INSTRUCTION MANUAL

FOR THE

ANELEX

SERIES 5 PRINTER SYSTEM

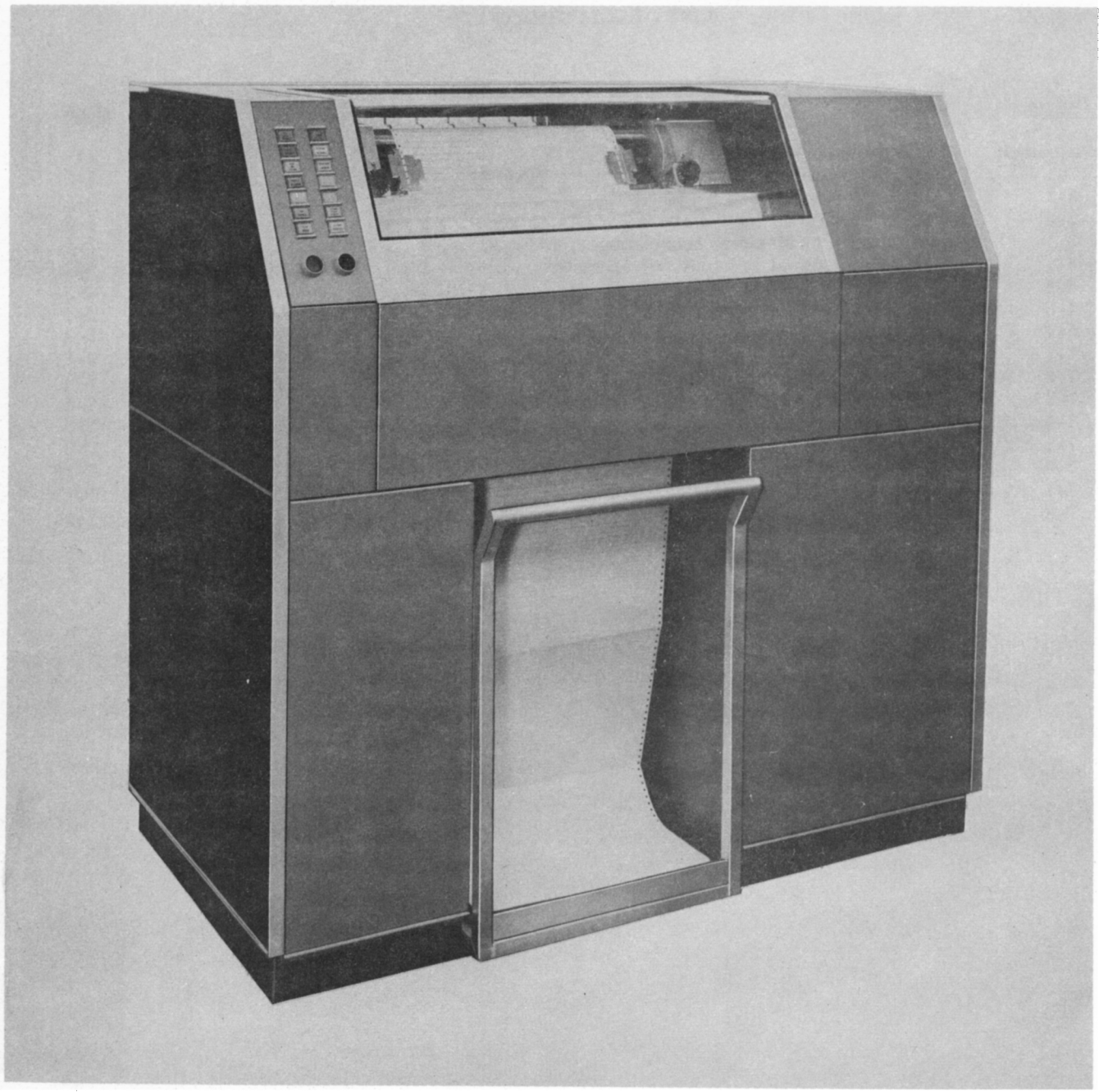
Manufactured By

ANELEX CORPORATION

150 CAUSEWAY STREET • BOSTON, MASSACHUSETTS • 02114

TABLE OF CONTENTS

LIST OF ILLUSTRATIONS



ANelex Series 5 Printer System

CHAPTER 1

GENERAL INFORMATION

1-1. INTRODUCTION.

The Anelex Series 5 Printer System is designed to produce printout in accordance with specified data from an external source. The system components are mounted in a single free-standing cabinet. The major components are the Series 5 Printer, Hammer Driver and Printer Control Chassis, Logic Rack, Sequencer, 36-Volt Power Supply, and Multiple-Output Power Supply. All controls and indicators for normal operation are provided as well as switches to insert data for testing and adjusting the system.

1-2. DESCRIPTION (Figure 1-1).

a. Cabinet.

The cabinet is constructed with readily removable front, end and rear panels for access to the interior; and a hinged counter-balanced cover, forming part of the top and front portions, provides access to the printer. The controls and indicators for normal operation are mounted in a group, as an Operator's Control Panel, on the end portions of the sloping front of the cabinet. Certain controls are duplicated in the Rear Control Panel, located at the upper right of the cabinet as viewed from the rear. The cabinet is mounted on castors which can be adjusted for leveling the equipment.

b. Series 5 Printer.

The Series 5 Printer occupies the greater part of the upper section of the cabinet. Paper for the printout is drawn from the paper bin in the central portion of the lower section of the cabinet and down through a paper puller assembly. Printer action can be observed through the transparent panel of the cover. Access to the printer is readily obtained for adjustment or paper and ribbon loading by raising this counter-balanced cover. The printer yoke can be swung out to facilitate the loading operations. Opening the upper left end panel gives access to a Vertical Format Unit for loading a format tape.

c. Hammer Driver and Printer Control Chassis.

This chassis mounts the plug-in type printed circuit (PC) cards of the hammer driver and printer control circuits. The chassis is located in the lower left end section of the cabinet. Removal of the lower left end panel of the cabinet gives access to the cards.

d. Logic Rack.

The Logic Rack, or Gate, occupies the right-hand end section of the cabinet and is accessible on opening the right end panel. The Logic Rack mounts the plug-in type PC cards and the Memory of the Printer Buffer for the system. Switches for entering data and commands in the test mode of operation are mounted on the left side of the rack assembly.

e. Sequencer.

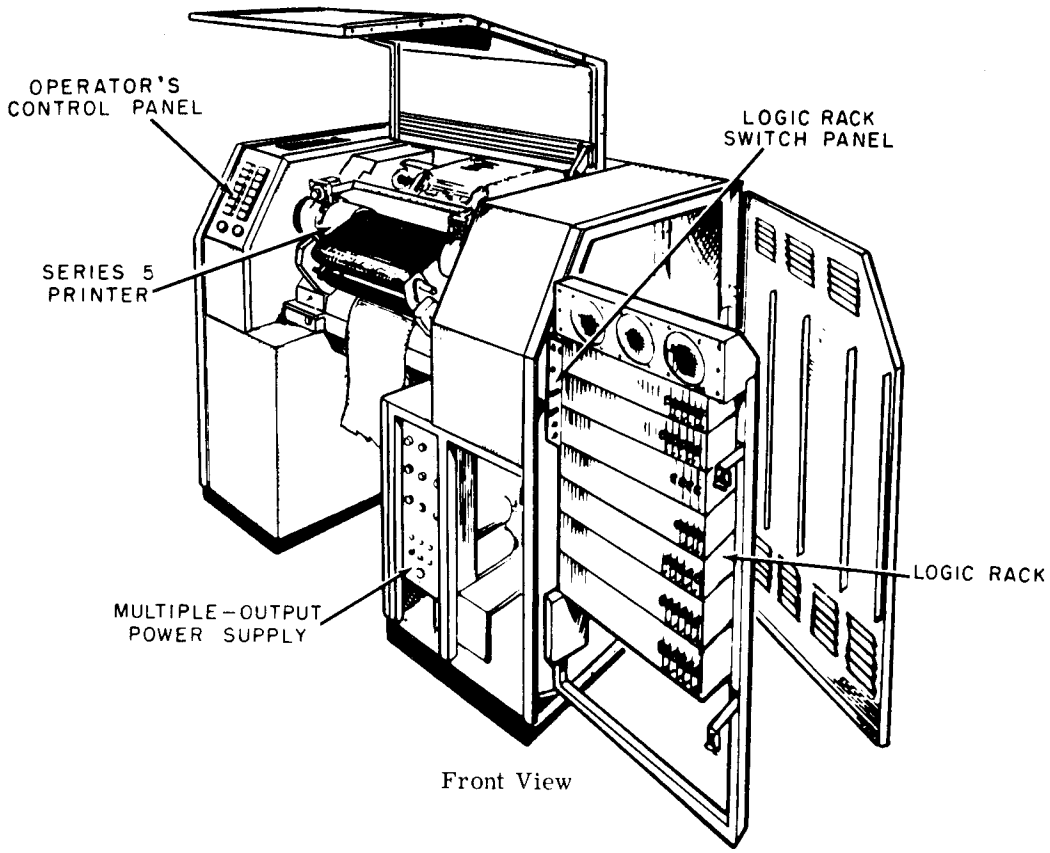
The sequencer is located behind the removable lower left panel of the cabinet, as viewed from the rear. This unit assures the application of power to the equipment in the proper order. The front panel supports the main power circuit breaker type switch, the circuit breakers for the motors, power and card alarm indicators, and an elapsed time meter that records the total hours of operation. A utility outlet is also mounted on the panel.

f. CVR Power Supply 36V-28A.

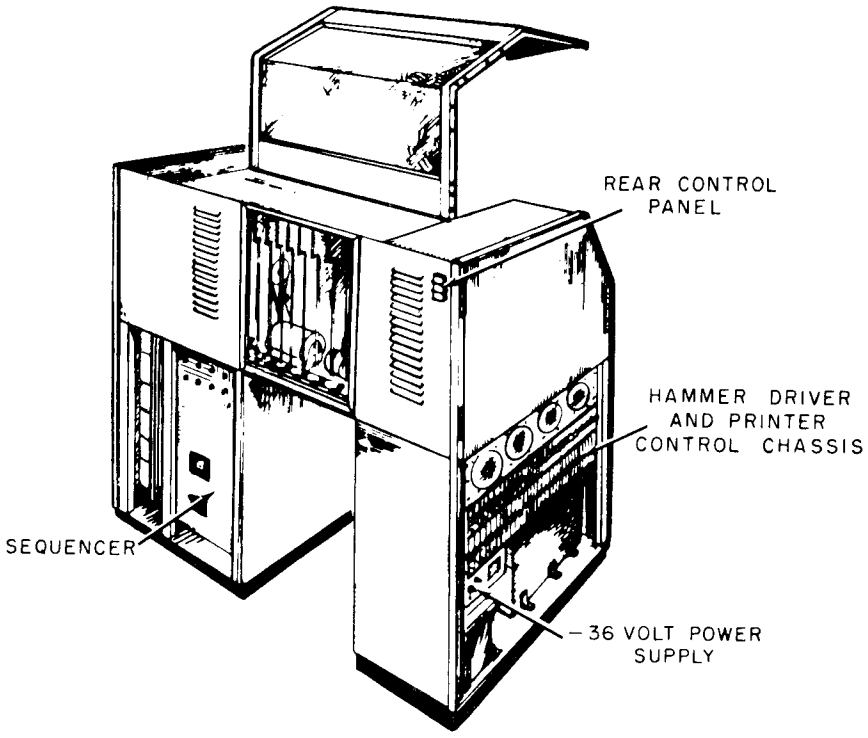
The 36-Volt Power Supply is mounted behind the removable lower right panel of the cabinet, as viewed from the rear. The input fuse is located on the front panel of the unit.

g. Multiple-Output Power Supply.

The Multiple-Output Power Supply is located in the lower right of the front section of the cabinet. The fuses for the +6, -6, and -18-volt outputs as well as for the input are mounted on the front panel of the unit. accessible upon removal of the cabinet panel.



Front View



Rear View

Figure 1-1. Major Components of Series 5 Printer System

1-3. REFERENCE DATA.

The reference data of table 1-1 is a summary of the principal characteristics of the Anelex Series 5 Printer System.

1-4. SIGNALS - INPUT AND OUTPUT.

Input signals from the external source and output signals to the external source, and their levels, are listed as table 1-2.

1-5. CHARACTER CODING.

The print roll characters and the corresponding test switch octal codes are shown in table 1-3.

1-6. PRINTED CIRCUIT CARDS.

The Anelex part numbers of the printed circuit (PC) cards employed and their location in the Logic Gate and Hammer Basket are shown on drawings in Chapter 10. The symbols on the logic diagrams bear codes indicating their PC card location. For example, a buffer logic symbol coding of J9 indicates that the circuit is on the PC card in horizontal row J (with the top row considered as A) and vertical row 9 (counting from left, facing the card side of the gate.) Where more than one circuit is on a card, a letter follows the number (J9B) to show the circuit used. Unless otherwise stated in the circuit descriptions, the internal logic levels of the system are: Logic 1 = 0.0 ±0.5 volts; Logic 0 = -3.0 ±0.5 volts.

TABLE 1-1. REFERENCE DATA

Physical Characteristics	
Height:	52 to 57 inches
Length:	56 inches
Depth:	30 inches
Weight:	1350 pounds
Printing Characteristics	
Width:	160 columns at 10 per inch
Lines per inch:	6
Lines per minute:	333
Paper Characteristics	
Single copy	15 to 30 pound weight
Multiple copy:	Paper 9 to 12 pound weight; carbon, high speed type, 5 to 7 pound weight
Width:	19 inches maximum
Feed holes:	0.155 (+0.005; -0.000) inches diameter, centered 0.250 (±0.010) inches from related paper edge, and 0.500 (±0.010) inches center to center vertically
Ribbon Requirement	
Multilith Ribbon and Roll Assembly:	Anelex Part No. 66210
Power Requirement	230v, 50 cycle, single phase, 3 wire

TABLE 1-2. SIGNALS - INPUT AND OUTPUT

Input Signals.

INFO DATA -- provides format and character data, transmitted serially in 40-bit "words", with a maximum of 25 "words" for one line of printout. The first "word" orders the format and states the number of 8-bit character codes to follow in subsequent "words", five per "word".

INFO SAMPLE -- logical 1 pulses, the mid-points in coincidence with the data bit mid-points.

SENDING WORD -- a logical 1 pulse coinciding in length and time with each 40-bit "word".

PRINT COMMAND -- a logical 1 initiates the system print cycle.

CLEAR BUFFER -- a logical 1 initiates a system clear cycle.

Output Signals.

BUFFER READY -- a logical 1 indicates that the buffer is ready for transfer of data.

ALARM I -- a logical 1 indicates that an invalid code has been received.

ALARM II -- a logical 1 indicates that the number of characters received does not agree with number stated in first "word".

TABLE 1-3. PRINT ROLL CHARACTER CODES

HIGH	LOW	ROW	SYM.	HIGH	LOW	ROW	SYM.
03	03	1	0	10	04	34	L
03	04	2	1	10	05	35	M
03	05	3	2	10	06	36	N
03	06	4	3	10	07	37	O
03	07	5	4	10	08	38	P
03	08	6	5	10	09	39	Q
03	09	7	6	10	10	40	R
03	10	8	7	10	11	41	S
03	11	9	8	10	12	42	T
03	12	10	9	11	03	43	U
04	04	11	.	11	04	44	V
04	05	12	+	11	05	45	W
04	06	13	-	11	06	46	X
04	09	14	,	11	07	47	Y
08	05	15	■	11	08	48	Z
08	06	16	?	04	03	49	10
12	03	17	/	04	07	50	*
12	06	18	(	04	12	51	¢
12	07	19	)	07	09	52	#
12	08	20	:	12	04	53	[
12	09	21	=	12	05	54	]
12	10	22	'	12	11	55	"
09	03	23	A	12	12	56	→
09	04	24	B	08	03	57	%
09	05	25	C	08	04	58	!
09	06	26	D	08	07	59	&
09	07	27	E	08	09	60	;
09	08	28	F	08	12	61	ε
09	09	29	G	11	09	62	◊
09	10	30	H	07	10	63	DM
09	11	31	I	00	00	64	
09	12	32	J				
10	03	33	K				

CHAPTER 2

CONTROLS AND INDICATORS

The printer system controls and indicators are listed below, grouped by their locations in the equipment, shown in Figures 1-1, 2-1 and 2-2.

2-1. PRINTER CONTROLS.

a. Paper Tractor and Paper Guide Adjustments.

These provide precise horizontal positioning of forms for various form widths. A scale is provided for convenience. The paper should be taut in the horizontal direction; not loose enough to buckle or crease and not taut enough to tear the drive holes in the paper.

b. Form Position Control.

The FORM POSITION control allows the form to be shifted up or down, thereby raising or lowering the printing in respect to the form. When, for example, the form has definite lines on which the printed information must appear, it may be shifted for exact alignment. Turning the knob clockwise will raise the form and lower the line of printing on the form. Counterclockwise turning will lower the form and raise the line of printing on the form. Use this control while the printer is in operation.

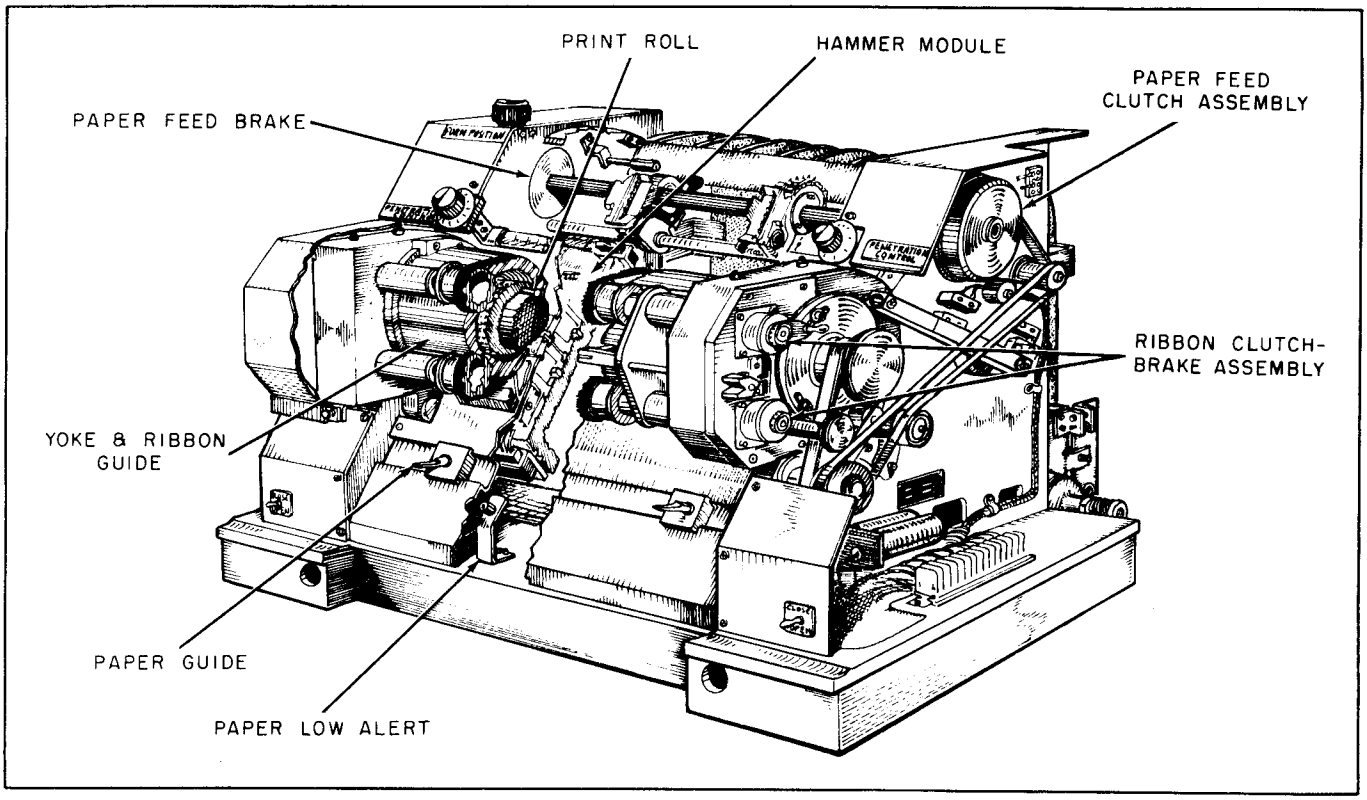


Figure 2-1. Front View of Series 5 Printer

c. Penetration Control.

The PENETRATION control raises or lowers the print drum thereby increasing or decreasing the distance between the hammer faces and the printer roll. The distance between the hammers and print roll is important in printout quality. Different weights of paper and forms of multiple parts receive various penetration settings. Turning the knob counterclockwise will decrease the distance between the hammers and print roll, making the printing darker. Clockwise turning will increase the distance and lighten the printing.

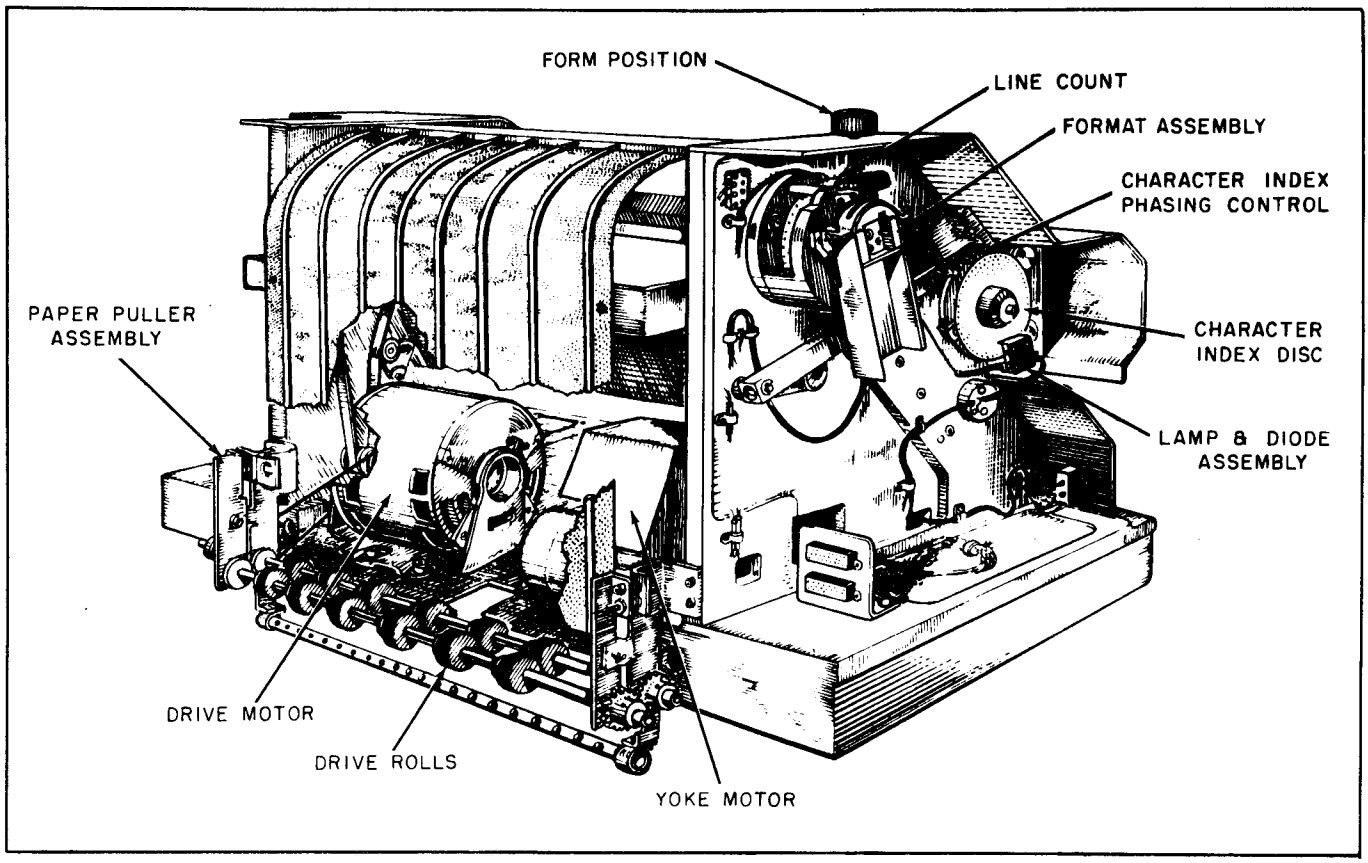


Figure 2-2. Rear View of Series 5 Printer

d. Character Index Phasing Control.

A sensing support ring, on the left end of the yoke, may be adjusted with a screwdriver to phase the code wheel with the proper line of characters on the print wheel. This is accomplished by inserting the screwdriver between the two leverage arms on the casting so that the blade contacts the adjustment grooves machined on the ring. If the characters are not fully height, a fine adjustment of the sensing support ring will assure that the entire line of characters has equal printout density at the top and bottom of each character. An adjustment made in the direction away from the front of the machine will bring in the upper portion of the character; an opposite pressure will bring in the lower.

e. Yoke Position Control.

Two toggle switches, one on the lower front section of each end cover plate, command opening and closing of the yoke. Both switches must be actuated at the same time.

2-2. SEQUENCER.

a. MAIN POWER. Circuit breaker switch which closes to connect primary power to sequencer.

b. POWER ALARM. Illuminates upon failure of one or more power supplies.

c. OVERRIDE. Pushbutton switch which can override power alarm during testing.

d. CARD ALARM. Indicator which illuminates to indicate a blown fuse on a PC card in the hammer driver basket.

e. PHOTO ALARM. Indicator which illuminates upon failure of a photodiode lamp.

f. INTERLOCK ALARM. Indicator which illuminates upon failure of an interlock in the logic gate or hammer driver basket, and signals turn-off of -18 volt supply to hammer drivers.

2-3. OPERATOR'S CONTROL PANEL.

a. ON. Momentary closure of switch, with MAIN POWER switch closed, initiates sequencing of power to system; illuminated upon completion of sequencing.

b. OFF. Momentary closure of switch initiates removal of sequenced power; illuminated with MAIN POWER on and sequenced power off. Normally actuated only when system is off-line to avoid data loss.

c. START. Momentary closure of switch initiates placement of system on-line from the off-line state; illuminated when system is on-line.

d. STOP. Momentary closure of switch initiates placement of system off-line from the on-line state or initiates termination of test mode of operation; illuminated while command is active but not completed.

e. TEST PRINT. Momentary closure of switch, with system off-line, initiates printing out of data inserted by switches on logic rack switch panel; closure of STOP switch initiates termination of test mode, with paper advancing to the second following top of form position. The indicator is illuminated during test operation.

f. YOKE OPEN. Indicator is illuminated when yoke is not closed.

g. NO PAPER. Indicator illuminated upon break or tearing of paper in the printer.

h. PAPER LOW ALERT. Indicator illuminated when supply of paper is nearly depleted.

i. TOP OF FORM. Momentary closure of switch, with system off-line and not in the test mode, initiates advance of paper feed mechanism to top of form position; illuminated with sequenced power on.

j. TRACTOR INDEX. Momentary closure of switch, with system off-line and not in test mode, initiates advance of paper mechanism for format tape alignment; illuminated with sequenced power on.

k. ALARM STATUS. Indicator illuminated upon occurrence of any alarm condition that prevents the ready state of the system (open motor circuit breaker, blown fuse, etc.).

l. PRINTER READY. Indicator illuminated when the Printer System is placed on-line with the external controller.

m. PAPER RUNAWAY. Indicator illuminated when forms are transported for more than one second without command.

2-4. REAR CONTROL PANEL.

a. START. Duplicate of operator's control panel START switch.

b. STOP. Duplicate of operator's control panel STOP switch.

c. TOP OF FORM. Duplicate of operator's control panel TOP OF FORM switch.

2-5. LOGIC RACK SWITCH PANEL.

a. HIGH ORDER/LOW ORDER. These two, 8-position rotary switches provide binary-coded data inputs in accordance with their octal setting for test printout. (See table 1-3.)

b. TEST. Duplicate of operator's control panel TEST PRINT switch.

c. TEST/OPERATE. Toggle switch to inhibit format command control in TEST position (automatic single spacing) and enable format command control in OPERATE position when in test mode of operation.

d. RESET. Pushbutton switch whose momentary closure initiates resetting of system.

e. STOP. Duplicate of operator's control panel STOP switch.

CHAPTER 3

PRINCIPLES OF OPERATION

3-1. GENERAL DESCRIPTION.

The Anelex Series 5 Printer System produces printout in accordance with data supplied from an external source. The printing is accomplished in the Series 5 Printer, consisting essentially of an engraved print roll that rotates over a row of solenoid actuated print hammers. As each row of characters on the print roll turns into printing position over the print hammers, pulses identifying the character are generated. Data transferred for a line of information is stored in the Memory of the Buffer. The code stored in each column position of the Memory is compared with the code of the print roll character in printing position. If the codes are the same, the corresponding print hammer is actuated to press paper and an inked ribbon against the print roll, printing the character for that column. The paper is advanced, as required, between print cycles. Of the major system divisions, the Printer, the Printer Control Logic, and the Buffer will be discussed in following sections of this chapter. The principles of operation of the Sequencer and Power Supplies are included with their schematic in Chapter 10.

3-2. PRINTER.

The Printer comprises the following major subassemblies, see Figures 2-1 and 2-2; the print roll, photo-data pulse generator, ribbon feed mechanism, print hammers, paper feed mechanism, line count pulse generator, and vertical format unit. The print roll is supported by a hinged yoke over the row of print hammers. The hinged yoke provides for adjusting the distance between the print roll and print hammers for desired density of printing, and can be swung outward to facilitate servicing procedures. The print roll is mounted within a ribbon guide around which an inked ribbon is transported by the ribbon feed mechanism. The photo-data pulse generator is also mounted on the yoke, the rotor attached to the print roll shaft. The paper feed mechanism advances the continuous paper forms as required through the space between the print hammers and the inked ribbon beneath the print roll. This mechanism also drives the rotor of the line count pulse generator and the shaft of the vertical format unit. The motor driving the print roll, ribbon feed mechanism, and the paper feed mechanism is mounted in the rear section of the printer, as is the motor for moving the yoke.

a. Yoke.

The yoke is opened for paper loading or ribbon loading and closed for printing by a motor controlled by two manually operated switches. The switches are so placed that the operator must use both hands to energize the motor to prevent accidental motion of the yoke. The control switches are in series with limit switches which open the circuit at each extreme of yoke motion. Two PENETRATION control knobs, one at each end of the yoke, precisely control the closed position of the yoke by adjusting the limit stops at each end. The density of printing is varied by these knobs. Positive contact of the stops and repositioning accuracy is assured through the use of over-travel springs. The yoke is provided with interlock switches, wired to prevent printing operations with the yoke open.

b. Print Roll.

The engraved portion of the print roll (or drum) is made of cylindrical sections, keyed or pinned to maintain their alignment. Each section has 20 columns of engraved characters in 64 equally spaced character row positions on the periphery, with like characters of each font in the same row. The rows are slightly skewed so that each pair of odd and even characters arrives at the printing position a discrete interval after the preceding pair. In operation, the print roll is driven continually at constant speed by an electric motor through a belt and pulley transmission system. Thus, every character of the font in each column passes through the printing position over the print hammers with each revolution. Actuation of the print hammers at the proper times as directed by the Buffer, produces the desired printout. The skew of the character rows compensates for the delay incurred in comparing the stored column data code with that of the character in printing position.

c. Photo-Data Pulse Generator.

The Photo-Data Pulse Generator produces a character pulse as each row of print roll characters turns into the printing position for use in timing the printing operation. It also generates the binary codes identifying the character rows for comparison with the codes stored in the Memory of the characters to be printed.

The Unit consists of a code wheel or disk, a lamp board, and a photodiode board. The code wheel is mounted on and turns with the print roll shaft. The lamp and photodiode boards are so mounted that they straddle the outer portion of the code wheel. This part of the disk is opaque except for transparent "holes".

The "holes" are located on 64 equally spaced radii, corresponding to the 64 print roll character rows, and on concentric circles, aligned with the photodiodes, as required. As the code wheel rotates, the light from the lamps passes through the "holes" and energizes the photodiodes to produce positive going pulses. The "holes" on the outer circle provide the character pulses and those on the inner circles provide the frame of bits that identify the character.

d. Ribbon Feed Mechanism.

The inked ribbon of the Printer is automatically advanced and reversed by the ribbon feed mechanism. The mechanism is located on the yoke assembly and comprises two ribbon rolls supported between a clutch-brake assembly and an idler support assembly. Through the action of the clutch-brake assembly the ribbon rolls turn in opposite directions at approximately 20 rpm. The path of ribbon travel is from the upper surface of the upper ribbon roll, around the cylindrical guide that encloses the print roll, between the print roll and paper, and then to the lower surface of the lower ribbon roll. The direction of ribbon travel is automatically reversed when one ribbon roll is nearly full and the other nearly depleted. The clutch-brake assembly has two electromagnetically operated clutches, one for each ribbon roll. The clutch rotors are gear driven in opposite directions from a shaft turned by a belt from the print roll drive.

When the coil of a clutch is energized, the magnetic field established clamps the armature plate to the rotor to turn the ribbon roll. The control circuits are such that only one clutch can be energized at any one time. With the clutch coil de-energized, pressure blocks in constant contact with the cap roller, stop the roll. Adjusting screws vary the drag on the ribbon rolls to maintain the ribbon sufficiently taut to avoid rubbing against the paper. The gear of each clutch has a cam as part of its hub. The cam, through the action of a cam follower, allows a sensing arm to contact the ribbon on a roll once in every revolution. The amount of ribbon on a roll determines the distance the sensing arm will travel. When a ribbon roll is nearly depleted, the travel is sufficient to operate an associated microswitch, reversing the direction of ribbon feed. Refer to the Reference Drawing Chapter for detailed description and the schematic of the reversing circuit.

e. Print Hammers.

The print hammers are assembled in modules of four hammers each. The modules are mounted in two opposing rows, the hammers dovetailing to present one continuous row of hammer faces, on the module mounting plate. This plate is a machined steel casting bolted between the two upright side members of the frame to provide a solid support for the modules.

Each hammer can be actuated by a pulse from an associated hammer driver circuit. The pulse energizes a solenoid, attracting the hammer armature. The hammer pivots; the hammer face strikes the paper against the inked ribbon and print roll; then returns to rest. Although the ribbon is moving and the print roll rotating, the short dwell time of the hammer prints the character without smudging or blurring.

f. Paper Feed Mechanism.

The paper feed mechanism holds the paper stationary during the print cycle and advances paper as required between print cycles. It consists essentially of a splined shaft, bearing, driving paper feed tractors, and two in-line electromagnetic clutches, mounted in the upper portion of the printer frame side plates. The rotor of the right-hand clutch, the drive clutch, is driven continuously by the motor that also drives the print roll. When this clutch coil is energized, the magnetic field established clamps the clutch armature firmly against the rotor to drive the splined shaft. When the coil of the left-hand clutch or brake clutch is energized, the armature clamps firmly against the frame mounted coil, holding the splined shaft stationary. The clutches are energized in response to signals from the paper feed control circuits, so connected that only one clutch at a time can be activated.

Each paper tractor consists of a chain, drive sprocket, idler sprocket, paper hold-down plate, and frame. The tractors ride on the splined drive shaft and a support shaft and can be positioned laterally to accommodate various paper widths. The chain links have extending arms with protruding teeth for engaging the drive holes in the paper edges. The frames also support shutters that are released, when the paper breaks or tears, to interrupt a light beam and initiate an alarm.

g. Line Count Generator.

The line count generator produces a pulse for each line of paper advance. The unit consists of a plastic disk, similar to the code wheel, a lamp board, and a photodiode board. The disk is mounted on and turned by an extension of the splined drive shaft of the paper feed mechanism. The lamp and photodiode boards are so mounted that they straddle the outer portion of the disk. This part of the disk is opaque except for transparent "holes" equally spaced on a circle aligned with the photodiode. When paper is advanced, the disk turns and a "hole" permits light from the lamp to activate the diode for each line of advance, producing a positive going pulse. This pulse is used in the control of the paper feed mechanism.

h. Vertical Format Unit.

The vertical format unit provides for the selection of any one of up to 12 different vertical spacing formats for the printout. The unit comprises a lamp board, a photodiode board, and a sprocket driven by the paper feed mechanism. When paper is advanced, the sprocket transports a twelve-channel pre-punched tape between the lamp and photodiode boards. A hole in any one of the 12 channels allows light to energize the associated photodiode, producing a positive going pulse. The outputs are strobed by the line count pulse in the control circuitry; on coincidence of a pulse from the selected channel of the format tape and a line count pulse, a command to stop paper feed is initiated.

i. Paper Puller.

The paper puller assembly is used to prevent paper that has been statically charged in passing over the tractors from adhering to the top and rear of the cabinet. The drive rolls, revolving at a slightly higher speed than the tractors, maintain just enough tension on the forms to prevent this, yet will not damage the feed holes at the edge of the paper.

3-3. PRINTER CONTROL LOGIC.

A logical 0 on the $\overline{\text{PAPER FEED IN}}$ line, unless inhibited by a BRAKE PULSE logical 1, produces a logical 1 output from the Clutch section of the P. F. Control and Sense circuit. This output is applied to the Brake section to initiate the de-energizing of the P. F. Brake Coil. At the same time the CLUTCH output is fed to the P. F. Hold and Pulse circuit to generate the PULSE and HOLD currents to energize the P. F. Clutch Coil for advance of paper. The pulse, approximately four milliseconds wide, provides a high start current for the rapid actuation of the clutch armature; and applied to the Brake section of A10, inhibits brake action for this period, in case the paper feed command is shorter than the one shot cycle.

The Anelex Paper Feed Control and Sense Printer Circuit Card contains two fused resistor loads which form an integral part of the circuitry used with the paper feed engine clutch and brake coils of the Anelex High Speed Printer Mechanism, see paragraph 7-2-1. The 0.1 ohm resistor component of each network has been provided with a pair of test points, which may be used for monitoring the corresponding current amplitude. The voltage drop across this resistor is generally observed as a means of determining the proper adjustment of the two externally mounted current limiting resistors. A fuse-monitor is connected in series with the -36 volt line from each resistor as a protective device. In the event either fuse is destroyed by an overload condition, -36 volts will be applied to the external alarm circuits.

On termination of the paper feed command, the logical 0 output of the Clutch section initiates the de-energizing of the P. F. Clutch Coil. At the same time, this output applied to the Brake section produces, unless inhibited by a CLUTCH PULSE logical 1, a logical 1 to generate pulse and hold currents for the P. F. Brake Coil. The pulse is also applied to the clutch section, inhibiting clutch action during the brake pulse period.

The P. F. CLUTCH HOLD logical 1 or a $\overline{\text{FORCE RIBBON}}$ logical 0, inverted in the Ribbon section of A10, sets the Motion FF of the Ribbon Control circuit to start ribbon feeding in the direction determined by state of the Direction FF. On termination of the command, all inputs to the Duration Timer are logical 0, allowing it to start its cycle. If one of the commands is not received before the cycle is completed, a logical 1 is produced to reset the Motion FF. As the ribbon feeds, the amount of ribbon on each roll is sampled. When a roll is nearly depleted, an associated switch is actuated by the sensor to change the state of the Direction FF, directing drive to that mandrel for rewinding the ribbon.

The Monitor 5 printed circuit card (A08) contains five independent circuits used for sensing operational characteristics of the Anelex Printer System. Each logic circuit functions independently in monitoring inputs from the printer and hammer driver and printer control chassis. The MON 5 circuits are identical, and are designed to amplify the switching transients of external photoelectric sensors which monitor the absence and near absence of printout forms at the print head. A logical 0 level (-6 volts) present at input of any of the three circuits will produce a logical 1 (zero volt level) at the corresponding output which illuminates the proper indicator on the control panel.

The circuitry for the next five inputs senses the filament continuity of lamps used in the photomonitoring assemblies of the two previously mentioned sensors as well as the lamps used with the photoelectric pulse generators which provide the timing functions for the various print cycles. A lamp failure will allow current to flow (zero volt level) at the output, and illuminate the ALARM STATUS indicator on the operator's control panel to alert the operator to an equipment malfunction.

The continuity circuit monitors all the zone and column cable connector connections, assuring that all connectors are present and properly installed. If a break in continuity is detected, this section of the monitor

circuitry removes -18 volts from the Hammer Driver Circuits by de-energizing the -18 Volt Interlock Relay in the sequencer. A schematic and a detailed description of the sequencer and P.C. cards can be found on the reference drawings in Chapter 10.

The Anelex Data 5 printed circuit cards receive binary data from two lamp and photodiode assemblies on the printer mechanism, and convert this data to a form which is compatible with external logic either as a direct or adjunct function. The two photodiode assemblies read the code punched in the vertical format tape and character code wheel disk. The tape and disk are mounted on the paper feed and print roll drives so that, as the former are mechanically driven past the lamps, light from the lamps is modulated in passing through the punched holes to the photoelectric diodes. The Data 5's are basically buffer circuits which match the high output impedance of the photodiodes, and route data to the printer interface.

Each Anelex Strobe 5 printed circuit card contains six independent circuits, three of which are identical photoelectric strobe pulse receiving circuits, and the other three are identical complemented emitter-follower circuits. The photoelectric pulse circuits are designed to receive and shape the light modulated outputs from a photoelectric diode.

The printer mechanism contains a paper feed synchronizing line count generator which provides one of three optional line counts in accordance with the printing density desired. Each of the three options provides a mechanically implemented strobe signal for an associated STROBE 5 receiver. A tractor index signal also accompanies any one of the linefeed options selected. The tractor index strobe aligns the paper tractors with the relative mechanical position of the line count generator. The Channel 1 Code Wheel Clock is used to indicate that a new row of characters has moved into printing position. The output of each receiver circuit is transmitted to other logic sections through an associated complemented emitter-follower driver circuit, which is connected as shown.

Each strobe receiver consists of an impedance-buffing emitter-follower and a d-c Schmitt-type circuit (high squaring factor) which is r-c coupled to an output inverter stage. Any photodiode so connected, experiencing a light modulation transition will cause the associated complemented emitter-follower circuit to produce an output pulse transition from zero volts to -6 volts and back to zero volts.

3-4. BUFFER LOGIC.

3-4-1. General.

The Anelex Buffer Logic is an interface-controller which provides signal compatibility between the ZUSE interface and the Anelex Printer System. The Buffer is designed to receive data and command signals from the external processor and convert them to a form capable of implementing the proper Anelex Printer Control circuits. The Buffer also receives operational status signals from the Printer Control circuits and transmits them back to the external processor. In addition, the Buffer contains part of the logic circuitry required for controlling the data transmission cycles between the external processor and the Printer Memory in synchronism with the transmission rates and routines of the external processor. During the printing cycle, the Buffer Logic controls the removal of data from the Printer Memory in synchronism with the instantaneous rotational positions of the printer character drum. The Buffer Logic is also capable of responding to page format commands and will implement the proper control circuits to comply with these instructions after printing.

Actuating the START switch causes the Buffer Logic to perform a "dummy" print or memory clearing cycle prior to communicating to the ZUSE processor that it is ready to accept data. The "dummy" print cycle insures that the Printer Memory is cleared before accepting data. Upon completion of the "dummy" print cycle, the Buffer Logic signals the ZUSE processor that it is available to accept and print data. The printer will stand by in this condition until contacted by the processor.

The Buffer Logic consists of four major sections: Interface, Memory, Vertical Format, and Print Control. Each section contains logic circuitry for data handling and printer control operations. The relationships of the various logic functions are shown in the Printer Buffer Block Diagram, Anelex Drawing 46232, and are detailed in Drawings 46079 - 46082. The ANelex Drawings may be found in Chapter 10, Reference Drawings, at the end of this manual. The inputs and outputs shown on the logic diagrams indicate, from left to right, section, subsection and page number to show source and destination of signals.

The Printer System sends a BUFFER READY logical 1 to the computer when the system is placed on line, indicating that transfer of data can take place. Information is transmitted serially in 40-bit "words" of five 8-bit character codes. Also transmitted are SENDING WORD levels, coincident with each word, and INFO SAMPLE pulses, the mid-points coincident with the mid-points of the data bits, that initiate the processing of the information. Each 8-bit serial character code is converted in the Data Translator to a corresponding parallel frame of bits on eight lines to set flip-flops in the Data Storage accordingly.

The flip-flop outputs from the first 8-bit code of the first "word" in the information for a line of printout are decoded in the Vertical Format section for storage of the format command. The outputs from the second and third 8-bit codes of the first "word" are processed in Master Counter section to set a counter in accordance with the stated number of characters to follow in subsequent "words". The fourth and fifth 8-bit groups of the first "word" are not used. Termination of the first SENDING WORD pulse conditions the buffer for Memory write-in of data that follows.

The printable character information is transmitted in such order that the last code received is for the character to be printed in the first, or most left-hand column. The counter therefore directs that the first address the Memory column corresponding numerically with the number of characters be transmitted. The counter "counts down" for storage of each character, directing Section 9 to address the Memory columns in descending order. The last code received is thus stored in the first column position of the Memory.

The print cycle is initiated by a PRINT COMMAND pulse from the computer to the Master Timing Generator section. As each character row of the print roll turns into printing position, the Memory is read out, an odd and even column pair at a time, and the data compared with the code wheel data. If a column code agrees with the character code, the associated print hammer is actuated to print the character; if a column code does not agree with the character code, it is rewritten into the Memory. The completion of a Memory scan without a readout, indicating the Memory is empty, initiates paper feed in accordance with the command stored in the Vertical Format section. At the end of the paper feed cycle, the BUFFER READY signal, a logical 0 from the start of the print cycle, returns to a logical 1 as notification that data transfer can again take place.

3-4-2. Load Cycle.

After applying power to the Printer System and before sequencing is complete, a logical 1 on the (-) ON LINE READY line directly sets register A2, assuring that the system will be activated in the off-line state; and a logical 1 on the (-) SYSTEM READY LINE through A24D and A4F, produces a MASTER CLEAR (+) to initiate a clear cycle. On completion of the sequencing, the (-) SYSTEM READY logical 0 is inverted by A24D and A4F to remove a MASTER CLEAR (+) logical 1 allowing "zeroing" of memory. In addition, the (-) SYSTEM READY logical 0, in the absence of paper alarm or yoke open signals lights the PRINTER READY LAMP on the Operator's Control Panel.

A momentary closure of the START switch changes the state of A2 to extinguish the STOP lamps, illuminate the START lamps, and reset flip-flop A4C/A4D. Resetting A4C/A4D generates an ON LINE (+) logical 1 and, through A4E, an OFF LINE (+) logical 0 level. The transition of the A4D output triggers pulser A13A, generating a MASTER CLEAR to initiate a memory clearing cycle. During this clearing, "dummy" print cycle, the Printer Busy (+) logical 1 produces a logical 1 from A24C (01.02.01) which inhibits BUFFER READY (+) to the ZUSE Controller until completion of clear cycle. Upon completion of dummy prin cycle BUFFER READY is transmitted to the Zuse controller, also the 0-to-1 transition of gate C23B triggers pulser A12B to BUFFER READY PULSE (+), and sets the First Word flip-flop A28C/B22D for the First Word (+) logical 1 and (-) First Word logical 0 levels. Transfer of data can now take place.

The SENDING WORD (+) is inverted by F12C and, when applied to A28B enables each inverted INFO SAMPLE (+) pulse to trigger A29, generating a (-) DATA SAMPLE (on transfer of the first word, the inverted INFO SAMPLE pulses are inhibited after the first three 8-bit bytes by an INFO SAMPLE INHIBIT (-) logical 1. The F12C output is also applied to A24A for a PRINT COMMAND INHIBIT (+) logical 1 during the load cycle. The termination of the SENDING WORD (+) pulse provides the (-) SENDING WORD logical 1 to directly reset registers B28 and B29 as the Data Translator Control-A section (01.03.01), and triggers pulser A13B to reset the 1st Word flip-flop after transfer of the first word.

Each serially transmitted 8-bit group of data is processed, four bits at a time, to provide corresponding parallel outputs on the eight SET DATA lines. The data bits and their accompanying (-) DATA SAMPLE pulses change the state of registers C26 through C29 so that after four bits the register outputs present the complement of the transmitted code in parallel form. The (-) DATA SAMPLE pulse also steps counter B28/B29 and, after the third pulse, the gated outputs enable one shot A27. The fourth pulse triggers A27 and resets counter B28/B29. The resetting of B29 changes the state of register B25.

The trailing edge of A27 pulses trigger A26, enabled by the (-) PR BUSY logical 1. The logical 0 output, (-) BIT SAMPLE is gated with the set output of B25, a logical 0 after the first four bits, in C24D and with the inverted set output of B25, a logical 1 after the second four bits, in C23D. The logical 1 pulse from C24D is inverted and gated with the C26 through C29 to place the transmitted code of the first four bits on SET DATA lines 1-4 parallel form. In a like manner, the logical 1 from C23D places the transmitted code of the second four bits on SET DATA lines 5-8. Each eight bit frame of data on the SET DATA lines is stored in Data Storage for further processing.

The trailing edge of the inverted logical 1 from C22D triggers one shot C21, sending a (-) CHAR SAMPLE pulse to Vertical Format Control for processing the format information in the first eight bits of the first word. The trailing edge of the (-) CHAR SAMPLE pulse triggers one shot B23 to produce a DATA RESET in Write Control for clearing the Data Storage flip-flops. Because resetting B25 steps counters B26 and B27, a logical 1 is placed on lines DC2 and DC4 after the first eight bits to inhibit the function of the (-) CHAR SAMPLE pulse in the Vertical Format section. The outputs of the counter and B25 are also gated in C2A/C24C for a (-) PRESET COUNTER I pulse after the second eight bits; and in C25A/C25C for a (-) PRESET COUNTER II pulse after the third eight bit group. These pulses initiate the setting of counters in accordance with the decimal information conveyed in the second and third bytes of the first word for a line of print. After the third byte, gate C23A/C23C produces an INFO SAMPLE INHIBIT (+) logical 1 inhibiting the remaining illegal fourth and fifth bytes in that word.

The functions of the format and counter pulses are inhibited the first word by a (-) 1st WORD logical 1 level. All the registers are initially positioned by a PRINT FINISH pulse after the preceding print cycle and returned to that state on termination of each SENDING WORD pulse. After transfer of the first word, the inverted (-) 1st WORD logical 1 enables E18B and E18D to Write Control. Subsequent triggering of C21 after each byte produces write ODD (+) and (-) WRITE ODD or WRITE EVEN (+) and (-) WRITE EVEN levels, as directed by ODD and EVEN signals from Master Control, to write the data into memory. If the decimal excess three code for a blank space (88) is transmitted, a logical 1 from A28A inhibits generation of write-in pulses. In the print cycle, the ODD and EVEN signals are inhibited by the PR BUSY logical 1 level. The REWRITE SAMPLE pulse generates both odd and even groups of write-in pulses to restore the data unless inhibited by a COMPARE ODD or COMPARE EVEN logical 1. The following READ RESET pulse produces the DATA RESET to clear DATA Storage.

The printable character information is transmitted so that the last character received is for the first, or left-most column. The Memory Address (Units, Tens, and Hundreds) sections must therefore be directed to first address the Memory column that corresponds to the number conveyed in the second and third bytes of the first word for a line of printout.

The (-) PRESET COUNTER I pulse is gated with the logical 0 and 1 outputs of the Even Data storage flip-flops to set one of five low-order registers (02.05.01) and Memory Section Select register E24 to direct the Memory Address subsections and write-in pulses. The outputs of EVEN DATA storage flip-flops, (+) and (-) ED5-8, are also gated with (-) PRESET COUNTER I to set one or two of 17 high-order registers.

Because the (-) WRITE COUNT that changes the state of E24 occurs before the write-in of data, the counters are set for a count of columns that is one greater than the number transmitted. Also, as the "hundreds" information is conveyed in the third eight-bit group, the first seven and the last seven high-order registers are paired. The (-) PRESET COUNTER II pulse is gated with the outputs of the EVEN DATA 3 flip-flops of 02.05.03 to reset one of a set pair as required for directing the memory address high-order drivers. For example: for printout of 120 characters, the second byte would be the decimal-less-three code, 20, and the third byte, 01. On the PRESET COUNTER I pulse, E24 would be reset and low-order register E25 would be set, high order registers F25 and F14 would be set to store 21 and 121 stored. On the (-) PRESET COUNTER II level high order register F14 would be reset leaving F21 set and 121 stored. The (-) WRITE COUNT pulse preceding write-in would change the state of E24, which in turn steps counter to a count of 120 directing storage of the first character received into the 120th column position of Memory.

After transfer of the first word, each (-) WRITE COUNT level enabled by the 1st WORD (-) logical 0 level changes the state of E24; and each reset-to-set transition triggers D19, enabled by the (-) 1st WORD logical 1. The logical 0 output, gated with the PR BUSY (+) logical 0, produces a logical pulse to step the low-order counting, directing address of the Memory column in descending order. When E25 resets, E29 is set, well as the next lower register of the high-order counter to continue the "count down". The COUNT (+), EVEN (+), (-) CX1, 2 and (-) C1-10 levels are sent to the Set Alarms function (01.06.02) to initiate an alarm if the number of characters received exceeds the number specified in the first word.

A logical 1 on a SET DATA line sets the associated Odd and Even Data Storage (02.01.01 and 02.01.02) flip-flops to store the 8-bit frame of data for processing. The flip-flop outputs are decoded for format, column and alarm information. After the first word, the set logical 0 outputs are gated with a (-) WRITE ODD or (-) WRITE EVEN in the Data Write-Rewrite (02.02.01) subsection to trigger half-current core drivers (CD200), energizing a Memory data line for storage, with the storage flip-flops being reset after each character by the DATA RESET level.

The magnetic core storage (Memory) is wired in two 8 x 80 arrays to provide storage of eight data bits in each 160 column positions, one array for the odd numbered columns and the other array for the even numbered columns. The memory address, directed by the Master Counter described above, activates the required column for write-in and readout functions. This is accomplished by means of a set of high-order core drivers and two sets of low-order core drivers, one for write-in, the other for readout. The high-order drivers

are connected to the "high" end of groups of ten "write" and "read" column lines, an odd and even line in series, and the low-order drivers are connected to the "low" ends of corresponding "write" or "read" lines in each group of ten lines; thus only one set of odd and even column lines can be activated for write-in or readout. (See Figure 3-1.)

For example: if column 15 is required for write-in, H20B is energized to connect the "high" end of the "write" lines of column positions 11-20 to the -18V RTN; and H15A a "half-current" driver, is energized to apply the CD LOAD output to the low end of the "write" 5-6 line in each of the 12 groups of 10 lines. Only the 5-6 line of the 11-20 group (column positions 15 and 16) completes the circuit. The WRITE ODD pulse places a "half-current" on the required data lines of the odd section of the Memory. As column 15 is the only odd column through which the address "half-current" is flowing, only the state of cores in that column position can be changed by a data line "half-current" to store a logic 1 bit.

Columns for readout are addressed in a similar manner. However, the read low-order drivers furnish a "full current" that resets any set core of the addressed odd and even column positions, the change of state of a core induces a signal on the associated "sense" line for processing. The required high-order driver is activated by a logical 1 on a line from the high-order counter. The required low-order driver is activated by a logic 0 from the low-order counter gated, for write-in, by an inverted WRITE ODD or WRITE EVEN pulse or for readout, by (-) a READ SAMPLE pulse. This last pulse is inverted to provide the ODD-EVEN SA STROBE for the read/write sense amplifiers in 02.01.01 and 02.01.02.

In the Test mode exceeding, the Memory capacity generates a SET ALARM II. (-) SET ALARM II is gated with (-) TEST to furnish the TEST PRINT signal that initiates a print cycle, see subsection 3.4.3.

3.4.3. Print Cycle.

With the equipment ON LINE and not in a paper feed cycle; the INPUT INHIBIT (+) is a logical 0 of C10A in 04.01.02, which is the case of the PRINT COMMAND INHIBIT (+) line after termination of the SENDING WORD pulse. The PRINT COMMAND (+) from the computer which is inverted in the F12B IN circuit, produces a set level from C10B for the PR Busy flip-flop and a logical 1 on the PRINT (+) line. On termination of the PRINT COMMAND, the logical 0 from C10B is gated with the (-) PR BUSY from the flip-flop, and a logical 0 on the VF BUSY (+) line from Format Control to provide PRINTING (+) level to enable one shot C9.

The next code wheel strobe pulse triggers C9 and the trailing edge of the output pulse triggers C8. The logical 0 output of C9 is inverted for a PR PRESET (+) C8 to set the Read and Print Finished Control flip-flops, provides CHAR SYNC (+) and, through C12F, the (-) C. W. Sample pulse. The logical 0 output of the Read flip-flop after the delay of C8 furnishes a logical 0- to -1 transition from E12D to trigger C16 and E6/F10. E6 and F10 establish a delay in which to "time" the "Read Clock" to the speed and skew of the Print roll. Each logical 0- to -1 transition of E12D also initiates the sequential firing of high speed one-shots series C16 through C15, ("READ CLOCK") producing in turn the (-) READ SAMPLE, COMPARE SAMPLE (+), (-) COL COUNT, and READ RESET (+) and (-) READ COUNT pulses.

On the eightieth set of these pulses, the (-) CX 1, 2 and (-) C1-C10 inputs to J19D are logical 0 indicating that a memory scan is complete. The logical 0 from C18 produces a logical 1 to reset the Read flip-flop and place an inhibiting logical 1 on F12D. The J19D output is also applied to one-shot C14 in Print Control (04.01.02). However, as stored information is read out of Memory, one or more OD1-ED8 inputs from the Data Storage flip-flops are a logical 1, resetting the PR Finish flip-flop and removing the logical 1 gate from C14.

Each subsequent (-) C. W. CHAN 1 pulse initiates a similar cycle until the Memory is emptied. The OD1-ED8 inputs then remain at logical 0, the PR FINISH CONTROL remains set to gate C14, and the J19D output triggers the one-shot on completion of the scan. The logical 0 output forms the (-) PR FINISH and PR FINISH (+) pulses and the terminating transition triggers pulser C13A to reset the PR Busy flip-flop, ending the print cycle. The PRINT FF (+) levels sets Print Governor flip-flop D3D/D3F to place a logical 0 on short delay timer B24, allowing it to start its cycle. The 18 millisecond delay inhibits the print cycle to allow the hammer time to recover from a previous actuation. The initial setting of PR Busy flip-flop placed, through E11D and B21D, a logical 0 on the short delay timer A25, allowing it to start its cycle. If, due to storage of an invalid code, the flip-flop is not reset, A25 generates a pulse to set the Clear Memory flip-flop for CLEAR MEMORY (+) command. When the Memory is cleared, C14 is triggered at the end of the scan to reset the Printer Busy and Clear Memory flip-flops.

A CLEAR BUFFER (+) pulse, inverted and gated with logical 0 inhibit levels, or a MASTER CLEAR (-) pulse sends a CLEAR (+) signal to Format Control, assures the Read flip-flop is reset, sets the Pr Busy flip-flop to initiate a print cycle for reading out the Memory, and sets the Clear Memory flip-flop for a CLEAR MEMORY (-) logical 1 level to inhibit printing and rewrite.

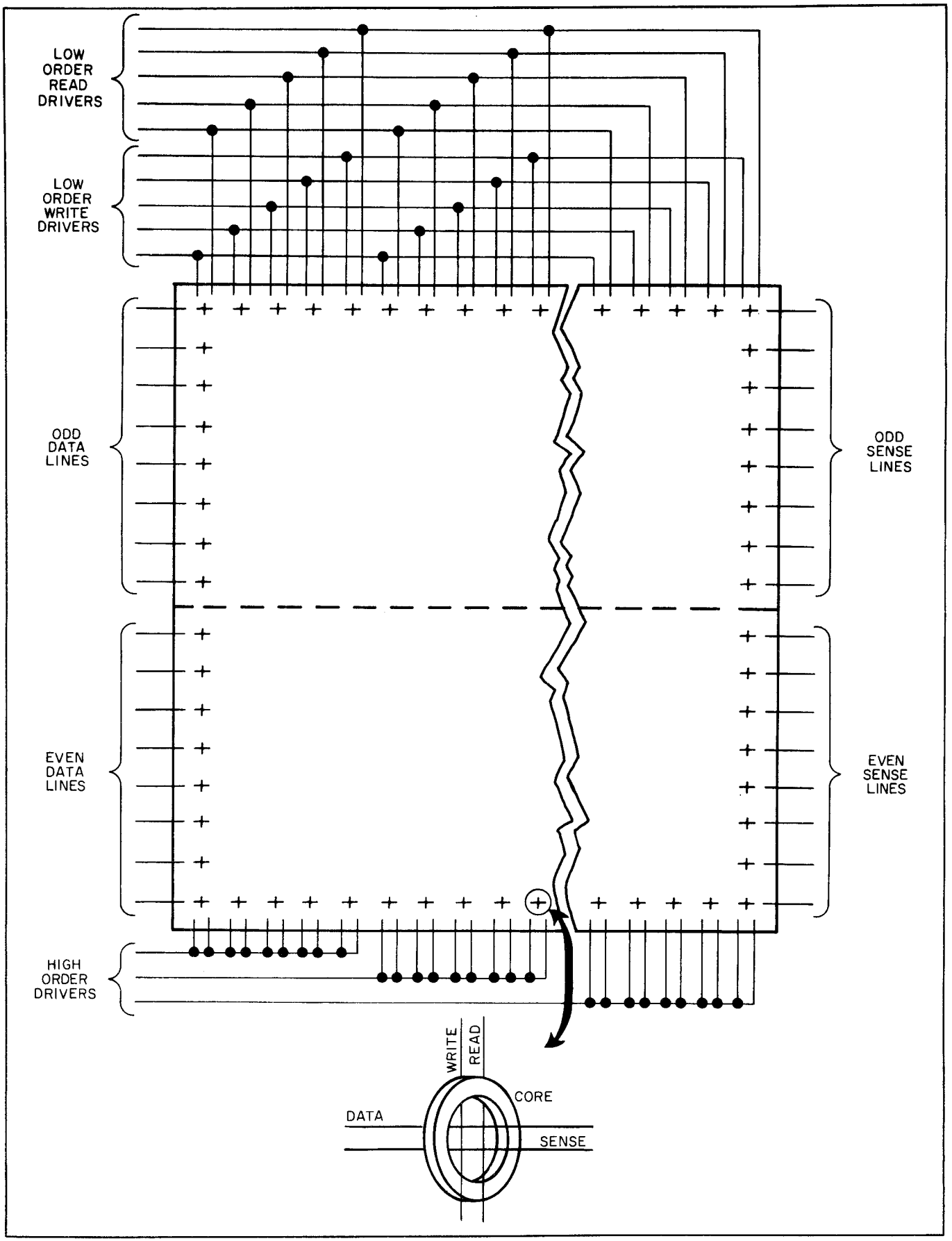


Figure 3-1. Principles of Memory Addressing

As each character row on the print roll turns into the printing position, a PR PRESET pulse resets all the registers and the CHAR SYNC pulse that follows sets the counter to direct the addressing of maximum Memory column positions. Each READ COUNT pulse is inverted to step the registers, directing address of the Memory column positions, an odd and even pair at a time, in descending order. The outputs of the registers are also used for addressing the hammer drivers. After all characters have been printed out, a PR FINISH logical 1 resets all registers in readiness for the next write cycle.

When each character row of the print roll turns into printing position during the print cycle, the PR PRESET (+) pulse generated resets the CW1 STORE-CW8 STORE flip-flops (04. 02. 01). The (-) CW SAMPLE pulse that follows is gated with the signals on the (-) CW CHAN 2 thru (-) CW CHAN 9 lines to set flip-flops in correspondence with the character code from the printer code wheel. As each odd and even Memory pair is addressed and read out, the (-) and (+) outputs of the Odd and Even Data Storage flip-flops are gated with the (+) and (-) outputs of the CW1 STORE - CW8 STORE flip-flops for comparison. Only on agreement of the readout code with the character code will all the outputs of a set of comparator gates be logical 0 which, combined with CLEAR MEMORY (+) and (-) PR BUSY logical 0 levels, will produce COMPARE ODD (+) or COMPARE EVEN (+) logical 1 signals for inhibiting rewrite of the data.

The hammer drivers that actuate the print hammers are wired in an 8 odd col. and 8 even col. by 10 zones matrix. During the Print cycle the Master counter is decoded by means of the C Reg to select each of the 10 zone in sequence.

The B Reg decodes the Col. Counter (of 04. 08. 02) which is initially preset by PR PRESET. After each Compare Sample the col. counter steps. When the B Reg completes it's count (8 odd and even col.) the C Reg is cleared and the Master counter is again decoded for the next Zone. The B Reg is gated with Compare Odd and Compare Even to generate the trigger(s) for the Hammer Driver(s) in the enable Zone.

If the code readout of the Memory does not agree with that of the character, the COMPARE ODD (+) or COMPARE EVEN (+) signal is a logical 0 enabling rewrite of the data into the Memory for readout and comparison with the next character code. The inverted logical 0 from E11B or E12B, also produced by a CLEAR MEMORY or (-) PR BUSY logical 1, inhibits the odd or even group of circuits, preventing printout.

3. 4. 4. Paper Feeding Cycle.

Only after transfer of the first byte of the word does the (-) CHAR SAMPLE level find all the B12A/C inputs (03. 02. 01) at logical 0, enabling it to produce to a VF SAMPLE (+) logical 0 for selecting the Vertical Format Channel (03. 03. 01) Select flip-flops. If the format code 0011 (signifying no paperfeed) is transmitted from the processor, a logical 1 from B7F inhibits the setting of the Single Space flip-flop; otherwise this flip-flop is set by the VF SAMPLE (provided VF INHIBIT has not been activated by an illegal excess code) through C7D, and as any other flip-flop having a logical 1 decoding gate output. (Of the 16 binary combinations from 0000 to 1111, the first and last three are illegal. Thus, the codes for format control are as follows:

0, 1, 2	-	illegal
3	-	no line feed
4	-	single space
5	-	double space
6	-	channel 1 (top of form)
7	-	channel 2
8	-	channel 3
9	-	channel 4
10	-	channel 5
11	-	channel 6
12	-	channel 7
13, 14, 15	-	illegal

A set vertical format control flip-flop produces a logical 0 from C2A and C2D in Paper Feed Control which is gated with the output of the Paper Feed Inhibit flip-flop. Reset by the preceding BUFFER READY (+) logical 1, this output is an inhibiting logical 1 until the PR FIN (+) pulse at the end of the print cycle sets the flip-flop. Removal of the inhibit level produces the PAPER FEEDING (+) and VF BUSY logical 1 signals, and the (-) Paper Feed logical 0 command that initiates paper advance.

The first (-) 6 LINES STROBE, indicating a line of paper feed has occurred, resets the Single Space flip-flop, enabling one-shot A18. If the Double Space flip-flop is set, the 2nd strobe will then trigger A18 to reset the flip-flop. A channel-selecting flip-flop is reset on receipt of the photodiode input which signifies that channel on the type has been reached. When all control flip-flops are reset, the logical 1 from C2A and C2B terminates the PAPER FEEDING (+) signal and (-) FEED PAPER command. The transition of D3B output triggers one-shot A16 to hold the VF BUSY (+) signal at logical 1 while the paper comes to rest. Short delay timer A20 is also fired to inhibit the (-) FEED PAPER command.

During the paper feed cycle, the logical 0 output of D3B allows LD+C20A to start cycling. If paper feed is not terminated within one second, the long delay timer generates a pulse that sets the Paper Feed Runaway flip-flop. The set output furnishes a logical 1 signal that energizes the Paper Runaway lamps, generates a signal that extinguishes the PRINTER READY lamps and places the system off-line. Closure of the TOP OF FORM switch triggers A19 to set the Channel 1, and Paper Feed Inhibit flip-flops for advance of paper to the top of form position as signaled by the (-) CHANNEL 1 line. In testing, each (-) PR FINISH pulse sets the Single Space flip-flop for single line advance and an END TEST (+) pulse moves paper to the 2nd top of form position. (To clear test copy from printer.) In each instance, if a CLEAR (-) signal is present, a logical 1 level is fed to the Paper Runaway flip-flop to insure its reset state and inhibit an alarm.

3.4.5. Test Generation

The SYSTEM READY (+) logical 0, after application of power and before sequencing is complete, assures that the system is activated with the Test Control flip-flop (04.08.01) in the reset state. The PR FINISH (+) pulse at the end of the clear cycle assures that register A9, A10 and A11 (04.08.02) are directly set.

If SYSTEM READY (+) is a logical 1, closing the TEST PRINT switch on the control panel, with the system off-line, sets the Test Control flip-flop for a (-) TEST logical 0 level. The transition of (-) TEST, inverted by gate B/4A/C, triggers A12A for a TEST PRESET (+) logical 1 to preset the Master Counter for a load cycle, and fires one-shot A7. The logical 0 output of A7 is inverted and steps the Test Data and Column Counter that sequences the data, and trailing edge triggers A8 for TEST SAMPLE pulse. The TEST SAMPLE (+) is sent to Load Control where it initiates a (-) DATA SAMPLE as described in subsection 3.4.2., and, on termination produces a 0-to-1 output transition at B14A to retrigger A7 for another set of pulses. The A8 output inhibits the retriggering of A12A.

The inverted outputs of the counter registers are so gated with the R1 TEST SWITCH outputs that, as the counter is stepped, the 0 or 1 state of each switch in sequence is represented by the level on the TEST DATA line. A7 and A8 continue the stepping of the counter and the production of TEST SAMPLE pulses until, when the Memory is filled, a PR BUSY logical 1 inhibits their regenerative action, as does the PAPER FEEDING logical 1 at the end of the print cycle. When the paper feed cycle is completed, the return of the PAPER FEEDING signal to logical 0 produces the 0-to-1 transition of the B14A output to start another load cycle.

Test operation continues until STOP CONTROL is pressed which sets the STOP FF allowing the next 6LPI STROBE to reset the test CONT FF. The logical 1 output triggers A5, sending an END TEST pulse to 03.01.01 that commands advance to paper to the 2nd top of form position.

3.4.6. Alarm Generation

Each eight-bit group of a "word" is composed of two sets of four bits. Of the sixteen combinations in the binary sequence from 0000 through 1111, the first three and last three are INVALID. The (-) and (+) outputs from the Odd Data Storage flip-flops (01.06.02) are so gated that the transmission of an invalid combination produces a logical 1 output from B19A-B19D. This output furnishes a VF INHIBIT (+) signal for Vertical Format Control and, inverted and gated with a CHAR SAMPLE pulse, sets the ALARM I flip-flop for an ALARM I indication to the computer. The INPUT INHIBIT (+) logical 1 level resets the flip-flop and, in the off-line state, inhibits the generation of an ALARM I signal.

An ALARM II signal is sent to the computer if the number of printable character codes transferred does not agree with number stated in the first "word". When the first column position of the Memory is addressed, the inputs at J18D are all logical 0, producing a logical 1 to enable one shot B17; an additional COUNT pulse triggers B17, setting the flip-flop. If a print command is received before the first column position is addressed, the PRINT pulse generated, gated with the J18D logical 0 output, sets the ALARM II. In either case, the set flip-flop generates an ALARM II logical 1 signal for the computer. The flip-flop is reset by the PR FINISH logical 1 pulse. In the off line state, the OFF LINE logical 1 level inhibits generation of an ALARM II signal.

With the system on-line, a momentary closure of the STOP switch changes the state of A2 to extinguish the START lamps, illuminate the STOP lamps and place a logical 0 on pin 15 of A4C. If the switch was closed during a load cycle, the following PR BUSY logical 1 sets flip-flop A4C/A4D for ON LINE logical 0 and OFF LINE logical 1 levels. The setting of A2 also places a logical 0 on LDT C20B, allowing it to cycle. If a PR BUSY signal is not received during the delay period, C20B generates a pulse to set A4C/A4D, placing the system off-line.

CHAPTER 4

OPERATION

4-1. STARTING PROCEDURES.

The following procedures serve as guide in placing the Printer System on line from a shutdown condition:

1. Place MAIN POWER circuit breaker switch of Sequencer in the ON position. Observe that OFF indicator is illuminated on control panel.

2. Press ON pushbutton of Operator's Control Panel for two seconds, and observe that the indicator remains illuminated by green lamps. Note that the ALARM STATUS and OFF indicators are extinguished, and that the fan and printer motors operate.

3. Load format tape, paper and ribbon as required.

4. Position TEST DATA switches on logic rack at the octal code for the letter "M".

5. Momentarily press TEST PRINT switch on Operator's Control Panel and adjust penetration and phasing controls on the printer (Section 2-1) for the desired density of printing (see Figure 4-1 below).

CAUTION

The phasing control has a degree of freedom of + one character. Make fine adjustments of a few degrees at a time so that a character will not be "phased-out", resulting in the loss of the desired character.

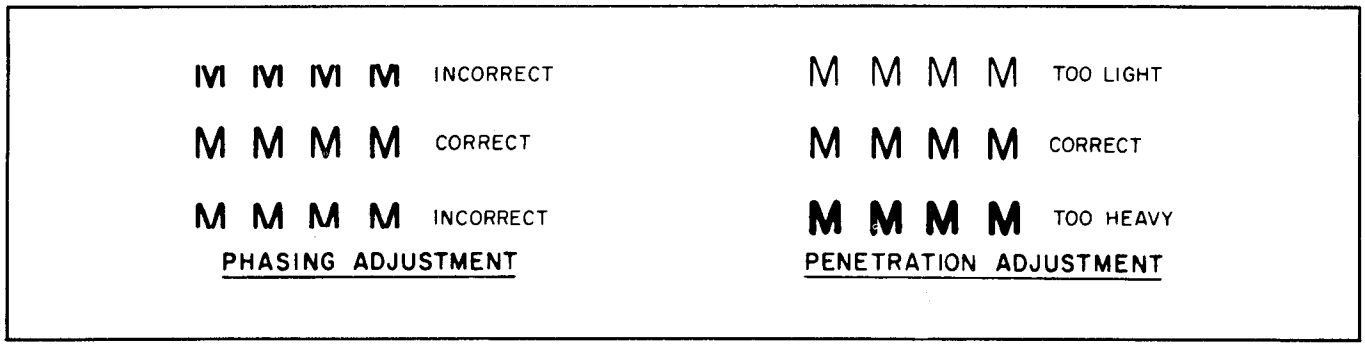


Figure 4-1. Pre-Operational Printout Adjustments

6. When proper adjustment is obtained, press STOP switch momentarily and detach test printout.

7. Press and release START switch and observe that START indicator illuminates.

4-2. OPERATING PROCEDURE.

There is no routine operating procedure. During printout, the density of the print should be examined and the penetration and phasing control adjusted if necessary. Indicators should be monitored and corrective action taken if an alarm condition occurs. When required, the Printer System can be placed off-line by momentarily pressing the STOP switch. Return to the on-line state is accomplished by pressing START switch.

4-3. STOPPING PROCEDURES.

1. Place system off line, if not in that state, by pressing STOP switch.

2. A momentary closure of the OFF pushbutton initiates power turnoff by the Sequencer.

3. Complete shutdown is obtained by placing the MAIN POWER switch in the OFF position.

4-4. VERTICAL FORMAT TAPE INSTALLATION.

1. Place system off line, if not in that state.

2. Momentarily press the TRACTOR INDEX switch to align format and paper feed mechanisms.

3. Open upper-left-side panel of cabinet for access to vertical format unit.

4. Release hold-down plate latch and raise plate.

5. Remove tape in place, if any.

6. Hold tape to be loaded with numbered edge away from printer; insert over drive sprocket, engaging feed holes in tape with pins.

7. Lower hold-down plate, making certain that latch seats.

8. Close left-side panel of cabinet.

4-5. RIBBON LOADING PROCEDURES.

1. Place system off line, if not in that state, by momentarily pressing the STOP switch.

2. Press both yoke drive switches to the OPEN position and hold until yoke motion ceases.

3. Wind ribbon onto the top mandrel.

4. Remove top mandrel by pushing it to the left and lifting out; discard ribbon and mandrel.

5. Holding new ribbon and roll so that ribbon will feed from top side into printer, fit left end onto idler cap; push mandrel to left and engage right-hand end onto drive cap, making certain that drive pins engage slots in mandrel.

6. Unroll about 18 inches of ribbon and feed it down through the yoke opening.

7. Attach leader squarely to empty mandrel, using masking tape or equivalent so that the ribbon feeds from the printer onto the bottom side of the mandrel.

8. Wind on three or more layers of ribbon to secure the leader and to take up any slack.

9. Press both yoke drive switches to the CLOSE position and hold until yoke motion ceases.

10. Press and release START switch to return system to on-line state.

4-6. PAPER LOADING PROCEDURES.

1. Place system off line, if not in that state, by momentarily pressing the START switch.

2. Press and release TOP OF FORM switch to advance paper feed tractors to top of form position.

3. Press both yoke drive switches to OPEN position and hold until yoke motion ceases.

4. Raise tractor pressure plates to give access to drive chain pins.

5. Place stack of paper in bin, so positioned that carbon paper, if any, will face downward as paper is threaded through printer. Pull out about five feet of forms.

6. Feed paper upward through yoke opening; position paper on the pins of the upper tractors so that the top of form is in print line position; lower both upper tractor pressure plates.

7. Pull paper taut and engage feed holes with pins of lower tractor; lower pressure plates and fanfold excess paper into paper stack.

8. Feed the paper over the top of the printer and pass the taut forms through the drive rolls of the paper puller.

9. Press both yoke drive switches to CLOSE position and hold until yoke motion ceases.

10. Press TEST PRINT switch and adjust penetration and phasing control for desired density of printing as necessary.

11. Press and release START switch to return system to on-line state.

4-7. FORMAT TAPE LOOP PREPARATION.

The following is a suggested procedure for the preparation of printer vertical format tape loops. Since formats differ from application-to-application, this procedure is intended to serve only as a guide for those lacking previous experience in tape preparation.

The following special tools and materials are recommended for the preparation of a format tape:

Format Tape Punch (Figure 4-2) - Part No. 120910

Format Tape (Figure 4-3) - Part No. 87723

Elmer's Glue (Borden Co.) (or equivalent)

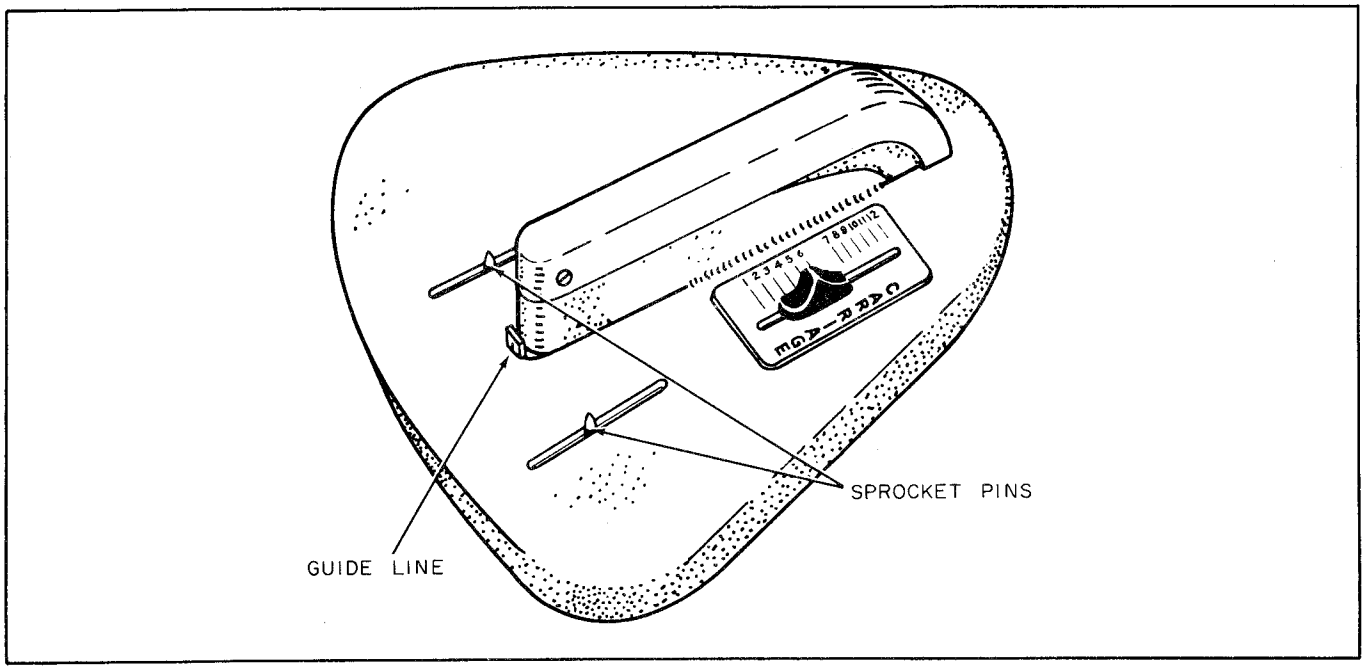


Figure 4-2. Format Tape Punch

The following presents a step-by-step procedure for preparing format tape loops. The steps are:

1. Determine the total number of lines contained on the entire form. This is done by multiplying the length of the form in inches by the number of lines of paper feed per inch. Thus, an 11-inch form in the 6 lpi mode will have 66 lines (6 x 11); a 17-inch form at 8 lpi 136 lines, etc.

2. Take a sample form and rule in all the lines. Number each line.

3. Cut off a strip of format tape containing three more sprocket holes than the total number of lines of the sample form (always cut across the middle of the sprocket hole). Each sprocket hole on the tape corresponds to a line on the form, so that a tape for a 66-line form should have 69 sprocket holes. The extra holes are used in splicing the ends of the format loop. In cases of small forms, such as 3-inch, 18-line form, it is common practice to format the form a multiple number of times onto a single form. For example, an 18-line form may be formatted three times on a tape containing 57 sprocket holes. In any case, the tape must be long enough to loop around the format drum loosely, but not be so long as to catch on protruding assemblies below the format unit.

4. Place the format tape in a vertical position with the column of sprocket holes appearing to the right of the sample form, and visualize the location of the 12 possible channels which may be punched onto the tape. Channel designations are shown in Figure 4-3.

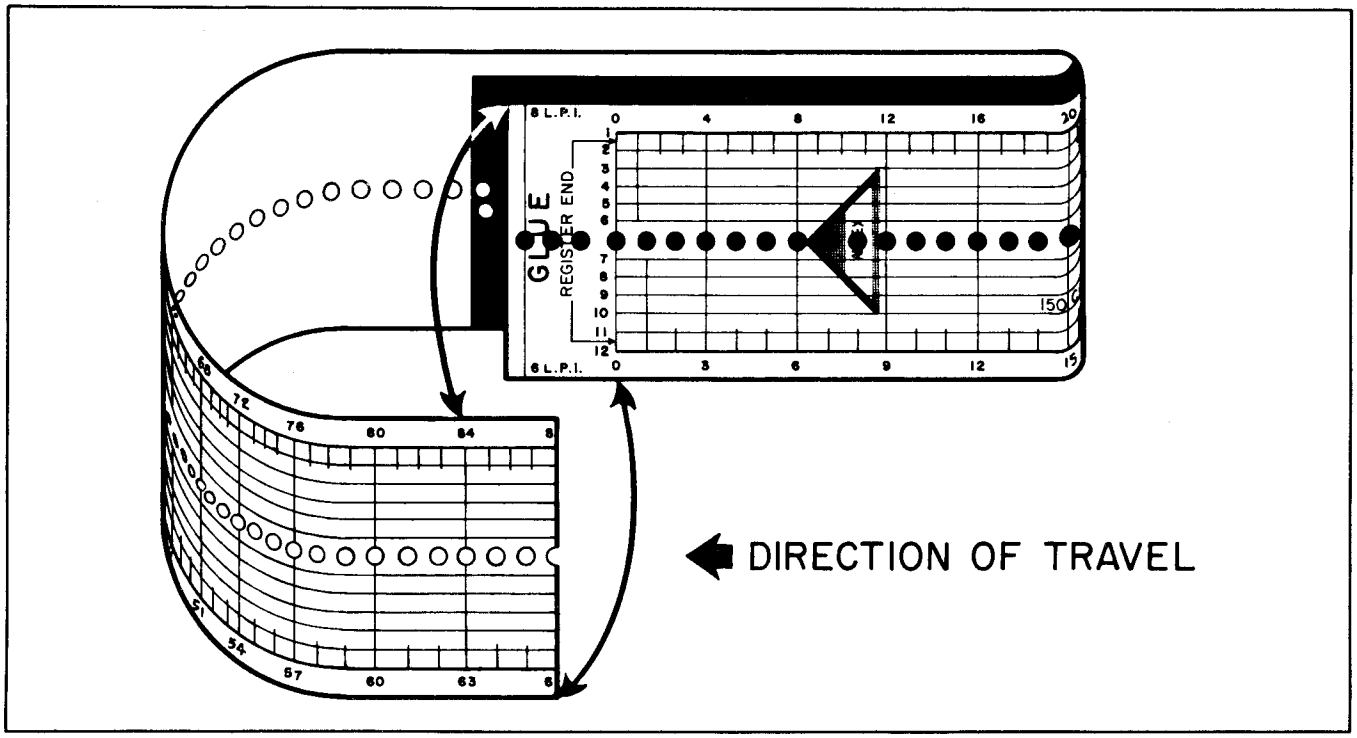


Figure 4-3. Channel Designations

5. Determine the desired format and mark same on the sample form by placing a mark where a line of print is desired. The hole preceding the hole designated as sprocket hole 1 is generally considered as the top of form.

6. Insert the tape into the puncher, aligning the first hole to be punched beneath the punch guide line (see Figure 4-2). The Channels 1-12 are selected by moving the CARRIAGE button.

7. Punch the format hole(s) into the tape by pressing the punch at the desired sprocket hole.

8. Carefully lift the tape off the sprocket pins and advance it through the puncher until the next punching position is reached. Small grease pencil markings made at strategic places on the tape may help prevent losing hole count during tape advancement. Markings should be wiped off after the entire tape is punched.

9. Repeat 7 and 8 until all channels have been punched. If format holes have been punched adjacent to the first sprocket hole, they should be duplicated adjacent to the last or 66th sprocket hole.

10. Carefully remove the tape from the puncher and turn the end of the tape containing the 66th hole in so that the bottom side of the tape becomes the top side. Channel No. 1 should still appear on the right side of the sprocket hole column. With the tape reversed in this manner, engage the 66th sprocket hole with the center sprocket pin of the puncher. Also engage the first sprocket pin with a corresponding hole. This will keep the tape even and aligned for the next step.

11. Apply a thin coat of Elmer's Glue (or equivalent) across the width of the tape adjacent to the 66th sprocket hole. Application may be made with a toothpick.

12. Holding the middle section of the tape firm against the flat portion of the puncher, bring the free end of the tape with the first sprocket hole over and place it above the cemented end. Engage the first sprocket hole with the same sprocket pin protruding through the 66th hole. Align any holes which may have been punched adjacent to the first and 66th sprocket holes so that they complement each other perfectly.

13. Apply pressure to the union until it is held firm.

14. Clean excess cement from tape punch.

CHAPTER 5

INSTALLATION AND INITIAL CHECKOUT

5-1. INSTALLATION.

a. Remove bolts attaching cabinet to skid assembly.

b. Remove equipment from skid; lower caster assemblies and move equipment to selected site. At least three feet of clearance should be provided all around cabinet with two feet of clearance above cabinet.

c. Remove protective covering.

d. Connect power and signal cables, passing cables through openings in bottom of cabinet.

e. Remove the four bolts beneath printer supporting channel to free the printer shock-mounts.

f. Remove screw from lower logic gate pivot support, through gate hinge arm, to free the gate.

g. Level the equipment by turning caster jackscrews, as required.

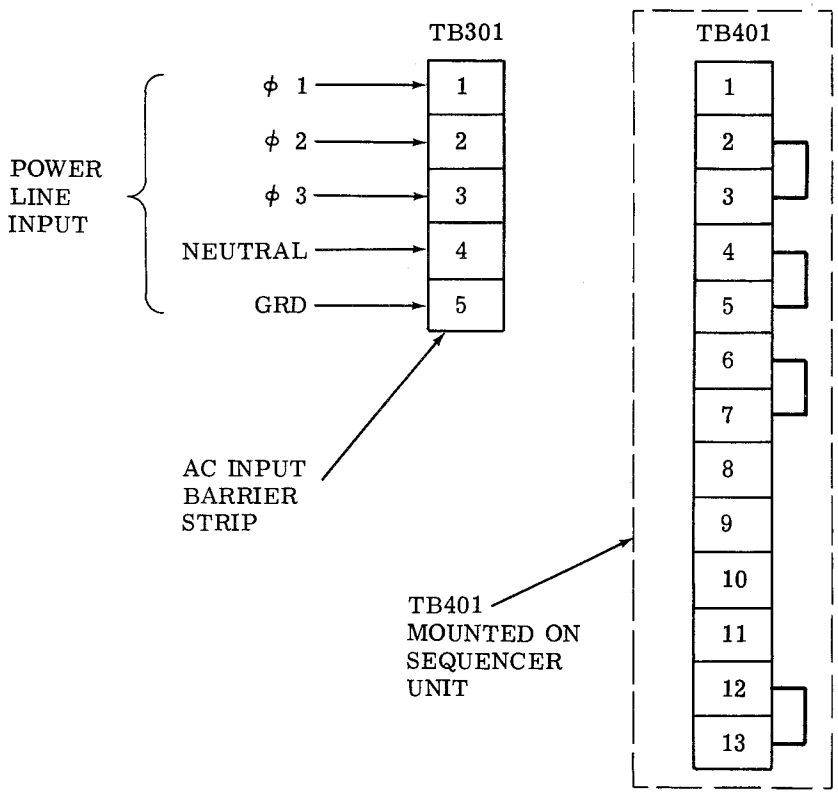
5-2. INITIAL CHECKOUT.

Carefully inspect equipment for obvious faults, such as loose cable connections, PC cards not fully seated, broken wires, etc. After taking any corrective action required, follow the procedures of the Operating Instructions Manual for starting the equipment.

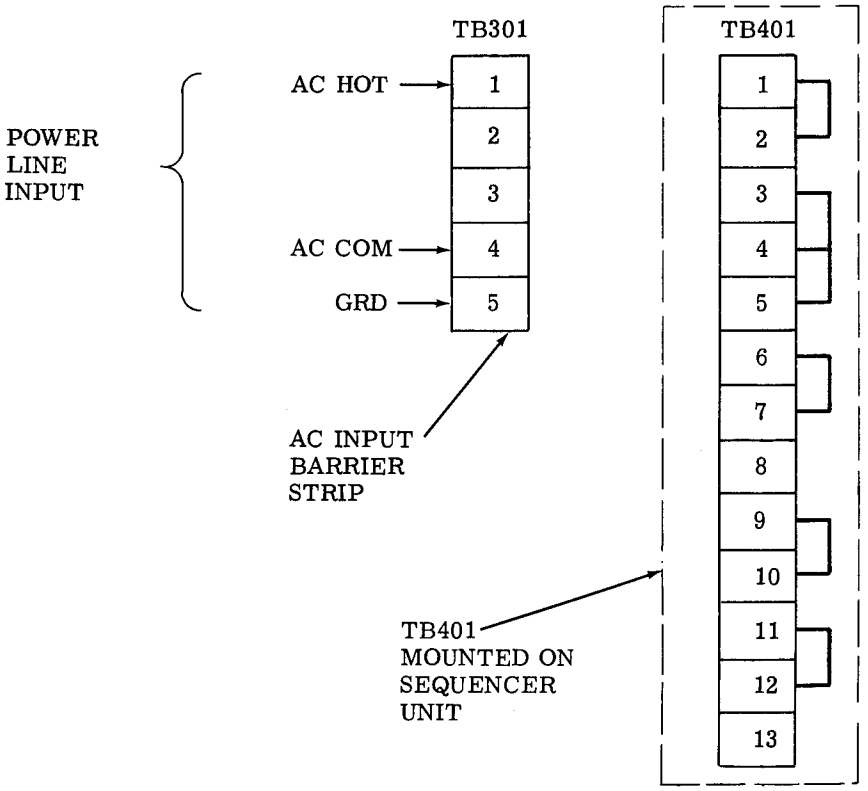
WARNING

INSPECT SEQUENCER TERMINAL BLOCK STRAP TERMINALS 1 THROUGH 13 FOR THE PROPER STRAPPING IN ACCORDANCE WITH THE TYPE OF PRIMARY USED AS SPECIFIED BELOW.

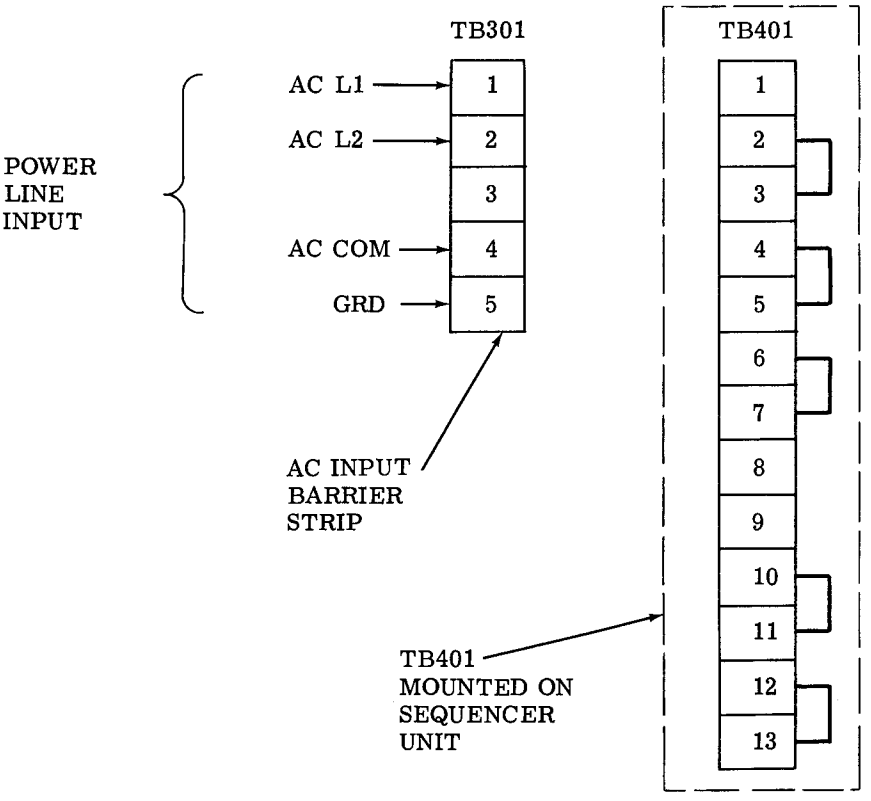
CONNECTIONS FOR 3 ϕ, 208V, 60 CPS, 4 WIRE



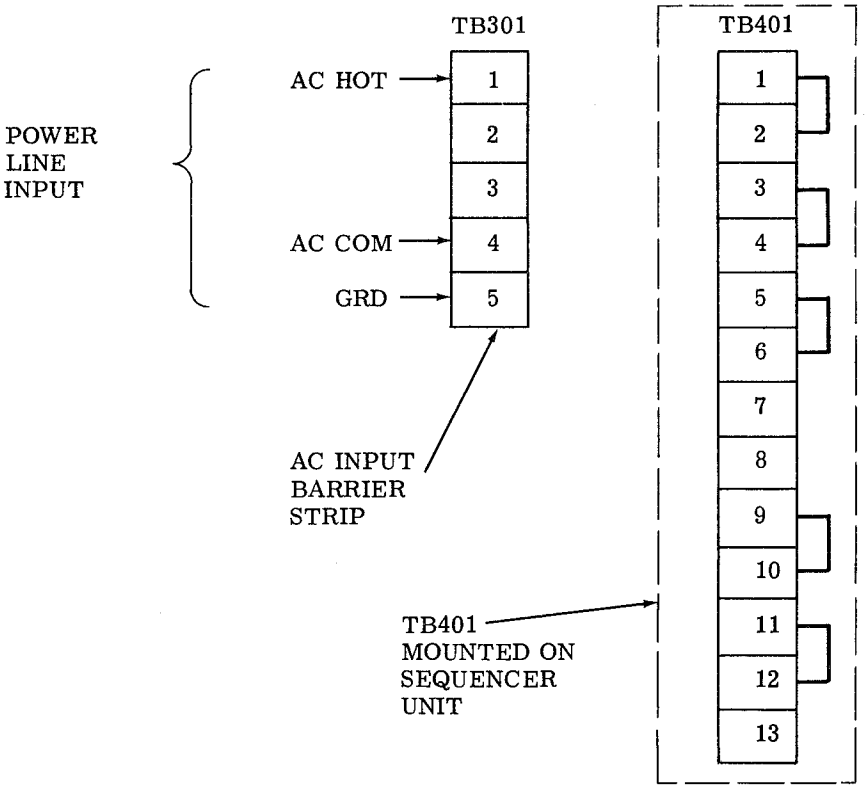
CONNECTIONS FOR 1 ϕ , 115V, 60 CPS



CONNECTIONS FOR 1 ϕ , 220V, 60 CPS, 3 WIRE



CONNECTIONS FOR 1 ϕ, 230V, 50 CPS



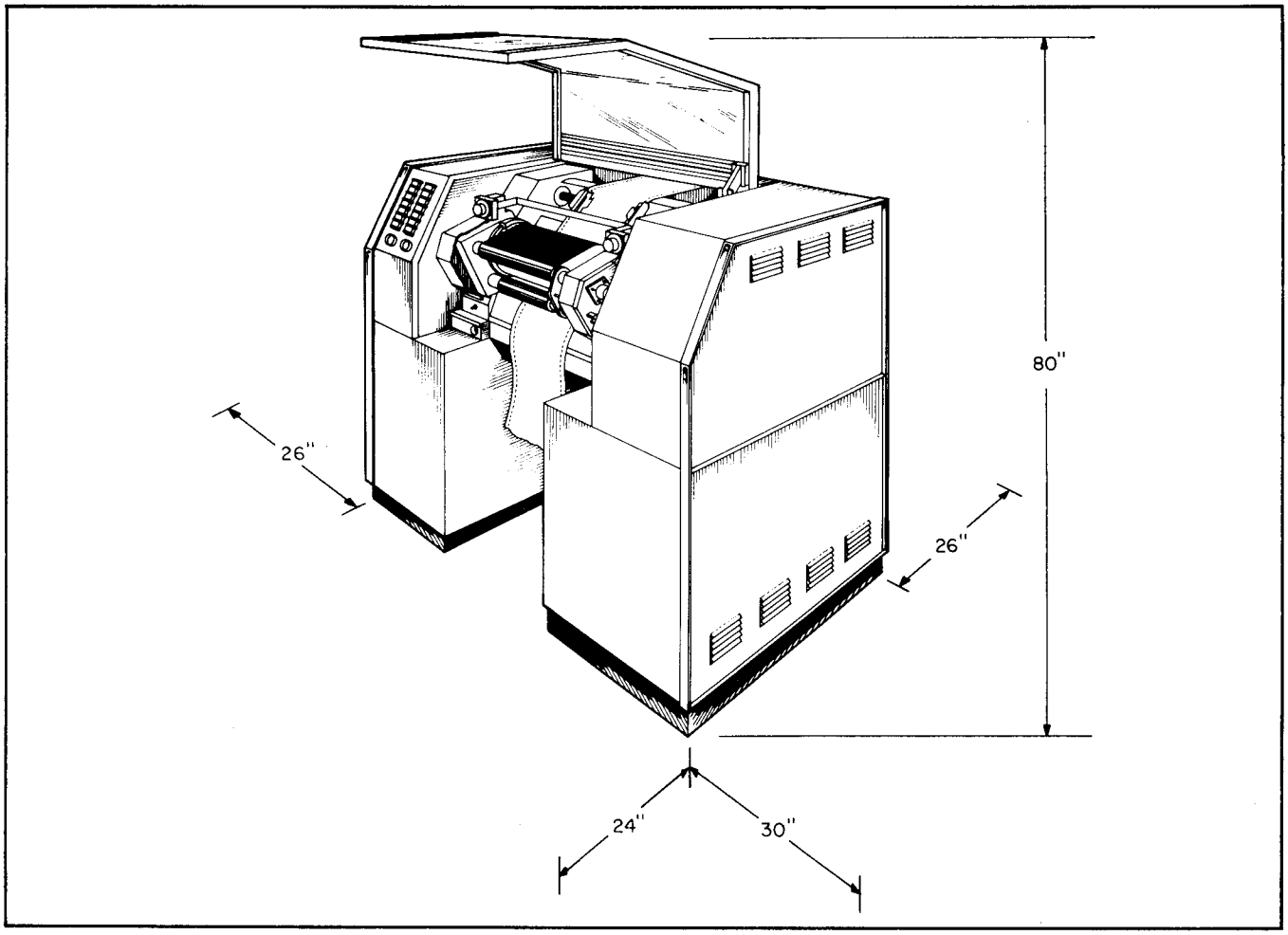


Figure 5-1. Installation Drawing

CHAPTER 6

PREVENTIVE MAINTENANCE

6-1. GENERAL INFORMATION.

It is recommended that the following cleaning, lubricating, and inspection procedures be used in order to keep the equipment in best operating condition. The time schedule given is based on normal operation and environment. If the printer is not used for extended periods of time, the frequency of maintenance operations should be based on time-since-last-performance rather than hours-of-operation. Shorten the time between maintenance operations when the system is operated in a dusty, humid, or hot area. Replace the cover panels as quickly as possible to prevent dust or moisture collecting inside the equipment.

6-2. MATERIALS.

a. Cleaning Materials.

1. Lint-free cloth.
2. Orange stick.
3. Cleaning solvent.
4. Typewriter cleaning fluid.
5. Soft sash-type cleaning brush.
6. Toothbrush-type cleaning brush.

b. Lubricating Materials.

1. Bemol H10XT or equivalent grease.
2. Standard Oil Co. of Indiana LO-17, Gulf Oil Co. Gulfcrest C, or equivalent light machine oil.

6-3. SIXTEEN-HOUR MAINTENANCE.

Perform the following cleaning and inspection procedures after 16 hours of operation or once a week, whichever occurs first.

a. Preparation.

Open all cabinet covers and panels; open yoke; remove paper, inked ribbon and ribbon rolls.

b. Cleaning.

1. Vacuum out all dust from exposed areas and parts, being careful not to damage electrical connections or disturb adjustments.
2. Brush the print roll clean with toothbrush-type cleaning brush.
3. Brush around print hammer heads and armatures with soft sash-type cleaning brush.
4. Vacuum again to remove any particles or dust remaining.

c. Lubrication.

No lubrication is required as part of the 16-hour maintenance procedure.

d. Inspection.

Perform a visual inspection; if any evidence of possible malfunction is apparent, perform the 80-hour inspection.

6-4. EIGHTY-HOUR MAINTENANCE.

Perform the following cleaning, lubrication, and inspection procedures after 80 hours of operation or once a month, whichever occurs first.

a. Preparation.

Open all cabinet covers and panels; open yoke; remove paper, inked ribbon and ribbon rolls.

b. Cleaning.

1. Vacuum out all dust from exposed areas and parts, being careful not to damage electrical connections or disturb adjustments.

2. Wipe exposed areas and parts with a lint-free cloth slightly moistened with cleaning solvent. Clean areas adjacent to electrical connections and places that are difficult to reach with the cloth wrapped around an orange stick.

3. Using a toothbrush-type cleaning brush and typewriter cleaning fluid, scrub the print roll thoroughly, making sure that all characters are clean.

4. Apply air under pressure to all exposed hammer parts. Pay particular attention to the heads and armatures; any dust or paper shavings caught in either place will affect hammer travel.

c. Lubrication.

Perform the lubrication procedure of paragraph 6-5 as part of every sixth 80-hour maintenance routine, that is, once every 480 hours of operation or once every six months, whichever occurs first.

d. Inspection.

Perform the following inspections after cleaning and lubrication.

1. Check all electrical connectors and ground connections.

2. Examine all belts for proper tension and signs of wear. Replace any that appear likely to become unserviceable before the next inspection.

3. Check hammer alignment, adjusting as necessary.

6-5. LUBRICATION.

Once every 480 hours of operation or once every six months, whichever occurs first, perform the following routine as part of the 80-hour maintenance procedure.

CAUTION

Do not overlubricate.

a. Ribbon Drive Assembly.

Place a few drops of light machine oil on the input shaft of the gear reduction box on the right-hand ribbon support assembly.

b. Yoke Assembly.

Place several drops of light machine oil on the yoke pivot pins and yoke link pins.

c. Yoke Drive.

Apply a very light coating of grease to the drive chain.

CHAPTER 7

CORRECTIVE MAINTENANCE

7-1. GENERAL.

This chapter contains instructions for performing corrective maintenance on printer components and assemblies. This chapter is divided into subsections covering the corrective maintenance procedures for each component unit or assembly.

7-2. CONTROL ELECTRONICS.

The only adjustments normally made in the control logic are outlined in the following paragraphs.

a. Clutch and Brake Current Adjustments.

1. Clutch Pulse and Hold Waveforms (refer to Figure 7-1). Test points TP06 and TP07 are provided on the P.F. Control and Sense card to monitor the waveform and amplitude of the pulse and hold currents passing through the clutch coil. The currents are represented by output voltages developed across a one-tenth ohm resistor in series with the coil. The hold currents must be adjusted first.

To adjust the clutch hold current, connect an oscilloscope across TP06 and TP07, program test printing to feed paper advance pulses and then adjust R203 for 0.12 volts on the scope.

To adjust the clutch pulse current, connect an oscilloscope across TP06 and TP07, program test printing to feed paper advance pulses and then adjust R201 for 0.55 to 0.6 volts on the scope.

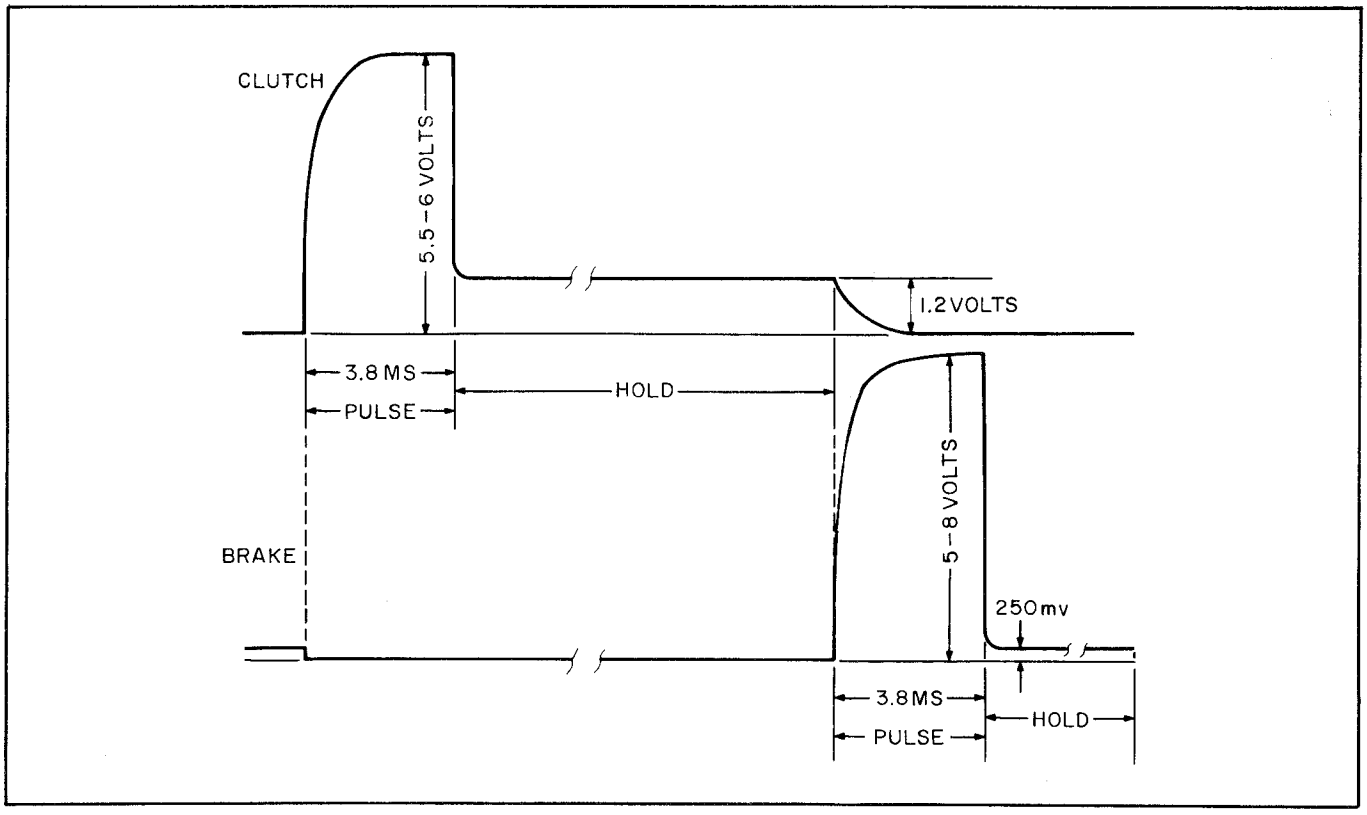


Figure 7-1. Paper Feed Brake and Clutch Waveforms

2. Brake Pulse and Hold Waveforms (refer to Figure 7-1). Test points TP04 and TP05 are provided on the P.F. Control and Sense card to monitor the waveform and amplitude of the currents pulse and hold currents passing through the brake coil. The currents are represented by output voltages developed across a one-tenth ohm resistor in series with the coil. The hold current must be adjusted first.

