IBM Field Engineering Theory-Maintenance

OLSA-T Off Line Selectric Analyzer

229-9009-1

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CONTENTS

TRANSISTORIZED OLSA

- Transistorized version of the original OLSA.
- Parity checking with automatic stop on error.
- Variable Pulse Generator (VPG), when turned on, takes the place of the feed back contacts.

The Transistorized Off Line Selectric Analyzer (OLSA "T") is a service aid tool that can be used by the Customer Engineer to diagnose the causes of I/O Printer failures. Service can be performed without the need of "on line" operation, thereby providing maximum system availability to the customer.

The OLSA will cycle the printer in a continuous or single cycle operation. A choice of any single character or up to any four characters can be pre-selected to print in sequence. Two different functions can be substituted for any of the print characters.

Parity checking, when utilized, is performed during the print cycle with an automatic stop when an error occurs. Printer feedback contacts are used to control the sequential stepping of the print characters and functions. Test points are brought out to the front panel to facilitate scoping the printer magnets and contacts.

Another feature is the Variable Pulse Generator (VPG). When the VPG is on, it determines the speed of the OLSA rather than the printer feedback contacts. The pulse duration and rate are variable to simulate open ended systems operation and provide marginal checks of the printer.

The OLSA-T is a redesigned version of the original model. The transistorized circuitry used is quite common with the possible exception of the Silicon Controlled Rectifier and the Unijunction Transistors.

The operation of an SCR is similar to that of a thyratron. With the anode positive with respect to the cathode, a positive signal must be applied to the gate before it will "fire" or conduct. Once the SCR has fired, the signal on the gate can be removed and the unit will remain in conduction. In order to cut the SCR off, the load current must be reduced below the value required to sustain conduction.

The components in a unijunction transistor are the emitter, base 1 and base 2. In operation, a constant positive potential is applied to base 2 and base 1 is connected through an external load to zero volts. When a positive potential is applied to the emitter that is equal to approximately .6 of the base 2 voltage, the unijunction conducts heavily in the emitter base 1 circuit. Although the amount is much less, current will also flow in the base 2 to base 1 circuit at this time. The unijunction will remain in conduction until the emitter voltage drops below the amount required to sustain conduction.

The improvements and benefits gained by this redesign are:

1. Completely transistorized circuitry.
2. More compact.
3. Built in Variable Pulse Generator.
4. Polarity and Machine Type Provided by Internal Wiring of Adaptor Box.
5. Selectable Contact Load, 15 or 100 ma. More nearly simulates actual load conditions.
6. Four Sequential Steps of Print and/or Function Operations. This is referred to as the print ring.

OLSA CONTROLS

Refer to Figure 2-1

CONTROL	FUNCTION	DESCRIPTION
SW 1	SCOPE POINT	Selects one of two rows of magnet scope points.
SW 2	SHIFT	Manual operation of shift magnets.
SW 3	START	Initiates a printer cycle.
SW 4	PARITY	Check I/O parity contacts where utilized.
SW 5	RUN/STOP	RUN position allows printer to cycle continuously. STOP position will stop the printer or allow a single cycle with each depression of the START switch.
SW 6	CONTACT LOAD	Selects 15 ma or 100 ma load for the printer contacts.
SW 7	SKIP	When SKIP B, C or D is depressed, that portion of the ring will not operate. To cancel SKIP, depress NORMAL.
SW 8	LOCK/UNLOCK	Pulse to keyboard magnet.
SW 9	RING CONTROL	RUN - Control ring steps sequentially. HOLD - Ring remains on one step. STEP - A momentary position that steps the ring one step at a time without activating the printer. The ring will not dependably step if VPG is on.
SW 10	CARRIER RETURN	Manual operation of carrier return.
SW 11	ROTATE	Selects rotate position for character to print in ring "A". Switch 12, 13 and 14 are rotate switches for B, C and D.
SW 15	TILT/FUNCTION	Selects tilt position for character to print or one of two functions -- FX or FY -- in ring "A". Switch 16, 17 and 18 are used for B, C and D.
SW 19	FUNCTION SELECT	Selects the function to be performed.
SW 20	D.C.	Controls 48 volts and 12 volts D.C.
SW 21	MOTOR	Controls printer motor voltage.
SW 22	A.C.	Controls A.C. power and the convenience outlet.
SW 23	VPG	Turns on VPG and selects one of two variable ranges. At the present time, fast VPG is of no use to the Customer Engineer. Fast VPG has been modified to operate at the same rate and duration as slow VPG. If in the future it proves to be useful, a small change will activate it.
R 1	RATE	Selects printer cycling speed in characters per second.
R 2	DURATION	Selects the duration in milliseconds of the pulse to the printer magnets.

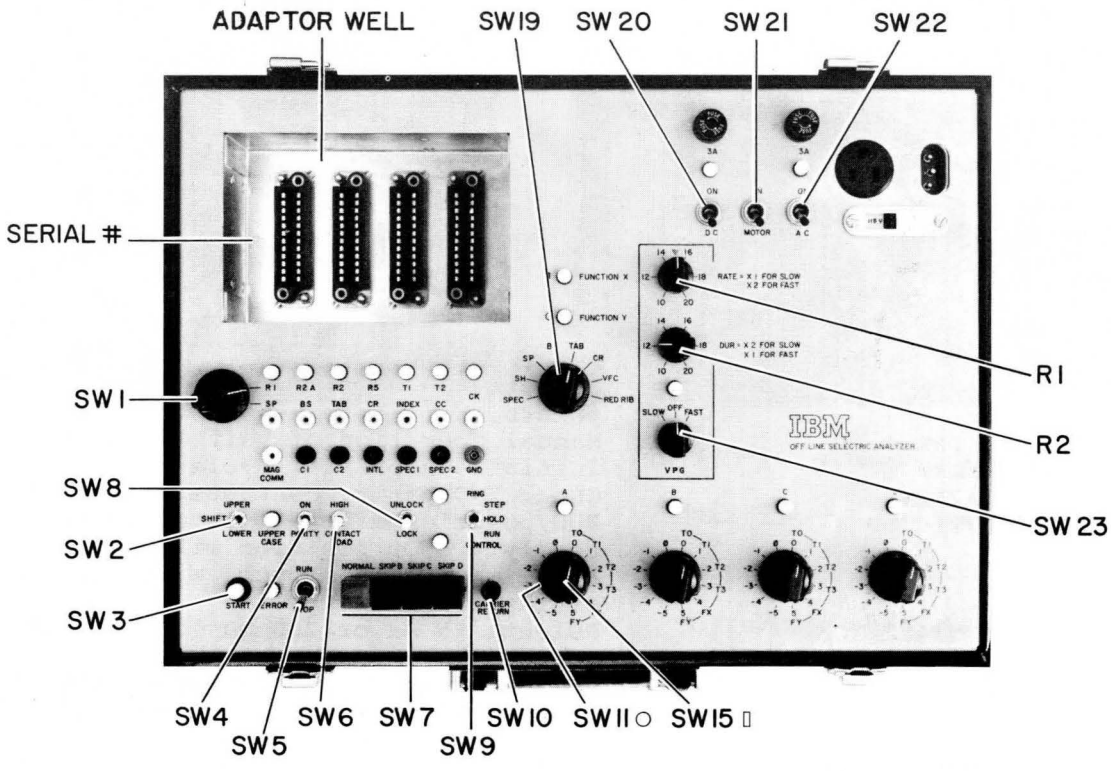


Figure 2-1.

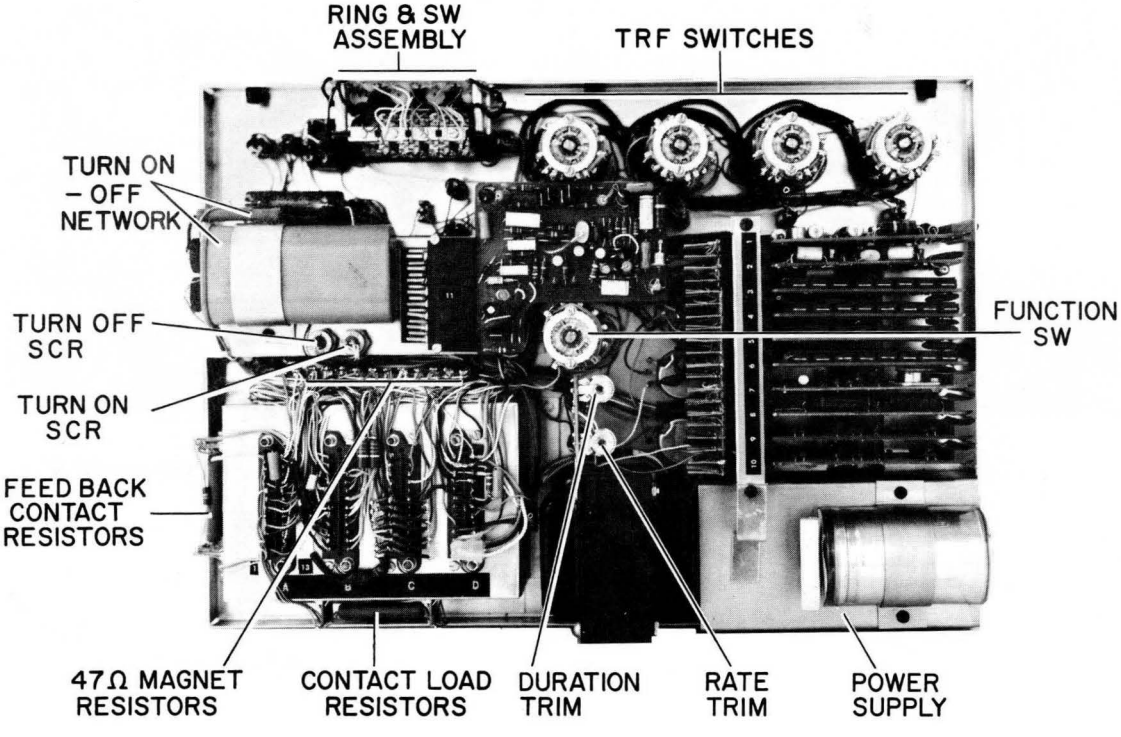
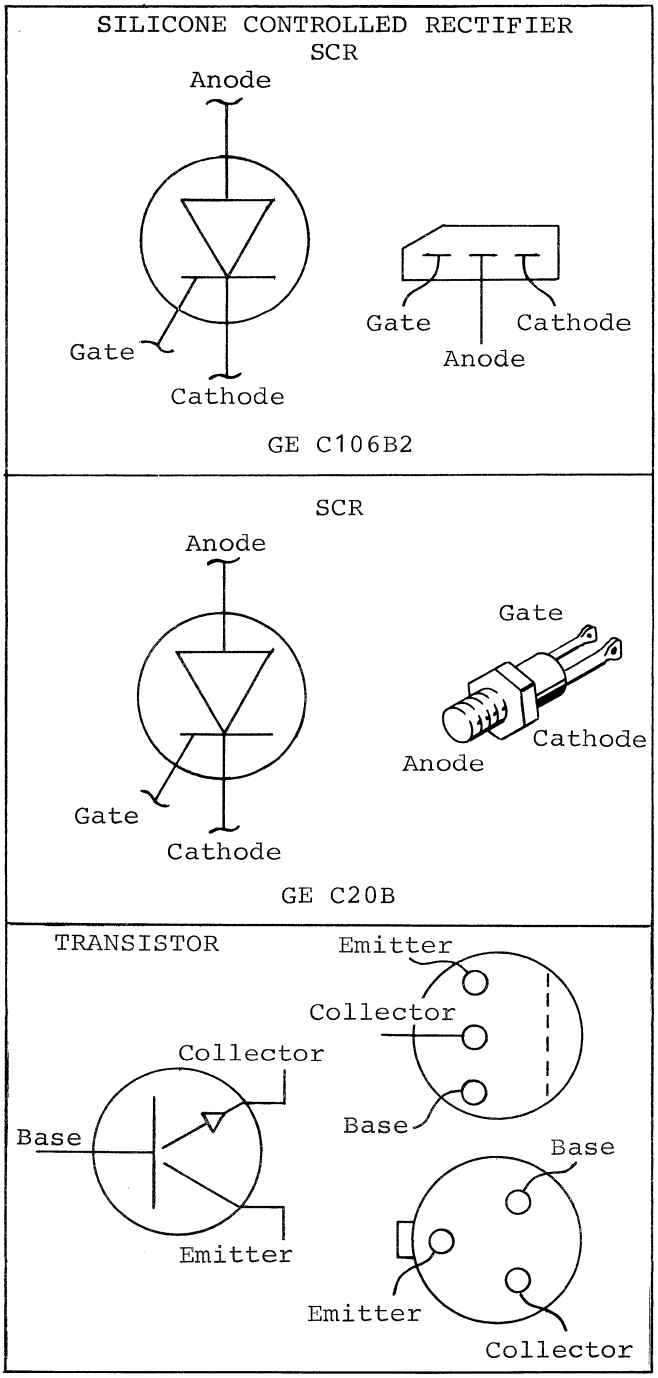
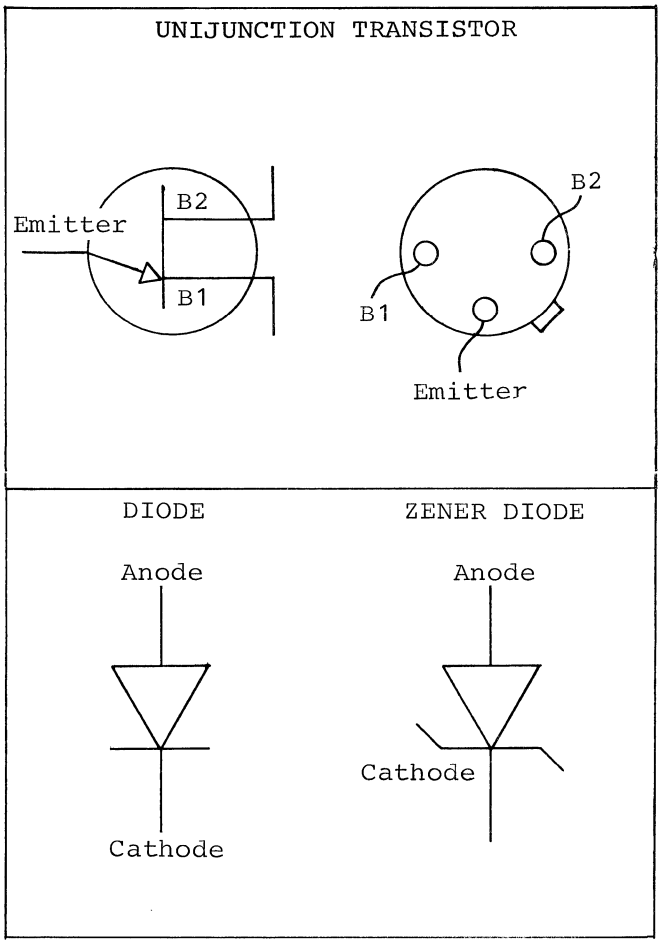


Figure 2-2.





TERMINATION IDENTIFICATION

C21 = Adaptor Box Connection

(7) = Test Point on End of Card

R = SMS Card Base Pin

SMS CARD LOCATION

Pos.	Identification
1	385-12 Voltage Regulator
2	385-13 SCR Driver
3	385-10 Matrix
4	385-10 Matrix
5	385-10 Matrix
6	385-10 Matrix
7	385-14 Pulse Control
8	385-15 VPG
9	385-11 Flip-Flop
10	385-11 Flip-Flop
11	385-17 Function & Error Detect

Figure 2-3.

SECTION 1. SETUP PROCEDURES

- The lamps indicate the sequence of operation.
- The Switches provide control for the OLSA and printer.
- The test jacks provide scope points for the printer contacts and magnets.

CAUTION - The AC power switch must be off prior to attaching or removing the adaptor box or cable connections.

The OLSA-T should be operated as follows:

1. Turn AC and DC switches off.
2. Select the proper adaptor box and insert into the adaptor well. OLSA will not operate without an adaptor box installed. Be sure that the adaptor box is right side up and press into place.
3. Attach the I/O Printer cables to the adaptor. The adaptor sockets are labeled the same as the printer cable connectors.
4. Parity switch (switch 4). If the printer has transmitting contacts and is wired for parity, turn the switch to ON. When checking odd bit parity, the error lamp will flicker during continuous machine operation. If a parity error occurs, the OLSA-T will automatically stop with the error light on. When checking even bit parity, such as the 1980, the lamp will come on only if parity is not obtained.
5. Ring control (switch 9). Place in Run position for continuous cycling of printer. To repeat the operation of an individual ring position, place the switch in the Hold position. To manually step the ring, move the ring control switch to Step and release. This is a momentary switch in the Step position and will return to Hold when released. Manual stepping of the ring is not accurate while the printer is in operation. Move the Run-Stop switch (switch 5) to Stop before attempting to step the ring manually.
6. Run/Stop (switch 5). Set to Run.
7. Skip (switch 7). Depress normal button. This permits the OLSA's ring to step sequentially A,B,C, D. Ring positions B,C or D can be skipped by depressing the desired button. Do not depress these switches if the printer is in operation. This can result in the loss of all the ring lights. If this occurs, the ring can be reactivated by turning the DC switch (switch 20) off and back on.
8. TRF Switches (switch 11 through 18). Set switches to Tilt and Rotate combinations or functions. The Tilt Switch on each position controls tilt selection and function X or Y. If the Tilt Switch is selecting X or Y, the rotate portion of the switch is electrically out of the circuit.
9. Function Select (switch 19). If a function is selected by the TRF switch, the function to be performed must be selected by this switch. This is a two section switch, the top portion being function X and the bottom portion function Y. If function X or Y is selecting Shift and the other section is selecting Red Ribbon, both functions will produce Red Ribbon Shift. This is a normal operation of the OLSA.
10. VPG (switch 23, R1, R2). If the printer operates in open-loop mode, turn the VPG to slow and set R1 and R2 to desired operating conditions. The silver arrow between 14 and 16 for the Rate Switch, indicates 15 cps. VPG is the same rate and duration on fast as it is on slow. Fast VPG is of no use at this time.
11. AC Switch (switch 22). Turn on. This switch also controls the convenience outlet.
12. Motor Switch (switch 21) Turn on.
13. DC Switch (switch 20). Turn on. If the DC switch is turned on before the AC switch, a ring light will not come on. The OLSA will

not operate in this condition.

14. Start button (switch 3). Depress to begin printer cycling. If this button is held down, parity checking is suppressed.
15. 115/220 volt switch. All OLSA-T's are shipped with a plate locking this switch in the 115 volt position. To operate the OLSA from a 220 volts AC source, change the switch position. The 115 volt convenience outlet remains at 115 volts regardless of this switch setting.
16. Scope point (switch 1). Switch 1 is a two position switch. When set at position R1, the indicator lamps follow the print magnets being selected. When set at SP, the indicator lamps follow the operational magnets being selected.
17. Test jacks. Test jacks are provided to scope the pick or seal time of the printer magnets and the timing of the feedback contacts. The test jacks are as follows:

SP-(Space Magnet) (R1 Magnet)

BS-(Back Space Magnet) R2A Magnet

TAB-(Tab Magnet) (R2 Magnet)

CR-(Carrier Return Magnet) (R5 Magnet)

INDEX-(Index Magnet) (T1 Magnet)

CC-(Cycle Clutch Model 7 and 8 SPIO) (T2 Magnet)

CK-(Check Magnet)

MAG COMM-(Scope ground for printer magnets)

C1-(C1 Contact)

C2-(C2 Contact)

INTL-(N/O Interlock Contacts)

SPEC 1-(Scope ground for feedback contacts)

SPEC 2-(VPG output)

GND-(Frame Ground)

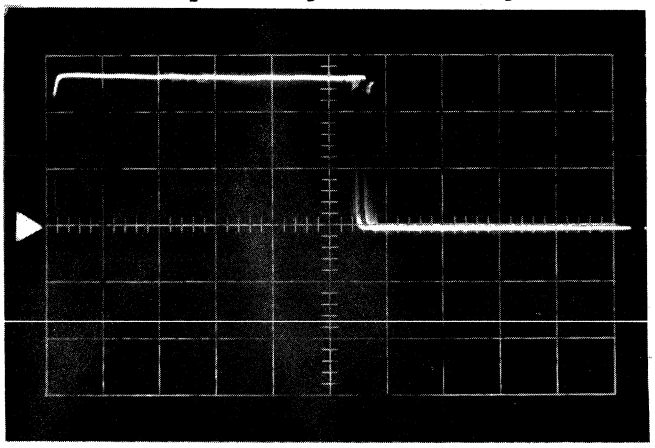


Fig. 3-1. C2 Feedback

Location	C2 Test Jack
Trigger	Internal
Volts/Div.	2
Time/Div.	5 MS

NOTE: Reverse oscilloscope leads if an inverted picture is produced on the scope.

Trigger scope internally.

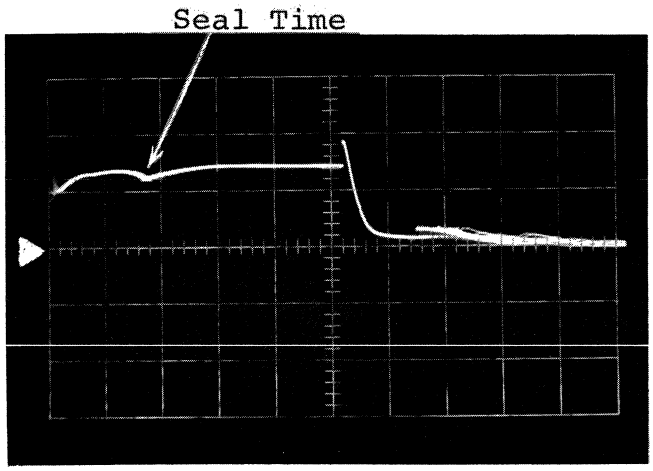


Fig. 3-2. Magnet Pick and Seal (R1)

Location	Magnet Test Jack
Trigger	Internal
Volts/Div.	.5
Time/Div.	5 MS

For the pick and seal time of individual magnets (print or function) refer to Selectric I/O Service Index in reference manual for that machine.

SECTION 2. SERVICE TIPS

1. The ring control card is mounted to the switch assembly with nylon screws. Do not use metal screws as a replacement.

2. Turn the power off on the OLSA when removing or replacing a component, including SMS cards. Failure to do so could result in serious damage to the unit.

3. The VPG output is present at the test point labeled Spec 2. If +48 volts is applied to this point, card 7 and 9 will be damaged.

4. Test point labeled Spec 1 is scope common when scoping feedback contacts.

5. Test point labeled Mag Comm is scope common when scoping the pick and seal time of the printer magnets.

6. The convenience outlet is 115 volts 60 cycle AC, regardless of the setting of the line voltage switch.

7. If one section of the TRF or function switches become defective, it is not necessary to replace the complete switch. The stacks can be separated and the defective section replaced. To replace a complete switch, it will be necessary to remove the printed overlay because the nut securing the switch to the panel is under the overlay.

8. Operating problems experienced with the OLSA after an indicator lamp burns out can be due to a shorted SCR or an open load resistor in the lamp circuit that was replaced. Never operate the OLSA with a burned out lamp. Remove lamp if a replacement is not available.

9. If the error detect card becomes defective and produces false error pulses, tape pin F on card 11 until a new card can be obtained. The defective card should be replaced as soon as possible since this deactivates the error detect circuit.

10. If the shift flip-flop card in position 10 becomes defective, it can be replaced with the VPG card in position 9. This will deactivate VPG but the OLSA can be operated in regular run.

