SUPPLEMENTARY MANUAL

PDI 2022M Series

MARK SENSE CARD READER

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SECTION 1

INTRODUCTION

1.1 SCOPE

This manual contains supplementary information on the PDI 2022M Series Mark Sense Card Readers. This supplementary information, when used in conjunction with the information contained in the Operation/Maintenance Manual for the basic 2022H series card reader, provides complete operation and maintenance information for the 2022M series readers. Special information regarding the configuration of any readers, which differ from PDI's standard configuration, will be found in the Addendum (Section 6).

1.2 GENERAL DESCRIPTION

The PDI 2022M Series Card Readers are self-contained optical mark readers capable of sensing either marks or holes on standard 40 or 80-column mark-sense cards without the necessity of a clock track. The card readers are capable of reading marks and holes intermixed on the same cards as long as mark-sense cards are used (cards which are printed with reflective inks), and both holes and marks are done in the same format (all 80-column, or all 40-column). For most mark reading, the 40-column format is preferable because the increased spacing between columns makes it easier for the persons marking the cards to enter the data correctly. Moreover, on the 40-column cards, coding information is usually printed directly on the cards and the operator can mark the cards correctly without having to refer to coding tables. For most applications, the internal machine timing furnished as "standard" is preferable because cards printed without a timing track cost only about half that of cards printed with timing tracks. For certain applications, however, clock tracks are preferable. For these instances, clock track capability can be provided on either the 9-edge or the 12-edge, as an optional feature.

With the exception of the additional parts required for mark-sense, the 2022M series card readers are identical, both electrically and mechanically, with the 2022H series card readers. This supplementary manual will deal only with those differences; all other information required will be found in the 2022H series manual. The mark-sense card readers contain a different type of read station and light sources, and an additional PC board containing the amplifiers and additional circuitry needed for mark-sense. There are also a few minor changes to the logic board and the wiring. Revised schematics and wiring diagrams are included in this supplement to cover these points.

The reflective read station used with the mark-sense readers is mounted from beneath the bed of the card reader. It is comprised of 13 phototransistors and 12 light-emitting diodes, which emit in the infrared region. Twelve of the sensors are used to sense data and the thirteenth one is used to sense the leading edge of the card. When reading either holes or marks in the marks mode, infrared from the LED's is reflected back from the card into the data sensing phototransistors. A maximum amount of light is reflected into the sensors on those portions of the card which do not have marks or holes. For a mark or a hole, a minimum amount of light is reflected since the mark or hole absorbs some of the light. Almost any medium can be used to mark the cards as long as it has a non-reflective characteristic. It is recommended that an ordinary #2 lead pencil be used to mark the cards since the pencils are easy to obtain, have the desired characteristic, and the pencil marks are easy to change, should a mistake be made.

When reading either holes or marks in the marks mode, mark-sense cards must be used; i.e., cards that are printed with reflective ink. The cards are read face down with column 1 leading, from the underside. The leading edge sensor is illuminated from above the card path and when this light beam is interrupted by the card, a leading edge signal is generated. The data is read

by sensing the reflected light from the card with the data sensors. When a mark is encountered, the mark absorbs some of this light and this light loss is detected by the phototransistors. When a hole is encountered, the light passes through the hole and this loss of light is detected by the phototransistors. Therefore, the hole and a mark look identical to the read station when operating in the marks mode.

In order to provide complete flexibility, a punch mode of operation is provided for use in reading standard punched cards which are printed in non-reflective ink and may have pencil marks or other sorts of marks on them. The only positive way of reading cards of this type is to read through the cards. For this reason, the mark-sense card readers are equipped with an additional light source mounted above the cards. This light source is an infrared-emitting LED assembly comprised of 12 LED's for the data and a 13th LED for illuminating the leading edge detector. This array is energized in the punch mode and the LED array underneath is de-energized. When operated in this mode, the card reader functions similarly to the standard 2022H series in which light passes through the holes of the card to be sensed by the read station.

The amplifier board contains the data amplifier potentiometers, and erasure discrimination circuitry, the data latches, the 40/80 column timing circuitry, a clock track amplifier and timing circuitry (if provided), and a zener regulator to power the data amplifiers. This board is about half the size of the logic board and is mounted adjacent to the logic board in the backpan. The amplifier board contains all the additional circuitry required for mark-sense operation.

SECTION 2

INSTALLATION

2.1 GENERAL

This section of the mark sense supplementary manual again covers only those points of difference between the mark sense units and the standard 2022H series reader. Where there are no differences in specific areas, the reader will be referred to the 2022H manual.

2.2 UNPACKING AND HANDLING

Refer to 2022H manual.

2.3 OPERATIONAL CHECKS

Refer to 2022H manual, omitting step "a" and substituting the following procedure in place of step "d".

d. Operate POWER switch: POWER lamp should light; RESET lamp should light; MARKS or PUNCH lamp should light; 40 COL. or 80 COL. lamp should light; and if clock track capability has been provided, CLK. TRK. or INT. CLK. lamp should light. Operate MARKS/PUNCH switch, 40 COL/80 COL switch, and CLK. TRK./INT. CLK. switch (if provided); alternate indicator lamps should light on these switches.

2.4 INSTALLATION REQUIREMENTS

All details in 2022H manual apply, with the following exceptions:

(a) Power requirements in para. 2.4.2 are 180 watts maximum.

(b) In Figure 2-2, there are five (or six) indicator switches in the control grouping instead of the three shown. Also, the 2022HT dimensions apply for the Model 2022MT and the 2022HR dimensions apply for the Model 2022MR.

(c) In addition to the card reader operating modes described in para. 2.4.3.3, there are the additional operating modes of MARKS (reflective reading) or PUNCH (transmissive reading), 80-column or 40-column formats, and Internal or Clock track timing if provided.

2.5 INSTALLATION CHECKS

The procedure given in the 2022H manual applies for 80-column internal timing. In the 40-column timing mode, only 40 data available pulses are issued per card, at a rate of approximately 3.84 milliseconds per column.

SECTION 3

OPERATION

3.1 GENERAL

All of the paragraphs of Section 3 in the 2022H manual apply. Information on the additional operational features of the mark sense reader is given below:

3.2 OPERATING CONTROLS AND INDICATORS

In addition to the three basic controls (POWER, RESET and HALT) of the 2022H series reader, the 2022M series mark sense readers have the following two (or three) additional controls:

(a) MARKS/PUNCH - An alternate action push button indicator that selects reflective or transmissive mode operation of the read station. The lighted half of the indicator displays the selected condition.

(b) 40 COL/80 COL - An alternate action push button indicator that selects either the 40 or 80-column internal timing formats. The lighted half of the indicator displays the selected condition.

(c) CLK TRK/INT CLK - (Optional Feature) An alternate action push button indicator that conditions the reader either to generate timing from a clock track printed on the cards, or to generate internal timing in either of the two standard selectable formats. The lighted half of the indicator displays the selected condition.

3.3 OPERATING INSTRUCTIONS

Follow the general operating instructions given in the 2022H manual. Specific additional instructions for the mark sense models are given in the following paragraphs.

3.3.1 Punch Mode Operation

Punch Mode is provided in the PDI mark sense card readers for the purpose of reading standard 80-column punched card decks. The MARKS/PUNCH switch must be

placed in the PUNCH position, and the 40 COL/80 COL switch must be placed in the 80 COL position. Under these conditions, the reader is set to read the data in the transmissive mode; that is, through the holes in the cards. In this mode, the card reader is insensitive to the type of ink used in printing the cards, or any extraneous marking that may be on the cards as well. It is the most positive method of reading punched cards, and should be used in preference to the MARKS mode wherever all the data fields in a given deck are punched holes.

The cards are to be loaded into the input hopper face down, with column 1 leading and row 12 toward the front of the machine.

3.3.2 Marks Mode Operation

In the marks mode, the card reader is conditioned to read the data reflectively from the cards. The data may be punched or marked, or consist of both punches and marks, intermixed. Such a situation might arise, for example, in an inventory control application; where certain fields of information such as part numbers might be punched, and certain other fields such as quantities might be hand marked. Reading cards in the marks mode does impose the basic requirement that mark sense type cards must be used; that is, the cards must be printed with a reflective type ink. This is so because the sense head reads non-reflective marks against the normally reflective background nature of the card stock. Another requirement is that the cards must be kept reasonably clean. Even though the PDI mark sense card readers incorporate such advanced features as discrimination against erasures and background smudges, the clarity of the desired marks should be maintained. If the desired marks are allowed to become smudgy or smeared, the marks themselves will ultimately be discriminated against.

3.3.2.1 Mark Sense Cards

The card stock shall conform to the American Standard Specification X3.11-1966, and in addition, shall have a minimum reflectance of 80% as measured with a Kidder Model 082 (or equivalent) Tester using a barium sulfate plaque as a

a standard for 100% reflectance. The measurements shall be taken in the near infrared light region.

All printing on the cards shall be done with reflective ink. The pre-printed envelope or marks defining the location of the data fields and other printing shall have a reflectance equivalent to that of the card stock.

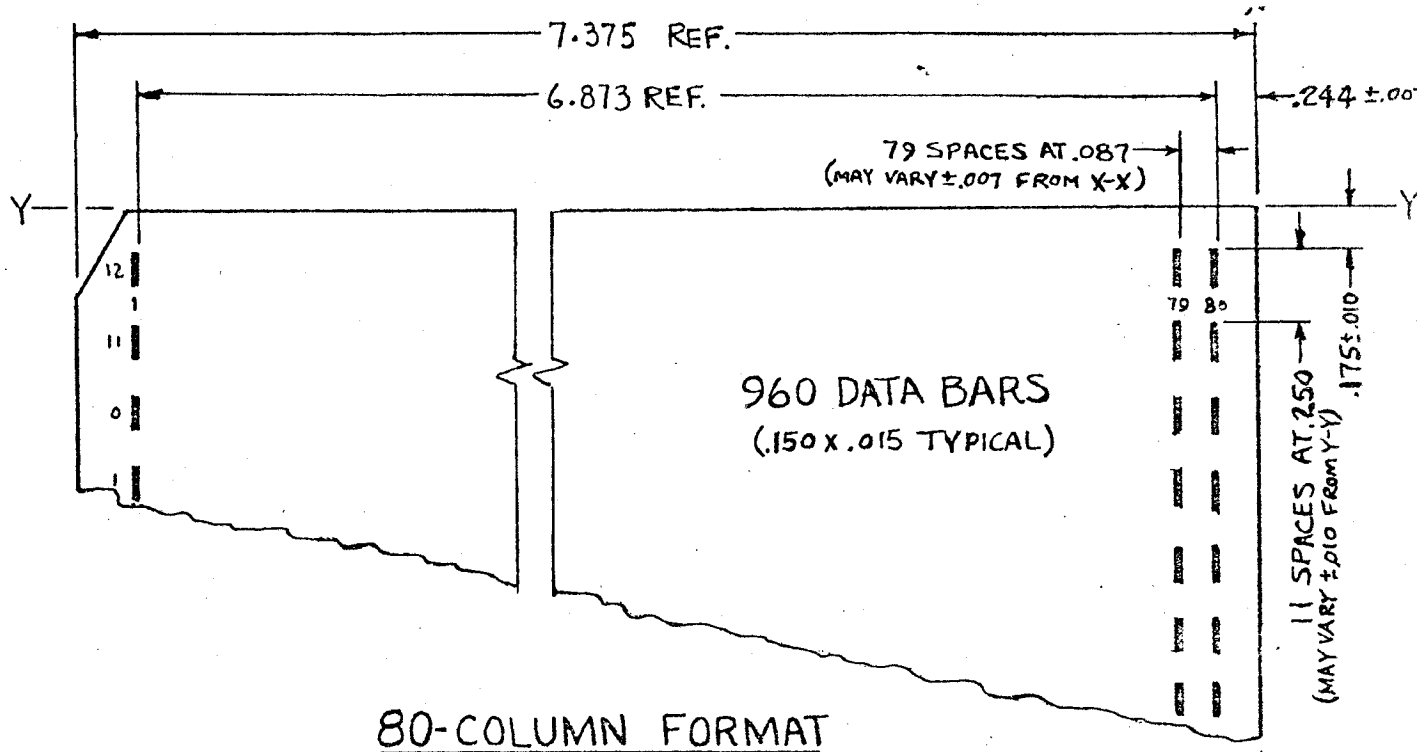
The locations of the pre-printed marking guides for 80-column and 40-column internal timing are shown in Figure 3-1.

If clock tracks are to be used, the clock marks shall be printed with non-reflective ink. These clock marks shall have a maximum reflectance of 5% as measured on the Kider Model 082 (or equivalent) tester. The clock track is to be placed along either the 9-edge or 12-edge of the card, as required. If location is not specified at time of order, this option is furnished with clock track sensing along the 9-edge of the cards as standard.

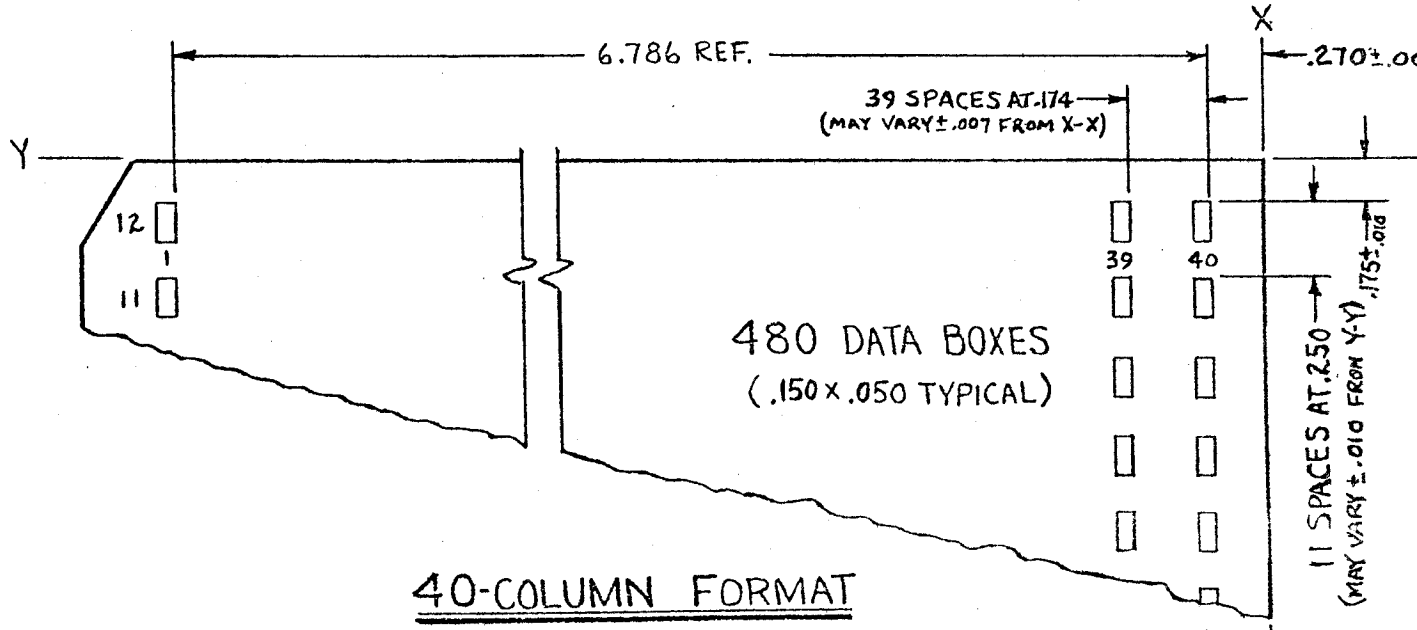
A single clock mark is to precede each column of data. The dimensioning of the clock marks and their placement with respect to the data areas of the card is shown in Figure 3-1.

3.3.2.2 Marking the Cards

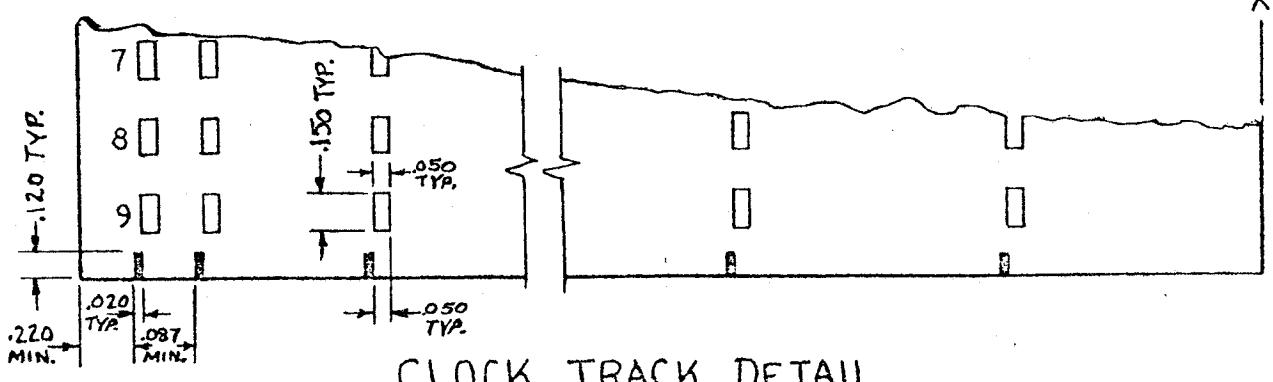
The cards may be marked with any medium that is sufficiently non-reflective. The marks should be clear and legible, and exhibit no greater than 5% reflectance as measured above. A standard number 2 lead pencil gives reflectance readings of about 3% and is ideal for marking the cards because of its general availability and the ease with which mistakes in marking may be corrected. When marking the cards, it is not necessary to scrub back and forth over a mark to make it appear big and black. In fact, such a technique is likely to cause problems rather than prevent them. It is the clarity and positioning of the mark that is more important than the apparent intensity of the mark to the eye. Positionwise, if a mark is placed outside of a marking area, it should be erased and placed in the proper area instead of widening out the mark until it extends into the proper



80-COLUMN FORMAT



40-COLUMN FORMAT



CLOCK TRACK DETAIL

FIGURE 3-1. PDI MARK SENSE CARD FORMATS

area. To sum up, it is necessary only to make a simple one or two stroke pencil mark over the guidance printing on the card. The average thickness of such a mark, for example, is on the order of .015" - .020".

3.3.2.3 Cards that are both Punched and Marked

To read both punches and marks on the same cards, it is only necessary to use mark sense type cards and to enter all the data in the same format; i.e., all 80-column format or all 40-column format. The cards are read in the MARKS mode with the proper selection of internal timing format.

SECTION 4

PRINCIPLES OF OPERATION

4.1 BLOCK DIAGRAM

The inter-relationship of the additional parts required to transform a standard 2022H series card reader into a 2022M series mark sense card reader is shown in block diagram form in Figure 4-1. It can be seen from this diagram that the principal areas of interest are the read station, the amplifier board, the additional switch-indicators required, and the additional power supply. Each of these areas will be treated, in turn, in the following discussion with reference to the block diagram.

4.1.1 Read Station

The read station is composed of two distinct parts; the read station sensors and reflective-mode light source; and the transmissive-mode light source. The read station sensor array, located beneath the card path on the light source/sense head board, consists of 12 photo-transistors mounted in-line on a small PC board in the appropriate positions for reading the 12 rows of data contained on standard tabulating cards. Twelve transistor amplifiers, each of which amplifies the signal level obtained from its row sensor, are also located on the board. If clock track capability is provided, an additional photo-transistor is provided, in line with the 12 data sensors, adjacent to either the row 9 edge, or the row 12 edge, of the card for sensing a clock track (a series of non-reflective marks printed along the specified edge of the cards, one clock mark immediately preceding each point on the card where a column of 12 possible data bits are to be read out). In addition to the foregoing, another photo-transistor is located slightly downstream from the data sensors and centrally located between rows 3 and 4 of the card, for leading edge detection. This sensor is illuminated by the leading edge light source, which is located above the card path as an integral

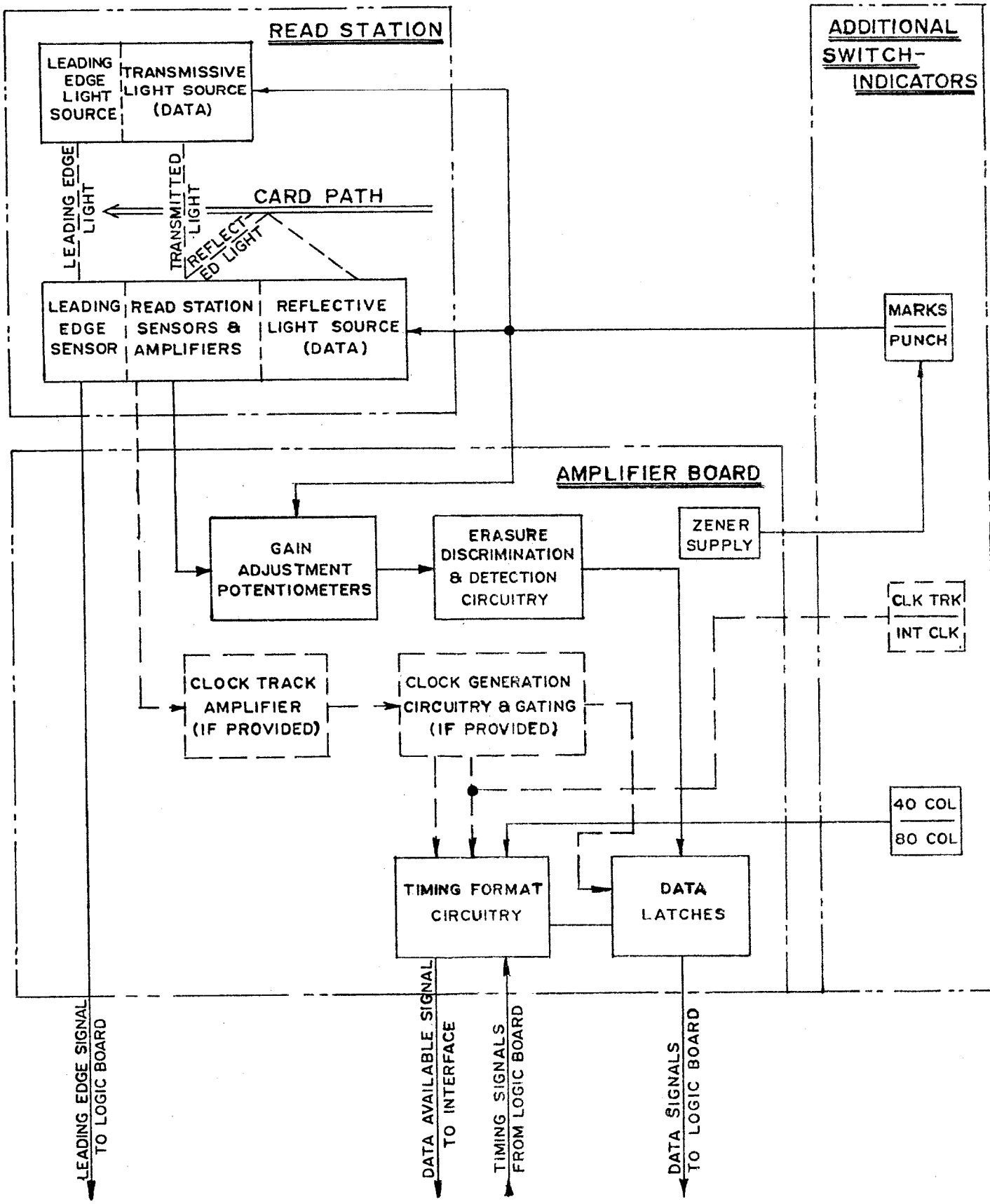


FIG. 4-1 BLOCK DIAGRAM, MARK SENSE ADDITIONS TO STANDARD CARD READER

part of the transmissive light source, and detects the absence of light as a card passes through the read station. The leading edge sensor provides information basic to the internal timing structure of the card reader. The reflective light source, also located beneath the card path on the light source/sense head board, is comprised of 12 infrared light emitting diodes (LED's), mounted in-line, and spaced in correspondence with the 12 data sensors; e.g., at the centers of each of the 12 data rows of the cards. If the clock track feature is provided, an additional LED is provided on the clock track edge of this array to illuminate the clock track area of the cards. Both the reflective light source array and sensor are mounted in a vertical orientation, and a prism is used to angle the radiation so that the light is reflected from the bottom surface of the cards into the read station sensors. The reflective light source is operative only when the MARKS/PUNCH switch is in the MARKS position.

