

PERFORATED TAPE READER

SERIAL NUMBER 6197

MODEL 2500



RACK MOUNT



CASE MOUNT

NOVEMBER 1964


DIGITRONICS CORP.
ONE ALBERTSON AVENUE • ALBERTSON, NEW YORK • PHONE HT 4-1000

... pioneers in data processing technology

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BC1443	LENS & HEAD ASSEMBLY

MOTOR OPTIONS

BC1935	MOTOR OPTION ASSEMBLY
CC2197	MOTOR REDUCER ASSEMBLY (300 char/sec.)
CC2249	MOTOR REDUCER ASSEMBLY (200 char/sec.)
CC2196	MOTOR REDUCER ASSEMBLY (100, etc. char/sec)
BC2154	PLATE ASSEMBLY

MOUNTING OPTIONS

BC1936	RACK MOUNTING OPTION ASSEMBLY
CA2476	PANEL, RACK MOUNTING
CC1937	CASE ASSEMBLY OPTION
DC1928	CASE ASSEMBLY

LOGIC DIAGRAMS, SCHEMATICS AND WIRING DIAGRAMS

	LOGIC DIAGRAM, MODEL 2500
AH634	POWER SUPPLY SCHEMATIC
CH617	MPC SCHEMATIC
DC1734	PRINTED CIRCUIT BOARD ASSEMBLY (MPC)
CH619	LAC SCHEMATIC
DC1784	PRINTED CIRCUIT BOARD ASSEMBLY (LAC)
BK295	PHOTO DIODE HEAD WIRING DIAGRAM
DK296	WIRING DIAGRAM, MODEL 2500

APPENDIX A

WARRANTY

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TRANSISTOR SPECIFICATIONS

SECTION I

INTRODUCTION

1.1 SCOPE OF THIS SECTION

This section defines the purpose of the equipment, describes the applications of the equipment, lists the specifications and gives a physical description of the equipment. This section also lists the accessories supplied, and the associated equipment.

1.2 PURPOSE OF THE EQUIPMENT

The DIGITRONICS Model 2500 Unidirectional Perforated Tape Reader is designed to read up to 8 channel perforated tape at speeds of 100 characters per second, 300 characters per second, or step at speeds up to the slow speed.

1.3 APPLICATIONS OF THE EQUIPMENT

The applications include input equipment for numerically controlled machine tools, missile checkout devices, and lower speed inputs to digital instrumentation.

1.4 SPECIFICATIONS

The following are specifications for the Model 2500.

1.4.1 Power Requirements

- 1) AC power input, 105V-125V, 60cps, single phase, 125 watts.
- 2) Voltage available to energize relays in tape handler -15 volts. This voltage is available from pin "Z" on the input output connector. Pin "AA" ties this voltage through the load resistors, and the pinch roller and brake coils to 0 volts.
- 3) The maximum current available through Pin "Z" during rewind is 600 ma.
- 4) The following additional information is supplied for customer use:
 - a) Surge current at 125V RMS - 10 amps peak to peak.
 - b) Average power - 125 watts.

1.4.2 Start-Stop Controls

1) DC Mode

DC level input - One line input - 6 volts (tolerance: -5V to -16V) at 2.5 ma for RUN and 0 volts (tolerance: $\pm 0.5V$) at 0.5 ma for STOP.

2) Pulsed Mode

Pulsed Input - In this mode of operation the reader will self-initiate a STOP command upon seeing the next sprocket hole. To go into this mode two pins on the output connector must be shorted together. The reader will step to the next character when a six volt pulse 0V to -6V with a minimum duration of 5 microseconds is applied to the input/output connector (0V to -6V-Negative going edge accomplishes triggering. Tolerance on -6V is from -5V to -16V. Tolerance on 0V is ± 0.5 V.). For the reader to stop on the next character the input line must return to 0V before seeing the leading edge of the next sprocket hole.

3) DC Input in Pulsed Mode

When a -6V DC level is applied at the input and the two pins for the pulsed mode are shorted at the connector, the unit will RUN for the duration of the DC level at the input. When the -6V DC level returns to 0 volts the reader will STOP on the leading edge of the next sprocket hole.

1.4.3 Output Signals

Built-in sprocket gated transistor amplifiers permit driving external circuits directly at the following levels:

Hole Condition : -10 volts ± 0.5 volts at 5 ma.
No-hole Condition : 0 volts ± 0.5 volts at 8 ma.

Note: Amplifiers may be ungated by not connecting jumper on input/output connector (Ref. Figure 2-4)

1.4.4 Mechanical Characteristics

1) Mounting

- a) Rack Adapter is for standard 19" relay rack.
- b) Desk Top - see dimensions.

2) Dimensions (Refer to Outline Drawing Fig. 1-1 and Mounting Options)

a) Stock Unit

Width of Front Panel: 10"
Thickness of Front Panel: 1/8"
Depth behind Front Panel: 10 5/8"
Height of Components behind Front Panel: 6"
Width of Components behind Front Panel: 10"
Height of Front Panel: 2 3/8"
Extension in Front of Panel: 2 3/8"
Weight: Approximately 15 pounds

- b) Rack Mount Adapter
Width of adapter: 19"
Height of adapter: 7"
Thickness of adapter: 3/8"
Depth of components behind adapter: 10 1/4"
Weight: 5 pounds
This rack mount adapter with standard holes will accommodate #10 screws spaced to fit a RETMA rack.
- c) Case Mount Adapter
Width of adapter: 10"
Height of adapter: 6 7/16"
Depth of adapter behind front panel: 10"
Height of rubber feet for adapter: 7/16"
Weight: 3 pounds.

1.4.5 Tape Characteristics

- 1) Tape Width Selector - Variable three position in-out action. Standard 5,6,7 or 8 level tapes (tapes include sprocket channel) may be used interchangeably.
- 2) In-line loading - 3 inches of leader required. Rotating Tape Width Selector clockwise permits loading of tape without removing power.
- 3) Type of Tape - Paper or Mylar tape, .004 to .005 in, thickness. Tapes with up to 40% transmissivity are acceptable. Can be adjusted to operate with tapes from .0025 to .008 in. thickness.
- 4) Type of Read - Unidirectional.
- 5) Speeds - Single speed units at 100 or 300 characters per second. Speeds other than 100 and 300 characters per second available as options.
- 6) Stop Distance - Stops on Stop character at both speeds.
- 7) Pinch Roller Operate Time: Less than 3 milliseconds.
- 8) Start Time: For the start time or time to the first character, add pinch roller operate time to the time it takes to read one character at the slow speed, then multiply by the appropriate friction factor as shown on the following page:

TABLE 1-1 COEFFICIENT OF FRICTION FOR PERFORATED TAPE

TYPE OF PAPER	FRICTION FACTOR
Dry Paper	1.1 - 1.3
Oiled Paper	1.3 - 1.5
Mylar (aluminized or solid)	1.5 - 4.0
Paper/Mylar/Paper	1.1 - 1.3

Above factors are approximate since the coefficient of friction varies from sample to sample.

1.4.6 Drive Motor Specifications

3600 RPM, Synchronous

Wound Stator

115 VAC, 60cps, 45 watts

Barber Colman Co.

Hi/Lo Temperature Lubricant ANDROL L456 (Reorder by Digitronics P/N TA-BD0002)

1.5 ACCESSORIES SUPPLIED

a) Connecotrs - Mating connector provided for signal and control - U.S. COMPONENT type UPCC - F2 HSL - 23 (Reorder by Digitronics P/N TPES02302).

b) Line cord for AC power - three wire type BIRNBACH #347, eight feet. long (Reorder by Digitronics P/N TLCMB0002).

1.6 ASSOCIATED EQUIPMENT

The Model 2500 reader will operate at 100 or 300 char/sec. with any of the following perforated tape handlers:

1) Model 4566ALCR Bidirectional Tape Handler - unit equipped with uni-directional high speed 100 inches/second rewind. Unit will handle 8" NAB reels (8" NAB reels 650' of 4.5 mil tape or 1000' of 2.5 mil tape).

2) Model 6070 Bidirectional Tape Handler - unit equipped with bidirectional high speed 140 inches/second rewind. Unit will handle either 8" or 10 1/2" NAB reels. (10 1/2" NAB reel will handle either 1200' of 4.5 mil tape or 1200' of 2.5 mil tape).

3) Model 6071 Bidirectional Tape Handler - unit equipped with unidirectional reel to reel rewind. Rewind speed is 160 inches/sec. During rewind, tape is transferred from the lower reel to the upper reel. Unit will handle either 8" or 10 1/2" NAB reels.

SECTION II

INSTALLATION

2.1 SCOPE OF THIS SECTION

This section describes the procedures required for the proper mechanical and electrical installation of the equipment. Initial installation checks are also given in this section.

2.2 UNPACKAGING

The DIGITRONICS Model 2500 Perforated Tape Reader is shipped in a reinforced packing case designed to provide maximum protection during handling and transportation. These cases are reuseable and should be retained if reshipment is anticipated. Care should be exercised in packaging to insure no damage occurs during this process. A visual inspection of all parts of the equipment should be performed to verify that the unit sustained no damage in transit. This check may avoid costly down time after installation. Should this inspection result in the discovery of damage, the carrier and Digitronics Corporation should be notified at once.

2.3 MECHANICAL INSTALLATION

2.3.1 Desk Mounting - When the unit is desk mounted no mechanical installation is required.

2.3.2 Rack Mounting - When the unit is rack mounted a special adapter plate is fitted to the unit so that the only requirement is that the unit be mounted in the rack.

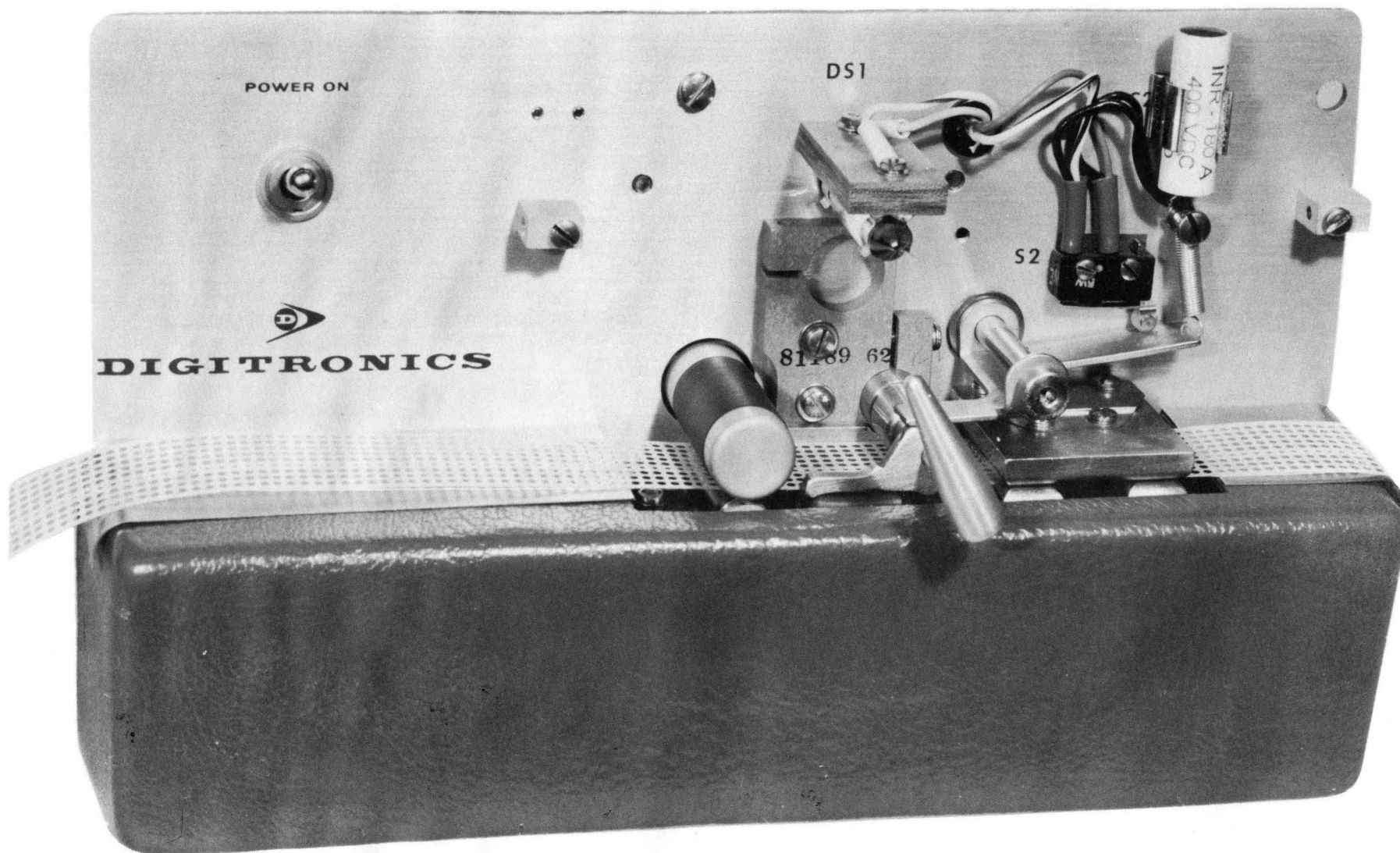
2.3.3 Ventillation - Cooling is provided by a fan which blows cool air across the components.

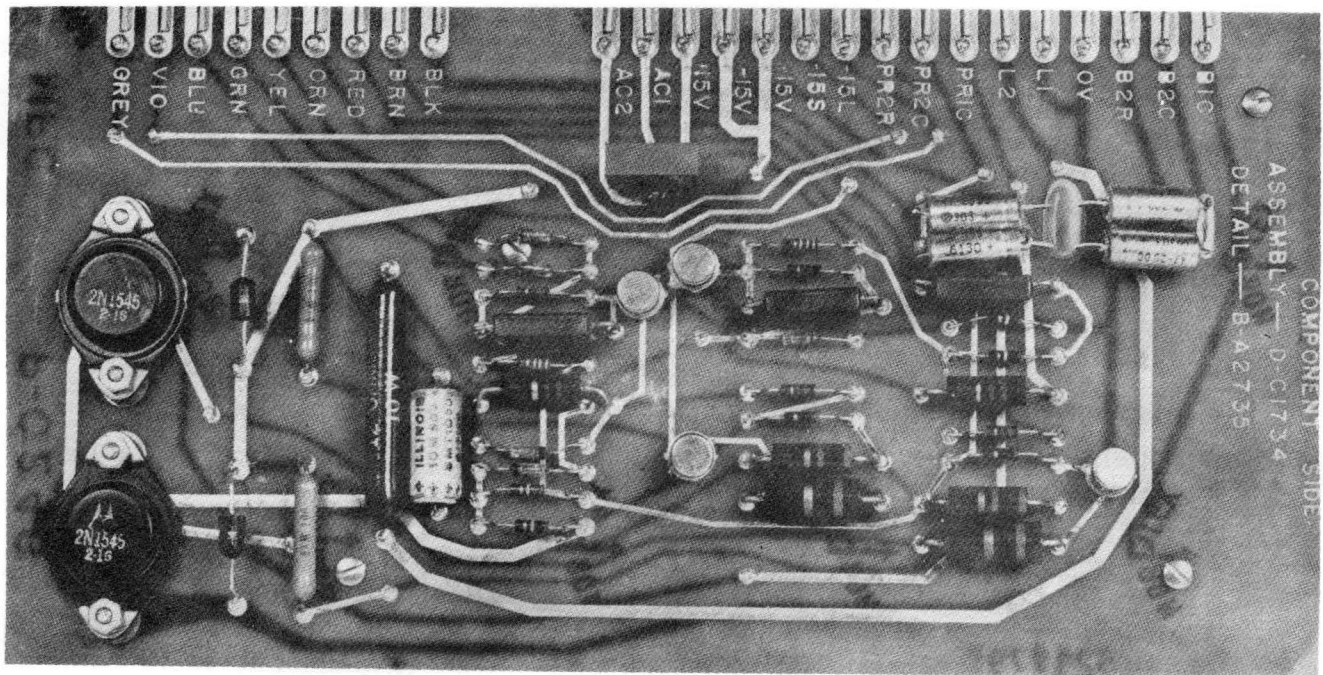
2.4 ELECTRICAL INSTALLATION

A special mating connector is provided which must be wired to the external equipment to provide the necessary signals to operate the unit. Refer to figure 2-4 for proper wiring of Input/Output connector.

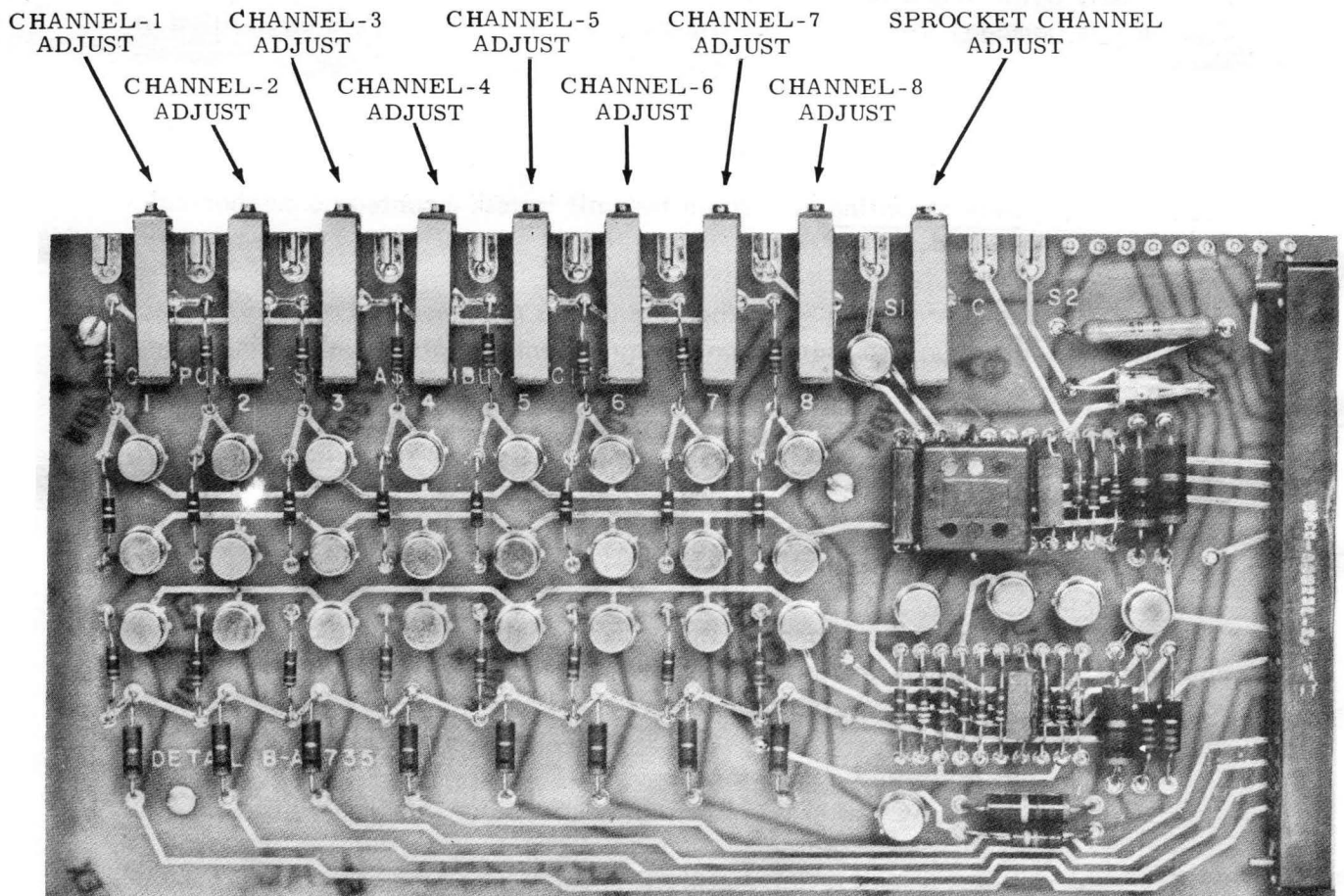
- 1) Install wired connector.
- 2) Apply AC power by inserting the line cord into 115V \pm 10V AC power source.
- 3) Insert a loop of tape with all channels punched.

FIGURE 2-1 TAPE PATH





CIRCUIT CARD MPC



CIRCUIT CARD LAC

4) If unit is to operate with a tape handler Models 4566ALCR or Model 6015 wire -15S to TB1-4 on the tape handler and -15L to TB1-5. See Fig. 2-4 and Section III.

5) If unit is operated without a tape handler -15L must be shorted to -15S on the input/output connector. Without this jumper, the reader will not slew tape and the brake coil will not energize.

2.5 ELECTRICAL INSTALLATION CHECKOUT PROCEDURES

The electrical installation procedures provide an effective means for checking the dynamics of the reader. These procedures provide checks for the data channel amplifiers, sprocket channel amplifier, and motion control circuitry.

2.5.1 Power Supply Voltages

Before performing checks of the logic amplifiers it is necessary that the -15 volt line from Pin "R" and the +15 volt line from Pin "U" to the 0 volt reference as taken from Pin "K" be checked. The tolerance on these lines are as follows:

- 1) -15 volts \pm 1 volt
- 2) +15 volts \pm 1 volt

2.5.2 Sprocket Channel Output Check

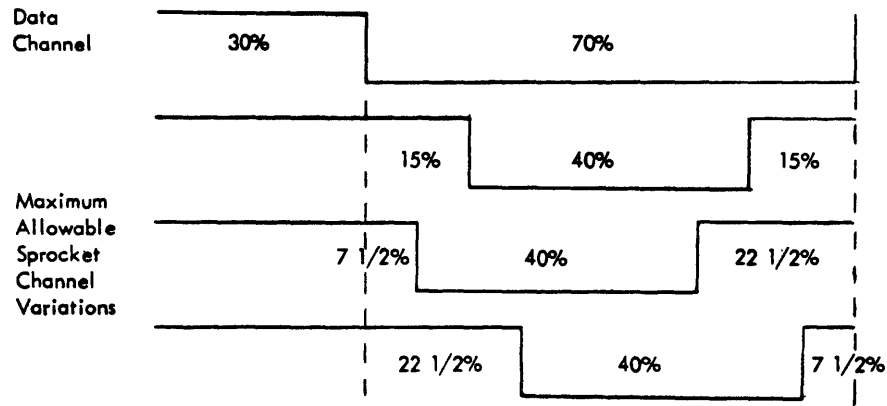
The sprocket channel output "PSP" may be taken from the output pin "V" on the input/output connector.

- 1) Apply a "RUN" signal to the reader. (Reference paragraph 1.4.2 and Figure 2-4).
- 2) With the tape in motion, apply the "PSP" signal to an oscilloscope.
- 3) Adjust the scope for 10 divisions equal to one cycle of the sprocket signal.
- 4) Check that the sprocket signal is 40% negative and 60% 0 volts. If adjustment is required, the potentiometer for the sprocket adjustment is located between S1 and S2 on card LAC.

2.5.3 Data Channel Output Check

For the location of each data channel output to the output connector see Figure 2-4. and 2-2. The adjustments are located on card LAC. The pots are numbered 1 through 8 to correspond to the data channel they represent.

NEGATIVE OUTPUT



POSITIVE OUTPUT

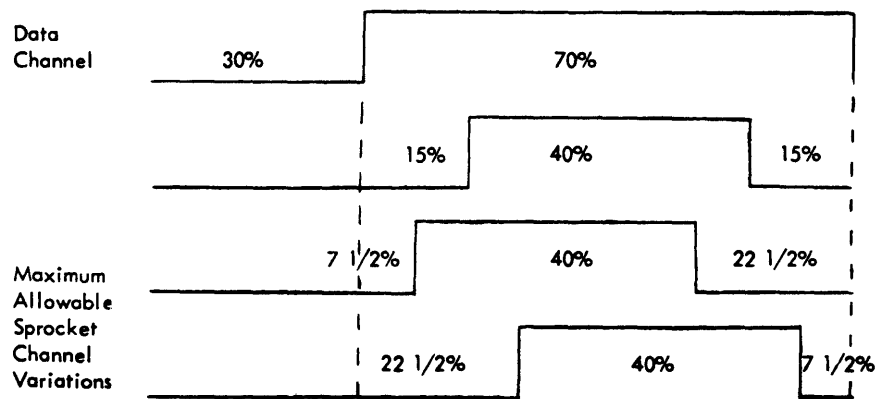


FIGURE 2-3 MAXIMUM ALLOWABLE SPROCKET CHANNEL TO DATA CHANNEL SHIFT

Gated or Ungated Outputs

In order to check the data channel outputs the unit must operate ungated.

- a) Assure the reader is operating ungated by checking that Pin "S" is not shorted to Pin "T" on the output connector.
- b) Apply an external "RUN" signal to start tape.
- c) Set the scope that 10 divisions equal one cycle of data channel output hole/no-hole information.
- d) Check that each data channel has an output 70% negative and 30% 0 volts.
- e) If the output is out of adjustment, correct the pot associated to that data channel to return the 70/30 condition.

2.5.4 Use of Neutral Density Filter

The neutral density filter may be used as an alternate method for checking the adjustment of the photodiodes. This filter has a neutral density of 50%. This means that only 50% of the light available from the lamp will be passed through this filter. This 50% ND filter is available from Digitronics Corp. The part number for this filter is AA4559. The following is the adjustment procedure for the photodiodes to be used with the ND filter.