11. If the matrix cards in position 4, 5 or 6 become defective, the ring skip switch for that position can be depressed and the OLSA will operate. If card 3 in ring position A becomes defective, replace with card 4, 5 or 6 and skip the ring position in which the card was removed.

12. Before replacing the bridge rectifier in the power supply, grind off one end of the new rectifier to allow for clearance. (Use old rectifier as pattern.)

13. Check the input masking when replacing the SCR driver card (P/N 9900400) in position 2 or the function/error detect card (P/N 9900428) in position 11. See Figures 9-17 and 9-18 for proper scope setting and desired wave shapes. Note that the wave shape desired for card position 2 (Figure 9-17) rises to approximately 40V in 4.5 to 5 ms. The desired wave shape for card position 11 (Figure 9-18) shows the unijunction conducting (sharp voltage drop) between 4.5 and 5 ms.

    Figures 10-2 and 10-7 show scope points on cards 2 and 11 respectively. A card extender (P/N 451075) must be used for card position 2.

    Adjustment is accomplished by the 80K potentiometer mounted on the cards.

SECTION 3. SPECIAL NOTES & PRECAUTIONS

The OLSA-T is designed to operate a printer to such a degree that leaves very little doubt that the printer is ready for service when returned to the system. Due to the speed of the OLSA-T in operation and to the critical tests the printer is subjected to, excessive service time may result unless the service man understands and recognizes the reaction of various printers.

This section of the manual will pertain to the items that, unless understood, may be interpreted as machine failures.

In order to detect a print of function failure, it is desirable to have each printed line reproduce the line above it. In this manner a missing or added character can be detected at a glance. If the number of characters printed on a line is not divisible by the number of ring steps being used, this condition will not exist. On printers with adjustable margin stops, a repetitive print-out can be accomplished by moving the right hand margin stop left or right a column at a time, until the desired results are obtained. On printers with fixed margins, the same results can be obtained by skipping one of the ring positions.

The red ribbon shift function is designed to operate printers with two magnets and will not operate the ribbon mechanism that uses only one magnet.

If shift is selected for function X and red ribbon is selected for function Y, both functions will operate the red ribbon mechanism. This is normal operation and should not cause concern.

Testing for proper operation of feedback contacts on a printer is one of the major functions of the OLSA-T. Any feedback contact that has more than 5 milliseconds of bounce when it makes, or has a discontinuity of more than 200 microseconds during its closed time, will produce an extra step to the ring. This error indication will be displayed on the printed copy by omitting the character in that step. This emphasizes the need for a repeat pattern for each printed line.

When using the OLSA to check and adjust head plot, it is advisable to have the skip B, C and D switches depressed. Each rotation of the cycle shaft operates the C contacts, develops feedback to the OLSA and steps the ring. Unless the ring can be prevented from stepping or all the ring positions are selecting the same character, this may become quite confusing. Because of the discontinuity circuit and the slow operation of the feedback contacts while hand cycling, placing the ring control switch in the Hold position will not prevent the ring from stepping.

The 1052 Mod 8 SIPO Printer will not operate correctly if the TRF switches are selecting 3 prints and a carrier return. Due to the lack of a C6 contact, the printer does not provide the needed feedback for correct operation with this configuration.

The OLSA will not start unless one of the four ring lights is on. The depression or restoring of skip B, C or D switches, while the printer is operating, can result in the loss of all the ring lights. If this occurs, ring control can be restored by turning the DC switch off and back on.

When the OLSA is turned on and the start switch depressed, it is possible for the printer to lock up if the function switch is selecting Shift. The printer can be unlocked and the test continued by depressing the mannual carrier return button. This is normal and is discussed in detail in the Theory of Operations Section.

When scoping the shift contacts on 1415 printers, select shift in position "A" and depress skip B, C and D. If not set up in this manner, the error detect circuit will produce an error indication and step the ring.

Do not use cleaning fluid to clean the OLSA panel. Use soap and a damp cloth.

Do not operate the manual shift switch with the printer in operation. This can result in a broken rotate tape.

If the printer fails to cycle or provide feedback, the OLSA will stop when operated in regular run. A function or print can fail when VPG is on without locking up. Examination of the printed copy, during VPG operation, will determine a mechanical failure as opposed to a contact failure. The loss of a character or function will indicate a mechanical failure.

OLSA TEST

- Determines the condition of the OLSA.

The following OLSA Test will insure that the OLSA is operating correctly and providing the proper pulses to the printer. All circuits are checked with the exception of the circuits that receive feedback information from the printer.

CHECK FUNCTIONS LIGHTS

SWITCH		SETTINGS
1	SCOPE POINT	SP
18	AC	On
17	MOTOR	Off
16	DC	On
19	VPG	Slow
9	RING CONTROL	Hold
Ring light "A"		On
Tilt Switch "A"		FX or FY
Run/Stop		On
Start Switch		Depress

FUNCTION SELECT SWITCH	LIGHT FLASHING - FX or FY
SPEC	None
SP	Space (RI)
SH	
BS	BS (R2A)
TAB	TAB (R2)
CR	CR (R5)
VFC	Index (T1)
RR	

OLSA SET UP FOR SWITCHING CHECK

SWITCH	FUNCTION	SETTING
1	Scope Point	R1
9	Ring Control	Hold
4	Parity	Off
6	Contact Load	Low
18	A C	On
16	D C	On
17	Motor	Off
19	V P G	Slow
11 through 18	T R F	See Chart
5	Run/Stop	On

Ring with "A" light on.

OPERATION TESTING	RING SW. SETTINGS A	B	C	D	LAMPS FLASHING	INSTRUCTIONS
ROTATE Set Tilt Switches: A=TO B=FY C=FY D=FY	R=-5	R=+5	R=+5	R=+5	R1,R2A,R2,R5,T1,T2,CK	To check rings B, C or D, use "A" ring setting for desired ring. Set "A" ring to +5. Change Tilt Switch to "O" for desired ring and all others to function X or Y. Y is used in this chart.
	R=-4	R=+5	R=+5	R=+5	R2A,R2,R5,T1,T2	
	R=-3	R=+5	R=+5	R=+5	R1,R2A R5,T1,T2,	
	R=-2	R=+5	R=+5	R=+5	R2A,R5,T1,T2,CK	
	R=-1	R=+5	R=+5	R=+5	R1 R5,T1,T2,CK	
	R= Ø	R=+5	R=+5	R=+5	R5,T1,T2	
	R= 0	R=+5	R=+5	R=+5	R1,R2A,R2 T1,T2	
	R=+1	R=+5	R=+5	R=+5	R2A,R2 T1,T2,CK	
	R=+2	R=+5	R=+5	R=+5	R1,R2A T1,T2,CK	
	R=+3	R=+5	R=+5	R=+5	R2A T1,T2	
	R=+4	R=+5	R=+5	R=+5	R1, T1,T2	
	R=+5	R=+5	R=+5	R=+5	T1,T2,CK	
TILT Set Rotate Switches: +5	T= 0	T=FY	T=FY	T=FY	T1,T2,CK	To check rings B, C or D, use "A" ring setting and set "A" ring on function X or Y.
	T= 1	T=FY	T=FY	T=FY	T2	
	T= 2	T=FY	T=FY	T=FY	T1	
	T= 3	T=FY	T=FY	T=FY	CK	
FUNCTION	T=FX	T=FY	T=FY	T=FY	FX	To check rings B, C or D, use "A" ring setting.
	T=FY	T=FX	T=FX	T=FX	FY	

To check B, C or D, move the ring control switch to Step, repeatedly, until desired ring light is on. The ring may not step with VPG switch on. Move to off, step ring to desired position, return to slow.

ADAPTOR INFORMATION

The information contained in this chapter will assist you in choosing the proper adaptor and cable to operate each printer.

The adaptor box charts list the jumpers and components contained in the adaptor and the function connected to each. It lists the type of printer that can be operated and the cable part number, if needed, to operate it.

The cable charts contain the termination points of the cable at both the adaptor box and the printer.

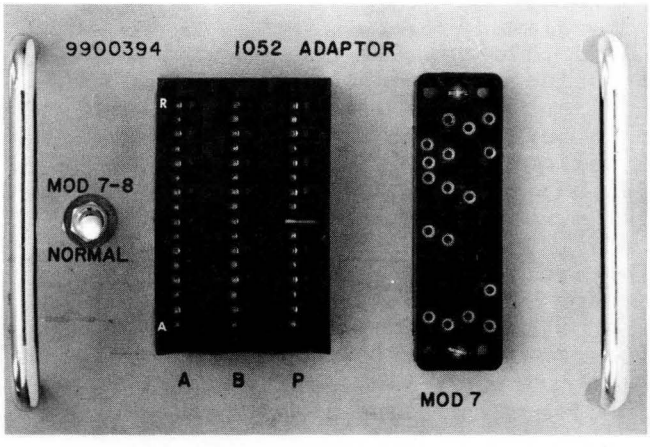


Fig. 5-1 1052 Adaptor P/N 9900394

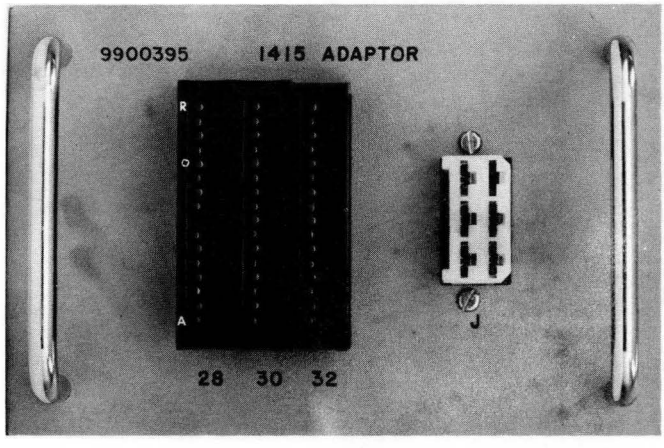


Fig. 5-2 1415 Adaptor P/N 9900395

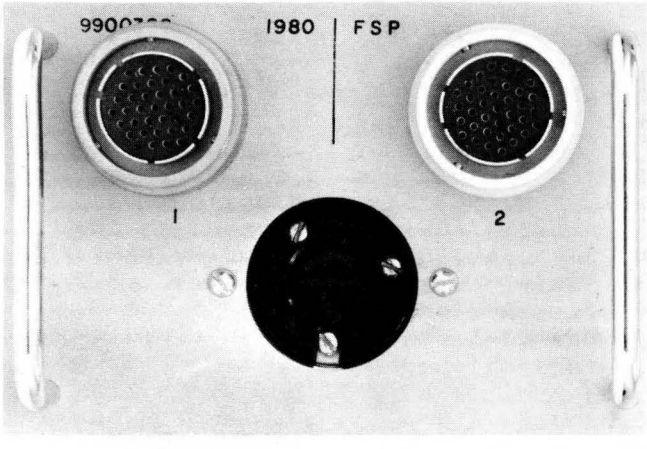


Fig. 5-3 1980-1 Adaptor P/N 9900388

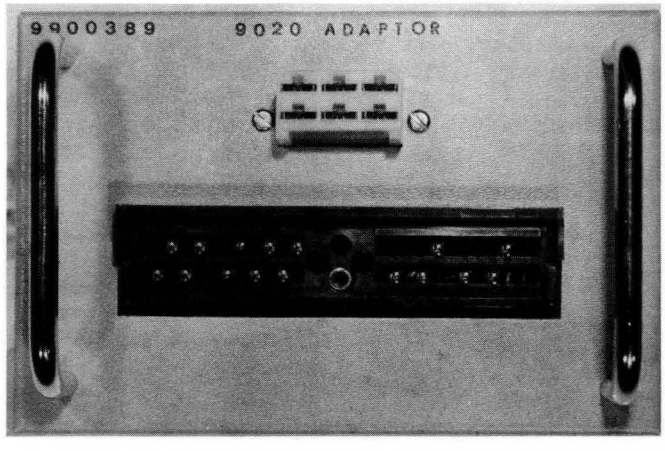


Fig. 5-4 9020 Adaptor P/N 9900389

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mfr 30874

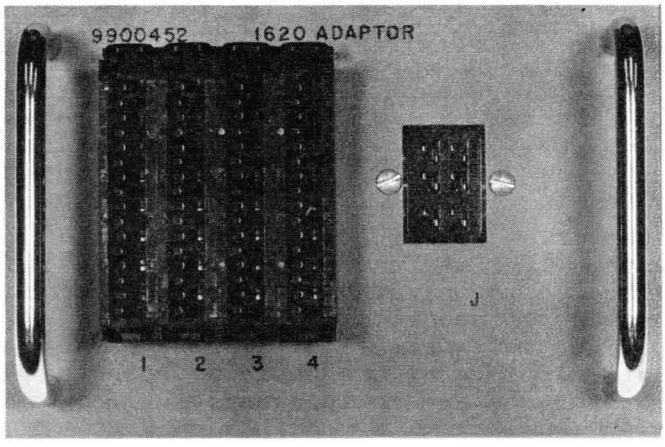


Figure 5-5.

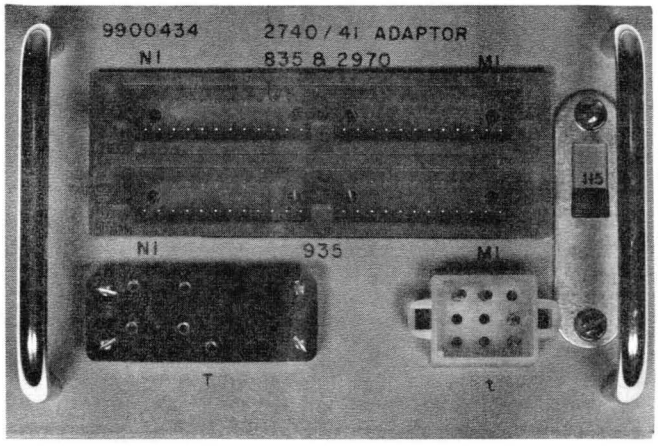


Figure 5-6.

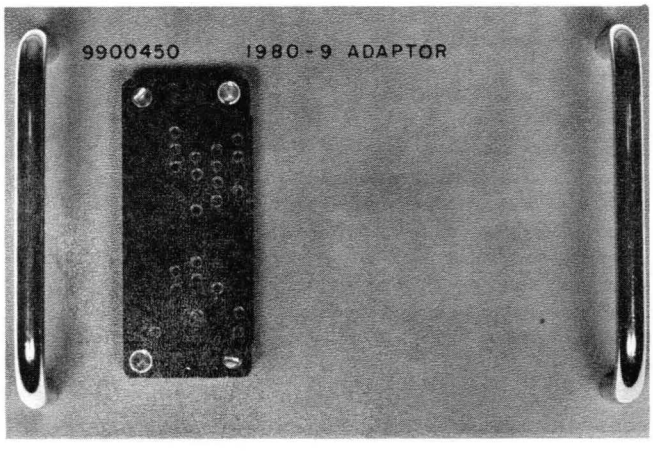


Figure 5-7.

1052 ADAPTER BOX P/N 9900394

A			B			USED WITH PRINTER		
ADAPTOR	I/O	FUNCTION	ADAPTOR	I/O	FUNCTION	MODEL	CABLE	PARITY
1		C2 N/C-	1		+VPG	1052 1-6	None	None
2		C2 N/C	2		VPG Delay Trig.	1052 7 SIPO	None	None
3		C2 N/C	3		-VPG Delay	1052 8 SIPO	None	None
4		C2 N/O-	4		Funct. X SCR	1800	9900353	None
5		C2 N/O	5		Defeat Parity Turn Off	1033	9900350	None
6		C2 N/O	6		DC -	1062	9900312	None
7		Parity-	7		Shift Pulse +	6400	9900250	None
8		Parity on (ODD)	8		Shift Trig.	1131	#None	None
9		Parity	9		Shift Pulse -	1447	None	None
10		Load N/C	10		Funct. X Sw.	Full 1052-7	9900351	None
11		Load N/O	11		Funct. Y SCR	1070	9900352	None
12		Load Parity	12		Funct. Y Sw.	1518	9900356	None
13		Ext. Drive R1	13 D19		Turn Off SCR	2152	9900356	None
14		Ext. Drive R2	14		Lamp Up Case			
15		Ext. Drive R2A	15		Lock Lamp			
16		Ext. Drive R5	16		Unlock Lamp			
17		Ext. Drive CK	17		Funct. Sw. Shift			
18		Ext. Drive T2	18		Up Shift SCR			
19		Ext. Drive T1	19	A-L (h)	Up Shift Mag.			
20	*	C2 N/C	20		Up Shift SCR			
21	B-D**	N/O	21		Down Shift SCR			
22		Parity	22	A-R(y)	Down Shift Mag.			
23		DC +	23		Down Shift SCR			
24		DC -	24 **	**	C.R. Invert			

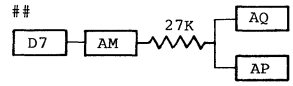
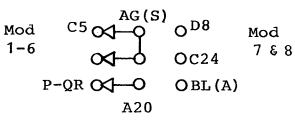
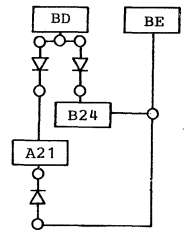
C			D			SPECIAL NOTES
1	AD (H)	R1	1	PFG(EE)	AC Comm.	# Remove wire from h7 (other end r8). Install jumper h8 - h7.
2	AF (X)	R2	2		Turn On SCR	
3	AC (U)	R2A	3		Turn Off SCR	## 
4	AE (K)	R5	4		DC	
5	*	CK	5 B-M	(L)	Mag. Comm.	
6	AA (B)	T2	6		Mag. Comm.	
7	AB (D)	T1	7	##	Parity Turn Off	
8	BJ (M)	SP	8 *	*	CC Pulse	
9	BH	B.S.	9		Turn On SCR	
10	AJ	Tab	10		DC +	* 
11	AK (BR (e)	C.R.	11		DC -	
12	AH	Index	12		Turn Off SCR	
13	BC	R. Ribbon	13	PCD (FF)	117V AC Motor	
14	BG	B. Ribbon	14	PAB	220V AC Motor	
15		Lock	15		Turn On SCR Load	** 
16		C.R. Invert	16		Spare	
17			17		Turn On SCR Load	
18			18		DC Comm.	
19	B-D	C1 Test	19 B13		Main On SCR	
20		Spare	20		Main On SCR	
21	BL	N/O Test	21		Turn On SCR Load	
22	D23	Spec. 1	22		DC +	
23			23	BP	DC -	PM P-QR
24	*	C.C. Lamp	24	PKL(HH)	Frame Ground	

Figure 5-8.

1415 ADAPTER BOX P/N 9900395

A				B				USED WITH PRINTER		
ADAPTOR		I/O	FUNCTION	ADAPTOR		I/O	FUNCTION	MODEL	CABLE	PARITY
1			C2 N/C-	1			+VPG	1415	None	ODD
2			C2 N/C	2			VPG Delay Trig.	Old 775	9900314	None
3			C2 N/C	3			-VPG Delay	New 775	##9900314	None
4			C2 N/O-	4			Funct. X SCR	1014	9900249	ODD
5			C2 N/O	5	.5		Defeat Parity Turn Off	Sabre	9900247	ODD
6			C2 N/O	6			DC -	Stretch	9900248	None
7			Parity-	7			Shift Pulse +	731 Corr.	#9900245	ODD
8			Parity on (ODD)	8			Shift Trig.	731 BCD	9900246	ODD
9			Parity	9			Shift Pulse -	870	#9900315	None
10			Load N/C	10			Funct. X Sw.	7040	None	None
11			Load N/O	11			Funct. Y SCR			
12			Load Parity	12			Funct. Y Sw.			
13			Ext. Drive R1	13	D12		Turn Off SCR			
14			Ext. Drive R2	14		30D	Lamp Up Case			
15			Ext. Drive R2A	15		30L	Lock Lamp			
16			Ext. Drive R5	16		30K	Unlock Lamp			
17			Ext. Drive CK	17			Funct. Sw. Shift			
18			Ext. Drive T2	18			Up Shift SCR			
19			Ext. Drive T1	19			Up Shift Mag.			
20		28M	C2 N/C	20		32H	Up Shift SCR			
21	*	30J*	N/O	21			Down Shift SCR			
22		30G	Parity	22			Down Shift Mag.			
23			DC +	23		32J	Down Shift SCR			
24			DC -	24			C.R. Invert			

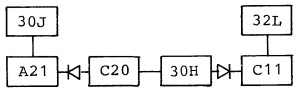
C				D			
1		32A	R1	1		j block 2	AC Comm.
2		32C	R2	2			Turn On SCR
3		32B	R2A	3			Turn Off SCR
4		32D	R5	4			DC
5		32G	CK	5			Mag. Comm.
6		32F	T2	6			Mag. Comm.
7		32E	T1	7			Parity Turn Off
8		32M	SP	8			CC Pulse
9		32K	B.S.	9			Turn On SCR
10		32P	Tab	10			DC +
11	*	32L	C.R.	11			DC -
12			Index	12	B13		Turn Off SCR
13			R. Ribbon	13		j block 1	117V AC Motor
14			B. Ribbon	14		j block 6	220V AC Motor
15		32N	Lock	15			Turn On SCR Load
16			C.R. Invert	16			Spare
17				17			Turn On SCR Load
18				18			DC Comm.
19		28J	C1 Test	19			Main On SCR
20	*	30H*	Spare	20			Main On SCR
21			N/O Test	21			Turn On SCR Load
22	B6		Spec. 1	22		30C	DC +
23				23		j block 5	DC -
24			C.C. Lamp	24	Note	j block 3	Frame Ground

SPECIAL NOTES

Positive polarity only

Use cable 9900367 in conjunction with 9900314 for new Model 775.

*



1415 Diode Jumpers CR

Note
Connect D24 to locator pin on connector D.

Figure 5-9.

1980-1 ADAPTOR BOX P/N 9900388

A				B				USED WITH PRINTER		
	ADAPTOR	I/O	FUNCTION		ADAPTOR	I/O	FUNCTION	MODEL	CABLE	PARITY
1			C2 N/C-	1			+VPG	1980-1	None	Even
2			C2 N/C	2			VPG Delay Trig.			
3			C2 N/C	3			-VPG Delay			
4			C2 N/O-	4			Funct. X SCR			
5			C2 N/O	5			Defeat Parity Turn Off			
6			C2 N/O	6			DC -			
7			Parity	7			Shift Pulse +			
8	D7		Parity on (ODD)	8			Shift Trig.			
9			Parity	9			Shift Pulse -			
10			Load N/C	10			Funct. X Sw.			
11			Load N/O	11			Funct. Y SCR			
12			Load Parity	12			Funct. Y Sw.			
13			Ext. Drive R1	13	D19		Turn Off SCR			
14			Ext. Drive R2	14			Lamp Up Case			
15			Ext. Drive R2A	15			Lock Lamp			
16			Ext. Drive R5	16			Unlock Lamp			
17			Ext. Drive CK	17			Funct. Sw. Shift			
18			Ext. Drive T2	18			Up Shift SCR			
19			Ext. Drive T1	19		2R	Up Shift Mag.			
20		2d	C2 N/C	20			Up Shift SCR			
21	C21		N/O	21			Down Shift SCR			
22		1f	Parity	22		2S	Down Shift Mag.			
23			DC +	23			Down Shift SCR			
24			DC -	24		1c	C.R. Invert			

C				D				SPECIAL NOTES
					C21			
1		2B	R1	1		Hubbell	AC Comm.	
2		2C	R2	2			Turn On SCR	
3		2D	R2A	3			Turn Off SCR	
4		2E	R5	4			DC	
5		2A	CK	5			Mag. Comm.	
6		2H	T2	6			Mag. Comm.	
7		2F	T1	7	A8		Parity Turn Off	
8		2K	SP	8			CC Pulse	
9		1d	B.S.	9			Turn On SCR	
10		2J	Tab	10		1a	DC +	
11		2M	C.R.	11			DC -	
12		2N	Index	12			Turn Off SCR	
13		2L	R. Ribbon	13		Hubbell	117V AC Motor	
14		2P	B. Ribbon	14			220V AC Motor	
15			Lock	15			Turn On SCR Load	
16			C.R. Invert	16			Spare	
17				17			Turn On SCR Load	
18				18			DC Comm.	
19		2j	C1 Test	19			Main On SCR	
20			Spare	20			Main On SCR	
21	A21	2e	N/O Test	21			Turn On SCR Load	
22	B6		Spec. 1	22		1Y	DC +	
23		1W		23			DC -	
24			C.C. Lamp	24		Hubbell	Frame Ground	

Figure 5-10.