To adjust the brake hold current, connect an oscilloscope across TP04 and TP05, stop test printing and then adjust R204 for 25 millivolts on the scope.

To adjust the brake pulse current, connect an oscilloscope across TP04 and TP05, program test printing to feed paper advance pulses and then adjust R202 for 0.5 to 0.8 volts on the scope.

7-3. PRINTER.

a. Yoke Adjustments.

The printer yoke should be adjusted in accordance with the yoke alignment procedures below:

1. Print for several seconds without bottom sheet of paper of a multiple part form. The alignment of hammers to print roll will be indicated on the face of each hammer. See Figure 7-7 G.

2. Remove ribbon cover.

3. Loosen locking setscrew (Figure 7-2).

4. Turn left-hand yoke pivot pin clockwise to move yoke left and counterclockwise to move yoke right.

5. Tighten locking setscrew.

6. Repeat this procedure including printing without bottom paper until the yoke is correctly aligned.

7. Replace ribbon cover.

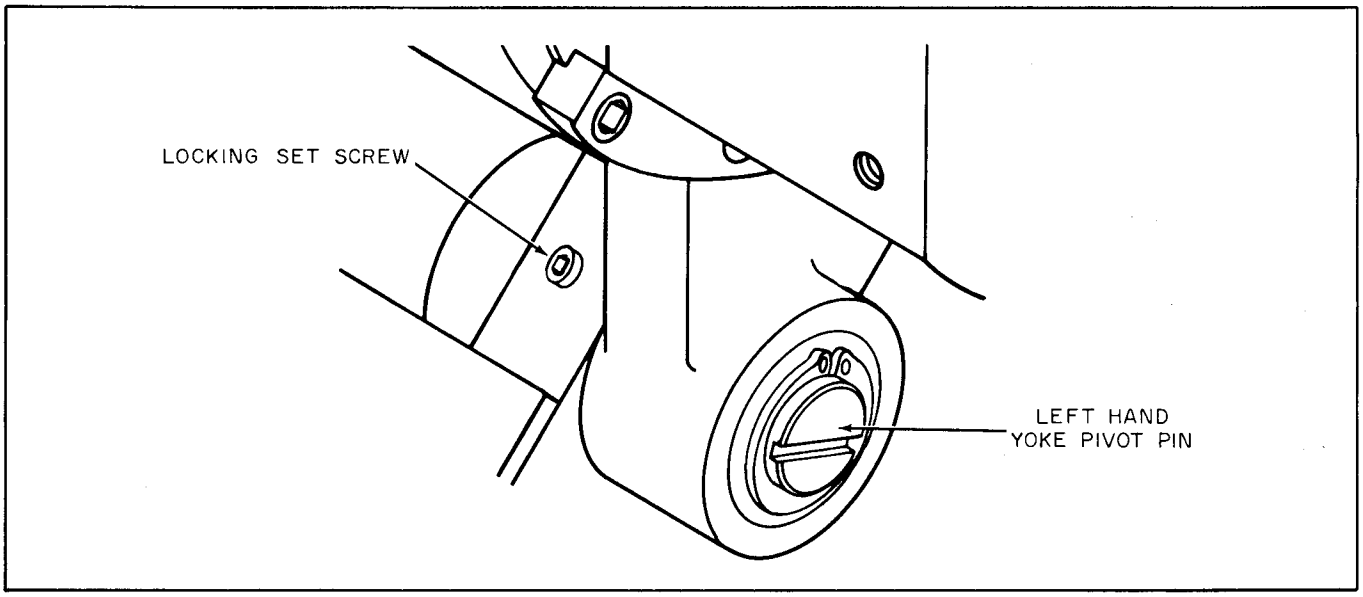


Figure 7-2. Yoke Alignment Adjustment

b. Print Roll Maintenance Procedures.

All required print roll maintenance should be performed in strict accordance with the procedures below:

Removal.

1. Loosen setscrew in print roll pulley (see Figure 7-8) that retains ribbon drive pulley; remove "O" ring ribbon drive belt and ribbon drive pulley.

2. Loosen the three socket head cap screws holding right end bearing retainer to relieve tension on print roll belt; slide belt from print roll pulley.

3. Remove the three socket head screws and bearing retainer; remove wave washer.

4. Remove socket head cap screw on left end of print roll shaft; remove disk clamp, character index disk or code wheel, and flanged spacer.

5. Mark sensing support ring and frame for reassembly alignment; remove ring clamps and sensing support ring.

6. Pry out spring retaining ring.

7. Push print roll pulley and pull on left end of print roll shaft until left-hand bearing is free; pull print roll straight out from ribbon guide.

CAUTION

Do not allow print roll to contact ribbon guide or yoke; such contact can damage engraving.

8. Support removed print roll by wooden V-blocks.

Replacement of Damaged Section.

1. The print roll is dynamically balanced after assembly in manufacture. It is essential on reassembly that parts are returned as nearly as possible to their initial position. As an aid in accomplishing alignment, draw a chalk line along the left-hand spacers, the right-hand spacers and pulley, and note the character row the latter lines up with.

2. Remove the print roll pulley, noting the positions of the three cap screws for reassembly.

3. With a bearing puller, remove the right end bearing.

4. Remove spacers, noting their order for reassembly.

5. Slide print roll sections from shaft, noting their order, until damaged section is removed.

CAUTION

Under no circumstances should a metal screwdriver be used to pry the segments.

6. Replace damaged section and return other sections to their initial positions.

Note

Straight print roll segments can be replaced either end first; make certain that they are properly oriented to avoid inverted printout.

7. Return spacers, in proper order, and align them with each other and the character row noted in Step 1 by the chalk line. Check alignment of left-hand spacers by their chalk line.

8. Start bearing on shaft, making certain that it is positioned squarely.

9. Align chalk mark of pulley with chalk line of spacers; replace cap screws in their proper holes and turn in until slight but equal resistance is met on all three.

10. Fully seat bearing, pulley, and screws by turning each screw, in sequence, a small but equal amount. Remove chalk marks.

Installation.

1. Carefully insert print roll into ribbon guide until left print roll bearing is seated.

CAUTION

Do not allow print roll to contact ribbon guide or yoke; such contact can damage engraving.

2. Insert spring retaining ring.

3. Replace sensing support ring in its initial position, by marks made in a. (5), and secure with replaced ring clamps.

4. Replace flanged spacer, character index disk, and disk clamp; make certain disk and alignment pin are engaged; secure with cap screw.

5. Insert wave washer into right end of ribbon guide, against right print roll bearing, and replace bearing retainer with idler pulley approximately in the "7 O'clock" position.

6. Place print roll belt in position on pulleys; turn bearing retainer until proper tension is obtained, then tighten the three cap screws.

7. Insert ribbon drive pulley into print roll pulley and secure with setscrew. Replace "O" ring ribbon drive belt.

c. Ribbon Feed Adjustments.

Ribbon drive mechanism adjustments are required to change the points of ribbon feed reversal and to obtain correct tension in the ribbon for maximum ribbon life and proper printout.

Ribbon Replacement.

When it becomes necessary to replace the ribbon, follow the procedures outlined in the Chapter 3, Operation.

Ribbon Reversal Adjustment.

The ribbon feed should reverse when 2 or 3 turns of ribbon are remaining on the depleting roll. Use the following procedures as a guide when setting the ribbon reversing point:

1. Feed the ribbon for 2 or 3 cycles of ribbon feed observing reversal points on both ribbon rolls to estimate adjustment required.

2. The microswitch actuating arms have adjusting screws which actuate the microswitch. Turn the screw clockwise to increase, and counterclockwise to decrease the number of turns of ribbon remaining on the roll at reversal.

3. Repeat this procedure of cycling the ribbon and adjusting the microswitch actuators until the ribbon reverses when 2 to 3 turns of ribbon remain on each roll.

Ribbon Tension Adjustment.

Correct ribbon tension adjustment holds the ribbon taut across the printing area to prevent smudged printout, yet does not stretch the ribbon excessively. Use the following procedures as a guide when setting ribbon tension:

1. Remove the ribbon and install an empty ribbon mandrel in the upper position.

2. Secure a piece of string or lacing cord to the locating pin on the ribbon mandrel spindle and wind several turns around the mandrel.

3. Hook a spring tension scale in a loop tied to the free end of the string.

4. Holding the scale firmly, pull scale until mandrel turns. The scale should indicate a nominal value of 16 inch-ounces.

5. Turn the adjusting screw in the pressure block (Figure 7-3), located on the right-hand yoke near the cap roller of the ribbon and roll assembly, clockwise to increase tension and counterclockwise to decrease tension.

6. Repeat the procedure for the lower position until the desired ribbon tension is achieved.

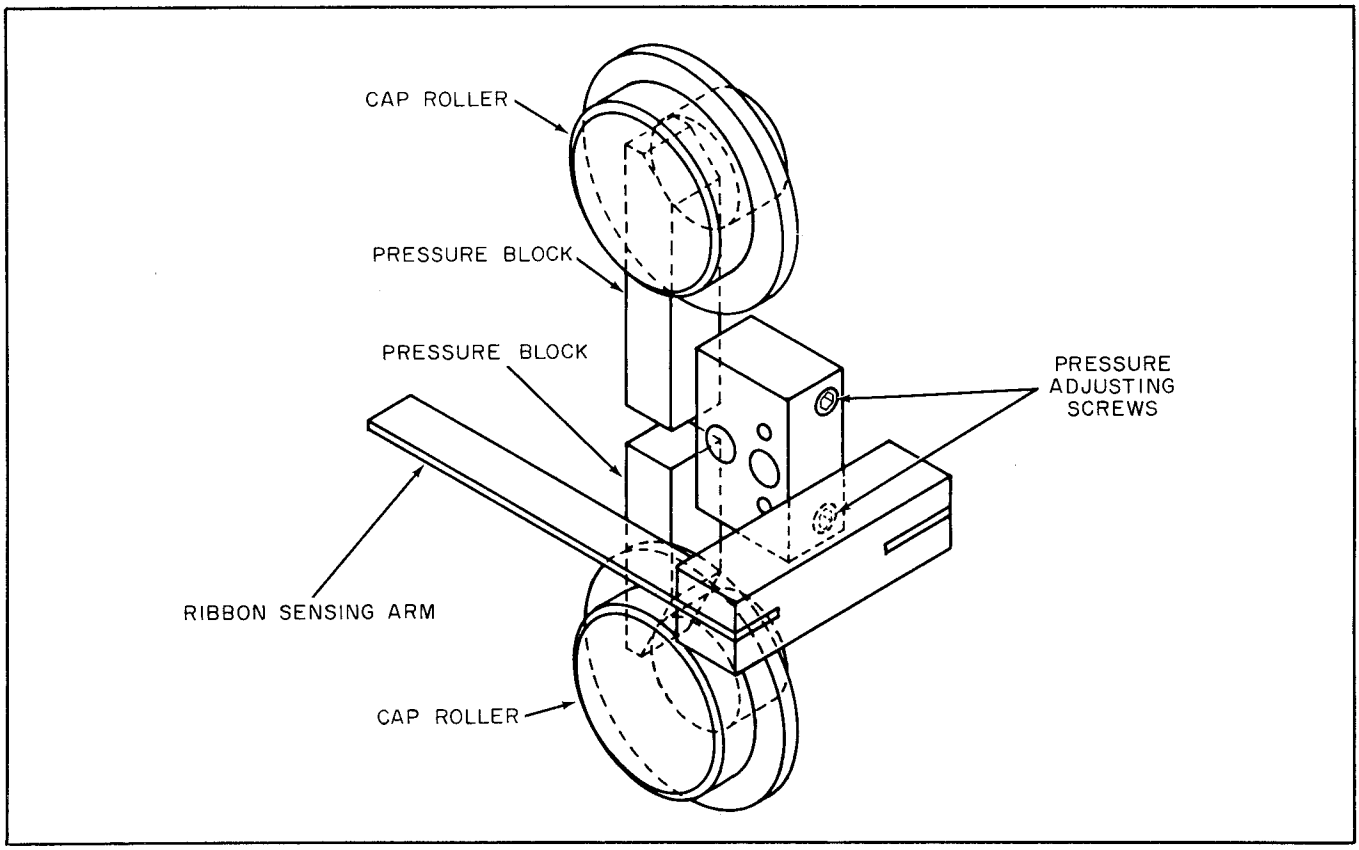


Figure 7-3. Ribbon Tension Adjustment

d. Paper Feed Adjustments.

Pencilscope.

The pencilscope is an aid in determining the condition of the clutch and brake assemblies and the paper drive mechanism. An increase in paper time indicates worn plates in the clutch and brake assemblies, and loose or worn belts. An excessive amount of paper flutter indicates loose belts, loose paper tractor chains, and tractors fitting loosely on the splined shafts.

The pencilscope is also a quick, easy, and accurate method for measuring paper feed time. Paper feed time is important because, during the time paper is being moved, the printer should not receive print commands. If print commands are received at this time, misplaced characters will result. Further, when the actual paper feed time is known, a more efficient use of time in the printer is possible. If, for example, 25 milliseconds is allowed for paper feed and the paper is actually fed in 17 milliseconds, the printer is unproductive for 8 milliseconds. The printer, therefore, is not operating at peak efficiency.

Upon receipt of the printer from ANelex, several pencilscopes should be made to determine the paper feed time. Comparing pencilscopes made after the printer has been in service with the pencilscopes made when the printer was installed will quickly indicate any misadjustments or worn units. The tools required for making a pencilscope are: a ball point pen, straight edge, and metric scale. Use the following procedures for making a pencilscope:

1. Advance blank paper line-by-line through the printer.

2. Draw a line across the paper using the straight edge as a guide. Move the pen at a steady rate. The accuracy of the pencilscope depends on how constant the rate of pen movement is.

3. Repeat Step 2 several times to make an accurate pencilscope.

4. Remove the paper from the printer and place it on a flat surface. The pencilscope trace will be shown in Figure 7-4 Ⓐ. The little waviness just before point B is paper flutter, sometimes called overshoot. For clarity it is shown exaggerated. In most cases paper flutter will not be noticeable in the pencilscope.

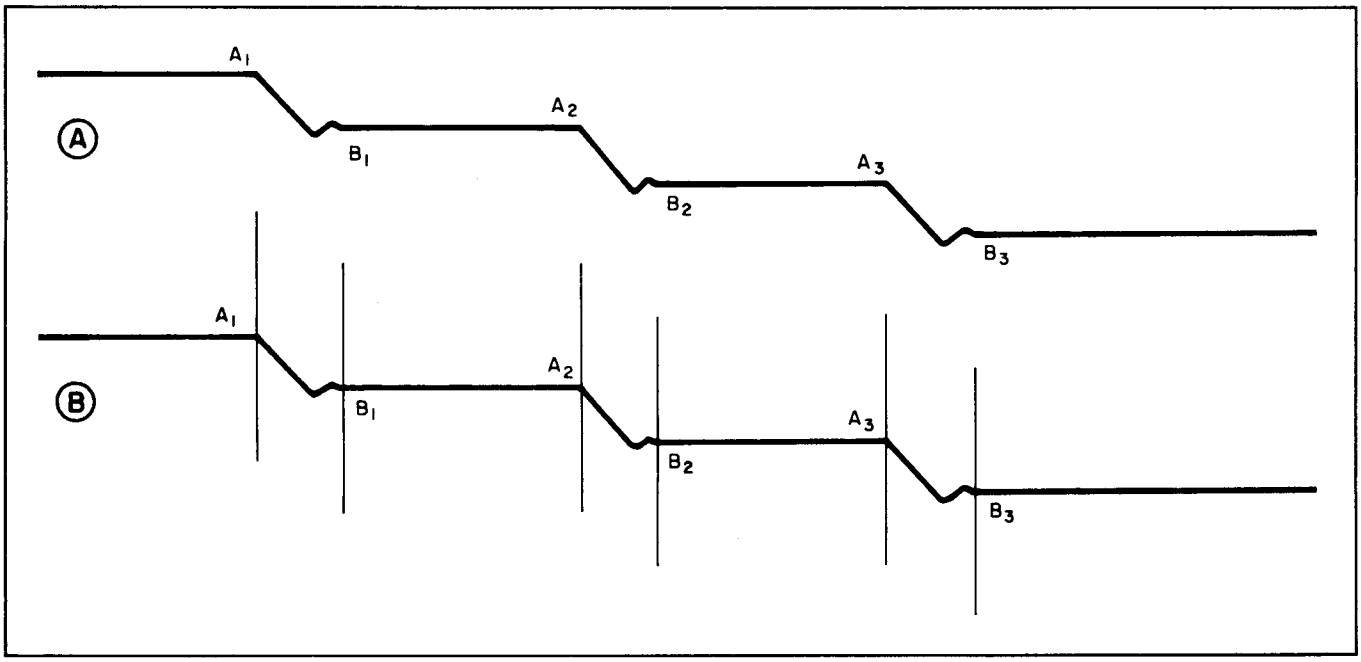


Figure 7-4. Pencilscope Trace

5. Determine milliseconds per revolution of the print roll from the table. For example, if the print roll speed is 1000 rpm, the milliseconds per revolution (mpr) would be 60.0.

6. Draw vertical lines at points A and B on the pencilscope. Make the vertical lines at right angles to the horizontal lines of the pencilscope. The pencilscope will now be as shown in Figure 7-4Ⓑ. The time between line A_1 and line A_2 is the time for one complete print cycle, and the time between A_1 and B_1 is the paper feed time.

7. Place the metric scale diagonally from line A_1 to line A_2 with zero at line A_1 and the mpr number at line A_2. To continue the above example, zero would be at A_1 and 60.0 at A_2.

8. The number on the metric scale at line B_1 is the time in milliseconds for paper feed. In our example, this is 17 milliseconds.

9. The absence of a sharp angle at "A" indicates a worn armature plate or insufficient spring tension on the armature plate in the paper feed clutch or a faulty advance paper signal. An enlarged flutter indicates incorrect belt tension, loose paper tractor chains, or tractors fitting loosely on splined drive shafts.

Paper Drive Clutch.

When the pencilscope as described in paragraph a, above, indicates a worn clutch armature plate or insufficient spring tension the clutch must be disassembled to inspect these components.

Remove the drive belt, drive pulley, and the flange mounted field assembly to reach the clutch armature and armature spring. Remove the clutch hub to remove the spring.

Replace the armature plate if excessively worn. When the armature plate is not excessively worn increase the armature plate spring tension by bending the spring.

Replace the components and repeat the pencilscope.

Paper Tractors.

1. Alignment of Tractors. The chain in each tractor must be aligned to the frame of that tractor. The position of the chain in each tractor will then be aligned to the position of the chains of the other tractors. This will insure even driving of the paper forms through the printer without tearing of the drive holes in the paper. On the frame of each tractor in the chain track is an index line. Lift the paper hold-down plates of the lower tractors and manually turn the splined shaft until the leading edge of a link in one tractor is on the index line. Check the position of the chain in the other tractor. To move the chain without turning the splined shaft, loosen the three cap screws on the chain drive sprocket. This will allow rotation of the sprocket chain without rotation of the splined shaft. Move the chain until the leading edge of a link is aligned with the index line. Tighten the three cap screws. The two lower tractors are now aligned. To align the upper tractors to the lower tractors, place the paper tension adjusting knob in the center of its travel. This will allow maximum adjustment. Rotate the lower splined shaft until the chain in each tractor is aligned to the index line. Align the chain in each of the upper tractors by loosening the cap screw at the drive sprockets. After aligning the chains, tighten the cap screws. Check alignment by inserting lined paper. Close the hold-down and line up between marks.

2. Adjustment of Tractors. The position of the tractors on the shafts is adjustable by the printer operator. The tractor pairs are adjustable to allow printing on forms of different widths. The control knob allows the tractor pairs to slide right or left.

3. Chain Tension. The chain tension is adjustable in each tractor. Correct chain tension will assure even and straight feeding of paper through the printer. Check the tension by lifting the chain at the center (midway between the drive and idler sprockets). The chain should lift up not more than 1/8-inch from the chain track. The idler sprocket is on an eccentric bushing. The distance between the centers of the drive and idler sprockets is varied by turning the eccentric bushing. This change in distance will change the chain tension. The eccentric bushing is held in position by a setscrew accessible through the chain track. To adjust the chain tension loosen the setscrew and turn the eccentric bushing with a spanner wrench. After adjusting chain tension, check the alignment of the chain in the tractor. Adjust the alignment as necessary.

Belt Tension.

Correct belt tension is important in the operation of the tractor drive system. Loosened belts will allow sloppy paper feed with uneven line spacing resulting. Excessive belt tension will shorten the life of the belts and cause needless wear of supporting shafts and bearings. The belt has a tension double idler assembly (see Figure 7-8).

e. Vertical Format Adjustment and Service.

Format Diode Block Adjustment.

The alignment between the holes in the format tape and the photo-diodes is adjustable. Since the tape drive wheel is fixed, the horizontal position of the photo-diode blocks is adjustable. This adjustment is provided to compensate for slight hole misalignments due to the large punching tolerances allowed in the format tape preparation. When channel leakage is evident, reposition the photo-diode blocks. Place a tape which has a row of holes encompassing all channels in position over the photo-diodes. Loosen the photo-diode block cap screws and position the block so that each photo-diode is visually beneath its corresponding hole in the format tape. Remove the format lamp assembly for visual examination of alignment. Tighten the photo-diode block cap screws and replace the lamp assembly. When replacing the lamp assembly the generated light must be centered on the photo-diodes.

Format Tape Preparation and Installation.

A suggested procedure for the preparation and installation of a printer vertical format tape can be found in Chapter 4.

Format Tape.

Replace tape when worn or damaged as specified in Chapter 4.

Line Count Generator.

The lamp boards used with the Line Count Generator and the Vertical Format Assembly contain bulbs which are prefocused and rated for 10,000 hours minimum. If a bulb burns out, the entire board must be replaced. No special alignment procedures are required to replace a lamp board, however, care should be taken to prevent heat damage when unsoldering and soldering the leads on the board.

The diode boards used in conjunction with the lamp boards contain photodiodes which are also rated for long life. If a photodiode malfunctions, the entire board or a complete diode mount should be replaced to reduce downtime. The individual diode should be replaced at a later, convenient time. No special alignment procedures are required to replace a diode board, however, care should be taken to prevent heat damage when unsoldering and soldering the leads on the board.

The code wheel disks used with the Photo-Data Pulse Generator and Line Count Generator should not require any replacement in normal life if careful servicing procedures are followed.

Data 5 and Strobe 5.

Data 5 and Strobe 5 are printed circuit cards and are replaced as a unit. Refer to the Reference Drawing Section for a detail schematic and circuit description.

f. Photo-Data Pulse Generator Phasing Adjustment and Service.

The Code Wheel mounts on the print roll and is held by a collar and hex nut. The Code Wheel should not require replacement in normal service, except when replacing print drum. The bulbs in the lamp assembly should be entirely replaced whenever one burns out. The individual photodiode or entire board may be replaced as desired. However, heat damage may accidentally occur when soldering and unsoldering the diode leads.

If a bulb in the Lamp Assembly burns out, the entire board must be replaced. No special alignment procedures are required to replace a lamp board, however, care should be taken to prevent heat damage when unsoldering and soldering the leads on the board. The diode boards used in conjunction with the lamp boards contain photodiodes which are also rated for long life. If a photodiode malfunctions, the entire board or a complete diode mount should be replaced to reduce downtime. The individual diode should be replaced at a later, convenient time. No special alignment procedures are required to replace a diode board, however, care should be taken to prevent heat damage when unsoldering and soldering the leads on the board.

The Photo-Data Pulse Generator may be adjusted to correct phasing misalignments as indicated in Figure 7-5. The procedure for correcting phasing is as follows:

1. Compare the printer readout with Figure 7-5 to determine the type of misalignment.

2. For misalignment A turn the character phasing control counterclockwise and monitor the printer readout.

3. For misalignment B turn the character phasing control clockwise and monitor the printer readout.

4. For misalignment C proceed as follows:

(a) Set external circuitry to print the first character of the character sequence.

(b) Print several lines and monitor the printer readout.

(c) Loosen hex nut on collar and manually rotate the print roll until the first character of the character sequence is in printing position.

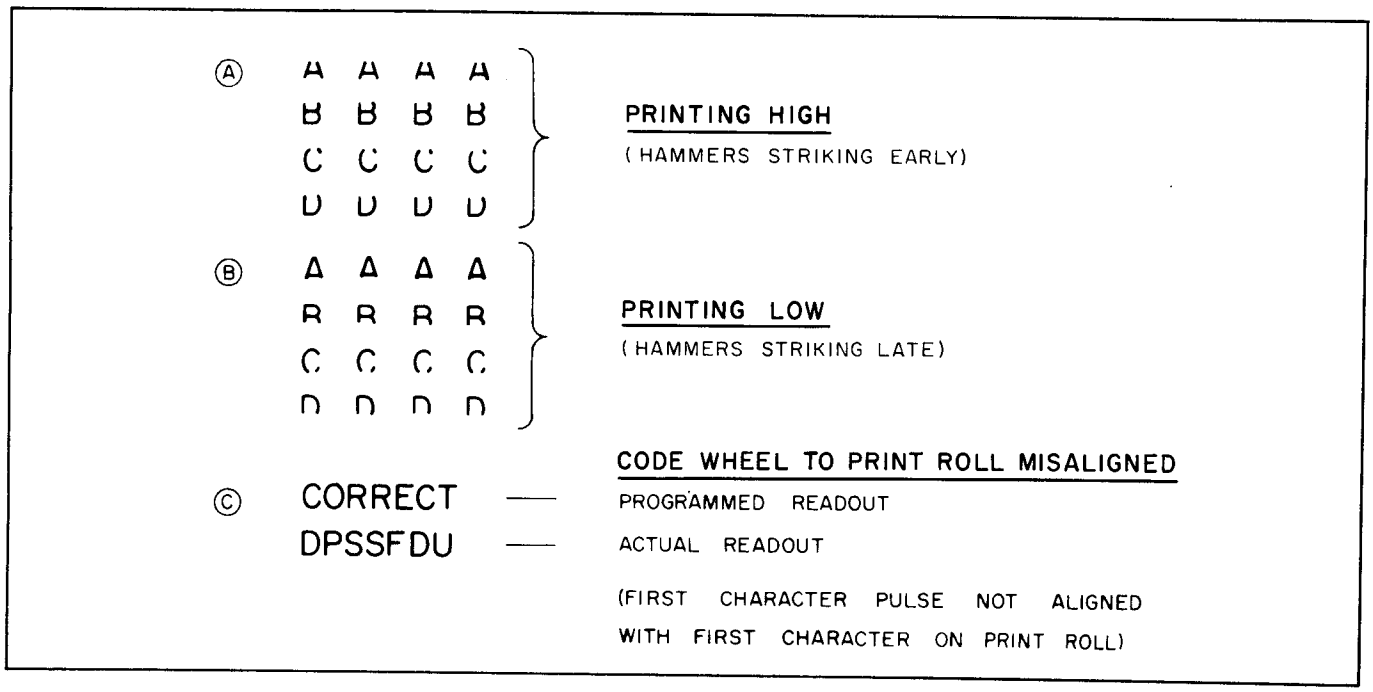


Figure 7-5. Examples of Phasing Misalignment

(d) Hold the print roll in this position and turn the code wheel until the hole for the first character is aligned; tighten nut.

(e) Print several lines and monitor the printer readout.

g. Hammer Module Adjustments.

Three basic methods for evaluating printout quality and determining proper corrective actions are given below.

1. If two factory adjusted modules are available proceed as follows:

(a) Substitute the two reference modules for two end modules presently installed.

(b) Bring in the overall penetration (Figure 7-6) until the reference modules are printing medium dark.

(c) Adjust the individual penetration and flight times (refer to paragraph (b), below) of all other modules to match the printout quality of reference modules.

2. If no factory adjusted modules are available, but spare modules are, proceed as follows:

(a) In a hammer module, back off the individual penetration adjustments so that they do not stop the hammer flight.

(b) Apply six volts d-c to each hammer and, with shim stock, measure the gap between the hammer and the top stop. If it is between .0075 inch and .0035 inch the hammer is gapped properly. Next insert a shim which is .0015 inch less than the measured gap and set the individual penetration down to it. When two modules are found which can meet the above specifications, they may be used as reference modules as in (a), above.

Note

If modules are found which vary from the above gapping specifications, they should be returned to ANelex for resetting.

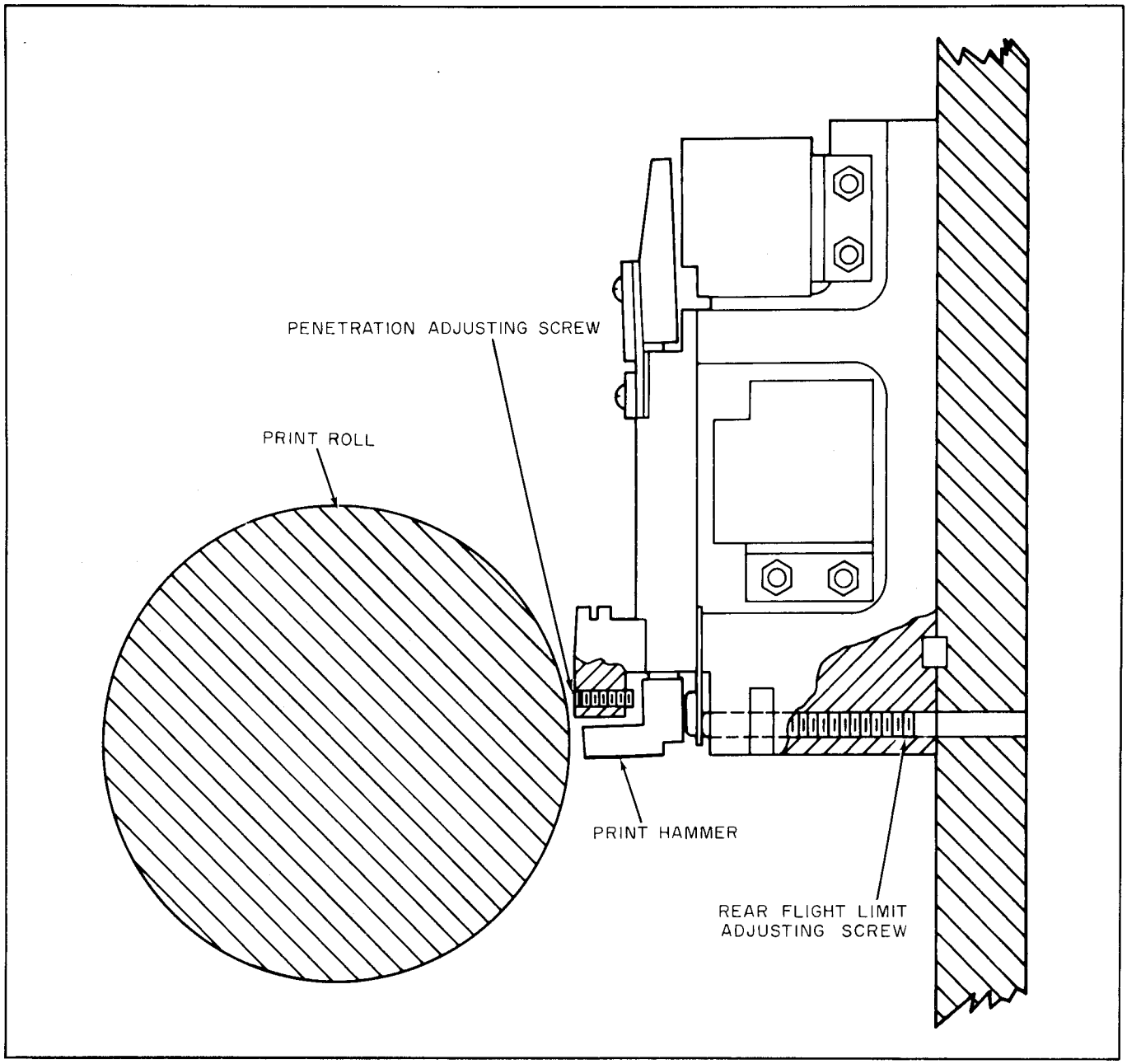


Figure 7-6. Penetration and Flight Time Adjustments

3. The need for hammer module and mounting plate adjustments can be indicated by certain errors in printout character quality as illustrated in Figure 7-7. To obtain a printout sample for comparison with Figure 7-7, proceed as follows:

(a) Start the printer and program the computer to print "M" in each column. The letter "M" is used for monitoring purposes because a full width and full height character will quickly reveal any misalignment.

Note

When M's are not available use a comparable symbol.

(b) Monitor the printout and compare with Figure 7-7 to determine what misalignments are present.

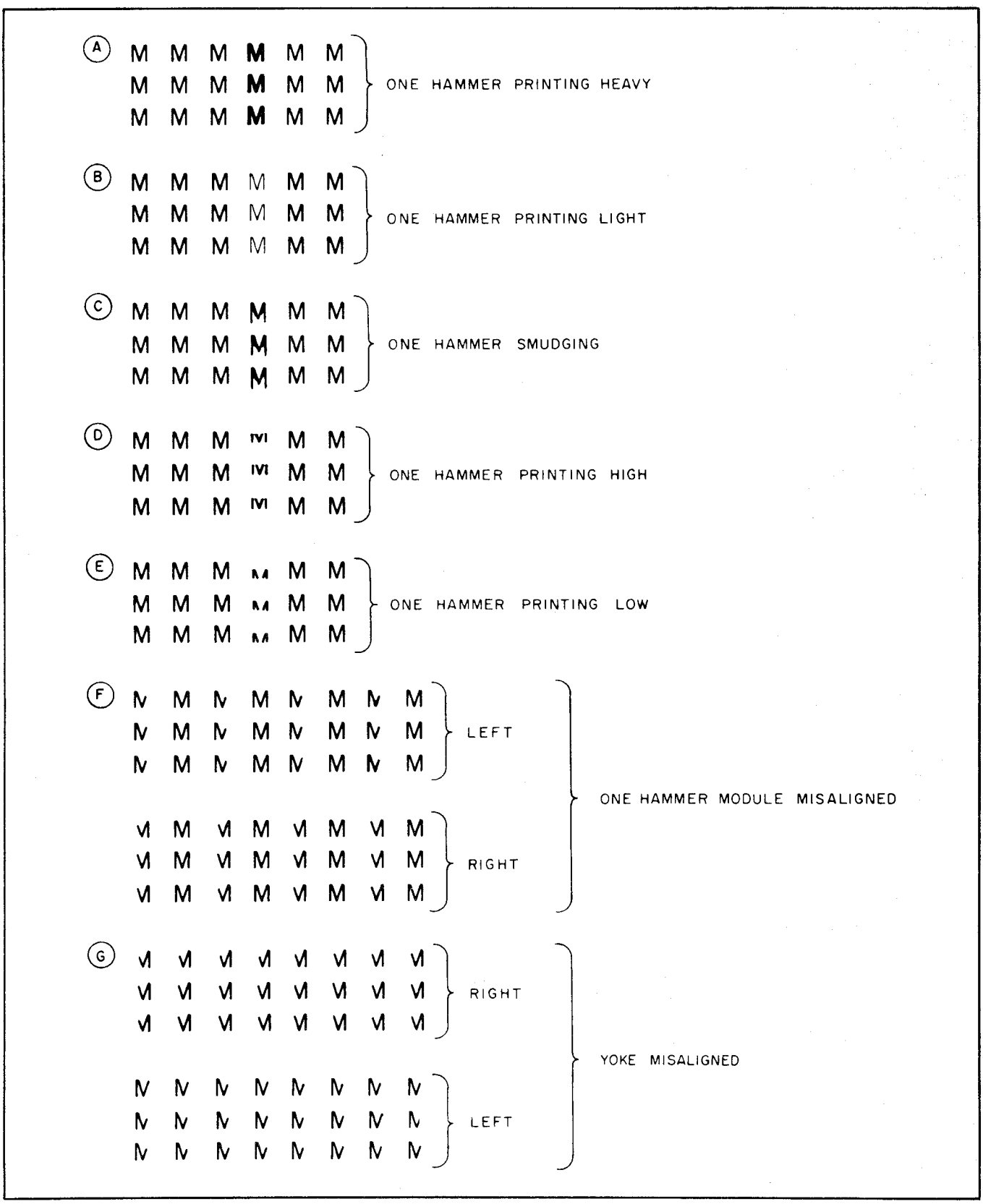


Figure 7-7. Examples of Hammer Misalignment

h. Alignment Procedures.

Typical misalignments and proper corrective actions for each are given below. Refer to Figure 7-7.

1. Misalignment A. One hammer is printing heavy because its penetration is greater than that of the other hammers.

(a) Open the yoke and remove the paper and paper guide plate.

(b) Turn the penetration adjusting screw (Figure 7-6) clockwise approximately 5 degrees.

CAUTION

This is a critical adjustment and care should be taken not to overcorrect.

(c) Return the yoke to the printing position.

(d) Replace the paper guides and the paper.

(e) Monitor the printout and repeat the adjustment procedures until the correct printing weight for the faulty hammer is obtained.

2. Misalignment B. One hammer is printing light because its penetration is less than that of the other hammers.

(a) Open the yoke and remove the paper and the paper guide plates.

(b) Turn the penetration adjusting screw counterclockwise approximately 5 degrees.

(c) Return the mounting plate to the printing position.

(d) Replace the paper guides and the paper.

(e) Monitor the printout and repeat the adjustment procedures until the correct printing weight for the faulty hammer is obtained.

3. Misalignment C. One hammer is smudging. The face of the hammer is vibrating against the print roll or is remaining too long (excess dwell time) in the strike position. Excessive dwell time is indicated by a low character as well as a smudged one.

(a) Open the yoke and remove the paper and the paper guide plates.

(b) Examine the module which has the smudging hammer for dirt or a broken reed.

(c) The individual penetration adjusting screw may be incorrectly positioned. Adjust as directed for misalignment A.

(d) If the smudging cannot be corrected by cleaning or by adjusting the penetration, the hammer module with the smudging hammer must be replaced. Refer to paragraph 7-3 i. of this section for hammer module replacement.

4. Misalignment D. One hammer is printing high. The flight time of the hammer is short in comparison to the flight time of the other hammers.

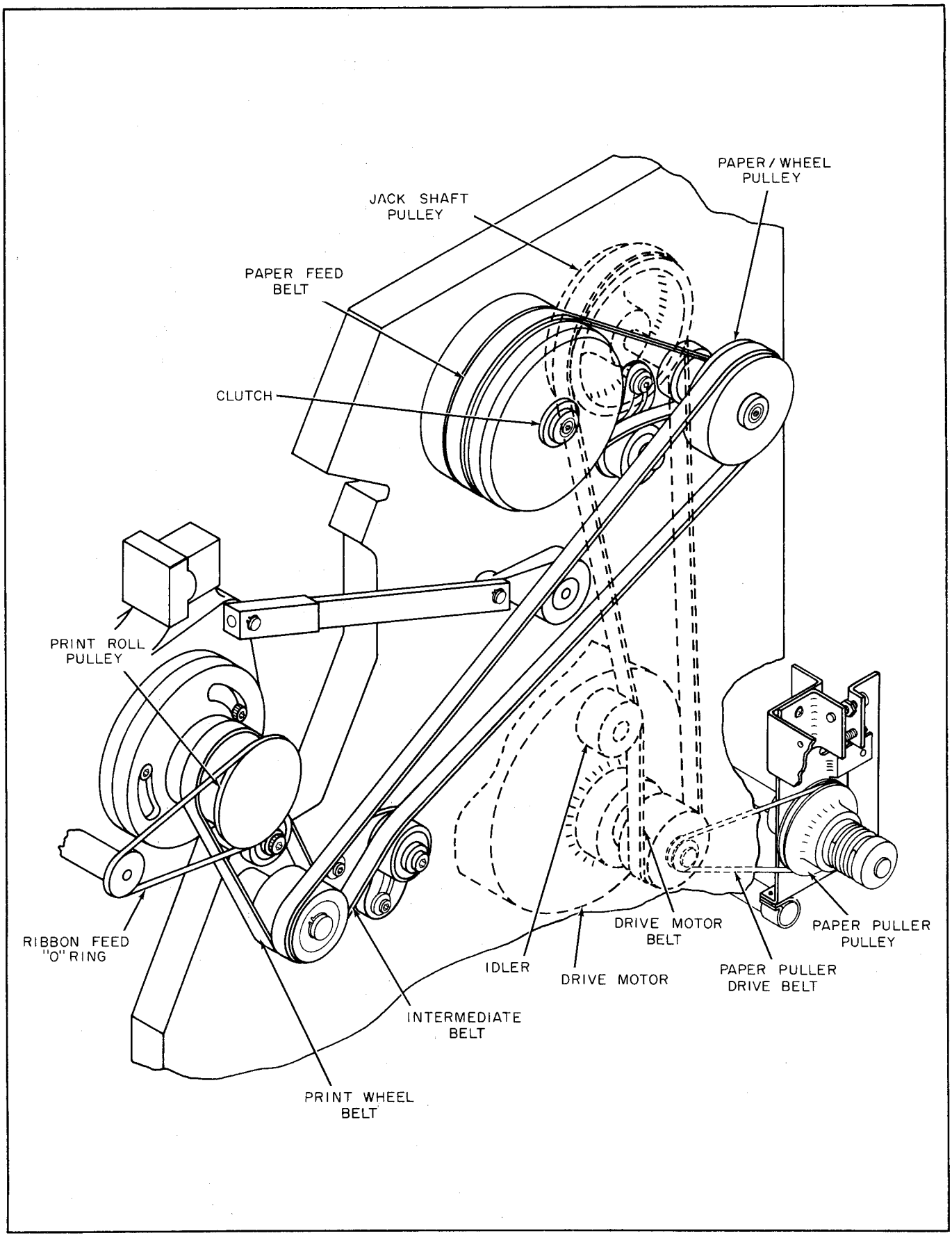


Figure 7-8. Belt Drives

(a) Turn the rear flight limit adjusting screw (Figure 7-6), accessible through the module mounting plate, counterclockwise approximately 5 degrees.

CAUTION

The adjusting screw fits tightly. Do not force it; otherwise the small hexagonal socket may be stripped.

(b) Monitor the printout and repeat the adjustment procedure until the correct alignment for the faulty hammer is obtained.

5. Misalignment E. One hammer is printing low. The flight time of the hammer is long in comparison with the flight time of the other hammers.

(a) Turn the rear flight limit adjusting screw, accessible through the module mounting plate, clockwise approximately 5 degrees.

(b) Monitor the printout and repeat the adjustment procedures until the correct alignment for the faulty hammer is obtained.

6. Misalignment F. When misalignment F is indicated proceed as follows to accurately determine the source of misalignment.

(a) Stop the printing and paper feed.

(b) Remove the bottom sheet of paper. This will allow the hammers to strike the carbon paper. The alignment of the hammers to the print roll will be indicated on the face of each hammer.

(c) Print without the bottom sheet of paper for approximately 10 seconds. (The same letter must be used in each column.)

(d) Stop the printer and remove the paper and paper guide plates.

(e) Examine the face of each hammer for indications of misalignment.

(f) Loosen the attaching screws of the misaligned module.

(g) Move the module in the direction indicated by the carbon impression on each hammer face. Take care to move both ends of module to maintain it parallel. Tighten the attaching screws.

(h) Replace the paper guide plates.

(i) Print for several seconds with the bottom paper in position to remove the carbon imprints on the hammer faces. Check alignment.

(j) Repeat this procedure, including printing without bottom paper, until the module is correctly aligned.

i. Replacement Procedures.

The hammer modules must be removed and replaced in sequence because of the interlocking design of the hammer modules.

1. Hammer Module Removal.

In general, start at either side and work toward the module to be replaced.

(a) Remove the attaching screws of the two outside modules.

(b) Disconnect the wire leads from the connectors.

(c) Slide the module sideways until clear of obstructions, then lift it straight up.

(d) Continue in this manner until the faulty module is removed.

2. Hammer Module Replacement.

In general, replace the modules by reversing the removal procedures.

(a) Align hammers visually so that the tailing hammers of the modules are equally spaced and hammers are parallel.

(b) After all modules are replaced, align hammers as outlined above.

Note

Do not attempt to repair hammer modules. The hammer modules are a factory repairable item.

j. Belt Drives.

Before checking belt tension, be sure belts are properly installed. The shiny side of the flat drive belts must be in contact with the pulleys. If any of the drive belts have been installed incorrectly, remove, reinstall correctly and repeat the pencilscope.

Adjust the tension of the flat drive belts (Figure 7-8) with the adjustable idler pulley assemblies. Moderate pressure midway between the pulleys should deflect the belt 1/16 to 1/8-inch on the short belt and 1/8 to 1/4-inch on the long belt. Adjust the position of the idler pulleys as necessary.

The idler adjustment for the drive belt is a spring loaded plunger. The plunger pushes against the arm which supports the tension idler pulley. The plunger is held in position with a setscrew. To properly tension the belt, simply loosen the setsscrew and let the spring loaded plunger position the idler pulley. Lock the plunger with the setscrew.

The belt tension for the upper drive belt must be measured with a belt tension gage (ANelex Part Number 75712), because the position of the idler is set manually. The setscrew positions the support arm of the idler pulley. To set the belt tension, loosen the setscrew locking nut and turn the setscrew locking nut and turn the setscrew. After changing the belt tension, place the belt tension gage on the belt as shown in the gage instruction sheet. If the pointer on the plunger does not align with the zero mark, remove the tension gage and turn the setscrew again. Measure tension again. Continue in this manner until the pointer on the gage aligns with the zero line indicating correct tension. Lock the position of the setscrew with the locking nut.

Correct belt tension will assure maximum life of belts, even printing, and correct spacing between lines.

CHAPTER 8

TROUBLESHOOTING

8-1. GENERAL.

A knowledge of the principles of operation of the Series 5 Printer, Buffer and Printer Control logic is a necessary prerequisite for diagnosis of trouble. The troubleshooting procedure given in the paragraph below assumes that the objective is to return the system to operating condition as quickly as possible. Table 8-1 is a guide for the operator in analyzing printout quality.

In the event of an ALARM STATUS indication, check the POWER ALARM and CARD ALARM indicators on the Sequencer to determine the type of fault. If the POWER ALARM is illuminated, check the fuses on the Sequencer, 36-volt power supply and multiple-output power supply. Replace a blown fuse with a good one of same value. If the CARD ALARM is illuminated, examine the F LOAD printed circuit cards in the printer control and hammer driver basket assembly for a blown fuse. This condition is indicated by a projecting "flag" on a fuse. Remove card with blown fuse from rack; replace fuse with good one of same value; replace card in rack, making certain it is fully seated. If neither POWER ALARM nor CARD ALARM is illuminated, examine motor and fan fuses on Sequencer. No response to closure of yoke drive switches indicates possible failure of yoke motor fuse on the Sequencer. Replace a blown fuse with a good one of same value. If a fuse failure is not the cause of the alarm, notify service personnel so that immediate corrective action can be taken.

8-2. TROUBLESHOOTING AIDS.

8-2-1. Drawings.

A block diagram of the Printer Control Logic and circuit descriptions of the printed circuit cards used in the various sections of the control logic may be found in Chapter 10.

8-2-2. Tools and Test Equipment.

Aside from standard tools, the following special tools and test equipments are recommended. (The extender cards recommended provide power on access to any point on the circuit cards.)

1. Extender card.
2. Any standard multimeter.
3. Tektronix, Inc., Type 531 Oscilloscope with capacitive type probe (X10 attenuation) and CX-19 plug-in unit, or equivalent.
4. Three assorted test leads.
5. Four hexagonal socket wrenches.

8-2-3. Troubleshooting Procedures.

Table 8-1 is a troubleshooting chart for the Printer.

TABLE 8-1. TROUBLESHOOTING CHART

MALFUNCTION	PROBABLE CAUSE	CORRECTIVE ACTION
No printing, paper advancing properly.	Improper penetration.	Adjust PENETRATION.
Column not printing.	Hammer actuation pulse from external controller is missing, or is of improper width or amplitude.	Check external controller outputs.
Printing half of Character.	Improper phasing.	Adjust PHASING.

TABLE 8-1 (Continued)

MALFUNCTION	PROBABLE CAUSE	CORRECTIVE ACTION
Printing too light or dark	Improper penetration.	Adjust PENETRATION.
	Faulty ribbon.	Replace ribbon.
Paper and ribbon feed erratic.	Loose signal cable connections.	Ensure that signal cable connections are properly mated.
First or last column fails to print.	Stretched ribbon due to continued use on one side and ribbon skews.	Change ribbon spools at intervals to prevent stretching.
		Check power.
Wavy printing.	Improper tractor alignment.	Re-align paper tractors.
	Insufficient paper tension.	Adjust paper tension.
Printing on a bias.	Paper feed brake slipping.	Re-adjust brake holding current.
Paper feed irregular or not positioning properly.	Paper feed clutch slipping.	Re-adjust clutch holding current.
Overprinting, no paper feed.	Paper feed clutch inoperative.	Check fuse on PC card.
Excessive paper feed, incorrect line spacing.	Paper feed brake inoperative.	Check fuse on PC card.
Format channel pulses missing.	Improperly punched tape.	Replace tape.
	Vertical Format Diode Block misaligned.	Re-adjust Diode Block.

The diode boards used in conjunction with the lamp boards contain photo-diodes which are also rated for long life. If a photo-diode malfunctions, the entire board should be replaced to reduce downtime. The individual diode should be replaced at a later, convenient time. No special alignment procedures are required to replace a diode board, however, care should be taken to prevent heat damage when unsoldering and soldering the leads on the board.

The lamp boards used with the Photo-Data Pulse Generator, the Line Count Generator and the Vertical Format Assembly contain bulbs which are prefocused and rated for 12,000 hours minimum. If a bulb burns out, the entire board must be replaced. No special alignment procedures are required to replace a lamp board, however, care should be taken to prevent heat damage when unsoldering and soldering the leads on the board.

CHAPTER 9

ILLUSTRATED PARTS LIST

9.1 INTRODUCTION

This chapter contains a complete list of replaceable parts for the ANelex Series 5 Printer System. Part index numbers, keyed to the referenced illustration, have been assigned to all parts which appear on the illustrations. Part names in the description column have been indented to show relationship of subordinate parts to higher assemblies.

To facilitate the procurement of parts not manufactured by ANelex, the descriptions for such parts include the manufacturer's code number as assigned by the Federal Supply Code for Manufacturers, Cataloging Handbook H4-1. Manufacturers' names and addresses corresponding to these code numbers are given below. Commercially available hardware has been listed with the notation, "COML", in the part number column; however, sufficient detail has been included in the description column to enable the user to order replacements.

List of Manufacturers

Code Number	Manufacturer's Name and Address
00141	PIC Design Corporation East Rockaway, New York
00685	Farmer Electric Company Waban, Massachusetts
00779	AMP Incorporated Harrisburg, Pennsylvania
01121	Allen-Bradley Company Milwaukee, Wisconsin
01295	Texas Instruments, Incorporated Semiconductor Components Division Dallas, Texas
04009	Arrow-Hart and Hegeman Electric Company Hartford, Connecticut
08732	Solid State Products Company Salem, Massachusetts
09922	Burndy Corporation Norwalk, Connecticut
13812	Dialco Electric Corporation Brooklyn, New York
21335	Fafnir Bearing Company New Britain, Connecticut
24455	General Electric Company Lamp Division Cleveland, Ohio
43334	General Motors Corporation New Departure Division Bristol, Connecticut
44655	Ohmite Manufacturing Company Skokie, Illinois
49956	Raytheon Manufacturing Company Waltham, Massachusetts
52090	Rowan Controller Company Baltimore, Maryland
55938	Raytheon Company Commercial Apparatus and Systems Division Industrial Operation South Norwalk, Connecticut
56185	Speedway Manufacturing Company Cicero, Illinois

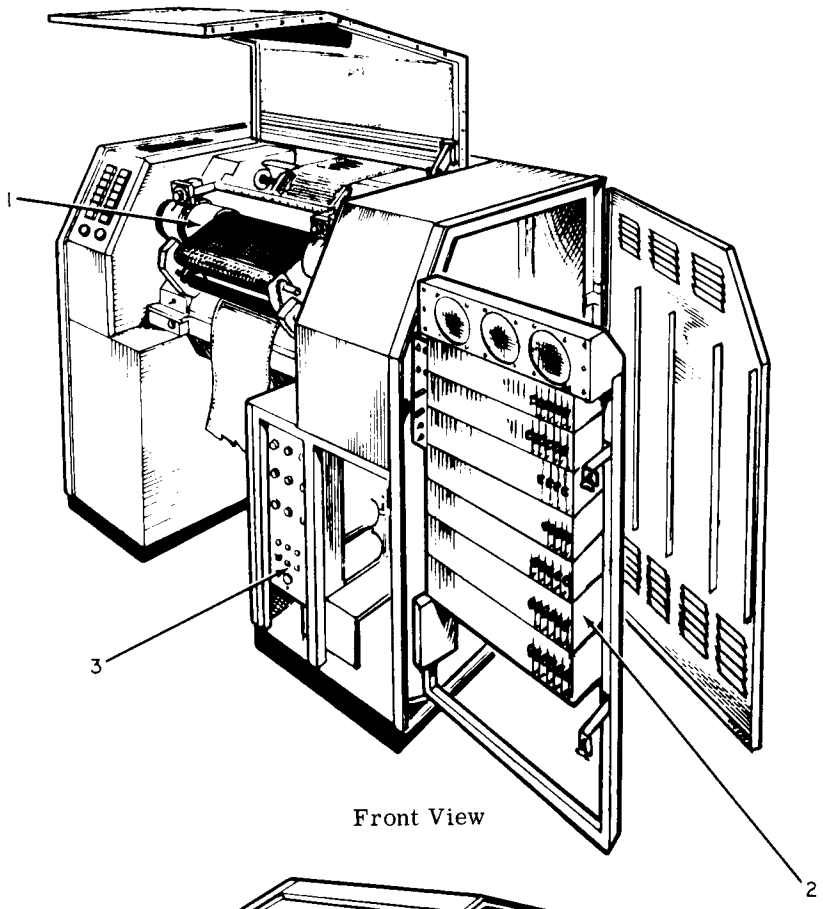
List of Manufacturers (Cont'd)

Code Number	Manufacturer's Name and Address
56289	Sprague Electric Company North Adams, Massachusetts
58474	Superior Electric Company Bristol, Connecticut
59875	Thompson Ramo Wooldridge, Inc. Cleveland, Ohio
61463	U. S. Rubber Company New York, New York
63743	Ward Leonard Electric Company Mt. Vernon, New York
70854	Barden Corporation Danbury, Connecticut
71041	Boston Gear Works Quincy, Massachusetts
71400	Bussmann Manufacturing Company St. Louis, Missouri
71729	Crescent Box Corporation Philadelphia, Pennsylvania
73976	Hardware Products Company Cambridge, Massachusetts
74193	Heinemann Electric Company Trenton, New Jersey
75173	Howard B. Jones Chicago, Illinois
75382	Kulka Electric Mfg. Company, Inc. Mt. Vernon, New York
77342	Potter and Brumfield, Inc. Princeton, Indiana
81073	Grayhill, Incorporated Chicago, Illinois
83259	Parker Seal Company Culver City, California
84171	Arco Electronics, Incorporated New York, New York
84411	Good-All Electric Mfg. Company Ogallala, Nebraska
89462	Waldes Kohinoor, Incorporated Cambridge, Massachusetts

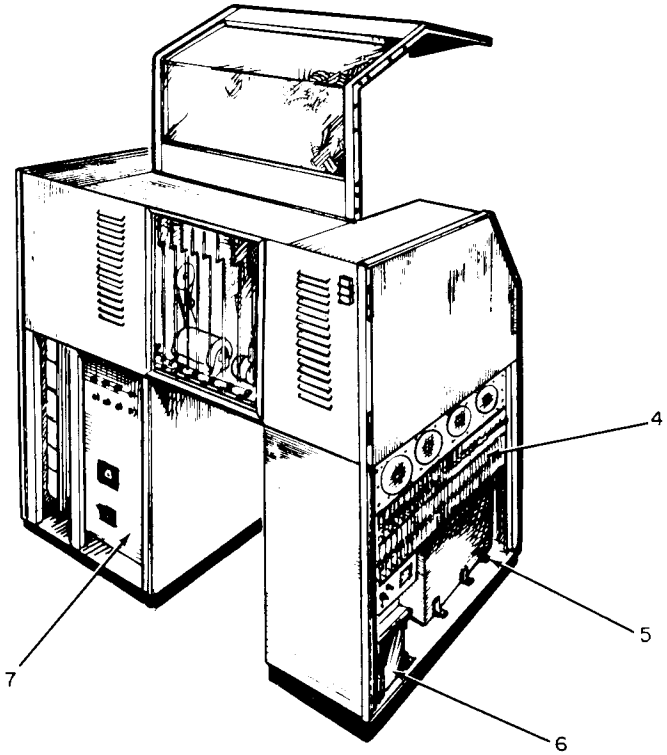
List of Manufacturers (Cont'd)

Code Number	Manufacturer's Name and Address
91146	Cannon Electric Company Salem, Massachusetts
91662	Elco Corporation Willow Grove, Pennsylvania
91929	Minneapolis-Honeywell Regulator Company Micro Switch Division Freeport, Illinois
97965	Stancor Electronics, Incorporated Chicago, Illinois

FIG. & INDEX NO.	PART NO.	DESCRIPTION 1 2 3 4 5 6 7	MFR CODE	UNITS PER ASSY	USABLE ON CODE
9-1-	15337	ANELEX SERIES 5 PRINTER SYSTEM		1	
-1	50629G1	. PRINTER ASSEMBLY (see Figure 9-2 for detail breakdown)		1	
-2	51716G1	. LOGIC GATE ASSEMBLY (see Figure 9-17 for detail breakdown)		1	
-3	68623	. MULTIPLE POWER SUPPLY (see Figure 9-11 for detail breakdown)		1	
-4	62770	. HAMMER BASKET ASSEMBLY (see Figure 9-12 for detail breakdown)		1	
-5	62756	. CAPACITOR BANK ASSEMBLY (see Figure 9-13 for detail breakdown)		1	
-6	62678-2	. POWER SUPPLY, 36 volt (see Figure 9-14 for detail breakdown)		1	
-	62747	. CONSOLE ASSEMBLY		1	
-7	62435	. . SEQUENCE ASSEMBLY (see Figure 9-15 for detail breakdown)		1	



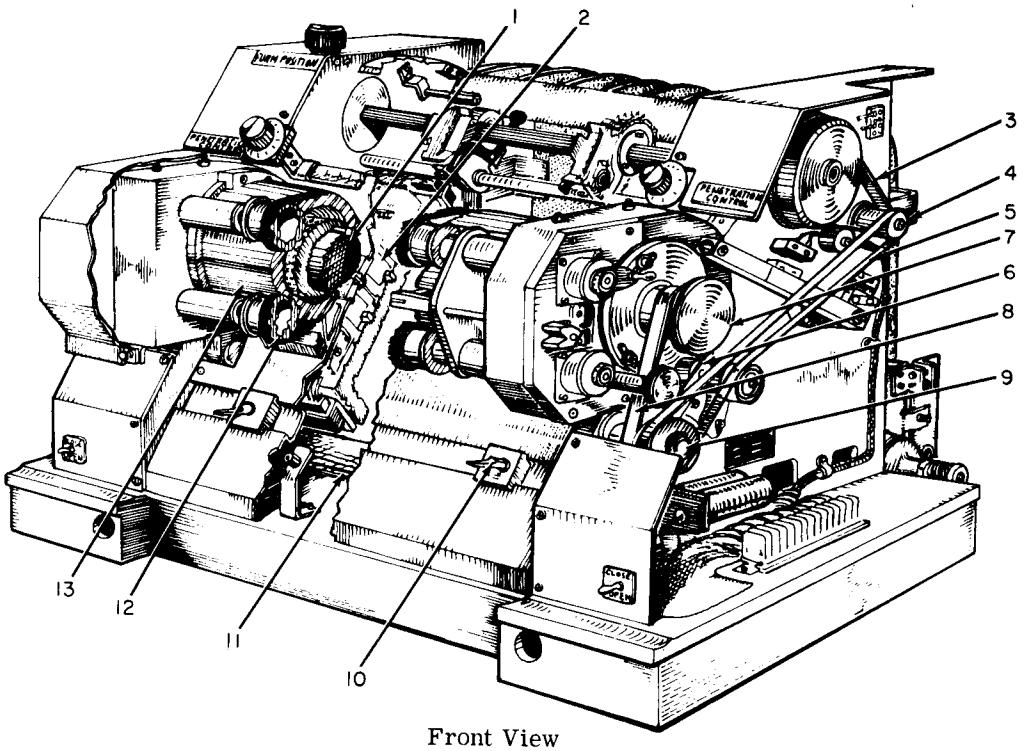
Front View



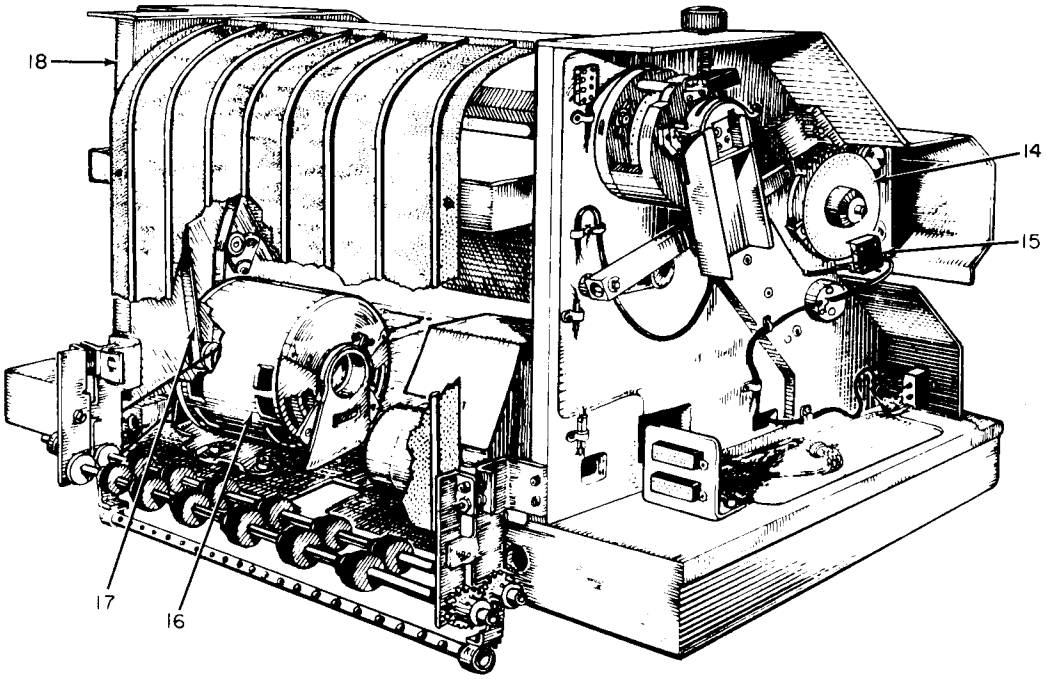
Rear View

Figure 9-1. ANelex Series 5 Printer System

FIG. & INDEX NO.	PART NO.	DESCRIPTION 1 2 3 4 5 6 7	MFR CODE	UNITS PER ASSY	USABLE ON CODE
9-2-	50629G1	PRINTER ASSEMBLY (see Figure 9-1-1 for NHA) . . .		Ref	
-1	61502G1	. PRINT ROLL ASSEMBLY (see Figure 9-3 for detail breakdown)		1	
-2	10-66609	. HAMMER MODULE		40	
-3	10154	. BELT, Paper feed		1	
-4	87683	. PULLEY, Paper wheel		1	
-5	10195	. BELT, Intermediate		1	
-6	530-110-001	. BELT, Ribbon drive		1	
-7	82055	. PULLEY, Ribbon drive		1	
-8	10187	. BELT, Print wheel		1	
-9	87583	. PULLEY, Hinge pin		1	
-10	87719	. HOLD DOWN SUBASSEMBLY		2	
-11	61642G2	. FAN AND FILTER ASSEMBLY		1	
-12	66210	. RIBBON AND ROLL		1	
-13	61674G3	. YOKE AND RIBBON DRIVE ASSEMBLY (see Figure 9-4 for detail breakdown)		1	
-14	30314	. CHARACTER INDEX DISC		1	
-15	77582	. LAMP AND DIODE ASSEMBLY (see Figure 9-5 for detail breakdown)		1	
-16	10173	. MOTOR, Electrical		1	
-17	10196	. BELT, Motor		1	
-18	50633G2	. BASIC FRAME ASSEMBLY (see Figure 9-6 for detail breakdown)		1	



Front View



Rear View

Figure 9-2. Printer Assembly

FIG. & INDEX NO.	PART NO.	DESCRIPTION 1 2 3 4 5 6 7	MFR CODE	UNITS PER ASSY	USABLE ON CODE
9-3-	61502G1	PRINT ROLL ASSEMBLY (see Figure 9-2-1 for NHA). .		Ref	
-1	77516	. PULLEY, 2 inch		1	
		(ATTACHING PARTS)			
-2	842-122-094	. SCREW, Soc hd, cap, 10-32 x 2 in. lg		3	
		---*---			
-3	525-122-011	. BEARING, Ball		1	
-4	77517	. SPACER, Print roll		1	
-5	87692	. SPACER, Print roll		2	
-6		. SEGMENT, Engraved		8	
-7	97559	. KEY, Print roll		1	
-8	61508	. SHAFT, Print roll		1	
-9	525-122-012	. BEARING, Ball		1	
-10	77515	. RETAINER, Bearing		1	
		(ATTACHING PARTS)			
-11	842-122-086	. SCREW, Soc hd, cap, 10-32 x 1/2 lg		3	
		---*---			

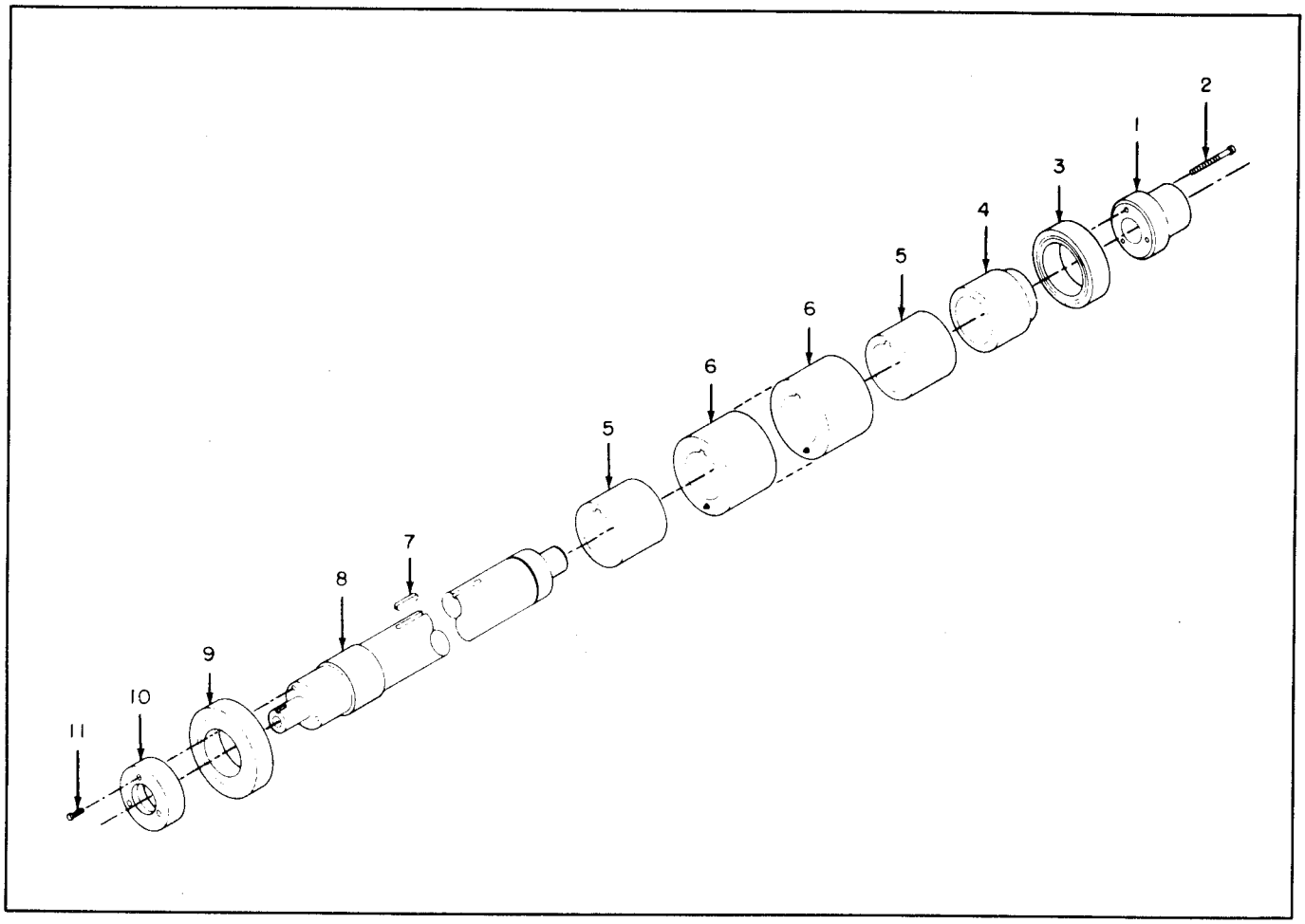


Figure 9-3. Print Roll Assembly

FIG. & INDEX NO.	PART NO.	DESCRIPTION 1 2 3 4 5 6 7	MFR CODE	UNITS PER ASSY	USABLE ON CODE
9-4-	61674G3	YOKE AND RIBBON DRIVE SUBASSEMBLY (see Figure 9-2-13 for NHA)		Ref	
-1	91772	. HUB, Armature		2	
	82098	. CRANK ASSEMBLY		1	
-2	92672	. . KNOB		1	
		(ATTACHING PARTS)			
-3	829-111-005	. . RING, Retaining		2	
		---*---			
-4	82097	. . CRANK		1	
-5	91793	. . PLATE, Armature		1	
		(ATTACHING PARTS)			
-6	842-122-022	. . SCREW, Cap, soc hd, 4-40 x 1/4 lg		2	
	933-111-003	. . WASHER, Lock, No. 4		2	
		---*---			
	62471G4	. REDUCTION GEAR SUBASSEMBLY		1	
		(ATTACHING PARTS)			
-7	842-122-086	. SCREW, Cap, soc hd, 10-32 x 1/2 lg		4	
		---*---			
-8	91774	. . FIELD ASSEMBLY, Clutch		2	
		(ATTACHING PARTS)			
-9	842-122-044	. . SCREW, Cap, soc hd, 6-32 x 3/8 lg		10	
-10	933-105-004	. . WASHER, Plain, No. 6		14	
		---*---			
-11	546-103-007	. . BEARING, Flanged		1	
-12	10201	. . ROTOR, Clutch		2	
	82071	. . SWITCH SUBASSEMBLY		1	
-13	11SM1-T	. . . SWITCH, Micro	91929	2	
		(ATTACHING PARTS)			
-14	COML	. . . SCREW, Machine, bd hd, No. 2-56 x 3/8 lg.		4	
-15	COML	. . . WASHER, Lock, No. 2		4	
-16	COML	. . . WASHER, Plain, No. 2		4	
		---*---			
-17	97514	. . . INSULATOR, Strip		1	
-18	82096	. . . BRACKET, Switch		1	
	76594	. . SHAFT SUBASSEMBLY, Input		1	
-19	82054	. . . PULLEY		1	
		(ATTACHING PARTS)			
	TYPE A	. . . PIN, Groove, 1/16 x 5/8 lg		1	
-20	COML	. . . SETSCREW, Soc hd, 8-32 x 1/4 lg		1	
		---*---			
-21	82041	. . . HOUSING, Bearing		1	
-22	F33KDD5	. . . BEARING, Ball, Class		2	
-23	82072	. . . GEAR, Worm, reduction		1	
		(ATTACHING PARTS)			
-24	TYPE A	. . . PIN, Groove, 1/16 x 3/8 lg		1	
		---*---			
-25	A2-30	. . . SHAFT	00141	1	
-26	546-103-009	. . BEARING, Flanged		1	
-27	82074	. . ACTUATOR SUBASSEMBLY, Switch		1	
-28	82214G4	. . SHAFT SUBASSEMBLY		1	
-29	76592	. . CAM AND GEAR		2	
-30	97570	. . SPACER, Laminated		2	
-31	829-111-013	. . RING, Retaining		2	
-32	870-201-320	. . SPRING, Tension, .180 dia x 2 in. lg x .031		1	
-33	870-201-302	. . SPRING, Tension, .180 dia x 1-1/4 in. lg x .022		1	

FIG. & INDEX NO.	PART NO.	DESCRIPTION 1 2 3 4 5 6 7	MFR CODE	UNITS PER ASSY	USABLE ON CODE
9-4-34	829-113-005	. . RING, Retaining		1	
-35	82213	. . PIVOT, Sensing		1	
		(ATTACHING PARTS)			
	845-101-063	. . SETSCREW, Soc hd, cup pt, 8-32 x 1/4 lg		2	
		. . WASHER, Plain, No. 6		2	
		---*---			
	76595	. . REDUCER SHAFT SUBASSEMBLY		1	
-36	GQUH	. . . GEAR, Worm, 24 dp, 1/2 pd		2	
		(ATTACHING PARTS)			
-37	TYPE A	. . . PIN, 3/32 x 3/8 lg		2	
		---*---			
-38	FB46-4	. . . BEARING, Flanged		2	
	82082	. . . SPACER		1	
-39	82073	. . . GEAR, WORM, 32 dp, 5/8 pd		1	
		(ATTACHING PARTS)			
-40	TYPE A	. . . PIN, 3/32 x 5/8 lg		1	
		---*---			
-41	A3-51	. . . SHAFT	00141	1	
-42	82205	. . . ROCKER ASSEMBLY		2	
-43	76596	. CAP, Ribbon		2	
		(ATTACHING PARTS)			
-44	845-101-065	. SETSCREW, Soc hd, cupt pt, 8-32 x 3/8 lg		2	
		---*---			
-45	82075	. BLOCK SUBASSEMBLY, Tension adjust		1	
		(ATTACHING PARTS)			
-46	842-122-047	. SCREW, Soc hd, cap, 6-32 x 5/8 lg		2	
		---*---			
-47	82058	. ARM SUBASSEMBLY, Sensing		1	
-48	546-103-006	. BEARING, Flanged		3	
-49	82053	. BLOCK, Pressure		2	
	842-122-066	. SCREW, Cap, soc hd, 8-32 x 1/2 lg		5	
-50	829-113-008	. RING, Retaining, 5133-31		2	
-51	87508	. CAP, Roller		2	
-52	546-103-011	. BEARING, Flanged		2	
-53	82065	. SPINDLE		2	
-54	842-110-082	. SCREW, Machine, pan hd, 8-32 x 1/4 lg		2	
-55	870-101-003	. SPRING, Compression, .240 od x .032 w dia, 2-1/2 in. lg		2	
-56	82064	. ARBOR, 160 column		2	
	66803G4	. YOKE AND RIBBON GUIDE ASSEMBLY		1	
-57	62473	. . YOKE, R. H.		1	
-58	62475	. . YOKE, L. H.		1	
-59	87549	. . RING, Tube clamp		4	
		(ATTACHING PARTS)			
-60	842-122-087	. . SCREW, Soc hd, cap, 10-32 x 5/8 lg		14	
		---*---			
-61	842-122-044	. . SCREW, Cap, soc hd, 6-32 x 3/8 lg		2	
-62	544-102-005	. . BUMPER		2	
-63	842-122-088	. . SCREW, Cap, soc hd, 10-32 x 3/4 lg		2	
-64	97538	. . BUSHING		2	
-65	5133-37	. . RING, Retaining	89462	2	
-66	87560	. . SCREW, Adjusting penetration		2	
-67	845-116-083	. . SETSCREW, Soc hd, 10-32 x 1/4 lg		2	
	97510	. . INSERT		2	
-68	97525	. . BUSHING, Penetration		2	
	TYPE D	. . PIN, 1/8 dia x 3/4, Type D	83584		

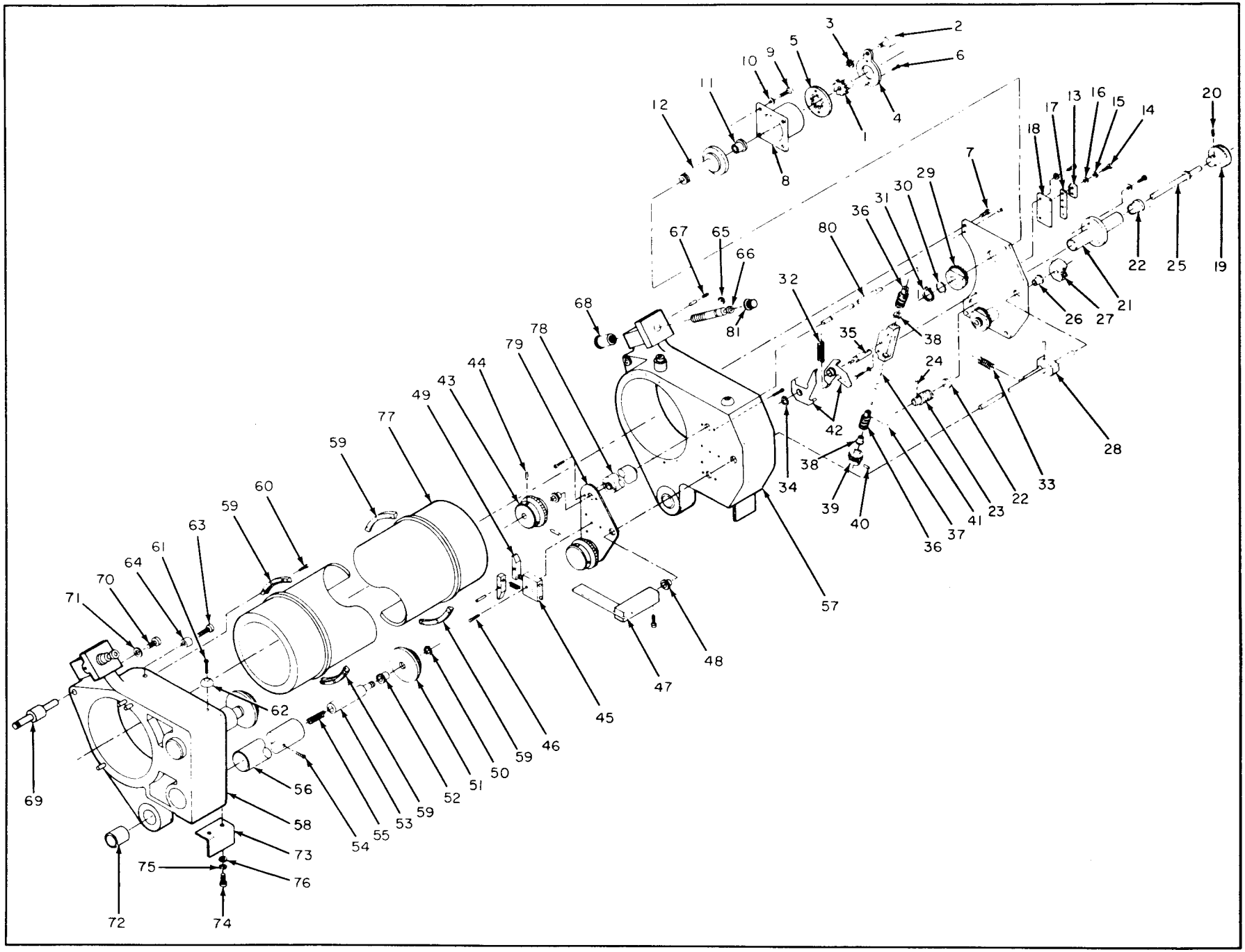


Figure 9-4. Yoke and Ribbon Drive Subassembly

FIG. & INDEX NO.	PART NO.	DESCRIPTION 1 2 3 4 5 6 7	MFR CODE	UNITS PER ASSY	USABLE ON CODE
9-4-69	87572	. . LINK PIN		2	
		(ATTACHING PARTS)			
-70	842-122-087	. . SCREW, Soc hd, cap, 10-32 x 5/8 lg		Ref	
-71	933-109-009	. . WASHER, Plain, No. 10		2	
		---*---			
-72	B-1214-7	. . BUSHING (71041)		2	
-73	724-103-002	. . BRACKET		2	
		(ATTACHING PARTS)			
-74	842-110-064	. . SCREW, Pan hd, 6-32 x 3/8 lg		4	
-75	933-104-005	. . WASHER, Lock, No. 6		4	
-76	933-109-007	. . WASHER, Plain, No. 6		4	
		---*---			
-77	63075	. . SLEEVE, Ribbon guide		1	
-78	82042	. STANDOFF, 160 column		2	
-79	82294	. SUPPORT, Machine		1	
-80	82049	. SHAFT, Clutch, 160		2	

FIG. & INDEX NO.	PART NO.	DESCRIPTION 1 2 3 4 5 6 7	MFR CODE	UNITS PER ASSY	USABLE ON CODE
9-5-1	77582	LAMP AND DIODE ASSEMBLY (see Figure 9-2-15 for NHA)		Ref	
-1	77559	. DIODE MOUNTING BLOCK SUBASSEMBLY		1	
		(ATTACHING PARTS)			
-2	COML	. SCREW, Machine, pan hd, 10-32 x 1/2 leg		1	
-3	COML	. WASHER, Lock, No. 10		1	
		---*---			
-4	30132	. . DIODE CARD		1	
-5	97554	. . COVER, Glass		1	
-6	92596	. DIODE, Photo		9	
-7	87661	. COVER SUBASSEMBLY, LAMP		1	
		(ATTACHING PARTS)			
-8	COML	. SCREW, Machine, pan hd, 8-32 x 3/8 lg		2	
-9	COML	. WASHER, Lock, No. 8		2	
-10	COML	. WASHER, Flat, No. 8		2	
		---*---			
-11	30186	. LAMP ASSEMBLY		1	
		(ATTACHING PARTS)			
-12	COML	. SCREW, Machine, pan hd, 4-40 x 3/8 lg		4	
		---*---			
-13	GE253	. . LAMP	24445	5	
	387-202-009	. . RESISTOR, 12 ohms, 5w		2	
	387-201-007	. . RESISTOR, 7.5 ohms, 3w		1	
	168-104-001	. . DIODE		2	

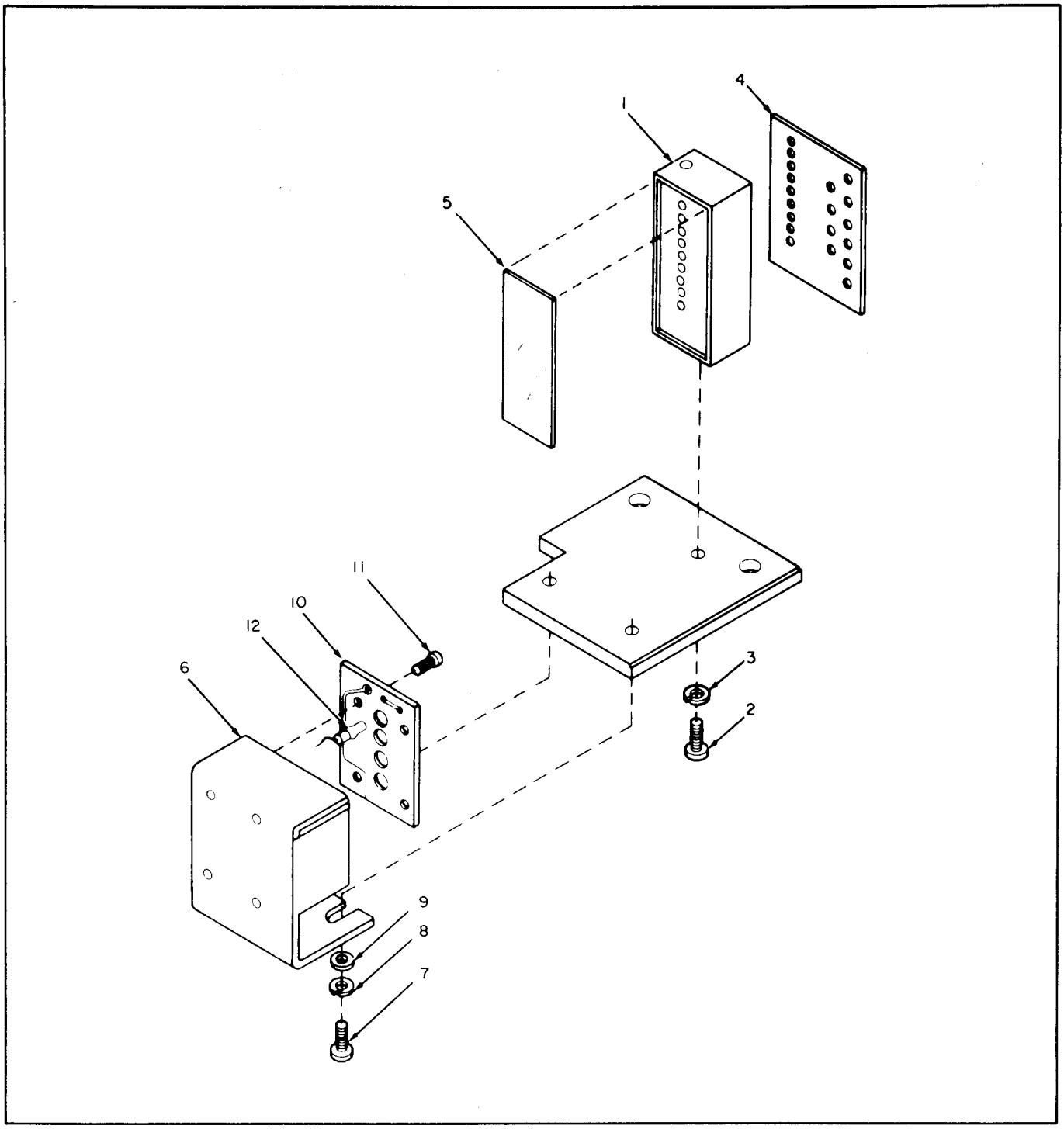
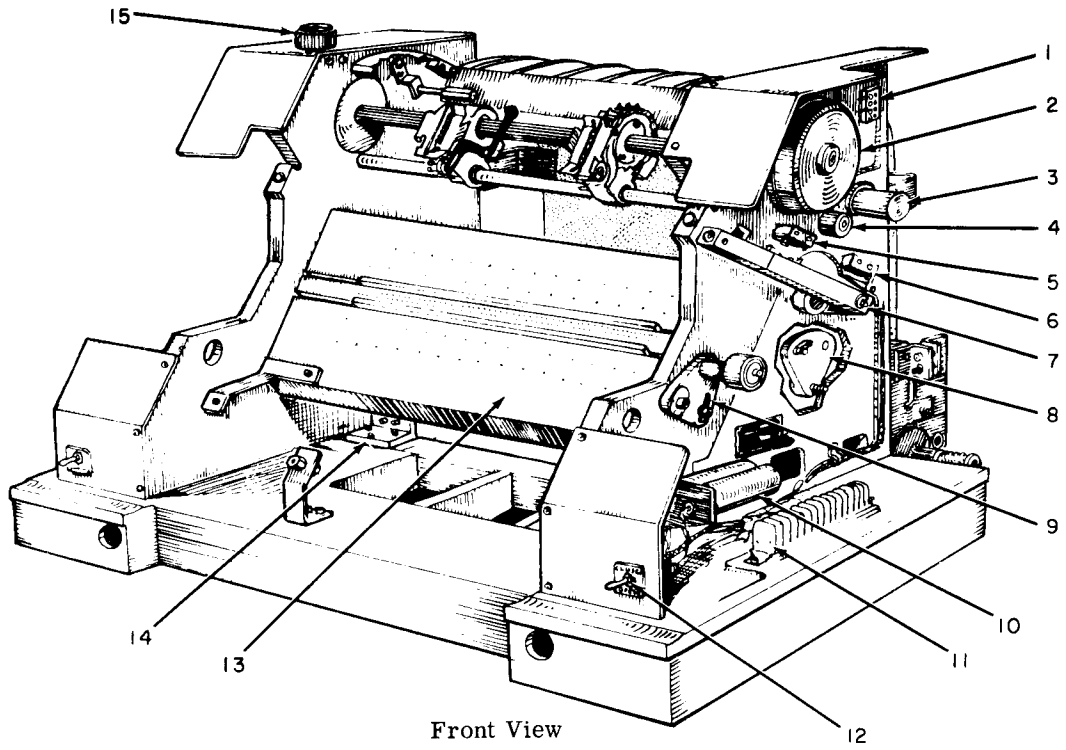
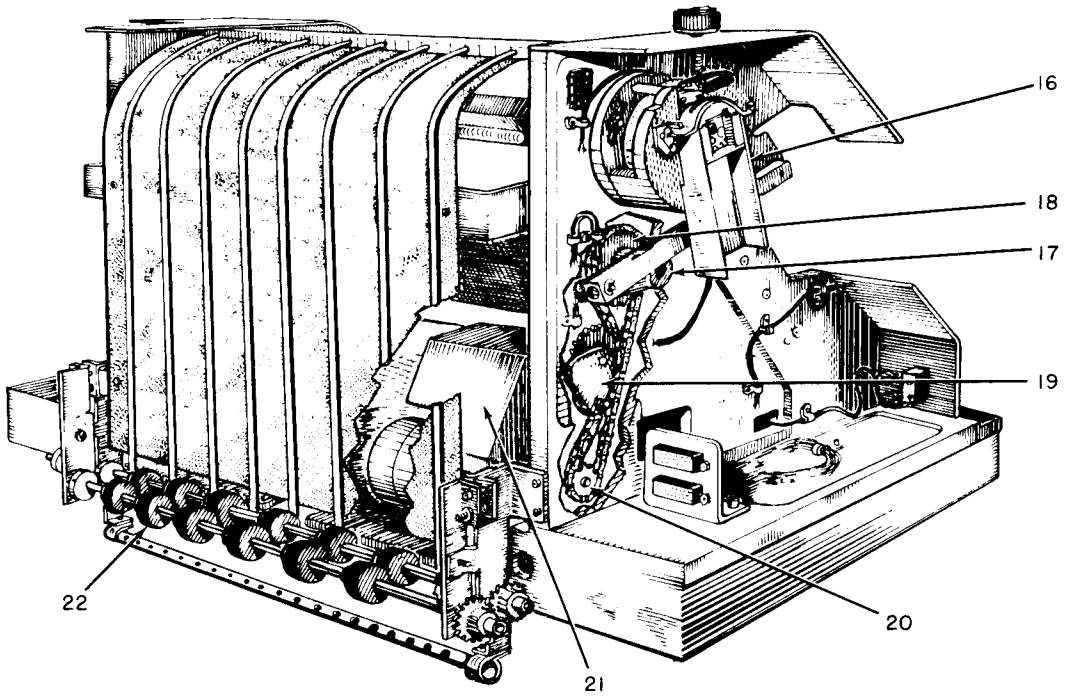


Figure 9-5. Lamp and Diode Assembly

FIG. & INDEX NO.	PART NO.	DESCRIPTION 1 2 3 4 5 6 7	MFR CODE	UNITS PER ASSY	USABLE ON CODE
9-6-	50633G2	BASIC FRAME ASSEMBLY (see Figure 9-2-18 for NHA)		Ref	
-1	423-102-002	. TERMINAL BOARD		2	
-2	61649G1	. PAPER DRIVE ASSEMBLY (see Figure 9-7 for detail breakdown)		1	
-3	77531	. SHAFT BEARING ASSEMBLY		1	
-4	87599	. IDLER SUBASSEMBLY, Paper feed		1	
-5	416-201-001	. SWITCH, Micro		2	
-6	416-110-001	. SWITCH, Micro		2	
-7	77533	. YOKE LINK SUBASSEMBLY (see Figure 9-8 for detail breakdown)		2	
-8	87531	. IDLER SUBASSEMBLY, Motor drive		1	
-9	87537	. IDLER SUBASSEMBLY, Connecting drive		1	
-10	87690	. FILTER SUBASSEMBLY		1	
	5JX100	. . FILTER (56289)		2	
-11	328-101-001	. MODULOK		14	
-12	416-213-001	. SWITCH, Toggle		2	
-13	61513	. MODULE MOUNTING PLATE		1	
-14	77536	. BRACKET, Mounting yoke motor		1	
-15	717-105-010	. KNOB		2	
-16	61617	. FORMAT ASSEMBLY, Low speed (see Figure 9-7 for detail breakdown)		1	
-17	87580	. CRANK ARM SUBASSEMBLY		2	
-18	87567	. SPROCKET, Chain, large		1	
-19	87601	. IDLER SUBASSEMBLY, Yoke drive		1	
-20	87553	. SPROCKET, Yoke motor, small		1	
-21	10189	. MOTOR, Yoke		1	
-22	63091G1	. PAPER PULLER ASSEMBLY (see Figure 9-10 for detail breakdown)		1	



Front View



Rear View

Figure 9-6. Basic Frame Assembly

FIG. & INDEX NO.	PART NO.	DESCRIPTION 1 2 3 4 5 6 7	MFR CODE	UNITS PER ASSY	USABLE ON CODE
9-7-	61649G1	PAPER DRIVE ASSEMBLY (see Figure 9-7-2 for NHA)		Ref	
-1	842-122-127	. SCREW, Cap, soc hd, 1/4-20 x 5/8 lg		2	
-2	87550	. CLAMP, Pulley, clutch		1	
-3	77509	. PULLEY, Paper feed		1	
-4	842-122-066	. SCREW, Cap, soc hd, 8-32 x 1/2		8	
	87689	. CLUTCH ASSEMBLY		1	
-5	10192	. . FIELD ASSEMBLY, Flange mounted, clutch		1	
	87687	. . SPACER, Clutch		1	
-6	SS773LL03	. . BEARING, Ball	43334	1	
-7	97563	. SPACER, Bearing		1	
-7A	SS773LL03XR3E	. BEARING, Ball	43334	1	
-8	10158	. ROTOR, Clutch		1	
-9	97500	. WASHER, Clutch		1	
-10	91770	. ARMATURE PLATE		2	
	87520	. HUB CLUTCH SUBASSEMBLY		1	
-11	77513	. . HUB, Splined		1	
-12	87521	. . SPRING, Armature plate		1	
-13	RS-81	. . RING, Retaining	59875	1	
-14	87625	. HOUSING, Clutch		1	
		(ATTACHING PARTS)			
-15	842-122-088	. SCREW, Cap, soc hd, 10-32 x 3/4 lg		3	
		---*---			
-15A	Z993LO3XR1C	. BEARING, Ball	43334	1	
-16	5103-68	. RING, Retaining	89462	2	
-18	87623	. PAN, Dust		1	
-19	10162	. TRACTOR ASSEMBLY, R. H.		1	
-20	87505	. SHAFT, Tractor guide		1	
-21	77544	. SHAFT, Drive, upper tractor		1	
-22	10161	. TRACTOR ASSEMBLY, L. H.		1	
-23	87672	. TRACTOR ADJUSTER ASSEMBLY, L. H.		1	
-24	842-122-090	. SCREW, Cap, soc hd, 10-32 x 1 in. lg		2	
-25	97541	. BUSHING		2	
-26	Deleted				
-27	87612	. BLOCK, Mounting, adjusting screw		1	
-28	87628	. ROD, Upper adjustment		1	
-29	829-111-007	. RING, Retaining	89462	1	
-30	87610	. NUT, Swivel		1	
-31	842-122-086	. SCREW, Cap, soc hd, 10-32 x 1/2 lg		1	
-32	61548	. HOUSING, Brake		1	
	87522	. HUB SUBASSEMBLY, Brake		1	
-33	RS-81	. . RING, Retaining	59875	1	
-34	87521	. . SPRING, Plate		1	
-35	77514	. . HUB, Splined		1	
-36	91769	. FACE ASSEMBLY, Relaceable		1	
	87685	. SPACER, Brake hub		1	
-37	87688	. BRAKE ASSEMBLY		1	
-37A	SS773LL03	. . BEARING, Ball	43334	1	
	87686	. . SPACER, Brake		1	
	10193	. . FIELD ASSEMBLY, Brake, flange mounted		1	
-38	COML	. SCREW, Machine, pan hd, 4-40 x 1/8 lg		4	
-39	993-109-023	. WASHER, Flat, No. 1/4		3	
-40	42NE-048	. NUT, Stop		3	

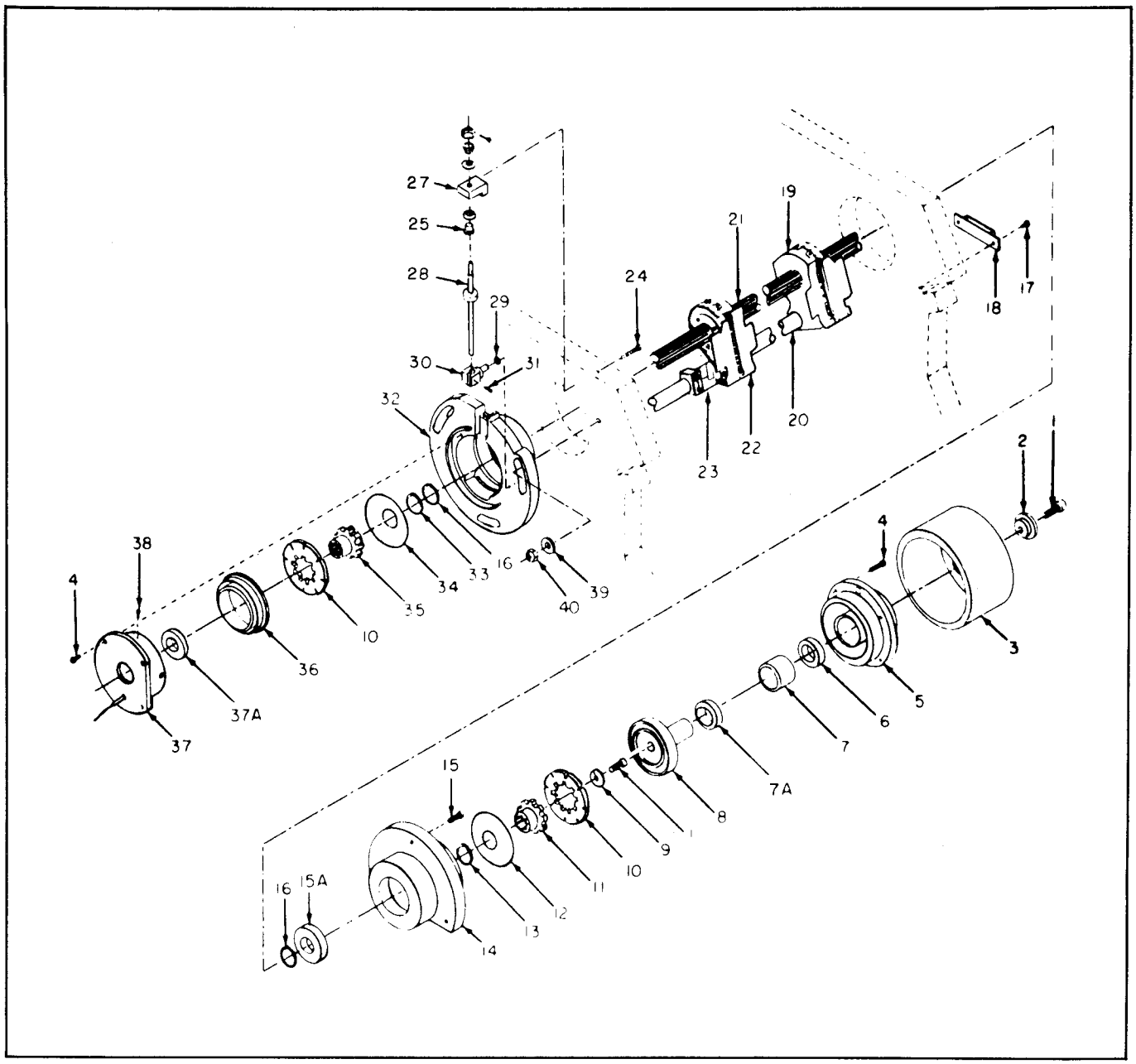


Figure 9-7. Paper Drive Assembly

FIG. & INDEX NO.	PART NO.	DESCRIPTION 1 2 3 4 5 6 7	MFR CODE	UNITS PER ASSY	USABLE ON CODE
9-8-	77533	YOKE LINK SUBASSEMBLY (see Figure 9-6-7 for NHA)		Ref	
-1	87581	. SPRING, Compression		1	
		(ATTACHING PARTS)			
-2	COML	. SETSCREW, 8-32, "NO MAR"	00141	1	
-3	COML	. SCREW, Machine, soc hd, 1/4-20 x 2 in. lg . . .	00141	1	
-4	C1-3	. COLLAR		1	
		---*---			
-5	87570	. YOKE, Top link		1	
-6	87571	. YOKE, Bottom link		1	

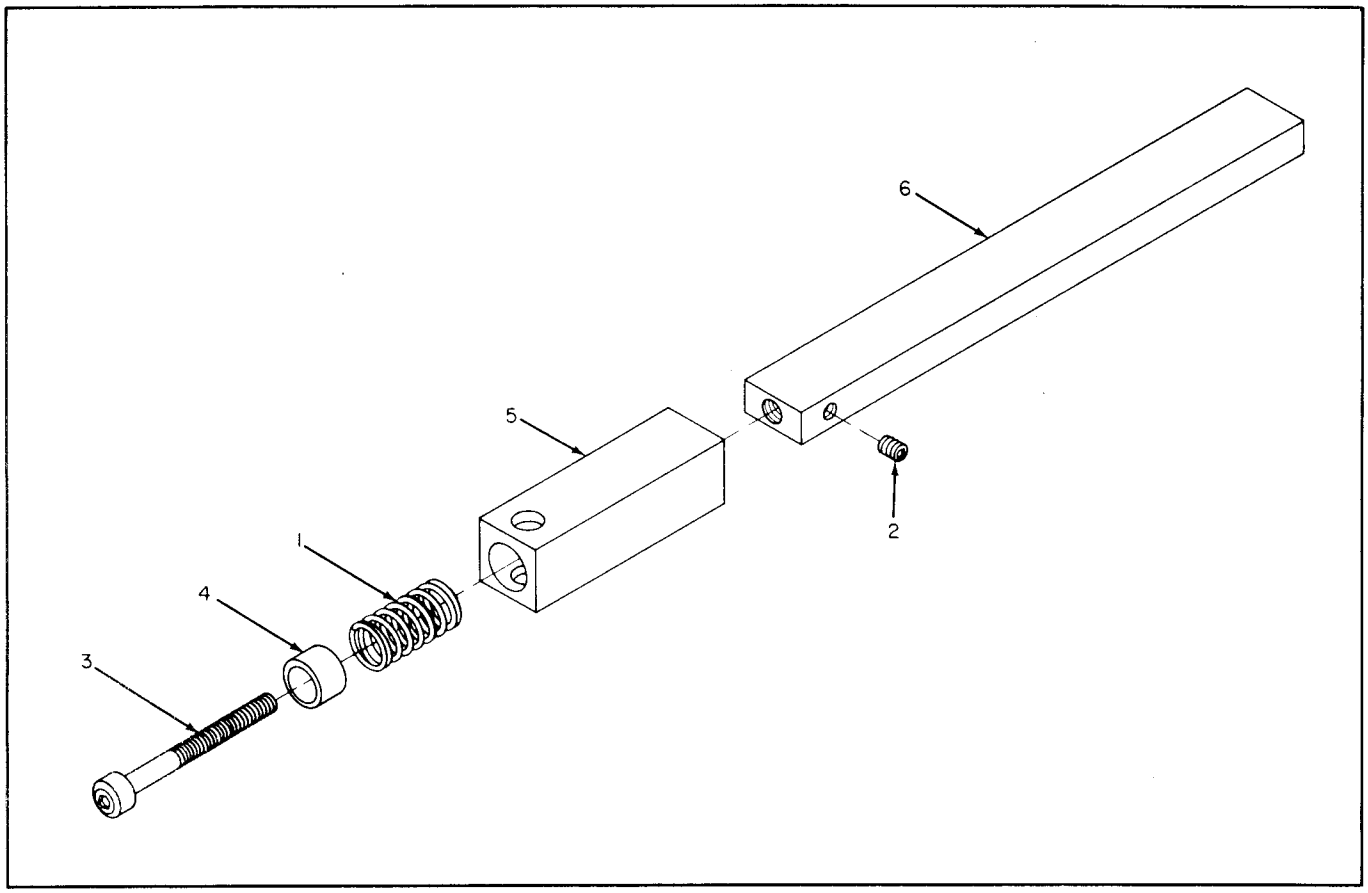


Figure 9-8. Yoke Link Subassembly

FIG. & INDEX NO.	PART NO.	DESCRIPTION 1 2 3 4 5 6 7	MFR CODE	UNITS PER ASSY	USABLE ON CODE
9-9-	61617G1	FORMAT SUBASSEMBLY, Low speed (see Figure 9-6-16 for NHA)		Ref	
-1	77581G1	. LINE COUNT FORMAT LAMP SUBASSEMBLY . . .		1	
		(ATTACHING PARTS)			
-2	842-122-084	. SCREW, Pan hd, 10-32 x 3/8 lg		2	
		---*---			
-3	77580	. . LAMP AND DIODE SUBASSEMBLY		1	
-4	842-122-086	. SCREW, Cap, soc hd, 10-32 x 1/2		1	
-5	87634	. BLOCK			
-6	87635	. LATCH		1	
		(ATTACHING PARTS)			
	842-122-046	. SCREW, Cap, soc hd, 6-32 x 1/2 lg		2	
		---*---			
	6159G1	. FORMAT TAPE READER SUBASSEMBLY		1	
-7	61582	. . CHUTE, Format tape		1	
		(ATTACHING PARTS)			
-8	842-109-044	. . SCREW, Pan hd, 6-32 x 3/8 lg		4	
		---*---			
-9	77551	. . BRACKET		1	
-10	77583G1	. . BLOCK AND CABLE SUBASSEMBLY		1	
		(ATTACHING PARTS)			
-11	842-122-072	. . SCREW, Cap, soc hd, 8-32 x 1-1/2 in. lg		4	
-12	933-113-006	. . WASHER, Lock, No. 8		4	
		---*---			
-13	COML	. . CLAMP, Cable		1	
		(ATTACHING PARTS)			
-14	842-109-064	. . SCREW, Cap, soc hd, 8-32 x 3/8 lg		1	
-15	776-107-004	. . NUT, Hex		1	
-16	933-109-008	. . WASHER, Flat		1	
		---*---			
-17	77543	. SPROCKET, Tape		1	
-18	87615	. CLAMP		1	
		(ATTACHING PARTS)			
-19	842-122-087	. SCREW, Cap, soc hd, 10-32 x 5/8 lg		1	
-20	933-112-007	. WASHER, Lock, No. 10		1	
		---*---			
-21	87613	. SPACER		1	
-22	87679	. HOLD DOWN		1	
		(ATTACHING PARTS)			
-23	842-122-084	. SCREW, Cap, soc hd, 10-32 x 3/8 lg		1	
-24	933-109-009	. WASHER, Flat, No. 10		1	
		---*---			
-25	795-123-065	. PIN, 1/2 od x 7/8 lg, Type B		1	
-26	61591	. PLATE, Format		1	
		(ATTACHING PARTS)			
-27	842-116-135	. SCREW, Cap, soc hd, 1/4-20 x 2-1/2 in. lg		3	
-28	933-112-009	. WASHER, Lock		3	
		---*---			
-29	795-218-126	. PIN, 1/8 od x 7/8 lg, Type G		1	
-30	525-125-104	. BEARING	43334	1	
-31	87667	. SPACER, Splined		1	

FIG. & INDEX NO.	PART NO.	DESCRIPTION 1 2 3 4 5 6 7	MFR CODE	UNITS PER ASSY	USABLE ON CODE
		(ATTACHING PARTS)			
9-9-32	842-122-066	. SCREW, Cap, soc hd, 8-32 x 1/2 lg		3	
		---*---			
-33	77634G2	. DISC LINE COUNT SUBASSEMBLY		1	
-34	97557	. SPACER, Format		1	