The transmissive light source, located above the card path, is comprised of 13 infrared LED's mounted on a small PC board. Twelve of these LED's are mounted in-line in opposition to the 12 data sensors and the 13th (the leading edge light source) is mounted in opposition to the leading edge sensor. The leading edge LED is always operative, while the 12 data LED's are operative only when the MARKS/PUNCH switch is in the PUNCH position.

4.1.2 Amplifier Board

The amplifier board contains all of the additional circuitry required to interface the special mark sense read station to the logic board of a standard PDI punched card reader. This board contains 12 gain adjustment potentiometers, one for each data-row sensor of the read station. A separate gain adjustment is incorporated into each of the data amplifiers so that the outputs from all 12 bits may be standardized. The amplified and standardized signals from the data amplifiers are passed through 12 identical R-C coupled circuits, to the gates of their respective SCR latches. The latches will be triggered ON, only if risetime and

pulse amplitudes exceed a certain detection threshold. In the reading of marks, it is characteristic of the read station to produce a pulse output with sharper rise and fall times for a well-defined mark, and to produce slower rise and fall times for an erased or smeared mark. Advantage is taken of this fact in the PDI mark sense system by detecting only those outputs indicative of an intended mark, and rejecting those outputs indicative of a poorly-erased or unintended mark.

The timing format circuitry, under control of the 40 COL/80 COL switch, either allows the 80-column timing signals from the logic board ($\overline{\text{RSRP}}$ and $\overline{\text{DA}}$) to reset the data latches and to transmit data available signals (strobe signals) to the interface directly, or "edits" these signals to reset the data latches and provide data available signals to the interface at the 40-column rate. For the latter case, the data latches are reset by the reset pulses for all the odd numbered of the normal 80 columns, and data available pulses are sent to the interface for all the even numbered of the normal 80 columns. This technique allows more latitude in recovering the data from poorly marked cards; that is, the cards do not have to be quite so carefully marked since twice the window is available for 40-column operation as for 80-column operation.

If clock track capability is provided, the clock track signal from this sensor is amplified and passed through the clock generation circuitry which, for each clock mark, first clears the data latches and then supplies a data available pulse to the interface at an appropriate later time when the data should be present in the data latches. If the 40 COL/80 COL switch is in the 80 column position, to read 80 column density cards, the $\overline{\text{DA}}$ pulse will be supplied approximately 5/8 of a column spacing (5/8 X .087") past the leading edge of the clock mark and the leading edge of the data marks must occur within this spacing. If the 40 COL/80 COL switch is in the 40 column position, to read 40 column density cards, the $\overline{\text{DA}}$ pulse will be supplied approximately 1-1/8 column spacing (1.125 X .087"

past the leading edge of the clock mark and the leading edge of the data marks must occur within this spacing. Thus, when operating in "80 column-clock track", the clock marks should be no closer together than .087"; and when operating in "40 column-clock track", the clock marks should be no closer together than .174". Clock track operation is, however, completely asynchronous, in that clock marks may occur anywhere within the data field of the card, and their centers need not correspond with the defined centers for normal punched card reading. It is, however, required that the leading edge of the first clock mark occur no closer than .22" from the leading edge of the card, and that the leading edge of the last clock mark occur no further back than .34" from the trailing edge of the card in 40 column mode, and no further back than .279" from the trailing edge of the card in 80 column mode. The CLK TRK/INT CLK switch must be set to CLK TRK for clock track operation, and to INT CLK for normal internal timing functions.

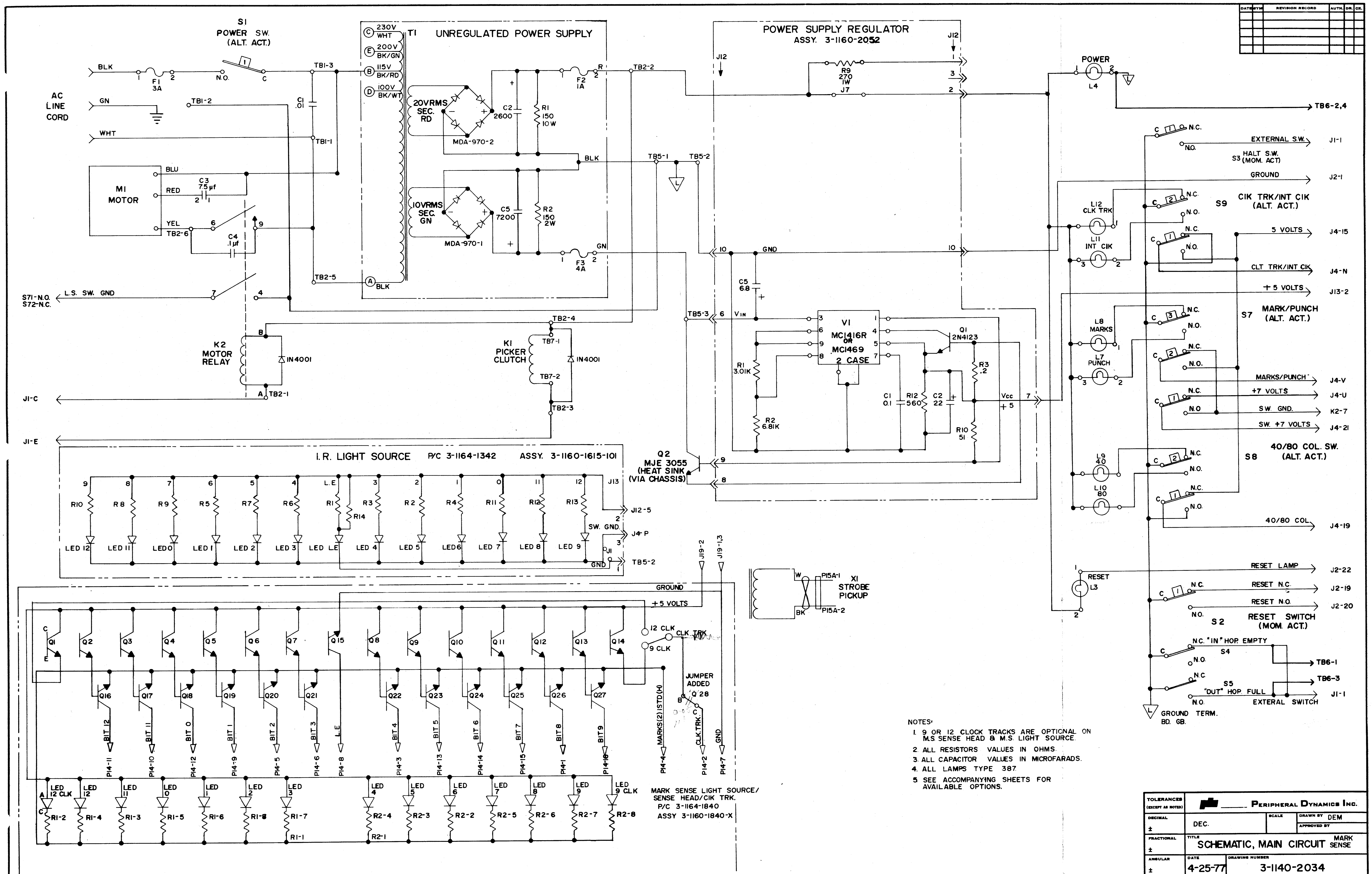
In reflective reading (MARKS mode), a data hole or mark absorbs light causing a reduction in output from the read station sensors. Conversely, in transmissive reading (PUNCH mode), a data hole allows light to strike the sensors causing an increase in output from the sensors. As a result of this logical inversion, it is necessary to invert the polarity of the data amplifiers in marks versus punch mode. In marks mode, the amplifiers are operated in normal common emitter configuration from a 7.5 volt zener supply for increased dynamic range. In punch mode, the amplifiers are operated as emitter followers from the normal 5 volt TTL supply. The outputs of the amplifiers as presented to the R-C coupling networks will therefore be positive pulses for data in both modes of operation, and the data latches are triggered ON at the leading edge of these positive data pulses.

4.1.3 Additional Switch Indicators

The standard PDI punched card readers have three pushbutton/indicator controls. These are POWER, RESET and HALT. The standard PDI mark sense card readers have two additional pushbutton/indicator controls labelled MARKS/PUNCH

and 40 COL/80 COL. Optionally, if clock track capability is provided, there is a sixth pushbutton/indicator, labelled CLK TRK/INT CLK. The first three control switches operate in the same manner as described in the 2022H series manual; the remaining two (or three) control switches are of the alternate action type and function as described in the foregoing paragraphs.

4.1.4 A complete set of schematic diagrams for the series 2022M mark sense card readers are included in this supplementary manual. The main circuit schematic is shown in Figure 4-2; the logic board schematic is shown in Figure 4-3 and the amplifier board schematic is shown in Figure 4-4.


S1 POWER SW. (ALT. ACT.)
AC LINE CORD
BLK
GN
WHT
F1 3A
TB1-3
TB1-2
TB1-1
C1 .01
M1 MOTOR
BLU
RED
YEL
C3 7.5 μf
C4 .1 μf
TB2-6
TB2-5
S71-N.O.
S72-N.C.
L.S. SW. GND
T1 UNREGULATED POWER SUPPLY
230V WHT
200V BK/GN
115V BK/RD
100V BK/WT
BLK
20VRMS SEC. RD
10VRMS SEC. GN
MDA-970-2
MDA-970-1
C2 2600
C5 7200
R1 150 10W
R2 150 2W
F2 1A
F3 4A
TB2-2
TB5-1
TB5-2
TB5-3
TB2-4
TB2-1
TB2-3
TB7-1
TB7-2
K2 MOTOR RELAY
K1 PICKER CLUTCH
1N4001
J1-C
J1-E
POWER SUPPLY REGULATOR
ASSY. 3-1160-2052
J12
R9 270 1W
J7
GND
VIN
V1 MC1416R OR MC1469 2 CASE
Q1 2N4123
R1 3.01K
R2 6.81K
R3 .2
C1 0.1
R12 560
C2 22
R10 51
Vcc +5
C5 6.8
Q2 MJE 3055 (HEAT SINK) (VIA CHASSIS)
POWER
L4
TB6-2,4
EXTERNAL SW.
HALT S.W. S3 (MOM. ACT)
J1-1
GROUND
J2-1
L12 CLK TRK
L11 INT CIK
S9 CIK TRK/INT CIK (ALT. ACT.)
5 VOLTS
J4-15
CLT TRK/INT CIK
J4-N
+5 VOLTS
J13-2
L8 MARKS
L7 PUNCH
S7 MARK/PUNCH (ALT. ACT.)
MARKS/PUNCH
J4-V
+7 VOLTS
J4-U
SW. GND.
K2-7
SW. +7 VOLTS
J4-21
L9 40
L10 80
S8 40/80 COL. SW. (ALT. ACT.)
40/80 COL.
J4-19
RESET L3
RESET LAMP
J2-22
RESET N.C.
J2-19
RESET N.O.
J2-20
S2 RESET SWITCH (MOM. ACT.)
N.C. "IN" HOP. EMPTY S4
TB6-1
TB6-3
S5 "OUT" HOP. FULL
EXTERAL SWITCH
GROUND TERM. BD. GB.
I.R. LIGHT SOURCE P/C 3-1164-1342 ASSY. 3-1160-1615-101
J13
J12-5
J4-P
TB5-2
SW. GND.
R10 R8 R9 R5 R7 R6 R1 R14 R3 R2 R4 R11 R12 R13
LED 12 LED 11 LED 0 LED 1 LED 2 LED 3 LED LE LED 4 LED 5 LED 6 LED 7 LED 8 LED 9
X1 STROBE PICKUP
P15A-1
P15A-2
J19-2
J19-1,3
GROUND
+5 VOLTS
Q1 Q2 Q3 Q4 Q5 Q6 Q7 Q15 Q8 Q9 Q10 Q11 Q12 Q13 Q14
Q16 Q17 Q18 Q19 Q20 Q21 Q22 Q23 Q24 Q25 Q26 Q27
12 CLK
9 CLK
CLK TRK
JUMPER ADDED Q28
BIT 12 BIT 11 BIT 0 BIT 1 BIT 2 BIT 3 L.E. BIT 4 BIT 5 BIT 6 BIT 7 BIT 8 BIT 9
MARKS(2) ISTD(H)
CLK TRK
GND
P14-11 P14-10 P14-12 P14-9 P14-5 P14-6 P14-8 P14-3 P14-13 P14-14 P14-15 P14-1 P14-16 P14-4 P14-2 P14-7
LED 12 CLK
LED 9 CLK
R1-2 R1-4 R1-3 R1-5 R1-6 R1-8 R1-7 R1-1 R2-4 R2-3 R2-2 R2-5 R2-6 R2-7 R2-8 R2-1
MARK SENSE LIGHT SOURCE/ SENSE HEAD/CIK TRK.
P/C 3-1164-1840
ASSY 3-1160-1840-X

NOTES:

1. 9 OR 12 CLOCK TRACKS ARE OPTIONAL ON M.S. SENSE HEAD & M.S. LIGHT SOURCE.
2. ALL RESISTORS VALUES IN OHMS.
3. ALL CAPACITOR VALUES IN MICROFARADS.
4. ALL LAMPS TYPE 387.
5. SEE ACCOMPANYING SHEETS FOR AVAILABLE OPTIONS.

TOLERANCES (EXCEPT AS NOTED)	PERIPHERAL DYNAMICS INC.
DECIMAL ±	DEC. — DRAWN BY DEM
FRACTIONAL ±	TITLE: SCHEMATIC, MAIN CIRCUIT MARK SENSE
ANGULAR ±	DATE 4-25-77 — DRAWING NUMBER 3-1140-2034

FIGURE 4-2

MOD 8 COUNTER	
STATES	COUNT
0	1 1 1 1
1	0 1 1 1
2	0 0 1 1
3	0 0 0 1
4	0 0 0 0
5	1 0 0 0
6	1 1 0 0
7	1 1 1 0

DATE	SYM	REVISION RECORD	AUTH.	DR.	CK.

MOD 8 COUNTER

MAIN COUNTER

REMOTE RESET J2-18

RESET S.S.

RESET F.F.

MISPICK COUNTER

3 PICKS-C1
5 PICKS-C2

ALL ONE'S J2-5

BIT 9 J2-Z J3-22
BIT 8 J2-W J3-21
BIT 7 J2-T J3-20
BIT 6 J2-17 J3-19
BIT 5 J2-15 J3-18
BIT 4 J2-N J3-17
BIT 3 J2-11 J3-16
BIT 2 J2-8 J3-15
BIT 1 J2-H J3-14
BIT 0 J2-E J3-13
BIT 11 J2-C J3-12
BIT 12 J2-4 J3-11

DS STATE 4, STRAP A2 & B2
STATE 5, STRAP A1 & B1
STATE 6, STRAP A3 & B3

J4-S MARK/STD J1-F

RESYNC. SS

RESYNC

ENABLE DATA FF

STROBE J1-X

STROBE S.S.

Q1 2N4123

CR1 IN3064

DA H-1 2μS H-0 120μS

J3-6 PICK J1-T

PICK FF

LOCKUP FF

HOLD FF

PICKER CLUTCH F.F.

STROBE PICKUP J1S-1 J1S-2

STROBE PREAMP OPTION

K-0 STROBE OUT K-1 STROBE IN
L-0 L-1

JAM SHUTDOWN F.F.

READ CHECK J1-R

J3-A MOTOR DISABLE J1-A

JAM SHUTDOWN J1-21

J4-7 L.E. J1-W

L.E. FF

LEADING EDGE SS

TIME DELAY

J2-14 +5 VOLTS J12-7

J2-13 J2-13

TIMEOUT J1-V

MOTOR STATUS J1-2

CARD COVER J1-10

J1-16 J3-Z J4-X

L.E. SS J1-Y

J1-M

INTERLOCK J1-P J3-4

J3-F J2-K DS

STS 89-96 J1-22

J4-22 STROBE SS J1-18

STS 81-96 J1-H

HANG CNT J1-J

MOTOR RELAY

T82-1 J1-C IP

J1-S

PICKER CLUTCH

T82-3 J1-E

L3-1 J2-22 RESET LAMP

J3-3 J1-U CHECK CONDITIONS

J4-20 J2-B RSRP

J3-1 J4-17 J1-N CTS

PICK FAILURE

J3-T J2-21

PICKER CLUTCH

J1-K

INT CLK

J1-5 DA CT

J1-4

DATA AVAIL

J4-16 J2-V

J2-13 +5 VOLTS J2-2

J4-1 GND J3-10 J2-1 J2-A

C6 .05μf, C7 22μf, C15 .01μf, C19 .01μf, C20 .01μf, C21 .01μf, C22 .01μf, C23 .01μf, C24 .01μf

NOTES.
1. ALL RESISTANCE VALUES ARE IN OHMS.
2. ALL LOGIC MODULES HAVE PIN 7 CONNECTED TO GROUND AND PIN 14 CONNECTED TO +5 VOLTS, UNLESS OTHERWISE INDICATED.
3. FOR STRAPPING, SEE STRAPPING CHART.

TOLERANCES (EXCEPT AS NOTED)	PERIPHERAL DYNAMICS INC.		
DECIMAL ±	MARK SENSE	SCALE	DRAWN BY CCJ/RTJ
FRACTIONAL ±	TITLE BASIC LOGIC		APPROVED BY
ANGULAR ±	DATE 3-9-76	DRAWING NUMBER 3-1140-2035-1	

FIGURE 4-3

DATE	SYM	REVISION RECORD	AUTH.	DR.	CK.

CLOCK TRACK AMP.

CLK. TRK. LATCH

CIS FF

40/80 COL. F.F.

CLK. F.F.

DA RELAY REG.

RSRP ALLOW F.F.

DATA LATCHES

Q1-Q12 2N5060

TOLERANCES (EXCEPT AS NOTED)	PERIPHERAL DYNAMICS INC.		
DECIMAL ±		SCALE	DRAWN BY DEM
FRACTIONAL ±			APPROVED BY
ANGULAR ±	TITLE: MARK SENSE AMPLIFIER/CLK TRK		
	DATE: 4-27-77	DRAWING NUMBER: 3-1140-1857	

FIGURE 4-4

SECTION 5

MAINTENANCE

5.1 GENERAL

This section is divided into two general categories--Preventive Maintenance and Corrective Maintenance. The first part discusses the recommended daily care items and other periodic procedures, which will enhance the overall performance of the equipment and enable it to render trouble-free operation. The second part discusses the procedures to be followed in the removal and replacement of specific parts and assemblies, if it should be required.

Two overall views of the Card Reader, with callouts on the major components are shown in Figures 5-1 and 5-2. Most of the major components can be located with the aid of these illustrations.

5.2 PREVENTIVE MAINTENANCE

5.2.1 Daily Care

It is recommended that the card resting surface of the input hopper be cleaned once a day by the operator. Remove any dust or card stock material which has accumulated in the input hopper. A dry, lint-free cloth should be used. Visually check opening under throat gauge to ensure that all foreign material is removed. If removal of materials is necessary, use a scrap punched card and gently run back and forth under knife edge until all foreign material is removed.

5.2.2 Weekly Care

Because of the contaminating nature of the graphite pencil markings, it is recommended that a periodic cleaning of the picker roller and read station rollers be made by the operator on a weekly basis (or more often, as usage dictates). To facilitate this operation, follow the procedures outlined below. NOTE: If cards are marked with ballpoint pens or markers containing non-reflective ink, the weekly care procedures can be placed on a monthly basis.