1980-9 AND 12 ADAPTOR BOX P/N 9900450

A			B			USED WITH PRINTER		
ADAPTOR	I/O	FUNCTION	ADAPTOR	I/O	FUNCTION	MODEL	CABLE	PARITY
1		C2 N/C-	1		+VPG	1980-9	None	None
2		C2 N/C	2		VPG Delay Trig.	1980-12	None	None
3		C2 N/C	3		-VPG Delay			
4		C2 N/O-	4		Funct. X SCR			
5		C2 N/O	5		Defeat Parity Turn Off			
6		C2 N/O	6		DC -			
7		Parity	7		Shift Pulse +			
8		Parity on (ODD)	8		Shift Trig.			
9		Parity	9		Shift Pulse -			
10		Load N/C	10		Funct. X Sw.			
11		Load N/O	11		Funct. Y SCR			
12		Load Parity	12		Funct. Y Sw.			
13		Ext. Drive R1	13	D 19	Turn Off SCR			
14		Ext. Drive R2	14	5	Lamp Up Case			
15		Ext. Drive R2A	15	33	Lock Lamp			
16		Ext. Drive R5	16		Unlock Lamp			
17		Ext. Drive CK	17		Funct. Sw. Shift			
18		Ext. Drive T2	18		Up Shift SCR			
19		Ext. Drive T1	19	63	Up Shift Mag.			
20	30	C2 N/C	20		Up Shift SCR			
21	35	N/O	21		Down Shift SCR			
22		Parity	22		Down Shift Mag.			
23		DC +	23		Down Shift SCR			
24		DC -	24		C.R. Invert			

C			D			SPECIAL NOTES
1	59	R1	1		AC Comm.	
2	11	R2	2		Turn On SCR	
3	14	R2A	3		Turn Off SCR	
4	53	R5	4		DC	
5	56	CK	5	74	Mag. Comm.	
6	21	T2	6		Mag. Comm.	
7	17	T1	7		Parity Turn Off	
8	16	SF	8		CC Pulse	
9	27	B.S.	9		Turn On SCR	
10	13	Tab	10		DC +	
11	23	C.R.	11		DC -	
12	20	Index	12		Turn Off SCR	
13		R. Ribbon	13		117V AC Motor	
14		B. Ribbon	14		220V AC Motor	
15	33	Lock	15		Turn On SCR Load	
16		C.R. Invert	16		Spare	
17			17		Turn On SCR Load	
18			18		DC Comm.	
19		C1 Test	19		Main On SCR	
20		Spare	20		Main On SCR	
21	35	N/O Test	21		Turn On SCR Load	
22		Spec. 1	22	79/82	DC +	
23			23	64	DC -	
24		C.C. Lamp	24	75	Frame Ground	

Figure 5-11.

9020 ADAPTER BOX P/N ~~9900389~~

A				B				USED WITH PRINTER		
ADAPTOR		I/O	FUNCTION	ADAPTOR		I/O	FUNCTION	MODEL	CABLE	PARITY
1			C2 N/C-	1			+VPG	9020	None	None
2			C2 N/C	2			VPG Delay Trig.			
3			C2 N/C	3			-VPG Delay			
4			L2 N/O-	4			Funct. X SCR			
5			C2 N/O	5			Defeat Parity Turn Off			
6			C2 N/O	6			DC -			
7			Parity-	7			Shift Pulse +			
8			Parity on (ODD)	8			Shift Trig.			
9			Parity	9			Shift Pulse -			
10			Load N/C	10			Funct. X Sw.			
11			Load N/O	11			Funct. Y SCR			
12			Load Parity	12			Funct. Y Sw.			
13			Ext. Drive R1	13	D19		Turn Off SCR			
14			Ext. Drive R2	14			Lamp Up Case			
15			Ext. Drive R2A	15			Lock Lamp			
16			Ext. Drive R5	16			Unlock Lamp			
17			Ext. Drive CK	17			Funct. Sw. Shift			
18			Ext. Drive T2	18			Up Shift SCR			
19			Ext. Drive T1	19	(S)G5		Up Shift Mag.			
20		j block 4	C2 N/C	20			Up Shift SCR			
21	C21	(S)G8	N/O	21			Down Shift SCR			
22			Parity	22	(S)J6		Down Shift Mag.			
23			DC +	23			Down Shift SCR			
24			DC -	24			C. R. Invert			

C				D				SPECIAL NOTES
1		(S)B8	R1	1		j block 2	AC Comm.	(S) = Serpentine Block
2		(S)D9	R2	2			Turn On SCR	
3		(S)D6	R2A	3			Turn Off SCR	
4		(S)B10	R5	4			DC	
5		(S)D4	CK	5			Mag. Comm.	
6		(S)B3	T2	6			Mag. Comm.	
7		(S)B5	T1	7			Parity Turn Off	
8		(S)B12	SP	8			CC Pulse	
9		(S)D13	B.S.	9			Turn On SCR	
10		(S)D11	Tab	10			DC +	
11		(S)G3,J11	C.R.	11			DC -	
12			Index	12			Turn Off SCR	
13			R. Ribbon	13		j block 1	117V AC Motor	
14			B. Ribbon	14		j block 6	220V AC Motor	
15			Lock	15			Turn On SCR Load	
16			C.R. Invert	16			Spare	
17				17			Turn On SCR Load	
18				18			DC Comm.	
19			C1 Test	19			Main On SCR	
20			Spare	20			Main On SCR	
21			N/O Test	21			Turn On SCR Load	
22			Spec. 1	22		(S)G10	DC +	
23				23		j block 5	DC -	
24			C.C. Lamp	24		j block 3	Frame Ground	

Figure 5-12.

2740/2741/2970 ADAPTER BOX P/N 9900434

A				B				USED WITH PRINTER		
ADAPTOR		*I/O	FUNCTION	ADAPTOR		*I/O	FUNCTION	MODEL	CABLE	PARITY
1			C2 N/C-	1			+VPG	2740	None	None
2			C2 N/C	2			VPG Delay Trig.	2741	None	None
3			C2 N/C	3			-VPG Delay	**2970	None	None
4			C2 N/O-	4			Funct. X SCR			
5			C2 N/O	5			Defeat Parity Turn Off			
6			C2 N/O	6			DC -			
7			Parity	7			Shift Pulse +			
8			Parity on (ODD)	8			Shift Trig.			
9			Parity	9			Shift Pulse -			
10			Load N/C	10			Funct. X Sw.			
11			Load N/O	11			Funct. Y SCR			
12			Load Parity	12			Funct. Y Sw.			
13			Ext. Drive R1	13	D19		Turn Off SCR			
14			Ext. Drive R2	14		N1D02/N1B04	Lamp Up Case			
15			Ext. Drive R2A	15	C15	M1D07/N1D07	Lock Lamp			
16			Ext. Drive R5	16			Unlock Lamp			
17			Ext. Drive CK	17			Funct. Sw. Shift			
18			Ext. Drive T2	18			Up Shift SCR			
19			Ext. Drive T1	19		N1D13/N1B03	Up Shift Mag.			
20		M1B07/M1B10	C2 N/C	20			Up Shift SCR			
21		N1B08/N1D05	N/O	21			Down Shift SCR			
22			Parity	22			Down Shift Mag.			
23			DC +	23			Down Shift SCR			
24			DC -	24			C.R. Invert			

C				D				SPECIAL NOTES
1		N1B13/N1B12	R1	1		t4	AC Comm.	*2740/2741
2		M1B03/N1D11	R2	2			Turn On SCR	**On 2970 the OLSA must be operated with VPG on when selecting shift.
3		M1D04/N1B10	R2A	3			Turn Off SCR	
4		N1B12/N1D09	R5	4			DC	
5		N1D12/N1B08	CK	5		t2	Mag. Comm.	
6		M1D05/N1B09	T2	6			Mag. Comm.	
7		M1B04/N1D10	T1	7			Parity Turn Off	# D14 TP D13
8		N1B04/N1B02	SP	8			CC Pulse	
9		M1D06/M1B04	B.S.	9			Turn On SCR	
10		N1D04/M1D04	Tab	10			DC +	
11		N1B05/M1B03	C.R.	11			DC -	
12		N1D05/M1D02	Index	12			Turn Off SCR	
13			R. Ribbon	13			117V AC Motor	
14			B. Ribbon	14			220V AC Motor	
15	B15		Lock	15			Turn On SCR Load	
16			C.R. Invert	16			Spare	
17				17			Turn On SCR Load	
18				18			DC Comm.	
19			C1 Test	19			Main On SCR	
20			Spare	20			Main On SCR	
21	A21		N/O Test	21			Turn On SCR Load	
22	D18		Spec 1	22		t6/t1	DC +	
23				23		M1D13	DC -	
24			C.C. Lamp	24		t9	Frame Ground	

Figure 5-13.

1620-2 ADAPTOR BOX P/N 9900452

A				B				USED WITH PRINTER		
ADAPTOR		I/O	FUNCTION	ADAPTOR		I/O	FUNCTION	MODEL	CABLE	PARITY
1			C2 N/C-	1			+VPG	1620-2	None	Odd
2			C2 N/C	2			VPG Delay Trig.			
3			C2 N/C	3			-VPG Delay			
4			C2 N/O-	4			Funct. X SCR			
5			C2 N/O	5			Defeat Parity Turn Off			
6			C2 N/O	6			DC -			
7			Parity	7			Shift Pulse +			
8			Parity on (ODD)	8			Shift Trig.			
9			Parity	9			Shift Pulse -			
10			Load N/C	10			Funct. X Sw.			
11			Load N/O	11			Funct. Y SCR			
12			Load Parity	12			Funct. Y Sw.			
13			Ext. Drive R1	13	D19		Turn Off SCR			
14			Ext. Drive R2	14	2P		Lamp Up Case			
15			Ext. Drive R2A	15		1N	Lock Lamp			
16			Ext. Drive R5	16			Unlock Lamp			
17			Ext. Drive CK	17			Funct. Sw. Shift			
18			Ext. Drive T2	18			Up Shift SCR			
19			Ext. Drive T1	19		1M	Up Shift Mag.			
20		4K	C2 N/C	20			Up Shift SCR			
21	C21	2E/4P	N/O	21			Down Shift SCR			
22		4C	Parity	22		1P	Down Shift Mag.			
23			DC +	23			Down Shift SCR			
24			DC -	24		2D	C.R. Invert			

C				D				SPECIAL NOTES
1		1A	R1	1		j block 1	AC Comm.	A jumper is connected from 4D - 4M in the adaptor box.
2		1B	R2	2			Turn On SCR	
3		1C	R2A	3	D12		Turn Off SCR	
4		1D	R5	4			DC	
5		1G	CK	5		4J	Mag. Comm.	
6		1F	T2	6		4L	Mag. Comm.	
7		1E	T1	7			Parity Turn Off	
8		1K	SP	8			CC Pulse	
9		1H	B.S.	9			Turn On SCR	
10		1J	Tab	10			DC +	
11		1L	C.R.	11			DC -	
12		1Q	Index	12			Turn Off SCR	
13			R. Ribbon	13		j block 2	117V AC Motor	
14			B. Ribbon	14			220V AC Motor	
15		1N	Lock	15			Turn On SCR Load	
16			C.R. Invert	16			Spare	
17				17			Turn On SCR Load	
18				18		j block 6	DC Comm.	
19		2J	C1 Test	19			Main On SCR	
20			Spare	20			Main On SCR	
21			N/O Test	21			Turn On SCR Load	
22	D18		Spec 1	22		4Q	DC +	
23				23			DC -	
24			C.C. Lamp	24		j block 3	Frame Ground	

Figure 5-14.

NEGATIVE POLARITY ADAPTOR BOX P/N9900416

A				B				USED WITH PRINTER		
ADAPTOR		I/O	FUNCTION	ADAPTOR		I/O	FUNCTION			
1			C2 N/C -	1			+VPG			
2			C2 N/C	2			VPG Delay Trig.			
3			C2 N/C	3			-VPG Delay			
4			C2 N/O	4			Funct. X SCR			
5			C2 N/O	5			Defeat Parity Turn Off			
6			C2 N/O	6			DC -			
7			Parity -	7			Shift Pulse +			
8			Parity on (ODD)	8			Shift Trig.			
9			Parity	9			Shift Pulse -			
10			Load N/C	10			Funct. X Sw.			
11			Load N/O	11			Funct. Y SCR			
12			Load Parity	12			Funct. Y Sw.			
13			Ext. Drive R1	13	D19		Turn Off SCR			
14			Ext. Drive R2	14		30D	Lamp Up Case			
15			Ext. Drive R2A	15		30L	Lock Lamp			
16			Ext. Drive R5	16		30K	Unlock Lamp			
17			Ext. Drive CK	17			Funct. Sw. Shift			
18			Ext. Drive T2	18			Up Shift SCR			
19			Ext. Drive T1	19		32H	Up Shift Mag.			
20		28M	C2 N/C	20			Up Shift SCR			
21	*	30J	N/O	21			Down Shift SCR			
22		30G	Parity	22		32J	Down Shift Mag.			
23			DC +	23			Down Shift SCR			
24			DC -	24	*		C.R. Invert			

C				D			
1		32A	R1	1		#Hubbel j block 2	AC Comm.
2		32C	R2	2			Turn On SCR
3		32B	R2A	3			Turn Off SCR
4		32D	R5	4			DC
5		32G	CK	5			Mag. Comm.
6		32F	T2	6			Mag. Comm.
7		32E	T1	7	**		Parity Turn Off
8		32M	SP	8	**		CC Pulse
9		32K	B.S.	9			Turn On SCR
10		32P	Tab	10		30C	DC +
11		32L	C.R.	11			DC -
12		32Q	Index	12			Turn Off SCR
13		32R	R. Ribbon	13		j block 1	117V AC Motor
14		30Q	B. Ribbon	14		Hubbel j block 6	220V AC Motor
15		32N	Lock	15			Turn On SCR Load
16			C.R. Invert	16			Spare
17				17			Turn On SCR Load
18				18			DC Common
19		28J	C1 Test	19	B13		Turn On SCR
20	*	30H	Spare	20			Turn On SCR
21		28L	N/O Test	21			Turn On SCR Load
22	D23		Spec. 1	22		* *j block 5	DC +
23				23			DC -
24			C.C. Lamp	24		Hubbel j block 3	Frame Ground

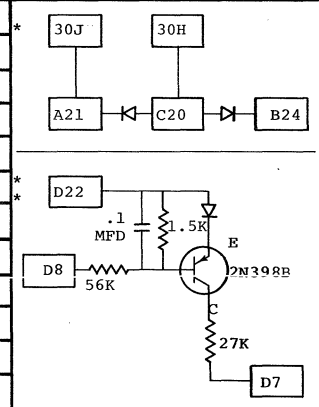


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Figure 5-15.

ADAPTOR CABLE TERMINATIONS

CABLE #	9900250	9900312	9900350	9900353	9900356		
1052 ADAPTOR	P R I N T E R						
P-C/D	P-JA1 L-JF1	Black	P-6	P-3			
P-F/G	P-JA3 L-JF3	White	P-2	P-1			
P-K/L	P-JA2 L-JF3	Green	P-3	P-4	H-H		
P-M	L-2F1, 2F8	S, X		B-W			
P-Q/R	P-2A4 L-2F3	B	P-5	B-Y	Y		
A-A	P-1A1 L-1F1	A	A4A	B-K	A		
A-B	P-1A3 L-1F3	K	B	B-J	C		
A-C	P-1A4 L-1F4	P	C	B-P	D		
A-D	P-1A5 L-1F5	u	D	B-M	E		
A-E	P-1A7 L-1F7	N	E	B-N	H		
A-F	P-1A6 L-1F7	L	F	B-L	F		
A-G	P-1A2 L-1F2	E	G	B-H	B		
A-H					R		
A-J	P-1A10 L-1F10	C	J	B-E	L		
A-K	P-1A8 L-1F8	M	K	B-F	P		
A-L	P-1A11 L-1F11			B-R	S		
A-Q					P		
A-R	P-1A12 L-1F12			B-S	T		
B-C				B-U	U		
B-D	P-2A7 L-2F5	D,J,T		B-AA	6		
B-E				B-LL			
B-G				B-X	V		
B-H	P-2A11		A-H	B-A	N		
B-J	P-1A9 L-1F9	H	A-J	B-D	M		
B-M	P-2A1,6,10		A-M	B-V	XJ		
B-P	P-3A9,10		A-P				
B-R	P-3A12		A-R		f		

Figure 5-16.

ADAPTOR CABLE TERMINATIONS

CABLE #	9900245	9900246	9900247	9900248	9900249	9900314	9900315
1415 ADAPTOR	P R I N T E R						
J-1	Black	Black	Black	Black	J-1	EE	MM
J-2	White	White	White	White	J-2	FF	LL
J-3	Green	Green	Green	Green	J-3	HH	NN
J-4							
J-5	J	J	f	A-16	J-5	X	J
J-6							
28-H				B-19	4N	u	
28-J			M	B-11	2A	Z	
28-K				B-10	5B		
28-L			n	B-13	4P	Y	
28-M	Y	Y	k	B-12	2C	p,t	AA
30-A							
30-C	X,y,c	X,y,c	K,L	B23,24	4H,5R,4K,3H	w,k	X
30-D	h			B-21		j	
30-E							
30G,30B	p	p	Taper pin "a"	B-11	2B		
30-H	f	f			4L	y	BB
30-J		b	b	B22,15	2H		CC
30-K	k	m				S	
30-L	m	k	d	A-15			
32-A	E	E	Y	A-2	3G	A	E
32-B	D	D	W	A-4	3F	C	D
32-C	F	F	X	A-3	3E	B	F
32-D	H	H	Z	A-1	3D	D	H
32-E	C	C	V	A-6	3C	E	C
32-F	A	A	U	A-5	3B	F	A
32-G	B	B	T	A-7	3A	H	B
32-H	S	S		A-14		P	S
32-J	T	T		A-13		R	T
32-K	N	N	R	A-9	4J	L	N
32-L	P	P	S	A-10	2Q	K	P
32-M	M	M	P	A-8	3K	M	M
32-N	K	K	d	A-15	2R	S	K
32-P	L	L	N	A-11	3J	N	
32-Q					4G		
	a d	a d	c m		2E 5F	U T	30K 32N
						t p	
						32N 30K	

Figure 5-17.

SECTION 1. BRIEF DESCRIPTION

- Adaptor boxes provide correct printer polarity.
- Printers can be operated open or closed loop.
- VPG controls printer speed when turned on.
- Operates 115/220 volt 50/60 cycle A.C.

Closed Loop, Without Parity

Depression of the Start Button turns on the start-control circuit. This circuit is a bi-stable flip-flop which will remain on until a voltage of the proper polarity is applied to the off input. The output of the start-control circuit turns on the start pulse driver, which is a unijunction transistor oscillator. As long as an input is applied, a series of pulses are produced. These pulses are transformer coupled to the gate of the turn-on SCR, turning it on.

Magnet common potential is applied to all four of the tilt/rotate/function (TRF) switch wipers. Connections within the adaptor boxes provide the correct polarity for the printer. The step control ring determines which print control matrix is conditioned for operation (A, B, C or D). The magnet circuit is completed through the selected matrix or function SCR and the printer begins to cycle.

Early in the printer cycle, the appropriate feedback contact operates and the feedback control circuit establishes two conditions.

1. Grounds the emitter to the start pulse oscillator and stops its oscillation.
2. Applies voltage to the emitter circuit of the stop-pulse oscillator.

Pulses are now available to gate the turn-off SCR. When the turn-off SCR fires it turns off the turn-on SCR which interrupts the magnet circuits.

A pulse is also supplied to the step control ring circuit which advances the ring to the next position.

All circuits remain unchanged until late in the cycle when the feedback contact returns to normal. At this time, the inhibit to the start pulse oscillator, and the off input to the stop pulse oscillator, are removed. The start pulse oscillator once again conditions the turn-on SCR. From this point, the printer continues to cycle until the run/stop switch is turned to stop.

Parity

With the parity switch on and checking odd bit parity, the +48 volts from the print selection magnets turns the start control circuit to its off condition. During the print cycle, if parity is obtained, the parity start circuit turns the start control on again to begin the next cycle. If, however, parity does not occur, the start control remains off and the printer stops with the error light on. When checking even bit parity, the start control circuit is turned off through the parity contacts only if parity is not obtained.

Variable Pulse Generator (VPG)

The VPG is used when testing open end printers and for marginal tests on both open end and closed loop printers. The pulse rate can be varied from 10 cycles per second to 20 cycles per second, and pulse duration from 20 milli-seconds to 40 milli-seconds.

The VPG must be used with discretion. With the wide range of variables that are possible, marginal operation can be induced if speeds are too high or they can be overcome if speeds are too low. However, by intentionally setting up marginal conditions, intermittent malfunctions may become more evident, allowing for faster analysis and repair.

With the VPG switch on, the VPG circuit takes the place of the feedback contact to provide input to the feedback control circuit. The operation of the OLSA is the same with the exception that now the printer cycles at the speed determined by the setting of the rate control. During a tab or carrier

return, the VPG is turned off for approximately 800 milli-seconds. This prevents printing during these operations. There is no control over the VPG by the space or backspace operation since they occur at the same rate as print.

The OLSA-T can operate on 117 volts or 220 volts AC, 50 to 60 cycles under the control of the line voltage switch. Regardless of the setting of this switch, the convenience outlet is always 117 volts AC. The AC and DC voltages are fused at 3 amps. Closing the AC switch supplies voltage to the primary of the power supply transformer. This transformer has two secondaries. One is 12 volts, the second is 48 volts. The voltage on the 48 volt secondary is rectified, filtered and applied to section one of the DC switch. The 12 volts secondary is connected to position two of the DC switch. It is important to note at this point, that the voltages present at the DC switch is not instantaneous with the closing of the AC switch. The action of the secondaries and the filter network will tend to delay this voltage buildup. It is imperative that the voltage at this point be present the instant the DC switch is closed in order to set the ring control to its proper position. If the 48 volts is allowed to build up gradually, the circuit design for setting the ring control will be defeated. This will become quite evident when the ring and switch assembly is discussed later. The proper turn-on sequence of the OLSA-T is the AC Switch on first and then the DC Switch.

By choosing the proper adaptor box, a variety of printers can be operated by the OLSA-T. The operations described in this manual will refer to the more commonly used negative polarity 1052 type printer. Since the operation of the OLSA-T is relatively the same for all printers, only the exceptions will be discussed separately.

When operating a positive polarity printer, it should be remembered that the diodes and SCR connections are reversed. The operation, with that exception, is identical. There are two SCR's for each magnet to be selected. One is connected for negative polarity and the other for positive polarity. Both will receive gating pulses at the same time and the polarity of the printer will determine which one conducts.

Only one turn-on and turn-off SCR is used. They are electrically reversed in the circuit by the adaptor box being used.

