

CARD READER TECHNICAL MANUAL

29-510

**TRUE DATA CORPORATION
IRVINE, CALIFORNIA, U. S. A.**

TECHNICAL MANUAL

MODEL OE 800

**TRUE DATA
CORPORATION**

P/N 335300500

PREFACE

This manual provides information about the Model OE 800 Card Reader for use by technical personnel involved in maintaining and repairing the unit.

IMPORTANT NOTICE

This manual is supplied with your True Data Card Reader and should remain with that unit.

To assist in a speedy and accurate cross reference to schematics and replacement parts as required please enter the model number and serial number as noted on the serial number tag affixed to this reader.

MODEL NUMBER _____

SERIAL NUMBER _____

Refer to these numbers in any future correspondence.

TABLE OF CONTENTS

<u>PARAGRAPH</u>	<u>TITLE</u>	<u>PAGE</u>
Section I - INTRODUCTION		
1-1	General Description	1-1
1-2	Physical Description	1-3
1-3	Interface Characteristics	1-7
1-3.1	Signal Interface	1-10
1-3.2	Electrical Interface	1-11
Section II - OPERATING INSTRUCTIONS		
2-1	General	2-1
2-2	Controls and Indicators	2-1
2-3	Off Line Procedures	2-3
2-4	Operating Procedures	2-3
2-5	Operator Maintenance	2-4
2-5.1	General Cleaning	2-4
2-5.2	Feed Jam Reduction	2-5
2-5.3	Switch Lamp Replacement	2-5
2-5.4	Fuse Replacement	2-6
Section III - INSTALLATION AND CHECKOUT		
3-1	General	3-1
3-2	Site Requirements	3-1
3-2.1	Power	3-1
3-2.2	Signal Interface	3-2
3-2.3	Floor Loading	3-2
3-2.4	Area and Maintenance Access	3-2
3-2.5	Grounding	3-2
3-3	Uncrating and Inspection	3-2
3-4	Initial Set-Up/Checkout	3-3
Section IV - THEORY OF OPERATION		
4-1	General	4-1
4-2	Functional Description	4-1
4-3	Functional Analysis	4-4
4-3.1	Card Transport Operation	4-4
4-3.2	Read Station Functions	4-6
4-3.3	Timing/Synchronization	4-9
4-3.4	Error Detection	4-19

TABLE OF CONTENTS (Con't)

<u>PARAGRAPH</u>	<u>TITLE</u>	<u>PAGE</u>
Section V - MAINTENANCE		
5-1	General	5-1
5-2	Maintenance Aids	5-1
5-2.1	Special Tools and Equipment	5-1
5-2.2	Materials	5-2
5-2.3	Diagnostic Features	5-2
5-3	Preventive Maintenance	5-3
5-3.1	Cleaning	5-4
5-4	Corrective Maintenance	5-4
5-5	Troubleshooting	5-5
5-5.1	Electrical Adjustment/Alignments	5-7
5-5.2	Mechanical Adjustments	5-14
5-6	Component Removal and Replacement	5-18
5-6.1	Power Supply Removal	5-18
5-6.2	Fan Assembly Removal	5-18
5-6.3	Feed Plate Sub-Assembly Removal	5-18
5-6.4	Cast Stacker Assembly Removal	5-19
5-6.5	Cast Stacker Belt Installation	5-19
5-6.6	Cast Stacker Spring Assembly Removal	5-21
5-6.7	Feed Solenoid Removal	5-21
5-6.8	Read Head Assembly Removal	5-23
5-6.9	Lower Pressure Roller Assembly Removal	5-23
5-6.10	Lower Pressure Band and Pressure Roller Removal	5-23
5-6.11	Read Head & Card Stop Support Assy-Removal	5-23
5-6.12	Upper Pressure Roller Removal	5-25
5-6.13	Upper Pressure Band & Select Band Removal with Read Head & Card Stop Assy Installed	5-25
5-6.14	Read Head Assembly Replacement	5-25
5-6.15	Drive Motor Assembly Removal	5-27
5-6.16	Timing Disk Removal	5-28
5-6.17	Timing Disk Replacement (Transport Pulley)	5-28
5-6.18	Timing Lamp Removal	5-29
5-6.19	Timing Mask/Phototransistor Removal	5-29
5-6.20	Hopper Empty Switch Removal	5-29
5-6.21	Output Stacker Switch Removal	5-30
5-6.22	Stacker Follower Assembly Removal	5-30

Section VI - DIAGRAMS

6-1	General	6-1
-----	---------	-----

TABLE OF CONTENTS (Con't)

<u>PARAGRAPH</u>	<u>TITLE</u>	<u>PAGE</u>
Section VII - Parts List		
7-1	General	7-1
7-2	Parts List Interpretation	7-1
	Parts List	7-3 thru 7-

LIST OF ILLUSTRATIONS

<u>FIG. NO.</u>	<u>TITLE</u>	<u>PAGE</u>
1-1	Cabinet Dimensions	1-6
1-2	Interface Lines	1-8
2-1	Switch Panel Assembly Options	2-2
4-1	Reader Functional Block Diagrams	4-2
4-2	Feed Mechanism Components	4-5
4-3	Power Stacker/Spring Arrangement	4-7
4-4	Read Amplifier Operation	4-11
4-5	Read Amplifier Schematic	4-12
4-6	Timing Disc and Pickup Arrangement	4-14
4-7	Subcount Timing	4-15
4-8	Error Detection Timing	4-15
4-9	Card Format Information	4-18
5-1	Timing Lamp Adjustment	5-11
5-2	Read Lamp Adjustment	5-13
5-3	Read Lamp Adjustment	5-13
5-4	Skew Adjustment	5-13
5-5	Feed Plate-to-Drum Mechanical Check	5-17
5-6	Stacker Drive Belt Mounting	5-20
5-7	Stacker Spring Operation	5-22
5-8	Mechanical Deck Assembly	5-24
5-9	Select Band & Pressure Band Mounting	5-26
5-10	Timing Disk Replacement	5-28

SECTION I

INTRODUCTION

SECTION I - INTRODUCTION

1-1. GENERAL DESCRIPTION

The card reader is a column-oriented device, intended to read punched hole data as presented upon 80-column tabulating cards excluding black cards or cards with detectable non-reflecting marks on the unprinted side of the card; i.e., cards should conform to USA STD X3.21-1967. Various model configurations are available that provide for card reader speed options of 600 cpm and 1000 cpm, card capacities of 1000 or 1500 cards, and an input power compatibility of either 50 or 60 Hz. Additionally, one model is available that provides for operation with either punched cards or cards, whereupon data is transcribed by appropriate 'marks'. A third model is available that provides for operation with 'marked' card only. Table 1-1 lists and defines the several model configurations.

When properly powered-up and loaded, operation of the reader is automatically controlled by an associated controller unit. Data reading is accomplished, in response to controller issued commands, by transporting cards individually past a fiber optic read station. The data image is then transferred via the fiber optics to a bank of electronic light sensors. These sensors convert the visual data to electrical impulses. Internally contained control logic causes the 12-bit, parallel data to be shifted to the interface connector (data output pins) in accordance with system and unit timing considerations. Cards may be added to the input hopper and removed from the output stacker while the cards are being processed (on the fly). Refer to Table 1-2 for additional information covering physical and functional characteristics.

The normal operating life of all readers is five years or 15,000 operating hours. The foregoing figures were computed at nominal workload rates; i.e., 50,000 cards per day, 250 days per year.

TABLE 1-1 DIFFERENCE DATA

This table describes the difference between the major categories of the Model OE 800:

<u>Model No.</u>	<u>Speed</u>	<u>Hopper</u>	<u>Stacker</u>	<u>Mode</u>
OE 806 P	600 cpm	1000	1000	Punch
OE 810 P	1000 cpm	1500	1500	Punch
OE 806 M	600 cpm	1000	1000	Mark
OE 810 M	1000 cpm	1500	1500	Mark
OE 806 C	600 cpm	1000	1000	Punch/Mark
OE 810 C	1000 cpm	1500	1500	Punch/Mark

Power Options (Field Strapable)

115 Volts	60 Hz
208 Volts	60 Hz
230 Volts	50 Hz
100 Volts	50 Hz

1-2. PHYSICAL DESCRIPTION

The card reader is completely self-contained unit provided with input hopper, card feed mechanism, read station, output stacker, control logic, and data buffer electronics, as well as integral power supplies. An operator control panel (upper left of unit) provides the controls and indicators necessary to initialize or stop unit operation and to monitor the several status alarms (see Section 2). The entire left side decorative panel is hinged and held secure by bayonet type snap-open disconnects to permit ready access to the read station and feed mechanism components. Also, the input hopper and deck assembly is hinged (lower edge) and secured (upper edge) by captive screws.

Control logic and data buffer electronics are contained upon a circuit board, fixed to the inside of the rear panel. Two 1/4-turn quick disconnect fasteners, located along the upper edge of this hinged panel, permit access during maintenance operations. All signal connections are made via ribbon type cable and associated connectors.

Power and signal interface receptacles and fuse access is located at the rear of the unit along the lower main frame of the cabinet. The fuse is contained by bayonet, twist-lock receptacle (See Operator Maintenance, Section 2). A cooling fan is provided and operate through a circular cutout on the cabinet floor.

TABLE 1-2. CARD READER SPECIFICATIONS

<u>CHARACTERISTICS</u>	<u>SPECIFICATIONS</u>	
	<u>1000 Card Capacity</u>	<u>1500 Card Capacity</u>
Dimensions and Weight		
Height	17.0 inches	19.0 inches
Width	14.0 inches	17.5 inches
Depth	18.0 inches	21.0 inches
Weight	55 pounds	57 pounds
Cabinet Dimensions	(See Figure 1-1)	
Installation	(See Section 3)	
Environmental		
Temperature	+50° to 100°F with a maximum gradient of 0.2°F per minute (Operating). -30° to 150°F with a maximum gradient of 20°F per hour (Non-Operating).	
Relative Humidity	30% to 80% without condensation (Operating). 5% to 95% without condensation (Non-Operating). Nominal range is based upon minimum commercial standards for card media range may be extended. (10% to 90%) with OEM assuring card specification control.	
Altitude	-1000 to 10,000 feet (Operating) -1000 to 30,000 feet (Non-Operating).	
Heat Dissipation	1100 BTU per hour (maximum).	
Vibration		
Non-Operating:	The card reader as packed for shipment shall withstand a peak displacement of +0.005 inch for a frequency range of 5 to 60 Hz and 2.0 G's for the range of 60 to 500 Hz.	
Cleanliness:	The card reader operates in a satisfactory manner while exposed to operating conditions well beyond the typical office environment. Clean, in-plant conditions and protected remote area locations are normally acceptable.	

Shock: Non-Operating: The card reader as packed for shipment will withstand 3 shocks of 15 G $\pm 10\%$ in opposite directions along each of 3 mutually perpendicular axes (18 shocks total). Shock duration shall be 11 \pm (1) millisecond. The maximum "G" shall occur at approximately 5 $\frac{1}{2}$ milliseconds.

Conducted Susceptibility: When operating as specified, the reader will withstand conducted noise on the raw incoming AC power leads. This interference is expected to be a damped sinusoidal oscillation at any frequency between 14 KHz and 200 MHz. The pulse amplitude shall not exceed 250 volts when applied to the AC power leads at any time during sinewave period.

Radiated Susceptibility: When operating as specified, the reader will withstand a radiated narrow band field of 1 volt/meter in the frequency range of 14 KHz. to 1 MHz.

Audible Noise: When operating as specified, the reader shall operate within the following parameters.

<u>Octave Band Geometrical Center Frequency (Hz) ANSI S1.5</u>	<u>Maximum Octave Band Sound Power Level (dB ref: 1 Picowatt) Class 2</u>
63	83
125	78
250	74
500	70
1000	66
2000	64
4000	62
8000	62

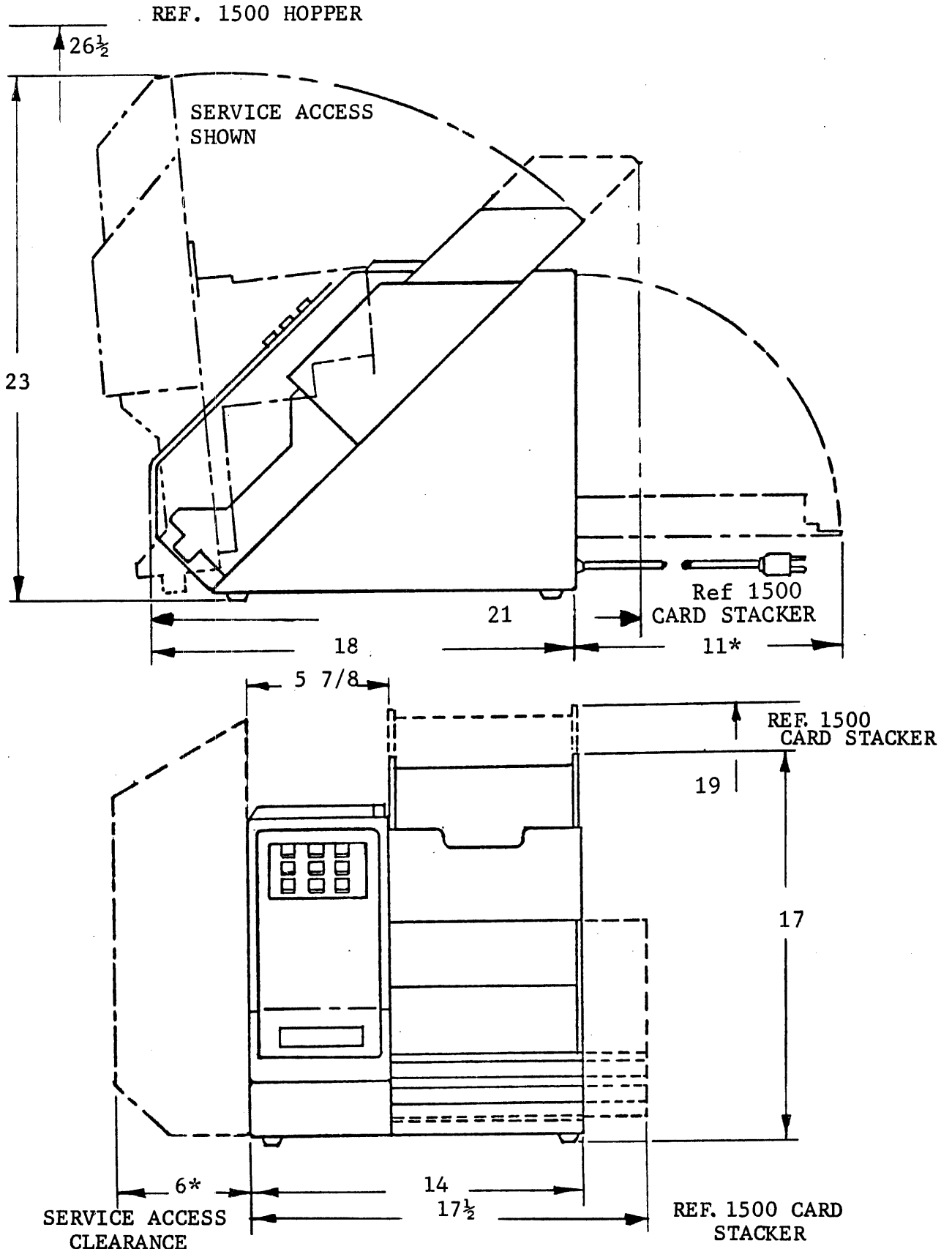


FIG. 1-1
CABINET DIMENSIONS

Electrical

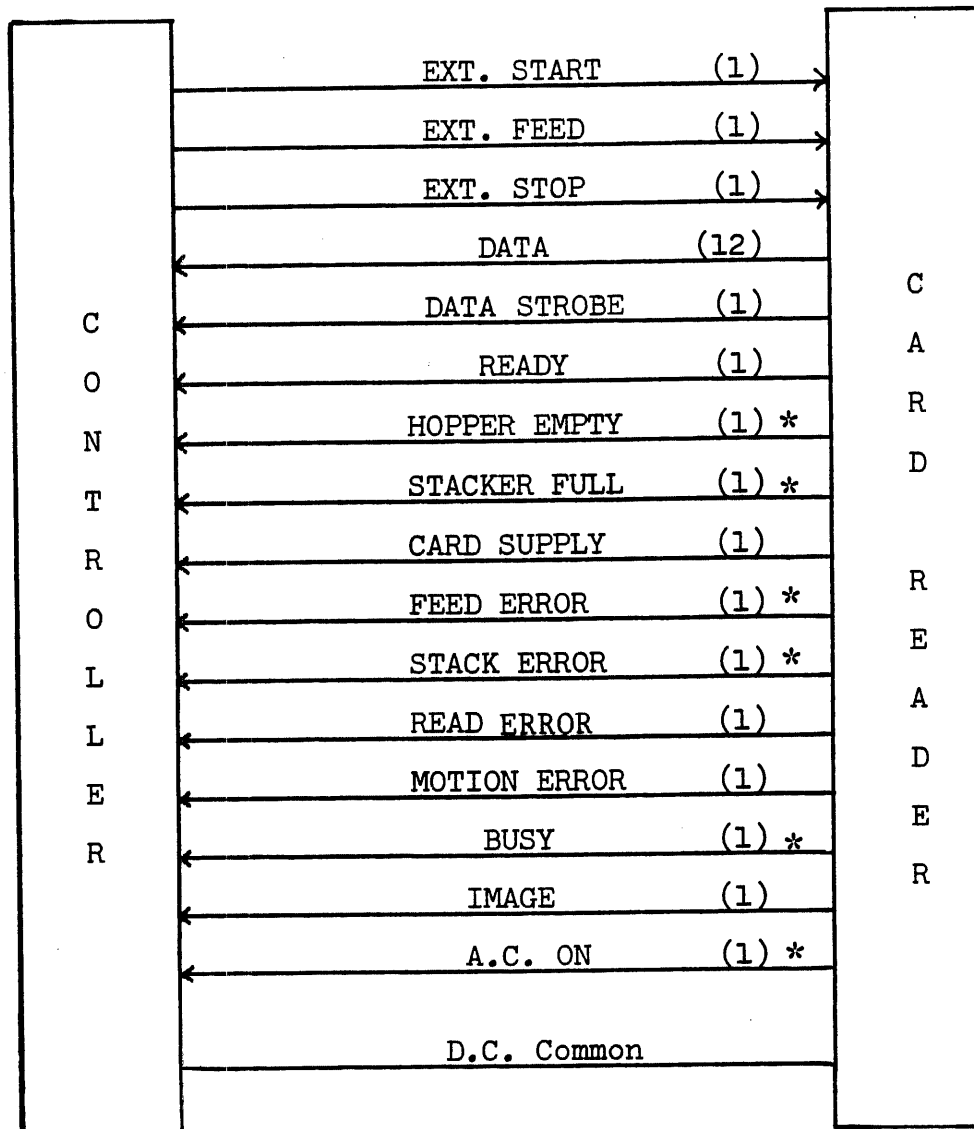
Input Power Requirements

<u>Freq.</u>	<u>Voltage</u>	<u>Current</u>	<u>Limiting Values</u>
60 Hz	115V,1 ϕ	<u>4 amp</u> (nominal)	104-127 VAC 57-63 Hz
50 Hz	230V,1 ϕ	<u>2 amp</u> (nominal)	207-253 VAC 48-52 Hz
60 Hz	208V,1 ϕ	<u>2 amp</u> (nominal)	188-229 VAC 57-63 Hz
50 Hz	100V,1 ϕ	<u>4 amp</u> (nominal)	90-110 VAC 48-52 Hz

1-3. INTERFACE CHARACTERISTICS

The reader utilizes integrated circuits from the 7400 TTL Series. Signals that originate in the reader are defined as output signals. Signals are received in the reader by 7414 Schmitt Trigger Gates. The user's output drivers must be capable of sinking 30 milliamperes plus any additional current from stray cable capacitance while maintaining a maximum of 0.8V. In the Hi level, the source must be capable of withstanding +5 VDC. The reader output drivers are capable of sinking 12 milliamperes in the Lo state, when 7416 drivers are used, the driver will be capable of sinking 40 Ma in the 'Lo' state and a 1K resistor will pull the line toward the +5 VDC level in the 'Hi' state.

Figure 1-2 is a diagram showing signals present at the card reader interface. Arrows associated with each lead indicate direction of signal flow. Table 1-3 identifies and describes each interface line.



Signals not on standard rear panel connector.

Figure 1-2. Interface Lines

TABLE 1-3. INTERFACE LINES DESCRIPTION

<u>NAME</u>	<u>DESCRIPTION</u>
Input Signals:	
External Start (ES)	An input command signal which, when 'true' initiates drive motor turn-on and conditions the reader ready logic to accept a feed command, provided that no error alarms have been generated.
External Feed (EF)	An input command signal which, when 'true', initiates a single card feed and read cycle. Signal will only be accepted by the reader when the reader is Not Busy.
External Stop (EP)	An input command signal which, when 'true', stops the reader and makes the reader Not Ready. If a card cycle is in process, that cycle will be complete before the reader stops.
Output Signals:	
Data	Twelve buffered data lines correspond with data rows on punch cards. Signal is 'true' for one full column (16 clock pulses).
Data Strobe (DS)	Indicates that data has stabilized on the data lines and is ready for acceptance.
Ready (R)	Indicates that motor is running and no error conditions exist. If RESET switch is depressed, or if HOPPER EMPTY, READ ERROR, or STACKER FULL errors occur, READY remains 'true' until the card cycle is complete. SYNC FAIL or FEED ERROR will cause READY to go 'not true' upon detection of the error.
*Hopper Empty (HE)	Indicates that the input hopper is empty and the last card has been used.
*Stacker Full (SF)	Indicates that the stacker is full and that the last card fed has been read.

Card Supply (CS)	Indicates that a hopper empty or a stacker full condition exists.
Feed Error (FE)	Indicates that the reader was not able to feed the bottom card from the deck after two feed attempts (initial feed and repick attempt).
Stacker Error (SE)	Indicates a jam in the card path from the read station to the stacker, double feed, or timing errors.
Read Error (RE)	Indicates a read station failure or possible data error and damaged card at the leading or trailing edge. (Refer to Section 4 - Theory of Operation)
Motion Error (ME)	Indicates a read station failure or possible data error. A composite of the following may cause this condition: <ol style="list-style-type: none"> 1. Feed Error 2. Stacker Error (jam)
*Busy (B)	Indicates that a feed or read cycle is in process and that the reader will not accept a feed command. Leading edge of BUSY indicates a feed command has been accepted.
Image (I)	Indicates that a card is in the read station. Signal encompasses the time frame of all eighty DATA STROBES and all DATA ERROR checks.
*AC On	Indicates power is 'on' and the +5 VDC supply is 'up'. Line is open when power is 'off'.

*Optional

1-3.1 SIGNAL INTERFACE

a. Connector and Cable

The card reader is supplied with back panel mounted cable and connector assembly. ELCO connector (00-8016-038-000-707) is the standard connector and the mating connector is Elco (00-8016-038-217-704).

1. Cable - The card reader will operate with twisted-pair signal lines of size 24 AWG copper wire having a maximum length of 25 feet. The card reader will also operate into non-twisted signal lines of size 24 AWG copper wire having maximum lengths of 15 feet.

b. Interface Pin Assignment

Each of the signal and data lines is individually referenced to signal ground. Pin assignments for data and signal lines are tabulated in Table 1-4.

1-3.2 ELECTRICAL INTERFACE

Accepted commercial engineering practices are employed to prevent the introduction of large current transients into the input power lines and the dc logic power lines. To prevent power line current transients, triacs are used for motor control. To prevent dc logic line current transients, the following practices are employed:

- a. All ac power lines of appreciable length are shielded.
- b. The mechanical deck and motor frame is connected to frame (ac) ground.
- c. Power supply dc return lines and frame ground are strapped together internal to the power supply. The common and frame ground may be isolated by removing this strap.
- d. Power transformer is farraday shielded to meet European requirements.

TABLE 1-4. INTERFACE PIN ASSIGNMENT

<u>SIGNAL TITLE</u>	<u>CONNECTOR CIRCUIT CARD SIGNAL PIN</u>	<u>REAR CONNECTOR SIGNAL PIN</u>	
		RET (GND)	
D12	13	A	E
D11	14	B	F
D0	16	C	H
D1	18	D	J
D2	20	K	P
D3	42	L	R
D4	43	M	S
D5	22	N	T
D6	21	U	W
D7	15	V	X
D8	17	Y	CC
D9	44	Z	DD
Data Strobe	19	AA	EE
Ready	6	BB	FF
Hopper Empty	5	*	
Stacker Full	9	*	
Card Supply	10	JJ	
Feed Error	3	*	
Stack Error	2	*	
Motion Error	7	KK	
Read Error	4	HH	
Busy	11	*	
Image	8	MM	
External Stop	23	*	
External Start	24	*	
External Feed	1	LL	SS
AC On	12	*	
Ground Pin	27-41		SS, NN, PP RR, TT

Note: All signals are pre-set through specified Integrated Circuits (I.C.'s) for (positive) true or (negative) ground true inputs and outputs except for AC On.

Optional Signal

SECTION II

OPERATING INSTRUCTIONS

SECTION 2 - OPERATING INSTRUCTIONS

2-1. GENERAL

On-line operation of the card reader is controlled and synchronized with system demands by an associated card reader controller. Power-up and loading/unloading operations are facilitated by controls located on the left front of the unit and are accomplished by procedures outlined within this section.

2-2. CONTROLS AND INDICATORS

Table 2-1 lists and describes the operator's switch controls and status indicators. See Figure 2-1 for appropriate location reference. Function descriptions contained in Table 2-1 are applicable to the energized (on) state of all indicators and the activated (closed) condition of all switches.

TABLE 2-1. OPERATOR SWITCH PANEL

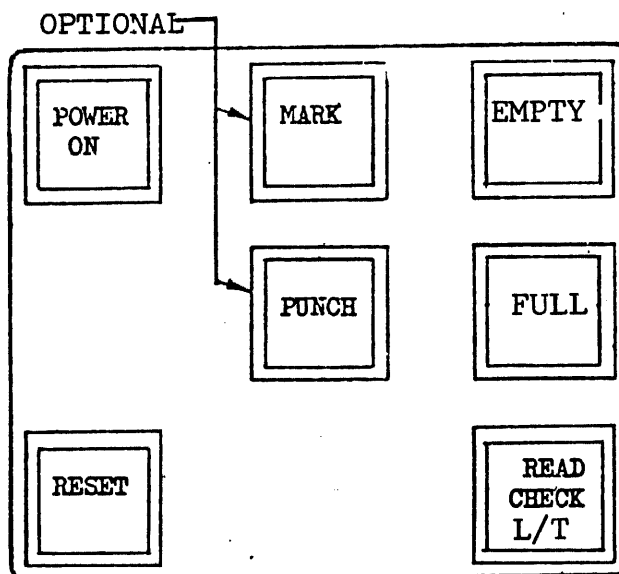
<u>NAME</u>	<u>NAME</u>	<u>SWITCH/INDICATOR FUNCTION</u>
Assembly 3501427XX	Assembly 3504010XX	
POWER ON	POWER ON	Indicator lamp (Green) - Acknowledges power application and indicated that power toggle switch S1, rear of unit is 'on'
RESET	RESET	Illuminated momentary contact switch (White) used to reset control electronics. Lamp 'on' indicates unit is in a READY status; i.e., is 'reset'.
HOPPER	EMPTY	Indicator lamp (Red) - Indicates an empty input hopper or a feed failure.
STACK	FULL	Indicator lamp (Red) - Indicates a full output stacker or a stacking failure.
READ CHECK L/T	READ CHECK L/T	Illuminated momentary contact switch (Red) used to test front panel indicator bulbs when unit is 'not ready'. Lamp section turns on to indicate possible read station or data error failures.

PUNCH PUNCH
(Optional)

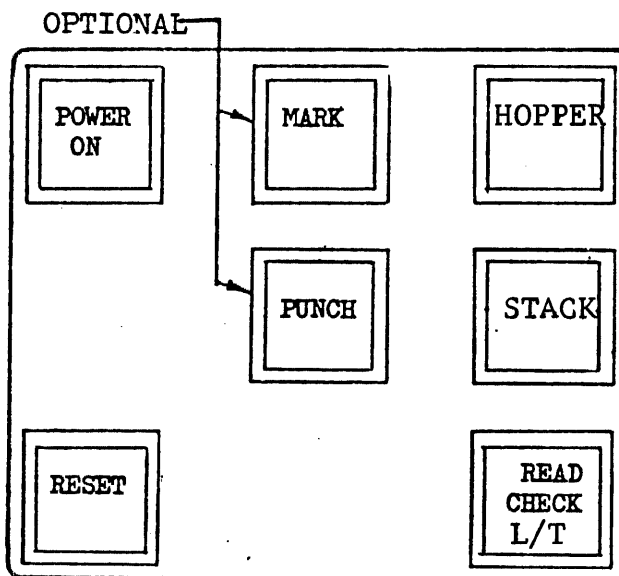
Illuminated momentary contact switch
(White) - Used to set control logic for
reading punched cards.

MARK MARK
(Optional)

Illuminated momentary contact switch
(White) - Used to set control logic for
reading marked cards.



Circuit Card Assy 3504010XX



Circuit Card Assy 350427XX

Figure 2-1. Switch Panel Assembly Options

2-3. OFF LINE PROCEDURES

Off-line operation of the card reader may be controlled through switch panel control when the reader is set as follows:

Note:

Remove I/O cable before running off line

a. The status and I/O line switch positions:

Chip Switch S1 Loc. D-9

- No. 1 Enable OFF= Positive True (Switch Open)
- No. 2 Line ON = Negative Ground True (Switch closed)
- No. 3 Fix F ON = Negative ground true (Switch closed)
- No. 4 Sync. ON = Negative ground true (Switch closed)

Place cards in the hopper, face down with 12 edge out.

Depress RESET and cards will process. Press RESET to stop.

2-4. OPERATING PROCEDURES

To load machine, first remove the hopper weight FOR PUNCH FORMAT CARDS place the card deck into the input hopper with printed side down and column one on the left (toward the throat). FOR MARK FORMAT CARDS. Place the card deck into the input hopper with mark sense data boxes up and column one on the left (toward the throat). Replace the hopper weight. For best operation, prior to loading, cards should be fanned and packed. Press the RESET switch, if not illuminated. As the cards are being processed, they are stacked in the output stacker. Cards may be added to the input hopper or removed from the output stacker during a processing cycle, without affecting the reading operation.

Errors in feeding may occur if less than approximately seventy-five (75) cards remain in the input hopper when the hopper weight is removed. (Motion or feed error). Under certain circumstances, caused mainly by the condition of the card deck, the card weight may be required at the hopper spacer block level.

