | 011-319     | RESISTOR, COMP, 330 OHMS, 1/2W, 5%  | R25        | 1                        |
| 74       | 011-245     | RESISTOR, COMP, 1K OHMS, 1/2W, 5%   | R26        | 1                        |
| 75       |             |                                     |            |                          |
| 76       |             |                                     |            |                          |
| 77       |             |                                     |            |                          |
| 78       |             |                                     |            |                          |
| 79       |             |                                     |            |                          |

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4050699A



NOTES:  
 1. PART NO. IS 4050699-XX.  
 ▷ MARK DASH NO. PER BDI-1.



**4050699A**  
**Regulator-Oscillator PWA**

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Next Assy: 4050658

| ITEM NO. | PART NUMBER | DESCRIPTION                          | REF. DISC. | QTY. REQD. PER DASH NUMBER |     |     |     |
|----------|-------------|--------------------------------------|------------|----------------------------|-----|-----|-----|
|          |             |                                      |            | -01                        | -02 | -03 | -04 |
| 1        | 411028A-01  | OVERLAY, CONTROL PANEL, 8 CHANNEL    |            |                            |     |     |     |
| 2        | 411028B-02  | OVERLAY, CONTROL PANEL, 16 CHANNEL   |            |                            |     |     |     |
| 3        | 411028C-03  | OVERLAY, CONTROL PANEL, 24 CHANNEL   |            |                            |     |     |     |
| 4        | 415092E-01  | SUBPANEL, CONTROL BOX                |            |                            |     |     |     |
| 5        | 415092F-01  | BASE, CONTROL BOX                    |            |                            |     |     |     |
| 6        | 411028A-04  | OVERLAY, CONTROL PANEL               |            |                            |     |     |     |
| 7        | 4420081-01  | BUTTON, "LIFTER DEFALT"              |            |                            |     |     |     |
| 8        | 4420081-02  | BUTTON, "RECORD", RED                |            |                            |     |     |     |
| 9        | 4420081-03  | BUTTON, "PLA", GREEN                 |            |                            |     |     |     |
| 10       | 4420081-04  | BUTTON, "STOP", YELLOW               |            |                            |     |     |     |
| 11       | 4420081-05  | BUTTON, "REVIEW"                     |            |                            |     |     |     |
| 12       | 4420081-06  | BUTTON, "FAST FORWARD"               |            |                            |     |     |     |
| 13       | 4420082-01  | SWITCH, ROCKER, SAFE / READY, NO. 1  |            |                            |     |     |     |
| 14       | 4420082-02  | SWITCH, ROCKER, SAFE / READY, NO. 2  |            |                            |     |     |     |
| 15       | 4420082-03  | SWITCH, ROCKER, SAFE / READY, NO. 3  |            |                            |     |     |     |
| 16       | 4420082-04  | SWITCH, ROCKER, SAFE / READY, NO. 4  |            |                            |     |     |     |
| 17       | 4420082-05  | SWITCH, ROCKER, SAFE / READY, NO. 5  |            |                            |     |     |     |
| 18       | 4420082-06  | SWITCH, ROCKER, SAFE / READY, NO. 6  |            |                            |     |     |     |
| 19       | 4420082-07  | SWITCH, ROCKER, SAFE / READY, NO. 7  |            |                            |     |     |     |
| 20       | 4420082-08  | SWITCH, ROCKER, SAFE / READY, NO. 8  |            |                            |     |     |     |
| 21       | 4420082-09  | SWITCH, ROCKER, SAFE / READY, NO. 9  |            |                            |     |     |     |
| 22       | 4420082-10  | SWITCH, ROCKER, SAFE / READY, NO. 10 |            |                            |     |     |     |
| 23       | 4420082-11  | SWITCH, ROCKER, SAFE / READY, NO. 11 |            |                            |     |     |     |
| 24       | 4420082-12  | SWITCH, ROCKER, SAFE / READY, NO. 12 |            |                            |     |     |     |
| 25       | 4420082-13  | SWITCH, ROCKER, SAFE / READY, NO. 13 |            |                            |     |     |     |
| 26       | 4420082-14  | SWITCH, ROCKER, SAFE / READY, NO. 14 |            |                            |     |     |     |
| 27       | 4420082-15  | SWITCH, ROCKER, SAFE / READY, NO. 15 |            |                            |     |     |     |
| 28       | 4420082-16  | SWITCH, ROCKER, SAFE / READY, NO. 16 |            |                            |     |     |     |
| 29       | 4420082-17  | SWITCH, ROCKER, SAFE / READY, NO. 17 |            |                            |     |     |     |
| 30       | 4420082-18  | SWITCH, ROCKER, SAFE / READY, NO. 18 |            |                            |     |     |     |
| 31       | 4420082-19  | SWITCH, ROCKER, SAFE / READY, NO. 19 |            |                            |     |     |     |
| 32       | 4420082-20  | SWITCH, ROCKER, SAFE / READY, NO. 20 |            |                            |     |     |     |
| 33       | 4420082-21  | SWITCH, ROCKER, SAFE / READY, NO. 21 |            |                            |     |     |     |
| 34       | 4420082-22  | SWITCH, ROCKER, SAFE / READY, NO. 22 |            |                            |     |     |     |
| 35       | 4420082-23  | SWITCH, ROCKER, SAFE / READY, NO. 23 |            |                            |     |     |     |
| 36       | 4420082-24  | SWITCH, ROCKER, SAFE / READY, NO. 24 |            |                            |     |     |     |
| 37       |             |                                      |            |                            |     |     |     |

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4050646A  
Control Box, 8, 16, and 24-Channel

Next Assy: 4010210

| ITEM NO. | PART NUMBER | DESCRIPTION                                  | REF. DISC. | QTY. REQD. PER DASH NUMBER |     |     |     |
|----------|-------------|--|------------|----------------------------|-----|-----|-----|
|          |             |  |            | -01                        | -02 | -03 | -04 |
| 38       | 4420083-01  | SWITCH, ROCKER, MONITOR NORMAL/IMPDT, TEL-GM |            |                            |     |     |     |
| 39       | 4420083-02  | SWITCH, ROCKER, "REPRO-SELSTM", TEL-GM       |            |                            |     |     |     |
| 40       | 4420083-03  | SWITCH, ROCKER, "SPEED 30-15", GUM-RED       |            |                            |     |     |     |
| 41       | 4840347     | SCHEMATIC, CONTROL BOX                       |            |                            |     |     |     |
| 42       | 013-078     | DIPSE, SILICON, SMALL SIGNAL                 |            |                            |     |     |     |
| 43       | 060-373     | LAMP, INCANDESCENT, 28V                      |            |                            |     |     |     |
| 44       | 060-471     | LAMP, INCANDESCENT, 28V                      |            |                            |     |     |     |
| 45       | 119-108     | SWITCH, PUSHBUTTON, ROBERTARY                |            |                            |     |     |     |
| 46       |             |  |            |                            |     |     |     |
| 47       | 141-057     | CONNECTOR, 104 PINS                          | J1         |                            |     |     |     |
| 48       | 615-012     | WIRE, SOLID, UNINSULATED, 20 AWG             |            |                            |     |     |     |
| 49       | 600-21A     | SLEEVING, TEFLON, FLEXIBLE, 20 AWG           |            |                            |     |     |     |
| 50       | 173-041     | TERMINAL STUD, #6-32 EXT THREAD              |            |                            |     |     |     |
| 51       | 169-143     | CONTACTS, CONN, PIN                          |            |                            |     |     |     |
| 52       | 250-165     | BUMPER, RUBBER                               |            |                            |     |     |     |
| 53       | 280-716     | SPACER, THREADED, 4-40 X 2.25 LG             |            |                            |     |     |     |
| 54       | 280-161     | SPACER, MAIN #6-32 X 1" LG                   |            |                            |     |     |     |
| 55       | 470-018     | SCREW, CAP, HEX LOC, 6-32 X .375             |            |                            |     |     |     |
| 56       | 471-061     | SCREW, MACH, PAN HD, 4-40 X 5/16 LG          |            |                            |     |     |     |
| 57       | 471-064     | SCREW, MACH, PAN HD, 4-40 X 1/2 LG           |            |                            |     |     |     |
| 58       |             |  |            |                            |     |     |     |
| 59       | 493-006     | NUT, SELF-LOCKING, 4-32                      |            |                            |     |     |     |
| 60       | 496-004     | NUT, KEPS 4-40                               |            |                            |     |     |     |
| 61       |             |  |            |                            |     |     |     |
| 62       | 501-008     | WALNUT, FLAT #4                              |            |                            |     |     |     |
| 63       | 502-024     | WASHER, LOCK, INT TOOTH #4                   |            |                            |     |     |     |
| 64       |             |  |            |                            |     |     |     |
| 65       | 318-740     | CATCH ASSY                                   |            |                            |     |     |     |
| 66       | 09558       | WIRE, STAMPED, INSULATED, 22 AWG             |            |                            |     |     |     |
| 67       | 415-006     | WIRE, #14 BOD SOLID, BARE                    |            |                            |     |     |     |
| 68       |             |  |            |                            |     |     |     |
| 69       |             |  |            |                            |     |     |     |
| 70       | 4050703-01  | HARNES ASSY, CONTROL BOX                     |            |                            |     |     |     |
| 71       | 4050703-02  | HARNES ASSY, CONTROL BOX                     |            |                            |     |     |     |
| 72       | 4050703-03  | HARNES ASSY, CONTROL BOX                     |            |                            |     |     |     |
| 73       | 4050703-04  | HARNES ASSY, CONTROL BOX                     |            |                            |     |     |     |