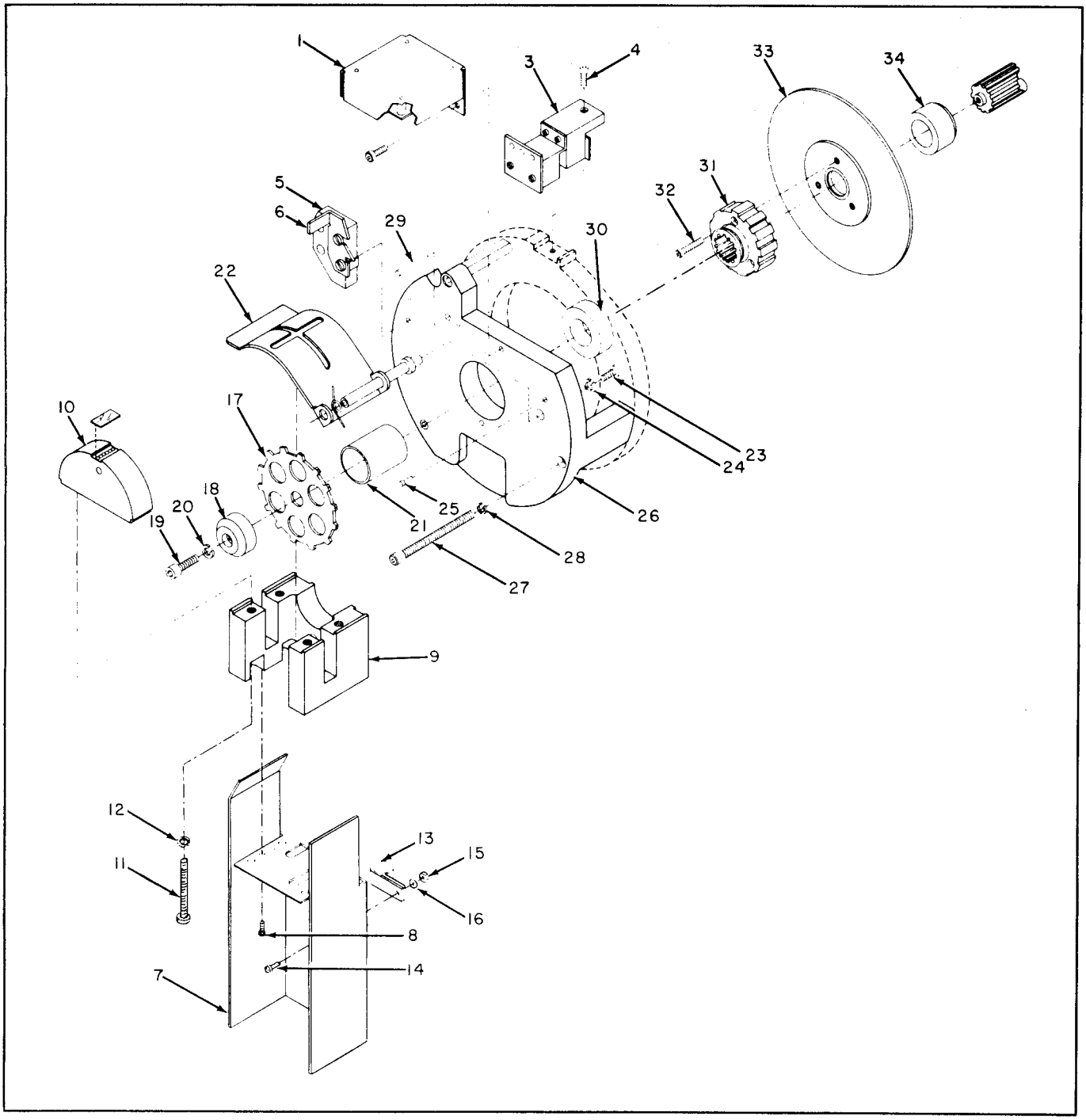


Figure 9-9. Format Subassembly

FIG. & INDEX NO.	PART NO.	DESCRIPTION 1 2 3 4 5 6 7	MFR CODE	UNITS PER ASSY	USABLE ON CODE
9-10-	63091G1	PAPER PULLER ASSEMBLY (see Figure 9-6-22 for NHA)		Ref	
-1	95784	. GEAR, Spur		1	
-2	95783	. GEAR, Spur		1	
		(ATTACHING PARTS)			
-3	845-126-005	. SETSCREW, Hex, soc hd 8-32 x 15/64		1	
		---*---			
-4	95716	. COLLAR, Paper puller		4	
		(ATTACHING PARTS)			
-5	845-126-011	. SETSCREW, Hex, soc hd, 1/4-20 x 5/16		4	
		---*---			
-6	82308	. DRIVE ROLL, Paper puller		14	
-7	82303-2	. SHAFT, Drive roll		1	
-8	50661G1	. CLUTCH BODY AND DRIVE SHAFT		1	
-9	82304	. NUT, Spring, retainer		1	
-10	95708	. SPRING, Compression		1	
-11	50662	. PLATE SUBASSEMBLY, Friction		1	
-12	COML	. . SETSCREW		1	
	51093	. PULLEY SUBASSEMBLY, Clutch		1	
-13	51091-1	. . PULLEY, Clutch		1	
-14	546-102-251	. . BUSHING		1	
-15	82299	. BRACKET, Support, R. H.		1	
		(ATTACHING PARTS)			
-16	842-201-003	. SCREW, Shoulder No. 10-32		2	
		---*---			
-17	776-110-002	. NUT, Hex, jam		2	
-18	845-112-609	. SETSCREW, 1/2 dog pt, 1/4-28 x 5/8		2	
-19	870-105-113	. SPRING, Compression		2	
-20	842-141-240	. SCREW, Long-lak, 10-32 x 1 in. lg		2	
-21	993-109-009	. WASHER, Plain, No. 10		2	
-22	776-107-005	. NUT, Hex, 10-32		2	
-23	50605-2	. BRACKET, Tension adjust, R. H.		1	
		(ATTACHING PARTS)			
-24	842-110-084	. SCREW, Pan hd, 8-32 x 3/8 lg		4	
-25	933-109-008	. WASHER, Plain, flat, No. 8		4	
-26	933-113-006	. WASHER, Lock, split, No. 8		4	
		---*---			
-27	82302	. SUPPORT, Shaft, R. H.		1	
-28	82301	. SUPPORT, Shaft, L. H.		1	
-29	50605-1	. BRACKET, Tension adjust, L. H.		1	
-30	82300	. BRACKET, Support, L. H.		1	

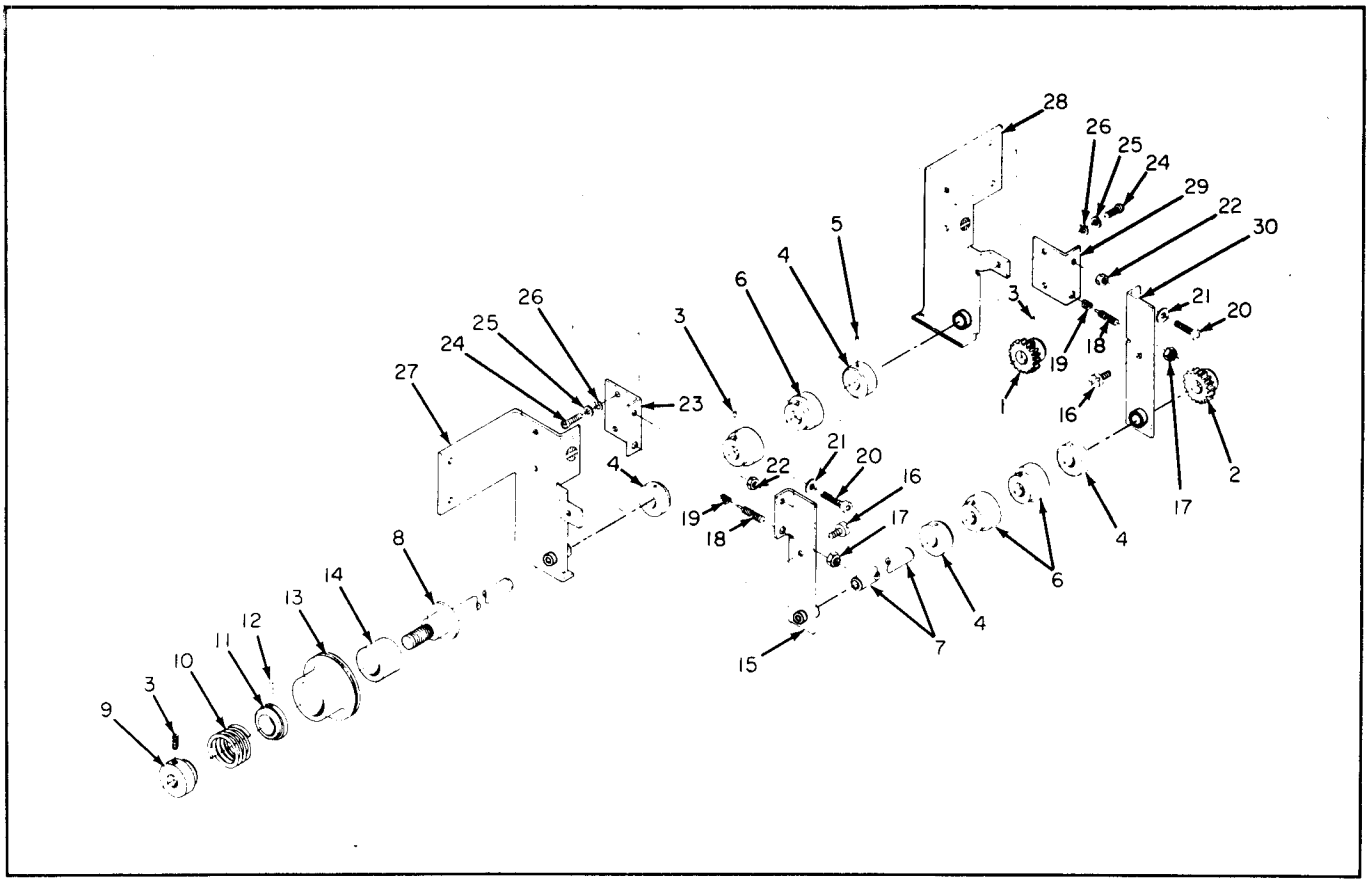


Figure 9-10. Paper Puller Assembly

FIG. & INDEX NO.	PART NO.	DESCRIPTION 1 2 3 4 5 6 7	MFR CODE	UNITS PER ASSY	USABLE ON CODE
9-11-	68623	POWER SUPPLY ASSEMBLY, Multiple output, 230v, 50 cycle (see Figure 9-1-3 for NHA)		Ref	
-1	68594	. PANEL		1	
-2	70-3-8	. KNOB	49956	6	
-3	COML	. SWITCH, Rotary, 1 pole, 2 position		3	
-4	COML	. RESISTOR, Variable		3	
-5	HPC	. FUSEHOLDER	71400	4	
-6	BAN-15	. FUSE, 15 amp	71400	1	
-7	AGU-10	. FUSE, 10 amp	71400	2	
-8	DF-30-BC	. POST, Binding, black	58474	3	
-9	DF-30-RC	. POST, Binding, red	58474	3	
-10	FNM-5	. FUSE, 5 amp	71400	1	
-11	COML	. CAPACITOR		1	
-12	COML	. CAPACITOR		1	
-13	COML	. CAPACITOR		1	
-14	COML	. CAPACITOR		1	
-15	T1866-230-508	. TRANSFORMER	08732	1	
-16	COML	. HEAT SINK		6	
-17	COML	. TRANSISTOR		6	
-18	242-18Y	. TERMINAL STRIP		1	

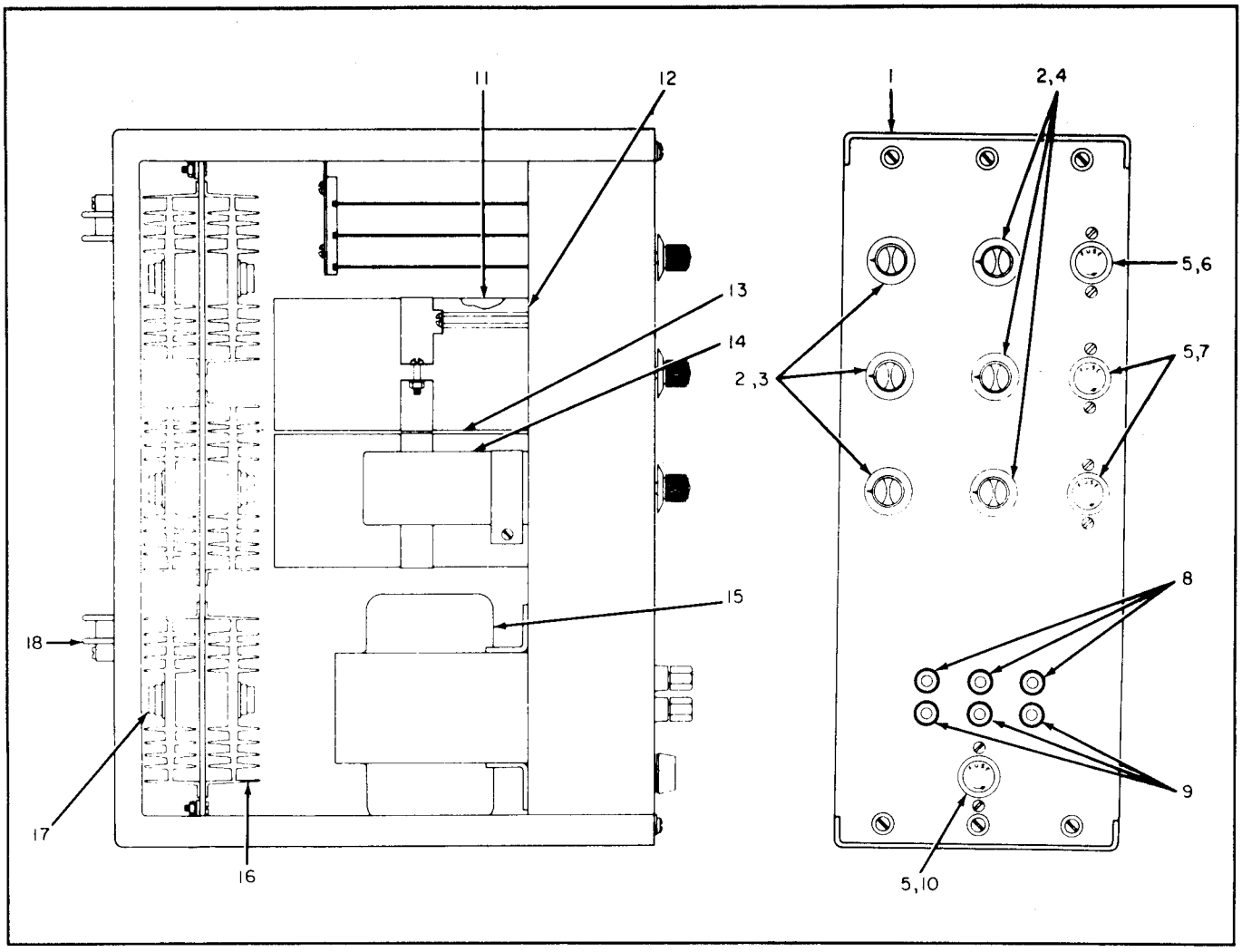


Figure 9-11. Power Supply Assembly

FIG. & INDEX NO.	PART NO.	DESCRIPTION 1 2 3 4 5 6 7	MFR CODE	UNITS PER ASSY	USABLE ON CODE
9-12-	62770	HAMMER BASKET ASSEMBLY (see Figure 9-1-4 for NHA)		Ref	
-1	328-102-001	. MODULOK, Module		47	
-2	387-702-008	. RESISTOR, 50 ohms, 100w		1	
-3	134-204-009	. CAPACITOR, 100 uf, 50v		1	
-4	387-702-006	. RESISTOR, 10 ohms, 100w		1	
	387-702-010	. RESISTOR, 250 ohms, 100w		1	
	134-204-010	. CAPACITOR, 150 uf, 50v		1	
	387-702-005	. RESISTOR, 5 ohms, 100w.		1	
-5	145-125-001	. CONNECTOR, Receptacle, 41 pin		7	
-6	141-101-010	. CLAMP, Cable		8	
		(ATTACHING PARTS)			
-7	842-110-086	. SCREW, Machine, pan hd, 8-32 x 1/2 lg		36	
-8	933-111-006	. WASHER, Lock, No. 8		43	
-9	933-105-005	. WASHER, Flat, No. 8.		43	
		---*---			
-10	192-102-001	. FAN, Muffin, vanturi		4	
-11	76612	. SCREEN, Fan		1	
-12	62368	. GUIDE, P.C. card		12	
		(ATTACHING PARTS)			
-13	842-110-029	. SCREW, Machine, flat hd, 4-40 x 3/4 lg.		48	
-14	933-109-022	. WASHER, Flat		154	
		---*---			
-15	95605	. SPACER		26	
-16	76456	. CONNECTOR, Receptacle, 23 pin, P.C. card. . . .		64	
		(ATTACHING PARTS)			
-17	776-107-002	. NUT, Hex, No. 4-40		28	
		---*---			

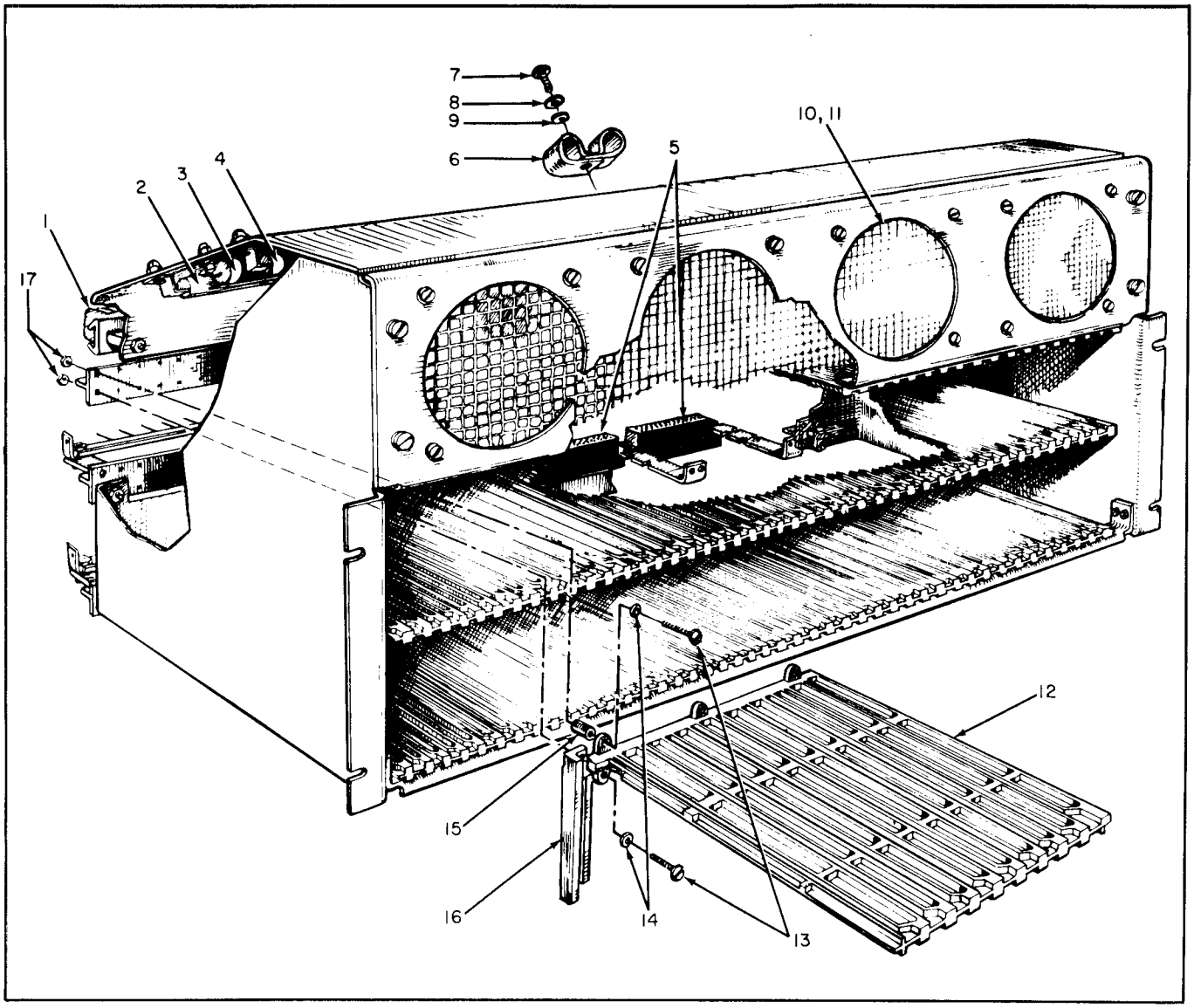


Figure 9-12. Hammer Basket Assembly

FIG. & INDEX NO.	PART NO.	DESCRIPTION 1 2 3 4 5 6 7	MFR CODE	UNITS PER ASSY	USABLE ON CODE
9-13-	62756	CAPACITOR BANK ASSEMBLY (see Figure 9-1-5 for NHA)		Ref	
-1	62620	. CHASSIS, Capacitor		1	
-2	76696	. CLAMP, Capacitor		1	
		(ATTACHING PARTS)			
	842-110-086	. SCREW, Machine, pan hd, 10-32 x 3/4 lg		6	
	933-111-006	. WASHER, Lock, No. 8		4	
	933-105-005	. WASHER, Flat, No. 8		4	
	COML	. NUT, Hex, 8-32		4	
		---*---			
-3	88110-1	. BUS BAR, Tie, short		1	
-4	88110-2	. BUS BAR, Tie, long		1	
		(ATTACHING PARTS)			
	842-110-090	. SCREW, Machine, pan hd, 8/32 x 7/8		4	
	933-104-006	. WASHER, Lock, No. 8		4	
	867-130-022	. SPACER		4	
		---*---			
-5	76628	. BUS BAR, Short		2	
-6	76627	. BUS BAR, Long		2	
		(ATTACHING PARTS)			
	842-111-007	. SCREW, Machine, pan hd, 10/32 x 5/8 lg		20	
	933-104-007	. WASHER, Lock, No. 10		20	
		---*---			
-7	95665	. RETAINER, Capacitor		3	
-8	95664	. ROD, Tie down, capacitor		3	
		(ATTACHING PARTS)			
	776-101-002	. NUT, Hex, 1/4-20		3	
	933-104-009	. WASHER, Lock, No. 1/4		3	
	933-105-007	. WASHER, Flat, No. 1/4		3	
		---*---			
-9	134-152-001	. CAPACITOR, 26,000 uuf		11	

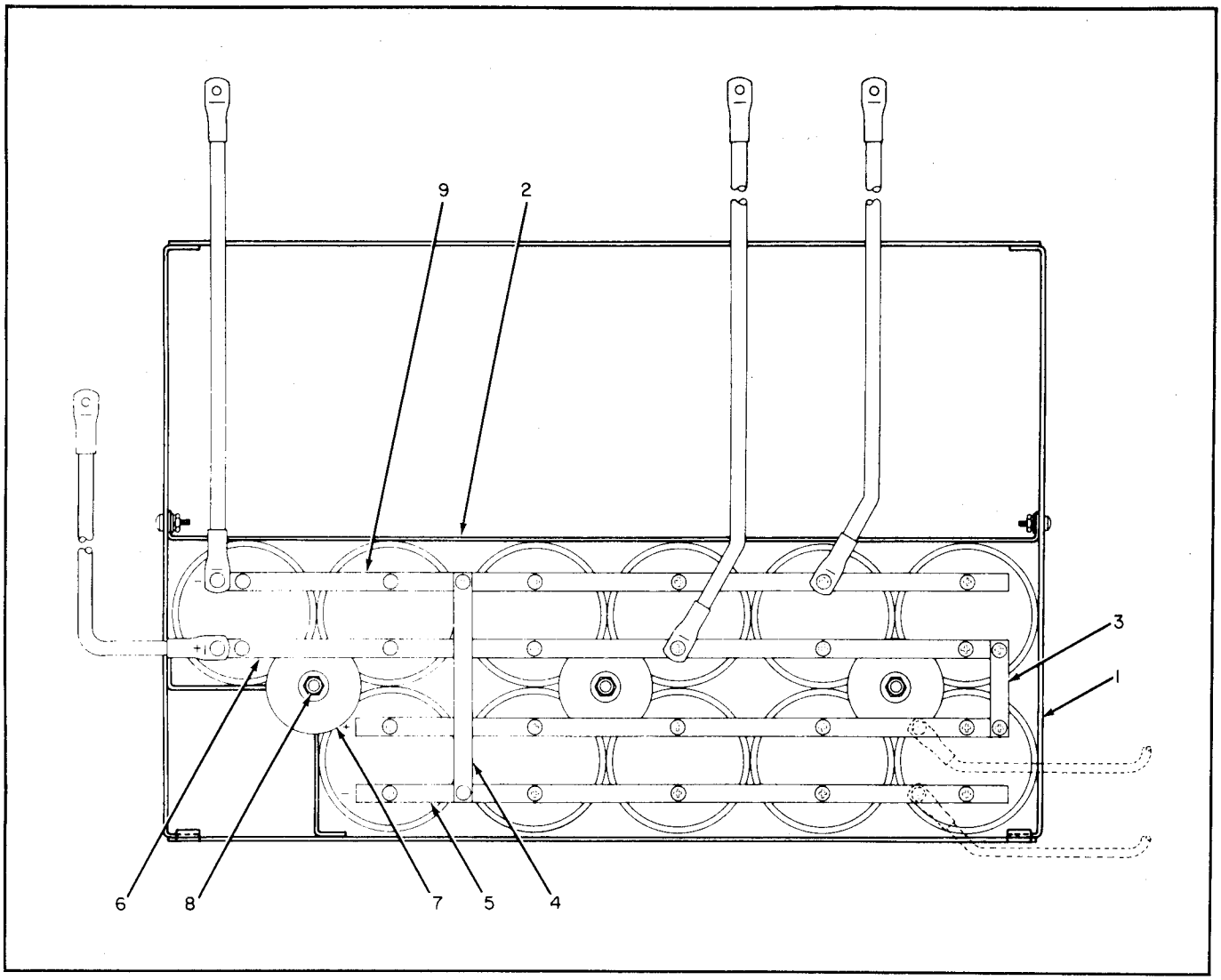


Figure 9-13. Capacitor Bank Assembly

FIG. & INDEX NO.	PART NO.	DESCRIPTION 1 2 3 4 5 6 7	MFR CODE	UNITS PER ASSY	USABLE ON CODE
9-14-	62678-2	CVR POWER SUPPLY, 36v, 28A, 50/60 cycle (see Figure 9-1-6 for NHA)		Ref	
-1	55S	. RESISTOR, 1 ohm, 55w	63743	1	
-2	COML	. SCREW, 8-32 x 7/8 lg		4	
-3	COML	. WASHER, Flat, No. 8		4	
-4	COML	. WASHER, Lock, No. 8		4	
-5	COML	. NUT, Hex, 8-32		4	
-6	PR11AY	. RELAY, DPDT, 24v	77342	1	
-7	88050	. BRACKET, Mounting		1	
-8	COML	. SCREW, 6-32 x 1/2 lg		8	
-9	88038	. HEAT SINK		1	
-10	1N1186A	. DIODE	49956	2	
-11	COML	. SCREW, 6-32 x 3/8 lg		4	
-12	COML	. WASHER, Flat, No. 6		7	
-13	COML	. WASHER, Lock, No. 6		10	
-14	COML	. NUT, Hex, 6-32		7	
-15	A2SM14-1	. MODULOK, 2 tier		11	
-16	88037	. TRACK		1	
-17	AMC-1	. CLAMP, End	09922	2	
-18	49F4313	. CAPACITOR, 8 mfd, 660vac		2	
-19	GE302C920	. BRACKET, Mounting		4	
-20	76650	. BRACKET, Mounting		1	
-21	95667	. SPACER		4	
-22	COML	. SCREW, 10-32 x 7/8 lg		4	
-23	COML	. WASHER, Lock, No. 10		4	
-24	COML	. NUT, Hex, No. 10-32		4	
-25	T36-28-50-60	. TRANSFORMER	08732	1	
-26	88039	. BRACKET, Mounting		2	
-27	76651	. BRACKET, Mounting		1	
-28	KA11DY	. RELAY, DPDT, 24vdc	77342	1	
-29	DF30BC	. BINDING POST	58474	1	
-30	DF30RC	. BINDING POST	58474	1	
-31	BAN15	. FUSE, 15A, 250v	71400	1	
-32	HPC	. FUSEHOLDER	71400	1	
-33	1947-1	. TERMINAL	71729	1	
-34	134-601-018	. CAPACITOR, .1 mfd, 100vdc	84171	1	
-35	TYPE HB	. RESISTOR, 220 ohms, 2w	01121	1	

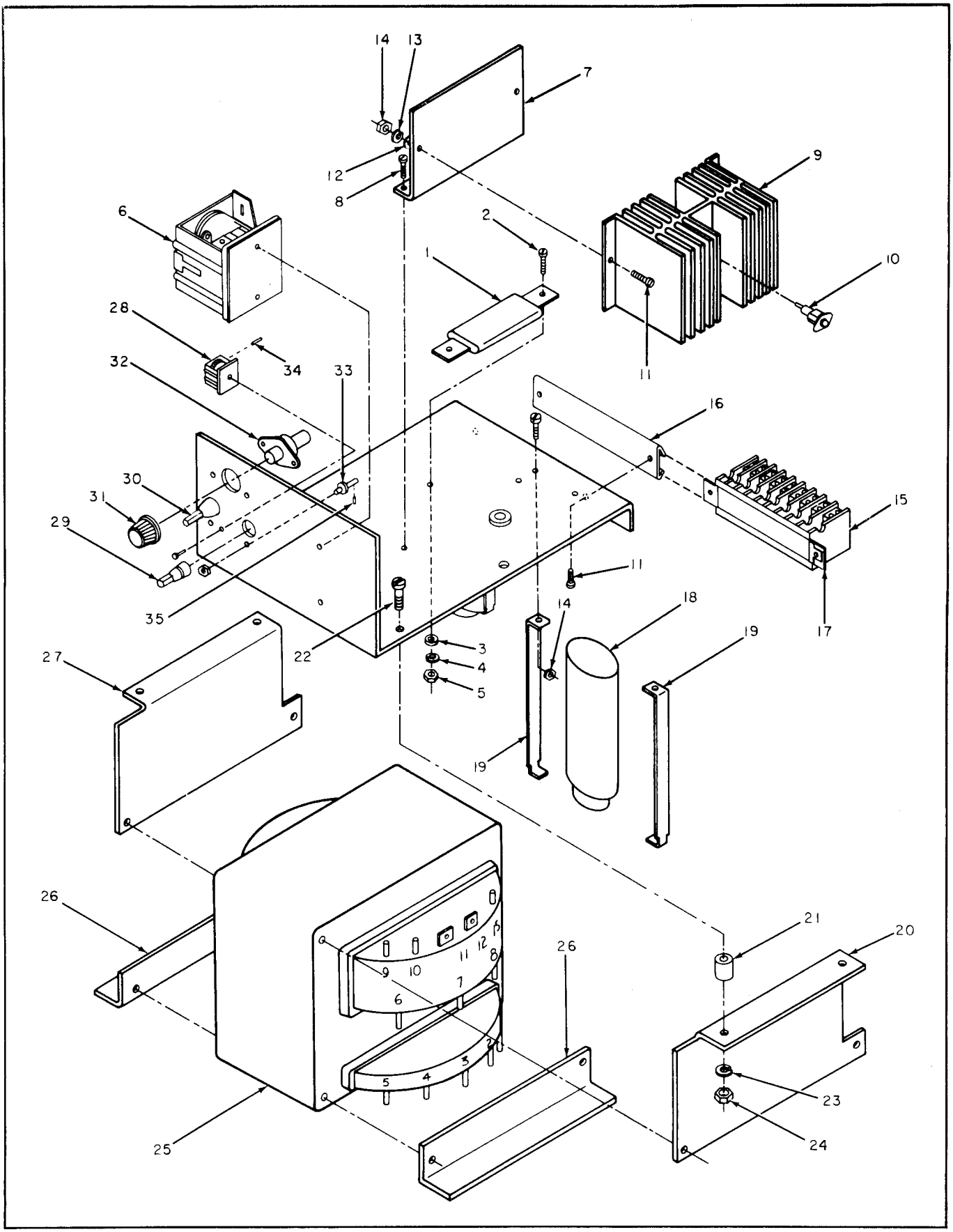


Figure 9-14. CVR Power Supply

FIG. & INDEX NO.	PART NO.	DESCRIPTION 1 2 3 4 5 6 7	MFR CODE	UNITS PER ASSY	USABLE ON CODE
9-15-	62435	SEQUENCER ASSEMBLY (see Figure 9-1-7 for NHA)		Ref	
-1	387-111-069	. RESISTOR, 680 ohms, ±5%, 1w		1	
-2	KA5DY	. RELAY, SPDT, 5A, 24vdc	77342	1	
-3	387-111-057	. RESISTOR, 220 ohms, ±5%, 1w	44655	1	
-4	KA14DY	. RELAY, 3 PDT, 5A, 12vdc	77342	1	
-5	KA5DY	. RELAY, SPDT, 5A, 12vdc	77342	2	
-6	387-112-045	. RESISTOR, 68 ohms, ±5%, 2w	44655	3	
-7	KA5DY	. RELAY, SPDT, 5A, 6vdc	77342	1	
-8	1N537	. DIODE		5	
-9	6377	. TRANSFORMER, 115v-230v	97965	1	
-10	76552	. TRACK		1	
-11	A2SM14-1	. MODULOK, 2 tier	09922	56	
	A2SME	. END PLATE	09922	2	
	AMC-1	. END CLAMP	09922	2	
-12	86993	. BRACKET		1	
-13	SWL612G10506	. CAPACITOR, 1 uf, 600v	84411	4	
-14	FE4159PA	. CONTACTOR, 3PST, 15A	52090	1	
-15	AN1-522XAX	. RELAY, Time delay, 2 sec, 24 vac	74193	1	
-16	KA14AY	. RELAY, 3PDT, 5A, 24vac	77342	2	
-17	KA11DY	. RELAY, DPDT, 5A, 6vdc	77342	1	
-18	4001	. SWITCH, Push, momentary	81073	1	
-19	HKL	. FUSEHOLDER, Indicating	71400	2	
	AGC-1	. FUSE, 1A, 250v	71400	2	
-20	AM333	. CIRCUIT BREAKER, 30A, 23vac	74193	1	
-21	1CF-5AA	. CIRCUIT BREAKER, 5A	52090	2	
-22	1CF-10AA	. CIRCUIT BREAKER, 10A	52090	1	
-23	No Number	. METER, Time		1	
-24	7538	. HOLDER, Lamp	13812	4	
	39-28-1471	. LAMP, Incandescent	13812	4	

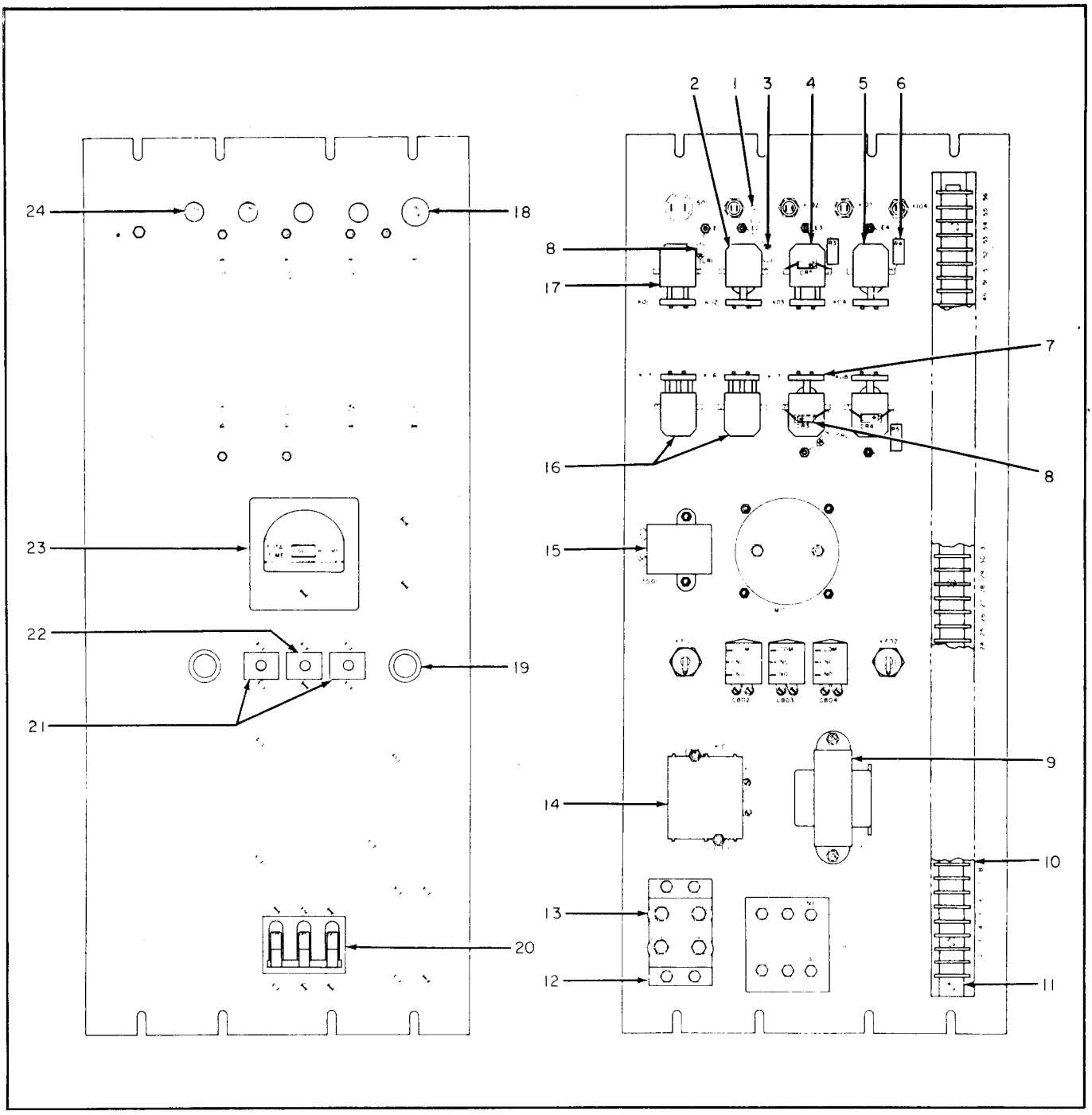


Figure 9-15. Sequencer Assembly

FIG. & INDEX NO.	PART NO.	DESCRIPTION 1 2 3 4 5 6 7	MFR CODE	UNITS PER ASSY	USABLE ON CODE
9-16-	51716G1	LOGIC GATE ASSEMBLY (see Figure 9-1-2 for NHA)		Ref	
-1	62975G1	. FAN ASSEMBLY		1	
-2	82103	. LATCH ASSEMBLY		2	
-3	76456	. CONNECTOR, 23 pin		233	
-	95605	. SPACER		30	
		(ATTACHING PARTS)			
-4	842-110-030	. SCREW, Machine, 4-40 x 78		116	
	842-110-087	. SCREW, Machine, 8-32 x 5/8		53	
	933-109-002	. WASHER, Flat, No. 4		116	
	933-109-008	. WASHER, Flat, No. 8		53	
	933-113-003	. WASHER, Lock, No. 4		116	
	933-111-006	. WASHER, Lock, No. 8		53	
-5	62891	. GUIDE, P. C. Cord		29	
-6	6263562	. CORE PLANE ASSEMBLY		1	
-7	63039G1	. FRAME ASSEMBLY, GATE		1	
-8	76665	. BRACKET, Connector		1	
-9	145-125-001	. CONNECTOR, Series "M", 41 pin		7	
	145-146-001	. CONNECTOR, Series "M", 41 pin		3	
	5138661	. PANEL ASSEMBLY, Test		1	
-10	76621	. . SWITCH, Rework		2	
	717-104-001	. . KNOB, Pointer		2	
-11	416-208-001	. . SWITCH, Toggle		2	
-12	416-207-001	. . SWITCH, Push button		3	
-13	800-101-006	. . PLUG, Button		1	

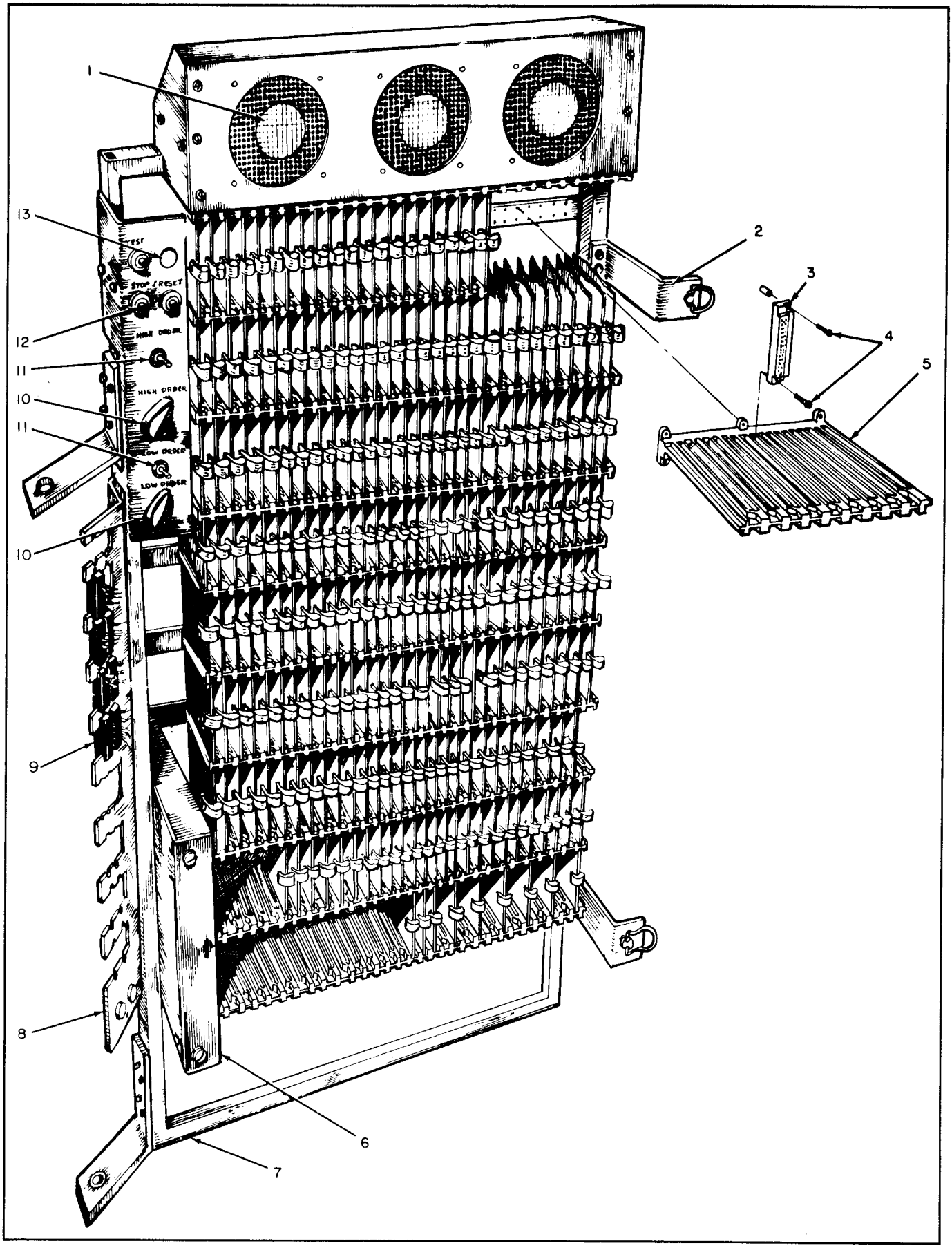


Figure 9-16. Logic Gate Assembly

CHAPTER 10

REFERENCE DRAWINGS

PRINTER LOGIC DIAGRAMS

TITLE	DRAWING NUMBER
Printer Control Logic	33003
Hammer Driver Logic 1	33021 (2 sheets)
Card Listing - Hammer Basket	62950

PRINTER PRINTED CIRCUITS AND DESCRIPTIONS

TITLE	ASSEMBLY NUMBER	SCHEMATIC NUMBER
High Density Hammer Driver	34730	34780
Data 5	34731	34781
Strobe 5	34732	34782
Paper Feed Hold and Pulse	34733	34783
Paper Feed Control and Sense	34734	34784
Ribbon Control	34735	34785
Monitor 5	34736	34786
F Load	34738	34788

BUFFER LOGIC DIAGRAMS

TITLE	DRAWING NUMBER
Card Location and Listing (2 sheets)	35216
Interface Block Diagram	46079
Memory Block Diagram	46080
Vertical Format Block Diagram	46081
Print Control Block Diagram	46082
On Line Control	46083
Load Control	46084
Data Translator Control-A	46085
Data Translator Control-B	46086
Data Translator	46087
Lamp Control	46088
Alarms	46089
Set Alarms	46090
Odd Data Storage	46091
Even Data Storage	46092
Data Write-Rewrite	46093
Data Loads	46094
Write Control	46095
Preset Master Counter Units (1-6)	46096
Preset Master Counter Units (7-0)	46097
Preset Master Counter (X00-X40)	46098
Preset Master Counter (X50-X90)	46099
Master Counter Units	46100
Master Counter C1-10 thru C81-90	46101
Master Counter C91-100 thru C121-130	46102
Master Counter C131-140 thru C151-160	46103
Memory Address Units	46104
Memory Address Tens and Hundreds	46105
Paper Feed Control	46106
Vertical Format Control	46107
Vertical Format Channel Select	46108
Read Control	46109
Print Control	46110

BUFFER LOGIC DIAGRAMS (Cont'd)

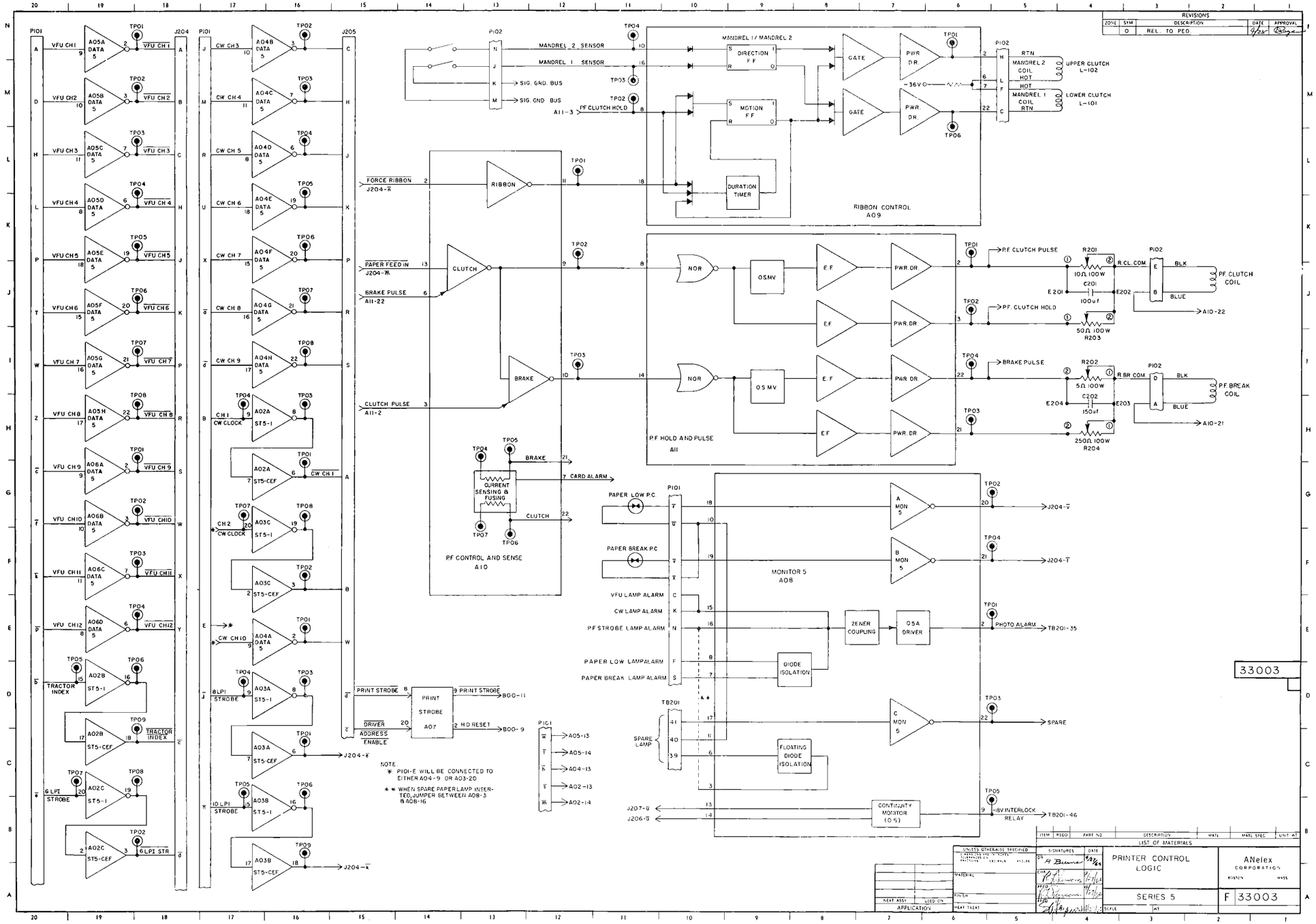
TITLE	DRAWING NUMBER
Code Wheel Storage	46111
Compare Odd	46112
Compare Even	46113
B Register	46114
Enable Odd Column Gate	46115
Enable Even Column Gate	46116
C Register 6 thru 10	46117
C Register 1 thru 5	46118
Enable Zone Gate	46119
Test Generator Logic	46120
Test Data and Column Counter	46121
Print Buffer Block Diagram	46232

BUFFER PRINTED CIRCUITS AND DESCRIPTIONS

TITLE	SCHEMATIC NUMBER	ASSEMBLY NUMBER
Register	34101	34051
One Shot Long	34102	34052
One Shot Short	34103	34053
Core Driver 200	34104	34054
Core Driver 400	34105	34055
Core Driver Load	34106	34056
A NOR 5	34107	34057
B NOR 5	34108	34058
Pulse Amplifier Gate Generator	34110	34060
A NOR 10	34116	34066
B NOR 10	34117	34067
A Trigger Load	34122	34072
High Speed One Shot	34130	34080
Pulser	34147	34097
C NOR 5	34149	34099
C NOR 10	34150	34100
Switch to DC Converter	34354	34304
Long Delay Timer	34357	34307
Read/Write Sense Amplifier	34376	34326
Complemented Emitter Follower	34382	34332
Short Delay Timer	34397	34347
C NOR 20	34754	34704
K NOR	34902	34852
18-30 Lamp Driver	34910	34860
IN 1562	44097	44047

SCHEMATICS AND WIRING DIAGRAMS

TITLE	DRAWING NUMBER
Multiple - Output Supply	32242
Sequencer	32714
CVR Power Supply, 36V-28A	32826
Printer Wiring Diagram	32879
Unbuffered Connector Wiring Terminations	32959


REVISIONS
ZONE | SYM | DESCRIPTION | DATE | APPROVAL
O | REL. TO PED. | 6/25
VFU CH1
VFU CH2
VFU CH3
VFU CH4
VFU CH5
VFU CH6
VFU CH7
VFU CH8
VFU CH9
VFU CH10
VFU CH11
VFU CH12
TRACTOR INDEX
6 LPI STROBE
CW CH3
CW CH4
CW CH 5
CW CH 6
CW CH 7
CW CH 8
CW CH 9
CH 1 CW CLOCK
CH 2 CW CLOCK
CW CH10
8 LPI STROBE
10 LPI STROBE
6 LPI STR
MANDREL 2 SENSOR
MANDREL 1 SENSOR
SIG. GND. BUS
PF CLUTCH HOLD
A11-3
MANDREL 1/ MANDREL 2
DIRECTION F F
MOTION F F
GATE
PWR. DR.
-36V
RTN
MANDREL 2 COIL HOT
HOT
MANDREL 1 COIL RTN
UPPER CLUTCH L-102
LOWER CLUTCH L-101
RIBBON CONTROL A09
FORCE RIBBON J204-R
PAPER FEED IN J204-M
BRAKE PULSE A11-22
CLUTCH PULSE A11-2
RIBBON
CLUTCH
BRAKE
NOR
O.S.M.V.
E.F.
PF HOLD AND PULSE A11
PF CLUTCH PULSE
PF. CLUTCH HOLD
BRAKE PULSE
R201 10Ω 100W
R202 5Ω 100W
R203 50Ω 100W
R204 250Ω 100W
C201 100uf
C202 150uf
R.CL.COM
R.BR.COM
BLK
BLUE
PF. CLUTCH COIL
PF. BREAK COIL
A10-22
A10-21
BRAKE
CARD ALARM
CLUTCH
CURRENT SENSING & FUSING
PF CONTROL AND SENSE A10
PRINT STROBE
DRIVER ADDRESS ENABLE
PRINT STROBE A07
B00-11
B00-9
J204-E
J204-K
NOTE
* PI01-E WILL BE CONNECTED TO EITHER A04-9 OR A03-20
** WHEN SPARE PAPER LAMP INSERTED, JUMPER BETWEEN A08-3 & A08-16
PAPER LOW P.C.
PAPER BREAK P.C.
VFU LAMP ALARM
CW LAMP ALARM
PF STROBE LAMP ALARM
PAPER LOW LAMP ALARM
PAPER BREAK LAMP ALARM
MONITOR 5 A08
A MON 5
B MON 5
C MON 5
ZENER COUPLING
OSA DRIVER
DIODE ISOLATION
FLOATING DIODE ISOLATION
CONTINUITY MONITOR (O.S)
PHOTO ALARM
TB201-35
SPARE
-5V INTERLOCK RELAY
TB201-46
J207-U
J206-U
J204-V
J204-T
P1G1
A05-13
A05-14
A04-13
A02-13
A02-14
33003
ITEM | REQD | PART NO | DESCRIPTION | MATL | MATL SPEC | UNIT MT
LIST OF MATERIALS
UNLESS OTHERWISE SPECIFIED
SIGNATURES | DATE
DR R Burns 7/1/65
CHK 7/1/65
APPD 7/1/65
ENGR 7/1/65
MATERIAL
FINISH
NEXT ASSY | USED ON
APPLICATION
HEAT TREAT
PRINTER CONTROL LOGIC
SERIES 5
SCALE | WT
ANelex CORPORATION BOSTON MASS
F 33003

REVISIONS				
ZONE	SYM	DESCRIPTION	DATE	APPROVAL
	0	REL TO PED	6/2	

TO SHEET 2

J207

SIG GRD 65-72 (ENABLE COLUMNS)

SIG GRD 49-56 (ENABLE COLUMNS)

SIG GRD 33-40 (ENABLE COLUMNS)

SIG GRD 17-24 (ENABLE COLUMNS)

1-8 (ENABLE COLUMNS)

ZONE CONN.

J207

SIG GRD 73-80 (ENABLE COLUMNS)

41-48 (ENABLE COLUMNS)

25-32 (ENABLE COLUMNS)

9-16 (ENABLE COLUMNS)

ZONE CONN.

J206

RESET

PRINT STROBE

A	B	C	D	E	F	H	J	K	L	M	N	P	R	S	T	U	V	W	X	Y	Z	a	b	c	d	e	f	h	j	k	p	r
1,17,33,49, 65,81,97,113 129,145	2,18,34,50, 66,82,98,114 130,146	3,19,35,51, 67,83,99,115 131,147	SIG GRD			4,20,36,52, 68,84,100,116 132,148	5,21,37,53, 69,85,101,117, 133,149	6,22,38,54, 70,86,102,118, 134,150	SIG GRD			7,23,39,55, 71,87,103,119, 135,151	(ENABLE COLUMNS) 8,24,40,56, 72,88,104,120, 136,152	9,25,41,57, 73,89,105, 121,137,153	SIG GRD			10,26,42,58, 74,90,106, 122,138,154	11,27,43,59, 75,91,107, 123,139,155	12,28,44, 60,76,92,108, 124,140,156	SIG GRD			13,29,45,61, 77,93,109, 125,141,157	14,30,46, 62,78,94,110, 126,142,158	SIG GRD			15,31,47,63, 79,95,111, 127,143,159	SIG GRD			16,32,48, CONN 64,80,96,112,128 144,160

J206 COLUMN

CARD ALARM → T8201-37

P105

	PINS	
HAMM	BLK	BLU
1	D	A
3	E	B
5	F	C
7	L	H
9	M	J
11	N	K
13	T	P
15	U	R
17	V	S
19	Z	W
21	a	X
23	b	Y
25	f	c
27	h	d
29	j	e
31	p	k
33	r	m
35	s	n
37	w	t
39	x	v

P106

PINS		
BLU	BLK	HAMM
A	D	2
B	E	4
C	F	6
H	L	8
J	M	10
K	N	12
P	T	14
R	U	16
S	V	18
W	Z	20
X	a	22
Y	b	24
e	f	26
d	h	28
e	j	30
k	p	32
m	r	34
n	s	36
t	w	38
v	x	40

P107

PINS		
HAMM	BLK	BLU
41	D	A
43	E	B
45	F	C
47	L	H
49	M	J
51	N	K
53	T	P
55	U	R
57	V	S
59	Z	W
61	a	X
63	b	Y
65	f	c
67	h	d
69	j	e
71	p	k
73	r	m
75	s	n
77	w	t
79	x	v

P108

PINS		
BLU	BLK	HAMM
A	D	42
B	E	44
C	F	46
H	L	48
J	M	50
K	N	52
P	T	54
R	U	56
S	V	58
W	Z	60
X	a	62
Y	b	64
e	f	66
d	h	68
e	j	70
k	p	72
m	r	74
n	s	76
t	w	78
v	x	80

A38 F OR FR. LOAD

A36 F OR FR LOAD

A34 F OR FR LOAD

A32 F OR FR. LOAD

A30 F OR FR. LOAD

A28 F OR FR. LOAD

A26 F OR FR. LOAD

33021

ITEM	REQD	PART NO	DESCRIPTION	MATL	MATL SPEC	UNIT WT

LIST OF MATERIALS

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES TOLERANCES ON FRACTIONS ±1/64 DECIMALS ±.01 ANGLES ±1°

MATERIAL

FINISH

NEXT ASSY USED ON

APPLICATION

HEAT TREAT

SIGNATURES	DATE
DR	
CHK	
APVD	
QUAL	

HAMMER DRIVER LOGIC
160 COLUMN
SHEET 1 OF 2

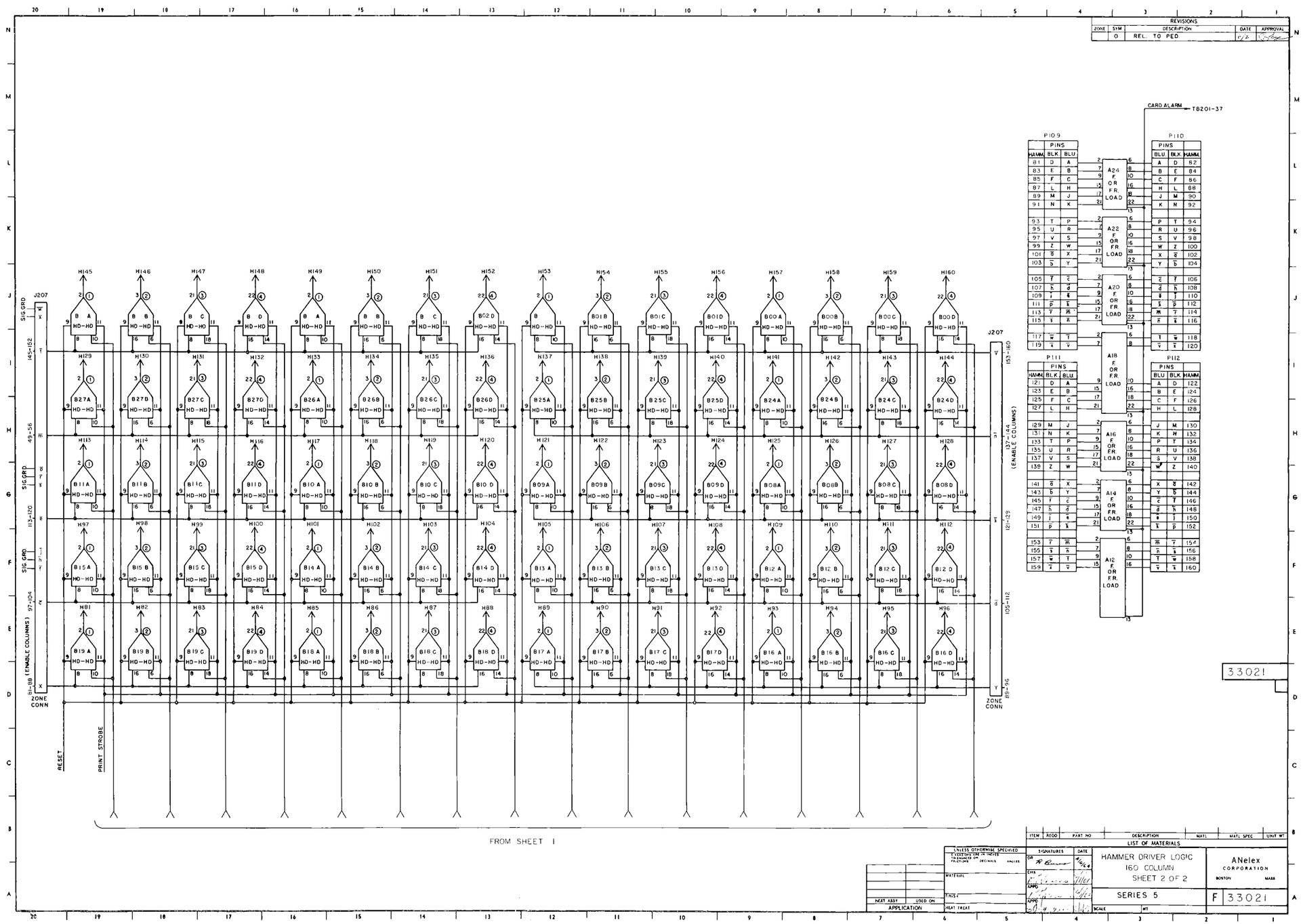
SERIES 5

SCALE WT

ANelex CORPORATION BOSTON MASS

F 33021

REVISIONS				
ZONE	SYM	DESCRIPTION	DATE	APPROVAL
	0	REL. TO PED	10/2	



33021

ITEM	REQD	PART NO	DESCRIPTION	MATL	MATL SPEC	UNIT WT

LIST OF MATERIALS

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES TOLERANCES ON FRACTIONS DECIMALS ANGLES

MATERIAL

FINISH

NEXT ASSY USED ON APPLICATION

HEAT TREAT

SIGNATURES	DATE
DR	10/2/64
CHK	
APPD	

HAMMER DRIVER LOGIC
160 COLUMN
SHEET 2 OF 2

SERIES 5

SCALE WT

ANelex CORPORATION BOSTON MASS

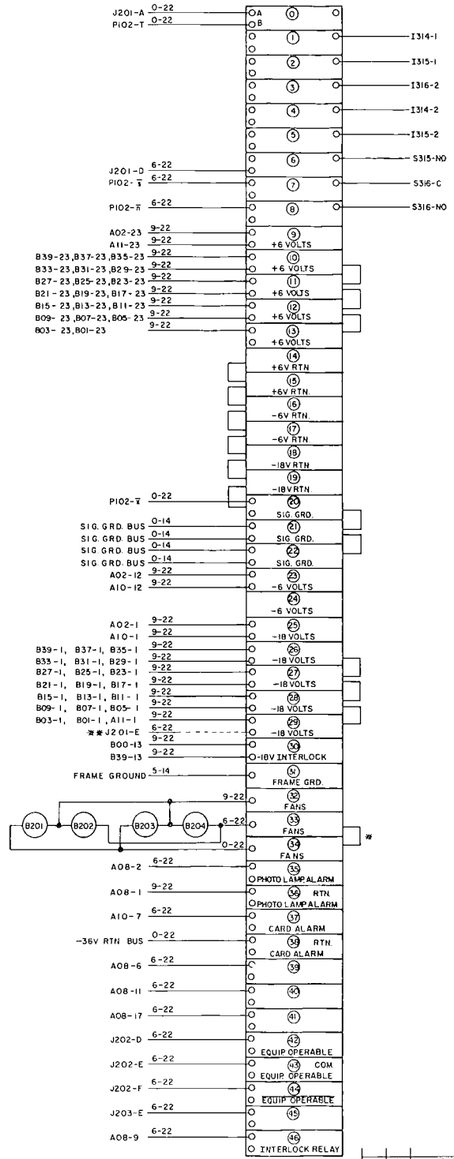
F 33021

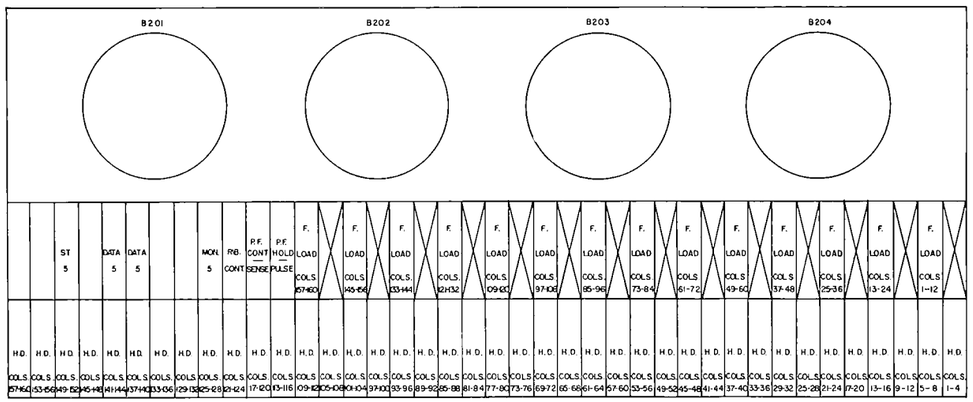
CARD LIST				VOLTAGE BUS PINS						
ITEM	QUANT.	NUMBER	TITLE	SIG GRD.	+6V	-6V	-18V	-18V INT.	-36V	-36V RTN.
1	2	34731	DATA 5	4,5	13,14 23	12	1	—	—	——
2	1	34732	STROBE 5	4,5	33 22,23	12	1	—	—	——
3	1	34733	P.F. HOLD — PULSE	5	23	—	1	—	19,20	4
4	1	34734	P.F. CONTROL — SENSE	5	23	12	1	—	19,20	4
5	1	34735	RIBBON CONTROL	5	23	—	1	—	19,20	4
6	1	34736	MONITOR 5	4,5	23	12	1	—	—	——
7	14	34738	F. LOAD	——	—	—	—	—	19,20	——
8	40	34730	H.D. HAMMER DR.	5	23	—	1	13	19,20	4

KEYING
10—11 18—19
10—11 12—13
10—11 15—16
10—11 16—17
10—11 17—18
12—13 16—17
10—11 21—22
10—11 14—15

MODULOK (TYPICAL)

MODULOK TB201 POWER DIST.





INDICATES RECEPTACLE POSITIONS WHICH CANNOT BE USED.

* THIS JUMPER SUPPLIED FOR 115V 60~ OPERATION ONLY.

** FOR ISOLATED LAMP COMMON, THIS LEAD WILL BE CONNECTED TO TB201-45.

REVISIONS				
ZONE	SYM	DESCRIPTION	DATE	APPROVAL
	0	REL. TO PED	6/18	

62950

ITEM	REQD	PART NO.	DESCRIPTION	MATL	MATL SPEC	UNIT WT

LIST OF MATERIALS

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES TOLERANCES ON FRACTIONS DECIMALS ANGLES

MATERIAL

FINISH

HEAT TREAT

NEXT ASSY | USED ON

APPLICATION

SIGNATURES	DATE
DR R Reiss	6/18/64
CHK M.F. Ferreira	6/18/64
ENGR M.R. Reiss	6/18/64
APPD	

CARD LISTING HAMMER BASKET

SERIES 5

ANelex CORPORATION BOSTON MASS

F 62950

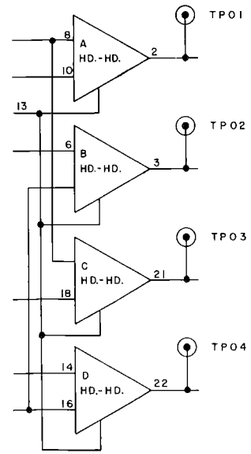
SCALE WT

REVISIONS				
ZONE	SYM	DESCRIPTION	DATE	APPROVAL
	0	REL TO PED	11/27	
	A	REV TO ECA 18090	1-7-64	

NOTES:
1. UNLESS OTHERWISE SPECIFIED:
   ALL DIODES ARE 1N276,
   ALL RESISTORS ARE 1/4W 1%,
   ALL TRANSISTORS ARE 2N2541.
2. COMPONENT TYPES SHOWN ON THIS SCHEMATIC ARE INDICATIVE ONLY. APPROVED SUBSTITUTES MAYBE USED.

WARNING— THE INSERTION OR WITHDRAWAL OF THIS MODULE WHEN DC POWER IS PRESENT AT THE CONNECTOR MAY RESULT IN PERMANENT DAMAGE TO THE SEMI-CONDUCTORS.

LOGIC SYMBOL



34780 A

APPROVED PROD. ENG. 11/15/63 DIR MANUFT.

ITEM	REQD	PART NO	DESCRIPTION	MATL	MATL SPEC	UNIT WT

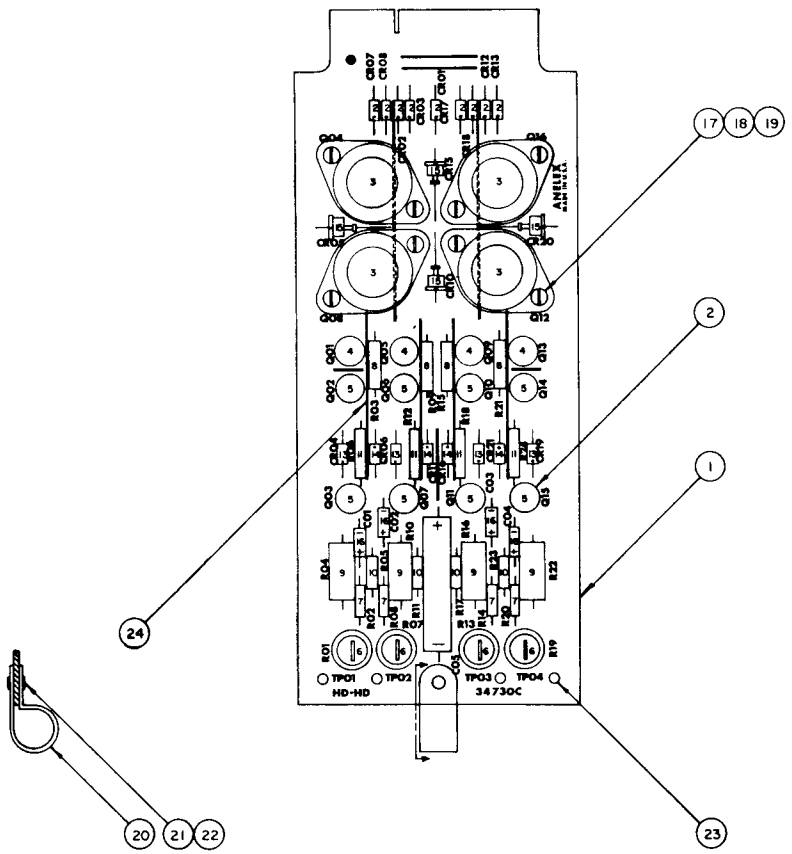
LIST OF MATERIALS

UNLESS OTHERWISE SPECIFIED	SIGNATURES	DATE	HI-DEN. HAMMER DRIVER SCHEMATIC	ANelex CORPORATION BOSTON MASS
DIMENSIONS ARE IN INCHES TOLERANCES ON FRACTIONS DECIMALS ANGLES	DR. McDonough	12-7-63		
MATERIAL	CHK. Mc Nichols	8/2/63	SERIES 5	D 34780
FINISH	APPD.	11/14/63		
HEAT TREAT	APPD.	11/14/63	SCALE NONE WT	
34730 NEXT ASSY USED ON APPLICATION				

1394

REVISIONS				
ZONE	SYM	DESCRIPTION	DATE	APPROVAL
	C	REV PER ECA 18233 & 18314	12/17/68	RH
	D	REV. PER. ECA 18946	3/20/69	RH

NOTES:
1. ITEMS 4 AND 5 ARE MOUNTED ON ITEM 2.
2. NO'S ON COMPONENTS ARE ITEM NO'S.
3. CATHODE END OF DIODE INDICATED BY DOT.
4. STAMP G2 1/8 BLK. CHAR. AFTER ASSY. NO. COAT PER FS514.



ITEM	REQD	PART NO	DESCRIPTION	MATL	MATL SPEC	UNIT WT
26	REF	34780	SCHEMATIC, H.D. HAMMER DR.			
25	1	134-302-013	CAPACITOR 100μF 25V			
24	AR	465-101-021	WIRE, INSULATED, BLK VINYL	#22		
23	4	420-111-002	TERMINAL, STUD			
22	1	95642	COMPRESSION RIVET FEMALE			
21	1	95641	COMPRESSION RIVET MALE			
20	1	141-101-006	CLAMP, CABLE			
19	8	933-104-003	WASHER, LOCK #4			
18	8	842-110-024	SCREW #4-40X3/8 PHIL. HD.			
17	8	874-101-009	STANDOFF			
16	4	134-202-022	CAPACITOR .27μF 35V			
15	4	167-201-002	DIODE	1N537		
14	4	168-106-001	DIODE	SSD762		
13	4	169-102-003	DIODE	1N704A		
12	9	168-102-001	DIODE	1N276		
11	4	387-102-143	RESISTOR 301Ω 1/2W, 1%			
10	4	387-101-239	3.01K 1/4W, 1%			
9	4	387-304-025	100Ω 2W, 2 OR 5%			
8	4	387-102-210	1.5K 1/2W, 1%			
7	4	387-101-265	RESISTOR 5.62K 1/4W, 1%			
6	4	353-114-006	POTENTIOMETER 5K			
5	8	436-128-001	TRANSISTOR PNP	GTR-502		
4	4	436-107-001	TRANSISTOR NPN	2N1605		
3	4	436-503-001	TRANSISTOR PNP	2N2812		
2	12	438-101-001	PAD, MTG, TRANSISTOR			
1	1	34830	PC. CARD H.D. HAMMER DR.			

LIST OF MATERIALS

34730 D

NEXT ASSY	USED ON
APPLICATION	

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON FRACTIONS DECIMALS ANGLES
MATERIAL
FINISH
HEAT TREAT

SIGNATURES		DATE
DR	J. Maglio, Jr.	2-19-69
CHK		2/19/69
APPD	R. Hahn	11/26/68
APPD		11/26/68

HI-DEN. HAMMER DRIVER ASSEMBLY

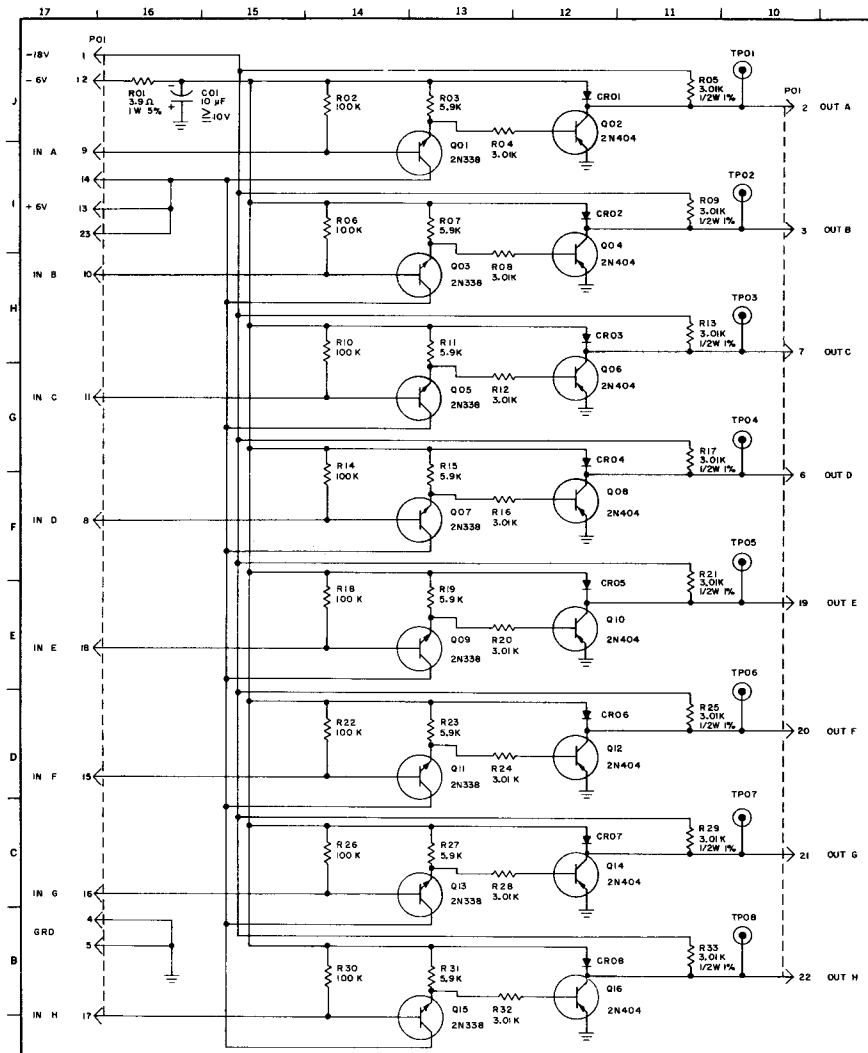
SERIES 5

ANelex CORPORATION BOSTON MASS

C 34730

SCALE 1/1 WT

1394

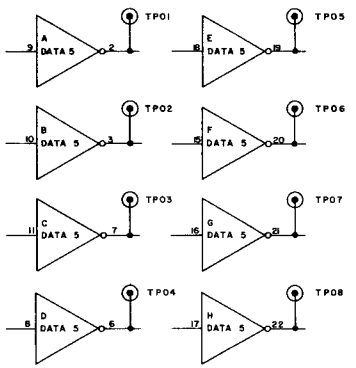


REVISIONS				
ZONE	SYM	DESCRIPTION	DATE	APPROVAL
	0	REL TO PED	11/30	
	A	REV. PER ECA 16337	1-17-63	

NOTES:
1. UNLESS OTHERWISE SPECIFIED, ALL RESISTORS ARE 1/4W 1%, ALL DIODES ARE IN276.
2. COMPONENTS SHOWN ON THIS SCHEMATIC ARE INDICATIVE ONLY, APPROVED SUBSTITUTES MAY BE USED.

WARNING – THE INSERTION OR WITHDRAWAL OF THIS MODULE WHEN DC POWER IS PRESENT AT THE CONNECTOR MAY RESULT IN PERMANENT DAMAGE TO THE SEMI-CONDUCTORS.

LOGIC SYMBOL



34781 A

APPROVED PROD. ENG. MFG. QUALITY

ITEM	REQD	PART NO	DESCRIPTION	MATL	MATL SPEC	UNIT WT

LIST OF MATERIALS

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
FRACTIONS | DECIMALS | ANGLES
MATERIAL
FINISH
HEAT TREAT

SIGNATURES	DATE
DR	3/5/63
CHK M. Nichols	3/13/63
APPD	3/15/63
APPD	3/15/63

DATA 5
SCHEMATIC
SERIES 5
SCALE NONE WT

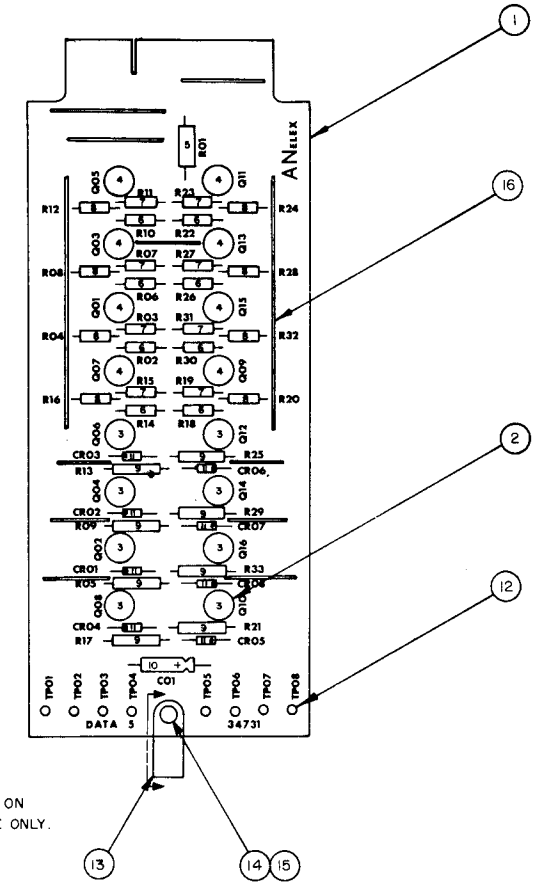
ANelex CORPORATION BOSTON MASS

D 34781

34731 NEXT ASSY USED ON
APPLICATION

NOTES:
1. NO'S ON COMPONENTS ARE ITEM NO'S.
2. ALL TRANSISTORS ARE MOUNTED ON ITEM 2.
3. CATHODE END OF DIODE INDICATED BY DOT.
4. STAMP G2 1/8 BLK. CHAR. AFTER ASSY. NO. COAT PER FS514.

REVISIONS				
ZONE	SYM	DESCRIPTION	DATE	APPROVAL
	0	REL TO PED	10/30	
	A	REV TO ECA 16950	5-15-64	
	B	REV PER. ECA 18314	12-8-64	
	C	REV PER ECA 18946	5/20/65	



34731 C

ITEM	REQD	PART NO	DESCRIPTION	MATL	MATL SPEC	UNIT WT
17	REF	34781	SCHEMATIC, DATA 5			
16	A R	465-101-021	WIRE, INSULATED, BLK, VINYL	#22		
15	1	95642	COMPRESSION RIVET FEMALE			
14	1	95641	COMPRESSION RIVET MALE			
13	1	141-101-006	CLAMP, CABLE			
12	8	420-111-002	TERMINAL, STUD			
11	8	168-102-001	DIODE	1N276		
10	1	134-101-008	CAPACITOR 10 μF ≧ 10V			
9	8	387-102-239	RESISTOR 3.01 K 1/2W 1%			
8	8	387-101-239	3.01 K 1/4W 1%			
7	8	387-101-267	5.9 K 1/4W 1%			
6	8	387-101-385	100 K, 1/4W 1%			
5	1	387-111-015	RESISTOR 3.9 Ω 1W 5%			
4	8	436-101-001	TRANSISTOR NPN	2N338		
3	8	436-103-001	TRANSISTOR PNP	2N404		
2	16	438-101-001	PAD, MOUNTING, TRANSISTOR			
1	1	34831	P.C. CARD DATA 5			

LIST OF MATERIALS

NEXT ASSY	USED ON
APPLICATION	

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON FRACTIONS DECIMALS ANGLES
MATERIAL
FINISH
HEAT TREAT

SIGNATURES		DATE
DR	J. McDermott	9-11-63
CHK	M. Nichols	9/12/63
APPD	R. Ethes	10/21/63
APPD	S. Ingvarson	10/21/63

DATA 5
ASSEMBLY

SERIES 5

SCALE 1/1 WT

ANelex
CORPORATION
BOSTON MASS

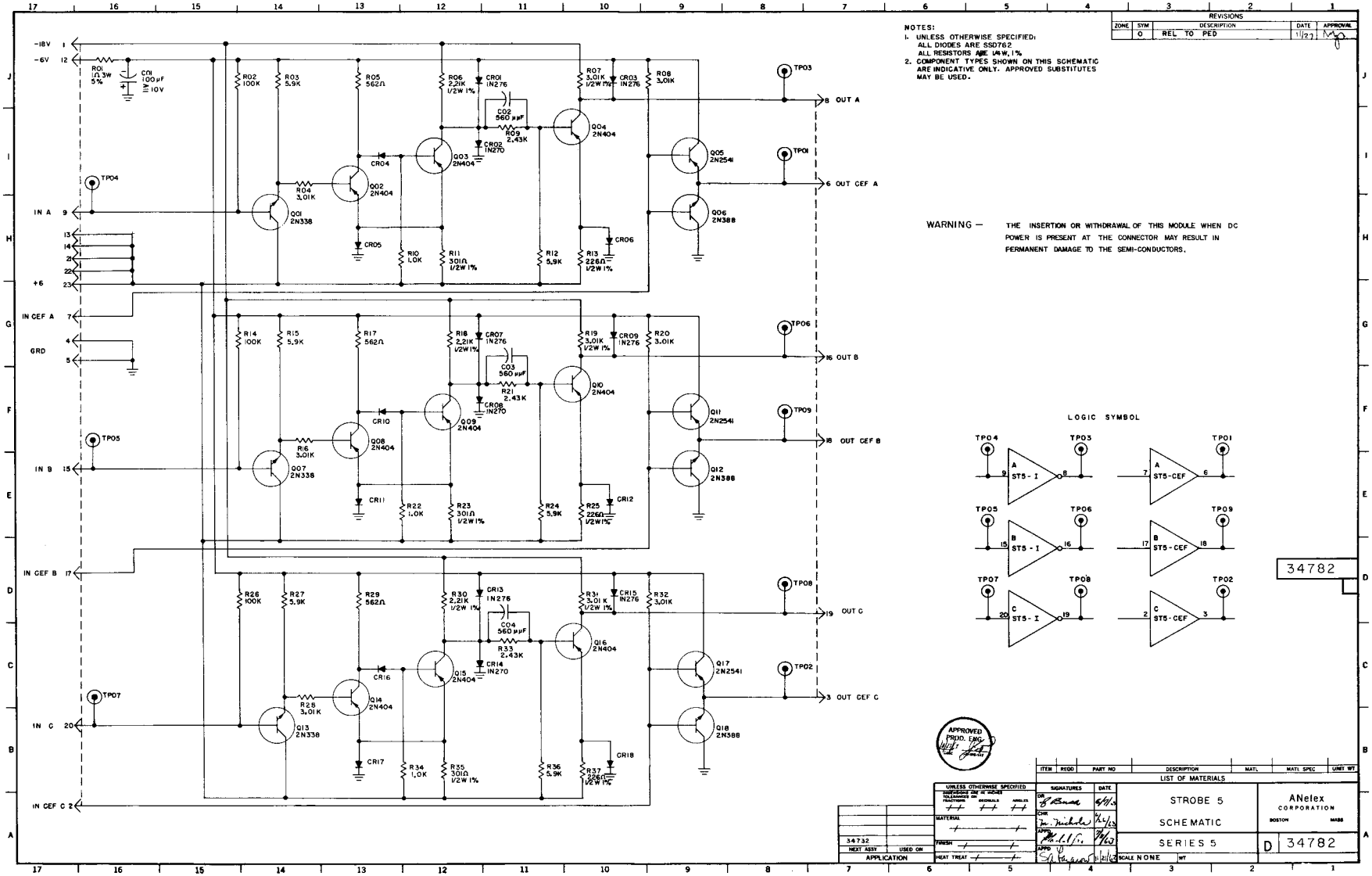
C 34731

DATA 5

The ANelex Photo Data printed circuit card contains eight identical independent circuits. Each circuit has been designed to receive binary data from an external photo-electric detector (IN2175 silicon duo diode or equivalent), and convert this data to a form that will be compatible to external logic either as a direct or adjunct function. The photo-electric diodes are located on the printer mechanism, and are excited by a mechanically driven light modulator, which transmits coded data relative to the various mechanical functions of the printer mechanism. Each circuit is composed of two basic stages, a silicon emitter follower buffer which is capable of matching the high output impedance of the silicon duo diode, followed by an output inverter stage.

The switching transfer function of the circuit outlined below assumes that the output of one of the silicon duo diode sensors is connected to the input of the circuit described. An application of light to the sensitive surface of the diode causes its silicon element to become a low resistance between a source of +6 volts and the circuit input. Under these conditions the circuit will inhibit the flow of signal current (-6 volt level) in its output. When light is absent from the sensitive surface of the diode, the silicon element provides a high resistance between the +6 volt source and the circuit input. Under these conditions the circuit will allow full signal current to flow (zero volt level) in its output.

The output of any Photo Data circuit is designed to implement ANelex logic circuits requiring medium speed static level switching such as gating circuits, pushbutton lamp driver, etc. The Photo Data circuit does not have the high squaring factor found in ANelex Photo Strobe circuits, and therefore should not be used as a trigger source for ANelex high speed pulse circuits such as One Shot-Short, One Shot-Long, Register, etc. Photo Data circuits are recommended for usage in functions such as Vertical Format disk readers, or Print Wheel code disk readers, etc. The output of each circuit is capable of driving three unit loads, and may be observed at the test points provided.



NOTES:
1. UNLESS OTHERWISE SPECIFIED:
   ALL DIODES ARE SSD762
   ALL RESISTORS ARE 1/4W, 1%
2. COMPONENT TYPES SHOWN ON THIS SCHEMATIC ARE INDICATIVE ONLY. APPROVED SUBSTITUTES MAY BE USED.

REVISIONS				
ZONE	SYM	DESCRIPTION	DATE	APPROVAL
	O	REL TO PED	11/27	MO

WARNING — THE INSERTION OR WITHDRAWAL OF THIS MODULE WHEN DC POWER IS PRESENT AT THE CONNECTOR MAY RESULT IN PERMANENT DAMAGE TO THE SEMI-CONDUCTORS.

LOGIC SYMBOL

34782

APPROVED PROD. ENG.

ITEM	REQD	PART NO	DESCRIPTION	MATL	MATL SPEC	UNIT WT
LIST OF MATERIALS						

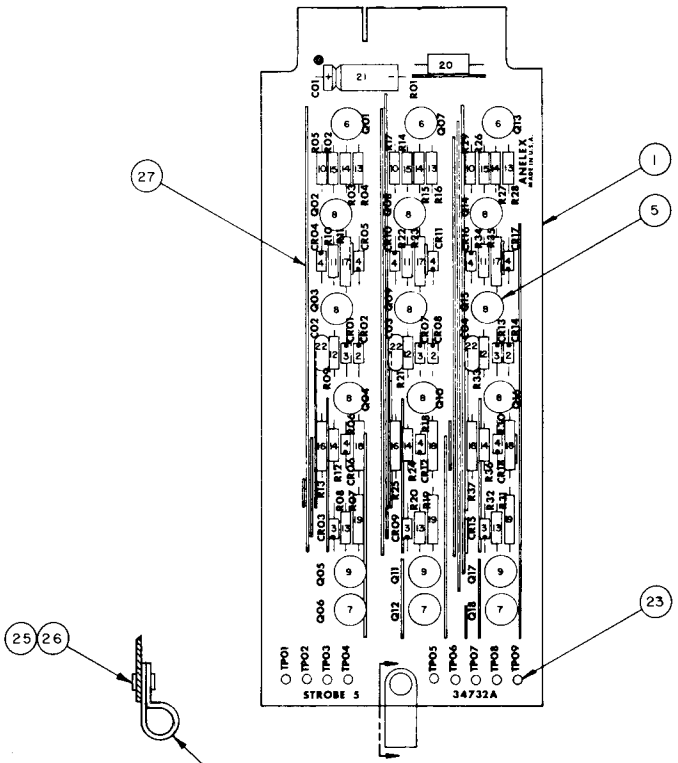
UNLESS OTHERWISE SPECIFIED	SIGNATURES	DATE
DR		6/5/63
CHK		7/1/63
APPD		7/9/63
APPD		11/21/63
SCALE NONE	WT	

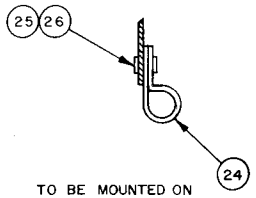
STROBE 5 SCHEMATIC	ANelex CORPORATION BOSTON MASS
SERIES 5	D 34782

34732 NEXT ASSY — USED ON APPLICATION

REVISIONS				
ZONE	SYM	DESCRIPTION	DATE	APPROVAL
	A	REV B REDRAWN PER ECA 16927	3-16-64	RSH
	B	REV PER ECA 18314	12-5-64	RSH
	C	REV. PER. ECA 18946	3/29/65	RSH

NOTES:
1. NO'S ON COMPONENTS ARE ITEM NO'S.
2. ALL TRANSISTORS ARE MOUNTED ON ITEM 5.
3. CATHODE END OF DIODE INDICATED BY DOT.
4. STAMP G2 1/8 BLK. CHAR. AFTER ASSY. NO. COAT PER FS514.





TO BE MOUNTED ON COMPONENT SIDE ONLY.

ITEM	REQD	PART NO	DESCRIPTION	MATL	MATL SPEC	UNIT WT
28	REF	34782	SCHEMATIC, STROBE 5			
27	AR	465-101-021	WIRE, INSULATED, BLK VINYL	#22		
26	1	95642	COMPRESSION RIVET, FEMALE			
25	1	95641	COMPRESSION RIVET, MALE			
24	1	141-101-006	CLAMP, CABLE			
23	9	420-111-002	TERMINAL, STUD			
22	3	134-501-047	CAPACITOR 560μμF			
21	1	134-101-015	CAPACITOR 100μF ≥10V			
20	1	387-201-001	RESISTOR 1Ω 3W,5%			
19	3	387-102-239	3.01K 1/2W,1%			
18	3	387-102-226	2.21K 1/2W,1%			
17	3	387-102-143	RESISTOR 301Ω 1/2W,1%			
16	3	387-102-131	RESISTOR 226Ω 1/2W,1%			
15	3	387-101-385	100K 1/4W,1%			
14	6	387-101-267	5.9K			
13	6	387-101-239	3.01K			
12	3	387-101-230	2.43K			
11	3	387-101-193	1K			
10	3	387-101-169	RESISTOR 562Ω 1/4W,1%			
9	3	436-128-001	TRANSISTOR	GTR502		
8	9	436-103-001		2N404		
7	3	436-102-001		2N388		
6	3	436-101-001	TRANSISTOR	2N338		
5	18	438-101-001	PAD, MOUNTING, TRANSISTOR			
4	9	168-106-001	DIODE	SSD762		
3	6	168-102-001	DIODE	IN276		
2	3	168-101-001	DIODE	IN270		
1	1	34832	P.C. CARD, STROBE 5			

LIST OF MATERIALS

34732 C

NEXT ASSY	USED ON
APPLICATION	

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON FRACTIONS DECIMALS ANGLES
MATERIAL
FINISH
HEAT TREAT

SIGNATURES		DATE
DR	Ed Connors	3/29/65
CHK		4/1/65
APPD	RSHaas	3/16/65
APPD		3/16/65

STROBE 5 ASSEMBLY

SERIES 5

SCALE 1/1 WT

ANelex CORPORATION BOSTON MASS

C 34732

PCA A

STROBE 5

The ANelex Strobe 5 printed circuit card contains six independent circuits, three of which are identical photo-electric strobe pulse receiving circuits, and the other three are identical complemented emitter follower circuits. The photo-electric pulse circuits are designed to receive and shape the light modulated data from an external photo-electric diode (IN2175 silicon duo diode or equivalent), and convert this data to a form that will be compatible to external logic either as a direct or adjunct function. The photo-electric diodes are located on the printer mechanism, and are excited by a mechanically driven light modulator, which transmits coded data relative to the various mechanical functions of the printer mechanism. Each complemented emitter follower circuit input may be connected externally to any ANelex circuit output (such as the output from an ANelex photo-electric Strobe 5 pulse receiver) for driving a number of external circuit inputs or transmission cables.

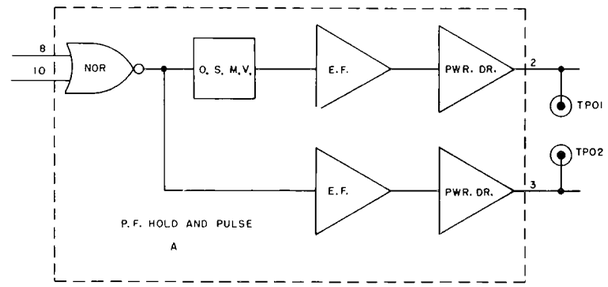
Each Strobe receiver consists of a silicon impedance buffing emitter follower (Q1), a d-c Schmidt type circuit (Q2, Q3) with a high squaring factor, which is coupled to an output inverter stage. Each photocell is connected in a voltage divider configuration between +6 volts and the input to the corresponding receiver. Any photocell so connected, experiencing a light modulation transition will cause the associated Strobe 5 circuit to produce an output pulse transition from approximately zero volts to -6 volts and back to zero volt. A Strobe 5 circuit, connected externally with an associated complemented emitter follower circuit and experiencing a similar light modulation will cause the associated emitter follower circuit output to produce an output pulse transition from approximately zero volt to -6 volts and back to zero volt. Each complemented emitter follower output is able to drive approximately 12 unit loads.

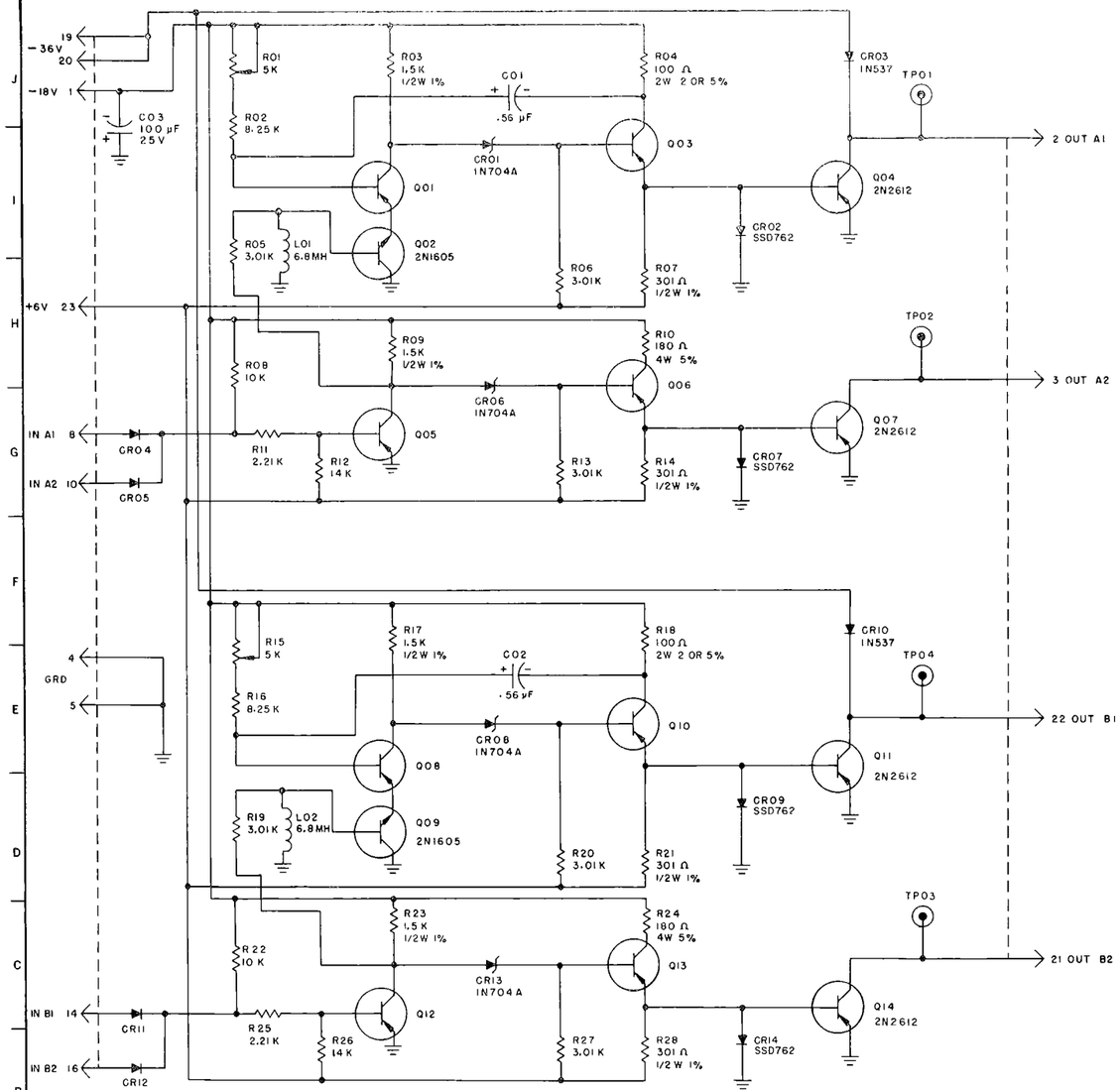
REVISIONS				
ZONE	SYM	DESCRIPTION	DATE	APPROVAL
	0	REL TO PED	11/27	WMO
	A	REV PER ECA 18777 LWT	3-15-64	RLN

NOTES:
1. COMPONENT TYPES SHOWN ON THIS SCHEMATIC ARE INDICATIVE ONLY. APPROVED SUBSTITUTES MAY BE USED.
2. UNLESS OTHERWISE STATED,
   ALL TRANSISTORS ARE 2N2541,
   ALL DIODES ARE IN276,
   ALL RESISTOR ARE 1/4W 1%

WARNING— THE INSERTION OR WITHDRAWAL OF THIS MODULE WHEN DC POWER IS PRESENT AT THE CONNECTOR MAY RESULT IN PERMANENT DAMAGE TO THE SEMI-CONDUCTORS.

LOGIC SYMBOL





APPROVED PROD. ENG. 11/19/63 ENGINEER

ITEM	REQD	PART NO	DESCRIPTION	MATL	MATL SPEC	UNIT WT

LIST OF MATERIALS

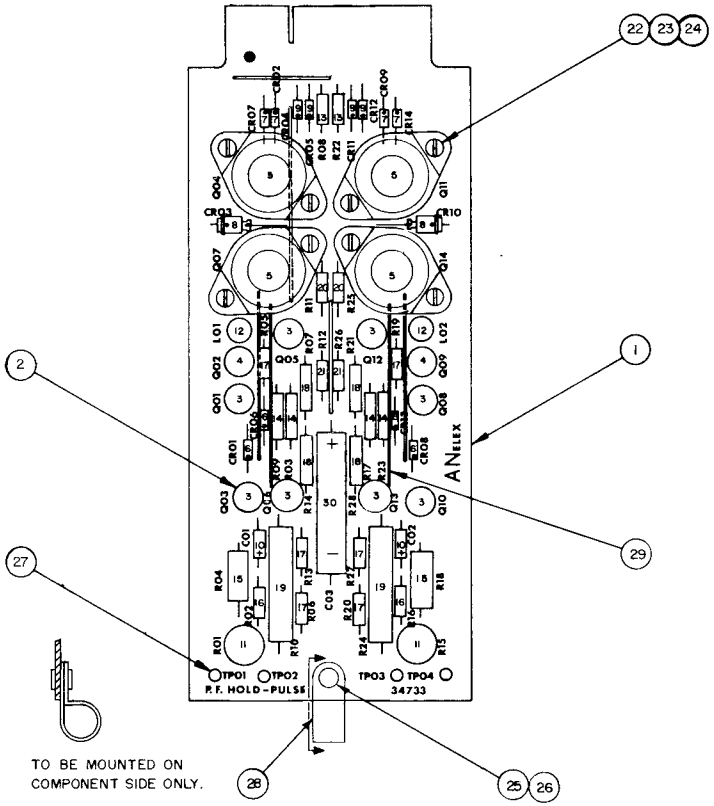
UNLESS OTHERWISE SPECIFIED			SIGNATURES	DATE	PAPER FEED HOLD AND PULSE SCHEMATIC	ANelex CORPORATION BOSTON MASS
DIMENSIONS ARE IN INCHES TOLERANCES ON FRACTIONS	DECIMALS	ANGLES	DR			
			CHK M. Nichols	7-17-63		
MATERIAL			APPD	9/7/63		
FINISH			APPD	11/21/63	SERIES 5	D 34783
HEAT TREAT			APPD	11/26/63	SCALE NONE WT	

34733	
NEXT ASSY	USED ON
APPLICATION	

34783 A

NOTES:
1. NO'S ON COMPONENTS ARE ITEM NO'S.
2. ALL TRANSISTORS ARE MOUNTED ON ITEM TWO EXCEPT ITEM FIVE.
3. CATHODE END OF DIODE INDICATED BY DOT.
4. STAMP G2 1/8 BLK. CHAR. AFTER ASSY. NO. COAT PER FS514.

REVISIONS				
ZONE	SYM	DESCRIPTION	DATE	APPROVAL
	O	REL TO PED	11/27	WMO
	A	REV TO ECA 16950	3-19-64	RH
	B	REV PER ECA 18314	12-8-64	RH
	C	REV PER ECA 18777 W.T.	2-15-65	RH
	D	REV PER ECA 18946	3/30/65	RH



TO BE MOUNTED ON COMPONENT SIDE ONLY.