- 1) Assure that AC power is applied to the unit. With AC power applied to the unit and the POWER switch is "ON", the lamp will light and the capstan will rotate.
- 2) Assure the jumper is installed between pins "AA" and "Z" and the "READY LOAD" switch is in the "READY" position (fully counterclockwise).
- 3) Insert the 50% ND filter over the photodiodes. No tape is required for this portion of the adjustment.
- 4) Check that the lamp voltage to the bulb is $8.2 \pm 0.5V$.
- 5) Attach a DC voltmeter, oscilloscope or equivalent to the output of the data channel (or sprocket) to be adjusted. The output may be taken either from the collector of the output transistor or from the pin on the input/output connector of the channel to be tested.
- 6) Adjust all amplifier pots until they switch to 0 volts.
- 7) Then individually readjust each amplifier until it is just switched to -15 volts. Care should be taken to seek out this point as accurately as possible. That is, do not adjust the pot too far into the "OFF" condition since this will result in a loss of sensitivity.

As an added check, remove the ND filter and insert a loop of tape with all holes punched. With a oscilloscope check and record the duty cycle of each channel. The duty cycle need not conform to the 60/40 or 70/30 relationship described in paragraphs 2.5.2 and 2.5.3. Do not change the adjustments performed above if the duty cycle for the channels do not conform it is no longer necessary to maintain these relationships.

2.5.5 Motion Control Circuitry Check - DC Mode

To check the motion control circuitry apply RUN and STOP commands in accordance with paragraph 1.4.2 to the RUN/STOP input Pin "Y".

1) The RUN signal, as applied to Pin "Y", should initiate tape motion within 5 to 9 milliseconds after receipt of RUN command (dependent upon the tape used) and slew tape at the slew speed.

2) The STOP signal, as applied to Pin "Y", should initiate the tape stop within 300 to 600 microseconds after receipt of the STOP command.

2.5.6 Motion Control Circuitry - DC Mode (pulsed Option)

When SA1 is shorted to SA2 as described in Section III, and a -6 volt RUN level is applied to the RUN/STOP input, the reader will slew tape at the slew speed until all of the following conditions are met. When they occur tape will stop.

- 1) The RUN/STOP input must return to 0 volts.
- 2) The leading edge of the next sprocket hole appears over the photodiode.
- 3) Note that if the input line returns to 0 volts during sprocket hole "ON" time, the reader will continue to run until the photodiode recognizes the leading edge of the next sprocket hole.

2.5.7 Motion Control Circuitry Check - Stepping Mode

When SA1 is shorted to SA2 as described in Section III and a -6V pulse train is applied to the RUN/STOP input the reader will step character-by-character at the stepping rate of the pulse train. There are two types of stepping modes "Open Loop" mode and "Closed Loop" mode. The maximum stepping rate in the "Open Loop" mode is 60 steps per second. The maximum stepping rate in the "Closed Loop" mode is the slew speed of the reader. For a more detailed description for these modes of operation, see THEORY OF OPERATION, Section IV, Paragraph 4.10.

In actual operation in both modes the unit will step to the next character and self-initiate a STOP command when 1) the sprocket photodiode reads a hole and 2) the input control line is at 0 volts. Note that the input control line must be at 0 volts prior to the recognition of the leading edge of the sprocket hole, if not, the reader will continue to slew tape until both conditions are present.

	<u>PIN #</u>	<u>SIGNAL</u>	<u>DESCRIPTION</u>
o	A	PD-1	Data Channel Output
o	B	PD-2	Data Channel Output
o	C	PD-3	Data Channel Output
o	D	PD-4	Data Channel Output
o	E	PD-5	Data Channel Output
o	F	PD-6	Data Channel Output
o	H	PD-7	Data Channel Output
o	J	PD-8	Data Channel Output
o	K	0V	
o	L		
o	M		
o	N		
o	P		
o	R	-15V+1V	
o---*	S	G1	(Gated or Ungated Data Channel Amplifiers)
o---*	T	G2	
o	U	+15V+1V	
o	V	PSP	Sprocket Channel Output
o---*	W	SA1	(For Stepping or Stop on sprocket— jumper "W" and "X" and apply a pulse train or DC level to the RUN/STOP input)
o---*	X	SA2	
o	Y	RUN/STOP	FORWARD direction (Slewing)
o---*	Z	-15S	(Load switch - allows tape to be inserted without removal of power from the unit)
o---*	AA	-15L	

NOTE: P2, the input/output connector should be wired to this configuration. When any or all of the option outlined in Table 3-2 are required, connect the pins associated with the option at the connector or through external switches.

*NOTE: Connect a jumper (s) or switch (s) between the pins connected by dashes to accomplish the option (s) required.

FIGURE 2-4 INPUT/OUTPUT CONNECTOR

SECTION III

OPERATION

3.1 SCOPE OF THIS SECTION

This section describes the operating controls and the input-output connector. Also in this section is a suggested procedure for operating the unit.

3.2 OPERATING CONTROLS

TABLE 3-1 OPERATING CONTROLS

CONTROLS		FUNCTION
1.	POWER ON Switch	Applies AC power to the power supply, capstan drive motor, and fan motor.
2.	READY/LOAD Switch and Tape Width Selector Knob	The load switch de-energizes the brake and pinch roller to allow for tape insertion. The knob also moves in and out to handle different tape levels.

TABLE 3-2 READER OPTIONS AVAILABLE

OPERATION			OPTIONS
	CONNECT	PIN	<u>Gated Outputs</u>
1.	G1 G2	"S" "T"	These pins may be wired to an external switch. Note the unit must be ungated for data channel adjustment, do not short these wires at the connector without this consideration.
2.	SA1 SA2	"W" "X"	<u>Step On Every Character</u> These pins may be shorted at the connector or wired to an external switch.
3.	-15S -15L	"Z" "AA"	<u>Load Switch and Tape Rewind</u> These pins must be shorted at the connector to permit operation of Model 2500, and to allow tape to be inserted or removed without turning off power. These pins will also provide high speed <u>rewind</u> when through the Models 4566ALCR or Model 6015 Tape Handler when TB1-4 is connected to -15S and TB1-5 is connected to -15L.

3.3 OPERATING PROCEDURES

Assure that external control is attached to the unit.

- 1) Operate POWER switch to ON.
- 2) Select operating mode.
- 3) Load Tape. (Assure the READ/LOAD switch is fully counterclockwise and Pins "AA" and "Z" are shorted on input/output connector.
- 4) Apply desired input (pulsed or DC) to the unit.

3.4 STEPPING MODES OF OPERATION

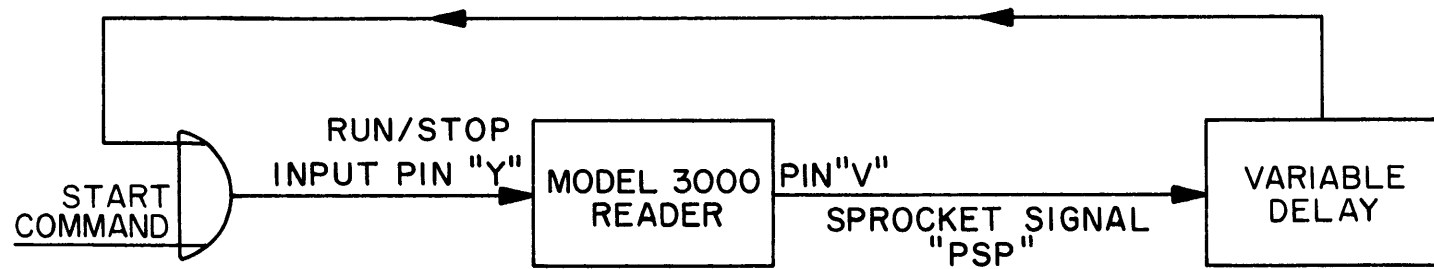
There are two basic stepping modes of operation, which are arbitrarily called "open loop" operation and "closed loop" operation.

3.4.1 Open Loop Operation

In the "Open Loop" mode RUN signals are sent to the reader from a piece of equipment which may, in character, resemble a signal generator. The reader must be capable of starting up, slewing to the next character and stopping before the next RUN signal is applied. This is called "Open Loop" stepping because there is no tie back from the reader to the equipment which is generating the RUN signals. When using this type of system, the maximum stepping rate is 60 characters per second.

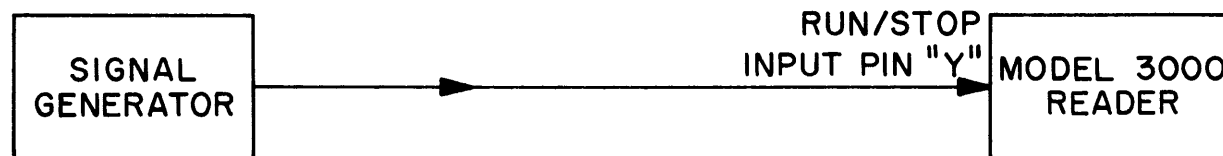
3.4.2 Closed Loop Operation

The "Closed Loop" mode is more often used. In this case, the reader is also given a RUN signal by the instrumentation utilizing the reader. The reader then proceeds to the next character. Upon seeing the leading edge of the next character the reader self-initiates a STOP. At the same time, the external instrumentation uses this edge to indicate that information is coming in and proceeds to process the information. The external instrumentation then generates another RUN signal some time later depending on how much time it took to process this information. Therefore, there is no limitation in stop to start time. Since there is no limitation from Start to Stop time, when operating in this mode, the reader is capable of stepping at any rate up to the slew speed.



Note: Stepping speed of reader varies directly with delay time.

CLOSED LOOP BLOCK DIAGRAM



OPEN LOOP BLOCK DIAGRAM

FIGURE 3-1 STEPPING MODES OF OPERATION

SECTION IV

THEORY OF OPERATION

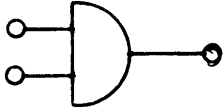
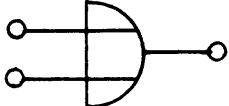
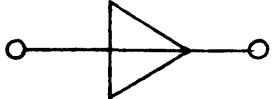

4.1 SCOPE OF THIS SECTION

This section describes symbol terminology, signal terminology, the relationship between the basic circuits through logics analysis and analyzes the circuitry comprising these circuits.

4.2 SYMBOL TERMINOLOGY

The symbols contained in the table below are used throughout Digitronics logics and may be used as a guide to understanding all Digitronics equipment.

TABLE 4-1 SYMBOL TERMINOLOGY

SYMBOL	NOMENCLATURE
	Gate or "AND" Gate
	Buffer or "OR" Gate
	Non-inverting Amplifier
	Inverter

4.3 SIGNAL TERMINOLOGY

4.3.1 Tape Read

Signal terminology consists of the terms logical "1" and "0" usually abbreviated "1" and "0" respectively. Logical "1" corresponds to hole time and logical "0" corresponds to no-hole time.

4.3.2 Tape Drive

For the tape drive system, logical "1" will represent a high level signal (-6 volts) and logical "0" will represent a low level signal (0 volts).

4.4 LOGICS DIAGRAM ANALYSIS

As shown in the logics block diagram in the back of this manual the unit consists of a Tape Read System and a Tape Drive System. Tape Read consists of a sprocket channel amplifier and eight data channel amplifiers. Tape Drive consists of start/stop circuitry necessary to activate the unit's brake and pinch roller solenoids. The power supply provides the necessary operating voltages.

4.5 TAPE DRIVE SYSTEM

The Tape Drive system contains a control section, a pinch roller section and a brake section.

4.5.1 Control Section - The control section is used to activate the unit's brake or pinch roller solenoids and hold them in operation for the desired period of time.

4.5.2 Brake Section - The brake section is essentially a logical inverter which activates the brake solenoid.

4.5.3 Pinch Roller Section - The pinch roller section is essentially a non-inverting amplifier which activates the pinch roller solenoid.

4.6 TAPE READ SYSTEM

The Tape Read System contains two main sections, the Sprocket Channel Section and the Data Channel Section.

4.6.1 Sprocket Channel Section

The sprocket channel is essentially an inverter which shapes a hole signal and makes it available for gating. The gating may be internal or external. Internal gating is accomplished by shorting G1 to G2. External gating may be accomplished by using the "PSP" signal available at pin "V" of the input/output connector.

4.6.2 Data Channel Section

The Data Channel amplifiers are non-inverting amplifiers designed so that the output signal may be gated with the sprocket signal or left ungated. Gating will minimize the effects of skew should it occur.

4.7

CIRCUIT ANALYSIS

Turn to the back of this manual for schematics of the Power Supply, A-H634 "MPC" circuit card, (C-H617) and "LAC" circuit card (C-H619). In addition to the schematics, there is a Logics Block Diagram which shows both the Tape Read and Tape Drive Sections. The power supply has been de-centralized, that is, part of the power supply is mounted to the main chassis, part is located on the "MPC" circuit card, the rest is located on the "LAC" circuit card.

4.8

POWER SUPPLY (See Schematic A-H634, C-H617 and C-H619)

The power supply operates on 115V, single phase AC power and will draw 125 watts. The power supply provides all of the following voltages; +15 volts, -15 volts, -7.5 volts, -3.6 (photodiode bias) and an exciter lamp voltage of 8.2 volts.

AC power is applied through the line cord to the capstan motor, the fan motor, and the constant voltage transformer T1. Transformer T1 has one secondary which applies 35 V RMS to the full wave rectifier CR3. CR3 provides the -15 volt supply, the +15 volt and the exciter lamp supply through resistor R21 to R22. The exciter lamp is connected across L1 and L2 (see MPC card C-H617). The -7.5 volts is used as the collector supply in the emitter follower portion of the amplifier circuits. The -3.6 volt is used to supply bias for all photo diodes. Both the -7.5 volt and -3.6 volt are generated on the "LAC" card. (See C-H619).

The power transformer also contains a filter winding which in conjunction with a resonating capacitor, C1, is used to suppress fluctuations on the AC line.

The power supply portion of the schematic shows the layout of the brake and pinch roller solenoids. These solenoids are supplied -15 volts through -15L. -15L is part of a set of contacts available at the input/output connector which can be used to open the brake and pinch roller circuits externally without removing AC power from the unit. In order to slew tape or the brake to operate, -15L must be shorted -15S (Pin "AA" jumpered to "Z" on the input/output connector). The other side of the solenoids are connected to the heavy duty output transistors of the Pinch Roller Section and the Brake Section. These heavy duty transistors switch from 0 volts for enabling the solenoids, to -15 volts to disable the solenoids. Due to the nature of the Control Section logic, the solenoids are energized one at a time, that is, the pinch roller solenoid will not be enabled when the brake solenoid is enabled. The reverse is also true.

NOTE

This unit contains a floating ground. For signal levels or voltage measurements use 0 volts as taken from Pin "K" on the input/output connector.

4.9 TAPE DRIVE SYSTEM (See "MPC" Schematic CH617)

4.9.1 Control Section

The control section contains an inverter and two diode "OR" gates. The control section is used to determine tape motion.

4.9.2 RUN/STOP Input

The RUN/STOP input is a one line input from pin "Y" of the input/output connector that causes tape to either RUN or STOP.

Electrically, the switching time from a RUN condition to a STOP condition is approximately 2 usec. Mechanical switching time however, is much slower. From a complete STOP, full energization of the pinch roller coil is less than 3 milliseconds. When slewing tape at the maximum capstan speed (300 char/sec.) the time for tape to come to a complete STOP will be less than 600 usec. In the stepping mode of operation the time for stopping is greatly reduced. In addition, in the stepping mode, these stop and start times are the reason the unit can step at any rate up to the slew speed.

1) RUN - Tape will run when a -6 volt input signal is applied to the RUN/STOP input of the Control Section. The -6 volt signal is logical "1". When this is applied through the "OR" gate to inverter T1, T1 will produce a "0" output (a 0 volt signal). This output is applied to the Pinch Roller Section and through the second "OR" gate to the Brake Section. This set of signals will energize the pinch roller solenoid and de-energize the brake solenoid.

2) STOP - Tape will stop when a 0 volt input signal is applied to the RUN/STOP input of the Control Section. The 0 volt signal is logical "0". When this signal is applied through the "OR" gate to inverter T1, T1 will produce a "1" output. This output is applied to the Pinch Roller Section and through the second "OR" gate to the Brake Section. This set of signals will energize the brake solenoid and de-energize the pinch roller solenoid.

4.9.3 -15V (preset) Input

This input to the control section is internal to the unit and occurs only at initial power on. The purpose of this signal is to prevent unwanted tape RUN until the equipment comes up to operating speed.

4.9.4 Special Stepping Option

For the special stepping option, SA1 must be shorted to SA2 (Pin "W" to Pin "X" on input/output connector) and -6 volts must be applied to the RUN/STOP input.

1) When a -6 volt/5 usec pulse is applied to the input line, the leading edge of the next sprocket hole will apply a STOP command through T2, T3 and T5, to the Brake Section and through SA1 and SA2 to T1, T4 and T6 of the Pinch Roller Sections. When these pulses are applied as a "train", the reader will "step" character-by-character.

2) DC input in pulsed mode - When a -6 volt level is applied to the input line, the reader will slow tape at the slow speed. The reader will stop upon seeing the leading edge of the sprocket hole after the input line has returned to 0 volts. This can be used where the application calls for search for a certain character and then stop upon seeing the leading edge of the following character.

4.10 DETAILS ON STEPPING OPERATION (START/STOP WITH SA1 SHORTED TO SA2)

The purpose of the stepping function is to provide a self-initiated STOP command whenever the leading edge of the sprocket hole passes over the read head. The description below will cover further details of the operation and the control action used to perform either "Open Loop" or "Closed Loop" stepping.

To use this stepping option SA1 must be shorted to SA2 (Pin "W" to Pin "X" on the input/output connector) and pulses must be applied to the external RUN/STOP input (Pin "Y" on the input/output connector).

The reader will self-initiate a STOP command whenever it recognizes the leading edge of the sprocket hole (logical "1" "PSP" signal) and the RUN/STOP input is at 0 volts.

1) Signal "PSP" is derived from the sprocket hole and is available as an output through the input/output connector. During sprocket hole ON time, the "PSP" signal is logical "1". During sprocket hole OFF time the "PSP" signal is logical "0".

Signal "PSP" is also applied through a capacitor C2 a diode D5. This capacitor allows only the leading and trailing edges of the "PSP" signal to be transmitted through the inverter, T2, to SA1. With SA1 shorted to SA2 the inverted "PSP" signal is applied to an "OR" gate. The other leg of the "OR" gate is connected to the external RUN/STOP input from Pin "Y". The external RUN/STOP input will change from a -6 volt level (logical "1") for RUN to a 0 volt level (logical "0") for STOP.

Whenever either leg of the "OR" gate is at -6 volts the reader will RUN. But the reader will STOP only when both inputs of the "OR" gate are at 0 volts. With SA1 shorted to SA2, the SA2 input is at -6 volts during the sprocket signal no-hole time; as a result of a logical "0" (0 volts) "PSP" signal applied to the inverter T2. For this reason the reader will continue to RUN until it sees the leading edge of the next sprocket hole whether or not there is a 0 volt signal present at the external RUN/STOP input.

4.10.1 Pulsed Mode

When a START/STOP pulse from 0 volts to -6 volts with a minimum duration of 5 usec is applied to the RUN/STOP input, the reader will RUN as soon as the leading edge of the

input START/STOP pulse goes to -6 volts and will continue to RUN during the time that the START/STOP is at 0 volts. However, the unit will self-initiate a STOP only when the leading edge of the sprocket hole is recognized. This self-initiated STOP is the result of both the RUN/STOP signal and the SA2 leg being at 0 volts.

The number of 5 usec pulses applied externally to the RUN/STOP input will determine the stepping rate together with the mode of operation selected; "Open Loop" operation or "Closed Loop" operation.

There is no limitation if the externally generated pulses are derived from the sprocket signal as described previously. In this "Closed Loop Mode" the reader can step at any rate up to the slow speed.

4.10.2 Open Loop Operation

The maximum stepping rate is 60 characters/second when operating in the "Open Loop Mode", that is when an external clock or timing device (such as a signal generator) that does not derive these 5 usec pulses from the sprocket signal, applies pulses to the external RUN/STOP input.

4.10.3 DC Input with SA1 Shorted to SA2

When a -6 volt level is applied to the external RUN/STOP input and SA1 shorted to SA2 the reader will drive tape at the slow speed. The reader will STOP upon seeing the leading edge of the next sprocket hole, but will not stop until the RUN/STOP input goes to 0 volts.

4.11 PINCH ROLLER SECTION

The pinch roller section contains two inverters. The first inverter T4 is a power driver which supplies the increased current to the base of the power amplifier T6. Power amplifier T6 swings from 0 volts when its on to -15 volts when it is off, and can handle the 1.5a dc current surge requirements of the pinch roller solenoid.

4.11.1 RUN- When the Control Section applies a RUN signal to the pinch Roller Section the value of the input signal is 0 volts and may be considered logical "0". When this logical "0" signal is applied to the base of inverter T4 the output, logical "1", will be applied to the base of inverter T6. When inverter T6 receives a logical "1" input its output will be logical "0". Logical "0" will be 0 volts. This causes current to flow through the pinch roller solenoid. The pinch roller arm will then move up pressing the tape against the continuously rotating capstan and tape will RUN.

4.11.2 STOP- When the Control Section applies a STOP signal to the Pinch Roller Section the value of the input signal is -6 volts and may be considered a logical "1". When this logical "1" signal is applied to the base of inverter T4 the output, logical "0"

of T4 will be applied to the base of inverter T6. When inverter T6 receives a logical "0" input, its output will be logical "1". The value of logical "1" will be -15 volts due to the -15 volt input through -15L. This keeps 0 volts off the solenoid and holds it de-energized. The clamp diode prevents collector voltage from exceeding -15V, thus protecting the output transistor.

4.12 BRAKE SECTION

The brake section contains three inverters. The first is inverter T2; a standard transistor that performs a logical function only. The second inverter T3 is a power driver which supplies the increased current needed to drive the third inverter. Power amplifier T5 is the third inverter. This inverter swings from 0 volts when its conducting to -15 volts when its off and can handle the 1.5a dc current surge requirements of the brake solenoid.

4.12.1 RUN- When the Control Section applies a RUN signal to the Brake Section the value of the input signal is 0 volts and may be considered logical "0". When this logical "0" signal is applied to the base of inverter T2, the output logical "1" is applied to the base of inverter T3. Inverter T3 inverts this logical signal so that the output of the inverter is logical "0". The logical "0" is applied to the base of inverter T5 holding it off. The output of the inverter T5 is then logical "1". The value of the logical "1" will be -15 volts due to the -15 volt input through -15L. This keeps 0 volts off the solenoid and holds the solenoid de-energized. The clamp diode prevents collector voltage from exceeding -15V, thus protecting the output transistor.

4.12.2 STOP- When the Control Section applies a STOP signal to the Brake Section the value of the input signal is -6 volts and may be considered logical "1". When this logical "1" signal is applied to the base of inverter T2, the output logical "0" is applied to the base of inverter T3. Inverter T3 inverts this logical signal so that the output of the inverter is logical "1". This logical "1" signal is applied to the base of inverter T5 turning it on. The output is then logical "0". The value of logical "0" will be 0 volts. This causes current to flow through the brake solenoid coil which will press the armature against the tape, causing tape to STOP.

4.13 TAPE READ SECTION (See "LAC" Schematic C-H619)

4.13.1 Sprocket Channel Section

The sprocket channel section contains an emitter follower, two inverters and a Schmitt trigger. A sprocket hole is generated for every character that is read.

When the sprocket photodiode conducts during a hole condition, the positive signal produced by the photodiode is applied to the base of emitter follower (EF), T1. T1 couples this positive signal to the base of amplifier T2, resulting in a negative going collector potential. This signal is applied to the Schmitt trigger (ST) shaper transistors T3 and T4.

The negative going input to the base of T3 produces a positive going level at the

collector. The positive going voltage at the collector of T3 is coupled through a capacitor, C3, to the base of the emitter follower T4. Conduction in T4 decreases with the collector current being drawn through the emitter resistor R10 which is common to both T3 and T4. The decreased current through this emitter resistor results in a positive going change in the emitter potential of T3. The cumulative effect of any increasingly negative base potential and increasingly positive emitter potential, accelerates the increase in collector current of T3. The collector potential is thereby driven further positive, and is coupled through the input resistors to the base of transistor T4, with the result that conduction through input resistors to the base of transistor T4, with the result that conduction through T4 is further decreased. This positive feedback effect thus produces rapid turn-on of the first stage, while similarly abruptly driving the second stage into cut-off. The output of the Schmitt trigger is applied to G1 on the output connector Pin "S" and through inverter T5 to the "PSP" output Pin "V" on the output connector.

4.13.2 Gating Circuit and Operation of T6 (Gated or Ungated Output)

The gating option may be used by shorting pins "S" and "T" on the input/output connector. When this is done, the output from the Schmitt trigger is applied to the base of transistor T6 through G1 and G2 (Pins "S" and "T" on the input/output connector). The output at the collector of T6 is called PSPG. This point is tied to a diode D5, (TCRSUO125) in each of the data channel circuits.

When T6 receives the output of the Schmitt trigger through G1 and G2, the transistor turns off producing a -4 volt output at PSPG for the duration of the sprocket hole. During time between sprocket holes, the output at PSPG is +4 volts. During the ungated mode, the output at PSPG remains at -4 volts DC.

Zener diode, D4, supplies -3.6 volt regulated bias to the data channel photodiode through C. (See assembly drawing of LAC card D-C1784).

The +4 volt bias for the sprocket channel photodiode is supplied through S2 by a voltage divider network composed of resistors R18, R19, and R22.

The collector of the emitter follower T1 in all data channel circuits and the sprocket circuit, requires -7.5 volt level. This level is supplied by the voltage divider network composed of resistor R21 and zener diode CR5.

4.13.3 Data Channel Section

This unit contains 8 data channel amplifiers; each of these amplifiers is capable of producing -10 volts at 5ma into a 2K load for a hole condition and 0 volts for a no-hole condition. These 8 outputs are applied directly to the input/output connector, pins "A", "B", "C", "D", "E", "F", "H", and "J".

- 1) Ungated Mode - When any of the eight photodiodes reads a hole, it will conduct.