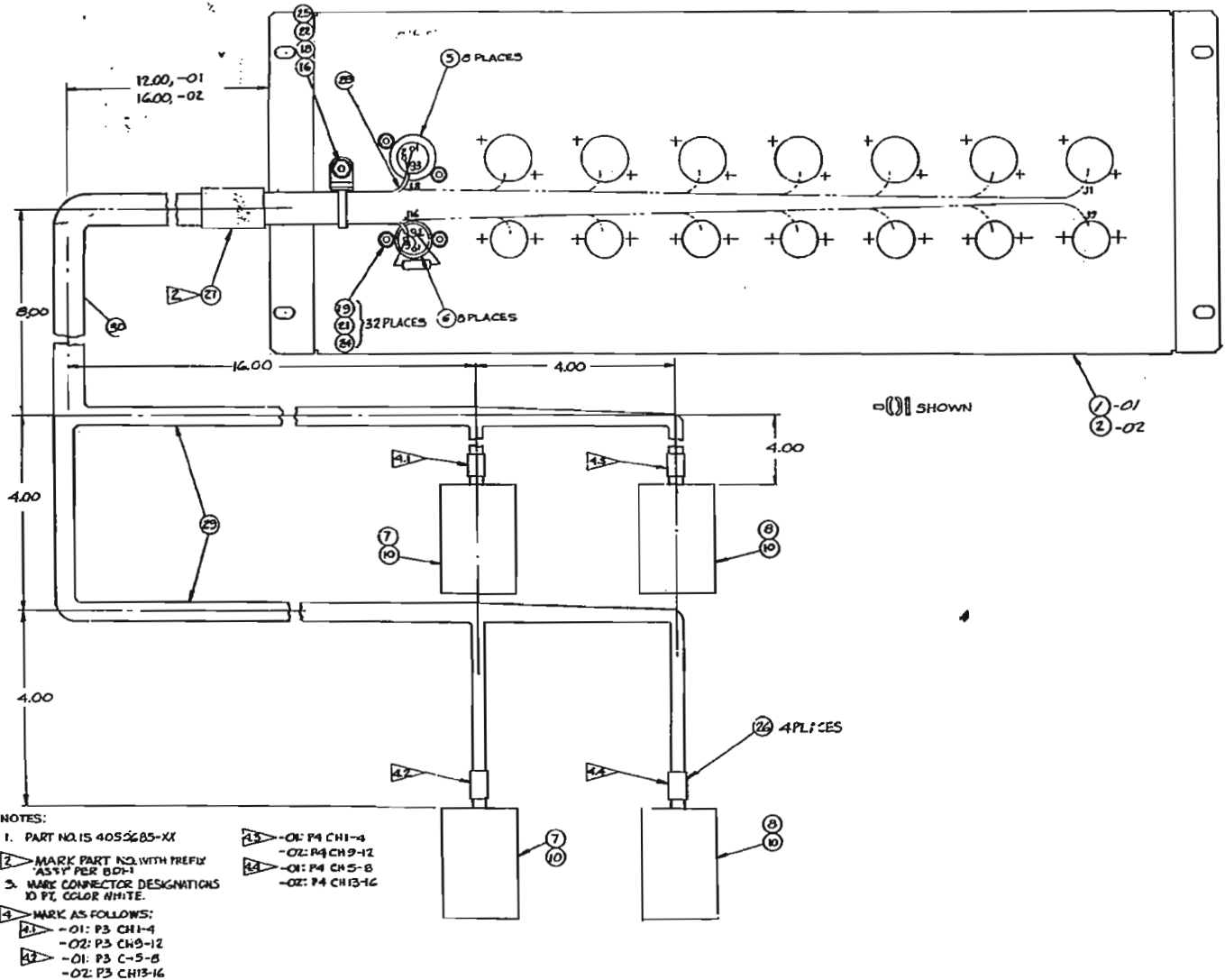
4050646A

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| ITEM NO. | PART NUMBER | DESCRIPTION                      | REF. DESIG. | QTY REQ PER DSK NUMBER |
|----------|-------------|----------------------------------|-------------|------------------------|
| 1        | 4160-007-02 | ANGLE, CONTROL BOX               | 41          | 1                      |
| 2        | 4160-008-01 | ANGLE, CONTROL BOX               | 41          | 1                      |
| 3        | 4160-011-01 | INCHGT. AS OUTPT                 | 41          | 1                      |
| 4        | 4160-012-01 | INCHGT. CIRCUIT BREAKER          | 41          | 1                      |
| 5        | 4160-013-01 | COVER, TERMINAL BLOCK, 11        | 41          | 1                      |
| 6        | 4160-014-01 | SCHEMATIC, CIRCUIT BREAKER       | 41          | 1                      |
| 7        | 4160-015-01 | SCHEMATIC, CIRCUIT BREAKER       | 41          | 1                      |
| 8        | 4160-017-01 | CIRCUIT BREAKER, 15 AMP          | 41          | 1                      |
| 9        | 4160-018-01 | TERMINAL STRIP, 6 DUAL TERMINALS | 41          | 1                      |
| 10       | 4160-019-01 | TERMINAL STRIP, 6 DUAL TERMINALS | 41          | 1                      |
| 11       | 4160-020-01 | TERMINAL STRIP, 6 DUAL TERMINALS | 41          | 1                      |
| 12       | 4160-021-01 | TERMINAL STRIP, 6 DUAL TERMINALS | 41          | 1                      |
| 13       | 4160-022-01 | TERMINAL STRIP, 6 DUAL TERMINALS | 41          | 1                      |
| 14       | 4160-023-01 | TERMINAL STRIP, 6 DUAL TERMINALS | 41          | 1                      |
| 15       | 4160-024-01 | TERMINAL STRIP, 6 DUAL TERMINALS | 41          | 1                      |
| 16       | 4160-025-01 | TERMINAL STRIP, 6 DUAL TERMINALS | 41          | 1                      |
| 17       | 4160-026-01 | TERMINAL STRIP, 6 DUAL TERMINALS | 41          | 1                      |
| 18       | 4160-027-01 | TERMINAL STRIP, 6 DUAL TERMINALS | 41          | 1                      |
| 19       | 4160-028-01 | TERMINAL STRIP, 6 DUAL TERMINALS | 41          | 1                      |
| 20       | 4160-029-01 | TERMINAL STRIP, 6 DUAL TERMINALS | 41          | 1                      |
| 21       | 4160-030-01 | TERMINAL STRIP, 6 DUAL TERMINALS | 41          | 1                      |
| 22       | 4160-031-01 | TERMINAL STRIP, 6 DUAL TERMINALS | 41          | 1                      |
| 23       | 4160-032-01 | TERMINAL STRIP, 6 DUAL TERMINALS | 41          | 1                      |
| 24       | 4160-033-01 | TERMINAL STRIP, 6 DUAL TERMINALS | 41          | 1                      |
| 25       | 4160-034-01 | TERMINAL STRIP, 6 DUAL TERMINALS | 41          | 1                      |
| 26       | 4160-035-01 | TERMINAL STRIP, 6 DUAL TERMINALS | 41          | 1                      |
| 27       | 4160-036-01 | TERMINAL STRIP, 6 DUAL TERMINALS | 41          | 1                      |
| 28       | 4160-037-01 | TERMINAL STRIP, 6 DUAL TERMINALS | 41          | 1                      |
| 29       | 4160-038-01 | TERMINAL STRIP, 6 DUAL TERMINALS | 41          | 1                      |
| 30       | 4160-039-01 | TERMINAL STRIP, 6 DUAL TERMINALS | 41          | 1                      |
| 31       | 4160-040-01 | TERMINAL STRIP, 6 DUAL TERMINALS | 41          | 1                      |
| 32       | 4160-041-01 | TERMINAL STRIP, 6 DUAL TERMINALS | 41          | 1                      |
| 33       | 4160-042-01 | TERMINAL STRIP, 6 DUAL TERMINALS | 41          | 1                      |
| 34       | 4160-043-01 | TERMINAL STRIP, 6 DUAL TERMINALS | 41          | 1                      |
| 35       | 4160-044-01 | TERMINAL STRIP, 6 DUAL TERMINALS | 41          | 1                      |
| 36       | 4160-045-01 | TERMINAL STRIP, 6 DUAL TERMINALS | 41          | 1                      |
| 37       | 4160-046-01 | TERMINAL STRIP, 6 DUAL TERMINALS | 41          | 1                      |
| 38       | 4160-047-01 | TERMINAL STRIP, 6 DUAL TERMINALS | 41          | 1                      |
| 39       | 4160-048-01 | TERMINAL STRIP, 6 DUAL TERMINALS | 41          | 1                      |
| 40       | 4160-049-01 | TERMINAL STRIP, 6 DUAL TERMINALS | 41          | 1                      |
| 41       | 4160-050-01 | TERMINAL STRIP, 6 DUAL TERMINALS | 41          | 1                      |
| 42       | 4160-051-01 | TERMINAL STRIP, 6 DUAL TERMINALS | 41          | 1                      |
| 43       | 4160-052-01 | TERMINAL STRIP, 6 DUAL TERMINALS | 41          | 1                      |
| 44       | 4160-053-01 | TERMINAL STRIP, 6 DUAL TERMINALS | 41          | 1                      |
| 45       | 4160-054-01 | TERMINAL STRIP, 6 DUAL TERMINALS | 41          | 1                      |
| 46       | 4160-055-01 | TERMINAL STRIP, 6 DUAL TERMINALS | 41          | 1                      |
| 47       | 4160-056-01 | TERMINAL STRIP, 6 DUAL TERMINALS | 41          | 1                      |
| 48       | 4160-057-01 | TERMINAL STRIP, 6 DUAL TERMINALS | 41          | 1                      |
| 49       | 4160-058-01 | TERMINAL STRIP, 6 DUAL TERMINALS | 41          | 1                      |
| 50       | 4160-059-01 | TERMINAL STRIP, 6 DUAL TERMINALS | 41          | 1                      |
| 51       | 4160-060-01 | TERMINAL STRIP, 6 DUAL TERMINALS | 41          | 1                      |
| 52       | 4160-061-01 | TERMINAL STRIP, 6 DUAL TERMINALS | 41          | 1                      |
| 53       | 4160-062-01 | TERMINAL STRIP, 6 DUAL TERMINALS | 41          | 1                      |
| 54       | 4160-063-01 | TERMINAL STRIP, 6 DUAL TERMINALS | 41          | 1                      |
| 55       | 4160-064-01 | TERMINAL STRIP, 6 DUAL TERMINALS | 41          | 1                      |
| 56       | 4160-065-01 | TERMINAL STRIP, 6 DUAL TERMINALS | 41          | 1                      |
| 57       | 4160-066-01 | TERMINAL STRIP, 6 DUAL TERMINALS | 41          | 1                      |
| 58       | 4160-067-01 | TERMINAL STRIP, 6 DUAL TERMINALS | 41          | 1                      |
| 59       | 4160-068-01 | TERMINAL STRIP, 6 DUAL TERMINALS | 41          | 1                      |
| 60       | 4160-069-01 | TERMINAL STRIP, 6 DUAL TERMINALS | 41          | 1                      |
| 61       | 4160-070-01 | TERMINAL STRIP, 6 DUAL TERMINALS | 41          | 1                      |
| 62       | 4160-071-01 | TERMINAL STRIP, 6 DUAL TERMINALS | 41          | 1                      |
| 63       | 4160-072-01 | TERMINAL STRIP, 6 DUAL TERMINALS | 41          | 1                      |
| 64       | 4160-073-01 | TERMINAL STRIP, 6 DUAL TERMINALS | 41          | 1                      |
| 65       | 4160-074-01 | TERMINAL STRIP, 6 DUAL TERMINALS | 41          | 1                      |
| 66       | 4160-075-01 | TERMINAL STRIP, 6 DUAL TERMINALS | 41          | 1                      |
| 67       | 4160-076-01 | TERMINAL STRIP, 6 DUAL TERMINALS | 41          | 1                      |
| 68       | 4160-077-01 | TERMINAL STRIP, 6 DUAL TERMINALS | 41          | 1                      |
| 69       | 4160-078-01 | TERMINAL STRIP, 6 DUAL TERMINALS | 41          | 1                      |
| 70       | 4160-079-01 | TERMINAL STRIP, 6 DUAL TERMINALS | 41          | 1                      |
| 71       | 4160-080-01 | TERMINAL STRIP, 6 DUAL TERMINALS | 41          | 1                      |
| 72       | 4160-081-01 | TERMINAL STRIP, 6 DUAL TERMINALS | 41          | 1                      |
| 73       | 4160-082-01 | TERMINAL STRIP, 6 DUAL TERMINALS | 41          | 1                      |
| 74       | 4160-083-01 | TERMINAL STRIP, 6 DUAL TERMINALS | 41          | 1                      |
| 75       | 4160-084-01 | TERMINAL STRIP, 6 DUAL TERMINALS | 41          | 1                      |
| 76       | 4160-085-01 | TERMINAL STRIP, 6 DUAL TERMINALS | 41          | 1                      |
| 77       | 4160-086-01 | TERMINAL STRIP, 6 DUAL TERMINALS | 41          | 1                      |
| 78       | 4160-087-01 | TERMINAL STRIP, 6 DUAL TERMINALS | 41          | 1                      |
| 79       | 4160-088-01 | TERMINAL STRIP, 6 DUAL TERMINALS | 41          | 1                      |
| 80       | 4160-089-01 | TERMINAL STRIP, 6 DUAL TERMINALS | 41          | 1                      |
| 81       | 4160-090-01 | TERMINAL STRIP, 6 DUAL TERMINALS | 41          | 1                      |
| 82       | 4160-091-01 | TERMINAL STRIP, 6 DUAL TERMINALS | 41          | 1                      |
| 83       | 4160-092-01 | TERMINAL STRIP, 6 DUAL TERMINALS | 41          | 1                      |
| 84       | 4160-093-01 | TERMINAL STRIP, 6 DUAL TERMINALS | 41          | 1                      |
| 85       | 4160-094-01 | TERMINAL STRIP, 6 DUAL TERMINALS | 41          | 1                      |
| 86       | 4160-095-01 | TERMINAL STRIP, 6 DUAL TERMINALS | 41          | 1                      |
| 87       | 4160-096-01 | TERMINAL STRIP, 6 DUAL TERMINALS | 41          | 1                      |
| 88       | 4160-097-01 | TERMINAL STRIP, 6 DUAL TERMINALS | 41          | 1                      |
| 89       | 4160-098-01 | TERMINAL STRIP, 6 DUAL TERMINALS | 41          | 1                      |
| 90       | 4160-099-01 | TERMINAL STRIP, 6 DUAL TERMINALS | 41          | 1                      |
| 91       | 4160-100-01 | TERMINAL STRIP, 6 DUAL TERMINALS | 41          | 1                      |