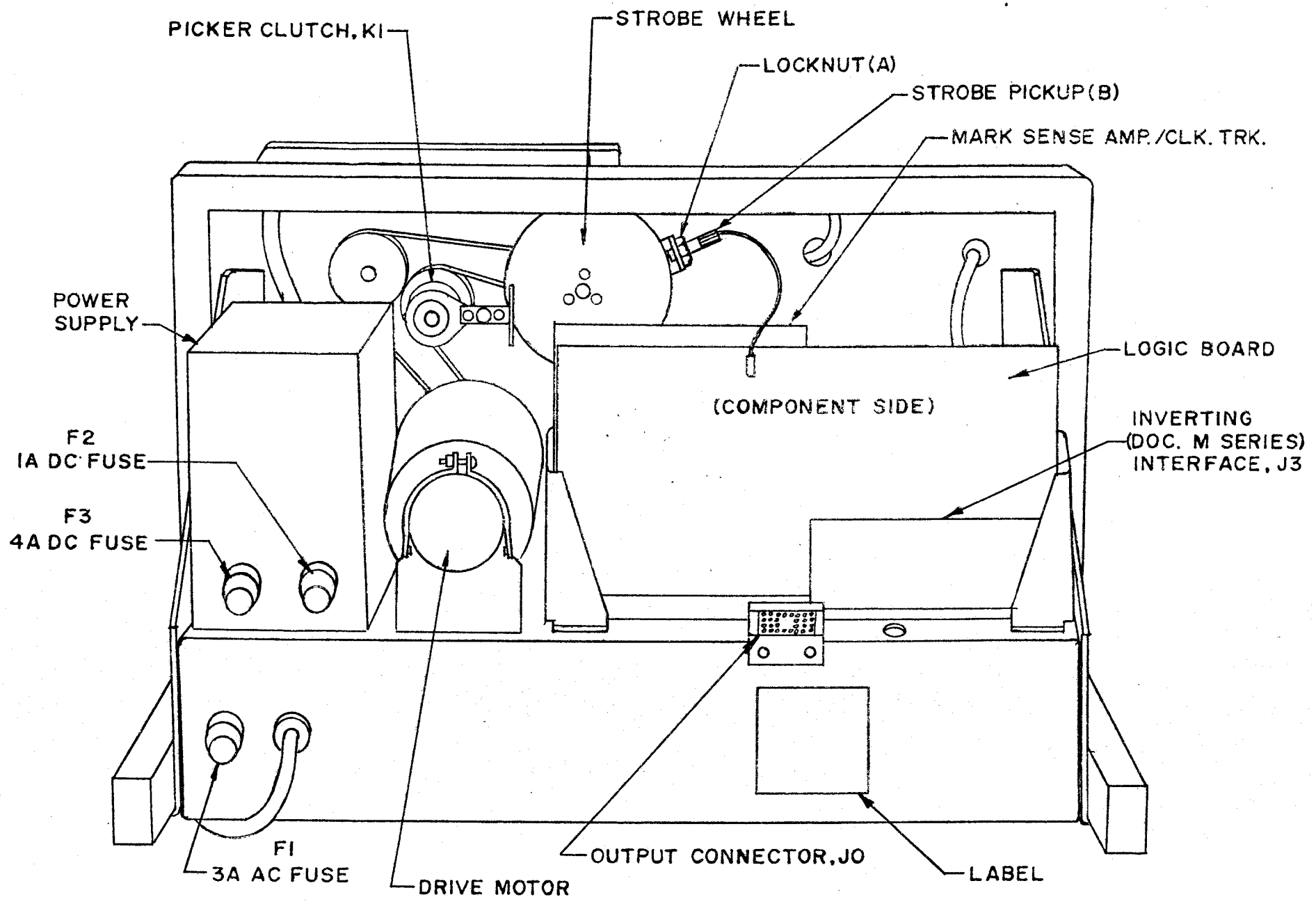


FIG. 5-1 REAR VIEW OF CARD READER, REAR COVER REMOVED

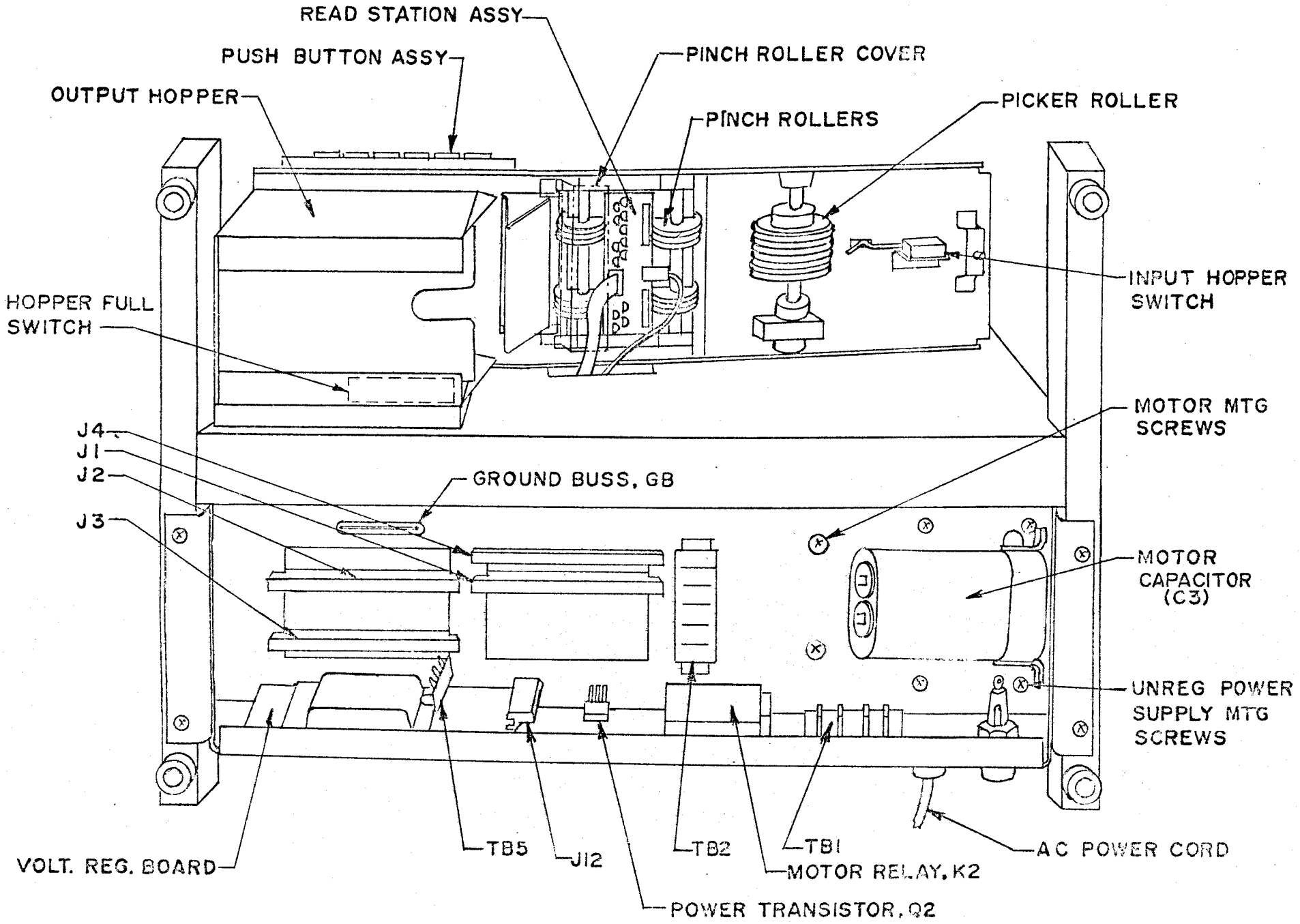


FIG. 5-2, BOTTOM VIEW OF CARD READER, FRONT COVER REMOVED

a. With power off, remove front cover by inserting a 1/8-inch hex Allen wrench into front cover retaining screw which is located adjacent to the switches. Turn retaining screw counter-clockwise until the screw disengages. Remove cover by pulling outward from both ends. Remove rear cover by loosening two cross recess screws from front of machine (one on each side of unit). These screws are accessable through a 3/8 inch diameter hole on each side at the front of the main frame. When screws disengage, rear cover may be pulled off.

b. Moisten a clean cloth with alcohol and place the moistened cloth over a finger and hold against the top surface of the picker roller as exposed in the input hopper. With the other hand, reach under the input hopper and rotate the picker roller while holding the moistened cloth against the top of the roller. Continue the cleaning operation until all accumulated dirt is removed.

c. Moisten a clean cloth with alcohol and place the moistened cloth over a finger and clean the four surfaces of the read station drive rollers from above while holding cloth on rollers and slowly rotating strobe wheel until complete surface of roller is cleaned. The four polyurethane-covered pinch rollers may be cleaned in similar fashion from below the read station. The pinch rollers are shown in Figure 5-2.

d. Replace front and rear covers by reversing the procedure followed in step a.

5.2.3 Monthly Care

A periodic cleaning of the card reader is recommended on a monthly basis to assure proper trouble-free operation of the card reader.

a. With power off, remove front cover by inserting a 1/8-inch hex

Allen wrench into front cover retaining screw which is located adjacent to the switches. Turn retaining screw counter-clockwise until the screw disengages. Remove cover by pulling outward from both ends. Remove rear cover by loosening two cross recess screws from front of machine (one on each side of unit). These screws are accessable through a 3/8 inch diameter hole on each side at the front of the main frame. When screws disengage, rear cover may be pulled off.

b. Moisten a clean cloth with alcohol and place the moistened cloth over a finger and hold against the top surface of the picker roller while rotating picker roller from underneath with the other hand. Continue cleaning until all accumulated dirt is removed.

c. Wipe out input hopper with alcohol-moistened cloth.

d. Moisten a clean cloth with alcohol and clean the four surfaces of the polyurethane-covered pinch rollers from below, and the four surfaces of the read station drive rollers from above, while rotating strobe wheel with other hand.

e. Inspect for lint buildup around read station area. Excessive lint should be removed by gently blowing and/or carefully wiping with a dry, lint-free cloth.

f. The throat gap should be checked by placing the plastic throat gauge (PDI Part Number 3-14460-342) under the knife edge of the throat assembly. If throat is out of tolerance, operator should call for service.

Adjustment of knife is described in paragraph 5.3.2.

g. Replace front cover by reversing the procedure followed in step a.

5.2.4 Six-Month Care

It is recommended that the following preventive maintenance procedures

be accomplished on a six-month basis, or more often as usage dictates, by a trained serviceman.

a. With power switch off and AC power source disconnected, remove front cover by inserting a 1/8-inch hex Allen wrench into front cover retaining screw which is located adjacent to the switches. Turn retaining screw counter-clockwise until the screw disengages. Remove cover by pulling outward from both ends. Remove rear cover by loosening two cross recess screws from front of machine (one on each side of unit). These screws are accessable through a 3/8 inch diameter hole on each side at the front of the main frame. When screws disengage, rear cover may be pulled off.

b. Examine all belts for evidence of wear such as frayed edges or broken fibers. If evidence of wear is noted, replace belt as described in paragraphs 5.3.10 or 5.3.12.

c. Moisten a clean cloth with alcohol and place the moistened cloth over a finger and clean the four surfaces of the read station drive rollers from above while holding cloth on rollers and slowly rotate the strobe wheel until complete surface of roller is cleaned. The four polyurethane-covered pinch rollers may be cleaned in similar fashion from below the read station. The pinch rollers are shown in Figure 5-2.

d. Remove excessive lint buildup in the holes of the top LED aperture block. This is accomplished by removing the mounting screws on the top LED assembly and removing the assembly, thereby making the lamp aperture block accessible as described in paragraph 5.3.8. Remove all lint or dust from the top LED aperture block with a clean cloth or by gently blowing. Carefully blow any dust or lint from the LED's before replacing the top LED assembly.

e. Replace front and rear covers by reversing the procedure followed in step a.

f. Reconnect card reader to AC power source.

5.3 CORRECTIVE MAINTENANCE

Should corrective maintenance be required, follow the procedures outlined in this section. For convenience, a paragraph number listing of the various procedures is given below:

5.3.1 Strobe Pickup Adjustment (Refer to Figure 5-1)

a. To adjust strobe-pickup gap, loosen locknut (A), insert .005 in. feeler gauge between strobe wheel gear teeth and tip of pickup, and rotate pickup (B) to obtain snug fit. Retighten locknut (A). Gap should be between .004 and .006 in.

5.3.2 Knife-Throat Adjustment (Refer to Figure 5-3)

a. Loosen two knife mounting screws just enough to allow knife blade to move but still maintain contact with its mounting surface.

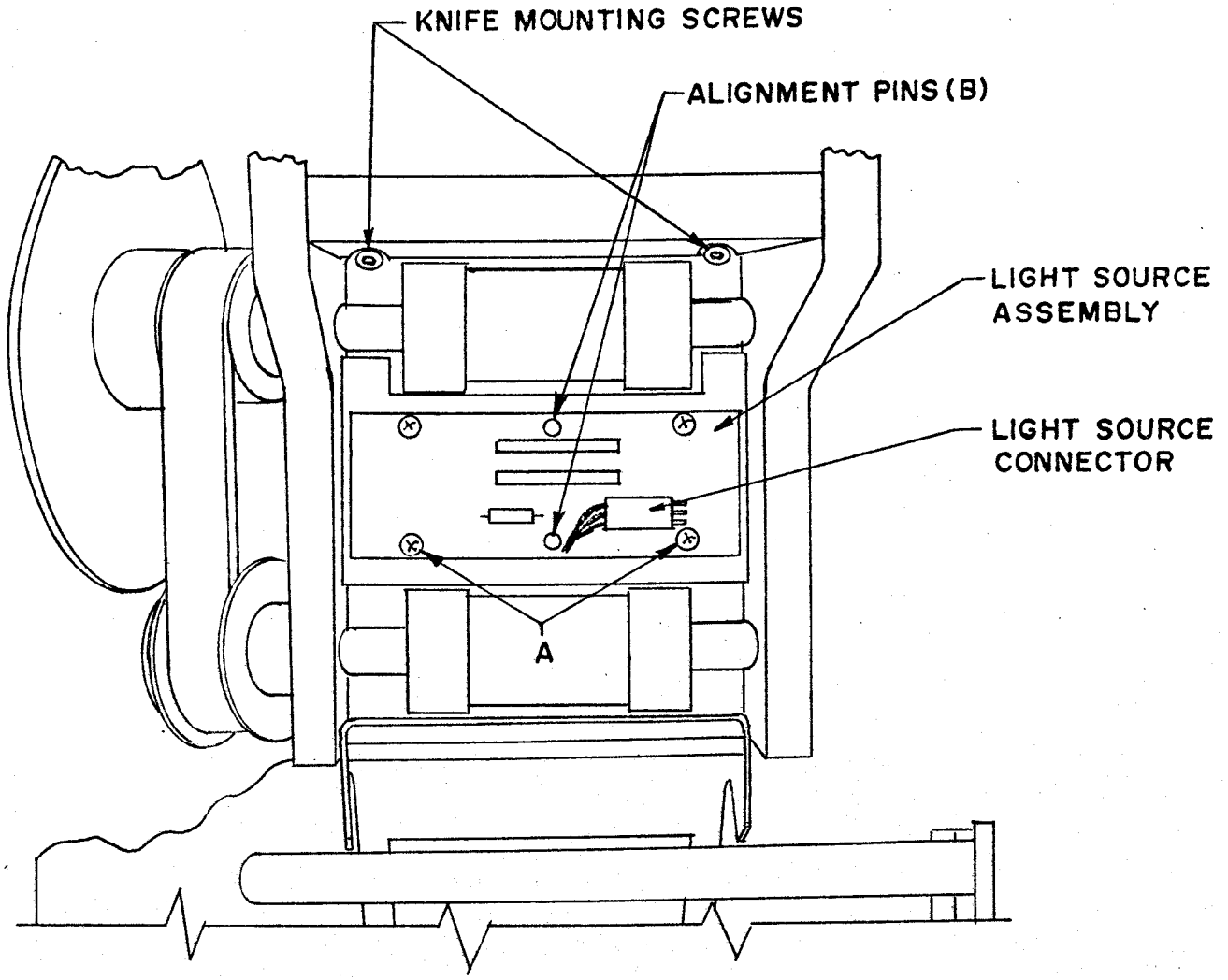


FIG. 5-3, READ STATION, TOP VIEW

b. Insert throat gauge, PDI Part No. 3-14460-342, between the knife and throat block, from input hopper side. Feeler gauges or metal stock MUST NOT BE USED.

c. Slide the knife blade down onto the throat gauge gently, and without cocking the blade. Check for full-width contact of the knife with the gauge.

d. Fully tighten the mounting screws and remove the gauge.

e. Check adjustment by partially inserting gauge from both sides of knife to ensure that knife is parallel to throat block at the correct gap. Gauge should be slightly and equally snug on both sides of knife.

5.3.3 Input Hopper Empty Switch Adjustment

a. Loosen two mounting screws that attach hopper switch to mounting bracket on underside of input hopper.

b. Rotate switch back and forth to find position where switch is just actuated with switch actuator protruding through card bed 3/16 in., and retighten screws. NOTE: It should not be necessary to bend switch arm to achieve adjustment.

5.3.4 Amplifier Gain Adjustment

The following procedure may be used for checking and/or setting up the gain adjustments on the mark sense amplifier board. This will normally only have to be done if the read station or amplifier board have been replaced.

a. Set up card reader to read MARKS in either 40 COL. or 80 COL. mode, and place a deck of mark sense type cards in the input hopper. The deck should be comprised of cards which are all punched identically and contain several punches per data row. (An ideal pattern would be one in which all rows are punched every tenth column.)

b. Use a pick jumper paddle in output connector J3 of card reader,

or otherwise apply a steady state ground signal to pin 6 of J3.

c. Sync oscilloscope from T.P.1 of the logic board (sync negative), set scope time base to 20 msec/cm, and set scope vertical gain to 1v/cm. The oscilloscope ground may be connected conveniently to the ground turret lug located adjacent to T.P.1 of the logic board.

d. With oscilloscope probe on T.P.12 of amplifier board and card reader reading cards, a waveform similar to Figure 5-4(a) should be observed. If the amplitutde is significantly different from that shown, adjust trimpot R1 (adjacent to the bit 12 test point) either clockwise to increase gain, or counter-clockwise to decrease gain, to give correct amplitude. Amplifier should be tuned until almost fully saturated for reflective card surface (area of card between data holes), with just a slight amount of waviness between holes. This will result in maximum amplitude of data pulses, which should be in excess of 4 volts, and typically 5 volts or greater.

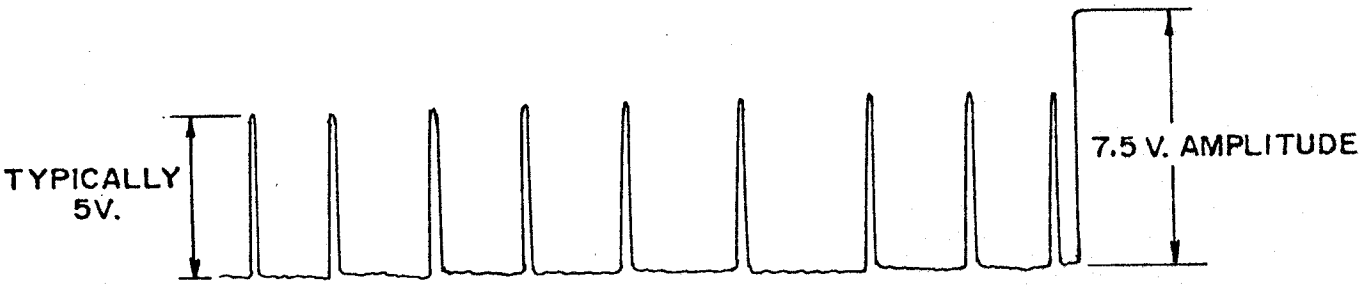
e. Repeat this procedure for bits 11 through 9, adjusting trimpots R2, R3, R4, etc., in turn, until all twelve amplifier outputs resemble Figure 5-4(a).

f. When marked decks are run, the amplitudes of the marks should be at least 1.0 volts as shown in Figure 5-4(b).

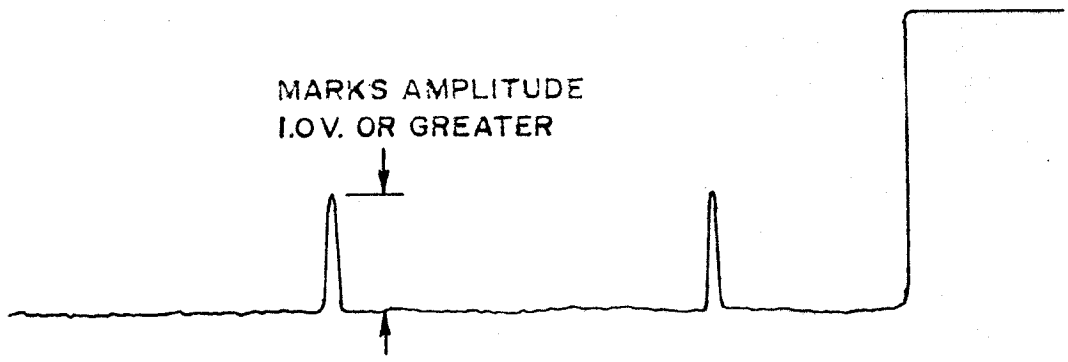
g. When punched decks are run in PUNCH mode, the amplitude of the punches must be at least 1.0 volt, but may typically be 4.0 volts or greater.

5.3.5 Clock Track Amplifier Adjustment

The following procedure may be used for checking and/or setting up the clock track amplifier gain on the mark sense amplifier board. This will



(a) PUNCHED CARDS IN MARKS MODE



(b) MARKED CARDS IN MARKS MODE
OR
PUNCHED CARDS IN PUNCH MODE

FIG 5-4. AMPLIFIER GAIN ADJUSTMENT WAVEFORMS

normally be done only if the read station or amplifier board have been replaced.

a. Set up card reader to read MARKS in either 40 COL. or 80 COL. mode.

b. Set CLK.TRK./INT.CLK. switch to CLOCK TRACK mode.

c. Place a deck of mark sense type cards, with pre-printed clock track in the input hopper.

d. Use a pick jumper paddle in output connector J3 of card reader, or otherwise apply a steady state ground signal to pin 6 of J3.

e. Sync oscilloscope from T.P.1 of the logic board (sync negative), set scope time base to 2.0 msec/cm., and set scope vertical gain to 2v/cm. The oscilloscope ground may be connected conveniently to the ground turret lug located adjacent to T.P.1 on the logic board.

f. With oscilloscope probe on clock track test point (labelled C.T. at top left of mark sense amplifier board), and card reader process-cards, adjust trimpot R28 (adjacent to C.T. test point) until negative pulses at TTL levels are observed on the scope. The potentiometer should be adjusted until the width of the clock track pulses correspond to the width of the clock track marks printed on the card. Thus, .020 in. clock marks should typically yield approximately .5 msec. pulses.

5.3.6 Leading Edge Single Shot Adjustment

Normally, it will not be necessary to perform a leading edge single shot adjustment to the card reader in routine maintenance situations. There are instances, however, when it is desirable to check and possibly reset this adjustment. Such a situation might arise, for example; if a read station assembly or top light source assembly must be replaced, or if a 60Hz unit is

converted for 50Hz use. Amplifier gains must be properly adjusted before this procedure is attempted (see paragraph 5.3.4).