2-5. OPERATOR MAINTENANCE

Operator maintenance should be limited to those activities covered by the following subordinate paragraphs; i.e., general cleaning, feed jam elimination, switch lamp replacement, and fuse replacement. Should the foregoing procedures fail to restore the unit to operation, the problem should be referred to trained maintenance specialists.

DANGER

To pre-empt exposure to hazardous voltages, untrained personnel should not attempt access to internal components while the unit is connected to primary power.

2-5.1 GENERAL CLEANING

The unit should be periodically inspected for dirt, dust accumulation, or the introduction of foreign material at critical points along the card feed path; i.e., the input/output throats and drum surface. Vacuum clean any build-up of card dust. The drum surface should be cleaned with a clean, lint-free cloth, moistened with water.* Cleaning operations should be performed with the unit de-energized. To expose the entire surface of the feed drum, manually rotate the cylinder in the direction of card feed; do not counter-rotate the drum.

* or isopropyl alcohol

2-5.2 FEED JAM REDUCTION

Data card distortions or damage can cause a card jam condition which should result in immediate shutdown of the unit. If a card or portion of a card remains in the read station, the reader will not start and no additional error indication will be provided. To clear a jam, proceed as follows:

- a. Place the backpanel power toggle switch in the 'off' (down) position.
- b. Snap open the left side decorative panel to better expose the card feed path.
- c. With finger pressure, maintain the jammed card or card remnant against the drum and rotate the drum slowly in the direction of card flow. DO NOT ATTEMPT COUNTER ROTATION.
- d. Grasp the edge of the lead card as it passes through the exit throat to the output stacker and pull free.
- e. Remove all other cards in the feedway as described above; clear the stacker springs of any residual cards.
- f. Attempt start and read. If failure persists, request qualified maintenance support.

2-5.3 SWITCH LAMP REPLACEMENT

Failure of the unit to provide an appropriate switch lamp response may be due to a defective bulb element. Replacement is accomplished by grasping the recessed edges of the affected switch or lamp enclosure (thumb and forefinger) and pulling outward with a sharp, deliberate movement. The bulbs are removed by pulling free from the insert aperture. Following a bulb replacement, snap the entire enclosure into place.

Observe nomenclature lettering to insure correct insertion. Execute a lamp check, i.e., place unit in a 'not ready' status then press the READ/CHECK switch lamp and observe for lamp illumination. If failure persists, request qualified maintenance support.

2-5.4 FUSE REPLACEMENT

A failure of the unit to power-up or a sudden shutdown not immediately attributable to a feed or jam problem could be caused by an open element. Fuses are located at the rear of the unit on the power supply. Place power toggle switch (rear of unit) in the 'off' (down) position and disconnect the power cord from the power source prior to checking this fuse. To inspect or replace, turn the fuse holder counterclockwise $\frac{1}{4}$ -turn and withdraw from receptacle.

F1 - Primary 115 VAC, 60 Hz - Use 5 amp, 3 AG
(slow-blow)

or

F1 - Primary 230 VAC, 50 Hz - Use 3 amp, 3 AG
(slow-blow)

or

F1 - Primary 100 VAC, 50 Hz - Use 5 amp, 3 AG
(slow-blow)

or

F1 - Primary 208 VAC, 60 Hz - Use 3 amp, 3 AG
(slow-blow)

SECTION III

INSTALLATION AND CHECKOUT

SECTION 3 - INSTALLATION AND CHECKOUT

3-1. GENERAL

The card reader is highly compact and portable and is compatible with any reasonable data processing environment. This section lists applicable site requirements and provides information pertinent to uncrating, initial inspection, and preliminary set-up.

3-2. SITE REQUIREMENTS

With the exceptions of meeting the environmental limitations of Table 1-2, the only additional site requirements are those related to power and signal interface provisions.

3-2.1 POWER

Depending on the reader power supply strapping the reader requires access to either 120 or 208VAC/60Hz or 100 or 230VAC/50Hz primary power source. Tolerance values are listed below:

<u>Frequency</u>	<u>Voltage</u>	<u>Current</u>	<u>Limiting Values</u>
60 Hz	115 VAC	<u>5 amp</u> (nominal)	104-127 VAC 57-63 Hz
50 Hz	230 VAC	<u>2 amp</u> (nominal)	207-253 VAC 48-52 Hz
50 Hz	100 VAC	<u>5 amp</u> (nominal)	90-110 VAC 48-52 Hz
60 Hz	208 VAC	<u>2 amp</u> (nominal)	188-229 VAC 57-63

The reader power cable is color coded as follows:

- Black: VAC (100, 115, 208 or 230 Volts)
- White: ACN (neutral)
- Green: Chassis (earth ground)

3-2.2 SIGNAL INTERFACE

The input provides 12-bit word length, parallel output data to I/O connector and cable, through which associated controller commands and unit status signals are also routed. Interface characteristics and signal definitions, pertinent to controller/unit compatibility are provided by paragraph 1-3, Section 1, of this manual.

3-2.3 FLOOR LOADING

Distributed floor loading is approximately 50 pounds per square foot. Maximum load imposed upon each of the four support bumpers is 17 pounds per square foot.

3-2.4 AREA AND MAINTENANCE ACCESS

With the decorative cover, rear panel, and the hinged front panel all extended for maintenance access, the reader will occupy approximately 4.5 square feet of installation space (See Figure 1-1).

3-2.5 GROUNDING

Frame ground within the reader is connected to the cabinet, mechanical deck, and drive motor housing. Frame ground conducts only leakage currents and short circuit currents for the protection of personnel against shock and fire hazards. The frame ground is connected to the service ground center terminal of the main power receptacle with #16 wire.

3-3. UNCRATING AND INSPECTION

The reader unit is shipped in a heavy duty cardboard carton and is buffered from shock and/or impact damage by industrial filler. Appropriate documentation, i.e., packing slip and service manual, is enclosed. No special instructions are required to remove the unit. The "Visual Inspection",

Table 3-1, should be accomplished to determine the possibility of in-transit damage. First examine shipping container for signs of mishandling or abuse.

TABLE 3-1. VISUAL INSPECTION

<u>ITEM</u>	<u>DESIRED CONDITION</u>
Cabinet Exterior and Decorative Panels	Painted surfaces unmarred, no structural damage, and hinged panels open/close without bind.
Switch Lights	Plastic housings intact, marking legible, and assemblies properly seated in plug-in receptacles.
Cabling and Wiring	Check for viewable continuity, connector pins not broken or bent, and insulation sleeving correctly positioned.
Circuit Cards	No visible evidence of component damage and ribbon connectors properly seated in receptacles.
Fuse Elements	Properly rated fuses are installed. See Operator Maintenance, Section 2-5.4.

3-4. INITIAL SET-UP/CHECKOUT

Prior to placing the reader in on-line operation, perform the following checks:

- a. Compare unit nameplate data; i.e., primary power rating to that of the available power source to insure compatibility.
- b. Observe the setting of the S-1 feature switch, contained by a single DIP switch located on the logic circuit card (rear of back panel), to insure that settings are consistent with the desired modes of operation. The effect of these switches on unit operation is defined by Table 5-2.

- c. Observe the installed IC's and jumpers (Tbl 3-2) to insure that all signal and data interface lines will match system requirements. The IC's are located at 10A, 12A, 14A, and 15A on the Control Logic Board and are either Hex Inverter Drivers (7416/836) or Hex Drivers (7417). The inverter drivers provide for a negative true I/O signal and the driver only provides for a positive true I/O signal. Various jumpers provides for additional flexibility in the I/O circuit.
- d. Observe the setting of the four feature switches at location 9D.

TABLE 3-2. POLARITY IC'S JUMPERS AND FEATURE SWITCHES

<u>I/O SIGNAL</u>	<u>JUMPERS</u>	<u>SIGNAL LEVEL</u>		<u>LOCATION</u>
		NEG TRUE	POS TRUE	IC/JUMPER
All output signals except Busy, Ready, AC ON, Ext. Feed	None	7416/836 IC	7417IC	10A, 12A, 14A 15A/None
Busy	C-A	7416/836 IC	7417IC	14A/14-15A
Busy	C-B	7417 IC	7416/836IC	14A/14-15A
Ready	F-D	7416/836 IC	7417IC	14A/14-15A
Ready	F-E	7417 IC	7416/836IC	14A/14-15A
AC ON		Jumper H-G	Jumper Y-Z	None/10-11B
Ext Feed		Jumper H-G	Jumper H-I	None/8-9C
Mark			Jumper R-S	None/P2-P30

FEATURE SWITCHES

S1	Feature	ON (Closed)	OFF (Open)
1	Enable	Auto Restart On	Auto Restart Off
2	Line	Off Line	On Line
3	Fix F	80 Col. Format	Variable Format
4	Sync	Resync On	Resync Off

NOTE: Upon completion of step d, above, the reader should be ready for primary power and controller interface connections. The manufacturer recommends, however, that the unit first be set-up for off-line operation (See Instructions, Section 5) and a short card deck processed in order to verify unit operation.

SECTION IV
THEORY OF OPERATION

SECTION 4 - THEORY OF OPERATION

4-1. GENERAL

Information presented within this section is intended to describe the principles of operation of the card reader.

4-2. FUNCTIONAL DESCRIPTION

Figure 4-1 presents the functional relationship of the various components that make up the card reader. The processing of punched (or marked) cards is initiated in response to system demands through the function of an external controller unit. Typically, a "Reset" switch is selected by the operator and recognized by the Control Logic Circuits, provided that no alarms are set and the reader is not otherwise busy or in a jammed condition. Recognition of the "Reset" command causes the Control Logic to issue a motor drive signal to the card transport motor. Upon reaching operational speed (a time delay function), the Control Logic Circuits set the READY signal on the correct status line to the controller which then responds with an External Feed (EXT FEED) command.

When notified by receipt of appropriate signal level that a feed and read cycle is to be initiated the lead (bottom) card in the Input Hopper is selected and drawn through the read station by the rotating transport drum. Physically attached to the drum is a timing disc that operates with a phototransistor pickup to generate timing pulses. These pulses are used by the control logic to properly gate (strobe) the data carried by each column of the punched card to the output Data Buffer.

NOTE

Mark option units can also receive output column timing from format timing marks (clock marks) transcribed upon the data cards.

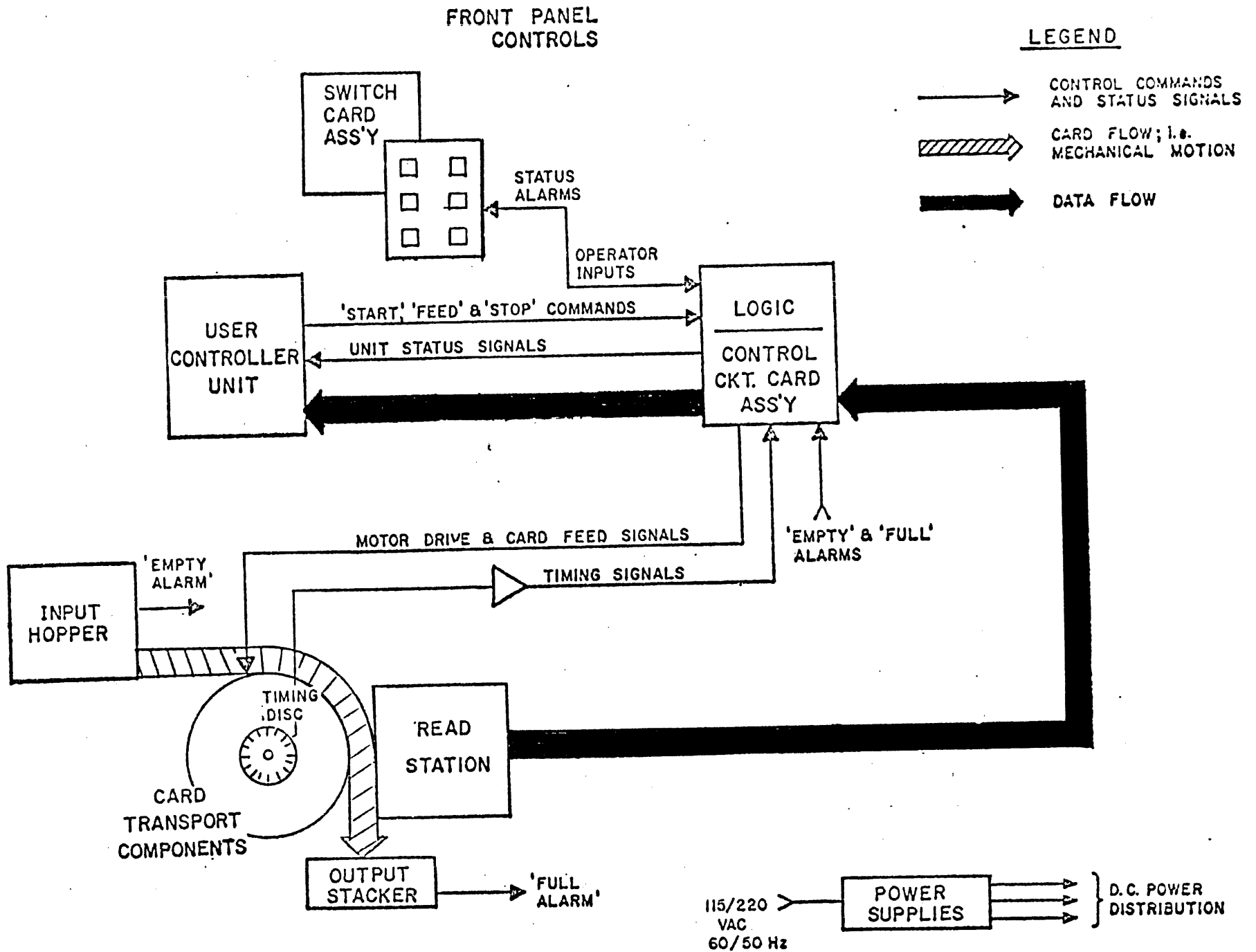


Fig. 4-1 Reader Functional Block Diagram

4-2. FUNCTIONAL DESCRIPTION (Con't)

The Read Station utilizes a system of fiber optic bundles, a light source, and an array of light sensitive phototransistors to detect the data state existing with respect to each column of a card as it transitions through the station. This light sensing system also provides a means of performing basic 'error checks'; i.e., that sensors correctly respond to the leading and trailing edges of a card and that column to column synchronization of the read function is maintained. A data read or timing error is caused to terminate the read function and the front panel READ CHECK lamp is turned on.

The electrical impulses, developed by the read station phototransistors (for punched hole or mark conditions), are amplified and shaped by channel amplifier circuits carried by the Amplifier Circuit Card components. Data bits are shifted into the output Data Buffer circuits, column by column, in coordination with timing and strobe signals as previously discussed. The reader continues to sequence cards, as long as the FEED commands are provided at the controller to reader interface. Operation is automatically discontinued, however, in response to error alarms, loss of timing, or upon control logic response to an 'empty' Input Hopper or 'full' Output Stacker alarm.

Other internally located control switches are associated with mode select and maintenance functions and are listed and defined by Section 5 - Maintenance.

4-3. FUNCTIONAL ANALYSIS

4-3.1 CARD TRANSPORT OPERATION

A 1/12 Hp, single phase AC motor serves as the drive source for the card transport drum. A solenoid activated feed plate (A, Figure 4-2) holds the card deck above the drum's surface until a FEED command is received. In response to the FEED command, this solenoid is energized, thus drawing the feed plate down and allowing the select bands to depress the card's leading edge against the elastomer surface of the drum thereby drawing the card into the feed path and through the read station.

Located just above the drum surface, along the input throat, is a pair of adjustable card stops (B, Figure 4-2). The card stops restrict the input feed to no more than one card at a time.

A spring loaded pressure roller grips the front edge of a card as it passes the card stops, and thus serves as an aid in transporting the card through the read station. The pressure roller maintains constant pressure between the card and the elastomer surfaces of the drum, thereby eliminating card flutter and skew. As the card is transported through the read station, the leading edge of the card wipes the fiber optics clean, thus eliminating any potential dust buildup. During the travel of the card through the read station, a pair of read head pressure bands (mounted on the read head block) and a stripper plate (mounted on the deck assembly) aid in guiding the card to the output stacker.

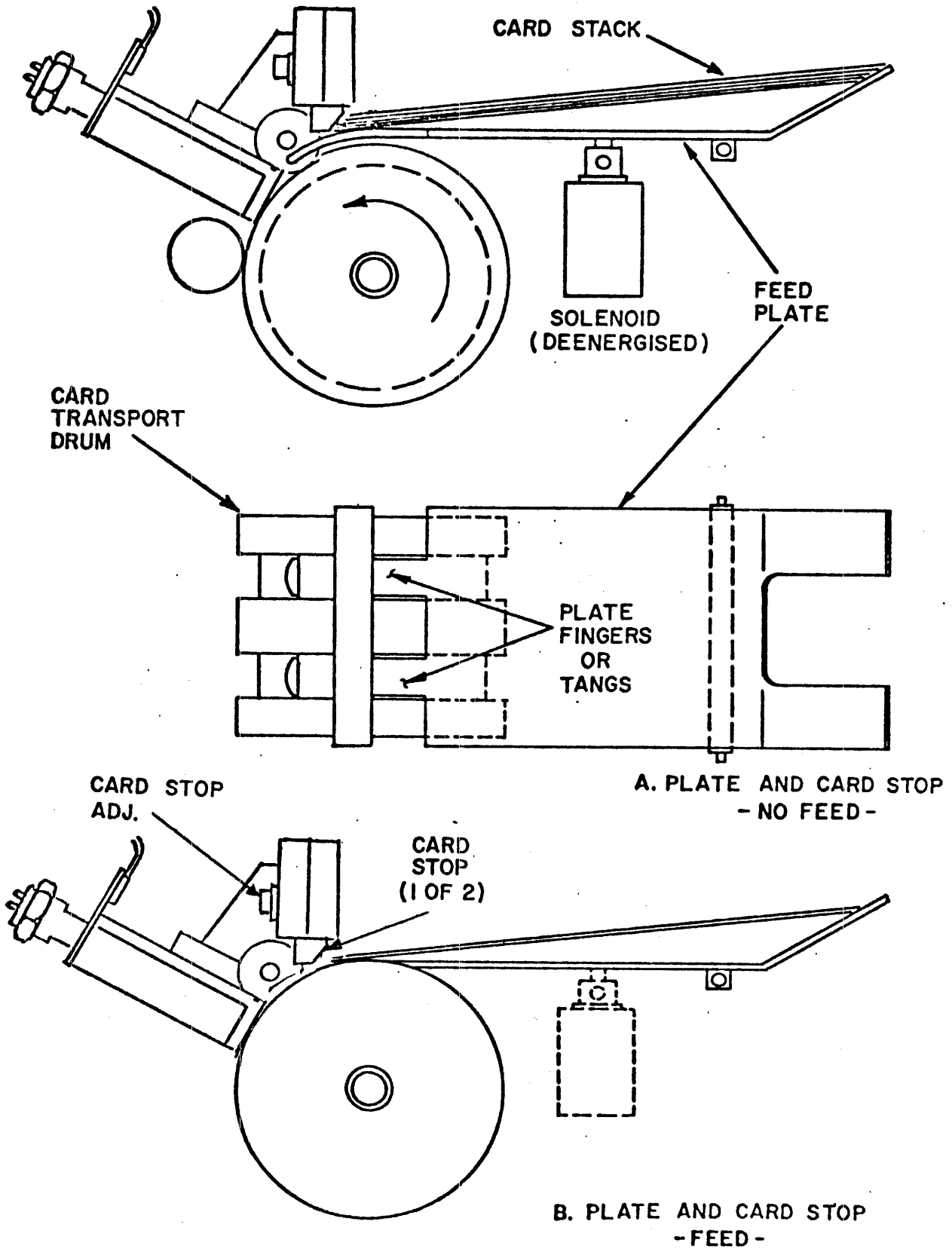


Figure 4-2. Feed Mechanism Components

Just past the read station, the transport mechanism delivers each card to a pair of belt driven, spiral spring stackers. The two spiral springs are driven in counter rotation and are placed one on each side of the card track at the entrance to the output stacker (Figure 4-3), thus, as a card exits the read station, these springs accelerate card motion toward the output stacker and maintain an initial 1/2--inch clearance between cards. A curved ramp at the stacker entrance decelerates card motion, thus preventing leading edge damage as the card is moved against the previously stacked card.

4-3.2 READ STATION FUNCTIONS

a. Read Head Operations

The read head consists of an array of randomly distributed fiber optic bundles, a light source, and a row of 12 phototransistor sensors (13 or 14 for mark option units). The light source provides its illumination through an array of fiber optic bundles that distribute light onto the card surface. Where a data hole is punched on a card's surface, the light is not reflected and results in a binary 'one' at the I/O interface. An unpunched surface at any data point on a card permits light to be reflected, and thus transferred to the phototransistor sensor via the fiber optics. The resultant electrical impulse is representative of a binary 'zero'. Important to internal timing is the detection of a card's leading edge as it enters the read station and its trailing edge as it exits the station.

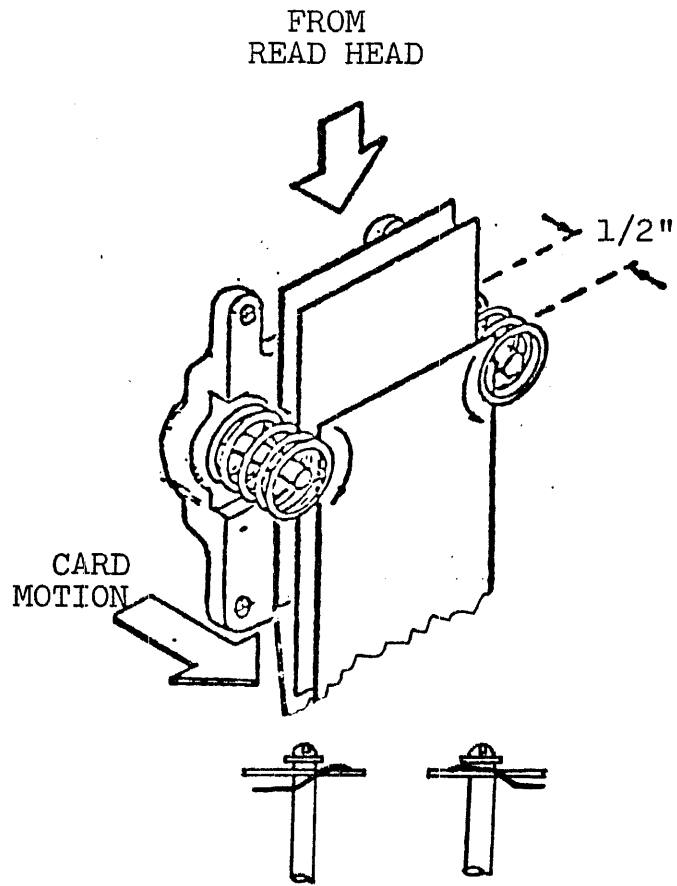


Figure 4-3
Power Stacker/Spring Arrangement

Leading edge detection is accomplished when any one of four designated phototransistors (channel positions 0, 1, 6 or 7) respond to reflected light for the first time in a given card cycle. Trailing edge detection is resolved when all twelve channel phototransistors respond to a dark condition after the card has passed the read head. The current, generated by a leading edge response, is furnished to the read amplifier circuits to condition the amplifiers for receipt of data impulses. Conversely, the dark sensing is used to reduce amplifier sensitivity when a card is not in the read station. (Also, see Read Amplifier Operation, paragraph 4-3, 2b and ERROR DETECTION, paragraph 4-3.4).

b. Read Amplifier Operation

There are thirteen (13) identical channel amplifiers on the amplifier circuit. Each consists of two (2) comparators. The signal from the sensor is shared in the input of the two (2) LM3900 comparator sections. One section works as a peak detector, supplying an output across the capacitor supplies current to each comparator. As the reflectance of the card changes, it is compared against the dynamically set voltage across the capacitor. If the rate of reflectance change is great enough and the ratio of change is sufficient the amplifier will switch and indicate a data output.

Figure 4-4 depicts typical read amplifier operation, contrasting a typical mark and typical punch read head sensor current.

Figure 4-5 provides a schematic interpretation of a single channel amplifier, operating in conjunction with the bias control circuit that is common to all channels.

The automatic bias circuit consists of circuit elements 25, 26, 27, 28, 7, Q1, Q2 and Q3. The purpose of this circuit is to determine the average dark current carried by all twelve phototransistors, and to inject a stabilizing bias current at point B of each amplifier section.

By reference to Figure 4-5, it is seen that the twelve phototransistors collectors (thirteen if clock channel is used) are tied to point 'D'. All twelve R2's (thirteen if clock channel is used) are tied to point 'C' and the opposite end of each of these resistors (R2) is connected to point B of its respective amplifier.

When a card is in the read station, the photocells sense a white (reflective) level and additional current is drawn through resistor R4. The voltage drop across R4 is sufficient to turn Q1 on, causing a larger voltage drop across R6 and turning Q2 off. The bias voltage, established while looking at a black level (point 'F'), is sustained during card time by capacitor C2.

4-3.3 TIMING/SYNCHRONIZATION

Correct timing of the read function and synchronization of the several error checks is accomplished by circuits associated with the control board and the amplifier board. These circuits obtain their columnar timing

reference from one of two possible sources, depending upon the model options incorporated by the unit and/or specific operating mode selections. In all units, a timing disc is employed for basic timing. Punch/mark units can receive data column timing from either a binary counter, driven by a disc, or from timing marks inscribed upon the card (Figure 4-9). Counter operation is consistent with standard (Hollerith) card format while timing marks provide a variable output format.

Since the operation of the counter and steering logic circuits is essentially similar for both modes of operation, the punch mode is selected for the basic discussion with operational differences of mark timing discussed under a separate heading. See System Timing Diagram, Section 6.

READ AMPLIFIER OPERATION

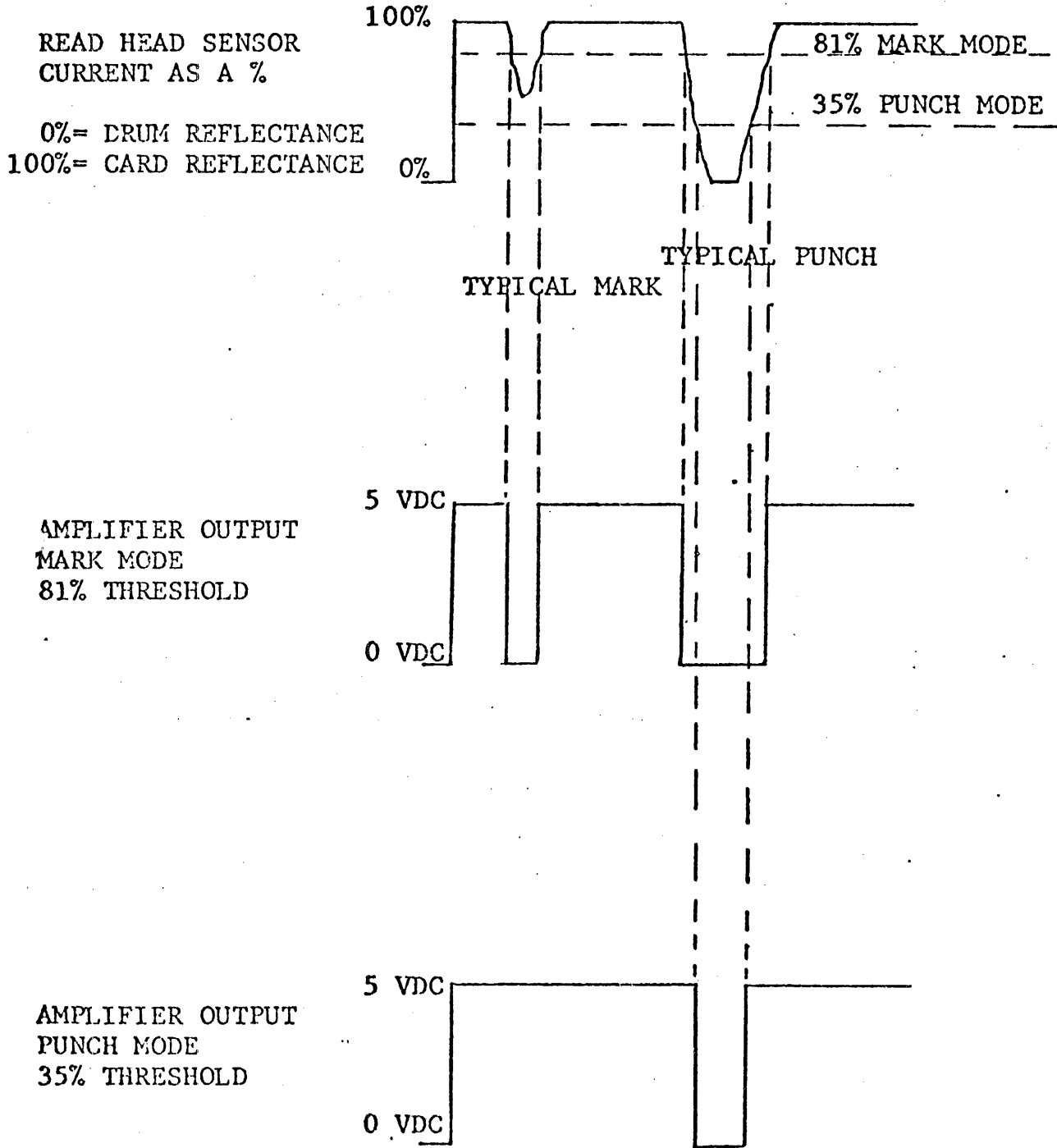
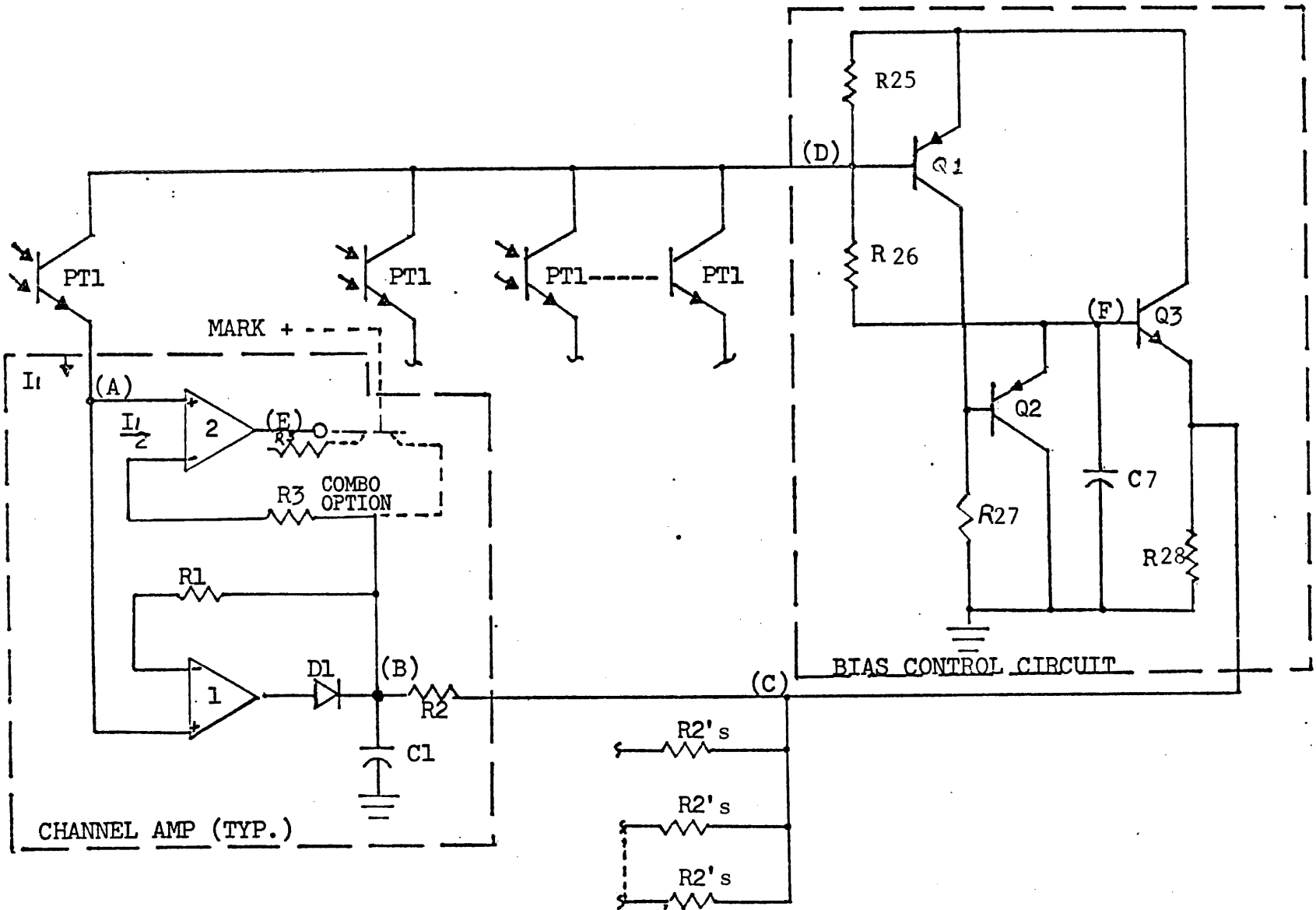


Figure 4-4 READ AMPLIFIER OPERATION

Figure 4-5 Read Amplifier Schematic



a. Punch Mode Timing

Column-to-column movement of a card through the read station is sensed and tracked through the function of a timing disc, associated pickup, and binary counting circuits. The timing disc (Figure 4-6) is rigidly mounted to the transport drum and carries 2304 (144 x 16) timing marks about its circumference. A mask (section of the disc) and phototransistor pickup (mounted behind the disc) provide timing pulses as the disc rotates with the transport drum. The repetition frequency of these timing pulses is such that 16 pulses represent 0.087 inch of card movement. This amount of travel is consistent with the distance between adjacent columns of data carried by the card.