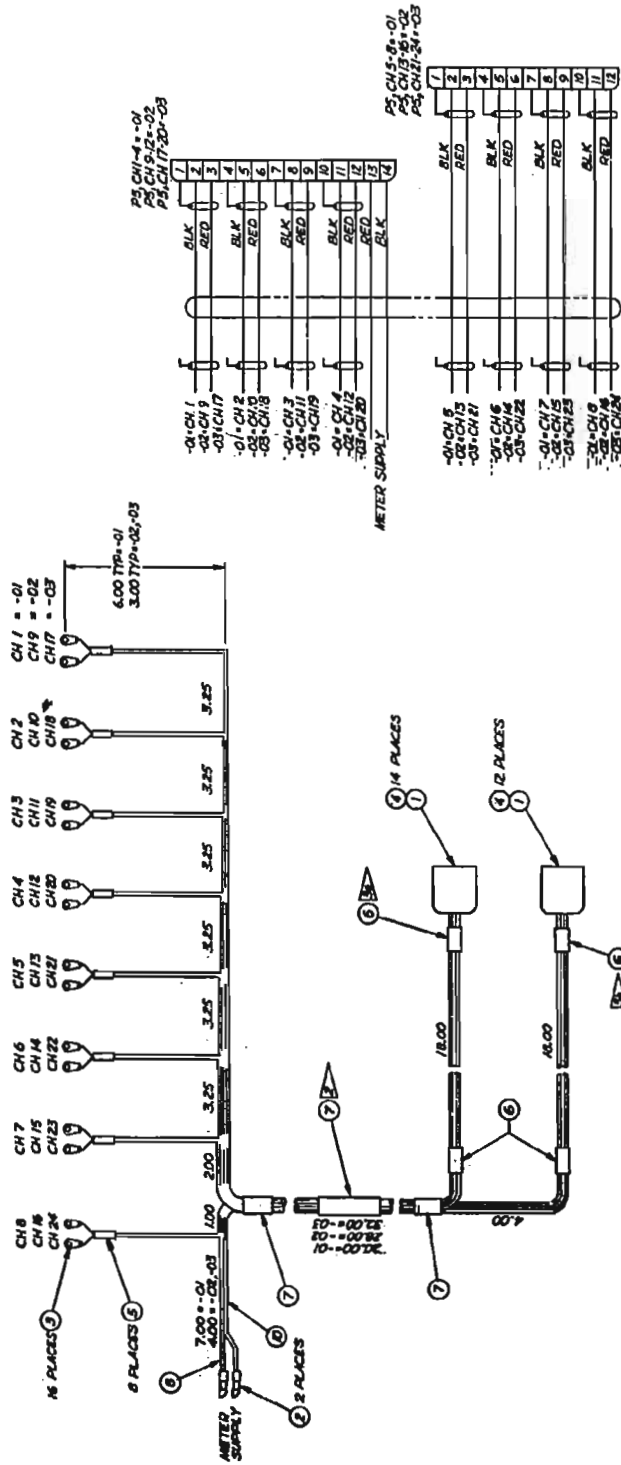




**4050685—** **Sheet 2 of 2**  
**Input/Output Connector Panel (8 and 16-Channel)**

Next Assy: 4010210

| ITEM NO. | PART NUMBER | DESCRIPTION                                      | REF. QUANTITY | QTY. REQD PER DASH NUMBER |     |     |     |     |
|----------|-------------|--|---------------|---------------------------|-----|-----|-----|-----|
|          |             |  |               | -01                       | -02 | -03 | -04 | -05 |
| 1        | 4050481-01  | WASHER ASSY, METER PANEL                         | 1             | -                         | -   | -   | -   | -   |
| 2        | 4050482-02  | WASHER ASSY, METER PANEL                         | 1             | -                         | -   | -   | -   | -   |
| 3        | 4110287-01  | OVERLAY, METER PANEL                             | 1             | -                         | -   | -   | -   | -   |
| 4        | 4110287-02  | OVERLAY, METER PANEL                             | 1             | -                         | -   | -   | -   | -   |
| 5        | 4110289-01  | OVERLAY, METER PANEL                             | 1             | -                         | -   | -   | -   | -   |
| 6        | 4150350-01  | ARM REST ASSY                                    | 1             | 1                         | 1   | 1   | 1   | 1   |
| 7        | 4300957-01  | BLADE, METER PANEL                               | 1             | -                         | 2   | -   | -   | -   |
| 8        | 4365912-01  | BRACKET, METER PANEL                             | 1             | 1                         | 1   | 1   | 1   | 1   |
| 9        | 4365912-02  | BRACKET, METER PANEL                             | 1             | 1                         | 1   | 1   | 1   | 1   |
| 10       | 4365913-01  | METER PANEL                                      | 1             | 1                         | -   | -   | -   | -   |
| 11       | 4365914-01  | METER PANEL                                      | 1             | -                         | -   | -   | -   | -   |
| 12       | 640-313     | LAMP, 28 VOLT                                    | 16            | 31                        | 48  | -   | -   | -   |
| 13       | 687-017     | SOCKET, HOLYHUB                                  | 16            | 31                        | 48  | -   | -   | -   |
| 14       | 100-048     | ESSENTIAL LAMP                                   | 16            | 31                        | 48  | -   | -   | -   |
| 15       | 312-331     | TEMP. ADJUSTIVE SINGLE LIGHP. FOOT               | 4             | 4                         | 4   | 4   | 4   | 4   |
| 16       | 481-342     | STAIRING, .255 I.D. X .48 O.D. X .04 THK         | 8             | 8                         | 8   | 8   | 8   | 8   |
| 17       | 481-343     | STAIRING, .255 I.D. X .37 I.D. PAN HO. X .04 THK | 4             | 4                         | 4   | 4   | 4   | 4   |
| 18       | 481-344     | WGT. PLAIN 1/2-3/8                               | 16            | 31                        | 48  | 12  | -   | -   |
| 19       | 481-345     | WGT. PLAIN 1/2-3/8                               | 4             | 4                         | 4   | 4   | 4   | 4   |
| 20       | 481-346     | WGT. PLAIN 1/2-3/8                               | 4             | 4                         | 4   | 4   | 4   | 4   |
| 21       | 4110287-01  | OVERLAY, METER PANEL                             | 1             | -                         | -   | -   | -   | -   |
| 22       | 4110289-01  | OVERLAY, METER PANEL                             | 1             | -                         | -   | -   | -   | -   |
| 23       | 401-001     | WASHER, PLAIN 7/8                                | 8             | 8                         | 12  | 12  | -   | -   |
| 24       | 401-002     | WASHER, PLAIN 7/8                                | 8             | 8                         | 12  | 12  | -   | -   |
| 25       | 401-003     | WASHER, BEVEL .255 I.D. X .056 THK               | 4             | 4                         | 4   | 4   | 4   | 4   |
| 26       | 171-009     | TERMINAL, QUICK DISCONNECT, 1/2-1/8              | 8             | 8                         | 8   | -   | -   | -   |
| 27       | 402-001     | WASHER, LOCK 7/8                                 | 8             | 8                         | 12  | 12  | -   | -   |
| 28       | 402-002     | WASHER, LOCK 7/8                                 | 8             | 8                         | 12  | 12  | -   | -   |
| 29       | 402-003     | WASHER, INT LOCK 7/8                             | 4             | 4                         | 4   | 4   | 4   | 4   |
| 30       | 402-004     | WGT. PLAIN 7/8-3/8                               | 4             | 4                         | 4   | 4   | 4   | 4   |
| 31       | 402-005     | WGT. PLAIN 7/8-3/8                               | 4             | 4                         | 4   | 4   | 4   | 4   |
| 32       | 880-719     | SPACER, HEX 3/16 AF 7/8-10 X .50 LG              | 16            | 31                        | 48  | -   | -   | -   |
| 33       | 880-718     | SPACER, THREADED 7/8-10 X .51 LG                 | 8             | 8                         | 12  | 12  | -   | -   |
| 34       | 4365914     | WASHER, 9/16-11/16, METER PANEL                  | REP           | REP                       | REP | -   | -   | -   |
| 35       | 4365915     | METER, MODUTEC 810-113                           | 1             | 1                         | 1   | 1   | 1   | 1   |
| 36       | 4365916     | ESCREV. SUS304 1/2-3/8                           | 4             | 4                         | 4   | 4   | 4   | 4   |
| 37       | 4365917     | WASHER, .255 I.D. X .48 O.D. X .04 THK           | 4             | 4                         | 4   | 4   | 4   | 4   |



WIRING DIAGRAM

| QTY | SIZE | DESCRIPTION                                  | PART NO. |
|-----|------|--|----------|
| 10  | 1/8" | WIRE, 20 AWG, RED                            | 617-050  |
| 10  | 1/8" | CABLE, SHIELDED & JACKETED, 2 COND, 22 AWG   | 616-283  |
| 9   | 1/8" | WIRE, 20 AWG, BLACK                          | 611-256  |
| 6   | 1/8" | SLEEVING, SHRINKABLE, .500 I.D.              | 600-257  |
| 6   | 1/8" | SLEEVING, SHRINKABLE, .375 I.D.              | 600-256  |
| 3   | 1/8" | SLEEVING, SHRINKABLE, .125 I.D.              | 600-253  |
| 4   | 1/8" | TERMINAL, QUICK DISCONNECT, MALE             | 197-036  |
| 3   | 1/8" | TERMINAL LUG, SOLDER, RING THRU, A.D. 10     | 172-005  |
| 2   | 2    | TERMINAL, QUICK DISCONNECT, WIRE TYPE        | 171-009  |
| 1   | 1    | CONNECTOR PART, BODY, BRET PLUG, 15 CONTACTS | 165-154  |
| 1   | 1    | PART NUMBER                                  | 4050707  |
| 1   | 1    | PART LIST                                    |          |

NOTES:  
 1. PART NO. IS 4050682-X1.  
 2. MARK PART NO. PER BDI-1.  
 3. MARK REF DES PER BDI-1.  
 4. -01, MARK '25, CH1-18', -02, MARK '25, CH19-30', -03, MARK '25, CH17-20', -04, MARK '25, CH15-16', -05, MARK '25, CH12-14', -06, MARK '25, CH11', -07, MARK '25, CH10', -08, MARK '25, CH9', -09, MARK '25, CH8', -10, MARK '25, CH7', -11, MARK '25, CH6', -12, MARK '25, CH5', -13, MARK '25, CH4', -14, MARK '25, CH3', -15, MARK '25, CH2', -16, MARK '25, CH1'.

| ITEM NO. | PART NUMBER | E | DESCRIPTION                                    | REF. DESIG. | QTY. REQ. PER DASH NUMBER |
|----------|-------------|---|--|-------------|---------------------------|
| 1        | 4990916-01  |   | PANEL, CONNECTOR, 24 CHANNEL                   | 1           |                           |
| 2        |             |   |  |             |                           |
| 3        |             |   |  |             |                           |
| 4        | 146-996     |   | CONNECTOR, AUDIO RECEPT, 3 SOC                 | 24          |                           |
| 5        | 146-999     |   | CONNECTOR, AUDIO RECEPT, 3 PIN                 | 24          |                           |
| 6        |             |   |  |             |                           |
| 7        | 146-144     |   | CONNECTOR, RECT. RECEPT, 15 SOC                | 6           |                           |
| 8        | 146-566     |   | CONNECTOR, RECT. RECEPT, 12 SOC                | 6           |                           |
| 9        |             |   |  |             |                           |
| 10       | 187-937     |   | TERMINAL, QUICK-DISCONNECT, FEMALE             | 144         |                           |
| 11       | 011-006     |   | RESISTOR, COMP. 500 OHMS, 1/2W, 5%             | 24          |                           |
| 12       | 302-365     |   | STAMP, CABLE                                   | 3           |                           |
| 13       |             |   |  |             |                           |
| 14       | 571-589     |   | SCREW, MACH. PAN. HD. X 1/8" L. 6-32 X .315    | 1           |                           |
| 15       | 571-518     |   | SCREW, MACH. FLAT HD. X 1/8" L. 6-32 X .315    | 96          |                           |
| 16       |             |   |  |             |                           |
| 17       | 496-006     |   | NUT, NUTS, 6-32                                | 96          |                           |
| 18       | 496-003     |   | NUT, NUTS, 6-32                                | 3           |                           |
| 19       |             |   |  |             |                           |
| 20       | 501-008     |   | WASHER, FLAT, #6                               | 96          |                           |
| 21       | 501-009     |   | WASHER, FLAT, #6                               | 3           |                           |
| 22       |             |   |  |             |                           |
| 23       | 600-037     |   | TUBING, FLEXIBLE, BLK, 500 ID                  | A/N         |                           |
| 24       | 600-039     |   | TUBING, FLEXIBLE, BLK, 875 ID                  | A/N         |                           |
| 25       | 600-058     |   | TUBING, HEAT SHRINKABLE, BLK, .375 ID          | A/N         |                           |
| 26       | 600-059     |   | TUBING, HEAT SHRINKABLE, BLK, 1.00 ID          | A/N         |                           |
| 27       | 616-183     |   | CABLE, SHIELDED, TWISTED PAIR, 2 COND., 22 AWG | A/N         |                           |

Sheet 1 of 2

4050715-  
Input/Output Connector Panel (24-Channel)