This adjustment must be performed with the aid of a computer or with PDI Off-Line Card Reader Tester 1011 (optionally available printed circuit test board), in order to tell whether the card reader is reading error-free or if it is making errors in reading. In general, a deck of punched cards of known good registration is used. All the cards of the deck have the same pattern, and the first card is read and loaded into memory. All the succeeding cards in the deck are read and compared against memory to determine if any data errors are made. The program should stop feeding cards if an error is made, and it is sometimes helpful if data expected vs. data read can be examined to determine the nature of an error.

Punched hole patterns are used to make this adjustment because punch registration and hole uniformity is far superior to marks placed on cards by hand. It is preferable to have decks punched on mark sense type cards; however, standard punched card decks may be used, face up, if the unprinted sides are fairly clean and free of ink marks.

In addition to the above, an oscilloscope is required to monitor the adjustment.

a. Connect card reader to computer via J3 connector, or insert PDI Off-Line Card Reader Tester 1011 into J3 connector slot.

b. Connect probe of oscilloscope to L.E. test point (T.P.1) on logic board. Set oscilloscope to sync negative, with time base on 0.1 millisecond/cm; set vertical amplitude to 2 volts/cm. The oscilloscope ground may be connected conveniently to the ground turret lug located adjacent to T.P.1 of the logic board.

c. Set card reader to read cards in PUNCH mode, 80-column format, and load deck of identical pattern punched cards into reader. Note: Cards must be loaded with printing side up if standard punched cards

(cards printed with black ink) are used.

d. Connect RESYNC test point (located at top right of logic board) to ground turret lug located above it, using a small clip lead. This will inhibit resync function.

e. With card reader processing cards under computer control, note width of zero-going pulse on trace of oscilloscope, and adjust trimpot R8 on logic board clockwise until card reader stops, indicating that a data error has been made. Adjust trimpot counter-clockwise a little at a time until point is reached where reader will process the deck error-free, and record width of pulse from trace (this is the upper margin reading in PUNCH mode).

f. Repeat step e, adjusting trimpot R8 in the counter-clockwise direction until errors are made. Adjust trimpot clockwise a little at a time until point is reached where reader will process the deck error-free, and record width of pulse from trace (this is the lower margin reading in PUNCH mode).

g. Add the upper and lower PUNCH margin readings obtained in steps e and f, and divide by two. Record this value as the center of margin reading in PUNCH mode, and remove shorting clip from RESYNC test point.

h. With the equipment set up as in steps a. and b. above, set card reader to read cards in MARKS mode, 80-column format.

i. Load same deck of cards, and in same manner, used for step c above.

j. With card reader processing cards under computer control, note width of zero-going pulse on trace of oscilloscope, and adjust trimpot R8 on logic board clockwise until card reader stops, indicating that a data error has been made. Adjust trimpot counter-

clockwise a little at a time until point is reached where reader will process the deck error-free, and record width of pulse from trace (this is the upper margin reading in MARKS mode).

k. Repeat step j, adjusting trimpot R8 in the counter-clockwise direction until errors are made. Adjust trimpot clockwise a little at a time until point is reached where reader will process the deck error-free, and record width of pulse from trace (this is the lower margin reading in MARKS mode).

l. Add the upper and lower MARKS margin readins obtained in steps j and k, and divide by two. Record this value as the center of margin reading in MARKS mode.

m. Add the center of margin reading for MARKS mode, to the center of margin reading for PUNCH mode, and divide by two. Readjust trimpot R8 to give this value on oscilloscope. Leading edge single shot is now adjusted for optimum reading in both PUNCH and MARKS mode.

5.3.7 Push Buttom Lamp Replacement

a. Grasp front edges of movable portion of button firmly with fingertips and pull straight out. Movable portion of button contains lamps.

b. Remove lamp (type 387) from button by flicking out with fingernail.

c. Slip new lamp into hole position from which old lamp was removed, and replace button by sliding back into switch assembly and pressing in on button until it snaps into place.

5.3.8 Top LED Head Replacement (Refer to Figure 5-3)

a. Disconnect light source connector by sliding plastic part of connector toward back of machine.

b. Remove four screws (A) which secure light source in place.

c. Carefully lift out light source PC board by pulling straight up on board assembly. NOTE: If board does not lift out easily, very

carefully pry around the edges with a sharp bladed instrument such as a small screwdriver to loosen head assembly from alignment pins B.

d. Replace light source assembly after first making sure that the individual LED's are all in reasonably good alignment with each other. Carefully drop into place so that each LED is properly started into its respective alignment hole in the aluminum mask. The light source assembly should be pressed down over the alignment pins, and the four screws (A) replaced.

e. Reconnect light source connector making sure that original alignment is observed.

5.3.9 Picker Clutch Replacement (Refer to Figure 5-5)

a. Unfasten two clutch leads (A) from terminal board.

b. Loosen screw (B), rotate stud-mounted assembly 90-degrees, and temporarily retighten screw (B).

c. Loosen two setscrews (C) in collar and slide clutch assembly off picker roller shaft.

d. Replace new clutch assembly by reversing the removal procedure, making sure that stop screw (E) engages slot in clutch assembly. IMPORTANT: Adjust picker clutch for proper running clearance by sliding clutch onto picker roller shaft as far as possible and then backing off between .005 in. to .010 in. before tightening setscrews (C) in collar. This spacing adjustment is not critical, but sufficient clearance must be provided to allow clutch plate and coil to move slightly but freely on shaft.

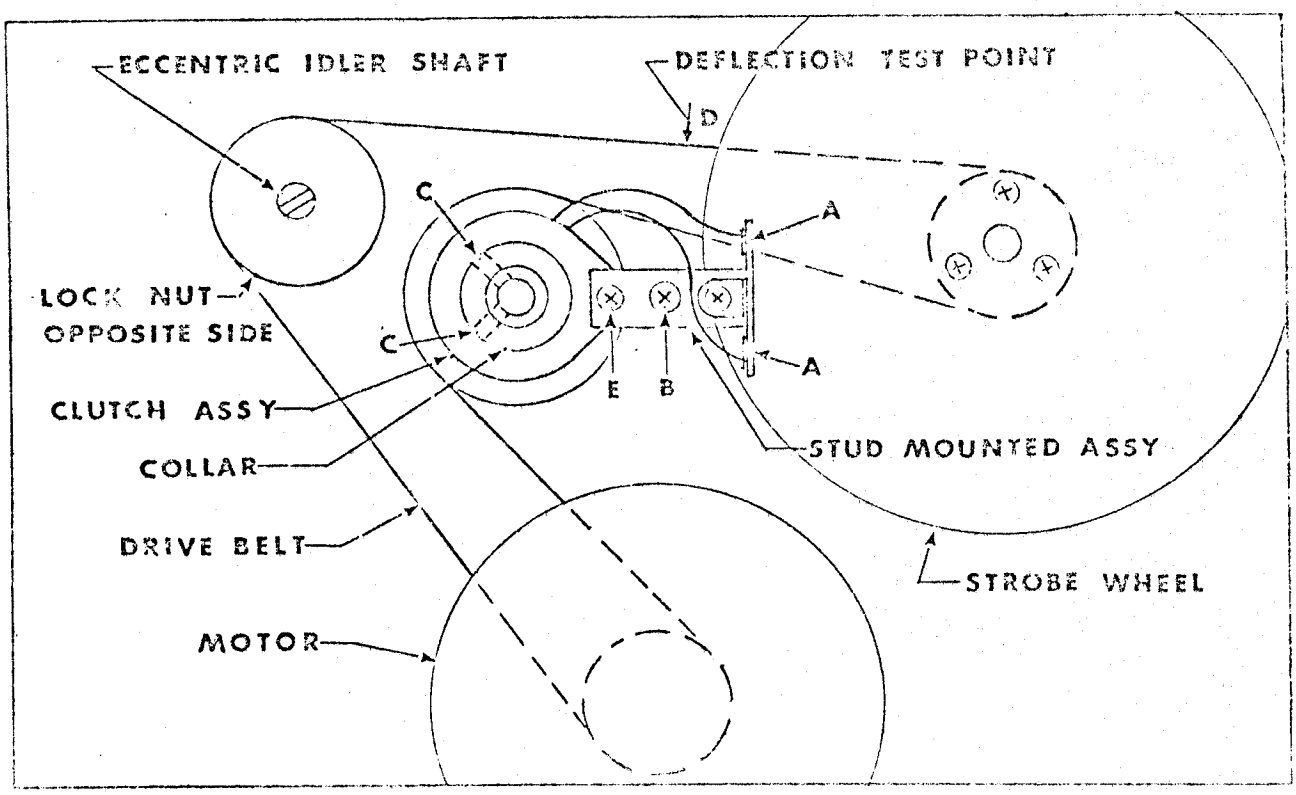


FIG. 5.5 PICKER CLUTCH AND DRIVE SYSTEM

5.3.10 Main Drive Belt Replacement (Refer to Figure 5-5)

a. Remove three screws which secure strobe wheel to pulley hub of forward drive roller, and remove strobe wheel.

b. Loosen lockscrew on opposite end of eccentric idler shaft.

c. Turn idler shaft with screwdriver, one-half turn counter-clockwise to relieve belt tension.

d. Remove belt.

e. Replace new belt, and adjust belt tension by turning idler shaft with screwdriver in clockwise direction for proper tension, and retightening lockscrew on opposite end of idler shaft.

IMPORTANT: Correct belt tension is 1/4 in. deflection at point (D), with one-pound force applied.

f. Replace strobe wheel and replace three screws to secure strobe wheel.

g. Check for strobe pick-up gap adjustment (See Paragraph 5.3.1).

5.3.11 Picker Roller Replacement (Refer to Figure 5-6)

a. Temporarily remove picker clutch (steps b and c of procedure for picker clutch replacement, Paragraph 5.3.9).

b. Relieve tension on main drive belt (steps b and c of procedure for main drive belt replacement, Paragraph 5.3.10).

c. Loosen setscrew (C) in collar.

d. Loosen two setscrews (D) in picker roller hub.

e. Slide shaft out by grasping picker shaft pulley with one hand and holding picker roller with other hand. NOTE: Slide shaft out just far enough to remove roller.

f. Install new picker roller by reversing step e above, pushing shaft in until it bottoms. Snug collar against fiber inertia damper and tighten setscrew (C) in collar.

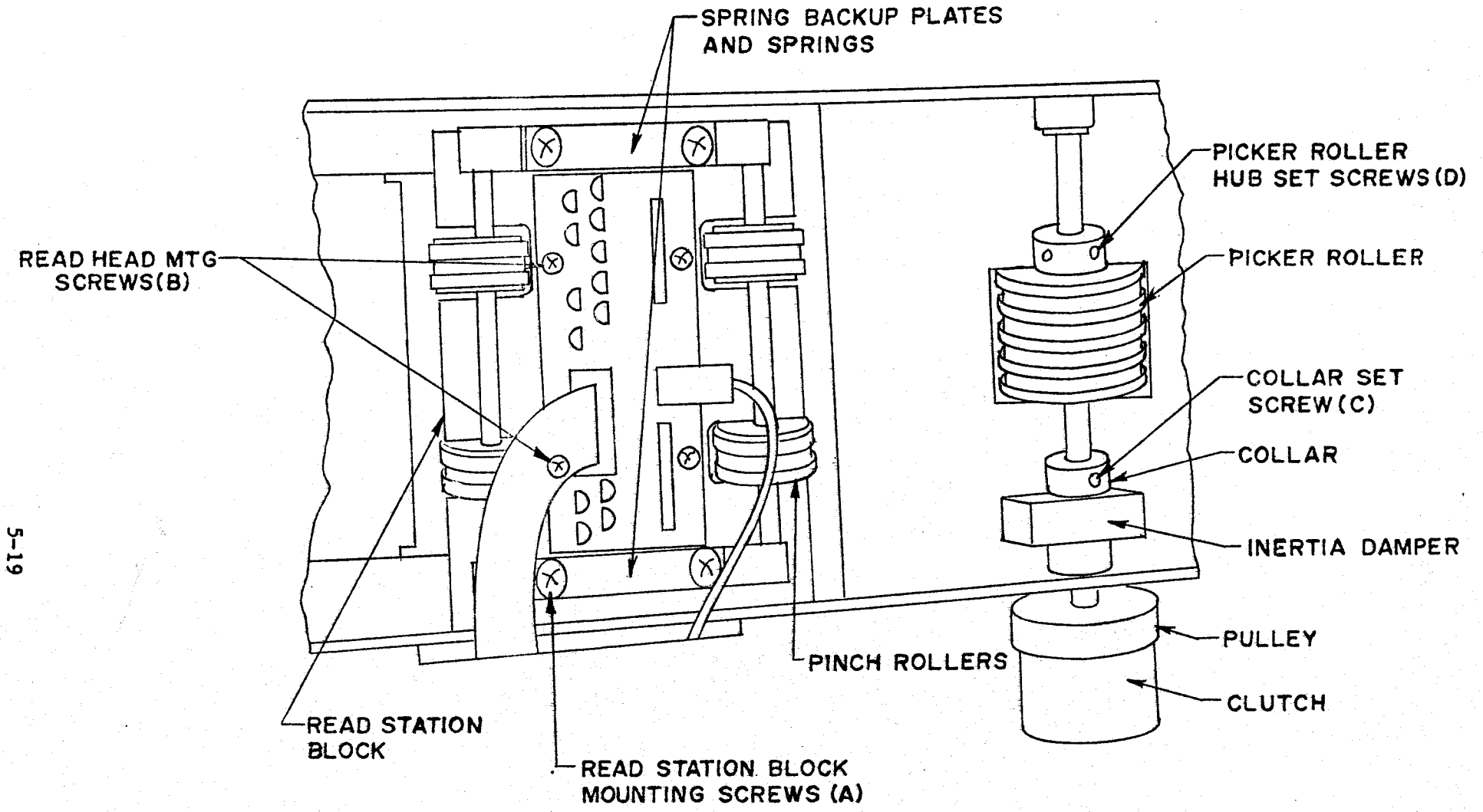


FIG. 5-6, READ STATION AND PICKER ROLLER, BOTTOM VIEW WITH PROTECTIVE COVER REMOVED

g. With picker roller setscrews (D) positioned over flats on picker roller shaft, center roller so that raised areas on picker roller fall between columns on a punched card. This adjustment may be easily made by placing a fully laced card in the input hopper, holding first against one side of the input hopper and then against the other side. The high points of the roller should not be visible through the punchings with the card in either extreme position. Tighten both setscrews in picker roller hub.

h. Adjust drive belt tension (step e of procedure for main drive belt replacement, Paragraph 5.3.10).

i. Replace picker clutch (step d of procedure for picker clutch replacement, Paragraph 5.3.9).

5.3.12 Roller Drive Belt Replacement (Refer to Figure 5-7)

a. Remove main drive belt and strobe wheel (steps a through d of procedure for main drive belt replacement, Paragraph 5.3.10).

b. Remove screws and spacers (C) and pickup mounting bracket.

c. Loosen two setscrews (A) and (B) in both roller pulleys, and slide both pulleys (along with belt) off roller shafts.

d. Place new belt over both pulleys and slide back onto shafts in the manner removed, taking care to align setscrews of double-pulley with flats on shaft of forward drive roller shaft.

e. Tighten two setscrews (A) in double-pulley, and after aligning setscrews and shaft in single-pulley, tighten two setscrews (B) in single-pulley.

f. Replace pickup mounting bracket using screws and spacers (C).

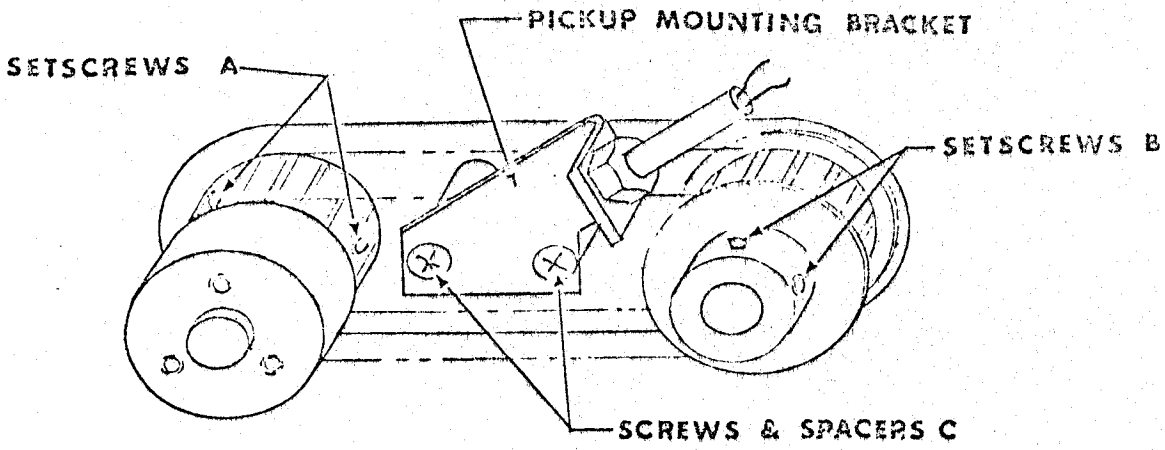


FIG. 5.7 ROLLER DRIVE

g. Replace motor drive belt and strobe wheel (steps e and f of procedure for main drive belt replacement, Paragraph 5.3.10), and adjust strobe pickup gap (Paragraph 5.3.1).

5.3.13 Pinch Rollers Replacement (Refer to Figure 5-6)

If pinch rollers become defective, it is recommended that all four pinch rollers be replaced.

a. Stand card reader on output hopper end and remove four screws (A), spring backup plates, and springs.

b. Remove pinch roller and shaft assemblies, without disturbing block.

c. Remove outer retaining ring at each roller position and slide rollers off shaft ends.

d. Replace new pinch rollers on shafts, and outside retaining rings on shafts.

e. Replace pinch roller and shaft assemblies in block with flats on shafts toward springs.

f. Replace springs, spring backup plates, and screws (A). Make sure that alignment pins in phenolic block engage alignment slots in bottom of side rails, center assembly sideways, and tighten screws (A).

5.3.14 Read Station Replacement (Refer to Figure 5-6)

a. Disconnect read head connector (J14) from amplifier board.

b. Stand card reader on output hopper end, remove four mounting screws (B), and remove head assembly by carefully lifting out. DO NOT TWIST OR FORCE ASSEMBLY. This could result in bending the mounting leads of the photo-transistors or LED's causing a resultant misalignment.

c. Work cable assembly containing J14 connector out through slot toward front of card reader.

d. Replace assembly in reverse order, being careful that photo-transistors and LED's slip into their wells. As above, DO NOT TWIST OR FORCE ASSEMBLY. Secure with four screws (B).

e. In reconnecting read head connector J14, make sure pins in connector are properly mated.

f. Follow procedure for checking amplifier gain adjustment, Paragraph 5.3.4.

g. Follow procedure for checking clock track amplifier adjustment, paragraph 5.3.5.

h. Follow procedure for checking leading edge single shot adjustment, Paragraph 5.3.6.

5.3.15 Drive Motor Replacement (Refer to Figures 5-1 and 5-2)

In the procedure to follow, clip lacing cord where required to remove wires, and relace cable at conclusion.

a. Loosen and free main drive belt from pulley (steps b anc c of procedure for main drive belt replacement, Paragraph 5.3.10).

b. Disconnect three motor leads by pulling off quick-connect fasteners at TB1-3, C3-2, and TB2-6.

c. Remove two screws which secure motor base to chassis, and remove motor.

d. Remove pulley from motor shaft and reinstall on new motor.

e. Replace motor, securing with screws removed in step c.

f. Reconnect motor leads to connection points broken in step b, and dress leads as originally done.

g. Replace main drive belt on pulleys and adjust belt tension (step e of procedure for main drive belt replacement, Paragraph 5.3.10).

5.3.16 Voltage Regulator Board Replacement (Refer to Figure 5-2)

a. Unplug cable connector from regulator board.

b. Remove regulator board from chassis by removing two screws, nuts and spacers; and unbolt wired TB5 from regulator board.

c. Replace with new regulator board in the reverse order.

5.3.17 Voltage Regulator Power Transistor Replacement (Refer to Figure 5-2)

a. Unsolder leads from transistor, carefully noting which color leads go to emitter, collector and base.

b. Remove transistor from chassis by removing screw, spring washer, and nut, being careful not to damage mica washer. If transistor is removed with a rolling motion, mica washer should stay in place on chassis by adhesive action of silicone grease.

c. Wipe a small dab of silicone grease over metal underside of replacement transistor before mounting. Tighten mounting screw to approximately 6 inch-pounds of torque.

d. Resolder leads removed in step a.

5.3.18 Unregulated Power Supply Replacement (Refer to Figures 5-1 and 5-2)

In the procedure to follow, clip lacing cord where required to remove wires, and relace cable at conclusion.

a. Remove power supply input leads (quick-connect terminals) from TB2-5 and C3-1.

b. Remove red power supply output lead (quick-connect terminal) from TB2-4.

c. Unsolder black power supply output lead from TB5-2, and green power supply output lead from TB5-3.

d. Remove power supply by removing four mounting screws.

e. Install new power supply by reversing the procedure.

5.3.19 Logic Module Replacement

When replacing logic modules, care should be exercised not to damage any of the plated-through holes in the PC board. The recommended procedure is to first clip all the module leads, and then individually unsolder the leads from the board. A solder-sucker should be used to clean solder from the holes before loading the new module on the board. Place new module on board with pin 1 adjacent to identifying dot and solder. After soldering the new module in place, clean solder joints with freon spray or similar solvent. The locations of the logic modules and discrete components on the logic board are shown in Figure 5-8. The locations of the logic modules and discrete components on the amplifier board are shown in Figure 5-9.