This conduction applies a negative signal through emitter follower T1 to the base of T2. Transistor T2 conducts when a negative signal is applied at its base. This occurs only during a hole condition.

Resistor R2 and diode D5 form an "AND" gate. In the ungated mode, diode D5 has applied to its anode a constant -4 volt level from PSPG, which allows the "AND" gate. This means that the negative level produced by the emitter follower T1 during a hole condition and applied through R2, will turn transistor R2 on.

When transistor T2 turns on, its collector applies a positive level to the base of T3, which then turns off. An output of -10 volts into a 2K load is then available at the input/output connector for the duration of the input hole signal. The hole signal is 70% of the distance from the leading edge of one data hole to the leading edge of the next data hole, therefore, the pulse width will be 70% for hole time and 30% for no/hole time.

2) Gated Mode - When any of the eight photodiodes reads a hole, it will conduct. This conduction applies a negative level through emitter follower T1 to the cathode of diode D5 and to the base of T2. In the gated mode, the input to the diode D5 from PSPG switches from a +4 volts for a no-hole condition to a -4 volts for a hole condition. Whenever the PSPG input is at +4 volts, the "AND" gate is blocked, which holds T2 off.

When transistor T2 turns on, its collector applies a positive level to the base of T3, which then turns off. An output of -10 volts into a 2K load is then available at the output connector for the duration of the combined sprocket and data signals. The sprocket hole, which generates PSPG through transistor T6, is smaller than the data hole and is centered within the data hole.

All data channel amplifiers receive the same PSPG signal, thus the sprocket hole will gate the data outputs. This assures that all data outputs will initiate and terminate at the same time. The sprocket hole is 40% of the distance from the leading edge of one sprocket to the leading edge of the next sprocket and centered within the data hole, therefore, the data channel output pulse width will be 40% for hole time and 60% for no/hole time.

SECTION V

MAINTENANCE

5.1 SCOPE OF THIS SECTION

This section describes the preventive maintenance, corrective maintenance, and adjustment procedures required to maintain the equipment in good operating condition. Access instructions are given first in order that the maintenance instructions may be performed.

5.2 ACCESS INSTRUCTIONS

5.2.1 Desk or Table Mounted

When the unit is desk mounted, a protective shield covers the components. This shield must be removed to gain access to the equipment. The protective cover is easily removed by unscrewing the two screws located on the front panel; the two screws which hold the cover to the back of the unit; and the four screws which are located in the rubber feet on the underside of the unit.

5.2.2 Rack Mounting

When the unit is rack mounted, no access instructions are necessary.

5.3 PREVENTIVE MAINTENANCE

For trouble-free operation, certain vital points should be inspected at periodic intervals, and the necessary replacements made when trouble is discovered. While this equipment has been designed for reliable operation, a certain amount of wear must be expected. If detected and corrected at an early stage, troubles from these causes can be minimized. Component Replacement Schedule Table 5-1 should be followed to assure maximum time between failure and to prolong troublefree use.

5.3.1 Periodic Inspection

An overall inspection of the equipment is recommended as a precautionary measure immediately before being put into service, and at intervals of six to nine months, thereafter. Such an inspection involves a complete examination of electrical wiring and mechanical details in addition to inspection of the output signals and the proper functioning of the operating controls. The inspection table which follows, was computed on the basis of a 40-hour week. When customer usage exceeds these limits, adjustments should be made to the table. If defects are evident during inspection period, i.e., capstan worn, etc; perform replacement procedures immediately.

TABLE 5-1

COMPONENT REPLACEMENT SCHEDULE

Item	Replace At
1. "O" Ring Belts	1. 1000 hrs. or 250 million start/stop operations
2. Light Bulbs	2. 1500 hrs.
3. Bearings, Capstan	3. 2000 hrs. or 500 million start/stop operations
4. Capstan	4. 2000 hrs.
5. Bearings, Pinch Roller	5. 2000 hrs. or 500 million start/stop operations
6. Pinch Solenoid	6. 3000 hrs. or 500 million start/stop operations
7. Motor, Capstan Drive	7. 4000 hrs.
8. Bearing, Pulley (Used on 100 cps, 150 cps, etc. Not used on 300 cps & 200 cps.)	8. 4000 hrs.
9. Brake Assembly	9. 5000 hrs.
10. Switch, load	10. 5000 hrs.

TABLE 5-2

PERIODIC INSPECTION

DAILY	MONTHLY	SEMI-ANNUALLY
1. Read Head	1. Pinch Roller/Capstan Gap (.001 to .002)	1. All moving parts for wear
2. Tape Guide	2. Belts in Drive Motor Assembly	2. Data Channel outputs
3. Pinch Roller	3. Return Spring Locknut check (2-3 lbs. with solenoid energized).	3. Sprocket Channel output
4. Capstan	4. Brake Armature resting squarely on coil. See paragraph 5.5.2.	4. Power Supply voltages
5. Brake Clean as required (Digitronics Cleaning Kit MS-133)		

5.3.2 Routine Maintenance

(1) Lubrication — This unit requires no lubrication. All bearings are permanently lubricated and require no attention. Double shielded ball bearings are used throughout the tape transport system to prevent the entry of dust. When any of these bearings indicate any sign of sticking, it should be replaced.

(2) Cleaning — When inspection reveals that components of the unit require cleaning, the Digitronics Cleaning Kit (MS-133) provides a convenient brush and solvent. Alternatively, a cotton swab or lint-free cloth may be used with a solvent such as N-Amyl Alcohol.

5.4 CORRECTIVE MAINTENANCE

When properly installed and preventive maintenance is carried out, any irregularities that occur in the performance of the equipment will be attributed to the failure of some component part. Since the unit has been factory adjusted, the adjustment procedures should not be undertaken until after the corrective maintenance has proved ineffective or has resulted in the replacement of parts.

5.4.1 Tools Required

- (1) Oscilloscope Tektronix 545 or equivalent with dual trace option
- (2) Screw Driver
- (3) VTVM Sr. Volt Ohmyst (RCA) or equivalent
- (4) Feeler Gauge (.001 to .002 range)
- (5) Spring Scale (1 - 5 lb. range)
- (6) Allen Wrench Set

5.4.2 Trouble Shooting

When it is necessary to trouble shoot the equipment, locate the defective circuit or component by conventional trouble shooting techniques. The most obvious source of trouble and one of the most easily corrected is Data Channel Amplifiers and the Sprocket Channel Amplifier. Point-to-point voltage checks and resistance measurements, or comparing input and output waveforms of the various stages may be necessary to locate less apparent faults. The circuit cards are very easy to trouble shoot due to the location and placement of the various stages. Note that the eight data channels are numbered on the LAC card and that transistor T1 is closest to the variable pot for any of the eight channels with T2 and T3 successively being further from the potentiometer. See Figure D-C1784-1 (assembly drawing of LAC card) for the locations of each data channel amplifier and sprocket channel amplifier. Figure D-C2898 (assembly drawing of PDC card) shows the location of the brake section, pinch roller sections, and control section on the card. The power supply rectifier CR18 is also on this card. The schematics in the back of this manual show the components as they are laid out on the circuit boards in addition to giving circuit relationships.

For mechanical trouble shooting, check the Pinch Roller/Capstan Gap as described in paragraph 5.5.1 and refer to the Illustrated Parts Breakdown. Mechanical disassembly should be accomplished only in conjunction with the Illustrated Parts Breakdown. The IPB may also be used to order replacement parts.

5.5 ADJUSTMENT PROCEDURES

The adjustment procedures given in this section should be performed only after corrective maintenance has proven ineffective or has resulted in the replacement of parts. Adjust controls only if suitable equipment is available for complete realignment.

5.5.1 Pinch Roller Assembly (FORWARD & REVERSE - Refer to Figure 6-3)

The Pinch Roller Assembly has two adjustments; the return spring locknut adjustment and the pinch roller/capstan gap adjustment. The return spring adjustment should be performed first since it will affect the gap adjustment.

(1) Return Spring Locknut Adjustment

- a) Actuate the pinch roller solenoid by applying a -6 volt RUN signal to the input/output connector pin "Y" (Forward) or pin "P" (Reverse).
- b) Increase spring tension by tightening locknut until solenoid toggles to deactivated position.
- c) Back off locknut until solenoid armature returns to actuated position.
- d) Back off locknut an additional half turn.
- e) Check that force to unseat solenoid is 2-3 lbs.
- f) Check the other pinch roller using the above procedure.

(2) Pinch Roller/Capstan Gap Adjustment

- a) Remove "O" ring drive belts prior to applying power to unit.
- b) Apply power to unit. Apply a RUN signal to pin "Y" (Forward) or pin "P" (Reverse).
- c) Using a feeler gauge, check the gap between the pinch roller and the capstan. The gap should be between .002 - .001 inches, if not, continue with step d).

- d) Loosen the screws that hold the solenoid assembly to the panel.
- e) Adjust for a .002 - .001 inch gap and tighten screws.
- f) Check the other pinch roller using the above procedure.

5.5.2 Brake Assembly (Refer to Figure 6-4)

The Brake Assembly requires no special gap adjustment, however, the brake armature should rest squarely and evenly upon the poles of the coil assembly. Whenever the brake assembly or either pinch roller assembly is replaced, assure that the tape remains in a straight line from either pinch roller assembly through the Head Assembly and Brake Assembly. A good check for squareness for the Brake Assembly is to operate the Ready/Load switches to Load. Then, using some object, activate the micro switch. Apply a RUN signal to the reader. Tape should guide smoothly with the tape guide in the Load position. If not, replace brake spring using the Illustrated Parts Breakdown as a guide.

5.5.3 Head Assembly (Refer to Figure 6-5)

The Head Assembly is a factory-adjusted unit. Should the trouble shooting show that the problem is in the Head Assembly, perform the following adjustment procedure:

(1) Assure that the lamp voltage between L2 and L1 is 8 volts, if not, adjust R22 to 8 volts.

(2) When the lamp voltage is 8 volts, but the photodiode does not respond properly, rotate the exciter lamp until maximum light is applied to the photodiode. This will usually correct the irregularity.

(3) Readjust Data Channel Amplifiers (ungated) to restore the 70/30 relationship in accordance with paragraph 2.5.1.

(4) Readjust the sprocket channel for a 40/60 condition in accordance with paragraph 2.5.1.

If this procedure does not correct the irregularity, remove the photodiode assembly (Item 7, Figure 6-5) and ship to DIGITRONICS Corporation. Under no circumstances should the photodiodes be removed from the assembly.

5.5.4 Motor Assembly (Refer to Figure 6-6)

When the motor requires replacement, follow the Illustrated Parts Breakdown for assembly and disassembly procedures. The only check for the motor assembly that has been replaced is to assure that both capstans are equidistant from their respective pinch roller assemblies. This can be accomplished by eye.

LUBRICATE HERE
WITH ANDROL L456

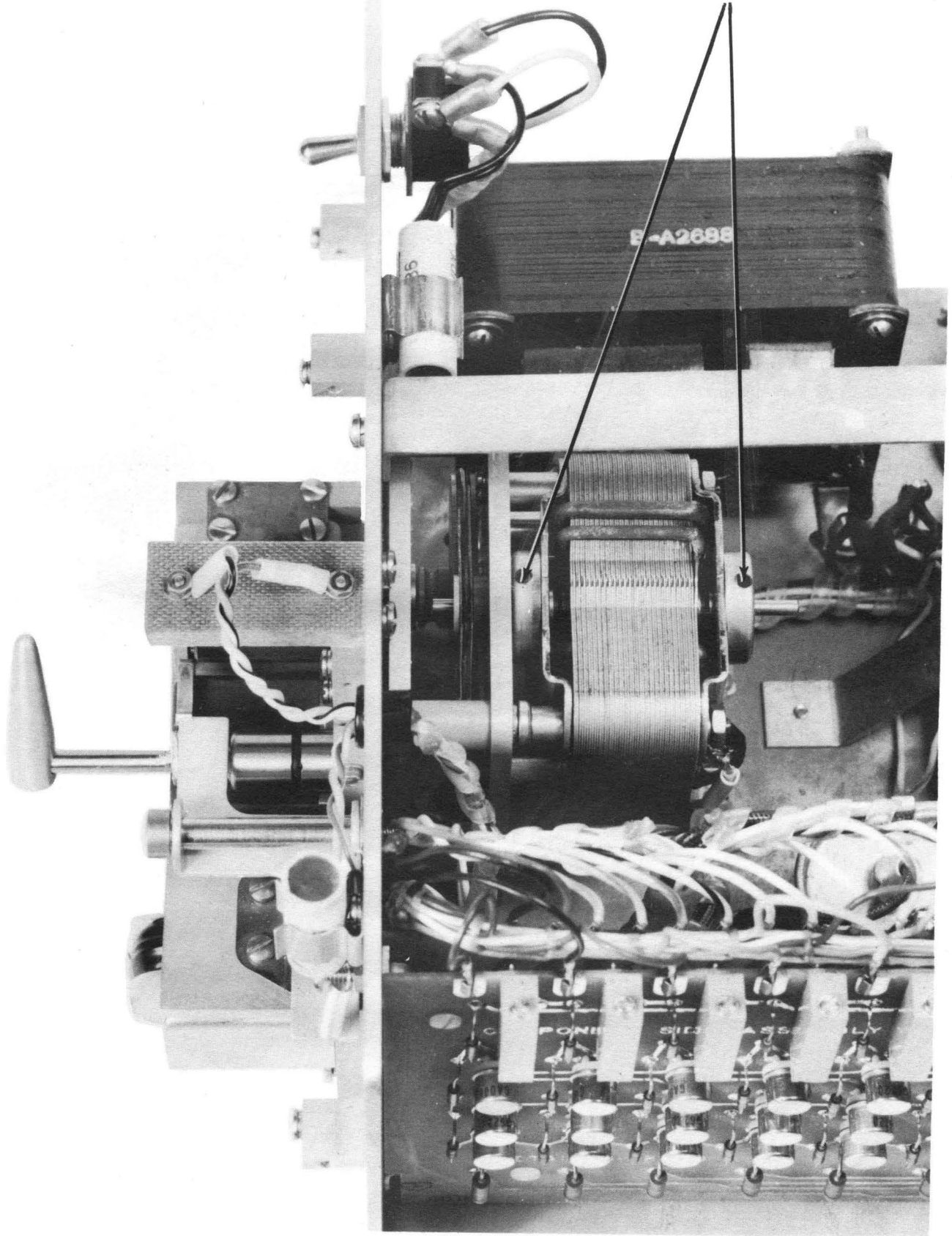


FIGURE 5-1 LUBRICATION POINTS

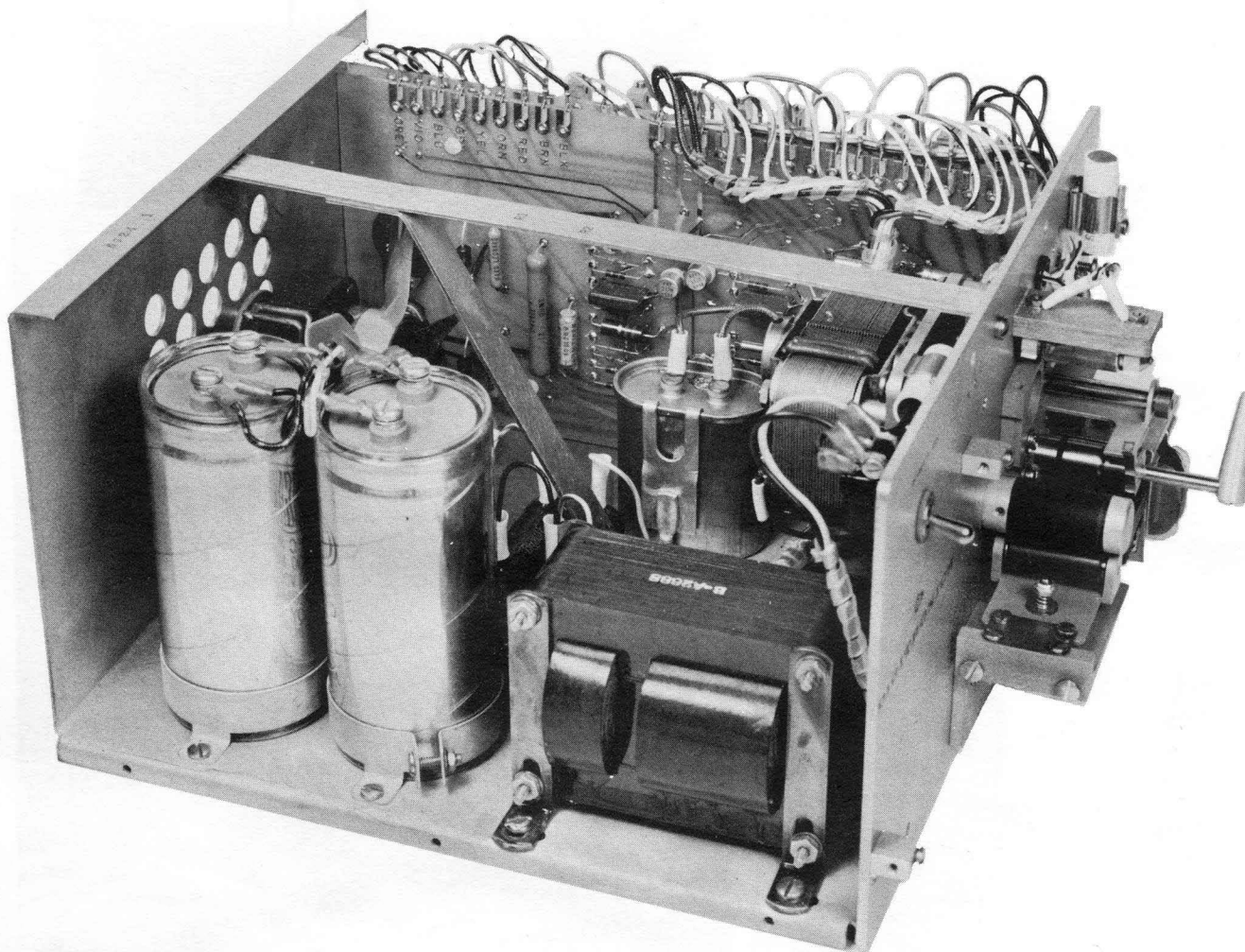


FIGURE 5-2

POWER SUPPLY COMPONENT LOCATION

INPUT/OUTPUT
CONNECTOR P2

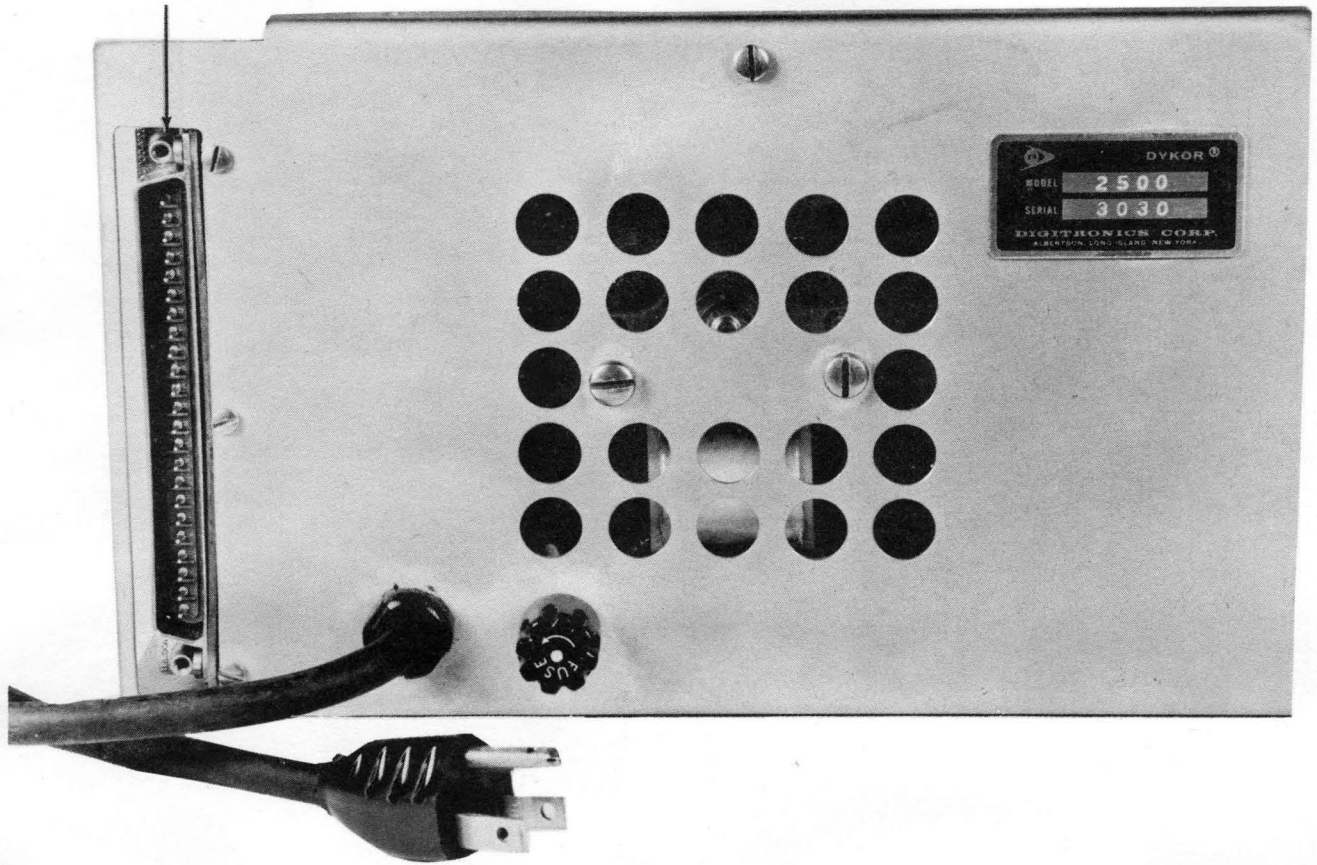
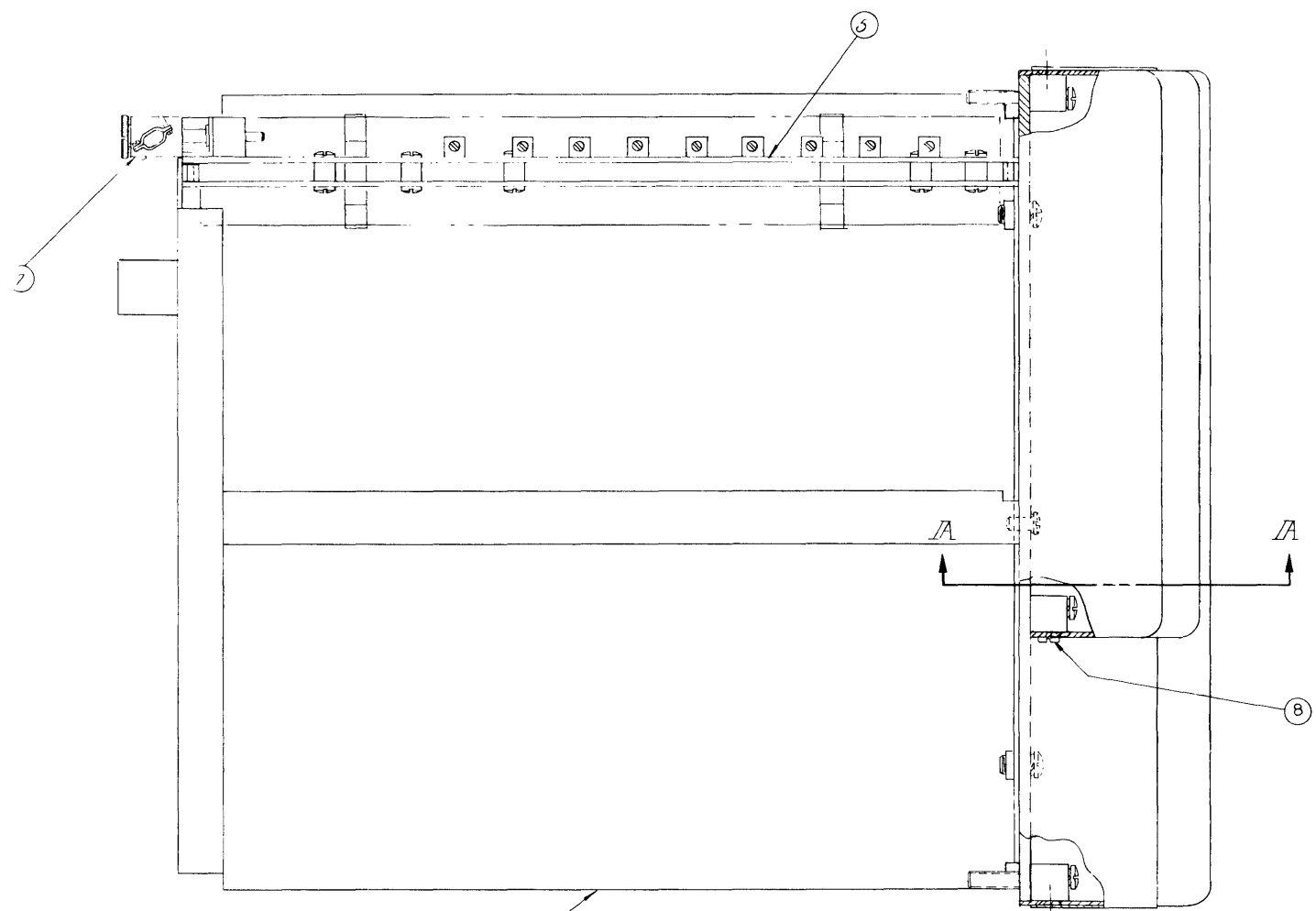
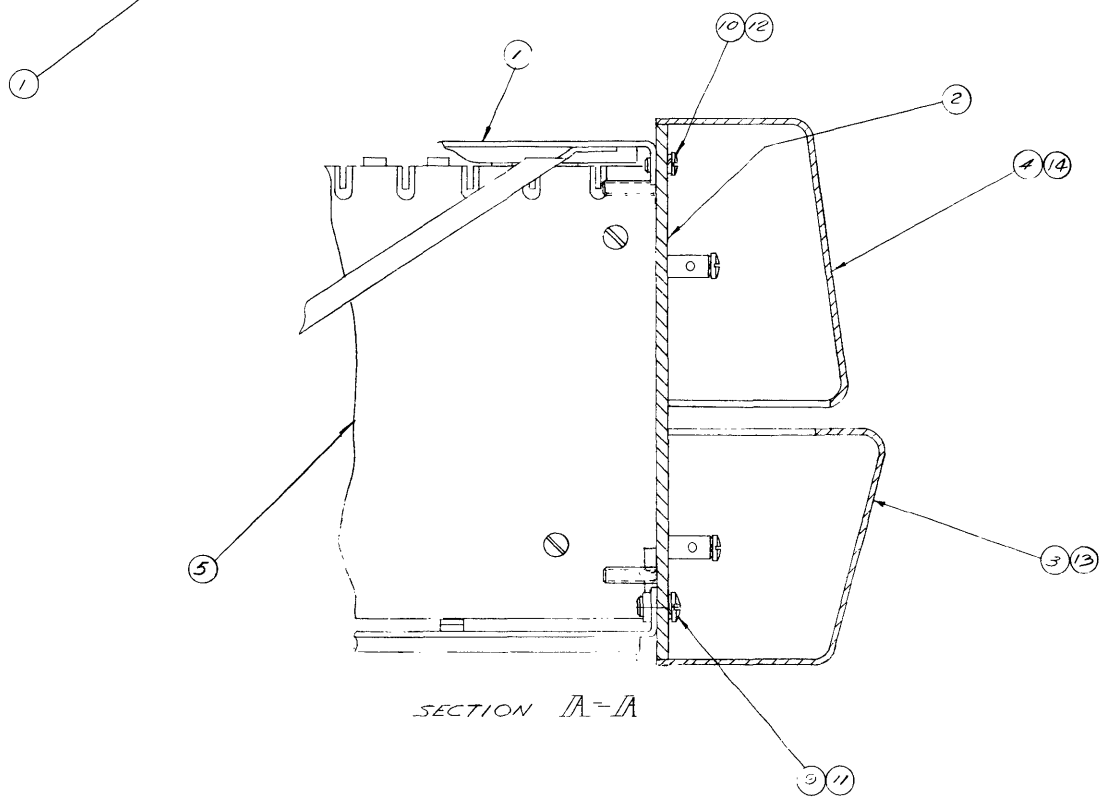