Next Assy: 4010210



| ITEM NO. | PART NUMBER | QTY REQ | D | DESCRIPTION                                | MFG. PKG. QTY | QTY REQ PER DASH NUMBER |     |     |     |
|----------|-------------|---------|---|--|---------------|-------------------------|-----|-----|-----|
|          |             |         |   |  |               | -02                     | -01 | -04 | -01 |
| 1        | 210952-10B  |         |   | BRACKET-MOTION SWITCH                      |               | 1                       | 1   | 1   |     |
| 2        | 210953-10B  |         |   | HOUSING-ACTUATOR                           |               | 1                       | 1   | 1   |     |
| 3        | 210954-10C  |         |   | SHAFT-BEARING S/A                          |               | 1                       | 1   | 1   |     |
| 4        | 210955-10B  |         |   | HOUSING-BEARING                            |               | 1                       | 1   | 1   |     |
| 5        | 210957-10B  |         |   | CAP-HOUSING                                |               | 1                       | 1   | 1   |     |
| 6        | 210950-10B  |         |   | COUPLING-PIH S/A                           |               | 1                       | 1   | 1   |     |
| 7        | 210951-10C  |         |   | COLLAR                                     |               | 1                       | 1   | 1   |     |
| 8        |             |         |   |  |               |                         |     |     |     |
| 9        | 211065-10B  |         |   | COVER, TERMINAL BLOCK                      |               | 1                       | 1   | 1   |     |
| 10       |             |         |   |  |               |                         |     |     |     |
| 11       |             |         |   |  |               |                         |     |     |     |
| 12       | 164864-03   |         |   | BEARING BALL                               |               | 1                       | 1   | 1   |     |
| 13       | 30-607      |         |   | SWITCH                                     | 51,2          | 2                       | 2   | 2   |     |
| 14       | 30-339      |         |   | SWITCH                                     |               |                         |     |     |     |
| 15       | 280-016     |         |   | SPACER, 1/4 DIA X 3/8 X #6-32 NYLON STRIP  |               | 4                       | 4   | 4   |     |
| 16       | 180-422     |         |   | TERMINAL BLOCK, 3 TERM (KULKA 600 3/AST-3) |               | 1                       | 1   | 1   |     |
| 17       | 619-983     |         |   | WIRE, STRD, IMS, 22 AWG, W18 5" LG         |               | 1                       | 1   | 1   |     |
| 18       | 619-983     |         |   | WIRE, STRD, IMS, 22 AWG, W10 1/2 X 1/3 LG  |               | 1                       | 1   | 1   |     |
| 19       | 530-085     |         |   | RETAINING RING                             |               | 1                       | 1   | 1   |     |
| 20       | 530-086     |         |   | RETAINING RING                             |               | 1                       | 1   | 1   |     |
| 21       | 430-063     |         |   | RETAINING RING                             |               | 1                       | 1   | 1   |     |
| 22       | 530-902     |         |   | RETAINING RING                             |               | 6                       | 6   | 6   |     |
| 23       | 371-338     |         |   | SCREW, FLAT HD, #6-32 X 1/2 LG             |               | 4                       | 4   | 4   |     |
| 24       | 377-184     |         |   | SCREW, SET, #6-32 X 3/16, NYLON            |               | 2                       | 2   | 2   |     |
| 25       | 371-071     |         |   | SCREW, PAN HD, #6-32 X 1/2 LG              |               | 4                       | 4   | 4   |     |
| 26       | 375-059     |         |   | SCREW, SEM, #6-32 X 1/2 LG                 |               | 4                       | 4   | 4   |     |
| 27       | 375-011     |         |   | SCREW, SEM, #6-32 X 3/16 LG                |               | 4                       | 4   | 4   |     |
| 28       | 370-185     |         |   | SCREW, CAP, #6-32, NYLON                   |               | 1                       | 1   | 1   |     |
| 29       | 619-982     |         |   | WIRE, STRD, IMS, 22 AWG, 67 3" LG          |               | 1                       | 1   | 1   |     |
| 30       | 666-002     |         |   | NUT, KEP #6-32                             |               | 4                       | 4   | 4   |     |
| 31       | 619-985     |         |   | WIRE, STRD, IMS, 22 AWG, 68 2 1/2 LG       |               | 1                       | 1   | 1   |     |
| 32       | 619-985     |         |   | WIRE, STRD, IMS, 22 AWG, 68 4" LG          |               | 1                       | 1   | 1   |     |
| 33       | 087-434     |         |   | SILICONE, COMPOUND 50,000 CS               |               | 1                       | 1   | 1   |     |
| 34       | 087-720     |         |   | TUBE OF SILICONE COMPOUND 50,000           |               | 1                       | 1   | 1   |     |
| 35       | 201-009     |         |   | WASHER, FLAT #6                            |               | 8                       | 8   | 8   |     |
| 36       | 6660233     |         |   | INSTALLATION INSTRUCTIONS                  |               | 1                       | 1   | 1   |     |
| 37       | 619-23      |         |   | WIRE, STRANDED, IMS, 22 AWG, 67 5" LG      |               | 1                       | 1   | 1   |     |

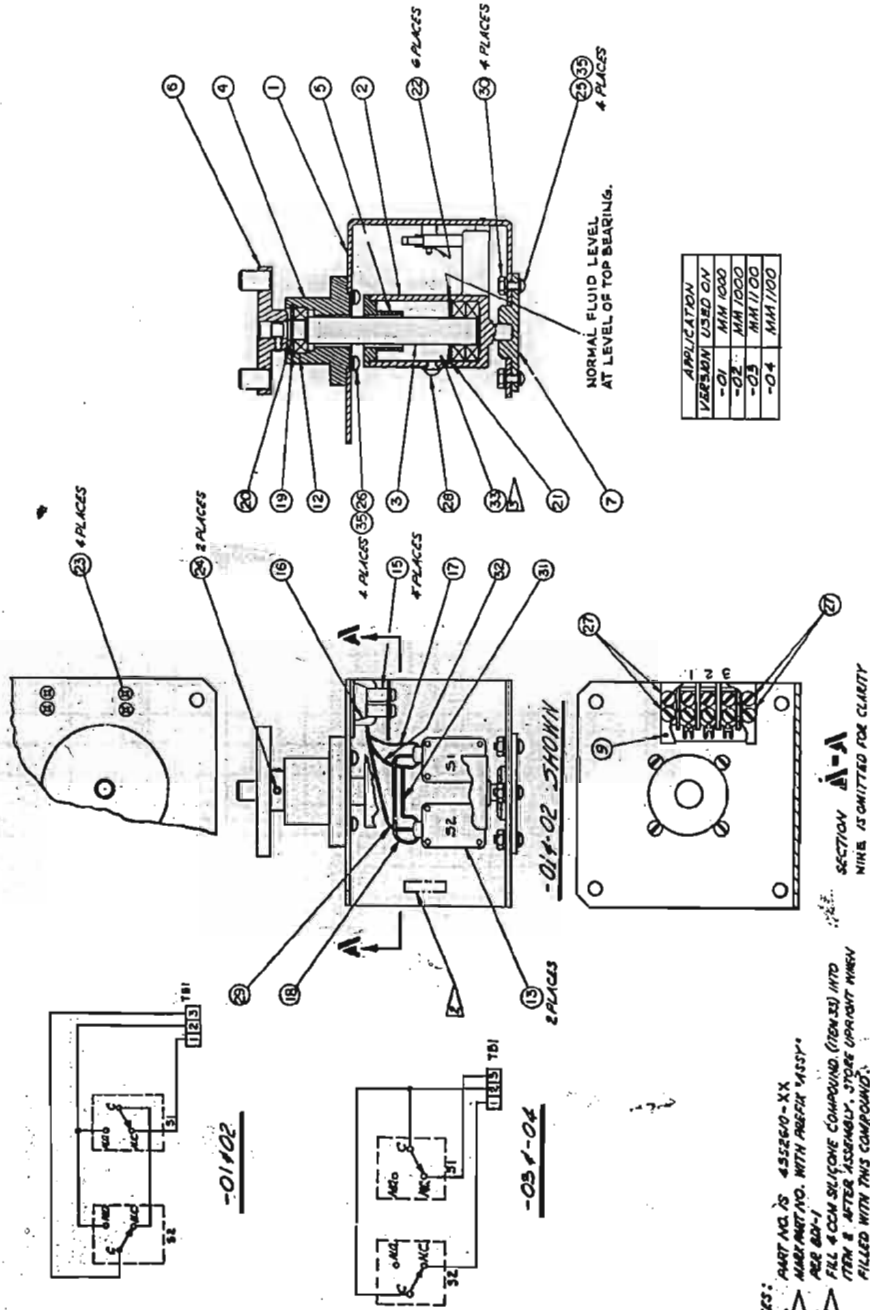
4952610D

Motion Sense Assembly

Next Assy: 4010210

Sheet 1 of 2





SIMILAR TO 1210952

Sheet 2 of 2

4952610D  
Motion Sense Assembly

Next Assy: 4010210



## SCHEMATIC DIAGRAMS

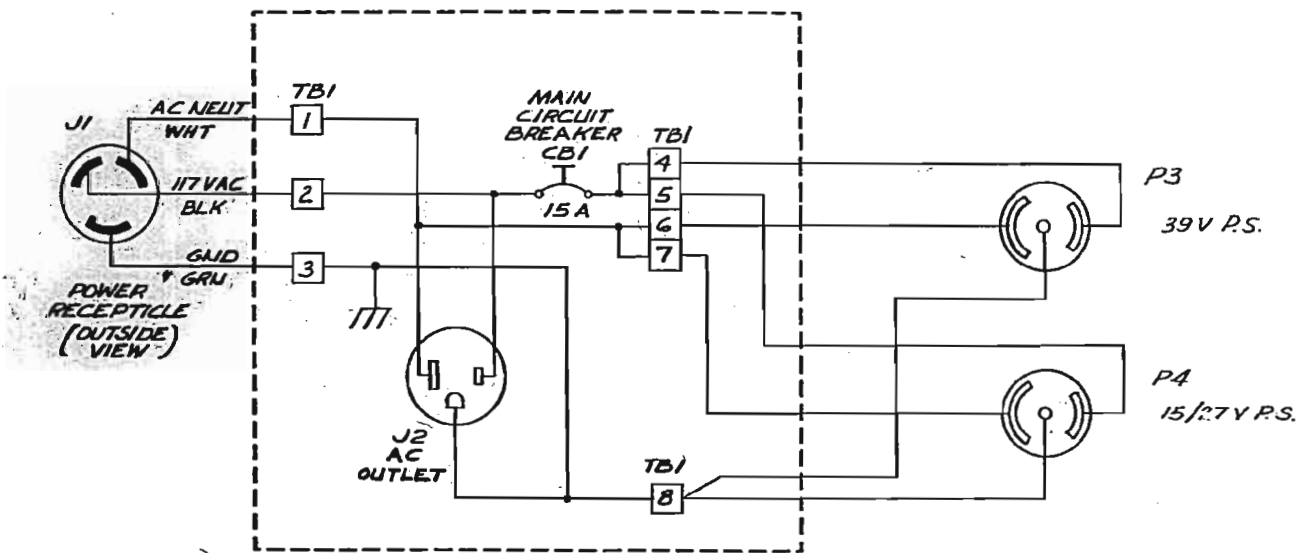
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| 4840339A    | 15/27 V Regulator PWA, -02            | 145  |
| 4840346A    | Transport Harness                     | 147  |
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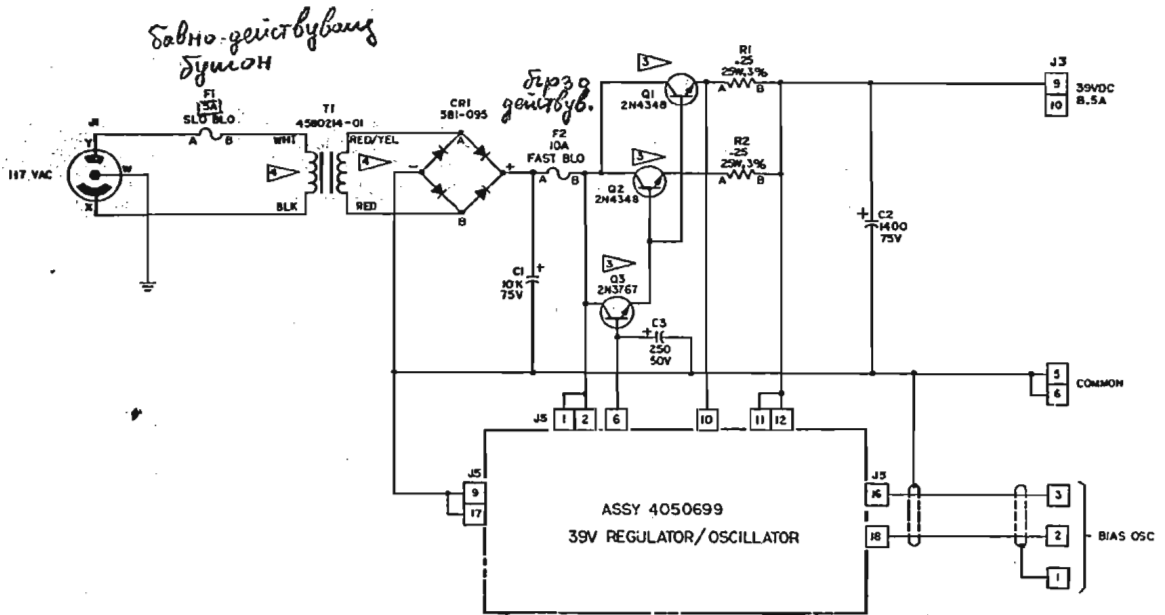
| DRAWING NO. | TITLE                                 | PAGE |
|-------------|---------------------------------------|------|
| 4840346A    | Transport Harness                     | 147  |
| 4840347-    | Control Box                           | 159  |
| 4840348-    | Transport Control Wiring Diagram, -01 | 149  |
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| 4840356-    | Capstan Servo PWA                     | 155  |
| 4840357A    | Reproduce, Record, and Erase PWA's    | 165  |
| 4840366-    | Meter Panel                           | 167  |