The disc pulse train, previously discussed, is employed to 'sync' a free-running oscillator (Amplifier Circuit), which, in turn, provides a clean, amplified clock train that agrees with the selected card speed of the unit. This clock train (80 CLK) is compared to a 1.1 MHz standard that is introduced at the flip-flop in the control logic. This slight modification of the basic clock is used to insure consistent leading edge transitions throughout the stepping of counter circuits that provide the column timing, data gating, and strobe signals necessary for synchronous operation.

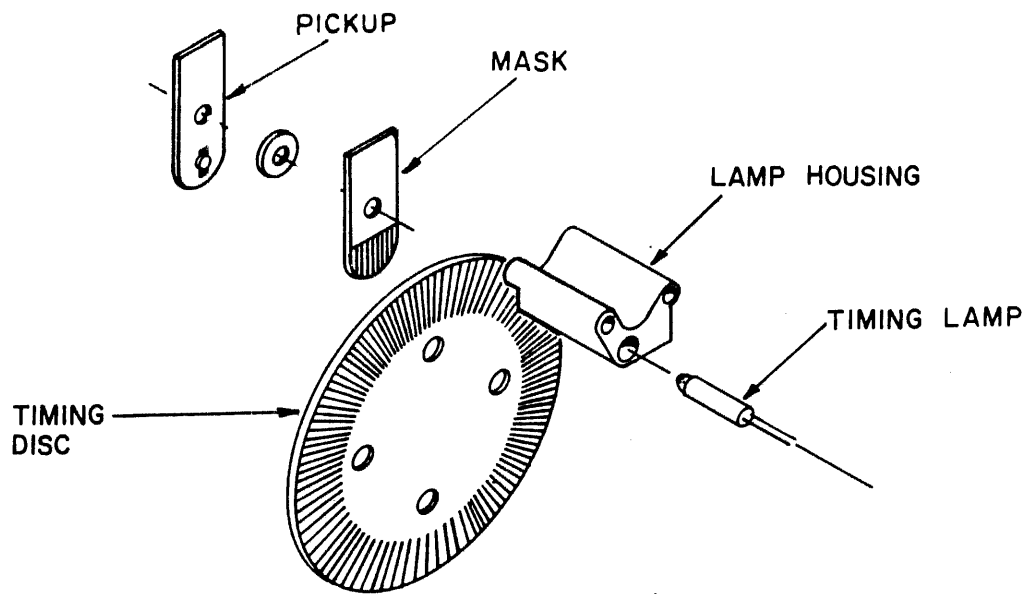


Figure 4-6. Timing Disc and Pickup Arrangement
(Miscellaneous hardware omitted for clarity)

Column-to-column timing is established by the subcounter circuit (4A). This 16-count circuit is triggered by the CLOCK input and divides column-to-column time into 16 discrete counts (Figure 4-7). The first significant count is 11, at which time the output, through associated decoder and gating logic, initiates the INGATE signal. This signal enables the first buffer chain and data is transferred into the buffer prior to the 15th count, at which time INGATE is terminated.

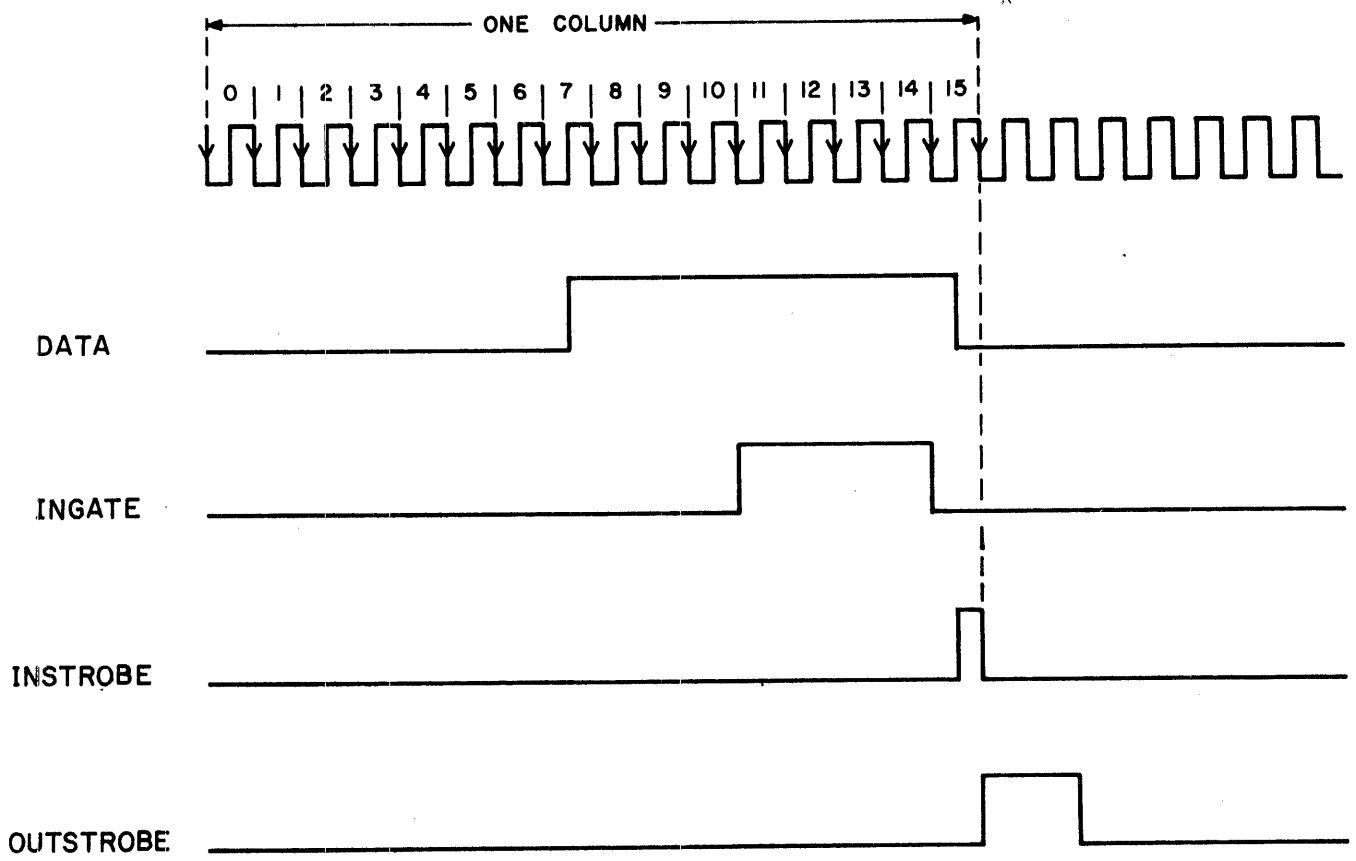


Figure 4-7. Subcount Timing

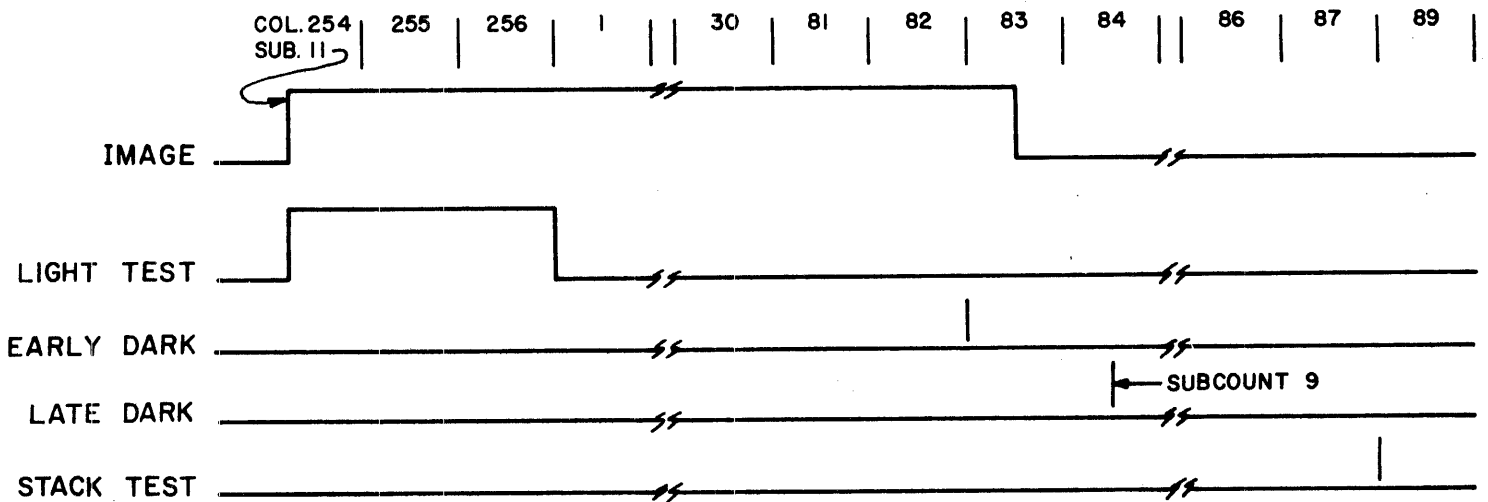


Figure 4-8. Error Detection Timing

At the count of 15.5, data is transferred to the second stage buffers by the INSTRB signal. The first stage buffers are cleared upon reading the zero count. Output lines from the second stage buffers, through exclusive OR circuits and driver/inverters, present the read data to the interface connector. Data transfer is effected upon reaching the count of 0 on the next subcounter sequence. At this time, OUTSTROBE appears at the interface connector through an exclusive OR and an inverter driver stage. This status signal enables controller logic to sense the output lines, thus concluding a first column data transfer.

Concurrent with completion of the first 16-count by the subcounter, the P-Gate output is fed as a clock to increment the first of two column counters. These cascaded counters are, therefore, incremented once for each column interval. This results in a possible total count of 256 (Figure 4-8) that divides the card (leading to trailing edge) into approximately 85 column widths or 80 data columns, plus leading and trailing edge setback. Timing compensation for leading edge to first column setback is accomplished (at IMAGE set) by presetting the subcounter to 11 and the column counter to 254. All counters are initially cleared upon receipt of a FEED command.

Functionally, column counters are employed to establish the timing sequence for various error checks, status sensings, and logic decisions required to sustain synchronous operation of the reader.

b. Mark Only Timing

Mark or Punch/Mark units are equipped with a front panel selector switch that programs the unit for operation with either standard punched cards or cards upon which data is entered by optically sensed 'marks'. Punched cards operate from internal disc timing as previously described. Mark timing can be accomplished via the internal mode or by sensing timing marks located along the upper or lower edge of the data card, and when present, are sensed by a thirteenth channel of the read head. The mark timing option is selected by opening an internal control switch (Fix F Switch S1-3 (9D location) on the Logic Board)

IMPORTANT

The mark timing mode is generally selected in order to achieve a variable format. Column spacing is thus usually dictated by application. However, when keypunching, the columns must be spaced on 0.174-inch centers or multiples thereof. See Figure 4-9 for data box and format (timing) mark positioning dimensions.

4-3.4 ERROR DETECTION

During a read operation, several checks are performed to determine:

- a. Leading edge entrance at the read head.
- b. Dynamic response of all channel sensors to reflected light, i.e., "Light Test."
- c. That the card is still present just prior to the end of card time, i.e., "Early Dark Test."
- d. Trailing edge exit from the read head, i.e., "Late Dark Test."

Information used to perform these checks are obtained directly from the light sensing elements of the read head.

a. Leading Edge Detection

This check is performed via data channels 0, 1, 6 and 7 since the associated light pickups are located over the grooves of the transport drum, and are hence not susceptible to false reflections caused by dust or foreign particles. Leading edge (LE) reflection results in setting one or more of the input lines to the counter to the 'false' state, wherein the 'carry' output is brought to a high level indicative of not all dark. The LE signal level is introduced to initiate logic operation required to clear and preset the sub-counter and counter circuits. LE is also fed to the enable gate of the counter circuit as a precondition of the next sequential test.

b. Light Test

This test is a dynamic check for proper operation of all photosensor circuits and associated

amplifier channels that is performed after LE time but prior to reading data from data column 1. With all 12 data sense lines in a 'false' state (a "see light" condition), the associated cascaded counters will produce a false LIGHT level at the borrow output. Any single channel failure results in a lack of 'reset' which will cause READ CHECK (error) lamp to turn on at the beginning of column one time. An error in this check causes termination of reader operation at the end of the card cycle.

c. Early Dark Test

Logic circuits, associated with the column counters, are employed to time this test, such that the data channels are sampled just subsequent to appearance of the final data column beneath the sensors, i.e., effectively column 82 in reference to total card travel. The upper section of the gate is conditioned for 80 column card applications and receives the AND result of IMAGE and the 82 column count. With image still present at this time, the clock drive input to the early dark flip-flop is disabled and the alarm to the READ CHECK lamp remains 'off'. However, a dark sense (no image) results in a high state and a resultant 'error lamp' indication.

d. Late Dark Test

The late dark test samples the 12 channel sensors at subcount 9 of column 84 to insure that an all dark response to the trailing edge has occurred. Logic actions are similar to those described for early dark above, except that 'image' must be false to prevent a READ CHECK lamp indication.

e. e. Miscellaneous Error Checks

The reader also stops operation if the input hopper is empty, the output stacker is full, the feeder cannot feed a card after two attempts, a card jams in the track, or there is a loss of timing.

A feed and read cycle is completed prior to motor cutoff for all errors except for a card jam, timing loss, or feed errors condition. These errors cause immediate shutdown of the reader. If a card or portion of a card remains in the read station, the reader will not start and no additional error indication will be provided.

SECTION V

MAINTENANCE

SECTION V - MAINTENANCE

5-1. GENERAL

This section contains information pertinent to routine preventive maintenance services as required to preempt failures and reduce downtime, plus those exact troubleshooting, removal/replacement and adjustment procedures required to return a defective unit to on-line status.

5-2. MAINTENANCE AIDS

5-2.1 SPECIAL TOOLS AND TEST EQUIPMENT

Special tools and test equipment required for maintenance of the card reader are listed in Table 5-1.

TABLE 5-1. SPECIAL TOOLS AND TEST EQUIPMENT

<u>ITEM</u>	<u>NAME</u>
1	Test deck of Punched Card, 9 & 12 punched (500)
2	Set of Allen Wrenches
3	Oscilloscope Dual Trace
4	Soldering Iron (low wattage)
5	Solder (resin core flux)
6	Assorted Screwdrivers
7	Metal Feeler Gauges (0.008 inches and 0.006 inches)
8	Volt-Ohm-Meter (high impedance)
9	General Purpose Pliers
10	Needlenose Pliers
11	Mylar Feeler Gauge (0.010, 0.015 and 0.020 inches)
12	Error Display Board Kit 327001701
13	Feed Plate Height Gauge 317300301
14	Feed Plate Tyne Adjusting Tool 317300201
15	Torque Screwdriver, Hex 2-30 in-lb.

5-2.2 MATERIALS

5-2.2.1 Lubricant

Bearings used in the reader are greased and sealed for life; therefore, lubrication is not recommended.

5-2.2.2 Cleaning Fluid

Cleaning of the transport is best accomplished with a soft cloth dampened with water or isopropyl alcohol.

5-2.3 DIAGNOSTIC FEATURES

Located on the Logic Card are the switches used in troubleshooting the reader. Their names and functions are listed in Table 5-2. An Error Display Board is available as an option. Six LED type error lamps provide maintenance personnel with indications as to the probable nature of a reader malfunction.

TABLE 5-2. SWITCHES/ERROR DISPLAY

SWITCHES -S1

<u>Name/Location</u>	<u>Description</u>
1. ENABLE	<u>ON</u> : <u>Normal Position</u> allows the reader to automatically restart upon receipt of feed command. <u>OFF</u> : Inhibit automatically restart.
2. LINE	<u>ON</u> : Allows off line operation of reader when disconnected from card reader controller. <u>OFF</u> : <u>Normal Position</u> disables circuitry employed when no card reader controller is used.
3. FIX F	<u>ON</u> : <u>Normal Position</u> allows reader to process punched cards. <u>OFF</u> : Selects variable format data collection when the mark mode is selected.
4. SYNC	<u>ON</u> : <u>Normal Position</u> allows resync of timing upon detection of leading edge of data. <u>OFF</u> : Disables resync of timing on data. (Service position only).

ERROR DISPLAY (Optional)

<u>LED Display</u>	<u>Description</u>
1. LIGHT ERROR	A light error is indicated following leading edge detection with image 'true' if read head sensors fail to detect 'all light' prior to column 1.
2. LONG CARD	A long card error is indicated if any channel sees light and image is cleared.
3. SYNC ERROR	If there is a loss in timing a sync error will be indicated.
4. IMAGE	Image signal is present.
5. EARLY DARK	A early dark error is indicated if all channels are dark at column 81 time.
6. STACK ERROR	A stack error is indicated if any channel sees light after column 89.

5-2.3.1 Operating Procedures

To run off line, set LINE switch to the "ON" position and ENABLE switch to "OFF". Place cards in the hopper, face down with 12 edge out. Depress RESET and cards will process. Press RESET to stop.

5-3 PREVENTIVE MAINTENANCE

Proper and regular performance of preventive maintenance helps to maintain maximum machine efficiency with a minimum of repair time. Periodically inspect all working parts of the machine for noticeable faults, or loose or worn parts. Early correction of small defects will prevent major problems later. See Table 5-3 for Preventive Maintenance Index.

The "Level" columns of Table 5-3 are designed for scheduling purposes as:

- Level 1 - - - Prior to power-up after sustained shutdown
- Level 2 - - - 150 hours or weekly
- Level 3 - - - 700 hours or monthly
- Level 4 - - - 2100 hours or quarterly

TABLE 5-3. PREVENTIVE MAINTENANCE INDEX

LEVEL				ACTIVITY/ACTION	REFERENCE	TIME REQ.
1	2	3	4			
X				Visual Inspection.	Table 3-3.	3 Min.
	X			Inspection/cleaning.	Para. 5-2.3	15 Min.
		X		Vacuum interior of unit.	None	10 Min.
			X	Throat gap setting, check/adj.	Para. 5-3.3a	10 Min.
			X	Head skew, check/adjust.	Para. 5-3.2e	15 Min.
			X	Drive belt, inspection and possible replacement.	Para. 5-3.3e	10 Min.
			X	Timing Disc, inspection adjustment/replacement.	Para. 5-3.3c	45 Min.

5-3.1 CLEANING

The reader should be checked for any buildup of dirt, dust, ink or other foreign material. To clean the drum, remove any cards from hopper. Clean surface with lint-free cloth dampened with water or isopropyl alcohol. Clean card dust from transport assembly and inside of cabinet using a vacuum or soft brush.

5-4. CORRECTIVE MAINTENANCE

Corrective maintenance incorporates electrical and mechanical checks necessary to ensure optimum performance of the reader. Checks should be made if an associated part is replaced or a possible malfunction is suspected.

5.5 TROUBLESHOOTING

Reader malfunctions lend themselves most readily to isolation with respect to the point-in-time that an 'error' is noted with respect to the overall card feed/read cycle. The 'error lamps', Table 5-2, facilitate rapid identification of the time point of a failure indication. Table 5-4, "Troubleshooting Guide", provides a rapid reference to problem areas associated with major symptoms and/or error lamp indications.

TABLE 5-4. TROUBLESHOOTING GUIDE

<u>SYMPTOM OR ERROR LAMP</u>	<u>PROBABLE CAUSE</u>	<u>ACTION</u>
Unit fails to power-up.	Improper input power connection.	Check-correct.
	Defective fuse elements.	Check-replace.
	Defective power supply component(s).	Replace para. 5-4.1
Transport motor fails to start.	Motor start logic defective.	See Section VI-Diagrams.
	Card jam condition exists.	
Fails to feed.	Interface command level (EF not set 'true').	Table 1-3.
	Card contacting surface of drum is excessively dirty.	Inspect-clean.
	Throat gap restrictively tight.	Inspect-adjust.
	Hopper empty or stacker full switch defective.	Inspect-replace.
	Feed plate mechanically bound.	Inspect-clear.
	Feed plate solenoid defective.	Check-replace.
	Control logic element defective.	See Section 7-Drawings.

TABLE 5-4. TROUBLESHOOTING GUIDE (Cont'd)

<u>SYMPTOM OR ERROR LAMP</u>	<u>PROBABLE CAUSE</u>	<u>ACTION</u>
Invalid Feed.	Logic element in feed control loop defective.	See Section 7-Diagrams.
	Solenoid spring weak or damaged.	Inspect-replace.
	Feed plate damaged or alignment with drum surface is incorrect.	Inspect-replace.
	Timing invalid.	See Paragraph 5.
	Feed plate up/down travel incorrect.	Check-replace.
Light Error.	Bent or missing corner on card.	Check.
	Read head lamp voltage low.	Check-adjust.
	Logic element in LE/Image defective.	See Section 7-Diagrams.
	Read channel component defective.	Replace read head.
Sync Error.	Amp. output bad.	Replace circuit card.
	Timing lamp defective	Check-replace.
	Timing disc or mask damaged or incorrectly positioned.	Inspect-replace.
	Timing phototransistor pickup defective.	Replace.
	Timing amplifier channel defective.	Replace circuit card.

TABLE 5-4. TROUBLESHOOTING GUIDE (Cont'd)

<u>SYMPTOM OR ERROR LAMP</u>	<u>PROBABLE CAUSE</u>	<u>ACTION</u>
Long Card Error	Throat gap setting excessively loose.	Check-adjust.
Data Errors (all channels affected).	Read lamp intensity low.	Check-adjust.
	Data Strobes missing or erratic.	Check strobe generation logic.
	Read head mechanical positioning incorrect; i.e., skew.	Check-align.
Data Errors (discrete channels only).	Channel sense and/or amplifier components defective.	Test-Replace
Card Damage (no other alarm/ malfunctions present).	Throat adjustment	Check-adjust.

5-5.1 ELECTRICAL ADJUSTMENT/ALIGNMENTS

Electrical adjustment/alignment procedures, that are pre-requisite to proper reader operation, are outlined by subordinate headings and are treated in the best order of performance. Instructions are prepared to the level of trained field maintenance personnel that are familiar with the operation of the reader unit and appropriate test equipment.

Prior to executing subsequent procedures, the reader must be placed in off-line operation; i.e., interface

must be decoupled and internal feature switches must be appropriately set. It is assumed that 80-column punched cards are used throughout the following procedures. An oscilloscope (Tektronix 585-A or equivalent) and VOM (high impedance input) are required. See "Off-line Operation", Table 5-2.

Place punched cards in hopper, column one first and face down. Insert standard marked cards, data side up, column 1 first. The operator panel RESET control is then used to start or stop card processing; i.e., alternate action sequencing.

a. Timing Pulse Check

1. Precondition: Unit powered up, motor off.
Oscilloscope: Set for single channel operation, internal trigger and time base at approximately 10 msec/cm. Connect scope test probe at 80 CLK output test point on the amplifier circuit.
2. Observe that free-running time of oscillator is 55 ± 10 usec. If incorrect, replace circuit components to accomplish correct time or replace circuit board.
3. Initiate motor start without feeding cards. Observe that clock cycle becomes shorter by at least 10%. Nominal value for 600 cpm read speed is 45 us and for 1000 cpm it is 30 us.

NOTE

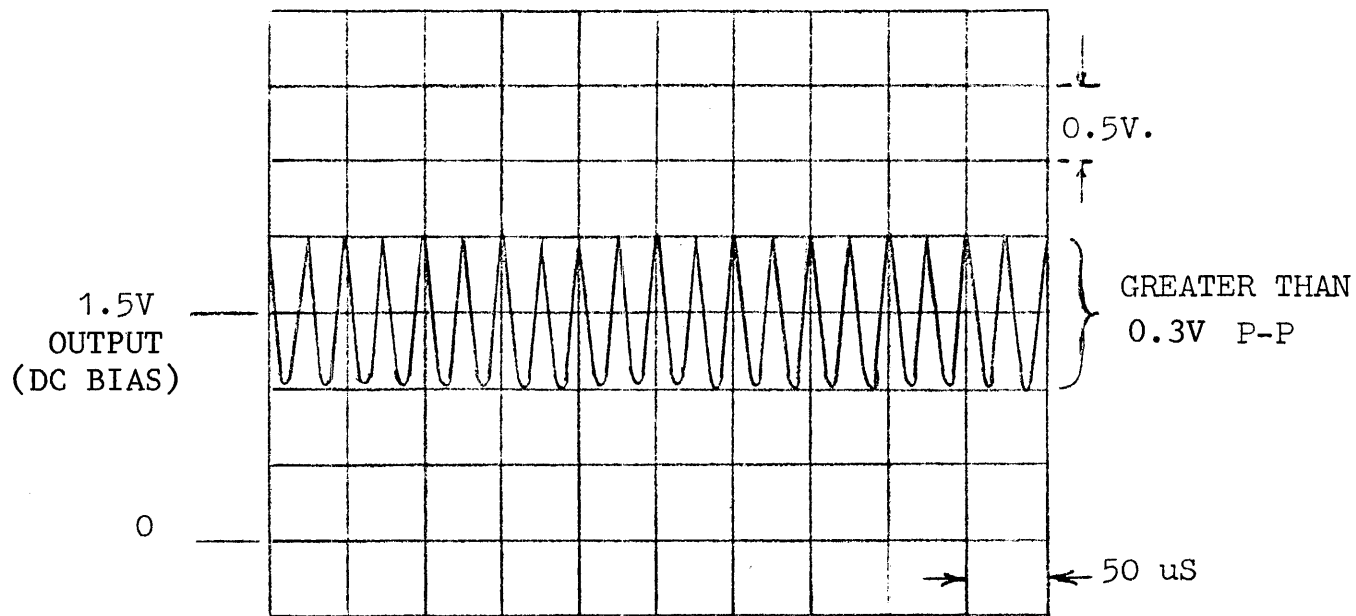
If excessive jitter is observed or if 80 CLK output fails to achieve a stable sync with disc input, perform Timing Lamp adjustment, paragraph 5-5.1b.

b. Timing Lamp Adjustment

There are two adjustment procedures depending upon whether the 304050001, Timing Lamp Holder or the 304050002, Timing Lamp Holder is installed. The newer holder p/n;304050002, is identified by an "02" stamped on the holder or the light hole being 0.250 inches in diameter and threaded for a #6-32 screw. The older holder p/n: 304050001 light hole is 0.062 inches in diameter and is smooth. Use b-1 for the 304050001 holder and b-2 for the 304050002 holder.

- 1.a. Precondition: Set up oscilloscope as stated in 5-5 1a except with transport motor running.
- b. Connect VOM to view dc lamp voltage across variable resistor R9 on A1 Board.
- c. Observe scope waveform while turning R9 clockwise (toward ground) until the 80 CLK output begins to lose sync with disc timing pulses. Record VOM reading.
- d. Observe scope waveform while turning R9 counterclockwise until the 80 CLK output begins to distort or lose sync. Record VOM reading.
- e. Set timing lamp voltage (R9) at midpoint of observed readings; i.e., (step 3 + step 2) \div 2 =
- f. Remove VOM connection and observe 80 CLK output for a clean, stable pulse train. Jitter at middle or trailing edge of the clock cycle should be minimal or preferably zero. A slight rotation of the timing lamp within its holder may be necessary to reduce jitter effect. If lamp rotation is accomplished, repeat this procedure to insure an appropriate final adjustment.