FIGURE 5-3 BACK VIEW MODEL 2500 SHOWING INPUT/OUTPUT CONNECTOR

D-C1933 K



DRWG. NO.		DESCRIPTION	
DC1933		READER ASSEMBLY STOCK	
QTY	ITEM	DRWG. NO.	DESCRIPTION
1	001	DC1035	ECONOMY READER ASSY
1	002	CC1932	FRONT PANEL ASSEMBLY
1	003	CC4002-1	LOWER COVER SPT. ASSY
1	004	EC4003-1	COVER ASSY UPPER
1	005	CC1930	P.C. PACKAGE ASSEMBLY
006			
1	007	TPES02302	CONN US COMP
4	008	TH-S01203	SCR#G-32 x 1/4 T.H.P
2	009	TH-S11405	SCR#8-32 x 3/8 BHM
1	010	TH-S11204	SCR#G-32 x 5/16 BHM
2	011	TH-WB0708	LOCKWASHER#8
1	012	TH-WB0605	LOCKWASHER#6

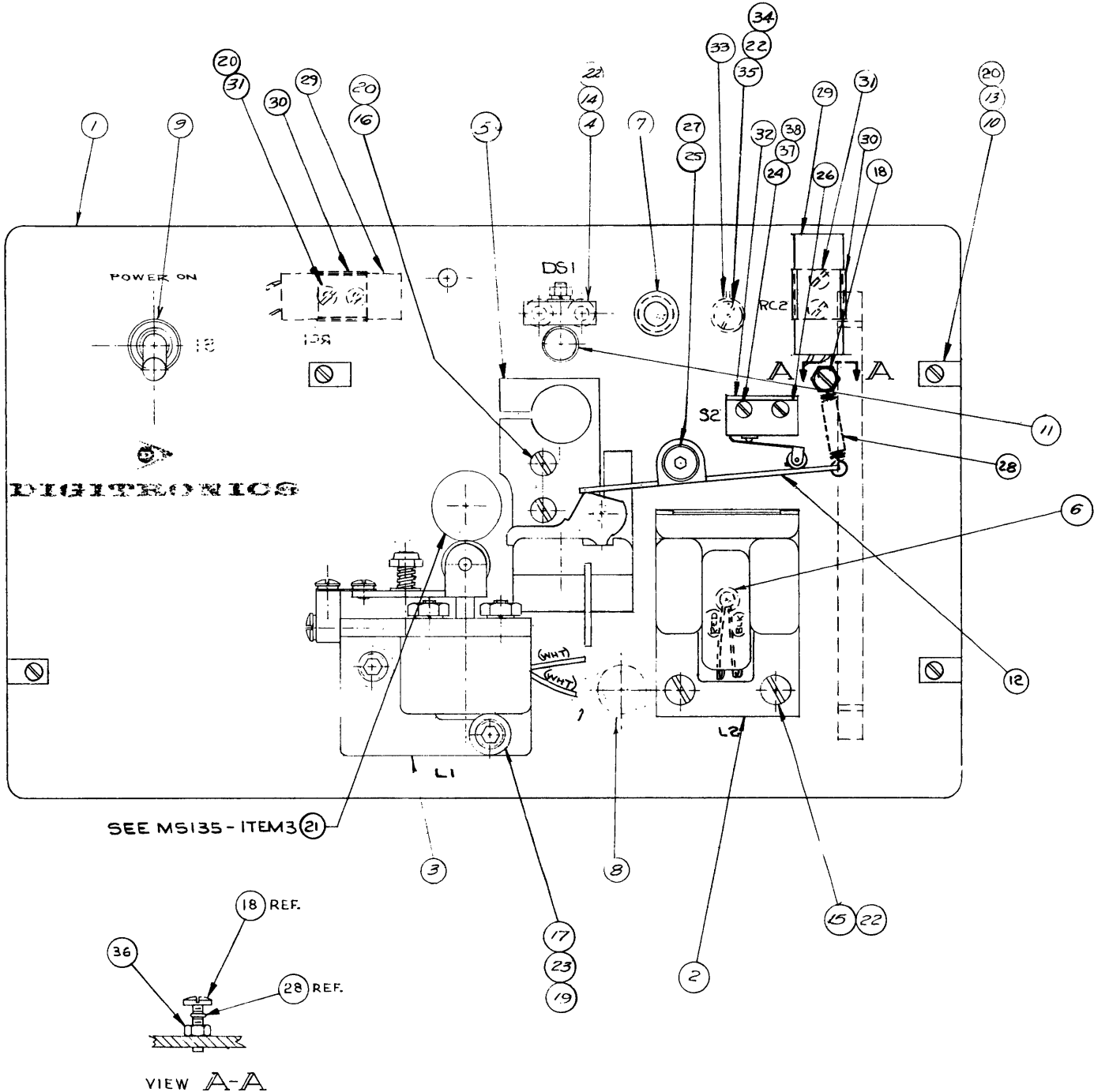


SECTION A-A

ADJUST PINCH ROLLER PER E-D43
WIRE AS PER D-K296



K	ECO 4490	FB	9-30-64
H	U.D.P/L ECO4521	WE	8-28-64
G	DELETED DASH	E	6-11-64
F	ECO 4281 (PL)	SE	3-9-64
E	ECO 4111	TH	11-19-63
D	UPDATED	DK	5-9-63
C	3490	LD	12-13-62
B	3215	RH	9-11-62
	2957	PP	6-9-62

DIGITRONICS	
ALBANY, NEW YORK	
TITLE	
READER ASSEMBLY STOCK	
USED ON	DRAWING NO.
	D-C1933



QTY	DESCRIPTION	PART NO	ITEM
1	PANEL, SCREENED	C-E286	1
1	BRACKET ASSY	B-C1142	2
1	SOLENOID MOUNT ASSY	C-C1924	3
1	LAMP ASSY	B-C461	4
1	LENS & HEAD ASSY. ^{SEE MS135}		5
1	SNAP BUSHING - HEYCO #SB-250-2	TSBN02001	6
1	SNAP BUSHING - HEYCO #SB-375-4	TSBN04003	7
1	SNAP BUSHING - HEYCO #SB-500-6	TSBNC6004	8
1	SWITCH, TOGGLE - CUTLER-HAMMER #8705KT	TOTO1A518	9
4	BRACKET, COVER	A-A4816	10
1	LAMP	TLNE0004	11
1	ACTUATOR, SWITCH	S-A2917	12
4	SCREW, B.H.M. #4-40X9/16 LG. (S-615)	TH-SI0805	13
2	SCREW, B.H.M. #6-32X 5/16 LG. (S-615)	TH-SI1205	14
2	SCREW, B.H.M. #6-32X 3/8 LG. (S-615)	TH-SI1205	15
2	SCREW, B.H.M. #4-40X 3/8 LG. (S-615)	TH-SI0805	16
2	SCREW, SOC. HD. CAP #8-32X 3/8 LG.	TH-SL1405	17
1	SCREW #6-32X 1/2 LG. B.H.M. (S-615)	TH-SI1207	18
2	WASHER, PLAIN #8 (S-604)	TH-WA0707	19
10	LOCK WASHER, SPLIT #4 (S-601)	TH-WB0405	20
1	MOTOR OPTION ASSY ^{SEE MS135}		21
5	LOCK WASHER, SPLIT #6 (S-601)	TH-WB0605	22
2	LOCK WASHER, SPLIT #8 (S-601)	TH-WB0708	23
2	SCREW, B.H.M. #2-56X 1/2 LG. (S-615)	TH-SI0307	24
1	CAP SCREW (MOD)	AA3889	25
1	SWITCH, UNIMAX	TDA01B503	26
1	SPACER	AA4883	27
1	SPRING	A-A188	28
2	SPARK SUPPRESSOR	A-A2786	29
2	COMPONENT CLIP AUGAT, COWA-2A	TCLAA0003	30
4	SCREW #4-40X 3/16 LG. B.H.M.	TH-SI0802	31
1	INSULATOR	A-A3158	32
1	RESISTOR, ADJ. 10K, 10W ^{OR WHITE #100G}	TEAF100D	33
1	SCREW #6-32X 2 1/8 LG. B.H.M.	TH-SI1239	34
2	FIBRE WASHER, GEN. CEM. #G525M	TH-YD0609	35
1	NUT, HEX 6-32 (S-600)	TH-NA1106	36
2	WASHER, PLAIN #2	TH-WA0206	37
2	LOCK WASHER, SPLIT #2	TH-WB0201	38

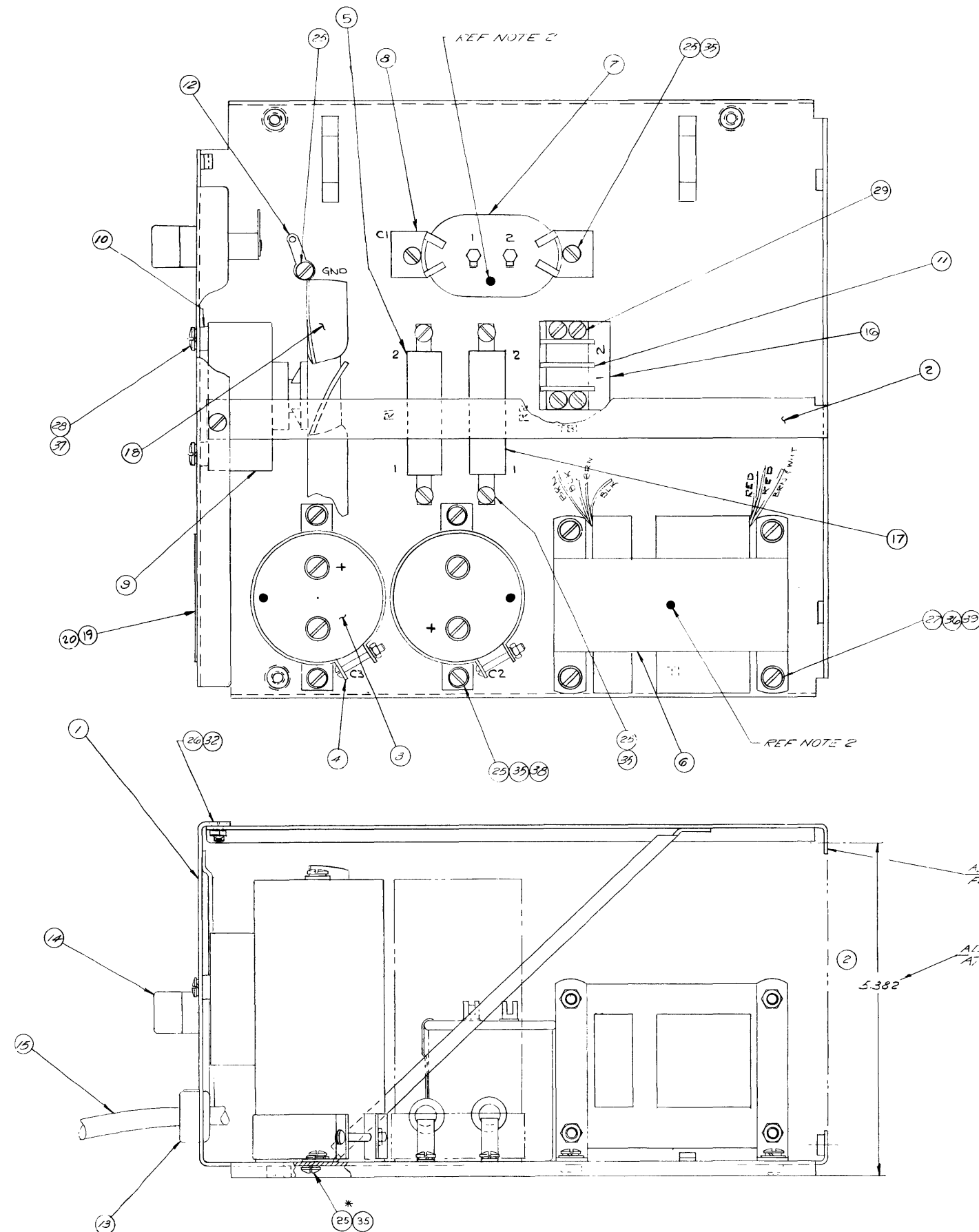
C-C1932

**DIGITRONICS**
ALBERTSON, NEW YORK

TITLE:
FRONT PANEL ASSY

USED ON:
C-C1932

DRAWING NO.
C-C1932



	DRWG NO	DESCRIPTION	
-0	DC1035	ECONOMY READER ASSY	
QTY	ITEM	DRWG NO.	DESCRIPTION
1	001	DE287	CHASSIS MARKING
1	002	CC1926	BRACE ASSY
2	003	TC-EH109F	CAP 10000 410 25V
2	004	TCBCE0005	MTG BLT DOME 1016 DIA
1	005	TR-UI250C	25 OHMS 25V OMH10200C
1	006	BA266B3	TRANSFORMER
1	007	HA2729	CAPACITOR
1	008	HA2904	MTG SMT CAPACITOR
1	009	TBLA10001	BLOWER HOW #1075
2	010	HA2495-9	SPACER
1	011	TBHA90502	TERM BD 600-2
1	012	TH-LA2006	#6 GND LUG INT LOCK
1	013	TSR00001	S.R. HEYMAN SEGP.1
1	014	TCB50106	FUSE HLDG L.F.#342003
1	015	TCMB0002	LINE CORD BIRNBACH 347
1	016	TMSA0102	MKP STR FULKA 600-2
1	017	TR-UI200C	RES 20R 25W
1	018	TBBPB0202	PLASTIC FAN BLADE
1	019	CA4899-1	PLATE, IDENT. PHOTO
A/R	020	AT 132	ADHESIVE SPEC. (EASTMAN 910)
	021		
	022		
	023		
	024		
12	025	TH-SL2003	SCR 6-32 x 3/16 BHM
1	026	TH-SE2004	SCR 6-32 x 5/16 FL. HD.
4	027	TH-SI2404	SCR 8-32 x 5/16 BHM
2	028	TH-SI1705	SCR 10-32 x 3/8 BHM
4	029	TH-SI1205	SCR 6-32 x 3/8 BHM
	030		
	031		
1	032	TH-2A1106	ESNA NUT #6 32
	033		
	034		
11	035	TH-WB0609	WASHER SPLIT #6
4	036	TH-WB0810	WASHER SPLIT #8
2	037	TH-WB1011	WASHER SPLIT #10
4	038	TH-WA0612	WASHER FLAT #6
4	039	TH-WA0812	WASHER FLAT #8
	040	X X X	AEC
	041	X X X	HARNESS ASSY

DIGITRONICS	
<small>ADDISON, NEW YORK</small>	
TITLE	
ECONOMY READER ASSEMBLY	
USED ON:	DRAWING NO.
	DC1035

SECTION VI

ASSEMBLY DRAWINGS, ILLUSTRATED PARTS BREAKDOWN, AND SCHEMATICS

6.1 SCOPE OF THIS SECTION

This section contains - the assembly drawings which show front panel component assemblies as well as chassis component assemblies; the illustrated parts breakdown of the Brake Assembly, Pinch Roller Solenoid Assembly, and the Head Assembly; and schematics for the unit which incorporates an electrical parts list for both the "MPC" and "LAC" printed circuit cards.

6.2 ASSEMBLY DRAWINGS

The assembly drawings (front panel and chassis assembly) give the relationship of the components and list component assembly part numbers. The chassis assembly also lists chassis electrical parts both may be used for reordering purposes.

6.3 ILLUSTRATED PARTS BREAKDOWN

The illustrated parts breakdown lists sub-assemblies which may be reordered and may also be used to generate excellent assemblies or dis-assembly procedures.

The illustrated parts breakdown also contains two mounting options: case mount and rack mount. Both are illustrated in this section.

6.4 SCHEMATICS

The schematics for the unit are printed on the foldout pages for easy reference while reading the rest of the manual. On the inner portion of the foldout page is the assembly drawing for the schematic which lists all electrical parts on the schematic.

ILLUSTRATED PARTS BREAKDOWN

ITEM	PART NUMBER	DESCRIPTION	UNITS PER ASSEMBLY
6-3	C-C1924	PINCH ROLLER SOLENOID ASSEMBLY	1
1.	C-A2890	Mounting Bracket Solenoid	1
2.	A-A2900	Spring, Compression	1
3.	A-1078-2	Stud, Spring	1
4.	TH-ZA0905	Nut, Lock-Esna #79NM-50 (5-4ONC-3B (THD)	1
5.	TH-WA0612	Washer, #6 Flat S-604	1
6.	B-A2142	Block, Roller Mount	1
7.	A-A2144	Spring, Pinch Roller	1
8.	B-A2145	Bracket, Roller	1
9.	A-A2722	Roller, Tape	1
10.	A-A2224	Shaft, Roller	1
11.	TB-FF0006	Bearing, Flanged, New Hampshire SFR2-5PPEE	2
12.	TH-SC0801	Screw, #4-40 x 1/8 lg., Truss Hd. S-613	2
13.	TH-SC0803	Screw, #4-40 x 1/4 lg., Truss Hd. S-613	2
14.	TH-XB0901	Screw, #4-48 x 1/8, Set Cup Point	1
15.	TH-WB0403	Lockwasher, #4 Split	4
16.	A-1306	Button Striker	1
17.	TH-SC0807	Screw, #6 -32 x 1/2 lg., Truss Hd. S-613	2
18.	TH-WB0605	Lockwasher, #6 Split S-601	2
19.	TH-NB0905	Nut, #5-40, Hex S-613	2
20.	TH-WB0504	Lockwasher, #5 Split S-613	2
21.	AB-73-1	Solenoid Assembly	1

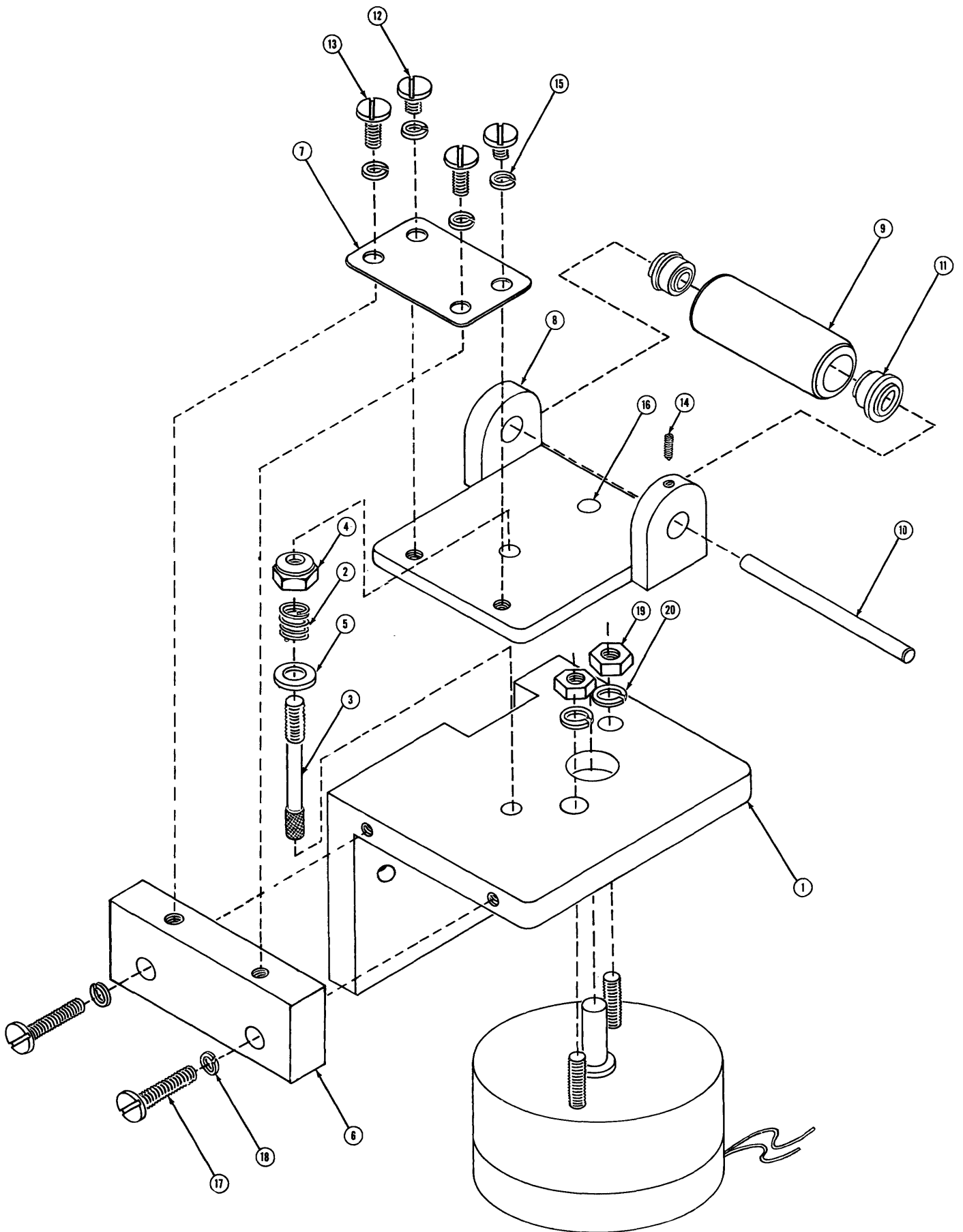


FIGURE 6-3 PINCH ROLLER SOLENOID ASSEMBLY

ILLUSTRATED PARTS BREAKDOWN

ITEM	PART NUMBER	DESCRIPTION	UNITS PER ASSEMBLY
6-4	B-C1142	BRAKE ASSEMBLY	1
1.	B-A2287	Base Plate	1
2.	B-C1143	Coil Assembly	1
3.	A-A2058	Armature	1
4.	A-A2905	Spring	1
5.	TH-WB0403	Lockwasher, #4 Split	4
6.	TH-SI0801	Screw, #4-40 x 1/8 lg., B.H.M.	4
7.	TH-SG1407	Screw, #8-32 x 1/2 lg., Flat Hd. Mach.	2