4840343—  
Circuit Breaker Assembly

Sheet 1 of 1

Ref. Assy: 4050647



NOTES: UNLESS OTHERWISE SPECIFIED

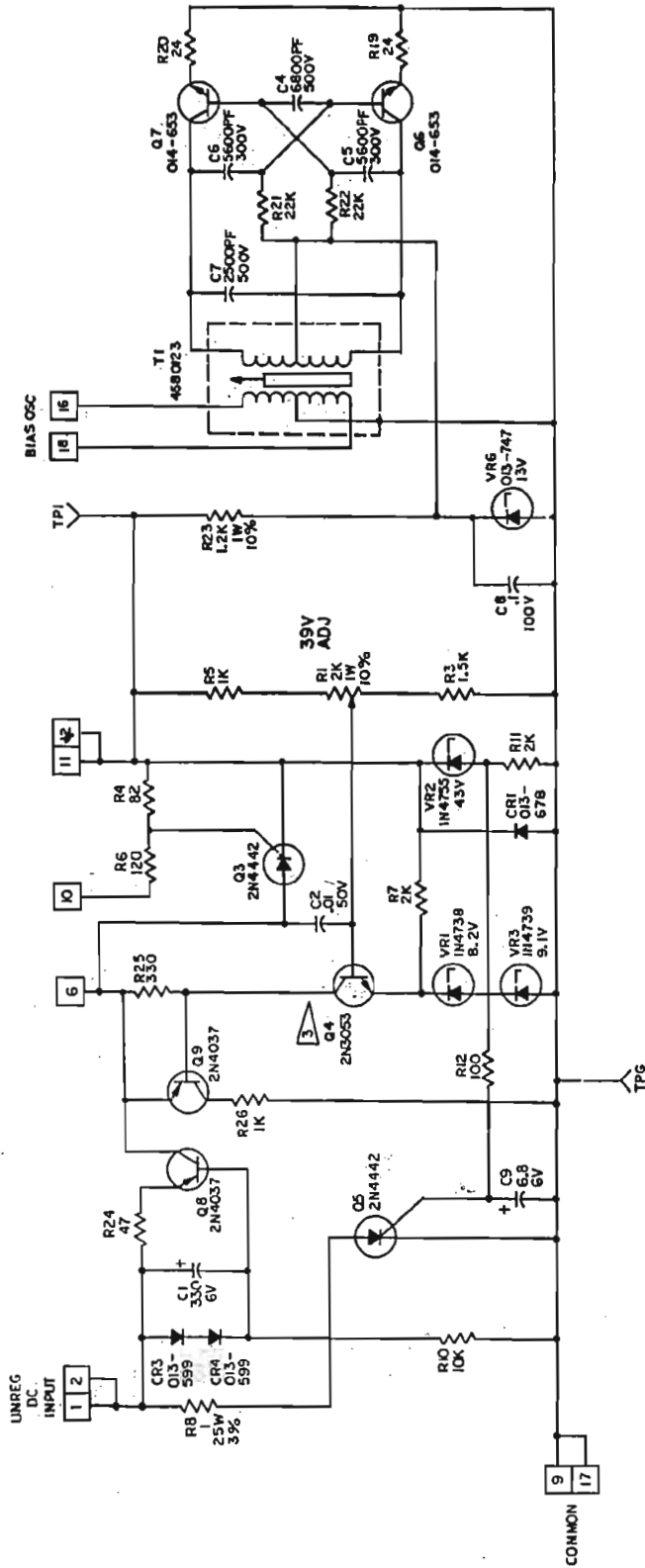
1. CAPACITANCE VALUES ARE IN MICROFARADS.
  2. RESISTANCE VALUES ARE IN OHMS.
- THIS TRANSISTOR TO HAVE HEAT SINK.  
 PRIMARY AND SECONDARY TRANSFORMER LEADS TO BE TWISTED TOGETHER TIGHTLY.

| REFERENCE DESIGNATIONS |          |
|------------------------|----------|
| LAST USED              | NOT USED |
| C3                     |          |
| CR1                    |          |
| F2                     |          |
| JS                     |          |
| Q3                     |          |
| R2                     |          |
| T1                     |          |

4840299—  
39 V Power Supply, -01

Sheet 1 of 1

Ref. Assy: 4050658



NOTES: UNLESS OTHERWISE SPECIFIED  
 1. CAPACITANCE VALUES ARE IN MICROFARADS.  
 2. RESISTANCE VALUES ARE IN OHMS, 1/2W, 5%.

⚠ THIS TRANSISTOR TO HAVE HEAT SINK.

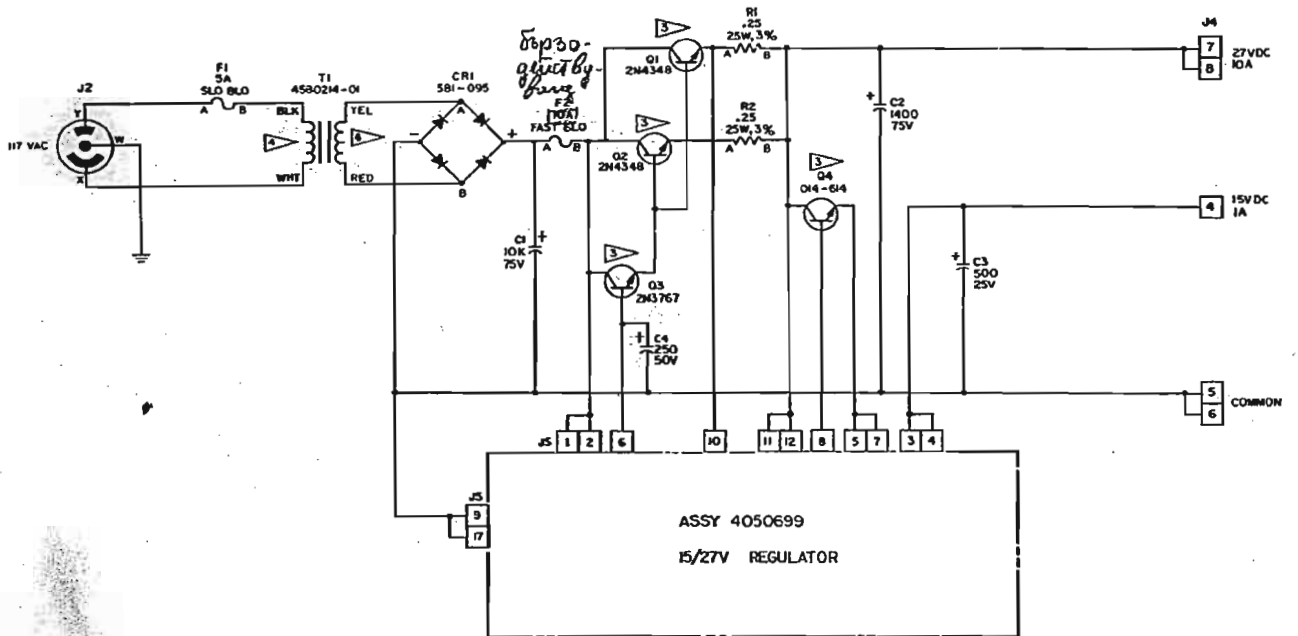
| REFERENCE DESIGNATIONS | LAST USED | NOT USED |
|------------------------|-----------|----------|
| C9                     |           | C3       |
| CR4                    |           | CR2      |
| Q3                     |           | Q1, Q2   |
| Q5                     |           | Q14-653  |
| VR6                    |           | VR4, VR5 |
| TP1                    | TPG       |          |

| FIELD SERVICE COMPONENT SUBSTITUTION LIST |                               |
|---|-------------------------------|
| AMPEX P/N                                 | NEAREST COMMERCIAL EQUIVALENT |
| 014-653                                   | 2N3904                        |

4840337A  
 39V Regulator, -01

Sheet 1 of 1

Ref. Assy: 4050699



NOTES - UNLESS OTHERWISE SPECIFIED

1. CAPACITANCE VALUES ARE IN MICROFARADS.
2. RESISTANCE VALUES ARE IN OHMS.
3. THIS TRANSISTOR TO HAVE HEAT SINK.
4. PRIMARY AND SECONDARY TRANSFORMER LEADS TO BE TWISTED TOGETHER TIGHTLY.

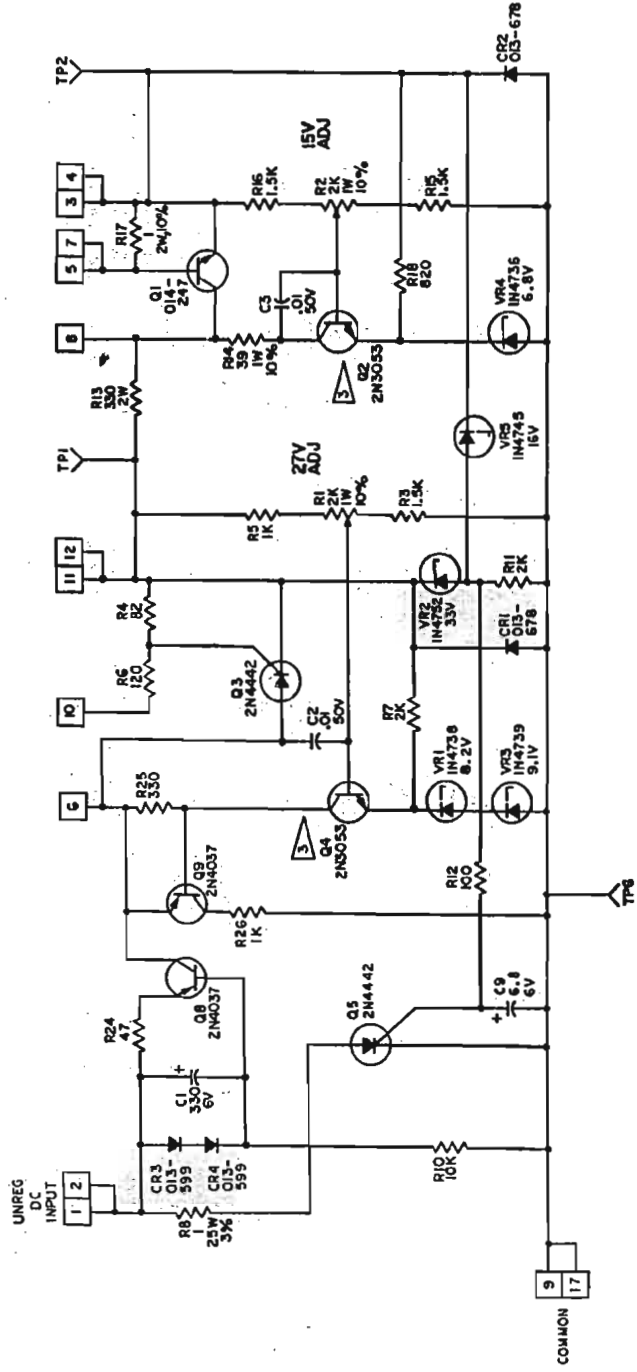
| REFERENCE DESIGNATIONS |          |
|------------------------|----------|
| LAST USED              | NOT USED |
| C6                     |          |
| CR1                    |          |
| F2                     |          |
| J3                     |          |
| Q4                     |          |
| R2                     |          |
| T1                     |          |

4840342-  
15/27 V Power Supply, -02

Sheet 1 of 1

Ref. Assy: 4050658





NOTES: UNLESS OTHERWISE SPECIFIED

1. CAPACITANCE VALUES ARE IN MICROARADS.

2. RESISTANCE VALUES ARE IN OHMS, 1/2W, 5%.

3. THIS TRANSISTOR TO HAVE HEAT SINK.

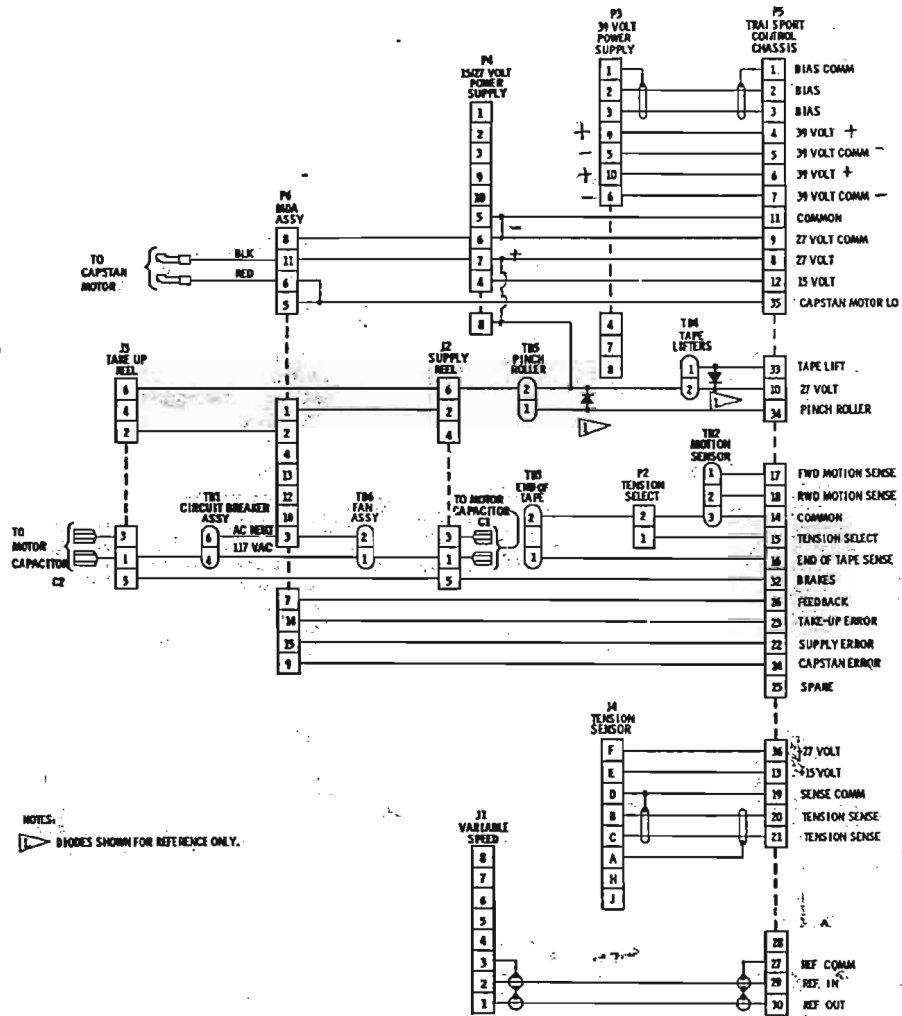
| REFERENCE DESIGNATIONS |            |
|------------------------|------------|
| LAST USED              | NOT USED   |
| C1                     | C4 THRU C8 |
| CR4                    | Q3         |
| Q3                     | Q6,7       |
| R26                    | R9,15-23   |
| VR3                    | TP2 TPG    |
| TP2                    |            |

| FIELD SERVICE COMPONENT SUBSTITUTION LIST |                               |
|---|-------------------------------|
| AMPEX P/N                                 | NEAREST COMMERCIAL EQUIVALENT |
| 014-247                                   | 2N2219                        |
|   |                               |