- 2.a. Adjust a multimeter for 5VDC and attach the positive lead to +5V Test Point (on left side of board) and negative lead to right end of R57 (near R26). Adjust R58 to obtain 2.25 VDC reading, Note: Leave multimeter attached till the adjustment procedure has been completed.
- b. Attach oscilloscope probe to IC Pin 4 (bottom end of R54-1K resistor) and Ground to: GND., Test Point on left side of board. Set up oscilloscope: Vertical to 0.5v per cm and Horizontal to 50 us per cm. With the Card Reader powered up but without the motor running the oscilloscope should display a wave form resembling a sine wave at approximately 20 KHZ with an amplitude of more than 0.3V P-to-P. Note: Leave oscilloscope attached until the adjustment procedure has been completed.
- c. Loosen Timing Lamp and mechanically adjust lamp for maximum output (DC Bias Level) then secure the lamp with the set screw. Reference Figure 5-1
- d. Load hopper with approximately 500 cards and while feeding the cards, adjust R58 for an optimum output of 1.5V as displayed on the oscilloscope. Reference Figure 5-1 Note: This is not a clean smooth wave form. Verify that the voltage on the multimeter (across the timing lamp) does not exceed 2.35V.
- e. If the maximum output is less than 1.5V, the lamp can be used down to a minimum of 1.2V, however, the longevity of the adjustment may be reduced. Replace the lamp, when a minimum of 1.2V output is unobtainable.
- f. If the minimum output is greater than 1.5V, mechanically readjust the lamp for a lower output and repeat step d. If still unable to obtain a 1.5V output, the lamp may be used to a maximum of 1.8V, however, the life of the lamp may be shortened. Replace the lamp, when a maximum of 1.8V is unobtainable.



Timing Lamp Adjustment - Oscilloscope Display
Figure 5-1

NOTE

If the timing lamp phototransistor is removed, observe the following precautions upon replacement: (1) polarity markings of connecting leads and (2) mask is reinstalled with marked lines closest to the timing disc.

c. Read Lamp Adjustment

1. Load 500 buff or white cards into the card reader with no punches, observe the voltage level at the peak detect test point (located on the amp. circuit) with oscilloscope. Ch1, 0.5v/Div, 10 ms. adjust read pot. for peak level equal to $2.5V \pm 0.5$ VDC.

NOTE: See wave form as shown in Figure 5-2

2. Load 500 blue cards into the card reader with no punches, observe the voltage level at the peak detect test point (located on the Amp. Circuit) with oscilloscope.

NOTE: See wave form as shown in Figure 5-3

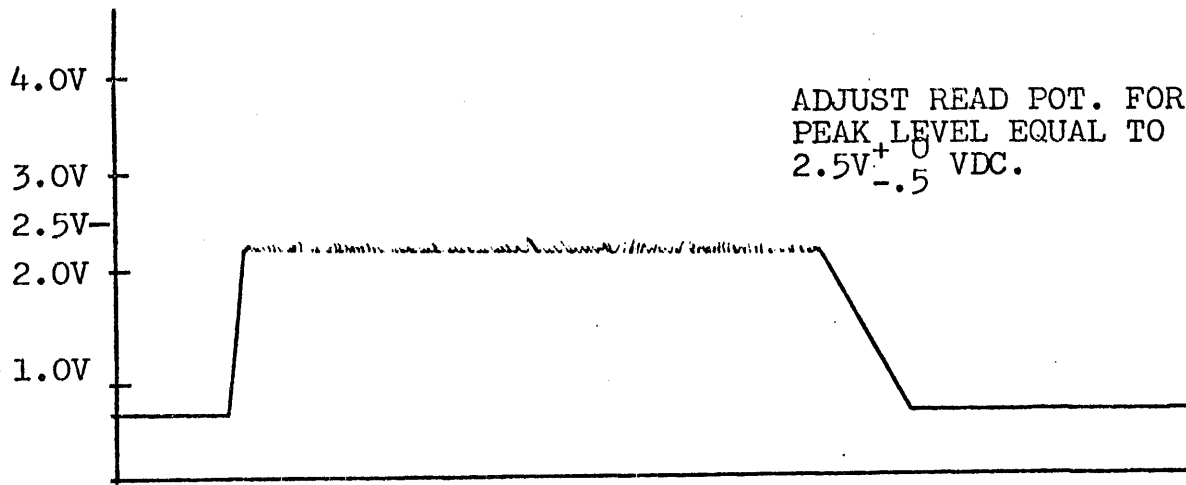
d. Skew Adjustment

1. Precondition: Input hopper loaded with properly registered buff cards, punched in rows 9 and 12 only, column 1 through 80.

Oscilloscope: Setup for dual channel operation, SYNC external on "Image".

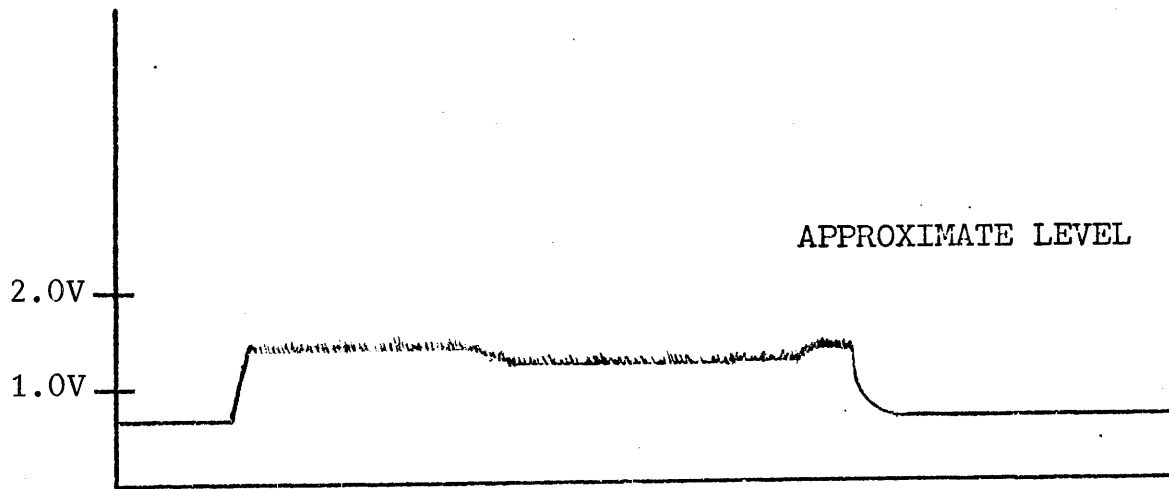
2. Connect CH-'A' probe at D9 test point and CH-'B' probe at D12 test point.

3. Initiate card run. View data at center of card, i.e., expand or delay sweep.



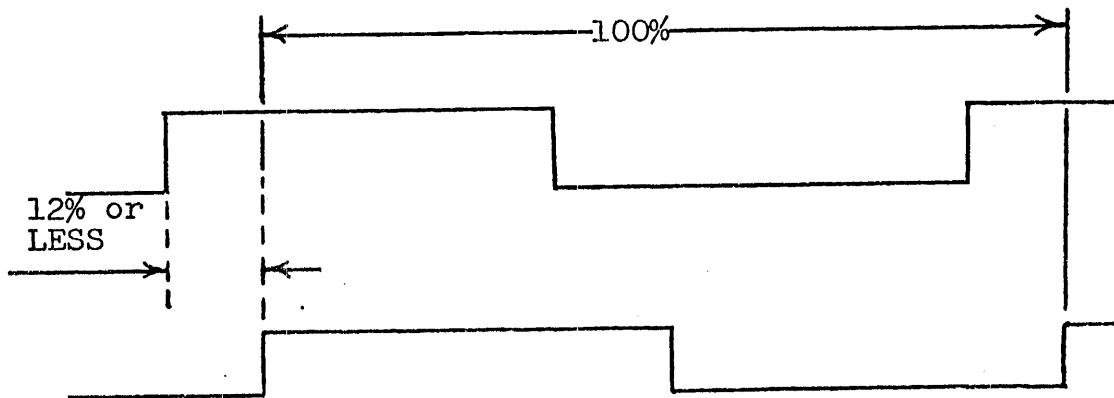
READ LAMP ADJUSTMENT

FIG. 5-2



READ LAMP ADJUSTMENT

FIG. 5-3



SKEW ADJUSTMENT

FIG. 5-4

4. Uncalibrate scope and expand one data column over 10 scope divisions.
 5. Loosen two read head skew adjusting screws (Figure 5-8) and adjust position of assembly for minimum skew (Figure 5-3). Tighten retaining screws carefully to avoid disturbing adjustment.
- e. Adjust sweep trace to observe data display at leading and trailing edge of card time. Skew should be less than 10% of one column at either end. (See Figure 5-4).

5-5.2 MECHANICAL ADJUSTMENTS

Mechanical adjustments, critical to the proper operation of the card reader, are outlined under appropriate subordinate headings of this subsection.

a. Card Stop Adjustment

Prior to setting the card stops, an attempt should be made to locate any low points along the card carrying surfaces of the drum; i.e., out of round points. This can be accomplished by slipping a .008-inch feeler gauge between each card stop and the associated elastomer drum ring, and slowly rotating the drum, in the direction of card flow only, until such points are noted. See Figure 5-8.

Insert an .008-inch thick feeler gauge between the card stop and rubber transport. Making sure the gauge is held along the tangent line formed by the throat contact point, move the gauge back and forth. The gauge should fit snugly causing the transport to turn slightly. Insert an .006 inch thick feeler gauge making sure the gauge is held along the tangent line. The gauge should slip without moving the transport.

b. Read Head Gap

Removal and replacement of a Read Head Assembly requires that the read head gap be initially set to .015 inch, using Mylar feeler gauge. Loosen the two read head adjustment screws and place the Mylar (.015) feeler gauge between the read head and the transport (both sides). Tighten read head adjustment screws. See Figure 5-8

c. Timing Disc To Frame Clearance

See removal/replacement procedure, paragraph 5-6.15.

d. Feed Plate To Drum - Symmetry and Throw

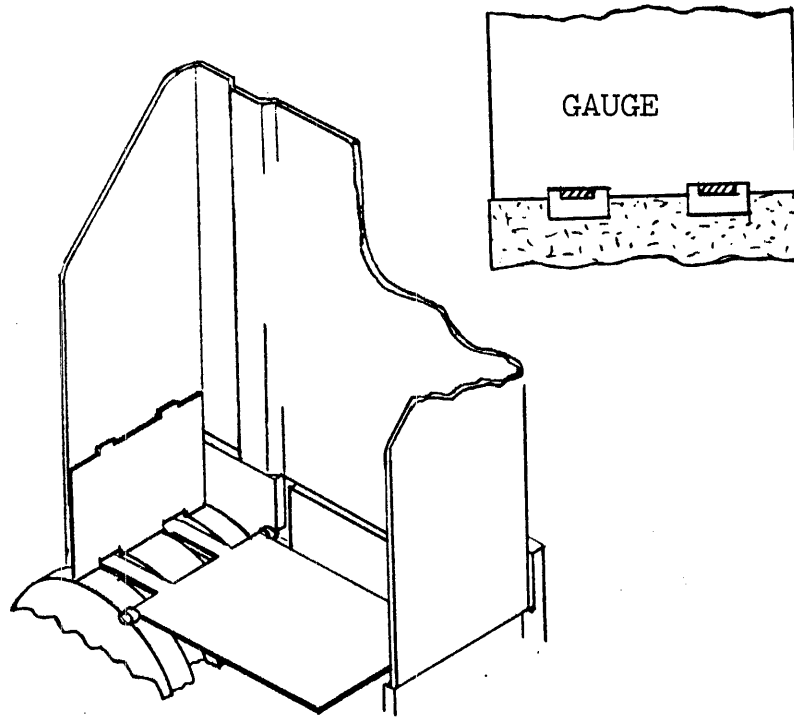
An undamaged (symmetrical feed plate), operating in conjunction with an appropriately installed and functionally correct solenoid assembly, should exhibit the following conditions: See Figure 5-5.

1. Deenergized - Feed plate tines should rise no more than 0.050-inch above elastomer rings on transport drum.
2. Energized - Feed plate tines should deflect no less than 0.050 inch below elastomer rings on transport drum.

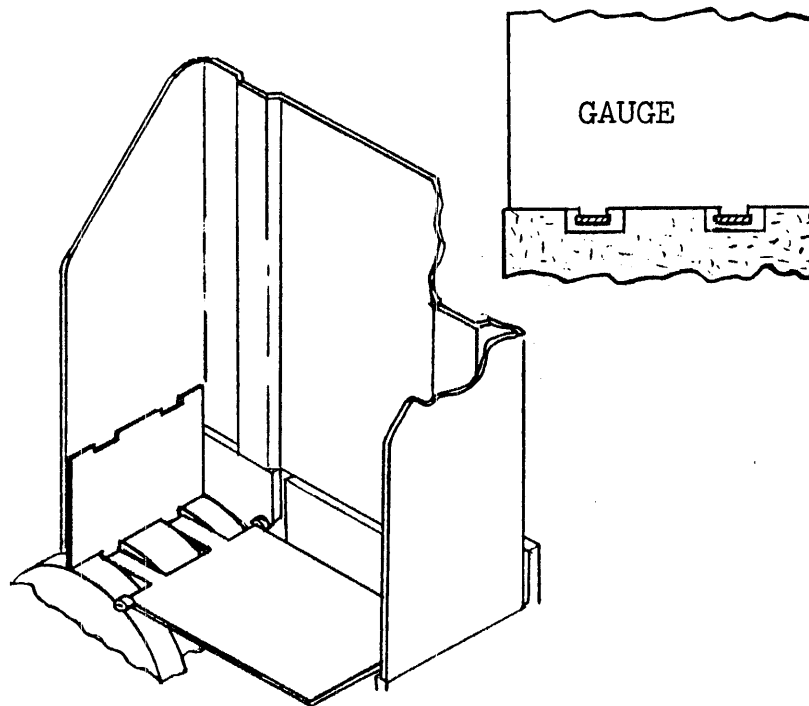
Obtain feed plate gauge (317300301). Check minimum/maximum deflections as follows:

1. Place gauge against left hand side wall of input hopper with calibrated tines cutout notches down.
Figure 5-5A. Deenergized Alignment

2. Allow gauge to rest across input throat, i.e., notches straddle feed plate tynes. Press gauge firmly against elastomer rings; the feed plate tines should not be depressed. Figure 5-5B. Energized Deflection.
3. Use feed plate tine adjusting tool (317300201) to form tine as required.



A. Deenergized Alignment



B. Energized Deflection

Figure 5-5 Feed Plate-To-Drum Mechanical Check

5-6 COMPONENT REMOVAL AND REPLACEMENT

The following procedures should be consulted prior to removal/replacement of reader components. Replacement/Reinstallation of a component is accomplished by reversing the removal procedure, a separate replacement procedure is not provided for all items.

Instructions carried hereunder are supported by exploded view drawings contained in Section 7 - PARTS LIST.

5-6.1 POWER SUPPLY REMOVAL

- a. Remove all (J) connectors and draw clear of power supply.
- b. Remove all cable clamps and ties.
- c. Remove two No. 6 socket head screws that secure power supply fuse/switch/plug panel to rear of reader cabinet.
- d. Remove two No. 6 socket head screws that secure power supply base tabs to cabinet base.
- e. Lift power supply through rear panel opening of cabinet.

5-6.2 FAN ASSEMBLY REMOVAL

- a. Remove fan lead from connector (J1) of power supply.
- b. Remove four No. 6 socket head screws that secure fan assembly to cabinet base and remove fan and protective screen.

5-6.3 FEED PLATE SUB-ASSEMBLY - REMOVAL

- a. Remove feed solenoid, paragraph 5-6.7

- b. From top of feed plate, remove two No. 4 socket head screws that pass through the plate spacer, feed plate, and plate pivot.
- c. Remove feed plate by drawing rearward and tilting slightly to disengage rubber grommets from flange guides from their respective raceways.

5-6.4 CAST STACKER ASSEMBLY - REMOVAL

- a. Remove belt from cast stacker.
- b. Loosen clamps or ties securing read head cable.
- c. Remove the number 6 screw holding the stop and wear plate and remove the stop and wear plate.
- d. Loosen the set screw holding the short shaft idler pulley assembly and remove the assembly.
- e. Remove the four 8-32 socket head screws and remove the cast stacker.
- f. NOTE: When reinstalling the cast stacker assembly ensure that the stacker is centered.
- g. NOTE: When reinstalling cast stacker belt see Figure 5-6.

5-6.5 CAST STACKER BELT - INSTALLATION

- a. Remove timing light holder.
- b. Remove old cast stacker belt.
- c. Install new cast stacker belt.
- d. NOTE: When reinstalling cast stacker belt on cast stacker reference Figure 5-6.
- e. Reinstall timing lamp holder. If timing lamp adjustment is necessary see 5-4.

STACKER DRIVE BELT
MOUNTING DIAGRAM

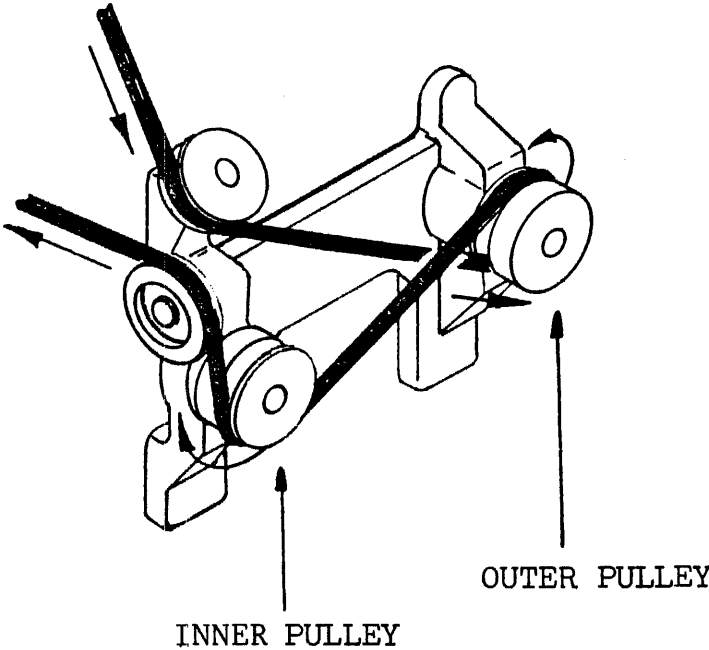


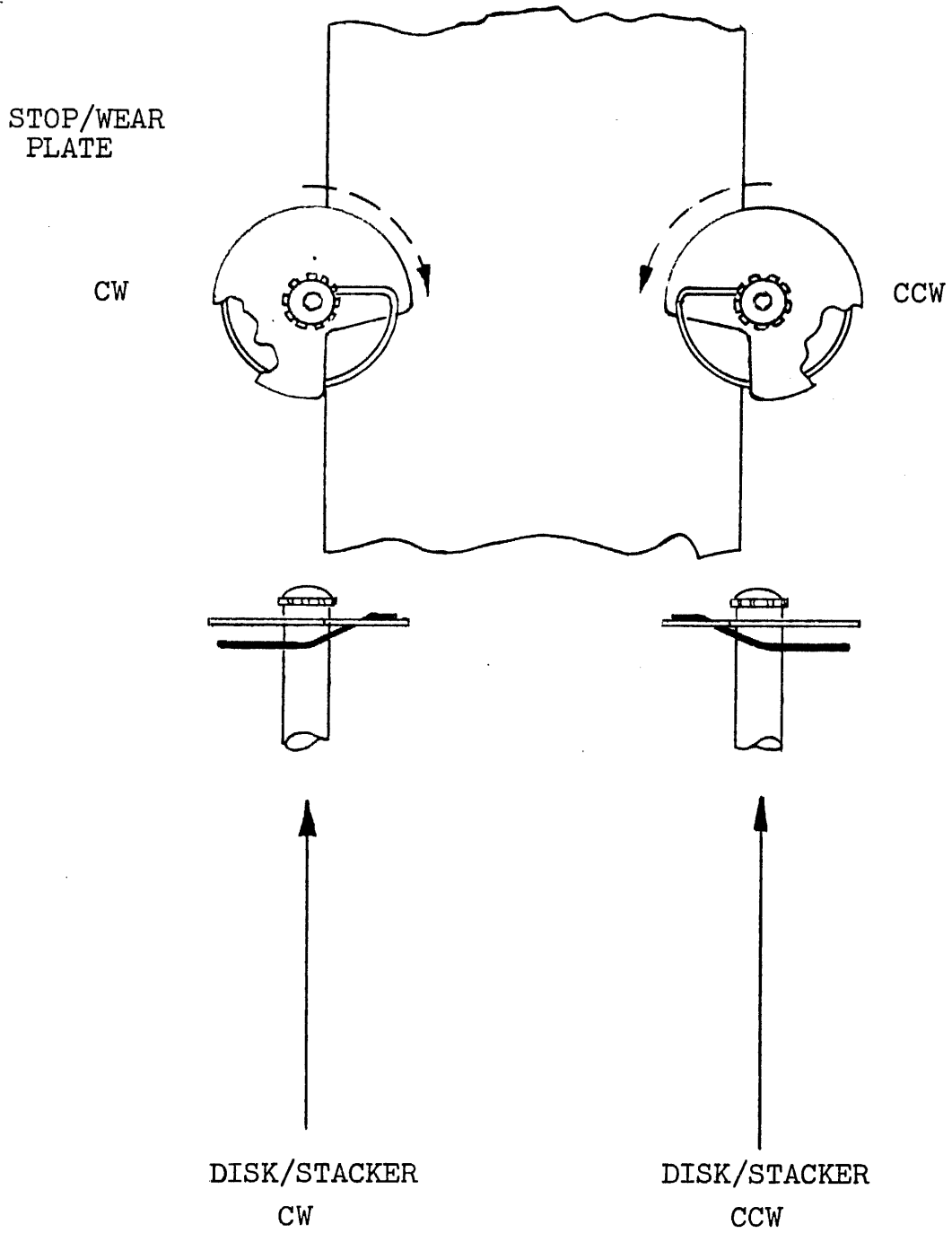
Figure 5-6

5-6.6 CAST STACKER SPRING ASSY - REMOVAL

- a. Remove cast stacker assembly, paragraph 5-6.4.
- b. Remove stacker pulley insuring not to lose nylon washers.
- c. Remove stacker spring assemble.
- d. On replacing spring assembly select proper spring assembly to conform to shaft rotation, i.e., cw/ccw. See Figure 5-7.

5-6.7 FEED SOLENOID - REMOVAL

- a. Remove power supply connector J4. Open cable wrap (cut tie wrap etc.) to solenoid assembly.
- b. Remove hopper switch assembly (right end plate) by removing four 6-32 button head screws.
- c. Insert No. 10 Allen wrench through the right hand access port located upon the front plate of the mechanical deck assembly and remove the 10-24 socket head screw, lock washer, and ground strap lug.
- d. Insert No. 10 Allen wrench through left hand access port and engage the remaining screw that secures the solenoid mounting plate to the rear plate of deck assembly. Remove screw while holding solenoid from underneath. Withdraw and remove, taking care to maintain possession of spring.



STACKER SPRING OPERATION

Figure 5-7

5-6.8 READ HEAD ASSEMBLY - REMOVAL (Ref. Figure 5-8)

- a. Remove two lead wires to read head lamp; i.e., bayonet type connection.
- b. Remove ground strap from end plate.
- c. Disconnect ribbon interconnecting cable at top of logic card. Undo plastic cable straps (or cut tie wraps) on stop and wear plate.
- d. Remove two 6-32 socket head screws (Read head Adj. screw) that retain read head assembly to the support bracket.

CAUTION

Ensure that read head assembly is not permitted to drop upon release of final retaining screw.

5-6.9 LOWER PRESSURE ROLLER ASSEMBLY - REMOVAL

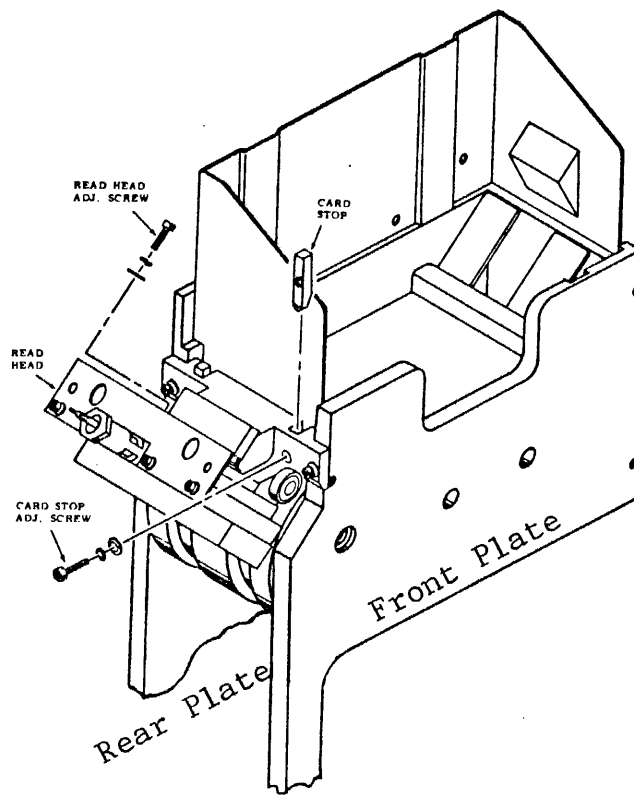
- a. Remove the two #4 socket head screws and remove assembly.

5-6.10 LOWER PRESSURE BAND AND PRESSURE ROLLER - REMOVAL

- a. Remove the two #6 socket head screws and remove the pressure band and pressure rollers.

5-6.11 READ HEAD AND CARD STOP SUPPORT ASSEMBLY - REMOVAL

- a. Remove read head via the support bracket.
- b. Remove the two #6 socket head screws which goes into the ends of the assembly (one each through front and rear plate).
- c. Remove the two #8 socket head screws holding assembly (1 each on outside of card stop adjustment screw). See Figure 5-8.
- d. Remove assembly.



MECHANICAL DECK ASSEMBLY

Figure 5-8

5-6.12 UPPER PRESSURE ROLLER - REMOVAL

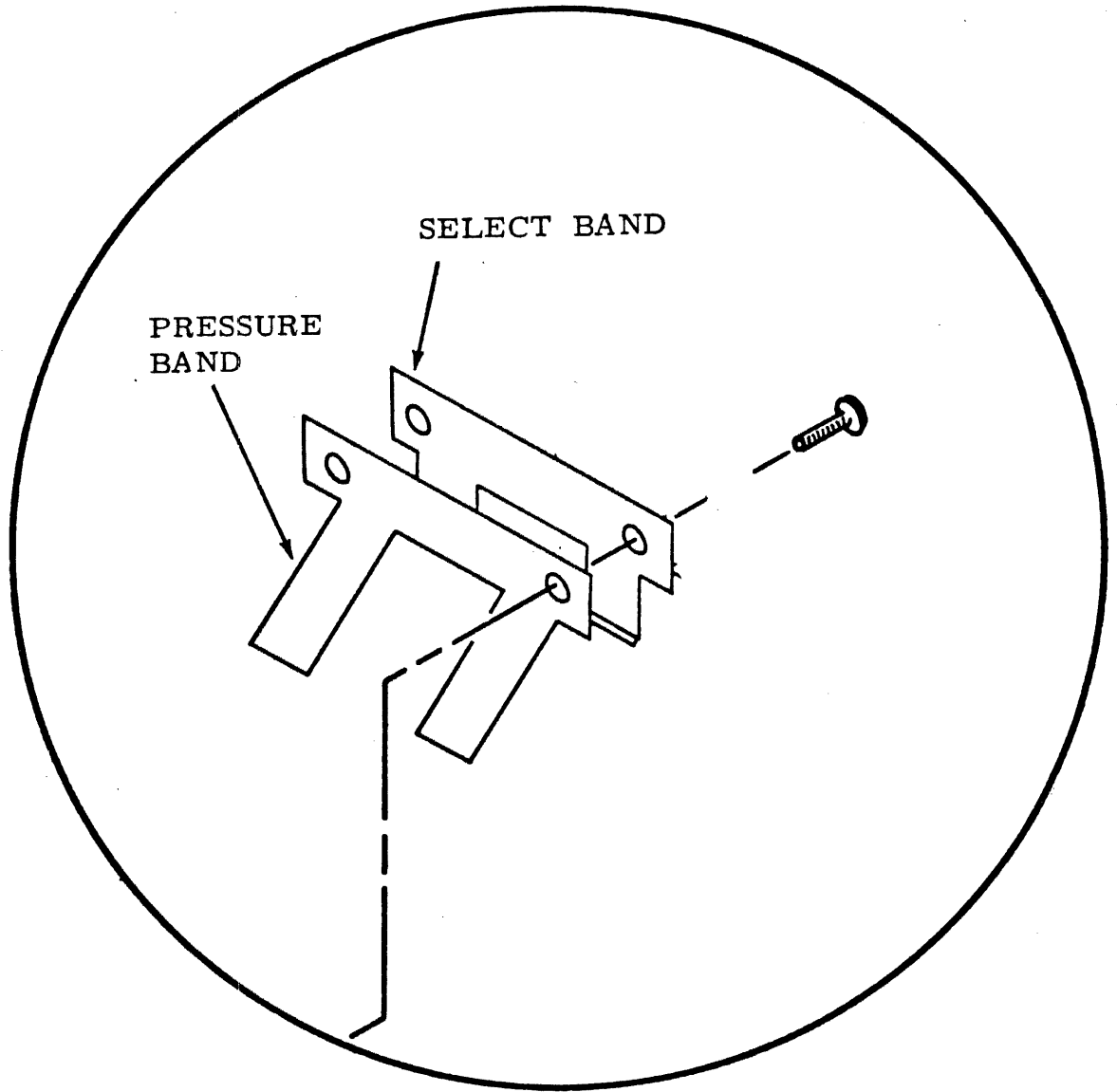
- a. Perform steps a through d of Paragraph 5-6.11.
- b. Remove the two #2 screws. (Note; the pressure roller shaft is spring loaded).

5-6.13 UPPER PRESSURE BAND AND SELECT BAND REMOVAL WITH THE READ HEAD AND CARD STOP ASSEMBLY INSTALLED

- a. Remove the four #6 button head screws which hold the input hopper in place. (See Figure 5-8).
- b. Remove the input hopper.
- c. Remove the two #6 button head screws which holds bands in place. (See Figure 5-9).
- d. Remove Pressure and Select Bands.