ITEM	REQD	PART NO	DESCRIPTION	MATL	MATL SPEC	UNIT WT
31	REF	34783	SCHEMATIC, P.F. HOLD & PULSE			
30	1	134-302-013	CAPACITOR, 100µF 25V			
29	AR	465-101-021	WIRE, INSULATED, BLK, VINYL	#22		
28	1	141-101-006	CLAMP, CABLE			
27	4	420-111-002	TERMINAL, STUD			
26	1	95642	COMPRESSION RIVET, FEMALE			
25	1	95641	COMPRESSION RIVET, MALE			
24	8	933-104-003	WASHER, LOCK #4			
23	8	842-110-022	SCREW #4-40X1/4 PHIL. HD			
22	8	874-101-009	STANDOFF			
21	2	387-101-303	RESISTOR 14K 1/4W 1%			
20	2	387-101-226	RESISTOR 2.21K 1/4W 1%			
19	2	387-502-026	RESISTOR 180Ω 4W 5%			
18	4	387-102-143	RESISTOR 301Ω 1/2W 1%			
17	6	387-101-239	RESISTOR 3.01K 1/4W 1%			
16	2	387-101-281	RESISTOR 8.25K 1/4W 1%			
15	2	387-304-025	RESISTOR 100Ω 2W 2 OR 5%			
14	4	387-102-210	RESISTOR 1.5K 1/2W 1%			
13	2	387-101-289	RESISTOR 10K 1/4W 1%			
12	2	257-103-062	INDUCTOR 6.8 MH			
11	2	357-114-006	POTENTIOMETER 5K			
10	2	134-202-026	CAPACITOR .56µF 35V			
9	4	168-102-001	DIODE	1N276		
8	2	167-201-002	DIODE	1N537		
7	4	168-106-001	DIODE	SSD762		
6	4	169-102-003	DIODE	1N704A		
5	4	436-503-001	TRANSISTOR PNP	2N2612		
4	2	436-107-001	TRANSISTOR NPN	2N1605		
3	8	436-128-001	TRANSISTOR PNP	GTR502		
2	10	438-101-001	PAD, MTG, TRANSISTOR			
1	1	34833	P.C. CARD P.F. HOLD + PULSE			

LIST OF MATERIALS

34733 D

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON FRACTIONS DECIMALS ANGLES
MATERIAL
FINISH
HEAT TREAT
NEXT ASSY USED ON
APPLICATION

SIGNATURES	DATE
DR E. Bacon	9-12-63
CHK M. Nichols	9/16/63
APPD R. Hahn	10/21/63
APPD S. A. Hamer	11/20/63

PAPER FEED HOLD AND PULSE ASSEMBLY

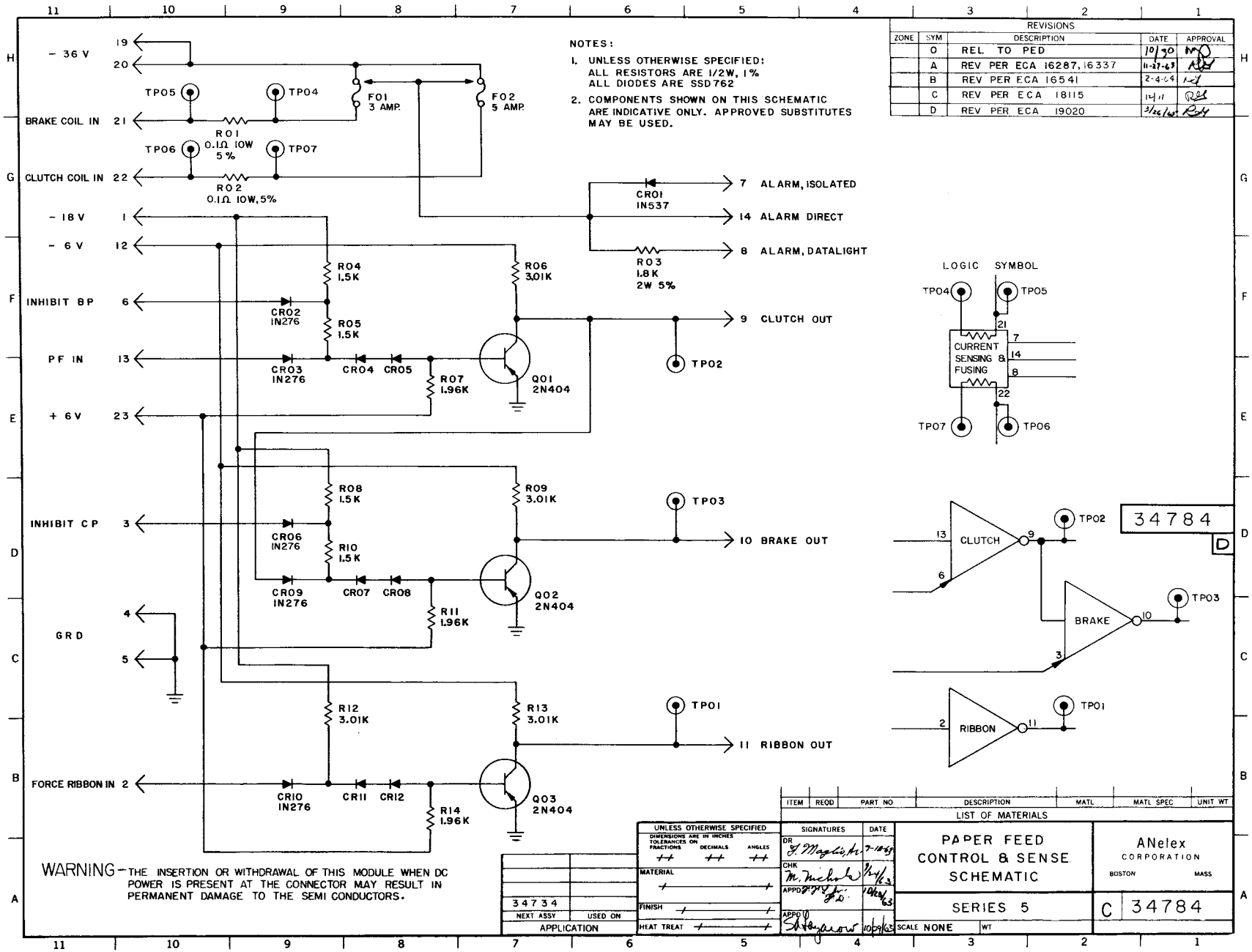
SERIES 5

SCALE 1/1 WT

ANelex CORPORATION BOSTON MASS

C 34733

13941

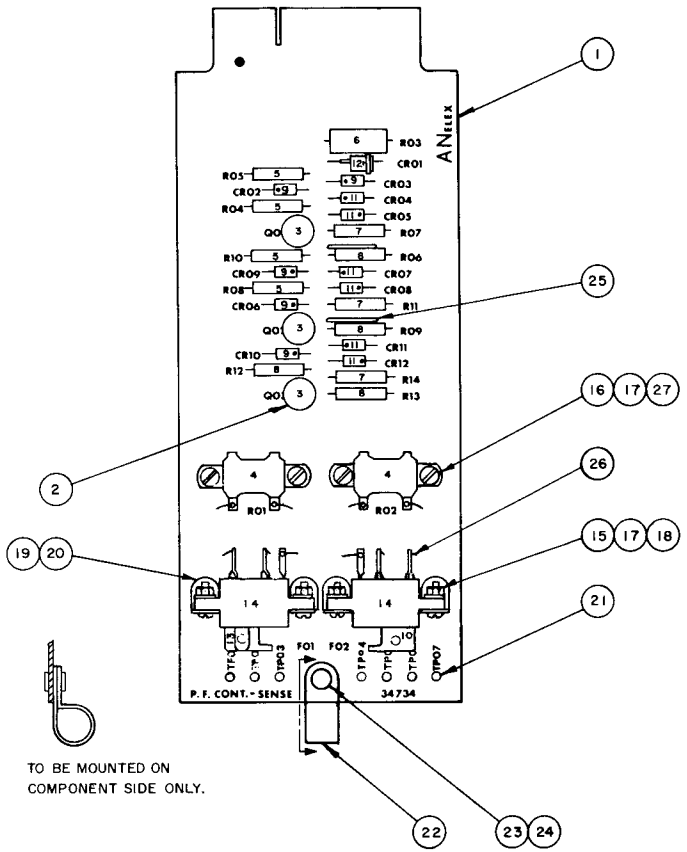


REVISIONS				
ZONE	SYM	DESCRIPTION	DATE	APPROVAL
	O	REL. TO PED	10/30	
	A	REV PER ECA 16287, 16337	11-27-63	
	B	REV PER ECA 16541	2-4-64	
	C	REV PER ECA 18115	11/11	
	D	REV PER ECA 19020	3/26/65	

REVISIONS				
ZONE	SYM	DESCRIPTION	DATE	APPROVAL
	0	REL TO PED	10/30	
	A	REV. PER ECA 16287	11-27-63	
	B	REV. PER ECA 16541	2-4-64	
	C	REV PER ECA 16950	5-19-64	
	D	REV PER ECA 18314 + 18115	12/11/64	
	E	REV PER ECA 18579	1-25-65	
	F	REV. PER. ECA 18975 & 18946 & 19020	3/24/66	

NOTES:

1. ALL TRANSISTORS ARE MOUNTED ON ITEM 2.
2. NO'S ON COMPONENTS ARE ITEM NO'S.
3. CATHODE END OF DIODE INDICATED BY DOT.
4. FOR SILK SCREENING OF COMPONENT DESIG. USE EPOXY INK 258-101-001.
5. STAMP G2 1/8 BLK. CHAR. AFTER ASSY. NO.



TO BE MOUNTED ON COMPONENT SIDE ONLY.

ITEM	REQD	PART NO	DESCRIPTION	MATL	MATL SPEC	UNIT WT
28	REF	34784	SCHEMATIC, P.F. CONT. & SENSE			
27	4	874-101-009	STANDOFF			
26	AR	465-107-001	WIRE, SOLID, TINNED	#22		
25	AR	465-101-021	WIRE, INSULATED, BLK. VINYL	#22		
24	1	95642	COMPRESSION, RIVET FEMALE			
23	1	95641	COMPRESSION, RIVET MALE			
22	1	141-101-006	CLAMP, CABLE			
21	7	420-111-002	TERMINAL, STUD			
20	4	542-102-001	BRACKET			
19	4	627-101-017	EYELET			
18	4	776-107-002	NUT, PLAIN #4-40			
17	8	933-104-003	WASHER, LOCK #4			
16	4	842-107-007	SCREW #4-40X1/4 BIND. HD.			
15	4	842-107-019	SCREW, #4-40X3/8 BIND. HD.			
14	2	205-105-001	FUSE, HOLDER			
13	1	203-114-009	FUSE, 3 AMP.			
12	1	167-201-002	DIODE		IN537	
11	6	168-106-001	DIODE		SSD762	
10	1	203-114-010	FUSE, 5 AMP.			
9	5	168-102-001	DIODE		IN276	
8	4	387-102-239	RESISTOR 3.01K 1/2W 1%			
7	3	387-102-221	1.96K 1/2W 1%			
6	1	387-304-055	1.8 K 2 W 5%			
5	4	387-102-210	1.5 K 1/2W 1%			
4	2	95651	RESISTOR .1Ω 10 W 5%			
3	3	436-103-001	TRANSISTOR PNP	2N404		
2	3	438-101-001	PAD, MOUNTING, TRANSISTOR			
1	1	34834	P. C. CARD, P.F. CONT. & SENSE			

LIST OF MATERIALS

34734 F

UNLESS OTHERWISE SPECIFIED	SIGNATURES	DATE
DIMENSIONS ARE IN INCHES. TOLERANCES ON FRACTIONS ± DECIMALS ± ANGLES ±	DR T. Mayhugh	3-19-63
MATERIAL	CHK M. Nichols	3/20/63
FINISH	APPD R. Ebbs	4/25/63
HEAT TREAT	APPD S. J. Bygrave	10/29/63

NEXT ASSY	USED ON
APPLICATION	

PAPER FEED CONTROL & SENSE ASSEMBLY

SERIES 5

SCALE 1/1 WT

ANelex CORPORATION BOSTON MASS

C 34734 A

9284

REVISIONS				
ZONE	SYM	DESCRIPTION	DATE	APPROVAL
	0	REL TO PED	10/30	WMD
	A	REV. PER ECA 16337	11-27-63	RJD
	B	REV. PER ECA 17016	5-4-64	RJD

NOTES:
1. UNLESS OTHERWISE SPECIFIED,
   ALL RESISTORS ARE 1/4 W 1%
   ALL DIODES ARE IN276
   ALL TRANSISTORS ARE 2N404
2. COMPONENTS SHOWN ON THIS SCHEMATIC ARE INDICATIVE ONLY, APPROVED SUBSTITUTES MAY BE USED.

19 -36V
20
1 -18V
RF. CLUTCH HOLD 8
RIBBON IN 18
MANDREL 1 SENSOR 10
MANDREL 2 SENSOR 16
+6V 23
4 GRD.
5
TP02
TP05
TP03
TP04
CR01
CR02
CR03
CR04
CR05
CR06
CR07 IN704A
CR08 SSD762
CR09 IN537
CR10
CR11
CR12
CR13
CR15
CR16
CR17 IN704A
CR18 SSD762
CR19 IN537
R01 75Ω 10W 5%
R02 6.81K
R03 5.62K
R04 5.62K
R05 6.81K
R06 10K
R07 6.81K
R08 5.62K
R09 5.62K
R10 6.81K
R11 10K
R12 4.64K
R13 560Ω 1W 2%
R14 12.1K
R15 12.1K
R16 12.1K
R17 12.1K
R18 8.25K
R19 562Ω 1/2W 1%
R20 6.81K
R21 5.62K
R22 12.1K
R23 1K 1W 2%
R24 221 K
R25 560Ω 1W 2%
R26 825Ω
R27 4.64K
R28 8.25K
R29 560Ω 1W 2%
R30 562Ω 1/2W 1%
Q01
Q02
Q03
Q04
Q05
Q06 2N2612
Q07
Q08 2N491
Q09
Q10
Q11 2N2612
C01 1μF 35V 10%
C02 1μF 35V 10%
TP01
TP06
6 COIL COMMON
7
2 MANDREL 2 COIL
22 MANDREL 1 COIL

LOGIC SYMBOL
TP04 16
10
TP03 18
8
TP02
TP05
S DIRECTION F F R I O
S MOTION F F R I O
DURATION TIMER
GATE
PWR. DR. 2
-36V 6,7
GATE
PWR. DR. 22
TP01
TP06

34785 B

WARNING—THE INSERTION OR WITHDRAWAL OF THIS MODULE WHEN DC POWER IS PRESENT AT THE CONNECTOR MAY RESULT IN PERMANENT DAMAGE TO THE SEMI-CONDUCTORS.

APPROVED PID ENG.

ITEM	REQD	PART NO	DESCRIPTION	MATL	MATL SPEC	UNIT WT
LIST OF MATERIALS						

34735	
NEXT ASSY	USED ON
APPLICATION	

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON FRACTIONS DECIMALS ANGLES
MATERIAL
FINISH
HEAT TREAT

SIGNATURES	DATE
DR	
CHK M. Nichols	9/17/63
APPD	11/22/63
APPD	11/22/63

RIBBON CONTROL SCHEMATIC

SERIES 5

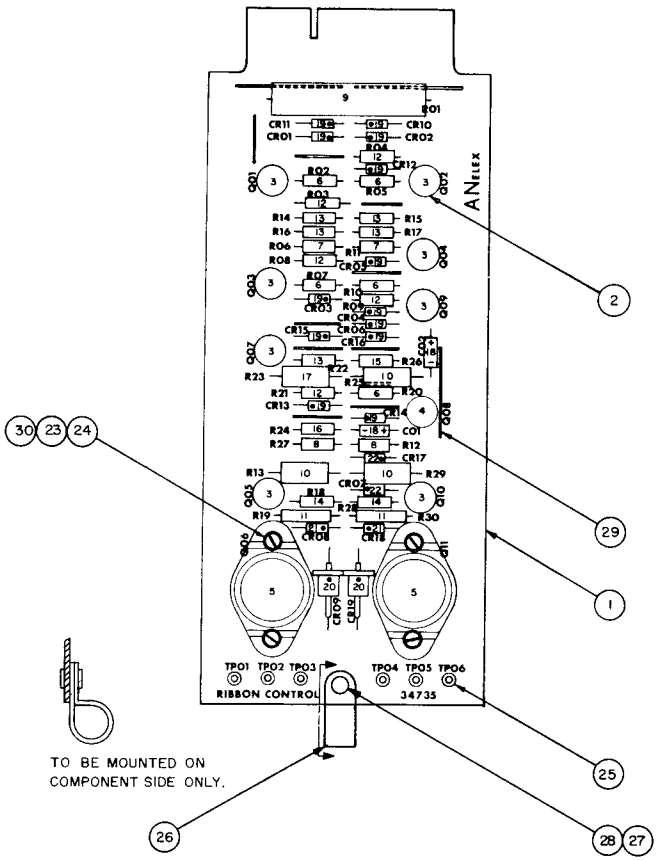
SCALE NONE WT

ANelex CORPORATION BOSTON MASS

D 34785

REVISIONS				
ZONE	SYM	DESCRIPTION	DATE	APPROVAL
	O	REL TO PED	11/30	WMS
	A	REV PER ECA 16950	3-19-64	RH
	B	REV PER ECA 18314	12-5-64	RH
	C	REV PER ECA 18946	3/24/65	RH

NOTES:
1. ALL TRANSISTORS ARE MOUNTED ON ITEM 2, EXCEPT ITEM 5.
2. NO'S ON COMPONENTS ARE ITEM NO'S.
3. CATHODE END OF DIODE INDICATED BY DOT.
4. STAMP G2 1/8 BLK CHAR. AFTER ASSY. NO. COAT PER FS 514.



ITEM	REQD	PART NO	DESCRIPTION	MATL	MATL SPEC	UNIT WT
31	REF	34785	SCHEMATIC, RIBBON CONT.			
30	4	933-104-003	WASHER, LOCK #4			
29	AR	465-101-021	WIRE, INSULATED, BLK, VINYL	#22		
28	1	95642	COMPRESSION RIVET, FEMALE			
27	1	95641	COMPRESSION RIVET, MALE			
26	1	141-101-006	CLAMP, CABLE			
25	6	420-111-002	TERMINAL, STUD			
24	4	842-110-022	SCREW 4-40 X 1/4 PHIL. HD.			
23	4	874-101-009	STANDOFF			
22	2	169-102-003	DIODE (ZENER)	1N704A		
21	2	168-106-001	DIODE	SSD762		
20	2	167-201-002	DIODE	1N537		
19	13	168-102-001	DIODE	1N276		
18	2	134-202-029	CAPACITOR 1μF 35V			
17	1	387-301-049	RESISTOR 1K 1W 2%			
16	1	387-101-418	RESISTOR 221K 1/4 1%			
15	1	387-101-185	825Ω 1/4 1%			
14	2	387-101-281	8.25K 1/4 1%			
13	5	387-101-297	12.1K 1/4 1%			
12	5	387-101-265	5.62K 1/4 1%			
11	2	387-102-169	562Ω 1/2 1%			
10	3	387-301-043	560Ω 1W 2%			
9	1	387-205-024	75Ω 10W 5%			
8	2	387-101-257	4.64K 1/4 1%			
7	2	387-101-289	10K 1/4 1%			
6	5	387-101-273	RESISTOR 6.81K 1/4 1%			
5	2	436-503-001	TRANSISTOR PNP	2N2612		
4	1	436-104-001	TRANSISTOR NPN	2N491		
3	8	436-103-001	TRANSISTOR PNP	2N404		
2	9	438-101-001	PAD, MOUNTING, TRANSISTOR			
1	1	34835	P. C. CARD RIBBON CONTROL			

LIST OF MATERIALS

34735 C

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON FRACTIONS DECIMALS ANGLES
MATERIAL
FINISH
HEAT TREAT
NEXT ASSY USED ON
APPLICATION

SIGNATURES	DATE
DR	9-17-63
CHK M. Nichols	9/24/63
APPD	10/25/63
APPD	10/24/63

RIBBON CONTROL ASSEMBLY

SERIES 5

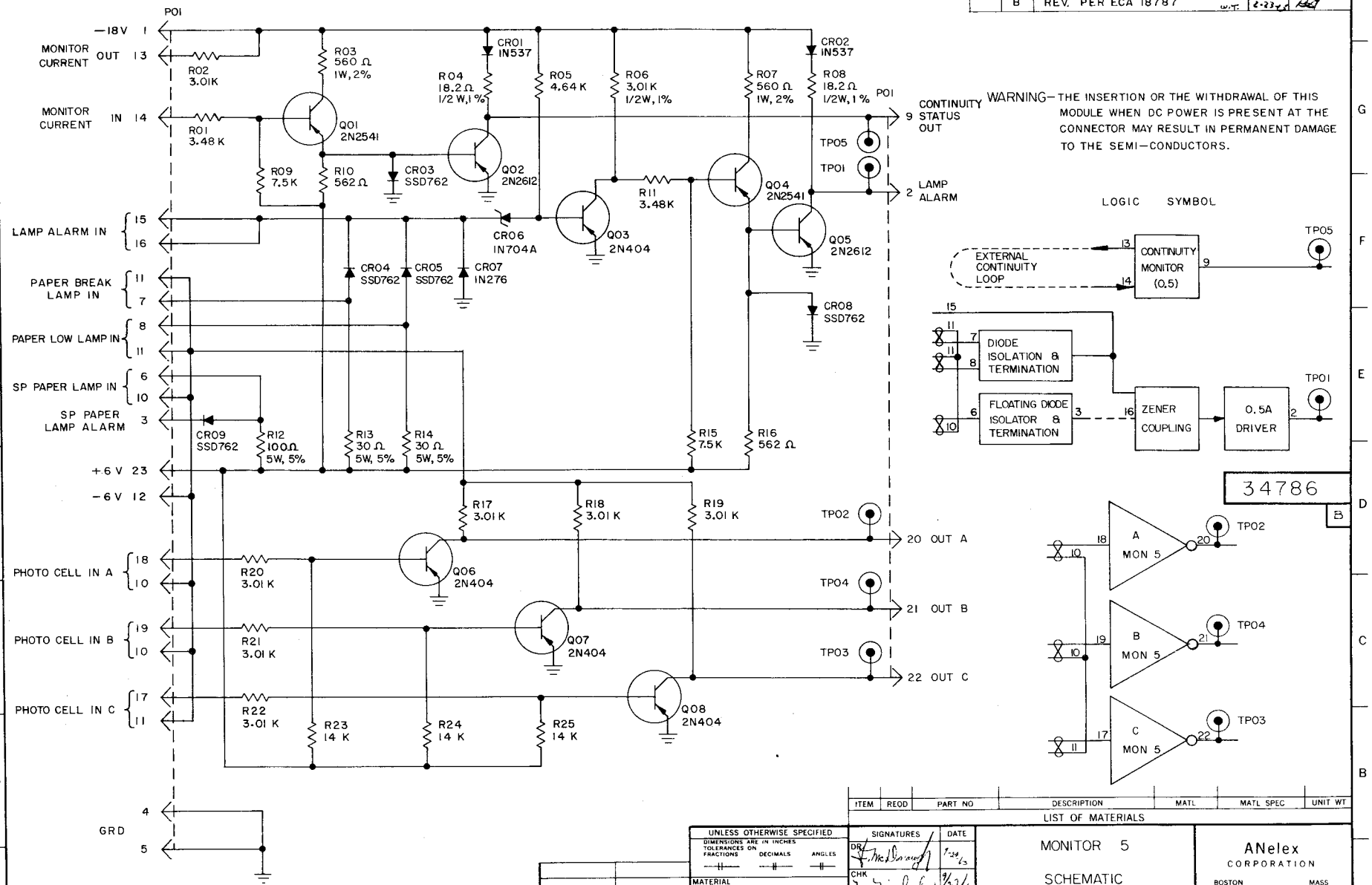
SCALE 1/1 WT

ANelex CORPORATION BOSTON MASS

C 34735

NOTES
1. COMPONENT TYPES SHOWN ON THIS SCHEMATIC ARE INDICATIVE ONLY, APPROVED SUBSTITUTES MAYBE USED.
2. UNLESS OTHERWISE STATED ALL RESISTORS ARE 1/4W, 1%.

REVISIONS				
ZONE	SYM	DESCRIPTION	DATE	APPROVAL
	O	REL TO PED	10/30	
	A	REV. PER ECA 16337	11-27-63	
	B	REV. PER ECA 18787 W.T.	2-23-64	



WARNING— THE INSERTION OR THE WITHDRAWAL OF THIS MODULE WHEN DC POWER IS PRESENT AT THE CONNECTOR MAY RESULT IN PERMANENT DAMAGE TO THE SEMI—CONDUCTORS.

LOGIC SYMBOL

34786 B

ITEM	REQD	PART NO	DESCRIPTION	MATL	MATL SPEC	UNIT WT

LIST OF MATERIALS

UNLESS OTHERWISE SPECIFIED	SIGNATURES	DATE
DIMENSIONS ARE IN INCHES TOLERANCES ON FRACTIONS DECIMALS ANGLES	DR	
MATERIAL	CHK	
FINISH	APPD	
HEAT TREAT	APPD	

34736 NEXT ASSY USED ON APPLICATION

MONITOR 5
SCHEMATIC

ANelex CORPORATION BOSTON MASS

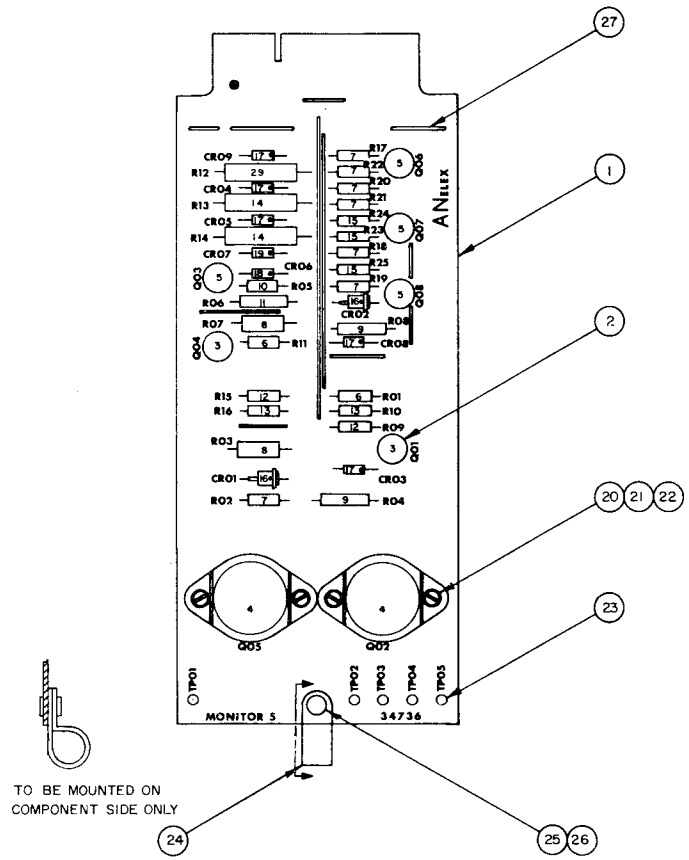
SERIES 5

C 34786

SCALE NONE WT

REVISIONS				
ZONE	SYM	DESCRIPTION	DATE	APPROVAL
	O	REL TO PED	10/30	
	A	REV PER ECA 16950	5-19-64	
	B	REV PER ECA 18314	12-9-64	
	C	REV PER ECA 18787 W.T.	8-23	
	D	REV PER ECA 18946	3/10/65	

NOTES:
1. ALL TRANSISTORS ARE MOUNTED ON ITEM NO. 2, EXCEPT ITEM NO. 4.
2. CATHODE END OF DIODE INDICATED BY DOT.
3. NO'S. ON COMPONENTS ARE ITEM NO'S.
4 STAMP G2 1/8 BLK. CHAR. AFTER ASSY. NO.
COAT PER FS514.



TO BE MOUNTED ON
COMPONENT SIDE ONLY

ITEM	REQD	PART NO	DESCRIPTION	MATL	MATL SPEC	UNIT WT
29	1	387-202-026	RESISTOR, 100Ω 5W 5%			
28	REF	34786	SCHEMATIC, MONITOR 5			
27	A R	465-101-021	WIRE, INSULATED, BLK VINYL	#22		
26	1	95642	COMPRESSION RIVET, FEMALE			
25	1	95641	COMPRESSION RIVET, MALE			
24	1	141-101-006	CLAMP, CABLE			
23	5	420-111-002	TERMINAL, STUD			
22	4	933-104-003	WASHER, LOCK #4			
21	4	842-110-022	SCREW 4-40X1/4 PHIL. HD.			
20	4	874-101-009	STANDOFF			
19	1	168-102-001	DIODE	1N276		
18	1	169-102-003	DIODE	1N704A		
17	5	168-106-001	DIODE	SSD762		
16	2	167-201-002	DIODE	1N537		
15	3	387-101-303	RESISTOR 14 K 1/4W 1%			
14	2	387-202-016	30Ω 5W 5%			
13	2	387-101-169	562Ω 1/4W 1%			
12	2	387-101-277	7.5 K 1/4W 1%			
11	1	387-102-239	3.01K 1/2W 1%			
10	1	387-101-257	4.64K 1/4W 1%			
9	2	387-102-026	18.2Ω 1/2W 1%			
8	2	387-301-043	560Ω 1W 2%			
7	7	387-101-239	3.01K 1/4W 1%			
6	2	387-101-245	RESISTOR 3.48K 1/4W 1%			
5	4	436-103-001	TRANSISTOR, PNP	2N404		
4	2	436-503-001	TRANSISTOR, PNP	2N2612		
3	2	436-128-001	TRANSISTOR, PNP	GTR502		
2	6	438-101-001	PAD, MOUNTING, TRANSISTOR			
1	1	34836	P.C. CARD MONITOR 5			

LIST OF MATERIALS

34736 D

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON FRACTIONS DECIMALS ANGLES
MATERIAL
FINISH
HEAT TREAT

SIGNATURES		DATE
DR		9/2/63
CHK	M. Nichols	9/27/63
APPD		10/25/63
APPD		10/29/63

MONITOR 5
ASSEMBLY

SERIES 5

SCALE 1/1 WT

ANelex
CORPORATION
BOSTON MASS

C 34736

NEXT ASSY	USED ON
APPLICATION	

1-9284

MONITOR 5

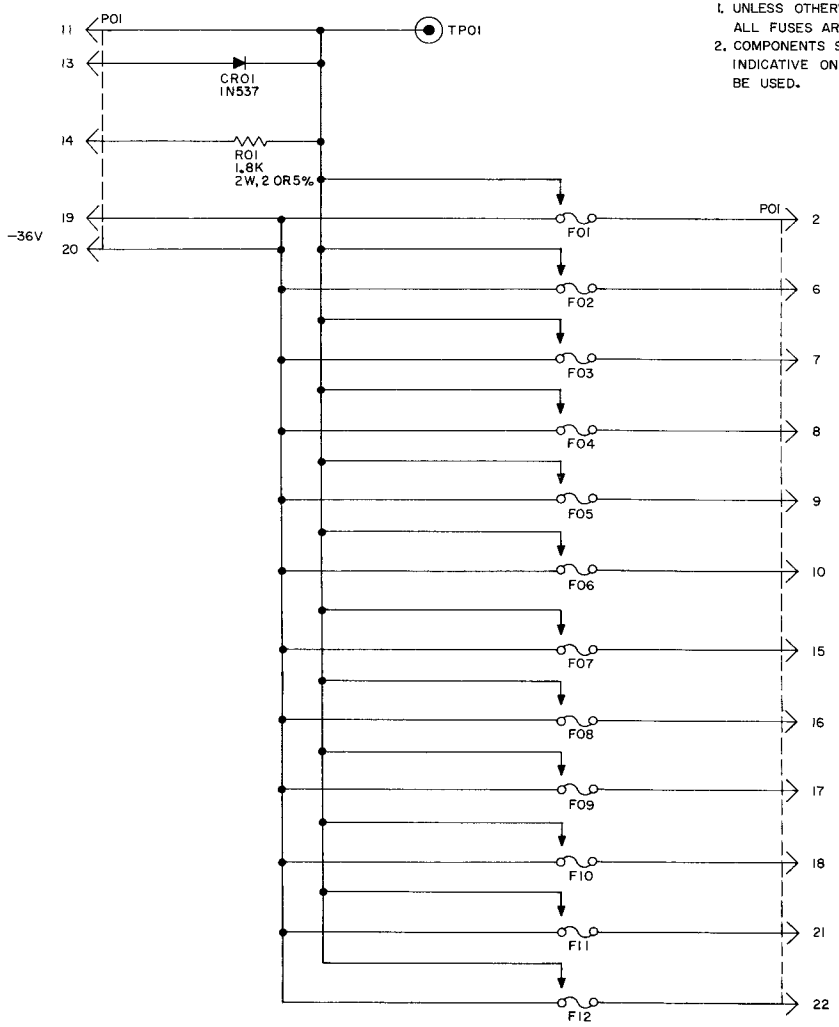
The ANelex Monitor 5 printed circuit card contains five independent circuits used for sensing certain operable conditions of the ANelex printer. Each of the five circuits is capable of functioning as logic operator in conjunction with the proper external assemblies as shown in the ANelex Printer Control Logic Drawing. The first circuit provided is a Continuity circuit (Q1 and Q2) capable of monitoring all of the zone and column cable connector connections, thus assuring that all connectors are present and properly installed. This condition will turn on Q1, and thus allow Q2 to provide a zero volt output signal used to energize the -18 volt interlock relay in the Power Sequencer unit. In the event Q1 detects a break in continuity, it will cause Q2 to remove -18 volts from the Hammer Driver circuits by de-energizing the -18 volt interlock relay.

The next circuit (Q3, 4, and 5) is designed to sense filament continuity of lamps used in the photo-monitoring assemblies of the printer mechanism; and lamps used with the photo-electric pulse generators, which provide the timing functions for the various printer cycles. This circuit consists of three basic sections; an input section (comprising a dual diode isolation input and termination, a floating diode isolation input and termination, and four direct inputs), zener coupled to an emitter follower buffered inverter (Q3 and Q4), which is impedance coupled to a power inverter output stage (Q5). A lamp failure (when connected as depicted in the ANelex Printer Control Logic Drawing) will allow current to flow (zero volt level) in the power inverter output. (The power inverter is designed to supply a maximum current of 500 milliamperes to an external inductive load.)

The remaining three circuits (Q6, 7, and 8) are identical, and are designed to amplify the switching transients of external photo-electric monitors, when connected as shown on the ANelex Printer Control Logic Drawing. Each circuit consists of a single stage inverter with an impedance isolated input. A logic 0 level (-6 volts typical) present on the input to any one of the three circuits will produce a logic 1 (zero volt level) at the corresponding output. Output signal transitions may be observed at the test points provided.

REVISIONS				
ZONE	SYM	DESCRIPTION	DATE	APPROVAL
	0	REL TO PED	11/27	
	A	REV PER ECA 17854	4-8-64	

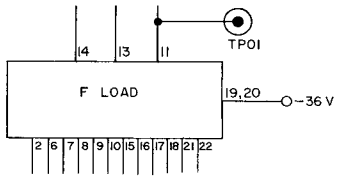
NOTES:
1. UNLESS OTHERWISE SPECIFIED:
   ALL FUSES ARE 1 AMP.
2. COMPONENTS SHOWN ON THIS SCHEMATIC ARE INDICATIVE ONLY. APPROVED SUBSTITUTES MAY BE USED.



WARNING — THE INSERTION OR WITHDRAWAL OF THIS MODULE WHEN DC POWER IS PRESENT AT THE CONNECTOR MAY RESULT IN PERMANENT DAMAGE TO THE SEMI-CONDUCTORS.

34788 A

LOGIC SYMBOL



ITEM	REQD	PART NO	DESCRIPTION	MATL	MATL SPEC	UNIT WT

LIST OF MATERIALS

APPROVED PROD. ENG. 11-15-63 DATE — Authority

34738	
NEXT ASSY	USED ON
APPLICATION	

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON FRACTIONS DECIMALS ANGLES
MATERIAL
FINISH
HEAT TREAT

SIGNATURES		DATE
DR	R Buss	9-25-63
CHK	M. Nichols	9/26/63
APPD		11/4/63
APPD	S Ferguson	11/26/63

F LOAD SCHEMATIC

SERIES 5

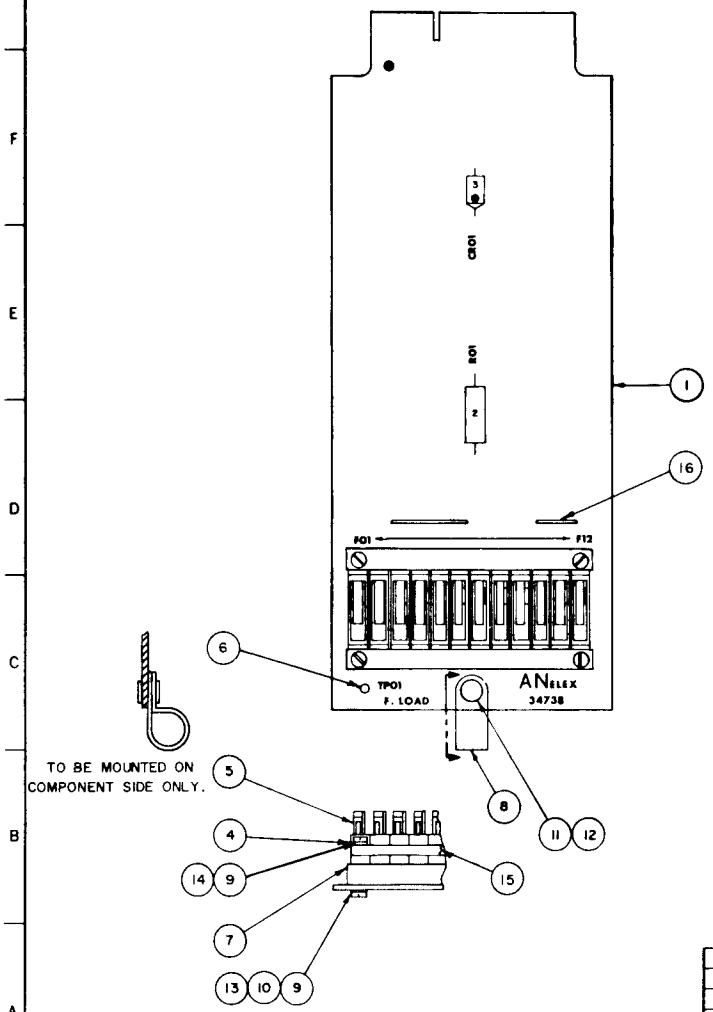
SCALE NONE WT

ANelex CORPORATION BOSTON MASS

C 34788

NOTE:
1. NO'S ON COMPONENTS ARE ITEM NO'S.
2. CATHODE END OF DIODE INDICATED BY DOT.
3. FLASH GOLD PLATE HEAT SINK.
4. STAMP G2 1/8 BLK. CHAR. AFTER ASSY. NO. COAT PER FS514.

REVISIONS				
ZONE	SYM	DESCRIPTION	DATE	APPROVAL
	0	REL TO PED	11/27	
	A	REV PER ECA 16950	9-9-64	
	B	REV PER ECA 17854	9-8-66	
	C	REV PER ECA 18314	11-9-66	
	D	REV PER ECA 18946	3/20/67	
	E	REV PER ECA 19195	4/3/67	



17	REF	34788	SCHEMATIC, F LOAD		

34738 E

ITEM	REQD	PART NO	DESCRIPTION	MATL	MATL SPEC	UNIT WT
16	AR	465 101-021	WIRE, INSULATED, BLK VINYL			
15	2	95652	LOCKING BAR			
14	4	842-110-024	SCREW #4 40X3/8 PHIL. HD.			
13	4	95643	WASHER, TEFLON			
12	1	95642	COMPRESSION RIVET, FEMALE			
11	1	95641	COMPRESSION RIVET, MALE			
10	4	842-107-002	SCREW #4-40X3/16 BIND. HD.			
9	8	933-104-003	WASHER, LOCK #4			
8	1	141-101-006	CLAMP, CABLE			
7	2	95644	FUSE, RETAINER			
6	1	420-111-002	TERMINAL, STUD			
5	12	203-114-006	FUSE, 1 AMP			
4	12	205-105-001	FUSE, HOLDER			
3	1	167-201-002	DIODE	IN537		
2	1	387-304-055	RESISTOR, 1.8K 2W, 2 OR 5%			
1	1	34838	P.C. CARD, F LOAD			

LIST OF MATERIALS

NEXT ASSY	USED ON
APPLICATION	

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON FRACTIONS DECIMALS ANGLES
MATERIAL
FINISH
HEAT TREAT

SIGNATURES		DATE
DR	B Dyer	10/6/63
CHK	M. Nichols	10/3/63
APPD	R Fleer	11/14/63
APPD	S Hanson	11/20/63

F LOAD ASSEMBLY

SERIES 5

SCALE 1/1 WT

ANelex CORPORATION BOSTON MASS

C 34738

F LOAD

The ANelex F Load Printed Circuit card contains 12 independent fuse monitors, which are supplied as protective devices for ANelex Hammer Driver circuits. Each fuse device is connected in series with a buss line from the -36-volt power supply and an external ANelex Hammer Driver module. In the event any one of the 12 fuse monitors is destroyed by an overload condition, -36 volts will be applied to the external alarm circuits simultaneously by an 1800-ohm resistor and Diode CR1. A test point from the module alarm line has been provided to expedite troubleshooting and servicing procedures.

CARD LIST			VOLTAGE BUS PINS								KEYING
① QTY.	CARD NO.	CARD NAME	GRD	+6V	-6V	-18V	-36V	-36V RTN	-18V RTN	-12V	
36	34051	REGISTER	10,11	14	12						4 1/2—8 1/2
8	34052	O.S. LONG	10,11	14	12						4 1/2—11 1/2
11	34053	O.S. SHORT	10,11	14	12						4 1/2—12 1/2
13	34054	CD 200	10,11	14	12						4 1/2—14 1/2
11	34055	CD 400	10,11	14	12						4 1/2—16 1/2
7	34056	CD LOAD	10,11			8					4 1/2—18 1/2
32	34057	A5	10,11	14	12						4 1/2—20 1/2
34	34058	B5	10,11	14	12						6 1/2—11 1/2
2	34060	PA GATE GEN	10	14	12	8			11		6 1/2—14 1/2
4	34066	A10	10,11	14	12						8 1/2—16 1/2
5	34067	B10	10,11	14	12						8 1/2—18 1/2
3	34072	A TRIGGER LOAD	10,11		12						11 1/2—20 1/2
6	34080	HSOS	10,11	14	12	8					8 1/2—11 1/2
3	34097	PULSER	10,11	14	12						9 1/2—22 1/2
18	34099	C5	10,11	14	12						13 1/2—22 1/2
1	34100	C10	10,11	14	12						16 1/2—22 1/2
2	34304	SWDC CONV.	10,11	14	12						2 1/2—16 1/2
1	34307	LDT	10,11	14	12	8					12 1/2—22 1/2
16	34326	R.W. SENSE AMP.	10	14	12	8			11		6 1/2—12 1/2
2	34332	CEF	10	14	12	8			11		12 1/2—18 1/2
3	34347	SDT	10,11	14	12	8					2 1/2—12 1/2
12	34704	C20	10,11	14	12						15 1/2—22 1/2
2	34852	K	10	14	12	8			11		11/2—6 1/2
2	34860	18-30 LAMP DR.	10	14		8			11		6 1/2—22 1/2
2	44047	IN 1562	10,11	14				1		16	7 1/2

35216 A

NOTE:
① QUANTITY IS FOR REFERENCE ONLY.

FOR LIST OF MATERIALS SEE LM 35216

SYM	ECA NO	DATE	APPD
C			
B			
A	19294	07/21/64	RJ
0	RELEASED		

SYM	ECA NO	DATE	APPD
G			
F			
E			
D			

SYM	ECA NO	DATE	APPD
K			
J			
I			
H			

USED ON

SIGNATURES	DATE
DR M Lamoureux	11/23/65
CHK K CHIN/SG	11/30/65
APPD P Flores	11/30/65
APPD D Hyman	11/30/65

ANELEX CORPORATION
BOSTON MASS U.S.A.

FUNCTION: CARD LOCATION AND LISTING
CLIENT: ZUSE

CODE NO
C 35216
SHEET 1 OF 2

△ INDICATES SLOTS IN WHICH CONNECTORS ARE INSERTED AND POWER WIRED.

⊠ INDICATES RECEPTACLE SLOTS WHICH MUST NOT BE USED.

(A)(B) — DESIGNATORS ENCLOSED IN CIRCLES INDICATE UNUSED PORTIONS OF CARDS.

	A	B	C	D	E	F	H	J	K	L	M
0	SWDG (D)	C20	CEF (B)	B5	LD (D)			⊠			
1	SWDG (B)	C20	CEF	B5	LD	RWSA	RWSA	⊠			
2	REG	C20	B5	C5	A10	RWSA	RWSA	⊠			
3	A5	A5	A5	C5	C20	RWSA	RWSA	⊠			
4	C10	A5	C5	A10	A10	RWSA	RWSA	⊠			
5	OSS	A5	B5	A TRIG LD	C20	RWSA	RWSA	△			
6	OSL	A5	B5	A TRIG LD	OSS	RWSA	RWSA	A5			
7	OSS	C5 (E)	B5	A10	B5	RWSA	RWSA	A5			
8	OSS	C5	OSS	C20	B5	RWSA	RWSA	A5			
9	REG	K	OSS	B10	B5	PAGG	PAGG	A5			
10	REG	K	A5	B10	B5	OSS	A5	A5			
11	REG	C20	A5	B5	B5 (A)	IN (B)(C)(D)	A5	A5			
12	PULSER	B5	C20	B5	B5 (A)	IN	A5	A5			
13	PULSER	B5	PULSER	B10	C5	REG	A5	A5			
14	A5	B5	OSL	B5	C5	REG	CD200	A5			
15	C5	B5	HSOS	B5 (D)	C5	REG	CD200	A5	△		
16	OSL	C5	HSOS	B5	B10	REG	CD200 (B)	A5	△		
17	OSL	OSL	HSOS	B5	B5	REG	CD400	A5	CD LOAD		
18	OSL	A5	HSOS	B10	B5	REG	CD400	B5	⊠		
19	OSL	A5	C20	OSS	B5	REG	CD400 (A)	B5	CD LOAD		
20	SDT	OSL	LDT	△	B5	REG	CD400	CD200	⊠		
21	C5 (E)	C5	OSS	A TRIG LD	B5	REG	CD400	CD200	CD LOAD		
22	A5 (A)	C5	C5	C20	B5	REG	CD400	CD200	⊠		
23	C20	OSS	B5	C20	B5	REG	CD400	CD200	CD LOAD		
24	C5	SDT	B5	C5	REG	REG	CD400	CD200	⊠		
25	SDT	REG	B5	C5	REG	REG	CD400	CD200	CD LOAD		
26	HSOS	REG	REG	C5	REG	REG	CD400	CD200	⊠		
27	HSOS	REG	REG	A5 (C) (D)	REG	REG	CD400	CD200	CD LOAD		
28	A5	REG	REG	A5	REG	REG	CD LOAD	CD200	⊠		
29	OSS	REG	REG	A5	REG	REG	⊠	CD200	△		

J802 J803 J804 J805 J806 J807 J808

35216 A

SYM	ECA NO	DATE	APPD
C			
B			
A	19294	11/2/65	RH
0	RELEASED	4-8-65	

SYM	ECA NO	DATE	APPD
G			
F			
E			
D			

SYM	ECA NO	DATE	APPD	USED ON
K				
J				
I				
H				

SIGNATURES	DATE
DR R.M. Lonczewicz	4/29/65
CHK K. CHIN/SR	4/14/65
APPD C. Hynes	4/14/65
APPD	4/17/65

ANELEX CORPORATION BOSTON MASS U.S.A.

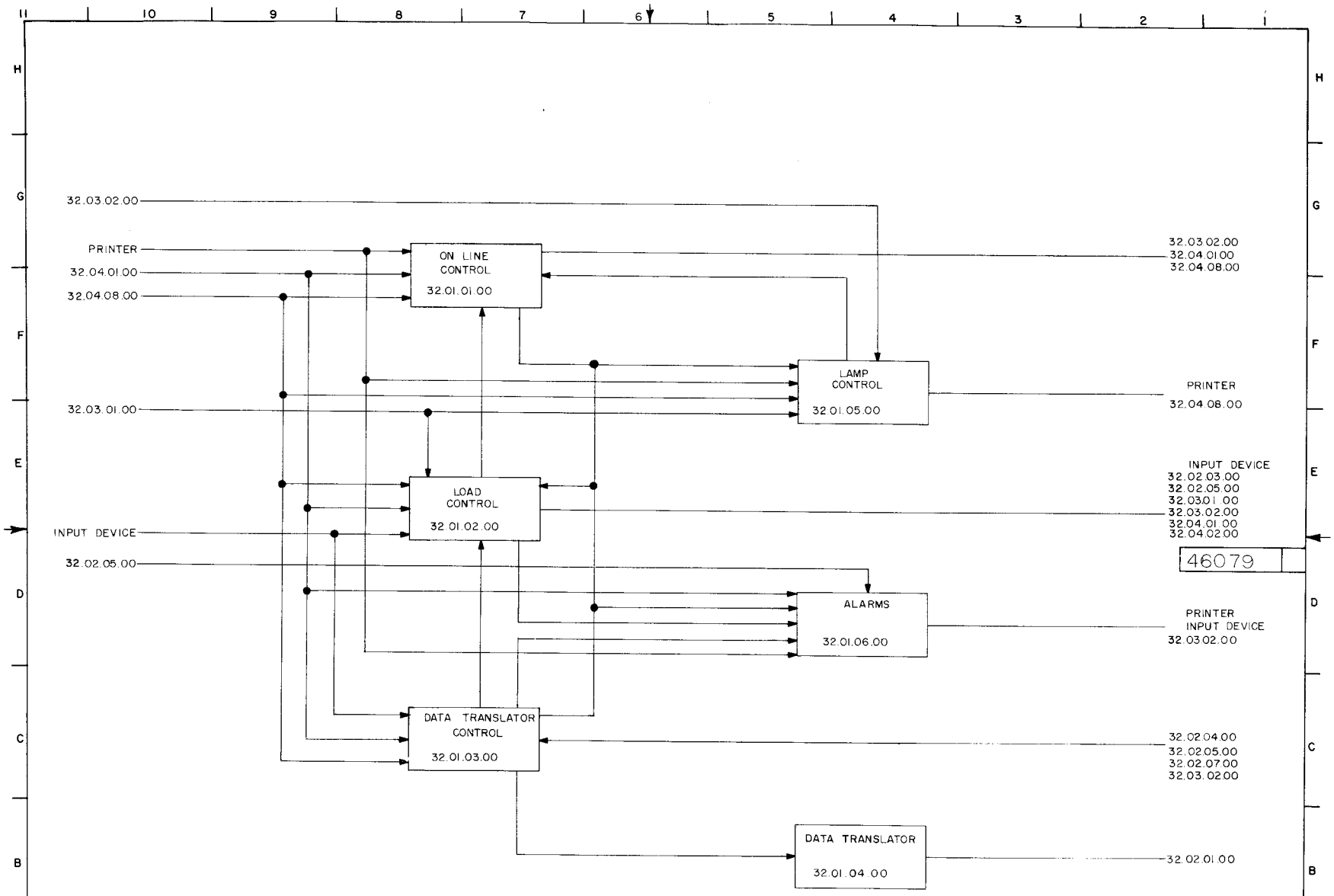
FUNCTION: CARD LOCATION AND LISTING

CLIENT: ZUSE

CODE NO

C 35216

SHEET 2 OF 2



46079

SYM	ECA NO	DATE	APPD	SYM	ECA NO	DATE	APPD	SYM	ECA NO	DATE	APPD	USED ON
O	RELEASED 4-5-65											

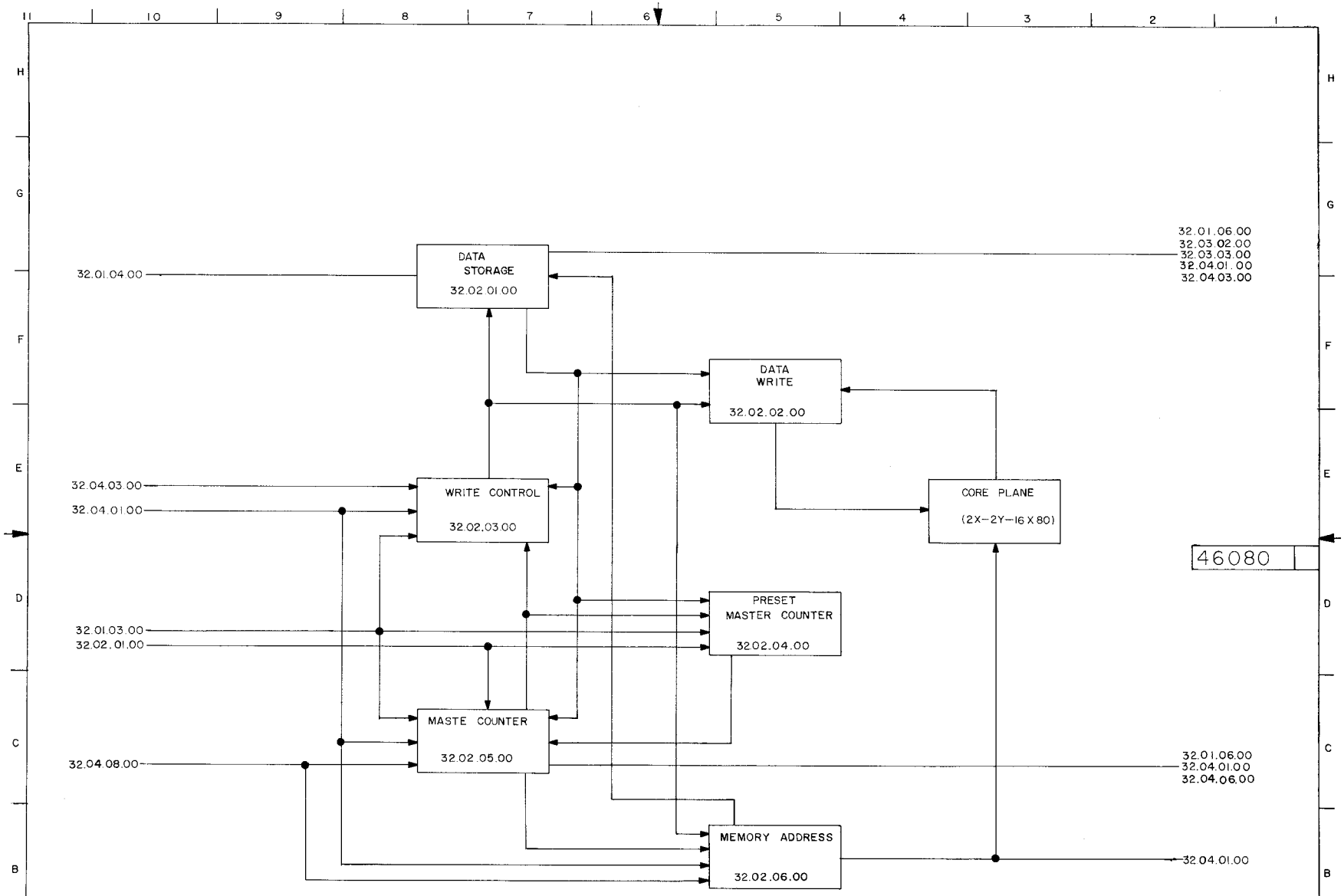
SIGNATURES	DATE
DR E. Peterson	8/26/63
CHK K.C.H.N.	12/1/63
APPD	
APPD	

ANELEX CORPORATION
BOSTON MASS U.S.A.

FUNCTION: INTERFACE BLOCK DIAGRAM
CLIENT: ZUSE

CODE NO: 32.01.00.00
DWG NO: C 46079
SHEET OF

BD

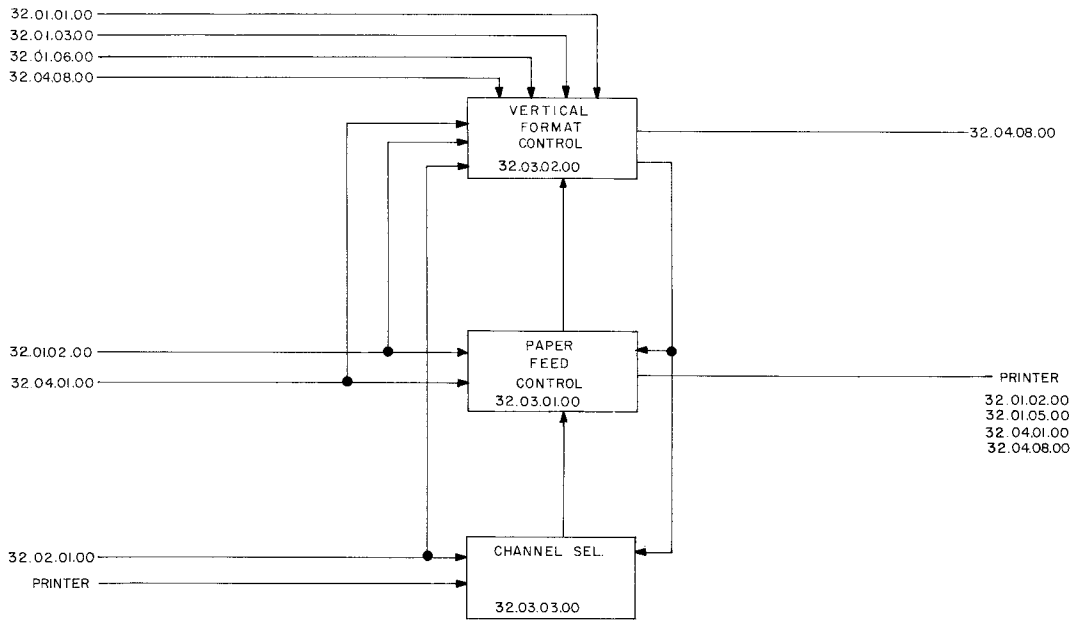


46080

SYM	ECA NO	DATE	APPD	SYM	ECA NO	DATE	APPD	SYM	ECA NO	DATE	APPD	USED ON	SIGNATURES	DATE
C				G				K					DR E Peterson	3/16/65
B				F				J					CHK WASHIN/DA	3/16/65
A				E				I					APPD D Ellyson	4-1-65
0	RELEASED	4-5-65		D				H					APPD C Clayton	4/16/65

ANELEX CORPORATION
BOSTON MASS U.S.A.

FUNCTION: MEMORY BLOCK DIAGRAM
CLIENT: ZUSE
CODE NO: 32.02.00.00
DWG NO: 46080
SHEET OF



46081

SYM	ECA NO	DATE	APPD	SYM	ECA NO	DATE	APPD	SYM	ECA NO	DATE	APPD	USED ON
C				G				K				
B				F				J				
A				E				I				
0	RELEASED 4-5-65			D				H				

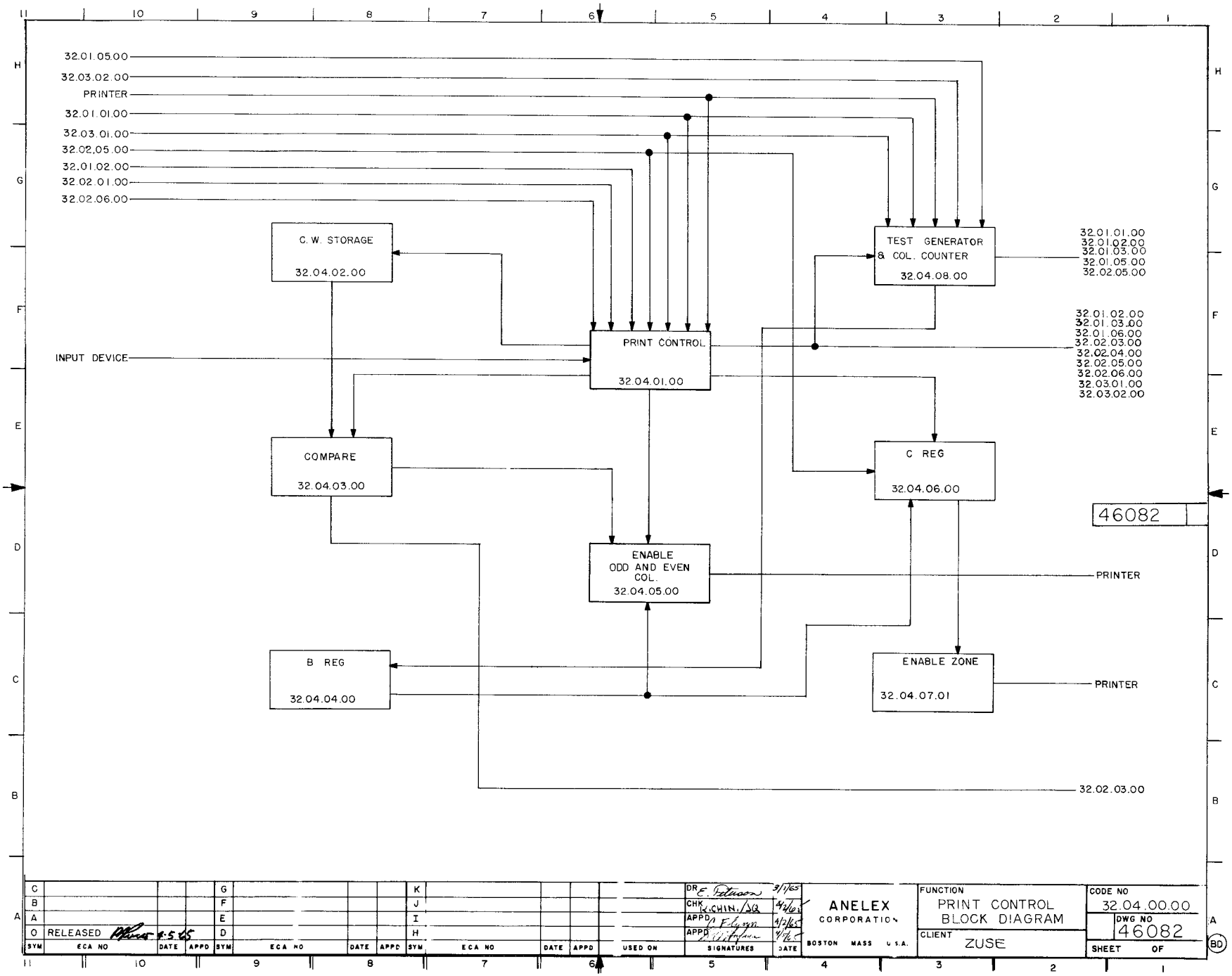
SIGNATURES		DATE
DR Jonah B. Fleiss		3/11/65
CHK K. CHIN / JQ		4/5/65
APPD F. Higgins		4/5/65
APPD		4/5/65

ANELEX CORPORATION
BOSTON MASS U.S.A.

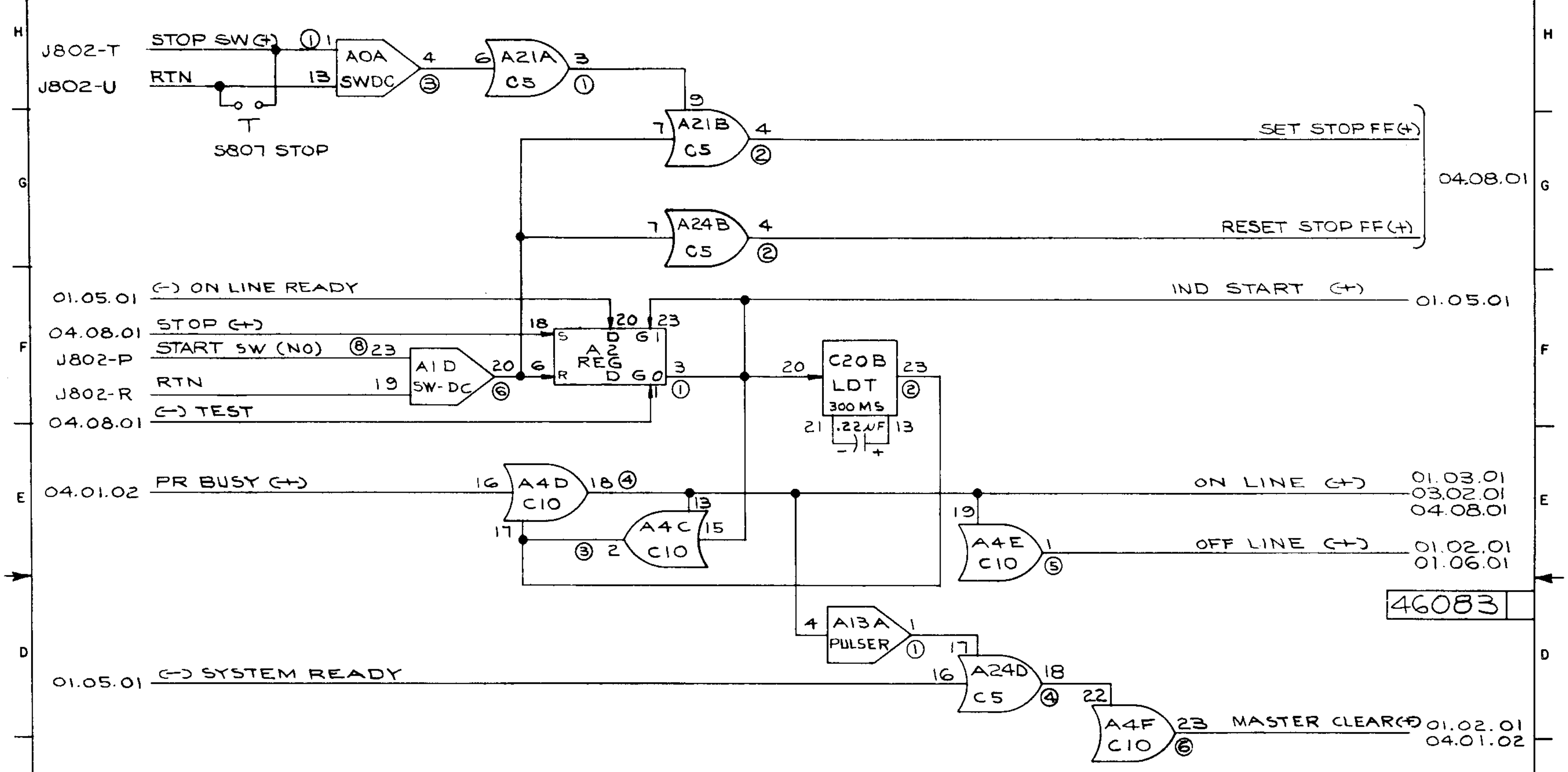
FUNCTION: VERTICAL FORMAT BLOCK DIAGRAM
CLIENT: ZUSE

CODE NO: 32.03.00.00
DWG NO: 46081
SHEET OF

BD



C				G				K					DR E. Peterson	3/1/65	ANELEX CORPORATION BOSTON MASS U.S.A.	FUNCTION PRINT CONTROL BLOCK DIAGRAM	CODE NO 32.04.00.00
B				F				J					CHK K.CHIN/AG	4/1/65			DWG NO 46082
A				E				I					APPD J.F.Lyon	3/2/65		CLIENT ZUSE	
0	RELEASED 4-5-65			D				H					APPD	4/1/65			SHEET OF
SYM	ECA NO	DATE	APPD	SYM	ECA NO	DATE	APPD	SYM	ECA NO	DATE	APPD	USED ON	SIGNATURES	DATE			



SYM	ECA NO	DATE	APPD	SYM	ECA NO	DATE	APPD	SYM	ECA NO	DATE	APPD	USED ON
C				G				K				
B				F				J				
A				E				I				
O	RELEASED	4-5-65		D				H				

SIGNATURES	DATE
DR R. Burns	12-21-64
CHK K.CHIN/JQ	4/2/65
APPD	4/2/65
APPD	4/5/65

ANELEX
CORPORATION
BOSTON MASS U.S.A.

FUNCTION
ON LINE
CONTROL

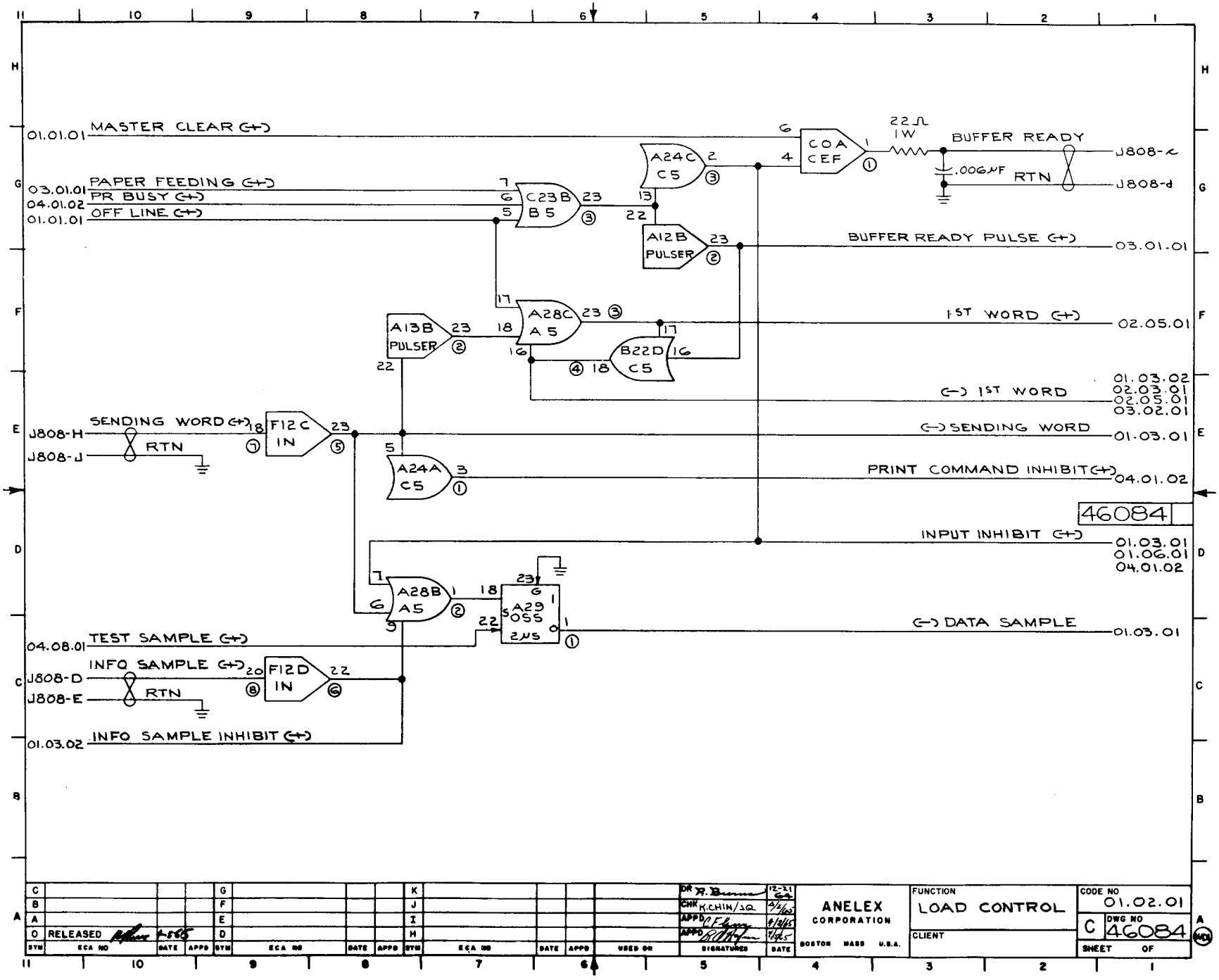
CLIENT

CODE NO
01.01.01

C
DWG NO
46083

SHEET OF

WDL



SYM	ECA NO	DATE	APPD	SYM	ECA NO	DATE	APPD	SYM	ECA NO	DATE	APPD	USED ON
C				G				K				
B				F				J				
A				E				I				
0	RELEASED	4-5-65		D				H				

SIGNATURES	DATE
DR R. B	12-21-64
CHK K.CHIN/SQ	4/2/65
APPD C F	4/2/65
APPD	4/5/65

ANELEX
CORPORATION
BOSTON MASS U.S.A.

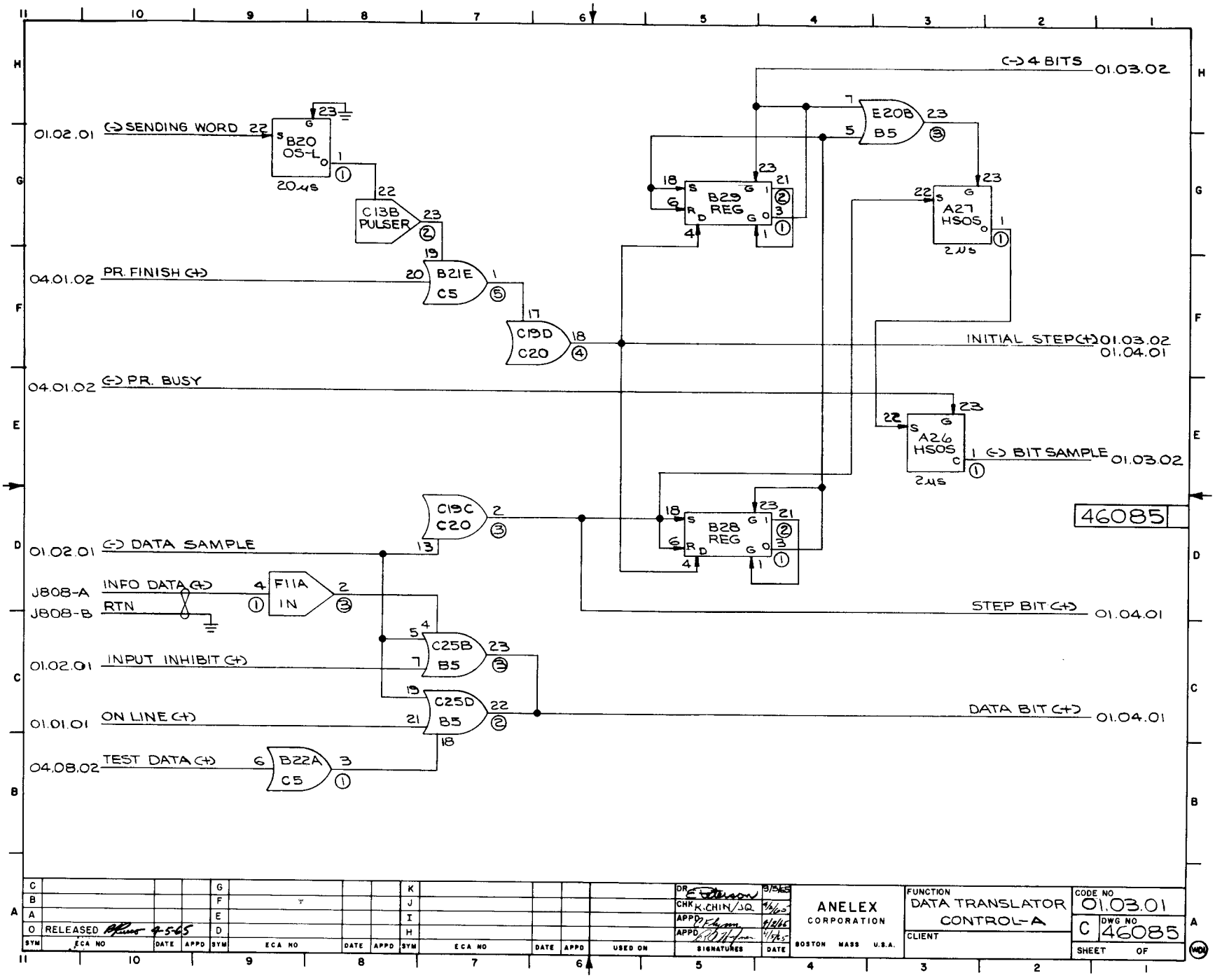
FUNCTION
LOAD CONTROL

CLIENT

CODE NO
01.02.01

C DWG NO
46084

SHEET OF

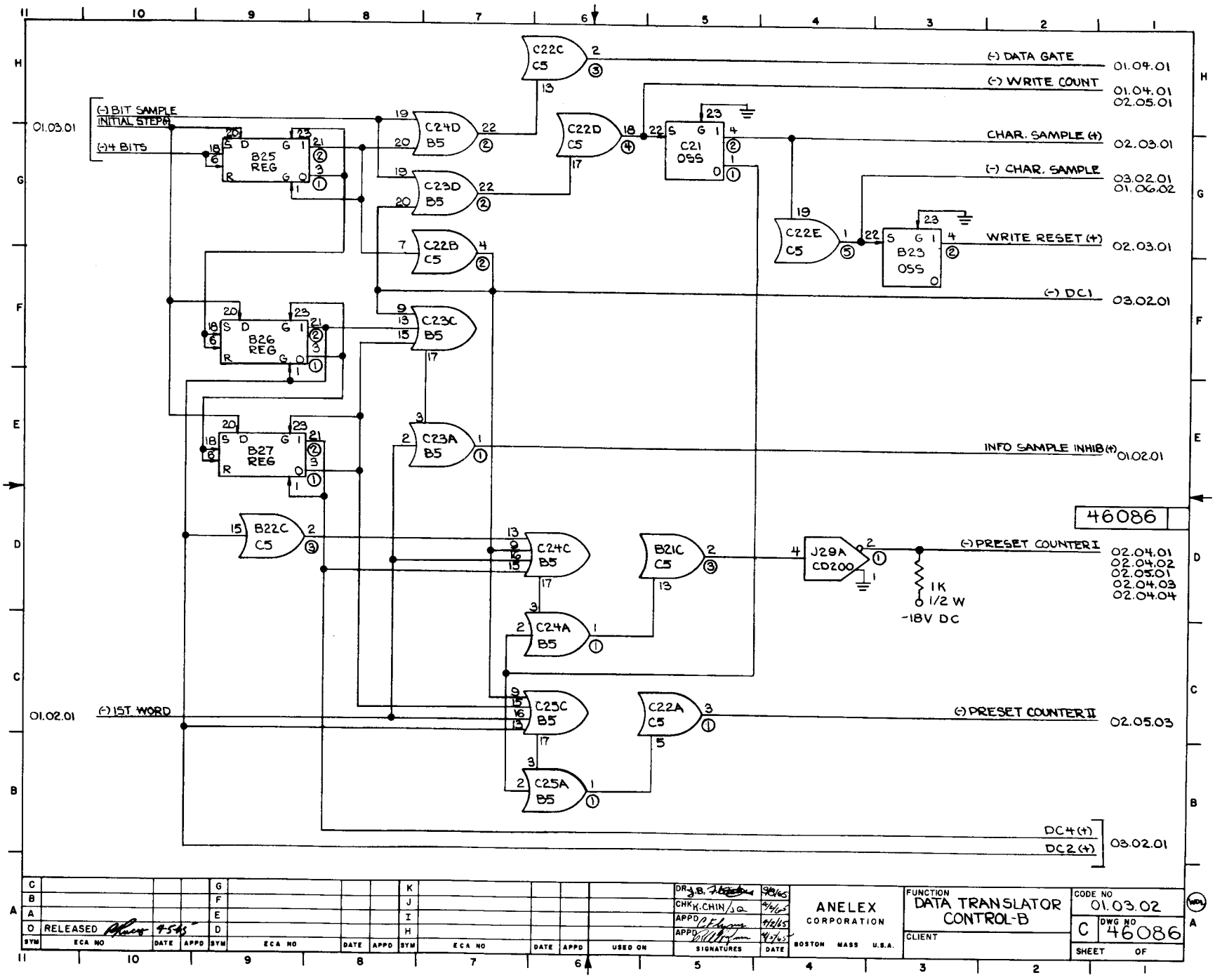


SYM	ECA NO	DATE	APPD	SYM	ECA NO	DATE	APPD	SYM	ECA NO	DATE	APPD	USED ON
C				G				K				
B				F				J				
A				E				I				
0	RELEASED			D				H				

SIGNATURES		DATE
DR E Johnson		8/5/65
CHK K. CHIN/JQ		4/5/65
APPD		4/12/65
APPD		4/19/65

ANELEX CORPORATION
BOSTON MASS U.S.A.

FUNCTION: DATA TRANSLATOR CONTROL-A
CLIENT:
CODE NO: 01.03.01
C 46085
SHEET OF



SYM	ECA NO	DATE	APPD
O	RELEASED	4-5-65	
A			
B			
C			
D			
E			
F			
G			
H			
I			
J			
K			

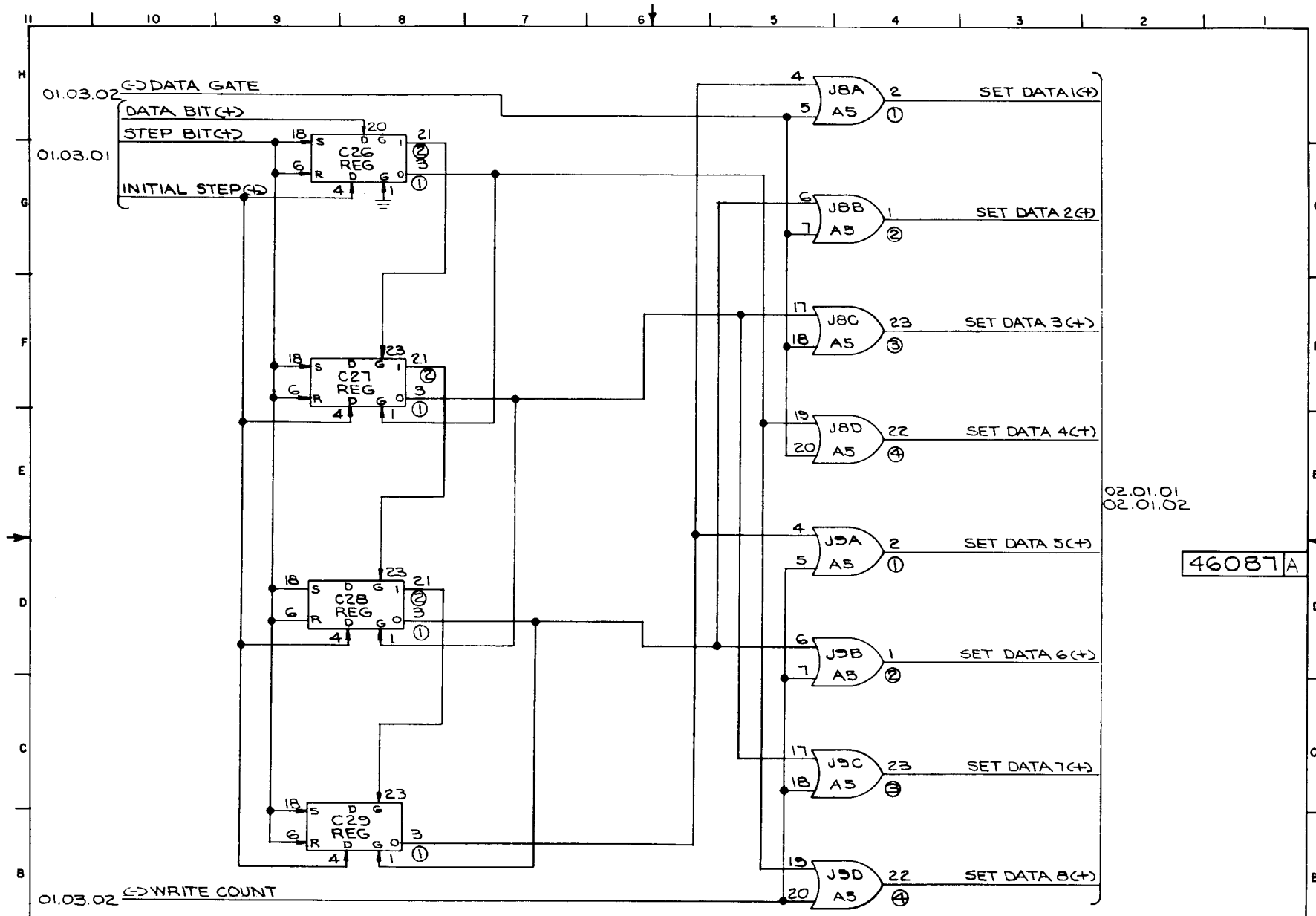
USED ON

SIGNATURES	DATE
DR J.B.	3/8/65
CHK K. CHIN	4/1/65
APPD C.E. Hyman	4/2/65
APPD	4-7-65

ANELEX CORPORATION
BOSTON MASS U.S.A.

FUNCTION: DATA TRANSLATOR CONTROL-B
CLIENT

CODE NO 01.03.02
SIZE C
DWG NO 46086
SHEET OF



46087 A

SYM	ECA NO	DATE	APPD
C			
B			
A	19294	5/13/66	
O	RELEASED	5/13/66	

SYM	ECA NO	DATE	APPD
G			
F			
E			
D			

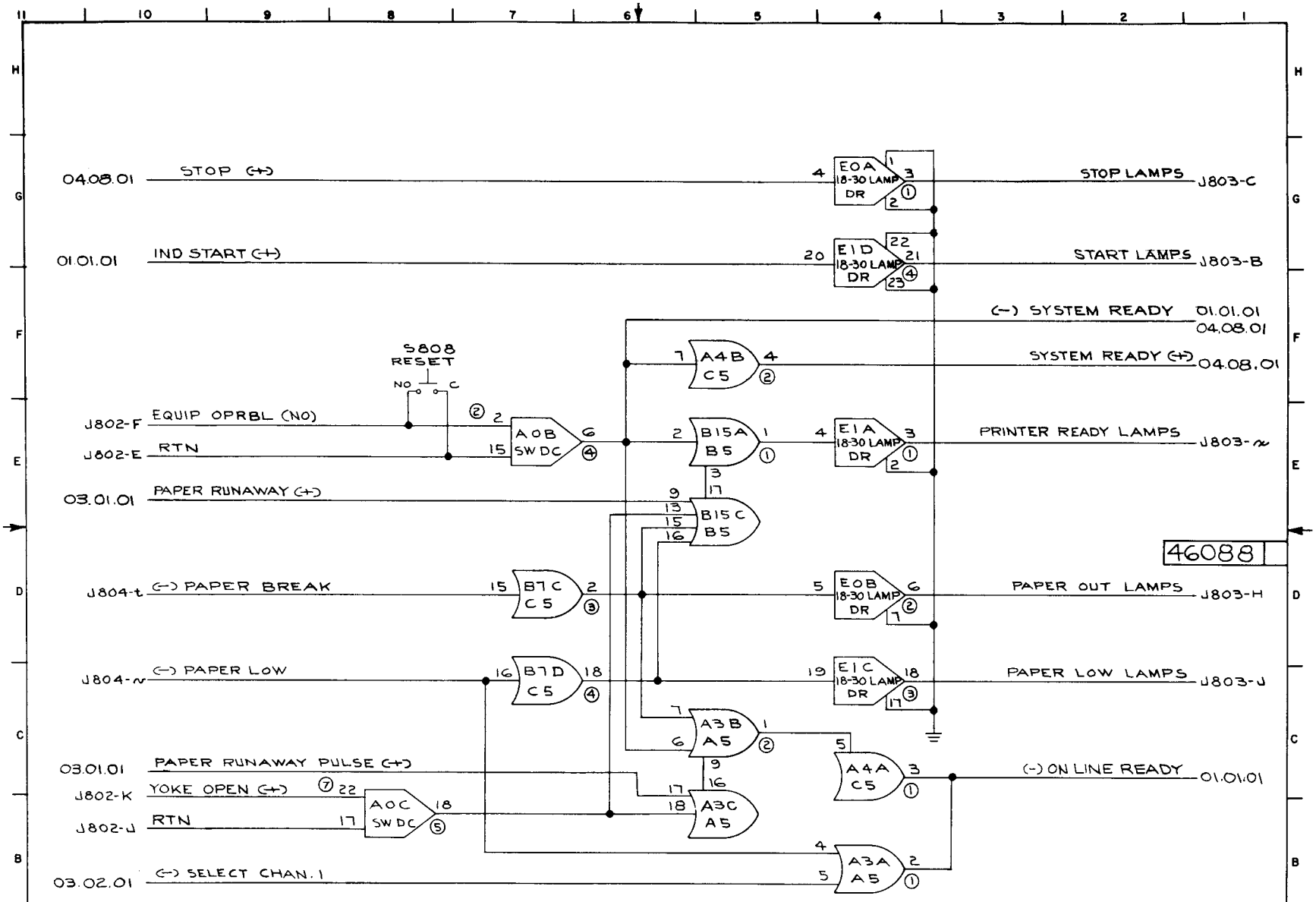
SYM	ECA NO	DATE	APPD	USED ON
K				
J				
I				
H				

	SIGNATURES	DATE
DR	E Peterson	8/16/65
CHK	K CHIN/JD	9/16/65
APPD	D Egan	9/16/65
APPD		

ANELEX CORPORATION
BOSTON MASS U.S.A.

FUNCTION: DATA TRANSLATOR
CLIENT:

CODE NO: 01.04.01
C 46087
SHEET OF



SYM	ECA NO	DATE	APPD	SYM	ECA NO	DATE	APPD	SYM	ECA NO	DATE	APPD
C				G				K			
B				F				J			
A				E				I			
0	RELEASED 8-5-65			D				H			

USED ON

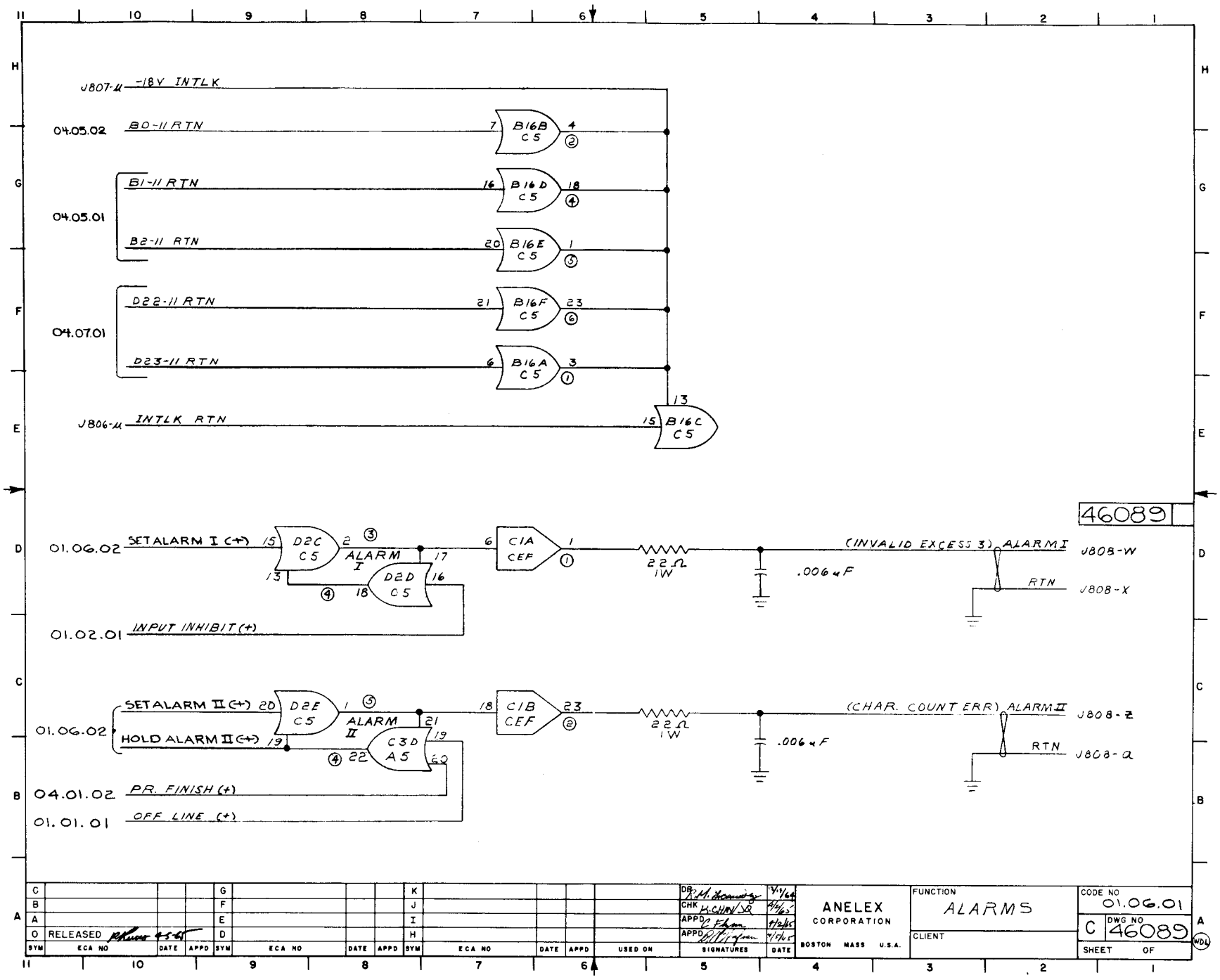
SIGNATURES	DATE
DR R. Burns	12-18-64
CHK M.CHIN/JQ	4/6/65
APPD C Flynn	4/2/65
APPD	4/5/65

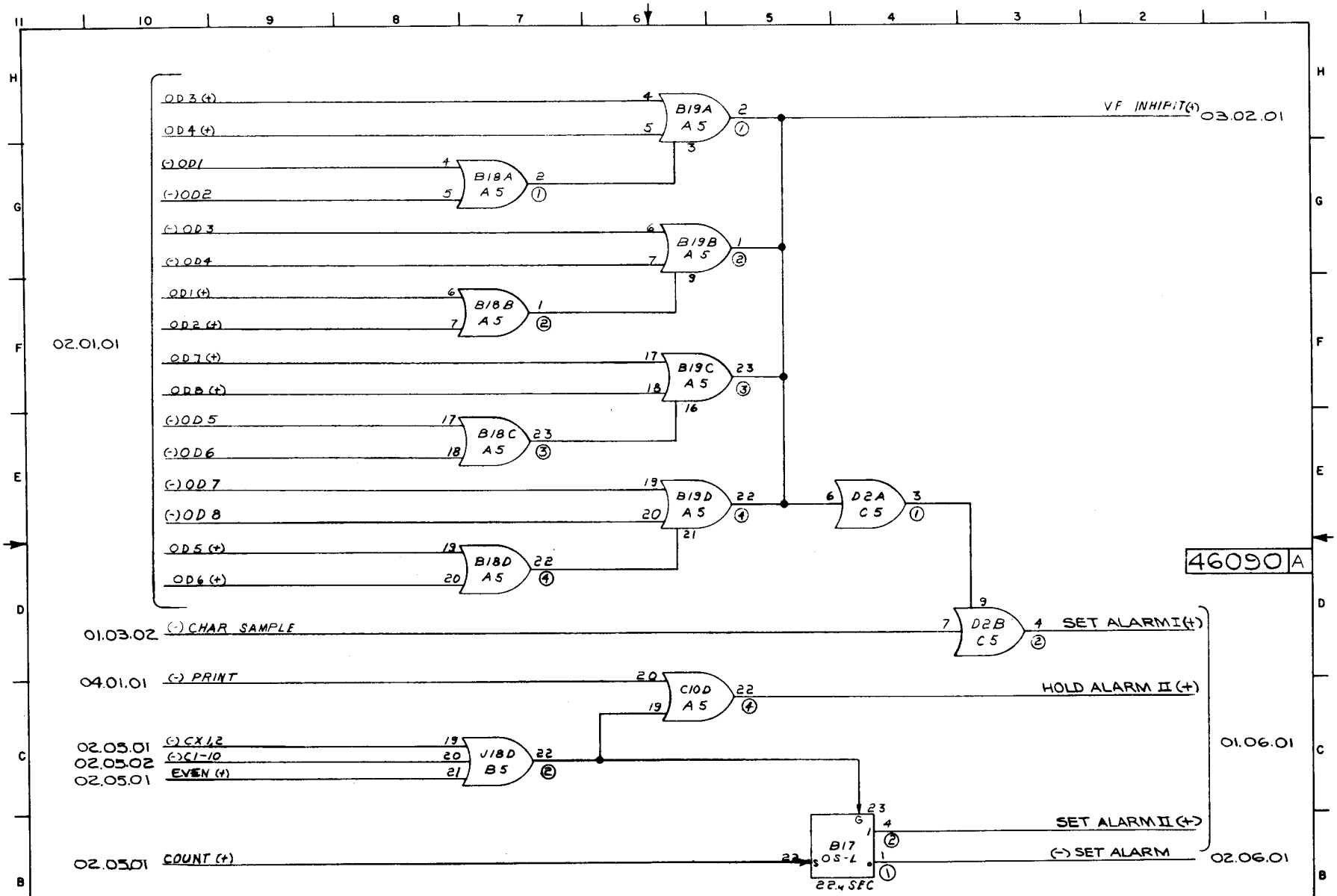
ANELEX
CORPORATION
BOSTON MASS U.S.A.

FUNCTION
LAMP CONTROL

CLIENT

CODE NO 01.05.01
C DWG NO 46088
SHEET OF


J807-μ -18V INTLK
04.05.02 B0-11 RTN
B16B C5
B1-11 RTN
B16D C5
04.05.01
B2-11 RTN
B16E C5
D22-11 RTN
B16F C5
04.07.01
D23-11 RTN
B16A C5
J806-μ INTLK RTN
B16C C5
46089
01.06.02 SET ALARM I (+)
D2C C5
ALARM I
D2D C5
C1A CEF
22Ω 1W
.006μF
(INVALID EXCESS 3) ALARM I
J808-W
RTN
J808-X
01.02.01 INPUT INHIBIT (+)
SET ALARM II (+)
HOLD ALARM II (+)
01.06.02
D2E C5
ALARM II
C3D A5
C1B CEF
22Ω 1W
.006μF
(CHAR. COUNT ERR) ALARM II
J808-Z
RTN
J808-a
04.01.02 PR. FINISH (+)
01.01.01 OFF LINE (+)
RELEASED
DR
CHK
APPD
APPD
ANELEX CORPORATION
BOSTON MASS U.S.A.
FUNCTION ALARMS
CLIENT
CODE NO 01.06.01
DWG NO C 46089
SHEET OF



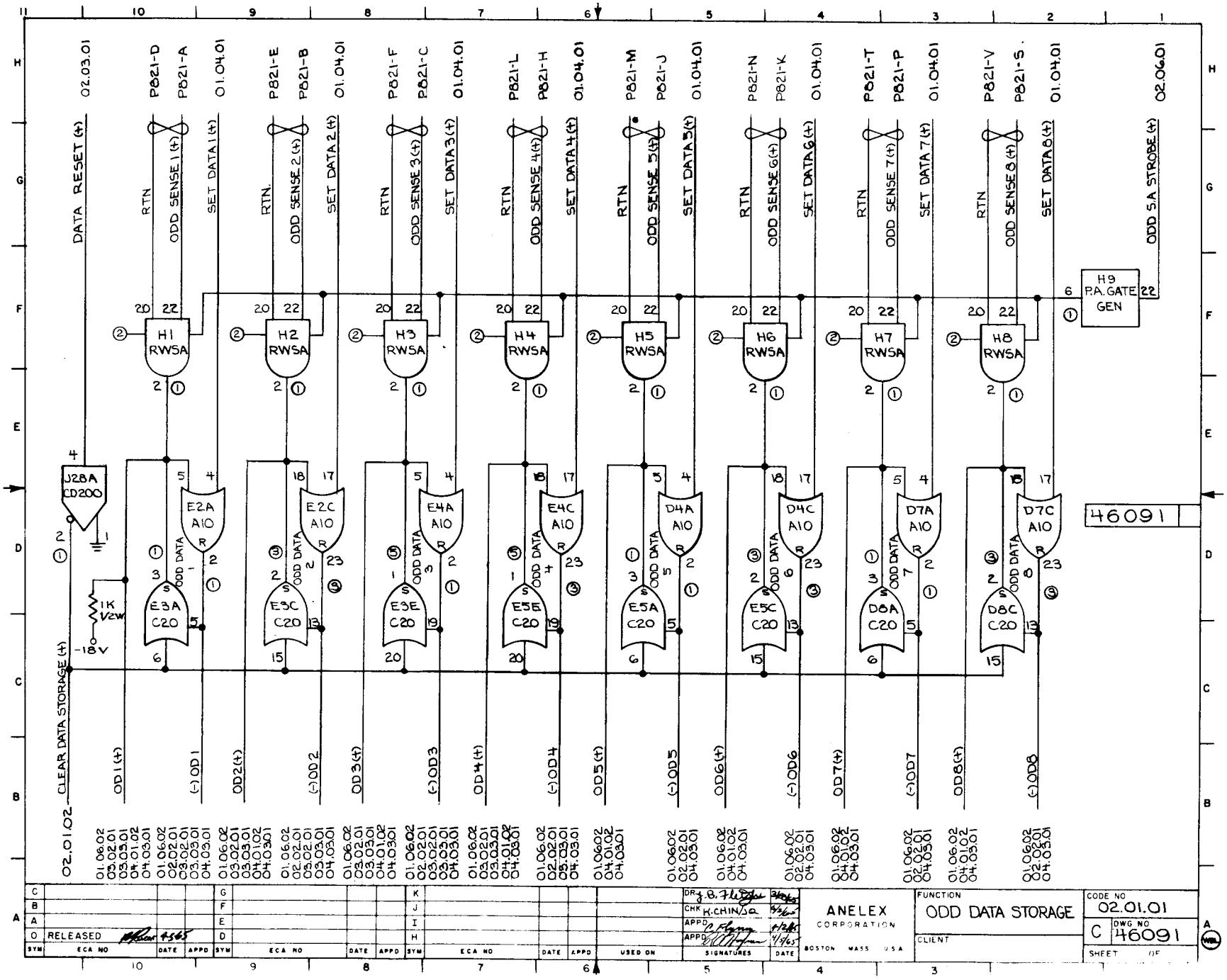
SYM	ECA NO	DATE	APPD
O	RELEASED		
A	19234	4/18/66	R.E.

DR	R.H. Brewster	4/19/66
CHK	K. CHIN	4/19/66
APPD		4/21/66
APPD		4/19/66

ANELEX CORPORATION
BOSTON MASS U.S.A.

FUNCTION: SET ALARMS
CLIENT:

CODE NO: 01.06.02
C 46090
SHEET OF



SYM	ECA NO	DATE	APPD
O	RELEASED 4565		
A			
B			
C			

SYM	ECA NO	DATE	APPD
D			
E			
F			
G			

SYM	ECA NO	DATE	APPD	USED ON
H				
I				
J				
K				

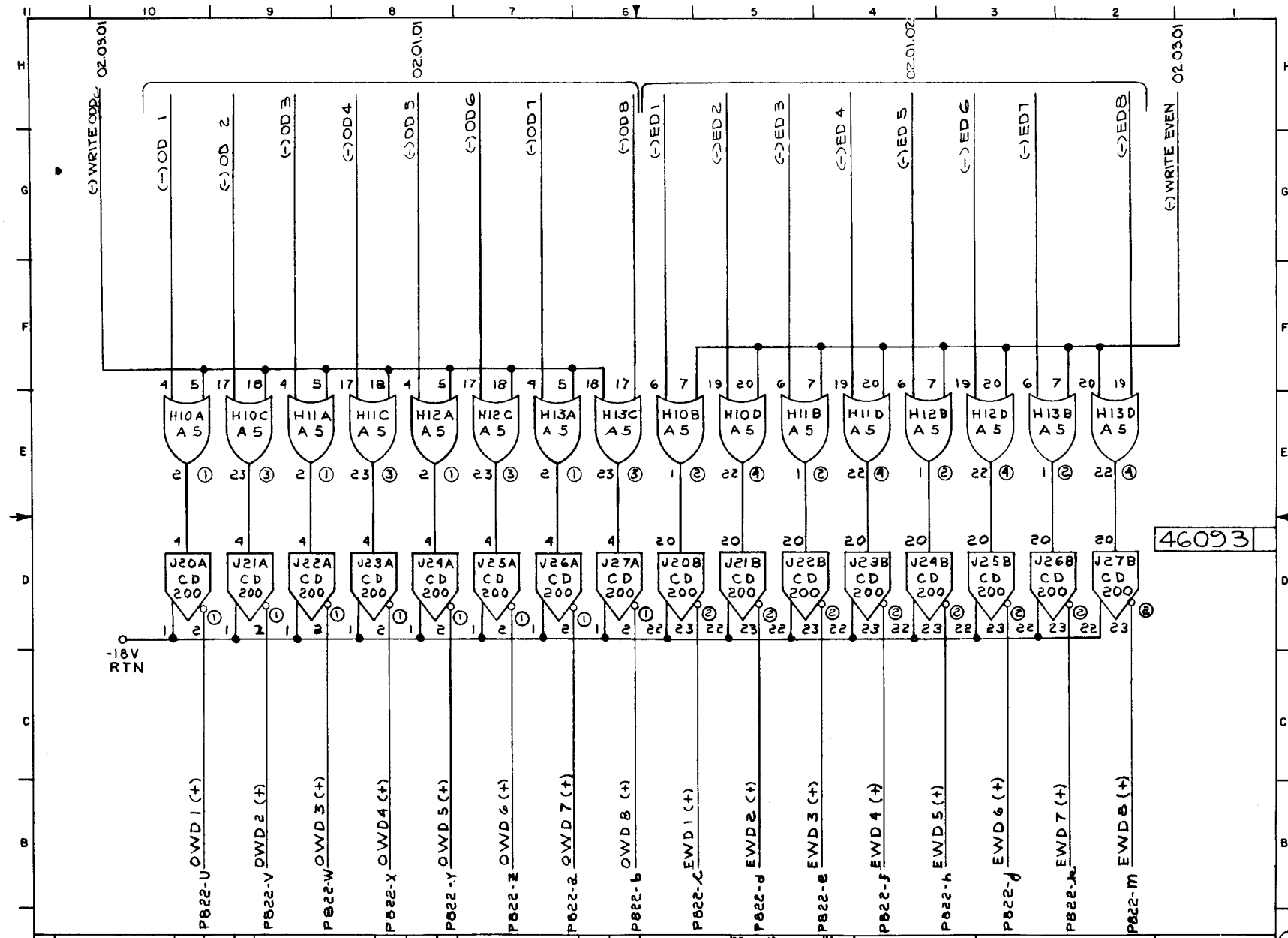
	SIGNATURES	DATE
DR	J.B. Fleming	3/4/65
CHK	K. CHIN/JA	3/5/65
APPD	[illegible]	3/8/65
APPD	[illegible]	3/9/65

ANELEX CORPORATION
BOSTON MASS U.S.A.

FUNCTION: ODD DATA STORAGE
CLIENT:

CODE NO: 02.01.01
C 46091
SHEET OF

46092
F9 R.A.GATE GEN
EVEN S.A. STROBE(+)
02.06.01
CLEAR DATA STORAGE (+)
02.01.01
SET DATA 8(+)
01.04.01
EVEN SENSE 8(+)
P821-N
RTN
P821-X
SET DATA 7(+)
EVEN SENSE 7(+)
P821-L
RTN
P821-W
SET DATA 6(+)
EVEN SENSE 6(+)
P821-n
RTN
P821-a
SET DATA 5(+)
EVEN SENSE 5(+)
P821-m
RTN
P821-r
SET DATA 4(+)
EVEN SENSE 4(+)
P821-s
RTN
P821-p
SET DATA 3(+)
EVEN SENSE 3(+)
P821-e
RTN
P821-j
SET DATA 2(+)
EVEN SENSE 2(+)
P821-d
RTN
P821-h
SET DATA 1(+)
EVEN SENSE 1(+)
P821-c
RTN
P821-f
F1 RWSA
F2 RWSA
F3 RWSA
F4 RWSA
F5 RWSA
F6 RWSA
F7 RWSA
F8 RWSA
E2B A10
E2D A10
E3B C20
E3D C20
E4B A10
E4D A10
E5B C20
E5D C20
D7B A10
D7D A10
D8B C20
D8D C20
EVEN DATA
(-)ED1
ED1(+)
(-)ED2
ED2(+)
(-)ED3
ED3(+)
(-)ED4
ED4(+)
(-)ED5
ED5(+)
(-)ED6
ED6(+)
(-)ED7
ED7(+)
(-)ED8
ED8(+)
ANELEX CORPORATION
BOSTON MASS U.S.A.
FUNCTION EVEN DATA STORAGE
CLIENT
CODE NO 02.01.02
DWG NO C 46092
SHEET OF
DR K.CHIN
CHK K.CHIN
APPD
RELEASED
ECA NO
DATE
SIGNATURES
USED ON



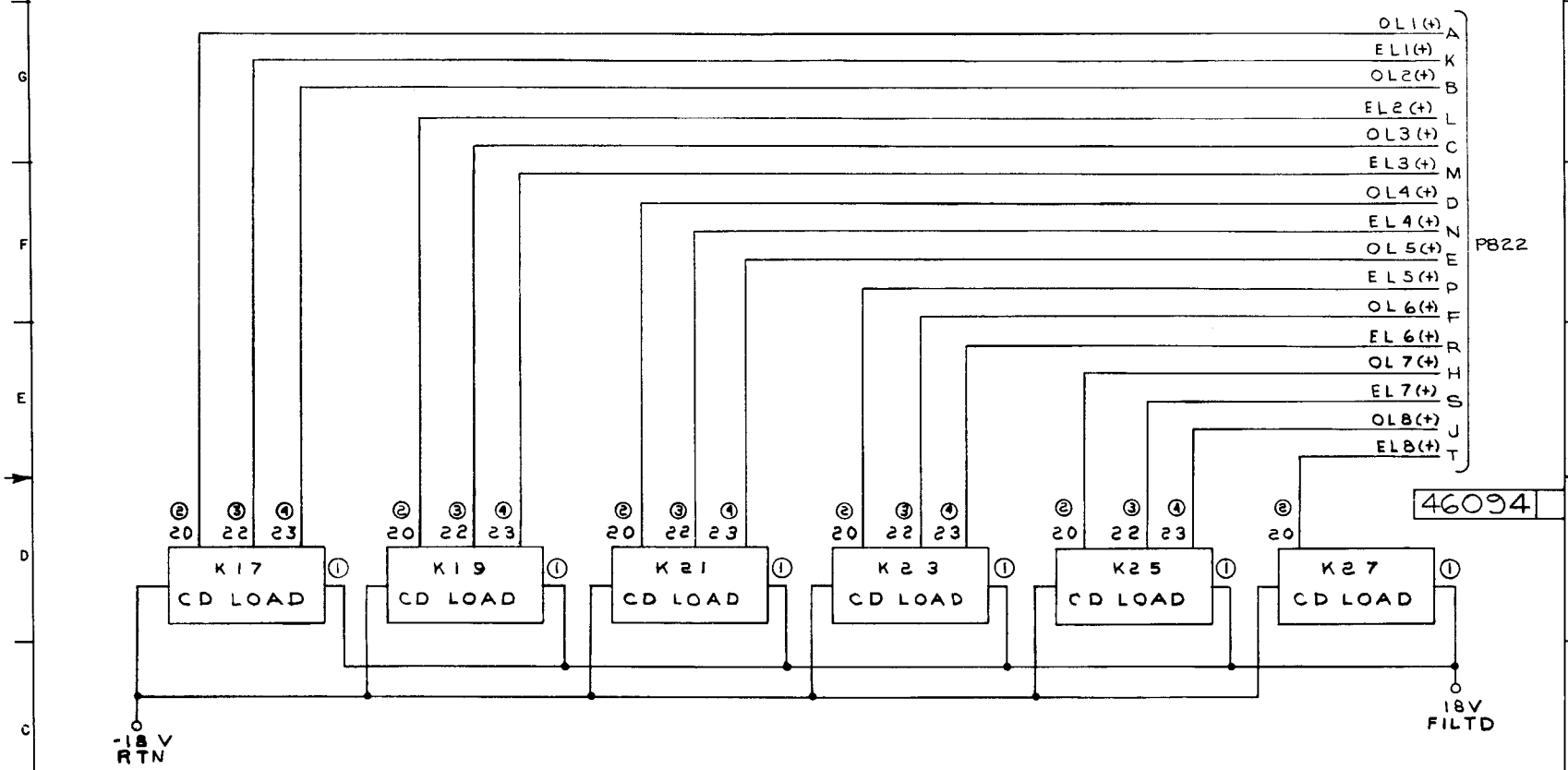
SYM	ECA NO	DATE	APPD	SYM	ECA NO	DATE	APPD	SYM	ECA NO	DATE	APPD	USED ON
C				G				K				
B				F				J				
A				E				I				
O	RELEASED	4-5-6		D				H				

SIGNATURES	DATE
DR RM	4/3/65
CHK K. CHIN/	4/3/65
APPD	4/3/65
APPD	4/6/65

ANELEX CORPORATION
BOSTON MASS U.S.A.