4840339A  
15/27 V Regulator, -02

Sheet 1 of 1

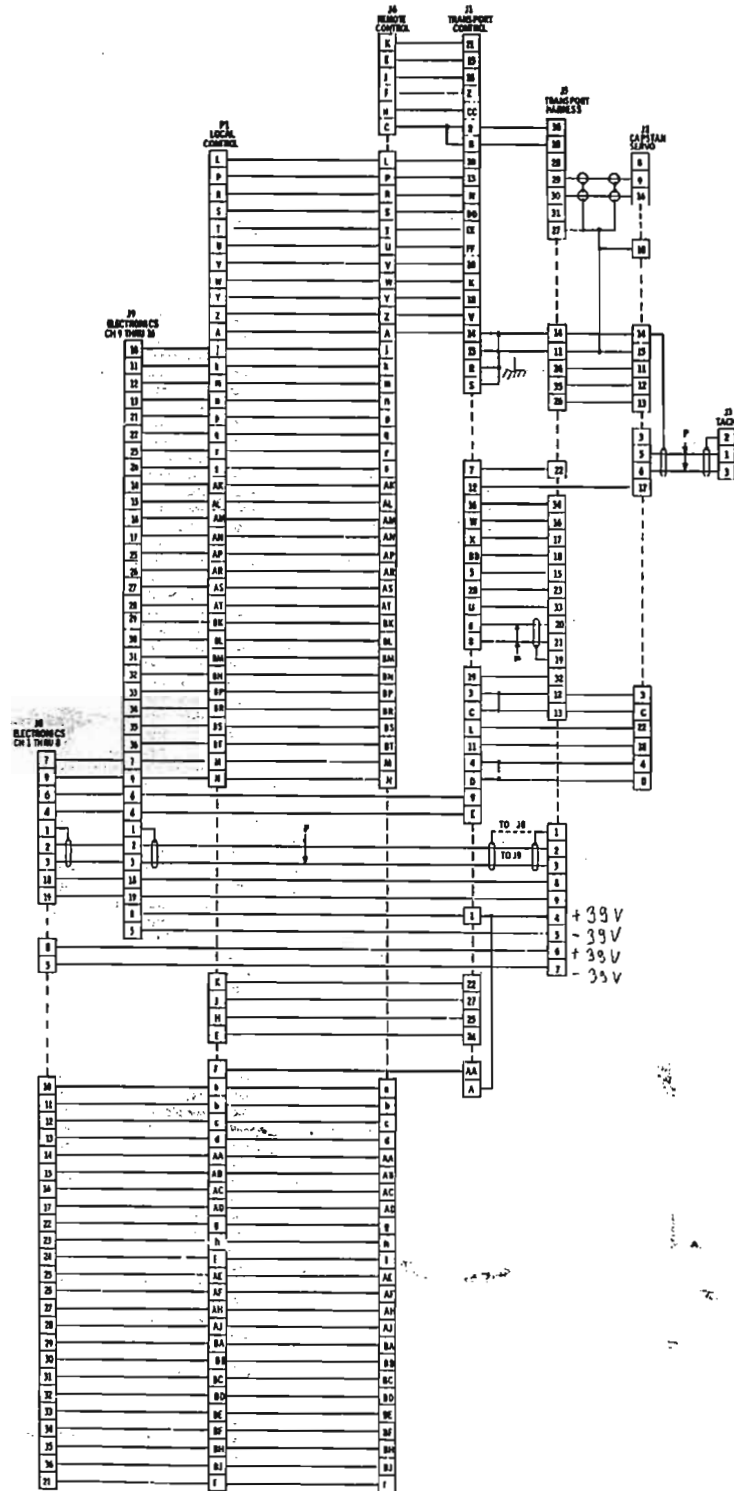
Ref. Assy: 4050699



48403-3A  
 Transport Harness

Sheet 1 of 1

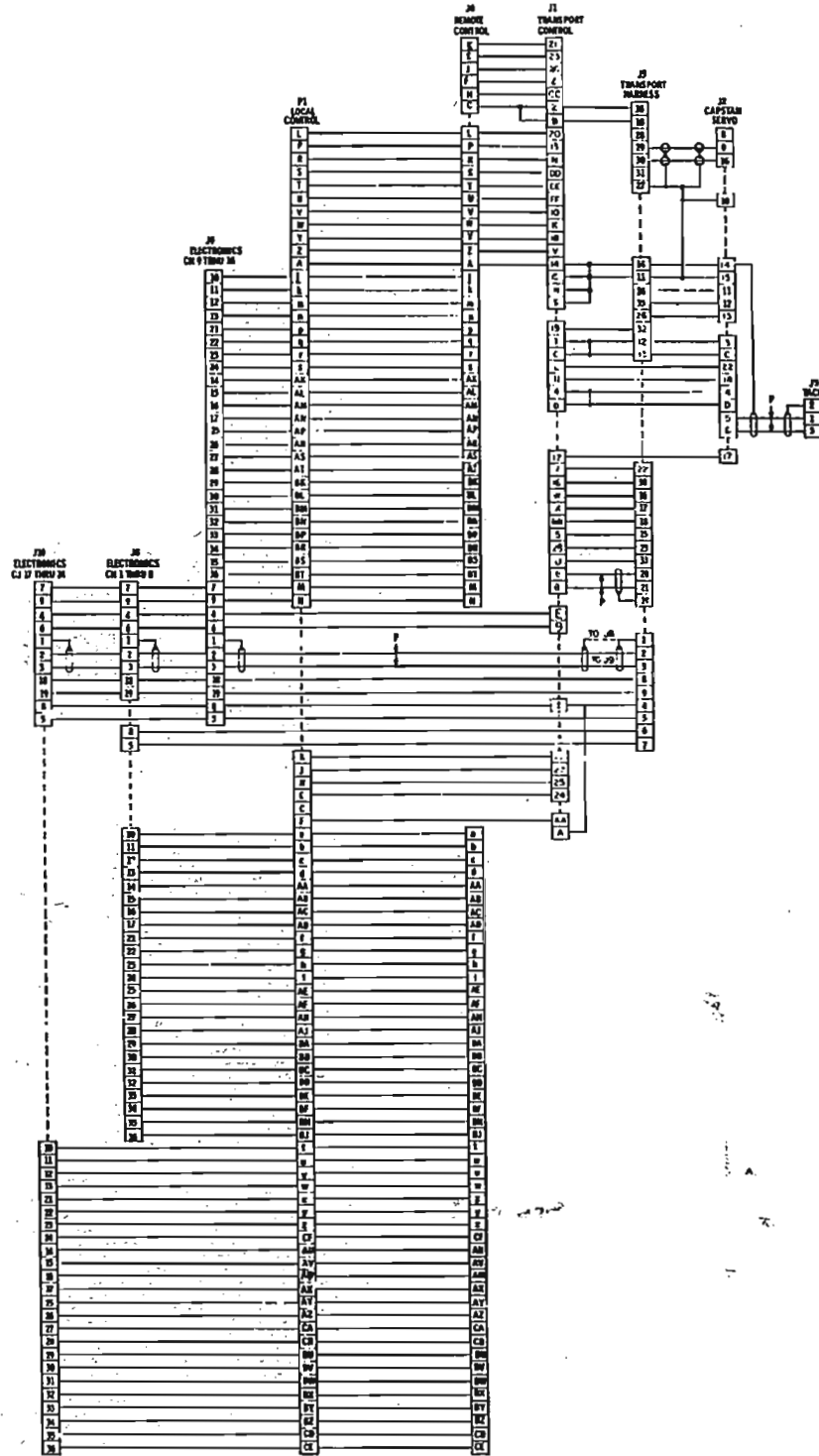
Ref. Assy: 4020360



NOTES:  
 1. THIS DIAGRAM REPRESENTS ELECTRICAL CONTINUITY AND DOES NOT NECESSARILY REPRESENT POINT TO POINT CONNECTIONS.

4840348—  
 Transport Control Wiring Diagram, -01  
 Ref. Assy: 4020373

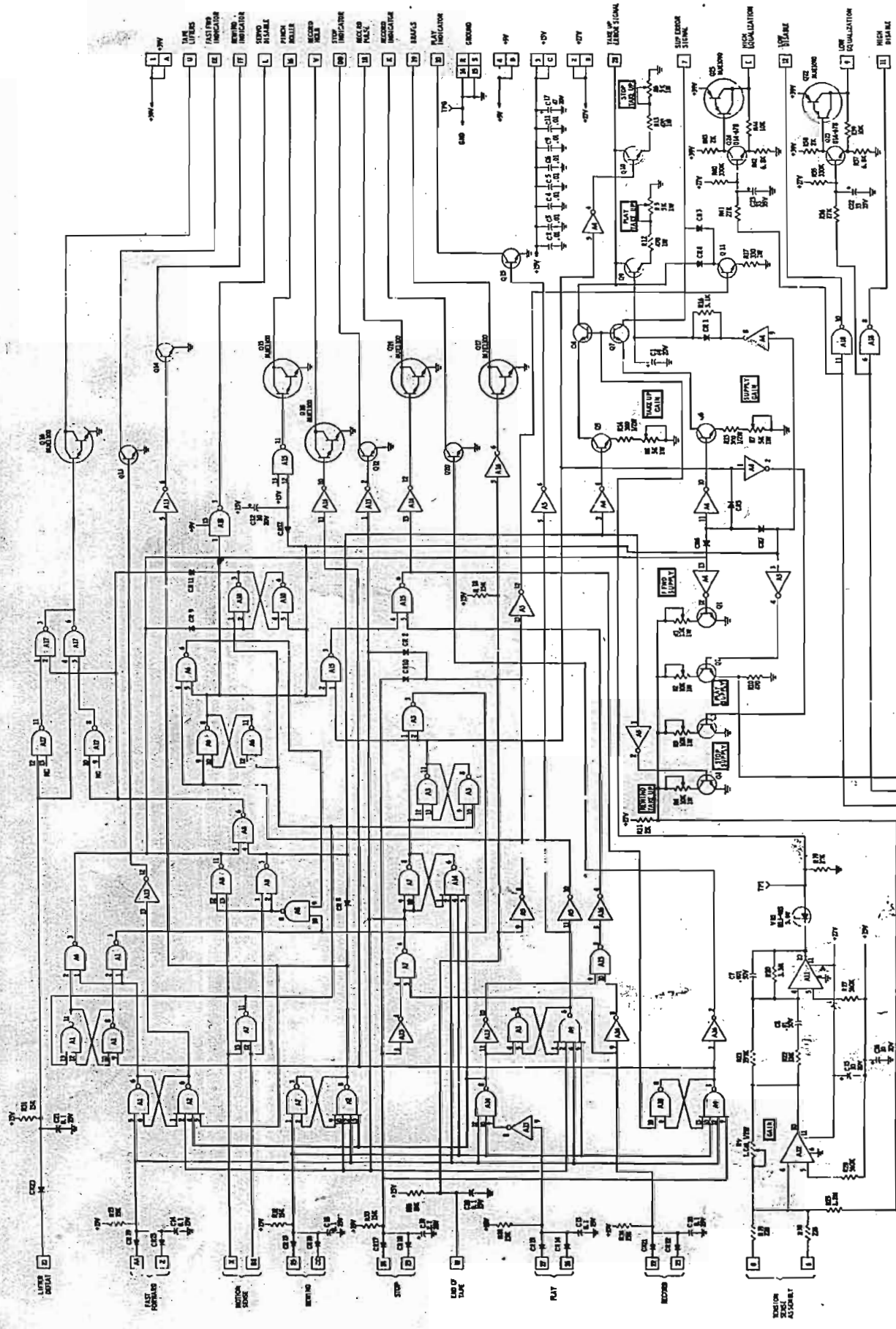
Sheet 1 of 1



NOTES:  
 1. THIS DIAGRAM SHOWS ELECTRICAL CONTINUITY AND DOES NOT NECESSARILY REPRESENT POINT TO POINT CONNECTIONS.

4840349—  
 Transport Control Wiring Diagram, -02  
 Ref. Assy: 4020373

Sheet 1 of 1



REFERENCE DESIGNATIONS

| DESIGNATION | QUANTITY | DESCRIPTION |
|-------------|----------|-------------|
| A1-A15      | 15       | AND GATES   |
| O1-O15      | 15       | OR GATES    |
| I1-I15      | 15       | INVERTERS   |
| CR1-CR15    | 15       | RESISTORS   |
| CA1-CA15    | 15       | CAPACITORS  |
| TR1-TR15    | 15       | TRANSISTORS |
| MT1-MT15    | 15       | MOTORS      |

L.C. LIST

| DESIGNATION | QUANTITY | DESCRIPTION |
|-------------|----------|-------------|
| A1-A15      | 15       | AND GATES   |
| O1-O15      | 15       | OR GATES    |
| I1-I15      | 15       | INVERTERS   |
| CR1-CR15    | 15       | RESISTORS   |
| CA1-CA15    | 15       | CAPACITORS  |
| TR1-TR15    | 15       | TRANSISTORS |
| MT1-MT15    | 15       | MOTORS      |

4840345A  
Transport Control PWA

Sheet 1 of 1

Ref. Assy: 4050706

NO IS THIS OPERATOR REQUIRED  
 1. CHECK ALL WIRING IN THIS ASSY.  
 2. CHECK ALL WIRING IN THIS ASSY.  
 3. CHECK ALL WIRING IN THIS ASSY.  
 4. CHECK ALL WIRING IN THIS ASSY.