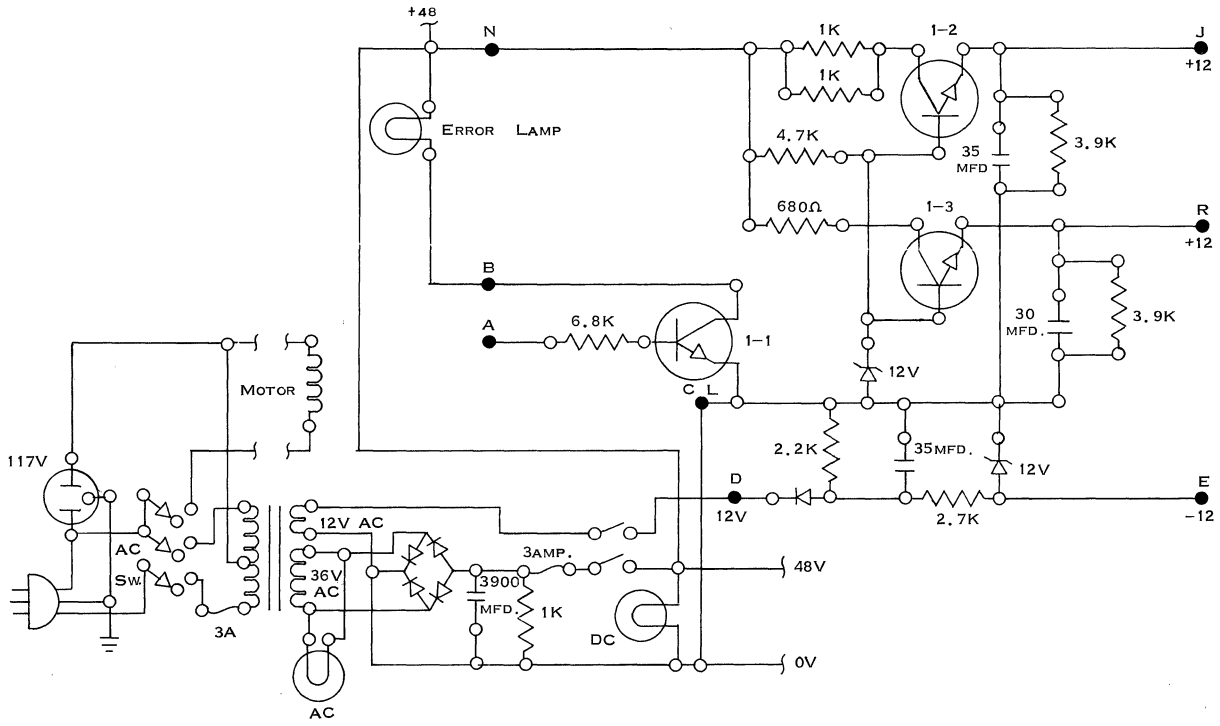


Figure 6-1. Power Supply

Power Supply

- Supplies +48V, +12V, -12V D.C. and 115V A.C.

Card 1 (SMS Type) contain three supplemental power supplies. These are two series regulated plus 12 volt and one shunt regulated minus 12 volt supplies. When the DC switch is closed, 12 volts AC is applied to Pin D. This voltage is rectified by the diode and filtered by the 2.2K resistor and the 35 microfarad capacitor. The 2.7K resistor in the output and the zener diode regulates the voltage at 12 volts. At Pin E (Supply C) there appears a regulated -12 volts at 300 micro-amps. When +48 volts is applied to Pin N, drive is applied to the base of the two transistors supplying +12 volt outputs. The zener diode in this circuit limits the amount of drive on the base of these transistors. The values of the resistors and capacitors in this circuit are chosen to operate the transistors in saturation when the supplies are delivering their rated outputs. At Pin J (Supply A) is a regulated +12 volts at 60 milli-amps. At Pin R (Supply B) is a regulated +12 volts at 40 milli-amps. By operating the transistors in saturation, the wattage and consequently the heat dissipated are kept to a minimum.

Start-Stop Circuit

- Controls continuous or single operation.
- Controlled by parity turn on and turn off and feedback contacts.
- Produces step pulses to ring.
- Provides gating pulses to turn on and turn off SCR.
- The 5-millisecond masking is adjustable by the 80K potentiometer in the emitter circuit of unijunction 2-2.

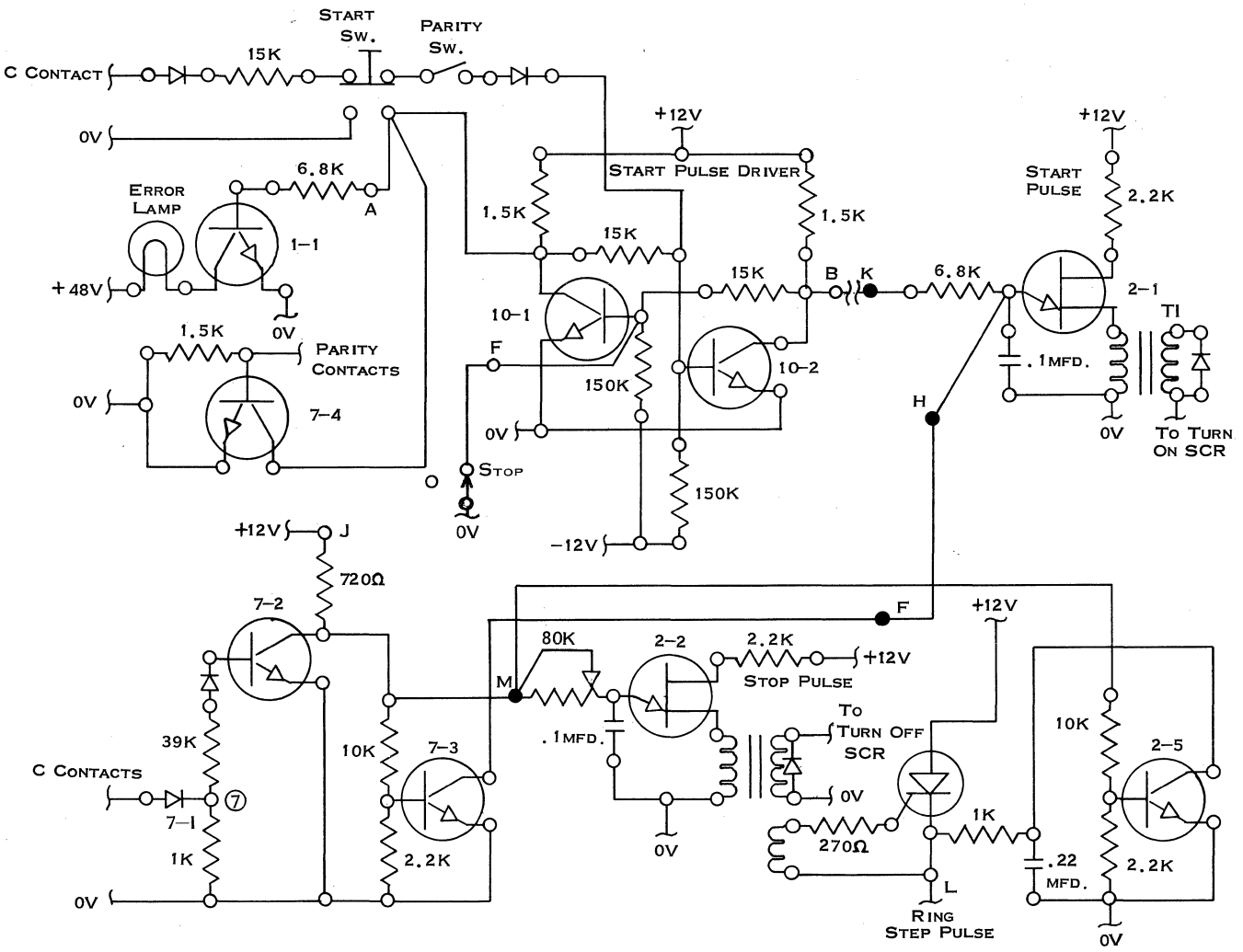


Figure 6-2. Start-Stop Circuit

Turn on the AC, DC and Motor Switches. This supplies operating voltages for the OLSA and to the printer.

The stop-run switch is a double pole, single throw switch. With the stop-run switch in stop position, 0 volts is applied to Pin F of Card 10 and to the base of transistor 10-1. Since 0 voltage will not condition the base of this transistor, it will not conduct, and +12 volts will appear at the collector. This positive 12 volts conditions the base of transistor 10-2 causing it to conduct, and its collector voltage drops to 0 volts. The +12 volts at the collector of transistor 10-1 is also applied to Pin D of Card 10, the normally open contacts of the start switch (as a tie point) to Pin A of Card 1, through the 6.8K resistor and to the base of transistor 1-1. This conditions this transistor and it conducts, turning on the error lamp. The OLSA is now in a stop mode. In this condition the OLSA will start with the depression of the start button but will only run as long as the start button is held down.

With the Start Switch depressed, 0 volts is applied to the base of transistor 1-1 on Card 1. This cuts the transistor off and turns off the error lamp. The 0 volts is also applied through the start switch to the collector of transistor 10-1 on Card 10, pulling the collector voltage to 0 volts. This negative shift in voltage is coupled to the base of transistor 10-2 cutting it off. As transistor 10-2 stops conducting, its collector voltage returns to +12 volts. This voltage is applied to Pin B of Card 10, Pin K of Card 2, through the 6.8K resistor, to the emitter of the start pulse unijunction and starts charging the .1 mfd. capacitor. As the charge on the capacitor reaches approximately .6 of the base 2 voltage supply, the unijunction conducts. The .1 mfd. capacitor now discharges through the emitter and base 1 circuit into the primary of transformer T1. This voltage is transformer coupled to the gate of the turn-on SCR. The frequency of

the output pulses in this circuit is determined by the RC network of the 6.8K resistor and the .1 mfd. capacitor in the emitter circuit. The turn on SCR continues to receive gating pulses as long as an input is applied to the emitter of the start pulse unijunction. The turn-on SCR will be discussed later under Print and Function.

When the Start Button is released, 0 volts is removed from the collector of transistor 10-1 and since the base is still at 0 volts through the stop switch, the transistor is turned off. The +12 volts that now appear at the collector of transistor 10-1 is also present at the base of transistor 1-1 on Card 1. This transistor conducts, turning on the error lamp. The plus voltage is also coupled to the base of transistor 10-2 turning it on. As Transistor 10-2 conducts, the collector voltage goes to 0 V. This removes the drive from the emitter of the start pulse unijunction, turning it off. The OLSA is again in a stop mode.

With the Stop-Run Switch in the run position, the depression of the Start Switch is still required to start the OLSA. When the start switch is depressed, 0 volts is applied to the base of transistor 1-1 on Card 1. This cuts the transistor off and the error lamp goes out. The 0 volts is also applied to the collector of transistor 10-1 and to the base of transistor 10-2 on Card 10. With 0 volts on the base of transistor 10-2, it cannot conduct and the collector voltage is +12 volts. This +12 volts is coupled to the base of transistor 10-1, conditioning it. When the start switch is released, the external path for the collector voltage of transistor 10-1 is removed, and the transistor conducts. With this transistor in conduction, the collector voltage remains at 0 volts and holds transistor 10-2 cut-off. The positive voltage at the collector of transistor 10-2 is applied to the emitter circuit of the start pulse unijunction transistor. As previously explained, the RC network charges the emitter to approximately .6 of the base 2 voltage, and the transistor conducts. The output pulses are transformer coupled to the gate of the turn-on SCR. This circuit will continue to emit pulses until the Stop-Run Switch is returned to the Stop position or until the feedback circuits turn it off. The feedback circuits will be discussed later in this manual under the heading of Print. As the Stop-Run Switch is returned to the stop position, 0 volts is applied to the base of transistor 10-1 and cuts it off. As the transistor stops conducting, the collector voltage returns to +12 volts. This plus voltage is coupled to the base of transistor 1-1 on Card 1. The transistor conducts, turning the error lamp on. The +12 volts on the collector of transistor 10-1 is also coupled to the base of transistor 10-2. This conditions the transistor and turns it on, pulling the collector voltage to 0 volts. This 0 volts removes the drive from the emitter circuit of transistor 2-1, the start-pulse unijunction, and turns it off.

With the OLSA turned on and before the printer starts cycling, the C contacts are closed, supplying +48 volts to adaptor box connection A20. This voltage is coupled through a 5.6K resistor, A2, A3, Pin R of Card 7, diode 7-1, test point 7 of Card 7, through a voltage divider network and conditions the base of transistor 7-2. The transistor conducts and pulls the collector voltage to approximately 0 volts. This 0 voltage is reflected from the collector of transistor 7-2 to Pin H of Card 7, to the off position of VPG Switch, to the ring control switch, and is applied to both the base of transistor 7-3 on Card 7 and to the emitter of the stop pulse unijunction transistor. In this condition, the two units are unable to conduct and the OLSA is in condition to operate upon the depression of the start button. Depression of the Start button, as previously described, conditions the start pulse unijunction transistor and pulses are developed to gate the turn-on SCR. When the turn-on SCR fires, the printer starts to cycle. Early in the printer cycle the C contact opens. This removes the +48 volt applied to Pin A20 and the drive on the base of transistor 7-2 on Card 7. This cuts the transistor off and the collector voltage returns to +12 volts. The +12 volts is applied through the VPG switch, ring control switch, Pin Q of Card 7, to the base of transistor 7-3. The voltage applied to the collector of transistor 7-3 is the same voltage used to drive the emitter of the start pulse unijunction transistor. Transistor 7-3 conducts, grounding the emitter of the start pulse unijunction transistor, cutting it off. The collector voltage of transistor 7-2 is also applied to the VPG switch, ring control switch, Pin M of Card 2, through the 80K potentiometer

in the emitter of the stop pulse unijunction transistor. The .1 mfd. capacitor starts charging in the same manner as the one in the emitter circuit of the start pulse unijunction. As it charges to approximately .6 of the base 2 voltage, the unijunction conducts and the capacitor discharges through the emitter and base 1 circuit. The transformer in the output of this circuit has two secondaries. One secdary is connected to the gate of the turn-off SCR, gating it. The other secondary couples the output to the gate of SCR 2-1 and to the collector of transistor 2-5. Since the base of transistor 2-5 has been conditioned by the same voltage applied to the emitter circuit of the stop pulse unijunction, transistor 2-5 conducts. This completes the cathode circuit of SCR 2-1 and it fires. This causes the voltage at point L to rise sharply to approximately +12 volts. This voltage shift is capacitor coupled to the step input to the ring and switch assembly, causing it to step. It should be noted at this point that early in the printer cycle, the OLSA has stepped the ring one position and is ready to perform the next operation.

Later in the printer cycle, the C contacts remake, and apply +48 volts again to point A20. This conditions the base of transistor 7-2 and it conducts. The collector voltage of transsistor 7-2 goes to 0 volts, removing the drive from the base of transistor 7-3, cutting it off. When transistor 7-3 cuts off, it removes the ground to the emitter of the start pulse unijunction transistor, turning it on. With transistor 7-2 in conduction, the drive is removed from the emitter circuit of the stop pulse unijunction transistor and to the base of transistor 2-5 on Card 2, cutting them off. This interrupts the circuit for SCR 2-1 and it cuts off.

Now let us assume that the parity switch is on during a print operation. Early in the printer cycle C-1 contact transfers. Voltage is applied to the diode matrix, two 15K resistors, the start switch, parity switch and conditions the base of transistor 10-2 on Card 10. The transistor conducts and the collector voltage goes to 0 volts. This removes the drive from the emitter circuit of the start pulse unijunction and the base of transistor 10-1 on card 10. With transistor 10-1 cut off, the collector voltage goes to +12 volts. This applies collector voltage to transistor 7-4 on Card 7 and drive to the base of transistor 1-1 on Card 1, turning on the error lamp.

If parity is obtained, positive voltage is applied to Pin E of Card 7 and to the base of transistor 7-4. With transistor 7-4 conducting, the collector of transistor 10-1 goes to 0 volts. The drive is removed from the base of transistor 1-1 and 10-2, turning them off. With transistor 10-2 cut off, the collector voltage returns to +12 volts and supplies drive to the base of transistor 10-1 and the emitter circuit of the start pulse unijunction. Transistor 1-1 cuts off, turning the error lamp out.

If parity had not been obtained, transistor 7-4 would not have conducted and the OLSA would have stopped with the error lamp on. It should be noted at this point that the error lamp will be turned off and on during each print operation when checking odd bit parity. The error lamp will come on only if an error is indicated, when checking even bit parity, and will stay on.

Ring and Switch Assembly

- Controls sequential operation.
- Steps with pulses from the stop pulse circuit.
- Requires one of the ring lights on to operate.
- Portions of the ring can be omitted by depressing the skip switches.

In order to operate the printer successfully, we not only need a means of controlling which print or function will occur, we also need a method of preventing more than one occurring at the same time.

When the AC and DC switches are turned on, +48 volts is applied thru a 100 ohm resistor, to lamps A, B, C and D of the ring. The voltage applied to lamp A is coupled to the gate of the SCR by the 330 mmfd. capacitor. This gates the SCR and it fires. When the SCR fires, it completes ground to lamp A and it comes on. Since an SCR in conduction represents very low resistance, almost all the voltage is dropped across lamp A. Approximately one volt appears at the anode of the SCR. SCR's B, C and D have not received a gating pulse so they will remain off. The anode voltage of each SCR is connected through a resistor to the cathode of their respective diodes. These diodes

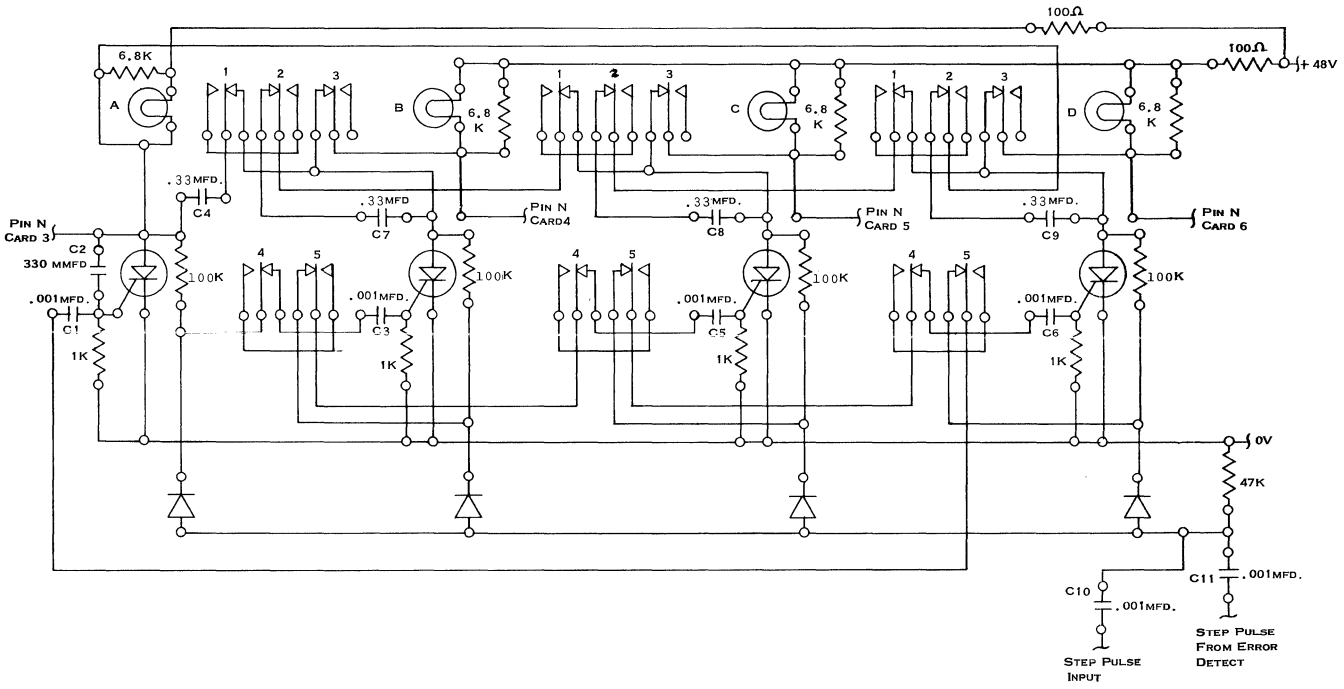


Figure 6-3. Ring and Switch Assembly

are now reverse biased. Diode A with +1 volt and diode B, C and D with +48 volts. These diodes are used to receive pulses of approximately +10 volts to step the ring. Since diode B, C and D are reverse biased with +48 volts, a +10 volt pulse on the anode will not be sufficient to overcome it. Diode A is reverse biased with only one volt and the +10 volt pulse on the anode will be coupled to the gate of B SCR through Skip B switch and capacitor 3. This provides sufficient gate to the SCR and it fires, turning on lamp "B". The anode voltage of "B" SCR drops to approximately +1 volt. This 47 volt negative shift in voltage is coupled to the anode of "A" SCR. The negative 47 volts algebraically adds to the +1 volt and drives the anode to a -46 volts. This cuts the SCR off and turns lamp "A" out. The anode voltage on "A" SCR returns to +48 volts. The rise in voltage is not rapid enough to couple through the 330 mmfd. capacitor (C2) to gate the SCR and lamp "A" remains off.

With lamp "B" on, B diode is reverse biased with approximately +1 volt and diodes A, C and D are reverse biased with +48 volts. The next stepping pulse overcomes the +1 volt reverse bias of diode B and gates "C" SCR, turning it on. This places diode C in a reverse biased condition with approximately +1 volt and diodes A, B and D with +48 volts. This process repeats itself on each succeeding step pulse. The voltage present at the anode of these SCR's is used to control the output of their respective matrix card. The matrix card operation will be discussed later under Print.

It may be desirable, while operating the OLSA, to skip portions of the ring and consequently the function or print that is controlled by that portion. This can be accomplished by depressing Skip B, Skip C and/or Skip D switches.

Assume for a moment that lamp "A" is lit and Skip B, Skip C and Skip D switches are normal. A step pulse is applied to the anode of diodes A, B, C and D. Diode A will conduct and the pulse will be applied through Skip B N/C contacts, to capacitor 3 and to the gate of "B" SCR. This steps the ring from A to B as previously explained. Now assume that Skip B switch is depressed. The path for the gating pulse at diode A is: to the O/P of section 4 on Skip B switch, through the N/O to the N/O contact of section 5, through

the O/P to the O/P of section 4 of Skip C switch, through the N/C to capacitor C5 and to the gate of "C" SCR. The SCR fires and the anode voltage drops to approximately +1 volt. This negative shift in voltage is coupled to section 1 of Skip C switch N/C, through the O/P to section 2 of the Skip B switch O/P, through the N/O to the N/O of section 1, through the O/P and capacitor 4 to the anode of "A" SCR. This negative shift in voltage cuts off "A" SCR and turns lamp "A" off. We have stepped the ring from A to C by skipping B. Assume now that Skip B and Skip C switches are depressed. The path for the stepping pulse at diode A is Skip B section 4 N/O, Skip B section 5 N/O, Skip C section 4 N/O, Skip C section 5 N/O, Skip D section 4 N/C, capacitor 6 and to the gate of "D" SCR. The SCR fires and the anode voltage drops to approximately +1 volt, turning lamp "D" on. This negative shift in voltage at the anode of D is coupled through section 1 N/C of Skip D, section 2 N/O Skip C, section 1 N/O Skip C, section 2 N/O Skip B, section 1 N/O Skip B, through capacitor 4, to the anode of "A" SCR, cutting it off. We have now stepped the ring from A to D by skipping B and C.