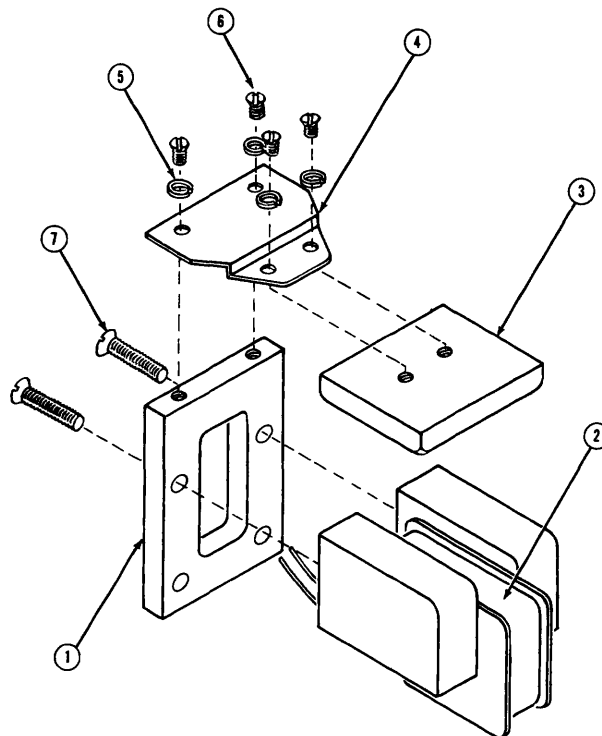
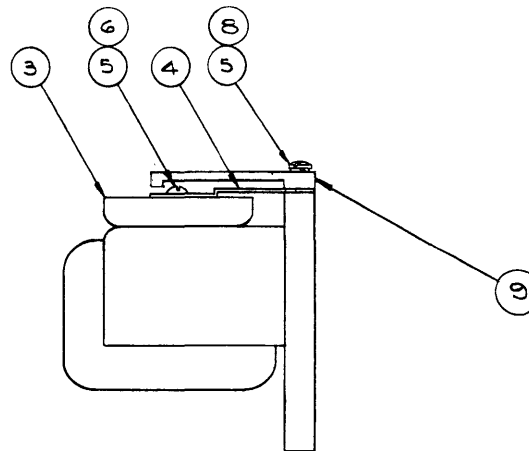
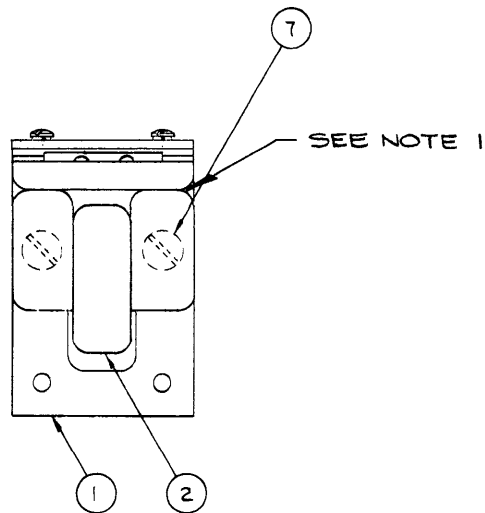


FIGURE 6-4 BRAKE ASSEMBLY

B C 1142 C

		DRWG No	DESCRIPTION
-0		BC1142	BRKE ASSY
QTY	ITEM	DRWG No	DESCRIPTION
1	001	BA2287	BASE
1	002	BC1143	COIL ASSEMBLY
1	003	AA2058	ARMATURE
1	004	AA2905	SPRING
4	005	TH-WB0103	LOCKWASHER #4 SPLIT
2	006	TH-SI0801	SCR # 4-40 x 1/8 LG BHM
2	007	TH-SG1407	SCR # 8-32 x 1/2 LG FHM
2	008	TH-SI0804	SCR # 4-40 x 5/16 LG BHM
1	009	AA4203	PLATE, LIMITER



1. ASSEMBLE AND ADJUST AS PER ED 175
NOTES:

C	ECO 4441	5-15-64
-	ADDED - 0, & UPDATED	12-6-63
B	ECO 3973	7-25-63
A	E.C.O. #2919	5-29-62
REV	E.C.O.	OWN. CHG. APP'D. NO. DAY YR.
MATERIAL		DFK 8-29-61
FINISH		SCALE: 1/1
TOLERANCES		DEC. ± .005
UNLESS OTHERWISE NOTED		FRACTION ± 1/64
		ANGLE ± 1/2°

DIGITRONICS ALBANY, NEW YORK	
TITLE: BRAKE ASSEMBLY	
USED ON: 10027	DRAWING NO. B C 1142

ILLUSTRATED PARTS BREAKDOWN

ITEM	PART NUMBER	DESCRIPTION	UNITS PER ASSEMBLY
6-5	B-C1443	READ HEAD ASSEMBLY	1
1.	TH-SI0805	Screw, #4-40 x 3/8 lg., BHM	2
2.	TH-SE0835	Screw, #4-40 x 9/16 lg., Fil. Hd. Mach.	2
3.	TH-WB0403	Lockwasher, #4 Split	4
4.	B-A2566	Base Plate	1
5.	A-A2462	Guide Block	1
6.			
7.	B-C1320	Head Assembly	1
8.	B-C1441	Adjustable Guide Assembly	1
9.	B-A2456	Housing, Adjustable Guide	1
10.	S-120-3	Ball	1
11.	TGRPR1212	"O" Ring	1
12.	TH-SI0803	Screw, #4-40 x 1/4 lg., BHM, S-615	1
13.	TH-WA0409	Washer, #4 Flat S-604	1
14.	A-A2635	Knob	1
15.	TH-XC1201	Screw, #6-32 x 1/8 lg., Soc. Hd. Set, Cupt Pt.	1
16.	B-C1943	Shaft/Arm Assembly	1

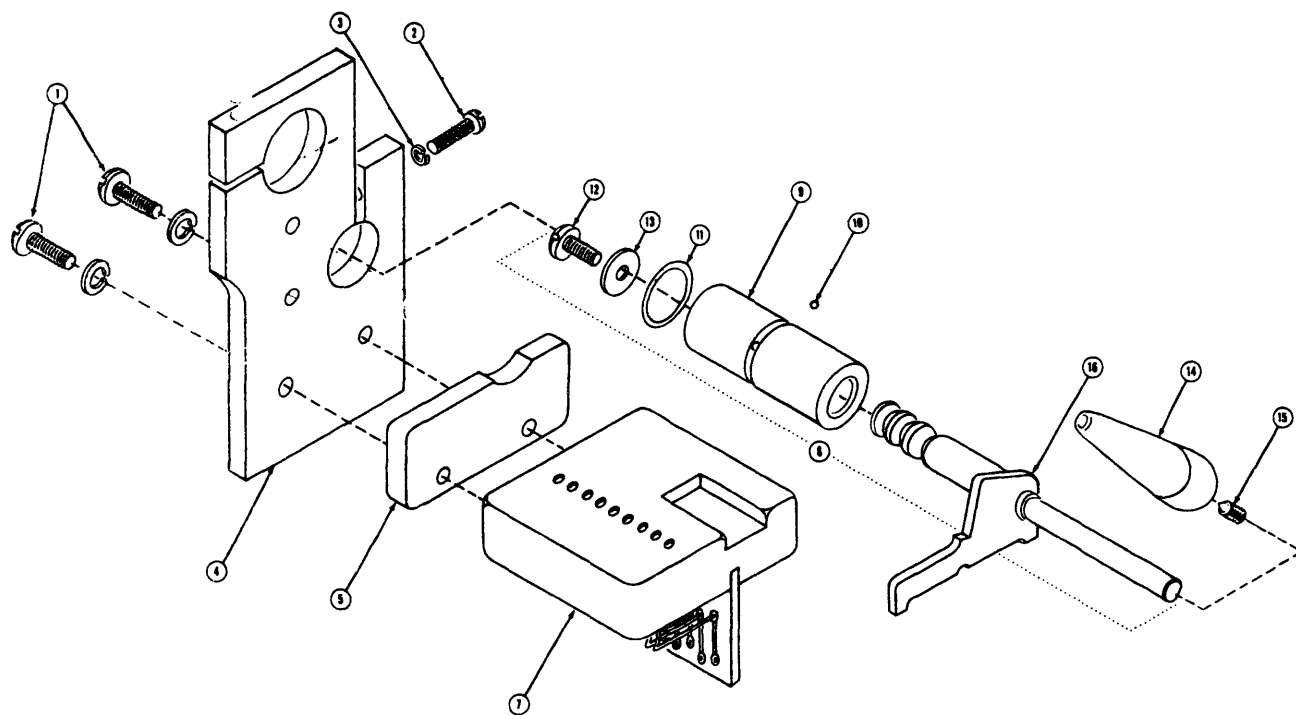


FIGURE 6-5 LENS AND HEAD ASSEMBLY

BC 1443 G

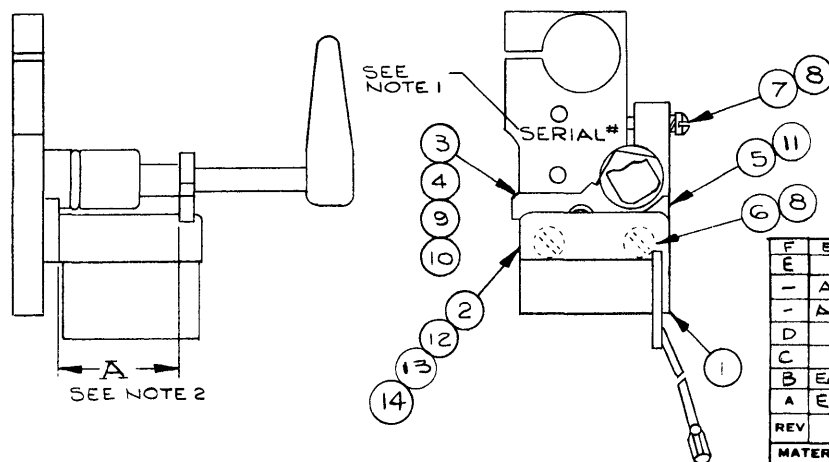
QUAN	QUAN	QUAN	QUAN	QUAN	QUAN	QUAN	QUAN	QUAN	QUAN	QUAN	QUAN	DESCRIPTION	PART NO	ITEM
1	1	1	1	1	1	1	1	1	1	1	1	BASE PLATE	B-A 2426	1
-	-	-	-	-	-	-	-	-	-	-	-	HEAD ASSEMBLY	B-C 1320-1	2
-	1	1	-	-	-	-	-	-	-	-	1	ADJUSTABLE GUIDE ASSEMBLY	B-C 1441	3
-	-	-	-	-	-	1	-	-	-	1	-	FIXED GUIDE ASSEMBLY	B-C 2475-1	4
1	1	1	-	1	1	1	-	1	1	1	1	GUIDE BLOCK	A-A 2462	5
2	2	2	2	2	2	2	2	2	2	2	2	SCREW # 4-40 x 3/8 LG. B.H.M.	TH-S10805	6
1	1	1	1	1	1	1	1	1	1	1	1	SCREW # 4-40 x 9/16 LG. FIL. HD. M.	TH-SE0835	7
3	3	3	3	3	3	3	3	3	3	3	3	LOCKWASHER # 4 SPLIT	TH-WB0403	8
1	-	-	1	-	1	-	1	-	1	-	-	FIXED GUIDE ASSEMBLY	B-C 2475-2	9
-	-	-	-	1	-	-	-	1	-	-	-	" " "	B-C 2475-3	10
-	-	-	1	-	-	-	1	-	-	-	-	GUIDE BLOCK (TELETYPE SETTER) TABLE	AA 2934	11
-	-	1	1	1	1	1	-	-	-	-	-	HEAD ASSEMBLY	CC1320-3	12
-	1	-	-	-	-	-	-	-	-	-	-	HEAD ASSEMBLY	CC1320-4	13
1	-	-	-	-	-	-	-	-	-	-	-	HEAD ASSEMBLY	CC4173-1	14

[illegible]

NOTES:

1. STAMP SERIAL NO & CHARACTERS
1/8 HIGH IN BLACK.
2. ADJUST GUIDE ASS'Y AS FOLLOWS:

<u>DWG. NO.</u>	<u>DIM A</u>
B-C 1443-9	1.0015 ± .0005
B-C 1443-1-5 d-10	1.0015 ± .0005
B-C 1443-2 d-6	.8765 ± .0005
B-C 1443-3 d-7	.6885 ± .0005
B-C 1443-4 d-8 1/1	.8765 ± .0005



← SEE BELOW

F	ECO 3564	LO	1	7-22-63
E	UPDATED P/L	JW	1	5-1-63
-	ADDED DASH 5th	JW	1	2-4-63
-	ADDED DASH-4	LD	1	12-6-62
D	3338	SR	1	10-16-62
C	3097	SR	1	7-30-62
B	ECO 3005	DRK	1	6-27-62
A	ECO 2919	DRK	1	6-4-62

REV	E.C.O.	DWN	CHKD	APP'D	MO. DAY YR.
MATERIAL		DFK	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	12-1-61
		SCALE: 1/1			

G	4500 (P/L)	X	X	8	8-20-64
REV	ECO				MO. DAY. YR.
<input checked="" type="checkbox"/>	ADDED -11	E	<input checked="" type="checkbox"/>	18	5-6-64
X	ADDED -10	SR	<input checked="" type="checkbox"/>	10	4-29-64

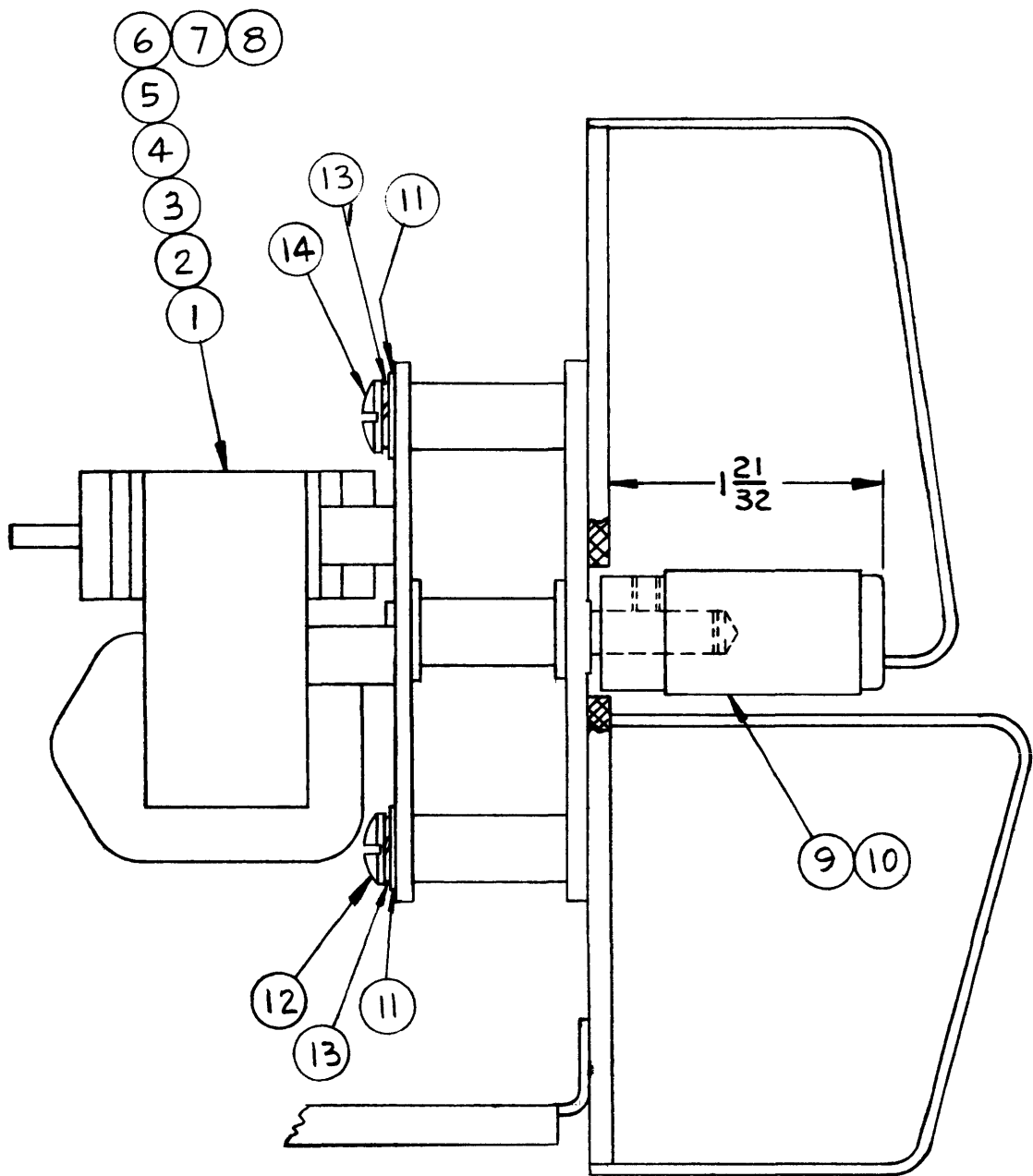
TOLERANCES UNLESS OTHERWISE NOTED	DEC. $\pm .003$	FRAC. $\pm 1/64$	ANGLE $\pm 1/2^\circ$
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DIGITRONICS
ALBERTSON, NEW YORK

TITLE: LENS & HEAD ASSEMBLY

USED ON:	DRAWING NO. B C 1443
----------	-------------------------



MOTOR OPTIONS



-9	-8	-7	-6	-5	-4	-3	-2	-1	DRWG. NO		DESCRIPTION		
									BC1935		MOTOR OPTION ASSY		
QTY	QTY	QTY	QTY	QTY	QTY	QTY	QTY	QTY	ITEM	DRWG. NO	DESCRIPTION		
1	-	-	-	-	-	-	1	-	001	CC2196	MTR ASSY MTR SPD(100)		
-	-	-	-	1	-	-	-	-	002	CC2196-1			(133)
-	-	-	1	-	-	-	-	-	003	CC2196-2			(75)
-	-	1	-	-	-	-	-	-	004	CC2196-3			(66)
-	1	-	-	-	-	-	-	-	005	CC2196-4			(50)
-	-	-	-	-	-	-	-	1	006	CC2197			(300)
-	-	-	-	-	-	1	-	-	007	CC2198			(400)
-	-	-	-	-	1	-	-	-	008	CC2549	MTR ASSY MTR SPD (200)		
		1	1	1	1	1	1	1	009	BC985	CAPSTAN ASSEMBLY		
1	-	-	-	-	-	-	-	-	010	BC1955	CAPSTAN ASSEMBLY		
3	3	3	3	3	3	3	3	3	011	TH-WA0814	WASHER #10 FLAT		
1	1	1	1	1	1	1	1	1	012	TH-SI1712	SCR #10-32X1 1/8 B.H.M.		
3	3	3	3	3	3	3	3	3	013	TH-WB0810	LOCKWASHER #10 SPLIT		
2	2	2	2	2	2	2	2	2	014	TH-SI1740	SCR.#10-32X1 3/16 B.H.M.		
									015				

G	4591	FB	HK	12	10-29-64
F	4539	F.B.	HK	12	9-18-64
E	ECO 4464	E	HK	12	6-9-64
D	3490	LD	HK	12	12-10-62
C	3115	SR	HK	12	8-6-62
B	3091	SR	HK	12	7-26-62
A	ADDED ITEM 5 ECO#2943	AP	HK	12	6-5-62
REV	E.C.O.	DWN.	CHKD.	APP'D.	MO. DAY YR.
MATERIAL		AP	HK	12	6-1-62
		SCALE: FULL			
FINISH					
TOLERANCES UNLESS OTHERWISE NOTED		DEC. ± .005	FRAC. ± 1/64	ANGLE ± 1/2°	

ADJUST PER E-D 48
WIRE AS PER DK 296 FOR MODEL 2500
WIRE AS PER DK 299 FOR MODEL 2500M

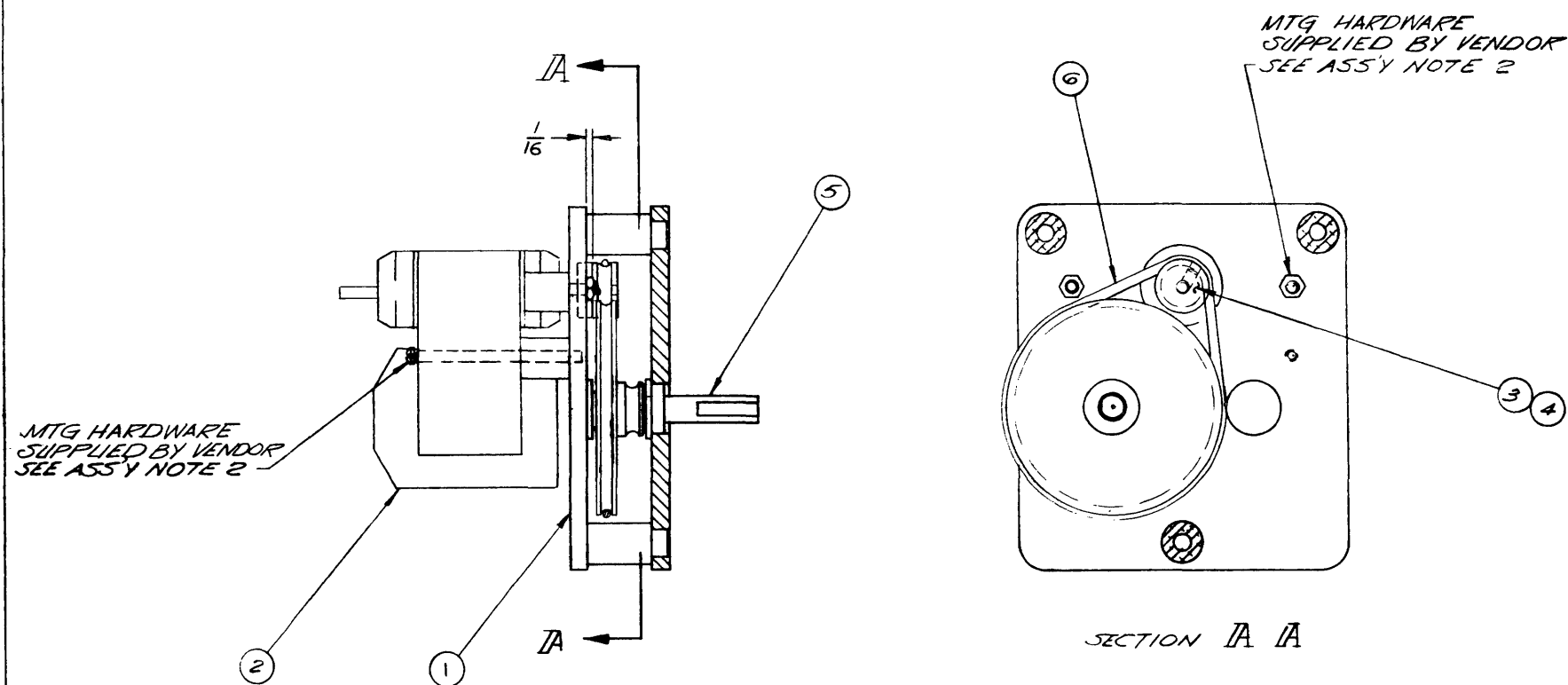
**DIGITRONICS**
ALBERTSON, NEW YORK

TITLE:
MOTOR OPTION ASSEMBLY

USED ON:

DRAWING NO.
B-C1935

QUAN	DESCRIPTION	REF STD	DWG NO	ITEM
1	PLATE, ASSY		B-C2154-2	1
1	MOTOR, MODIFICATION		B-C2847	2
1	PULLEY, MOTOR		A-A3085	3
1	SET SCREW #4-40 x 1/8 LG. ST. ST. CUR PT		TH-XB0801	4
1	PULLEY ASSEMBLY		B-C2152	5
1	O" RING, "DISOGRIN # 131		TGRPD0404	6
				7
				8



- ASSEMBLY PROCEDURE:
1. ASSEMBLE ITEM 3 (PULLEY, MOTOR) TO ITEM 2 (MOTOR) USING ITEM 4 (SET SCREW) AS SHOWN
 2. ASSEMBLE ITEM 2 (MOTOR) TO REAR PLATE OF ITEM 1 AS SHOWN
 3. ASSEMBLE 1 ITEM 5 (PULLEY ASSY) AS SHOWN
 4. ASSEMBLE ITEM 6 (O" RING) AS SHOWN
 5. PLACE FRONT PLATE OF ITEM 1 (PLATE ASSY) IN PLACE

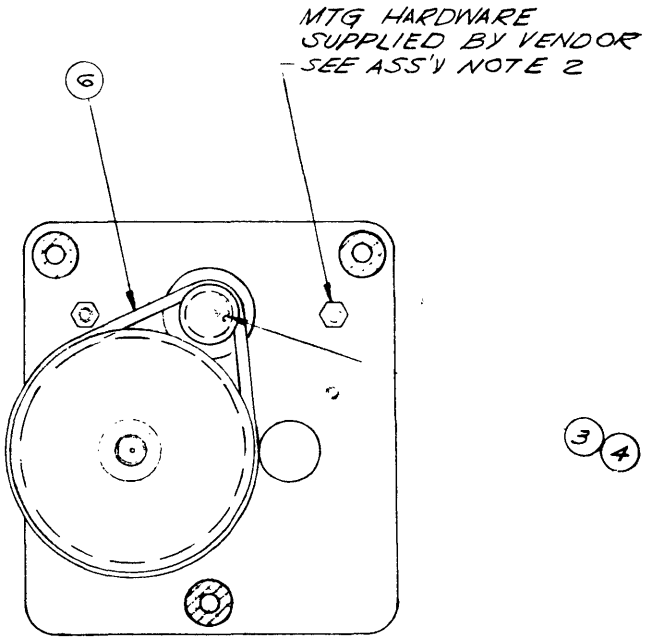
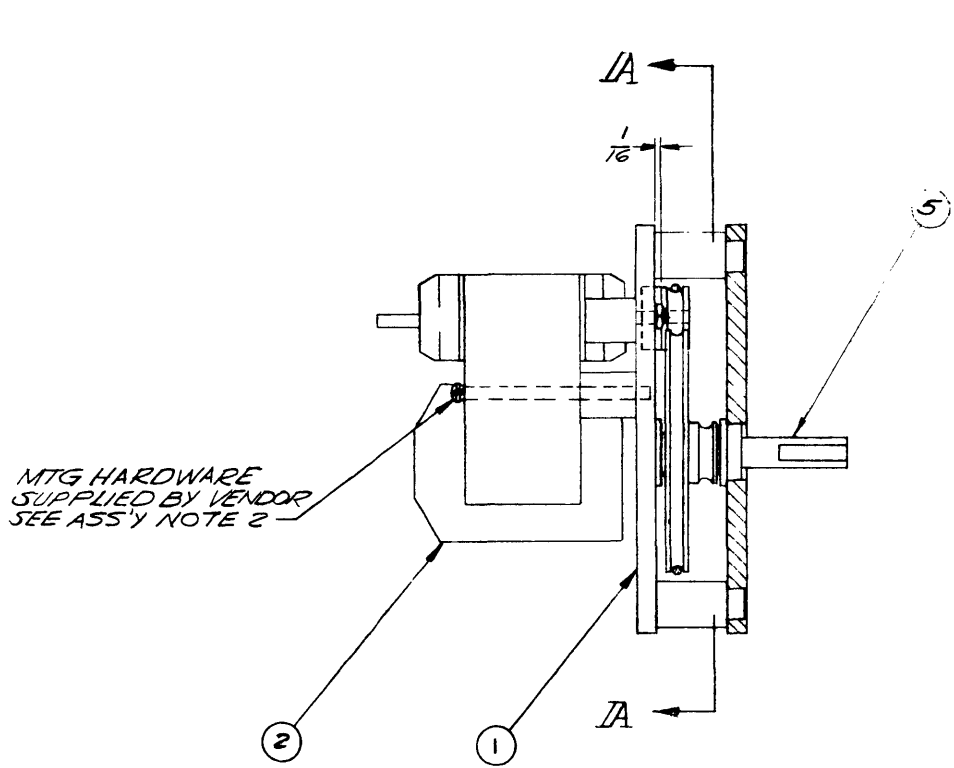
D	4024	E	7-20-63
C	ECO 3931	LD	7-9-63
B	ECO 3861	LD	6-10-63
A	UPDATED PL	SR	5-23-63
REV	E.C.O.	DWN	CHEK APP'D NO DAY YR.
MATERIAL		SCALE	1/1
FINISH			
TOLERANCES UNLESS OTHERWISE NOTED	DEC. ± .005	FRAC ± 1/64	ANGLE ± 1/2°

DIGITRONICS ALBERTSON NEW YORK	TITLE MOTOR-REDUCER ASS'Y -- (300 CH/SEC)
USED ON:	DRAWING NO. C-C2197

MOTOR-REDUCER ASSY.