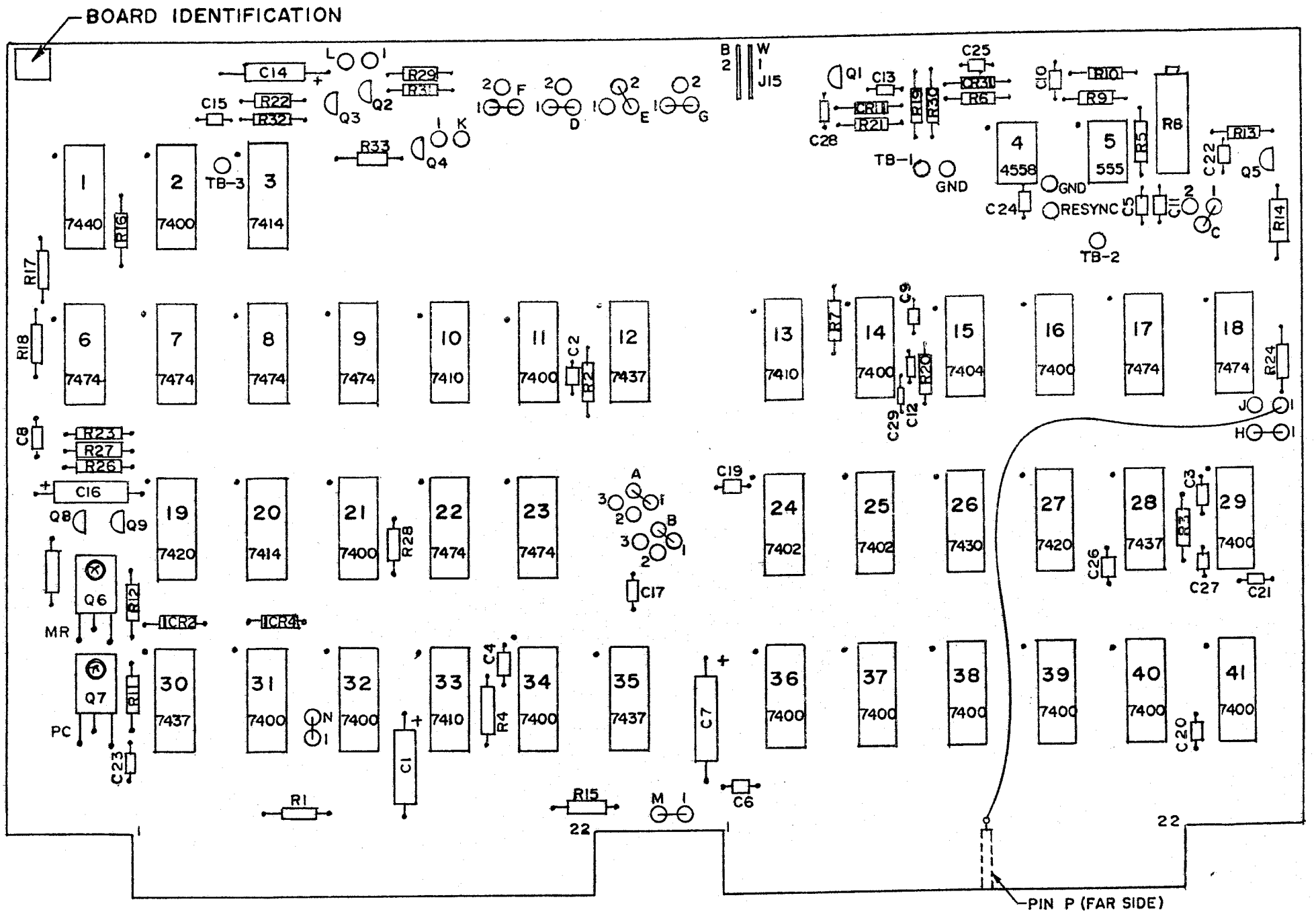


FIG. 5-8 LOCATION OF COMPONENTS ON LOGIC BOARD

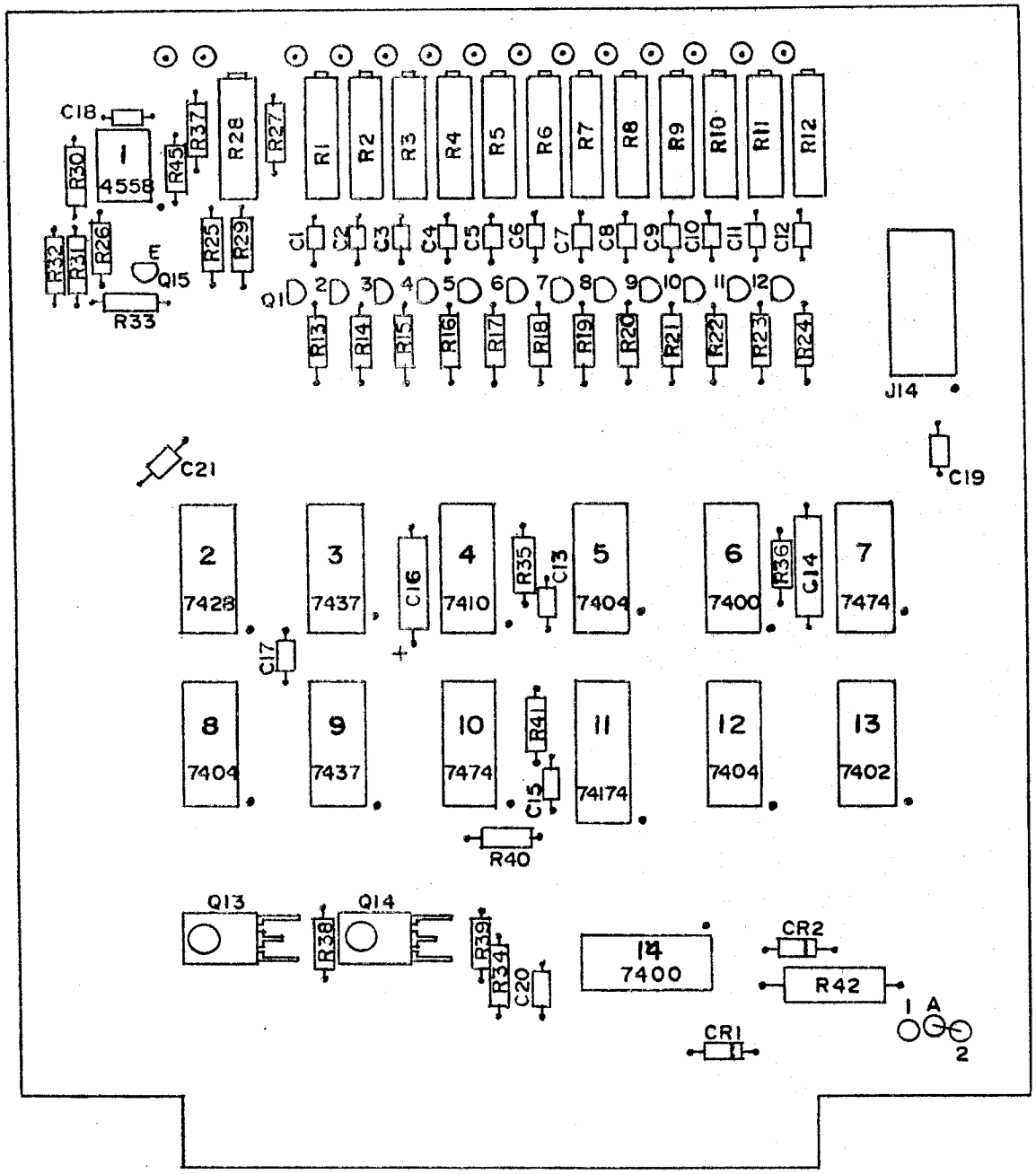


FIG. 5-9 LOCATION OF COMPONENTS ON AMPLIFIER BOARD

SECTION 6

ADDENDUM

This section contains all information pertaining to any differences in customer reader configuration, which vary from PDI's standard configuration.

6.1 OPERATIONAL CHECKS (Digital Equipment Corp.) (This paragraph is substituted for paragraph 2.3)

Although each card reader is thoroughly tested at PDI before shipment, it is recommended that the unit be checked out following the unpacking, to make sure that no damage has been incurred in shipment. The following checks should be made with both front and rear covers removed. Remove front cover by inserting a 1/8-inch hex Allen wrench into front cover retaining screw which is located adjacent to the switches. Turn retaining screw counterclockwise until the screw disengages. Remove cover by pulling outward from both ends. Remove rear cover by loosening two cross recess screws from front of machine (one on each side of unit). These screws are accessable through a 3/8 inch diameter hole on each side at the front of the main frame. When screws disengage, rear cover may be pulled off.

a. Visually inspect rear chassis area to make sure circuit boards and connectors are properly mated.

b. Inspect strobe wheel and magnetic pickup to ensure magnetic pickup and strobe wheel have correct clearance (.004 to .006 in.).

c. Plug line cord into A-C receptacle of the proper voltage (see nameplate on rear chassis apron of card reader).

d. Operate POWER switch: POWER lamp should light; RESET lamp should light; MARK or PUNCH lamp should light; 40 COL. or 80 COL. lamp should light; and CLK. TRK. or INT. CLK. lamp should light.

Operate MARK/PUNCH switch, 40 COL/80 COL switch, and CLK TRK/INT CLK switch; alternate indicator lamps should light on these switches. Operate POWER switch to remove power from the reader.

e. Remove interface board at the J3 position from its connector, and allow board to rest on the chassis in the unplugged condition.

f. Operate POWER switch to apply power to the reader. Hold input hopper switch down with finger, and operate RESET switch: motor should run and RESET lamp should extinguish. Release input hopper switch: motor should stop running and RESET lamp should light.

g. Hold input hopper switch down with finger and operate RESET switch again: with motor running, operate output hopper switch by gently depressing the bed plate in the output stacker, with other hand: motor should stop running and RESET lamp should again light.

h. Turn off power and reinsert interface board at the J3 position. (J3 is the 44-pin backpan connector closest to the back of the equipment.) Hold input hopper switch down as before and operate POWER switch: motor should run and unit should attempt to pick three times and stop; similarly, the motor should start and the unit should attempt to pick three times and stop each time the RESET switch is operated. RESET lamp should extinguish during time picking is attempted.

i. With power on, load deck of cards into input hopper and place card follower on top of cards. Operate RESET switch: unit should pick and stack deck of cards. When input hopper empties, unit should stop picking, motor should stop, and RESET lamp should light.

j. Restack cards into input hopper and operate RESET switch. With unit feeding cards, operate HALT switch: unit should stop picking, motor should stop, and RESET lamp should light.

k. Operate RESET switch: motor should start, RESET lamp should extinguish, and unit should resume picking until input hopper empties. The motor should stop and the RESET lamp should light as before.

l. Turn off power to the card reader, and replace front and rear covers, as required.

6.2 INVERTING INTERFACE (PDI Part No. 3-1140-1653-1)

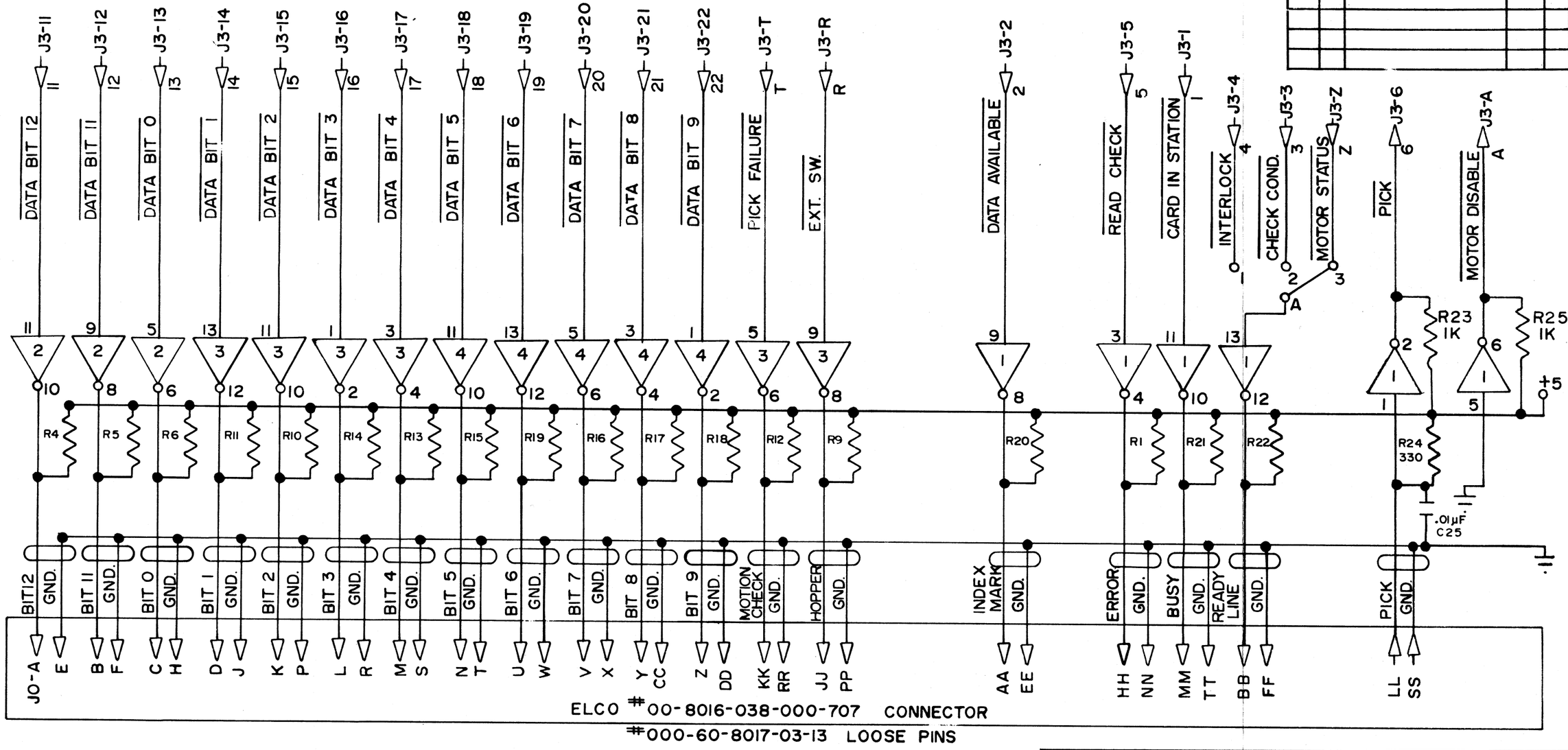
This interface inverts the normally supplied ground true logic interface signals into positive true TTL logic signal levels. Open collector hex buffer drivers with pull-up resistors are used for this purpose. The inverting interface is mounted on an edge-connected printed circuit board which plugs directly into the normal card reader interface connector slot (J3). The inverted signals from the interface are supplied to a rectangular panel connector via twisted pair. The rectangular panel connector is mounted to the rear component shelf by means of a connector bracket.

To remove the interface, it is simply necessary to remove the two screws connecting the bracket to the rear component shelf, and to unplug the printed circuit board from the J3 slot.

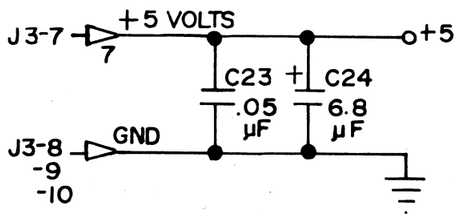
With the inverting interface in place, but with the panel connector disconnected from the controller, a constant PICK command will be generated by the card reader. If this is not desired, as may be the case with certain card reader operational checks, the interface may be unplugged from the J3 slot, for the duration of these checks.

A schematic diagram of the Inverting Interface is shown in Figure 6-1, with the assembly drawing shown in Figure 6-2.

DATE	SYM	REVISION RECORD	AUTH.	DR.	CK.



ELCO #00-8016-038-000-707 CONNECTOR
#000-60-8017-03-13 LOOSE PINS



MODULES 1-4 7416
RESISTOR R23, R25 1K 1/4W
RESISTOR R1,R3-R22 2.2K 1/4W
ALL CAPACITORS ARE .01µF

TOLERANCES (EXCEPT AS NOTED)	PERIPHERAL DYNAMICS INC.		
DECIMAL ±	DEC. 2022,1555	SCALE	DRAWN BY DEM
			APPROVED BY
FRACTIONAL ±	TITLE: DOC. M SERIES COMPATIBLE INTERFACE		
ANGULAR ±	DATE: 4-25-77	DRAWING NUMBER: 3-1140-1653-1	

FIGURE 6-1

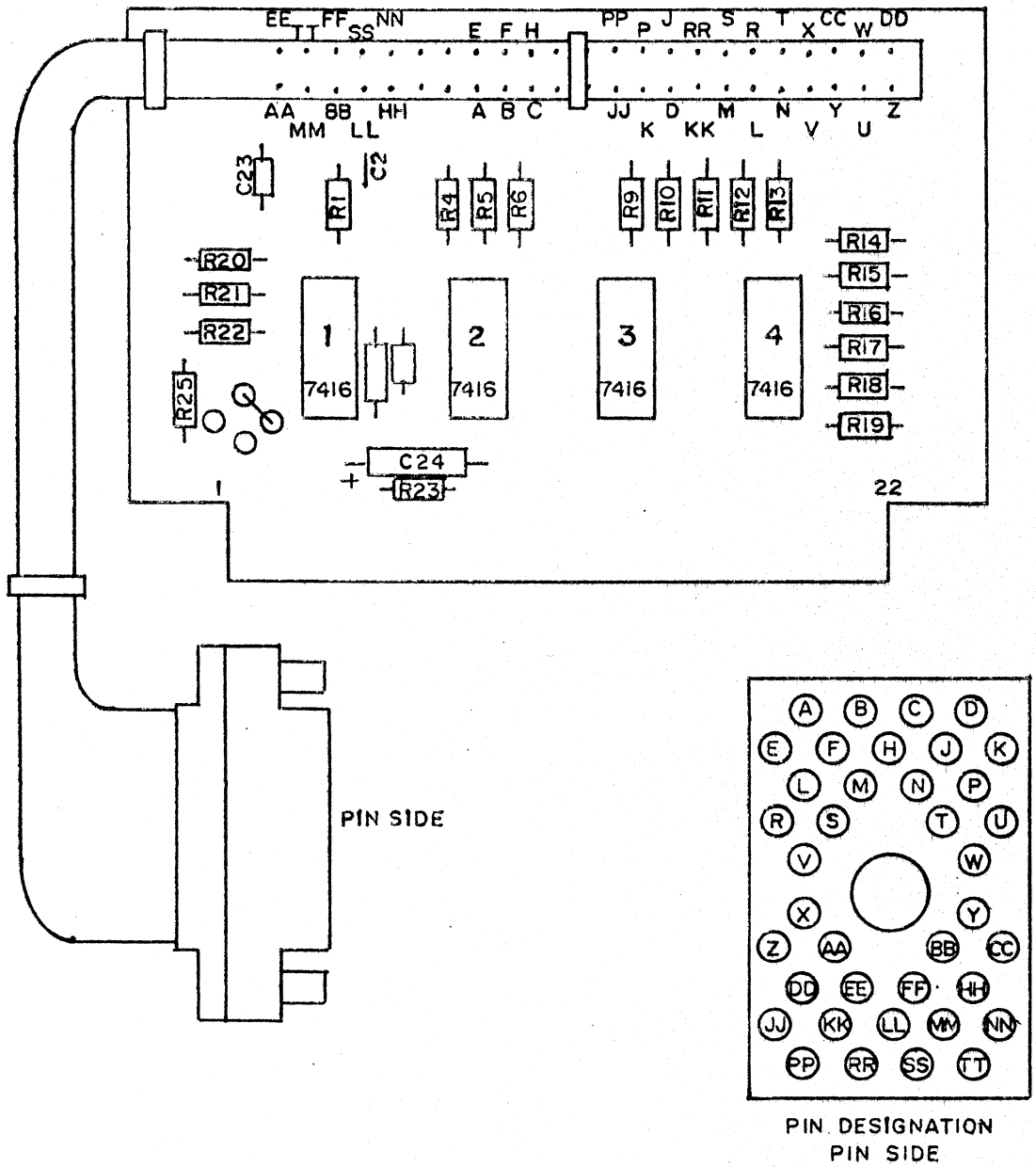
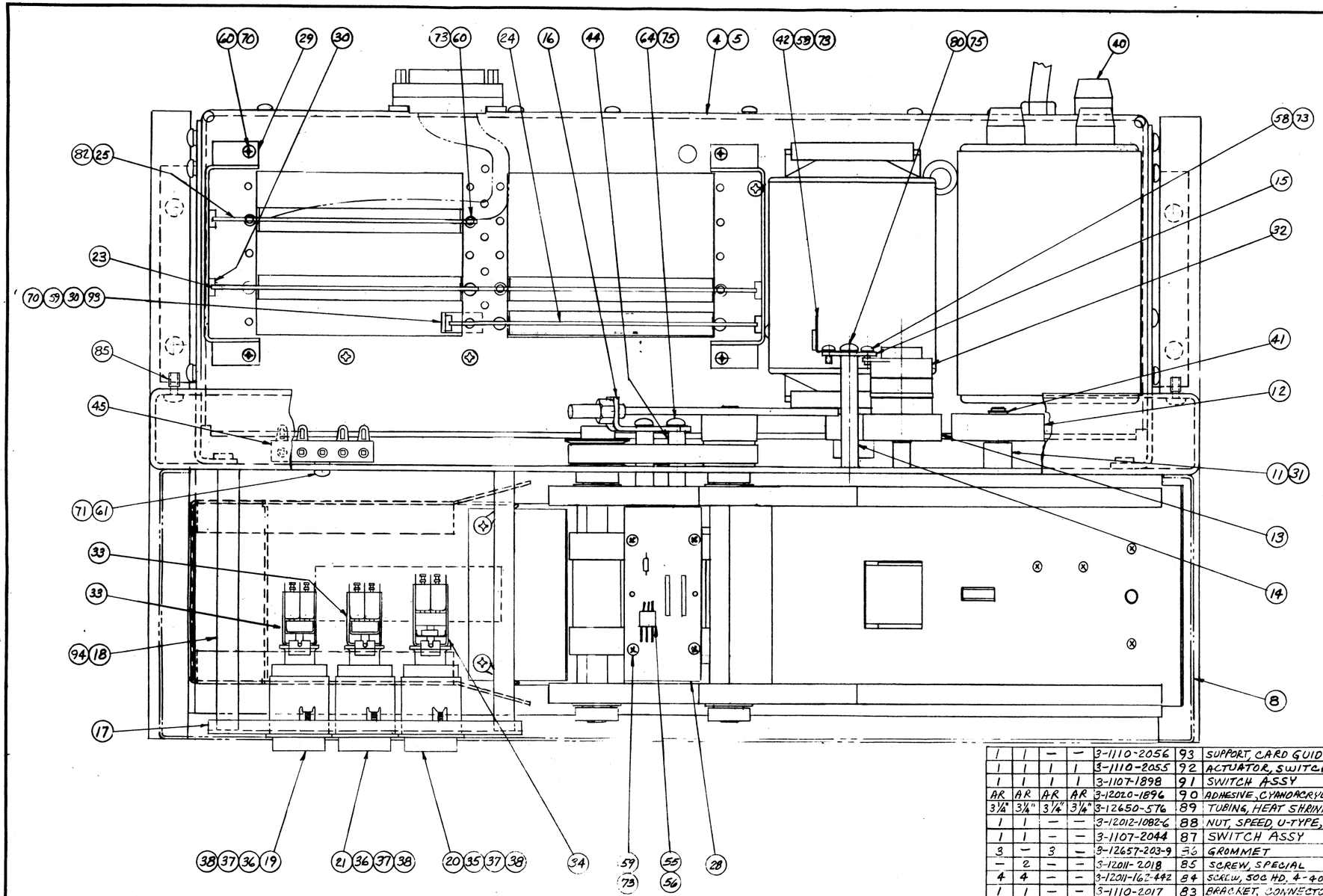


FIG 6-2 DOC. M SERIES COMPATIBLE INTERFACE



NOTES:
1. WIRE MAIN CABLE IN ACCORDANCE WITH WIRING TABLE 3-1146-1014, USING HARNESS KIT 3-1118-1015.
2. WIRE AC CABLE IN ACCORDANCE WITH WIRING TABLE 3-1134-891, USING HARNESS KIT 3-1118-890.
3. WIRE REGULATOR BOARD IN ACCORDANCE WITH WIRING TABLE 3-1134-893, USING HARNESS KIT 3-1118-889.