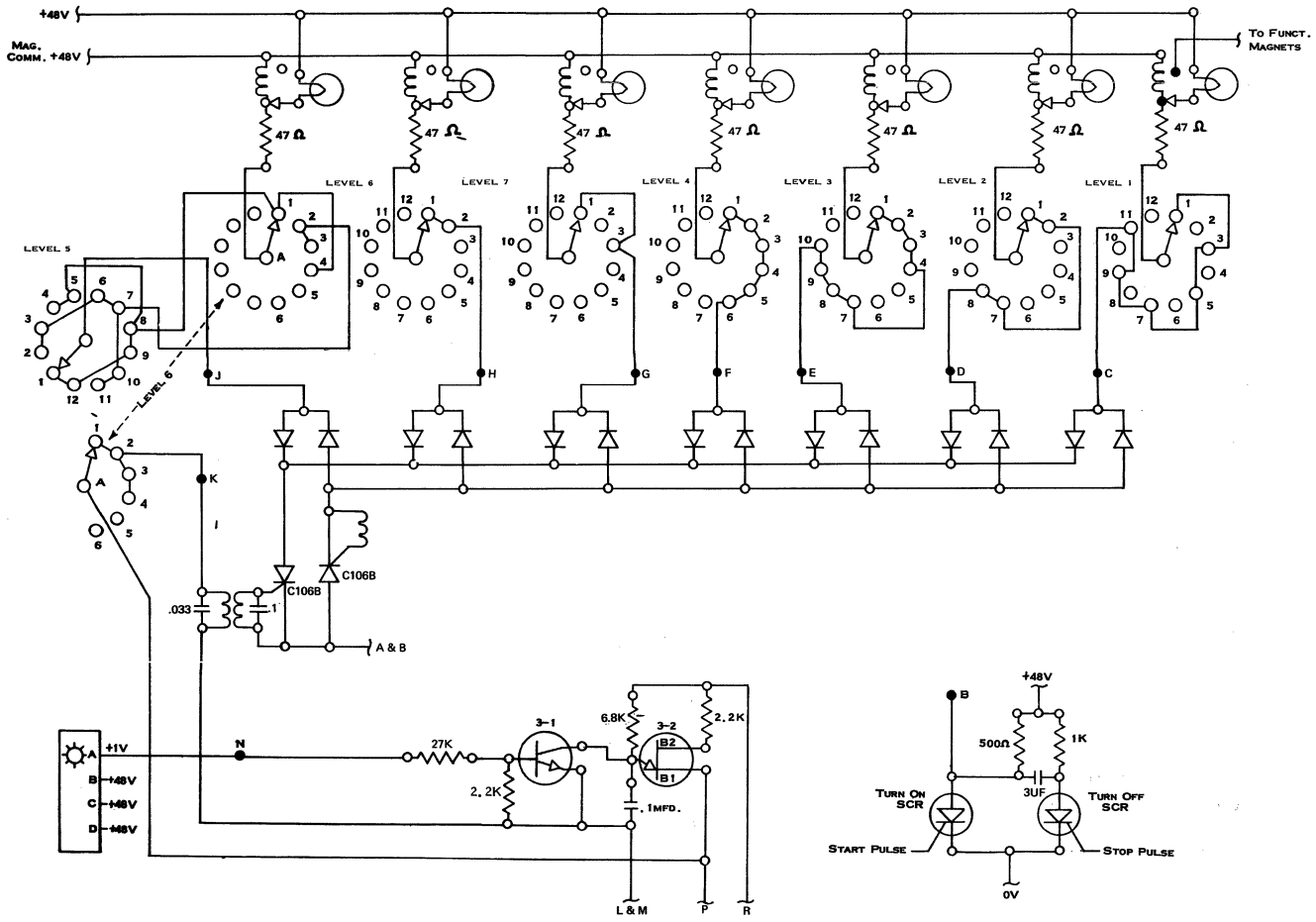


Figure 6-4. Print

Print

- The TRF switches must be selecting a character for print.
- Excessive bounce of feedback contacts will step control ring.
- Print is started by the print matrix, Turn-on and Turn-off SCR's and the control ring.

Assume now that the AC, DC and Motor Switches on the OLSA are turned on. Ring light "A" is on. As previously explained, the voltage present at the anode of the SCR in the ring, when the lamp is lit, is +1 volt. The voltage present at the other anodes is +48 volts.

The +1 volt at ring position "A" will not condition transistor 3-1 and it remains cut off. A +12 volts is applied to base 2 and to the emitter of unijunction 3-2. As the capacitor in the emitter circuit charges to approximately .6 of the base 2 voltage, the unijunction conducts. The capacitor discharges through the emitter and base 1 circuit until the voltage drops below that required to sustain conduction, and the unijunction turns off. The capacitor recharges to approximately .6 of the base 2 voltage, and the unijunction conducts again. The output pulse is developed in the base 1 circuit and coupled through a section of the tilt switch for ring "A" and to the primary of the print transformer. The print transformer on each matrix card contains one primary and eight secondaries. This transformer couples gating pulses to all the print SCR's on Card 3.

If a sufficient positive voltage was applied to the base of transistor 3-1, it would conduct and ground the emitter of unijunction 3-2, cutting it off. The output voltage of ring positions B, C and D is +48 volts. This voltage is applied to the base of the transistors on their respective matrix cards. The transistors conduct, grounding the emitter of the unijunctions. Gating pulses cannot be produced for matrix cards 4, 5, or 6.

The tilt and rotate switch for ring position "A" (Figure 6-4) are set for tilt 3 and negative 5 rotate. Plus 48 volts is applied through the print magnet coils, to the respective tilt or rotate switches and to the anode of the print SCR's. Although at this time they are receiving gating pulses, the turn-on SCR must fire before the circuit is complete and the magnets can be picked.

Notice that the operational lamps are connected in parallel with the print magnets. When the ground is completed to pick a magnet, the lamp will light. Level 6 of the tilt switch has two sections. One section controls the selection of the tilt 2 magnets and the other section controls the selection of print or function. When this switch is in positions 1, 2, 3 or 4, the unijunction's base 1 circuit is complete and the print SCR's will be gated. When the switch is in position 5 or 6, the base 1 circuit is completed through the function transformers. The function SCR's and transformers will be discussed later.

As previously discussed, by turning the stop/run switch to run and depressing the start button, the start circuit is conditioned and output pulses are coupled to the gate of the turn-on SCR. The turn-on SCR fires, completing the path from magnet common, through the print magnet, the tilt or rotate switch, the print SCR's to 0 volts. The print magnets are energized, the lamps light and the printer starts to cycle. With the turn-on SCR conducting, the anode voltage is approximately +1 volt, while the anode voltage on the turn-off SCR is +48 volts. The capacitor connecting the two anodes is charged to this same potential. Early in the printer cycle, the C contacts transfer, turning off the start pulse unijunction and turning on the stop pulse unijunction. With the turn-off SCR gated, it fires and the anode voltage drops to approximately +1 volt. This represents a voltage shift in the negative direction of 47 volts. Since any voltage change on one side of a capacitor is induced on the other side, the anode of the turn-on SCR is pulled to a -46 volts, cutting it off. It should be noted at this time that since capacitor action is required to turn off the turn-on SCR, if the turn-off SCR fires before the capacitor can charge to a sufficient value, the turn-on SCR will remain on. This condition can occur as a result of a very badly adjusted feedback contact. The OLSA will lock in a ring position and continue operating the printer until the DC switch is turned off. Moving the stop/run to stop will not stop the printer.

Late in the printer cycle the feedback contact transfers, applying voltage through the print magnet to the anode of the turn-on SCR. The stop pulse unijunction is cut off and the start pulse unijunction is turned on. This gates the turn-on SCR and it fires, pulling the anode voltage to approximately +1 volt. The same capacitor action used to turn off the turn-on SCR is now used to turn off the turn-off SCR.

This process is repeated until the stop-run switch is turned to stop.

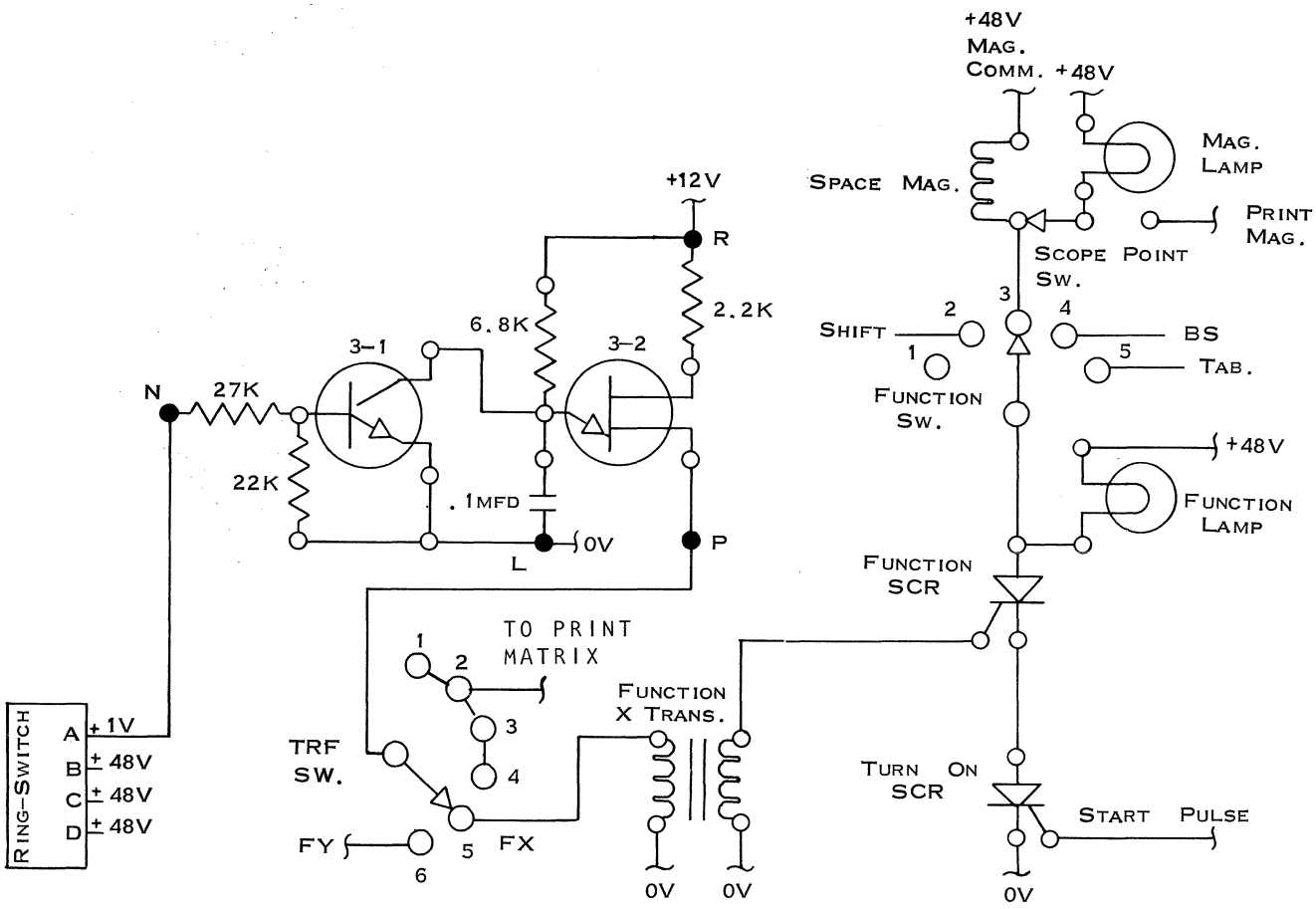


Figure 6-5. Space

Space

- Tilt switch must be selecting FX or FY.
- Function switch must be selecting space.
- Tab, B. S. and C. R. operation is identical to space.

With ring light "A" on, the +1 volt on the anode of the SCR is applied to the base of transistor 3-1. This does not condition the transistor and allows the capacitor in the emitter circuit of unijunction 3-2 to charge. The +48 volts from ring positions B,C and D inhibit their respective matrix pulse emitters.

With the TRF switch in position 5, the print matrix is deactivated and the output pulses from unijunction 3-2 are developed across the primary of the function X transformer. These pulses are transformer coupled to the gate of the function SCR.

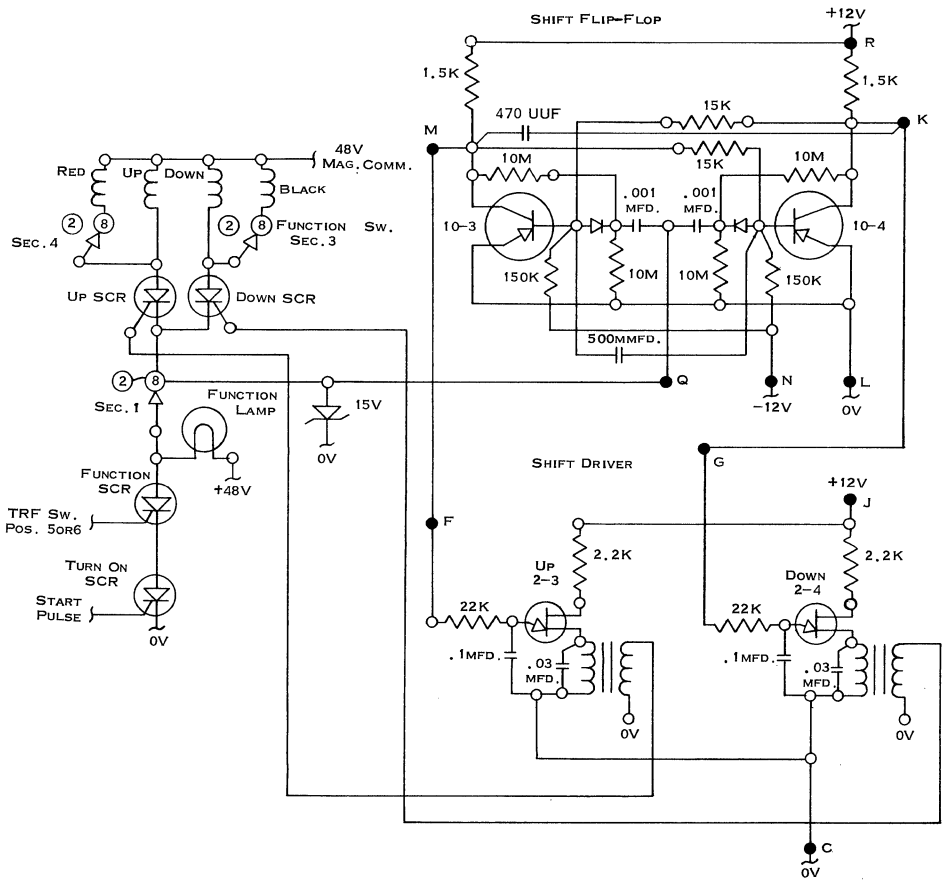
With the function switch in position 3, the space magnet is selected. The +48 volts is complete to the space magnet, through the function switch to the anode of the function SCR. With the depression of the start button, the start pulse unijunction conducts, providing gating pulses to the turn-on SCR. The turn-on SCR fires, completing the circuit to energize the space magnet and the printer starts to cycle. Early in the printer cycle the feedback contacts transfer. This inhibits the start pulse circuit and conditions the stop pulse circuit. With gating pulses on the turn-off SCR, it fires, turning off the turn-on SCR. This breaks the circuit to the space magnet and it drops out.

When the stop pulse unijunction conducts, a step pulse is developed and applied to the input of the ring and switch assembly. Assume the ring control switch is in the "Hold" position and the ring does not step.

Although gating pulses are still being applied to the gate of the func-

tion SCR, the circuit is not complete to pick the space magnet again until the turn-on SCR fires. Late in the printer cycle the feedback contacts return to normal, removing emitter drive from the stop pulse circuit and removing the inhibit from the start pulse circuit. With the pulses re-established to the gate of the turn-on SCR, it fires, completing the circuit and the space magnet picks again. This process repeats itself until the stop-run switch is moved to stop, turning the turn-on SCR off or until the ring and switch assembly steps to B, removing gating pulses from the function SCR. The gating pulses to the function SCR can be removed by moving the TRF switch away from position 5. The space magnet circuit can be opened by moving the function switch away from position 3.

The operation of backspace, tab and carrier return are identical to that of space except for the delay required for tab and carrier return when operated with VPG. This will become quite apparent when VPG is discussed later.



Figures 6-6. Shift

Shift

- One of the shift pulse drivers is conducting anytime power is turned on.
- With FX switch selecting shift and FY switch selecting Red Ribbon, both functions will produce Red Ribbon Shift.
- Red Ribbon will not operate the ribbon mechanism on a printer that uses one magnet.

The gating pulses on the shift-up and shift-down SCR's are controlled by the shift driver circuit on card 2. The control for these drivers is provided by a bistable flip-flop circuit on card 10. When OLSA power is turned on, one of the transistors in the flip-flop circuit will start conducting. The one that will start conducting first will

depend entirely on the characteristics of the transistor and the tolerance of the resistors feeding it. Assume that transistor 10-3 starts conducting and its anode voltage drops to 0 volts. This 0 voltage is coupled to the base of transistor 10-4, cutting it off, and to the emitter circuit of the up-shift driver on card 2. Since a plus voltage is required to condition the emitter, unijunction 2-3 will remain off. With transistor 10-4 cut off, +12 volt collector voltage is coupled to the base of transistor 10-3, holding it on, and to the emitter of the down-shift driver and starts charging the capacitor. As the capacitor charges to approximately .6 of the base 2 voltage, the unijunction conducts and the capacitor discharges through the emitter and base 1 circuit. As the capacitor charge drops below the value required to sustain conduction, the transistor cuts off. The pulses developed in this circuit are transformer coupled to the gate of the down-shift SCR. It can be seen then that with power turned on in the OLSA, one of the shift drivers is emitting pulses and gating its respective SCR.

The up-shift and down-shift magnets are connected directly to the anode of their respective SCR's. With the function switch in position 8, the red ribbon magnet is placed in parallel with the up-shift magnet and the black ribbon magnet is placed in parallel with the down-shift magnet. Section 1 of the function switch connects the cathode of the shift SCR's to the anode of the function SCR in position 8 or position 2. By moving the function switch to position 2 it can be seen that the ribbon magnets are switched out of the circuit.

With the TRF switch in position 5 or 6 (function X or function Y) the output of a pulse generator will supply gating pulses to the gate of the function SCR.

When the start switch is depressed, the start pulse oscillator applies gating pulses to the gate of the turn-on SCR. When the turn-on SCR fires, the circuit is complete and the down-shift magnet is picked. If the function switch is in position 8, the black ribbon magnet is picked at the same time. The positive voltage that was present at position 8 section 1 of the function switch and on the binary input to the shift flip-flop, pin Q of card 10, drops sharply negative. This pulls the base of transistor 10-3 and the collector of transistor 10-4 negative. Transistor 10-3 is cut off and its collector voltage rises to +12 volts. The positive voltage on the collector of transistor 10-3 conditions the base of transistor 10-4 and it conducts. The 0 voltage on the collector of transistor 10-4 maintains transistor 10-3 in a cut-off condition. With the shift flip-flop in this state, the 0 volts at the collector of transistor 10-4 is applied to the emitter circuit of the down-shift driver, cutting it off. The +12 volts at the collector of transistor 10-3 conditions the up-shift driver and gating pulses are now applied to the gate of the up-shift SCR.

It should be noted at this time, that when OLSA power is turned on, the shift flip-flop could condition either of the shift driver circuits depending upon which transistor started conducting first. In this example the down-shift magnet was energized. If the printer being operated was in a down-shift condition, the shift mechanism would not have been operated. The OLSA would not have received feedback and would stop with the lower case magnet picked. All that is necessary at this point is to depress the manual carrier return button. This provides the necessary feedback to change the state of the shift flip-flop and to get a restart of the OLSA.

Variable Pulse Generator (VPG)

- Provides feedback for open end printers.
- Controls the speed of the printer.
- Deactivates the error detect circuit.

When OLSA power is turned on, all the voltages necessary for the VPG to operate are present with the exception of the common line, which as we see, is completed when the VPG switch is closed. When the VPG switch is closed, one of the transistors, 9-1 or 9-2, will start conducting. For this discussion, let's assume that 9-1 starts conducting first. With transistor 9-1 conducting the collector voltage drops to 0 volts and cuts transistor 9-2 off. The +12 volts appearing at the collector of transistor 9-2 is coupled through the rate control, to the emitter of unijunction transistor 8-2 and starts charging the capacitors. As the capacitors charge to approximately .6 of the base 2 voltage, the unijunction

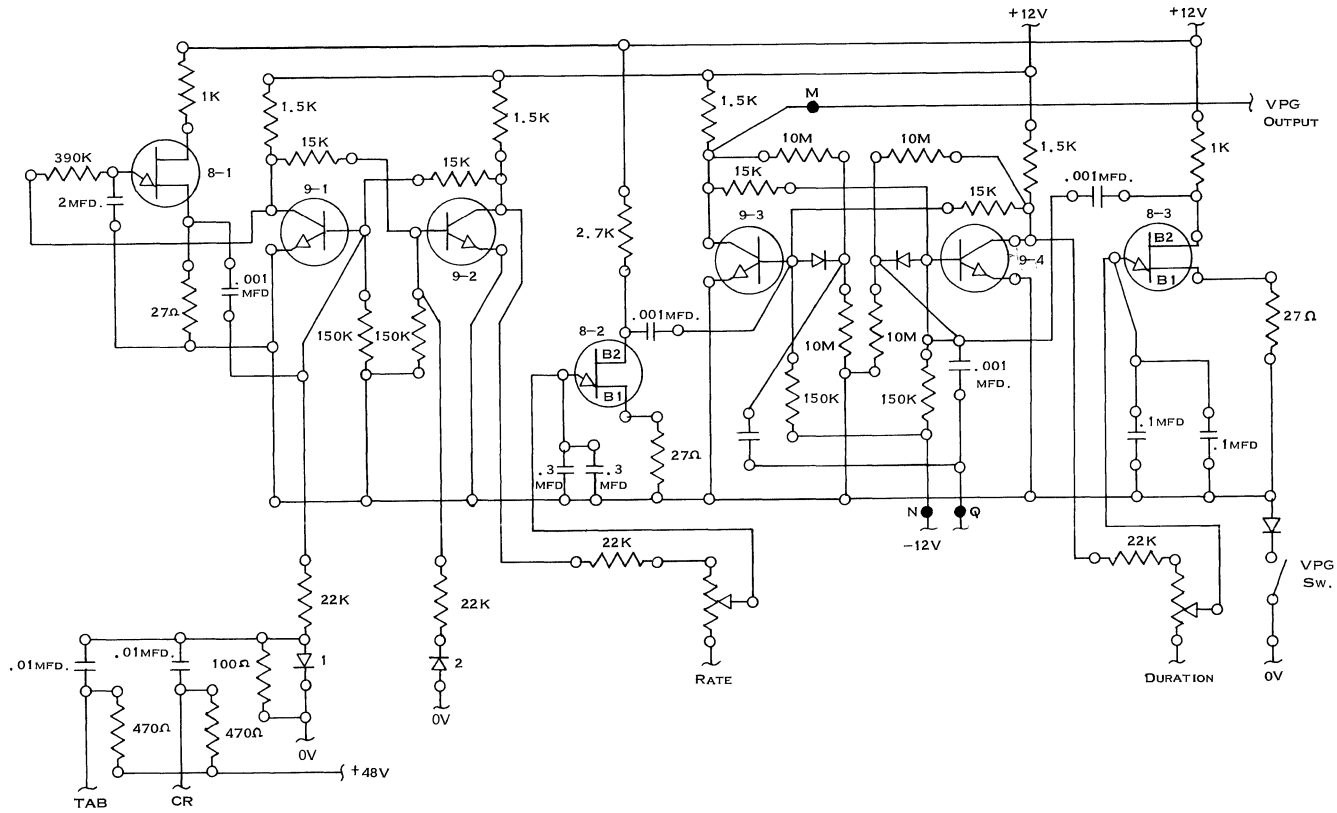


Figure 6-7. Variable Pulse Generator

conducts and the capacitor discharges through the emitter and base 1 circuit. As the charge on the capacitor falls below the value required to sustain conduction, the unijunction cuts off and the capacitor begins to charge again. The voltage of base 2 drops to approximately 0 volts when the unijunction conducts and back to +12 volts when the unijunction cuts off. This voltage is coupled through the .001 mfd capacitor to the base of transistor 9-3, turning it on. The collector voltage of transistor 9-3 drops to 0 volts and cuts off transistor 9-4. The +12 volts on the collector of transistor 9-4 is coupled through the duration control to the emitter circuit of unijunction 8-3 and starts charging the capacitors. As the capacitors in the emitter circuit charge to approximately .6 of the base 2 voltage, unijunction 8-3 conducts and the capacitors discharge through the emitter and base 1 circuit. As the capacitors discharge to a level below that required to sustain conduction, the unijunction cuts off. The pulse developed in the base 2 circuit is coupled through the .001 mfd capacitor to the base of transistor 9-4, turning it on. When transistor 9-4 turns on, the collector voltage drops to 0 volts and turns transistor 9-3 off.