CC2549C

QUAN	DESCRIPTION	REF STD	DWG. NO	ITEM
1	PLATE, ASSY		BC21542	1
1	MOTOR, MODIFICATION		BC2647	2
1	PULLEY, MOTOR		A43361	3
1	SET SCREW #4-40X1/8 LG. ST. ST. CUPPT.		TH-XB0801	4
1	PULLEY ASSEMBLY		BC2152	5
1	O" RING, "PRECISION" O" RING #131-8307		TGRPD0404	6
				7
				8



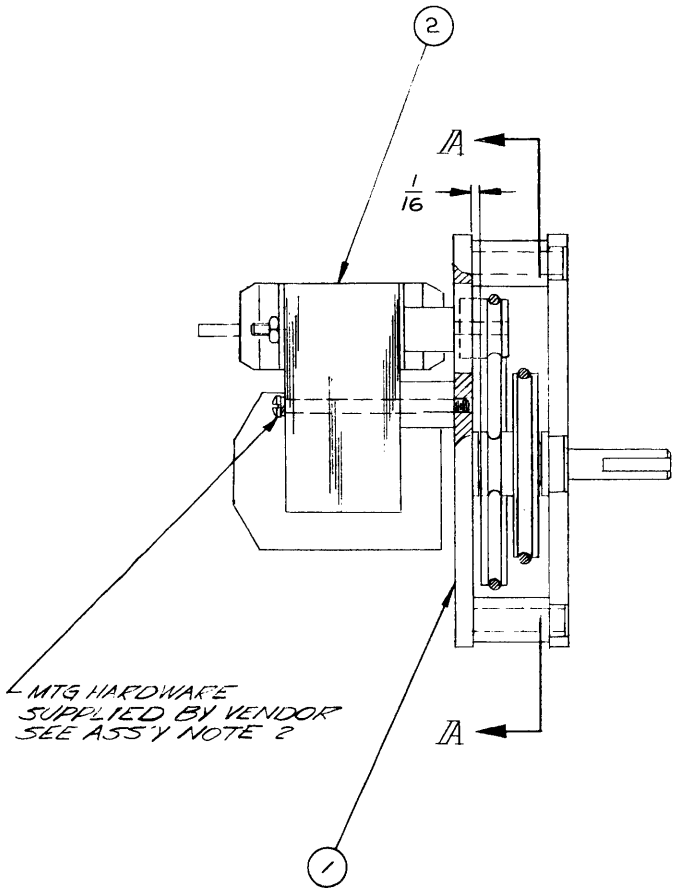
SECTION A A

- ASSEMBLY PROCEDURE:
1. ASSEMBLE ITEM 3 (PULLEY, MOTOR) TO ITEM 2 (MOTOR) USING ITEM 4 (SET SCREW) AS SHOWN
 2. ASSEMBLE ITEM 2 (MOTOR) TO REAR PLATE OF ITEM 1 AS SHOWN
 3. ASSEMBLE 1 ITEM 5 (PULLEY ASSY) AS SHOWN
 4. ASSEMBLE ITEM 6 (O" RING) AS SHOWN
 5. PLACE FRONT PLATE OF ITEM 1 (PLATE ASSY) IN PLACE

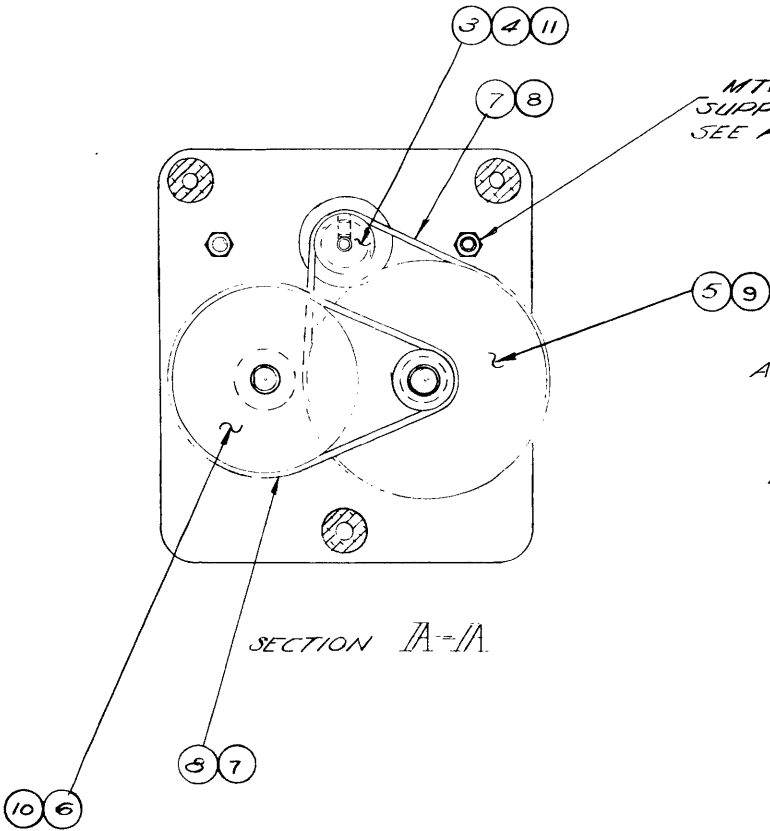
C	4363	(PL)	2	8-1464
B	4024	E	2	330-63
A	E.C.O. 3931	LD	2	7-8-63
REV	E.C.O.	OWN	LAST	APPL
MATERIAL		FIN	10-27-62	
TOLERANCES UNLESS OTHERWISE NOTED				
DIGITRONICS ALBANY, NEW YORK				
MOTOR-REDUCER ASS'Y - (200 CH/SEC)				
DRAWING NO CC2549				

QUAN	QUAN	QUAN	QUAN	QUAN	DESCRIPTION	REF STD	DWG NO	ITEM
1	1	1	1	1	PLATE ASSEMBLY		B-C2154-1	1
1	1	1	1	1	MOTOR, MODIFICATION		E C2847	2
-	-	1	1	1	PULLEY, MOTOR		BA4638-1	3
1	1	1	1	1	SET SCREW #4-40x1/8 LG. ST. ST. CUT PT.		TH-XB0801	4
1	1	1	-	1	PULLEY ASSEMBLY		BC2153	5
-	1	-	1	1	PULLEY ASSEMBLY		B-C21512	6
2	1	2	-	1	"O" RING, "DISOGRIN" #131		TGRPD0404	7
-	1	-	2	1	"O" RING "DISOGRIN" #129		TGRPD0202	8
-	-	-	1	-	PULLEY ASS'Y		BC2153-1	9
1	-	1	-	-	PULLEY ASS'Y		BC2152-1	10
1	1	-	-	-	PULLEY MOTOR		BA 4638-2	11
								12
								13
								14

CC2196-4
(50 CH / SEC.)
CC2196-3
(66 CH / SEC.)
CC2196-2
(133 CH / SEC.)
CC2196-1
(133 CH / SEC.)
CC2196
(100 CH / SEC.)





MTG HARDWARE
SUPPLIED BY VENDOR
SEE ASSY NOTE 2



MTG HARDWARE
SUPPLIED BY VENDOR
SEE ASSY NOTE 2

- ASSEMBLY PROCEDURE:
1. ASSEMBLE ITEM 3 OR 11 (PULLEY, MOTOR) TO ITEM 2 (MOTOR) USING ITEM 4 (SET SCREW) AS SHOWN
 2. ASSEMBLE ITEM 2 (MOTOR) TO REAR PLATE OF ITEM 1 AS SHOWN
 3. PLACE ITEM 5, 19 (PULLEY ASSEMBLY) IN PLACE & ASSEMBLE ITEM 7 OR 8 ("O" RING) AS SHOWN
 4. PLACE ITEM 6, 10 (PULLEY ASSEMBLY) IN PLACE & ASSEMBLE ITEM 7 & 8 ("O" RING) AS SHOWN
 5. PLACE FRONT PLATE OF ITEM 1 (PLATE ASSEMBLY) IN PLACE

F 4264	SR	2-10-64
E 4024	LD	5-30-63
D E.C.O. 3931	LD	7-9-63
C E.C.O. 3861	LD	5-10-63
B 3813	LD	5-10-63
A 3670	SR	2-26-63
- ADDED DASH NO	LD	7-7-62
- P/T HRU-4	LD	7-21-62
REV	E.C.O.	DWN. CHD. APP'D. MO. DAY. YR.
MATERIAL		SCALE 1/1
FINISH		
TOLERANCES UNLESS OTHERWISE NOTED	DEC. ± .005	FRAC. ± 1/64
		ANGLE ± 1/2°

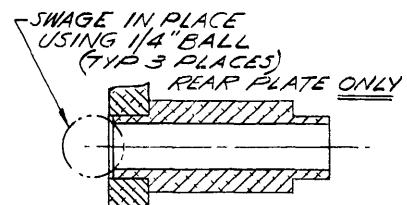
**DIGITRONICS**
ALBION, NEW YORK

TITLE:
MOTOR - REDUCER ASS'Y

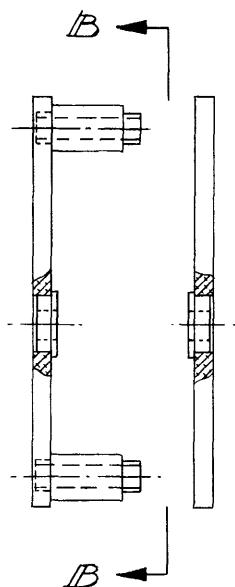
USED ON:
C-C2196

DRAWING NO.
C-C2196

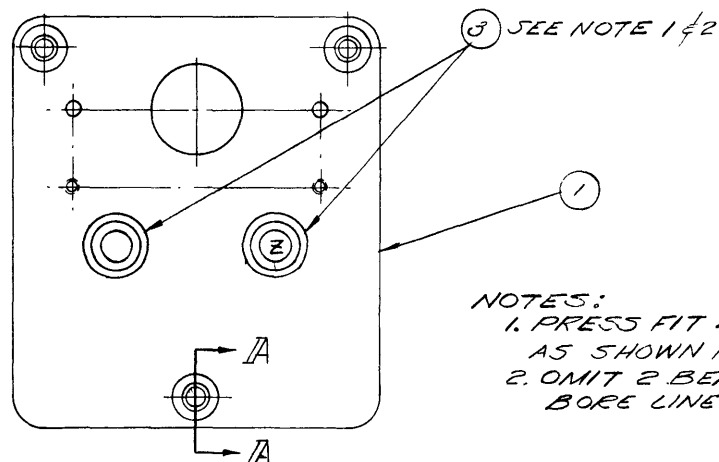
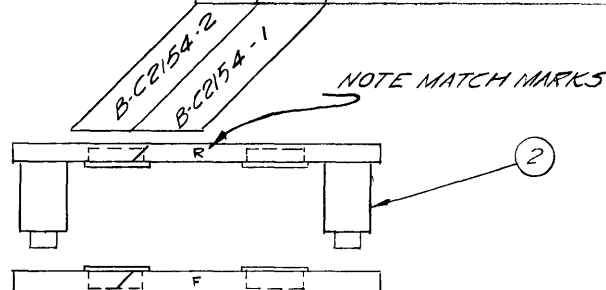
B-C2154 B



SECTION A-A
SCALE 2/1





QUAN	QUAN	DESCRIPTION	DWG NO.	ITEM
1	1	PLATES, REDUCER HOUSING	B-A3078	1
3	3	SPACER	A-A3077	2
2	4	BEARING, NEW HAMPSHIRE #5FRI	TB-BR0017	3



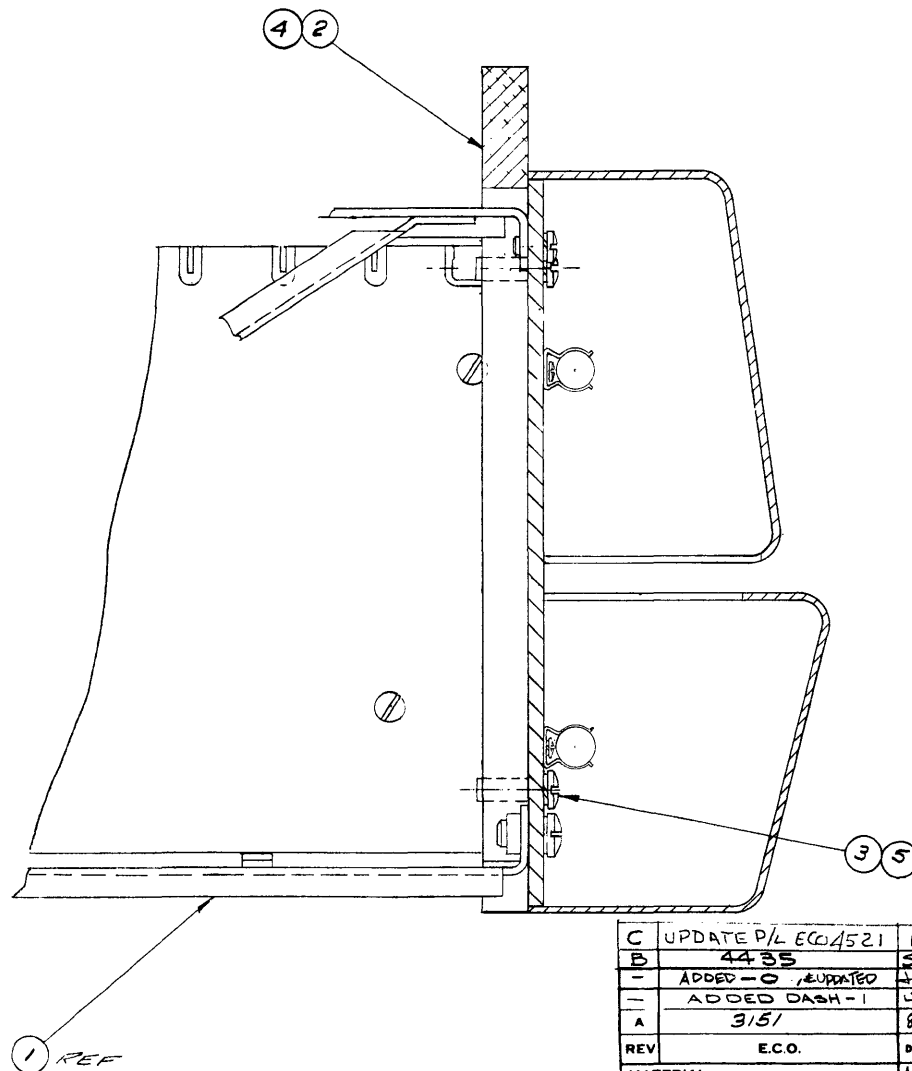
VIEW B-B

- NOTES:
1. PRESS FIT 4 BEARINGS AS SHOWN FOR B-C2154-1
 2. OMIT 2 BEARINGS AT BORE LINE (Z) FOR B-C2154-2

 DIGITRONICS 	
<small>ALBERTSON, NEW YORK</small>	
TITLE:	
PLATE ASS'Y	
USED ON:	DRAWING NO. B-C2154

MOUNTING OPTIONS

BC1936C



DWG NO. BC 1936				DESCRIPTION RACK MOUNTING OPTION ASSY
REF	REF	QTY	PART NO.	DESCRIPTION
-	1	001	CA2476	PANEL RACK MOUNTING
3	3	003	TH-SI1707	SCRE #10-32x5/8 BHM
1	-	004	CA2476-1	PANEL RACK MOUNTING
3	3	005	TH-WB0810	LOCKWASHER, SPLIT #10
-	REF	006	AT 67	PAINT AS PER
REF	-	007	AT175	PAINT AS PER

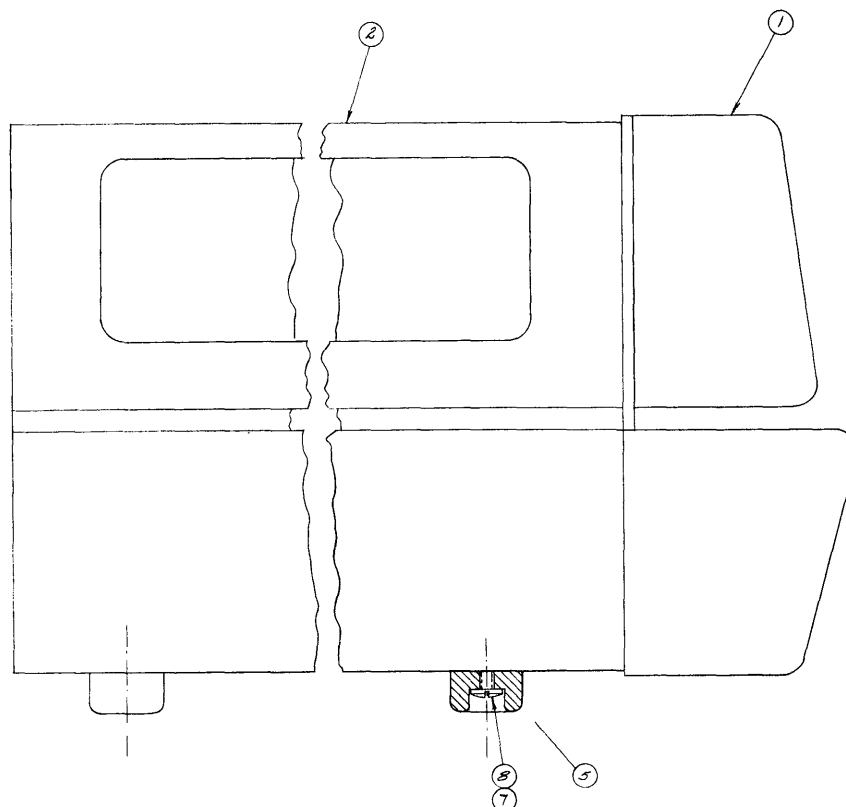
C	UPDATE P/L ECO 4521	INC	X	X	8-28-64
B	4435	SR	Y	Y	6-9-64
-	ADDED - O, UPDATED	LD	Y	Y	12-6-63
-	ADDED DASH-1	LD	Y	Y	12-6-62
A	3/5/	LD	Y	Y	8-27-62
REV	E.C.O.	DWN.	CHKD.	APP'D.	MO. DAY YR.
MATERIAL		85. WMS 6-2-62			
FINISH		SCALE: 1/1			
TOLERANCES UNLESS OTHERWISE NOTED		DEC. ± .005	FRAC. ± 1/64	ANGLE ± 1/2°	

DIGITRONICS ALBERTSON, NEW YORK		TITLE: RACK MOUNTING OPTION A.T.S.Y.
USED ON:		DRAWING NO. BC1936

C-C 1937

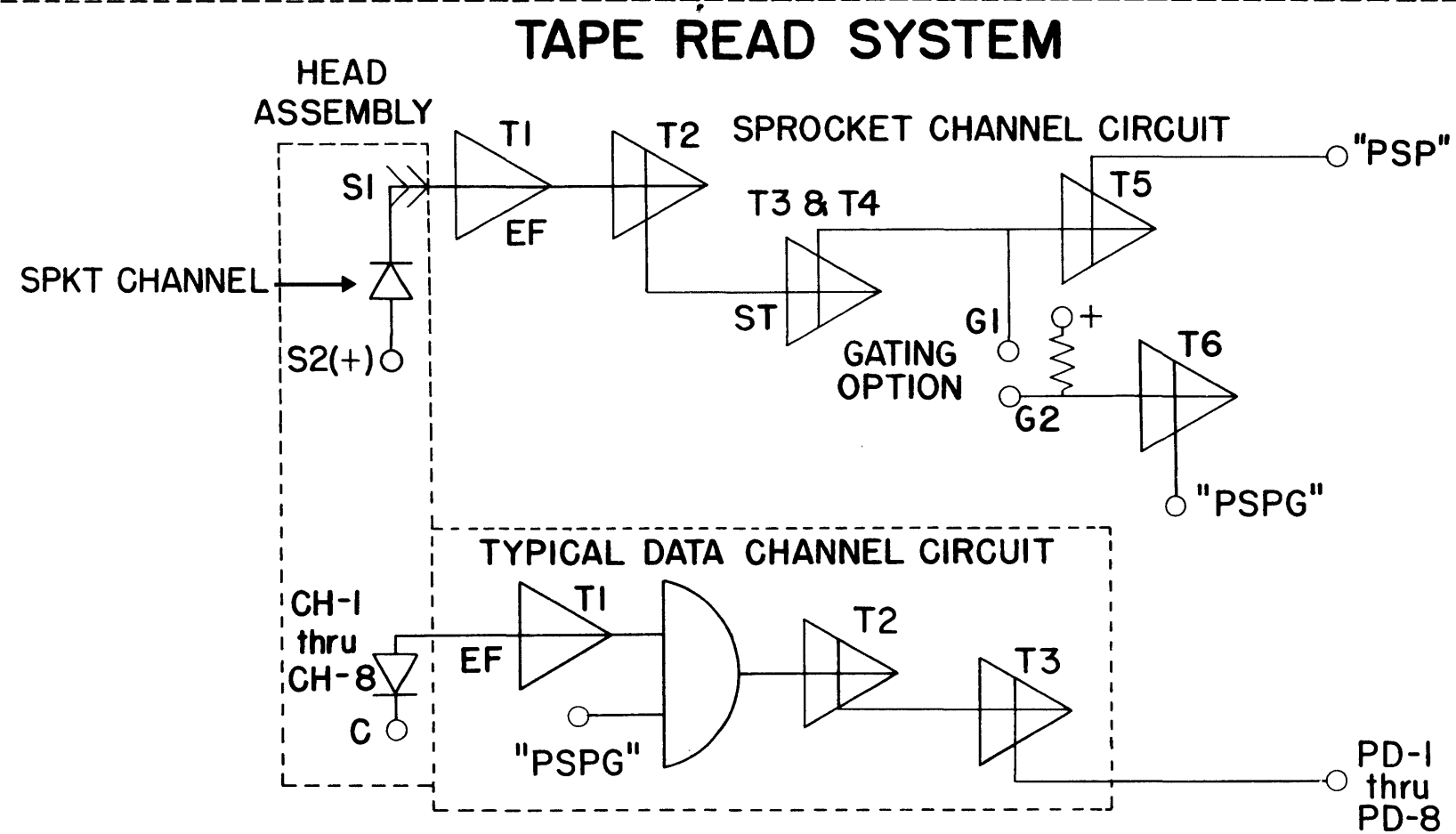
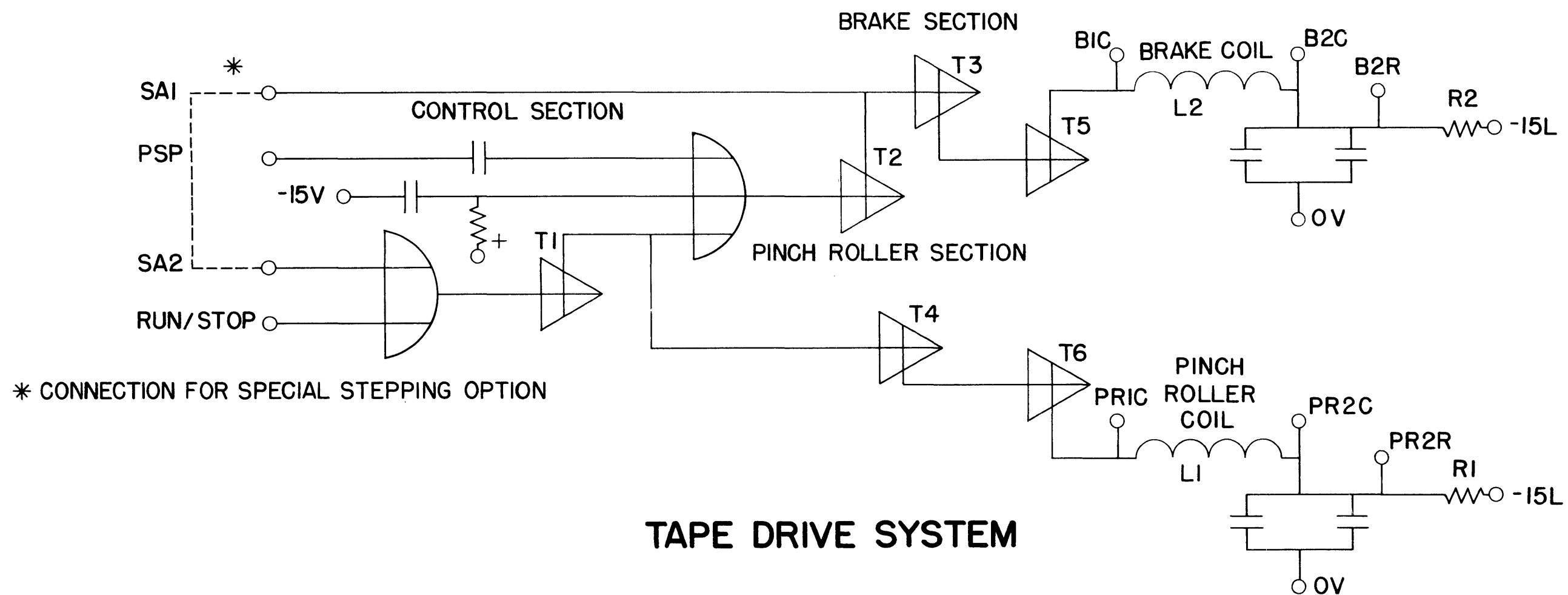
QTY	QTY	DESCRIPTION	PART NO.	ITEM
REF	REF	READER ASS'Y		1
—	1	CASE ASS'Y (PAINTED)	D-C 1928	2
1	—	CASE ASS'Y (UNPAINTED)	DC 1928-1	3
				4
4	4	RUBBER FOOT, ATLANTIC INDIA RUBBER #18		5
				6
4	4	LOCKWASHER # 8, SPLIT	TH-WB0712	7
4	4	SCREW, B. H. #8-32 x 1/2	TH-S1407	8
				9
				10
				11