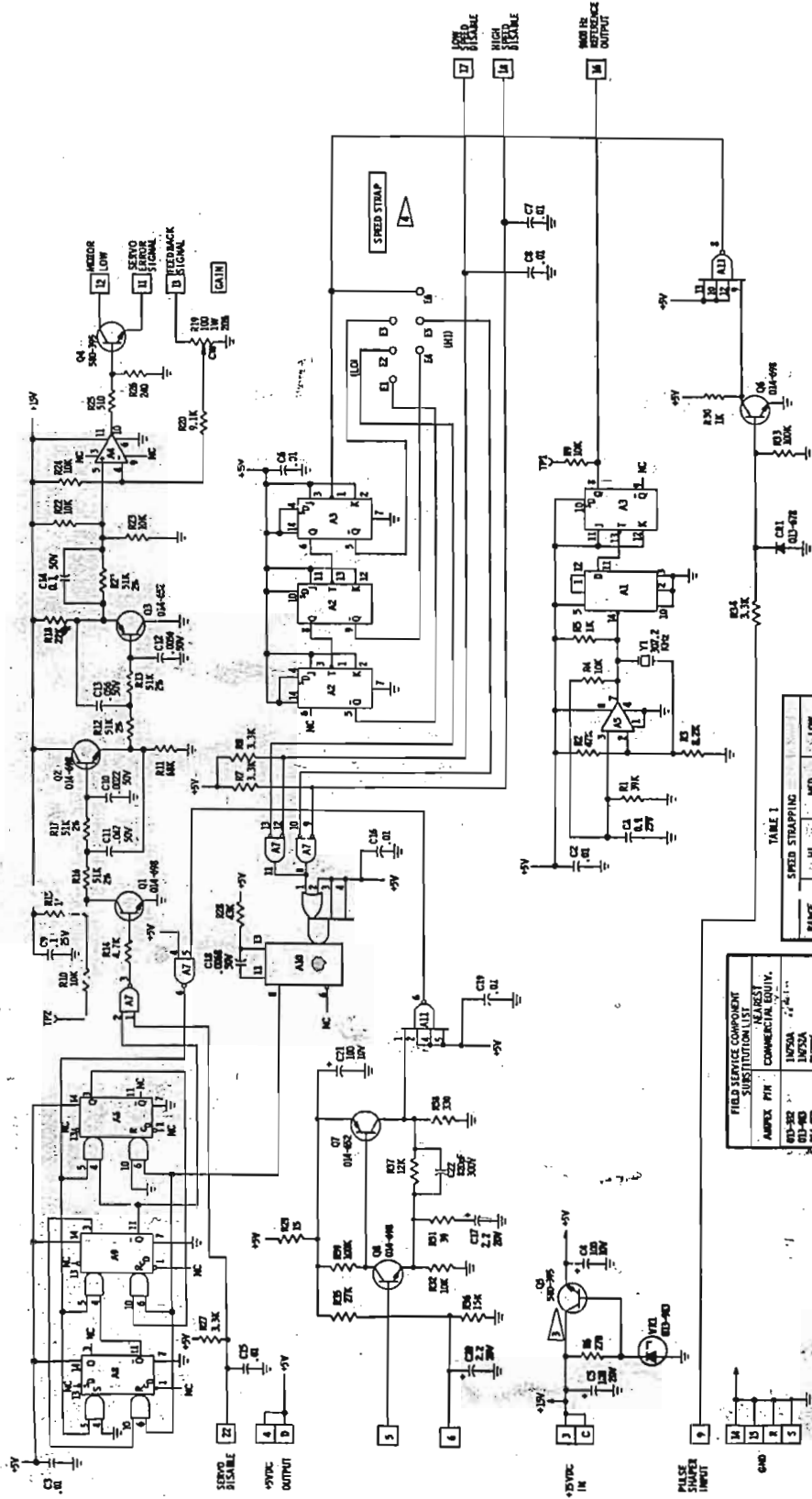


TABLE 1

| RANGE | HI       | MID      | LOW      |
|-------|----------|----------|----------|
| HI    | E3 TO E4 | E3 TO E3 | E3 TO E4 |
| LO    | E2 TO E3 | E2 TO E4 | E2 TO E1 |

FIELD SERVICE COMPONENT SUBSTITUTION NEAREST COMMERCIAL EQUIV.

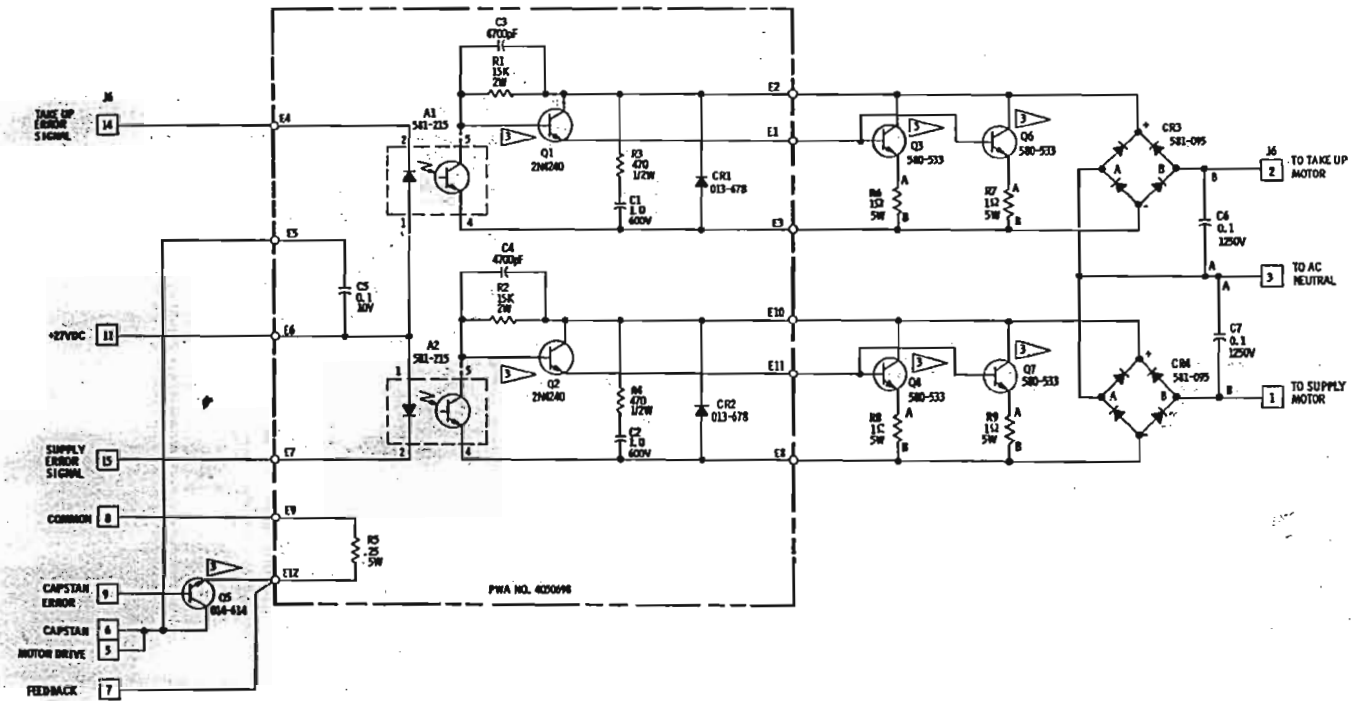
| AMPLEX P/N | NEAREST COMMERCIAL EQUIV. |
|------------|---------------------------|
| 01A-202    | 1N963A                    |
| 01D-202    | 1N925A                    |
| 01A-402    | 2N3638                    |
| 200-200    | 2N6190                    |
| 01A-400    | NONE                      |
| 01D-201    | 1N925B                    |

NOTES: UNLESS OTHERWISE SPECIFIED  
 1. CAPACITANCE VALUES ARE IN MICROFARADS, 100V.  
 2. RESISTANCE VALUES ARE IN OHMS UNLESS OTHERWISE SPECIFIED.  
 3. HEAT SINK REQUIRED.  
 4. SEE TABLE 1 FOR SPEED STRAPPING.

Sheet 1 of 1

4840356-  
 Capstan Servo

Ref. Assy: 4050692

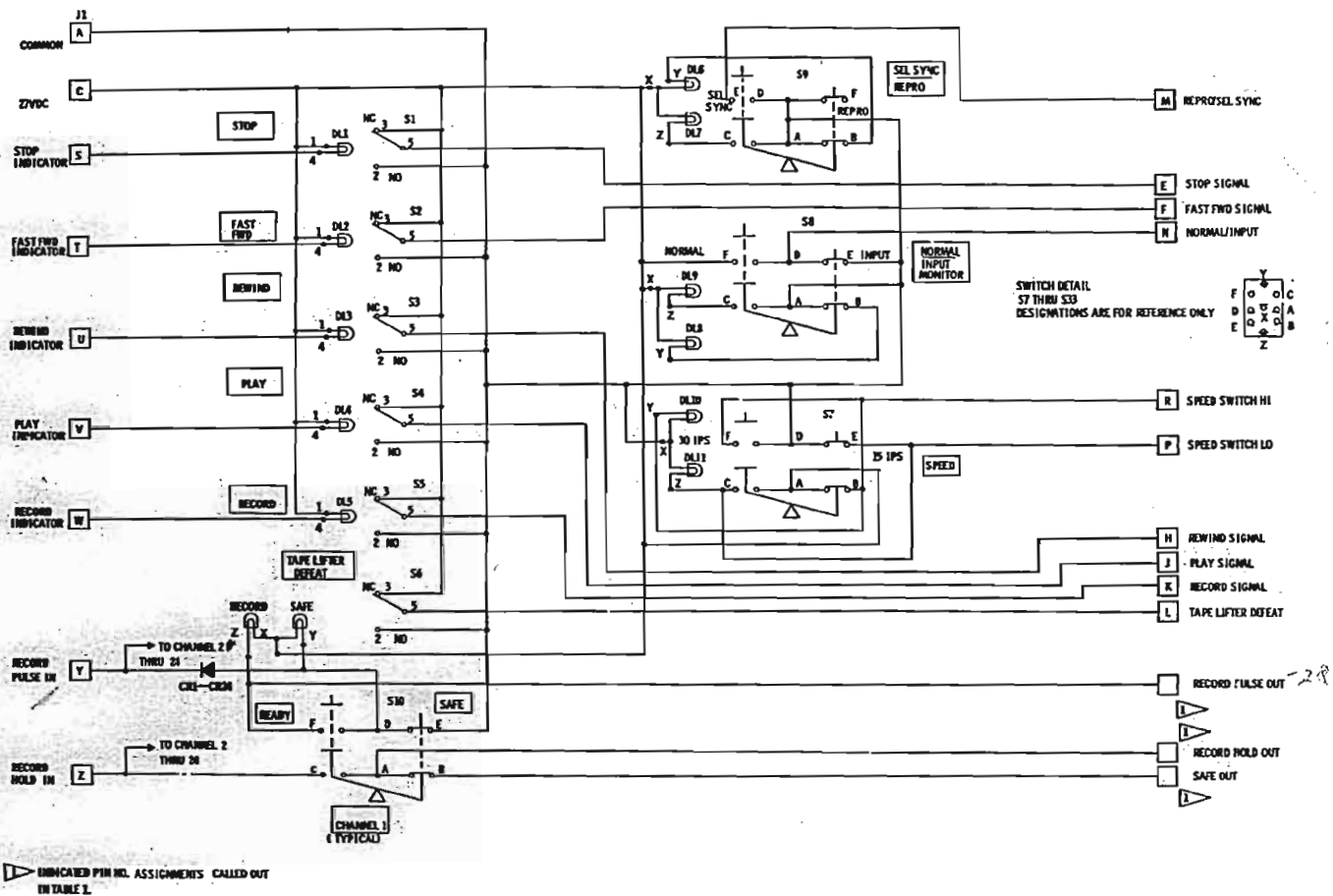


NOTES: UNLESS OTHERWISE SPECIFIED  
 1. CAPACITANCE VALUES ARE IN MICROFARADS.  
 2. RESISTANCE VALUES ARE IN OHMS.  
 ▲ HEATSINK REQUIRED.