FUNCTION DATA WRITE-REWRITE
CLIENT

CODE NO 02.02.01
C DWG NO 46093
SHEET OF



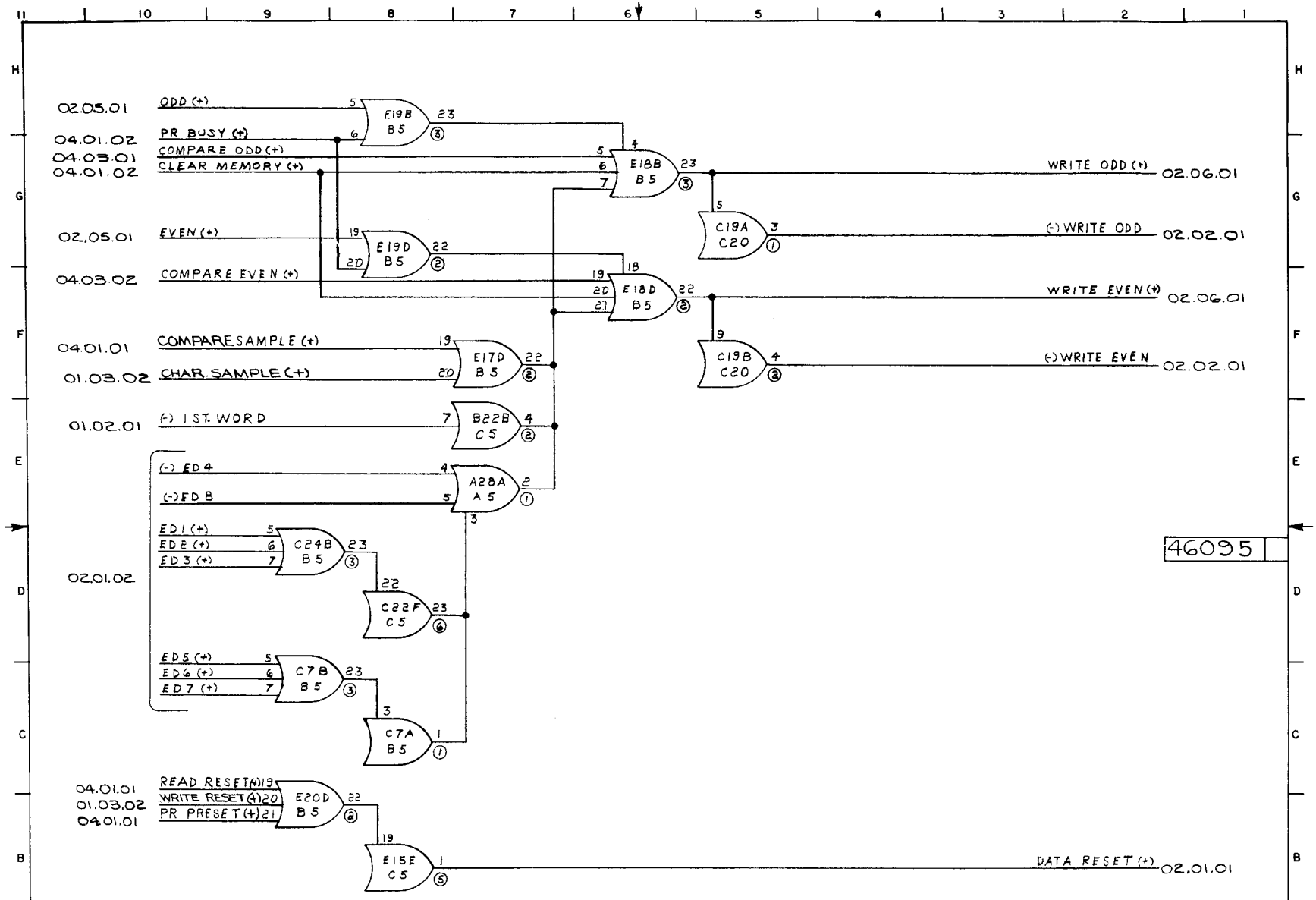
SYM	ECA NO	DATE	APPD
O	RELEASED		

DRN R.P.M. Rowbotham 1/4/65
CHK H.CHIN/SQ 1/5/65
APPD L. Flynn 1/4/65
APPD S.J. Hofman 1/5/65

ANELEX CORPORATION
BOSTON MASS U.S.A.

FUNCTION: DATA LOADS
CLIENT:

CODE NO 02.02.02
C DWG NO 46094
SHEET OF



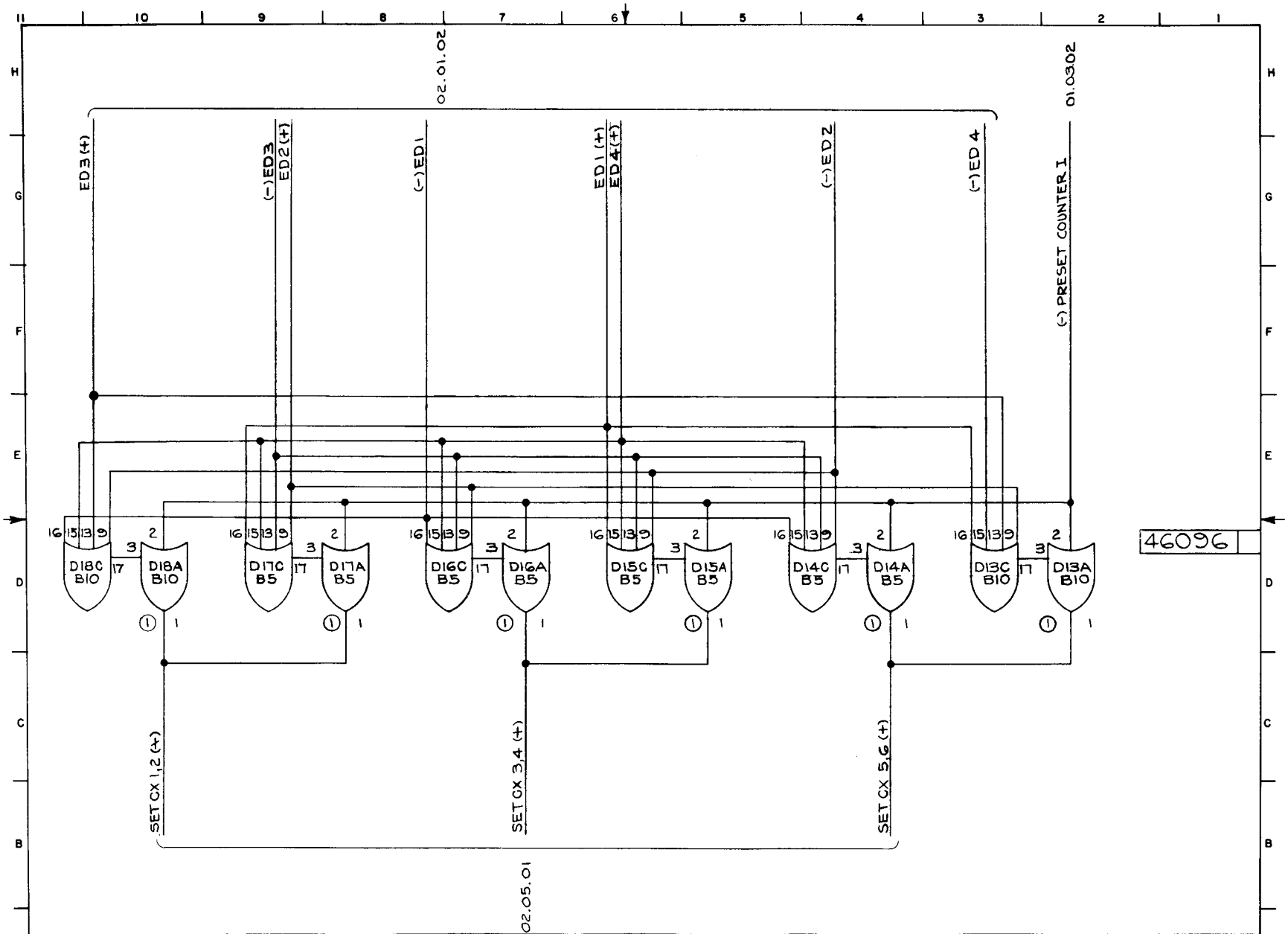
SYM	ECA NO	DATE	APPD	SYM	ECA NO	DATE	APPD	SYM	ECA NO	DATE	APPD	USED ON
C				G				K				
B				F				J				
A				E				I				
0	RELEASED			D				H				

SIGNATURES		DATE
DR R.M. Lawrence		12/23/64
CHK K. CHIN		9/1/65
APPD C. Flagg		9/1/65
APPD		9/1/65

ANELEX CORPORATION
BOSTON MASS U.S.A.

FUNCTION: WRITE CONTROL
CLIENT:

CODE NO 02.03.01
C 46095
SHEET OF



46096

SYM	ECA NO	DATE	APPD
O	RELEASED R Kraus 9-5-65		
A			
B			
C			

SYM	ECA NO	DATE	APPD
D			
E			
F			
G			

SYM	ECA NO	DATE	APPD
H			
I			
J			
K			

USED ON

SIGNATURES	DATE
DR E Peterson	1/28/65
CHK H. CHIN/JQ	4/1/65
APPD C Flagg	4/2/65
APPD	4/5/65

ANELEX CORPORATION
BOSTON MASS U.S.A.

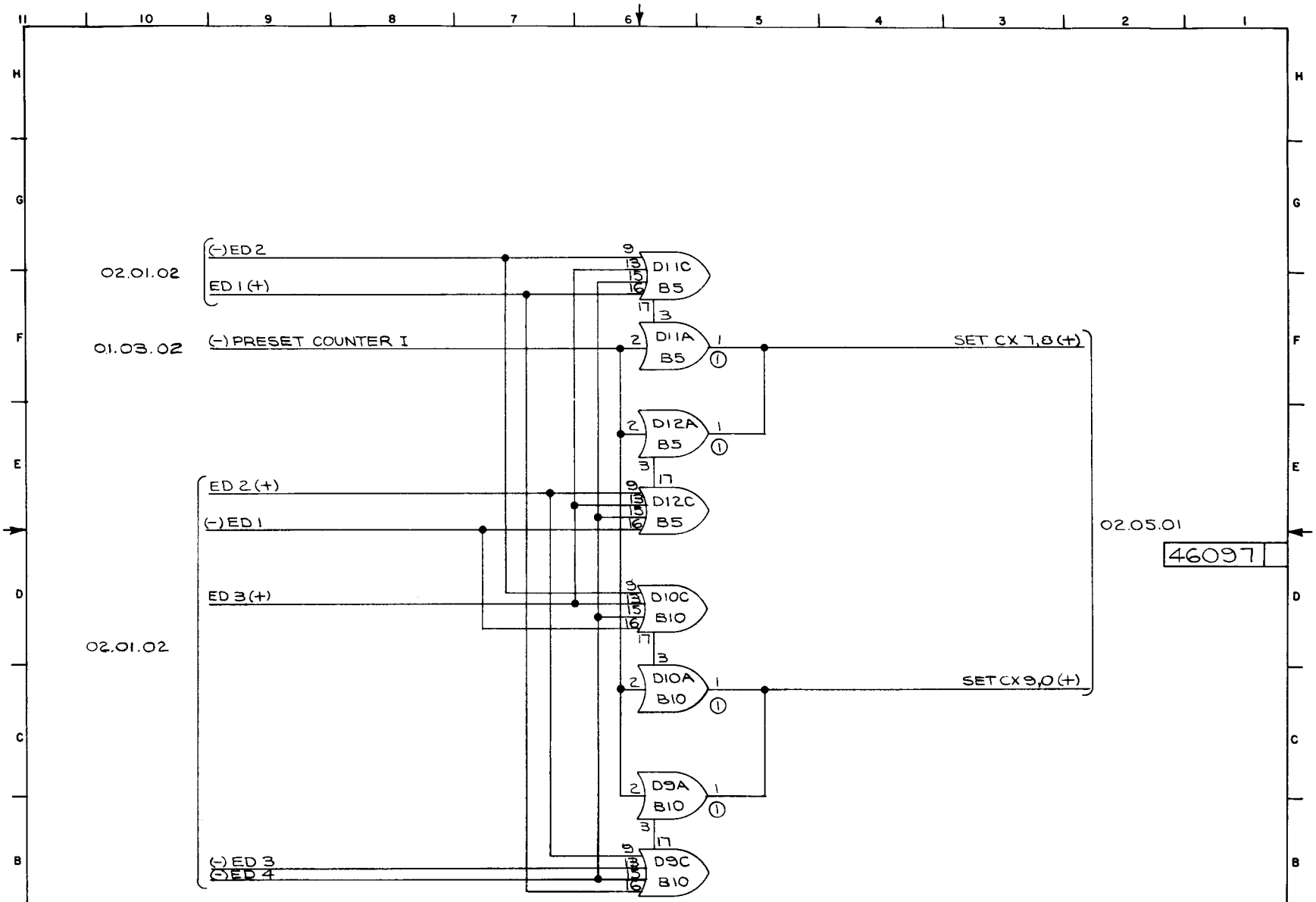
FUNCTION PRESET MASTER COUNTER UNITS (1-6)

CLIENT

CODE NO 02.04.01

C | DWG NO 46096

SHEET OF



SYM	ECA NO	DATE	APPD
O	RELEASED		

SYM	ECA NO	DATE	APPD

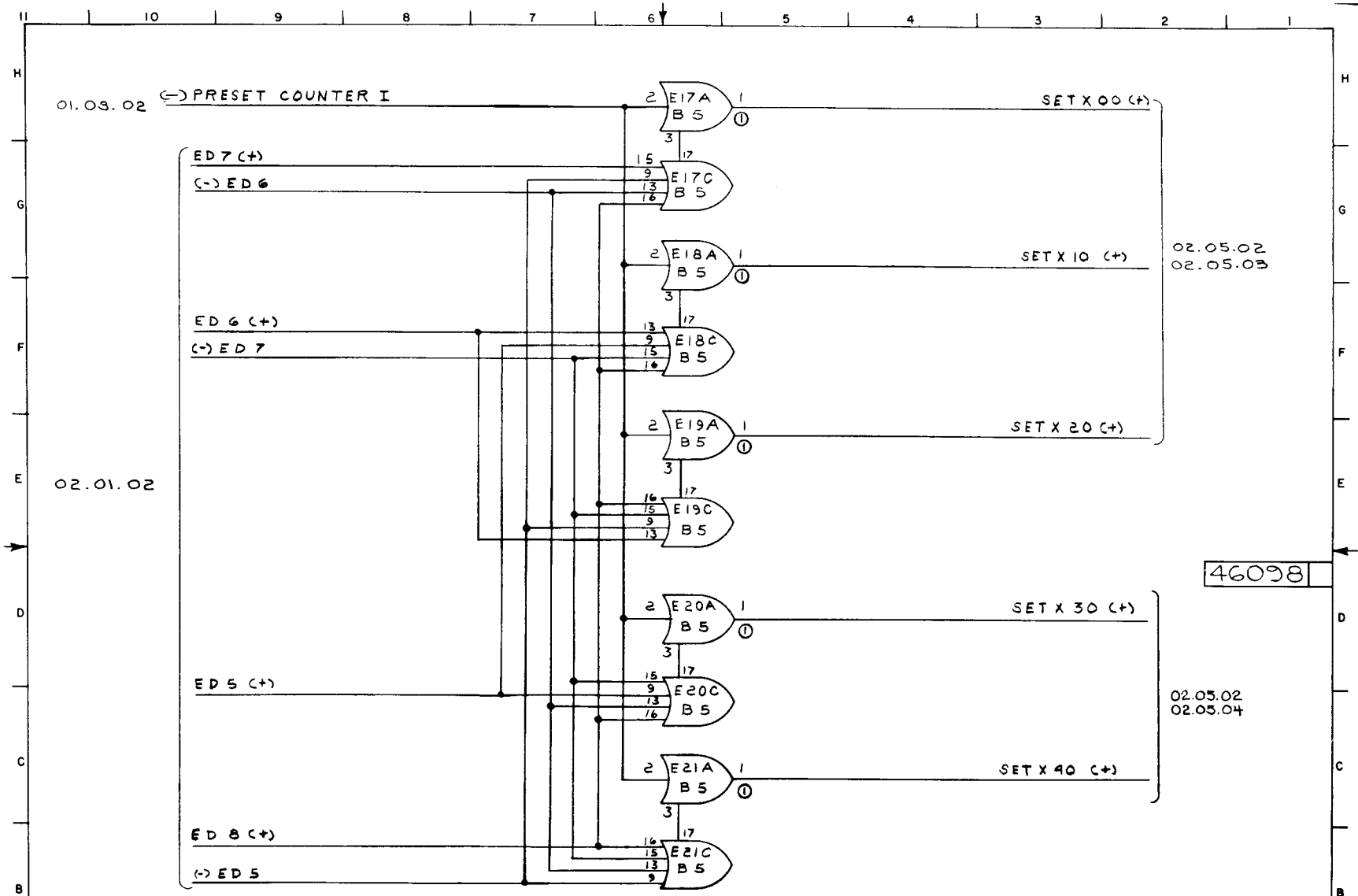
SYM	ECA NO	DATE	APPD	USED ON

	SIGNATURES	DATE
DR	E Peterson	
CHK	K. CHIN/JQ	4/2/65
APPD		4/2/65
APPD		4/2/65

ANELEX CORPORATION
BOSTON MASS U.S.A.

FUNCTION: PRESET MASTER COUNTER UNITS (7-0)
CLIENT:

CODE NO 02.04.02
C 46097
SHEET OF



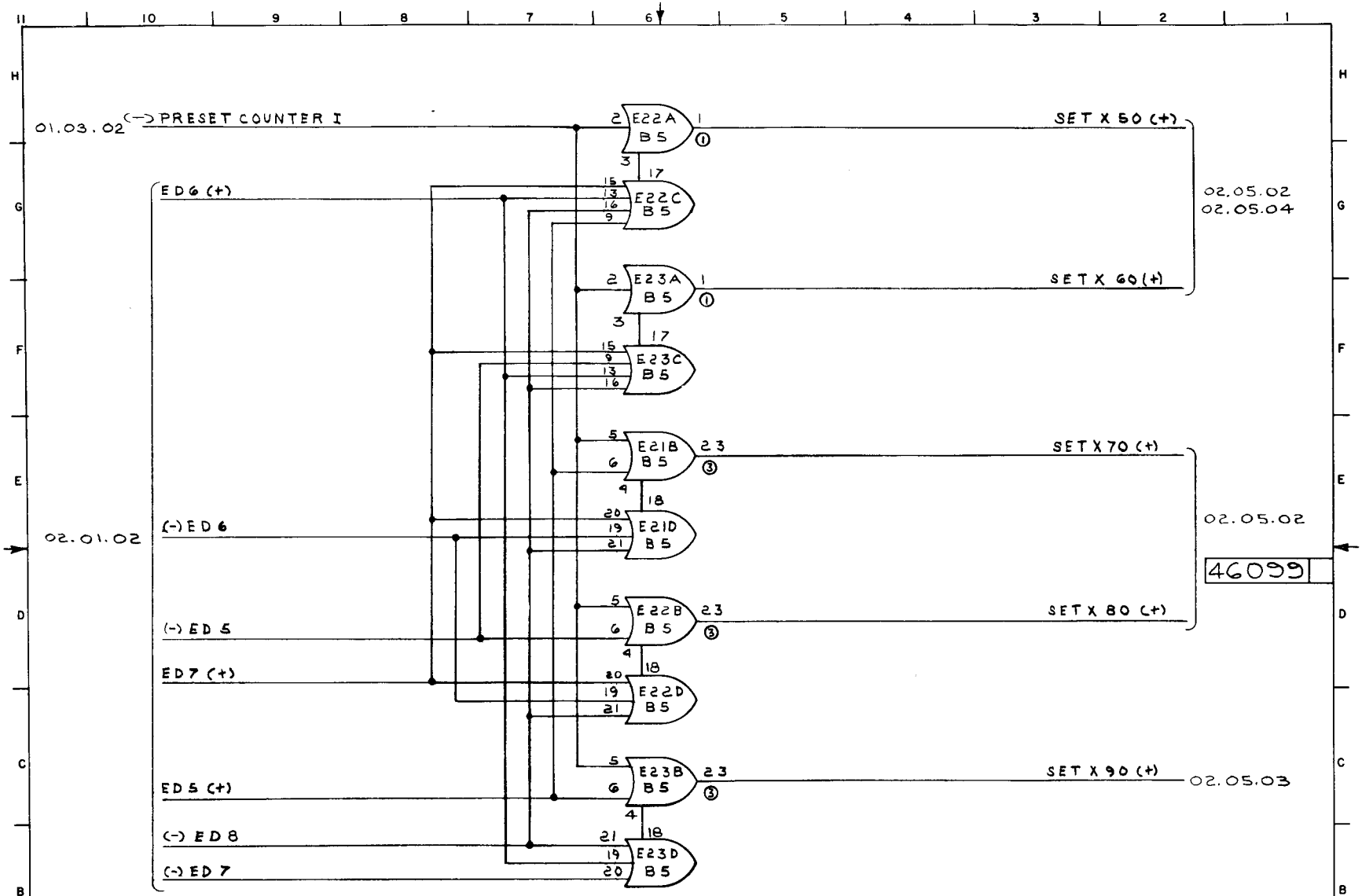
SYM	ECA NO	DATE	APPD	SYM	ECA NO	DATE	APPD	SYM	ECA NO	DATE	APPD	USED ON
C				G				K				
B				F				J				
A				E				I				
0	RELEASED 4-5-65			D				H				

SIGNATURES	DATE
DR TM Amerine	1/11/65
CHK K. CHIN	1/11/65
APPD C. Pappas	4-2-65
APPD [illegible]	4/7/65

ANELEX CORPORATION
BOSTON MASS U.S.A.

FUNCTION PRESET MASTER COUNTER X00 THRU X40
CLIENT

CODE NO 02.04.03
C 46098
SHEET OF



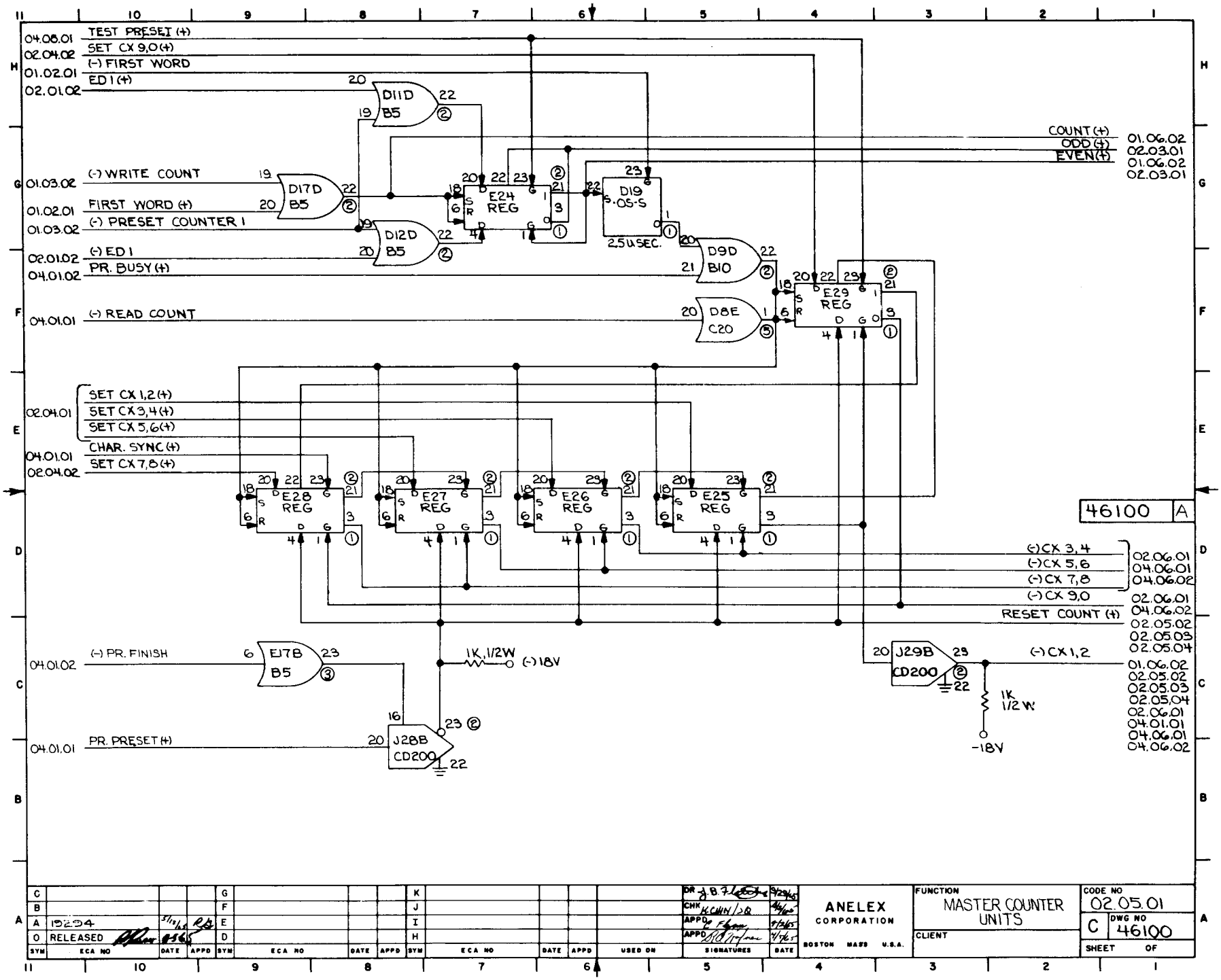
SYM	ECA NO	DATE	APPD	USED ON
O	RELEASED			

DR RH Kurowski 1/4/65
CHK H.CHIN/JO 4/6/65
APPD L Flynn 4/6/65
APPD [illegible] 4/7/65

ANELEX CORPORATION
BOSTON MASS U.S.A.

FUNCTION PRESET MASTER COUNTER X50 THRU X90
CLIENT

CODE NO 02.04.04
C 46099 A
SHEET OF



SYM	ECA NO	DATE	APPD
O	RELEASED	5/11/65	
A	19294		

SYM	ECA NO	DATE	APPD

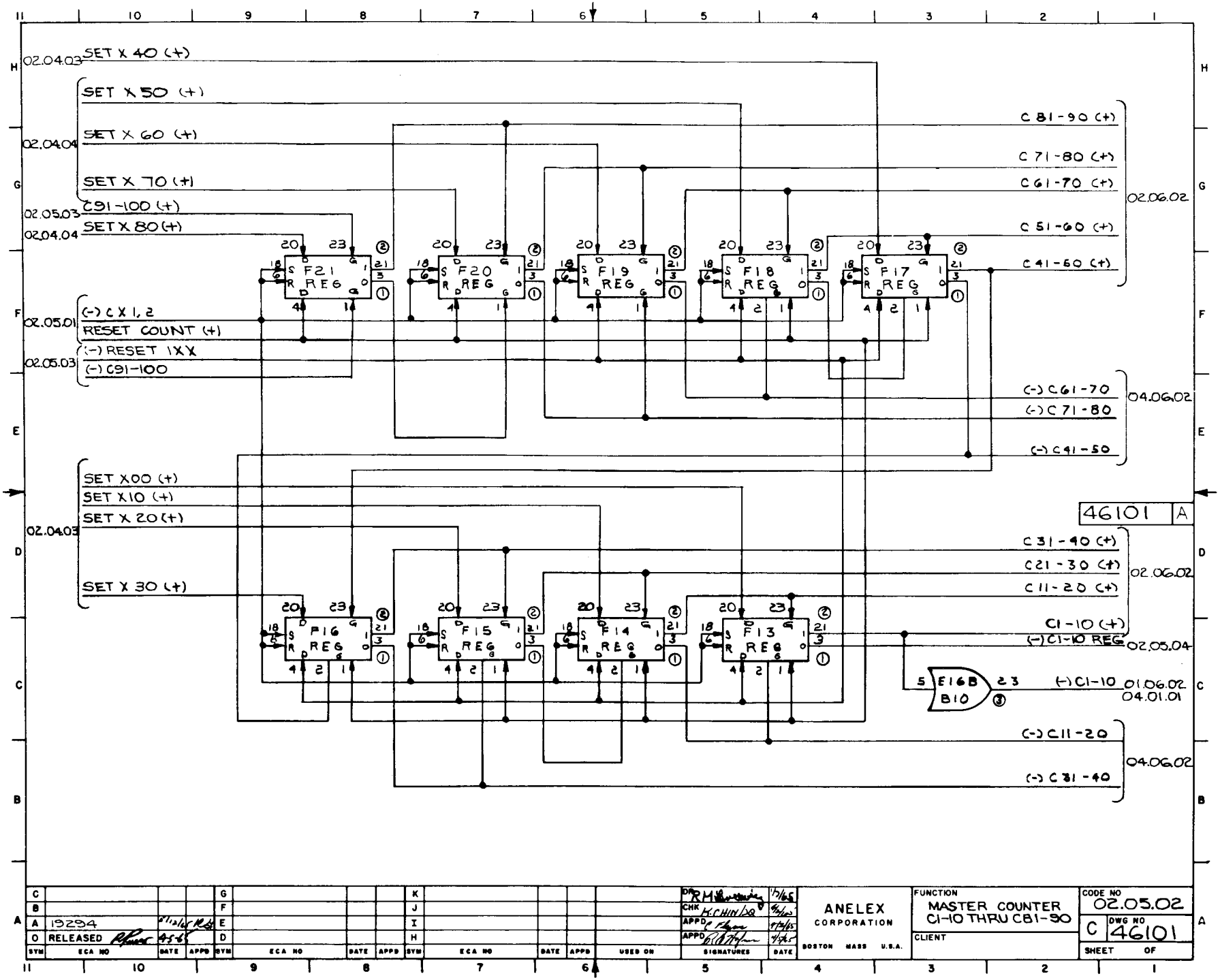
SYM	ECA NO	DATE	APPD	USED ON

	SIGNATURES	DATE
DR	J.B.T.	4/26/65
CHK	H.CHIN	4/26/65
APPD		4/26/65
APPD		4/26/65

ANELEX CORPORATION
BOSTON MASS U.S.A.

FUNCTION: MASTER COUNTER UNITS
CLIENT:

CODE NO: 02.05.01
C | DWG NO: 46100
SHEET OF



46101 A

SYM	ECA NO	DATE	APPD
O	RELEASED	4-5-65	
A	19294	3/11/65	

SYM	ECA NO	DATE	APPD

SYM	ECA NO	DATE	APPD

USED ON	SIGNATURES	DATE
	DR RH	1/26/65
	CHK H.CHIN/SQ	4/5/65
	APPD	4/14/65
	APPD	4/5/65

ANELEX CORPORATION
BOSTON MASS U.S.A.

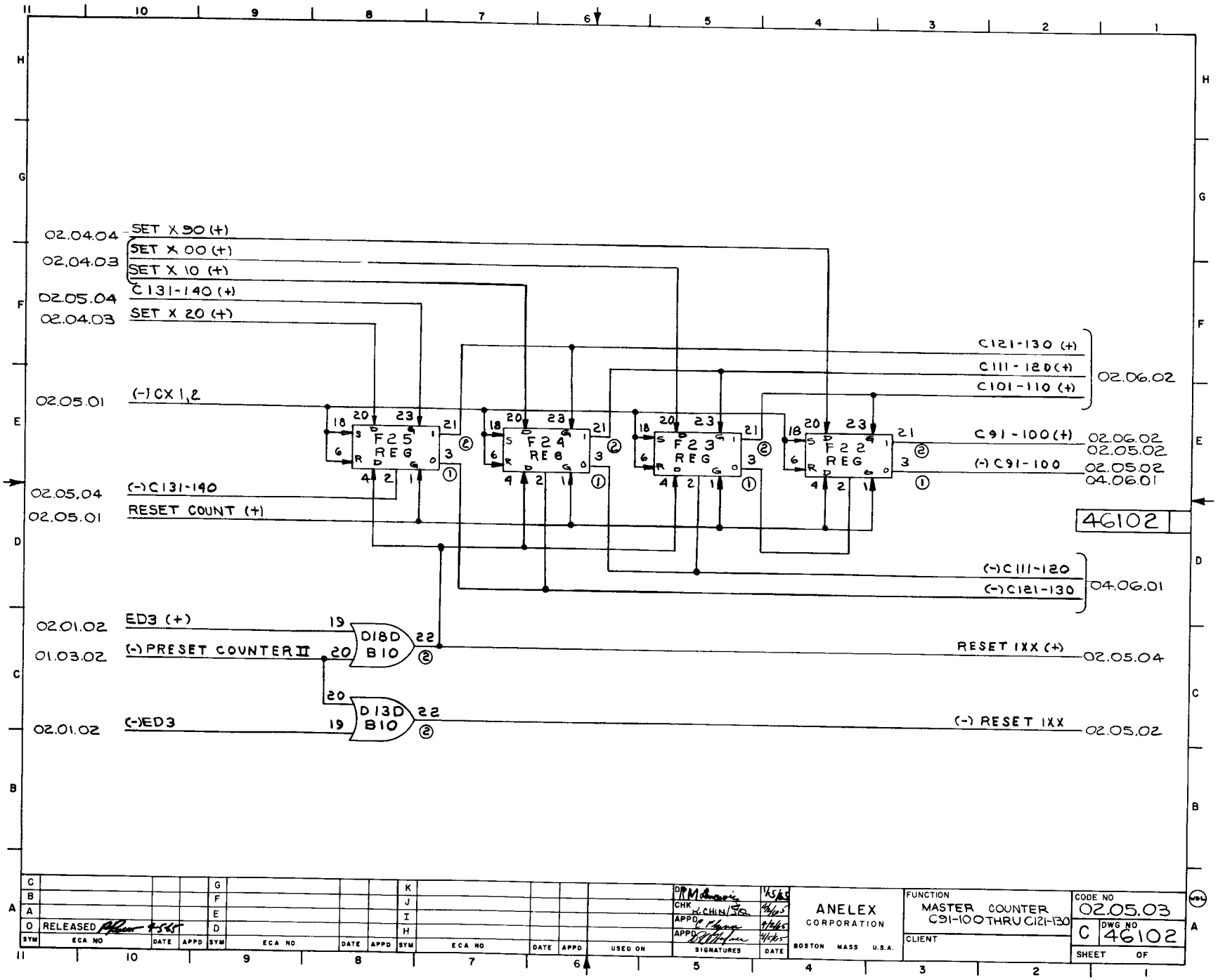
FUNCTION: MASTER COUNTER C1-10 THRU C81-90

CLIENT

CODE NO 02.05.02

C 46101

SHEET OF



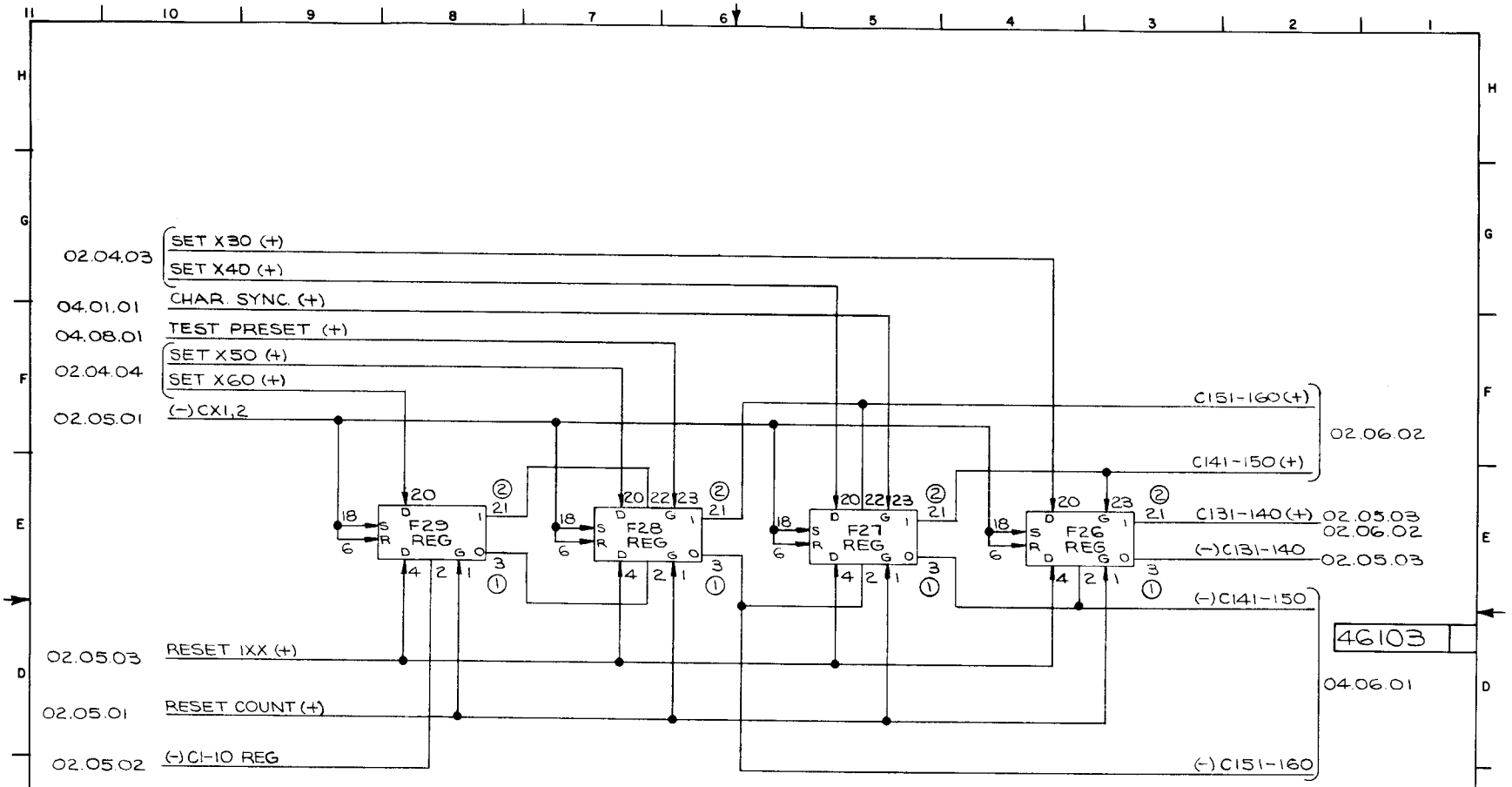
SYM	ECA NO	DATE	APPD	USED ON
O	RELEASED	4-5-65		

DRN	
CHK	H. CHIN
APPD	
APPD	

ANELEX CORPORATION
BOSTON MASS U.S.A.

FUNCTION: MASTER COUNTER C91-100 THRU C121-130
CLIENT:

CODE NO: 02.05.03
SIZE: C
DWG NO: 46102
SHEET OF



SYM	ECA NO	DATE	APPD
O	RELEASED	4-5-65	
A			
B			
C			
D			
E			
F			
G			
H			
I			
J			
K			

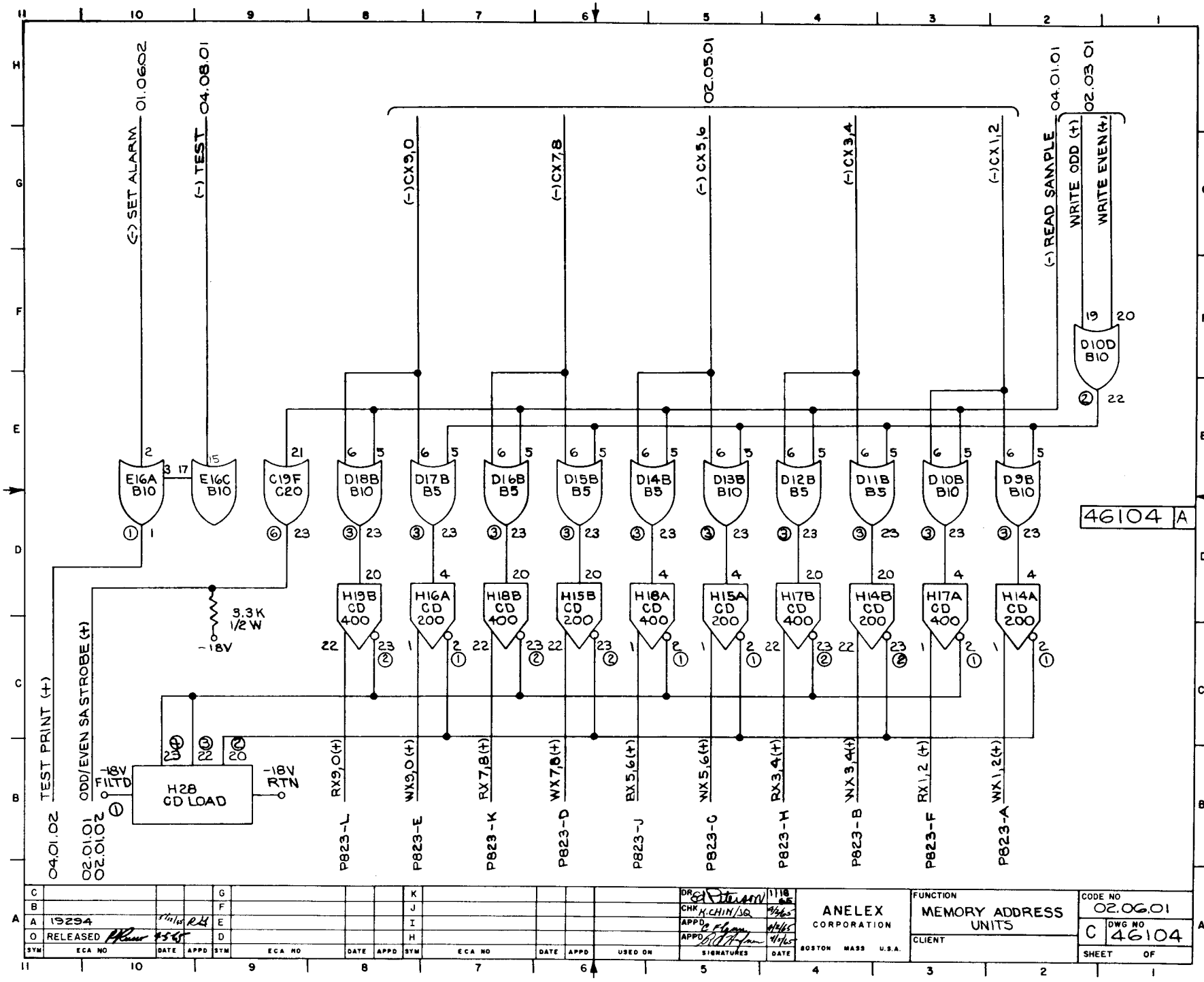
USED ON

	SIGNATURES	DATE
DR	E. Peterson	3/25/65
CHK	H. CHIN / SA	4/1/65
APPD	C. F. Gray	4/1/65
APPD	[signature]	4/1/65

ANELEX CORPORATION
BOSTON MASS U.S.A.

FUNCTION: MASTER COUNTER C131-140 THRU C151-160
CLIENT:

CODE NO: 02.05.04
C 46103
SHEET OF



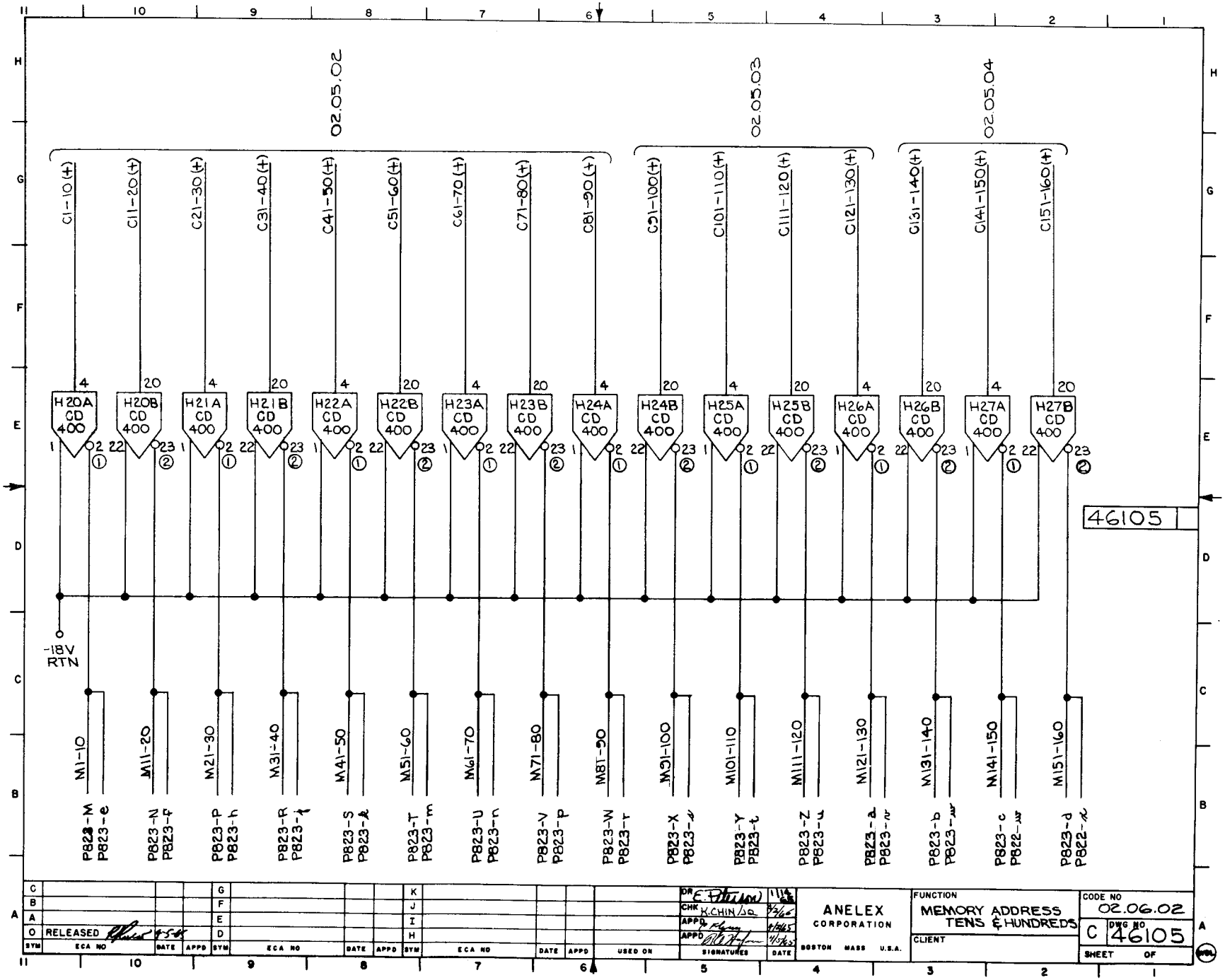
SYM	ECA NO	DATE	APPD
O	RELEASED		
A	19294		

USED ON	SIGNATURES	DATE
	DR	
	CHK K.CHIN/SQ	
	APPD	
	APPD	

ANELEX CORPORATION
BOSTON MASS U.S.A.

FUNCTION: MEMORY ADDRESS UNITS
CLIENT:

CODE NO: 02.06.01
DWG NO: C 46104
SHEET OF



46105

SYM	ECA NO	DATE	APPD
O	RELEASED	9-5-68	
A			
B			
C			

SYM	ECA NO	DATE	APPD
D			
E			
F			
G			

SYM	ECA NO	DATE	APPD
H			
I			
J			
K			

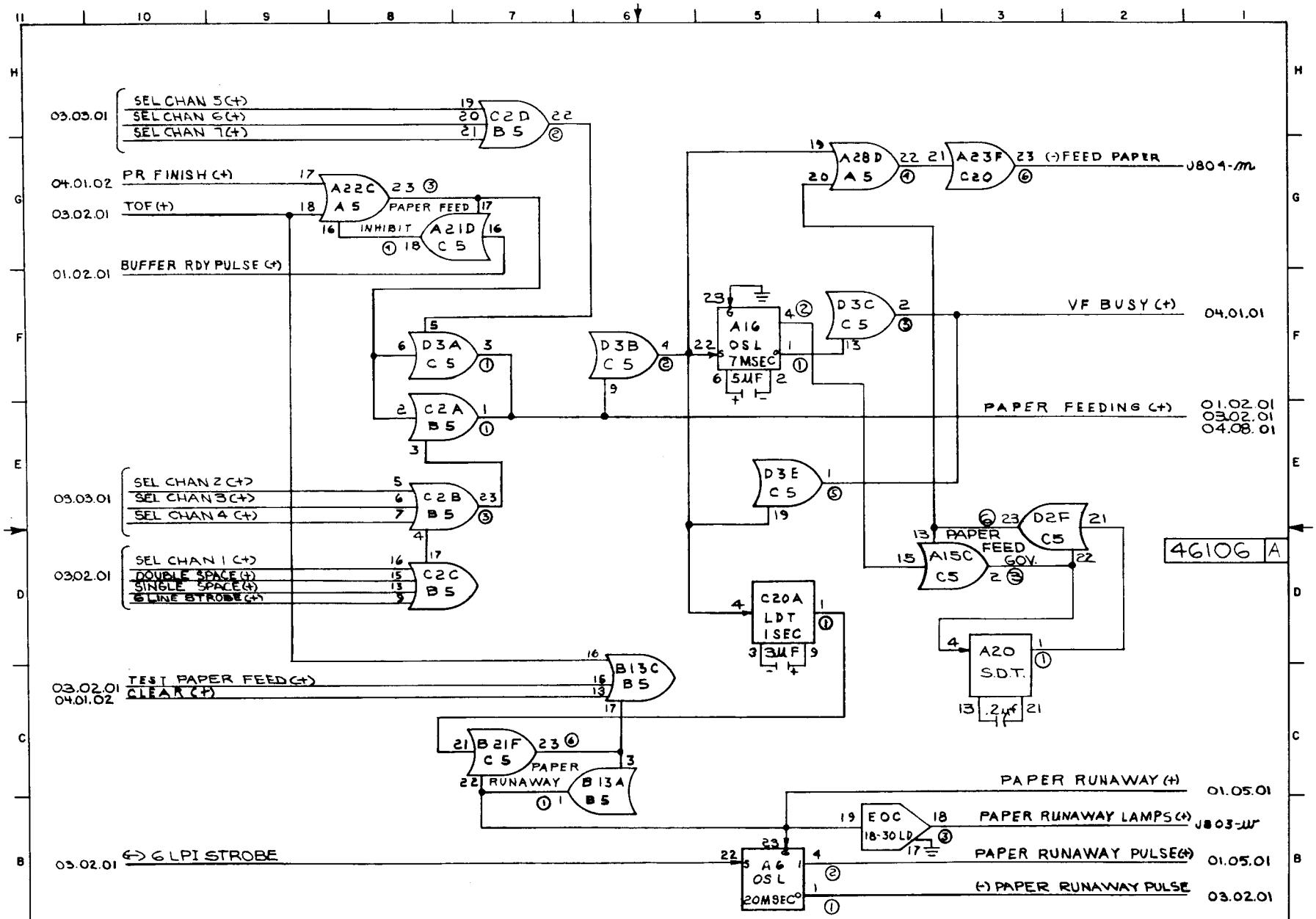
USED ON

SIGNATURES		
DR E. Peterson		11/5
CHK K. CHIN		9/5/68
APPD		9/6/68
APPD		11/15/68

ANELEX CORPORATION
BOSTON MASS U.S.A.

FUNCTION: MEMORY ADDRESS TENS & HUNDREDS
CLIENT

CODE NO 02.06.02
DWG NO C 46105
SHEET OF



SYM	ECA NO	DATE	APPD
C			
B			
A	19294	11/10/65	RM
O	RELEASED	4-1-65	

SYM	ECA NO	DATE	APPD
G			
F			
E			
D			

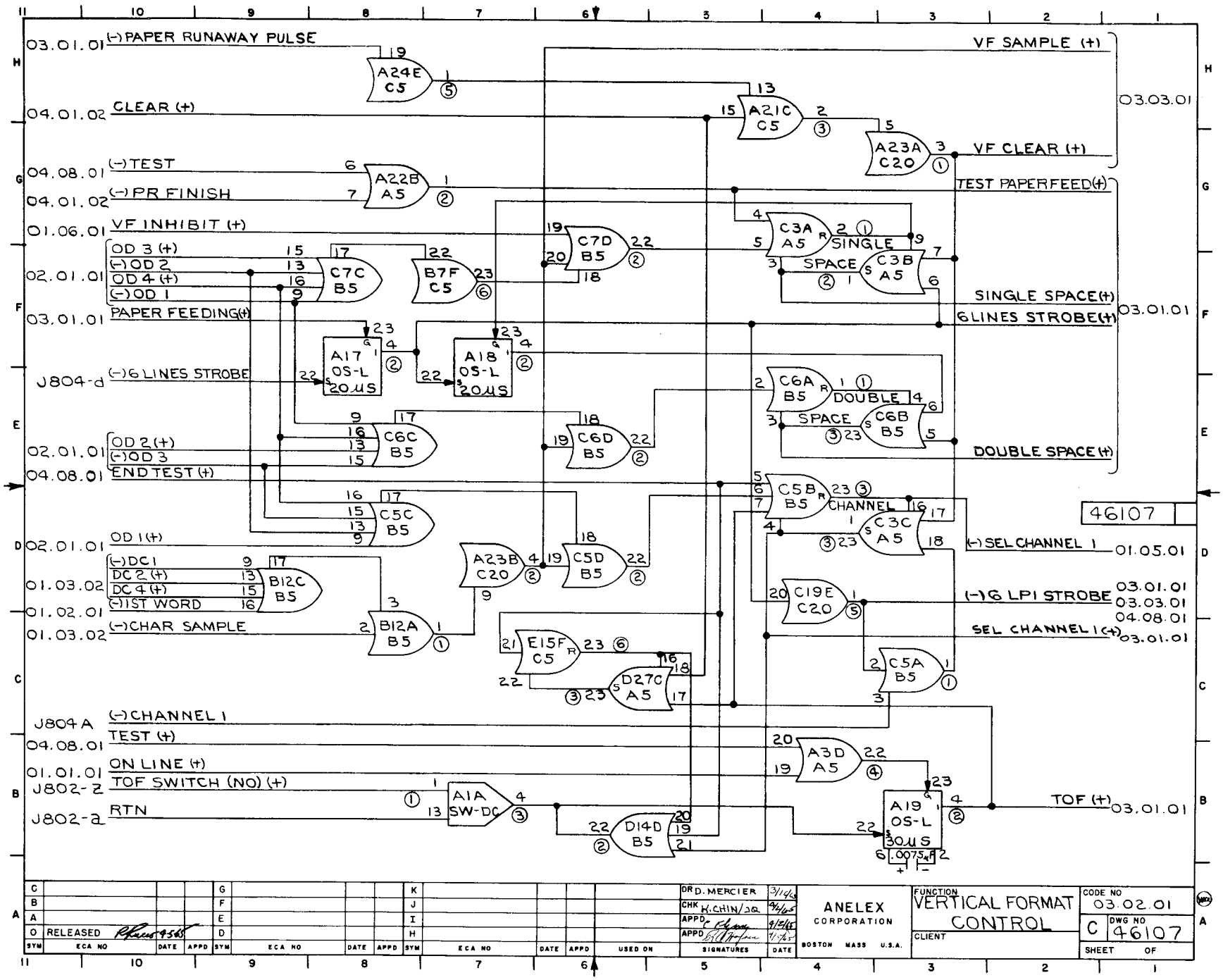
SYM	ECA NO	DATE	APPD	USED ON
K				
J				
I				
H				

SIGNATURES	DATE
DR R Mannarino	11/8/65
CHK A CHIN / J.R.	11/16/65
APPD C Flynn	4/2/65
APPD D.C. Hayman	4/5/65

ANELEX CORPORATION
BOSTON MASS U.S.A.

FUNCTION: PAPER FEED CONTROL
CLIENT:

CODE NO: 03.01.01
C 46106
SHEET OF



SYM	ECA NO	DATE	APPD	SYM	ECA NO	DATE	APPD	SYM	ECA NO	DATE	APPD	USED ON
O	RELEASED											

SIGNATURES		DATE
DR	D. MERCIER	3/1/65
CHK	K. CHIN/JG	4/1/65
APPD		4/12/65
APPD		7/1/65

ANELEX CORPORATION BOSTON MASS U.S.A.

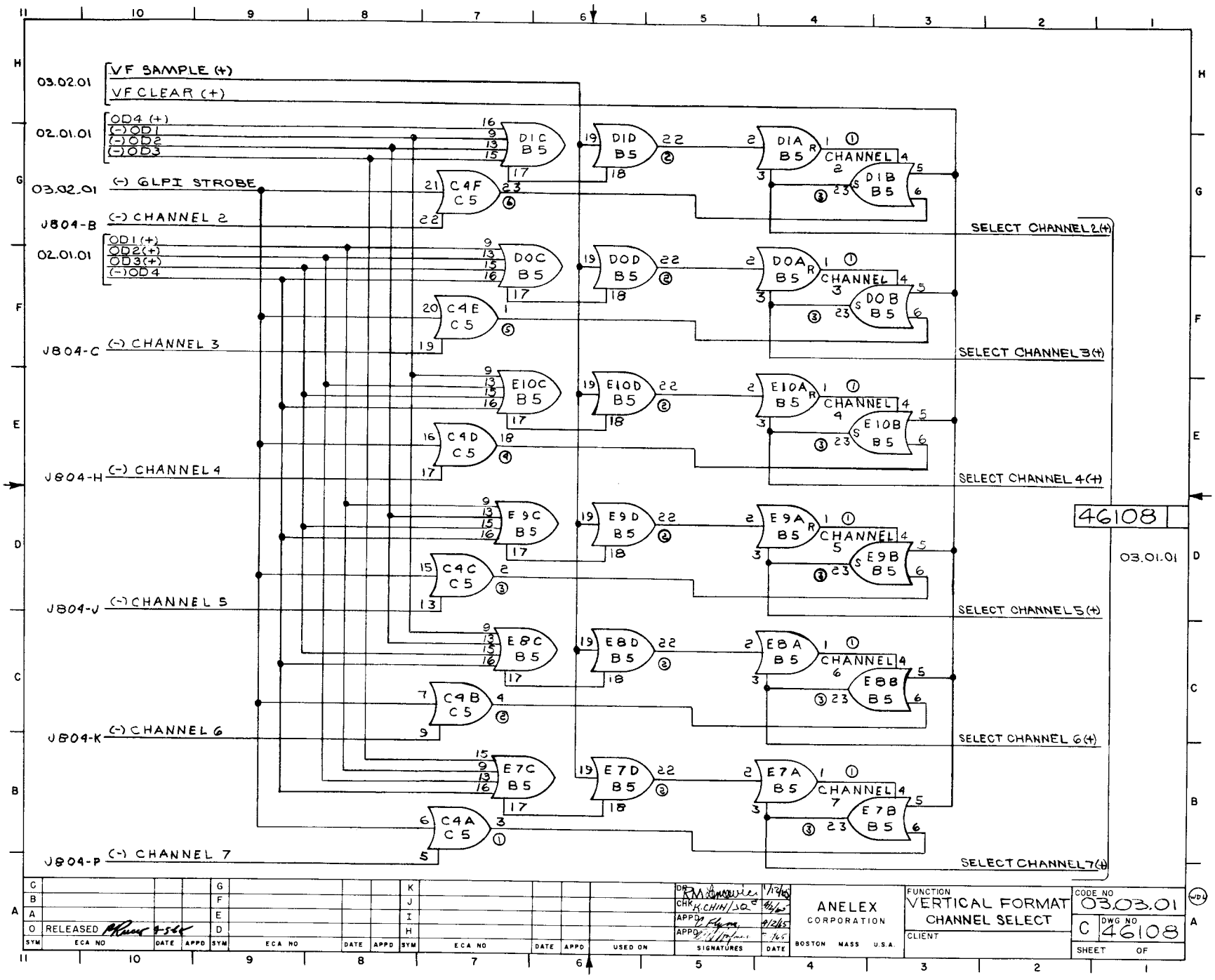
FUNCTION: VERTICAL FORMAT CONTROL

CLIENT

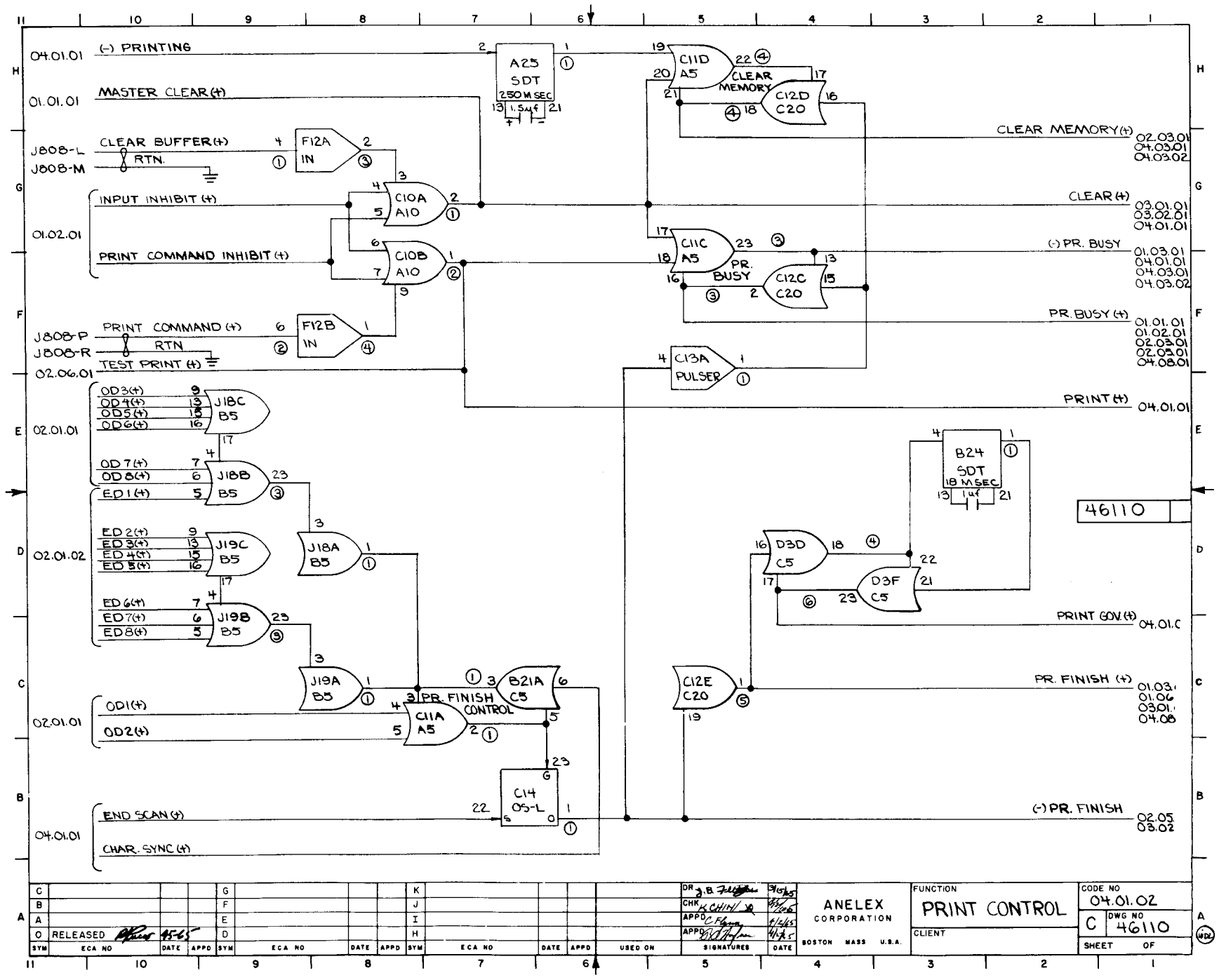
CODE NO 03.02.01

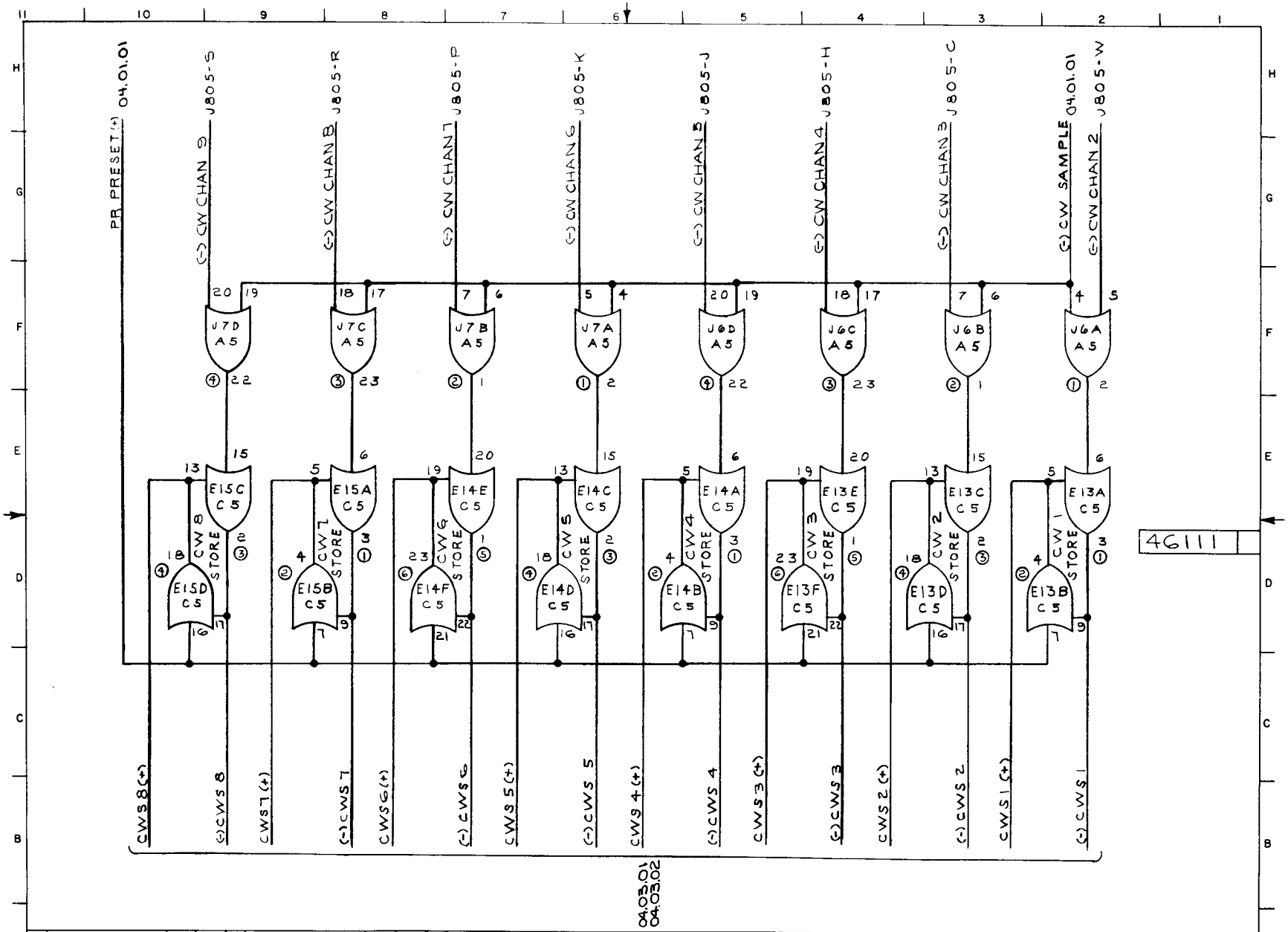
C 46107

SHEET OF


03.02.01
VF SAMPLE (+)
VF CLEAR (+)
02.01.01
OD4 (+)
(-) OD1
(-) OD2
(-) OD3
03.02.01
(-) GLPI STROBE
J804-B
(-) CHANNEL 2
02.01.01
OD1 (+)
OD2 (+)
OD3 (+)
(-) OD4
J804-C
(-) CHANNEL 3
J804-H
(-) CHANNEL 4
J804-J
(-) CHANNEL 5
J804-K
(-) CHANNEL 6
J804-P
(-) CHANNEL 7
D1C B5
D1D B5
D1A B5
CHANNEL 2
D1B B5
C4F C5
D0C B5
D0D B5
D0A B5
CHANNEL 3
D0B B5
C4E C5
E10C B5
E10D B5
E10A B5
CHANNEL 4
E10B B5
C4D C5
E9C B5
E9D B5
E9A B5
CHANNEL 5
E9B B5
C4C C5
E8C B5
E8D B5
E8A B5
CHANNEL 6
E8B B5
C4B C5
E7C B5
E7D B5
E7A B5
CHANNEL 7
E7B B5
C4A C5
SELECT CHANNEL 2 (+)
SELECT CHANNEL 3 (+)
SELECT CHANNEL 4 (+)
SELECT CHANNEL 5 (+)
SELECT CHANNEL 6 (+)
SELECT CHANNEL 7 (+)
46108
03.01.01
RELEASED
DR R.M.
CHK K.CHIN/SQE
APPD
APPD
SIGNATURES
DATE
ANELEX
CORPORATION
BOSTON MASS U.S.A.
FUNCTION
VERTICAL FORMAT
CHANNEL SELECT
CLIENT
CODE NO 03.03.01
DWG NO C 46108
SHEET OF
SYM ECA NO DATE APPD
USED ON

Zeichnung C-46109 fehlt im Original, stattdessen ist C-46110 doppelt


04.01.01 (-) PRINTING
A25 SDT 250 M SEC
C11D A5 CLEAR MEMORY
C12D C20
01.01.01 MASTER CLEAR (+)
J808-L CLEAR BUFFER (+)
J808-M RTN.
F12A IN
CLEAR MEMORY (+) 02.03.01 04.03.01 04.03.02
01.02.01 INPUT INHIBIT (+)
PRINT COMMAND INHIBIT (+)
C10A A10
C10B A10
C11C A5 PR. BUSY
C12C C20
CLEAR (+) 03.01.01 03.02.01 04.01.01
(-) PR. BUSY 01.03.01 04.01.01 04.03.01 04.03.02
J808-P PRINT COMMAND (+)
J808-R RTN
F12B IN
02.06.01 TEST PRINT (+)
C13A PULSER
PR. BUSY (+) 01.01.01 01.02.01 02.03.01 02.05.01 04.08.01
PRINT (+) 04.01.01
02.01.01 OD3(+) OD4(+) OD5(+) OD6(+) J18C B5
OD7(+) OD8(+) J18B B5
ED1(+) J18A B5
B24 SDT 18 M SEC
46110
02.01.02 ED2(+) ED3(+) ED4(+) ED5(+) J19C B5
ED6(+) ED7(+) ED8(+) J19B B5
D3D C5
D3F C5
PRINT GOV. (+) 04.01.C
J19A B5
B21A C5
PR. FINISH CONTROL
C12E C20
PR. FINISH (+) 01.03 01.06 03.01 04.08
02.01.01 OD1(+) OD2(+) C11A A5
C14 05-L
04.01.01 END SCAN (+) CHAR. SYNC (+)
(-) PR. FINISH 02.05 03.02
RELEASED 15-65
DR J.B. 3/16/65
CHK K.CHIN 4/1/65
APPD C.F. 4/1/65
APPD 4/1/65
ANELEX CORPORATION BOSTON MASS U.S.A.
FUNCTION PRINT CONTROL
CLIENT
CODE NO 04.01.02
DWG NO 46110
SHEET OF



SYM	ECA NO	DATE	APPD	SYM	ECA NO	DATE	APPD	SYM	ECA NO	DATE	APPD	USED ON	SIGNATURES	DATE
C				G				K					DR. M. Lancewicz	3/30/65
B				F				J					CHK K. CHIN/JG	4/1/65
A				E				I					APPD J. Flynn	4/2/65
O	RELEASED 4565			D				H					APPD	4/5/65

ANELEX CORPORATION BOSTON MASS U.S.A.

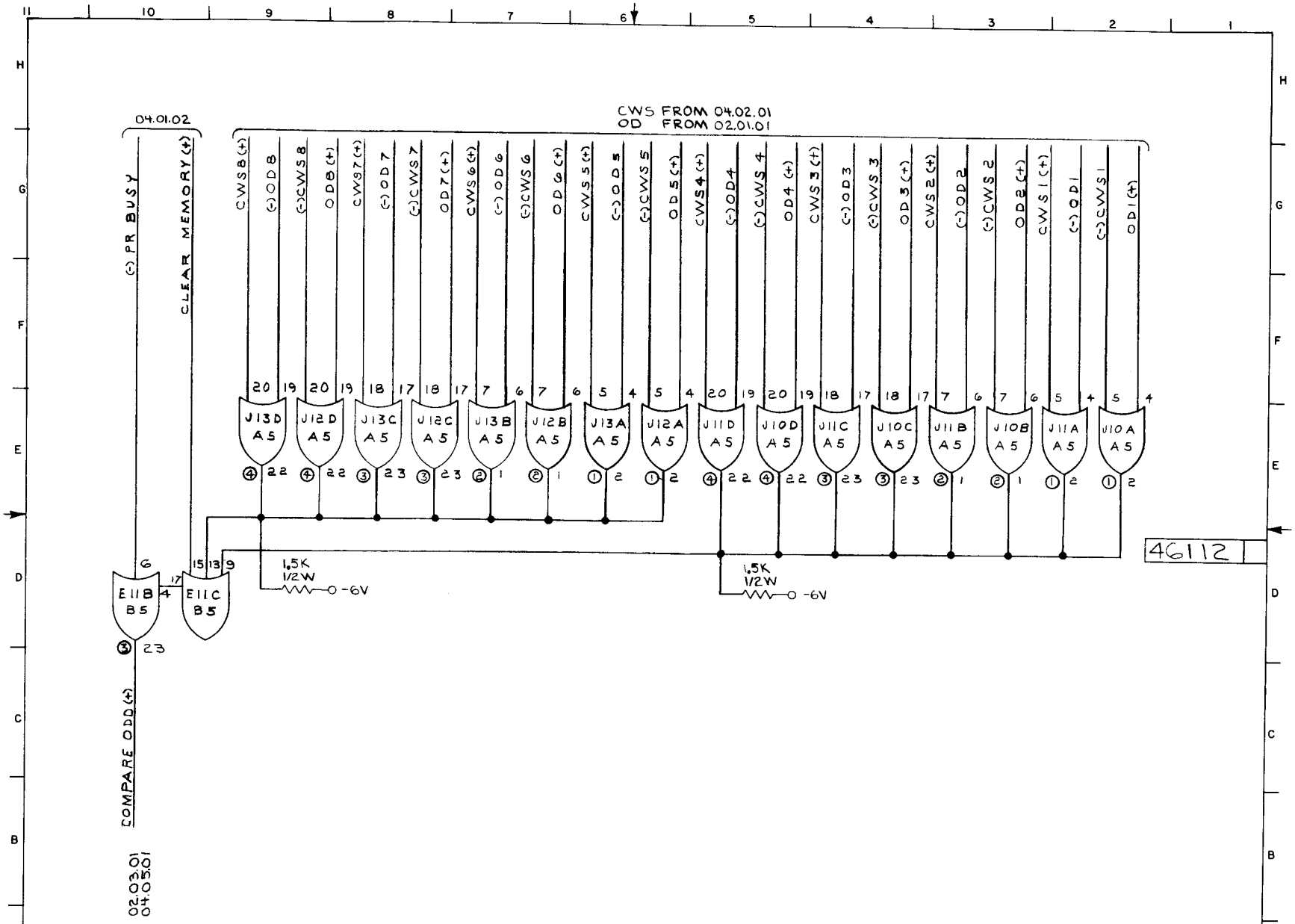
FUNCTION: CW STORAGE

CLIENT:

CODE NO 04.02.01

DWG NO C 46111

SHEET OF

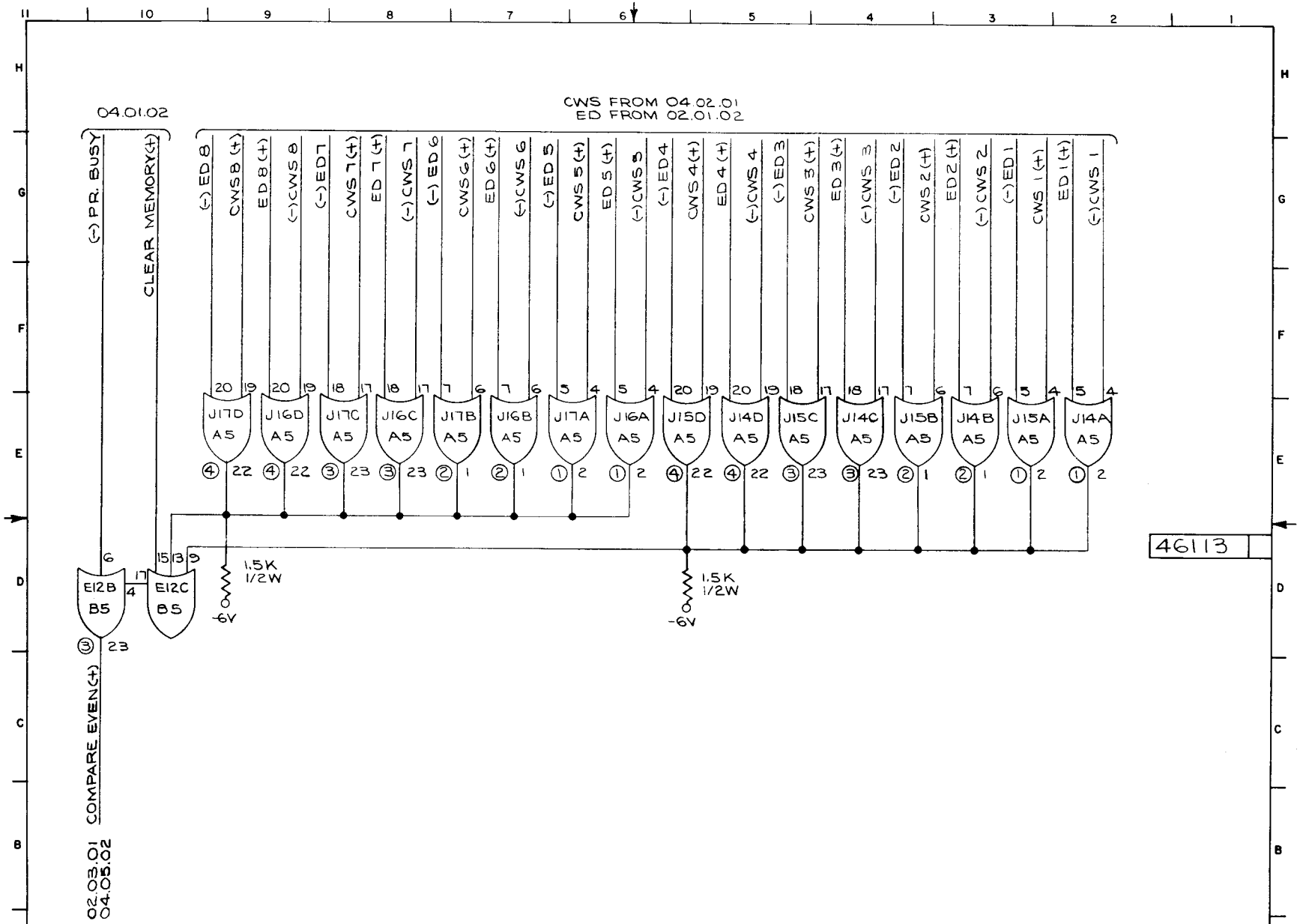


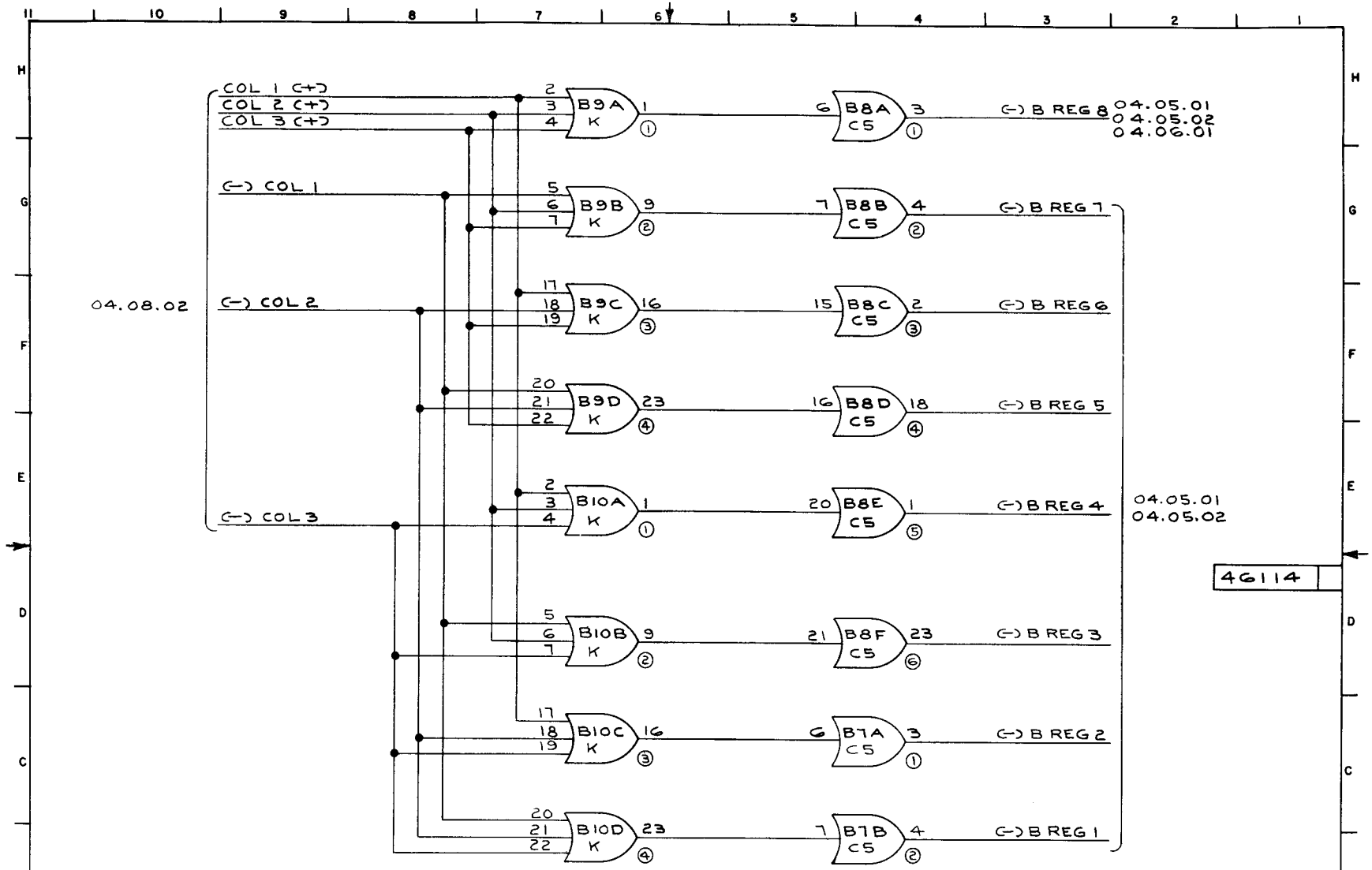
SYM	ECA NO	DATE	APPD	SYM	ECA NO	DATE	APPD	SYM	ECA NO	DATE	APPD	USED ON	SIGNATURES	DATE
C				G				K					DR R.M. Moncevicz	4/3/65
B				F				J					CHK K.CHIN/SG	4/3/65
A				E				I					APPD D.F. Lynn	4/3/65
0	RELEASED			D				H					APPD	

ANELEX CORPORATION
BOSTON MASS U.S.A.

FUNCTION: COMPARE ODD
CLIENT:

CODE NO: 04.03.01
DWG NO: C 46112
SHEET OF


04.01.02
(-) PR. BUSY
CLEAR MEMORY(+)
CWS FROM 04.02.01
ED FROM 02.01.02
(-) ED 8
CWS 8 (+)
ED 8 (+)
(-) CWS 8
(-) ED 7
CWS 7 (+)
ED 7 (+)
(-) CWS 7
(-) ED 6
CWS 6 (+)
ED 6 (+)
(-) CWS 6
(-) ED 5
CWS 5 (+)
ED 5 (+)
(-) CWS 5
(-) ED 4
CWS 4 (+)
ED 4 (+)
(-) CWS 4
(-) ED 3
CWS 3 (+)
ED 3 (+)
(-) CWS 3
(-) ED 2
CWS 2 (+)
ED 2 (+)
(-) CWS 2
(-) ED 1
CWS 1 (+)
ED 1 (+)
(-) CWS 1
J17D A5
J16D A5
J17C A5
J16C A5
J17B A5
J16B A5
J17A A5
J16A A5
J15D A5
J14D A5
J15C A5
J14C A5
J15B A5
J14B A5
J15A A5
J14A A5
E12B B5
E12C B5
1.5K 1/2W
-6V
1.5K 1/2W
-6V
COMPARE EVEN(+)
02.03.01
04.05.02
46113
RELEASED
4565
E Peterson
K CHIM/SA
ANELEX CORPORATION
BOSTON MASS U.S.A.
FUNCTION
COMPARE EVEN
CLIENT
CODE NO 04.03.02
DWG NO C 46113
SHEET OF



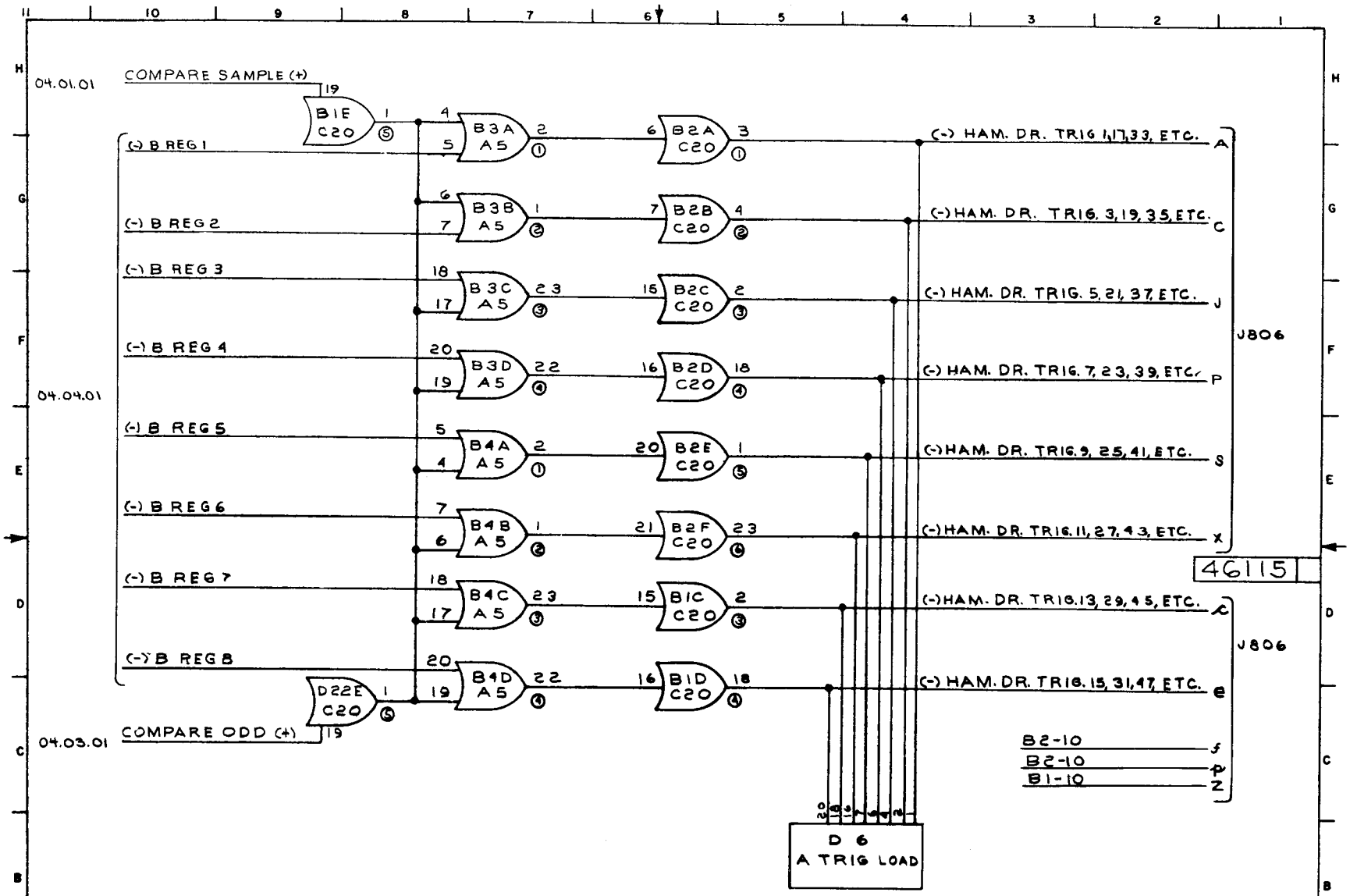
SYM	ECA NO	DATE	APPD	SYM	ECA NO	DATE	APPD	SYM	ECA NO	DATE	APPD	USED ON
C				G				K				
B				F				J				
A				E				I				
0	RELEASED 4565			D				H				

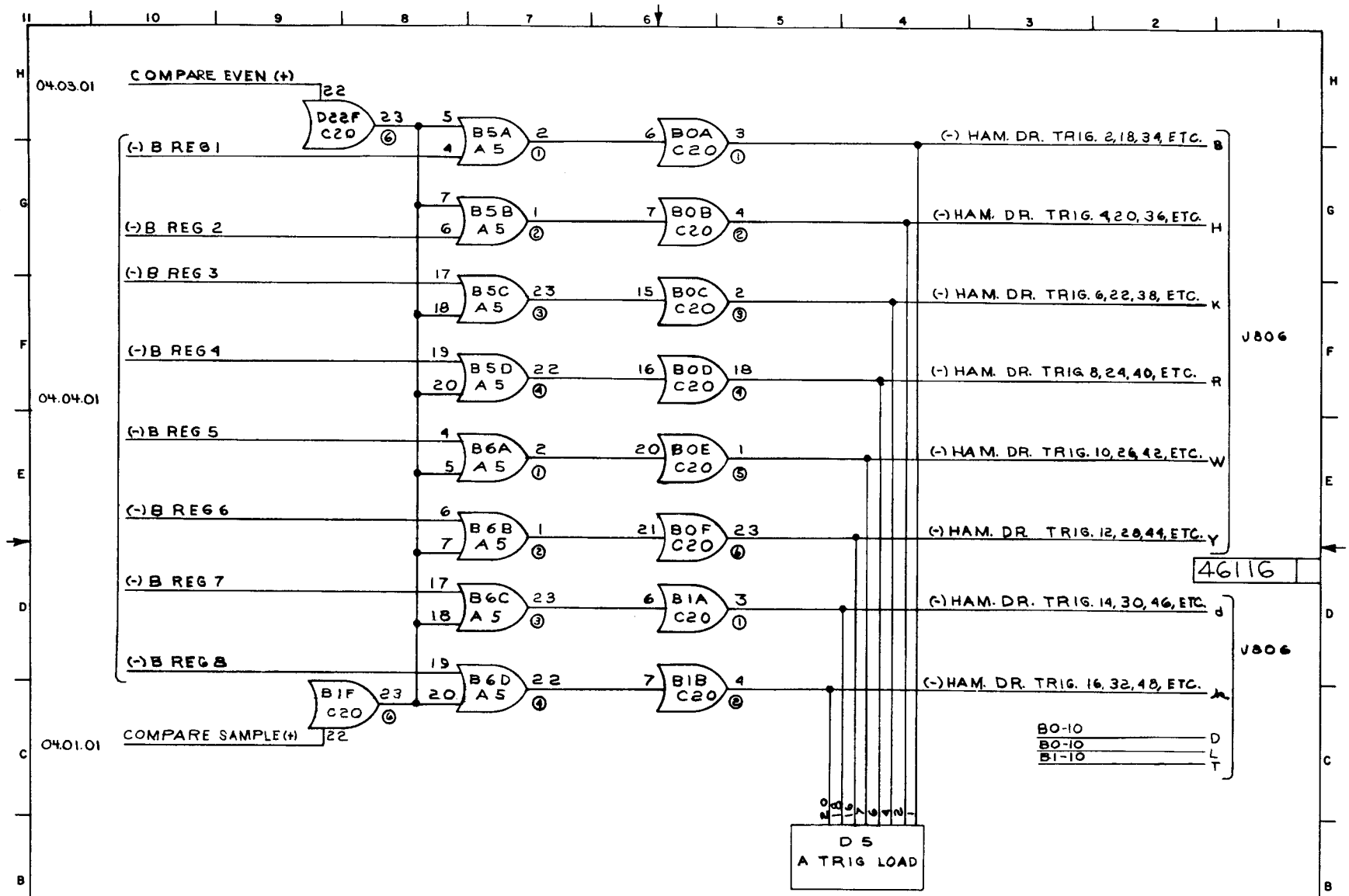
	SIGNATURES	DATE
DR	R. Bunn	3-26-65
CHK	H. CHIN/JA	4/2/65
APPD		4/2/65
APPD		4/2/65

ANELEX
CORPORATION
BOSTON MASS U.S.A.

FUNCTION: B REGISTER
CLIENT:

CODE NO: 04.04.01
SIZE: C
DWG NO: 46114
SHEET OF


04.01.01
COMPARE SAMPLE (+)
B1E C20
(-) B REG 1
B3A A5
B2A C20
(-) HAM. DR. TRIG 1, 17, 33, ETC.
A
(-) B REG 2
B3B A5
B2B C20
(-) HAM. DR. TRIG. 3, 19, 35, ETC.
C
(-) B REG 3
B3C A5
B2C C20
(-) HAM. DR. TRIG. 5, 21, 37, ETC.
J
J806
(-) B REG 4
B3D A5
B2D C20
(-) HAM. DR. TRIG. 7, 23, 39, ETC.
P
04.04.01
(-) B REG 5
B4A A5
B2E C20
(-) HAM. DR. TRIG. 9, 25, 41, ETC.
S
(-) B REG 6
B4B A5
B2F C20
(-) HAM. DR. TRIG. 11, 27, 43, ETC.
X
46115
(-) B REG 7
B4C A5
B1C C20
(-) HAM. DR. TRIG. 13, 29, 45, ETC.
(-) B REG 8
B4D A5
B1D C20
(-) HAM. DR. TRIG. 15, 31, 47, ETC.
e
D22E C20
J806
B2-10
B2-10
B1-10
04.03.01
COMPARE ODD (+)
D 6
A TRIG LOAD
RELEASED
ANELEX
CORPORATION
BOSTON MASS U.S.A.
FUNCTION
ENABLE ODD
COLUMN GATE
CLIENT
CODE NO
04.05.01
DWG NO
C 46115
SHEET OF



SYM	ECA NO	DATE	APPD	SYM	ECA NO	DATE	APPD	SYM	ECA NO	DATE	APPD	USED ON
C				G				K				
B				F				J				
A				E				I				
O	RELEASED	4561		D				H				

SIGNATURES	DATE
DR M. Ancewicz	1/25/65
CHK K.Chin/1R	3/2/65
APPD C. Flynn	4/2/65
APPD	4/5/65

ANELEX
CORPORATION
BOSTON MASS U.S.A.

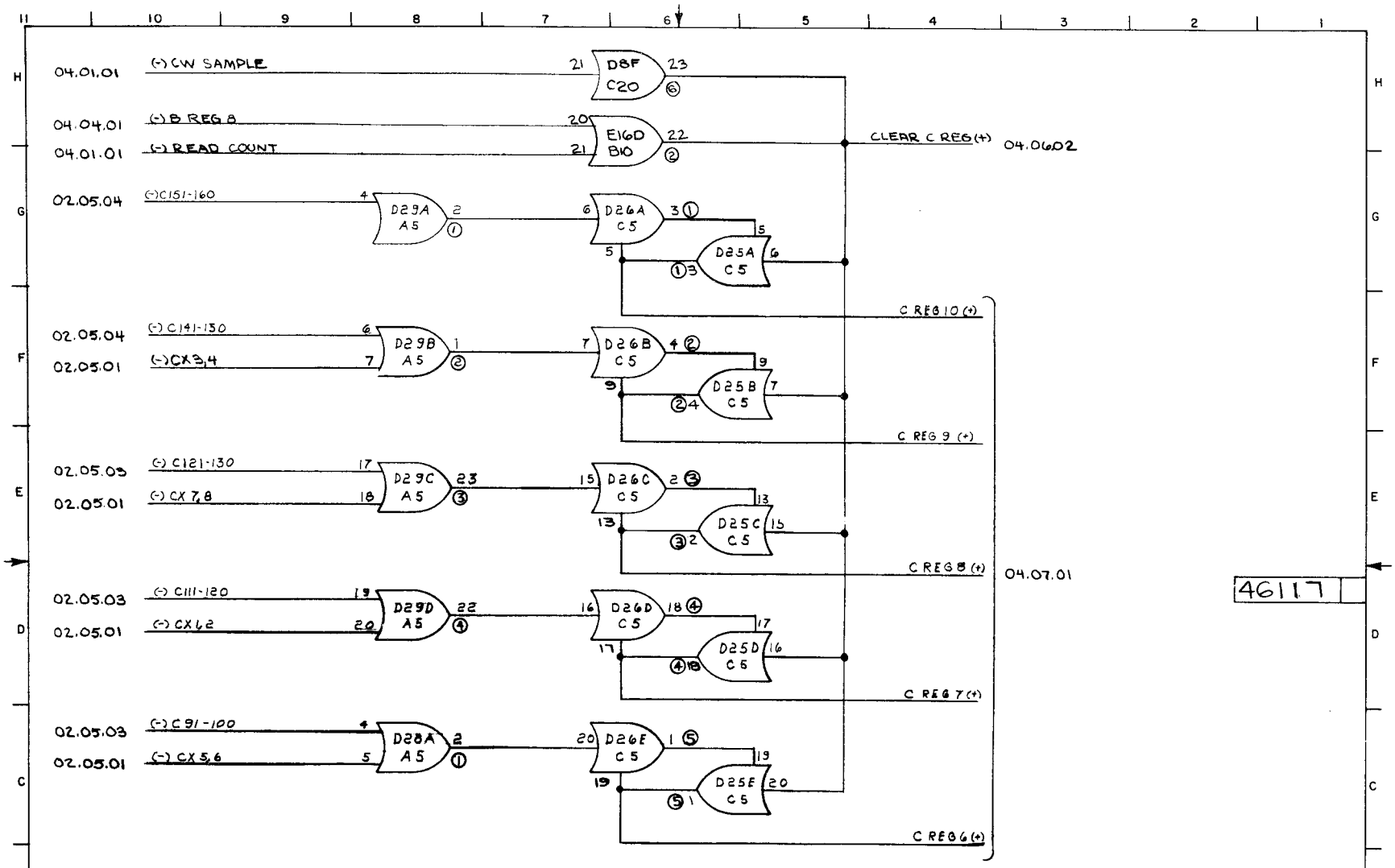
FUNCTION
ENABLE EVEN
COLUMN GATE

CLIENT

CODE NO
04.05.02

C
DWG NO
46116

SHEET OF



46117

SYM	ECA NO	DATE	APPD
O	RELEASED	4-5-65	
A			
B			
C			
D			
E			
F			
G			
H			
I			
J			
K			

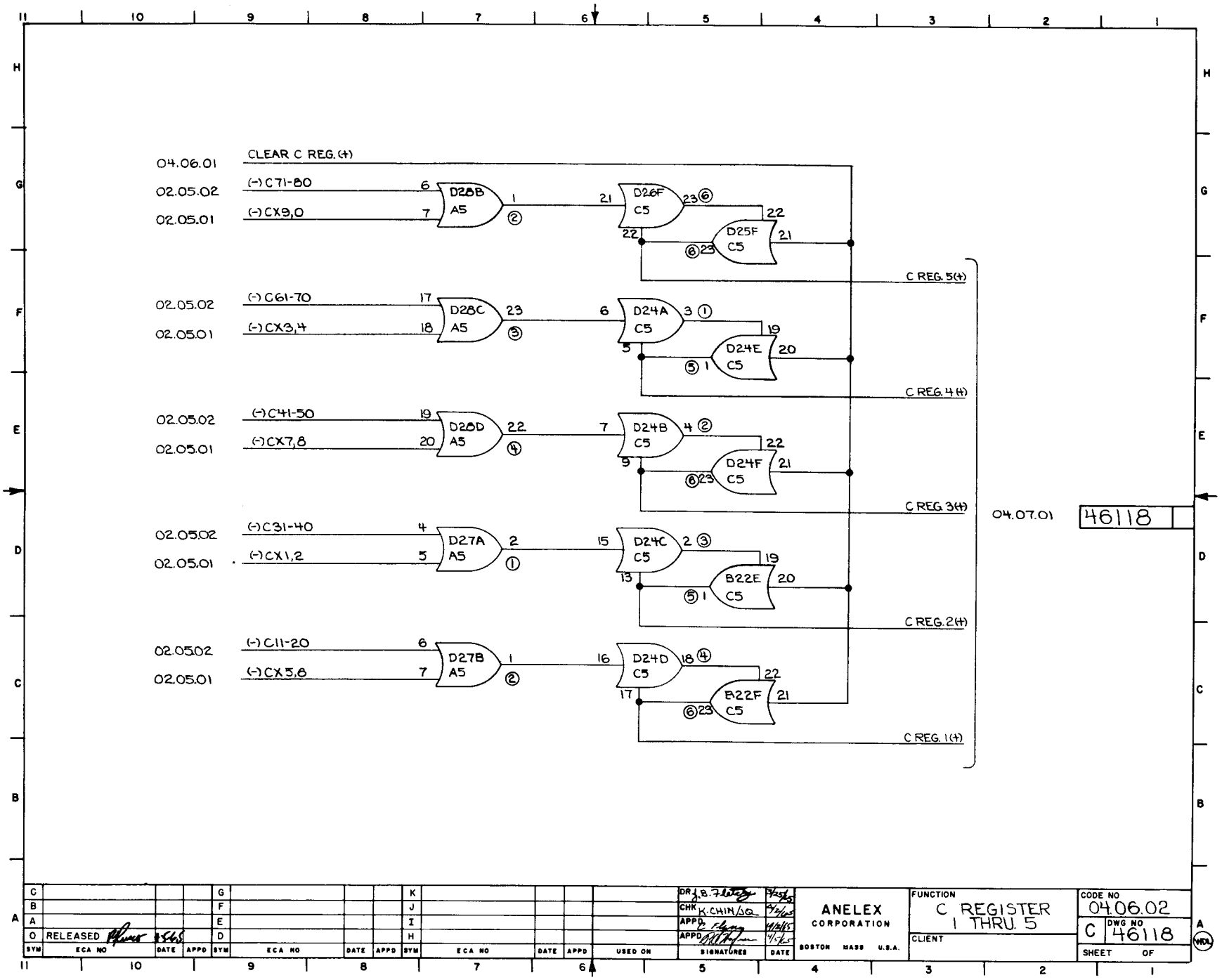
USED ON

	SIGNATURES	DATE
DR	Phyllis Young	12-18-64
CHK	K. CHIN	4/5/65
APPD	C. F. Young	4/5/65
APPD		4/5/65

ANELEX CORPORATION
BOSTON MASS U.S.A.

FUNCTION: C REGISTER 6 THRU 10
CLIENT:

CODE NO: 04.06.01
C 46117
SHEET OF



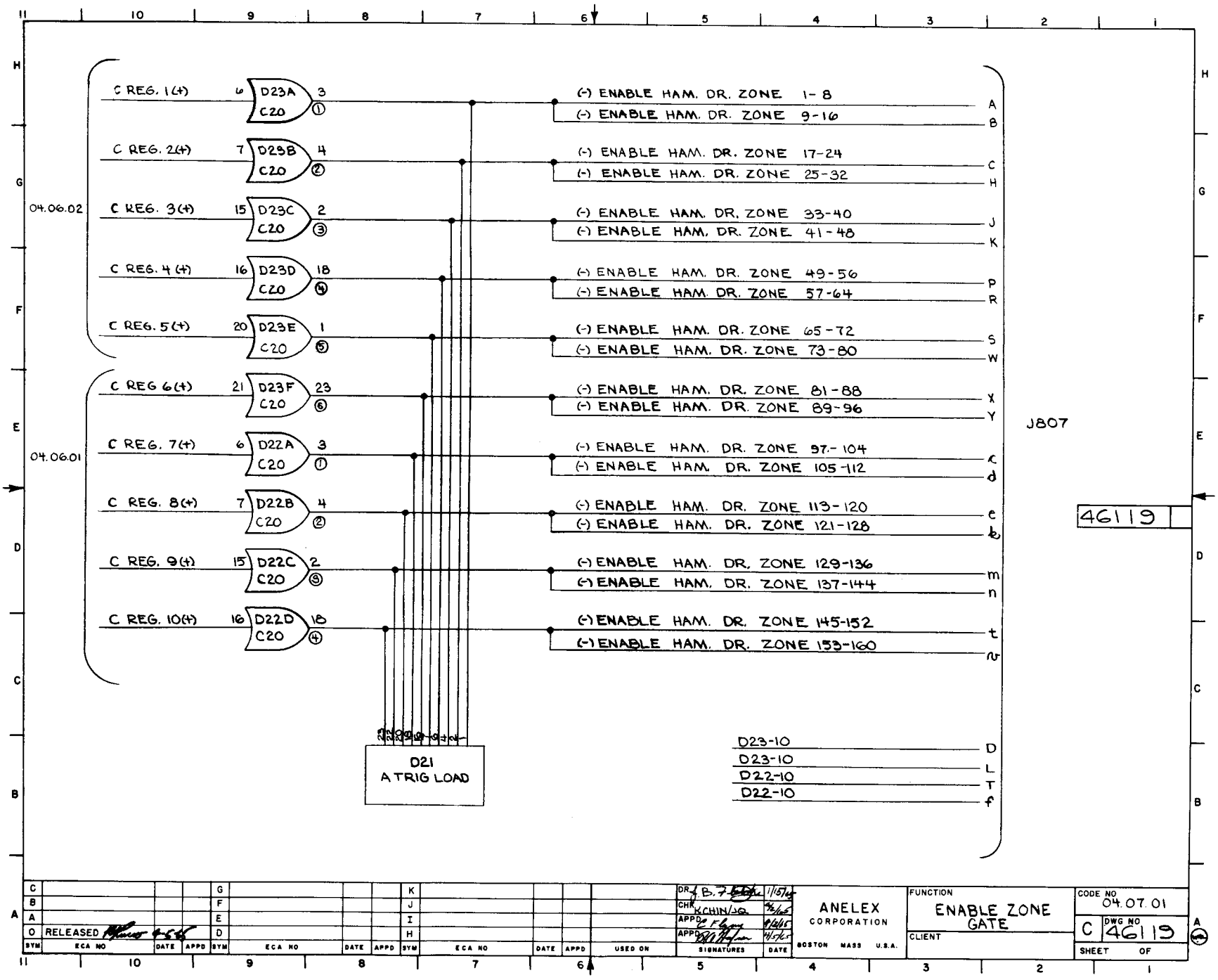
SYM	ECA NO	DATE	APPD	SYM	ECA NO	DATE	APPD	SYM	ECA NO	DATE	APPD	USED ON
C				G				K				
B				F				J				
A				E				I				
0	RELEASED			D				H				

SIGNATURES		DATE
DR J.B. Flaherty		9/25/65
CHK K.CHIN/GG		9/25/65
APPD		11/4/65
APPD		11/4/65

ANELEX CORPORATION
BOSTON MASS U.S.A.