5-6.14 READ HEAD ASSEMBLY - REPLACEMENT

- a. Hand feed a standard 80-column card such that the card will be essentially centered under read head.
- b. Position read head assembly beneath read head support and insert and loosely tighten the two 6-32 socket screws which has a #6 lock washer, a #6 and a #8 flat washer installed.
- c. Press assembly firmly forward until pressure band is in good contact with card surface. Observe for symmetrical alignment of read head assembly with respect to the support and tighten retaining screws. Use a rotational pattern, tightening screws a little each time until tight.
- d. Draw card through read head and remove at exit throat.



SELECT BAND AND PRESSURE BAND MOUNTING
Figure 5-9

- e. Connect ground lead to 6-32 socket head screw on rear plate; attaching end of plastic stripper plate.
- f. Insert and tighten read lamp in housing or reconnect bayonet lamp leads.
- g. Connect ribbon cable from read head assembly to receptacle at upper left of Circuit Card, P5. Secure cable clamps on stop and wear plate.
- h. Perform Skew and Read Lamp Adjustments, paragraph 5-5.1.

5-6. 15 DRIVE MOTOR ASSEMBLY - REMOVAL

- a. Remove two 6-32 socket head screws from top of motor bracket and disconnect cable clamps. Rethread screws for retention.
- b. Unwrap power cable to power supply, and disconnect motor leads at power supply connector J5.
- c. Disconnect drive belt from motor pulley.
- d. Loosen four 10-24 socket head screws located inside angle brackets.
- e. Remove upper right hand and two lower mounting screws.
- f. Cradle motor from beneath and remove remaining mounting screw. Lift motor assembly free of cabinet.

5-6.16 TIMING DISK - REMOVAL

- a. Remove belt from transport pulley.
- b. Disconnect timing lamp cable at quick disconnect plug.
- c. Remove two 6-32 X 1- $\frac{1}{2}$ inch socket head screws from lamp holder and remove holder.
- d. Remove stacker belt.
- e. Loosen two 8-32 set screws (located within transport pulley track) and slide transport pulley and disk free of shaft.
- f. Remove four 6-32 button head screws securing disk to transport pulley surface.

5-6.17 TIMING DISK REPLACEMENT (TRANSPORT PULLEY)

- a. Attach the timing disk to the transport pulley with four 6-32 button head screws such that the marked lines are on the side of the timing disk away from the transport pulley.
- b. Install transport pulley (Timing Disk) using new set screws. The gap between the mask and timing disk should be shimmed to a snug .010" at Point A in the sketch below prior to first positioning and tightening screw A with a conventional Allen wrench. Screw A should then be torqued to 16 inch pounds. Screw B is also to be torqued to 16 inch pounds, but only after screw A is fully torqued. (Ref. Figure 5-10)

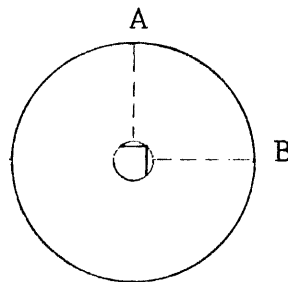


Figure 5-10

- c. Verify that gap is between .010" and 0.025" around the circumference of the Timing Disk.
- d. Reinstall the Timing Lamp Holder and Timing Lamp.

5-6.18 TIMING LAMP - REMOVAL

- a. Loosen set screw on right side of lamp housing.
- b. Withdraw timing lamp. Disconnect lamp leads at quick disconnect receptacle.
- c. Perform timing lamp adjustment, Paragraph 5-5.1

5-6.19 TIMING MASK/PHOTOTRANSISTOR - REMOVAL

- a. Remove lamp housing, paragraph 5-6.16c.
- b. Remove color coded leads from pickup assembly.

NOTE

Observe color coding of wires to insure correct polarity assignment, when reinstalling.

- c. Remove pulley/disk assembly, paragraph 5-6.16, step e.
- d. Remove 6-32 socket head screws that secure mask/phototransistor pickup to rear deck and ease entire assembly out of cutout notch.

NOTE: Mask is installed with marked lines closest to timing disk.

- e. Perform Timing Lamp Adjustment, Paragraph 5-5.1.

5-6.20 HOPPER EMPTY SWITCH - REMOVAL

- a. Remove four 6-32 socket head screws from right edge of front plate and rear plate attaching right end plate.
- b. Disconnect switch leads at quick disconnect receptacle.
- c. Remove two fillister head screws that attach switch, via standoffs, to the right end plate of the deck assembly. Remove switch.

5-6.21 OUTPUT STACKER SWITCH - REMOVAL

- a. Disconnect lead at quick disconnect receptacle.
- b. Remove two 6-32 X 3/8-inch socket head screws that attach switch bracket to rear plate of deck assembly and remove assembly. (1500 Card Stacker has switch bracket riveted in four places).
- c. Remove two 4-40 socket head screws and remove switch.

5-6.22 STACKER FOLLOWER ASSEMBLY - REMOVAL

- a. Remove two 4-40 X 1/4-inch button head screws that secure the spring support to the channel section of stacker tray. Pull spring assembly, follower assembly and rod free of channel.
- b. Remove one 6-32 button head screw that fastens follower spring to base of follower. Slide follower assembly from free end of rod.

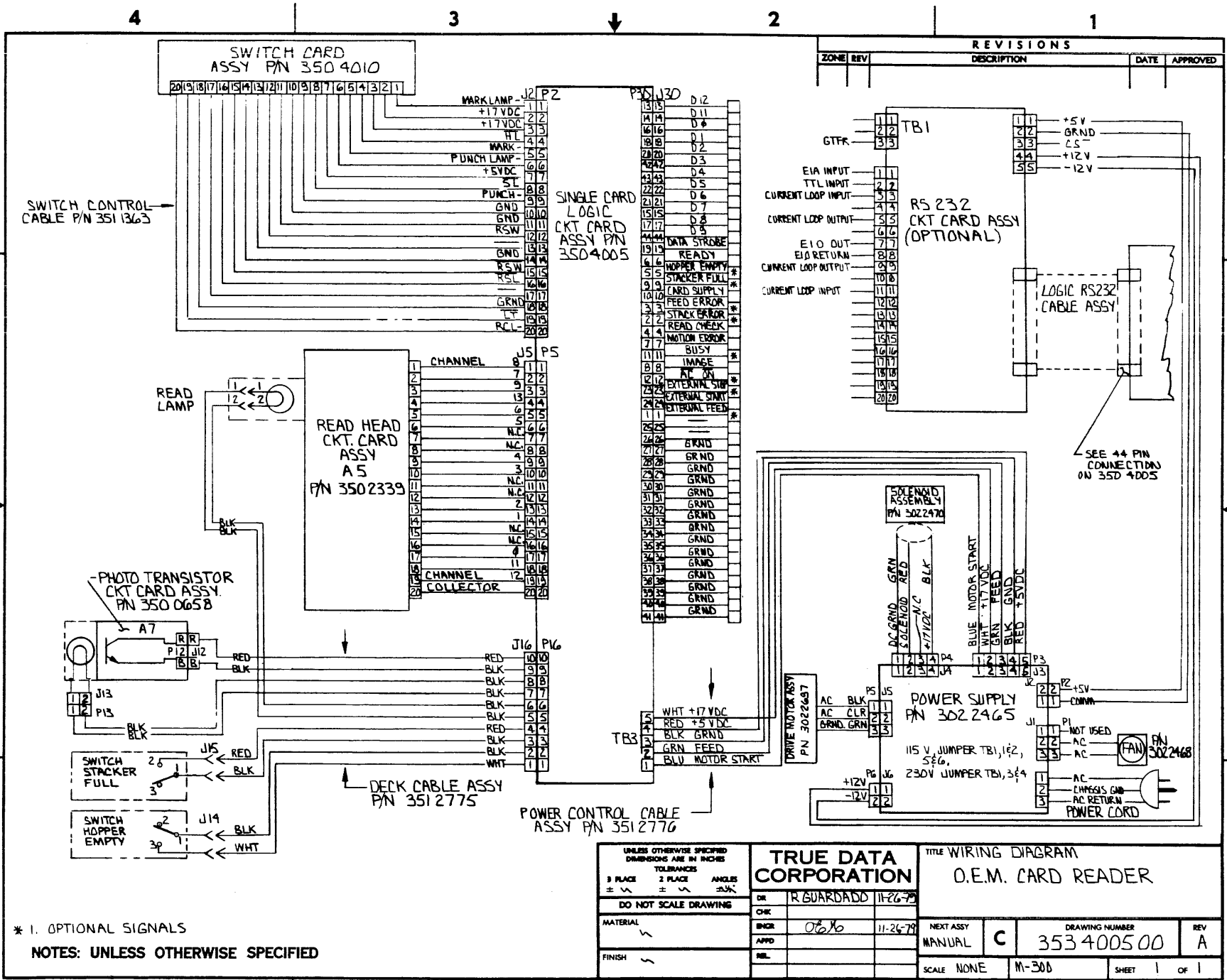
SECTION VI

DIAGRAMS

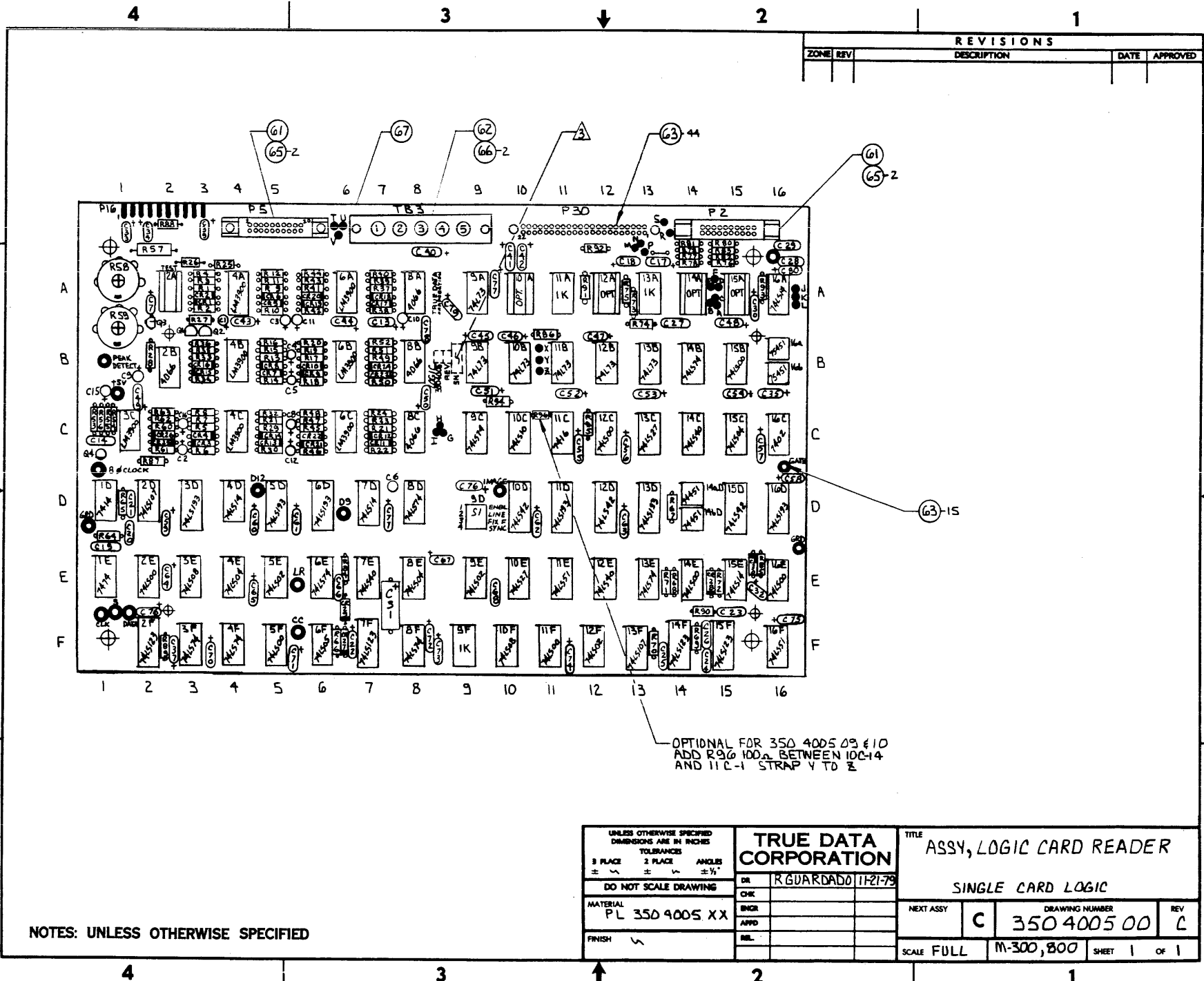
SECTION VI - DIAGRAMS

6-1. GENERAL

This section contains the schematics and diagrams necessary to maintain the reader in an operational status. Included are the logic diagrams and schematics for control and input/output, wiring diagram showing interconnection of the various reader components, and a timing diagram.



* 1. OPTIONAL SIGNALS
 NOTES: UNLESS OTHERWISE SPECIFIED

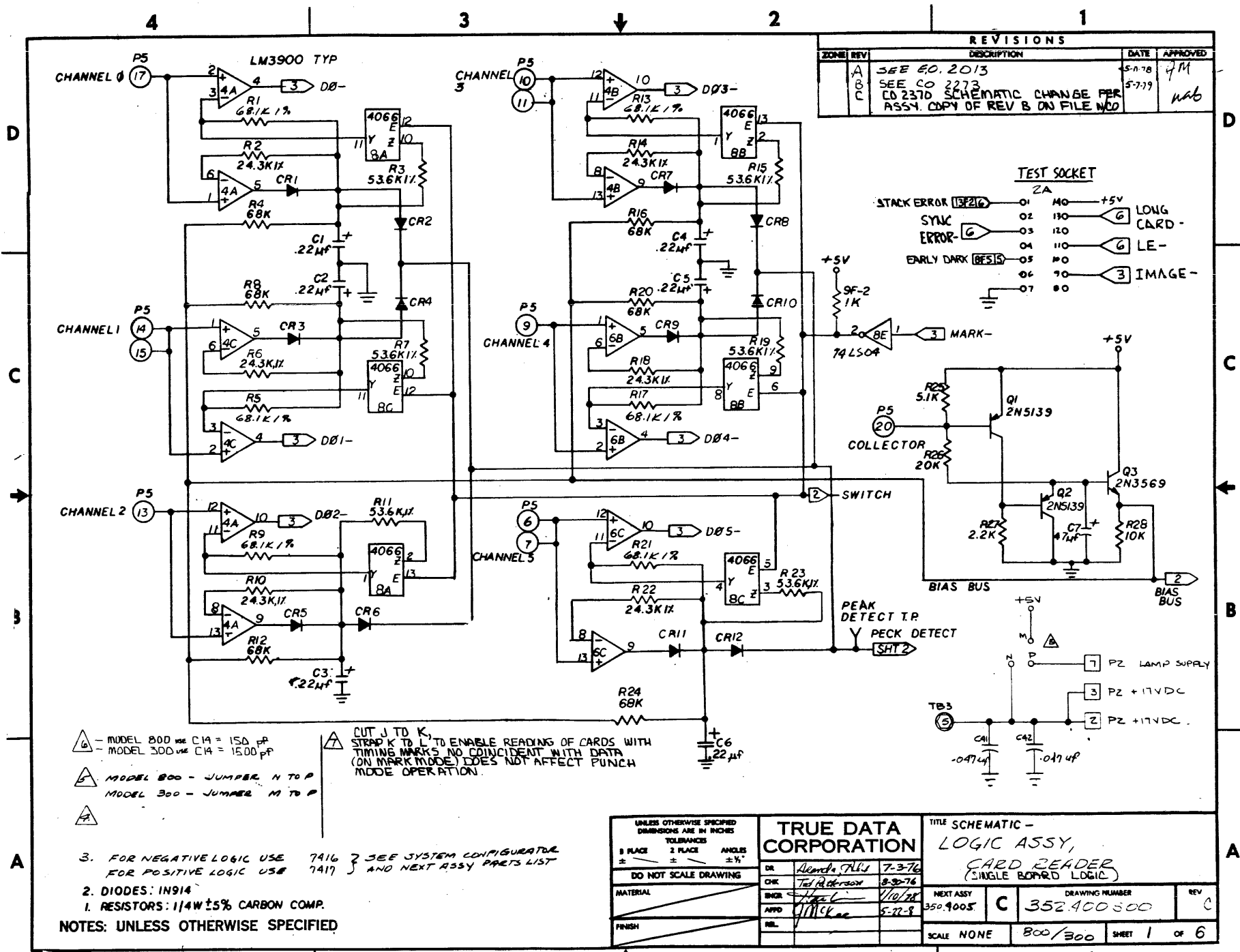


REVISIONS				
ZONE	REV	DESCRIPTION	DATE	APPROVED

OPTIONAL FOR 350 4005 03 & 10
 ADD R36 100.2 BETWEEN 10C-14
 AND 11C-1 STRAP V TO Z

NOTES: UNLESS OTHERWISE SPECIFIED

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES		TRUE DATA CORPORATION		TITLE ASSY, LOGIC CARD READER	
TOLERANCES		DR R GUARDADO 11F21-79		SINGLE CARD LOGIC	
3 PLACE	2 PLACE	DO NOT SCALE DRAWING		NEXT ASSY	C
± .001	± .005	MATERIAL PL 350 4005 XX		DRAWING NUMBER	350 4005 00
± .01	± .02	FINISH 		REV	C
				SCALE	FULL
					M-300,800
				SHEET	1 OF 1



REVISIONS				
ZONE	REV	DESCRIPTION	DATE	APPROVED
A	1	SEE CO. 2013	5-7-78	JM
B	2	SEE CO 2273	5-7-79	nab
C	3	CD 2370 SCHEMATIC CHANGE PER ASSY. COPY OF REV B ON FILE WCO		

- △ - MODEL 800 USE C1A = 150 pF
- MODEL 300 USE C1A = 1500 pF
- ▲ MODEL 800 - JUMPER N TO P
MODEL 300 - JUMPER M TO P
- ▲

CUT J TO K,
STRAP K TO L TO ENABLE READING OF CARDS WITH
TIMING MARKS NO COINCIDENT WITH DATA
(ON MARK MODE) DOES NOT AFFECT PUNCH
MODE MARK OPERATION.

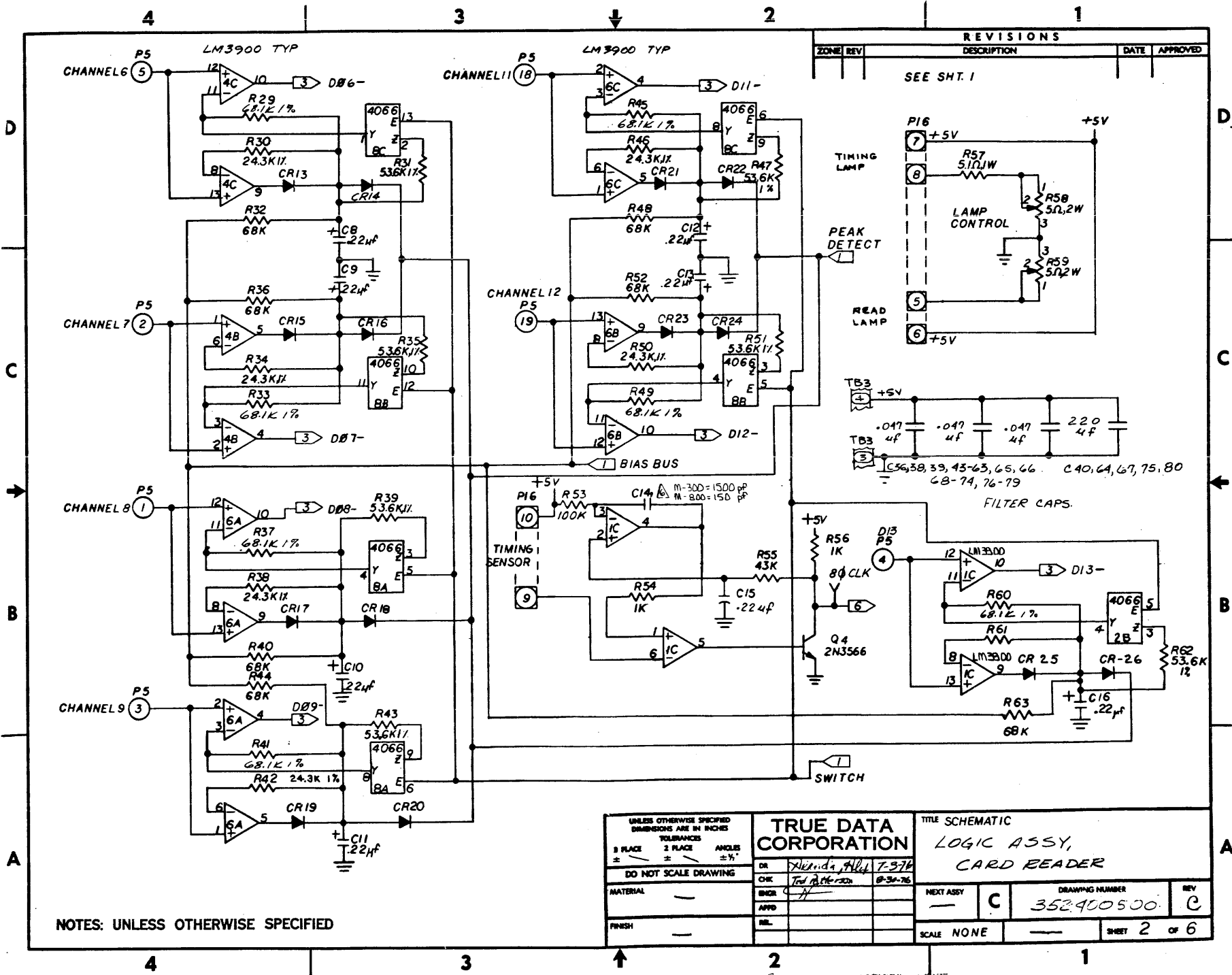
3. FOR NEGATIVE LOGIC USE 7416 } SEE SYSTEM CONFIGURATOR
FOR POSITIVE LOGIC USE 7417 } AND NEXT ASSY PARTS LIST

2. DIODES: 1N914

1. RESISTORS: 1/4W ±5% CARBON COMP.

NOTES: UNLESS OTHERWISE SPECIFIED

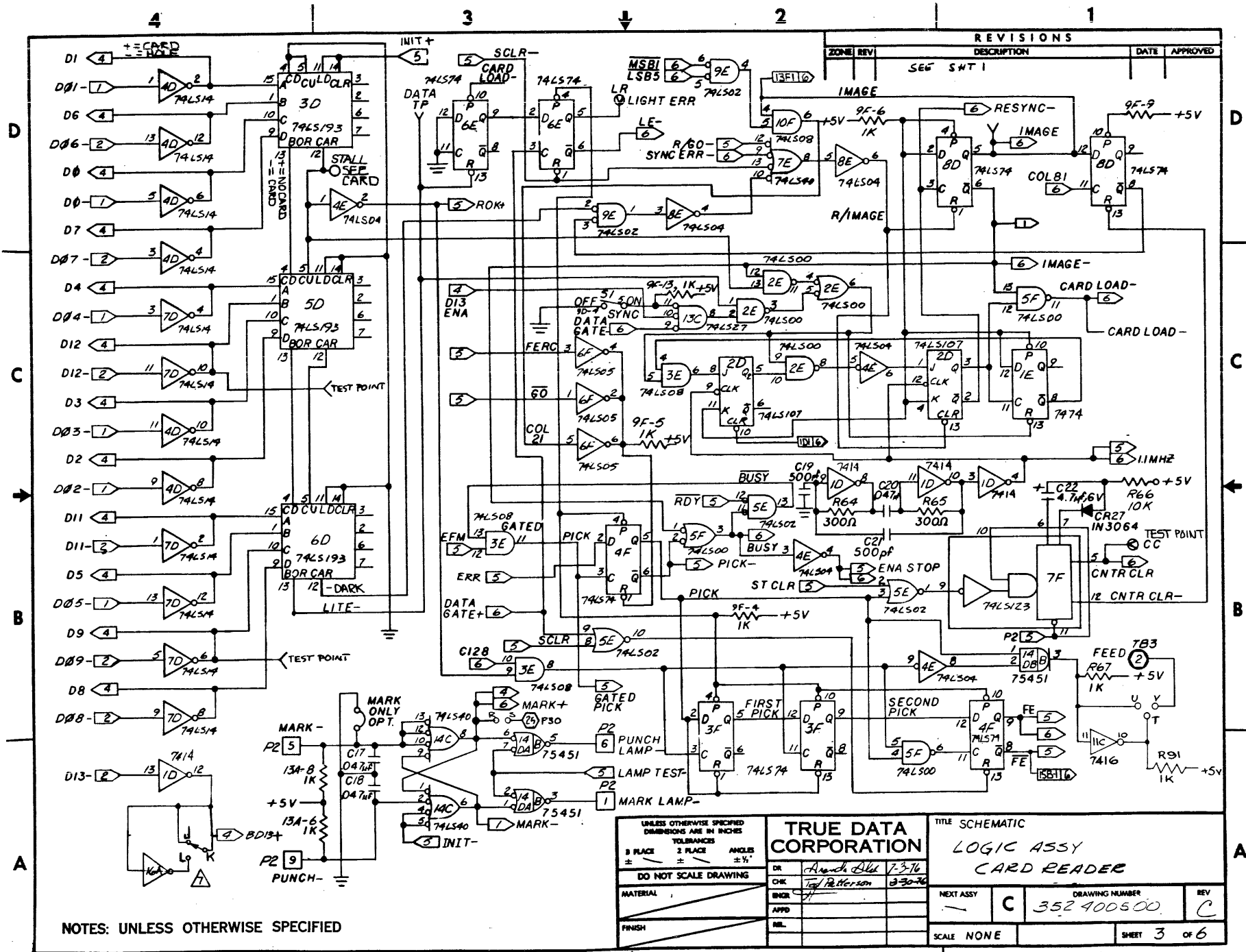
UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES		TOLERANCES		TITLE SCHEMATIC - LOGIC ASSY, CARD READER (SINGLE BOARD LOGIC)	
3 PLACE	2 PLACE	ANGLES	±%		
±	±	± 1/2°	± 1/2%		
DO NOT SCALE DRAWING				DRAWING NUMBER	
MATERIAL		DR	7-3-76	352400500	
FINISH		CHK	Tel Peterson 8-30-76	REV C	
		ENGR	1/10/78	NEXT ASSY 3509005	
		APPD	5-22-8	SCALE NONE	
		REL.		800/300	
				SHEET 1 OF 6	



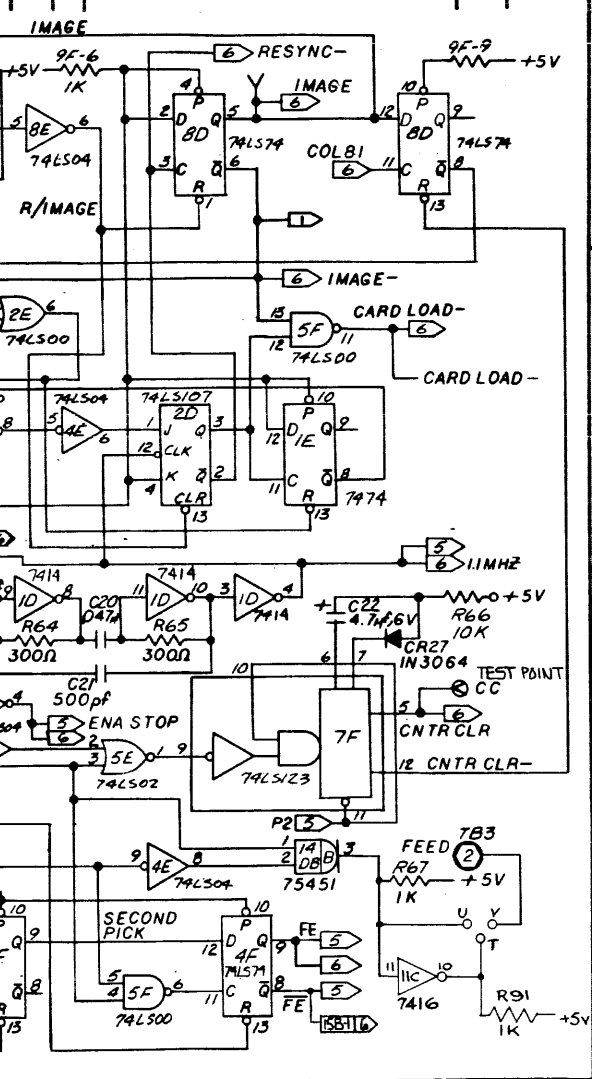
REVISIONS				
ZONE	REV	DESCRIPTION	DATE	APPROVED
		SEE SHT. 1		

NOTES: UNLESS OTHERWISE SPECIFIED

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES		TRUE DATA CORPORATION		TITLE SCHEMATIC	
± 1 PLACE	± 2 PLACE	ANGLE	LOGIC ASSY, CARD READER		
±	±	± 1/2°	DR	NANDA, ALA 7-376	
DO NOT SCALE DRAWING		CHK	Tel. Act. 220 8-30-76		
MATERIAL		ENGR		NEXT ASSY	C
FINISH		APPD		DRAWING NUMBER	352,900,500
		REL		REV	C
			SCALE	NONE	SHEET 2 OF 6