2	2	—	—	3-1110-2005	94	SPACER, SWITCH BRACKET
QTY -4	QTY -3	QTY -2	QTY -1	PART NO.	ITEM NO.	DESCRIPTION

1	1	—	—	3-1110-2056	93	SUPPORT, CARD GUIDE
1	1	1	1	3-1110-2055	92	ACTUATOR, SWITCH
1	1	1	1	3-1107-1898	91	SWITCH ASSY
AR	AR	AR	AR	3-12020-1896	90	ADHESIVE, CYANOACRYLATE
3¼"	3¼"	3¼"	3¼"	3-12650-576	89	TUBING, HEAT SHRINKABLE
1	1	—	—	3-12012-1082-6	88	NUT, SPEED U-TYPE, #10-24
1	1	—	—	3-1107-2044	87	SWITCH ASSY
3	—	3	—	3-12657-203-9	86	GROMMET
—	2	—	—	3-12011-2018	85	SCREW, SPECIAL
4	4	—	—	3-12011-162-492	84	SCREW, SOC HD, 4-40 X 1/4
1	1	—	—	3-1110-2017	83	BRACKET, CONNECTOR
1	1	—	—	3-1160-1655-1	82	DOC M SERIES COMP. INTERFACE
1	1	—	—	3-1107-2048-2	81	INPUT-OUTPUT MODULE
1	1	1	1	3-12011-160-8320	80	SCREW, PAN HD, 8-32 X 2 1/2
AR	AR	AR	AR	3-14470-308	79	SOLDER, 60/40
AR	AR	AR	AR	3-12230-309	78	CORD, LACING
—	4	—	4	3-12013-164-5	77	LOCKWASHER, 1/4
1	1	1	1	3-12013-164-4	76	LOCKWASHER, #10
11	15	11	15	3-12013-164-3	75	LOCKWASHER, #8
4	4	2	2	3-12013-164-2	74	LOCKWASHER, #6
17	17	15	15	3-12013-164-1	73	LOCKWASHER, #4
1	1	1	1	3-12012-163-258	72	NUT, HEX, 1/4-28
1	8	1	8	3-12012-1271-1	71	NUT, SPEED, #6-32
5	5	4	4	3-12012-1271-2	70	NUT, SPEED, #4-40
—	4	—	4	3-12011-162-2324	69	SCREW, SOC HD, 1/4-20 X 1/2
4	4	4	4	3-12011-161-8394	68	SCREW, FLAT HD, #8-32 X 1/2
3	—	3	—	3-12011-161-663	67	SCREW, FLAT HD, #6-32 X 3/8
—	6	—	6	3-12011-273	66	SCREW, PAN HD, SHEET METAL
QTY -4	QTY -3	QTY -2	QTY -1	PART NO.	ITEM NO.	DESCRIPTION

DATE	BY	REVISION RECORD	APPR.	CK.	ENG.

-4 ASSY	-3 ASSY	-2 ASSY	-1 ASSY			
1	1	1	1	3-12011-160-1034	65	SCREW, PAN HD, 10-32 X 1/2
2	2	2	2	3-12011-160-8312	64	SCREW, PAN HD, 8-32 X 1 1/2
9	5	9	5	3-12011-160-835	63	SCREW, PAN HD, 8-32 X 5/8
—	4	—	4	3-12011-160-839	62	SCREW, PAN HD, 8-32 X 3/4
9	9	7	7	3-12011-160-633	61	SCREW, PAN HD, 6-32 X 3/8
17	17	1	1	3-12011-160-444	60	SCREW, PAN HD, 4-40 X 1/4
5	5	4	4	3-12011-160-443	59	SCREW, PAN HD, 4-40 X 3/8
2	2	2	2	3-12011-160-442	58	SCREW, PAN HD, 4-40 X 1/4
3	7	3	7	3-12011-160-834	57	SCREW, PAN HD, 8-32 X 1/4
2	2	3	3	3-12593-859-2	56	CONNECTOR (PIN)
—	—	1	1	3-12593-959-1	55	CONNECTOR
3	—	3	—	3-12062-1017-2	54	STUD
—	7	—	7	3-12062-1017-1	53	STUD
—	4	—	4	3-12060-310	52	BUMPER, RUBBER
1	1	1	1	3-12136-771	51	BELT, FLAT
1	1	1	1	3-12516-686	50	RELUCTANCE PICKUP
—	3	—	3	3-12657-203-10	49	GROMMET
2	2	2	2	3-12067-244-6	48	CABLE CLAMP
6	6	6	6	3-12067-244-5	47	CABLE CLAMP
1	1	1	1	3-12135-79-1	46	GEAR
1	1	1	1	3-12597-269-1	45	TERMINAL STRIP
2	2	2	2	3-12010-320-10	44	SPACER
1	1	1	1	3-12010-320-15	43	SPACER
1	1	1	1	3-12597-269	42	TERMINAL STRIP
1	1	1	1	3-12067-172-1	41	RETAINING RING, EXT, BOWED
1	1	1	1	3-12641-233-5	40	FUSE
1	1	1	1	3-1107-1743	39	STATIC ELIMINATOR ASSY
—	—	3	3	3-12641-181-2	38	LAMP
—	—	3	3	3-12701-190-1	37	SWITCH HSG & MTG SHELL
—	—	2	2	3-12701-184-3	36	SWITCH DISPLAY MODULE
—	—	1	1	3-12701-184-5	35	SWITCH DISPLAY MODULE
—	—	1	1	3-12706-186-2	34	SWITCH MODULE
—	—	2	2	3-12706-186-1	33	SWITCH MODULE
1	1	1	1	3-12139-766	32	CLUTCH COUPLING
1	—	1	—	3-1110-763-2	31	SHAFT, IDLER PULLEY
5	5	3	3	3-12051-876-1	30	CARD GUIDE
2	2	2	2	3-1110-1103	29	SUPPORT, CARD GUIDE
1	1	1	1	3-1160-1615	28	I.R. LIGHT SOURCE ASSY
—	—	1	1	3-1160-1618	27	READ STA. & PADDLE ASSY
—	1	—	1	3-1110-2000-12	26	FOOT, CARD READER
—	—	1	1	3-1160-1004	25	PADDLE CONNECTOR
1	1	—	—	3-1160-2027	24	M.S. AMPLIFIER/CLK TRK BD'D
1	1	1	1	3-1160-849	23	LOGIC BOARD
1	1	1	1	3-1107-1998	22	COVER
—	—	1	1	3-1110-246-5	21	APPLIQUE, DISPLAY SCREEN
—	—	1	1	3-1110-246-2	20	APPLIQUE, DISPLAY SCREEN
—	—	1	1	3-1110-246-1	19	APPLIQUE, DISPLAY SCREEN
—	—	2	2	3-1110-2005	18	SPACER, SWITCH BRACKET
—	—	1	1	3-1110-175	17	BRACKET, SWITCH SUPPORT
1	1	1	1	3-1110-662	16	SUPPORT, TRANSDUCER
1	1	1	1	3-1110-772	15	PLATE, CLUTCH STOP
1	1	1	1	3-12010-320-13	14	SPACER
1	1	1	1	3-1107-752	13	PICKER PULLEY ASSY
1	1	1	1	3-1107-1662-2	12	IDLER PULLEY ASSY
—	1	—	1	3-1110-763-1	11	SHAFT, IDLER PULLEY
1	1	1	1	3-1107-1685	10	CARD FOLLOWER ASSY
—	1	—	1	3-1107-2040	9	REAR COVER ASSY
1	1	1	1	3-1107-2039	8	FRONT COVER ASSY
—	1	—	1	3-1110-331	7	PLATE, BOTTOM
—	—	1	1	3-1107-2048-1	6	INPUT-OUTPUT MODULE
1	—	1	—	3-1107-2050-2	5	COMPONENT SHELF ASSY
—	1	—	1	3-1107-2050-1	4	COMPONENT SHELF ASSY
1	—	1	—	3-1110-2049-11	3	BACK PAN
—	1	—	1	3-1110-2000-11	2	FOOT, CARD READER
—	1	—	1	3-1107-1996-11	1	CHASSIS
QTY REQ'D	QTY REQ'D	QTY REQ'D	QTY REQ'D	PART NO.	ITEM NO.	DESCRIPTION

TOLERANCES (EXCEPT AS NOTED)
DECIMAL ±
FRACTIONAL ±
ANGULAR ±

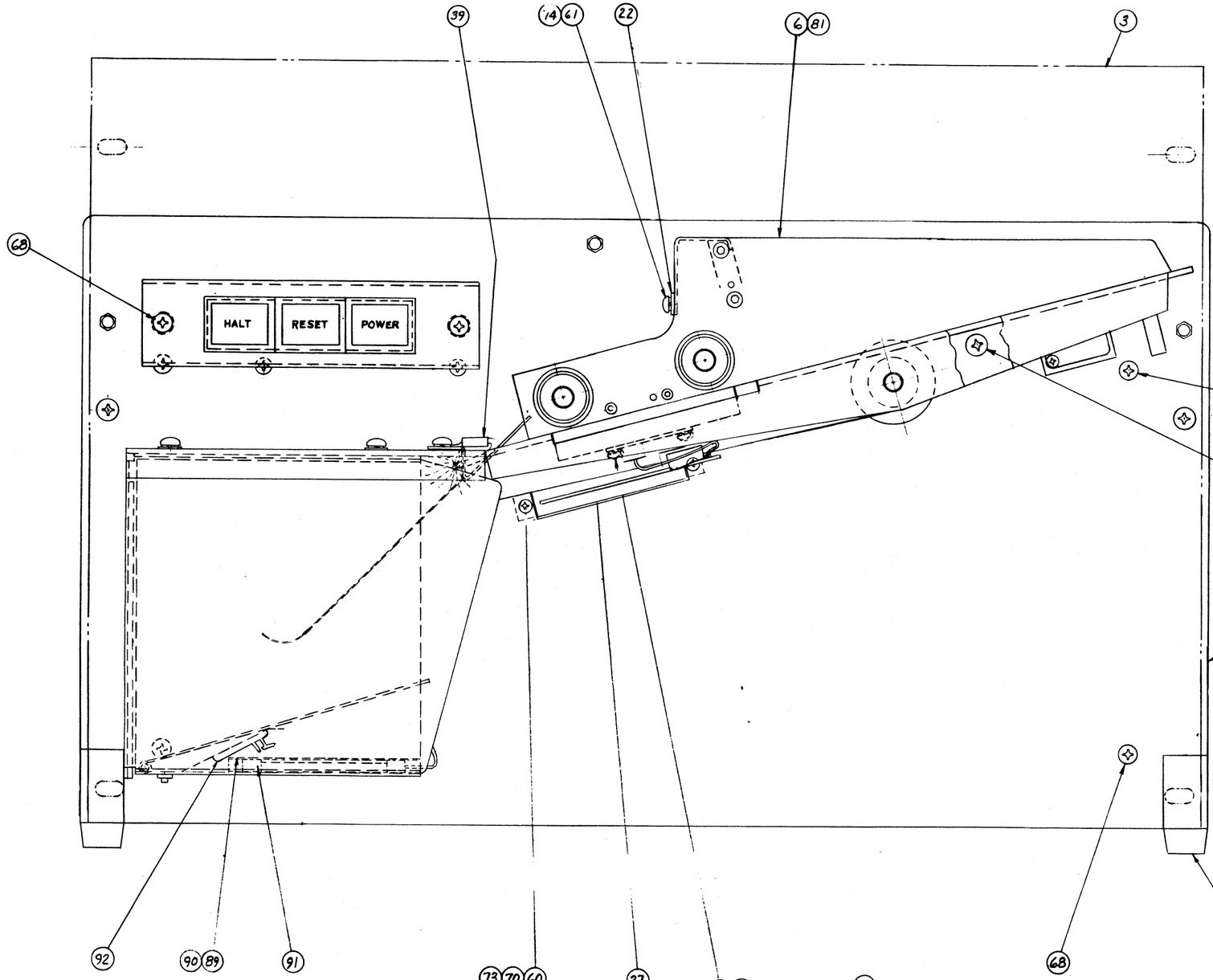
PERIPHERAL DYNAMICS INC

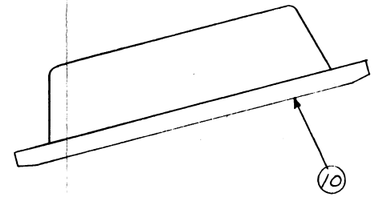
SCALE 1/1
DRAWN BY R.T.J.
APPROVED BY

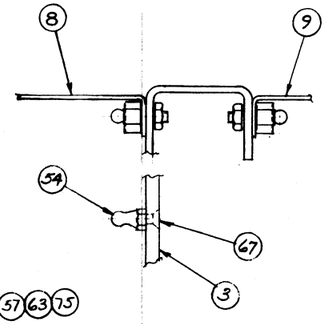
TITLE: CARD READER, MOD 2022
DATE: 5-4-77
DRAWING NUMBER: 3-1105-2057

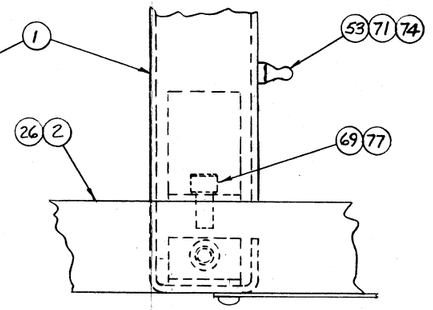
SHEET 1 OF 3

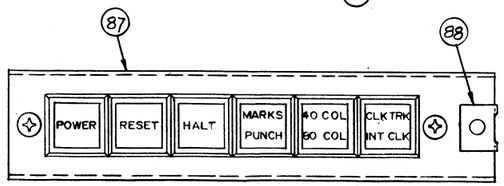
DATE	BY	REVISION RECORD	AUTH.	DR.	CK.







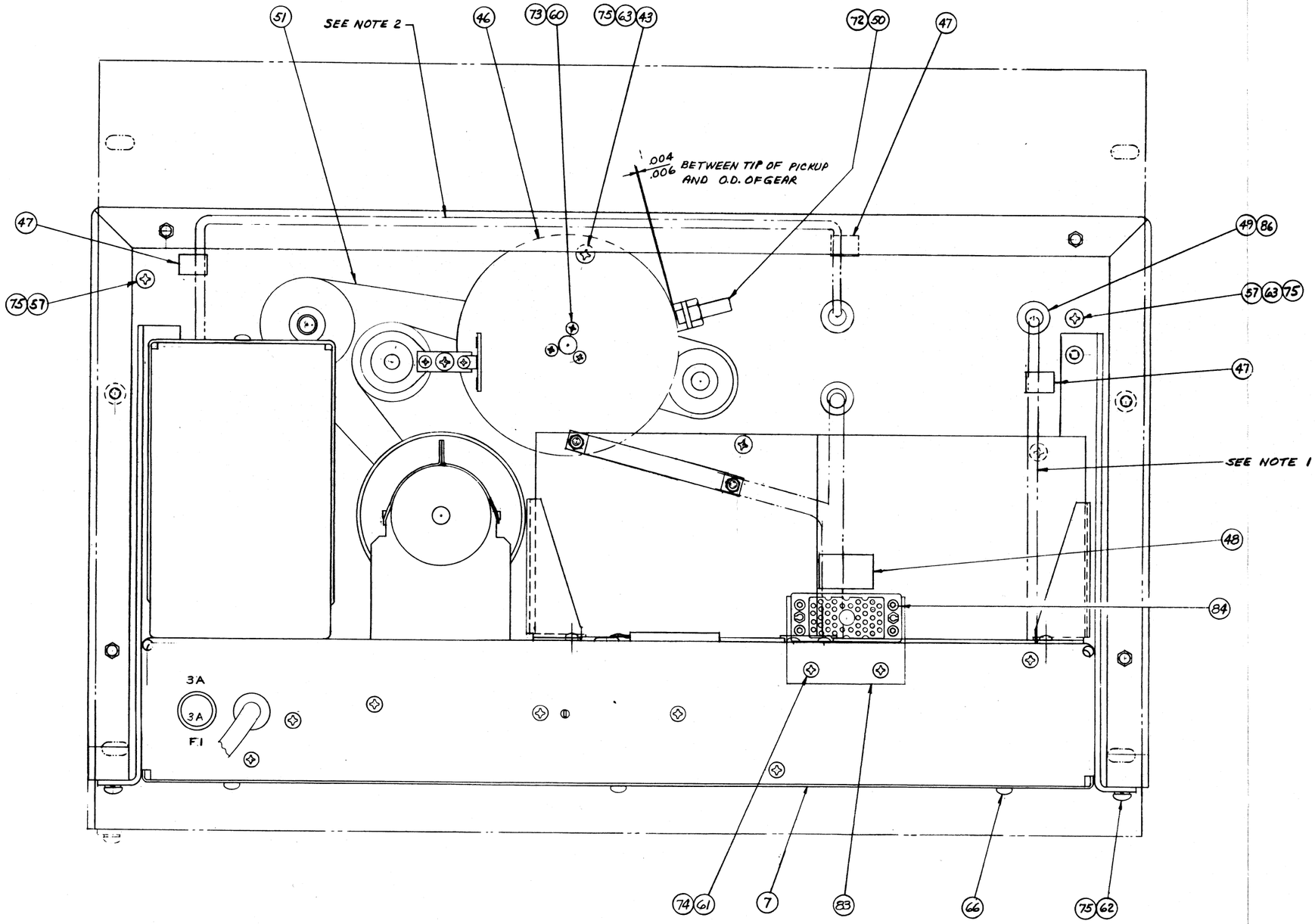




SWITCH ASSY FOR USE IN -3 & -4 ASSY'S.

TOLERANCES (EXCEPT AS NOTED)	PERIPHERAL DYNAMICS INC		
DECIMAL ±		SCALE 1/1	DRAWN BY R.T.J. APPROVED BY
FRACTIONAL ±	TITLE CARD READER, MOD 2022		
ANGULAR ±	DATE 5-4-77	DRAWING NUMBER 3-1105-2057	

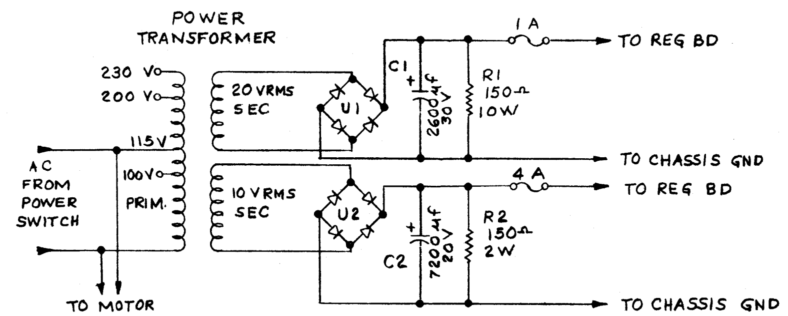
DATE	NOTE	REVISION RECORD	AUTH.	DR.	CK.