FUNCTION: C REGISTER 1 THRU 5
CLIENT:

CODE NO: 04.06.02
SIZE: C
DWG NO: 46118
SHEET OF



SYM	ECA NO	DATE	APPD
O	RELEASED		
A			
B			
C			

SYM	ECA NO	DATE	APPD
D			
E			
F			
G			

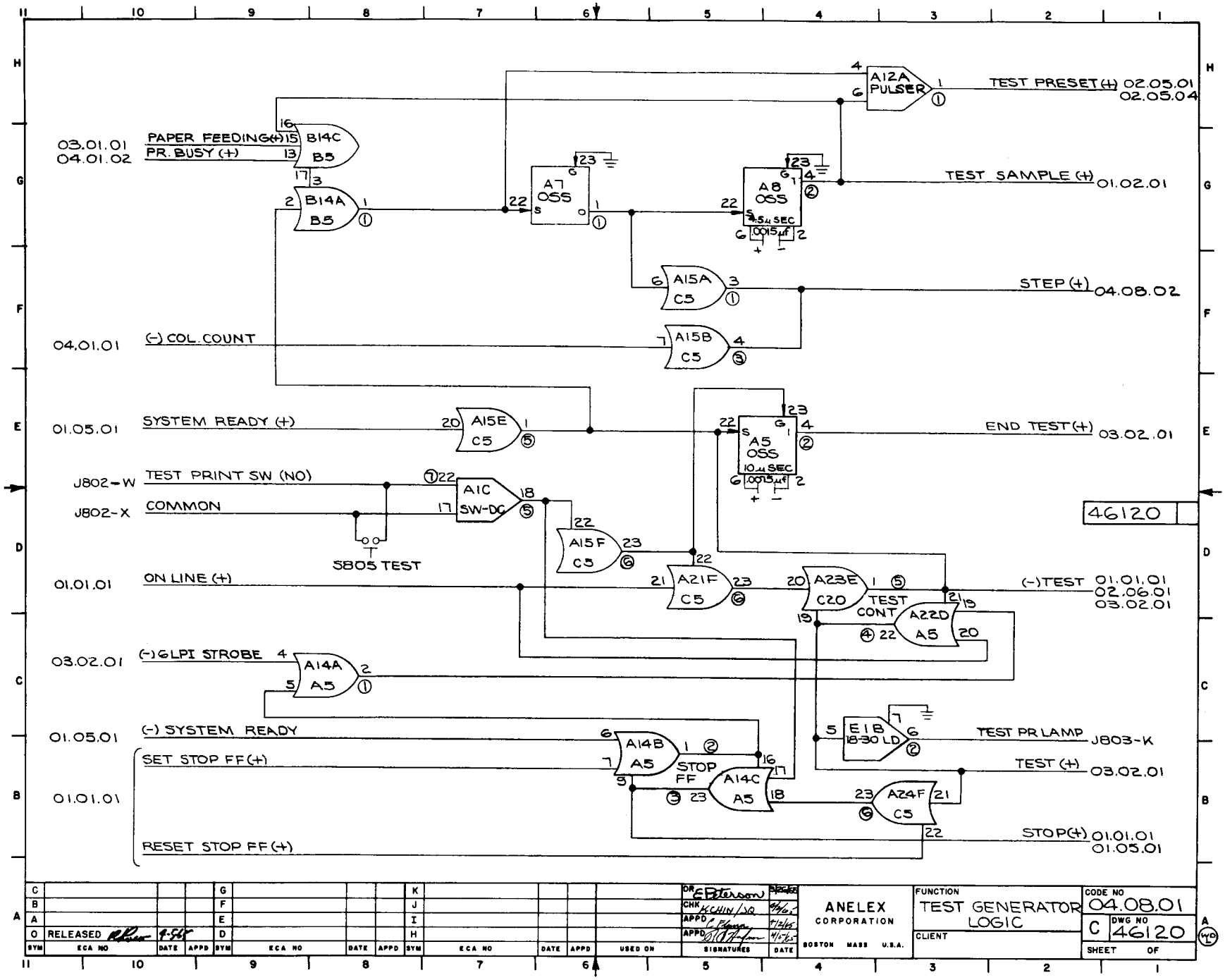
SYM	ECA NO	DATE	APPD	USED ON
H				
I				
J				
K				

SIGNATURES	DATE
DR B.T.	1/15/65
CHK K.CHIN/SG	1/15/65
APPD	1/14/65
APPD	1/15/65

ANELEX CORPORATION
BOSTON MASS U.S.A.

FUNCTION: ENABLE ZONE GATE
CLIENT:

CODE NO 04.07.01
DWG NO C 46119
SHEET OF



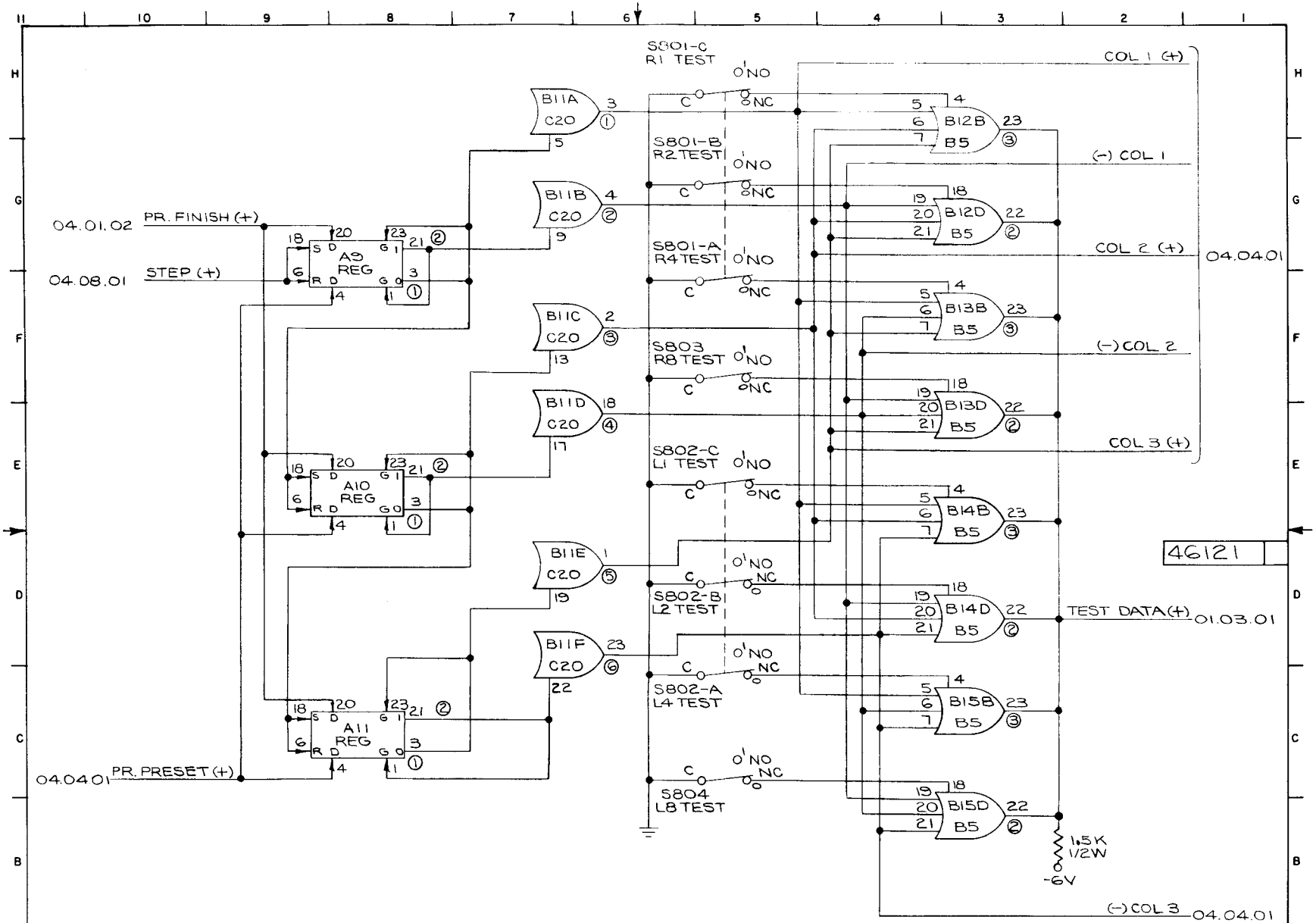
SYM	ECA NO	DATE	APPD	USED ON
O	RELEASED	4-5-65		

DR C Peterson 12-2-65
CHK K CHIN/JG 4/16/65
APPD C Flynn 4/16/65
APPD 4/15/65
SIGNATURES DATE

ANELEX CORPORATION
BOSTON MASS U.S.A.

FUNCTION: TEST GENERATOR LOGIC
CLIENT

CODE NO 04.08.01
C DWG NO 46120
SHEET OF



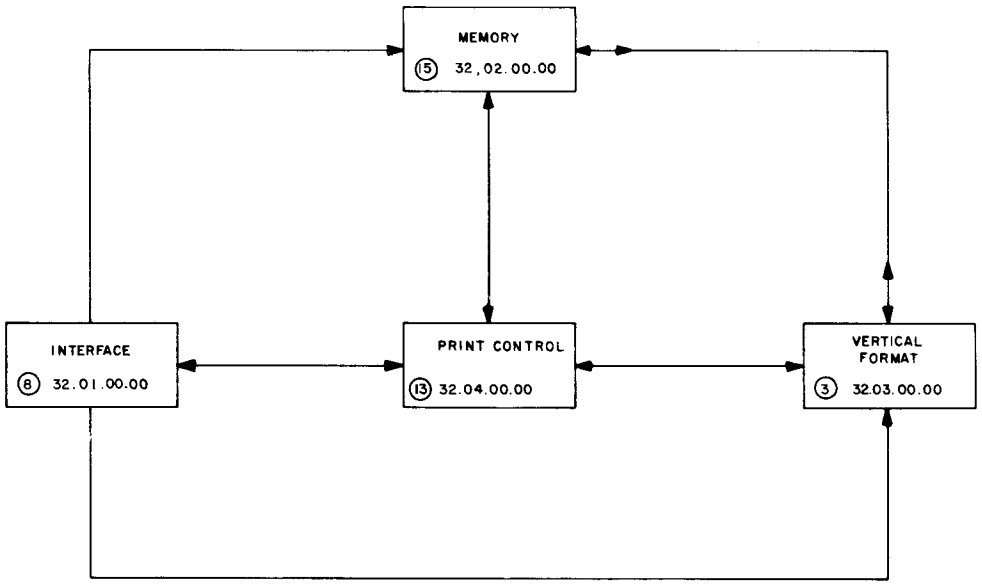
SYM	ECA NO	DATE	APPD
O	RELEASED		

USED ON	SIGNATURES	DATE
	DR E Peterson	3/25/65
	CHK K CHIN / JO	3/26/65
	APPD C Flynn	4/14/65
	APPD	

ANELEX CORPORATION
BOSTON MASS U.S.A.

FUNCTION: TEST DATA & COL. COUNTER
CLIENT:

CODE NO: 04.08.02
C | DWG NO: 46121
SHEET OF



46232

SYM	ECA NO	DATE	APPD
C			
B			
A			
0	RELEASED 4-56		

SYM	ECA NO	DATE	APPD
G			
F			
E			
D			

SYM	ECA NO	DATE	APPD	USED ON
K				
J				
I				
H				

	SIGNATURES	DATE
DR	D.G. Mercier	9/30/65
CHK	K.CHIN/J.G.	9/1/65
APPD	J. Flynn	11/3/65
APPD	W.C. Hoffman	11/7/65

ANELEX
CORPORATION
BOSTON MASS U.S.A.

FUNCTION: PRINTER BUFFER BLOCK DIAGRAM
CLIENT: ZUSE

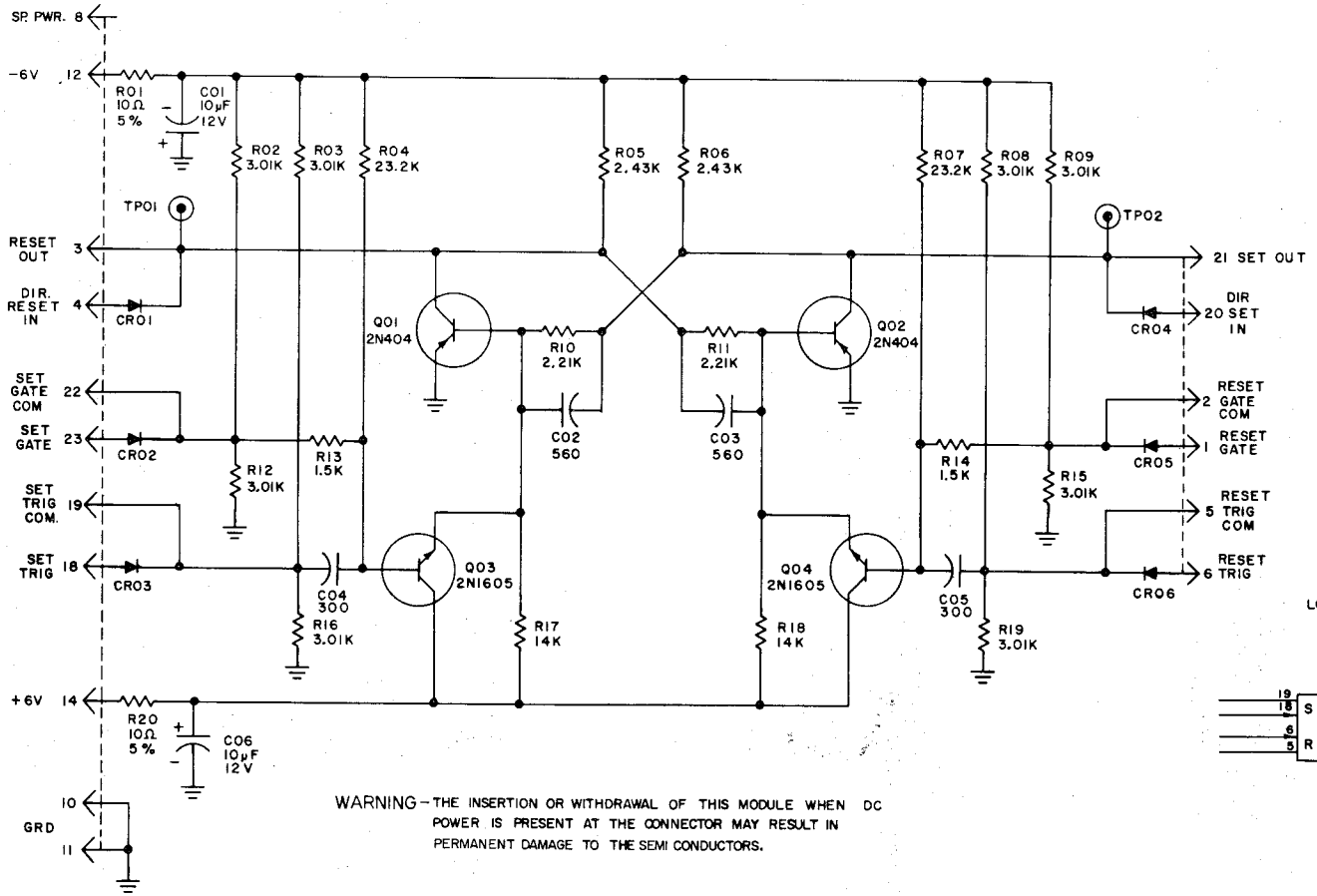
CODE NO: 32.00.00.00
SIZE: C
DWG NO: 46232
SHEET OF

BD

REVISIONS				
ZONE	SYM	DESCRIPTION	DATE	APPROVAL
	0	REL TO PED	11-24-62	

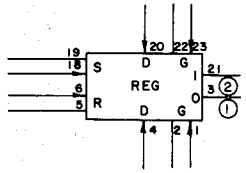
NOTES:

1. UNLESS OTHERWISE SPECIFIED:
   ALL RESISTORS ARE 1/2W 1%
   ALL CAPACITORS ARE IN μF
   ALL DIODES ARE IN276/CGD-851



WARNING – THE INSERTION OR WITHDRAWAL OF THIS MODULE WHEN DC POWER IS PRESENT AT THE CONNECTOR MAY RESULT IN PERMANENT DAMAGE TO THE SEMI CONDUCTORS.

LOGIC SYMBOL



34101

ITEM	REQD	PART NO	DESCRIPTION	MATL	MATL SPEC	UNIT WT

LIST OF MATERIALS

UNLESS OTHERWISE SPECIFIED	
DIMENSIONS ARE IN INCHES TOLERANCES ON FRACTIONS DECIMALS ANGLES	
MATERIAL	
FINISH	
HEAT TREAT	

SIGNATURES		DATE
DR	J. Maglis, Jr.	8-1-62
CHK	C. Erickson	9-26-62
APPD		
APPD		

APPROVED PROD. ENG. 11/21/64 DATE AUTHORITY

34051	
NEXT ASSY	USED ON
APPLICATION	

REGISTER SCHEMATIC

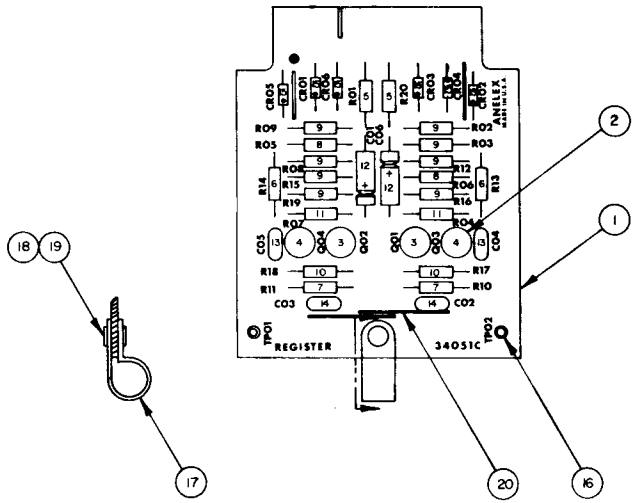
SCALE NONE WT

ANelex CORPORATION BOSTON MASS

C 34101

REVISIONS				
ZONE	SYM	DESCRIPTION	DATE	APPROVAL
	C	REV. & REDRAWN PER E.C.A. 16734-16814	1-29-64	RSH
	D	REV. PER ECA 18314	12-7-64	RSH
	E	REV PER ECA 18946	3-22-65	RSH

NOTES:
1. ALL TRANSISTORS ARE MOUNTED ON ITEM 2.
2. NO'S ON COMPONENTS ARE ITEM NO'S.
3. CATHODE END OF DIODE INDICATED BY DOT.
4. STAMP G2 1/8 BLK. CHAR. ABOVE ASSY. NO. COAT PER FS514.



ITEM	REQD	PART NO	DESCRIPTION	MATL	MATL SPEC	UNIT WT
21	REF	34101	SCHEMATIC, REGISTER			
20	AR	465-101-021	WIRE, INSULATED, BLK. VINYL	#22		
19	1	95642	COMPRESSION RIVET, FEMALE			
18	1	95641	COMPRESSION RIVET, MALE			
17	1	141-101-006	CLAMP, CABLE			
16	2	420-111-002	TERMINAL, STUD			
15	6	168-102-001	DIODE	1N276		
14	2	134-501-047	CAPACITOR 560μμF			
13	2	134-501-039	CAPACITOR 300μμF			
12	2	134-101-008	CAPACITOR 10μF 12V			
11	2	387-102-324	RESISTOR 23.2K 1/2W, 1%			
10	2	387-102-303	RESISTOR 14K 1/2W, 1%			
9	8	387-102-239	RESISTOR 3.01K 1/2W, 1%			
8	2	387-102-230	RESISTOR 2.43K 1/2W, 1%			
7	2	387-102-226	RESISTOR 2.21K 1/2W, 1%			
6	2	387-102-210	RESISTOR 1.5K 1/2W, 1%			
5	2	387-110-025	RESISTOR 10Ω 1/2W, 5%			
4	2	436-107-001	TRANSISTOR NPN	2N1605		
3	2	436-103-001	TRANSISTOR PNP	2N404		
2	4	438-101-001	PAD, MOUNTING, TRANSISTOR			
1	1	34151	P.C. CARD, REGISTER			

LIST OF MATERIALS

34051 E

NEXT ASSY	USED ON
APPLICATION	

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON FRACTIONS DECIMALS ANGLES
MATERIAL
FINISH
HEAT TREAT

SIGNATURES	DATE
DR J. Bruce	1-2-64
CHK M. Nichols	1/28/64
APPD RSH	1/29/64
APPD	

REGISTER ASSEMBLY

ANelex CORPORATION BOSTON MASS

SCALE 1/1 WT

C 34051

REGISTER

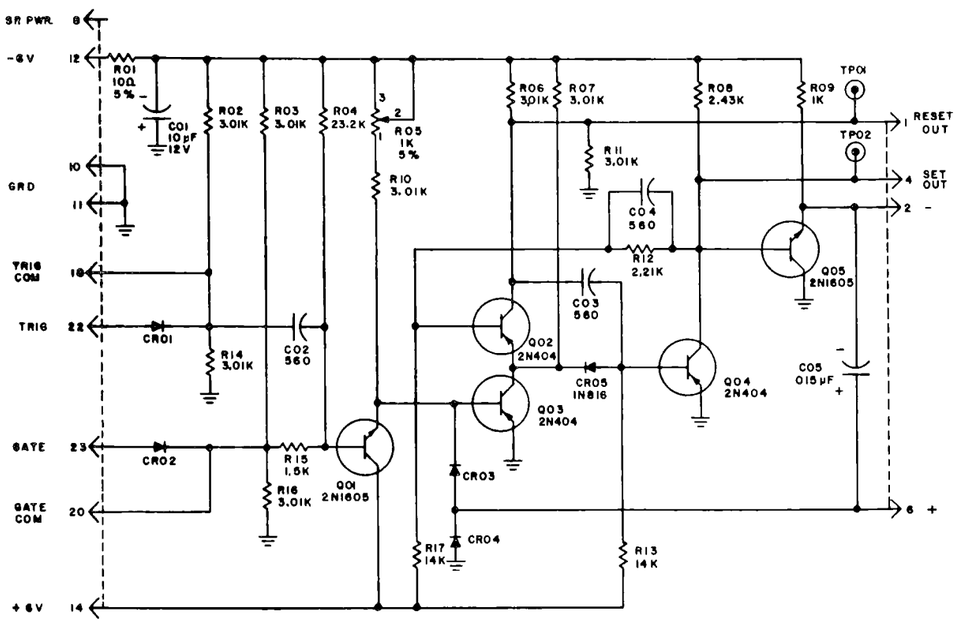
The ANelex register printed circuit card contains one complete bistable multivibrator circuit and associated input current buffers. The circuit is composed of two crosscoupled standard A NOR 5 circuits (Q1 and Q2) which form the binary and two input current buffer amplifiers (Q3 and Q4).

Both the set and reset inputs have five inputs each; a trigger input and common, a reset gate and common, and a direct input for clearing purposes. The current buffer amplifiers are used in the set and reset trigger inputs. Triggering occurs when the trigger inputs makes a transition from a negative voltage to zero volts if the associated gate is enabled. Either gate is enabled by applying signal current (zero volt level). Complementary operation of the Register module is obtained by coupling the output from either side of the register back into the input gate of the same transistor; and by connecting the trigger inputs together for parallel triggering.

The set and reset trigger inputs and associated gates are equal to one unit load each. The set and reset outputs of the register are each capable of driving four unit loads and may be observed at the test points provided. Inputs decoupling filters have been provided for each of the input d-c power supply voltages (+6 volt and -6 volt).

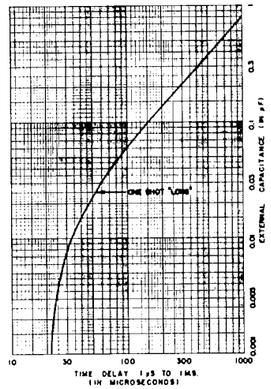
REVISIONS				
ZONE	SYM	DESCRIPTION	DATE	APPROVAL
	A	REV B REDRAWN TO ECA 17631	8-5-64	
	B	REV PER ECA 19287	5/10/65	

NOTES:
1. UNLESS OTHERWISE SPECIFIED
   ALL RESISTORS ARE 1/2W ±1%
   ALL CAPACITORS ARE IN μμF
   ALL DIODES ARE 1N276
2. COMPONENTS SHOWN ON THIS SCHEMATICS ARE INDICATIVE ONLY APPROVED SUBSTITUTES MAY BE USED.



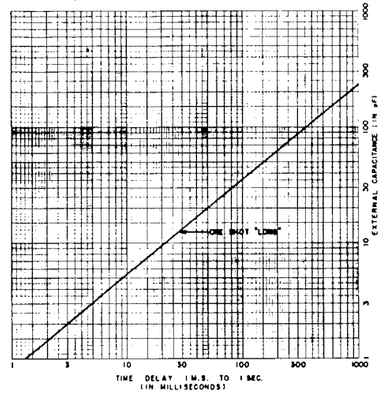
WARNING – THE INSERTION OR WITHDRAWAL OF THIS MODULE WHEN DC POWER IS PRESENT AT THE CONNECTOR MAY RESULT IN PERMANENT DAMAGE TO THE SEMI CONDUCTORS.

APPLICABLE EQUATIONS TO EVALUATE TIMING CAPACITOR FOR ONE SHOT-LONG
C = .000768T - .01536
C IN μF AND T IN μS UNITS

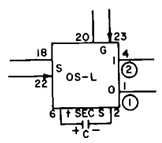


NO EXTERNAL CAPACITOR
ONE SHOT "LONG" = 20 μS

APPLICABLE EQUATIONS TO EVALUATE TIMING CAPACITOR FOR ONE SHOT-LONG
C = .768 - .01536
C IN μF AND T IN MS UNITS



34102 B



ITEM	REQD	PART NO	DESCRIPTION	MATL	MATL SPEC	UNIT WT

LIST OF MATERIALS

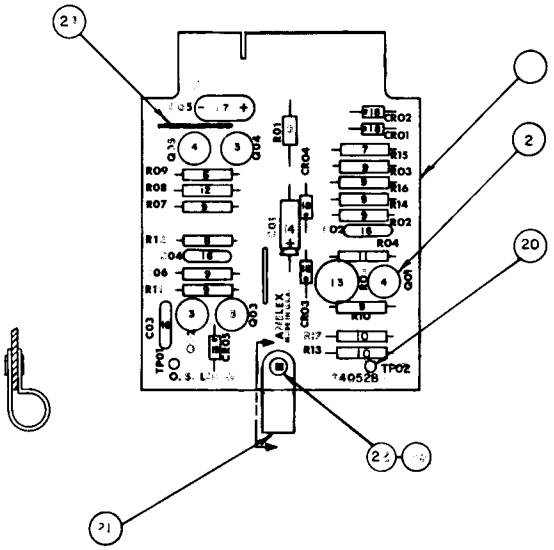
UNLESS OTHERWISE SPECIFIED	SIGNATURES	DATE		
DIMENSIONS ARE IN INCHES TOLERANCES ON FRACTIONS / DECIMALS / ANGLES	DR	7/21/64	ONE SHOT – LONG SCHEMATIC	ANelex CORPORATION BOSTON MASS
MATERIAL	CHK	8/1/64		
FINISH	APPD	8/5/64		D 34102
HEAT TREAT	APPD	8/5/64	SCALE NONE WT	

34052	
NEXT ASSY	USED ON
APPLICATION	

REVISIONS				
ZONE	SYM	DESCRIPTION	DATE	APPROVAL
	0	REL TO PED	9/13	
	A	REV PER ECA 16210	10-28-63	
	B	REV PER ECA 17058	12-7-64	
	C	REV PER ECA 18314	12-7-64	
	D	REV PER ECA 18946	5-22-65	

NOTES:

1. ALL TRANSISTORS ARE MOUNTED ON ITEM 2.
2. NO'S ON COMPONENTS ARE ITEM NO'S.
3. CATHODE END OF DIODE INDICATED BY DOT.
4. STAMP G2 1/8" BLK CHAR AFTER ASSY NO. COAT PER FS514.



ITEM	REQD	PART NO	DESCRIPTION	MATL	MAT SPEC	UNIT WT
22	REF	34102	SCHEMATIC, ONE SHOT-LONG			
21	AR	465-001-021	WIRE, INSULATED, BLACK VINYL	# 22		
23	1	95642	COMPRESSION RIVET, FEMALE			
22		95641	COMPRESSION RIVET, MALE			
21		140-101-006	CLAMP, CABLE			
20	1	320-111-002	TERMINAL, STUD			
19		368-107-001	DIODE	IN816		
18	4	368-102-001	DIODE	IN276		
17	1	134-601-006	CAPACITOR, .015 μF			
16	3	134-501-007	CAPACITOR, 560 μF			
15						
14	1	134-101-009	CAPACITOR, 10 μF, 12V			
13	1	357-111-004	POTENTIOMETER, 1K, 1/2W, 5%			
12	1	387-102-230	RESISTOR, 2.43K, 1/2W, 1%			
11		387-102-324	3.2K 1/2W, 1%			
10	2	387-102-301	1K, 1/2W, 1%			
09	8	387-102-232	3[illegible] 1/2W, 1%			
08	1	387-102-221	.21K, 1/2W, 1%			
07	1	387-102-210	1.5K, 1/2W, 1%			
06	1	387-102-193	[illegible] K 1/2W, 1%			
05		387-180-025	RESISTOR [illegible] Ω, 1/2W, 5%			
4		436-107-001	TRANSISTOR NPN	2N305		
03		436-103-201	TRANSISTOR PNP	2N404		
2	5	438-101-001	PAD, MOUNTING TRANSISTOR			
1	1	34052	PC CARD, ONE SHOT-LONG			

LIST OF MATERIALS

34052 D

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON FRACTIONS ± DECIMALS ± ANGLES ±
MATERIAL
FINISH
HEAT TREAT

SIGNATURES		DATE
DR	J. Maglothin	8-14-63
CHK	M. Nichols	8/14/63
APPD	R. Stiles	11/4/63
APPD	G. Bruening	11/7/63

ONE SHOT-LONG ASSEMBLY

ANelex CORPORATION BOSTON MASS

C 34052

SCALE 1/1 WT

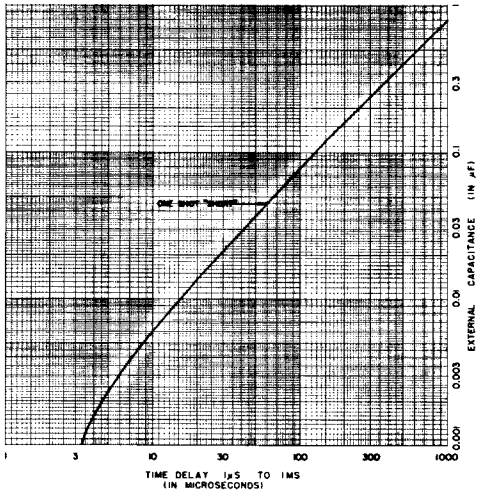
NEXT ASSY | USED ON
APPLICATION

REVISIONS				
ZONE	SYM	DESCRIPTION	DATE	APPROVAL
	0	REL TO PED	1/24/64	RH
	A	REV PER ECA 17631	8-6-64	RH
	B	REV PER ECA 19287	11/10/65	RH

NOTES:

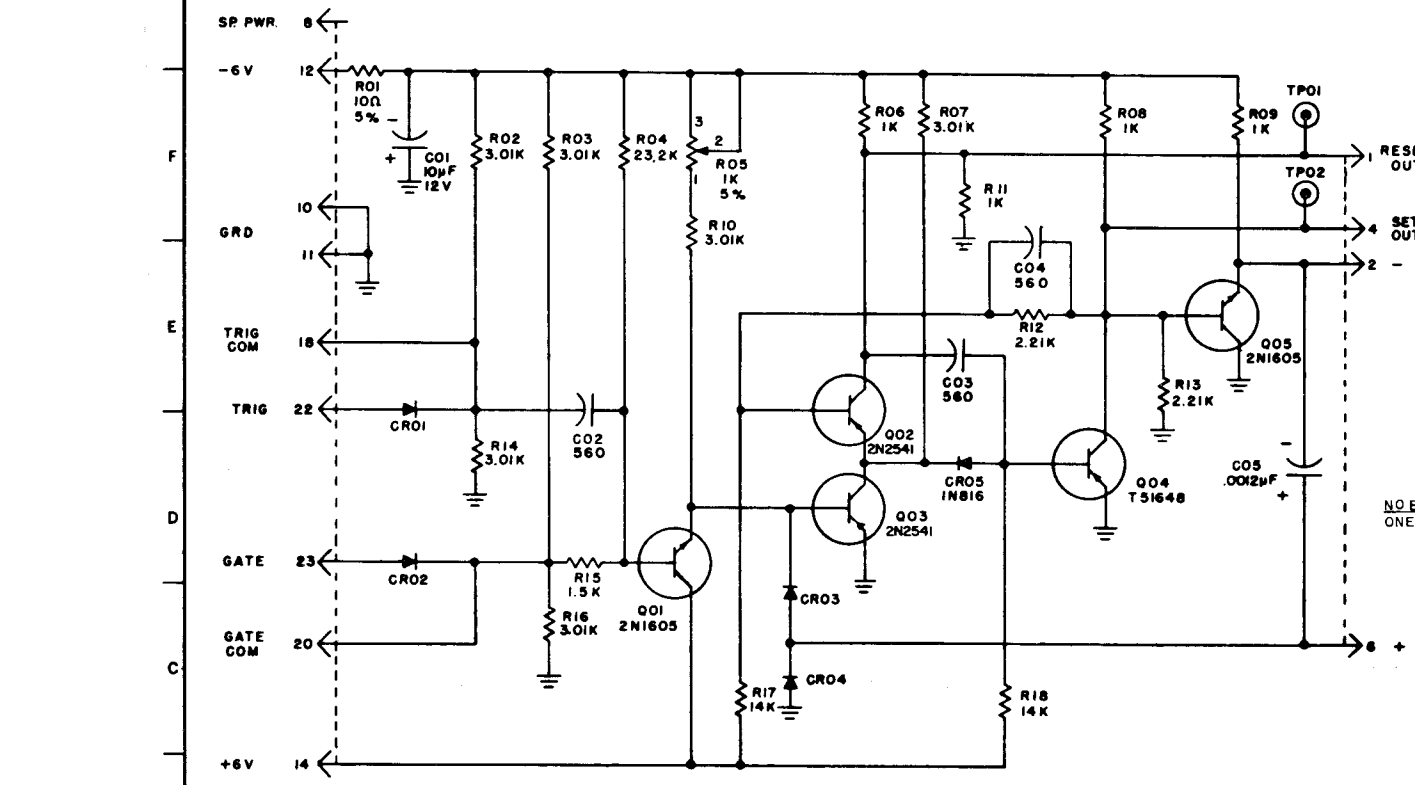
1. UNLESS OTHERWISE SPECIFIED:
   ALL RESISTORS ARE 1/2W ±1%
   ALL CAPACITORS ARE IN μμF
   ALL DIODES ARE 1N276
2. COMPONENTS SHOWN IN THIS SCHEMATIC ARE INDICATIVE ONLY, APPROVED SUBSTITUTES MAY BE USED.

APPLICABLE EQUATION TO EVALUATE TIMING CAPACITOR FOR ONE SHOT-SHORT
C = .000768T − .001536
C IN μF AND T IN μS UNITS

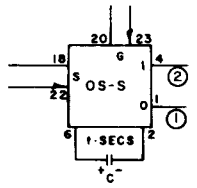


34103 B

NO EXTERNAL CAPACITOR
ONE SHOT "SHORT" = 2.0 μS



LOGIC SYMBOL



WARNING—THE INSERTION OR WITHDRAWAL OF THIS MODULE WHEN DC POWER IS PRESENT AT THE CONNECTOR MAY RESULT IN PERMANENT DAMAGE TO THE SEMI—CONDUCTORS.

ITEM	REQD	PART NO	DESCRIPTION	MATL	MATL SPEC	UNIT WT

LIST OF MATERIALS

34053	
NEXT ASSY	USED ON
APPLICATION	

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON FRACTIONS DECIMALS ANGLES
MATERIAL
FINISH
HEAT TREAT

SIGNATURES	DATE
DR J Maghak	7-10-62
CHK C. Erickson	7/24/62
APPD [illegible]	7/25/62
APPD [illegible]	7/26/62

ONE SHOT-SHORT SCHEMATIC

ANelex CORPORATION BOSTON MASS

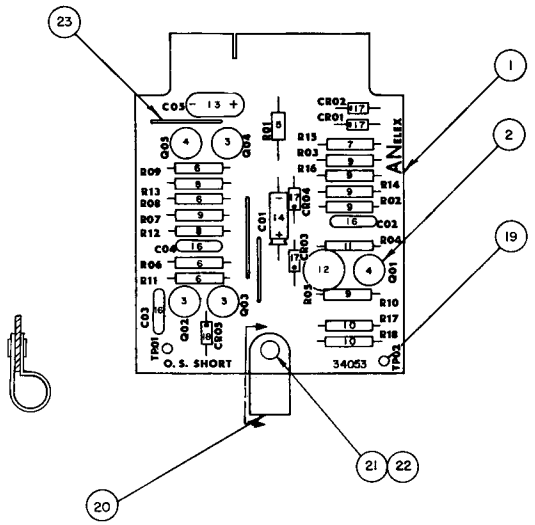
C 34103

SCALE NONE WT

REVISIONS				
ZONE	SYM	DESCRIPTION	DATE	APPROVAL
	0	REL TO PED	9/12	MMO
	A	REV PER ECA 16210	10-28-63	RLS
	B	REV PER ECA 18314		
	C	REV PER ECA 18946	3-22-65	RLS

NOTES:

1. ALL TRANSISTORS ARE MOUNTED ON ITEM 2.
2. NO'S ON COMPONENTS ARE ITEM NO'S.
3. CATHODE END OF DIODE INDICATED BY DOT.
4. STAMP G2 1/8 BLK. CHAR. ABOVE ASSY. NO. COAT PER FS514.



ITEM	REQD	PART NO	DESCRIPTION	MATL	MATL SPEC	UNIT WT
24	REF	34103	SCHEMATIC, ONE SHOT-SHORT			
23	AR	465-101-021	WIRE, INSULATED, BLK, VINYL		#22	
22	1	95642	COMPRESSION RIVET, FEMALE			
21	1	95641	COMPRESSION RIVET, MALE			
20	1	141-101-006	CLAMP, CABLE			
19	2	420-111-002	TERMINAL, STUD			
18	1	168-107-001	DIODE		IN816	
17	4	168-102-001	DIODE		IN276	
16	3	134-501-047	CAPACITOR, 560 μμF			
15						
14	1	134-101-008	CAPACITOR, 10 μF, 12V			
13	1	134-604-002	CAPACITOR, .0012 μF			
12	1	357-111-004	POTENTIOMETER, 1K, 1/2W, 5%			
11	1	387-102-324	RESISTOR, 23.2K, 1/2W, 1%			
10	2	387-102-303	14K, 1/2W, 1%			
9	6	387-102-239	3.01K, 1/2W, 1%			
8	2	387-102-226	2.21K, 1/2W, 1%			
7	1	387-102-210	1.5K, 1/2W, 1%			
6	4	387-102-193	1K, 1/2W, 1%			
5	1	387-110-025	RESISTOR, 10Ω, 1/2W, 5%			
4	2	436-107-001	TRANSISTOR NPN		2N1605	
3	3	436-128-001	TRANSISTOR PNP		GTR502	
2	5	438-101-001	PAD, MOUNTING, TRANSISTOR			
1	1	34153	P.C. CARD, ONE SHOT-SHORT			

LIST OF MATERIALS

34053 C

NEXT ASSY	USED ON
APPLICATION	

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON FRACTIONS DECIMALS ANGLES
MATERIAL
FINISH
HEAT TREAT

SIGNATURES		DATE
DR		8-14-63
CHK	M. Nichols	9/15/63
APPD		9/17/63
APPD		9/16/63

ONE SHOT-SHORT ASSEMBLY

ANelex CORPORATION BOSTON MASS

C 34053

SCALE 1/1 WT

PC A

ONE SHOT - SHORT

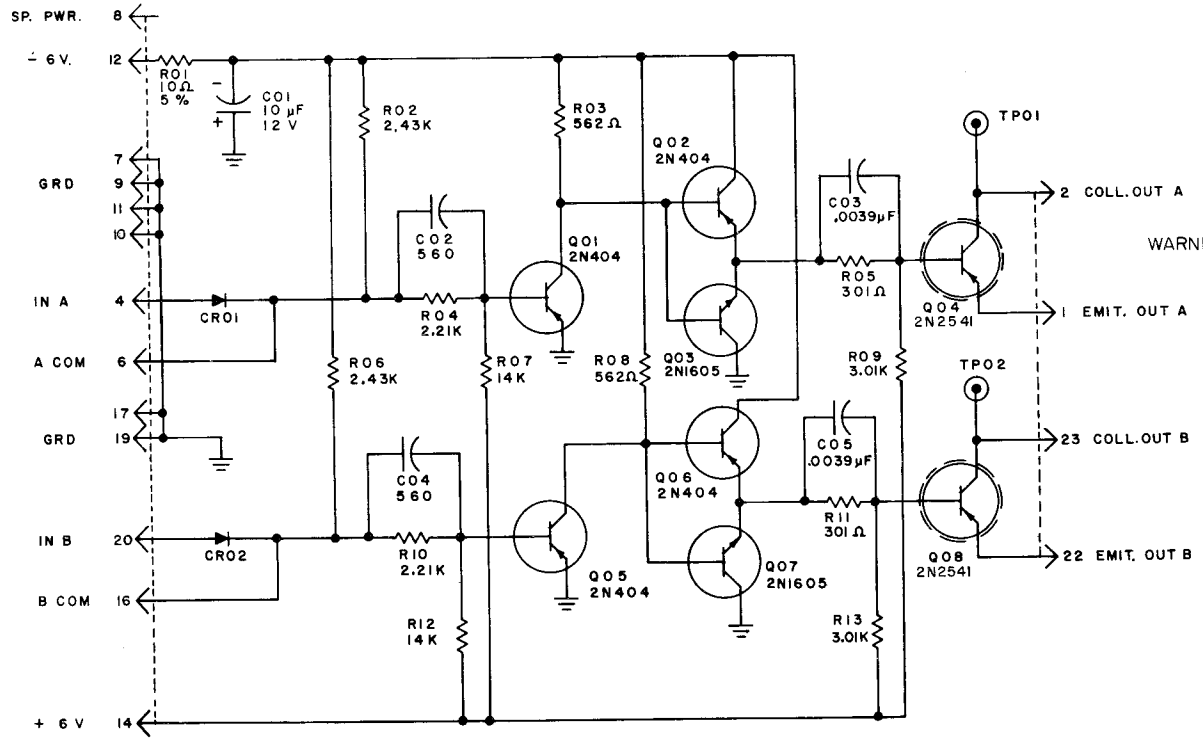
The ANelex One Shot - Short printed circuit card contains one modified monostable multivibrator, which has special circuitry to provide fast turn off at the end of the cyclic delay period. The circuit has four inputs, a trigger input with an associated common input from the diode buss, and an inhibit-gate input with an associated common input from the diode buss. The trigger input is capacitor coupled through an isolation diode into an emitter follower current buffer circuit used to isolate loading on the input signals.

Triggering occurs when the trigger input signal makes a transition from a zero current condition (-3 volt level) to a full current condition (zero volt level), providing the inhibit-gate has been enabled. A full current input signal (zero volt level) will enable the inhibit-gate, and a zero current input signal (-3 volt level) will disable the inhibit-gate and prevent the circuit from being triggered. The output pulse width is adjustable by an internal vernier, which has been provided for precise setting of the delay cycle; also provision has been made for connection of an external capacitor in parallel with the timing capacitor to lengthen the delay period (nominal value is equal to 2.5 microseconds).

The circuit has two outputs, a set output and a reset output. Either output is capable of driving four unit loads, and may be observed at the test points provided.

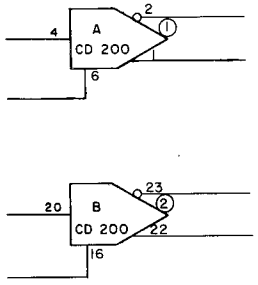
REVISIONS				
ZONE	SYM	DESCRIPTION	DATE	APPROVAL
	0	REL. TO PED.		

NOTES:
1. UNLESS OTHERWISE SPECIFIED:
   ALL RESISTORS ARE 1/2 W ±1%
   ALL CAPACITORS ARE IN μμF
   ALL DIODES ARE IN276
2. DOTTED CIRCLE AROUND TRANSISTOR DENOTES HEAT SINK.



WARNING - THE INSERTION OR WITHDRAWAL OF THIS MODULE WHEN DC POWER IS PRESENT AT THE CONNECTOR MAY RESULT IN PERMANENT DAMAGE TO THE SEMI CONDUCTORS.

LOGIC SYMBOL



34104

ITEM	REQD	PART NO	DESCRIPTION	MATL	MATL SPEC	UNIT WT

LIST OF MATERIALS

APPROVED PROD. ENG. 1/17/64

UNLESS OTHERWISE SPECIFIED	
DIMENSIONS ARE IN INCHES	
TOLERANCES ON FRACTIONS / DECIMALS / ANGLES	++ / ++ / ++
MATERIAL	
FINISH	
HEAT TREAT	

34054	
NEXT ASSY	USED ON
APPLICATION	

SIGNATURES	DATE
DR E. SHANKLE	9-25-62
CHK M. P. Adam	10/1/62
APPD	10/5/62
APPD R. B. Emmett	10/7/64

CORE DRIVER 200
SCHEMATIC

SCALE NONE WT

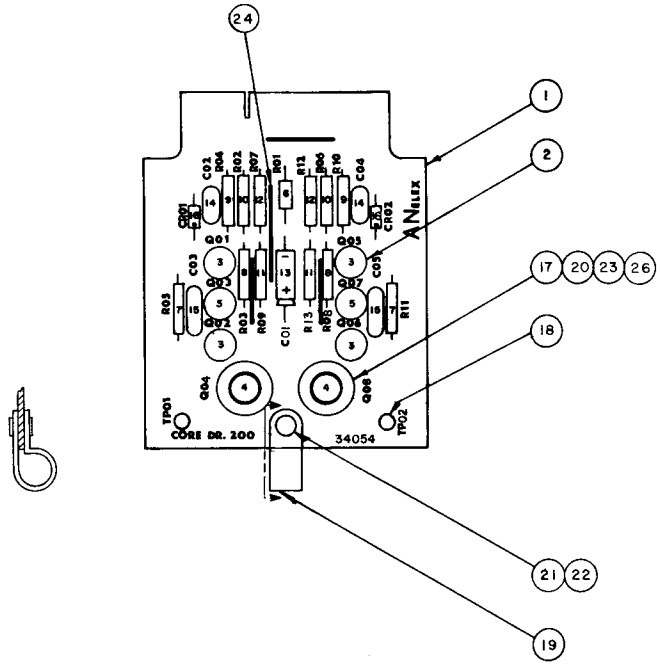
ANelex
CORPORATION
BOSTON MASS

C 34104

REVISIONS				
ZONE	SYM	DESCRIPTION	DATE	APPROVAL
	0	REL TO PED	9/1/63	
	A	REV PER ECA 16210	10-25-63	
	B	REV PER ECA 16286	11-21-63	
	C	REV PER ECA 16923	3-16-64	
	D	REV PER ECA 18314	7-14-64	
	E	REV PER ECA 18946	2-22-65	

NOTES:

1. CATHODE END OF DIODE INDICATED BY DOT.
2. ALL TRANSISTORS ARE MOUNTED ON ITEM 2 EXCEPT Q04 & Q08.
3. NO'S ON COMPONENTS ARE ITEM NO'S
4. a. PUT SMALL QUANTITY OF DOW CORNING DC-11 INSIDE HEAT SINK.
   b. INSERT TRANSISTOR & SEAT.
   c. INSERT & SCREW DOWN TO 30 IN. OZ. RETAINER RING.
5. STAMP G2 1/8 BLK. CHAR. AFTER ASSY. NO. COAT PER FS514.



ITEM	REQD	PART NO	DESCRIPTION	MATL	MATL SPEC	UNIT WT
26	4	95543	WASHER, TEFLON			
25	REF	34104	SCHEMATIC, CORE DR. 200			
24	AR	465-101-021	WIRE, INSULATED, BLK. VINYL	# 22		
23	AR	661-101-001	SILICONE GREASE			
22	1	95642	COMPRESSION RIVET, FEMALE			
21	1	95641	COMPRESSION RIVET, MALE			
20	4	842-107-002	SCREW #4-40X3/16 BIND. HD.			
19	1	141-101-006	CLAMP, CABLE			
18	2	420-111-002	TERMINAL, STUD			
17	2	235-101-001	HEAT SINK			
16	2	168-102-001	DIODE	IN276		
15	2	134-604-010	CAPACITOR, .0039 μF			
14	2	134-501-047	CAPACITOR, 560 μμF			
13	1	134-101-008	CAPACITOR, 10 μF, 12V			
12	2	387-102-303	RESISTOR, 14K, 1/2W, 1%			
11	2	387-102-239	3.01K, 1/2W, 1%			
10	2	387-102-230	2.43K, 1/2W, 1%			
9	2	387-102-226	2.21K, 1/2W, 1%			
8	2	387-102-169	562Ω, 1/2W, 1%			
7	2	387-102-143	RESISTOR, 301Ω, 1/2W, 1%			
6	1	387-110-025	RESISTOR, 10Ω, 1/2W, 5%			
5	2	436-107-001	TRANSISTOR NPN	2N1605		
4	2	436-128-001	TRANSISTOR PNP	GTR 502		
3	4	436-103-001	TRANSISTOR PNP	2N404		
2	6	438-101-001	PAD, MOUNTING, TRANSISTOR			
1	1	34154	P. C. CARD, CORE DR. 200			

LIST OF MATERIALS

34054 E

NEXT ASSY	USED ON
APPLICATION	

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON FRACTIONS DECIMALS ANGLES
MATERIAL
FINISH
HEAT TREAT

SIGNATURES		DATE
DR	J. Maglight	8-14-63
CHK	M. Nichols	8/15/63
APPD	R. Allen	8/15/63
APPD	D. Mulvey	9/3/63

CORE DRIVER 200 ASSEMBLY

ANelex CORPORATION BOSTON MASS

C 34054

SCALE 1/1 WT

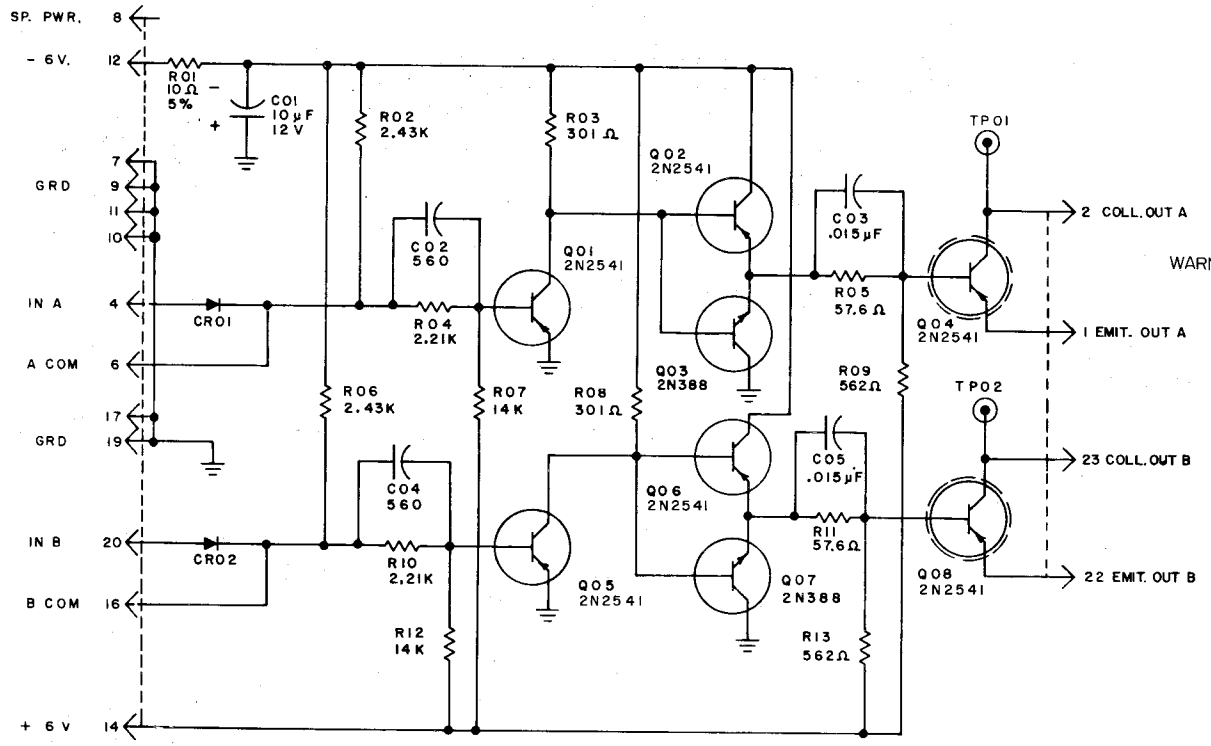
CORE DRIVER 200

The ANelex Core Driver 200 printed circuit card contains two identical independent Read-Write Memory magnetic core driver circuits. Each circuit has been designed to operate as a high speed current switch, and is made up of three basic stages. A standard inverter circuit with a single diode input and associated common comprise the input stage of the Core Driver circuit. The next stage is a complemented emitter follower impedance buffer circuit that is used for high speed switching response, and the output of the emitter follower drives the last stage, the main current amplifier.

Each circuit input is equivalent to one unit load and is normally driven from an external collector, such as an ANelex A NOR 5 or an ANelex A NOR 10. Application of current to any particular signal input (zero volt level) will enable current flow in the corresponding current amplifier stage, if the elements of the current amplifier are properly terminated externally. The absence of current in the signal input (-3 volt level) will inhibit current flow in the current amplifier stage. The collector and emitter leads from each current amplifier stage are normally terminated in the Printer Read-Write Memory plane. The output of each circuit is capable of supplying approximately 200 milliamperes of current to an external load, which may be defined as one-half of the full amount of current required to change the state of the ferrite material used in the Read-Write Memory planes. Output switching transitions may be observed at the test points provided.

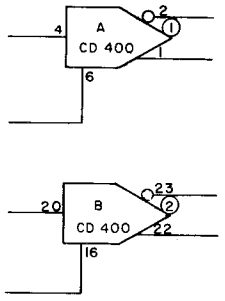
REVISIONS				
ZONE	SYM	DESCRIPTION	DATE	APPROVAL
	0	REL. TO PED	1/24/64	

NOTES:
1. UNLESS OTHERWISE SPECIFIED:
   ALL RESISTORS ARE 1/2 W ±1%
   ALL CAPACITORS ARE IN μμF
   ALL DIODES ARE IN276
2. DOTTED CIRCLE AROUND TRANSISTOR DENOTES HEAT SINK.



WARNING- THE INSERTION OR WITHDRAWAL OF THIS MODULE WHEN DC POWER IS PRESENT AT THE CONNECTOR MAY RESULT IN PERMANENT DAMAGE TO THE SEMI CONDUCTORS.

LOGIC SYMBOL



34105

ITEM	REQD	PART NO	DESCRIPTION	MATL	MATL SPEC	UNIT WT

LIST OF MATERIALS

APPROVED PROD. ENG. 1/17/64 DATE AUTHORITY

34055	
NEXT ASSY	USED ON
APPLICATION	

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON FRACTIONS DECIMALS ANGLES
MATERIAL
FINISH
HEAT TREAT

SIGNATURES	DATE
DR E. SWANICK	9-25-62
CHK M. P. O'Brien	10/9/62
APPD	10/15/62
APPD	10/15/62

CORE DRIVER 400
SCHEMATIC

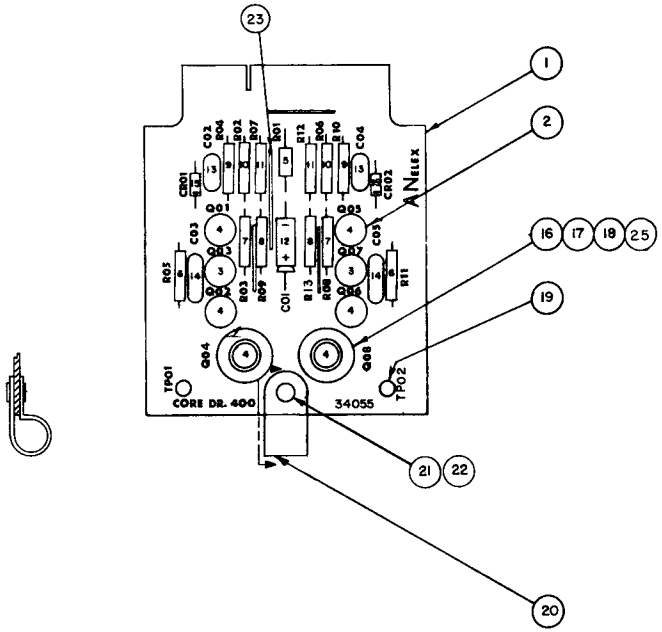
ANelex CORPORATION BOSTON MASS

SCALE NONE WT

C 34105

REVISIONS				
ZONE	SYM	DESCRIPTION	DATE	APPROVAL
	0	REL TO PED	9-1-3	
	A	REV PER ECA 16210	12-27-63	RH
	B	REV PER ECA 16924	3/16	RH
	C	REV PER ECA 18314	12-7-64	RH
	D	REV PER ECA 18946	2-22-65	RH

NOTES:
1. CATHODE END OF DIODE INDICATED BY DOT.
2. ALL TRANSISTORS ARE MOUNTED ON ITEM 2 EXCEPT Q04 & Q08.
3. NO'S ON COMPONENTS ARE ITEM NO'S.
4. a. PUT SMALL QUANTITY OF DOW CORNING DC-11 INSIDE HEAT SINK.
   b. INSERT TRANSISTOR & SEAT.
   c. INSERT & SCREW DOWN TO 30 IN. OZ. RETAINER RING.
5. STAMP G2 1/8 BLK. CHAR. AFTER ASSY. NO. COAT PER FS514.



ITEM	REQD	PART NO	DESCRIPTION	MATL	MATL SPEC	UNIT WT
25	4	95543	WASHER, TEFLON			
24	REF	34105	SCHEMATIC, CORE DR. 400			
23	AR	465-101-021	WIRE, INSULATED, BLK, VINYL	#22		
22	1	95641	COMPRESSION RIVET, MALE			
21	1	95642	COMPRESSION RIVET, FEMALE			
20	1	141-101-006	CLAMP, CABLE			
19	2	420-111-002	TERMINAL STUD			
18	AR	661-101-001	SILICONE GREASE			
17	4	842-107-002	SCREW #4-40 X 3/16 BIND. HD.			
16	2	235-101-001	HEAT SINK			
15	2	168-102-001	DIODE	1N276		
14	2	134-601-006	CAPACITOR .015 μF			
13	2	134-501-047	CAPACITOR 560 μμF			
12	1	134-101-008	CAPACITOR 10 μF, 12V			
11	2	387-102-303	RESISTOR, 14K, 1/2W, 1%			
10	2	387-102-230	2.43K, 1/2W, 1%			
9	2	387-102-226	2.21K, 1/2W, 1%			
8	2	387-102-169	562Ω, 1/2W, 1%			
7	2	387-102-143	301Ω, 1/2W, 1%			
6	2	387-102-074	57.6Ω, 1/2W, 1%			
5	1	387-110-025	RESISTOR, 10Ω, 1/2W, 5%			
4	6	436-128-001	TRANSISTOR PNP	GTR502		
3	2	436-102-001	TRANSISTOR NPN	2N388		
2	6	438-101-001	PAD, MOUNTING, TRANSISTOR			
1	1	34155	P.C. CARD, CORE DR. 400			

LIST OF MATERIALS

34055 D

NEXT ASSY	USED ON
APPLICATION	

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON FRACTIONS ± DECIMALS ± ANGLES ±
MATERIAL
FINISH
HEAT TREAT

SIGNATURES		DATE
DR	B Brun	8-15-63
CHK	M. Nichols	8/15/63
APPD	R.D. Lhs	
APPD	R Sweeney	9/26/63

CORE DRIVER 400 ASSEMBLY

SCALE 1/1 WT

ANelex CORPORATION BOSTON MASS

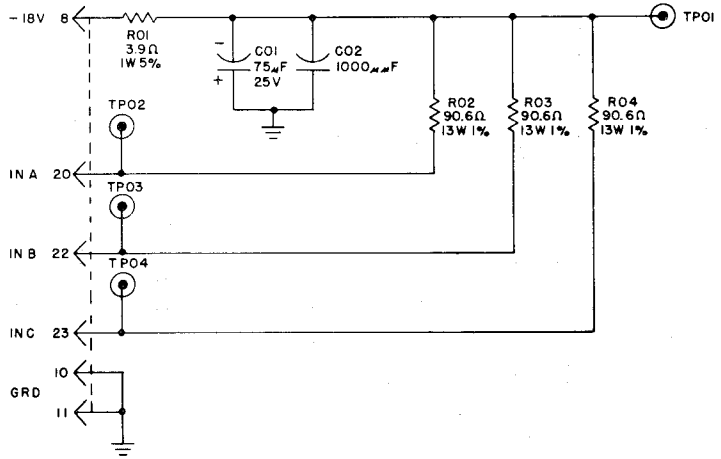
C 34055 A

CORE DRIVER 400

The ANelex Core Driver 400 printed circuit card contains two identical independent Read-Write Memory magnetic core driver circuits. Each circuit has been designed to operate as a high speed current switch and is made up of three basic stages. A standard inverter circuit with a single diode input and associated common comprise the input stage of the core driver circuit. The next stage is a complemented emitter follower impedance buffer that is used for high speed switching response, and the emitter follower output drives the last stage, the main current amplifier.

Each circuit input is equivalent to one unit load and is normally driven from an external collector, such as an ANelex A NOR 5 or an ANelex A NOR 10. Application of current to any particular signal input (zero volt level) will enable current flow in the corresponding current amplifier stage, if the elements of the current amplifier are properly terminated externally. The absence of current in the signal input (-3 volt level) will inhibit current flow in the current amplifier stage. The collector and emitter leads from each current amplifier stage are normally terminated in the printer Read-Write Memory plane. The output of each circuit is capable of supplying approximately 400 milliamperes of current to an external load which may be defined as the full amount of current required to change the state of the ferrite material used in the Read-Write Memory planes. Output switching transitions may be observed at the test points provided.

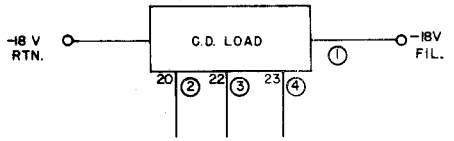
REVISIONS				
ZONE	SYM	DESCRIPTION	DATE	APPROVAL
	0	REL TO PED	11-14-61	



WARNING — THE INSERTION OR WITHDRAWAL OF THIS MODULE WHEN DC POWER IS PRESENT AT THE CONNECTOR MAY RESULT IN PERMANENT DAMAGE TO THE SEMI CONDUCTORS.

34106

LOGIC SYMBOL



ITEM	REQD	PART NO	DESCRIPTION	MATL	MATL SPEC	UNIT WT

LIST OF MATERIALS

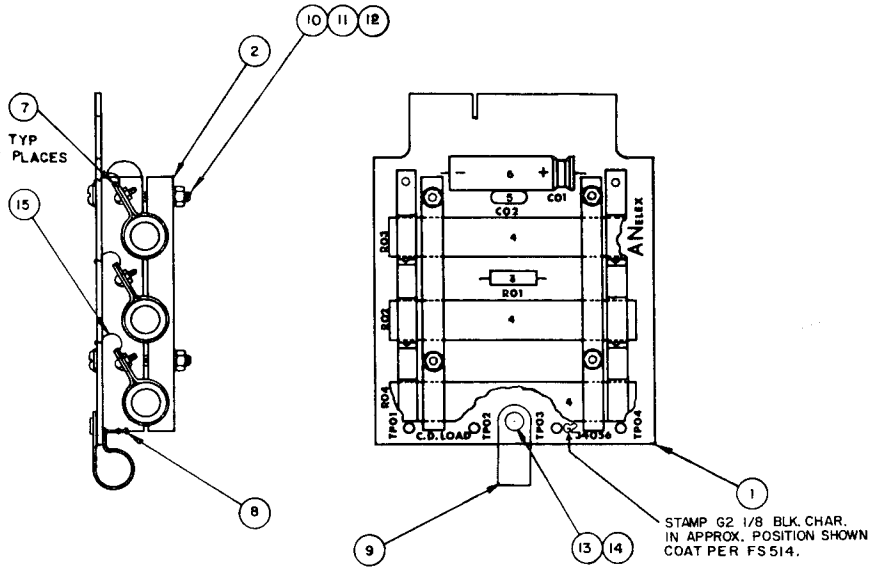
UNLESS OTHERWISE SPECIFIED	SIGNATURES	DATE		
DIMENSIONS ARE IN INCHES TOLERANCES ON FRACTIONS DECIMALS ANGLES	DR M.P. Graham	9/27/62	CORE DRIVER LOAD SCHEMATIC	ANelex CORPORATION BOSTON MASS
MATERIAL	CHK C. Erickson	9/27/62		
FINISH	APPD	9/27/62		C 34106
HEAT TREAT	APPD	9/27/62	SCALE NONE WT	

34056	
NEXT ASSY	USED ON
APPLICATION	

APPROVED PROD. ENG. 11/12/62 DATE AUTHORITY

NOTES
1. NO'S ON COMPONENTS ARE ITEM NO'S

REVISIONS				
ZONE	SYM	DESCRIPTION	DATE	APPROVAL
	0	REL TO PED	9/18	
	A	REV PER ECA 16210	10-28-63	
	B	REV PER ECA 18314	12/7/63	
	C	REV PER ECA 18946	2-32-64	



34056
C

ITEM	REQD	PART NO	DESCRIPTION	MATL	MATL SPEC	UNIT WT
16	REF	34106	SCHEMATIC, CORE DR. LOAD			
15	AR	465-107-001	WIRE, SOLID TINNED	# 22		
14	1	95642	COMPRESSION RIVET, FEMALE			
13	1	95641	COMPRESSION RIVET, MALE			
12	8	933-109-005	WASHER, PLAIN # 4			
11	4	95619	SCREW #4-40 X 1 1/8 BIND. HD.			
10	4	776-117-002	NUT, SELF LOCKING #4-40			
9	1	141-101-006	CLAMP, CABLE			
8	4	420-111-002	TERMINAL, STUD			
7	AR	791-101-001	PAINT, INSUL. GLOSS RED			
6	1	134-103-014	CAPACITOR 75 μF 25V			
5	1	134-501-053	CAPACITOR 1000 μμF 100V			
4	3	387-506-001	RESISTOR 90.6Ω 13W 1%			
3	1	387-111-015	RESISTOR 3.9Ω 1W 5%			
2	2	33030	BRACKET, RESISTOR			
1	1	34156	P.C. CARD, CORE DR. LOAD			

LIST OF MATERIALS

NEXT ASSY	USED ON
APPLICATION	

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON FRACTIONS ++ DECIMALS ++ ANGLES ++
MATERIAL
FINISH
HEAT TREAT

SIGNATURES		DATE
DR		8-23-63
CHK	M. Nichols	8/23/63
APPD		12/63
APPD		9/14/63

CORE DRIVER LOAD ASSEMBLY

SCALE 1/1 WT

ANelex
CORPORATION
BOSTON MASS

C 34056

(PC A)

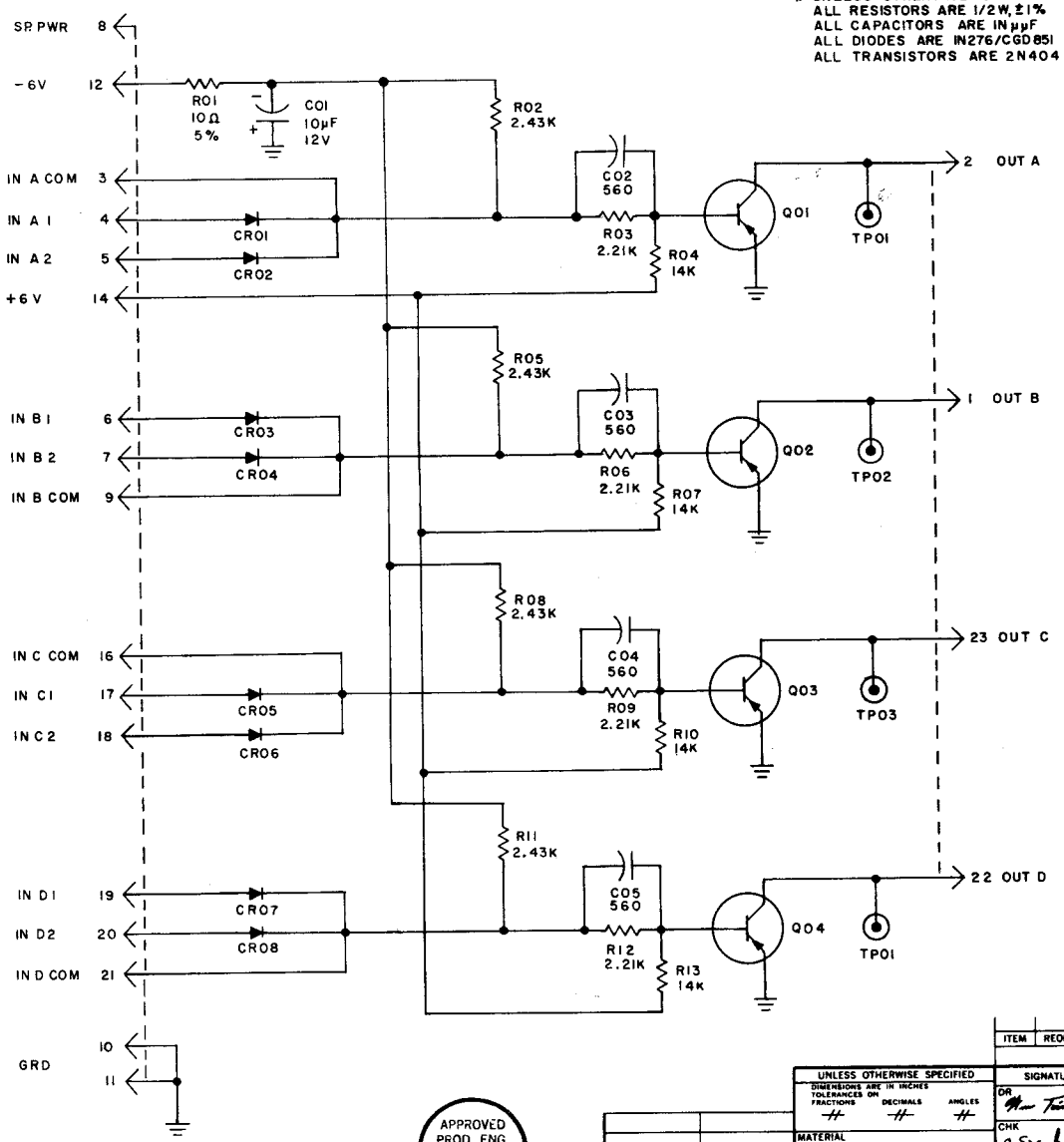
CORE DRIVER LOAD

The ANelex Core Driver Load printed circuit card contains three film oxide resistors to provide the current load termination required for the ferrite memory plane. Each termination represents one-half of the full switching current required for the ferrite material used in the memory plane. The film oxide resistors are also non-inductive and thus provide a load with a nonreactive component to the input switching currents.

Two current load resistors may be connected in parallel to provide the full switching current required for the ferrite memory. A single core driver module can, therefore, provide either three half current terminations, or one full current and one half current termination. Switching waveforms may be observed at the test points provided.

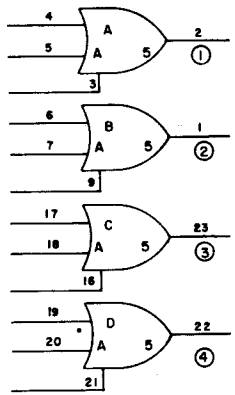
REVISIONS				
ZONE	SYM	DESCRIPTION	DATE	APPROVAL
		REL TO PED	1-24-64	

NOTES:
1. UNLESS OTHERWISE SPECIFIED
ALL RESISTORS ARE 1/2W, ±1%
ALL CAPACITORS ARE IN μF
ALL DIODES ARE IN276/CGD851
ALL TRANSISTORS ARE 2N404



WARNING — THE INSERTION OR WITHDRAWAL OF THIS MODULE WHEN DC POWER IS PRESENT AT THE CONNECTOR MAY RESULT IN PERMANENT DAMAGE TO THE SEMI CONDUCTORS

LOGIC SYMBOL



34107

ITEM	REQD	PART NO	DESCRIPTION	MATL	MATL SPEC	UNIT WT

LIST OF MATERIALS

APPROVED PROD. ENG. 1/17/64 DATE SPP AUTHORITY

34057	
NEXT ASSY	USED ON
APPLICATION	

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON FRACTIONS — DECIMALS — ANGLES
MATERIAL
FINISH
HEAT TREAT

SIGNATURES		DATE
DR		9-14-62
CHK	C. Erickson	9/6/62
APPD		9/7/62
APPD		9/21/62

A NOR 5
SCHEMATIC

SCALE NONE WT

ANelex
CORPORATION
BOSTON MASS

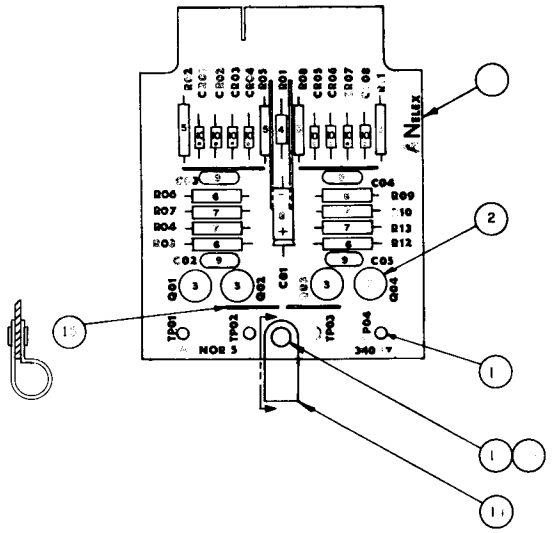
C 34107

REVISIONS				
ZONE	SYM	DESCRIPTION	DATE	APPROVAL
	0	REL TO PED	[illegible]	[illegible]
	A	REV PER ECA 16210	10-[illegible]-63	RJH
	B	REV. PER ECA 18314	12-7-[illegible]	RJH
	C	REV. PER ECA 18346	2-22-[illegible]	RJH

NOTES:

ALL TRANSISTORS ARE MOUNTED ON ITEM 2.

2. NO'S ON COMPONENTS ARE ITEM NO'S.
3. CATHODE END OF DIODE INDICATED BY DOT.
4. STAMP G2 1/8 BLK. CHAR AFTER ASSY. NO. COAT PER FS514.



34057

C

ITEM	REQ	PART NO	DESCRIPTION	MATL	MAT SPEC	UNIT WT
16	REF	34107	SCHEMATIC, A NOR 5			
15	AR	465-101-021	WIRE, INSULATED, BLK VINYL	#22		
14	1	141-101-00[illegible]	CLAMP, CABLE			
13	1	95642	COMPRESSION RIVET, FEMALE			
12	1	9564[illegible]	COMPRESSION RIVET, MALE			
11	4	#20-1H-[illegible]02	TERMINAL, STUD			
10	8	168-102-[illegible]	DIODE	1N276		
9	4	134-501-047	CAPACITOR, 560μμF			
8	1	134-101-008	CAPACITOR, 10μF, 12V			
7	4	387-102-[illegible]	RESISTOR 1K, 1/2W, 1%			
6	4	387-102-226	2.21K, 1/2W, 1%			
5	4	387-102-[illegible]30	2.43K, 1/2W, 1%			
4	1	387-110-025	RESISTOR, 10Ω, 1/2W, 5%			
3		436-103-001	TRANSISTOR, PNP	2N404		
2	4	438-101-001	PAD, MOUNTING, TRANSISTOR			
1	1	34157	P.C. CARD. A NOR 5			

LIST OF MATERIALS

UNLESS OTHERWISE SPECIFIED	SIGNATURES	DATE		
DIMENSIONS ARE IN INCHES TOLERANCES ON FRACTIONS ± DECIMALS ± ANGLES	DR J. Mayhoff	8-1-63	A NOR 5 ASSEMBLY	ANelex CORPORATION BOSTON MASS
MATERIAL	CHK M. Nichols	8/15/63		
FINISH	APPD R. Shea	8/[illegible]		SIZE 34057
HEAT TREAT	APPD T. J. Sweeney	9/3/63	SCALE 1/1 WT	
XT - SS ON APPLICATION				

A NOR 5

The ANelex A NOR 5 printed circuit card contains four identical independent current operated NOR circuits. Each circuit is composed of an input diode network followed by an inverter stage. The diode network consists of two parallel diode inputs with an associated common input from the diode buss.

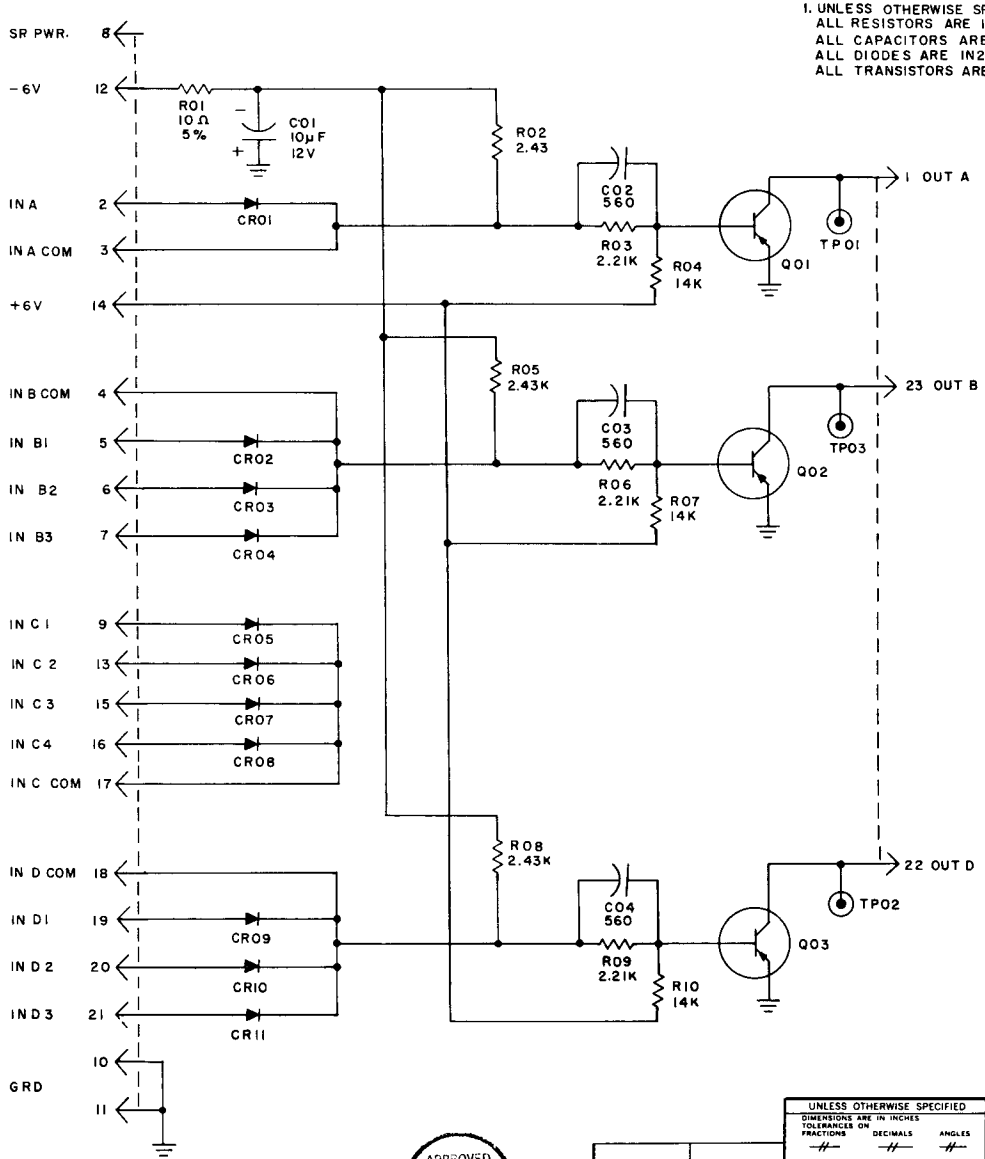
The output current flow from any ANelex A NOR circuit will be inhibited whenever signal current (zero volt level) is applied to any one of the inputs of that particular ANelex A NOR circuit. Output current will flow in any ANelex A NOR circuit whenever signal current is absent (-3 volt level) from all of the inputs of that particular NOR circuit.

The amount of input (current) loading produced by each A NOR 5 circuit is defined as one standard unit load. The output of each A NOR 5 circuit is capable of driving five unit loads, and may be observed at the test points provided.

NOTES:

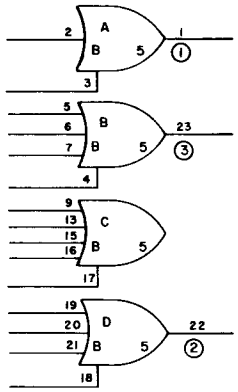
1. UNLESS OTHERWISE SPECIFIED
   ALL RESISTORS ARE 1/2W ± 1%
   ALL CAPACITORS ARE IN μμF
   ALL DIODES ARE IN276/CGD 851
   ALL TRANSISTORS ARE 2N404

REVISIONS				
ZONE	SYM	DESCRIPTION	DATE	APPROVAL
	0	REL TO PED	11/64	



WARNING— THE INSERTION OR WITHDRAWAL OF THIS MODULE WHEN DC POWER IS PRESENT AT THE CONNECTOR MAY RESULT IN PERMANENT DAMAGE TO THE SEMI CONDUCTORS.

LOGIC SYMBOL



34108

ITEM	REQD	PART NO	DESCRIPTION	MATL	MATL SPEC	UNIT WT

LIST OF MATERIALS

APPROVED PROD. ENG. 1/17/64 DATE AUTHORITY

34 058	
NEXT ASSY	USED ON
APPLICATION	

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON FRACTIONS DECIMALS ANGLES
MATERIAL
FINISH
HEAT TREAT

SIGNATURES	DATE
DR N. Trivonen	8-13-62
CHK C. Erickson	9/27/62
APPD	9/27/62
APPD	9/28/62

B NOR 5
SCHEMATIC

ANelex
CORPORATION
BOSTON MASS

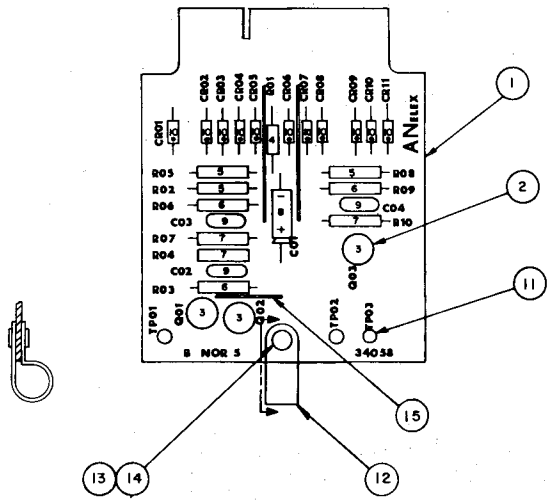
C 34108

SCALE NONE WT

REVISIONS				
ZONE	SYM	DESCRIPTION	DATE	APPROVAL
	O	REL TO PED	9/13	
	A	REV PER ECA 16210	10-25-63	
	B	REV PER ECA 18314	12-7-63	
	C	REV PER ECA 18946	2-22-63	

NOTES:

1. ALL TRANSISTORS ARE MOUNTED ON ITEM 2.
2. NO'S ON COMPONENTS ARE ITEM NO'S.
3. CATHODE END OF DIODE INDICATED BY DOT.
4. STAMP G2 1/8 BLK. CHAR. AFTER ASSY. NO. COAT PER FS 514.



34058 C

ITEM	REQD	PART NO	DESCRIPTION	MATL	MATL SPEC	UNIT WT
16	REF	34108	SCHEMATIC, B NOR 5			
15	AR	465-101-021	WIRE, INSULATED, BLK VINYL	#22		
14	1	95642	COMPRESSION RIVET, FEMALE			
13	1	95641	COMPRESSION RIVET, MALE			
12	1	141-101-006	CLAMP, CABLE			
11	3	420-111-002	TERMINAL, STUD			
10	11	168-102-001	DIODE	1N276		
9	3	134-501-047	CAPACITOR, 560 μμF,			
8	1	134-101-008	CAPACITOR, 10μF, 12V			
7	3	387-102-303	RESISTOR, 14K, 1/2W, 1%			
6	3	387-102-226	2.21K, 1/2W, 1%			
6	3	387-102-230	2.43K, 1/2W, 1%			
4	1	387-110-025	RESISTOR, 10Ω, 1/2W, 5%			
3	3	436-103-001	TRANSISTOR PNP	2N404		
2	3	438-101-001	PAD, MOUNTING, TRANSISTOR			
1	1	34158	P.C. CARD, B NOR 5			

LIST OF MATERIALS

UNLESS OTHERWISE SPECIFIED	SIGNATURES	DATE
DIMENSIONS ARE IN INCHES TOLERANCES ON FRACTIONS — DECIMALS — ANGLES	DR T. Mayhugh	8-15-63
MATERIAL	CHK M. Nicholas	8/15/63
FINISH	APPD R. Dow	9/14/63
HEAT TREAT	APPD D. Sweeney	9/16/63

NEXT ASSY	USED ON
APPLICATION	

B NOR 5
ASSEMBLY

ANelex
CORPORATION
BOSTON MASS

C 34058

SCALE 1/1 WT

B NOR 5

The ANelex B NOR 5 printed circuit card contains three current operated NOR circuits, and one floating diode network. Each NOR circuit is composed of an input diode network followed by an inverter stage. Two of the three NOR circuits are identical in that each circuit has three diodes and a common from the diode buss. The other B NOR circuit has an input network composed of a single diode with an associated common. The floating diode network is composed of four diodes and an associated common from the diode buss which may be connected with the common from any other ANelex diode network to expand the number of diode inputs.

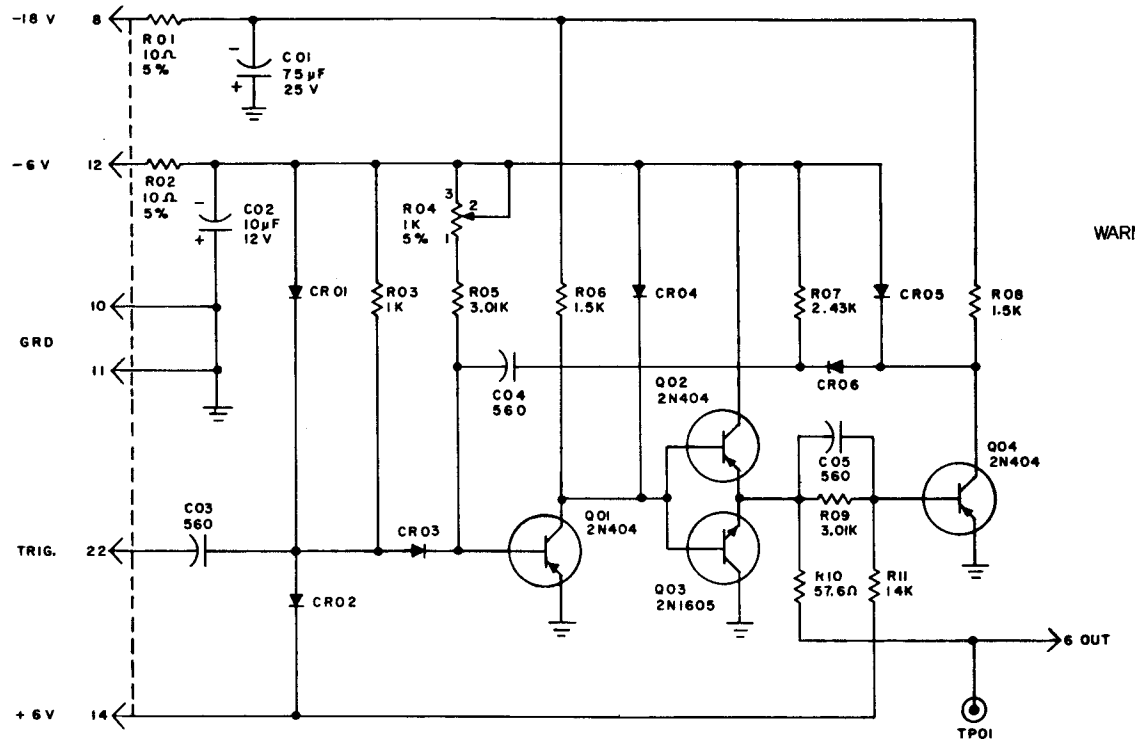
The output current flow from any ANelex NOR B circuit will be inhibited whenever signal current (zero volt level) is applied to any one of the inputs of that particular NOR circuit. Output current will flow in any ANelex B NOR circuit whenever signal current is absent (-3 volt level) from all of the inputs of that particular NOR circuit.

The amount of input (current) loading produced by each B NOR 5 circuit is defined as one standard unit load. The output of each B NOR 5 circuit is capable of driving five unit loads, and may be observed at the test points provided.

REVISIONS				
ZONE	SYM	DESCRIPTION	DATE	APPROVAL
	0	REL TO PED	12/4/62	

NOTES:

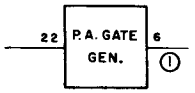
1. UNLESS OTHERWISE SPECIFIED:
   ALL RESISTORS ARE 1/2W ± 1%
   ALL CAPACITORS ARE IN μμF
   ALL DIODES ARE IN276



WARNING— THE INSERTION OR WITHDRAWAL OF THIS MODULE WHEN DC POWER IS PRESENT AT THE CONNECTOR MAY RESULT IN PERMANENT DAMAGE TO THE SEMI CONDUCTORS

34110

LOGIC SYMBOL



ITEM	REQD	PART NO	DESCRIPTION	MATL	MATL SPEC	UNIT WT

LIST OF MATERIALS

APPROVED
D ENG.
1/17/64
AUTHORITY

34060	
NEXT ASSY	USED ON
APPLICATION	

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON FRACTIONS ++ DECIMALS ++ ANGLES ++
MATERIAL ++
FINISH ++
HEAT TREAT ++

SIGNATURES	DATE
DR	9-29-62
CHK	10/4/62
APPD	10/5/62
APPD	10/5/62

P.A. GATE GEN
SCHEMATIC

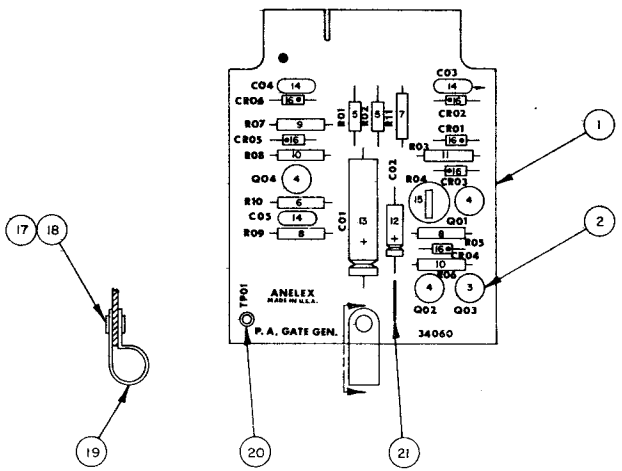
ANelex
CORPORATION
BOSTON MASS

C 34110

SCALE NONE WT

REVISIONS				
ZONE	SYM	DESCRIPTION	DATE	APPROVAL
	0	REL TO PED	11/24	
	A	REV PER ECA 18314	12-7-64	

NOTES:
1. ALL TRANSISTORS ARE MOUNTED ON ITEM 2.
2. NO'S ON COMPONENTS ARE ITEM NO'S.
3. CATHODE END OF DIODE INDICATED BY DOT.



ITEM	REQD	PART NO	DESCRIPTION	MATL	MATL SPEC	UNIT WT
22	REF	34110	SCHEMATIC, P.A. GATE GEN.			
21	AR	465-101-021	WIRE, INSULATED, BLK. VINYL	#22		
20	1	420-111-002	TERMINAL, STUD			
19	1	141-101-006	CLAMP, CABLE			
18	1	95642	COMPRESSION RIVET FEMALE			
17	1	95641	COMPRESSION RIVET MALE			
16	6	168-102-001	DIODE	1N276		
15	1	357-111-004	POTENTIOMETER 1K 1/2W, 5%			
14	3	134-501-047	CAPACITOR, 560 μμ F			
13	1	134-103-014	CAPACITOR, 75 μF, 25 V			
12	1	134-101-008	CAPACITOR, 10μF 12 V			
11	1	387-102-193	RESISTOR 1K 1/2W, 1%			
10	2	387-102-210	RESISTOR 1.5K 1/2W, 1%			
9	1	387-102-230	RESISTOR 2.43K 1/2W, 1%			
8	2	387-102-239	RESISTOR 3.01K 1/2W, 1%			
7	1	387-102-303	RESISTOR 14 K 1/2W, 1%			
6	1	387-102-074	RESISTOR 57.6Ω 1/2 W, 1%			
5	2	387-110-025	RESISTOR 10 Ω 1/2W, 5%			
4	3	436-103-001	TRANSISTOR PNP	2N404		
3	1	436-107-001	TRANSISTOR NPN	2N1605		
2	4	438-101-001	PAD, MOUNTING, TRANSISTOR			
1	1	34160	P. C. CARD, P. A. GATE GEN.			

LIST OF MATERIALS

34060 A

APPROVED PROD. ENG. 11-27-63 DATE AUTHORITY

UNLESS OTHERWISE SPECIFIED			
DIMENSIONS ARE IN INCHES TOLERANCES ON FRACTIONS	DECIMALS	ANGLES	
MATERIAL			
FINISH			
HEAT TREAT			

SIGNATURES	DATE
DR	11-25-63
CHK	11/25/63
APPD	11/26/63
APPD	11/26/63

NEXT ASSY	USED ON
APPLICATION	

P A GATE GEN ASSEMBLY

ANelex CORPORATION BOSTON MASS

C 34060

SCALE 1/1 WT

P. A. GATE GENERATOR

The ANelex P. A. (Pulse Amplifier) Gate Generator printed circuit card contains one complete pulse generating circuit which provides a synchronous strobing function for ANelex R/W (read-write) Sense (pulse) Amplifier modules. Normally the P. A. Gate Generator disables any associated R/W Sense Amplifier circuits and thus prevents noise and other extraneous signals from appearing in the Sense Amplifier outputs while writing or other memory conditioning functions are in progress. When the P. A. Gate Generator is triggered by the presence of (read) current in the corresponding (read) Core Driver load resistors, it will generate a discrete duration gating signal to enable the sense amplifier circuits during the period that stored memory data is presented to the sense amplifiers.

The P. A. Gate Generator circuit is composed of three basic sections, a passive network to provide input noise rejection and signal differentiation, a basic one shot multivibrator stage (Q1 and Q4) which provides the proper time delay interval for the sense amplifier enabling signal, and a complemented emitter follower output buffer, which functions as a coupling link in the multivibrator loop and provides a low impedance output to drive the gate inputs of the sense amplifier modules. The output pulse width is adjustable by an internal vernier, which has been provided for precise setting of the delay cycle.

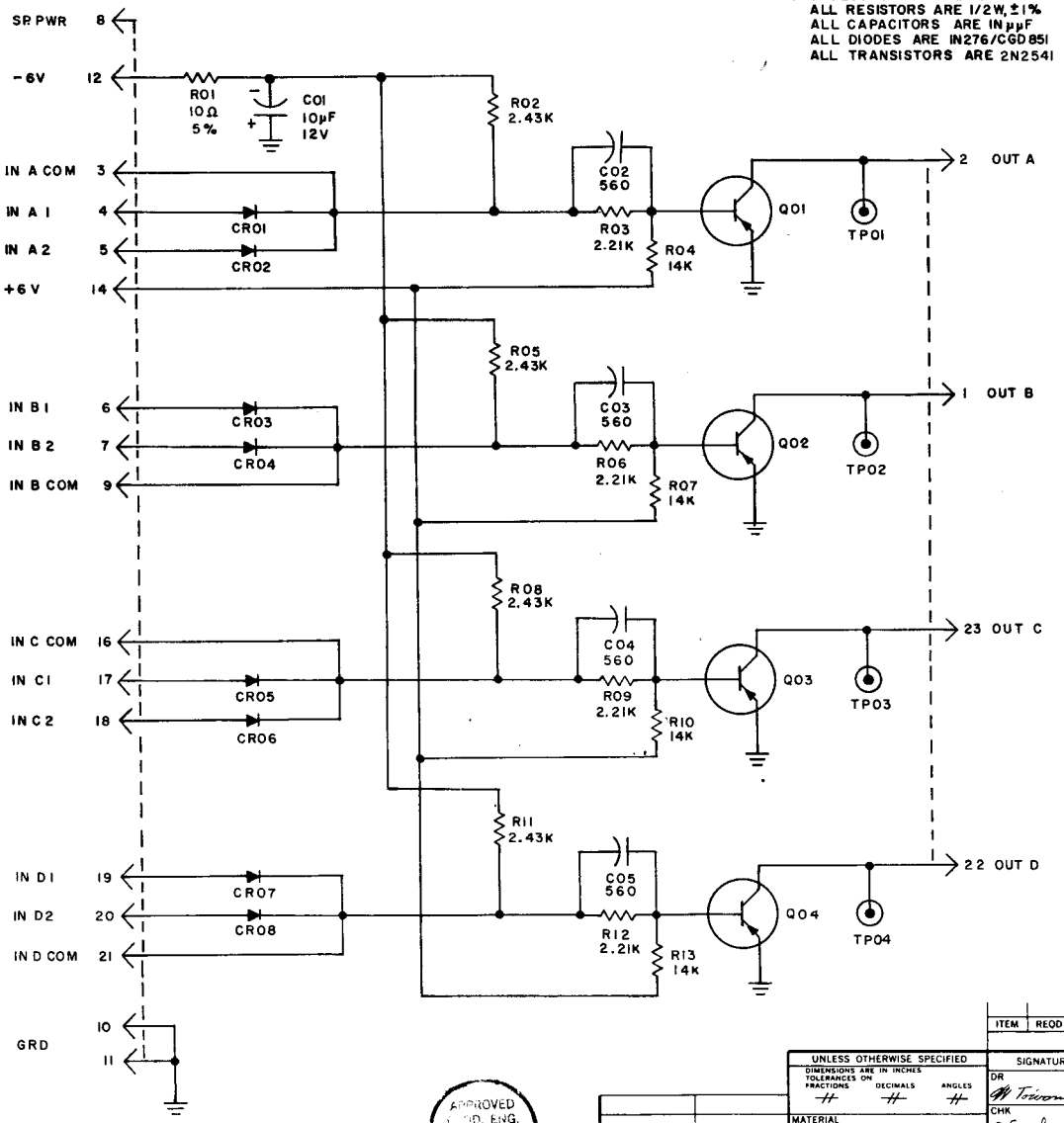
The P. A. Gate Generator is triggered by a differentiated positive going transition. When the P. A. Gate Generator circuit is in a quiescent state the circuit output remains at a constant zero volt level.

When the P. A. Gate Generator is triggered the circuit will produce an output transition that will initially swing from a 0 volt level to a -6 volt level and remain at this level during the delay period, and then return back to the quiescent 0 volt level at the end of the delay cycle. The output of the P. A. Gate Generator is capable of driving 7 sense amplifier gate inputs and may be observed at the test points provided.

REVISIONS				
ZONE	SYM	DESCRIPTION	DATE	APPROVAL
		REL TO PED	9/24	

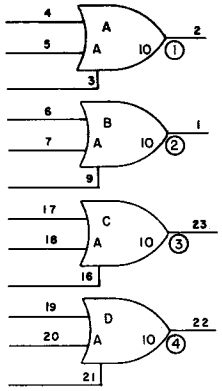
NOTES:

1. UNLESS OTHERWISE SPECIFIED
   ALL RESISTORS ARE 1/2W, ±1%
   ALL CAPACITORS ARE IN μμF
   ALL DIODES ARE IN276/CGD851
   ALL TRANSISTORS ARE 2N2541



WARNING— THE INSERTION OR WITHDRAWAL OF THIS MODULE WHEN D.C. POWER IS PRESENT AT THE CONNECTOR MAY RESULT IN PERMANENT DAMAGE TO THE SEMI CONDUCTORS.

LOGIC SYMBOL



34116

ITEM	REQD	PART NO	DESCRIPTION	MATL	MATL SPEC	UNIT WT

LIST OF MATERIALS

APPROVED
ENG.
1/17/67
AUTHORITY

UNLESS OTHERWISE SPECIFIED	
DIMENSIONS ARE IN INCHES TOLERANCES ON FRACTIONS DECIMALS ANGLES	
MATERIAL	
FINISH	
HEAT TREAT	

34066	
NEXT ASSY	USED ON
APPLICATION	

SIGNATURES	DATE
DR	8-24-62
CHK C. Erickson	9-26-62
APPD	9/4/62
APPD	9/27/62

A NOR 10
SCHEMATIC

SCALE NONE WT

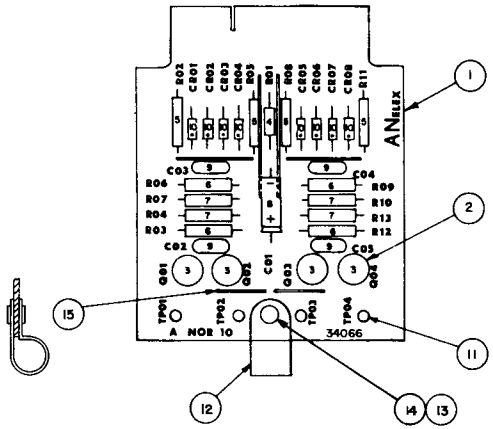
ANelex
CORPORATION
BOSTON MASS

C 34116

REVISIONS				
ZONE	SYM	DESCRIPTION	DATE	APPROVAL
	O	REL TO PED	9/11/63	[illegible]
	A	REV PER ECA 16210	10-25-63	RM
	B	REV PER ECA 18314	12-7-64	RM
	C	REV PER ECA 18946	2-22-65	RM

NOTES:

1. ALL TRANSISTORS ARE MOUNTED ON ITEM 2.
2. NO'S ON COMPONENTS ARE ITEM NO'S.
3. CATHODE END OF DIODE INDICATED BY DOT.
4. STAMP G2 1/8 BLK. CHAR. AFTER ASSY. NO COAT PER FS514.



34066 C

ITEM	REQD	PART NO	DESCRIPTION	MATL	MATL SPEC	UNIT WT
16	REF	34116	SCHEMATIC, A NOR 10			
15	AR	465-101-021	WIRE, INSULATED, BLK, VINYL	# 22		
14	1	95641	COMPRESSION RIVET, MALE			
13	1	95642	COMPRESSION RIVET, FEMALE			
12	1	141-101-006	CLAMP, CABLE			
11	4	420-111-001	TERMINAL, STUD			
10	8	168-102-001	DIODE	1N276		
9	4	134-501-047	CAPACITOR, 560μμF			
8	1	134-101-008	CAPACITOR, 10μF, 12V			
7	4	387-102-303	RESISTOR, 14K, 1/2W, 1%			
6	4	387-102-226	2.21K, 1/2W, 1%			
5	4	387-102-230	2.43K, 1/2W, 1%			
4	1	387-110-025	RESISTOR, 10Ω, 1/2W, 5%			
3	4	436-126-001	TRANSISTOR, PNP	GTR502		
2	4	438-101-001	PAD, MOUNTING, TRANSISTOR			
1	1	34166	P.C. CARD, A NOR 10			

LIST OF MATERIALS

UNLESS OTHERWISE SPECIFIED			
DIMENSIONS ARE IN INCHES			
TOLERANCES ON FRACTIONS	DECIMALS	ANGLES	
—	—	—	
MATERIAL	—		
FINISH	—		
HEAT TREAT	—		

SIGNATURES		DATE
DR	[illegible]	8-15-63
CHK	M. Nichols	9/15/63
APPD	R. Glass	9/12
APPD	[illegible]	9/16/63

NEXT ASSY	USED ON
APPLICATION	

A NOR 10
ASSEMBLY

SCALE 1/1 WT

ANelex
CORPORATION
BOSTON MASS

C 34066

A NOR 10

The ANelex A NOR 10 printed circuit card contains four identical independent current operated NOR circuits. Each circuit is composed of an input diode network followed by an inverter stage. The diode network consists of two parallel diode inputs with an associated common from the diode buss.

The output current flow from any ANelex A NOR circuit will be inhibited whenever signal current (zero volt level) is applied to any one of the inputs of that particular NOR circuit. Output current will flow in any ANelex A NOR circuit whenever signal current is absent (-3 volt level) from all of the inputs of that particular NOR circuit.

The amount of input (current) loading produced by each A NOR 10 circuit is defined as one standard unit load. The output of each A NOR 10 circuit is capable of driving ten unit loads, and may be observed at the test points provided.

REVISIONS				
ZONE	SYM	DESCRIPTION	DATE	APPROVAL
	0	REL. TO PED.	4/24/64	

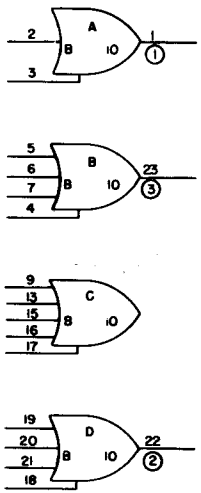
NOTES:

1 UNLESS OTHERWISE SPECIFIED:
ALL RESISTORS ARE 1/2W ±1%
ALL CAPACITORS ARE IN μμF
ALL DIODES ARE IN276
ALL TRANSISTORS ARE 2N2541

WARNING— THE INSERTION OR WITHDRAWAL OF THIS MODULE WHEN DC POWER IS PRESENT AT THE CONNECTOR MAY RESULT IN PERMANENT DAMAGE TO THE SEMI CONDUCTORS.

SP. PWR. 8
−6V 12
R01 10Ω 5%
C01 10μF 12V
IN A 2
IN A COM 3
+6V 14
CR01
R02 2.43K
C02 560
R03 2.21K
R04 14K
Q01
TP01
1 OUT A
IN B COM 4
IN B1 5
IN B2 6
IN B3 7
CR02
CR03
CR04
R05 2.43K
C03 560
R06 2.21K
R07 14K
Q02
TP03
23 OUT B
IN C1 9
IN C2 13
IN C3 15
IN C4 16
IN C COM 17
CR05
CR06
CR07
CR08
IN D COM 18
IN D1 19
IN D2 20
IN D3 21
CR09
CR10
CR11
R08 2.43K
C04 506
R09 2.21K
R10 14K
Q03
TP02
22 OUT D
GRD. 10
11

LOGIC SYMBOL



34117

ITEM	REQD	PART NO	DESCRIPTION	MATL	MATL SPEC	UNIT WT

LIST OF MATERIALS

APPROVED PROD. ENG. 4/17/64

UNLESS OTHERWISE SPECIFIED	
DIMENSIONS ARE IN INCHES	
TOLERANCES ON FRACTIONS	DECIMALS ANGLES
#	# #
MATERIAL	#
FINISH	++
HEAT TREAT	++

34067	
NEXT ASSY	USED ON
APPLICATION	

SIGNATURES	DATE
DR	4/27/64
CH	4/27/64
APPD	
APPD	4/27/64

B NOR 10
SCHEMATIC

SCALE NONE WT

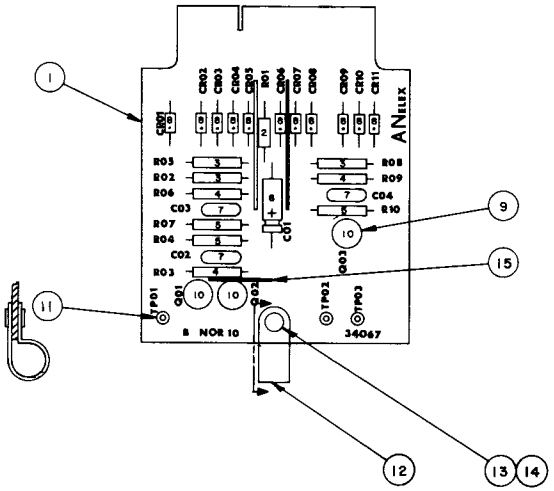
ANelex
CORPORATION
BOSTON MASS

C 34117

REVISIONS				
ZONE	SYM	DESCRIPTION	DATE	APPROVAL
	0	REL. TO PED.	9/13	MD
	A	REV PER ECA 16210	10-2-63	RH
	B	REV PER ECA 18314	12-7-63	RH
	C	REV PER ECA 18946	2-27-64	RH

NOTES:

1. ALL TRANSISTORS ARE MOUNTED ON ITEM 9.
2. NO'S ON COMPONENTS ARE ITEM NO'S.
3. CATHODE END OF DIODE INDICATED BY DOT.
4. STAMP G2 1/8 BLK. CHAR. AFTER ASSY. NO. COAT PER FS514.