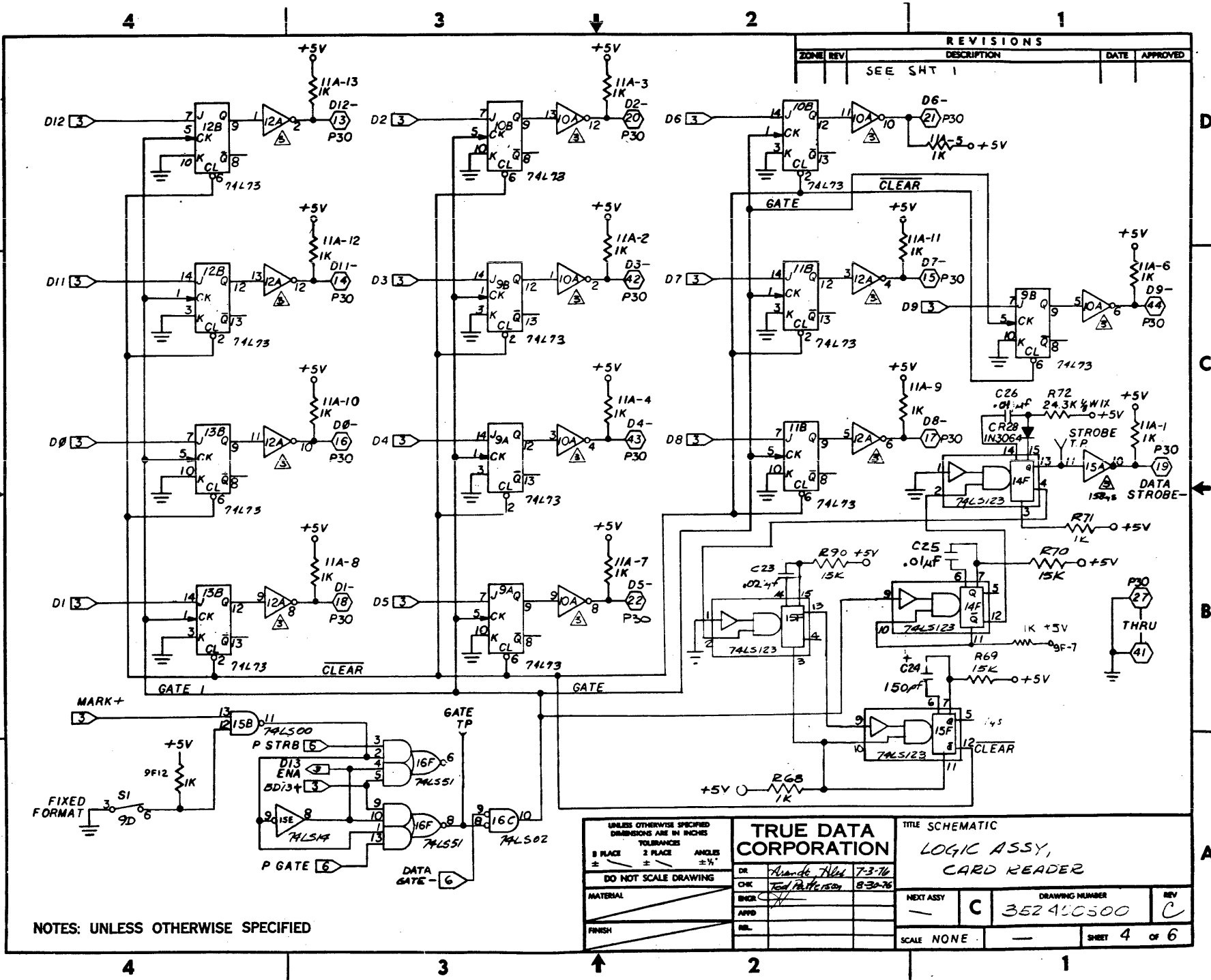


ZONE REV		DESCRIPTION	DATE	APPROVED
		SEG SNT 1		



NOTES: UNLESS OTHERWISE SPECIFIED

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES		TRUE DATA CORPORATION		TITLE SCHEMATIC	
3 PLACE	2 PLACE	DR	7-3-76	LOGIC ASSY	
±	±	CHK	3-30-76	CARD READER	
DO NOT SCALE DRAWING		MATERIAL		NEXT ASSY	C
		FINISH		DRAWING NUMBER	352 400600
				REV	C
				SCALE	NONE
				SHEET	3 OF 6

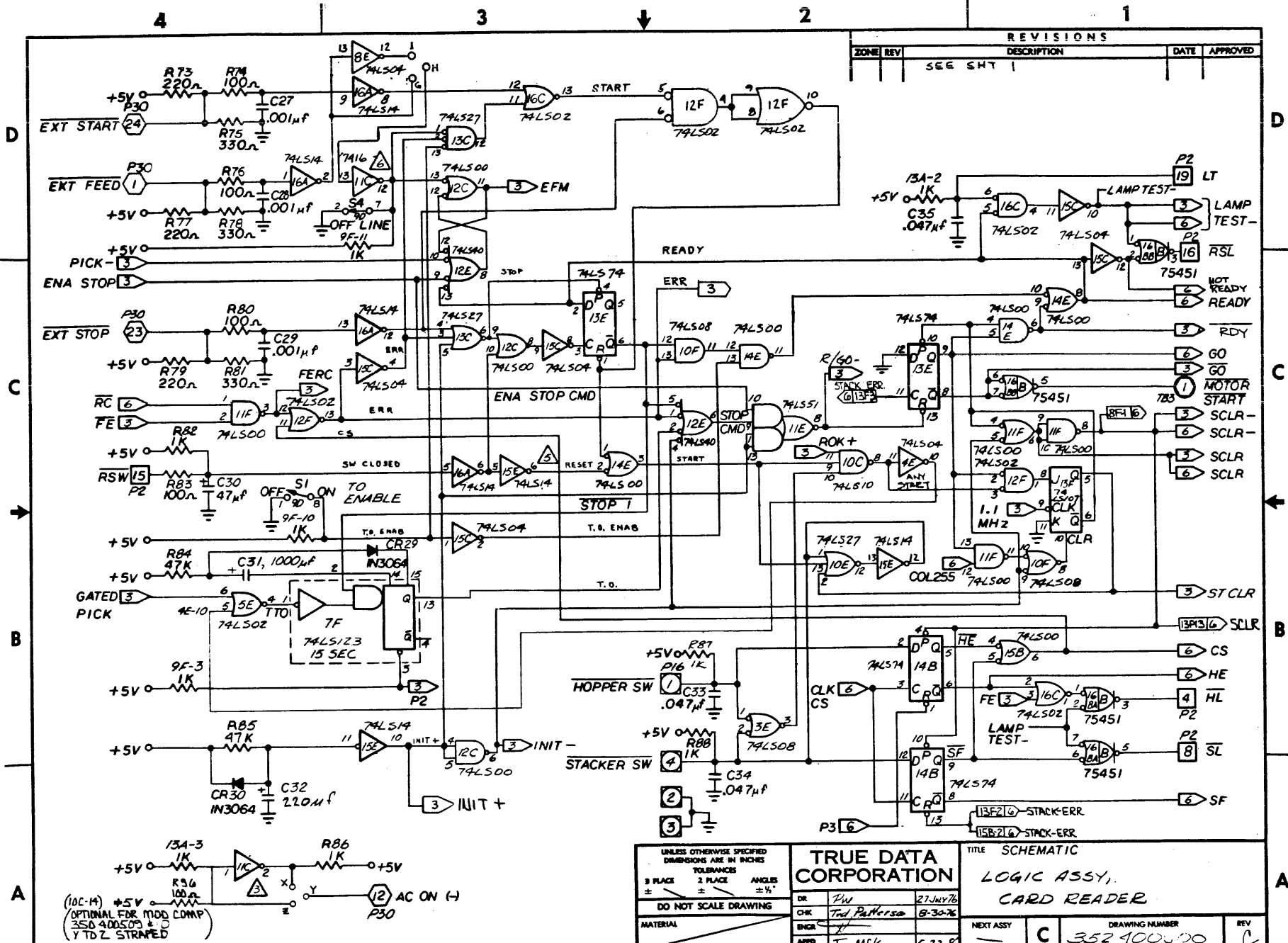


REVISIONS				
ZONE	REV	DESCRIPTION	DATE	APPROVED
		SEE SHT 1		

NOTES: UNLESS OTHERWISE SPECIFIED

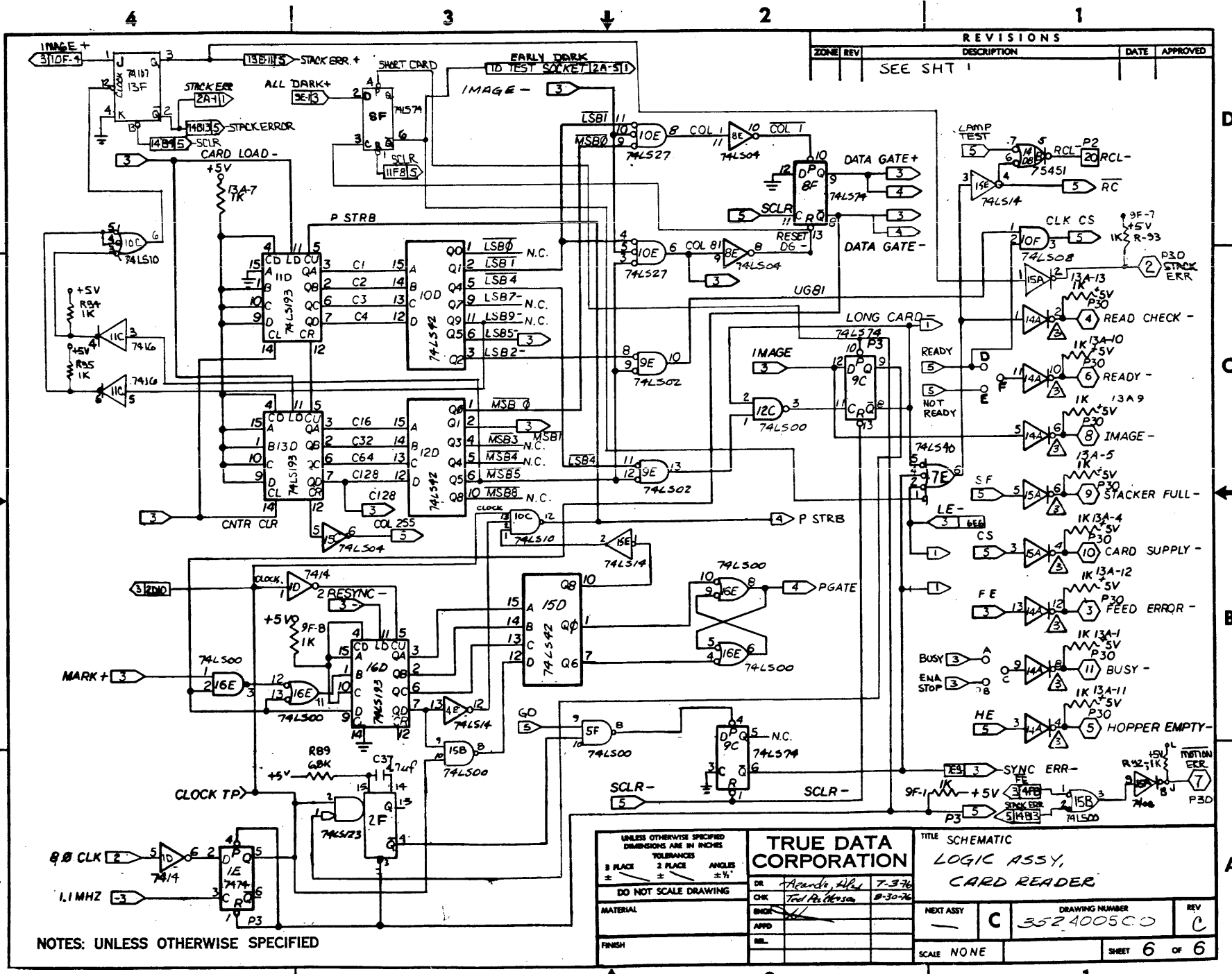
UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES		TRUE DATA CORPORATION		TITLE SCHEMATIC	
8 PLACE ±	2 PLACE ±			LOGIC ASSY, CARD READER	
DO NOT SCALE DRAWING		DR CHK	DATE		
		ENGR	REV		
		APPD		NEXT ASSY	C
		REL		DRAWING NUMBER	352400500
				REV	C
				SCALE	NONE
				SHEET	4 of 6

REVISIONS				
ZONE	REV	DESCRIPTION	DATE	APPROVED
		SEE SHT 1		



NOTES: UNLESS OTHERWISE SPECIFIED

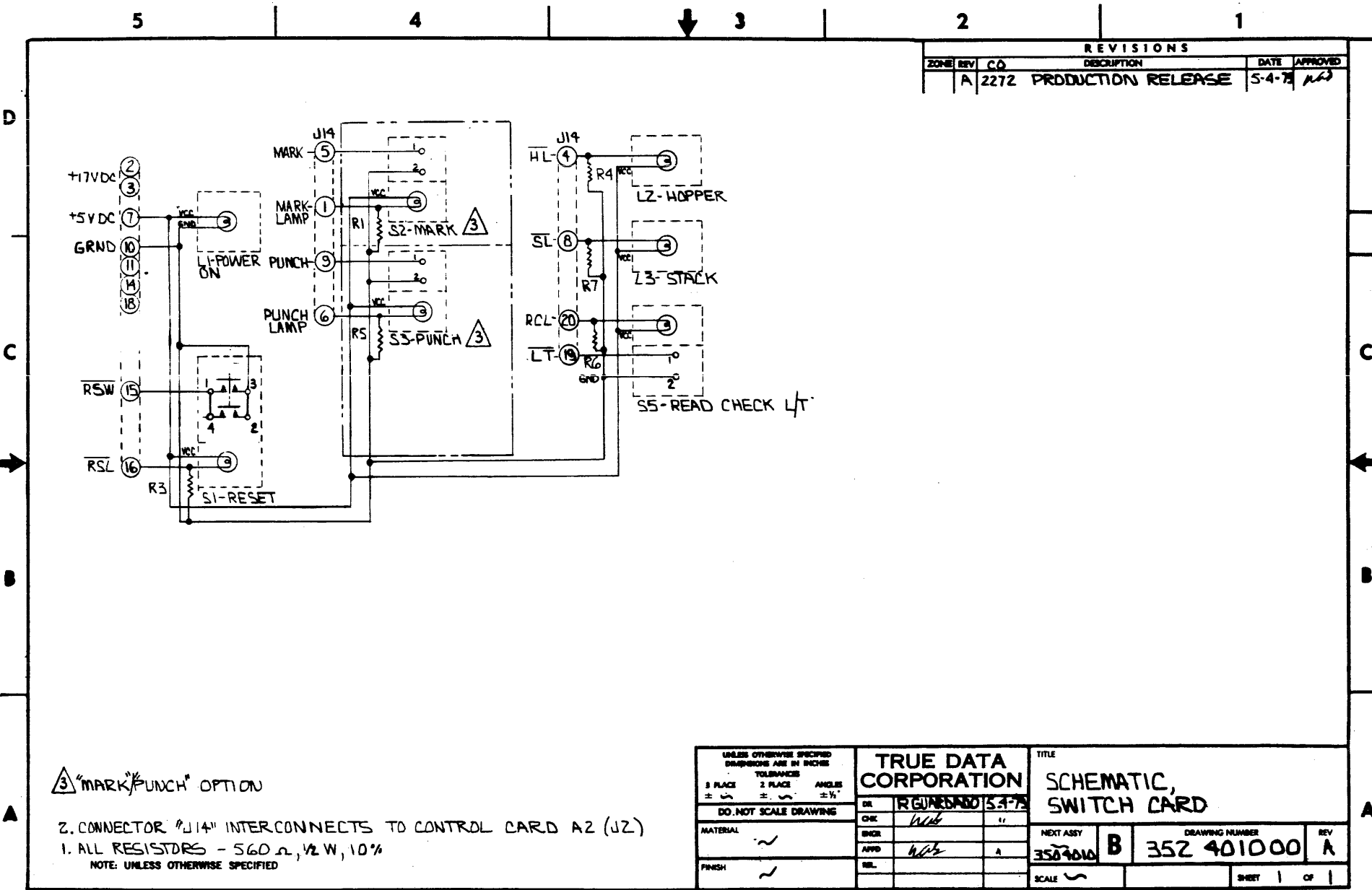
UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES		TOLERANCES		TITLE SCHEMATIC	
3 PLACE	±	2 PLACE	±	TRUE DATA CORPORATION	
DO NOT SCALE DRAWING		DR	JW	LOGIC ASSY.	
MATERIAL		CHK	Tom Patterson	CARD READER	
FINISH		ENGR		NEXT ASSY	C
		APPD	J. McKee	DRAWING NUMBER	352 400500
		REL.		REV	C
		SCALE NONE		SHEET 5 OF 6	



ZONE		REV	DESCRIPTION	DATE	APPROVED
1			SEE SHT 1		

NOTES: UNLESS OTHERWISE SPECIFIED

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES		TOLERANCES		ANGLES	
3 PLACE	2 PLACE	±		± 1/2°	
DO NOT SCALE DRAWING					
MATERIAL		DR	7-3-76	TITLE SCHEMATIC	
FINISH		CHK	8-30-76	LOGIC ASSY, CARD READER	
		ENGR		NEXT ASSY	C
		APPD		DRAWING NUMBER	352400500
		REL		REV	C
				SCALE	NONE
				SHEET	6 OF 6



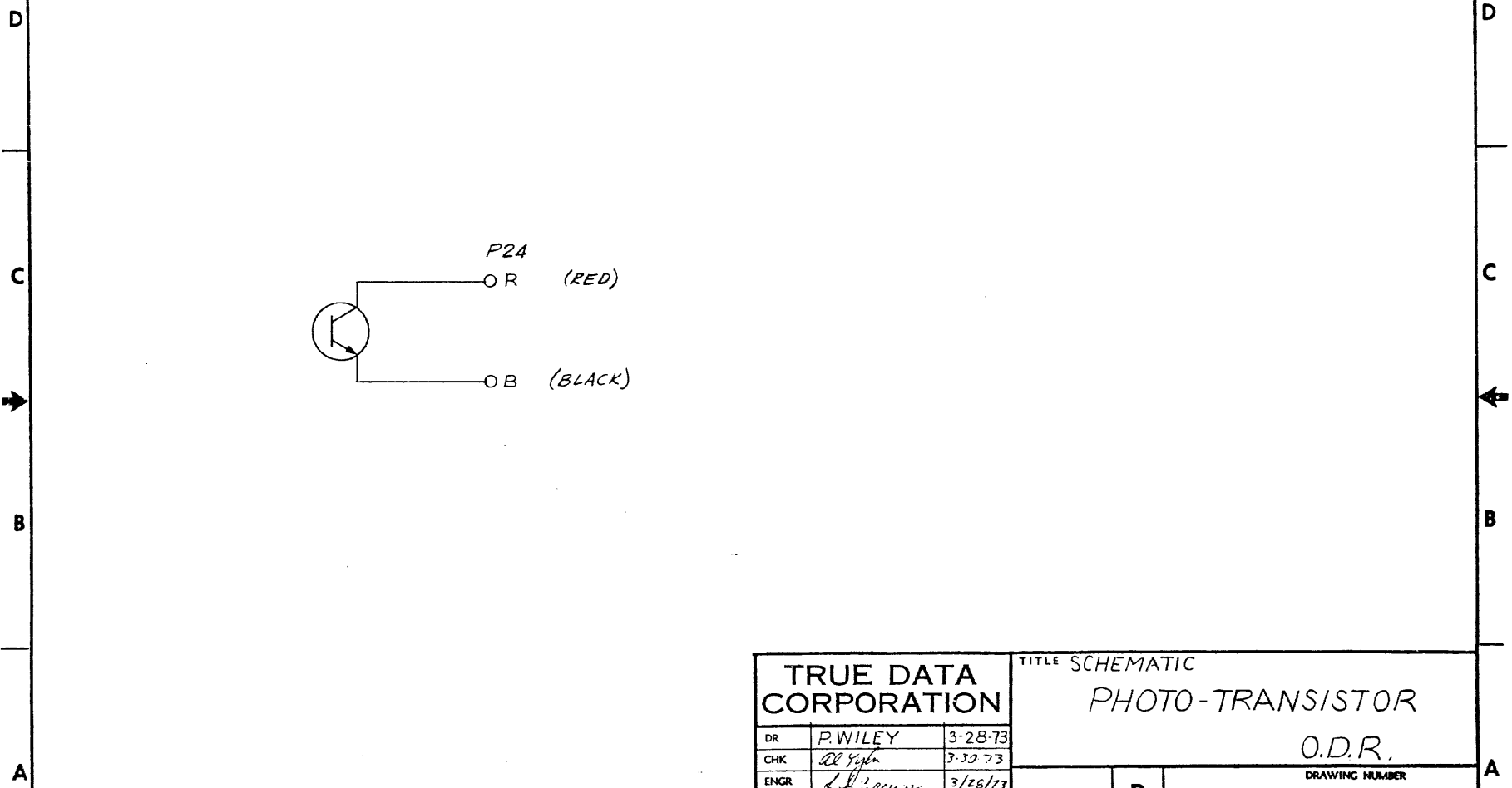
REVISIONS					
ZONE	REV	CO	DESCRIPTION	DATE	APPROVED
	A	2272	PRODUCTION RELEASE	5-4-73	RLD

⚠ "MARK/PUNCH" OPTION

- 2. CONNECTOR "J14" INTERCONNECTS TO CONTROL CARD A2 (J2)
 - 1. ALL RESISTORS - 560Ω, 1/2W, 10%
- NOTE: UNLESS OTHERWISE SPECIFIED

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES		TRUE DATA CORPORATION		TITLE	
3 PLACE ±	2 PLACE ±	ANGLES ± 1/2°	DR	SCHEMATIC, SWITCH CARD	
DO NOT SCALE DRAWING			CHK	NEXT ASSY	REV
MATERIAL	INCR	APPD	3507010	B	A
FINISH	REL	SCALE		DRAWING NUMBER	
				352 401000	
				SHEET	OF
				1	1

5 4 3 2 1

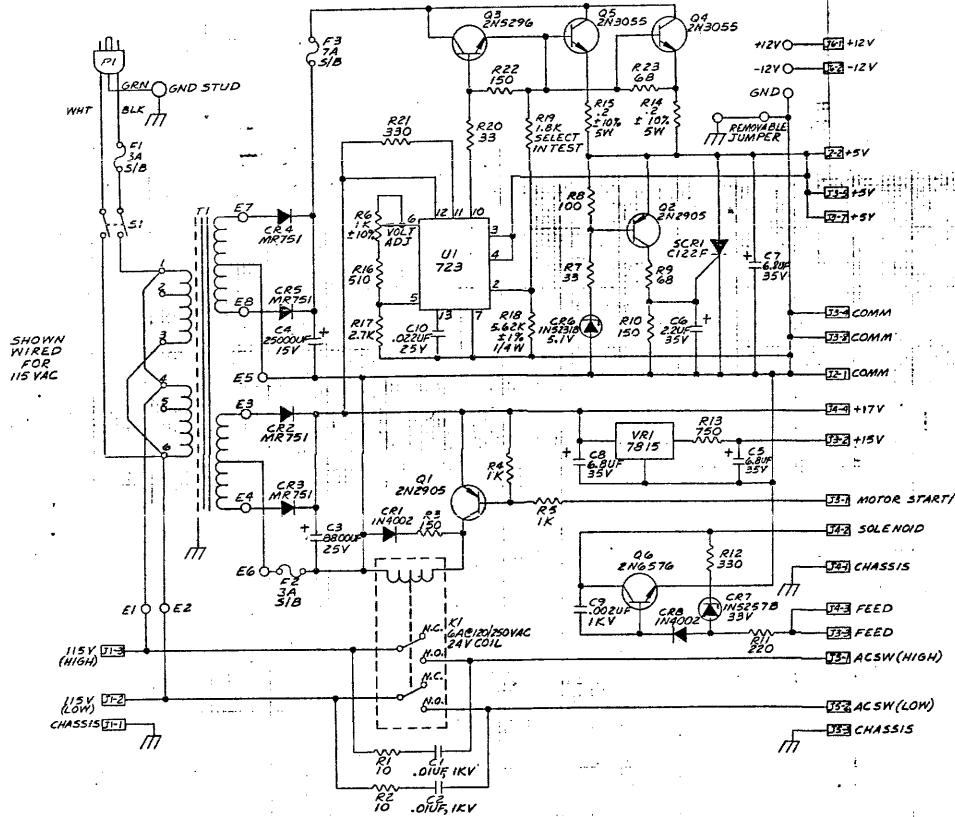


NOTE: UNLESS OTHERWISE SPECIFIED

TRUE DATA CORPORATION			TITLE SCHEMATIC	
			PHOTO-TRANSISTOR	
			O.D.R.	
DR	P. WILEY	3-28-73	DRAWING NUMBER	
CHK	<i>DL</i>	3-30-73	B	350065800
ENGR	<i>L. J. ...</i>	3/26/73		
APPD	<i>J. McKee</i>	4/1/73		
REL	<i>A.C. ...</i>	4-5-73	SCALE NONE	SHEET 1 OF 1

BRUNING 40-522 5 4 3 2 1

REVISIONS				
ZONE	REV	DESCRIPTION	DATE	APPROVED
	01	ENGINEERING RELEASE	11/61	MFS
	A	RELEASE FOR PRODUCTION		WBA
D-1	B	C.O. 2949 F.1 WAS 5A		
G-1		F.2 WAS 5A	7/1/62	CP/JOHN



SHOWN WIRED FOR 115VAC

1. ALL RESISTOR VALUES ARE IN OHMS, ±5%, 1/2W.
 NOTES: UNLESS OTHERWISE SPECIFIED

LINE VOLTAGE OPTION			
V.A.C. TRANSFORMER	105	115	208 240
LINE COIL-TURN	216	146	286 146
JUMPER T1 PINS	2-3/3-4	4-3/4	3-5 3-4
F1 VALUE	3A 5/8	3A 3/8	3A 3/8

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES TOLERANCES		TRUE DATA CORPORATION		TITLE	
1 PLACE	±.010	2 PLACE	±.005	SCHEMATIC, POWER SUPPLY	
DO NOT SCALE DRAWING		ANGLS	±.5°	DR	J. STORTO 11/4/61
		CHEK	P. KEGGWA 11/61	ENGR	
		APPD		APPD	
		FINISH		FINISH	
				NEXT ASSY	D 352402701
				DRAWING NUMBER	
				REV	B
				SCALE	NONE
				SHEET	1 OF 1

SECTION VII

PARTS LIST

Section 7 - PARTS LIST

7-1. GENERAL

This section lists and identifies functional, mechanical and all electrical components that may be subject to field maintenance removal and replacement; i.e., reflected by the authorized spares list.

7-2. PARTS LIST INTERPRETATION

Parts lists incorporated within this section are purposely abbreviated in order to reflect only those items subject to field/site level maintenance. The lists are supported by exploded view illustrations. Attaching hardware for removable assemblies/components is listed only when the location or identification of such items may be obscure. All attaching hardware is, however, referenced within the removal/replacement procedures covered by Section 5.

Col. 1, INDEX NO.

The number appearing before a hyphen identifies the appropriate exploded view illustration; i.e., figure number.

All numbers appearing after a hyphen are index (callout) numbers that locate, on the supporting illustration, the part, component or assembly listed under Col. 3.

Col. 2, PART NUMBER

This column incorporates the part numbers used in ordering replaceable parts.

A "No Number" designation is used to indicate that the exploded view illustrations are not, of themselves, orderable assemblies.

The "Ref Only" designation implies that a part or component is either not a field level replacement, or is listed solely to aid in maintaining the order of disassembly, or is an attaching part not otherwise readily identified.

Where an assembly/component is further exploded by separate illustration the "See Fig." notation is utilized. The part number for such an assembly is covered by the subordinate parts list.

Column 3, DESCRIPTION

This column provides nomenclature and abbreviated description of each identified part, component or assembly. The relative order of subordination is maintained by indenture. The term (AP) is used to identify attaching parts. The * symbol indicates that the various hardware items such as screws, washers, nuts, etc. are non-corrosive commercial items.

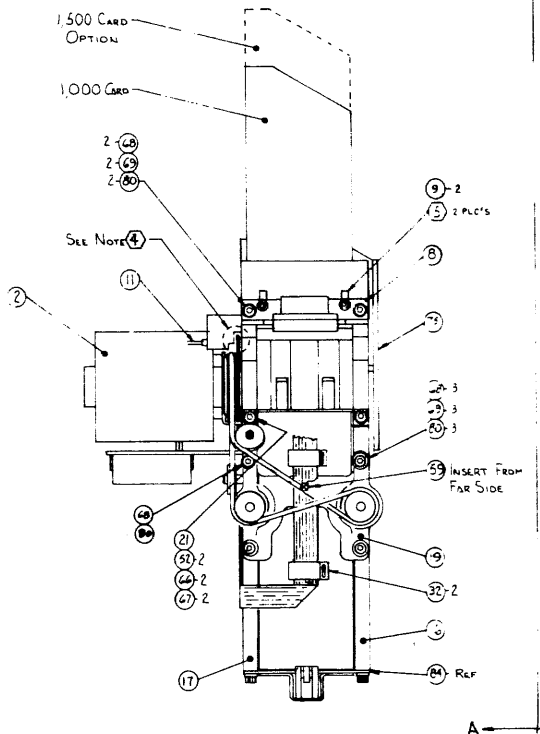
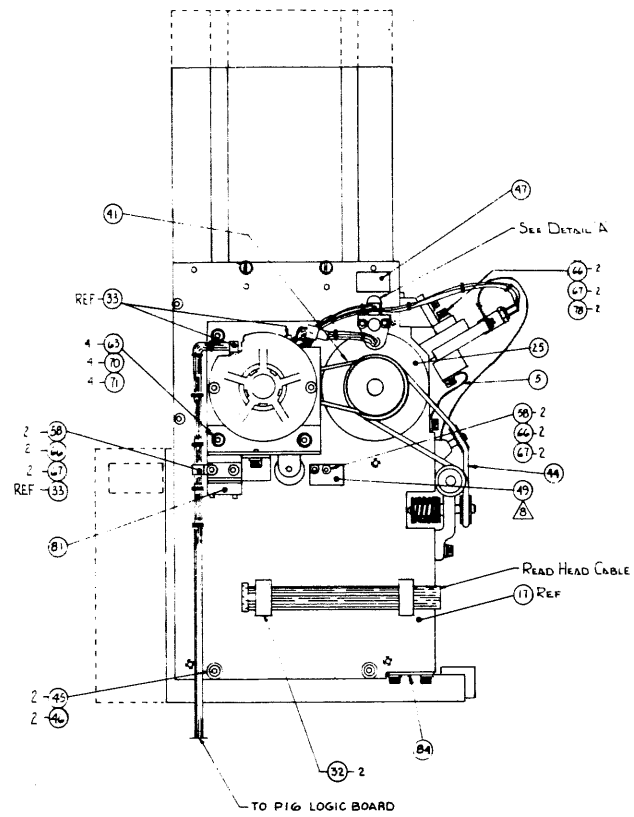
Column 4, QUANTITY

This column lists the total number of each identified part, component or assembly required to constitute one complete next higher assembly; i.e., in most cases, one complete card reader. The "OP" after the quantity indicates an optional item.