4840336—  
 Motor Drive Amplifier

Sheet 1 of 1

Ref. Assy: 4050698



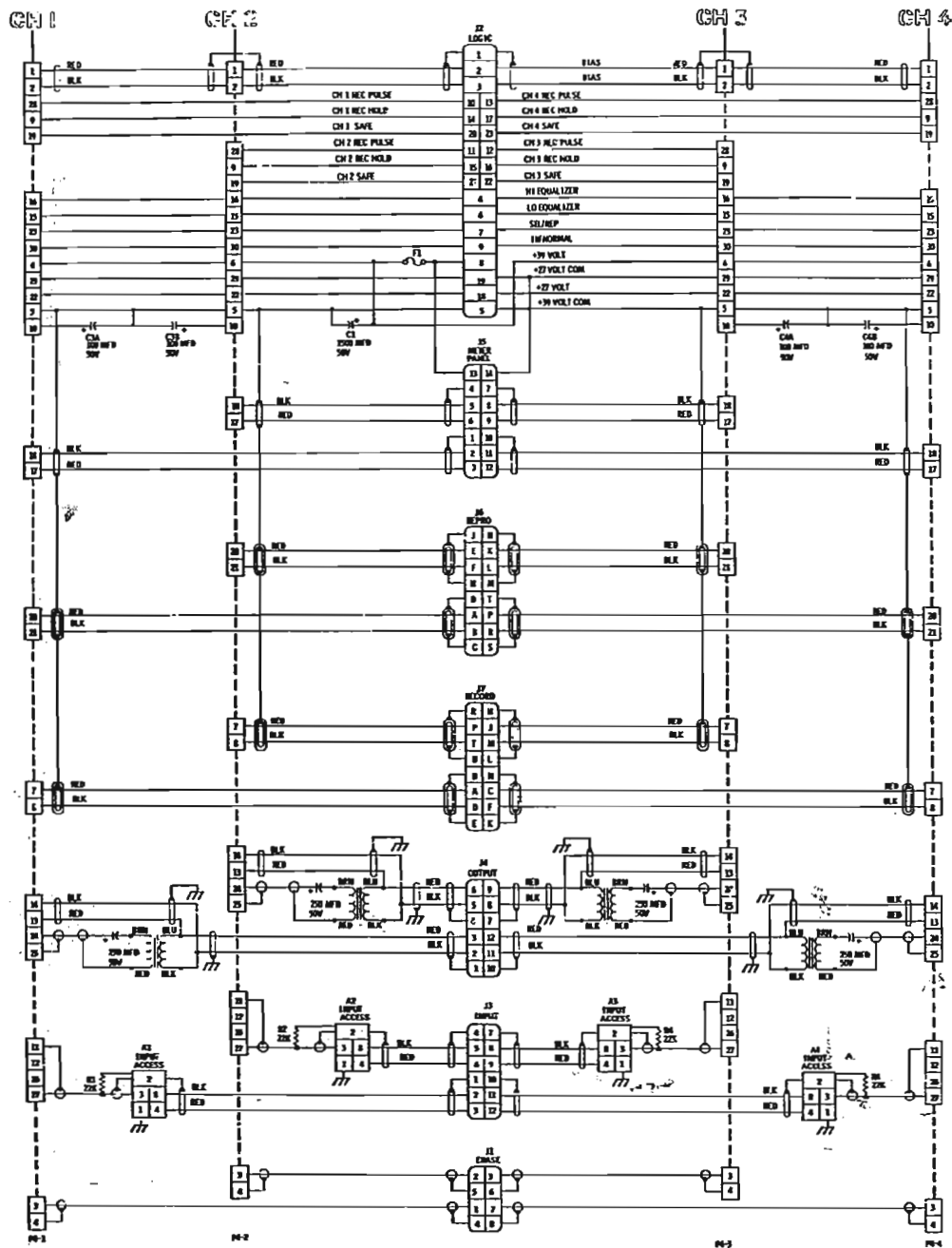
| J1 PIN ASSIGNMENTS |            |                          |                         |                  |
|--------------------|------------|--------------------------|-------------------------|------------------|
| CHANNEL NO.        | SWITCH NO. | RECORD PULSE OUT PIN NO. | RECORD HOLD OUT PIN NO. | SAFE OUT PIN NO. |
| 1                  | S30        | a                        | AA                      | BA               |
| 2                  | S31        | b                        | AB                      | BB               |
| 3                  | S32        | c                        | AC                      | BC               |
| 4                  | S33        | d                        | AD                      | BD               |
| 5                  | S34        | e                        | AE                      | BE               |
| 6                  | S35        | f                        | AF                      | BF               |
| 7                  | S36        | g                        | AG                      | BG               |
| 8                  | S37        | h                        | AH                      | BH               |
| 9                  | S38        | i                        | AI                      | BI               |
| 10                 | S39        | j                        | AJ                      | BJ               |
| 11                 | S20        | k                        | AK                      | BK               |
| 12                 | S21        | l                        | AL                      | BL               |
| 13                 | S22        | m                        | AM                      | BM               |
| 14                 | S23        | n                        | AN                      | BN               |
| 15                 | S24        | o                        | AO                      | BO               |
| 16                 | S25        | p                        | AP                      | BP               |
| 17                 | S26        | q                        | AQ                      | BQ               |
| 18                 | S27        | r                        | AR                      | BR               |
| 19                 | S28        | s                        | AS                      | BS               |
| 20                 | S29        | t                        | AT                      | BT               |
| 21                 | S30        | u                        | AU                      | BU               |
| 22                 | S31        | v                        | AV                      | BV               |
| 23                 | S32        | w                        | AW                      | BW               |
| 24                 | S33        | x                        | AX                      | BX               |
|                    |            | y                        | AY                      | BY               |
|                    |            | z                        | AZ                      | BZ               |
|                    |            | ca                       | CA                      | CB               |
|                    |            | cb                       | CB                      | CE               |

4840347—  
Control Box

Sheet 1 of 1

Ref. Assy: 4050646



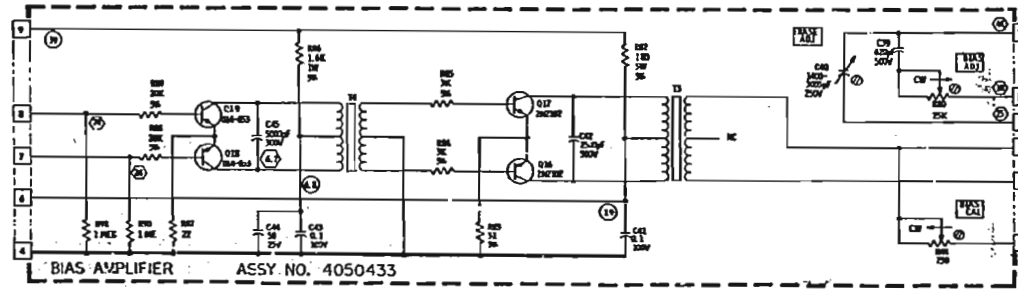
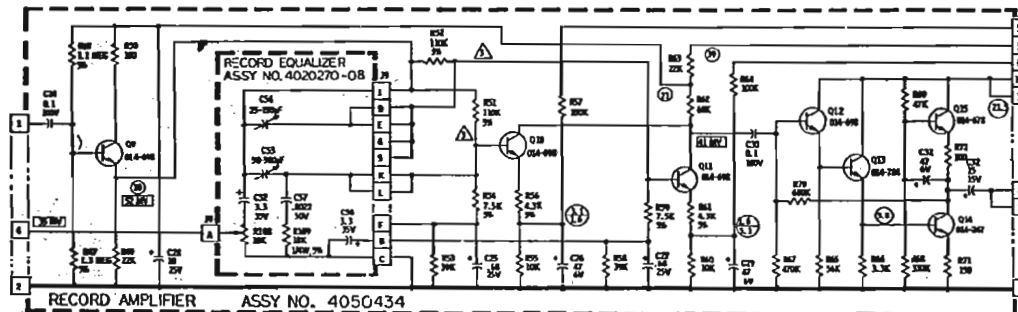
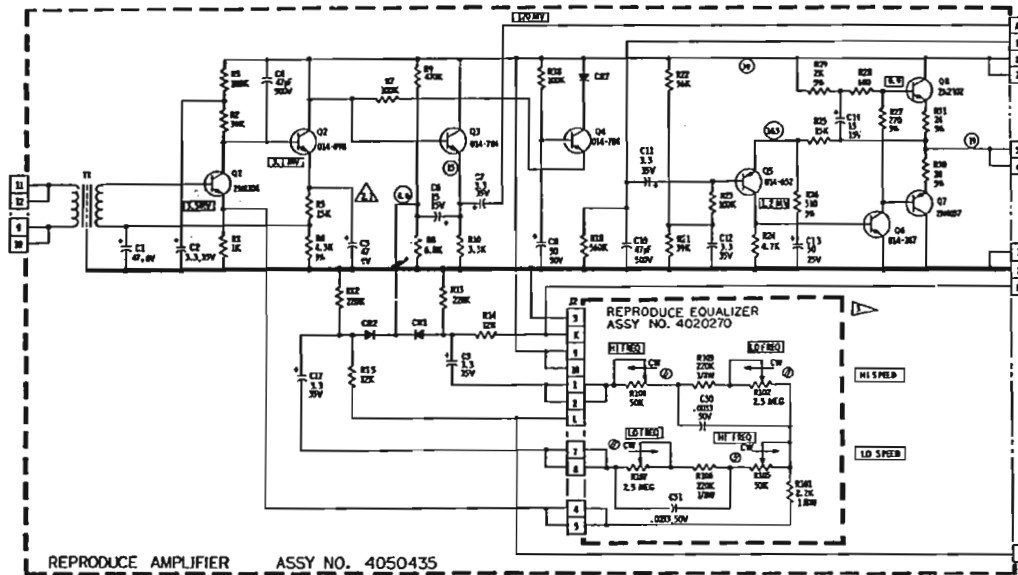


4840327—  
Electronics Interconnect Diagram

Sheet 1 of 1

Ref. Assy: 4020371

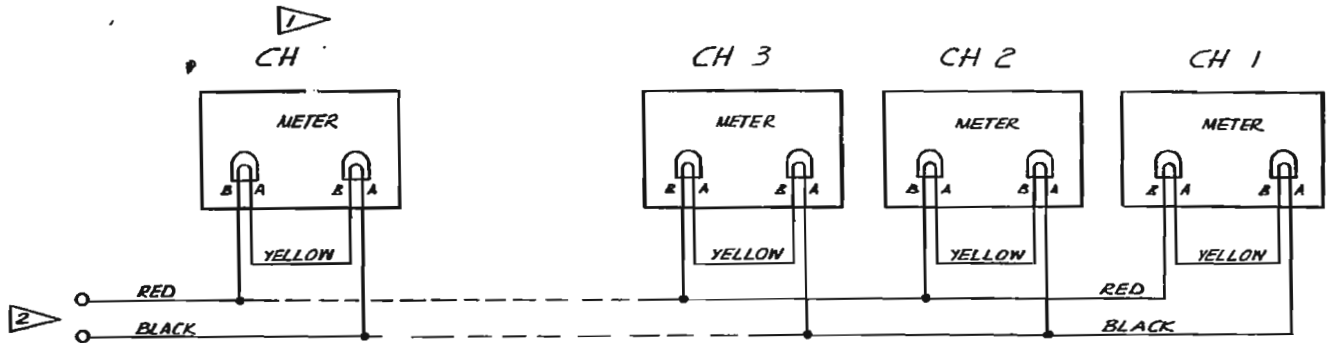
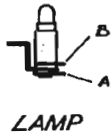




- 1. CAPACITANCE VALUES ARE IN MICROFARADS
- 2. DIODES ARE TYPE 1N50-05
- 3. RESISTANCE EQUALIZER 4020270-08 CAN BE ADJUSTED TO 0.01 OHM ACCURACY
- 4. RESISTANCE VALUES ARE IN OHMS UNLESS OTHERWISE SPECIFIED
- 5. INDICATES VOLTS D.C. MEASURED WITH A 100 OHM IMPEDANCE VTM.
- 6. INDICATES VOLTS D.C. MEASURED WITH A HIGH IMPEDANCE VTM.
- 7. INDICATES VOLTS A.C. MEASURED WITH A HIGH IMPEDANCE VTM AT OPERATING LEVEL OF 3000 Hz.
- 8. INDICATES VOLTS A.C. MEASURED WITH A HIGH IMPEDANCE VTM AT 60 Hz FREQUENCY.
- 9. REFERENCE SYMBOLS 40404, 5 SCHEMATIC, ADD TO SWITCHING.
- 10. FIELD SERVICE COMPONENT SUBSTITUTION.

| REF. DES.     | AMPLEX P/N | BEAN'S COM. EQUIVALENT |
|---------------|------------|------------------------|
| CX1, CX2, CX7 | 6X3-708    | 2N174                  |
| C6, C14       | 6A-37      | 2N2222                 |
| C5            | 6X4-052    | 2N1994                 |
| C19, C19      | 6X4-052    | 2N1994                 |
| C25           | 6A-37      | 2N1994                 |
| C7, C9-12     | 6X4-098    | 2N1994                 |
| C8, C13       | 6X4-708    | 2N1994                 |

4840357A Sheet 1 of 1  
 Reproduce, Record, and Bias PWA's (Electronics, -02)  
 Ref. Assy: 4020371



NOTES:

- 1 CHANNEL B, 16, OR 24
- 2 QUICK DISCONNECT TERMINALS
- 3. ALL WIRINGS ARE # 22 AWG.

4840366—  
Meter Panel

Sheet 1 of 1

Ref. Assy: 4050707