By varying the resistance in the emitter circuit of the rate and duration unijunction transistors, the charging time of the capacitors can be varied.

It should be noted that varying the duration control will control the length of time that transistor 9-3 will conduct but will not affect the frequency of turn-on pulses it receives from unijunction 8-2. It should also be noted that the frequency of pulses emitted from unijunction 8-2 controls the frequency that transistor 9-3 is turned on but has no effect upon the amount of time that the transistor conducts. VPG output is taken from the collector of transistor 9-3.

Since the VPG output takes the place of the feedback contacts, we must have a means of controlling the output during a tab or carrier return operation to prevent another operation until these functions are complete. This is accomplished by coupling the pulse applied to the tab or carrier return magnet, through a .01 capacitor, to the base of transistor 9-1. As we know, by applying a pulse to a capacitor we have both a positive and a negative reaction on the other side. The diode in this illustration shunts out the positive portion of this pulse and only the neg-

ative is reflected to the base of transistor 9-1, cutting it off. If we were operating a positive polarity machine, the adaptor box connections would remove diode 1 from the circuit and insert diode number 2. This diode would shunt out the negative portion of the pulse and apply the positive portion to the base of transistor 9-2, turning it on. As we can see, in either case, the collector voltage of 9-2 drops to 0 volts and cuts off the supply to the emitter circuit of unijunction 8-2. As transistor 9-1 cuts off, the collector voltage rises to +12 volts and starts charging the capacitor in the emitter circuit of unijunction 8-1. The values of the capacitor and resistor in the emitter circuit of unijunction 8-1 require approximately 800 milliseconds to cause the unijunction to conduct. When unijunction 8-1 conducts the voltage appearing at base 1 will be positive due to the voltage divider network of the base 1 and base 2 resistors. This positive voltage is coupled to the base of transistor 9-1 and it turns on. When transistor 9-1 turns on, the collector voltage drops to 0 volts, cutting transistor 9-2 off. With transistor 9-2 off, the collector voltage returns to +12 volts and again conditions the emitter circuit of unijunction 8-2. The delay required for a tab or carrier return has been accomplished and the pulses from the VPG have been resumed.

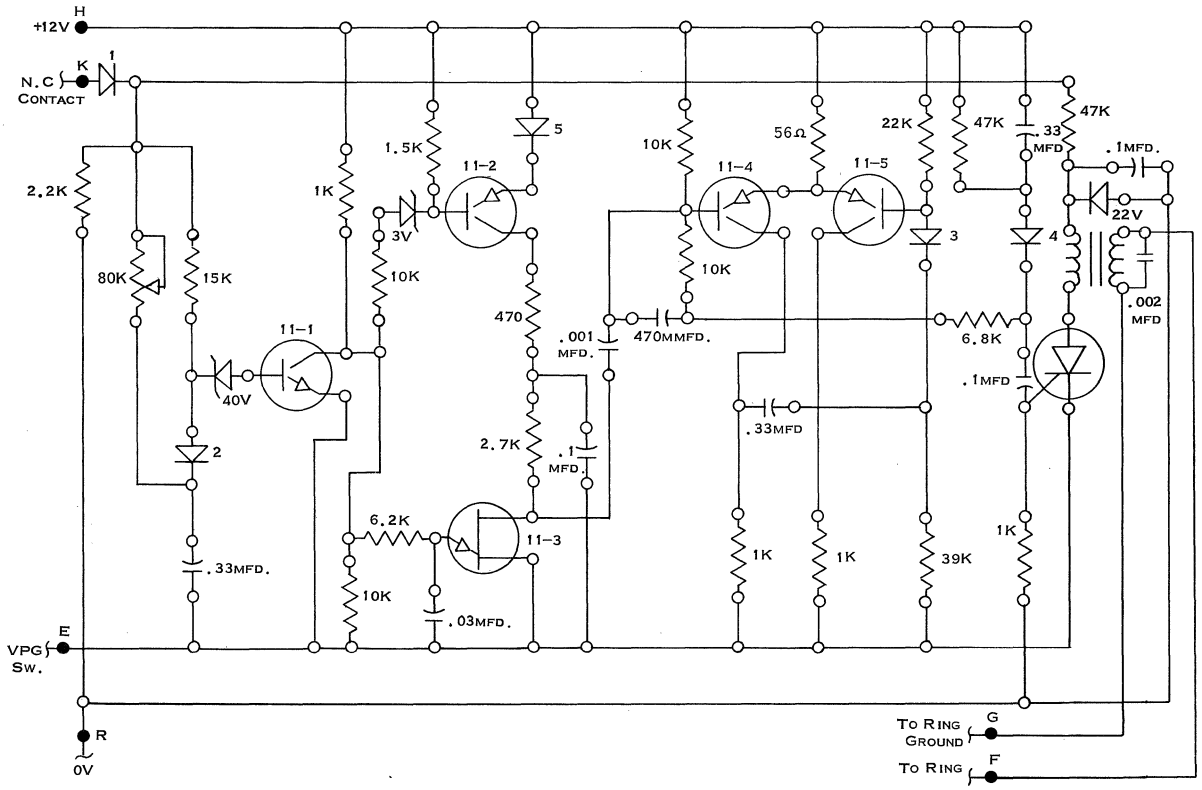


Figure 6-8. Error Detect

Error Detect Circuit

- Detects bounce in excess of 5 millisecond and discontinuity in excess of 200 microsecond in the feedback contacts.
- Produces a step pulse to the control ring if an error is detected.
- The 5-millisecond masking is adjustable by the 80K potentiometer in the base circuit of transistor 11-1.

This circuit is designed to detect contact bounce in excess of 5 milliseconds and a discontinuity in excess of 200 microseconds during the time that the contact is closed. If such an error is detected, the output pulse produced from this circuit is applied to the ring control and steps it one position.

The result will be the loss of a character or function during print-out.

When the feedback contact closes, +48 volts is applied to Pin K of card 11, a diode, a 27K and a 15K resistor in parallel, and starts charging the .33 mfd capacitor. As the capacitor charges above approximately +40 volts, the breakdown voltage of the 40 volt zener diode, the base of transistor 11-1 is conditioned and it conducts. With transistor 11-1 in conduction, the voltage difference across the 3 volt zener diode exceeds its rating and produces base current in transistor 11-2. Transistor 11-2 conducts and charges the .1 mfd capacitor in its collector circuit.

Now let's assume that the voltage drop appears at Pin K due to contact bounce or discontinuity. If this voltage drops below +40 volts, the 40 volt zener stops conducting and removes the drive from the base of transistor 11-1. With transistor 11-1 cut off, the +12 volt collector voltage is applied to the emitter circuit of unijunction 11-3, and starts charging the .03 capacitor. If this voltage is applied for the time required to charge the capacitor to .6 of the base 2 voltage (approximately 200 microseconds), the unijunction will start conducting. With transistor 11-1 cut off, the voltage difference across the 3 volt zener diode drops below its breakdown voltage and removes the drive from the base of transistor 11-2, cutting it off. The charge buildup on the .1 mfd capacitor while 11-2 was conducting, now supplies the drive for base 2 of unijunction transistor 11-3. Unijunction 11-3 conducts until the charge on the .03 mfd capacitor in its emitter circuit drops below the value required to sustain conduction and it cuts off. The .03 mfd capacitor charges again and the unijunction conducts. Each time unijunction 11-3 conducts, some of the charge on the .1 mfd capacitor in its base 2 circuit is reduced and the output of this circuit is a series of diminishing negative pulses. At this time, due to the voltage divider action between the 22K and the 39K resistor in the base of transistor 11-5, the base is negative with respect to the emitter and transistor 11-5 is in conduction. This places the collector of transistor 11-5 at approximately +9 volts. The negative pulse produced in the base 2 circuit of unijunction 11-3 is coupled through the .001 capacitor to the base of transistor 11-4, driving it into conduction. The positive voltage that appears at the collector of transistor 11-4 is coupled through the .33 mfd capacitor to the cathode end of the diode in the base circuit of 11-5. With the cathode positive, the diode cannot conduct and the drive is removed from the base of transistor 11-5 and it cuts off. Transistor 11-5 remains cut off until the charge on the .33 mfd capacitor can be reduced through the 39K resistor to a value that the diode can conduct and re-establish drive to its base. This time is 9 to 10 milliseconds. Since we do not want an output from the error detect circuit the instant transistor 11-5 cuts off, the negative slope of the pulse developed in the collector circuit of transistor 11-5 must be decreased to prevent coupling thru the .1 mfd capacitor and triggering the output SCR.

As the pulse goes negative, diode D conducts and the .33 mfd capacitor in its anode circuit charges. This action slows down the rate of charge on the .1 mfd capacitor sufficiently to prevent gating of the output SCR. As the collector voltage of transistor 11-5 returns positive, diode D is reverse biased and removes the action of the .33 mfd capacitor from the circuit. This allows the voltage at the .1 mfd capacitor to rise rapidly and gates the output SCR.

With the gate conditioned, the SCR fires and completes the circuit through the primary of the output transformer. This output is capacitor coupled to the step input of the ring and switch assembly.

The anode of the output SCR obtains its voltage from the same contact that produced the error. If the anode is not conditioned when the output SCR receives the gating pulse, it will not conduct and will result in the failure of the detect circuit. This condition is prevented by the .1 mfd capacitor in the anode circuit of the output SCR.

Through the N/C feedback contacts, +48 volts is applied to the 4.7K resistor and charges the .1 mfd capacitor. The charge level on the capacitor is limited to +22 volts by the zener diode. If the +48 volt supply is removed, the charge on the .1 mfd capacitor supplies anode voltage for the output SCR and insures that it will conduct when the gating pulse is applied. If, however, no error is detected during the close time of the feedback contacts, the charge on the .1 mfd capacitor must be removed to prevent

producing an error indication when the feedback contacts open under normal operation. The discharge path under these conditions is from the .1 mfd capacitor, 4.7K resistor and the 2.2K resistor on the input. Although the error detect circuit will produce a gating pulse to the output SCR when the feedback contact opens under normal operation, the charge on the .1 mfd capacitor has discharged sufficiently to prevent the output SCR from firing.

Vertical Forms Control (VFC)

- Provides repeated index pulses to the forms feed mechanism instead of a constant voltage.
- Stops with the error lamp on when the large bead on the control chain is detected.

Set the function switch to VFC, the parity switch to On and depress Skip B, Skip C and Skip D. With ring lamp "A" on, place the stop/run switch in run and depress the start button. The vertical forms feed will repeat index until the large bead on the control chain is sensed. This provides +48 volts through the forms feed contact, cable connection AP - AQ, adaptor box connection D7 and develops a turn off of the OLSA in the same manner as parity does. The printer stops with the error lamp on.

If the printer is not equipped with vertical forms feed, indexing will continue until the run/stop switch is moved to stop.

The flow charts are designed to provide a faster method of determining the area of failure in the OLSA-T. The Turn-On, Print, Space and Shift are diagramed. All functions are identical to Space with the exception of shift.

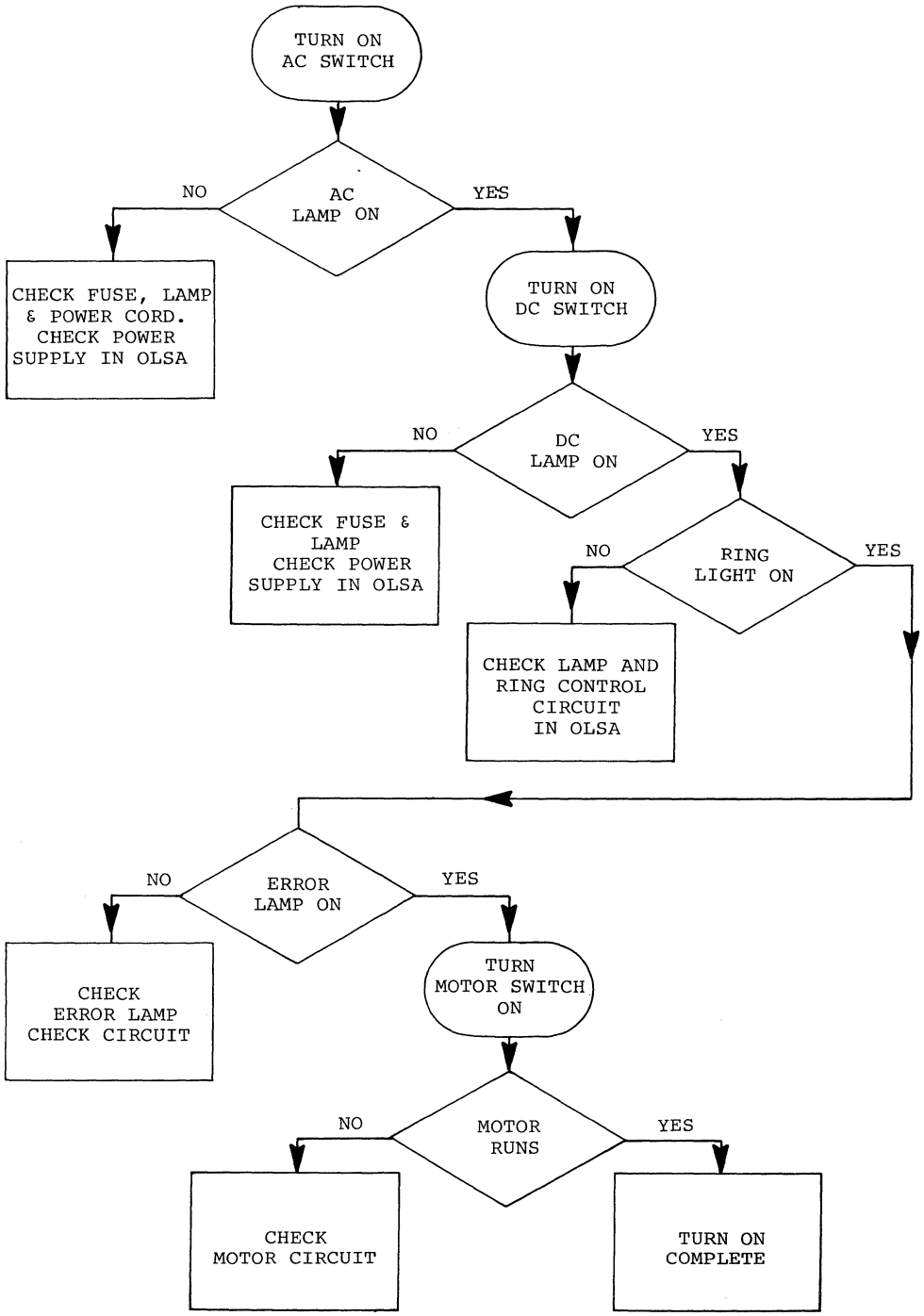


Fig. 7-1 Turn-On

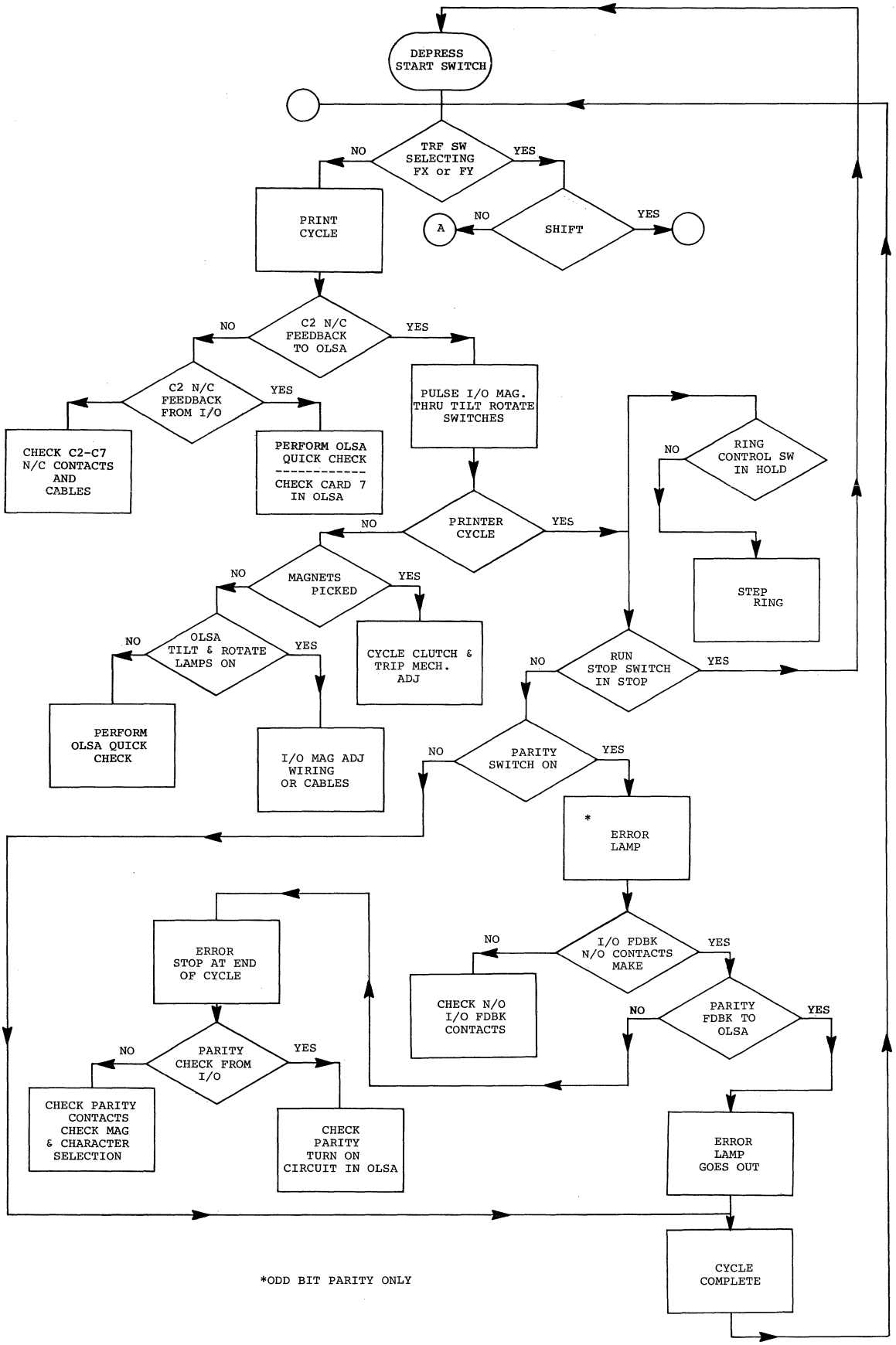

DEPRESS START SWITCH
TRF SW SELECTING FX or FY
NO
YES
PRINT CYCLE
A
NO
SHIFT
YES
C2 N/C FEEDBACK TO OLSA
NO
YES
C2 N/C FEEDBACK FROM I/O
YES
CHECK C2-C7 N/C CONTACTS AND CABLES
PERFORM OLSA QUICK CHECK
CHECK CARD 7 IN OLSA
PULSE I/O MAG. THRU TILT ROTATE SWITCHES
NO
RING CONTROL SW IN HOLD
PRINTER CYCLE
NO
YES
STEP RING
NO
MAGNETS PICKED
YES
NO
OLSA TILT & ROTATE LAMPS ON
YES
CYCLE CLUTCH & TRIP MECH. ADJ
PERFORM OLSA QUICK CHECK
I/O MAG ADJ WIRING OR CABLES
NO
RUN STOP SWITCH IN STOP
YES
NO
PARITY SWITCH ON
YES
*
ERROR LAMP
ERROR STOP AT END OF CYCLE
NO
I/O FDBK N/O CONTACTS MAKE
YES
CHECK N/O I/O FDBK CONTACTS
NO
PARITY FDBK TO OLSA
YES
NO
PARITY CHECK FROM I/O
YES
CHECK PARITY CONTACTS CHECK MAG & CHARACTER SELECTION
CHECK PARITY TURN ON CIRCUIT IN OLSA
ERROR LAMP GOES OUT
CYCLE COMPLETE
*ODD BIT PARITY ONLY