MAIN ASSEMBLY

ASSEMBLY & FIND	PART NUMBER	DESCRIPTION	UNITS PER ASSY	VENDOR PART NO.
1				
2	301270002	Cabinet Assembly	1	
3	301248802	Mechanical Deck Assy.	1	
4	3502528XX	RS-232 Circuit Card Assembly	1/OP	
4	3502528XX	RS-232 Circuit Card Assemble w/RCC	1/OP	
5	301300902	Hopper Weight	1	
7	302282702	Hopper 1000	1	
7	302286302	Hopper 1500	1	
8	302301801	Stacker Assembly, 1000	1	
8	302301802	Stacker Assembly, 1000 w/switch	1	
8	302301901	Stacker Assembly, 1500	1	
8	302301902	Stacker Assembly, 1500 w/switch		
9	103001604	*Screws, 6-32 X ¼L BHCS	8	
10	350249401	RCC Circuit Card Assy.	1/OP	
11	350274601	ED Circuit Card Assy.	1/OP	
12	350300600	Mux Circuit Card Assy.	1/OP	

REVISIONS				
ZONE	REV	DESCRIPTION	DATE	APPROVED

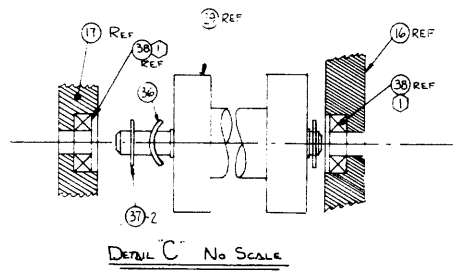
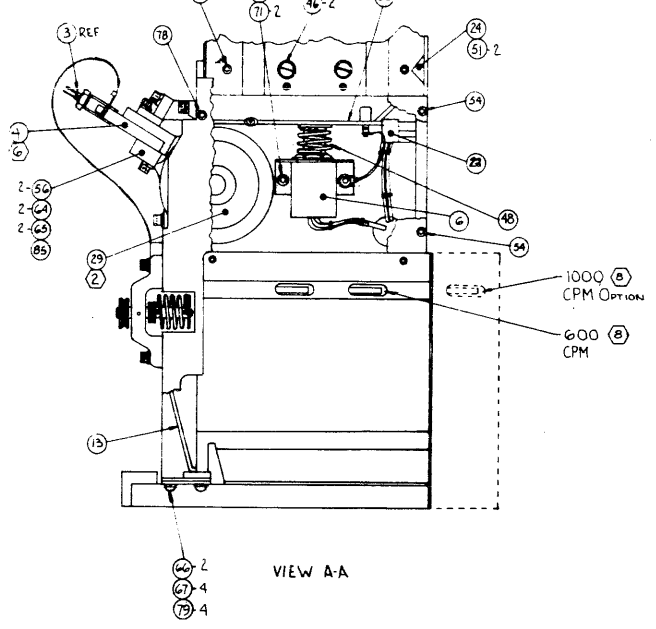
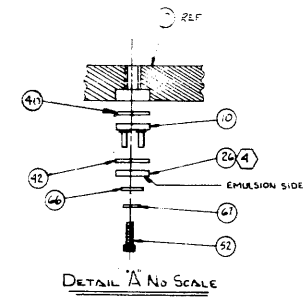
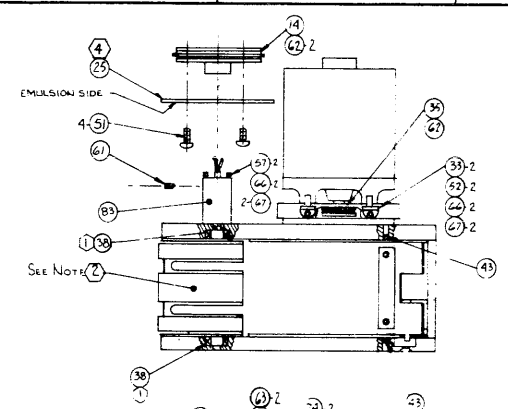


- NOTES: UNLESS OTHERWISE SPECIFIED
- BEARING (ITEM 38) TO BE PRESSED TO BOTTOM OF C BORE IN PLATE (ITEM 16) SEE DETAIL C
 - LATERAL MOVEMENT IN TRANSPORT (ITEM 29) NOT PERMISSIBLE.
 - SEE P/L 3012488XX
 - DISTANCE BETWEEN TIMING MASK (ITEM 26) & TIMING DISC (ITEM 25) TO BE $.015 \pm .005$.
 - DISTANCE BETWEEN CARD STOP ON PRESSURE ROLLER (ITEM 8) & TRANSPORT (ITEM 29) TO BE $.007$ TO $.008$.
 - ADJUST DISTANCE BETWEEN READ HEAD (ITEM 4), TRANSPORT (ITEM 29) $.015 \pm .005$. RIGHT HAND SIDE OF READ HEAD (ITEM 4) TO BE IN LINE WITH EDGE OF CARD MEDIA.
 - FEED PLATE HEIGHT TO BE $.050 \pm .005$ ABOVE TRANSPORT MEASURED IN LINE WITH LEFT END OF INPUT HOPPER.
- ▲ PARTS INDICATED TO BE POSITIONED AS REQ'D. FOR OPTION

NOTES: UNLESS OTHERWISE SPECIFIED

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES TOLERANCES				TITLE	
3 PLACE	2 PLACE	ANGLES	TRUE DATA CORPORATION		MECHANICAL DECK MODEL OE 800
± .010	± .005	± .010	DR	P. WILEY	4-27-73
DO NOT SCALE DRAWING					
MATERIAL	FINISH	DR	E. DOMMELER	4-26-73	
		ENGR	A. TAYLOR	5-12-73	NEXT ASBY
		APP	J. M'KEE	5-26-73	3541500
		REL	E. DOMMELER	9-2-75	D 301248800
					DRAWING NUMBER
					REV
					G
					SCALE 1/2
					SHEET 1 OF 2

REVISIONS				
ZONE	REV	DESCRIPTION	DATE	APPROVED



NOTES: UNLESS OTHERWISE SPECIFIED

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES		TRUE DATA CORPORATION		TITLE MECHANICAL DECK MODEL OE 800	
3 PLACE ±	TOLERANCES ±	ANGLE ± 1°	OR P. WILLEY 4-18-77	NEXT ASSY 3648600	DRAWING NUMBER 301248800
DO NOT SCALE DRAWING			CHK E. DOMINIANI 4-18-77	REV G	SCALE 1/2
MATERIAL			DRG J. TAYLOR 5-12-77	SHEET 2 OF 2	
FINISH			APP J. M'KEE 5-14-77		
			REL R. DOMINIANI 9-2-77		

MECHANICAL DECK ASSEMBLY

ASSEMBLY & FIND	PART NUMBER	DESCRIPTION	UNITS PER ASSY	VENDOR PART NO.
301248802				
2	302269701	Motor Drive, Assembly	1	
3	216000501	Lamp, Read Head	1	
4	3022339XX	Read Head Assembly	1	
5	351249001	Assy-Cable Rd Hd Gnd 1 $\frac{1}{2}$	1	
5	351301401	Assy-Cable Rd Hd Gnd 2 $\frac{1}{2}$	1	
6	302247001	Solenoid Assembly	1	
7		Not Used		
8	302242801	Rd Hd & Cd Stop Support Assembly	1	
9	304220201	Card Stops	2	
10	350065801	Ckt Cd Ay - Photo	1	
11	351087501	Cable Assy - Timing Lamp	1	
12		Not Used		
13	304242501	Plate, Wear & Stop	1	
14	304301403	Pulley, Transport 600 CPM 60 HZ	1	
14	304301404	Pulley, Transport 600 CPM 50 HZ	1	
14	304301407	Pulley, Transport 1000 CPM 60 HZ	1	
14	304301408	Pulley, Transport 1000 CPM 50 HZ	1	
15		Not Used		
16	304241901	Plate, Front	1	
17	304242001	Plate, Rear	1	

MECHANICAL DECK ASSEMBLY

ASSEMBLY & FIND	PART NUMBER	DESCRIPTION	UNITS PER ASSY	VENDOR PART NO.
18		Not Used		
19	302300103	Cast Stacker	1	
20		Not Used		
21	304056601	Plate, Stripper	1	

MECHANICAL DECK ASSEMBLY

ASSEMBLY & FIND	PART NUMBER	DESCRIPTION	UNITS PER ASSY	VENDOR PART NO.
22	325065201	Hopper Switch	1	
23		Not Used		
24	304062102	Spacer, "V" Block	1	
25	304058901	Disk, Timing	1	
26	304059001	Mask, Timing	1	
27		Not Used		
28		Not Used		
29	302179301	Transport	1	
30		Not Used		
31		Not Used		
32	136000602	Clamp, Cable	2	
33	136000201	Clamp, Cable, Strp.	4	
34		Not Used		
35	304270203	Pulley, Drive Motor 600 GPM, 60 Hz	1	
35	304270204	Pulley, Drive Motor 600 GPM, 50 Hz	1	
35	304270207	Pulley, Drive Motor 1000 CPM, 60 Hz	1	
35	304270208	Pulley, Drive Motor 1000 CPM, 50 Hz	1	
36	106000701	Washer, Spring	1	
37	106000302	Washer, Shim .005 THK	2	
38	109000402	Bearing, Transport	2	

MECHANICAL DECK ASSEMBLY

ASSEMBLY & FIND	PART NUMBER	DESCRIPTION	UNITS PER ASSY	VENDOR PART NO.
39		Not used		
40	106001501	Nylon #6 Spacer		
41	114000204	Belt, Drive (Gates 3M255)	1	
42	304324301	Spacer-Timing Mask	2	
43	109000301	Bushing (Teflon)	2	
44	114000601	Belt, Stacker	1	
45	116000601	Stud, Fastener	2	
46	107000801	Retainer, Fastener	4	
47	340055501	Label	1	
48	304285301	Spring, Conical	1	
49	3043062XX	Plate - Cover, Stacker Switch	1	
50		Not used		
51	103001604	*Screw, 6-32 x $\frac{1}{4}$ L BHCS	4	
52	103000807	*Screw, 6-32 X $\frac{1}{2}$ SHCS	5	
53	153000701	*Standoff, $\frac{1}{4}$ HRX M/F 6-32 x $\frac{1}{4}$ L	4	
54	103000803	*Screw, 6-32 x $\frac{5}{8}$ L SHCS	4	
55	103001501	*Screw, 4-40 x $\frac{3}{8}$ L SHCS	2	
56	103001506	*Screw, 4-40 x $\frac{7}{8}$ L SHCS	2	
57	103000802	*Screw, 6-32 x $1\frac{1}{2}$ L SHCS	2	
58	103000805	*Screw, 6-32 x $\frac{1}{4}$ L SHCS	7	
59	103002903	*Screw, 6-32 x $\frac{1}{4}$ L FHCS	1	
60	103002801	*Screw, 4-40 x $\frac{1}{4}$ L BHCS	1	
61	103003601	*Screw, Set, 8-32 x $\frac{1}{4}$ L No Mar	1	
62	103000201	*Screw, Set, 8-32 X $\frac{1}{2}$ L	3	
63	103003701	*Screw, 10-24 x $\frac{1}{2}$ L SHCS	6	
64	106000101	*Washer, Flat No. 4	3	
65	106001401	*Washer, Lock No. 4	3	
66	106001201	*Washer, Flat No. 6	25	
67	106001301	*Washer, Lock No. 6	25	
68	106001001	*Washer, Flat No. 8	5	

MECHANICAL DECK ASSEMBLY

ASSEMBLY & FIND	PART NUMBER	DESCRIPTION	UNITS PER ASSY	VENDOR PART NO.
69	106001101	*Washer, Lock No. 8	5	
70	106003101	*Washer, Flat No. 10	6	
71	106003201	*Washer, Lock No. 10	6	
72	106002601	*Washer, Star External #4	1	
73	136000801	Clip, Speed, Tubular	3	
74	116000602	Stud, Fastener	2	
75		Not Used		
76	351071102	Cable Assembly, Deck	1	
77		Not Used		
78	103000807	*Screw, 6-32 X 1/4L SHCS	3	
79	103001601	*Screw, 6-32 X 3/8L BHCS	4	
80	103000507	*Screw, 8-32 X 5/8L SHCS	5	
81	302283501	Stacker Switch Assy	1	
82	302170201	Feed Plate Assy	1	
83	304050001	Holder, Light	1	
83	304050002	Holder, Light	1	
84	302255401	Assy-Plate Card Bumper	1	
85	302245401	Assy-Pressure Roller Bottom 400-1000 CPM	1	

CABINET ASSEMBLY

ASSEMBLY & FIND	PART NUMBER	DESCRIPTION	UNITS PER ASSY	VENDOR PART NO.
301270000				
1	3040376XX	Cabinet Fabricated	1	
2		Not Used		
3	304207201	Bar, Racking, Rear	1	
4	304207101	Bar, Racking, Side	1	
5	304210701	Shield, Racking	1	
6	3043035XX	Panel, Trim	1	
7	304181101	Screen, Fan	1	
8	304329601	Conversion Bracket Slotted	1	
9	304329701	Conversion Bracket	1	
10	302246801	Assy Fan	1	
11	3022465XX	Assy Power Supply	1	
12	302312601	Mechanical Deck Latch Assy.	1	
13	35040100X	Switch Card Assy	1	
14	35040050X	Circuit Card Assy, Single Logic	1	
15	351246901	Assy Cable Power Control	1	
16	3511762XX	Assy Cable I/O	1	
17	351307901	Assy Cable Read Head Ext.	1	
18	351185301	Assy Cable Ground	3	
19	327240501	Kit I/O Connector	1/OP	
20	119000101	Feet, Bumper	4	
21	117000201	Stem, Bumper	1	
22	123000101	Guard, Fan	1	
23	105001001	Nut, Speed	8	
24	103004501	Ball, Stud	1	
25	136000501	Clip (Cabinet Top)	2	

CABINET ASSEMBLY

ASSEMBLY & FIND	PART NUMBER	DESCRIPTION	UNITS PER ASSY	VENDOR PART NO.
26	136000301	Tie Wrap	6	
26	136000602	Clamp Cable	6	
27	116000501	Stud, (Back Door)	2	
28	108000801	Spring, (Stud)	2	
29	107000701	Retainer, (Stud)	2	
30	106002301	Washer, (Stud)	2	
31	106002902	Washer, Star Internal	2	
32	106000203	Washer, Star External	7	
33	106001201	*Washer, Flat #6	27	
34	106001301	*Washer, Lock #6	36	
35	106001501	Washer, Flat Nylon .253 I.D.	2	
36	104000303	*Screw, 6-32 X 3/8 Long SHCS	11	
37	104000313	*Screw, 6-32 X 2.00 Long SHCS	4	
38	104000301	*Screw, 6-32 X 1/4 Long SHCS	13	
39	104001503	*Screw, 6-32 X 3/8 Long BHCS	4	
40	153000701	*Stand-Off 6-32 X 1/4 X 1/4 Hex Head	4	
41	105000201	*Nut, 6-32 Hex Head	8	
42	350208001	RS-232 Assy.	1/OP	
43	350303110	Buffer Board Assy	1/OP	
44		Not Used		
45		Not Used		
46		Not Used		
47		Not Used		

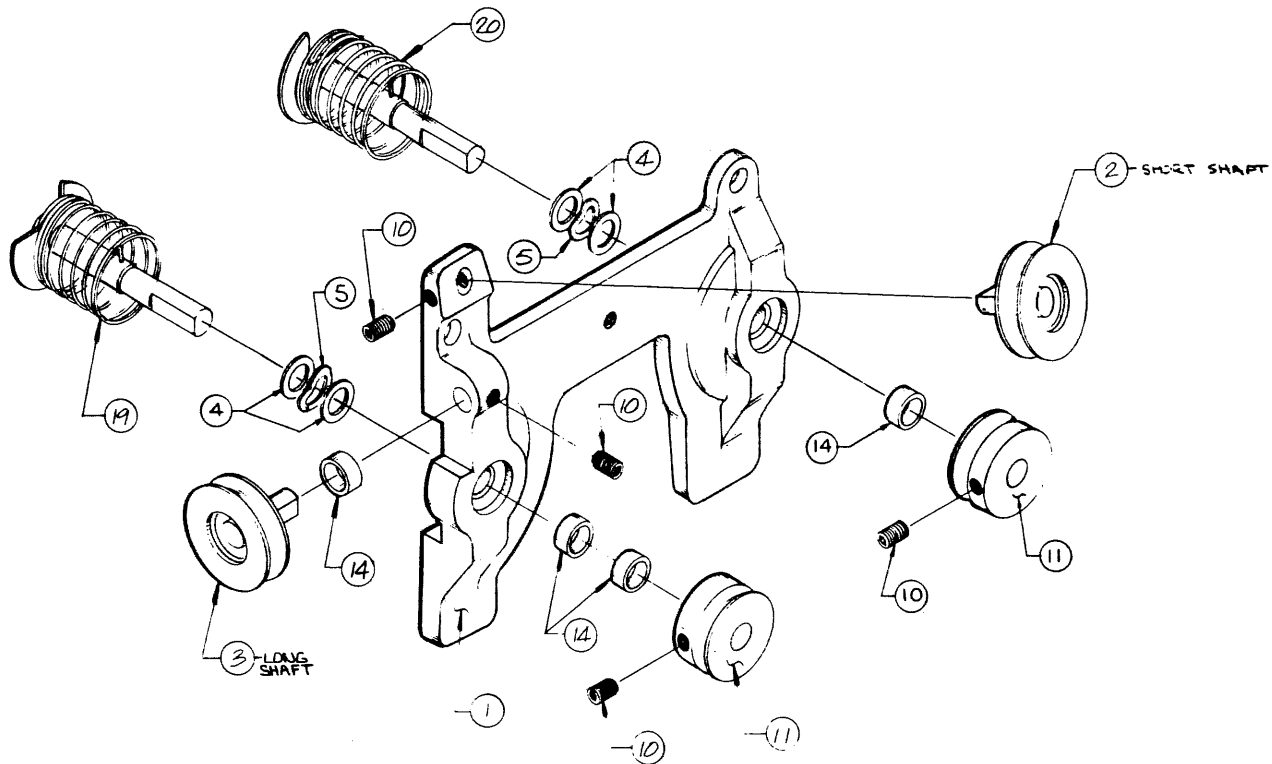
4

3

2

1

REVISIONS				
ZONE	REV	DESCRIPTION	DATE	APPROVED
	F	CD 2026 "E" REV ON FILE REVISED & REGRIND	6/21/78	WJG



1. SEE PL 302 3001 KX

NOTES: UNLESS OTHERWISE SPECIFIED

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES TOLERANCES 3 PLACE ± 2 PLACE ± ANGLES ± 1/2°	TRUE DATA CORPORATION		TITLE CAST STICKER ASSY	
	DO NOT SCALE DRAWING		DR R WELCH 5-16-78	
MATERIAL	CHK R GUARDADO 6-21-79	ENGR	NEXT ASSY 3012488	DRAWING NUMBER 302300100
FINISH	APPD	REL	REV F	
			SCALE NONE	M-800 SHEET 1 OF 1

4

3

2

1

D

C

B

A

D

C

B

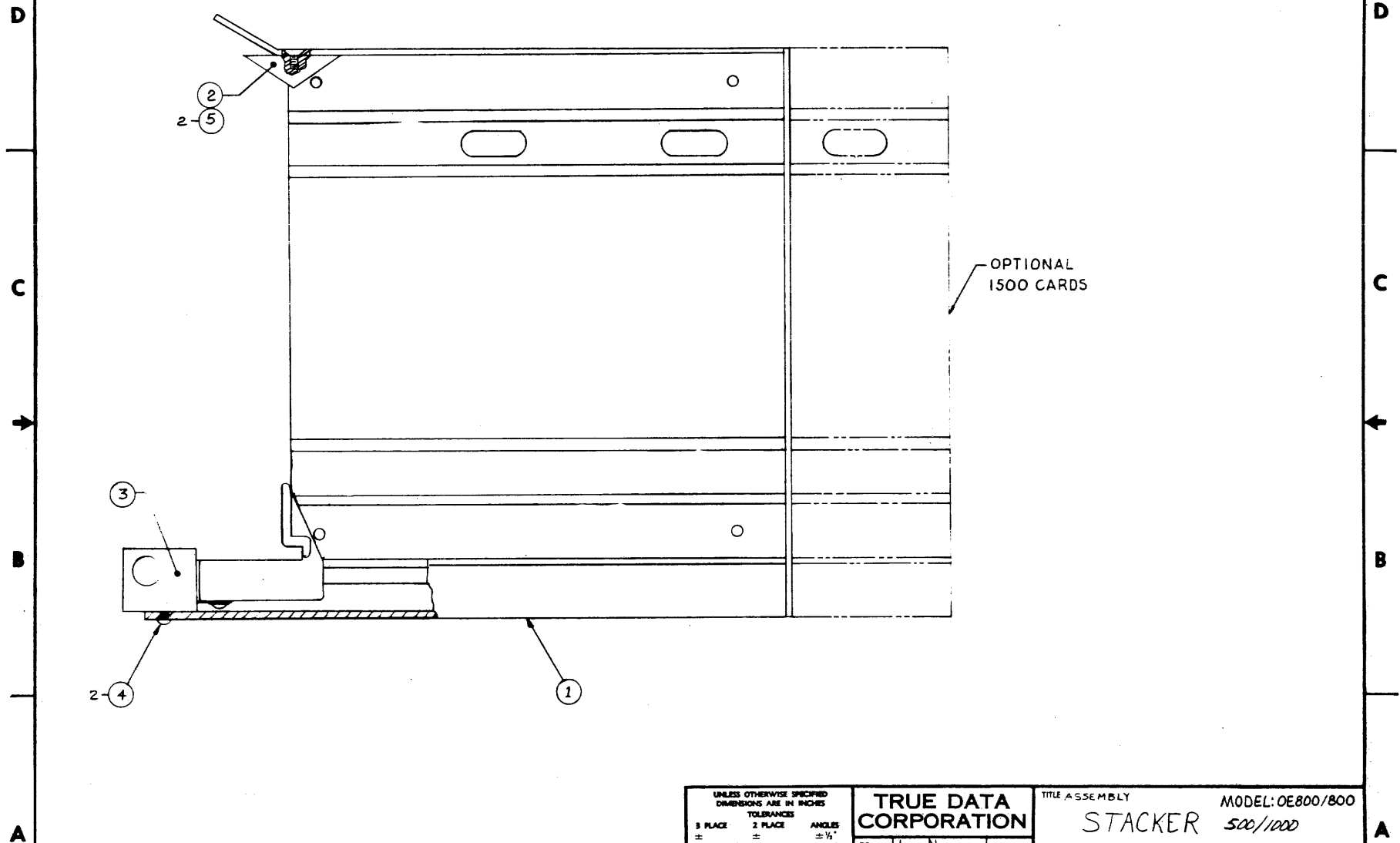
A

CAST STACKER ASSEMBLY

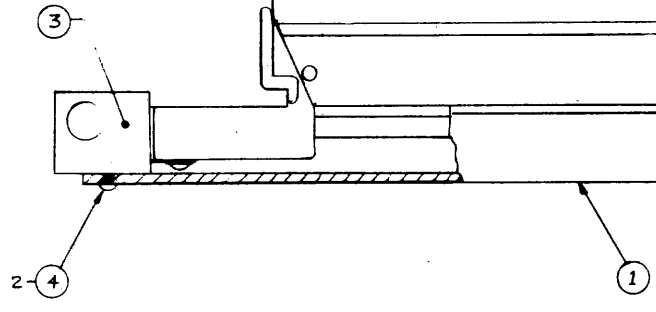
ASSEMBLY & FIND	PART NUMBER	DESCRIPTION	UNITS PER ASSY	VENDOR PART NO.
302300101				
1	302312501	Cast Stacker w/Staked Bearings Assembly	1	
2	302312401	Idler Pulley Assembly (Short Shaft)	1	
3	302312402	Idler Stacker Pulley Assembly (Long Shaft)	1	
4	106000602	Washer, S.S.	4	
5	108001101	Spring, Preload	2	
6		Not Used		
7		Not Used		
8		Not Used		
9		Not Used		
10	104002200	*Screw, Set 8-32 X .252	4	
11	304301601	Pulley-Stacker	2	
12		Not Used		
13		Not Used		
14	106001504	Washer, Nylon .253 ID X .312 OD X .125 THK	4	
15		Not Used		
16		Not Used		
17		Not Used		
18		Not Used		
19	302300302	Assy-Spring-Stacker CCW 7¼ T	1	
20	302300301	Assy-Spring-Stacker CW 7¼ T	1	

4 3 2 1

REVISIONS			
ZONE/REV	DESCRIPTION	DATE	APPROVED
A	CO-513 RELEASED	J.L.M. 4-30-76	<i>[Signature]</i>
B	CO-664 CORP C.O.	J.L.M. 12-7-76	<i>[Signature]</i>
C	CO-945 DELETE OPTIONAL VIEW	J.L.M. 5-9-78	<i>[Signature]</i>



OPTIONAL
1500 CARDS



(1) SEE P/L 3023018XX

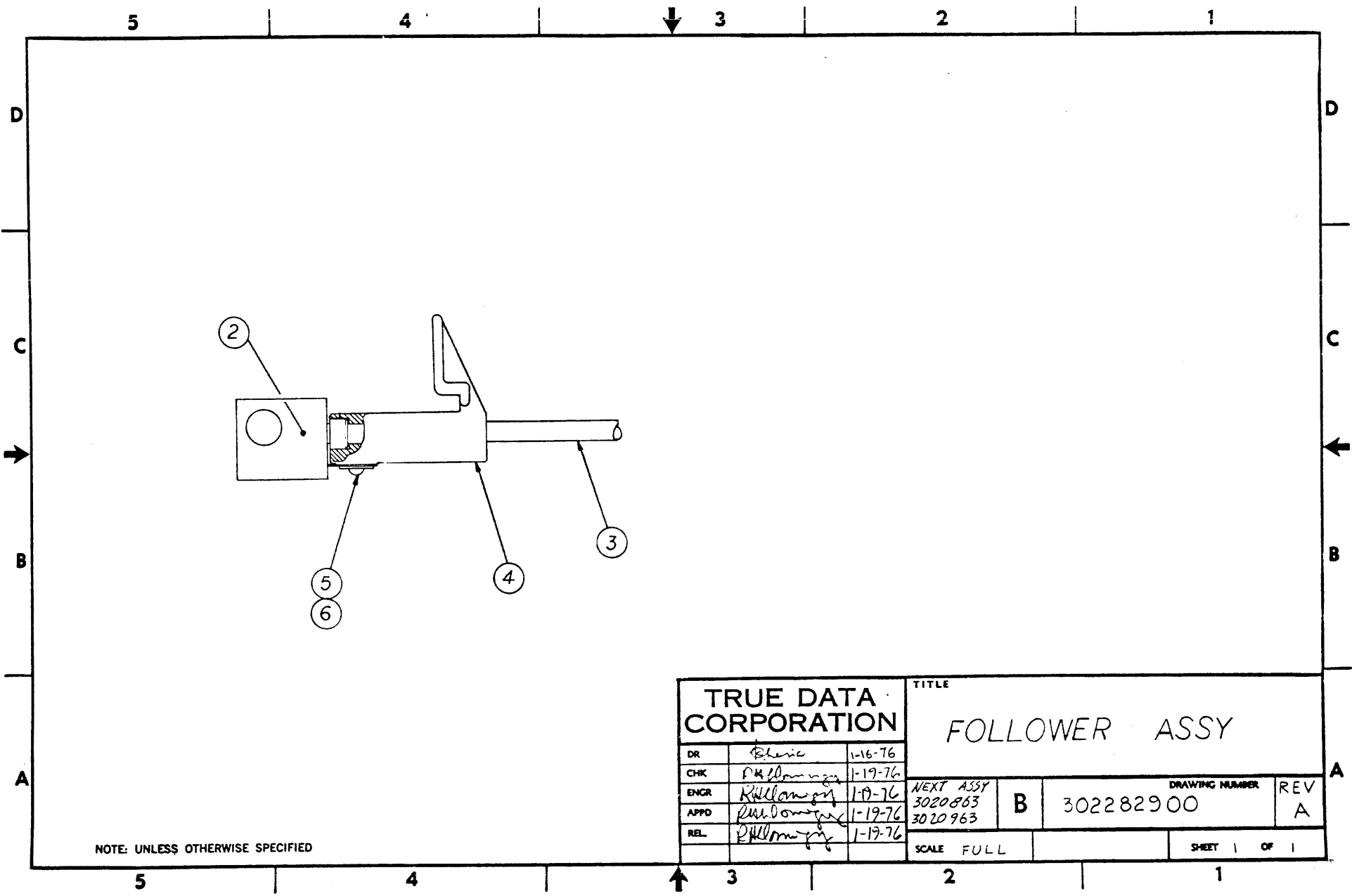
NOTES: UNLESS OTHERWISE SPECIFIED

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES		TRUE DATA CORPORATION		TITLE ASSEMBLY		MODEL: OE800/800	
TOLERANCES				STACKER		500/1000	
3 PLACE	2 PLACE	ANGLES					
±	±	± 1/2°					
DO NOT SCALE DRAWING				DR	JAMI NEASOME 4-30-76		
MATERIAL				CHK	<i>[Signature]</i> 5-8-76		
FINISH				ENGR	<i>[Signature]</i> 5-8-76		
				APPR	<i>[Signature]</i> 5-8-76		
				REL	<i>[Signature]</i> 5-8-76		
				NEXT ASSY		DRAWING NUMBER	
				3012488		C 302301800	
				SCALE		SHEET / OF /	
				NONE		/ /	

4 3 2 1

STACKER ASSEMBLY

ASSEMBLY & FIND	PART NUMBER	DESCRIPTION	UNITS PER ASSY	VENDOR PART NO.
302301800				
1	304305902	Stacker Black 1000	1	
2		Not Used		
3	302282901	Follower Assy	1	
4	103002801	*Screw. 4-40 X 1/4 BHCS	2	
302301902		Optional 1500 Cards		
1	304306002	Stacker Black 1500	1	
2		Not Used		
3	302282902	Follow Assembly	1	
4	103002801	*Screw, 4-40 X 1/4 BHCS	2	
Ref.	103001505	*Screw, 4-40 X 1/2 SHCS	2	
Ref.	304059701	Housing Switch Stacker	1	
Ref.	325067101	Switch Modified Stacker	1	
Ref.	107001001	*Rivet .125 Dia. X.125LG	2	