34067 C

ITEM	REQD	PART NO	DESCRIPTION	MATL	MATL SPEC	UNIT WT
16	REF	34117	SCHEMATIC, B NOR 10			
15	AR	465-101-021	WIRE, INSULATED, BLK, VINYL #22			
14	1	95642	COMPRESSION RIVET, FEMALE			
13	1	95641	COMPRESSION RIVET, MALE			
12	1	141-101-006	CLAMP, CABLE			
11	3	420-111-002	TERMINAL, STUD			
10	3	436-128-001	TRANSISTOR, PNP	GTR 502		
9	3	438-101-001	PAD, MOUNTING, TRANSISTOR			
8	11	168-102-001	DIODE	IN 276		
7	3	134-501-047	CAPACITOR, 560 μμF			
6	1	134-101-008	CAPACITOR, 10 μF, 12V			
5	3	387-102-303	RESISTOR, 14K, 1/2W, 1%			
4	3	387-102-226	2.21K, 1/2W, 1%			
3	3	387-102-230	2.43K, 1/2W, 1%			
2	1	387-110-025	RESISTOR, 10Ω, 1/2W, 5%			
1	1	34167	P.C. CARD, B NOR 10			

LIST OF MATERIALS

NEXT ASSY	USED ON
APPLICATION	

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON FRACTIONS: # DECIMALS: # ANGLES: #
MATERIAL: #
FINISH: #
HEAT TREAT: #

SIGNATURES		DATE
DR	L. Magli, Jr.	8-14-63
CHK	M. Nichols	8/15/63
APPD	R. Stiles	9/11/63
APPD	D. J. Sweeney	9/11/63

B NOR 10
ASSEMBLY

ANelex
CORPORATION
BOSTON MASS

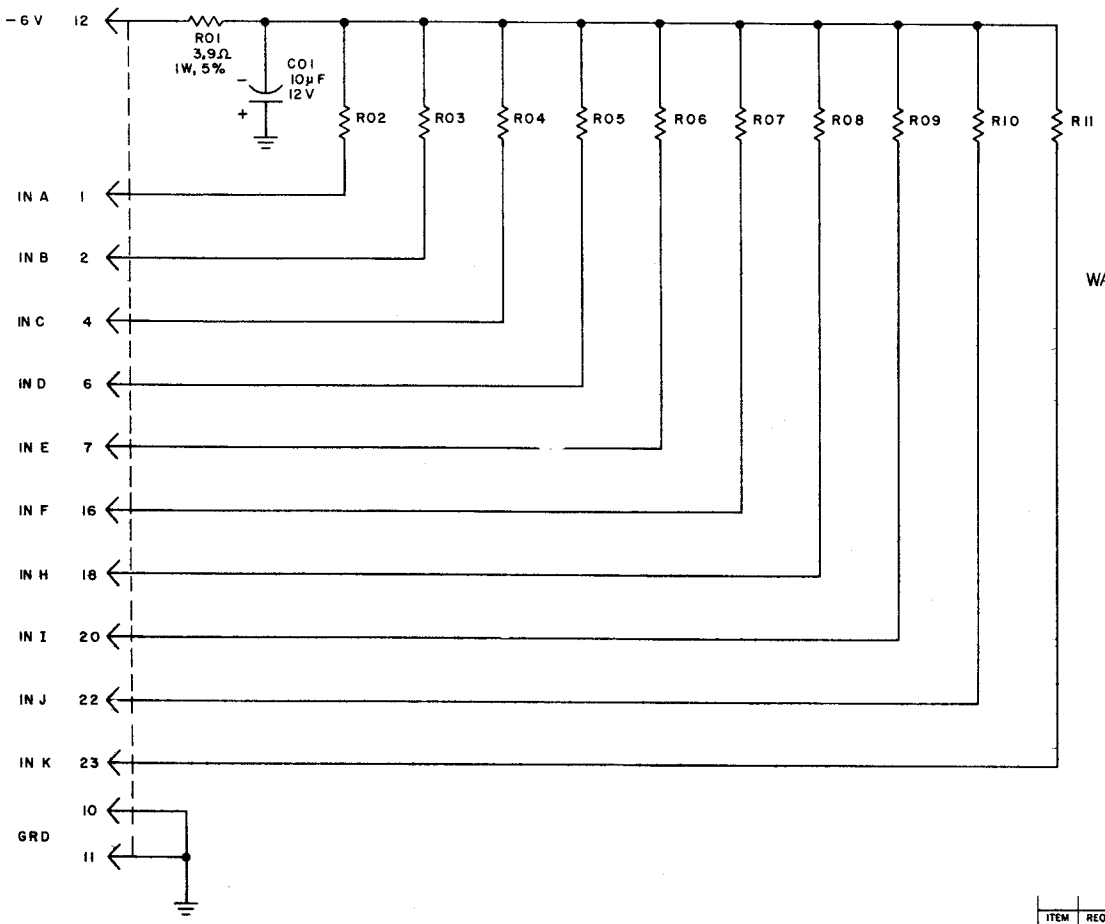
SCALE 1/1 WT

C 34067

REVISIONS				
ZONE	SYM	DESCRIPTION	DATE	APPROVAL
	0	REL TO PED	11-1-62	

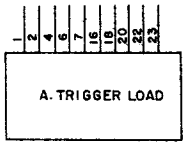
NOTES:

1. UNLESS OTHERWISE SPECIFIED:
   ALL RESISTORS ARE 301Ω, 1/2W, 1%



WARNING— THE INSERTION OR WITHDRAWAL OF THIS MODULE WHEN DC POWER IS PRESENT AT THE CONNECTOR MAY RESULT IN PERMANENT DAMAGE TO THE SEMI CONDUCTORS.

LOGIC SYMBOL



34122

ITEM	REQD	PART NO	DESCRIPTION	MATL	MATL SPEC	UNIT WT

LIST OF MATERIALS

34072	
NEXT ASSY	USED ON
APPLICATION	

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON FRACTIONS DECIMALS ANGLES
MATERIAL
FINISH
HEAT TREAT

SIGNATURES		DATE
DR	J. Maglente	9-24-62
CHK	M. P. Adam	10/4/62
APPD	P. Stadd, Jr.	10/15/62
APPD		10/15/62

A. TRIGGER LOAD SCHEMATIC

SCALE NONE WT

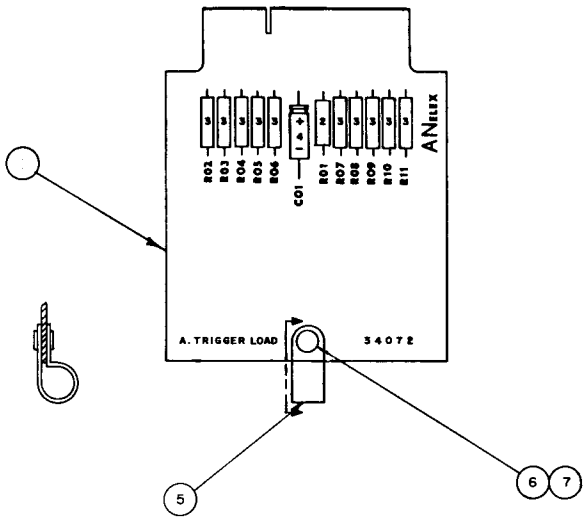
ANelex
CORPORATION
BOSTON MASS

C 34122

NOTES:

1. NO'S ON COMPONENTS ARE ITEM NO'S.
2. STAMP G2 1/8 BLK. CHAR. AFTER ASSY. NO. COAT PER FS514.

REVISIONS				
ZONE	SYM	DESCRIPTION	DATE	APPROVAL
	0	REL TO PED	9/24	
	A	REV PER ECA 16210	10-8-64	
	B	REV PER E.C.A. 16607	1-20-64	
	C	REV PER ECA 18314	12-7-64	
	D	REV PER ECA 18946	3-31-65	



34072 D

ITEM	REQD	PART NO	DESCRIPTION	MATL	MATL SPEC	UNIT WT
8	REF	34122	SCHEM, A. TRIGGER LOAD			
7	1	95642	COMPRESSION RIVET, FEMALE			
6	1	95641	COMPRESSION RIVET, MALE			
5	1	141-101-006	CLAMP, CABLE			
4	1	134-101-008	CAPACITOR, 10 μF, 12 V			
3	10	387-102-143	RESISTOR, 301Ω 1/2W 1%			
2	1	387-111-015	RESISTOR, 3.9Ω 1W 5%			
1	1	34172	P.C.CARD, A. TRIGGER LOAD			

LIST OF MATERIALS

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON FRACTIONS DECIMALS ANGLES
MATERIAL
FINISH
HEAT TREAT

SIGNATURES		DATE
DR	J. Maglio Jr.	5/27/63
CHK	M. Nichols	5/22/63
APPD	C. Glass	10/15/63
APPD	R. Burney	9/28/63

SCALE 1/1 WT

A. TRIGGER LOAD ASSEMBLY

ANelex CORPORATION BOSTON MASS

C 34072

NEXT ASSY | USED ON
APPLICATION

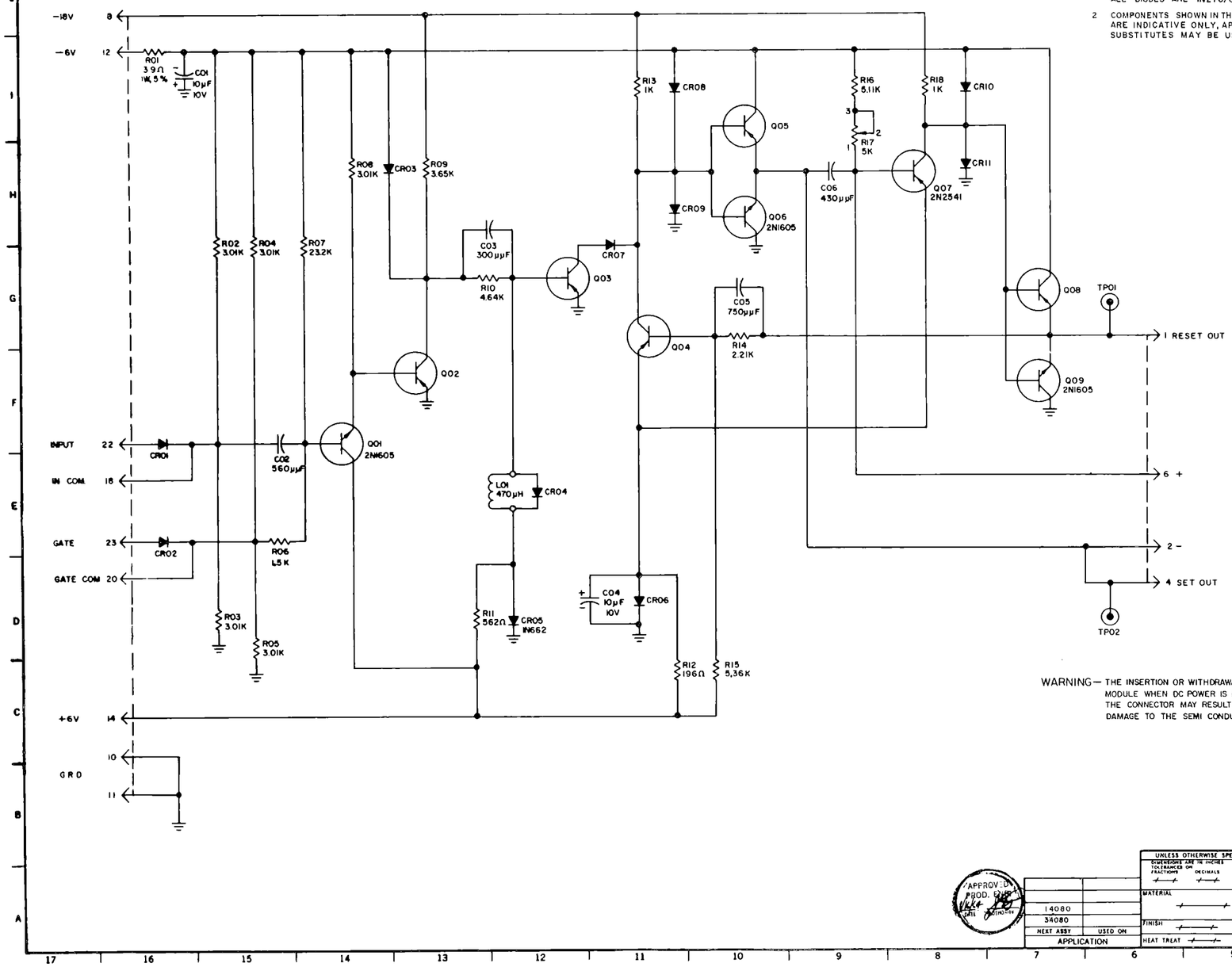
A. TRIGGER LOAD

The ANelex A. Trigger Load printed circuit card contains ten precision load resistors, and a resistor-capacitor filter for the -6 volt input power line. Each resistor functions as a load termination for the input trigger capacitor of a companion circuit, ANelex A Power Driver (ANelex Dwg. No. 33114). Each A. Trigger Load card provides precision load terminations for the trigger inputs of ten A Power Driver circuits.

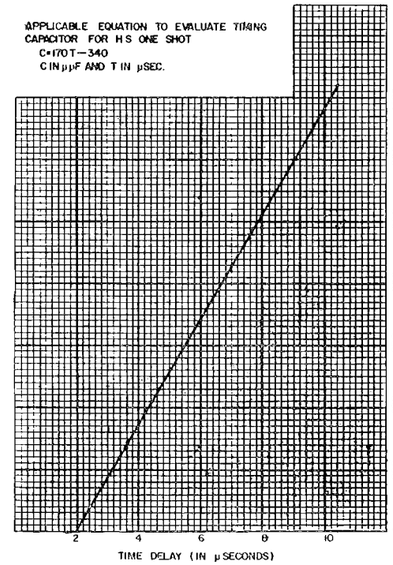
REVISIONS				
ZONE	SYM	DESCRIPTION	DATE	APPROVAL
	0	REL TO PED	2-11-64	
	A	REV. PER ECA 17047	5-4-64	
	B	REV. PER ECA 17634	6-4-64	
	C	REV. PER ECA 17856	7-9-64	

NOTES:

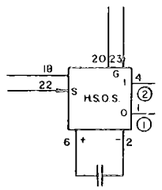
1. UNLESS OTHERWISE SPECIFIED:
   ALL RESISTORS ARE 1/2W, 1%;
   ALL TRANSISTORS ARE 2N404;
   ALL DIODES ARE IN276/CGD-851
2. COMPONENTS SHOWN IN THIS SCHEMATIC ARE INDICATIVE ONLY, APPROVED SUBSTITUTES MAY BE USED.



APPLICABLE EQUATION TO EVALUATE TIMING CAPACITOR FOR H S ONE SHOT
C=170T−340
C IN μμF AND T IN μSEC.



LOGIC SYMBOL



WARNING— THE INSERTION OR WITHDRAWAL OF THIS MODULE WHEN DC POWER IS PRESENT AT THE CONNECTOR MAY RESULT IN PERMANENT DAMAGE TO THE SEMI CONDUCTORS.

34130 C

ITEM	REQD	PART NO	DESCRIPTION	MATL	MATL SPEC	UNIT

LIST OF MATERIALS

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON FRACTIONS DECIMALS ANGLES
MATERIAL
FINISH
HEAT TREAT

SIGNATURES		DATE
DR	J. TILLEY	1/23/64
CHK		4/1/63
APPD		4/1/63
APPD		4/1/63

APPROVED PROD. ENGR. DATE

14080	
34080	
NEXT ASSY	USED ON
APPLICATION	

H.S. ONE SHOT SCHEMATIC

SCALE NONE WT

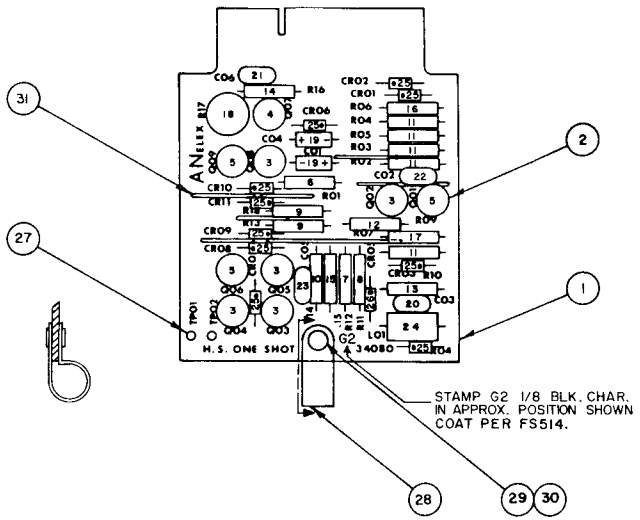
ANelex CORPORATION
603701 BOSTON

D 34130

REVISIONS				
ZONE	SYM	DESCRIPTION	DATE	APPROVAL
	0	REL TO PED	9/29	MJO
	A	REV PER ECA 16210	10-25-63	RJ
	B	REV PER ECA 18314	12-7-64	RJ
	C	REV PER ECA 18946	2-23-65	RJ

NOTES:

1. ALL TRANSISTORS ARE MOUNTED ON ITEM 2.
2. NO'S ON COMPONENTS ARE ITEM NO'S.
3. CATHODE END OF DIODE INDICATED BY DOT.



ITEM	REQD	PART NO	DESCRIPTION	MATL	MATL SPEC	UNIT WT
32	REF	34130	SCHEMATIC, H.S. ONE SHOT			
31	AR	465-101-021	WIRE, INSULATED, BLACK VINYL	# 22		
30	1	95642	COMPRESSION RIVET, FEMALE			
29	1	95641	COMPRESSION RIVET, MALE			
28	1	141-101-006	CLAMP, CABLE			
27	2	420-111-002	TERMINAL, STUD			
26	1	168-104-001	DIODE	1N662		
25	10	168-102-001	DIODE	IN276		
24	1	257-102-010	INDUCTOR 470 μH			
23	1	134-501-050	CAPACITOR 750 μμF			
22	1	134-501-047	560 μμF			
21	1	134-501-043	430 μμF			
20	1	134-501-039	300 μμF			
19	2	134-201-021	CAPACITOR 10μF ± 10V 10/20%			
18	1	357-114-006	POTENTIOMETER 5K 1W 5%			
17	1	387-102-324	RESISTOR 23.2K 1/2W 1%			
16	1	387-102-210	RESISTOR 1.5K 1/2W 1%			
15	1	-263	5.36K 1/2W 1%			
14	1	-261	5.11K 1/2W 1%			
13	1	-257	4.64K 1/2W 1%			
12	1	-247	3.65K 1/2W 1%			
11	5	-239	3.01K 1/2W 1%			
10	1	-226	2.21K 1/2W 1%			
9	2	-193	1K 1/2W 1%			
8	1	-169	562Ω 1/2W 1%			
7	1	387-102-125	196Ω 1/2W 1%			
6	1	387-111-015	RESISTOR 3.9Ω 1W 5%			
5	3	436-107-001	TRANSISTOR NPN	2N1605		
4	1	436-128-001	TRANSISTOR PNP	GTR502		
3	5	436-103-001	TRANSISTOR PNP	2N404		
2	9	438-101-001	PAD, MOUNTING, TRANSISTOR			
1	1	34180	P.C. CARD, H.S. ONE SHOT			

LIST OF MATERIALS

34080 C

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON FRACTIONS ± DECIMALS ± ANGLES ±
MATERIAL
FINISH
HEAT TREAT

SIGNATURES	DATE
DR J Bass	8-12-63
CHK M. Nichols	9/27/63
APPD R. Lyons	9/19/63
APPD D. Bruney	9/20/63

SCALE 1/1 WT

H. S. ONE SHOT ASSEMBLY

ANelex CORPORATION BOSTON MASS

C 34080

NEXT ASSY	USED ON
APPLICATION	

H.S. ONE SHOT

The ANelex High Speed One Shot printed circuit card contains one modified monostable multivibrator which features special circuitry to provide high speed turn on response and effective impedance isolation from external loads. The circuit has four inputs, a trigger input with an associated common input from the diode buss, and an inhibit-gate input with an associated common input from the diode buss. The trigger input is capacitor coupled through an isolation diode into an emitter follower current buffer stage used to isolate loading on the input signals. The circuit consists of three basic stages, an emitter follower input current buffer (Q1), a dual transistor stage resistive-inductive differentiator (Q2 and Q3), and a monostable multivibrator (Q4, Q7) featuring saturated complemented emitter follower isolation buffers (Q5, Q6, Q8 and Q9) as the multivibrator coupling elements.

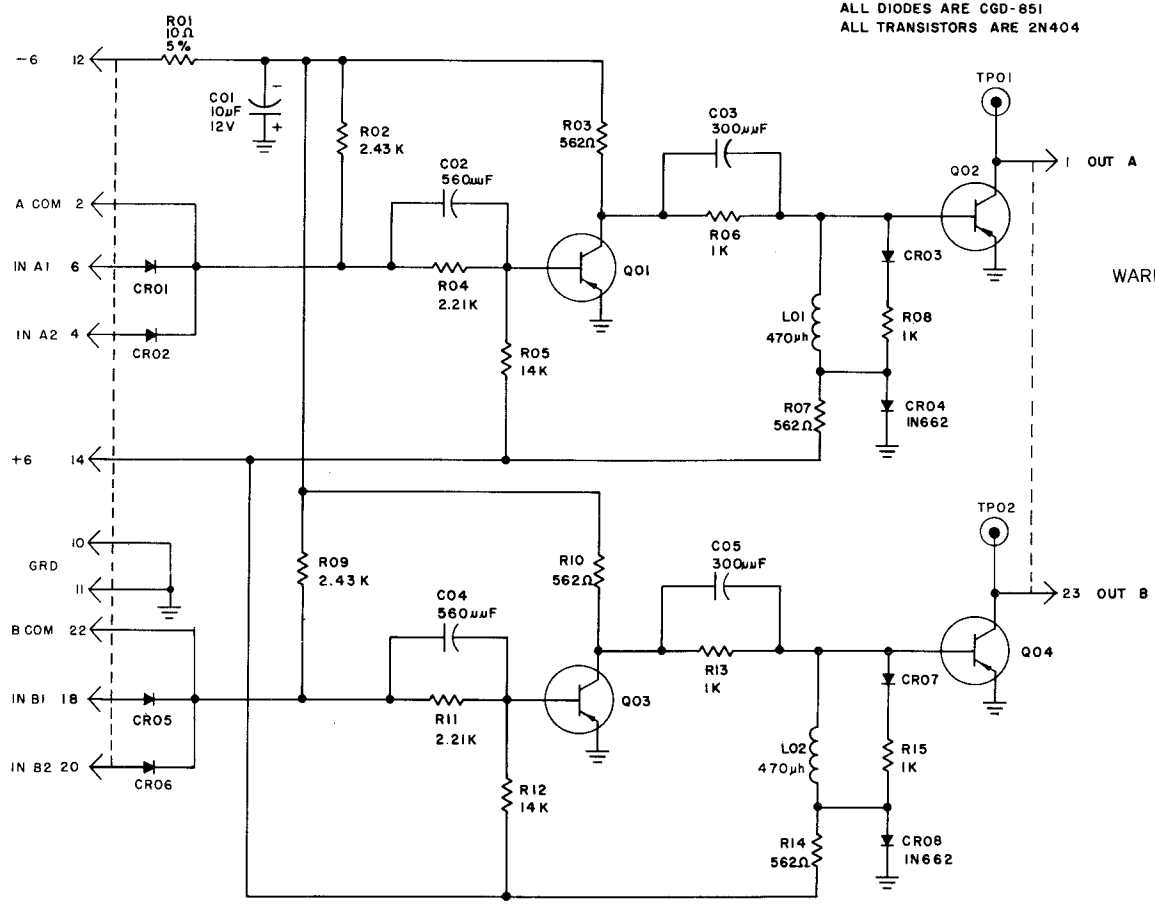
Triggering occurs when the trigger input signal makes a transition from a zero current condition (-3 volt level) to a full current condition (zero volt level), providing the inhibit-gate has been enabled. A full current input signal (zero volt level) will enable the inhibit-gate, and a zero current input signal (-3 volt level) will disable the inhibit-gate and prevent the circuit from being triggered. The output pulse width is adjustable by the means of an internal vernier, which has been provided for precise setting of the delay cycle. Provision has also been made for connecting an external capacitor in parallel with the timing capacitor to lengthen the delay period (nominal value is equal to 2 microseconds).

The circuit has two outputs, a set output and a reset output. Either output is capable of driving six unit loads, and may be observed at the test points provided.

REVISIONS				
ZONE	SYM	DESCRIPTION	DATE	APPROVAL
	0	REL. TO PED	1-24-64	

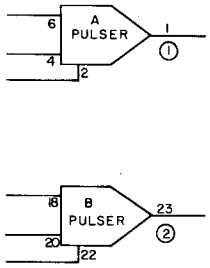
NOTES:

1. UNLESS OTHERWISE SPECIFIED:
   ALL RESISTORS ARE 1/2W, 1%
   ALL DIODES ARE CGD-851
   ALL TRANSISTORS ARE 2N404



WARNING— THE INSERTION OR WITHDRAWAL OF THIS MODULE WHEN DC POWER IS PRESENT AT THE CONNECTOR MAY RESULT IN PERMANENT DAMAGE TO THE SEMI CONDUCTORS.

LOGIC SYMBOL



34147

ITEM	REQD	PART NO	DESCRIPTION	MATL	MATL SPEC	UNIT WT

LIST OF MATERIALS

	34097
NEXT ASSY	USED ON
APPLICATION	

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON FRACTIONS # DECIMALS # ANGLES #
MATERIAL
FINISH
HEAT TREAT

SIGNATURES	DATE
DR Thomas J. Stahura	1/25/64
CHK Joe Borziello	2/2/64
APPD	2/10/64
APPD D. O'Sullivan	2/21/64

PULSER
SCHEMATIC

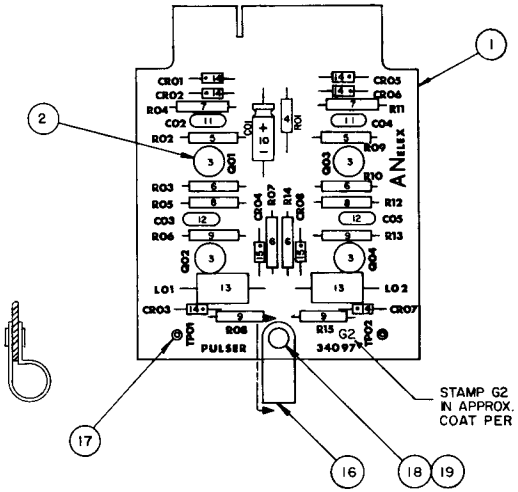
SCALE NONE WT

ANelex
CORPORATION
BOSTON MASS

C 34147

REVISIONS				
ZONE	SYM	DESCRIPTION	DATE	APPROVAL
	0	REL. TO PED	9/23	
	A	REV PER ECA 16210	10-25-63	
	B	REV PER ECA 18314	12-7-63	
	C	REV PER ECA 18946	2-28-64	

NOTES:
1. ALL TRANSISTOR ARE MOUNTED ON ITEM 2
2. NO'S ON COMPONENTS ARE ITEM NO'S.
3. CATHODE END OF DIODE INDICATED BY DOT.



STAMP G2 1/8 BLK. CHAR. IN APPROX. POSITION SHOWN COAT PER FS514.

ITEM	REQD	PART NO	DESCRIPTION	MATL	MATL SPEC	UNIT WT
20	REF	34147	SCHEMATIC, PULSER			
19	1	95642	COMPRESSION RIVET, FEMALE			
18	1	95641	COMPRESSION RIVET, MALE			
17	2	420-111-002	TERMINAL, STUD			
16	1	141-101-006	CLAMP, CABLE			
15	2	168-104-001	DIODE	IN662		
14	6	168-102-001	DIODE	IN276		
13	2	257-102-010	INDUCTOR, 470 μH			
12	2	134-501-039	CAPACITOR, 300 μμF			
11	2	134-501-047	CAPACITOR, 560 μμF			
10	1	134-101-008	CAPACITOR, 10μF 12V			
9	4	387-102-193	RESISTOR, 1K, 1/2W, 1%			
8	2	387-102-303	RESISTOR, 14K, 1/2W, 1%			
7	2	387-102-226	RESISTOR, 2.21K, 1/2W, 1%			
6	4	387-102-169	RESISTOR, 562Ω, 1/2W, 1%			
5	2	387-102-230	RESISTOR, 2.43K, 1/2W, 1%			
4	1	387-110-025	RESISTOR, 10Ω, 1/2W, 5%			
3	4	436-108-001	TRANSISTOR, PNP	2N404		
2	4	438-101-001	PAD, MOUNTING, TRANSISTOR			
1	1	34197	P.C. CARD, PULSER			

LIST OF MATERIALS

34097 C

NEXT ASSY	USED ON
APPLICATION	

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON FRACTIONS ± DECIMALS ± ANGLES ±
MATERIAL
FINISH
HEAT TREAT

SIGNATURES	DATE
DR F. Maglio, Jr.	9-1-64
CHK M. Merrill	
APPD R. Stern	9/23/63
APPD B. Sweeney	9/23/63

PULSER ASSEMBLY

ANelex CORPORATION BOSTON MASS

C 34097

SCALE 1/1 WT

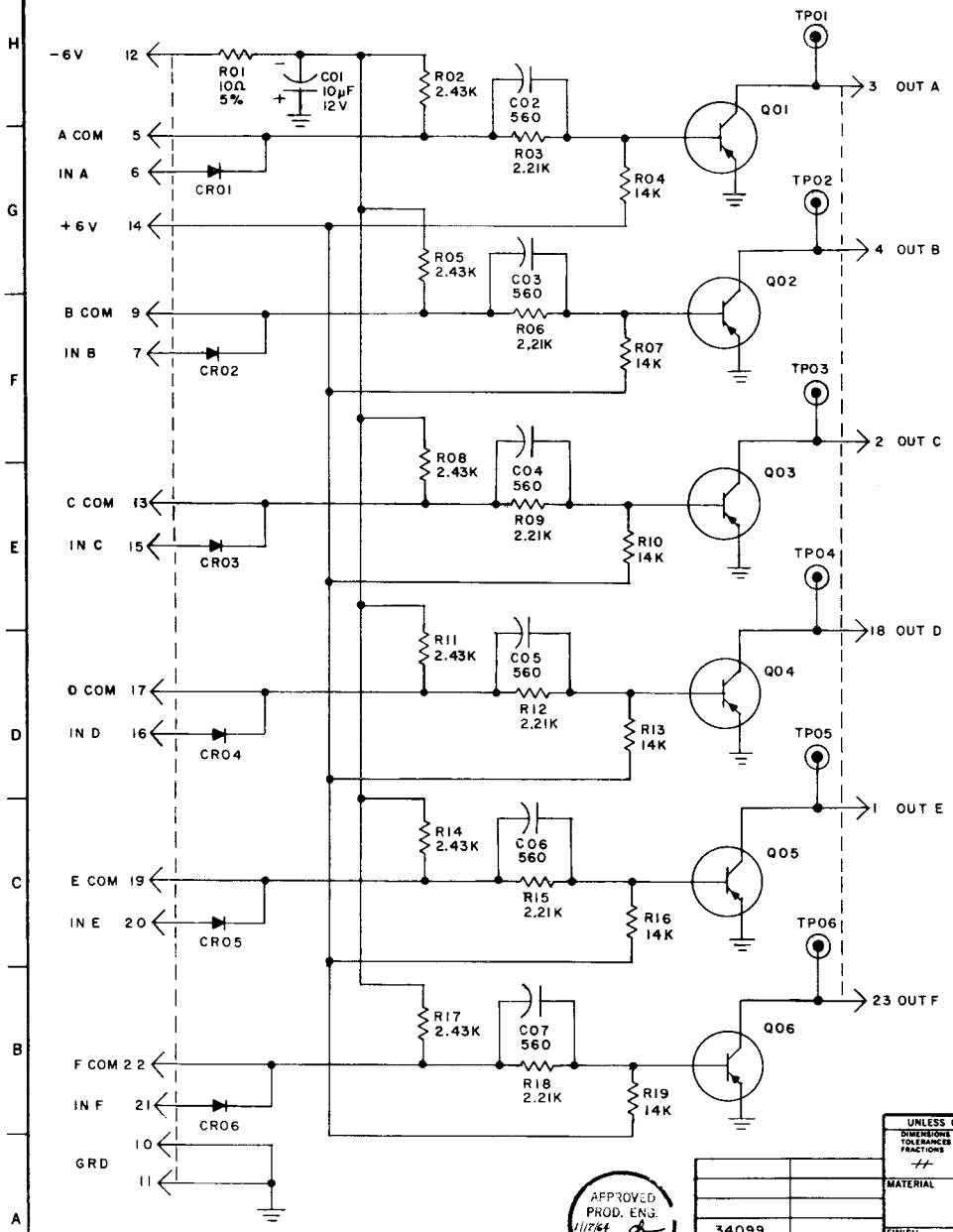
FSCM A

PULSER

The ANelex Pulser printed circuit card contains two identical independent circuits which convert an input transition to an output shaped current pulse. Either circuit will provide a single fixed output current pulse for each input transition. The ANelex Pulser module is frequently used in conjunction with the ANelex Switch to DC Converter module to provide an output pulse having a differential width consistent with the cyclic rate of the Printer System Buffer logic. The combination of these two ANelex modules will provide a single output current pulse for each manual actuation of an external switch.

Each circuit is composed of three sections; a standard A NOR 5 circuit with an input network formed by two parallel diode inputs and their associated common, a resistive-inductive differentiator network followed by an output inverter buffer.

An input current transition from zero current (-3 volt level) to a full current condition (zero volt level) will turn on the output inverter which provides output current to an external load for a predetermined period of time. The output current pulse width is controlled by the differentiator, which automatically turns off the output inverter to inhibit current flow in the output circuit, even though signal current is still flowing in the circuit input. Each output is capable of driving five unit loads and may be observed at the test points provided.



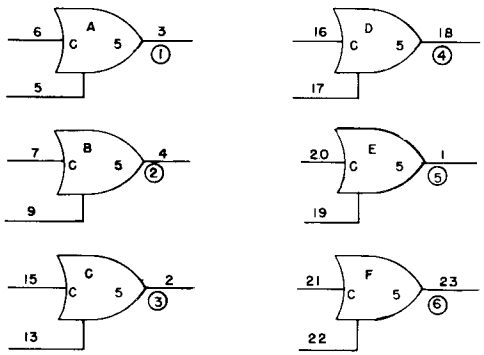
NOTES:

1. UNLESS OTHERWISE SPECIFIED:
   ALL RESISTORS ARE 1/2W ± 1%
   ALL CAPACITORS ARE IN μμF
   ALL DIODES ARE IN276
   ALL TRANSISTORS ARE 2N404

REVISIONS				
ZONE	SYM	DESCRIPTION	DATE	APPROVAL
	0	REL TO PED		

WARNING – THE INSERTION OR WITHDRAWAL OF THIS MODULE WHEN DC POWER IS PRESENT AT THE CONNECTOR MAY RESULT IN PERMANENT DAMAGE TO THE SEMICONDUCTORS.

LOGIC SYMBOL



34149

ITEM	REQD	PART NO	DESCRIPTION	MATL	MATL SPEC	UNIT WT

LIST OF MATERIALS

APPROVED PROD. ENG. 11/27/64 DATE AUTHORITY

34099	
NEXT ASSY	USED ON
APPLICATION	

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON FRACTIONS DECIMALS ANGLES
MATERIAL
FINISH
HEAT TREAT

SIGNATURES	DATE
DR	6/26/62
CHK	8/6/62
APPD	8/10/62
APPD	7/24/62

C NOR 5
SCHEMATIC

SCALE NONE WT

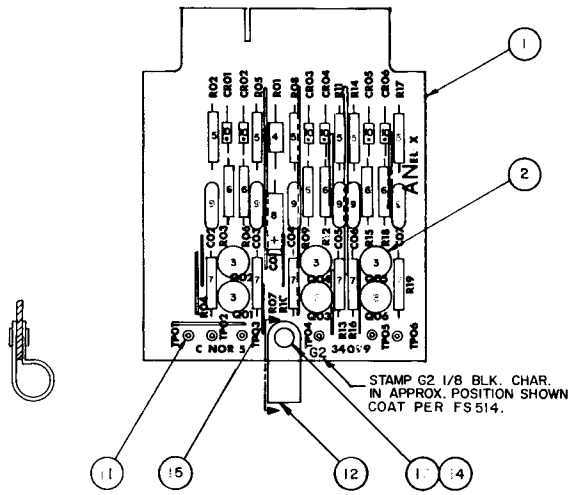
ANelex
CORPORATION
BOSTON MASS

C 34149

REVISIONS				
ZONE	SYM	DESCRIPTION	DATE	APPROVAL
	0	REL TO PED	9/13	MP
	A	REV PER ECA 16210	10-28-63	RH
	B	REV PER ECA 18314	12-7-64	RH
	C	REV PER ECA 18946	3/19/65	RH

NOTES:

1. ALL TRANSISTORS ARE MOUNTED ON ITEM 2
2. NO'S ON COMPONTS ARE ITEM NO'S.
3. CATHODE END OF DIODE INDICATED BY DOT.



34099 C

ITEM	REQD	PART NO	DESCRIPTION	MATL	MATL SPEC	UNIT WT
16	REF	34149	SCHEMATIC, C NOR 5			
15	AR	465-101-021	WIRE, INSULATED, BLK. VINYL	#22		
14		5542	COMPRESSION RIVET, FEMALE			
13	1	5641	COMPRESSION RIVET, MALE			
12	1	141-101-006	CLAMP, CABLE			
11	6	420-111-002	TERMINAL, STUD			
10	6	168-102-001	DIODES	IN276		
9	6	154-501-047	CAPACITOR, 560μμF			
8	1	134-101-008	CAPACITOR, 10μF, 12V			
7	6	387-102-303	RESISTOR 14K, 1/2W, 1%			
6	6	387-102-226	RESISTOR, 2.21K, 1/2W, 1%			
5	6	387-102-230	RESISTOR 2.43K, 1/2W, 1%			
4	1	387-110-025	RESISTOR, 10Ω, 1/2W, 5%			
3	6	436-103-001	TRANSISTOR PNP	2N404		
2	6	434-101-001	PAD, MOUNTING, TRANSISTOR			
1	1	34199	P.C. CARD, C NOR 5			

LIST OF MATERIALS

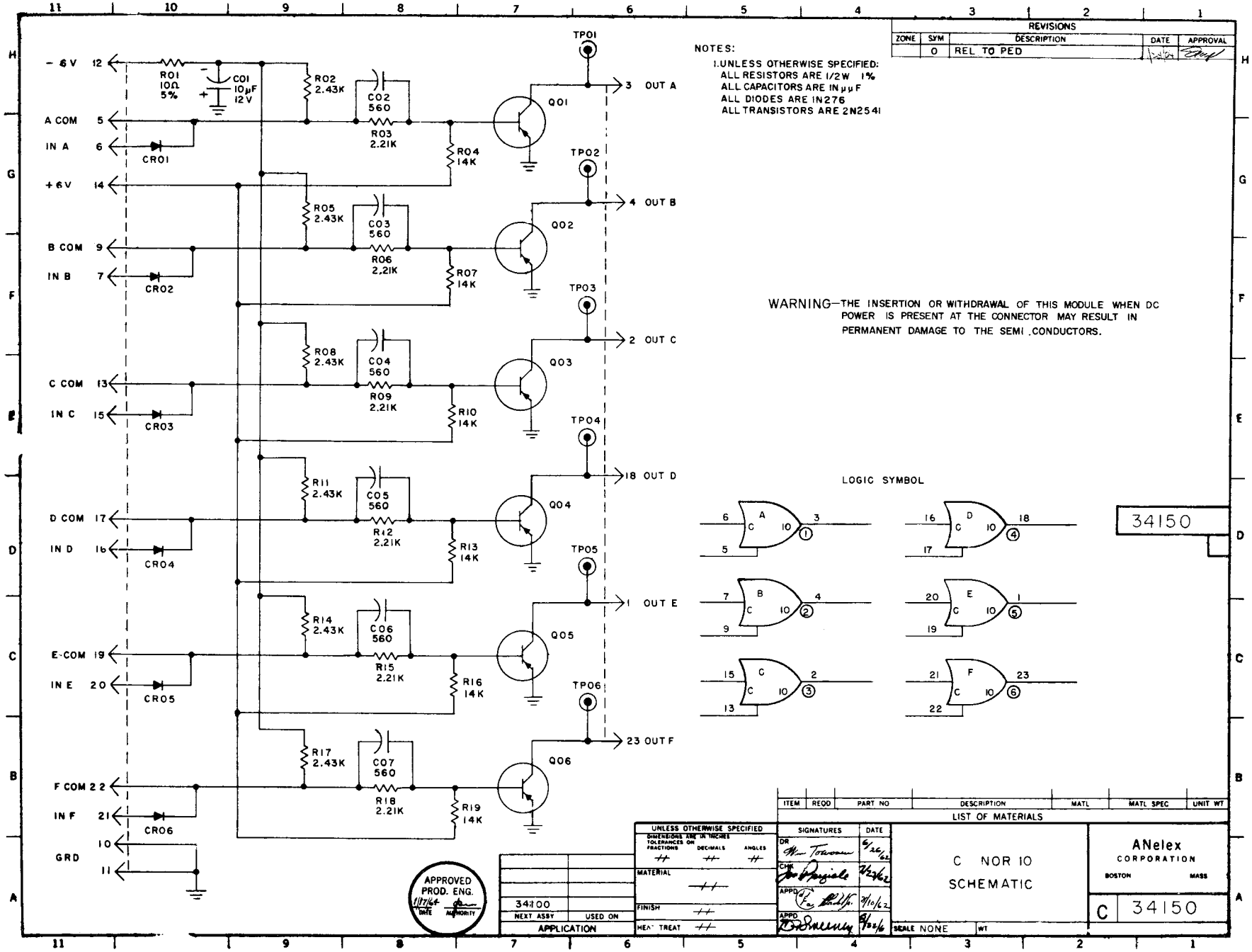
UNLESS OTHERWISE SPECIFIED	SIGNATURES	DATE		
DIMENSIONS ARE IN INCHES TOLERANCES ON FRACTIONS ± DECIMALS ± ANGLES ±	DR F. Maglio, Jr.	8-15-63	C NOR 5 ASSEMBLY	ANelex CORPORATION BOSTON MASS
MATERIAL	CHK M. Nichols	8-15-63		
FINISH	APPD P. Yhe	9/9/63		C 34099
HEAT TREAT	APPD R. Sweeney	9/11/63	SCALE 1/1 WT	
NEXT ASSY / USED ON	APPLICATION			

C NOR 5

The ANelex C NOR 5 printed circuit card contains six identical independent current operated NOR circuits. Each circuit is composed of an input diode network followed by an inverter stage. The input diode network consists of a single diode with an associated common from the diode buss.

The output current flow from any ANelex C NOR circuit will be inhibited whenever signal current (zero volt level) is applied to any one of the inputs of that particular NOR circuit. Output current will flow in any ANelex C NOR circuit whenever signal current is absent (-3 volt level) from all of the inputs of that particular NOR circuit.

The amount of input (current) loading produced by each C NOR 5 circuit is defined as one standard unit load. The output of each C NOR 5 circuit is capable of driving five unit loads, and may be observed at the test points provided.



NOTES:

1. UNLESS OTHERWISE SPECIFIED:
   ALL RESISTORS ARE 1/2W 1%
   ALL CAPACITORS ARE IN μμF
   ALL DIODES ARE IN276
   ALL TRANSISTORS ARE 2N2541

WARNING—THE INSERTION OR WITHDRAWAL OF THIS MODULE WHEN DC POWER IS PRESENT AT THE CONNECTOR MAY RESULT IN PERMANENT DAMAGE TO THE SEMI ,CONDUCTORS.

LOGIC SYMBOL

34150

REVISIONS				
ZONE	SYM	DESCRIPTION	DATE	APPROVAL
	0	REL TO PED		

ITEM	REQD	PART NO	DESCRIPTION	MATL	MATL SPEC	UNIT WT

LIST OF MATERIALS

UNLESS OTHERWISE SPECIFIED	
DIMENSIONS ARE IN INCHES TOLERANCES ON FRACTIONS / DECIMALS / ANGLES	++ / ++ / ++
MATERIAL	++
FINISH	++
HEAT TREAT	++

SIGNATURES		DATE
DR	Wm Townsend	6/22/62
CHK	Joe Angiolo	7/2/62
APPD	Ralph	7/10/62
APPD	D Sweeney	7/22/62

C NOR 10
SCHEMATIC

ANelex
CORPORATION
BOSTON MASS

C 34150

SCALE NONE WT

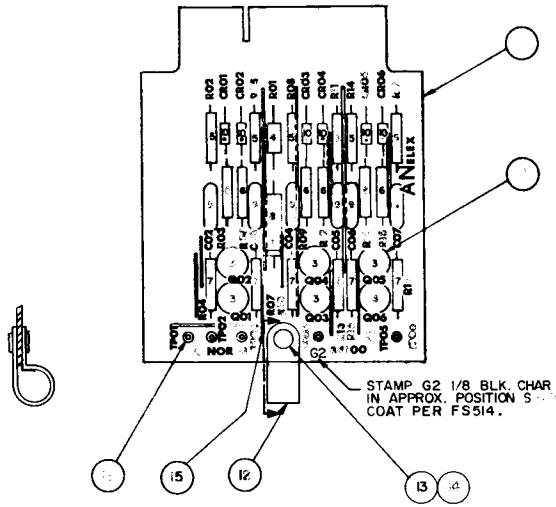
34100
NEXT ASSY USED ON
APPLICATION

APPROVED PROD. ENG. 11/17/64 DATE AUTHORITY

REVISIONS				
ZONE	SYM	DESCRIPTION	DATE	APPROVAL
	0	REL TO PED	9/13	MMD
	A	REV PER ECA 16210	10-25-67	RH
	B	REV PER ECA 18314	12-7-68	RH
	C	REV PER ECA 18946	2-22-69	RH

NOTES:

1. ALL TRANSISTORS ARE MOUNTED ON ITEM 2
2. NO'S ON COMPONENTS ARE ITEM NO'S
3. CATHODE END OF DIODE INDICATED BY DOT.



34100 C

ITEM	REQD	PART NO	DESCRIPTION	MATL	MATL SPEC	UNIT WT
16	RE	34150	SCHEMATIC, C NOR 10			
15	AR	465-101-721	WIRE, INSULATED, BLK. VINYL	#22		
14	1	9562	COMPRESSION RIVET, FEMALE			
13	1	95641	COMPRESSION RIVET, MALE			
12	1	141-101 006	CLAMP CABLE			
11	~	420-111-002	TERMINAL, STUD			
10	6	168-102-001	DIODE	IN276		
9	6	134-501-047	CAPACITOR, 560μμF			
8		134-101-008	CAPACITOR, 10μF, 12V			
7	6	387-102-303	RESISTOR, 14K, 1/2W, 1%			
6	6	387-102-226	RESISTOR 2.21K, 1/2W, 1%			
5	6	387-102-230	RESISTOR, 2.43K, 1/2W, 1%			
4	1	387-110 025	RESISTOR, 0Ω, 1/2 W, 5%			
3	6	436-128-001	TRANSISTOR PNP	GTR502		
2	6	478-101-001	PAD MOUNTING, TRANSISTOR			
1		34200	P.C. BOARD, C NOR 10			

LIST OF MATERIALS

UNLESS OTHERWISE SPECIFIED	SIGNATURES	DATE
DIMENSIONS ARE IN INCHES. TOLERANCES ON FRACTIONS ± DEC. PLACES ± ANGLES ±	DR J. Ruan	8-16-63
MATERIAL	CHK M. Nichols	8/14/63
FINISH	APPD R. Glass	9/1/63
HEAT TREAT	APPD D. Sweeney	9/3/63

NEXT ASSY	USED ON
APPLICATION	

C NOR 10
ASSEMBLY

SCALE 1/1 WT

ANelex CORPORATION BOSTON

C 34100

PCA

C NOR 10

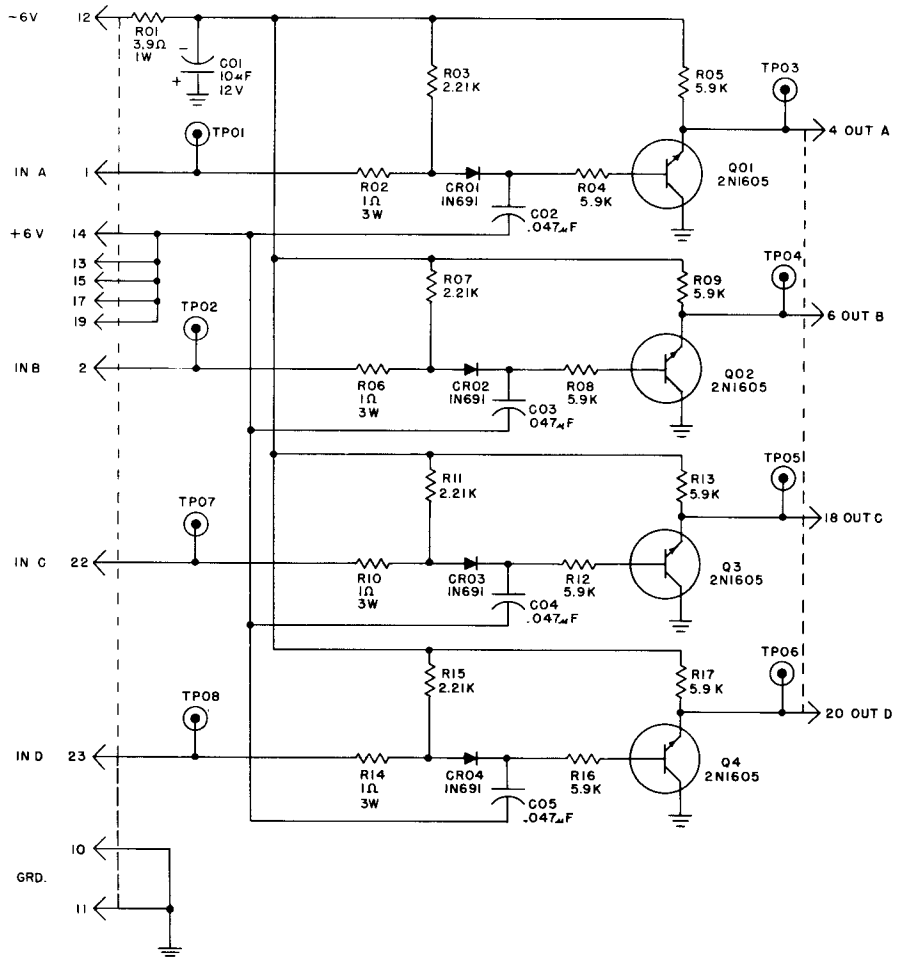
The ANelex C NOR 10 printed circuit card contains six identical independent current operated NOR circuits. Each circuit is composed of an input diode network followed by an inverter stage. The input diode network consists of a single diode with an associated common from the diode buss.

The output current flow from any ANelex C NOR circuit will be inhibited whenever signal current (zero volt level) is applied to any one of the inputs of that particular NOR circuit. Output current will flow in any ANelex C NOR circuit whenever signal current is absent (-3 volt level) from all of the inputs of that particular NOR circuit.

The amount of input (current) loading produced by each C NOR 10 circuit is defined as one standard unit load. The output of each C NOR 10 circuit is capable of driving ten unit loads, and may be observed at the test points provided.

REVISIONS				
ZONE	SYM	DESCRIPTION	DATE	APPROVAL
	0	REL. TO PED	11/4/64	
	A	REV. PER ECA 17048	5-22-67	
	B	REV. PER ECA 17856	9-14-67	

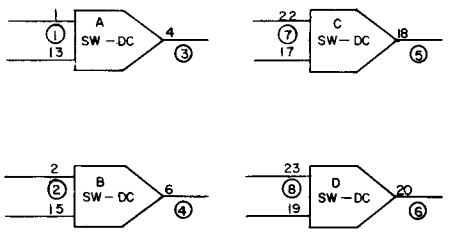
NOTES:
1. UNLESS OTHERWISE SPECIFIED: ALL RESISTORS ARE 1/2W, 1%



WARNING — THE INSERTION OR WITHDRAWAL OF THIS MODULE WHEN DC POWER IS PRESENT AT THE CONNECTOR MAY RESULT IN PERMANENT DAMAGE TO THE SEMI-CONDUCTOR.

34354 B

LOGIC SYMBOL



ITEM	REQD	PART NO	DESCRIPTION	MATL	MATL SPEC	UNIT WT

LIST OF MATERIALS

APPROVED PROD ENG 11/7/64

14304	
34304	
NEXT ASSY	USED ON
APPLICATION	

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON FRACTIONS DECIMALS ANGLES
# # #
MATERIAL #
FINISH #
HEAT TREAT

SIGNATURES	DATE
DR W. P. Acken	4/23/62
CHK	4/23/62
APPD	8/7/62
APPD D. Sweeney	8/23/62

SWITCH TO D.C CONVERTER SCHEMATIC

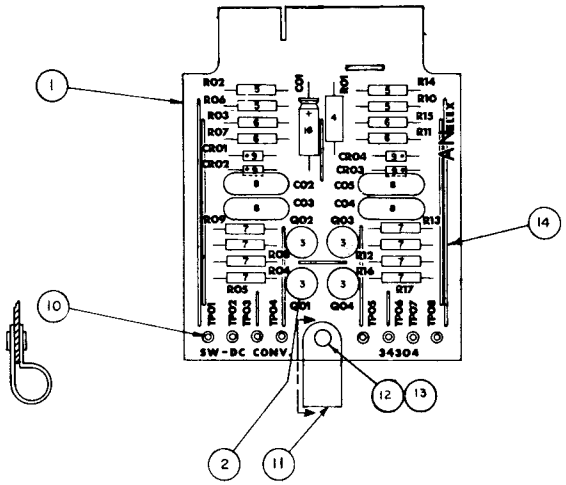
SCALE NONE WT

ANelex CORPORATION BOSTON MASS

C 34354

REVISIONS				
ZONE	SYM	DESCRIPTION	DATE	APPROVAL
	0	REL TO PED	9/26	WMO
	A	REV PER ECA 16210	10-28-63	RB
	B	REV PER ECA 18314	12-7-64	RB
	C	REV PER ECA 18946	12/24/64	RB

NOTES
1. NO'S ON COMPONENTS ARE ITEM NO'S.
2. CATHODE END OF DIODE INDICATED BY DOT.
3. STAMP G2 1/8 BLK CHAR. AFTER ASSY. NO.
   COAT PER FS514.



34304 C

ITEM	REQD	PART NO	DESCRIPTION	MATL	MATL SPEC	UNIT WT
16	1	134-101-008	CAPACITOR, 10μF, 12 V			
15	REF	34354	SCHEMATIC, SW-DC CONV.			
14	AR	465-101-021	WIRE, INSULATED BLK VINYL	# 22		
13	1	95641	COMPRESSION RIVET, MALE			
12	1	95642	COMPRESSION RIVET, FEMALE			
11	1	141-101-006	CLAMP, CABLE			
10	8	420-111-002	TERMINAL, STUD			
9	4	168-105-001	DIODE	IN691		
8	4	134-601-013	CAPACITOR, .047 μF			
7	8	387-102-267	RESISTOR, 5.9K, 1/2W, 1%			
6	4	387-102-226	RESISTOR, 2.21K, 1/2W, 1%			
5	4	387-201-001	RESISTOR, 1Ω, 3W, 5%			
4	1	387-111-015	RESISTOR, 3.9Ω, 1W, 5%			
3	4	436-107-001	TRANSISTOR, NPN	2N1605		
2	4	438-101-001	PAD, MOUNTING, TRANSISTOR			
1	1	34404	P.C. CARD, SW-DC CONV			

LIST OF MATERIALS

NEXT ASSY	USED ON
APPLICATION	

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON FRACTIONS DECIMALS ANGLES
MATERIAL
FINISH
HEAT TREAT

SIGNATURES		DATE
DR	G. Digiamo	9/15/63
CHK	M. Nichols	9/19/63
APPD	R. Stein	9/23/63
APPD	D. Sweeney	9/23/63

SWITCH TO D C CONVERTER ASSEMBLY

ANelex CORPORATION BOSTON MASS

C 34304

SCALE 1/1 WT

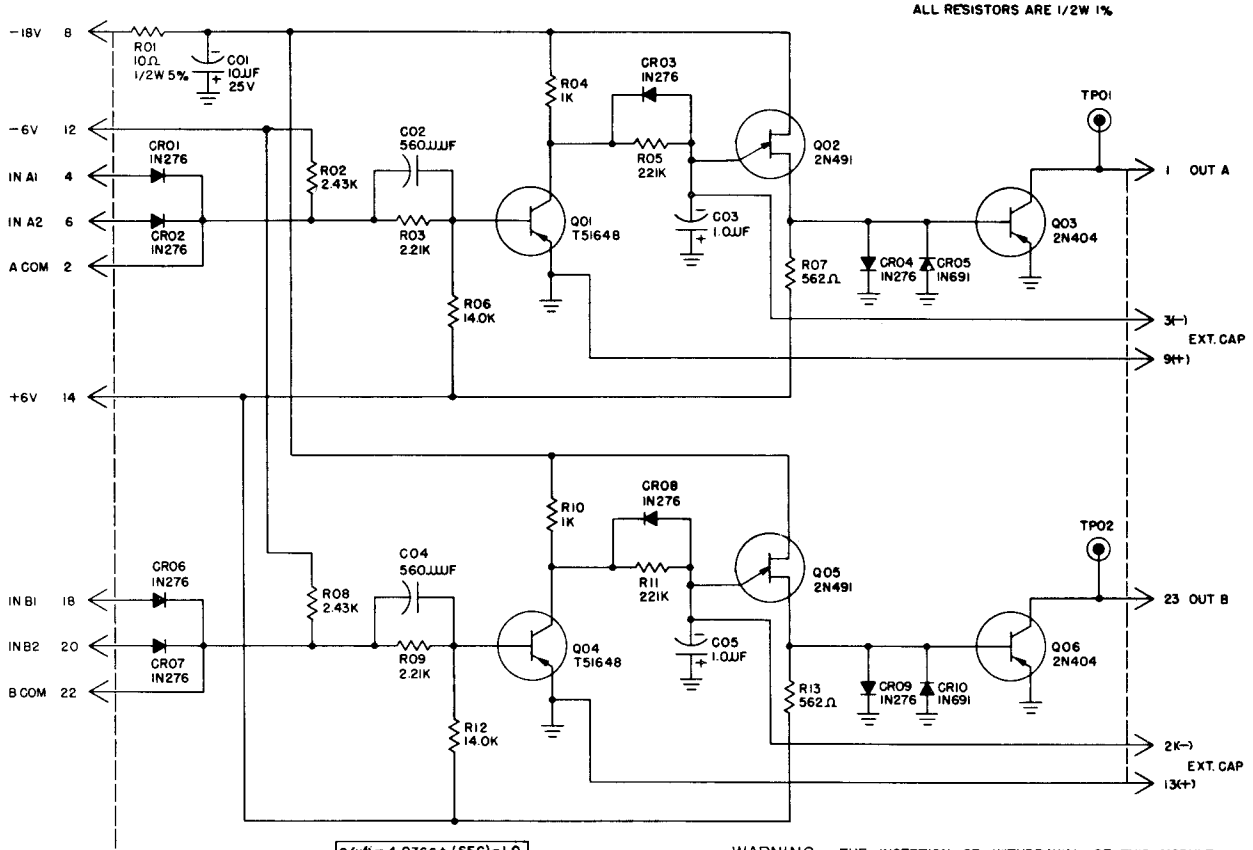
SWITCH TO DC CONVERTER

The ANelex Switch to DC Converter printed circuit card contains four identical independent circuits which function as an interface between manually operated external contact devices, and the electrical system of the ANelex Printer System Buffer unit. Each circuit consists of an input integrating network followed by an emitter follower buffer circuit. The integrating network provides input noise suppression for extraneous switching noise generated mechanically by contact bounce.

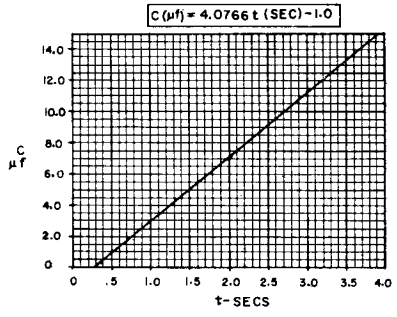
One side of each of the input switches is connected in common to +6 volts; and closure of any particular switch will rapidly discharge the integrating networks of the circuit associated with that switch, and cause an output switching transition from a quiescent negative voltage level to a zero volt level. The circuit output will remain at zero for as long as the input switch remains closed. When the input switch is opened the integrating network will start to slowly recharge, and the circuit output will return to the original negative voltage level (-6V). The output from each of the four circuits is capable of driving five unit loads, and may be observed at the test points provided. Test points have also been provided at the input to each circuit for observing input switching transitions.

REVISIONS				
ZONE	SYM	DESCRIPTION	DATE	APPROVAL
	0	REL. TO PED.	1/24/64	
	A	REV. PER ECA 17856	7-14-64	

NOTES:
UNLESS OTHERWISE SPECIFIED:
ALL RESISTORS ARE 1/2W 1%

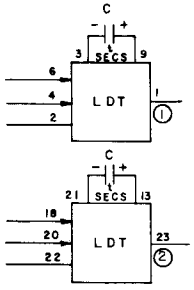


C (μf) = 4.0766 t (SEC) - 1.0



WARNING— THE INSERTION OR WITHDRAWAL OF THIS MODULE WHEN DC POWER IS PRESENT AT THE CONNECTOR MAY RESULT IN PERMANENT DAMAGE TO THE SEMI CONDUCTORS.

LOGIC SYMBOL



34357 A

APPROVED PROD. ENG. 1/17/64 DATE

ITEM	REQD	PART NO	DESCRIPTION	MATL	MATL SPEC	UNIT WT

LIST OF MATERIALS

14307	
34307	
NEXT ASSY	USED ON
APPLICATION	

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON FRACTIONS DECIMALS ANGLES
# # #
MATERIAL #
FINISH
HEAT TREAT

SIGNATURES	DATE
DR	9/17/62
CHK	9/3/62
APPD	9/3/62
APPD	9/3/62

LONG DELAY TIMER SCHEMATIC

SCALE NONE WT

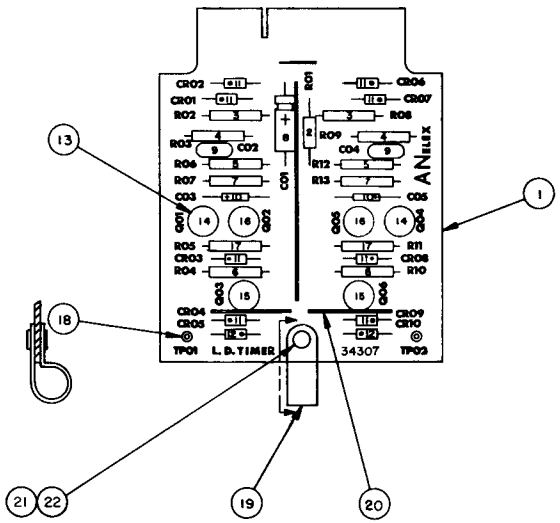
ANelex CORPORATION BOSTON MASS

C 34357

REVISIONS				
ZONE	SYM	DESCRIPTION	DATE	APPROVAL
	0	REL. TO PED.	9/19/63	MJ
	A	REV PER ECA 16210	10-28-63	RH
	B	REV PER ECA 18314	12-7-64	RH
	C	REV PER ECA 18946	3/26/65	RH

NOTES:

1. ALL TRANSISTORS ARE MOUNTED ON ITEM 13.
2. NO'S ON COMPONENTS ARE ITEM NO'S.
3. CATHODE END OF DIODE INDICATED BY DOT.
4. STAMP G2 1/8 BLK. CHAR. AFTER ASSY. NO. COAT PER FS514.



ITEM	REQD	PART NO	DESCRIPTION	MATL	MATL SPEC	UNIT WT
23	REF	34357	SCHEMATIC, L.D. TIMER			
22	1	95642	COMPRESSION RIVET, FEMALE			
21	1	95641	COMPRESSION RIVET, MALE			
20	AR	465-101-021	WIRE, INSUL, BLK, VINYL	#22		
19	1	141-101-006	CLAMP, CABLE			
18	2	420-111-002	TERMINAL, STUD			
17	2	387-102-418	RESISTOR 221K 1/2W 1%			
16	2	436-104-001	TRANSISTOR, UNIJUNCTION	2N491		
15	2	436-103-001	TRANSISTOR PNP	2N404		
14	2	436-128-001	TRANSISTOR PNP	GTR502		
13	6	438-101-001	PAD, MOUNTING, TRANSISTOR			
12	2	168-105-001	DIODE	IN691		
11	8	168-102-001	DIODE	IN276		
10	2	134-202-029	CAPACITOR 1.0μF 35V			
9	2	134-501-047	CAPACITOR 560μμF			
8	1	134-103-008	CAPACITOR 10μF 25V			
7	2	387-102-169	RESISTOR 562Ω 1/2W 1%			
6	2	-193	1K 1/2W 1%			
5	2	-303	14 K 1/2W 1%			
4	2	-226	2.21K 1/2W 1%			
3	2	387-102-230	2.43K 1/2W 1%			
2	1	387-110-025	RESISTOR 10Ω 1/2W 5%			
1	1	34407	P.C. CARD, L.D. TIMER			

LIST OF MATERIALS

34307 C

NEXT ASSY	USED ON
APPLICATION	

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON FRACTIONS ± DECIMALS ± ANGLES ±
MATERIAL
FINISH
HEAT TREAT

SIGNATURES		DATE
DR		8-26-63
CH	M. Nichols	9/27/63
APPD	R. Gibson	9/19/63
APPD		9/19/63

LONG DELAY TIMER ASSEMBLY

SCALE 1/1 WT

ANelex CORPORATION BOSTON MASS

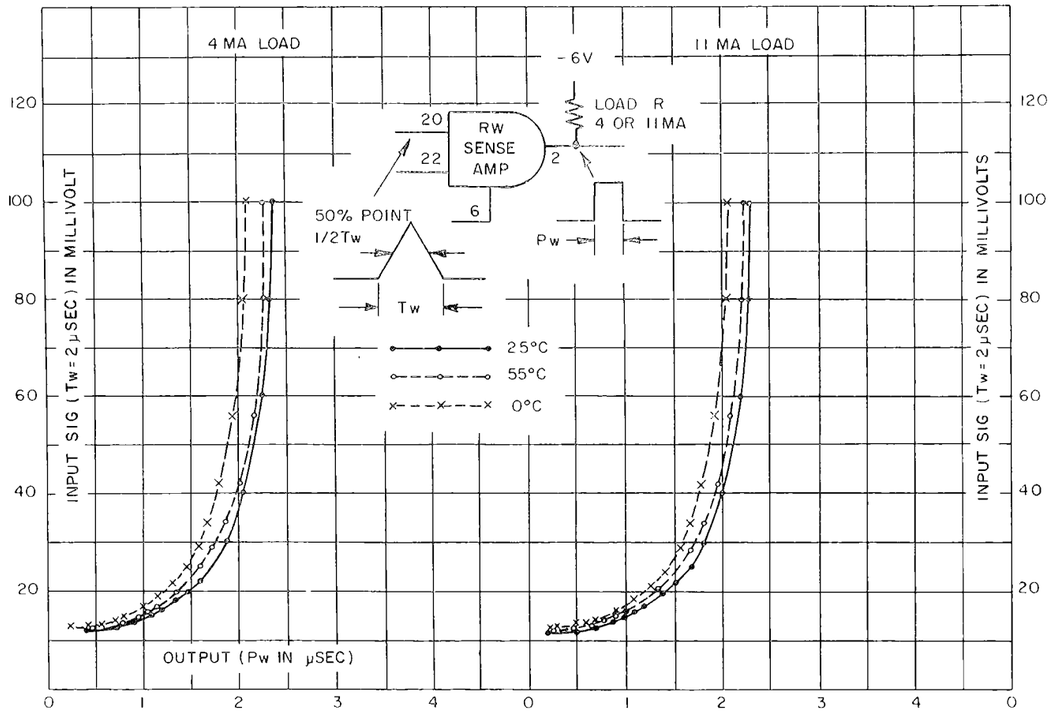
C 34307

LONG DELAY TIMER

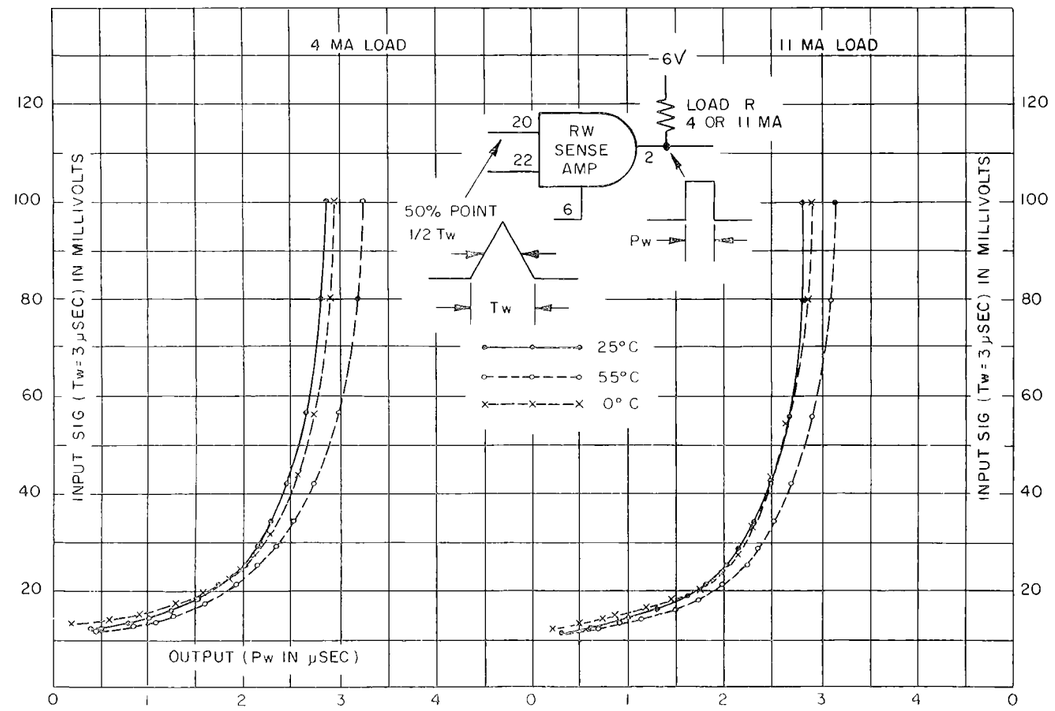
The ANelex Long Delay Timer printed circuit card contains two identical independent delay generator circuits. Each circuit has a resetable time base generator which has an output directly dependent upon the time interval between input pulses. Each circuit is composed of three basic stages; a standard input buffer inverter stage with two diode input network (and associated common from the diode buss), an unijunction time base generator stage, and an output buffer inverter stage. The unijunction time base generator circuit is so arranged electrically as to continuously attempt to cycle at a rate determined by the size of the timing capacitor. However, application of a current pulse to the input of the circuit will interrupt and reset the delay cycle of the time base generator. If the delay cycle is allowed to reach completion, the circuit output will deliver a current pulse to an external load. Each circuit is generally used in conjunction with an ANelex control flip-flop of either the d-c or the complementary type.

The amount of input loading of either circuit is equivalent to one unit load, and application of signal current (zero volt level) to the input of either circuit during any particular delay period will reset the time base generator recycling the delay period, and will prevent any output transitions from occurring (until the cycle is complete). The absence of signal current (-3 volt level) on all the inputs of either circuit for a period of time longer than the fixed circuit delay period will allow the time base generator delay cycle to be completed, and cause the circuit output to supply an external load with a current pulse formed by an output excursion from zero output current (-3 volts) to full output current (zero volt), and back to zero current (-3 volts).

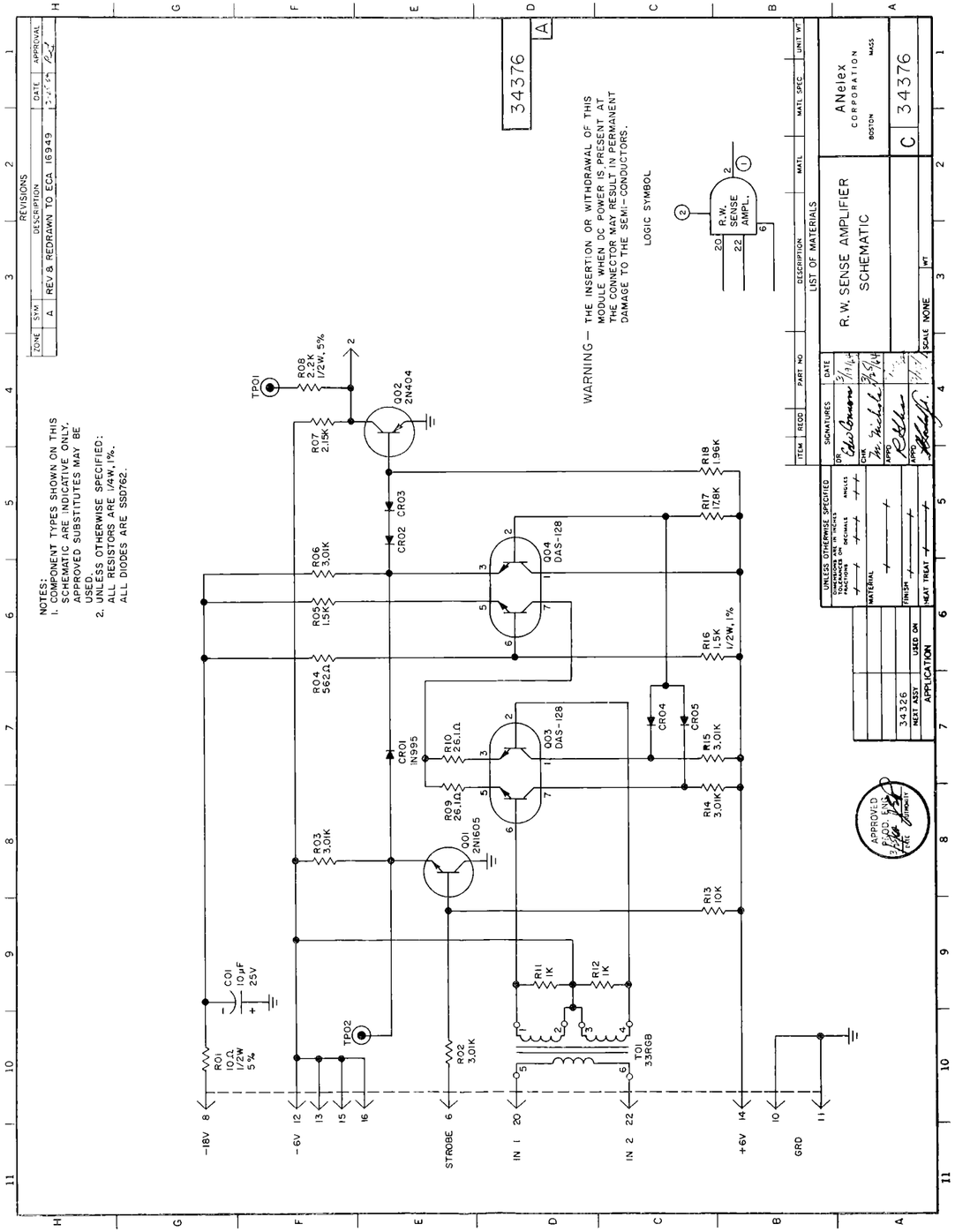
The output of each circuit is capable of driving five unit loads and may be observed at the test points provided. Each circuit has been provided with additional (polarized) facilities for connecting external capacitors to lengthen the fixed delay period. A timing chart has been provided on each schematic to correlate the desired extension of the length of the delay period with the amount of additional external capacitance that is required to achieve this amount of delay.



OPERATING CHARACTERISTIC OF RW SENSE AMPLIFIER. OUTPUT PULSE WIDTH VS INPUT PULSE AMPLITUDE. INPUT PULSE 2 μ SEC

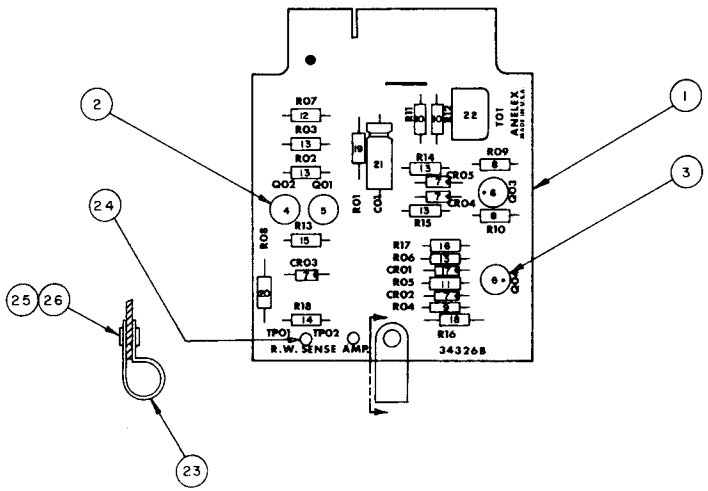


OPERATING CHARACTERISTIC OF RW SENSE AMPLIFIER. OUTPUT PULSE WIDTH VS INPUT PULSE AMPLITUDE. INPUT PULSE 3 μ SEC



REVISIONS				
ZONE	SYM	DESCRIPTION	DATE	APPROVAL
	B	REV & REDRAWN TO ECA 16949	3-25-64	RH
	C	REV PER ECA 18314	12-7-64	RH
	D	REV PER ECA 18946	3/24/65	RH

NOTES:
1. ALL TRANSISTORS ARE MOUNTED ON ITEM 2 OR 3.
2. NO'S ON COMPONENTS ARE ITEM NO'S.
3. CATHODE END OF DIODE INDICATED BY DOT.
4. STAMP G2 1/8 BLK. CHAR. AFTER ASSY. NO.
   COAT PER FS514.



ITEM	REQD	PART NO	DESCRIPTION	MATL	MATL SPEC	UNIT WT
27	REF	34376	SCHEMATIC, R.W. SENSE AMPLIFIER			
26	1	95642	COMPRESSION RIVET, FEMALE			
25	1	95641	COMPRESSION RIVET, MALE			
24	2	420-111-002	TERMINAL, STUD			
23	1	141-101-006	CLAMP, CABLE			
22	1	432-102-001	TRANSFORMER	33RGB		
21	1	134-103-008	CAPACITOR 10μF, 25V			
20	1	387-110-081	RESISTOR 2.2K 1/2W, 5%			
19	1	387-110-025	RESISTOR 10Ω 1/2W, 5%			
18	1	387-102-210	RESISTOR 1.5K 1/2W, 1%			
17	1	168-108-001	DIODE	IN995		
16	1	387-101-313	RESISTOR 17.8K 1/4W, 1%			
15	1	387-101-289	10K			
14	1	387-101-221	1.96K			
13	5	387-101-239	3.01K			
12	1	387-101-225	2.15K			
11	1	387-101-210	1.5K			
10	2	387-101-193	1K			
9	1	387-101-169	562Ω			
8	2	387-101-041	RESISTOR 26.1Ω 1/4W, 1%			
7	4	168-106-001	DIODE	SSD762		
6	2	436-117-001	TRANSISTOR NPN	DAS-128		
5	1	436-107-001	TRANSISTOR NPN	2N1605		
4	1	436-103-001	TRANSISTOR PNP	2N404		
3	2	438-104-001	PAD, MOUNTING, TRANSISTOR			
2	2	438-101-001	PAD, MOUNTING, TRANSISTOR			
1	1	34426	P.C. CARD, R.W. SENSE AMPLIFIER			

LIST OF MATERIALS

34326 D

NEXT ASSY	USED ON
APPLICATION	

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON FRACTIONS DECIMALS ANGLES
MATERIAL
FINISH
HEAT TREAT

SIGNATURES		DATE
DR	Ed Connors	3/19/64
CHK	M. Nichols	3/25/64
APPD	RHH	3/25/64
APPD		3/7/64

R.W. SENSE AMPLIFIER ASSEMBLY

ANelex CORPORATION BOSTON MASS

C 34326

SCALE FULL WT

1249

DESCRIPTION:

R. W. SENSE AMPLIFIER

34376A

The ANelex R. W. SENSE AMPLIFIER printed circuit card contains one complete circuit, which is capable of amplifying low level bipolar input pulse signals to standard ANelex logic voltage levels. The sense winding source applied to the card is transformer coupled to a differential amplifier stage regulated by a constant current source. The output of the differential amplifier is applied through an emitter follower which actuates the digital output stage.

The circuit is also provided with a Strobe gating section, which is capable of enabling or disabling the digital output stage. A zero volt signal applied to the strobe input of the circuit will inhibit the digital output stage. A -6 volt signal applied to the Strobe input of the circuit will enable the digital output stage, and the circuit output will be under the control of the input Memory Plane sense winding. The ANelex Memory Plane sense winding represents a typical low impedance signal source for the Sense Amplifier module. The output of the amplifier is capable of driving two (2) unit loads.

POWER REQUIREMENTS: (Card)

43 MA at -18V
1.0 MA at - 6V
43 MA at + 6V

TRANSFER FUNCTION: (Card Amplifier Section)

STROBE	INPUT	OUTPUT
-6V	"Read One"	Positive Pulse
-6V	"Read Zero"	No Output
0V	"Read One"	No Output
0V	"Read Zero"	No Output

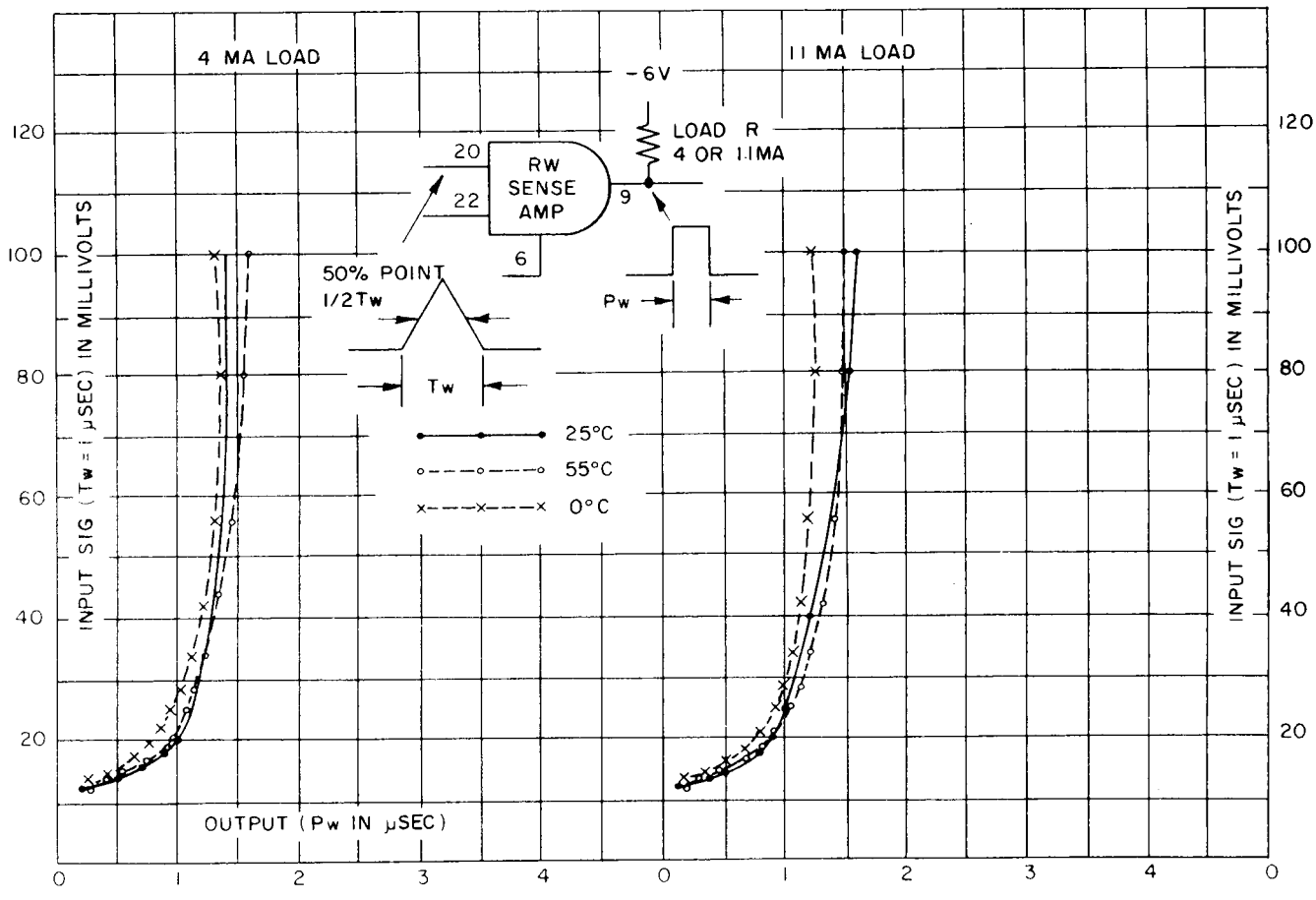
RECOMMENDED OPERATING CONDITIONS

"Read One" = +50 to +100 MV
"Read Zero" 0.0 to 8.0 MV

ELECTRICAL CHARACTERISTICS

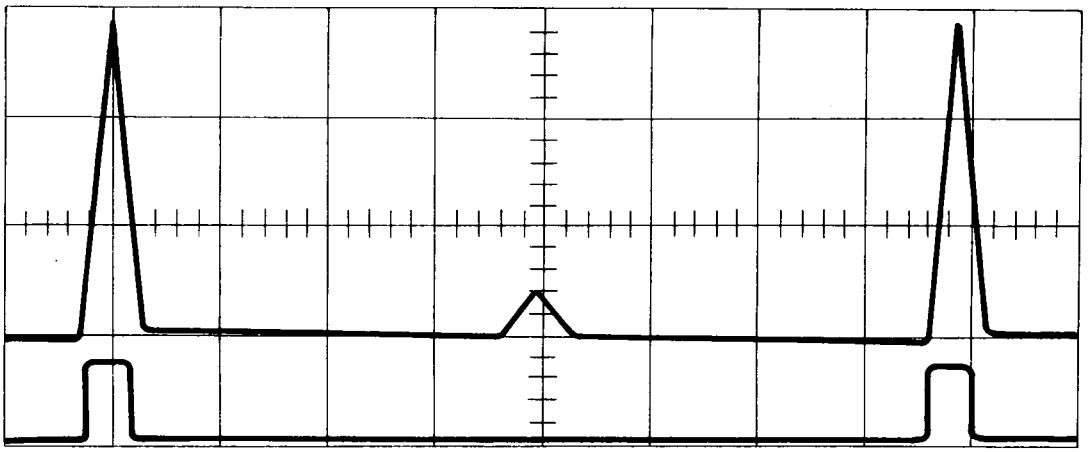
SIGNAL CURRENT - INPUT (READ ONE) = 2.4 MA Pulse @ +50 MV
OUTPUT (READ ONE) = 12 MA @ 0.0V to -.5V (2 Unit Loads)
OUTPUT (READ ZERO) = 0.0 MA @ -6V ± .5V

INPUT NOISE REJECTION (QUIESCENT OR ZERO) = 0.0 to 10.0 MV
MAXIMUM 3 μ SEC SIGNAL RATE = 25 KC
TRANSIENT RESPONSE RISE/FALL TIME = .2 μ SEC



OPERATING CHARACTERISTIC OF RW SENSE AMPLIFIER. OUTPUT PULSE WIDTH VS INPUT PULSE AMPLITUDE. INPUT PULSE 1 μ SEC

RW SENSE AMP.



TYPICAL CARD TRANSFER FUNCTION WAVEFORMS (11 MA LOAD)

TOP WAVEFORM (INPUT SIGNAL)

INPUT SIGNAL = READ ONE, ZERO, ONE
(W/-6V STROBE)

HORIZONTAL CALIBRATION = 5 μ SEC/CM
VERTICAL CALIBRATION = 20 MV/CM (GRD = 2ND LINE UP)

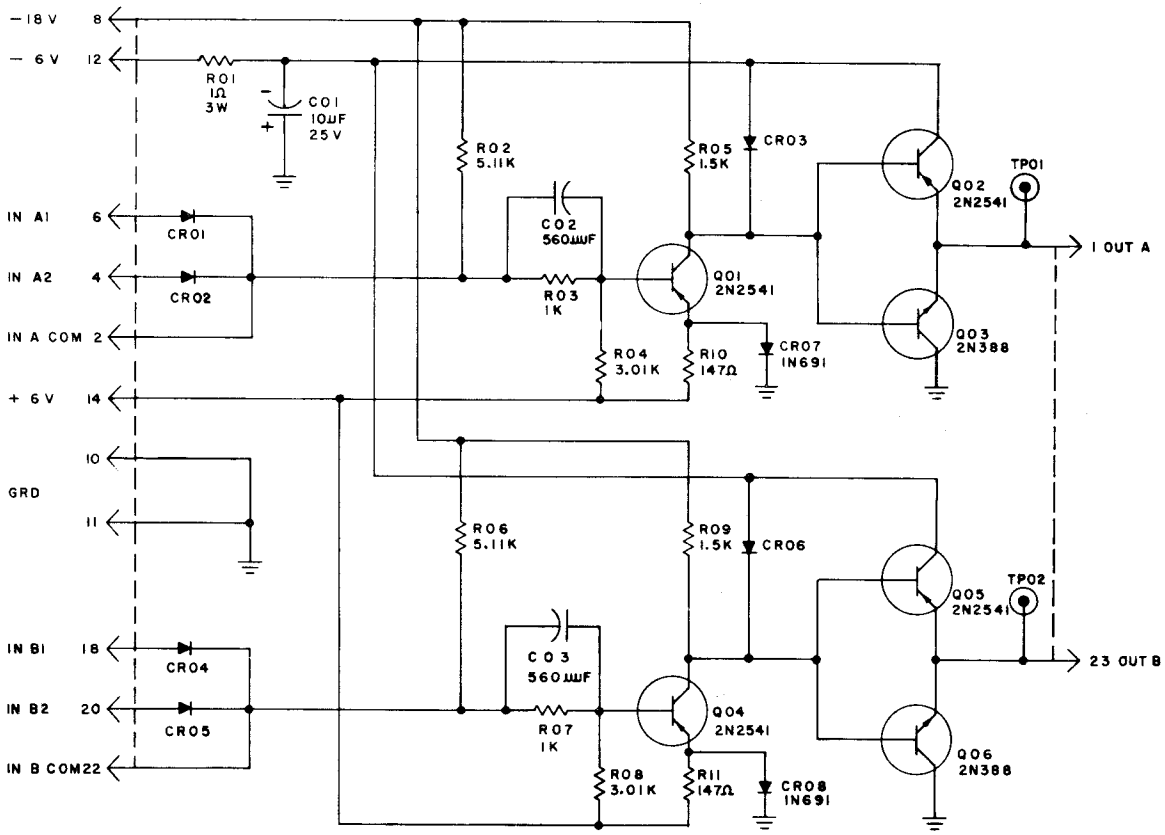
BOTTOM WAVEFORM (OUTPUT SIGNAL)

OUTPUT SIGNAL = READ ONE, ZERO, ONE

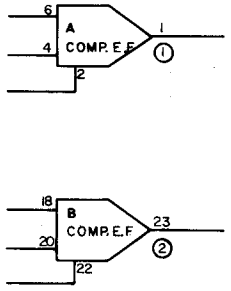
HORIZONTAL CALIBRATION = 5 μ SEC/CM
VERTICAL CALIBRATION = 10V/CM (-6V = BOTTOM LINE)

NOTES:
1. UNLESS OTHERWISE SPECIFIED:
   ALL RESISTORS ARE 1/2 W 1%
   ALL DIODES ARE IN276/CGD-851

REVISIONS				
ZONE	SYM	DESCRIPTION	DATE	APPROVAL
	0	REL TO PED	1/24/64	



LOGIC SYMBOL



34382

WARNING— THE INSERTION OR WITHDRAWAL OF THIS MODULE WHEN DC POWER IS PRESENT AT THE CONNECTOR MAY RESULT IN PERMANENT DAMAGE TO THE SEMI CONDUCTORS.

APPROVED PROD. ENGR. 11/6/63 DATE AUTHORITY

ITEM	REQD	PART NO	DESCRIPTION	MATL	MATL SPEC	UNIT WT

LIST OF MATERIALS

UNLESS OTHERWISE SPECIFIED	SIGNATURES	DATE
DIMENSIONS ARE IN INCHES TOLERANCES ON FRACTIONS DECIMALS ANGLES	DR H. Contarsko	8/27/63
MATERIAL	CHK M. Nichols	9/12/63
FINISH	APPD	9/12/63
HEAT TREAT	APPD D. Bowman	9/22/63

34332 NEXT ASSY | USED ON

APPLICATION

COMP. E. F.
SCHEMATIC

ANelex
CORPORATION
BOSTON MASS

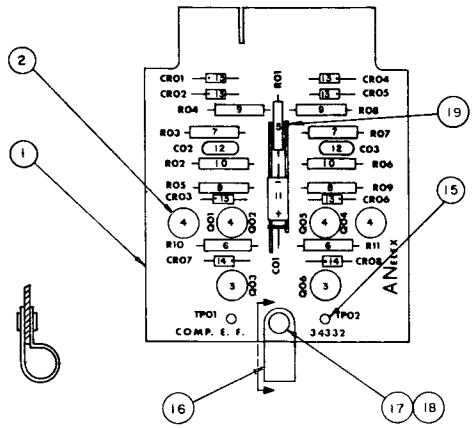
SCALE NONE | WT

C | 34382

REVISIONS				
ZONE	SYM	DESCRIPTION	DATE	APPROVAL
	0	REL TO PED	9/26	WMP
	A	REV PER ECA 16210	10-28-63	RH
	B	REV PER ECA 18314	12-7-64	RH

NOTES:

1. ALL TRANSISTORS ARE MOUNTED ON ITEM 2.
2. NO'S ON COMPONENTS ARE ITEM NO'S,
3. CATHODE END OF DIODE INDICATED BY DOT.



ITEM	REQD	PART NO	DESCRIPTION	MATL	MATL SPEC	UNIT WT
20	REF	34382	SCHEMATIC, COMP. E. F.			
19	AR	465-101-021	WIRE, INSULATED, BLK V'YL	#22		
18	1	95642	COMPRESSION RIVET, FEMALE			
17	1	95641	COMPRESSION RIVET, MALE			
16	1	141-101-006	CLAMP, CABLE			
15	2	420-111-002	TERMINAL, STUD			
14	2	168-105-001	DIODE	IN 691		
13	6	168-102-001	DIODE	IN276/CGD851		
12	2	134-501-047	CAPACITOR 560 μμF			
11	1	134-103-008	CAPACITOR 10 μF 25V			
10	2	387-102-261	RESISTOR 5.11K 1/2W 1%			
9	2	387-102-239	3.01K 1/2W 1%			
8	2	387-102-210	1.5K 1/2W 1%			
7	2	387-102-193	1K 1/2W 1%			
6	2	387-102-113	147Ω 1/2W 1%			
5	1	387-201-001	RESISTOR, 1Ω 3 W, 5 %			
4	4	436-128-001	TRANSISTOR PNP	GTR502		
3	2	436-102-001	TRANSISTOR NPN	2N388		
2	6	438-101-001	PAD, MOUNTING, TRANSISTOR			
1	1	34432	P.C. CARD, COMP. E.F.			

LIST OF MATERIALS

34332 B

APPROVED PROD. ENG. 11/25/63 DATE AUTHORITY

UNLESS OTHERWISE SPECIFIED	SIGNATURES	DATE
DIMENSIONS ARE IN INCHES	DR W. Lombardo	9/27/63
TOLERANCES ON FRACTIONS DECIMALS ANGLES	CHK M. Nichols	9/16/63
MATERIAL	APPD	11/25/63
FINISH	APPD D. Bowman	9/23/63
HEAT TREAT	SCALE 1/1	WT

NEXT ASSY | USED ON

APPLICATION

COMP. E.F. ASSEMBLY

ANelex CORPORATION BOSTON MASS

C 34332

COMPLEMENTED EMITTER FOLLOWER

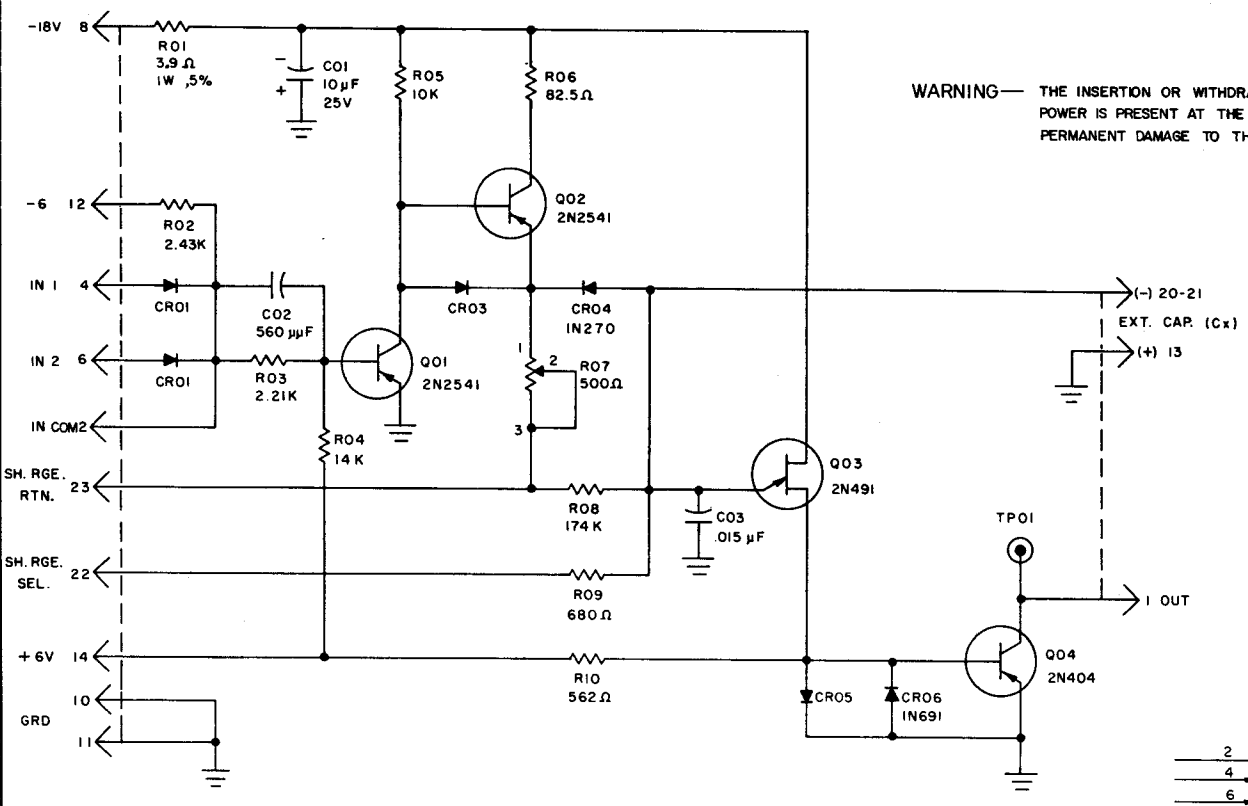
The ANelex Complemented Emitter Follower printed circuit card contains two identical independent emitter follower circuits. Each circuit consists of an input diode network, an inverter circuit, and a complemented emitter follower output buffer. The input diode network and inverter circuit configuration are similar to the standard ANelex A NOR 5 circuit, except for the collector resistor, which is located internally on the Complemented Emitter Follower printed circuit card.

The output voltage level of either circuit will be at a negative (-6 volt) potential whenever signal current (zero volt level) is applied to any one of the corresponding inputs. The output voltage level of either circuit will be at a zero volt potential whenever signal current is absent (-3 volt level) from all of the corresponding inputs.

The output from either Complemented Emitter Follower circuit is capable of driving ten standard ANelex Hammer Driver module trigger inputs in a matrix configuration.

REVISIONS				
ZONE	SYM	DESCRIPTION	DATE	APPROVAL
	0	REL TO PED		

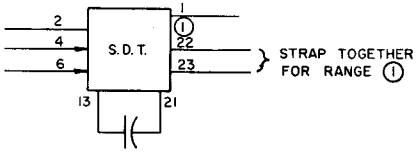
NOTES:
UNLESS OTHERWISE SPECIFIED:
ALL DIODES ARE IN276
ALL RESISTORS ARE 1/2W, 1%



WARNING— THE INSERTION OR WITHDRAWAL OF THIS MODULE WHEN DC POWER IS PRESENT AT THE CONNECTOR MAY RESULT IN PERMANENT DAMAGE TO THE SEMI CONDUCTORS.

34397

LOGIC SYMBOL



RGE.	TIME-M.S.	SELECTION
1	.02-4.0	STRAP "SH. RGE. SEL." TO "SH. RGE. RTN."
2	3.0-400.0	OPEN "SH. RGE. SEL." AND "SH. RGE. RTN."
3	300-4000	USE LONG DELAY TIMER 33307.

RGE 1: $C_{x(\mu f)} = \frac{t\,(ms) - .0025}{1.1667} - .015$

RGE. 2: $C_{x(\mu f)} = \frac{t\,(ms) - .0025}{193.14} - .015$

APPROVED PROD. ENG. DATE

ITEM	REQD	PART NO	DESCRIPTION	MATL	MATL SPEC	UNIT WT

LIST OF MATERIALS

34347	
NEXT ASSY	USED ON
APPLICATION	

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON FRACTIONS ± DECIMALS ± ANGLES ±
MATERIAL
FINISH
HEAT TREAT

SIGNATURES	DATE
DR	12/ 8/62
CHK	11/11/63
APPD	11/11/63
APPD D. Sweeney	11/11/63

SHORT DELAY TIMER
SCHEMATIC

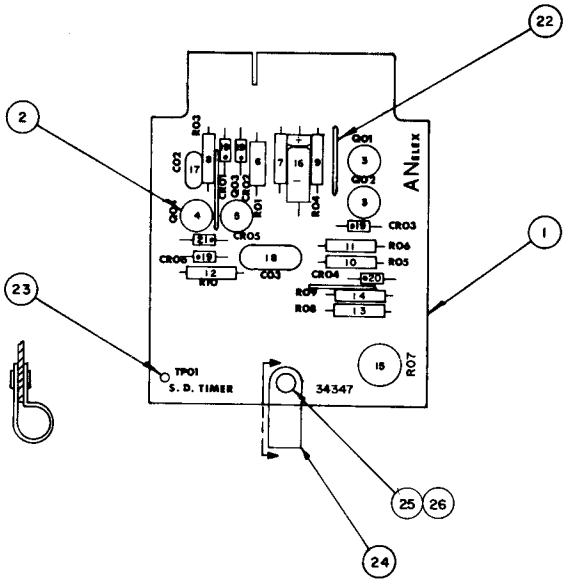
ANelex CORPORATION BOSTON MASS

C 34397

SCALE NONE WT

REVISIONS				
ZONE	SYM	DESCRIPTION	DATE	APPROVAL
	O	REL TO PED	9/24	WMP
	A	REV PER ECA 16210	10-27-63	RH
	B	REV PER ECA 18314	12-7-64	RH
	C	REV PER ECA 18946	3/22/65	RH

NOTES:
1. ALL TRANSISTORS ARE MOUNTED ON ITEM 2.
2. NO'S ON COMPONENTS ARE ITEM NO'S.
3. CATHODE END OF DIODE INDICATED BY DOT.
4. STAMP G2 1/8 BLK. CHAR. AFTER ASSY. NO. COAT PER FS514.



ITEM	REQD	PART NO	DESCRIPTION	MATL	MATL SPEC	UNIT WT
27	REF	34397	SCHEMATIC S.D. TIMER			
26	1	95642	COMPRESSION RIVET, FEMALE			
25	1	95641	COMPRESSION RIVET, MALE			
24	1	141-101-006	CLAMP, CABLE			
23	1	420-111-002	TERMINAL, STUD			
22	AR	465-101-021	WIRE, INSULATED, BLK, VINYL	#22		
21	1	168-105-101	DIODE	IN691		
20	1	168-101-001	DIODE	IN270		
19	4	168-102-001	DIODE	IN276		
18	1	134-601-006	CAPACITOR, .015 μF			
17	1	134-501-047	CAPACITOR, 560 μμF			
16	1	134-103-008	CAPACITOR, 10 μF 25V			
15	1	357-111-003	POTENTIOMETER, 500 Ω, 1/2W			
14	1	387-102-177	RESISTOR, 681 Ω 1/2W 1%			
13	1	387-102-408	174K 1/2W 1%			
12	1	387-102-169	562Ω 1/2W 1%			
11	1	387-102-089	82.5 Ω 1/2W 1%			
10	1	387-102-289	10K 1/2W 1%			
9	1	387-102-303	14K 1/2W 1%			
8	1	387-102-226	2.21K 1/2W 1%			
7	1	387-102-230	2.43K 1/2W 1%			
6	1	387-111-015	RESISTOR, 3.9 Ω 1W 5%			
5	1	436-104-001	TRANSISTOR, UNIJUNCTION	2N491		
4	1	436-103-001	TRANSISTOR, PNP	2N404		
3	2	436-128-001	TRANSISTOR, PNP	GTR502		
2	4	438-101-001	PAD, MOUNTING TRANSISTOR			
1	1	34447	P.C. CARD, S.D. TIMER			

LIST OF MATERIALS

34347 C

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON FRACTIONS DECIMALS ANGLES
MATERIAL
FINISH
HEAT TREAT

SIGNATURES		DATE
DR	J. Gilbert	12/17/62
CHK	M. Nichols	1/27/63
APPD	R. Hall	3/21/63
APPD	R. Sweeney	9/20/63

SCALE 1/1 WT

SHORT DELAY TIMER ASSEMBLY

ANelex CORPORATION BOSTON MASS

C 34347

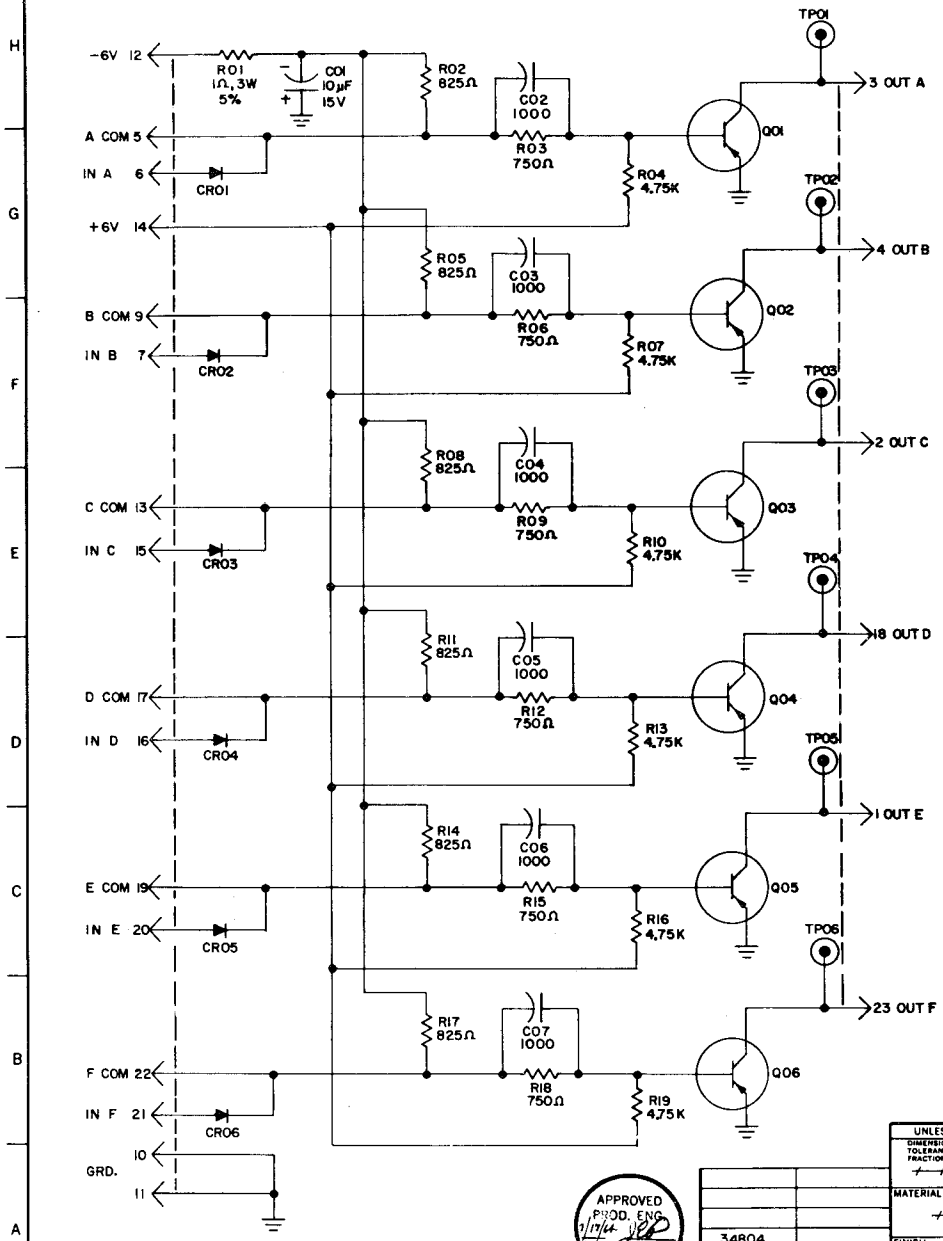
NEXT ASSY | USED ON
APPLICATION

SHORT DELAY TIMER

The ANelex Short Delay Timer printed circuit card contains one complete dual range delay generator. Each circuit has a resettable time base generator which has an output directly dependent upon the time interval between input pulses. Each circuit is composed of 3 basic stages, a standard input buffer inverter stage with a recycling emitter follower and a two diode input network (with an associated common from the diode buss), a unijunction time base generator stage, and an output buffer inverter stage. The unijunction time base generator circuit is so arranged electrically as to continuously attempt to cycle at a rate determined by the size of the timing capacitor. However, application of a current pulse to the input of the circuit will interrupt and reset the delay cycle of the time base generator. If the delay cycle is allowed to reach completion, the circuit output will deliver a current pulse to an external load. The circuit is generally used in conjunction with an ANelex control flip-flop of either the d-c or the complementary type.