Fig. 7-2 Print

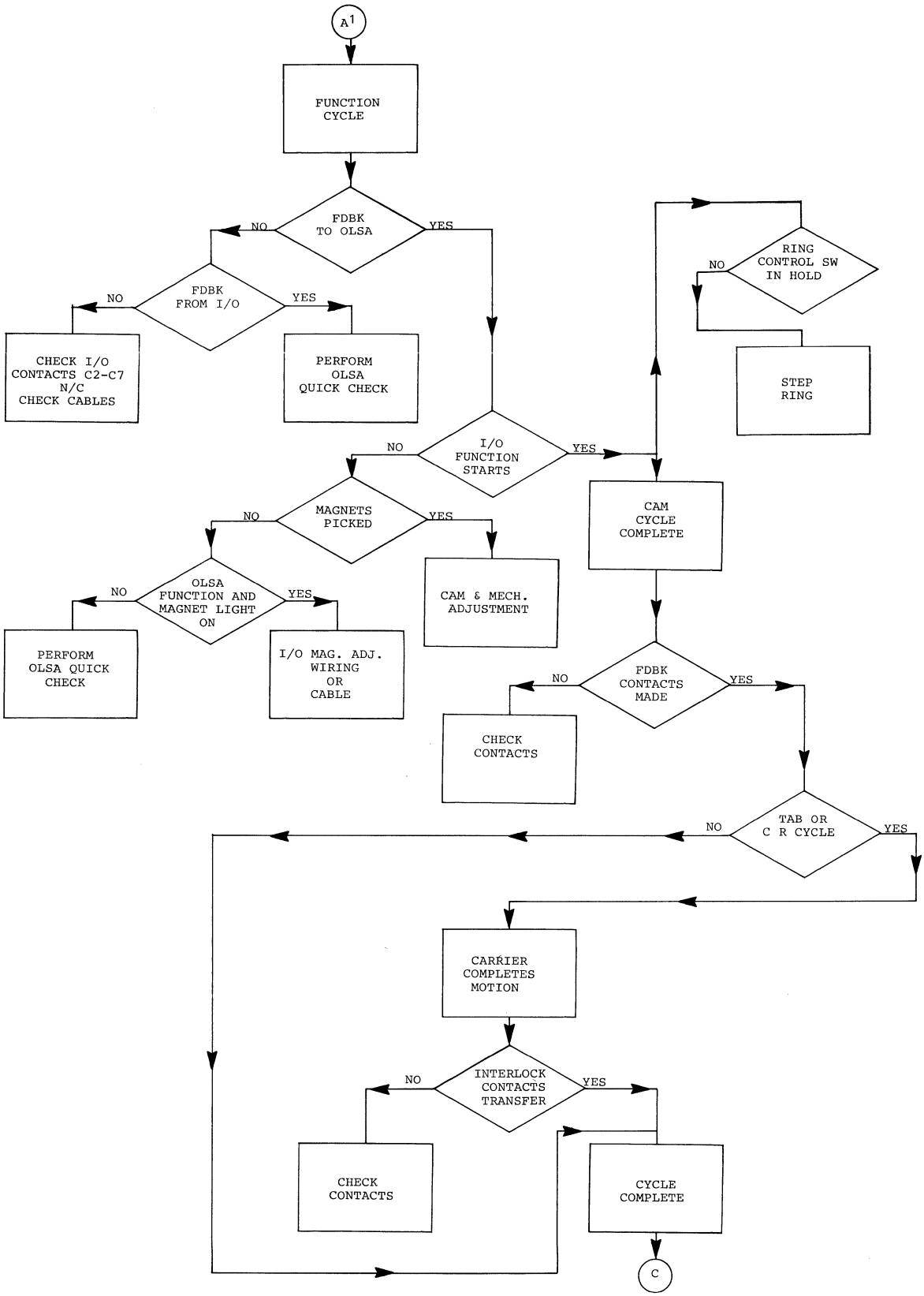


Figure 7-3. Space

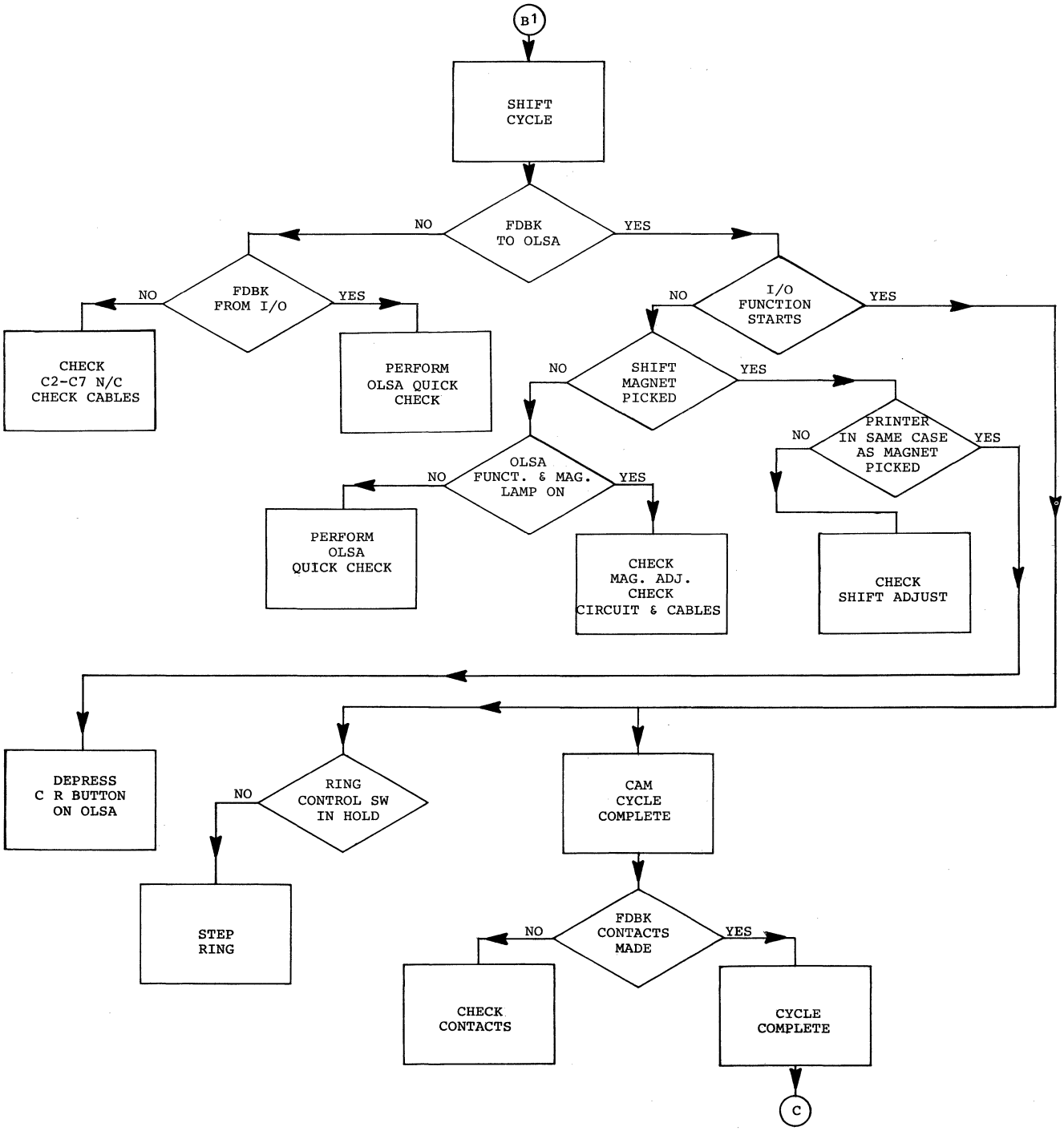


Figure 7-4. Shift

Part Description	Qty. Per OLSA	Part No.
Matrix Card 385-10	4	9900397
Flip-Flop Card 385-11	2	9900398
VPG Card 385-15	1	9900399
SCR Driver Card 385-13	1	9900400
Voltage Regulator Card 385-12	1	9900401
Pulse Control 385-14	1	9900424
Function & Error Detect Card 385-17	1	9900428
Rectifier Bridge 6 Amp., 300 V.	1	9900402
Indicator Lamp	19	9900403
Connector, Female Amphenol	3	9900404
Connector, Male Amphenol	3	9900405
Transformer, Power	1	9900442
Fuse, 3 Amp. AGC Buss	2	6324
Switch, T.P.D.T. 1052 Adaptor & Contact Load	2	9900429
Switch, Slide - 115/220 V.	1	9900430
Switch, D.P.D.T. (New Look)	4	734879
Switch, Start	1	9900431
Switch, Parity S.P.D.T.	2	9900432
Switch, Ring Control D.P.D.T.	1	9900435
Switch, Shift S.P.D.T.	1	9900436
Switch, C.R. D.P.D.T. Pushbutton	1	9900437
Switch, VPG	1	9900438
Switch, Function	1	9900439
Switch, Scope Point	1	9900440
Switch, TRF	4	9900441
Contacts, Ring & Switch Assembly	15	9900443
SCR, Large C20B	2	9900445

Power Cord	1	1132438
SCR, Small C106B2	68	9900444
Unijunction Transistor 2N2646	5	9900446
OLSA-T Instruction/Reference Manual		229-9009-1
OLSA-T Wiring Diagram		229-9010

NOTE: REPLACEMENT PARTS NOT SHOWN SHOULD BE PURCHASED LOCALLY.

Waveshapes

This section of the manual contains the majority of the important waveshapes generated in the OLSA-T. These waveshapes photographs were made with a Textronix 561A Oscilloscope. Minor voltage variations may exist between different units.

Scope Set-Up

1. If the calibration of the scope has not been checked recently, both the vertical and horizontal deflection should be checked.
2. Connect the scope ground to Special 1 test jack or the RH center terminal of the run-stop switch for all waveshapes except the magnet pulses. Connect the scope ground to Mag. Comm. test jack for magnet pulses.
3. Use a 10 to 1 attenuated probe.
4. Set the AC-DC switch on DC.
5. Set the Mag. switch on X1.
6. Set the mode switch, the red knob, on normal; the black knob, on Channel 1.
7. Set the Channel 1 voltage level switch to DC.
8. Trigger the scope internal, auto, negative except for the VPG waveshapes figures 9-1, 9-2, 9-3, 9-4 and 9-5. For VPG, connect trigger lead to pin H on Card 8. Trigger the scope external-DC-negative.
9. Adjust the Time/Division and Volts/Division as specified.
10. Adjust the ground reference line (indicated by the arrow to the left of each figure) on the graticule for each waveform.

OLSA-T Set-Up

1. Set the VPG switch to slow.
2. Set the rate control to approximately 15 CPS (indicated by a silver arrow on the panel).
3. Set the duration control to approximately 22 milliseconds.
4. Turn the AC switch on.
5. Turn the DC switch on.
6. Turn the motor switch off.
7. Turn the ring control switch to hold except for figure 9-11, input to ring.
8. Turn stop/run switch to run.
9. Depress the start switch.

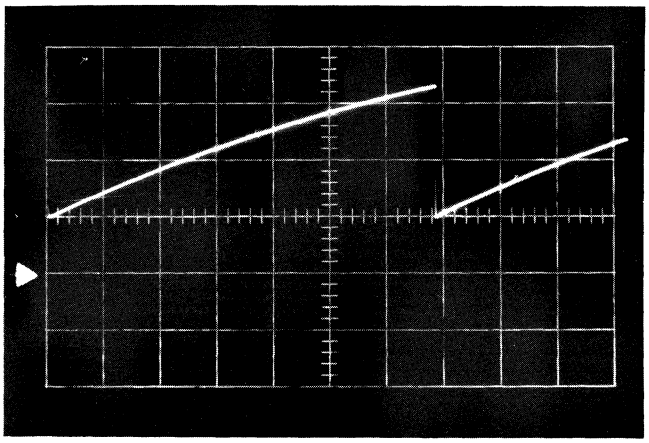


Fig. 9-1. Input VPG Rate Unijunction

Location	Pin N (10) Card 8
Trigger	Pin H Card 8
Volts/Div.	.5
Time/Div.	10 MS

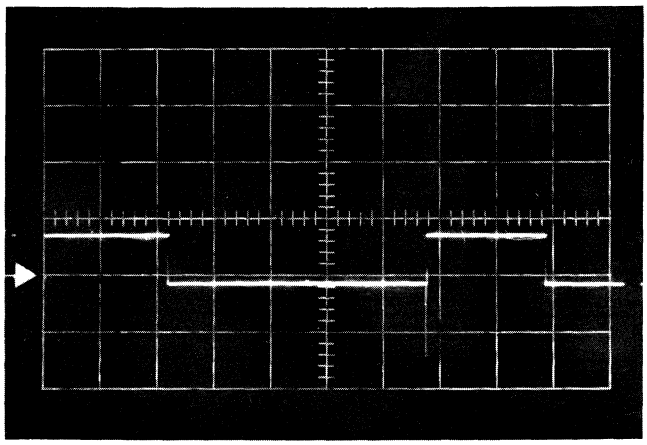


Fig. 9-2. Output VPG Rate Unijunction

Location	Pin P (9) Card 9
Trigger	Pin H Card 8
Volts/Div.	.2
Time/Div.	10 MS

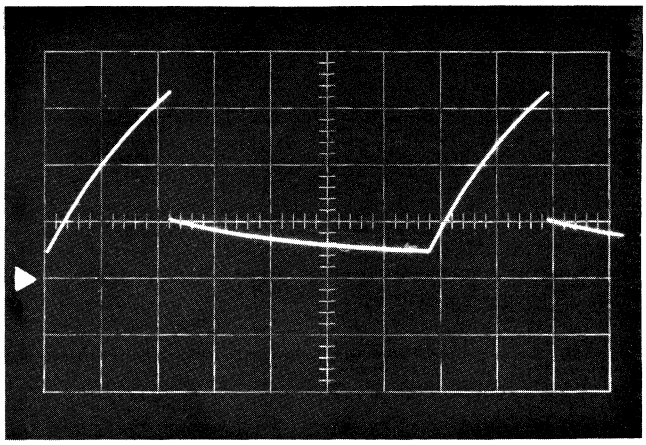


Fig. 9-3. Input VPG Dur. Unijunction

Location	Pin F Card 8
Trigger	Pin H Card 8
Volts/Div.	.5
Time/Div.	10 MS

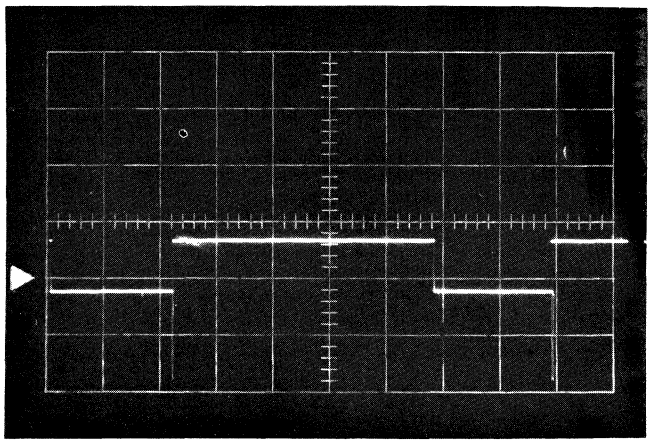


Fig. 9-4. Output VPG Dur. Unijunction

Location	Pin J (7) Card 9
Trigger	Pin H Card 8
Volts/Div.	.2
Volts/Div.	10 MS

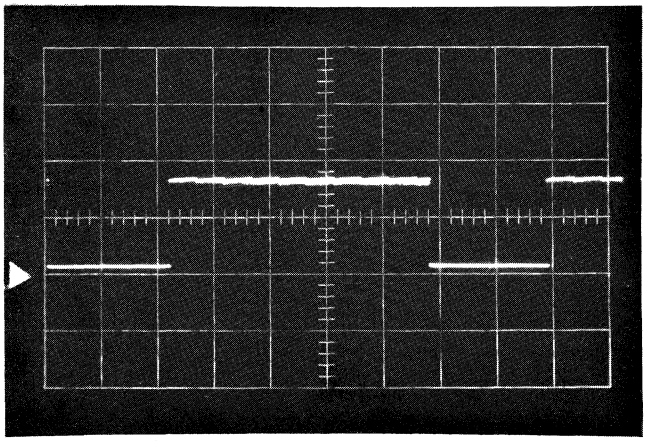


Fig. 9-5. VPG Output

Location	Pin M (11) Card 9
Trigger	Pin H Card 8
Volts/Div.	.5
Time/Div.	10 MS

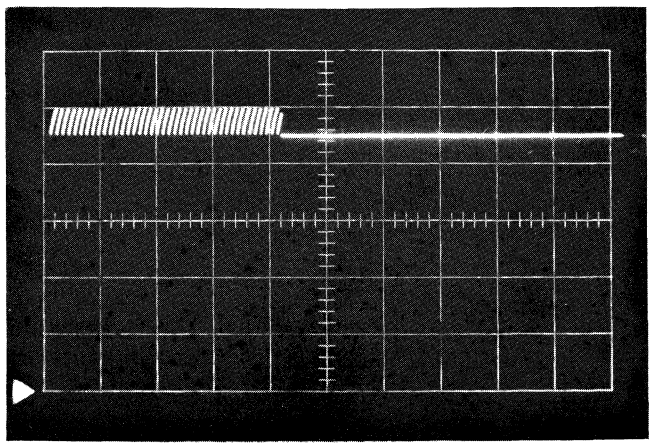


Fig. 9-6. Input Start Pulse Unijunction

Location	Pin K Card 2
Trigger	Internal Auto
Volts/Div.	.2
Time/Div.	5 MS

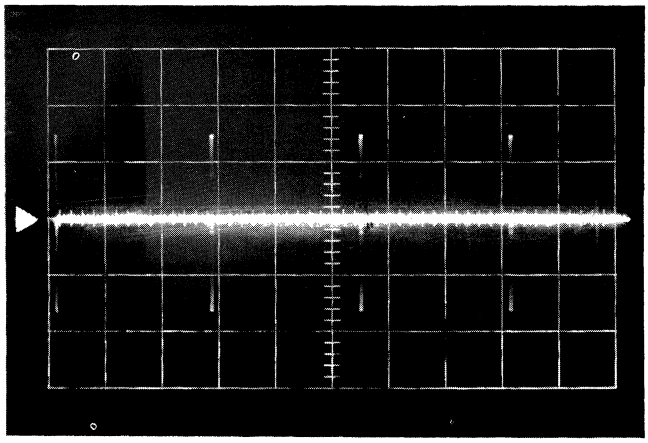


Fig. 9-7. Turn-On SCR Gate

Location	Pin P Card 2
Trigger	Internal Auto
Volts/Div.	.02
Time/Div.	2 MS

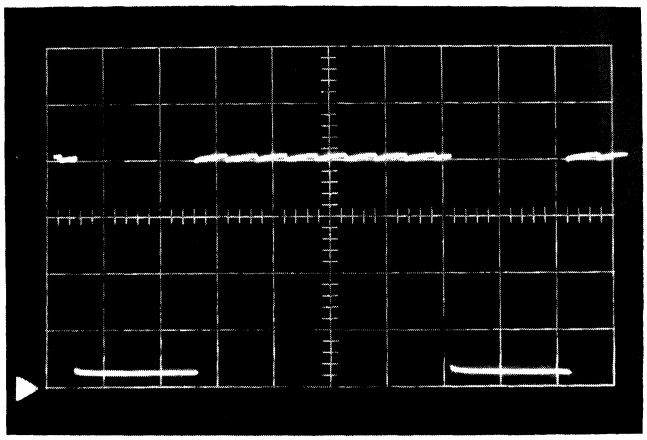


Fig. 9-8. Input Stop Pulse Unijunction

Location	Pin M Card 2
Trigger	Internal Auto
Volts/Div.	.2
Time/Div.	10 MS

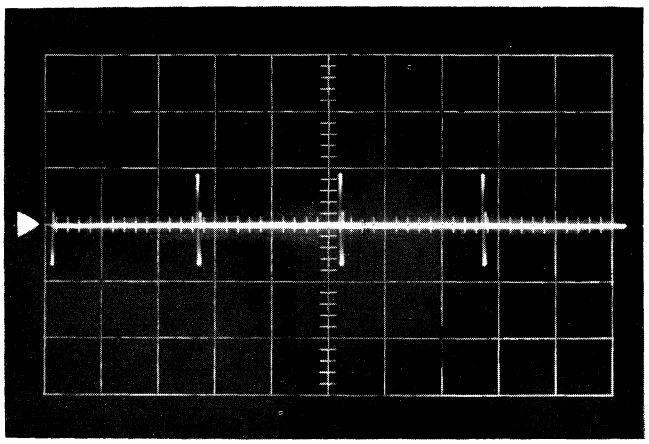


Fig. 9-9. Turn-Off SCR Gate

Location	Pin R Card 2
Trigger	Internal Auto
Volts/Div.	.1
Time/Div.	.2 MS

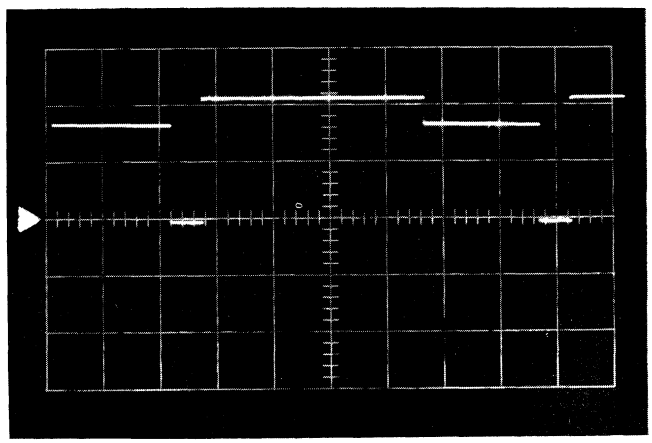


Fig. 9-10. Ring Step Pulse

Location	Pin L Card 2
Trigger	Internal Auto
Volts/Div.	.5
Time/Div.	10 MS

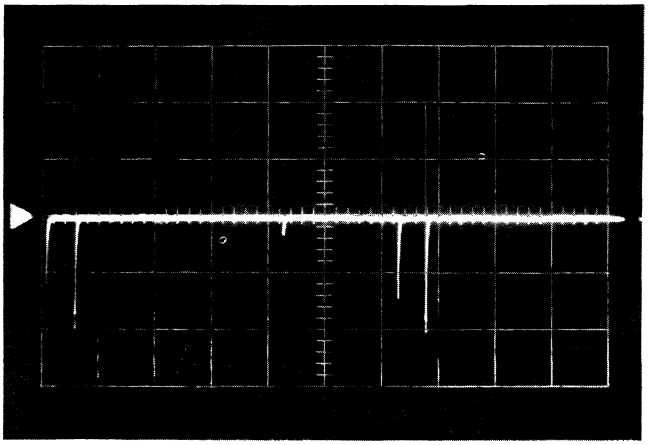


Fig. 9-11. Ring Step Pulse

Location	Edge of Ring Card
Trigger	Internal Auto
Volts/Div.	.2
Time/Div.	10 MS

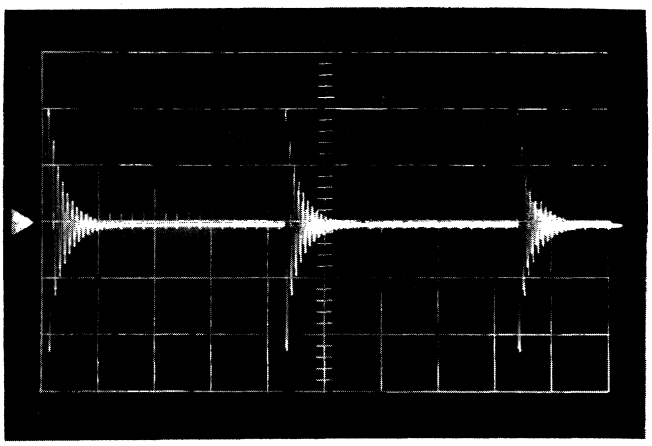


Fig. 9-12. Pulse Gen. Card 3, 4, 5 or 6

Location	Pin P
Trigger	Internal Auto
Volts/Div.	.05
Time/Div.	.1 MS

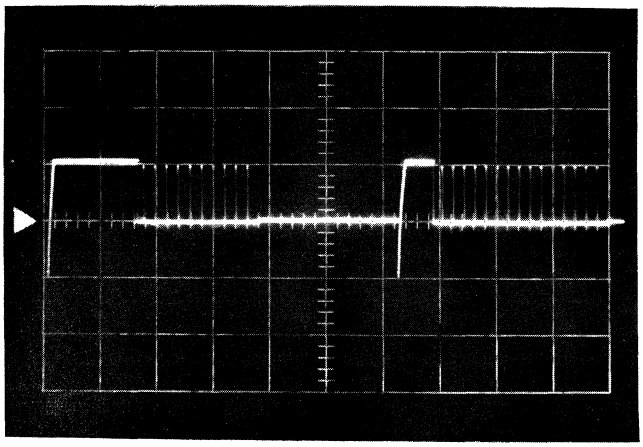


Fig. 9-13. Shift SCR

Location	B17 Adaptor
Trigger	Internal Auto
Volts/Div.	5
Time/Div.	10 MS

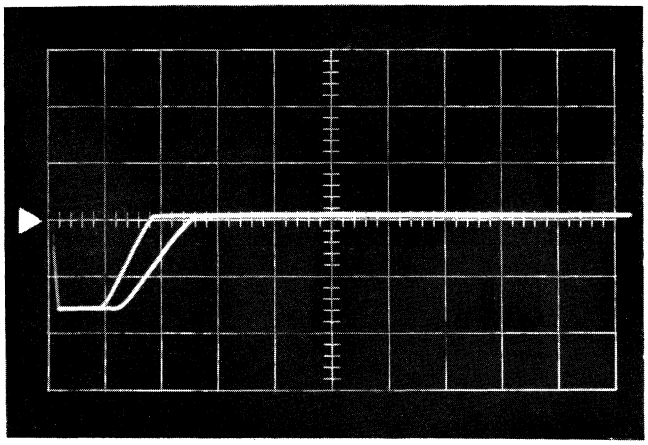


Fig. 9-14. Input-Shift Flip-Flop Neg.