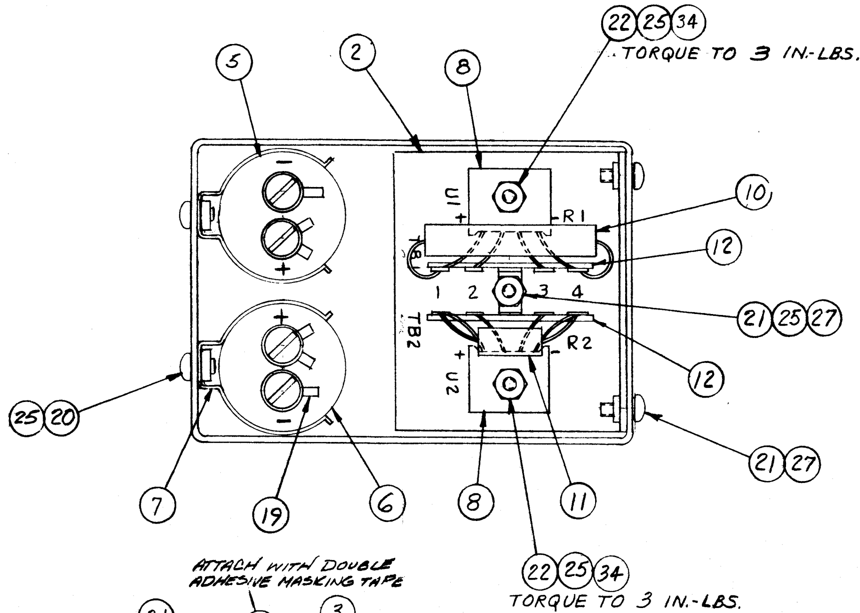


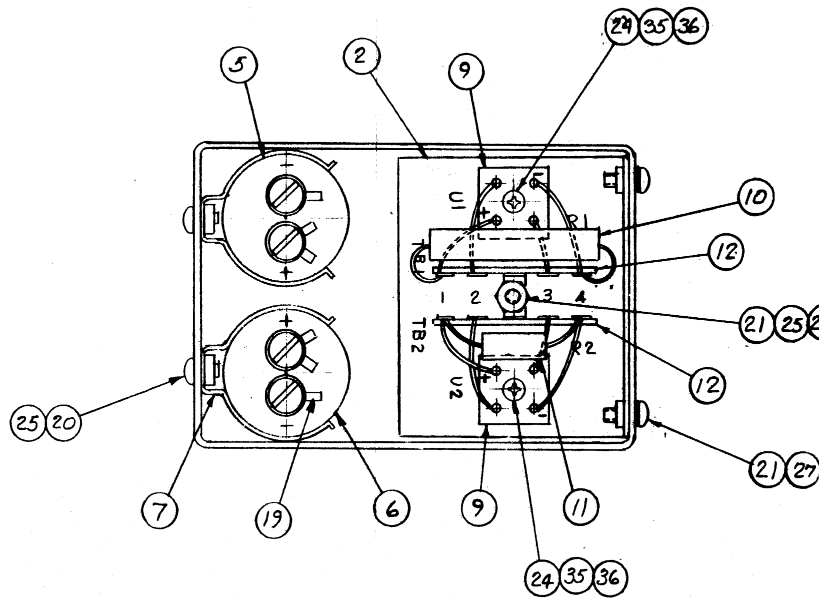
TOLERANCES (EXCEPT AS NOTED)	PERIPHERAL DYNAMICS INC		
DECIMAL ±		SCALE 1/1	DRAWN BY R.T.J. APPROVED BY
FRACTIONAL ±	TITLE CARD READER, MOD 2022		
ANGULAR ±	DATE 5-4-77	DRAWING NUMBER 3-1105-2057	

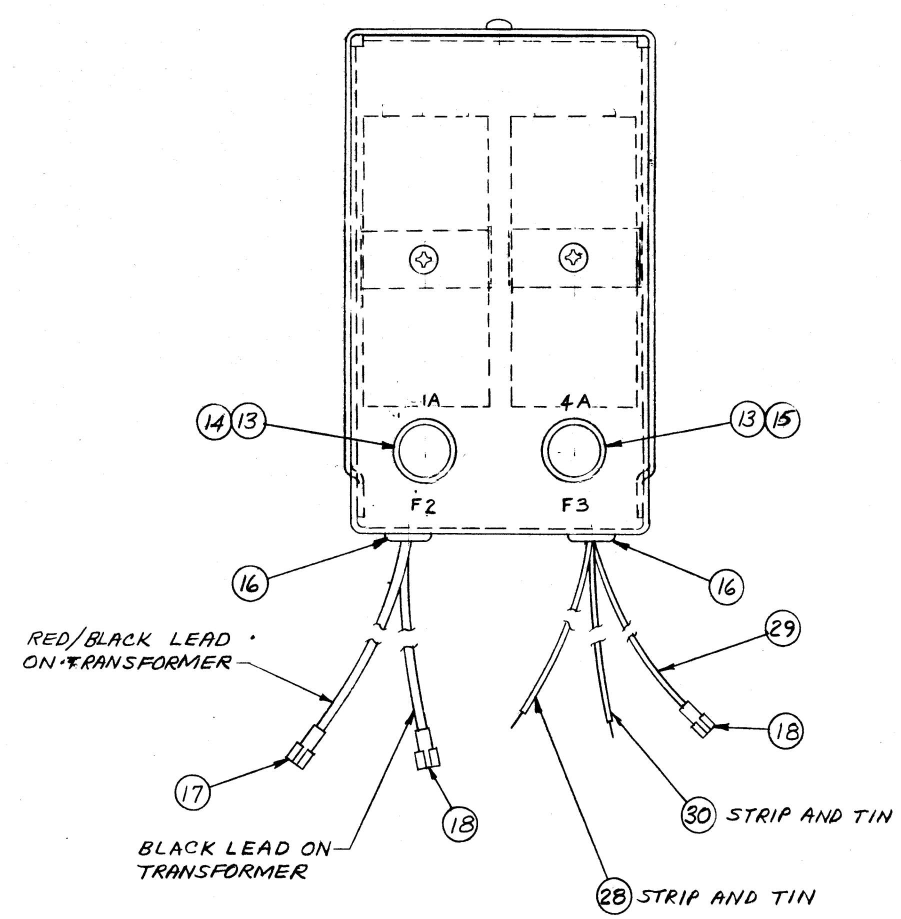
SHEET 3 OF 9

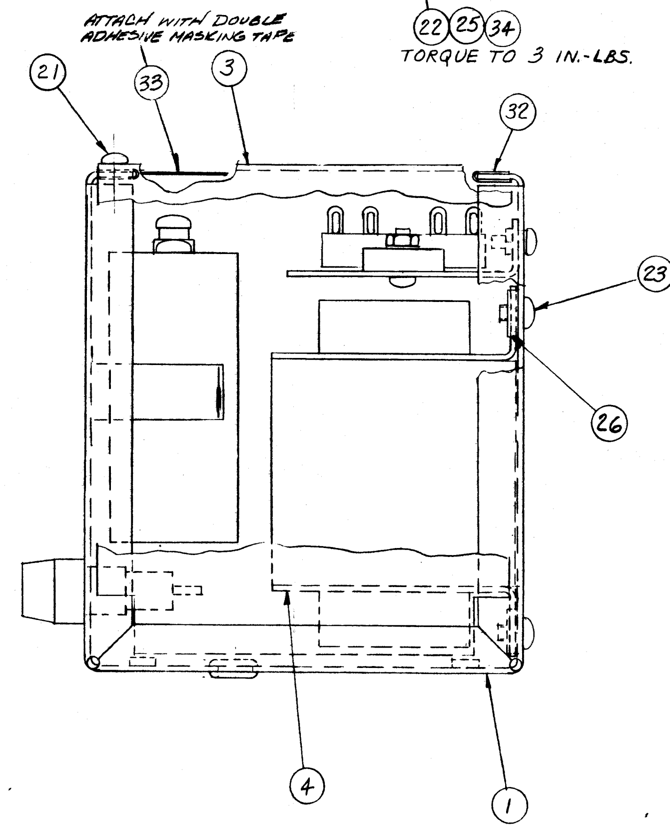
DATE	SYM	REVISION RECORD	AUTH.	DR.	CK.
[illegible]	A	3-12542-267 WAS -276		R.J.	
[illegible]	B	ADD ITEM 32 ECO 505	R.O.	[illegible]	R.C.
[illegible]	C	ADD ITEM 33 ECO 520	R.O.	[illegible]	[illegible]
[illegible]	D	ADD ITEM 34 ECO 587	R.C.	[illegible]	[illegible]
[illegible]	E	[illegible] ECO 570	E.M.	[illegible]	[illegible]
[illegible]	F	CHG. [illegible] ECO 720	E.M.	R.J.	
[illegible]	G	CHG. WIRES ECO 749	E.M.	R.J.	
[illegible]	H	ADD -1 ASSY ECO 928	E.M.	R.J.	[illegible]
[illegible]	J	CHG -58-6 ECO 1082	E.M.	R.J.	











NOTES:

1. ASSY 3-1107-1040 AND ASSY 3-1107-1040-1 ARE INTERCHANGABLE.

QTY REQD	QTY REQD	PART NO.	ITEM NO.	DESCRIPTION
2	—	3-12013-164-1	36	LOCKWASHER, #4
2	—	3-12012-163-44	35	NUT, HEX, 4-40
—	2	3-12013-816-2	34	LOCKWASHER, DISHED TYPE
1	1	3-12659-1273-1	33	MATERIAL, INSULATING 1½"x3"
2	2	3-12012-1082-2	32	NUT, SPEED, 6-32
AR	AR	3-14470-308	31	SOLDER, 60/40
AR	AR	3-12585-1217-5	30	WIRE, INS, 20 AWG, GREEN
AR	AR	3-12585-1217-2	29	WIRE, INS, 20 AWG, RED
AR	AR	3-12585-1217-0	28	WIRE, INS, 20 AWG, BLACK
3	3	3-12013-164-2	27	LOCKWASHER, #6
4	4	3-12012-1082-4	26	NUT, SPEED, 8-32
3	5	3-12012-163-63	25	NUT, HEX, 6-32
2	—	3-12011-160-443	24	SCREW, PAN HD, 4-40X3/8
4	4	3-12011-160-833	23	SCREW, PAN HD, 8-32X3/8
—	2	3-12011-160-634	22	SCREW, PAN HD, 6-32X½
5	5	3-12011-160-635	21	SCREW, PAN HD, 6-32X3/8
2	2	3-12011-166-632	20	SCREW, PAN HD, 6-32X3/16
6	6	3-12590-318-2	19	TERMINAL, RING TONGUE
2	2	3-12067-242-3	18	RECEPTACLE, Q.C.
1	1	3-12067-242-1	17	RECEPTACLE, Q.C.
2	2	3-12657-203-6	16	GROMMET
1	1	3-12641-233-7	15	FUSE, 4 AMP
1	1	3-12641-233-4	14	FUSE, 1 AMP
2	2	3-12643-232	13	FUSE HOLDER F2, F3
2	2	3-12597-269-1	12	TERMINAL STRIP TB1, TB2
1	1	3-12531-829-151	11	RESISTOR, 150Ω, 2W R2
1	1	3-12532-268	10	RESISTOR, 150Ω, 10W R1
2	—	3-12517-1771	9	RECTIFIER, BRIDGE
—	2	3-12517-796-3	8	F.W. BRIDGE RECTIFIER, U1&U2
2	2	3-12230-794-2	7	CLIP, COMPONENT
1	1	3-12542-795	6	CAPACITOR, ELECT. C2
1	1	3-12542-267	5	CAPACITOR, ELECT. C1
1	1	3-12563-764	4	TRANSFORMER
1	1	3-1110-1021	3	SHIELD, POWER SUPPLY
1	1	3-1107-1026	2	BRACKET, COMPONENT
1	1	3-1107-1025	1	BASE, POWER SUPPLY
—	-1 ASSY			

TOLERANCES (EXCEPT AS NOTED)

DECIMAL ±

FRACTIONAL ± 1/8

ANGULAR ±

PERIPHERAL DYNAMICS INC

SCALE 1/1

DRAWN BY R.T.J.

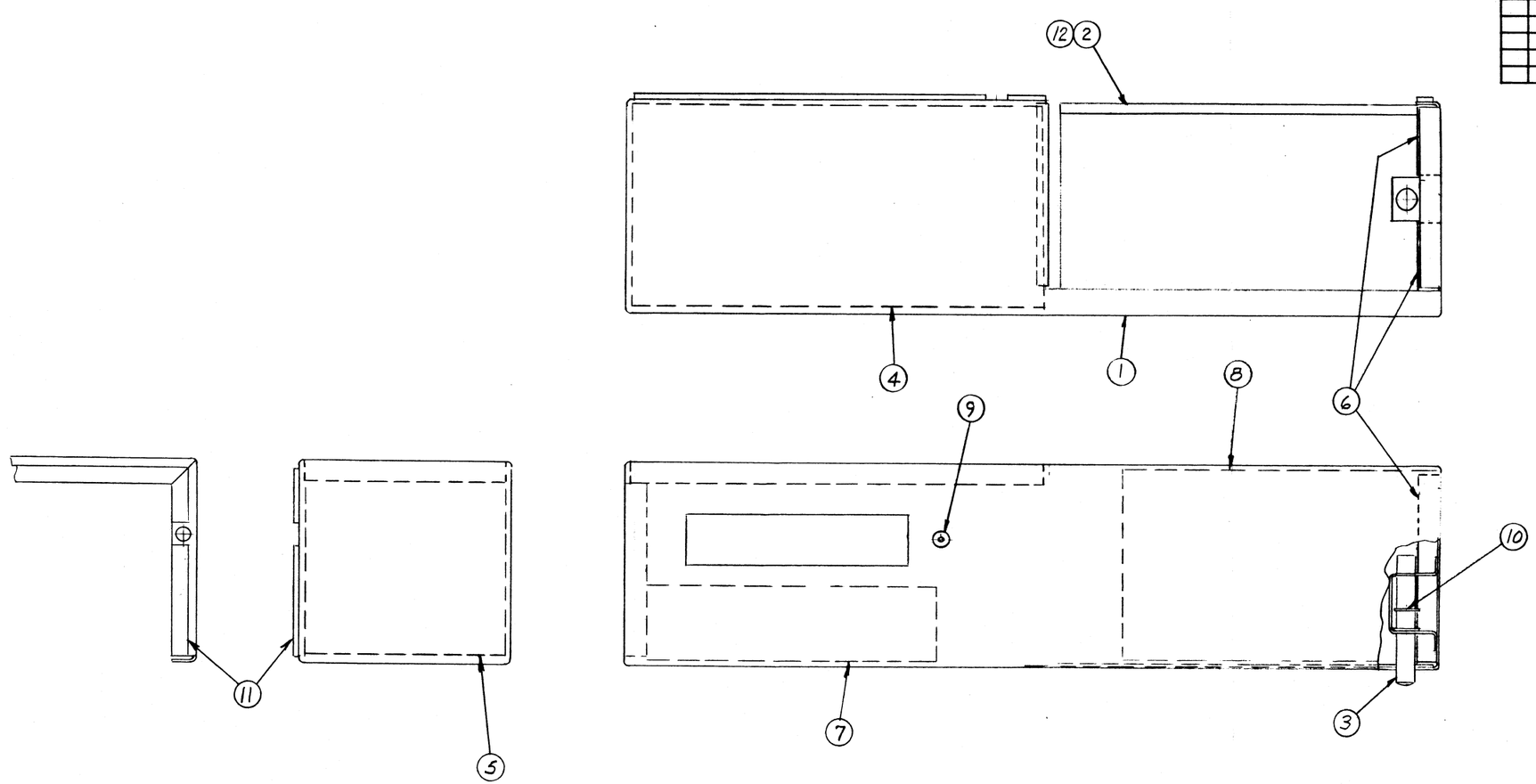
APPROVED BY [illegible]

TITLE: POWER SUPPLY

DATE: 6-11-71

DRAWING NUMBER: 3-1107-1040

DATE	SYM	REVISION RECORD	AUTH.	DR.	CK.

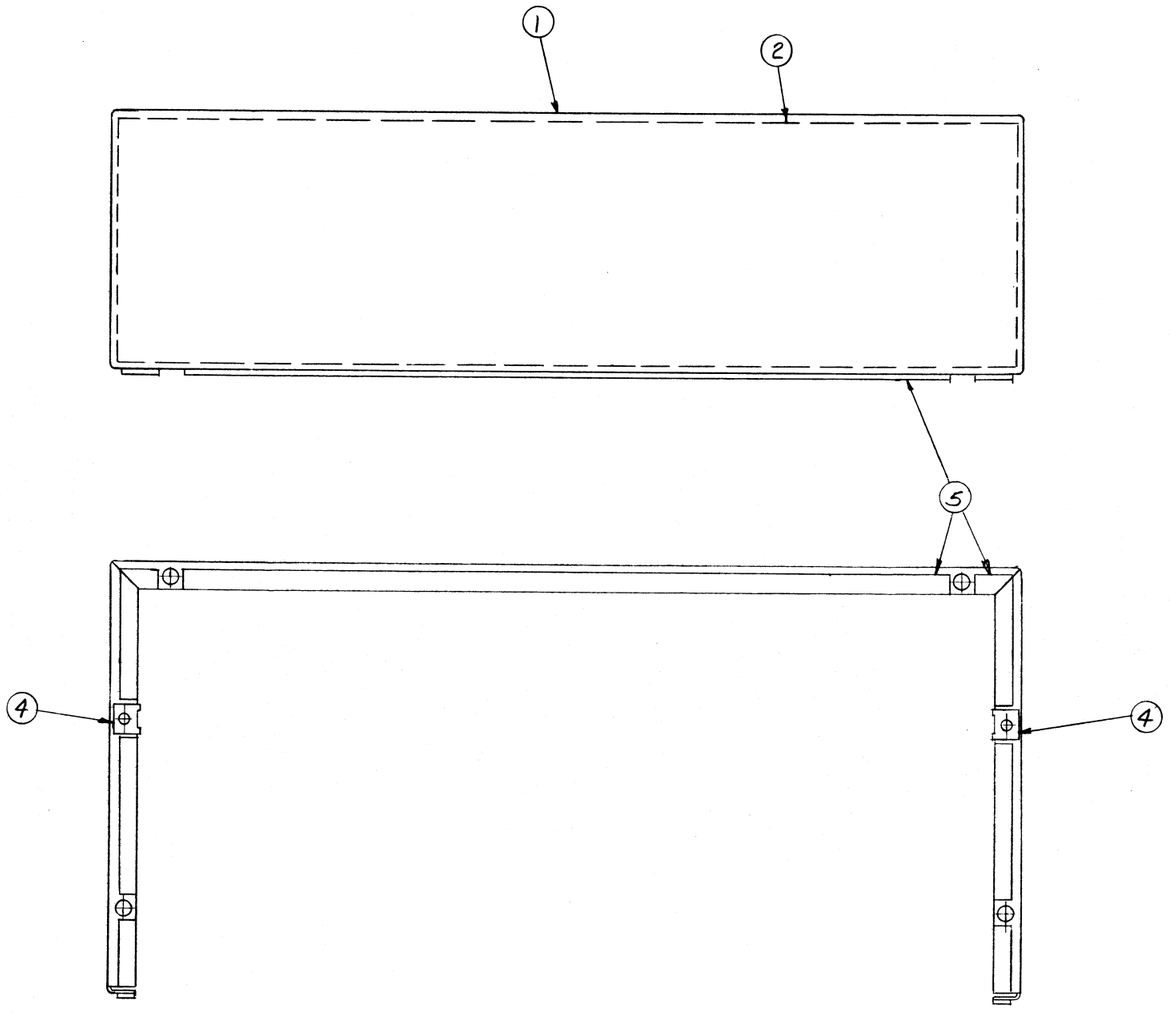


NOTES:
1. SURFACES MUST BE CLEAN AND DRY BEFORE INSTALLING DAMPING SHEETS, ITEMS 4 THRU 8, AND TAPE, ITEM 11.

QTY REQD	PART NO.	ITEM NO.	DESCRIPTION
AR	3-1202-1493	12	CEMENT, SILICONE
AR	3-12656-558	11	TAPE, SOUND DEADENING
2	3-12067-171-3	10	RETAINING RING, EXT, .50
1	3-12011-2019	9	SCREW, SPECIAL
1	3-1110-2007-7	8	SHEET, DAMPING
1	3-1110-2007-4	7	SHEET, DAMPING
2	3-1110-2007-3	6	SHEET, DAMPING
1	3-1110-2007-2	5	SHEET, DAMPING
1	3-1110-2007-1	4	SHEET, DAMPING
1	3-1110-2001	3	PUSHBUTTON, CARD LIFTER
1	3-1110-2014	2	SHIELD, FRONT COVER
1	3-1107-1999	1	FRONT COVER

TOLERANCES (EXCEPT AS NOTED)	PERIPHERAL DYNAMICS INC.		
DECIMAL ±		SCALE 1/2	DRAWN BY R.T.J.
			APPROVED BY
FRACTIONAL ±	TITLE FRONT COVER ASSY		
ANGULAR ±	DATE 4-18-77	DRAWING NUMBER 3-1107-2039	

DATE	SYM	REVISION RECORD	AUTH.	DR.	CK.

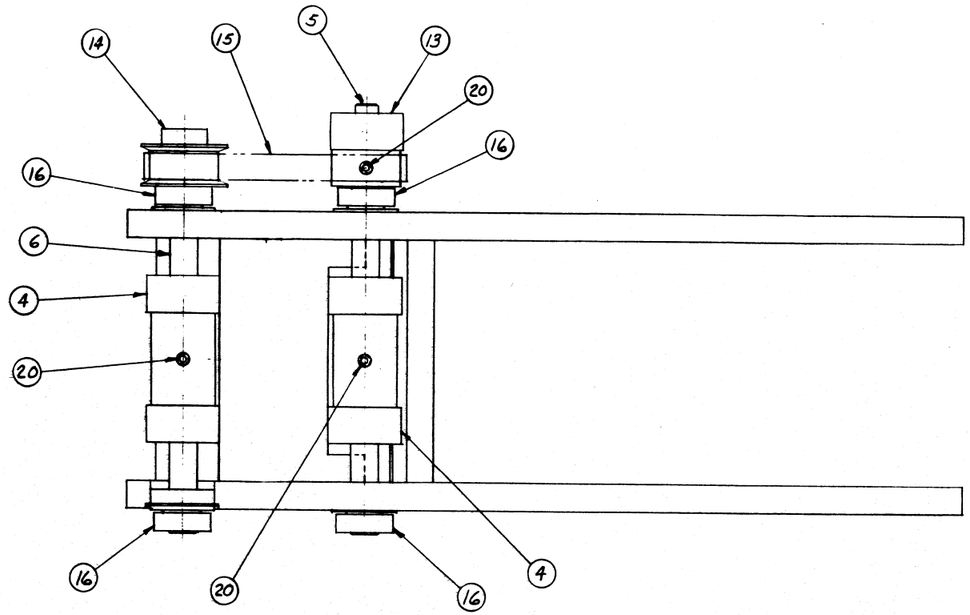


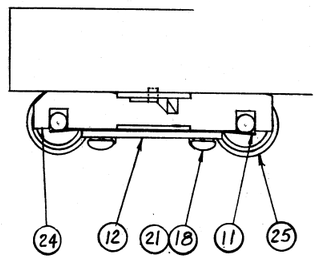
NOTES:
1. SURFACES MUST BE CLEAN AND DRY BEFORE INSTALLING DAMPING SHEETS, ITEMS 2 & 3, AND TAPE, ITEM 5.

QTY REQD	PART NO.	ITEM NO.	DESCRIPTION
AR	3-12656-558	5	TAPE, SOUND DEADENING
2	3-12012-1082-6	4	NUT, SPEED, U-TYPE, 10-24
2	3-1110-2007-6	3	SHEET, DAMPING
1	3-1110-2007-5	2	SHEET, DAMPING
1	3-1107-2004	1	REAR COVER

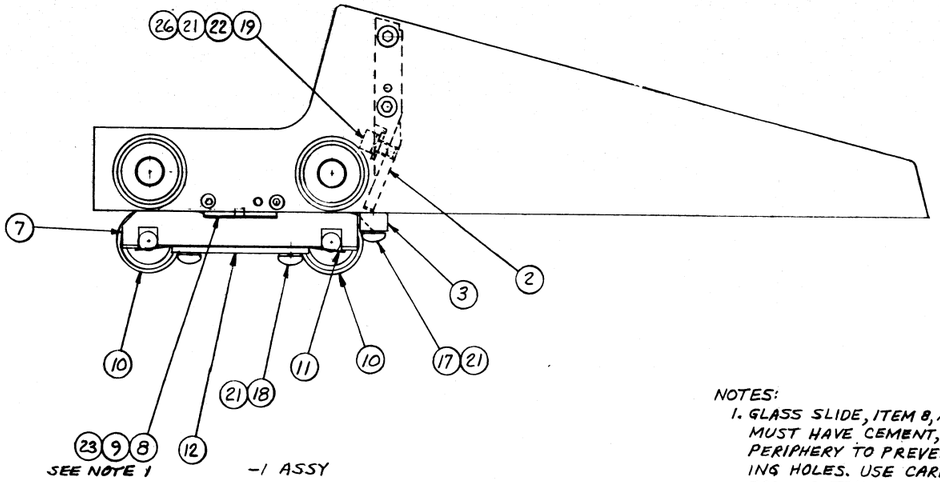
TOLERANCES (EXCEPT AS NOTED)	PERIPHERAL DYNAMICS INC.		
DECIMAL ±		SCALE 1/2	DRAWN BY R.T.J.
			APPROVED BY
FRACTIONAL ±	TITLE REAR COVER ASSY		
ANGULAR ±	DATE 4-18-77	DRAWING NUMBER 3-1107-2040	

DATE	BY	REVISION RECORD	AUTH.	SRL	CK.