When the minimum time delay range is selected (jumper connected between connector pins 22 and 23), the circuit will provide a delay ranging from 20 microseconds to 4 milliseconds as a function of the external capacitor. A potentiometer has been provided for precise adjustment within this delay range. When the high range is selected (no connector jumper) the circuit will cover the range from 30 milliseconds to 400 milliseconds.

The input to the circuit represents one unit load. Circuit recycling is accomplished by the presence of signal current (zero volt level) for a period of time equal to 20% of the selected delay interval. If signal current is absent (-3 volts) from all inputs for a period of time exceeding the selected delay interval will allow the delay generator to complete its cycle, and generate a current pulse in the circuit output. The current pulse is formed by an output excursion from zero signal current (-3 volt level) to full signal current (zero volt level) and then back to zero signal current (-3 volt level). This current output is capable of driving five unit loads, and may be observed at the test points provided.

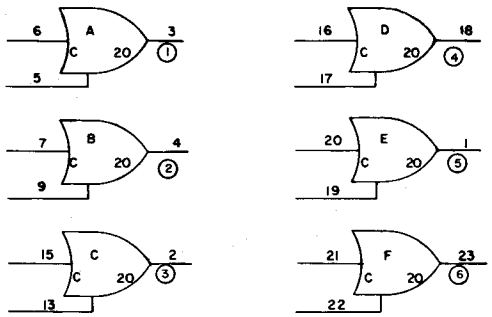


NOTES:

1. UNLESS OTHERWISE SPECIFIED,
   ALL RESISTORS ARE 1/2W 1%
   ALL CAPACITORS ARE IN μμF
   ALL DIODES ARE IN276
   ALL TRANSISTORS ARE 2N2541
2. COMPONENTS SHOWN ON THIS SCHEMATIC ARE INDICATIVE ONLY, APPROVED SUBSTITUTES MAY BE USED.

WARNING — THE INSERTION OR WITHDRAWAL OF THIS MODULE WHEN DC POWER IS PRESENT AT THE CONNECTOR MAY RESULT IN PERMANENT DAMAGE TO THE SEMI CONDUCTORS.

LOGIC SYMBOL



34754

REVISIONS				
ZONE	SYM	DESCRIPTION	DATE	APPROVAL
	0	REL TO PED	1/24/64	

APPROVED PROD. ENG. 1/17/64

34804 NEXT ASSY | USED ON APPLICATION

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON FRACTIONS DECIMALS ANGLES
MATERIAL
FINISH
HEAT TREAT

SIGNATURES	DATE
DR	4/7/63
CHK	6/20/63
APPD	7/12/63
APPD	8/15/63

C NOR 20
SCHEMATIC

ANelex CORPORATION BOSTON MASS

C | 34754

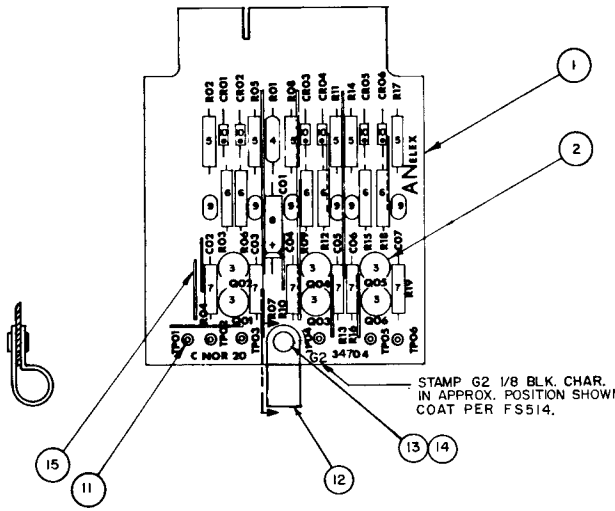
SCALE NONE | WT

LIST OF MATERIALS

ITEM	REQD	PART NO	DESCRIPTION	MATL	MATL SPEC	UNIT WT

REVISIONS				
ZONE	SYM	DESCRIPTION	DATE	APPROVAL
	O	REL TO PED	10/2	WMP
	A	REV PER ECA 16210	10-28-63	RH
	B	REV PER ECA 18314	12-9-64	RH
	C	REV PER ECA 18946	3/20/65	RH

NOTES:
1. ALL TRANSISTORS ARE MOUNTED ON ITEM 2.
2. NO'S ON COMPONENTS ARE ITEM NO'S.
3. CATHODE END OF DIODE INDICATED BY DOT.



STAMP G2 1/8 BLK. CHAR. IN APPROX. POSITION SHOWN. COAT PER FS514.

34704 C

ITEM	REQD	PART NO	DESCRIPTION	MATL	MATL SPEC	UNIT WT
16	REF	34754	SCHEMATIC, C NOR 20			
15	AR	465-101-021	WIRE, INSULATED, BLK, VINYL	#22		
14	1	95642	COMPRESSION RIVET, MALE			
13	1	95641	COMPRESSION RIVET, FEMALE			
12	1	141-101-006	CLAMP, CABLE			
11	6	420-111-002	TERMINAL, STUD			
10	6	168-102-001	DIODE	IN276		
9	6	134-501-053	CAPACITOR, 1000 μμF			
8	1	134-102-008	CAPACITOR, 10 μF 15 V			
7	6	387-102-258	RESISTOR, 4.75K 1/2W 1%			
6	6	387-102-181	▲ 750Ω 1/2W 1%			
5	6	387-102-185	▼ 825Ω 1/2W 1%			
4	1	387-201-001	RESISTOR 1Ω, 3W 5 %			
3	6	436-128-001	TRANSISTOR PNP	GTR502		
2	6	438-101-001	PAD, MOUNTING, TRANSISTOR			
1	1	34804	P.C. CARD C NOR 20			

LIST OF MATERIALS

NEXT ASSY	USED ON
APPLICATION	

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON FRACTIONS DECIMALS ANGLES
MATERIAL
FINISH
HEAT TREAT

SIGNATURES		DATE
DR	B Diggins	9/14/63
CHK	M. Nichols	9/16/63
APPD	R. Thus	9/20/63
APPD		9/26/63

C NOR 20
ASSEMBLY

SCALE 1/1 WT

ANelex
CORPORATION
BOSTON MASS

C 34704

C NOR 20

The ANelex C NOR 20 printed circuit card contains six identical independent current-operated NOR circuits. Each circuit is composed of an input-diode network followed by an inverter stage. The input-diode network consists of a single diode with an associated common from the diode buss.

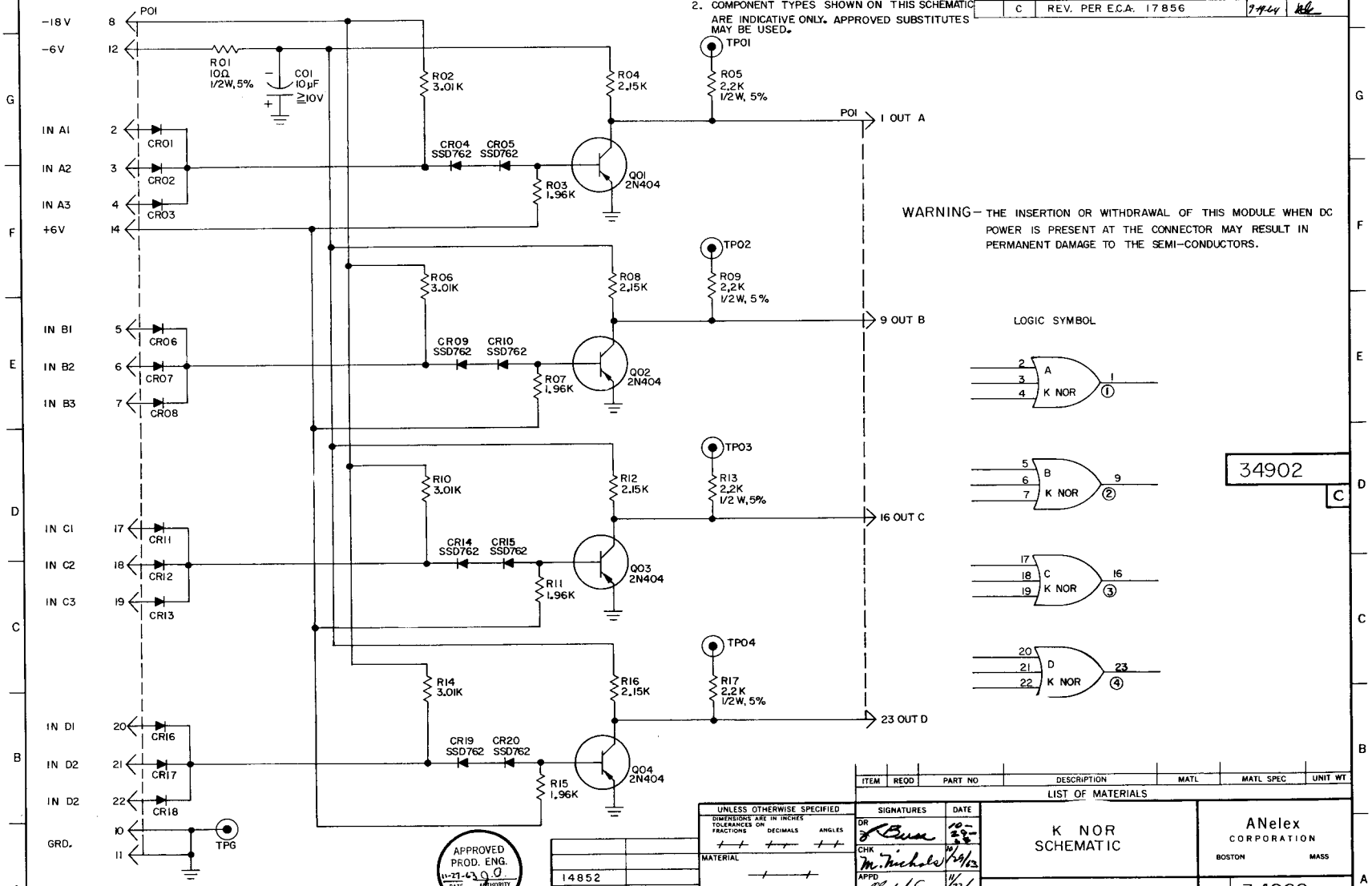
The output current flow from any ANelex C NOR circuit will be inhibited whenever signal current (zero volt level) is applied to any one of the inputs of that particular NOR circuit. Output current will flow in any ANelex C NOR circuit whenever signal current is absent (-3 volt level) from all of the inputs of that particular NOR circuit.

The amount of input (current) loading produced by each C NOR 20 circuit is three unit loads (7 ma. maximum). The output of each C NOR 20 circuit is capable of driving 20 standard unit loads (50 ma. maximum) and may be observed at the test points provided.

NOTES:
1. UNLESS OTHERWISE SPECIFIED,
   ALL RESISTORS ARE 1/4 W, 1%
   ALL DIODES ARE IN276.
2. COMPONENT TYPES SHOWN ON THIS SCHEMATIC ARE INDICATIVE ONLY. APPROVED SUBSTITUTES MAY BE USED.

REVISIONS				
ZONE	SYM	DESCRIPTION	DATE	APPROVAL
	0	REL TO PED	11/29	
	A	REV. PER E.C.A. 16699	1/30	
	B	REV. PER E.C.A. 16951	3/28/63	
	C	REV. PER E.C.A. 17856	9-4-64	

WARNING – THE INSERTION OR WITHDRAWAL OF THIS MODULE WHEN DC POWER IS PRESENT AT THE CONNECTOR MAY RESULT IN PERMANENT DAMAGE TO THE SEMI-CONDUCTORS.



LOGIC SYMBOL

34902 C

APPROVED PROD. ENG. 11-27-63 DATE AUTHORITY

ITEM	REQD	PART NO	DESCRIPTION	MATL	MATL SPEC	UNIT WT

LIST OF MATERIALS

14852	
34852	
NEXT ASSY	USED ON
APPLICATION	

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON FRACTIONS DECIMALS ANGLES
MATERIAL
FINISH
HEAT TREAT

SIGNATURES	DATE
DR	10-22-63
CHK M. Nichols	10/29/63
APPD	11/22/63
APPD	11/24/63

K NOR SCHEMATIC

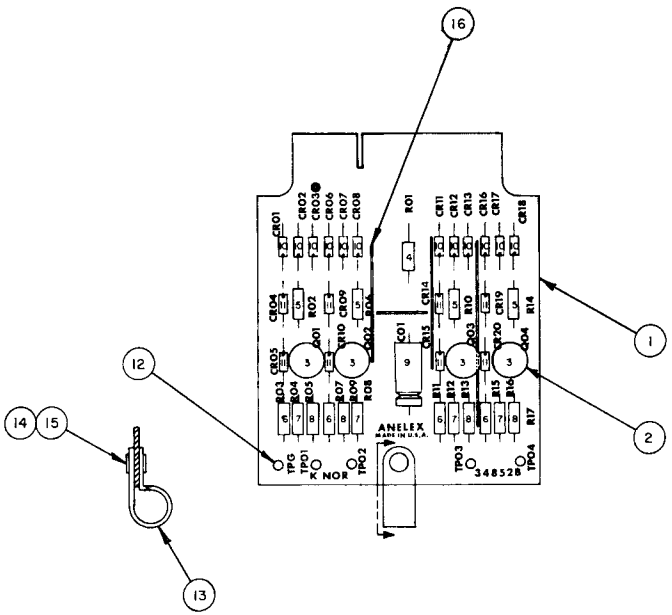
SCALE NONE WT

ANelex CORPORATION BOSTON MASS

C 34902

REVISIONS				
ZONE	SYM	DESCRIPTION	DATE	APPROVAL
	B	REV & REDRAWN PER ECA 16951	4-2-64	RS
	C	REV PER ECA 18314	12-9-64	RS
	D	REV PER ECA 18946	3/4/65	RS

NOTES:
1. ALL TRANSISTORS ARE MOUNTED ON ITEM 2.
2. NO'S ON COMPONENTS ARE ITEM NO'S.
3. CATHODE END OF DIODE INDICATED BY DOT.
4. STAMP G2 1/8 BLK. CHAR. ABOVE ASSY. NO. COAT PER FS514.



ITEM	REQD	PART NO	DESCRIPTION	MATL	MATL SPEC	UNIT WT
17	REF	34902	SCHEMATIC, K NOR			
16	AR	465-101-021	WIRE, INSULATED, BLK. VINYL	#22		
15	1	95642	COMPRESSION RIVET, FEMALE			
14	1	95641	COMPRESSION RIVET, MALE			
13	1	141-101-006	CLAMP, CABLE			
12	5	420-111-002	TERMINAL STUD			
11	8	168-106-001	DIODE	SSD762		
10	12	168-102-001	DIODE	IN276		
9	1	134-101-008	CAPACITOR, 10μF ± 10V			
8	4	387-110-081	RESISTOR, 2.2K 1/2W 5%			
7	4	387-101-225	2.15K 1/4W, 1%			
6	4	387-101-221	1.96K 1/4W, 1%			
5	4	387-101-239	3.01K 1/4W, 1%			
4	1	387-110-025	RESISTOR 10Ω 1/2W, 5%			
3	4	436-103-001	TRANSISTOR PNP	2N404		
2	4	438-101-001	PAD, MOUNTING TRANSISTOR			
1	1	34952	P.C. CARD, K NOR			

LIST OF MATERIALS

34852 D

NEXT ASSY	USED ON
APPLICATION	

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON FRACTIONS DECIMALS ANGLES
MATERIAL
FINISH
HEAT TREAT

SIGNATURES		DATE
DR	D. Mercier	3/1/64
CHK	M. Nichols	3/31/64
APPD	R. Ehrlich	4/1/64
APPD	A.G. Hofer	4/14/64

K NOR ASSEMBLY

ANelex CORPORATION BOSTON MASS

C 34852

SCALE 1/1 WT

DESCRIPTION:

The K NOR printed circuit card contains four identical, independent, saturated DDTL-type logical operators. Each circuit is composed of a three-diode input, which is stabistor-coupled to a switching inverter. Resistance-isolated test points have been provided for observing output signal transitions.

Power Requirements: (card)
24 MA AT -18 volts
12 MA AT - 6 volts
14 MA AT + 6 volts

Transfer Function:

INPUT	OUTPUT
- 3 V	0 V
0 V	- 6 V

Electrical Characteristics:

Signal Current:
Input: 4 MA MAX AT 0 V = 1 unit load
Output: 24 MA MAX AT 0 V = 6 unit loads

Signal Level:
Input: Logic 0 $\geqq$ - 3 volts (- 6 V typ)
Logic 1 = 0 $\pm$0.5 volts

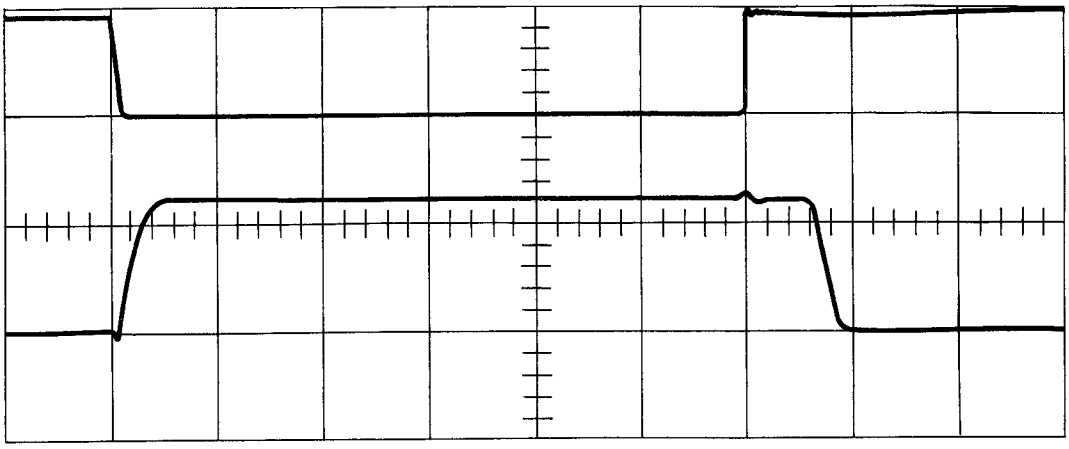
Noise Rejection: AT 0.0 V = -1.0 V MAX
AT - 6 V = 3.0 V MAX

Output: Logic 0 = -6 $\pm$0.5 volts
Logic 1 = 0 $\pm$0.5 volts

Duty Cycle: D. C. Coupled (100%) to 500 Kilobits/Sec

Transient Response:
Rise Time $\leqq$ 300 N-Sec.
Fall Time $\leqq$ 300 N-Sec.
Delay (Storage) Time $\leqq$ 600 N-Sec.

Typical Performance:



Input Waveform (Top)
Output Waveform (Bottom)
Vertical Scale 5 V/CM
Horizontal Scale 500 N-Sec/CM
@ 6-Unit Loads

NOTES:
1. UNLESS OTHERWISE SPECIFIED: ALL RESISTORS ARE 1/4W, 1% ALL DIODES ARE SSD762
2. COMPONENTS SHOWN ON THIS SCHEMATIC ARE INDICATIVE ONLY. APPROVED SUBSTITUTES MAY BE USED.

REVISIONS				
ZONE	SYM	DESCRIPTION	DATE	APPROVAL
	O	REL TO PED	1/14/64	
	A	REVISED TO ECA 17018	3-27-64	
	B	REV PER ECA 17856	9-4-64	

WARNING — THE INSERTION OR THE WITHDRAWAL OF THIS MODULE WHEN DC POWER IS PRESENT AT THE CONNECTOR MAY RESULT IN PERMANENT DAMAGE TO THE SEMI-CONDUCTORS.

−18V 8
IN A 4
+6V 14
IN B 5
IN C 19
IN D 20
GRD. 10, 11

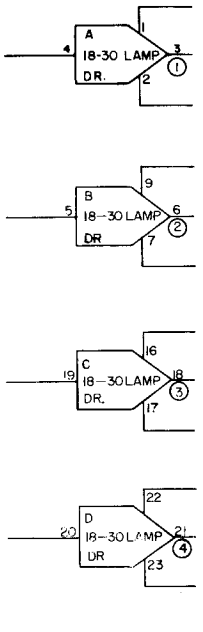
R01 3.01K
R02 820Ω 1W, 2%
CR04
CR01 IN276
CR02 CR03
Q01 2N404
R05 1.96K
R06 681Ω
TP01
Q02 2N2541
R03 560Ω 1W, 2%
R04 560Ω 1W, 2%
R07 560Ω 1/2W, 2%
3 OUT A
1
2

R08 3.01K
R09 820Ω 1W, 2%
CR08
CR05 IN276
CR06 CR07
Q03 2N404
R12 1.96K
R13 681Ω
TP02
Q04 2N2541
R10 560Ω 1W, 2%
R11 560Ω 1W, 2%
R14 560Ω 1/2W, 2%
6 OUT B
9
7

R15 3.01K
R16 820Ω 1W, 2%
CR12
CR09 IN276
CR10 CR11
Q05 2N404
R19 1.96K
R20 681Ω
TP03
Q06 2N2541
R17 560Ω 1W, 2%
R18 560Ω 1W, 2%
R21 560Ω 1/2W, 2%
18 OUT C
16
17

R22 3.01K
R23 820Ω 1W, 2%
CR16
CR13 IN276
CR14 CR15
Q07 2N404
R26 1.96K
R27 681Ω
TP04
Q08 2N2541
R24 560Ω 1W, 2%
R25 560Ω 1W, 2%
R28 560Ω 1/2W, 2%
21 OUT D
23
22

LOGIC SYMBOL



34910 E

LAMP CONNECTIONS

NO OF LAMPS	RTN. PIN(S) TO GRD.
1	NONE
2	2, 7, 17, 22
3	1, 9, 16, 23
4	1, 2, 7, 9, 16, 17, 22, 23

APPROVED PROJ. ENG. 9-4-64

ITEM	REQD	PART NO	DESCRIPTION	MATL	MATL SPEC	UNIT WT

LIST OF MATERIALS

NEXT ASSY	USED ON
14860	
34860	
APPLICATION	

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON FRACTIONS DECIMALS ANGLES
MATERIAL
FINISH
HEAT TREAT

SIGNATURES		DATE
DR	J. Mayfield	10-12-63
CHK	M. Nichols	11/11/63
APPD	R. Ethes	11/15/63
APPD	Mac Ellis	11/5/64

18-30 LAMP DRIVER SCHEMATIC

ANelex CORPORATION BOSTON MASS

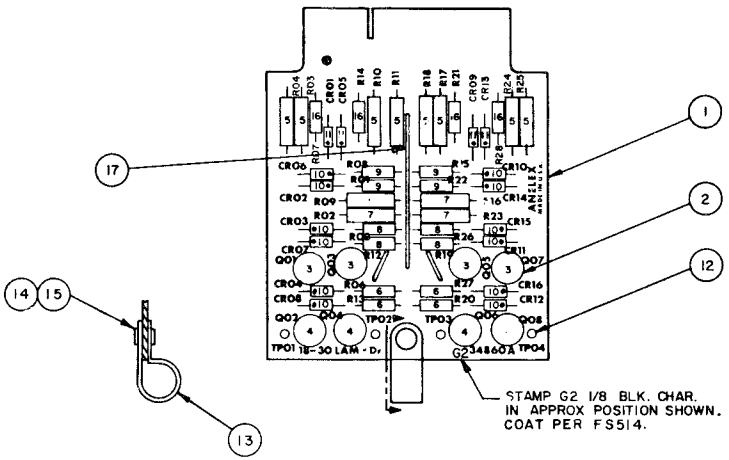
C 34910

SCALE NONE WT

REVISIONS				
ZONE	SYM	DESCRIPTION	DATE	APPROVAL
	0	REL TO PED	11/1/64	
	A	REVISED TO ECA 17018	11/23/64	
	B	REV PER ECA 18314	12/9/64	
	C	REV PER ECA 18946	3/26/65	

NOTES:

1. ALL TRANSISTORS ARE MOUNTED ON ITEM 2.
2. NO'S ON COMPONENTS ARE ITEM NO S.
3. CATHODE END OF DIODE INDICATED BY DOT.



ITEM	REQD	PART NO	DESCRIPTION	MATL	MATL SPEC	UNIT WT
18	REF	34910	SCHEMATIC 18-30 LAMP DR.			
17	AR	46[illegible]0 021	WIRE, INSULATED, BLK VINYL	# 22		
16	4	387-305-026	RESISTOR, 560Ω, 1/2W 2%			
15	1	95642	COMPRESSION RIVET, FEMALE			
14	1	95641	COMPRESSION RIVET, MALE			
13	1	141-101-006	CLAMP, CABLE			
12	4	420-111-002	TERMINAL, STUD			
11	4	168-002-00[illegible]	DIODE	1N276		
10	[illegible]	168-106-001	DIODE	SSD 762		
9	4	387-101-239	RESISTOR 3.01K 1/4W 1%			
8	4	387-101-221	1.96K 1/4W 1%			
7	4	387-301-047	820Ω 1W 2%			
6	4	387-101-177	681Ω 1/4W 1%			
5	8	387-301-043	RESISTOR 560Ω 1W 2%			
4	4	436-128-001	TRANSISTOR PNP	GTR 502		
3	4	436-103-001	TRANSISTOR PNP	2N404		
2	8	438-101-001	PAD, MOUNTING, TRANSISTOR			
1	1	34960	P.C. CARD, 18-30 LAMP DR.			

LIST OF MATERIALS

34860 C

NEXT ASSY	USED ON
APPLICATION	

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON FRACTIONS DECIMALS ANGLES
MATERIAL
FINISH
HEAT TREAT

SIGNATURES		DATE
DR	J. Maglish	11-25-63
CHK	M. Nichols	11/1/63
APPD	R. Adler	11/15/64
APPD	W. Hyman	11/17/64

18-30 LAMP DRIVER ASSEMBLY

SCALE 1/1 WT

ANelex CORPORATION BOSTON MASS

C 34860

DESCRIPTION:

The 18-30 Lamp Driver printed circuit card contains 4 identical, independent, circuits which converts an ANelex logic signal to a current drive used to illuminate a maximum of four indicator lamps. Each circuit is composed of a single-diode input with stabistor coupling to a switching inverter, followed by an output current driver. Each output current driver is shunted by a resistive preheating current divider which supplies enough leakage current to hold its external lamps in a thermally resistive condition. This feature helps extend lamp life by keeping the lamp filament resistances high enough to prevent large current surges when the output current driver is switched on. The proper leakage current level to preheat lamp loads greater than one lamp is selected by the means of jumpers at the module connector as specified in the Lamp Connection table on the schematic.

Power Requirements: (card only)

27 MA AT -18 volts
12 MA AT + 6 volts

Transfer Function:

INPUT	OUTPUT
-3 V	Preheat current (extinguished)
0 V	Output current (illuminated)

Electrical Characteristics:

Signal Current: Input: 4 MA MAX AT 0 V = 1 unit load
Output: 120 MA MAX AT 0 V = 4 lamp loads *

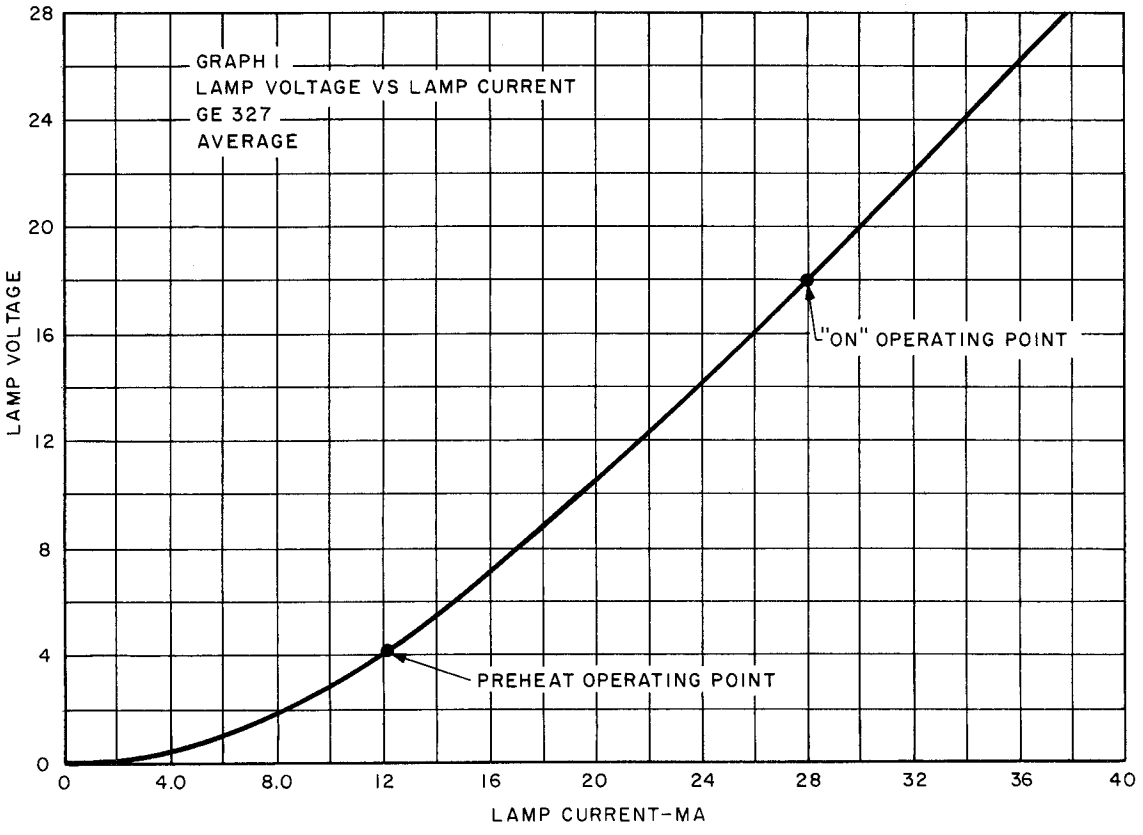
* Each lamp provides a typical load of 30 milliamperes, and the number of lamps used constitutes a multiple of this rating. This amount must be added to the -18 V current requirement.

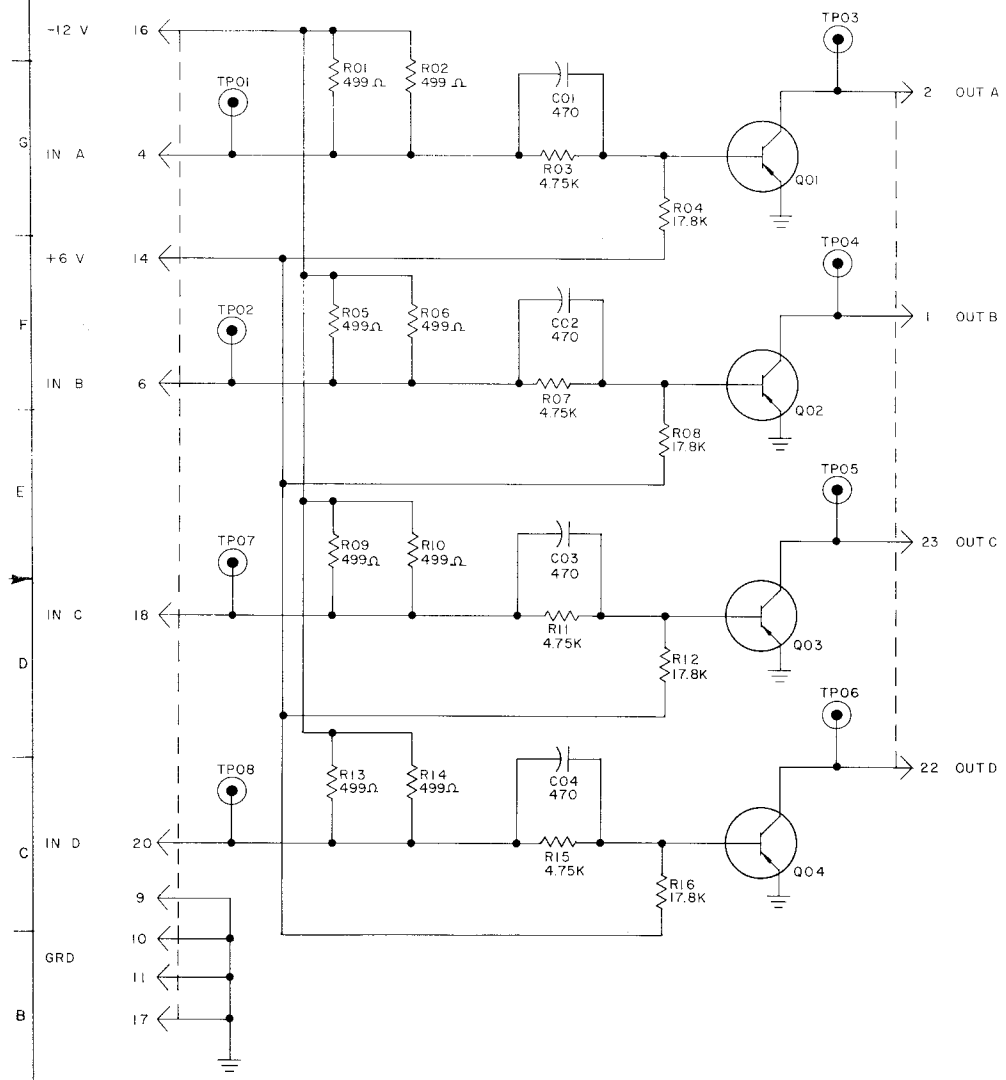
Signal Level: Input: Logic 0 $\geqq$ -3 V (-6 V typ)
Logic 1 = 0.0 V $\pm$ 0.5 V

Noise Rejection: AT 0.0 V = 1.0 V MAX
AT -6 V = 3 V MAX

Cyclic Interval: DC to 1.0 meg bits/sec. **

** This frequency range represents the circuit input capability; visual identification can only occur at DC or very low frequencies.





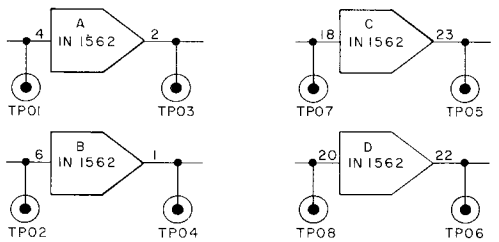
NOTES:

1. UNLESS OTHERWISE SPECIFIED:
   ALL RESISTORS ARE 1/2W ±1%,
   ALL CAPACITORS ARE 1Nμμf,
   ALL TRANSISTORS ARE 2N404.
2. COMPONENT TYPES SHOWN ON THIS SCHEMATIC ARE INDICATIVE ONLY. APPROVED SUBSTITUTES MAY BE USED.

WARNING – THE INSERTION OR THE WITHDRAWAL OF THIS MODULE WHEN DC POWER IS PRESENT AT THE CONNECTOR MAY RESULT IN PERMANENT DAMAGE TO THE SEMI-CONDUCTORS.

44097

LOGIC SYMBOL



SYM	ECA NO	DATE	APPD	SYM	ECA NO	DATE	APPD	SYM	ECA NO	DATE	APPD	USED ON
C				G				K				
B				F				J				
A				E				I				
0	RELEASED			D				H				44047

	SIGNATURES	DATE
DR		11/17/64
CHK		12/9/64
APPD		12/21/64
APPD		12/29/64

ANELEX
CORPORATION
BOSTON MASS U.S.A.

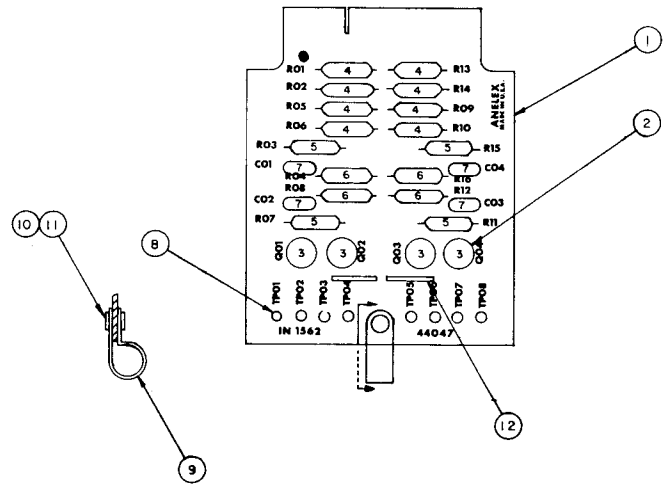
FUNCTION: IN 1562 SCHEMATIC
CLIENT:

CODE NO:
C | DWG NO 44097
SHEET OF

1562

NOTES:
1. ALL TRANSISTORS ARE MOUNTED ON ITEM 2.
2. NO'S ON COMPONENTS ARE ITEM NO'S.

REVISIONS				
ZONE	LTR	DESCRIPTION	DATE	APPROVED



REF	13		44097	SCHEMATIC, IN 1562			
AR	12		465-101-021	WIRE, INSULATED, BLK. VINYL	#22		
1	11		95642	COMPRESSION RIVET, FEMALE			
1	10		95641	COMPRESSION RIVET, MALE			
1	9		141-101-006	CLAMP, CABLE			
8	8		420-111-002	TERMINAL, STUD			
4	7		134-501-044	CAPACITOR 470μF			
4	6		387-102-313	RESISTOR 17.8K, 1/2W, 1%			
4	5		387-102-258	RESISTOR 4.75K, 1/2W, 1%			
8	4		387-102-164	RESISTOR 499Ω, 1/2W, 1%			
4	3		436-103-001	TRANSISTOR, PNP	2N404		
4	2		438-101-001	PAD, MOUNTING, TRANSISTOR			
1	1		44147	P.C. CARD, IN 1562			
QTY REQD	ITEM	DWG SIZE	PART NO.	DESCRIPTION	MATERIAL	MATL SPEC	SYM

LIST OF MATERIALS

UNLESS OTHERWISE SPECIFIED
REMOVE BURRS & SHARP EDGES
DIMENSIONS ARE IN INCHES
ALL DIMS APPLY AFTER PLATING
TOLERANCES ON
FRACTIONS: ±
DECIMALS : ±
ANGLES : ±
DIM. & TOL PER MIL-STD-8B
MATERIAL:

CONTRACT NO.
RELEASED 12/9/64
DRAWN 11/19/64
CHECKED 12/3/64
ENGINEER 12/21/64
E-IN-C
MANAGER 12/4/64
APPROVED

ANELEX CORPORATION
BOSTON, MASS.

TITLE:
IN 1562
ASSEMBLY

SIZE C | CODE IDENT NO. 09211 | DRAWING NO. 44047
SCALE: 1/1 | SHEET OF

NEXT ASSY	USED ON
APPLICATION	

DO NOT SCALE PRINT

EG-9-1M-7-64

1562

REV C 44047

REVISIONS				
ZONE	SYM	DESCRIPTION	DATE	APPROVAL
	O	REL TO PED	11-14-62	WKS
	A	REVISED PER ECA 14923	1-14-63	RH

TB-2
RED E1
BRN
GRN
YEL
RED E2
CR1 1N1132
CR2 1N1192
C7 5μF 660 VAC
C1 55 KMF 15VDC
Q1 2N2082
Q9 2N1502
R9 470Ω 3W
+6V REGULATOR
R18 2.4K, ½W
R10 4.7K 0.5W
R11 750Ω 0.5W
R12 1K 0.5W
+C10
333μf 100V
Q10 2N1306
T1G CR19
Z1 1/4AM4.7Z
CR20
CR21
CR22
Z2 1N958
Q11 2N1307
Q12 2N1307
R13 5.1K 0.5W
R14 2K 0.5W
R15 1.6K 0.5W
R16 510Ω 0.5W
R17 1.5K 0.5W
R19 1.5K 3W
P.C. ASSY PB 106
C4 1KμF 15VDC
R1 56Ω 2W
F2 10A 32V
R4 360Ω, ½W
REG S1
MAR0
F5 150Ω
+6VDC 5A
NOTE 3
F1 A18
T1 NOTE 4
TB-1
WHT/ORN
ORN/BLK
GRD
CR3 1N1192
CR4 1N1192
C2 55KMF 15VDC
Q2 2N2082
Q8 2N1502
-6V REGULATOR
C14
C5 1KμF 15VDC
R2 56Ω 2W
F3 10A 32V
E5 360Ω, 1/2W
S2
-6VDC 5A
BLK/WHT
RED/WHT
BLU
RED/YEL
BLK/YEL
K1 MAR
CR5 1N1185
CR6, 1N1185
REG
C3 46.5 KMF 25VDC
18 VOLT SEQ
T2 EIA#136232
T3 EIA#136232
T4 EIA#136232
C1 250μF 30VDC
C8 250μF 25VDC
C11 250μF 50VDC
C10 250μF 25VDC
C13 250μF 50VDC
C12 250μF 25VDC
BIAS SUPPLY 5/A - 5A - 101
Q6 2N2082
Q5 2N2082
Q4 2N2082
Q7 2N1692
R22 0.25Ω 3W
R23 0.25Ω 3W
R7 0.25Ω 3W
R8 0.25Ω 3W
-18V REGULATOR
R21 220Ω 3W
R20 7.5K, 1/2W
C6 1KμF 25VDC
R3 390Ω 2W
F4 15A 32V
R6 1100Ω 11W
R5 2000Ω
-18VDC 7.5A
TB-1
S3B
K1 OHMITE DOSX-7T
TB-2
P.C. ASSY PB 118

NOTES:
1. UNLESS OTHERWISE SPECIFIED: ALL DIODES ARE IN1220
2. VENDOR: SOLID STATE INST, CAMBRIDGE, MASS.
3. F1, 5AMP FOR 50 CYCLE 230V; 8AMP FOR 60 CYCLE 115V
4. T1, 1866-230-508 FOR 50 CYCLE 230V
   1866-115-60 FOR 60 CYCLE 115V

APPROVED PROD. ENG.

ITEM	REQD	PART NO	DESCRIPTION	MATL	MATL SPEC	UNIT WT

LIST OF MATERIALS

NEXT ASSY	USED ON
	68625
	68624
	68623
	68513

APPLICATION

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON FRACTIONS ± DECIMALS ± ANGLES ±
MATERIAL
FINISH
HEAT TREAT

SIGNATURES	DATE
DR C. Finamore, C. Kin Ja	9-30-62
CHK R. Shafe	11/14/62
APPD R.C. Fuld	11/15/62
APPD	

MULTIPLE OUTPUT POWER SUPPLY SCHEMATIC
50 CPS 230 VOLT
60 CPS 115 VOLT

ANelex CORPORATION BOSTON MASS

D 32242

SCALE NONE WT

32242 A

MULTIPLE-OUTPUT POWER SUPPLY

Description.

The multiple-output power supply (ANelex Drawing 32242) is designed to operate from 230 VAC, 50 cps line power and to provide three isolated output voltages. The supply combines a magnetic regulating transformer and a transistorized regulating circuit to maintain constant output voltage under varying conditions of line, load and temperature. For each output a front panel switch selects either of two operating modes. In the regulated mode, the output voltage is set and regulated to the nominal output voltage. In the marginal test mode, the output voltage can be varied by a front panel control over a range of ± 10%. The power supply is designed so that under no conditions will the output voltage exceed a value which would damage the circuitry in the printer which it operates. The supply is also designed so that it will maintain its nominal output voltages under high pulse current loads.

Multiple-Output Power Supply Specifications

Input:	195 to 265 VAC, 50 cps ± 0.1 cps
Output:	-18 VDC @ 7.5A + 6 VDC @ 5A - 6 VDC @ 5A
Regulation:	Outputs to remain within ± 3.5% of nominal output for the following conditions: (1) Load: 20% to 100% (2) Line: 195 to 265 VAC (3) Frequency: 50 cps ± 0.1 cps (4) Temperature: 0 to 55°C (5) Ripple: Not to exceed 1% at full load
Over-voltage Protection:	Voltage output of -18V supply not to exceed 20% Voltage output of ± 6V supplies not to exceed 58%
Marginal Adjustment:	In marginal test position, voltage of each supply is capable of ± 10% adjustment range.

Theory of Operation.

a. Magnetic Regulated Transformer and Rectifying Circuits.

In order to achieve high efficiency and good regulation, the multiple-power supply combines the advantages of a magnetic regulating transformer and a transistor regulating circuit. The diagram in Figure 1 shows the configuration of the magnetic regulating transformer and the rectifying circuits. For each output an isolated center tapped secondary winding is used in a full wave rectifier circuit to convert the input 230 VAC power to a suitable d-c voltage. Relatively large filter capacitors are used in order to store large amounts of energy to supply high pulse currents which are required by the load.

The characteristics of a magnetic regulating transformer are such that over a line voltage range of 195 to 265 VAC, the output d-c voltage will not vary by more than 5%. This line regulation is accomplished by a resonant circuit set up by the inductance of the transformer and the resonant Capacitor C-7. As the input line voltage changes, the resulting saturation changes in the transformer alter the inductance of the transformer and, hence, the operating point on the resonant curve which tends to maintain a constant secondary output voltage. Limiting the transformer secondary voltage variations allows a lower d-c supply voltage to be used to the regulator circuitry which, in turn, minimizes dissipation in the series passing transistor of the regulator and increases the overall efficiency of the power supply.

On the 18V supply, the secondary voltage is selected by the contacts of Relay K_1 dependent on the position of front panel mode selector switch. In the nominal output mode, the lower secondary voltage is selected since only 18V is required at the output. With the switch in the marginal position, the higher voltage taps are selected to provide a higher d-c supply voltage for increasing the d-c output of the regulator by 10%. The advantage here is that under normal operating conditions, the d-c supply voltage is lower which limits the amount of dissipation

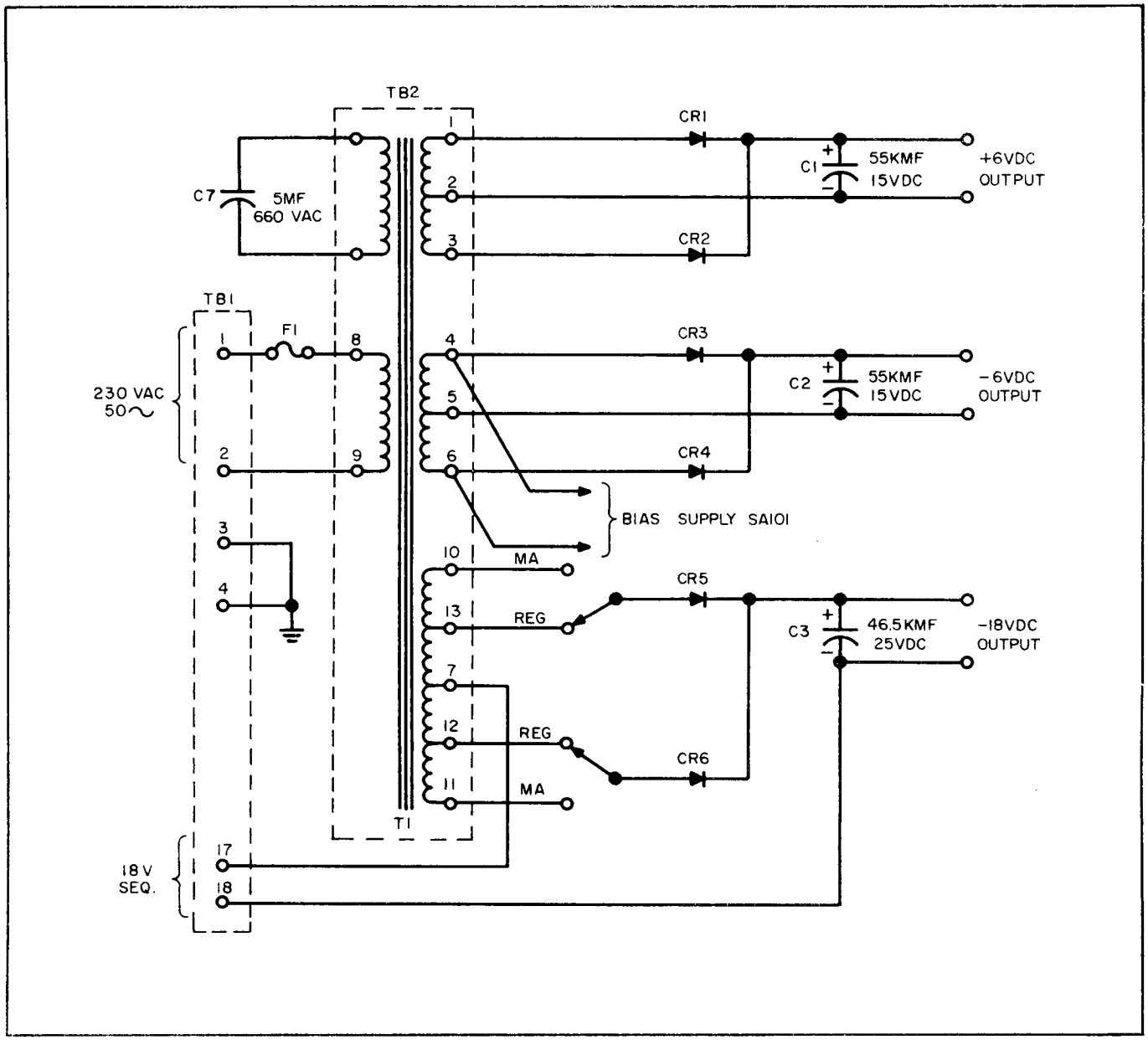


Figure 1. Regulating Transformer and Rectifying Circuits

in the series passing transistors of the regulating circuit which, in turn, assures more reliable operation. Under marginal test conditions, considerably more power is dissipated in the series passing transistors. The 18V supply has provisions for sequencing brought out to the rear terminals of the power supply, (Terminals 17 and 18 of TB-1). The purpose is that, under some operating conditions, it is desirable to turn on the 18V supply after turning on the ± 6V supplies.

b. Bias Supplies (Subassembly SA-101).

As will be discussed subsequently, each of the three regulator circuits requires bias voltages of 15 and 40 VDC. This necessitates a total of 6 bias supplies since each bias voltage must be isolated with respect to ground and to each other. Each bias supply utilizes a center tap, secondary full wave rectifier and filter capacitor. Primary excitation voltage for the bias Transformers, T_2, T_3, and T_4, is taken from the secondary winding of the regulating Transformer T_1, in order to minimize the effect of line voltage variations on the bias voltages. The overall schematic shows the bias supply subassembly enclosed in the dotted block.

c. Transistor Regulator Circuit.

A transistorized series regulating circuit is used in order to achieve a higher degree of line and load regulation than is possible with a magnetic regulating transformer. Figure 2 shows the regulator for the +6V output which is typical for the other regulators. The d-c input to this circuit is obtained from the magnetic transformer and rectifying circuits just discussed. To achieve regulation, a series Transistor Q_1 is located in one of the output leads. By varying the drive current to Transistor Q_9 the voltage drip across Q_1 can be changed to compensate for any voltage changes which may occur in the input d-c voltage. The remote sensing leads detect any change in voltage at the output terminals of the supply which may tend to occur. The output voltage is then compared to a reference within the regulator circuit and an error signal is derived which is proportional to any deviation of the output voltage from its nominal value. This error signal is amplified and applied to the driver Transistor Q_9 and, in turn, to Q_1 to either increase or decrease the voltage drop across Q_1 in such a way as to maintain the output voltage constant. By using high gain in the regulator feedback circuit, the variations in the output voltage can be maintained to exceedingly small voltages. The regulation achieved in the multiple-output supply is as good as 0.1% for variations of line voltage from 195 to 265 VAC and load changes from 20% to full load.

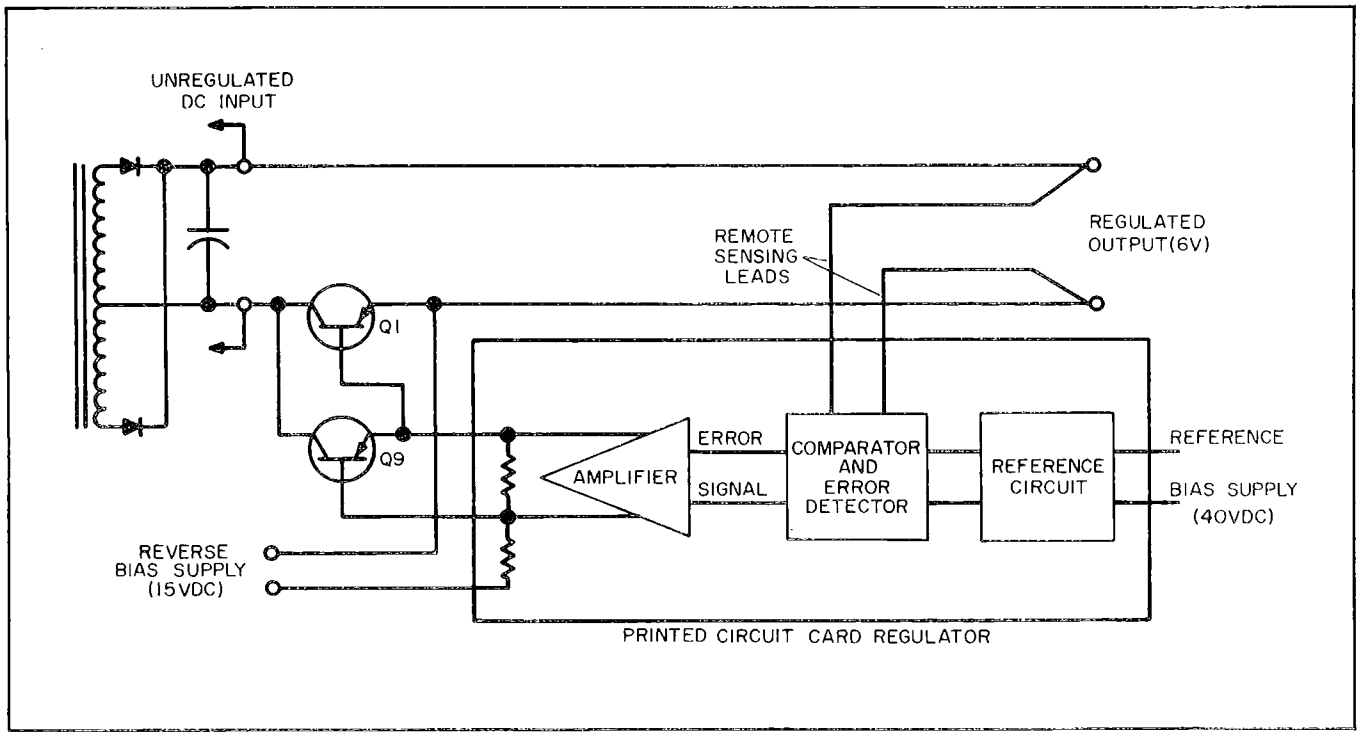


Figure 2. Regulator Circuit Schematic

d. Reference and Regulator Amplifier Circuit.

As we have mentioned, the function of the reference and regulator amplifier circuit is to sense changes in the output voltage and feed a signal to the passing Transistor Q_1 to compensate for these changes. The operation of the reference and error detecting circuit can best be understood in terms of current summing. The reference and error detecting circuit is shown by the heavy lines in Figure 3.

The Zener Diode Z_1 is used to establish a reference current in the following manner: To a first approximation, if we establish a constant voltage across the emitter base junction of Transistor Q_{12} we shall establish a constant emitter Current I_2. At constant temperature we can assume that voltage drop across the emitter base junction of Transistor Q_{11} is constant. As a result, we can see that Zener Diode Z_1 does, in fact, establish a constant voltage across the emitter base junction of Q_{12} and the constant reference current which is desired. If R_4 and R_{18} are adjusted appropriately for a nominal output voltage (for instance, 6V), Current I_1 can be made exactly equal to reference Current I_2 and in this case the error Signal I_3 will be equal to 0.

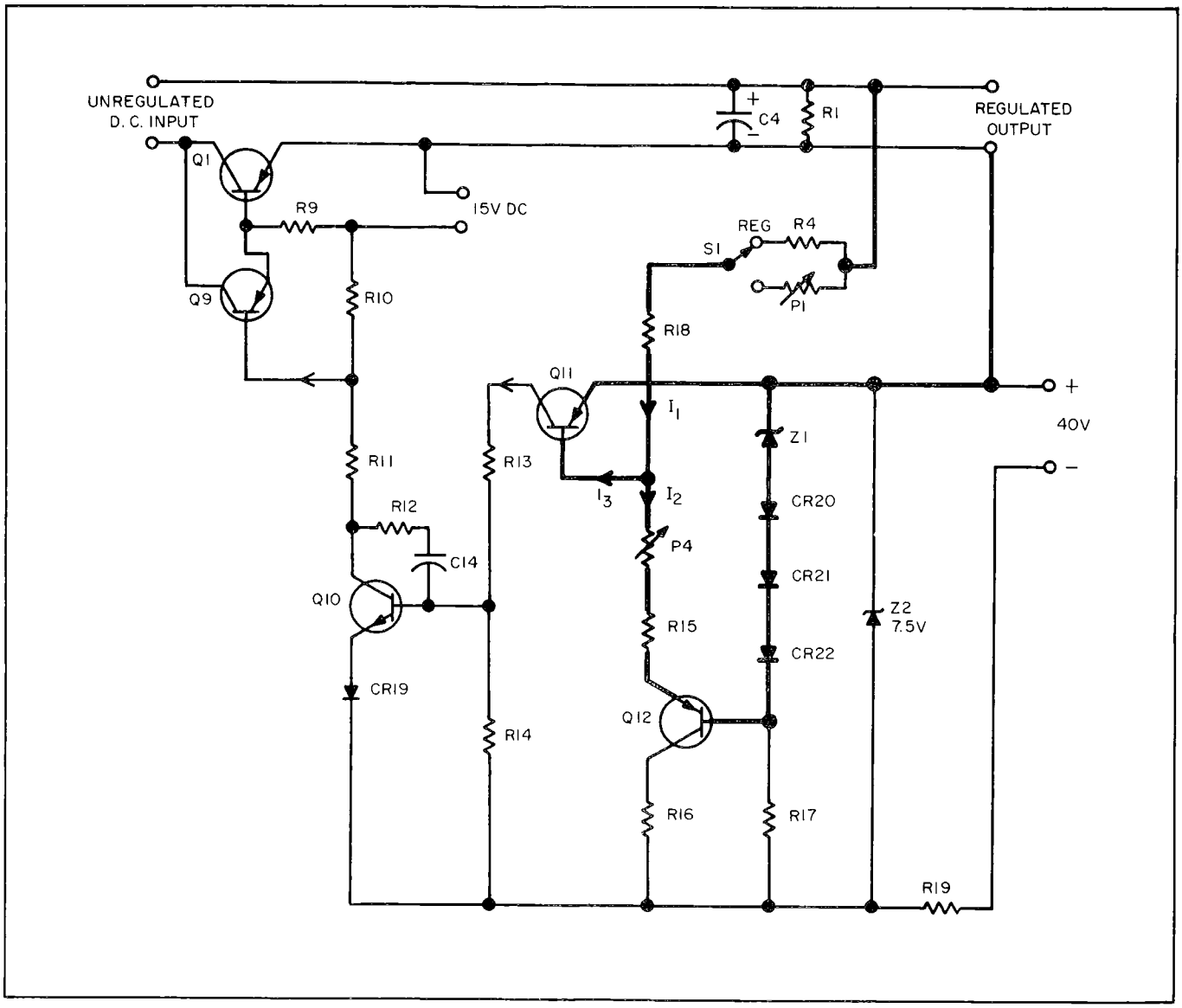


Figure 3. Reference and Error Detector Circuit

To understand how a change in output voltage will generate an error signal, we must keep in mind that reference current I_2 is maintained constant at all times by Zener Diode Z_1. If the output voltage tends to change due to line or load variations, Current I_1 will also change. Since reference Current I_2 is constant, an error signal Current I_3 will be generated to compensate for changes in I_1. Any changes in the base current I_3 of Q_{11} will result in an amplified change of collector current of Q_{11}. This change in collector current is further amplified by Transistors Q_{10} and Q_9 to produce a required change in the collector to emitter voltage of Transistor Q_1 which, in turn, compensates for the voltage which tends to produce the error signal. The overall function of the regulator circuit is to maintain the incremental error Signal I_3 equal to 0 -- a condition which assures a constant output voltage.

The purpose for Diodes CR_{20}, CR_{21}, and CR_{22} is to compensate for temperature effects which occur in the Zener Diode Z_1 and the base to emitter voltages of Transistors Q_{11} and Q_{12}. In effect, the temperature coefficient of these diodes is equal and opposite to the temperature coefficients of the junctions just mentioned which tends to negate the effect of temperature variations on the reference Current I_2. Diode CR_{19} is used in the same way to compensate for temperature effects on the base to emitter voltage of Transistor Q_{10}.

Resistors R_4 and R_{18} are used to fix the approximate nominal output voltage and Potentiometer P_4 is used as a fine adjustment to set the output to the exact voltage required. Since there is a limited range of adjustment on P_4, it is necessary to change the fixed Resistors R_4 and R_{20} in the remote sensing leads to accommodate the wide voltage difference between the $\pm$ 6V and -18V outputs.

When the front panel mode selector is switched to the marginal position, S_1 switches the remote sensing lead from R_4 to Potentiometer P_1. A front panel control on P_1 permits the output to be adjusted over a range of $\pm$ 10%. To understand the effect of changing P_1, consider the case where the resistance of P_1 is reduced below the nominal 360 ohms value of the fixed resistor, R_4. In this case for a nominal output of 6V, the Current I_1, in the remote sensing lead will increase. Since the reference current I_2 is maintained constant, this would require the error Signal I_3 to increase. The increase in Current I_3 is amplified and applied to the series Transistor Q_1 in such a way as to increase the emitter to collector voltage drop. The resulting effect is to reduce the nominal output voltage to a point where currents I_1 and I_2 are again equal. In this way, changing the resistance of P_1 permits the voltage output to be varied over the required range of $\pm$ 10%.

Capacitor C_4 is included across the output terminals to compensate the feedback loop in order to prevent high frequency oscillation. The purpose for Resistor R_1 is to present a minimum load to the regulator in the case where the output is open circuited. Resistor R_{12} and Capacitor C_{14} are included to stabilize the feedback loop against high frequency oscillation.

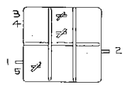
A 15 VDC reverse bias supply is applied across the emitter to base junctions of Q_1 and Q_9 through Resistors R_9 and R_{10} in order to compensate for the leakage current in Transistors Q_1 and Q_9 at high temperature. Without this reverse bias supply, the regulator would lose control at elevated temperatures.

In order for the regulator to function, a voltage must be supplied to bias the regulator circuitry with respect to the 6V output. A 40V bias voltage, supplied by the bias subassembly, SA-101, is applied between R_{19} and the negative side of the 6V output. Although this bias voltage is regulated against line voltage change by the regulating transformer, further regulation is provided by Zener Diode Z_2. The voltage drop across Zener Diode Z_2 provides a regulated voltage for the reference Zener Diode Z_1.

REVISIONS				
ZONE	SYM	DESCRIPTION	DATE	APPROVAL
	0	REL TO PED	11/7	
	A	GENERAL CHANGES PER ECA 16496	1-14-64	
3,4,H	B	REVISED PER ECA 16673	9-2-64	
14-G	C	ADDED JUMPER BETWEEN J16 & J21 PER ECA 17059	3-12-64	
	D	REVISED PER ECA 17233	2-8-67	

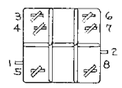
C01 - C04 ALL 1MFD 600VOLT

KA5



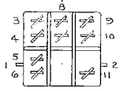
WIRING SIDE

KA11



WIRING SIDE

KA14



WIRING SIDE

AC SECTOR

CONTROL SECTOR

SENSING SECTOR

24VAC

24VAC RTN

CONTROL XF02-1A AGC1

METER XF01-1A AGC1

K10C

TO1

CB01A LD LN

CB01B LD LN

CB01C LOAD LINE

CB02A

CB02B

CB02C

CB03

CB04A 5A

CB04B 10A

CB04C 5A

K10A

K10D

M1 M01

C01

C02

C03

C04

SEE STRAP SCHEDULE

FRAME GRD

AC HIGH

TO FIELD INT. & LIGHTS

AC HIGH

OUT TO UTILITY

AC LOW

AC RET., PWR SUPS

AC RET., MTR & FANS

AC TO FANS

AC TO PRINTER

AC TO YOKE

AC TO MUST. P.S.

AC TO 36VDC P.S.

FANS

AC SPARE

PRIMARY STRAPS

	3φ 208V 60~ 4 WIRE	1φ 115V 60~	220V 60~ 3 WIRE	230V 50~
	1	1	1	1
	2	2	2	2
	3	3	3	3
	4	4	4	4
	5	5	5	5
	6	6	6	6
	7	7	7	7
		BEGRD		
φ1	9	9	9	9
φ2	10	AC HOT 10	AC L1 10	AC HOT 10
φ3	11	11	AC L2 11	11
NEUT.	12	AC COM 12	AC COM 12	AC COM 12
	13	13	13	13

K10 ON

K06 OFF

K05 ALARM

TD01

XI01 DC ALARM B

OVERRIDE B A S01

K05A K05B K05C K05D K05E

CB01A CB01B CB01C CB02 CB03 CB04

K01B K01C K01D K01E

K07

K10B K10C

K02A K02B K02C

K03A K03B K03C

K04A K04B K04C

K05A K05B K05C

K06A K06B K06C

K08A K08B K08C

TD1 L28

TD1 L2A

TO PANEL 25VAC

TO "ON" INTLKS

CONTROL 36VDC RET

CONTROL 36VDC

TO "ON" (PANEL)

SENSE 36VDC, P.S.

SENSE 36VDC, COM

PHOTO ALARM 36VDC, COM

-12VDC 36VDC, P.S.

OFF INDICATOR (PANEL)

ALL STATUS INDICATOR (PANEL)

ON INDICATOR (PANEL)

ALL CLAMP INTERLOCK

CONTROL SPARE

K10A

K02 24VDC

R01 10 5SN

K01 24VAC

R02 220Ω 1W

K01B

36VDC PWR SUPPLY (TYP)

K02B

K02A

K02A

OFF ALARM STATUS ON

OFF ON

CONTROL PANEL (TYP)

SENSE +12VDC

SENSE -12VDC

SENSE -18VDC

-18V NO ILK

CARD ALARM

PHOTO ALARM

K01 +12V

K07 -12V

K08A

K08B

K01A

K02 K03

K04

R04 68Ω 2W

R05 68Ω 2W

R03 68Ω 2W

R02 680Ω 1W

R01 220Ω 1W

XI02 CARD ALARM

XI03 PHOTO ALARM

E01 E05 E06 E03 E02 E04

CR01 IN537

CR05 IN4937

XI04

K03B

K03C

K03D

K03E

K03F

K03G

K03H

K03J

K03K

K03L

K03M

K03N

K03P

K03Q

K03R

K03S

K03T

K03U

K03V

K03W

K03X

K03Y

K03Z

K03AA

K03AB

K03AC

K03AD

K03AE

K03AF

K03AG

K03AH

K03AJ

K03AK

K03AL

K03AM

K03AN

K03AP

K03AQ

K03AR

K03AS

K03AT

K03AU

K03AV

K03AW

K03AX

K03AY

K03AZ

K03BA

K03BB

K03BC

K03BD

K03BE

K03BF

K03BG

K03BH

K03BJ

K03BK

K03BL

K03BM

K03BN

K03BP

K03BQ

K03BR

K03BS

K03BT

K03BU

K03BV

K03BW

K03BX

K03BY

K03BZ

K03CA

K03CB

K03CC

K03CD

K03CE

K03CF

K03CG

K03CH

K03CJ

K03CK

K03CL

K03CM

K03CN

K03CP

K03CQ

K03CR

K03CS

K03CT

K03CU

K03CV

K03CW

K03CX

K03CY

K03CZ

K03DA

K03DB

K03DC

K03DD

K03DE

K03DF

K03DG

K03DH

K03DJ

K03DK

K03DL

K03DM

K03DN

K03DP

K03DQ

K03DR

K03DS

K03DT

K03DU

K03DV

K03DW

K03DX

K03DY

K03DZ

K03EA

K03EB

K03EC

K03ED

K03EE

K03EF

K03EG

K03EH

K03EJ

K03EK

K03EL

K03EM

K03EN

K03EP

K03EQ

K03ER

K03ES

K03ET

K03EU

K03EV

K03EW

K03EX

K03EY

K03EZ

K03FA

K03FB

K03FC

K03FD

K03FE

K03FF

K03FG

K03FH

K03FJ

K03FK

K03FL

K03FM

K03FN

K03FP

K03FQ

K03FR

K03FS

K03FT

K03FU

K03FV

K03FW

K03FX

K03FY

K03FZ

K03GA

K03GB

K03GC

K03GD

K03GE

K03GF

K03GG

K03GH

K03GJ

K03GK

K03GL

K03GM

K03GN

K03GP

K03GQ

K03GR

K03GS

K03GT

K03GU

K03GV

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K03GX

K03GY

K03GZ

K03HA

K03HB

K03HC

K03HD

K03HE

K03HF

K03HG

K03HH

K03HJ

K03HK

K03HL

K03HM

K03HN

K03HP

K03HQ

K03HR

K03HS

K03HT

K03HU

K03HV

K03HW

K03HX

K03HY

K03HZ

K03JA

K03JB

K03JC

K03JD

K03JE

K03JF

K03JG

K03JH

K03JJ

K03JK

K03JL

K03JM

K03JN

K03JP

K03JQ

K03JR

K03JS

K03JT

K03JU

K03JV

K03JW

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K03KS

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K03KV

K03KW

K03KX

K03KY

K03KZ

K03LA

K03LB

K03LC

K03LD

K03LE

K03LF

K03LG

K03LH

K03LJ

K03LK

K03LL

K03LM

K03LN

K03LP

K03LQ

K03LR

K03LS

K03LT

K03LU

K03LV

K03LW

K03LX

K03LY

K03LZ

K03MA

K03MB

K03MC

K03MD

K03ME

K03MF

K03MG

K03MH

K03MJ

K03MK

K03ML

K03MM

K03MN

K03MP

K03MQ

K03MR

K03MS

K03MT

K03MU

K03MV

K03MW

K03MX

K03MY

K03MZ

K03NA

K03NB

K03NC

K03ND

K03NE

K03NF

K03NG

K03NH

K03NJ

K03NK

K03NL

K03NM

K03NN

K03NP

K03NQ

K03NR

K03NS

K03NT

K03NU

K03NV

K03NW

K03NX

K03NY

K03NZ

K03PA

K03PB

K03PC

K03PD

K03PE

K03PF

K03PG

K03PH

K03PJ

K03PK

K03PL

K03PM

K03PN

K03PP

K03PQ

K03PR

K03PS

K03PT

K03PU

K03PV

K03PW

K03PX

K03PY

K03PZ

K03QA

K03QB

K03QC

K03QD

K03QE

K03QF

K03QG

K03QH

K03QJ

K03QK

K03QL

K03QM

K03QN

K03QP

K03QQ

K03QR

K03QS

K03QT

K03QU

K03QV

K03QW

K03QX

K03QY

K03QZ

K03RA

K03RB

K03RC

K03RD

K03RE

K03RF

K03RG

K03RH

K03RJ

K03RK

K03RL

K03RM

K03RN

K03RP

K03RQ

K03RR

K03RS

K03RT

K03RU

K03RV

K03RW

K03RX

K03RY

K03RZ

K03SA

K03SB

K03SC

K03SD

K03SE

K03SF

K03SG

K03SH

K03SJ

K03SK

K03SL

K03SM

K03SN

K03SP

K03SQ

K03SR

K03SS

K03ST

K03SU

K03SV

K03SW

K03SX

K03SY

K03SZ

K03TA

K03TB

K03TC

K03TD

K03TE

K03TF

K03TG

K03TH

K03TJ

K03TK

K03TL

K03TM

K03TN

K03TP

K03TQ

K03TR

K03TS

K03TT

K03TU

K03TV

K03TW

K03TX

K03TY

K03TZ

K03UA

K03UB

K03UC

K03UD

K03UE

K03UF

K03UG

K03UH

K03UJ

K03UK

K03UL

K03UM

K03UN

K03UP

K03UQ

K03UR

K03US

K03UT

K03UU

K03UV

K03UW

K03UX

K03UY

K03UZ

K03VA

K03VB

K03VC

K03VD

K03VE

K03VF

K03VG

K03VH

K03VJ

K03VK

K03VL

K03VM

K03VN

K03VP

K03VQ

K03VR

K03VS

K03VT

K03VU

K03VV

K03VW

K03VX

K03VY

K03VZ

K03WA

K03WB

K03WC

K03WD

K03WE

K03WF

K03WG

K03WH

K03WJ

K03WK

K03WL

K03WM

K03WN

K03WP

K03WQ

K03WR

K03WS

K03WT

K03WU

K03WV

K03WW

K03WX

K03WY

K03WZ

K03XA

K03XB

K03XC

K03XD

K03XE

K03XF

K03XG

K03XH

K03XJ

K03XK

K03XL

K03XM

K03XN

K03XP

K03XQ

K03XR

K03XS

K03XT

K03XU

K03XV

K03XW

K03XX

K03XY

K03XZ

K03YA

K03YB

K03YC

K03YD

K03YE

K03YF

K03YG

K03YH

K03YJ

K03YK

K03YL

K03YM

K03YN

K03YP

K03YQ

K03YR

K03YS

K03YT

K03YU

K03YV

K03YW

K03YX

K03YY

K03YZ

K03ZA

K03ZB

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K03ZD

K03ZE

K03ZF

K03ZG

K03ZH

K03ZJ

K03ZK

K03ZL

K03ZM

K03ZN

K03ZP

K03ZQ

K03ZR

K03ZS

K03ZT

K03ZU

K03ZV

K03ZW

K03ZX

K03ZY

K03ZZ

K04A

K04B

K04C

K04D

K04E

K04F

K04G

K04H

K04J

K04K

K04L

K04M

K04N

K04P

K04Q

K04R

K04S

K04T

K04U

K04V

K04W

K04X

K04Y

K04Z

K05A

K05B

K05C

K05D

K05E

K05F

K05G

K05H

K05J

K05K

K05L

K05M

K05N

K05P

K05Q

K05R

K05S

K05T

K05U

K05V

K05W

K05X

K05Y

K05Z

K06A

K06B

K06C

K06D

K06E

K06F

K06G

K06H

K06J

K06K

K06L

K06M

K06N

K06P

K06Q

K06R

K06S

K06T

K06U

K06V

K06W

K06X

K06Y

K06Z

SEQUENCER SERIES 5

The ANelex Sequencer Series 5 is a unit panel containing all of the control elements used to cycle power into the ANelex logic system. The Sequencer is also capable of sensing an alarm condition in conjunction with external protective devices. The power sequencer has conventional wiring throughout and contains relays, and related devices to control the turn-on and turn-off of power to the system. The front panel has the following controls and indicators mounted thereon:

1. ON-OFF Circuit Breaker (CB1)
2. Total-time-in-use Meter (M1)
3. Card Alarm Indicator (X102)
4. Photo Alarm Indicator (X103)
5. Interlock Alarm Indicator (X104)
6. DC Alarm Indicator (X101)
7. Control Fuse (XF02)
8. Meter Fuse (XF01)
9. Override Switch (S1)
10. Fan Circuit Breaker (CB4)
11. Printer Circuit Breaker (CB3)
12. Yoke Circuit Breaker (CB2)

The Sequencer is divided into three functional sectors: a-c, Control, and Sensing sectors. The a-c section contains the components required for applying primary a-c to the chassis. The Control sector contains the majority of the control relays which monitor and cycle the voltages into the system. The Sensing sector contains relay provisions for sensing the outputs of the Multiple-Output supply along with card, photo and interlock malfunctions. The Sequencer will automatically shut down if any voltage is lost or absent. An alarm condition will cause the Sequencer to produce a nonoperable signal for the external logic, and notify the operator by illuminating the appropriate indicator. The two main operational functions that the Sequencer provides are a Power Control cycle and alarm sensing, with the discussion below separated accordingly.

Power Control Cycle.

During an initial installation and before primary power is applied to the Sequencer, inspect Terminals 1 through 13 of TB1 for the proper strapping for the type of primary power used, as specified on the Sequencer schematic. Power is applied through Circuit Breaker CB1 which in turn energizes stepdown Transformer T1. The Secondary of T1 provides 24 volts for operating the various relays used in the Control and Sensing sections. T1 is protected by a fuse-indicator device (XF02) which will illuminate a neon bulb in the event the fuse blows. CB1 also supplies a-c power to the Elapsed Time Meter, M1 and the normally open contacts of K10C, and K10A and D.

One side of the 24 transformer secondary is bussed to one side of the Control Sector relay and time delay coils. The other transformer lead is connected to one side of a momentary contact "Power On" switch mounted on the operator's control panel. When this switch is actuated a path is completed through the normally closed section of the "Power Off" switch (also on the operator's control panel), through the normally closed contacts of K6A and TD1, and energizes on Relay K10. Normally open contact K10B closes and provides a path to hold K10 in the energized state. Contacts K10A and K10D close, transmitting a-c power to the Multiple-Output and -36-volt supplies. The Multiple-Output supply will energize (under normal conditions), but the -36-volt supply must wait until K7 closes. Normally closed Contact K10B opens extinguishing the power OFF indicator on the operator's control panel.

The Multiple-Output supply on energizing provides +6 volts to energize Relay K1. The normally open Contact K1A closes and provides a path through the normally closed contact of K6B to allow the -18-volt output of the multiple-output supply to energize Relay K8. One side of Relay K3 is wired in parallel with K8, and K3 will energize providing a Hammer Driver -18-volt interlock circuit is complete and will remain energized as long as the circuit is complete. Relay Contact K8A will close and allow the -6-volt output to energize Relay K7. Normally open Contact K7B will close and supply 24 volts a-c to TB601 of -36-volt power supply, energizing its internal Relay K1. Normally open Contact K1A will complete the path for primary a-c input power to the supply. The other relay (contained in the -36-volt supply) K2, will energize when 36 volts appears at the supply output terminals.

However, at this point it should be noted that from the time K10 became energized (practically the same time that the "ON" pushbutton was actuated), Time Delay Relay TD1 started its three second cycle, (also through a closure of normally open contacts of K10B). The energizing path for TD1 is provided through the normally closed contact of K2A (in -36-volt supply) which is fed by K10B. If, under these circumstances, either supply

fails to provide the proper voltages within the time cycle of TD1, TD1 will de-energize the "ON" relay K10 turning the Sequencer off. The normally open side of TD1 will now close; and through the normally open contact of K5A (K5A energized when TD1 completed its cycle) completing the path to the Alarm Status indicator. Thus, the power sequence cycle must be completed before three seconds or TD1 will turn off the Sequencer.

As mentioned above when Relay K2 of the -36-volt power supply energizes it causes the normally closed contacts of K2A to break the power path to TD1. Normally open Contacts K2A and B close, and K2A feeds K2B. K2A in the closed position also provides another latching path for Relay K10 (Sequencer) through the normally closed contacts of TD1. When the Sequencer completes its cycle, it lights the ON indicator on the operator's control panel, and removes the connection between the Equipment Operable common and the Not Operable line as an indication the printer motor and fans have been turned on (K10C), and all voltages are present.

Alarm Sensing.

Alarm sensing is performed by four Sequencer Relays K2, 3, 4 and 5. Relay K2 will energize in the event any of the fuses (protecting the printed circuit cards of the logic system) happens to blow. Relay K3 will remain energized as long as the -18-volt interlock circuit for the hammer driver cable connections is complete. Relay K4 will energize if continuity through any one of the printer photoelectric lamp filaments is broken. Relay K5 will energize if either Relay K2 or K4 energizes, or if Circuit Breaker CB2, 3, or 4 happens to blow. Relay K5 becoming energized will close normally open contact K5A, illuminating the Alarm Status indicator on the operator's control panel. The normally closed contact K5C will open and extinguish both the On and Off indicators on the operator's control panel, leaving only the Alarm Status indicator illuminated.

As mentioned above K3 is energized as long as the hammer driver connector interlock circuit is intact. A break in continuity of the interlock circuit will de-energize K3 illuminating the Alarm Status indicator. However, if K3 is energized, normally open contact K3C will be closed, providing a path through the normally closed contact of K6C (K6 does not become functional until the OFF pushbutton on the control panel is operated), through the closed (normally open) contact of TD3, to illuminate the ON indicator. The condition of K3 also determines the operable condition of the system. Normally Open Contact K3A is closed (with K3 energized) to provide a path from the equipment operable common line (Terminal 39 of TB1), through the normally closed contacts of K5B (indicating alarm Relay K5 is de-energized), to the Operable line (Terminal 41 of TB1). The Not Operable line has two parallel contacts in an OR configuration. If either Relay K5 becomes energized or Relay K3 becomes de-energized, the Not Operable line will be connected to the common as an indication that a malfunction is present. In the event K3 becomes de-energized the normally closed Contact K3B will illuminate X104 and the normally open Contact K3B will remove -18 volts from the interlock circuit.

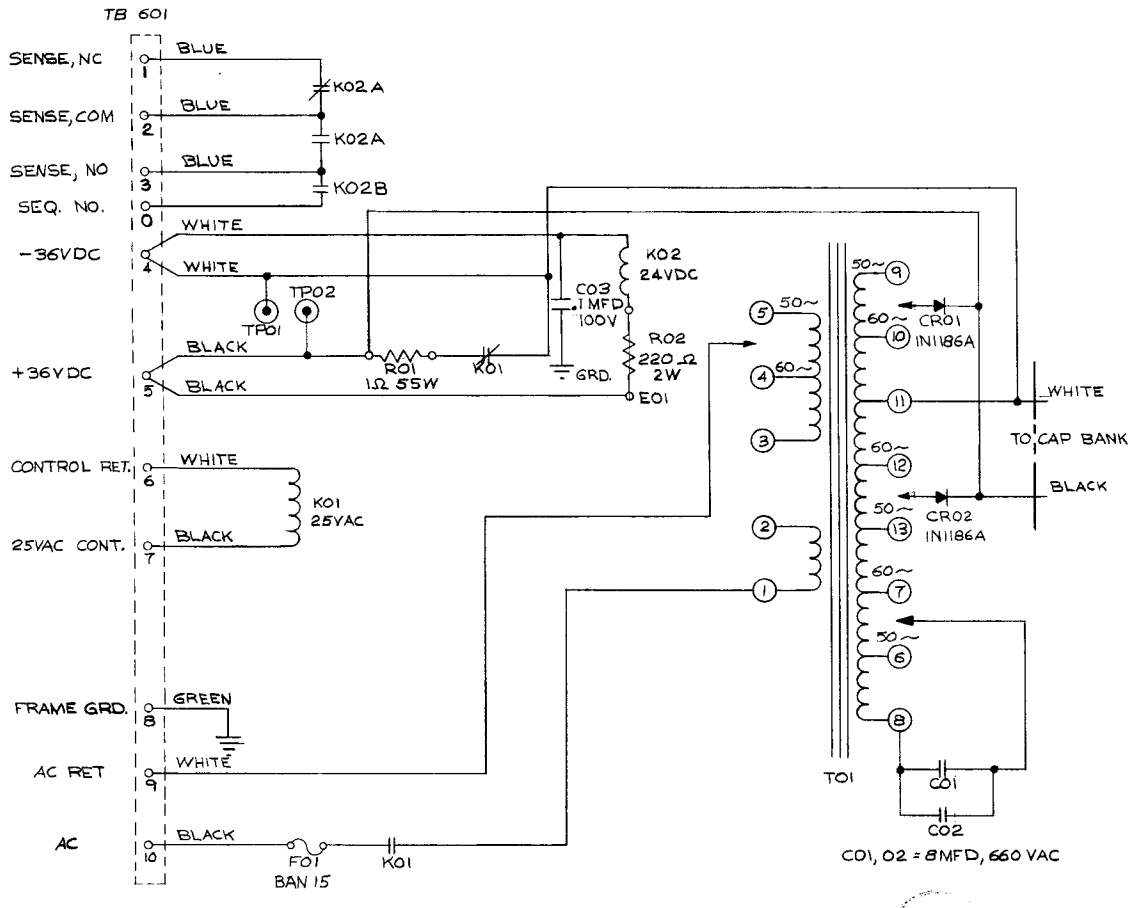
Turn Off.

The Off Relay K6 functions similar to the On relay, i.e., it is energized by an actuation of the Off pushbutton. Actuating the Off pushbutton on the Operator's Control Panel energizes K6, which closes its normally open Contact K6A, providing a latch for K6.

Contact K6B opens up normally its closed contact to Relay K8. K8 de-energizes opening up its normally open Contact K8A, de-energizing K7. De-energizing K7 returns contact K7B to its normally open state, causing the -36-volt power supply K1 to de-energize removing (through K1A) primary a-c power from its input. The removal of primary power from the -36-volt supply de-energizes Relay K2 (-36-volt supply), returning K2A to its normally open condition. Opening up K2A de-energizes K10 removing a-c power from the inputs of the Multiple-Output and -36-volt supplies. K10B returning to its normally closed condition illuminates the OFF indicator on the Operator's Control Panel.

Each alarm relay has an indicator associated with it and will be illuminated in the event of that particular alarm condition. An override switch S1 mounted on the front panel may be used to manually energize Relay K10 in the event of a power supply failure. The override switch is used primarily during testing and troubleshooting.

REVISIONS				
ZONE	SYM	DESCRIPTION	DATE	APPROVAL
	O	REL TO PED	11/24	
	A	REVISED TO ECA 16553	12/20/63	



32826
A

PRIMARY STRAPS	
60 ~	50 ~
1-3 2-4 INPUT ON 4	2-3 INPUT ON 5
CAP RET. T OUTPUT 10,12	6 9,13

ITEM	REQD	PART NO	DESCRIPTION	MATL	MATL SPEC	UNIT WT

LIST OF MATERIALS

NEXT ASSY	USED ON
62678	
APPLICATION	

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON FRACTIONS DECIMALS ANGLES
MATERIAL
FINISH
HEAT TREAT

SIGNATURES		DATE
DR	B. Diggins	12/3/63
CHK	E. Bakanaskas	12/9/63
APPD		12/9/63
APPD		12/9/63

CVR POWER SUPPLY
36V-28A
SERIES 5

ANelex
CORPORATION
BOSTON MASS

C 32826

SCALE NONE WT

2 551 9287 1 W

CVR POWER SUPPLY (-36V - 28A)

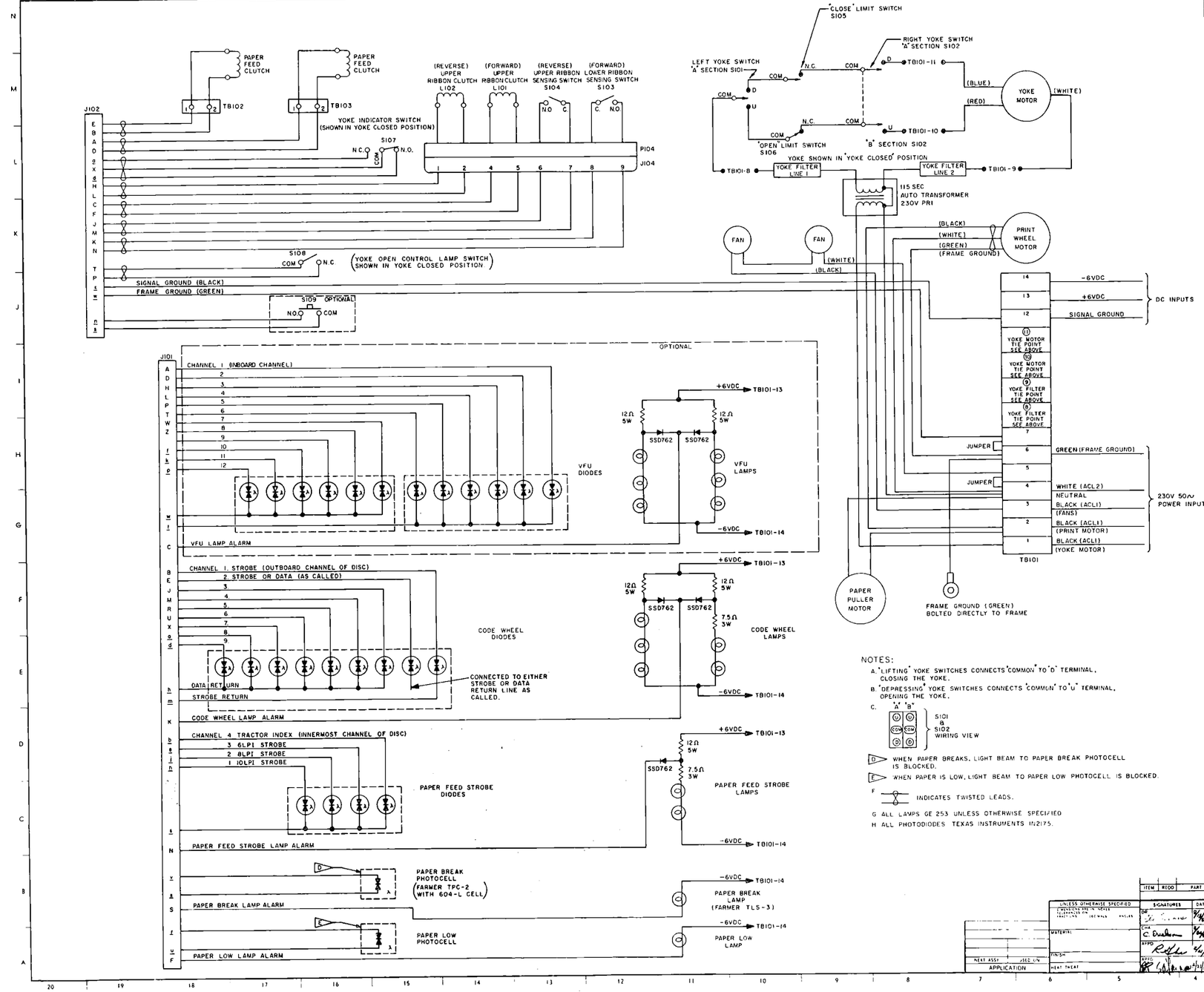
The -36 volt d-c power supplies furnishes a regulated output of -36 volts to the printer system. The primary purpose of this supply is to provide -36 volts for energizing the hammer solenoid coils through the hammer driver PC cards. In addition, the -36 volts is used to energize the ribbon reversing relay, paper feed clutch, and brake drive coils. The power supply is housed in a standard relay-rack type chassis, with conventional wiring throughout. The front panel mounts two test points for monitoring both sides of the output voltage, in addition to a 250-volt a-c, 15-ampere fuse. The electrical schematic of a -36-volt power supply is shown in Figure 2.

Input power is applied to the primary of power Transformer T1. This transformer is a constant voltage regulating (CVR) type, which depends on the combination of a resonant electrical circuit and a high-leakage-reactance magnetic circuit for its operation. The resonant circuit is formed by Terminals 6, 7, and 8 of the transformer secondary and parallel Capacitors C1 and C2. As indicated on the power supply schematic two sets of optional taps have been supplied with the Transformer T1. One group of taps has been reserved for 50-cycle operation, with the other group of taps reserved for 60-cycle operation. During initial installation, all transformer taps should be inspected to make sure that the proper tap connections have been made in accordance with the frequency of the power mains. For example, for 60-cycle operation a jumper would be connected between Terminals 1 and 3 of the transformer primary with another jumper connected between primary Terminals 2 and 4. The resonant capacitors of the transformer secondary would be connected between Terminals 7 and 8; with the rectifier anode of CR1 connected to Terminal 10, and the anode of CR2 connected to Terminal 12. The proper strapping connections for both 50- and 60-cycle operation are tabled on the power supply schematic.

This supply has been designed to operate in conjunction with a companion ANelex unit, the ANelex Series 5 Sequencer, which provides a controlled cyclic turn-on sequence of the system power supplies. The Sequencer also senses whether or not the -36 volt supply actually energizes. The turn-on control is implemented by the Sequencer which places 25 volts a-c on Terminals 6 and 7 of TB601. Relay K1 becoming energized performs two functions simultaneously: opens up its normally closed contact, which in series with a 1 ohm, 55 watt resistor forms a discharge network for the power supply filter capacitors, closes its normally open contact completing the path for the primary a-c voltage.

The Sequencer sensing control is provided in the form of Relay K2. The coil of K2 is connected in series with a 220 ohm 2 watt voltage dropping resistor. This series combination is connected across the power supply output terminals; so that when the supply energizes, K2 will also energize. Under these conditions the two normally open contacts of K2 will now close, and the one normally closed contact will open. This particular contact configuration will place 25 volts a-c on Terminals 3 and 0 and removes 25 volts a-c from Terminal 1 of TB601; all of which indicates to the sequencer that the -36-volt power supply has been energized.

REVISIONS				
ZONE	SYM	DESCRIPTION	DATE	APPROVAL
	0	REL TO PED		



NOTES:

A. 'LIFTING' YOKE SWITCHES CONNECTS 'COMMON' TO 'D' TERMINAL, CLOSING THE YOKE.

B. 'DEPRESSING' YOKE SWITCHES CONNECTS 'COMMON' TO 'U' TERMINAL, OPENING THE YOKE.

C. 'A' 'B' — S101 & S102 WIRING VIEW

D ▷ WHEN PAPER BREAKS, LIGHT BEAM TO PAPER BREAK PHOTOCELL IS BLOCKED.

E ▷ WHEN PAPER IS LOW, LIGHT BEAM TO PAPER LOW PHOTOCELL IS BLOCKED.

F INDICATES TWISTED LEADS.

G ALL LAMPS GE 253 UNLESS OTHERWISE SPECIFIED

H ALL PHOTODIODES TEXAS INSTRUMENTS IN2175.

32879

APPROVED PROD ENG.

ITEM	REQD	PART NO	DESCRIPTION	MATL	MATL SPEC	UNIT WT

LIST OF MATERIALS

UNLESS OTHERWISE SPECIFIED	SIGNATURES	DATE		
	DR	8/4/66	PRINTER WIRING DIAGRAM 230 VOLT 50~	ANelex CORPORATION BOSTON MASS
MATERIAL	CH C. Buchanan	8/4/66		
FINISH	APPD Rothe	8/4/66	SERIES 5	F 32879
NEXT ASSY / USED ON	APPD			
APPLICATION	HEAT TREAT		SIZE A1	

REVISIONS				
ZONE	SYM	DESCRIPTION	DATE	APPROVAL
	0	REL. TO PED.	5/17	

HAMMER (TYP)

P105

A38-2	A	1
B39-2	D	
A38-7	B	3
B39-21	E	
A38-9	C	5
B38-2	F	
A38-15	H	7
B38-21	L	
A38-17	J	9
B37-2	M	
A38-21	K	11
B37-21	N	
A36-2	P	13
B36-2	T	
A36-7	R	15
B36-21	U	
A36-9	S	17
B35-2	V	
A36-15	W	19
B35-21	Z	
A36-17	X	21
B34-2	a	
A36-21	Y	23
B34-21	b	
A34-2	c	25
B33-2	f	
A34-7	d	27
B33-21	h	
A34-9	e	29
B32-2	j	
A34-15	k	31
B32-21	p	
A34-17	m	33
B31-2	r	
A34-21	n	35
B31-21	s	
A32-2	t	37
B30-2	w	
A32-7	v	39
B30-21	x	

P107

A32-9	A	41
B29-2	D	
A32-15	B	43
B29-21	E	
A32-17	C	45
B28-2	F	
A32-21	H	47
B28-21	L	
A30-2	J	49
B27-2	M	
A30-7	K	51
B27-21	N	
A30-9	P	53
B26-2	T	
A30-15	R	55
B26-21	U	
A30-17	S	57
B25-2	V	
A30-21	W	59
B25-21	Z	
A28-2	X	61
B24-2	a	
A28-7	Y	63
B24-21	b	
A28-9	c	65
B23-2	f	
A28-15	d	67
B23-21	h	
A28-17	e	69
B22-2	j	
A28-21	k	71
B22-21	p	
A26-2	m	73
B21-2	r	
A26-7	n	75
B21-21	s	
A26-9	t	77
B20-2	w	
A26-15	v	79
B20-21	x	

P109

A26-17	A	81
B19-2	D	
A26-21	B	83
B19-21	E	
A24-2	C	85
B18-2	F	
A24-7	H	87
B18-21	L	
A24-9	J	89
B17-2	M	
A24-15	K	91
B17-21	N	
A24-17	P	93
B16-2	T	
A24-21	R	95
B16-21	U	
A22-2	S	97
B15-2	V	
A22-7	W	99
B15-21	Z	
A22-9	X	101
B14-2	a	
A22-15	Y	103
B14-21	b	
A22-17	c	105
B13-2	f	
A22-21	d	107
B13-21	h	
A20-2	e	109
B12-2	j	
A20-7	k	111
B12-21	p	
A20-9	m	113
B11-2	r	
A20-15	n	115
B11-21	s	
A20-17	t	117
B10-2	w	
A20-21	v	119
B10-21	x	

P111

A18-2	A	121
B09-2	D	
A18-7	B	123
B09-21	E	
A18-9	C	125
B08-2	F	
A18-15	H	127
B08-21	L	
A18-17	J	129
B07-2	M	
A18-21	K	131
B07-21	N	
A16-2	P	133
B06-2	T	
A16-7	R	135
B06-21	U	
A16-9	S	137
B05-2	V	
A16-15	W	139
B05-21	Z	
A16-17	X	141
B04-2	a	
A16-21	Y	143
B04-21	b	
A14-2	c	145
B03-2	f	
A14-7	d	147
B03-21	h	
A14-9	e	149
B02-2	j	
A14-15	k	151
B02-21	p	
A14-17	m	153
B01-2	r	
A14-21	n	155
B01-21	s	
A12-2	t	157
B00-2	w	
A12-7	v	159
B00-21	x	

PF & CW SIGNALS

P101

A05-9	A	
A05-10	D	
A05-11	H	
A05-8	L	
A05-18	P	
A05-15	T	
A05-16	W	
A05-17	Z	
A06-9	c	
A06-10	f	
A06-11	k	
A06-8	p	
A05-14	t	
A05-13	w	
A02-9	B	
*	E	
A04-10	J	
A04-11	M	
A04-8	R	
A04-18	U	
A04-15	X	
A04-16	o	
A04-17	d	
A04-13	h	
A02-14	m	
A08-18	r	
A08-10	u	
A08-15	C	
A08-8	F	
A08-15	K	
A08-16	N	
A08-7	S	
A02-15	b	
A02-20	g	
A03-9	j	
A03-15	n	
A02-13	s	
A08-19	v	
A08-10	y	

* P101-E WIRED TO EITHER A04-9 (DATA) OR A03-20 (STROBE)

CONTROL PANEL

J201

TB201-◊	A
TB201-6	D
J203-B	B
J203-C	C
**	E
J203-H	H
J203-J	J
J203-K	K
P102-P	L
J203-M	M
J203-N	N
J202-P	P
J202-R	R
J202-S	S
J202-T	T
J202-U	U
J202-V	V
J202-W	W
J202-X	X
J202-Y	Y
J202-Z	Z
J202-a	a
J202-b	b
J202-c	c
J202-d	d
J202-e	e
J202-f	f
J202-h	h
J202-j	j
J202-k	k
J202-m	m
J202-n	n
J202-p	p
J202-r	r
J202-s	s
J202-t	t
J202-u	u
J202-v	v
J203-w	w
J203-x	x

** J201-E WIRED TO EITHER TB201-29 (-18V DC) OR TB201-45 (FLOATING)

SWITCH CONTROLS

J202

TB201-6	A	OPTIONAL
TB201-7	B	
TB201-8	C	
TB201-42	D	
TB201-43	E	
TB201-44	F	
P102-d	H	
P102-X	J	
P102-a	K	
J201-P	P	
J201-R	R	
J201-S	S	
J201-T	T	
J201-U	U	
J201-V	V	
J201-W	W	
J201-X	X	
J201-Y	Y	
J201-Z	Z	
J201-a	a	
J201-b	b	
J201-c	c	
J201-d	d	
J201-e	e	
J201-f	f	
J201-h	h	
J201-j	j	
J201-k	k	
J201-m	m	
J201-n	n	
J201-p	p	
J201-r	r	
J201-s	s	
J201-t	t	
J201-u	u	
J201-v	v	

INDICATOR LIGHT CONTROLS

J203

J201-B	B	
J201-C	C	
TB201-45	E	
J201-H	H	
J201-J	J	
J201-K	K	
J201-N	M	
J201-N	N	
J201-w	W	
J201-x	X	
SGBUS-25	Z	
SGBUS-26	a	
SGBUS-27	b	

PRINTER

P106

A38-6	A	2
B39-3	D	
A38-8	B	4
B39-22	E	
A38-10	C	6
B38-3	F	
A38-16	H	8
B38-22	L	
A38-18	J	10
B37-3	M	
A38-22	K	12
B37-22	N	
A36-6	P	14
B36-3	T	
A36-8	R	16
B36-22	U	
A36-10	S	18
B35-3	V	
A36-16	W	20
B35-22	Z	
A36-18	X	22
B34-3	a	
A36-22	Y	24
B34-22	b	
A34-6	c	26
B33-3	f	
A34-8	d	28
B33-22	h	
A34-10	e	30
B32-3	j	
A34-16	k	32
B32-22	p	
A34-18	m	34
B31-3	r	
A34-22	n	36
B31-22	s	
A32-6	t	39
B30-3	w	
A32-8	v	40
B30-22	x	

P108

A32-10	A	42
B29-3	D	
A32-16	B	44
B29-22	E	
A32-18	C	46
B28-3	F	
A32-22	H	48
B28-22	L	
A30-6	J	50
B27-3	M	
A30-8	K	52
B27-22	N	
A30-10	P	54
B26-3	T	
A30-16	R	56
B26-22	U	
A30-18	S	58
B25-3	V	
A30-22	W	60
B25-22	Z	
A28-6	X	62
B24-3	a	
A28-8	Y	64
B24-22	b	
A28-10	c	66
B23-3	f	
A28-16	d	68
B23-22	h	
A28-18	e	70
B22-3	j	
A28-22	k	72
B22-22	p	
A26-6	m	74
B21-3	r	
A26-8	n	76
B21-22	s	
A26-10	t	78
B20-3	w	
A26-16	v	80
B20-22	x	

P110

A26-18	A	82
B19-3	D	
A26-22	B	84
B19-22	E	
A24-6	C	86
B18-3	F	
A24-8	H	88
B18-22	L	
A24-10	J	90
B17-3	M	
A24-16	K	92
B17-22	N	
A24-18	P	94
B16-3	T	
A24-22	R	96
B16-22	U	
A22-6	S	98
B15-3	V	
A22-8	W	100
B15-22	Z	
A22-10	X	102
B14-3	a	
A22-16	Y	104
B14-22	b	
A22-18	c	106
B13-3	f	
A22-22	d	108
B13-22	h	
A20-6	e	110
B12-3	j	
A20-8	k	112
B12-22	p	
A20-10	m	114
B11-3	r	
A20-16	n	116
B11-22	s	
A20-18	t	118
B10-3	w	
A20-22	v	120
B10-22	x	

P112

A18-6	A	122
B09-3	D	
A18-8	B	124
B09-22	E	
A18-10	C	126
B08-3	F	
A18-16	H	128
B08-22	L	
A18-18	J	130
B07-3	M	
A18-22	K	132
B07-22	N	
A16-6	P	134
B06-3	T	
A16-8	R	136
B06-22	U	
A16-10	S	138
B05-3	V	
A16-16	W	140
B05-22	Z	
A16-18	X	142
B04-3	a	
A16-22	Y	144
B04-22	b	
A14-6	c	146
B03-3	f	
A14-8	d	148
B03-22	h	
A14-10	e	150
B02-3	j	
A14-16	k	152
B02-22	p	
A14-18	m	154
B01-3	r	
A14-22	n	156
B01-22	s	
A12-6	t	158
B00-3	w	
A12-8	v	160
B00-22	x	

PF & RIBBON POWER CONTROL

P102

A10-21	A	
R202-1	D	
A09-2	H	
A09-6	L	
J201-L	P	
TB201-◊	T	
A10-22	B	
R201-2	E	
A09-16	J	
SGBUS-34	M	
J202-J	X	
J202-K	a	
J202-H	d	
A09-22	C	
A09-7	F	
SGBUS-31	K	
A09-10	N	
TB201-8	n	
TB201-7	s	
TB201-20	x	

PF SIGNALS

J204

A05-2	A	
A05-3	B	
A05-7	C	
A05-6	H	
A05-19	J	
A05-20	K	
A05-21	P	
A05-22	R	
A06-2	S	
A06-3	W	
A06-7	X	
A06-6	Y	
A02-18	c	
A02-3	d	
A03-6	e	
A03-18	k	
A10-13	m	
A10-2	n	
A08-21	t	
A08-20	v	
	D	
SGBUS-18	E	
	F	
SGBUS-19	L	
	M	
SGBUS-20	N	
	T	
	U	
	V	
SGBUS-21	Z	
	a	
	b	
SGBUS-22	f	
	h	
	j	
SGBUS-23	p	
	r	
SGBUS-24	s	
	w	
	x	

CODE WHEEL SIGNALS

J205

A02-6	A	
A03-3	B	
A04-3	C	
A04-7	H	
A04-6	J	
A04-19	K	
A04-20	P	
A04-21	R	
A04-22	S	
A04-2	W	
A07-20	X	
A07-8	Y	
	c	
	d	
	E	
SGBUS-14	F	
	L	
	M	
SGBUS-15	N	
	T	
	U	
	V	
SGBUS-16	Z	
	f	
	h	
SGBUS-17		

UNBUFFERED INTERFACE

COLUMN SELECT

J206

B39-10	A	
B39-6	B	
B39-18	C	
B39-14	H	
B38-10	J	
B38-6	K	
B38-18	P	
B38-14	R	
B37-10	S	
B37-6	W	
B37-16	X	
B37-14	Y	
B36-10	c	
B36-6	d	
B36-18	e	
B36-14	k	
A08-14	u	
	D	
	E	
SGBUS-8	F	
	L	
	M	
SGBUS-9	N	
	T	
	U	
SGBUS-10	V	
	Z	
	a	
SGBUS-11	b	
	f	
	h	
SGBUS-12	j	
SGBUS-13	p	

ZONE SELECT

J207

B39-16	A	
B37-16	B	
B35-16	C	
B33-16	H	
B31-16	J	
B29-16	K	
B27-16	P	
B25-16	R	
B23-16	S	
B21-16	W	
B19-16	X	
B17-16	Y	
B15-16	c	
B13-16	d	
B11-16	e	
B09-16	k	
B07-16	m	
B05-16	n	
B03-16	t	
A08-13	u	
B01-16	x	
	D	
	E	
SGBUS-1	F	
	L	
	M	
SGBUS-2	N	
	T	
	U	
	V	
SGBUS-3	Z	
	a	
	b	
SGBUS-4	f	
	h	
	j	
SGBUS-5	p	
	r	
SGBUS-6	s	
	w	
SGBUS-7	x	

32959

NOTES:
1. CONNECTOR ARRANGEMENT
   P101, P102, & P105 THRU P112 AMP BODY # 201302-1 WITH SOCKETS # 42981-1 (FEMALE)
   J201, J204, J205 AMP BODY # 202135-2 WITH SOCKETS # 42981-1 (FEMALE)
   J202, J203, J206, J207, AMP BODY # 202135-2 WITH PINS # 42980-1 (MALE)
2. WIRE COLOR FLAG
3. DENOTES TWISTED LEADS

ITEM	REQD	PART NO	DESCRIPTION	MATL	MATL SPEC	UNIT WT

LIST OF MATERIALS

UNLESS OTHERWISE SPECIFIED
DIMENSIONS IN INCHES
TOLERANCES ON FRACTIONS ±1/64 DECIMALS ±.010 ANGLES
MATERIAL
FINISH
NEXT ASSY | USED ON
APPLICATION
HEAT TREAT

SIGNATURES	DATE
DR Clemmer	7-27-64
CHK R. Ramos	7/27/64
APPD R. Ramos	7/27/64
MFG	

UNBUFFERED CONNECTOR WIRING TERMINATIONS (180 COL.)

SERIES V

ANelex CORPORATION BOSTON MASS

F 32959

SCALE | WT

92891