Location	Pin Q (10) Card 10
Trigger	Internal DC
Volts/Div.	1
Time/Div.	.2 MS

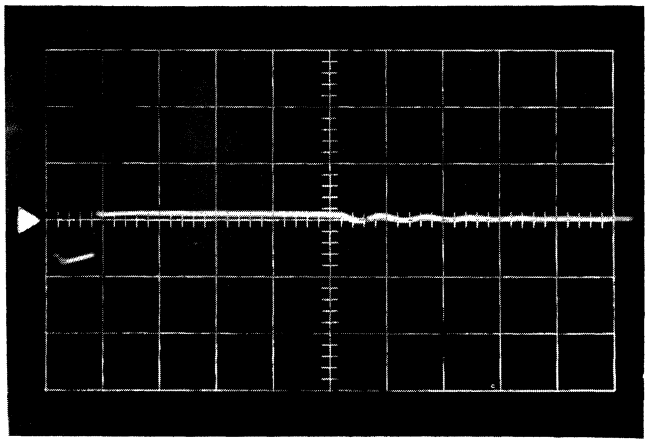


Fig. 9-15. Input-Shift Flip-Flop Pos.

Location	Pin Q (10) Card 10
Trigger	Internal DC
Volts/Div.	.5
Time/Div.	20 Microseconds

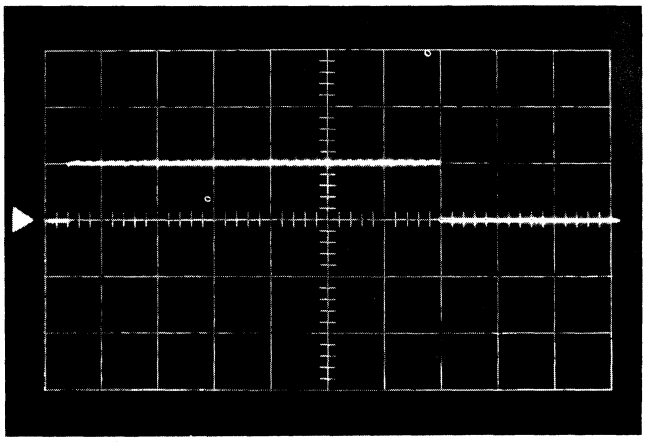


Fig. 9-16. Output-Shift Flip-Flop

Location	Pin F Card 2
Trigger	Internal Auto
Volts/Div.	1
Time/Div.	10 MS

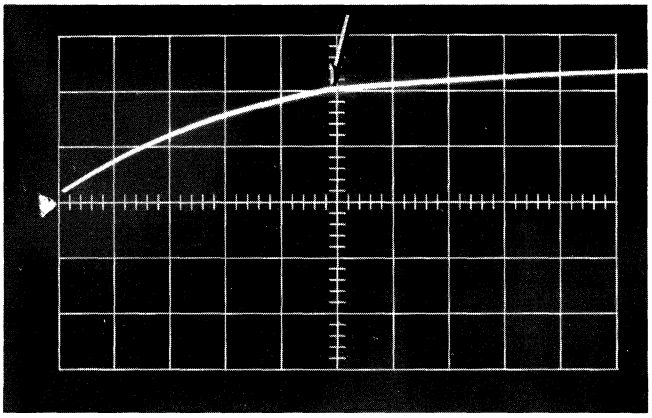


Fig. 9-17. Wave Shape - Card 11

Location	See Fig. 10-7
Trigger	Internal
Volts/Div.	2
Time/Div.	1 ms

The voltage in Fig. 9-17 should rise to 40V (arrow) between 4.5 ms and 5 ms.

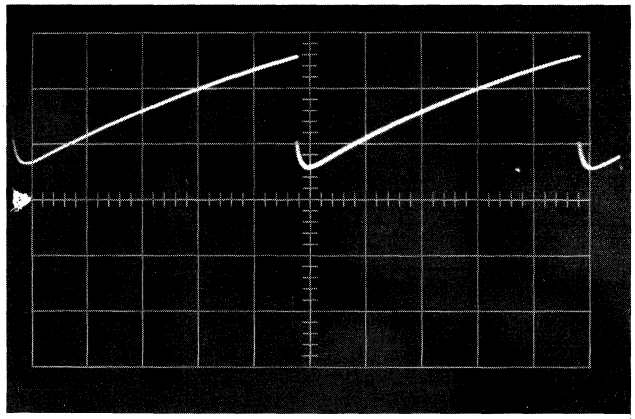


Fig. 9-18. Wave Shape - Card 2

Location	See Fig. 10-2
Trigger	Internal
Volts/Div.	.2
Time/Div.	] ms

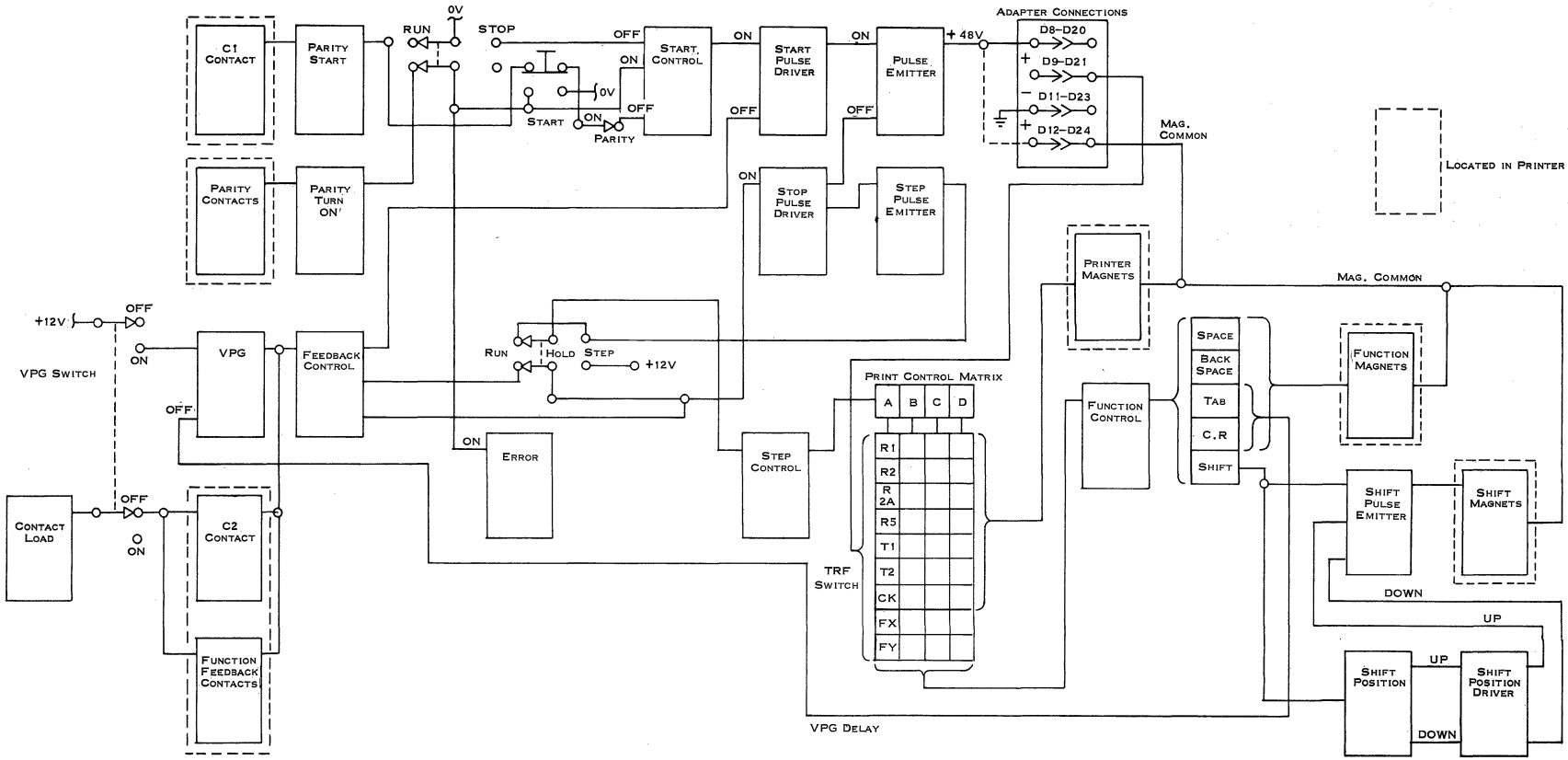
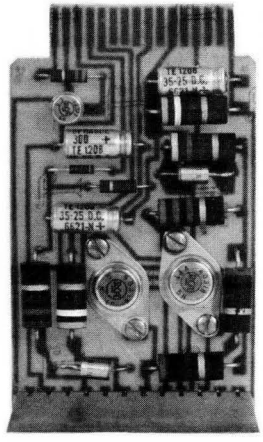


Figure 9-19. Second Level Diagram



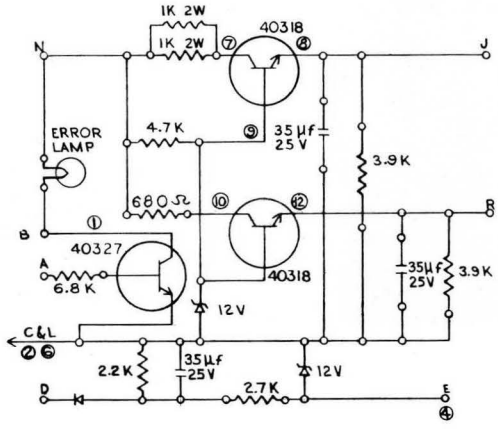
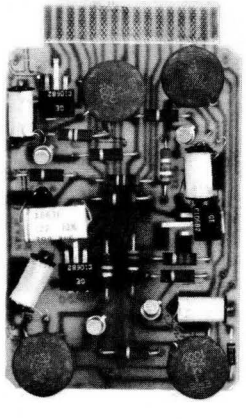


Figure 10-1. Card #1

The voltage regulator card contains two series regulated +12 volt supplies and one shunt regulated -12 volt supply. This card also contains the transistor and circuit used to control the error light.



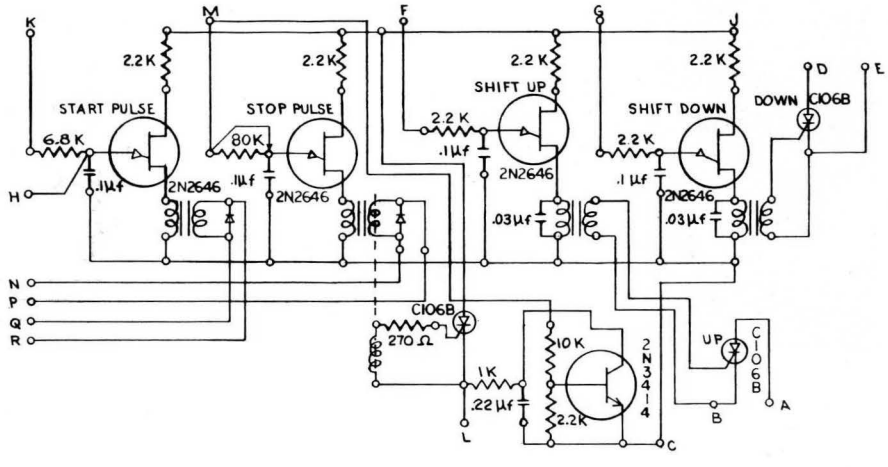
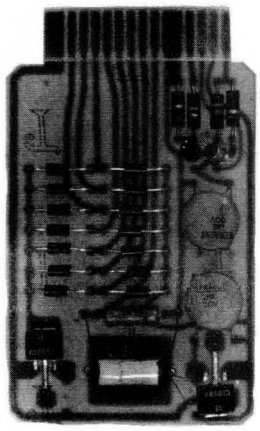


Figure 10-2. Card #2

The SCR driver contains three circuits. #1 - the start and stop pulse unijunction circuits, used to gate the turn-on and turn-off SCR's. #2 - the shift up and down unijunction drivers and the SCR's used to control the shift circuit. #3 - the SCR and transistors used to develop the pulse to step the ring. Input masking is adjustable by the 80K potentiometer. (See arrow.)



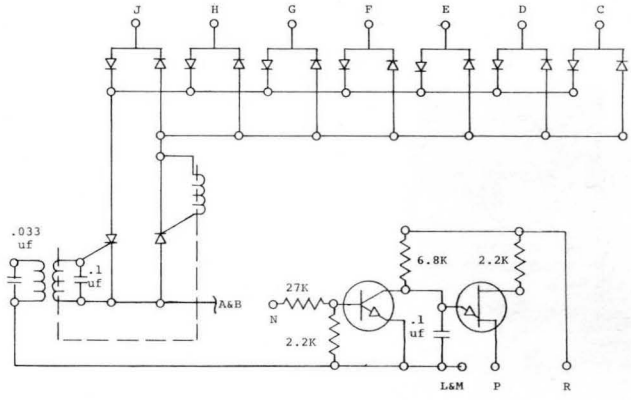
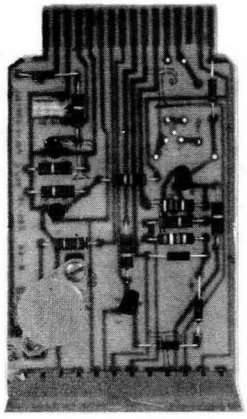


Figure 10-3. Cards #3, 4, 5 and 6

The matrix cards in position 3, 4, 5 and 6 are identical. They contain the SCR Print Matrix and the Pulse Generators used to gate the print and function SCR's.



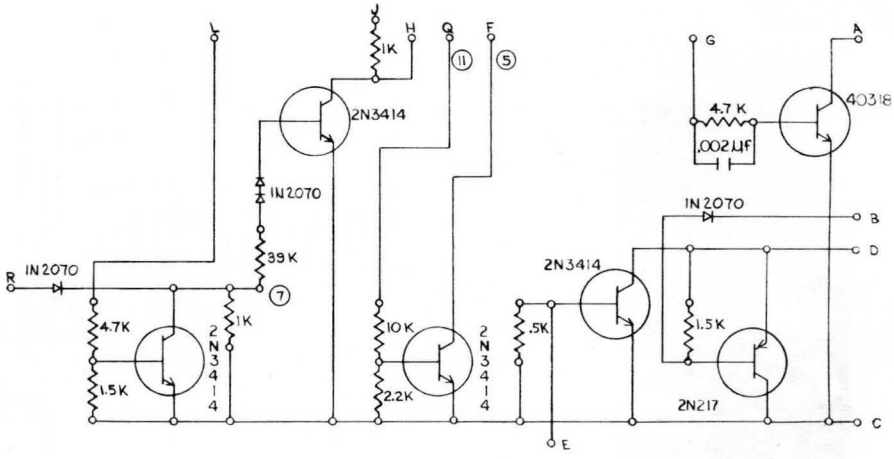
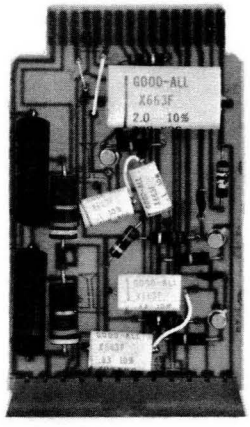


Figure 10-4. Card #7

Pulse control contains three circuits: #1 - the feedback circuit is controlled by the feedback contacts on the printer and, in turn, controls the start pulse unijunction circuit. #2 - the parity turn-on circuit, receives information from the parity contacts and controls the start pulse driver. #3 - the carrier return invert circuit.



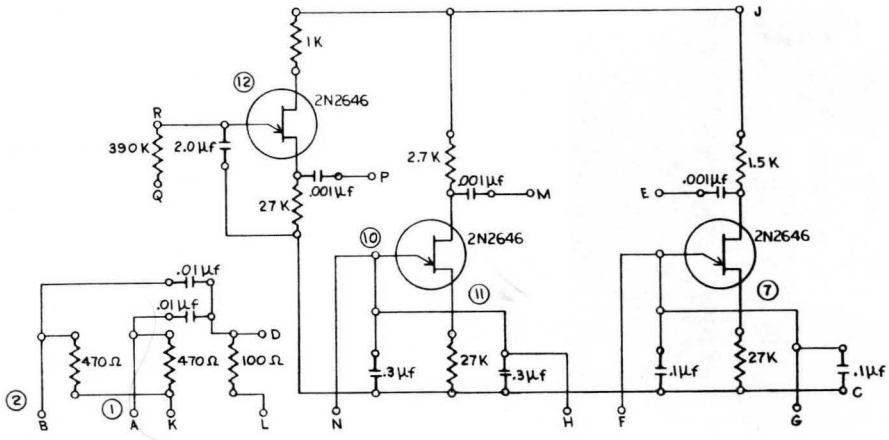
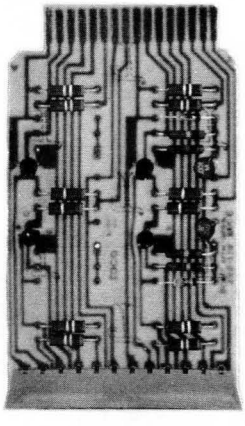


Figure 10-5. Card #8

VPG contains tab and carrier return delay and the unijunction circuits that control the rate and duration of the VPG output. This card works in conjunction with card #9.



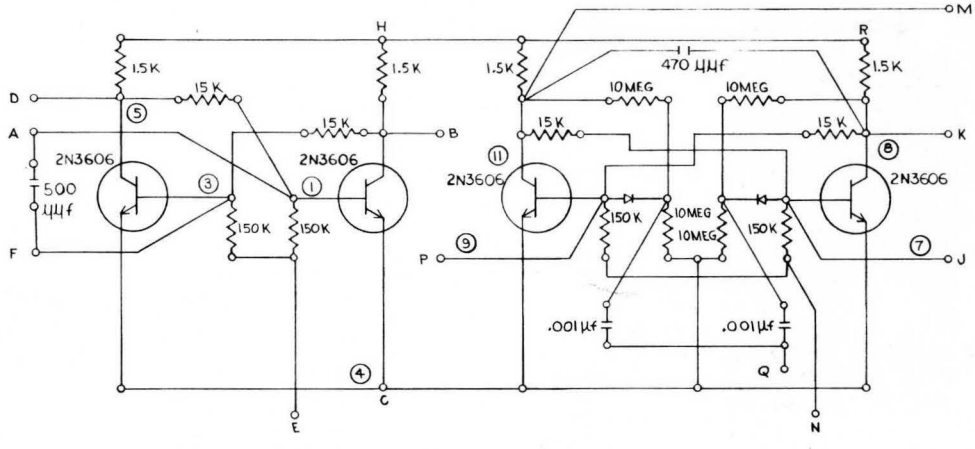
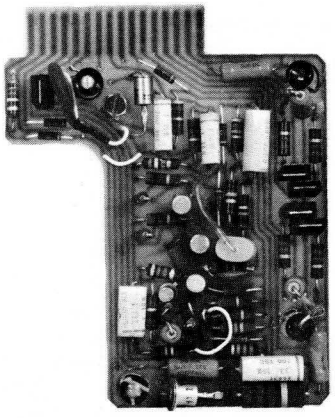


Figure 10-6. Cards #9 and 10

The flip-flop card is used in position 9 as the VPG Flip-Flop circuit and output. When used in position 10 it operates as the start pulse driver and the shift flip-flop circuit.



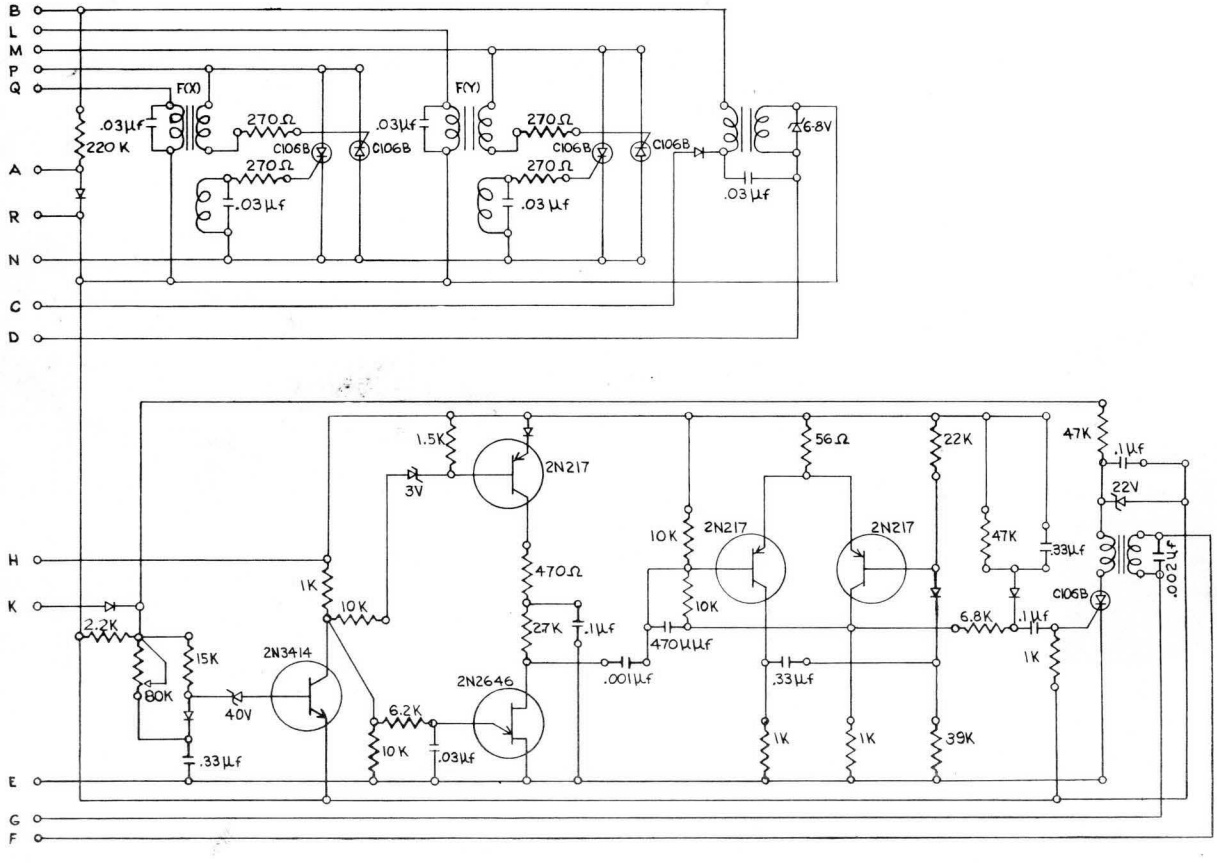


Figure 10-7. Card #11

Function and Error Detect contains three circuits. #1 - the function X and function Y SCR's and the transformers used to gate them. #2 - the transformer input to the shift flip-flop circuit on card 10 for positive polarity machines. #3 - the contact error detection circuit. Input masking is adjustable by the 80K potentiometer. (See arrow.)

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