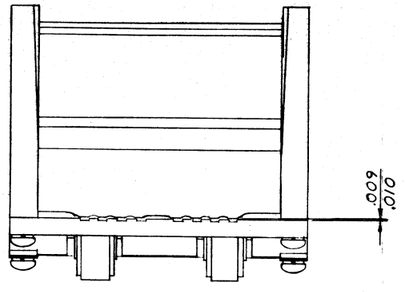




-2 ASSY



-1 ASSY

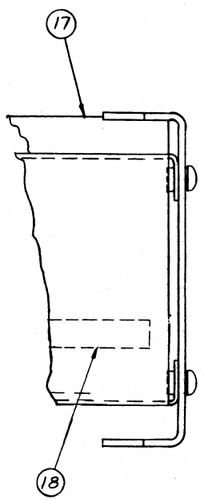


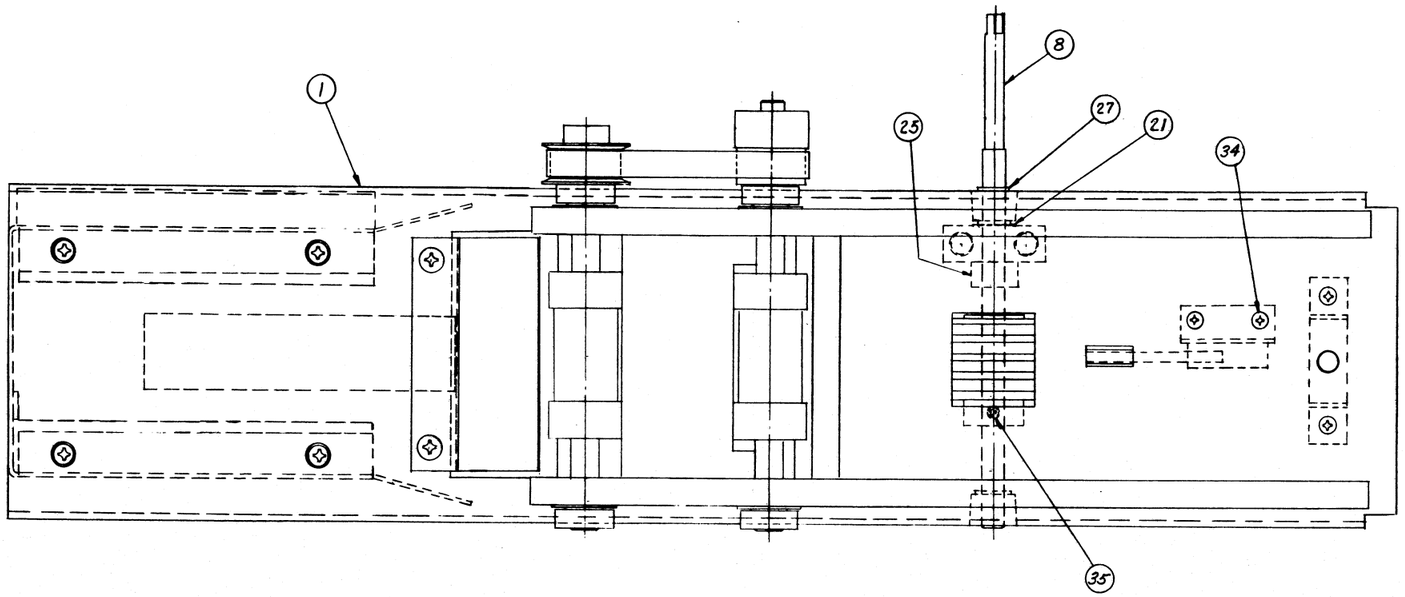
NOTES:
1. GLASS SLIDE, ITEM 8, AND APERTURE, ITEM 9, MUST HAVE CEMENT, ITEM 23, ALL AROUND PERIPHERY TO PREVENT DUST FROM ENTERING HOLES. USE CARE TO PREVENT CEMENT FROM GETTING INTO HOLES.

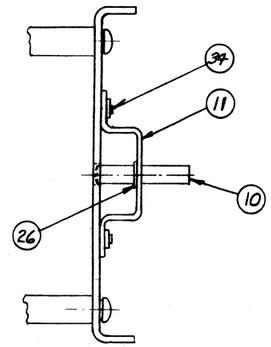
-2 ASSY QTY REQD	-1 ASSY QTY REQD	PART NO.	ITEM NO.	DESCRIPTION
AR	AR	3-12020-1235-2	26	ADHESIVE, LOCTITE
2	—	3-1107-158-3	25	PINCH ROLLER ASSY
1	—	3-1107-2042	24	READ BLOCK ASSY.
AR	AR	3-1202-1493	23	CEMENT, SILICONE
2	2	3-12013-271-4	22	WASHER, FLAT, #8
8	8	3-12013-164-3	21	LOCKWASHER, #8
6	6	3-12011-165-834	20	SETSCREW, 8-32 x 1/4
2	2	3-12011-1027-832	19	SCREW, SOC HD, NYLOK, 8-32 x 1/4
4	4	3-12011-160-838	18	SCREW, PAN HD, 8-32 x 1
2	2	3-12011-160-835	17	SCREW, PAN HD, 8-32 x 5/8
4	4	3-12131-645-68	16	BEARING, CLAMP TYPE
1	1	3-12136-155-1	15	BELT, TIMING
1	1	3-1110-32	14	PULLEY, MODIFIED
1	1	3-1107-751	13	DRIVE PULLEY ASSY
2	2	3-1110-134	12	KEEPER, SPRING
2	2	3-1110-74	11	SPRING, PINCH ROLLER
—	2	3-1107-158-2	10	PINCH ROLLER ASSY
—	1	3-1164-1424	9	APERTURE
1	1	3-1110-81	8	SLIDE, GLASS
—	1	3-1107-2045	7	READ BLOCK
1	1	3-1110-458	6	SHAFT, READ STA #2
1	1	3-1110-459	5	SHAFT, READ STA #1
2	2	3-1110-8-1	4	ROLLER, DRIVE
1	1	3-1110-1691	3	BLOCK, THROAT
1	1	3-1110-1690	2	KNIFE
1	1	3-1107-1991	1	PLATE ASSY, INPUT MODULE

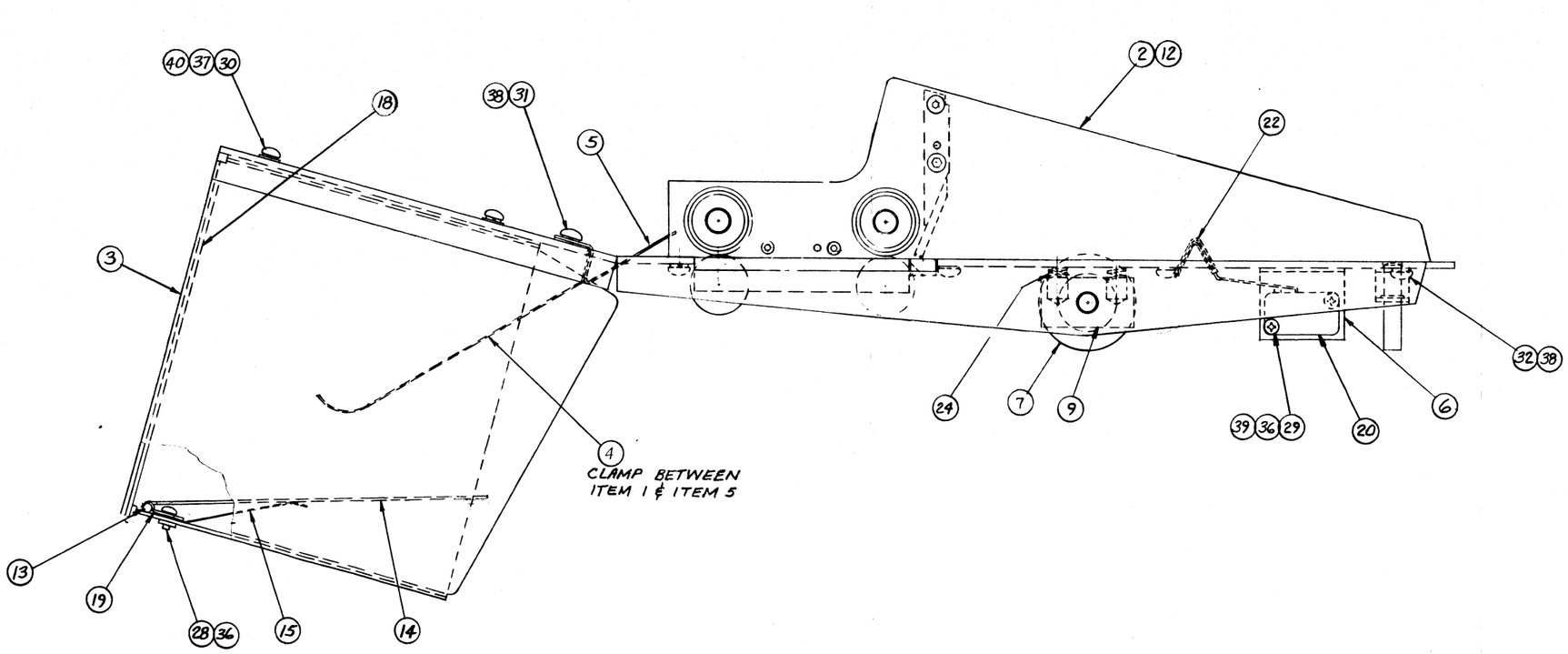
TOLERANCES (EXCEPT AS NOTED)	PERIPHERAL DYNAMICS INC	
DECIMAL ±		SCALE 1/1 — DRAWN BY R.T.J. — APPROVED BY
FRACTIONAL ±	TITLE INPUT MODULE ASSY	
ANGULAR ±	DATE 4-21-77	DRAWING NUMBER 3-1107-2046

DATE	BY	REVISION RECORD	APPR.	DR.	CK.
4-22-77	A	REVISED ITEMS 16, 18 & 33		R.T.	









QTY -2	QTY -1	PART NO.	ITEM NO.	DESCRIPTION
4	4	3-12013-271-3	40	WASHER, FLAT, #6
2	2	3-12012-163-44	39	NUT, HEX, 4-40
10	10	3-12013-164-3	38	LOCKWASHER, #8
4	4	3-12013-164-2	37	LOCKWASHER, #6
4	4	3-12013-164-1	36	LOCKWASHER, #4
2	2	3-12011-165-834	35	SETSCREW, 8-32 X 1/4
4	4	3-12011-161-442	34	SCREW, FLAT HD, 4-40X1/4
			33	
8	8	3-12011-160-834	32	SCREW, PAN HD, 8-32X1/2
2	2	3-12011-160-833	31	SCREW, PAN HD, 8-32X3/8
4	4	3-12011-160-633	30	SCREW, PAN HD, 6-32X3/8
2	2	3-12011-160-445	29	SCREW, PAN HD, 4-40X3/8
2	2	3-12011-160-442	28	SCREW, PAN HD, 4-40X1/4
1	1	3-12067-217-2	27	RETAINING RING
1	1	3-12067-171-1	26	RETAINING RING
1	1	3-121310-1010-1	25	COLLAR
2	2	3-12199-340	24	SPRING, COMPRESSION
			23	
1"	1"	3-12650-557-1	22	TUBING, TEFLON
1	1	3-12010-1755-2	21	SPACER SHIM
1	1	3-1110-78	20	SWITCH, MODIFIED
2	2	3-12067-237-1	19	CABLE CLAMP
1	1	3-1107-1770	18	TAPE ASSY
1	1	3-1110-333-3	17	SHEET, DAMPING
			16	
2	2	3-1110-424	15	SPRING, OUTPUT HOPPER
1	1	3-1110-422	14	BASE, OUTPUT HOPPER
1	1	3-1110-423	13	SHAFT, OUTPUT HOPPER
-	-	3-1107-2046-2	12	INPUT MODULE ASSY
1	1	3-1107-364	11	BRACKET, CARD LIFTER
1	1	3-1110-363	10	LIFTER, CARD
1	1	3-1110-663	9	BLOCK, BRAKE
1	1	3-1110-665	8	SHAFT, PICKER
1	1	3-1107-965	7	PICKER ROLLER ASSY
1	1	3-1107-551	6	BRACKET, SWITCH
1	1	3-1110-2032	5	GUIDE, CARD
1	1	3-1110-2027	4	FLIPPER
1	1	3-1107-55-12	3	OUTPUT HOPPER
-	1	3-1107-2046-1	2	INPUT MODULE ASSY
1	1	3-1107-1997	1	CHANNEL, BASE ASSY

TOLERANCES (UNLESS AS NOTED)
DECIMAL ±
FRACTIONAL ±
ANGULAR ±

PERIPHERAL DYNAMICS INC

SCALE 1/1
DRAWN BY R.T.J.
APPROVED BY

TITLE
INPUT- OUTPUT MODULE

DATE 4-22-77
DRAWING NUMBER 3-1107-2048

DATE	BY	REVISION RECORD	AUTH.	DR.	CK.

TORQUE TO 8 IN-LBS

BLACK WIRE

GREEN WIRE

WHITE WIRE

-2 ASSY
-1 ASSY

-2 ASSY	-1 ASSY	PART NO.	ITEM NO.	DESCRIPTION
2	2	3-12012-161-834	53	SCREW, FLAT HD, 8-32 X ½
1	1	3-12067-242-3	52	RECEPTACLE, Q.C.
1	1	3-12590-318-2	51	TERMINAL, RING TONGUE
4"	4"	3-12585-845-2	50	WIRE, INS., 20 AWG, RED
1	–	3-1107-2051-2	49	GUSSET, REAR CHASSIS
1	–	3-1107-2051-1	48	GUSSET, REAR CHASSIS
AR	AR	3-19470-308	47	SOLDER, 60/40
AR	AR	3-12585-265-8	46	WIRE, INS, 20AWG
2	2	3-12013-271-6	45	WASHER, FLAT, ¼
6	6	12-1271-1	44	NUT, SPEED, 6-32
1	1	3-12013-816-2	43	LOCKWASHER, DISHED TYPE, #6
1	1	3-12019-709-3	42	LOCKWASHER, INT. TOOTH, #6
2	2	3-12013-164-5	41	LOCKWASHER, ⅛
8	8	3-12013-164-3	40	LOCKWASHER, #8
1	1	3-12013-164-2	39	LOCKWASHER, #6
2	2	3-12012-1271-3	38	NUT, SPEED, 8-32
8	8	3-12012-163-63	37	NUT, HEX, 6-32
2	2	3-12011-165-833	36	SETSCREW, 8-32 x 3/16
2	2	3-12011-160-2524	35	SCREW, PAN HD, ¼-20 X ½
10	10	3-12011-160-834	34	SCREW, PAN HD, 8-32 X ½
2	2	3-12011-160-6312	33	SCREW, PAN HD, 6-32 X 1½
7	7	3-12011-160-634	32	SCREW, PAN HD, 6-32 X 1½
1	1	3-12501-815	31	TRANSISTOR, MJE 3055
1	1	3-12590-318-1	30	TERMINAL, RING TONGUE
8	8	3-12067-325-2	29	TERMINAL LUG, SOLDER
3	3	3-12067-325-1	28	TERMINAL LUG, SOLDER
5	5	3-12067-324-3	27	TAB, Q.C.
6	6	3-12067-324-2	26	TAB, Q.C.
4	4	3-12067-324-1	25	TAB, Q.C.
2	2	3-12067-243-4	24	TAB, Q.C.
AR	AR	3-12585-264-3	23	WIRE, INS, 24 AWG, RED
2	2	3-12067-242-2	22	RECEPTACLE, Q.C.
1	1	3-12067-326	21	BUSHING, STRAIN RELIEF
2	2	3-12010-320-10	20	SPACER
1	1	3-12591-852	19	MARKER STRIP
2	2	3-12512-227-1	18	RECTIFIER, SILICON
1	1	3-12541-219-8	17	CAPACITOR, 0.1 μf
1	1	3-12541-219-7	16	CAPACITOR, 0.01 μf
1	1	3-12657-208-3	15	GROMMET
1	1	3-12583-197	14	POWER CABLE
1	1	3-12649-232	13	FUSE HOLDER
1	1	3-12597-205-6	12	BARRIER STRIP, 6 TERM
1	1	3-12597-205-3	11	BARRIER STRIP, 3 TERM.
1	1	3-12571-180-2	10	RELAY
1	1	3-12067-229	9	CLAMP, CAPACITOR
1	1	3-12547-228-3	8	CAPACITOR
1	1	3-12081-878	7	MOTOR
1	1	3-1160-2052	6	REGULATOR ASSY, P.S.
1	1	3-1110-1660-1	5	PULLEY, MOTOR
1	1	3-1107-1040	4	POWER SUPPLY
–	1	3-1107-1995-2	3	GUSSET, REAR CHASSIS
–	1	3-1107-1995-1	2	GUSSET, REAR CHASSIS
1	1	3-1107-1994	1	CHASSIS, REAR

QTY REQD	QTY REQD	PART NO.	ITEM NO.	DESCRIPTION *

TOLERANCES (EXCEPT AS NOTED)
DECIMAL ±
FRACTIONAL ±
ANGULAR ±

PERIPHERAL DYNAMICS INC

SCALE 1/1
DRAWN BY R.T.J.
APPROVED BY

TITLE: COMPONENT SHELF ASSY

DATE: 4-26-77

DRAWING NUMBER: 3-1107-2050

22 pins
22 pins

Lower Set

1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22.

Blank.

Upper Set.

A B C D E F H J K L M N P R S T U V W X Y Z

Blank.

← THIS SIDE UP.

clip

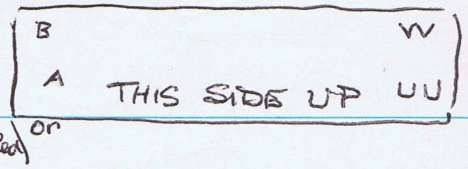
Or Grn Br. Gry Br. Gr. Yel Gr Gr Or Red Blu Blu Blu Or Gr Grey Red.

Red Red Blk Wh Wh. Blk Or Yell Blk Blk Blu Blk Yell Wh. Wh. Wh. Red Brown

JJ KK BB AA MM LL D B L N A K M C Z Y V U

PP RR FF EE TT SS J F R T E P S H DD CC X W

Red C +3 Or	White / Green / Brown	PP - JJ -	PP
Red D +4 Grn	" / Green / Grey	RR - KK -	RR
Blk E +5 Brn	" / Grey	FF - BB -	FF
Wh F +6 Grey.	" / Grey / Brown	EE - AA -	EE
Wh. G +7 Brn.	" / White / Blue	TT - MM -	TT
Bk H +8 Grey.	" / Orange / Blue	SS - LL -	SS
Or. K +9 Yellow	" / White Brown	J - D -	J
Y L +10 Gr	" / Blue Brown	F - B -	F
Bk M +11 Gr	" / Green Blue	R - L -	R
Bk N +12 Or.	" / Orange Brown	T - N -	T
Blu P +13 Red.	/ Grey Blue	E - A -	E
Blk R +14 Blu	" / Grey Brown	P - K -	P
Y S +15 Blue	" / White Grey	S - M -	S
Wh T +16 Blue	" / White Orange	H - C -	H
Wh U +17 Or.	" / Orange Green	DD - Z -	DD
Wh V +18 Grn.	" / Blue	CC - Y -	CC
R. W +19 Grey.	" / White Green	X - V -	X
Brn X +20 Red.	" / Orange	W - U -	W



E ✓ A	Red of Red/Blu	13			
F ✓ B	Green of Grn/Yell.	10			
H ✓ C	Blue of Blu/Wh.	16			
J ✓ D	Yellow of Y/Or.	9			
A ✓ E	Blu of Red/Blu	P			
B ✓ F	Yellow of Grn/Yell	L			
C ✓ ~~G~~ H	Wh. of Blu/Wh.	T			
D ✓ J	Or of Yell/or.	~~2~~ K			
P ✓ K	Blu of Blu/Blk	14			
R ✓ L	Grn of Grn/Blk	11			
S ✓ M	Blue of Blue/Yellow	15			
T ✓ N	Or of Or/Blk	12			
K ✓ P	Blk of Blue/Blk	R			
L ✓ R	Blk of Grn/Blk	M			
M ✓ S	Yellow of Blue/Yellow	S			
N ✓ T	Blk of Or/Blk	N			
W ✓ U	Red of Red/Br.	20			
X ✓ V	Grey of ~~Grey~~/Red/Grey	~~2~~ 19			
U ✓ W	Brn of Red Brn.	X			
V ✓ X	Red of Red/Grey	W			
CC ✓ Y	Grn of Whit/Grn	18			
DD ✓ Z	Or of Wh./Or.	17			
EE ✓ AA	Grey of Wh/Grey	6			
FF ✓ BB	Brn of Brn/Bk	5			
Y ✓ CC	White of Grn/Wh.	V			
Z ✓ DD	Wh of Wh/or	U			
AD ✓ EE	Wh of Gr/Wh	F			
BB ✓ FF	Blk of Brn/Blk	E			
HH	NIL		PP	Red of Red/or	
PP J JJ	Or of Red/Or.	3	RR	Red of Red/Green	I
RR ✓ KK	Grn of Red/Grn.	4	SS	Blk of Blk/Grey	J
SS ✓ LL	Grey of Blk/Grey	8	TT	Wh. of Wh./Brn.	H
TT MM	Brn of Wh/Brn	7			
NN	NIL				