CC 1927-1
REVISED
CC 1937
AT 67

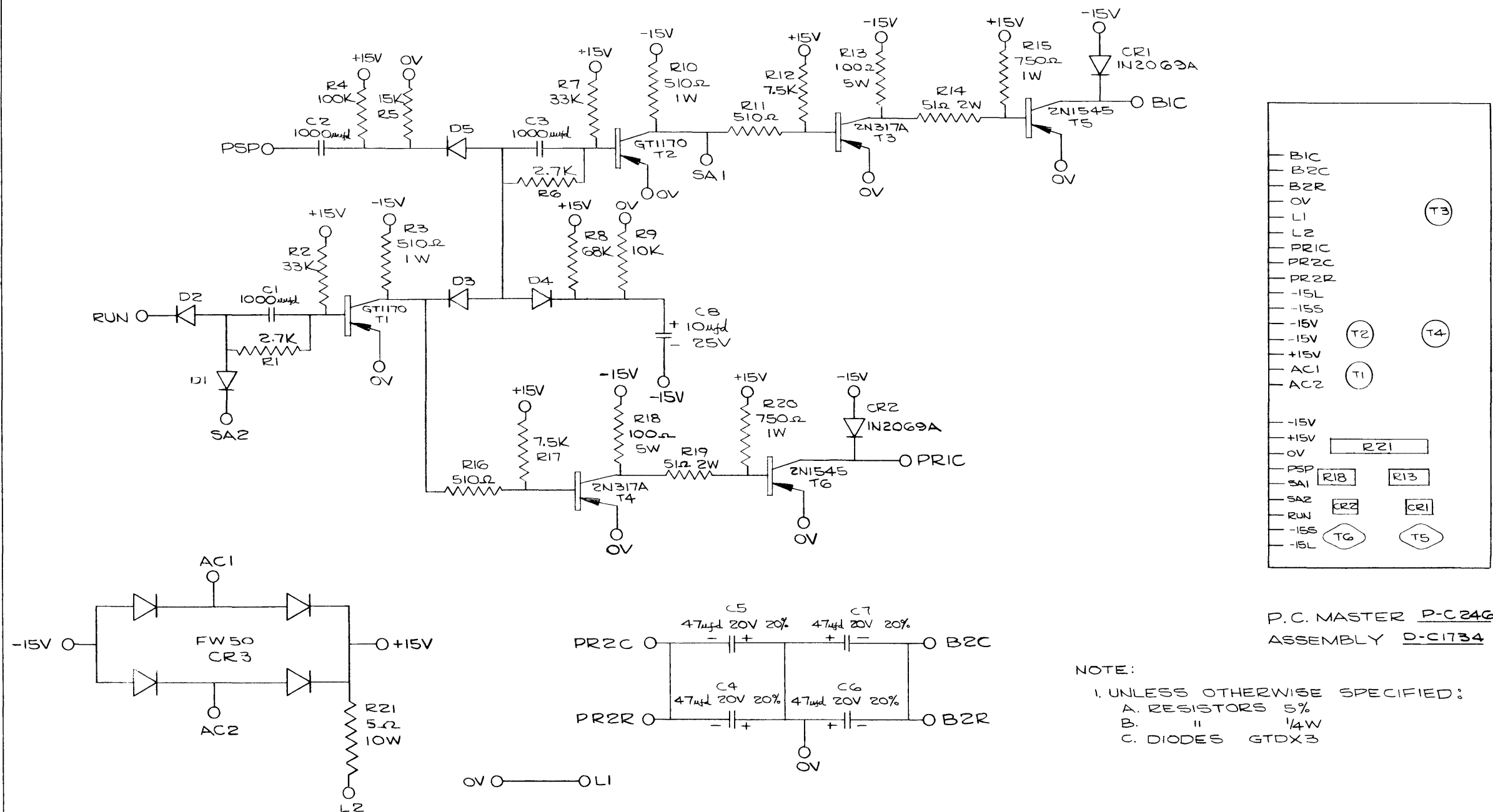


ADDED DASH - 1		VD 12-7-62	DIGITRONICS ALBANY, NEW YORK
A	3215	RH JMS 9-7-62	
REV	E.C.O.	DNV. CHD. APP'D. NO. DAY YR.	TITLE: CASE ASSEMBLY OPTION (ECONOMY READER)
MATERIAL		AP 19 6-4-62	
FINISH		SCALE: FULL	USED ON: 10027
TOLERANCES UNLESS OTHERWISE NOTED		DEC. ± .005	
		FRAC. ± 1/64	DRAWING NO. C-C 1937
		ANGLE ± 1/2°	

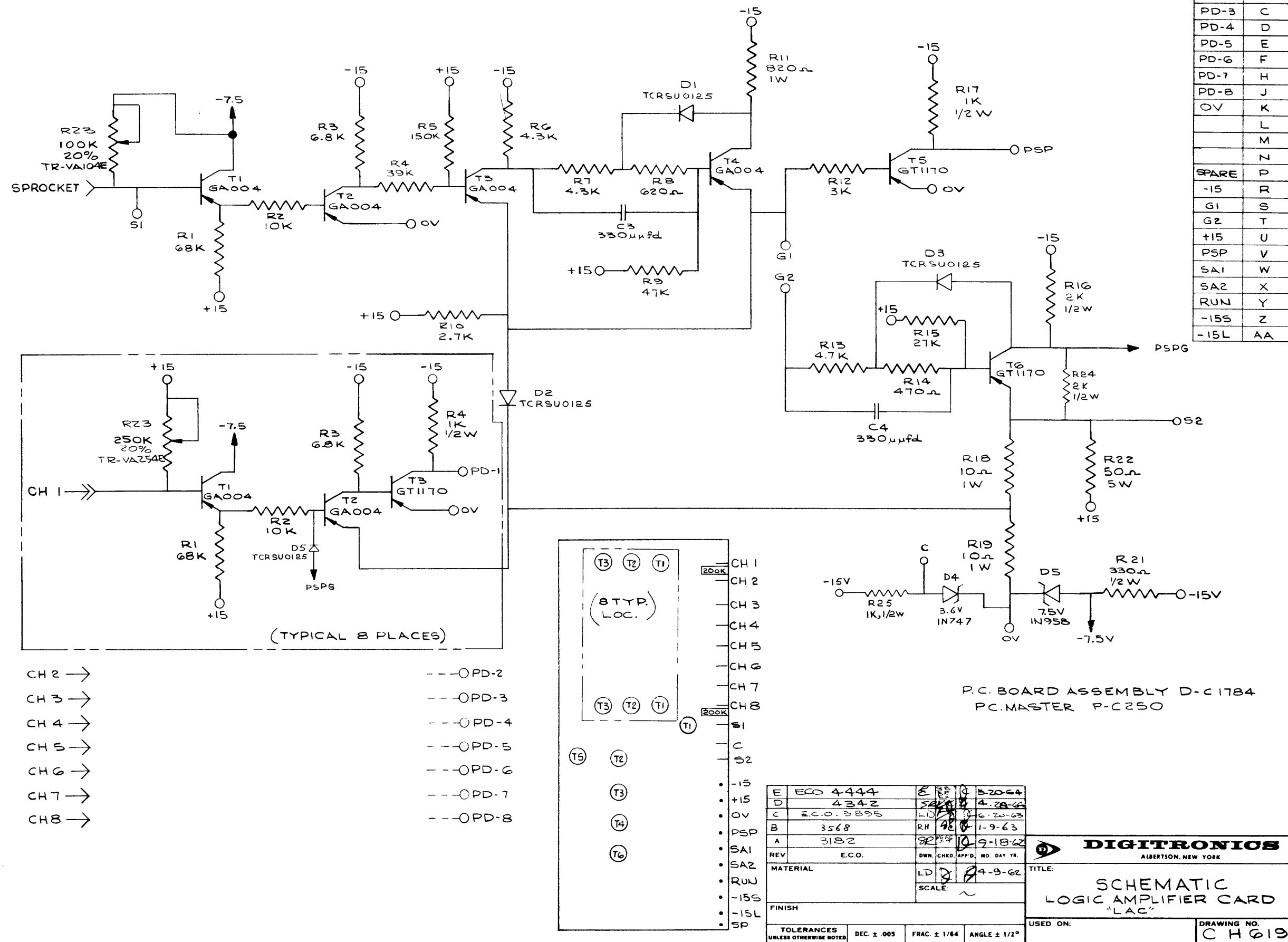
**LOGIC DIAGRAM, SCHEMATICS,
AND WIRING DIAGRAM**

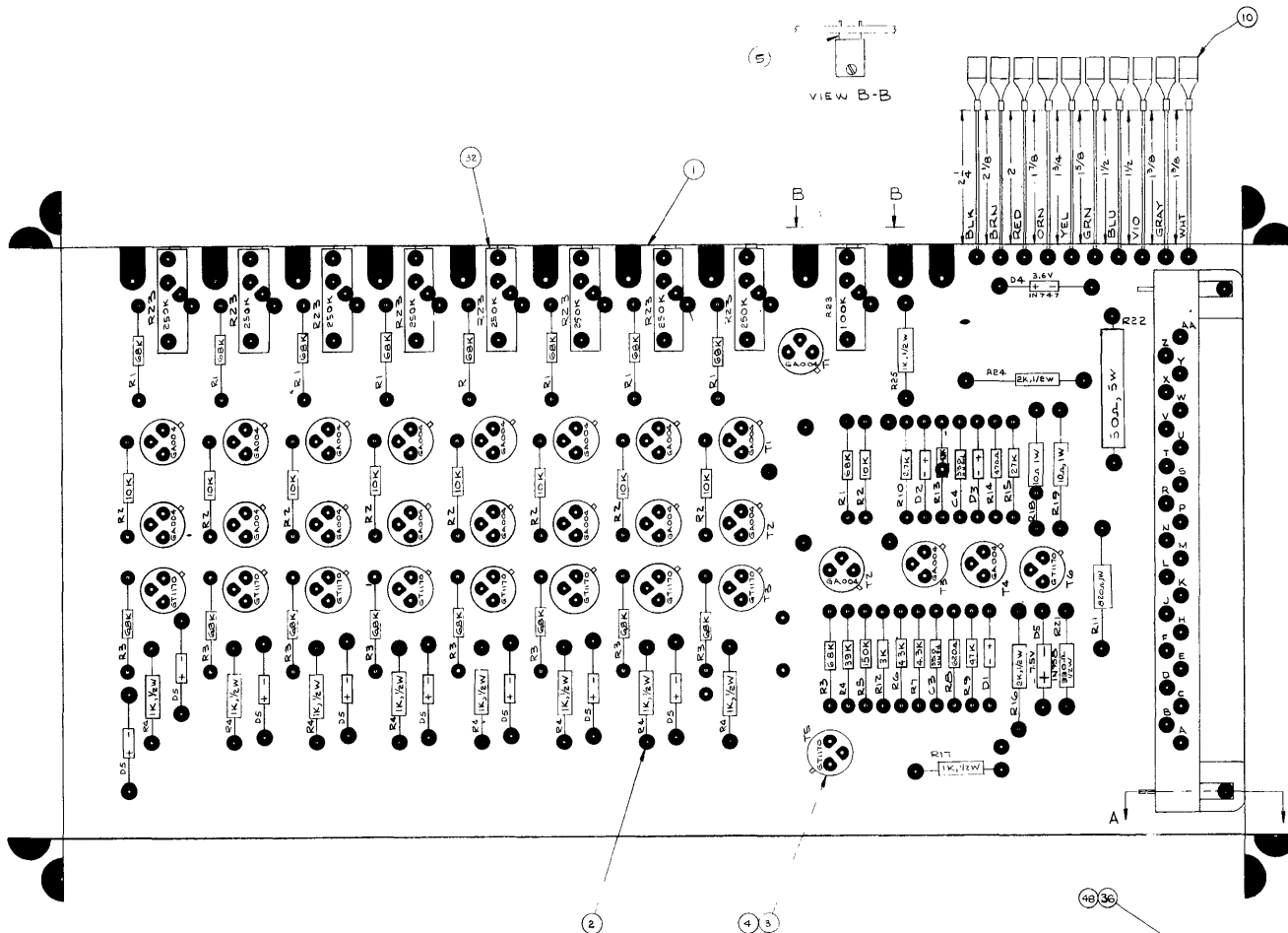


MODEL 2500



B	3182	3-27-62	9-18-62
A	3151	5-27-62	8-27-62
REV	E.C.O.	DWN. CHKD. APP'D.	NO DAY YR.
MATERIAL		RND	3-27-62
FINISH		SCALE	
TOLERANCES UNLESS OTHERWISE NOTED	DEC. ± .005	FRAC ± 1/64	ANGLE ± 1/2°
USED ON:		10027	DRAWING NO. C-H617
		DIGITRONICS ALBERTSON, NEW YORK	
		TITLE: SCHEMATIC, "MPC"	





VIEW B-B

SECTION A-A

QTY	QTY	DESCRIPTION	DWG. NO.	ITEM
1	1	BOARD DRILLED (REF. PG. 250)	CA 2752	1
120	120	EYELET	TY-SA0001	2
102	102	EYELET	TY-SA0002	3
30	30	TRANSISTOR SPACER	TQ-SA0001	4
9	9	SPACER	AA4B12	5
				6
20	20	TRANSISTOR, GA004	TQ-SA0004	7
10	10	GT1170	TQ-SA1170	8
				9
10	9	CONNECTOR SINGLE CKT EDGE AMP	TH-LJ1002	10
11	11	DIODE	TCR60125	11
1	1	" 1N747	TCR60747	12
1	1	DIODE, 1N955	TCR60955	13
				14
2	2	CAPACITOR, 350 μ F	TC-MB331C	15
				16
1	1	RESISTOR, 100K ADJ	TR-VA104E	17
1	1	RESISTOR, 47K, 1/4W 5%	TE-CC472C	18
2	2	RESISTOR, 10K, 1W 5%	TE-CC100C	19
1	1	" 50K, 1W	TE-CC500C	20
1	1	" 300K, 1/2W 5%	TE-CC301C	21
1	1	" 470K, 1/4W	TE-CC471C	22
1	1	" 820K, 1W	TE-CC821C	23
10	10	" 1K, 1/4W	TE-CC101C	24
1	1	" 3K, 1/4W	TE-CC302C	25
2	2	" 43K	TE-CC432C	26
9	9	" 68K	TE-CC681C	27
9	9	" 10K	TE-CC102C	28
9	9	" 68K	TE-CC682C	29
1	1	" 33K	TE-CC332C	30
1	1	" 150K	TE-CC151C	31
3	3	" 250K 20% ADJ	TE-VA251E	32
1	1	" 620K 1/4W 5%	TE-CC621C	33
2	2	" 2K, 1/8W 5%	TE-CC202C	34
1	1	" 27K, 1/4 5%	TE-CC272C	35
1	1	CONNECTOR, U.S. COMPONENTS	TJ-MP02301	36
1	1	RESISTOR, 27K, 1/4W 5%	TE-CC272C	37
1	1	WIRE #22 GA (BLK)	TW-F22000	38
1	1	" " (BRN)	TW-F22111	39
1	1	" " (RED)	TW-F22222	40
1	1	" " (GRN)	TW-F22333	41
1	1	" " (YEL)	TW-F22444	42
1	1	" " (GRN)	TW-F22555	43
1	1	" " (BLU)	TW-F22666	44
1	1	" " (VIO)	TW-F22777	45
1	1	" " (GRAY)	TW-F22888	46
1	1	RESISTOR, 47K, 1/4W 5%	TE-CC472C	47
2	2	SCREW #4-40X3/16 LG FHM	TH-SG0002	48
1	1	WIRE #22 GA(WHT)	TW-F22999	49

REF. SCHEMATIC DWG
DC1784-0 — CH 617
DC1784-1 — CH 773

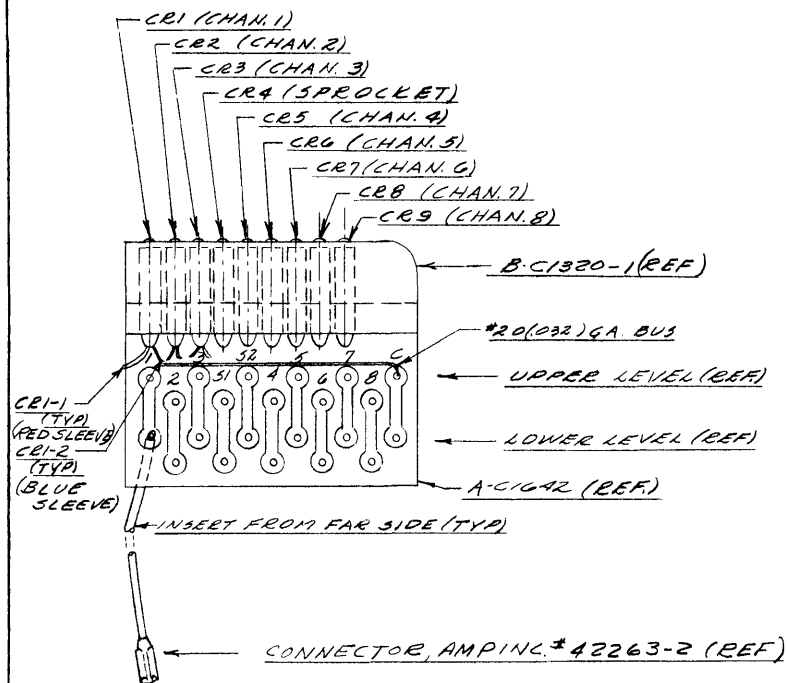
L	4526	LO	10-13-64
K	4500	K	8-20-64
J	4444	J	8-20-64
I	4342	I	4-28-64
H	ECO 4322	H	5-6-64
F	ECO 4395	F	6-20-64
E	ADDD -1	E	2-28-65
D	3568	D	7-1-65
C	3494	C	12-18-65
B	3182	B	9-10-65
A	EC-O, R1781	A	4-17-66

DIGITRONICS
ALBANY, NEW YORK

PCBOARD ASSEMBLY
LOGIC AMPLIFIER CARD
"LAC"

USED ON: **DC1784**

DATE: 4-6-68

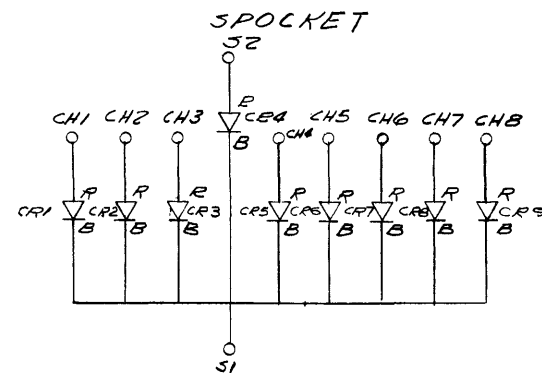




NOTES:

1. DIODE LEADS INDICATED BY A RED DOT ON THE DIODE IS TO BE INSULATED WITH A RED SLEEVE (THESE WILL BE REFERRED TO AS CR1-R, CR2-R, CR3-R, CR4-R, ETC)
2. THE REMAINING LEAD FROM EACH DIODE ARE TO BE INSULATED WITH A BLUE SLEEVE (THESE WILL BE REFERRED TO AS CR1-B, CR2-B, CR3-B, ETC)

		LOWER LEVEL CABLE #24 GA.			
FROM	TO	FROM	TO	LGTH	COLOR *TERM
CR1-R	A-C1642-1 UPPER LEVEL	A-C1642-1 LOWER LEVEL		9"	BLK. 1
CR1-B	-C				
CR2-R	-2	-2		9 3/4"	BEN 2
CR2-B	-C				
CR3-R	-3	-3		10 1/2"	RED 3
CR3-B	-C				
CR4-B	-51	-4		11 1/4"	GRN 4
CR4-R	-52	-5		12"	YEL 5
CR5-R	-4	-6		12 3/4"	GRN 6
CR5-B	-C				
CR6-R	-5	-7		13 1/2"	BLU 7
CR6-B	-C				
CR7-R	-6	-8		14 1/4"	PUR 8
CR7-B	-C				
CR8-R	-7	-51		15"	GRAY 51
CR8-B	-C				
CR9-R	-8	-C		15 3/4"	WHI C
CR9-B	-C	-52		16 1/8"	BLK/WHI 52

* AMPLIFIER CARD - REF



 DIGITRONICS 	
ALBERTSON, NEW YORK	
TITLE:	
PHOTO DIODE HEAD WIRING DIAGRAM	
USED ON:	DRAWING NO.
10,027	B-4295

APPENDIX A

CLAIM FOR DAMAGE IN SHIPMENT

The instrument should be tested as soon as it is received. If it fails to operate properly, or is damaged in any way, a claim should be filed with the carrier. A full report of the damage should be obtained by the claim agent, and this report should be forwarded to us. We will then advise you of the disposition to be made of the equipment and arrange for repair or replacement. Include model number, type number and serial number when referring to this instrument for any reason.

WARRANTY

Digitronics Corporation warrants each instrument manufactured by them to be free from defects in material and workmanship. Our liability under this warranty is limited to servicing or adjusting any instrument returned to the factory for that purpose and to replace any defective parts thereof (except tubes and fuses). This warranty is effective for one year after delivery to the original purchaser when the instrument is returned, transportation charges prepaid by the original purchaser, and which upon our examination is disclosed to our satisfaction to be defective. If the fault has been caused by misuse or abnormal conditions of operation, repairs will be billed at cost. In this case, an estimate will be submitted before the work is started.

If any fault develops, the following steps should be taken:

1. Notify us, giving full details of the difficulty, and include the model number, type number and serial number. On receipt of this information, we will give you service instructions or shipping data.
2. On receipt of shipping instructions, forward the instrument prepaid, and repairs will be made at the factory. If requested, an estimate will be made before work begins provided the instrument is not covered by the warranty.

SHIPPING

All shipments of Digitronics Corporation instruments should be made via Railway Express. The instruments should be packed in a wooden box and surrounded by two or three inches of excelsior or similar shock-absorbing material.

TRANSISTOR SPECIFICATIONS

APPENDIX B

TRANSISTOR and DIODE LIST

Specified in this manual are certain transistors and diodes indicated with an asterisk (*) which are manufactured to our specifications and therefore not available commercially. Listed below are Digitronics part numbers for re-ordering information.

<u>Transistor</u>	<u>Part Number</u>
2N357A	TQ-SB357A
2N317	TQ-SA317A
2N1545	TQ-PA1545
GA004 *	TQ-SAA004
GA005 *	TQ-SB0005
GT1170 *	TQ-SA1170
GT1659 *	TQ-SB1659
2N598	TQ-SA0598

Diodes

1N91	1N2069A (replaces 1N91)
DX2 *	TCRSU0125
DX3 *	TCRSU0125
GTD230 *	TCRSU0125
1N2069A	TCRP2069A

The following pages list the electrical and physical characteristics (and equivalents wherever possible) for these units to facilitate replacement or possible substitution.