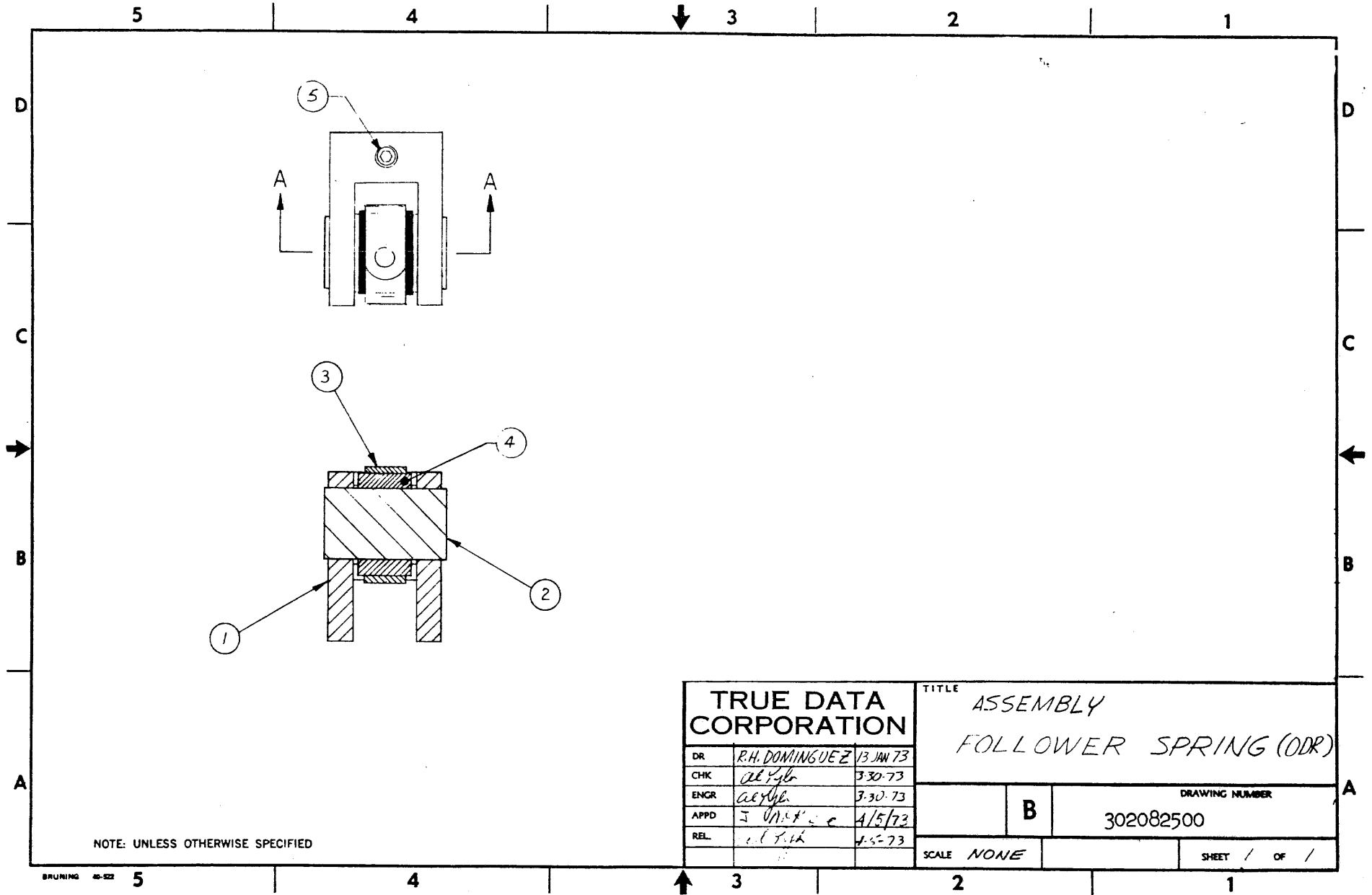


NOTE: UNLESS OTHERWISE SPECIFIED

TRUE DATA CORPORATION			TITLE FOLLOWER ASSY		
DR	<i>Blenc</i>	1-16-76			
CHK	<i>R. Williams</i>	1-19-76			
ENGR	<i>R. Williams</i>	1-19-76	NEXT ASSY	DRAWING NUMBER	REV
APPD	<i>R. Williams</i>	1-19-76	3020863	B 302282900	A
REL	<i>R. Williams</i>	1-19-76	3020963		
			SCALE FULL	SHEET 1 OF 1	

FOLLOWER ASSEMBLY

ASSEMBLY & FIND	PART NUMBER	DESCRIPTION	UNITS PER ASSY	VENDOR PART NO.
302282900				
2	302082501	Assy - Follower Spring	1	
3	304084201	Rod 1000	1	
3	304084301	Rod 1500	1	
4	302302301	Follower/Bushings Assy	1	
5	103001604	*Screw, 6-32 X ¼L BHCS	1	
6	106001201	*Washer, Flat #6		



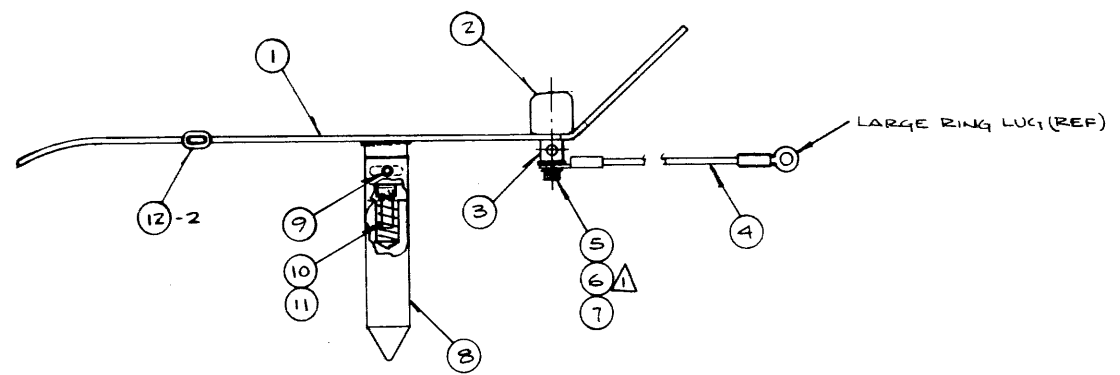
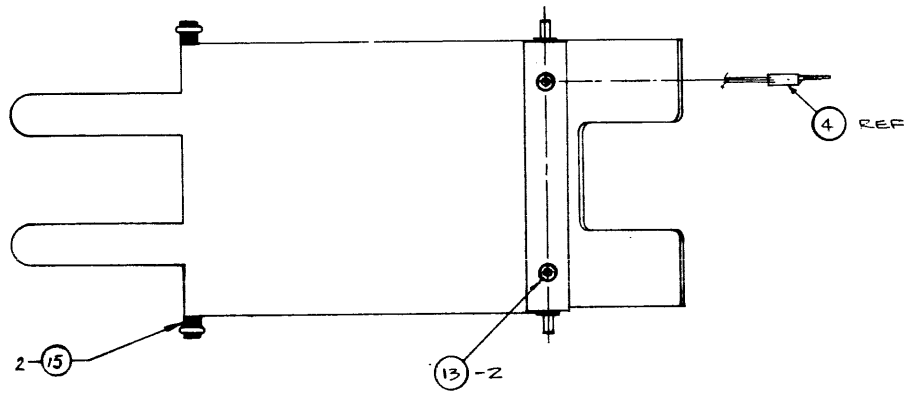
NOTE: UNLESS OTHERWISE SPECIFIED

TRUE DATA CORPORATION			TITLE <i>ASSEMBLY</i>	
			<i>FOLLOWER SPRING (ODR)</i>	
DR	<i>R.H. DOMINGUEZ</i>	<i>13 JAN 73</i>	DRAWING NUMBER	
CHK	<i>al ylb</i>	<i>3-30-73</i>	B	302082500
ENGR	<i>al ylb</i>	<i>3-30-73</i>		
APPD	<i>J. M. S. c</i>	<i>4/5/73</i>	SCALE <i>NONE</i>	
REL.	<i>al ylb</i>	<i>4-5-73</i>	SHEET / OF /	

FOLLOWER SPRING ASSY

ASSEMBLY & FIND	PART NUMBER	DESCRIPTION	UNITS PER ASSY	VENDOR PART NO.
302082500				
1	304082601	Support-Follower Spring	1	
2	304082701	Pin, .437 DIA X .750 Delron	1	
3	108000901	Spring-Extension	1	
4	109000701	Bearing-Teflon Dexon DRS-0710-3	1	
5	103000202	*Screw-Set 8-32 X ¼ LG (NYLOC)	1	

REVISIONS				
ZONE	REV	DESCRIPTION	DATE	APPROVED
	E	REV. 3 REDRAWN WITH CHANGES	EO	
	F	MOVED DOWN PIV. FIND 14 TO 302-500-010 SUB ASSY AND PRES. FIT TAMP. 302-500-010 - NEEDS DRAWING FIND 15, NOTE 1	2/14/78 2/20/78	1/1/78 1/1/78



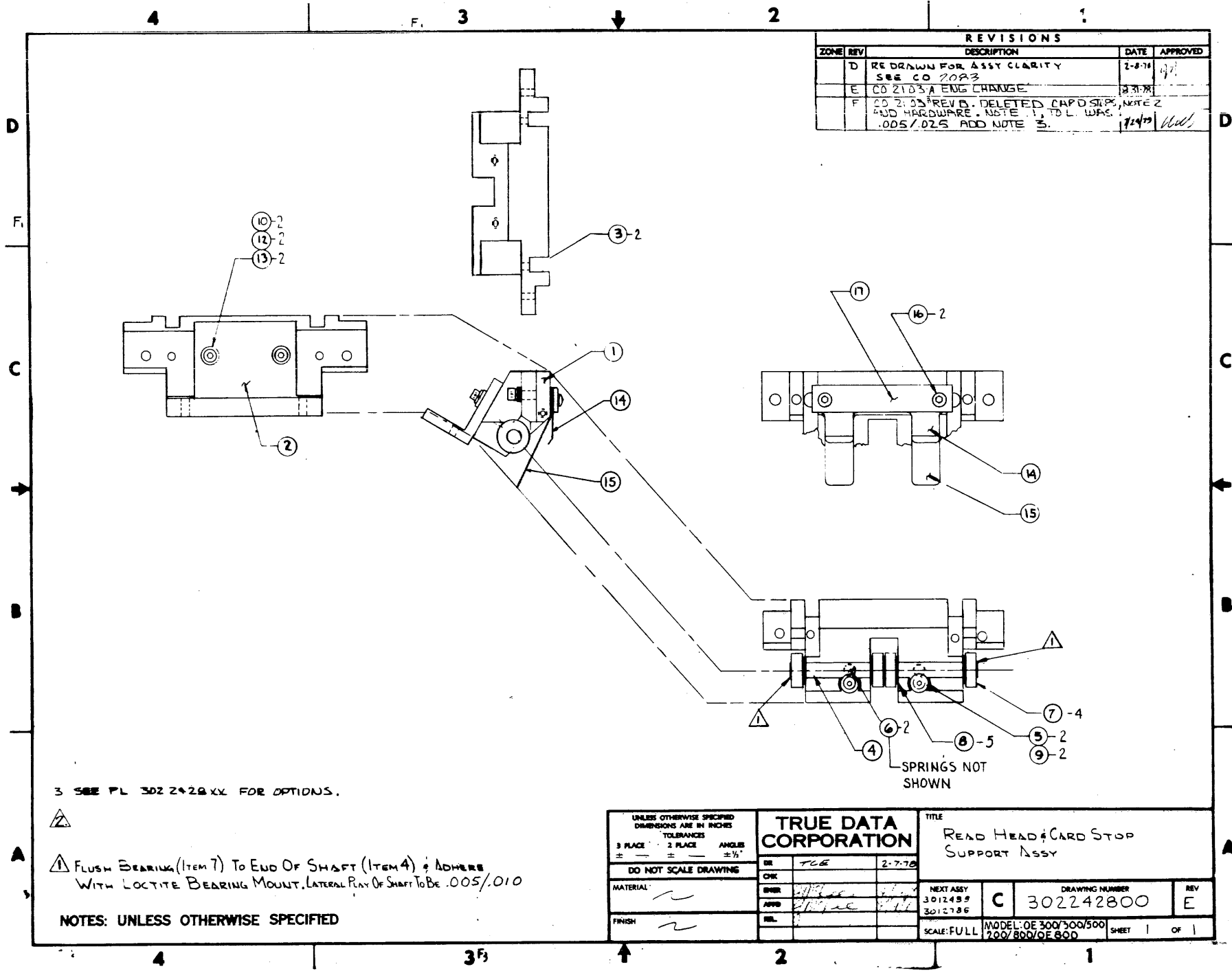
⚠ FIND 6 (EXT STAR WASHER) TO BE BETWEEN (GRIND CABLE) FIND 4 AND (PIVOT ASSY) FIND 3.

NOTES: UNLESS OTHERWISE SPECIFIED

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES		TRUE DATA CORPORATION		TITLE FEED PLATE ASSEMBLY	
3 PLACE ±	2 PLACE ±	ANGLES ± 1/2°	DR R.P.H.	M-300,500-200	
DO NOT SCALE DRAWING			CHK R.C.	2/12/78	
MATERIAL P/L 3021702XX			ENGR [Signature]	2/14/78	NEXT ASSY 3012744
FINISH —			APPD [Signature]	2/15/78	DRAWING NUMBER 302170201
			REL [Signature]	2/16/78	REV F
				SCALE 1/1	SHEET 1 OF 1

FEED PLATE ASSEMBLY

ASSEMBLY & FIND	PART NUMBER	DESCRIPTION	UNITS PER ASSY	VENDOR PART NO.
302170201				
	304057201	Feed Plate	1	
	304158301	Spacer, Feed Plate	1	
	302306901	Support, Pivot Assy	1	
	351159301	Cable Assy	1	
	104000201	*Screw, 4-40 X 3/8L SHCS	1	
	106000202	*Lock Washer, Ext. Star #4	1	
	106001401	*Lock Washer, Split #4	1	
	325301701	Armature, Solenoid, Modified	1	
	112000704	Pin, Spring, 1/8 Dia. X 1/2 LG	1	
	108000601	Spring .24OD X 1.0LG .026W 8.7T	1	
	104000303	*Screw, 6-32 X 3/8 LG SHCS	1	
	118000304	"O" Ring	2	
	104000206	*Screw, 4-40 X 5/8 LG SHCS	2	
		Not used		
		Shrink tubing		



REVISIONS				
ZONE	REV	DESCRIPTION	DATE	APPROVED
	D	RE DRAWN FOR ASSY CLARITY SEE CO 2083	2-8-78	
	E	CO 21037A ENG CHANGE	3-31-78	
	F	CO 21037 REV D. DELETED CAP STEPS, NOTE 2 ADD HARDWARE. NOTE 1, TO L. WAS. .005/.025 ADD NOTE 3.	7-24-79	<i>Wd</i>

3 SEE PL 302 2428 XX FOR OPTIONS.



⚠ FLUSH BEARING (ITEM 7) TO END OF SHAFT (ITEM 4) & ADHERE WITH LOCTITE BEARING MOUNT. LATERAL PLAY OF SHAFT TO BE .005/.010

NOTES: UNLESS OTHERWISE SPECIFIED

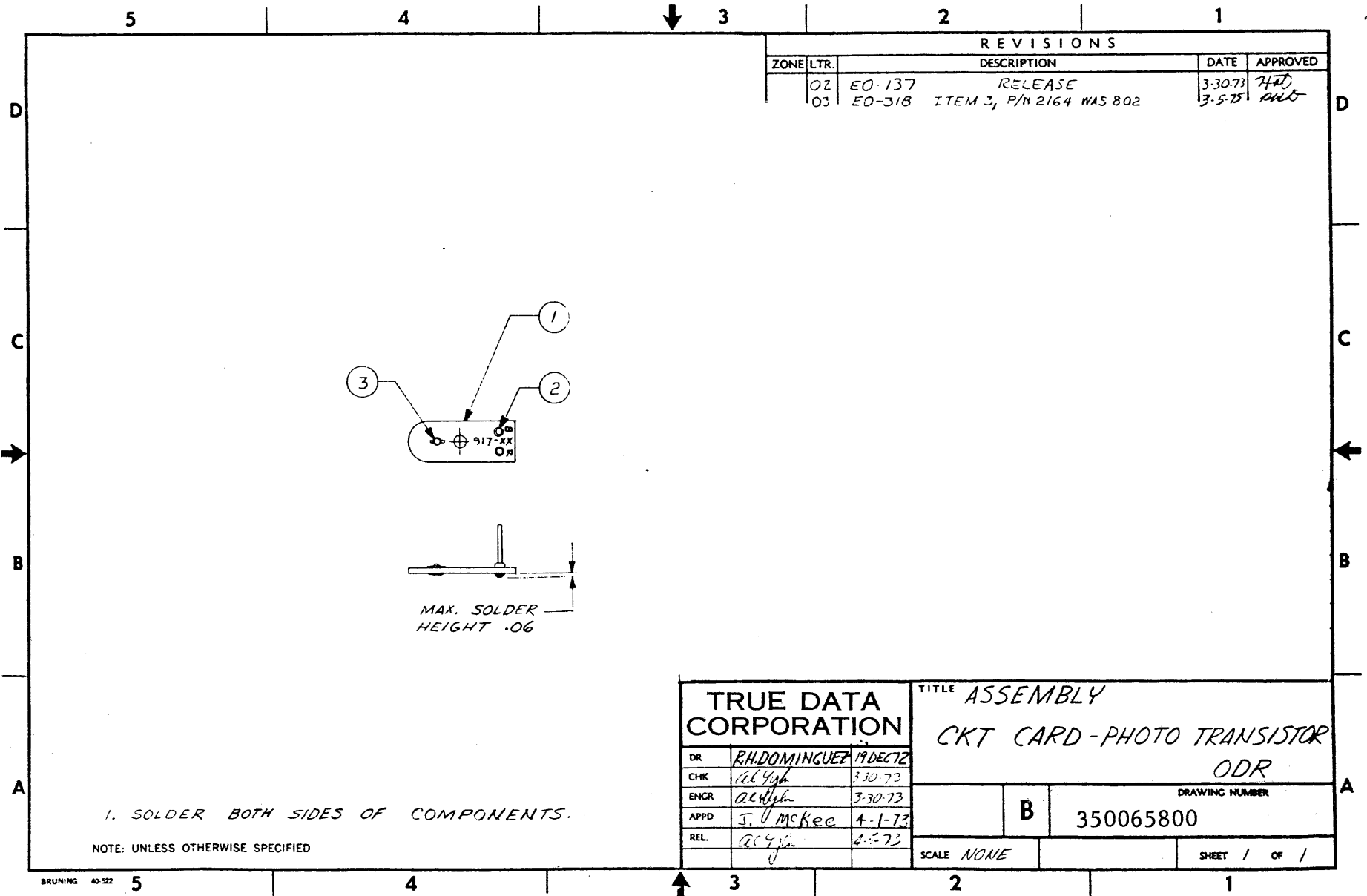
UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES TOLERANCES		TRUE DATA CORPORATION		TITLE	
3 PLACE	2 PLACE	ANGLS	DR	READ HEAD & CARD STOP SUPPORT ASSY	
±	±	± 1/2°	CHK		
DO NOT SCALE DRAWING			ENGR	NEXT ASSY	DRAWING NUMBER
			APPD	3012455	C 302242800
			REL	3012786	REV E
MATERIAL			SCALE: FULL		
FINISH			MODEL: OE 300/500/500 700/800/900		
			SHEET 1 OF 1		

READ HEAD CARD STOP SUPPORT ASSY.

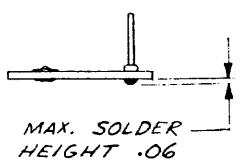
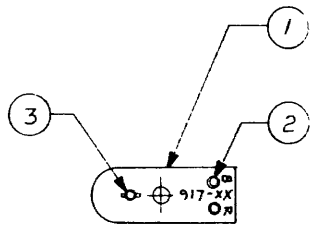
ASSEMBLY & FIND	PART NUMBER	DESCRIPTION	UNITS PER ASSY	VENDOR PART NO.
302242801				
1	304237301	Support - Card Stop	1	
2	304237401	Support (Read Head)	1	
3	304220201	Card Stop (Only slot for Stop shown)	2	
4	304163301	Shaft-Pressure Roller	1	
5	106001701	*Washer Flat #4	2	
6	108000602	Spring .2400.d. X 3/4L LC-024 C7	2	
7	109000401	Bearing .25 I.D. SIPP-7	4	
8	106001502	Washer - Flat Nylon .2531.D. X .500.D.	5	
9	103004101	*Screw 2-56 X 1/4 FHMS	2	
10	103000804	*Screw 6-32 X 3/4 SHCS	2	
11		Not Used	2	
12	106001201	*Washer Flat No. 6	2	
13	106001301	*Washer, Lock #6	2	
14	304072601	Band Select	1	
15	304249301	Band Pressure	1	
16	103001604	*Screw 6-32 X 1/4 BHCS	2	

CKT. CARD ASSY - SWITCH CARD

ASSEMBLY & FIND	PART NUMBER	DESCRIPTION	UNITS PER ASSY	VENDOR PART NO.
350401000				
1	309401001	Ckt. Card Fab	1	
2	351136301	Cable Assy Switch Control	1	
3		Not Used		
4	3043299XX	Switch Plate 5 Holes	1	
4	3043299XX	Switch Plate 7 Holes		
5	216001201	Lamp (Indicator) "Power On"	1 1	
6	216001301	Lamp (Indicator) "Empty"	1	
7	216001401	Lamp (Indicator) "Full"	1	
8	217003601	Switch (SPST) "Reset"	1	
9	217001901	Switch (SPST) "Mark"	1	
10	21700801	Switch (SPST) "Punch"	1	
11		Not Used		
12	217003201	Switch (SPST) "Read Check L/T"	1	
Ref.	203000405	Rez 560, ½ W Comp RC20	6	



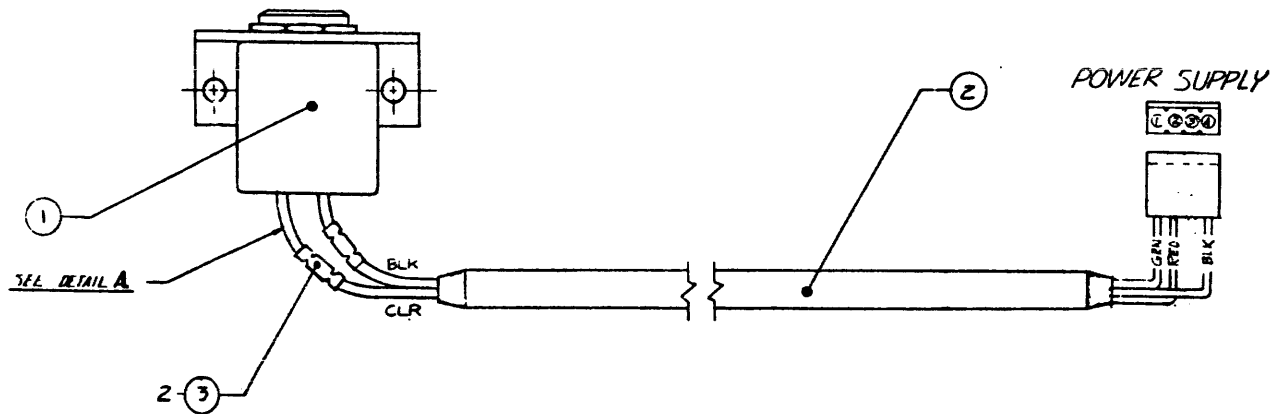
REVISIONS				
ZONE	LTR.	DESCRIPTION	DATE	APPROVED
02		EO-137 RELEASE	3-30-73	<i>Handwritten initials</i>
03		EO-318 ITEM 3, P/N 2164 WAS 802	3-5-75	<i>Handwritten initials</i>



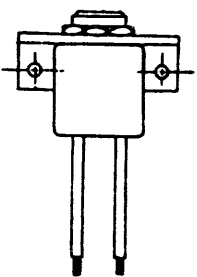
TRUE DATA CORPORATION		TITLE ASSEMBLY	
		CKT CARD-PHOTO TRANSISTOR	
		ODR	
DR	RH. DOMINGUEZ	19 DEC 72	
CHK	<i>Handwritten initials</i>	3-30-73	
ENCR	<i>Handwritten initials</i>	3-30-73	
APPD	J. McKee	4-1-73	
REL.	<i>Handwritten initials</i>	4-5-73	
		DRAWING NUMBER	
		B	350065800
		SCALE NONE	SHEET 1 OF 1

1. SOLDER BOTH SIDES OF COMPONENTS.

NOTE: UNLESS OTHERWISE SPECIFIED



SEE DETAIL A



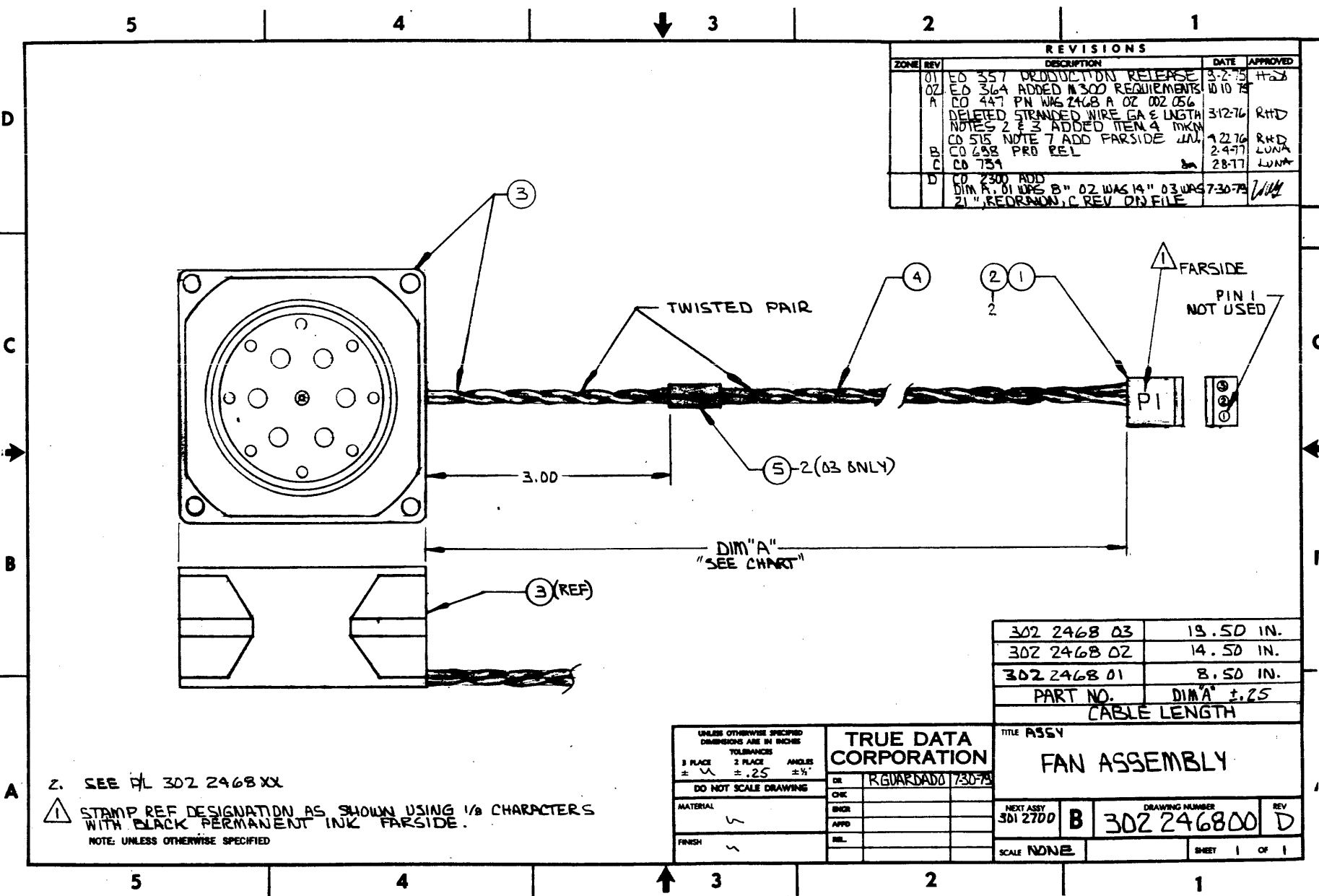
DETAIL A

NOTES: UNLESS OTHERWISE SPECIFIED

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES		TRUE DATA CORPORATION		TITLE ASSEMBLY	
3 PLACE	2 PLACE			SOLENOID	
DO NOT SCALE DRAWING		DR	J.H. Jones	7-10-75	
MATERIAL		CHK		7-27-75	
FINISH		ENGR		7-27-75	
		APPD		7-27-75	
		REL		7-27-75	
		3012488		C	DRAWING NUMBER
		302247000		A	REV
		SCALE FULL		SHEET 1 OF 1	

SOLENOID ASSY

ASSEMBLY & FIND	PART NUMBER	DESCRIPTION	UNITS PER ASSY	VENDOR PART NO.
302247000				
1	218000201	Solenoid W/Bracket	1	
2	351248101	Assy-Cable-Solenoid	1	
3	214001401	Terminal-Butt, Splice, Insul. 22-18	2	



REVISIONS				
ZONE	REV	DESCRIPTION	DATE	APPROVED
	01	ED 357 PRODUCTION RELEASE	3-2-75	HSD
	02	ED 364 ADDED #300 REQUIREMENTS	10-10-75	
A	01	ED 447 PIN WAS 2468 A OZ 002 056		
		DELETED STRANDED WIRE GA & LENGTH	3-12-76	RHD
		NOTES 2 & 3 ADDED ITEM 4 MKN		
		CO 515 NOTE 7 ADD FAR SIDE LUN	7-22-76	RHD
B	01	CO 698 PRO REL	2-9-77	LUNA
C	01	CO 759	2-8-77	LUNA
D	01	CO 2300 ADD DIM A. 01 WAS B" 02 WAS 14" 03 WAS 21" REORION, C REV ON FILE	7-30-78	WJH

302 2468 03	13.50 IN.
302 2468 02	14.50 IN.
302 2468 01	8.50 IN.
PART NO.	DIM A ±.25
CABLE LENGTH	

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES			TOLERANCES	
3 PLACE	2 PLACE	ANGLES	DI	DR
± .001	± .005	± 1/2°		
DO NOT SCALE DRAWING				
MATERIAL	CHK	ENGR	APPD	REL
FINISH				

TRUE DATA CORPORATION				TITLE ASSY	
FAN ASSEMBLY				FAN ASSEMBLY	
DI	RGUARDADO	730-78			
CHK					
ENGR					
APPD					
REL					
NEXT ASSY		301 2700	B	DRAWING NUMBER	302 246800
SCALE		NONE		REV	D
				SHEET 1 OF 1	

2. SEE PL 302 2468 XX

⚠ STAMP REF DESIGNATION AS SHOWN USING 1/8 CHARACTERS WITH BLACK PERMANENT INK FAR SIDE.
NOTE: UNLESS OTHERWISE SPECIFIED

FAN ASSY 115V, 60HZ

ASSEMBLY & FIND	PART NUMBER	DESCRIPTION	UNITS PER ASSY	VENDOR PART NO.
302246801				
1		Housing-Leaf Contact (3POS)	1	
2		Contact-Leaf type AP	2	
3		Fan 115V, 60 Hz, AP	1	
4		Wire-22Ga Strand Blk AP	14.5 in	