I. DIODE

125

CLASS

SWITCHING

MATERIAL

GERMANIUM

CATAGORY

GOLD BONDED JUNCTION
(UNIVERSAL TYPE)

II. PARAMETERS (at 25 degrees C unless otherwise noted)

POWER DISSIPATION 80 mw @ $\phi^{-1} = 1\text{mw}/^{\circ}\text{C}$ PIV 35 V (min) @ 100 uaI reverse 10 V (min) @ 10 ua
50ua @ 55°CV forward 0.45 @ 10 ma

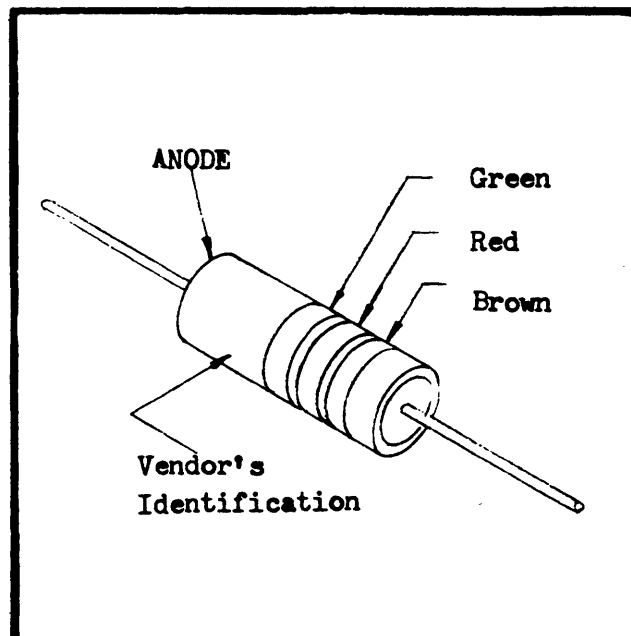
I peak _____ @ _____

I average 70 ma @ 0.7 V (max)I surge 300 ma @ $V_f \leq 1.5$ V per 10 ms @ 5CPS (5% duty cycle)

NOTE: 1. Recovery as per ED-10 _____

with tr \leq 0.3 usec

2. Environmental as per ED-67. _____

3. Replaces DX2 (S-151), DX3 (S-152)GTD230 (S-153)**DIGITRONICS**

ALBERTSON, NEW YORK



TITLE:

DIODE, 125

A				9/13/62
REV	E.C.O.	CHKD.	APP'D.	MO. DAY YR.

USED ON:

DRAWING NO. TCR SU0125

I. TRANSISTOR	CLASS	MATERIAL	POLARITY
1170	SWITCH	Ge	PNP

II. PARAMETERS (at 25 degrees C unless otherwise noted)

POWER DISSIPATION 150 M. W.

DERATING FACTOR 2.5 MW/°C

IC (max) 40 M.A.

BVCBO(min) 18 @ $I_c = 100 \mu a$ *VCE (max) 0.5 V @ $I_c = 40 \text{ MA}$ $I_b = 2 \text{ ma}$

BVCES (min) @ *VCE (max) @

BVCEO (min) 1 @ $I_c = 600 \mu a$ *VBE (max) 0.5 V @ $I_c = 40 \text{ ma}$ $I_b = 2 \text{ ma}$

BVEBO(min) 10 @ $I_e = 50 \mu a$ *VBE (max) @

ICBO (max) 8 μa @ VCB = 10V

hFE (min) 25 @ $I_c = 40 \text{ MA}$ VC = 0.5V

hFE (min) @

* SATURATION

NOTE: 1. Time response as per

ED - 68 with

$T_f = 0.7 \mu s$ MAX $T_o = 0.4 \mu s$ MAX

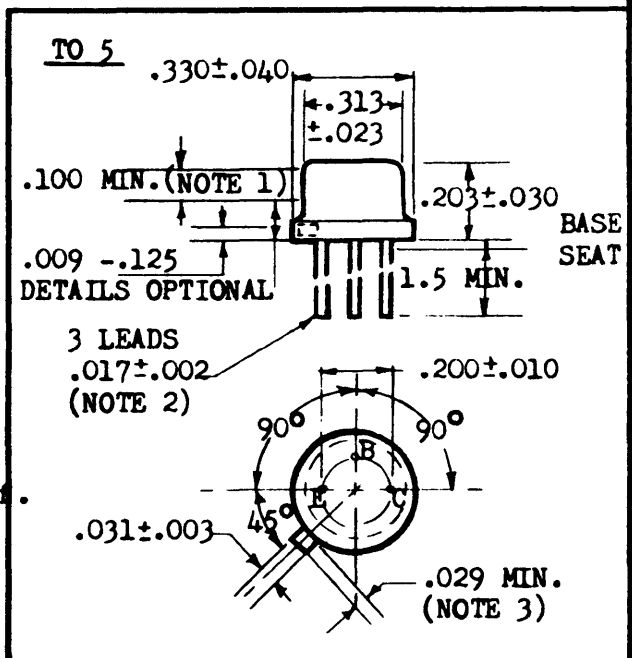
2. Environmental as per

ED - 67

3. Replaceable by TQ-SA0222

NOTES FOR TO 5:

- Controlled for automatic handling.
Dia. not to exceed .010.
- Lead dia. variation between
.050 and .250 from base seat as specifi.
Between .250 and 1.5 a max. of .021 dia.
is held.
- Measure from max. dia. of the actual
device.



DIGITRONICS

ALBERTSON, NEW YORK



TITLE:

TRANSISTOR

A				7/13/62
REV	E.C.O.	CHKD.	APP'D.	MO. DAY YR.

USED ON:

DIGITRONICS PART NUMBERS

DRAWING NO.

TQ-SA1170

I. TRANSISTOR	CLASS	MATERIAL	POLARITY
<u>TQS -GA004</u>	<u>SWITCH</u>	<u>Ge</u>	<u>PNP</u>

II. PARAMETERS (at 25 degrees C unless otherwise noted)

POWER DISSIPATION 150 mw DERATING FACTOR 2 MW/° C

IC (max) 50 ma

BVCB (min) 25 V @ Ic = 25 ua *VCE (max) 0.5 V @ Ic = 5 MA, Ib = 1MA

BVCES (min) 20 V @ Ic = 25 ua *VCE (max) _____ @ _____

BVCEO (min) _____ @ _____ *VBE (max) 0.5V @ Ic = 5MA, Ib = 1MA

BVEB (min) 15 V @ Ic = 25 ua *VBE (max) _____ @ _____

ICBO (max) 3 ua @ Vcb = 10V

hFE (min) 80 @ Ic = 5 ma VCE = 0.5 V

hFE (min) _____ @ _____

* SATURATION

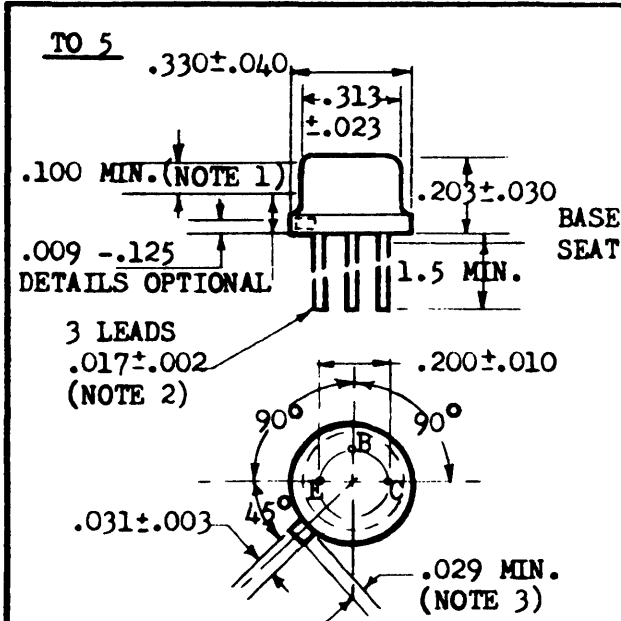
NOTE: Time response as per ED-68 with

Tf = 1us MAX, To = 0.5us MAX

environmental as per ED-67.

NOTES FOR TO 5:

1. Controlled for automatic handling.
Dia. not to exceed .010.
2. Lead dia. variation between
.050 and .250 from base seat as specif.
Between .250 and 1.5 a max. of .021 dia.
is held.
3. Measure from max. dia. of the actual
device.



DIGITRONICS

ALBERTSON, NEW YORK



TITLE

TRANSISTOR

A				9/18/62	USED ON:	DRAWING NO.
REV	E.C.O.	CHKD.	APP'D.	MO. DAY YR.	DIGITRONICS PART NUMBERS	TQ-SAA004

I. TRANSISTOR CLASS MATERIAL POLARITY
2N 1545 POWER Ge PNP

II. PARAMETERS (at 25 degrees C unless otherwise noted)

POWER DISSIPATION 80 WATTS DERATING FACTOR 1.25 W/°C

IC (max) 5 AMP.

BVCB0 (min) 60 V @ IC = 20 MA MAX *VCE (max) 0.3 V @ IC = 3AMPS Ib = 300MA

BVCES (min) 45 V @ IC = .5A *VCE (max) _____ @ _____

BVCEO (min) 30 V @ IC = .5A MAX, Ib = 0 *VBE (max) 0.5 V @ IC = 3AMPS Ib = 300MA

BVEB0 (min) 12 V @ Ie = 0.5 MA MAX *VBE (max) _____ @ _____

ICB0 (max) 20 MA @ tb = +90° C, Vcb = 22 V

hFE (min) 75 @ IC = 3.0 AMPS Vc = 2V

hFE (min) _____ @ _____

* SATURATION Switching time: Test Spec. See Note Below

NOTE: _____

Environmental as per ED-67

NOTE FOR TO 3:

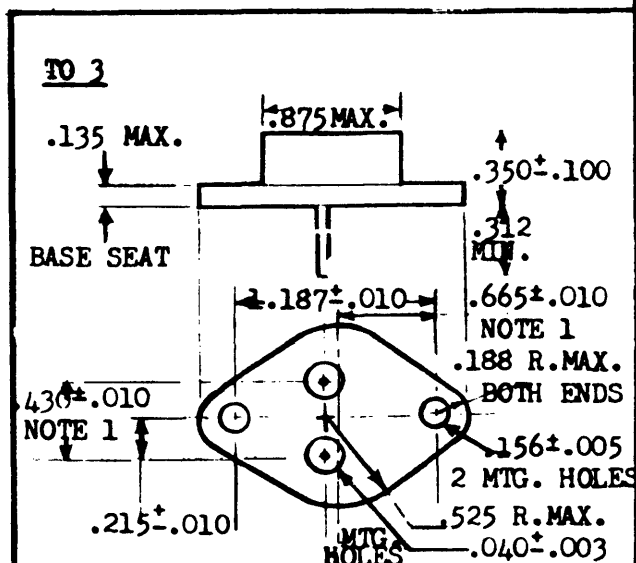
- These dimensions should be measured at points .050 to .005 below seating plane. When gage is not used, measurement will be made at base seat.



SWITCHING TIME:

TEST SPEC:

SEE (1) Motorola power Transistor Handbook, 1960 Edition, Page 181

(2) Clevite Transistor Bulletin TB 231-2
 March 1, 1962



 DIGITRONICS 	
ALBERTSON, NEW YORK	
TITLE:	
TRANSISTOR	

A				USED ON:	DRAWING NO.
REV	E.C.O.	CHKD.	APP'D.	DIGITRONICS PART NUMBERS	TQ-PA1545

I. TRANSISTOR	CLASS	MATERIAL	POLARITY
2N317A	SWITCH	Ge	PNP

II. PARAMETERS (at 25 degrees C unless otherwise noted)

POWER DISSIPATION 150 MW DERATING FACTOR 2 MW/°C

IC (max) 400 MA

BVCBO (min) 20 V @ Ic = 25 uA MAX *VCE (max) .2 V @ Ic = 400 MA, Ib = 20MA

BVCES (min) _____ @ _____ *VCE (max) _____ @ _____

BVCEO (min) 10 V @ Ic = 600 uA MAX *VBE (max) .95 V @ Ic = 400 MA, Ib=20MA

BVEBO (min) 20 V @ Ie = 25 uA MAX *VBE (max) .45 V @ Ib = 1 MA

ICBO (max) 2 uA @ VCE = 5 V

hFE (min) 20 @ Ic = 400 MA VCE = .25 V

hFE (min) 65 @ Ib = 1 MA VCE = .25 V

* SATURATION

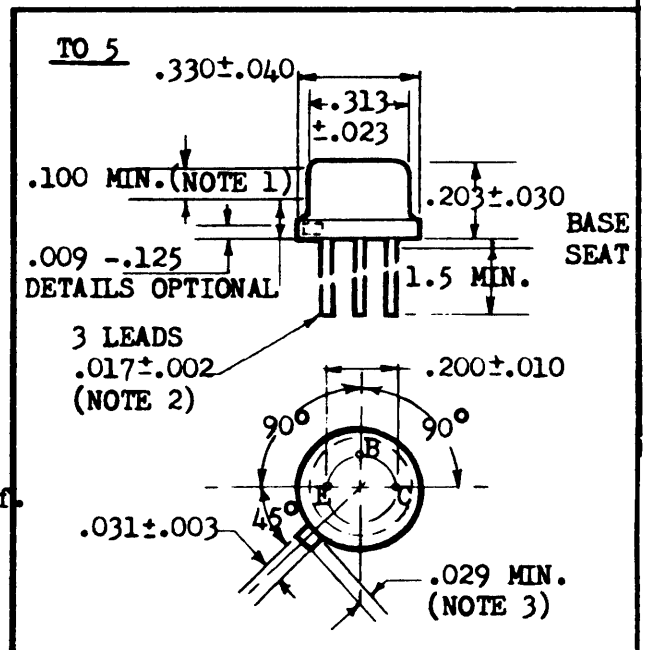
NOTE: Time Response as per ED-69 with

Tf = 0.7us MAX, To = 0.4us MAX

environmental as per ED-67.

NOTES FOR TO 5:

- Controlled for automatic handling.
Dia. not to exceed .010.
- Lead dia. variation between
.050 and .250 from base seat as specif.
Between .250 and 1.5 a max. of .021 dia.
is held.
- Measure from max. dia. of the actual
device.



DIGITRONICS

ALBERTSON, NEW YORK



TITLE

TRANSISTOR

A				9/13/62
REV	E.C.O.	CHKD.	APP'D.	MO. DAY YR.

USED ON:

DIGITRONICS PART NUMBERS

DRAWING NO.

TQ-SA317A

I. TRANSISTOR
2N 357A

CLASS
SWITCH

MATERIAL
Ge

POLARITY
NPN

II. PARAMETERS (at 25 degrees C unless otherwise noted)

POWER DISSIPATION 150 MW DERATING FACTOR 2 MW/°C

IC (max) 400 MA

BVCBO (min) 30 V @ Ic = 25 uA *VCE (max) 0.5 @ Ic = 200 MA IB = 10 MA

BVCES (min) 25V @ Ic = 100 ua *VCE (max) _____ @ _____

BVCEO (min) _____ @ _____ *VBE (max) 0.5V @ Ic = 200 MA IB = 10 MA

BVEBO (min) 6V @ IE = 10 ua *VBE (max) _____ @ _____

ICBO (max) 25ua @ VCB = 30 V

hFE (min) 25 @ Ic = 200 MA Vc = 0.25 V

hFE (min) _____ @ _____

* SATURATION

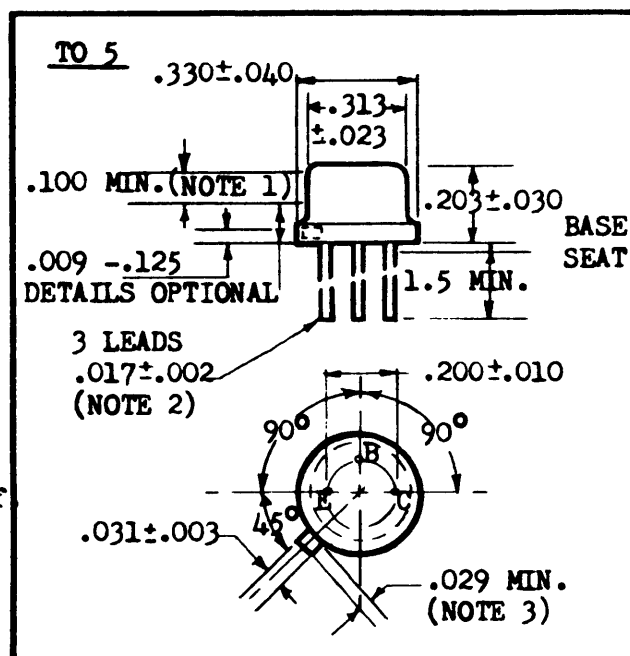
NOTE: Time Response as per ED-69 with

Tf = 0.7us MAX, To = 0.4us MAX

environmental as per ED-67.

NOTES FOR TO 5:

1. Controlled for automatic handling.
Dia. not to exceed .010.
2. Lead dia. variation between
.050 and .250 from base seat as specif.
Between .250 and 1.5 a max. of .021 dia.
is held.
3. Measure from max. dia. of the actual
device.



DIGITRONICS

ALBERTSON, NEW YORK



TITLE:

TRANSISTOR

A				9/20/62
REV	E.C.O.	CHKD.	APP'D.	MO. DAY YR.

USED ON:

DIGITRONICS PART NUMBERS

DRAWING NO.

TQ-5B357A

I. TRANSISTOR GA 005	CLASS SWITCH	MATERIAL Ge	POLARITY NPN
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II. PARAMETERS (at 25 degrees C unless otherwise noted)

POWER DISSIPATION 150 MW DERATING FACTOR 2 MW/°C

IC (max) 50 MA

BVCBO (min) 25V @ Ic = 25 ua *VCE (max) 0.5V @ Ic = 5MA, Ib = 1MA

BVCES (min) 20 @ Ic = 25 ua *VCE (max) _____ @ _____

BVCEO (min) _____ @ _____ *VBE (max) 0.5V @ Ic = 5MA, Ib = 1MA

BVEBO (min) 15V @ Ic = 25 ua *VBE (max) _____ @ _____

ICBO (max) 3 ua @ Vcb = 0V

hFE (min) 80 @ Ic = 5MA, Vce = 0.5V

hFE (min) _____ @ _____

* SATURATION

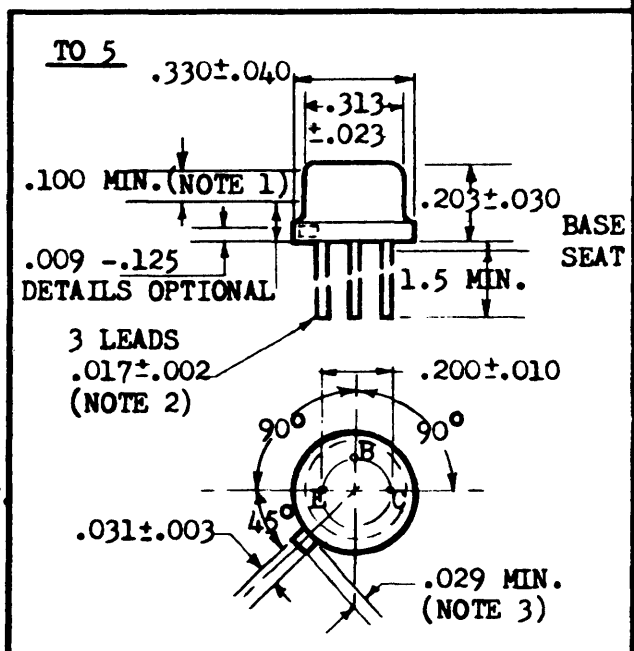
NOTE: Time response as per ED-69

Tf = 1.0us MAX, To = 0.5us MAX

environmental as per ED-67.

NOTES FOR TO 5:

1. Controlled for automatic handling.
Dia. not to exceed .010.
2. Lead dia. variation between
.050 and .250 from base seat as specif.
Between .250 and 1.5 a max. of .021 dia.
is held.
3. Measure from max. dia. of the actual
device.



DIGITRONICS

ALBERTSON, NEW YORK



TITLE:

TRANSISTOR

A				
REV	E.C.O.	CHKD.	APP'D.	NO. DAY YR.

USED ON:
DIGITRONICS PART NUMBERS

DRAWING NO.
TQ-SB0005

I. TRANSISTOR CLASS MATERIAL POLARITY
1659 SWITCH Ge NPN

II. PARAMETERS (at 25 degrees C unless otherwise noted)

POWER DISSIPATION 150 mw DERATING FACTOR 2 mw/°C

IC (max) 100 MA

BVCBO (min) 35V @ Ic = 25ua *VCE (max) .2V @ Ic = 20ma, Ib = 0.5ma

BVCES (min) 30V @ Ic = 25ua *VCE (max) @

BVCEO (min) @ *VBE (max) .4V @ Ic = 20MA, Ib = 0.5 ma

BVEBO (min) 10V @ IE = 10 uA *VBE (max) @

ICBO (max) 10ua @ VCB = 12 V

hFE (min) 40 @ Ic = 20MA, Vc = 0.5V

hFE (min) 30 @ Ic = 100 MA Vc = 0.5V

* SATURATION

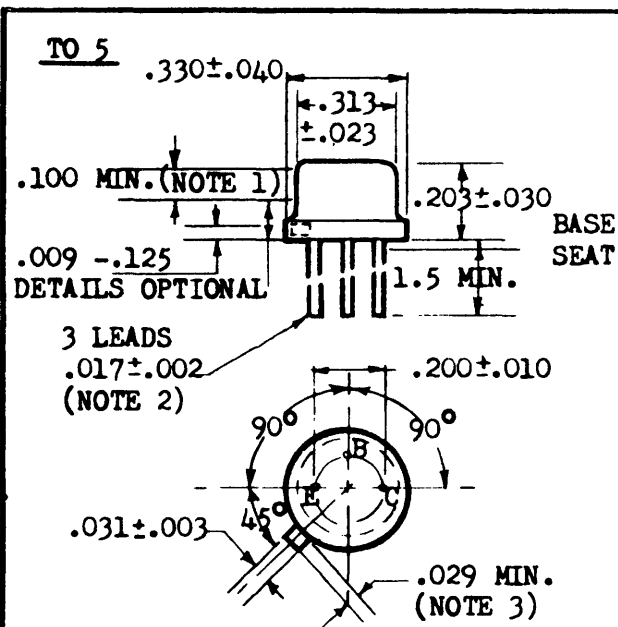
NOTE: Time Response as per ED-69 with

Tf = 0.7us MAX, To = 0.4us MAX

Environmental as per ED-67.

NOTES FOR TO 5:

- Controlled for automatic handling.
Dia. not to exceed .010.
- Lead dia. variation between
.050 and .250 from base seat as specif.
Between .250 and 1.5 a max. of .021 dia.
is held.
- Measure from max. dia. of the actual
device.



DIGITRONICS

ALBERTSON, NEW YORK



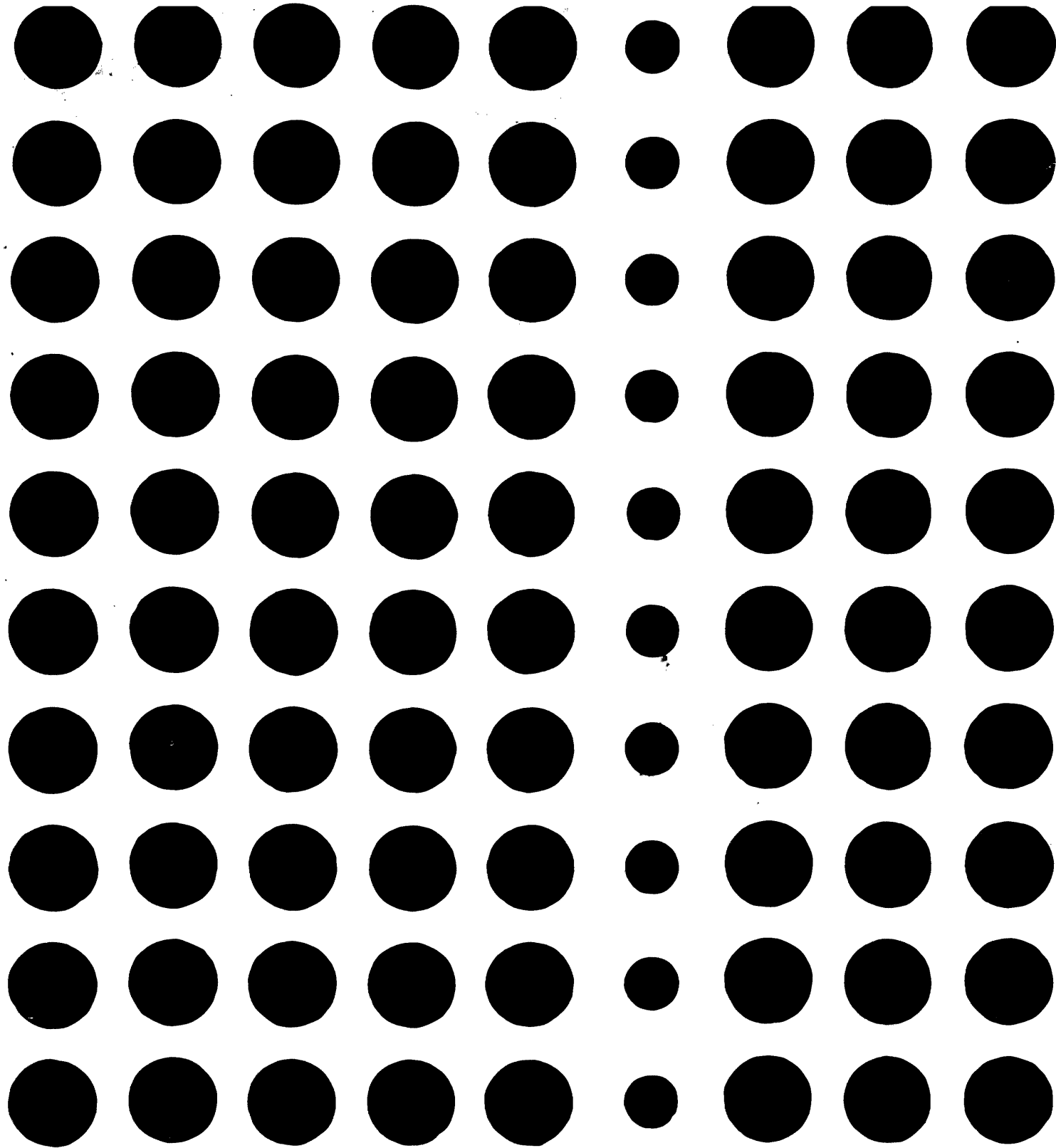
TITLE

TRANSISTOR

A
 REV E.C.O. CHKD APP'D MO DAY YR.

USED ON:
 DIGITRONICS PART NUMBERS

DRAWING NO.
 TQ- SB1659



▷DIGITRONICS CORPORATION, ALBERTSON, L.I.

