B 9343

CONSOLE AND DDP

(For B700 Systems)

INTRODUCTION AND OPERATION

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Burroughs

FIELD ENGINEERING

TECHNICAL MANUAL

AA454504

For Library Binder 160

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CONSOLE AND DDP

SECTION

I

INTRODUCTION
AND
OPERATION

Burroughs

FIELD ENGINEERING

TECHNICAL MANUAL

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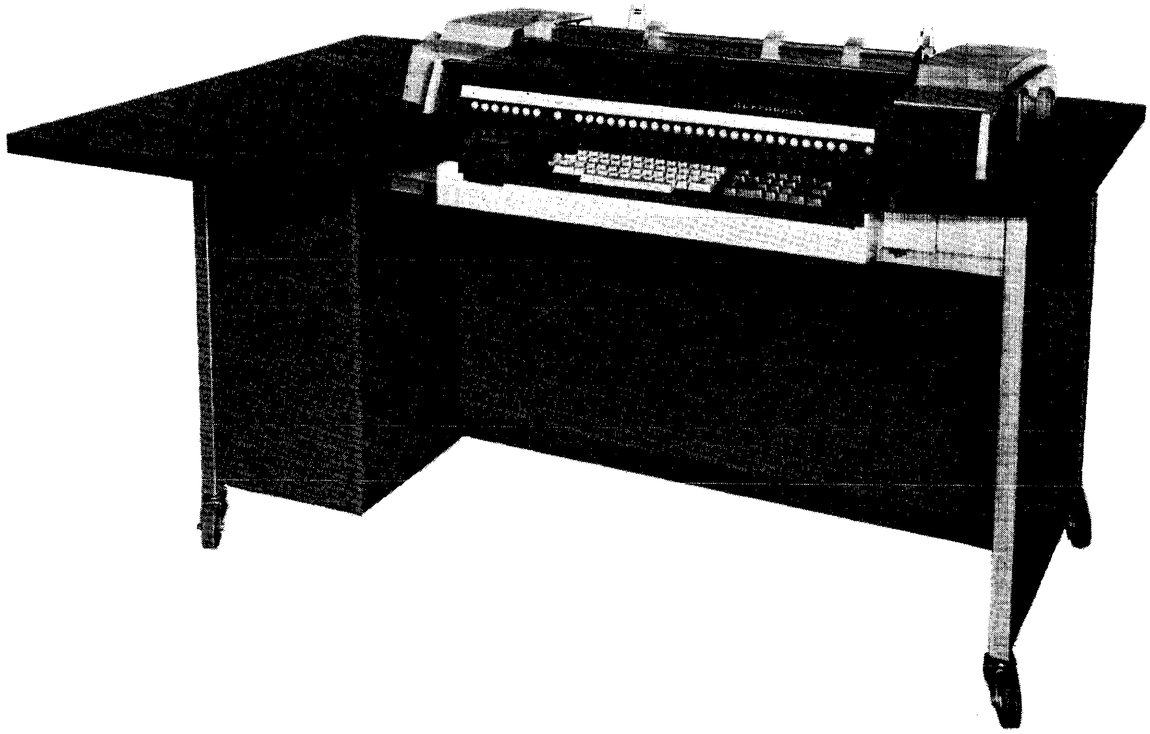

Fig. I-1

INTRODUCTION

The console provides the main point of operator communication with the B 700 system. It consists of a Keyboard for data input, Program select keys (PSK's) for program control, Indicators to inform the operator of various conditions and/or required operations. a Serial-printer for output of data, a Carrier mechanism for positioning the Printer, and a Forms transport mechanism for handling the output media.

There are four styles of console derived from combinations of either fifteen or twenty-six inch Front-feed Forms mechanism, together with either a sixty-four or ninety-four character printer.

The Console is connected to the Processor unit by three, fifteen feet cables. Two of these are for data and timing signals, the third cable supplies power for the Console mechanisms from the Processor power supply.

CONSOLE DDP

The Device Dependent Port (DDP) provides the interface between the Processor and the Console unit. It contains buffers for temporary storage of data, and controls the timing and sequencing of mechanical functions on receipt of instructions and data from the Processor.

Since there are five main sections in the Console, the DDP may be regarded as consisting of five DDP's combined into one unit. Because of this complexity the Console DDP is not interchangeable and resides in a dedicated backplane location in the Processor unit. (See Sec. II.)

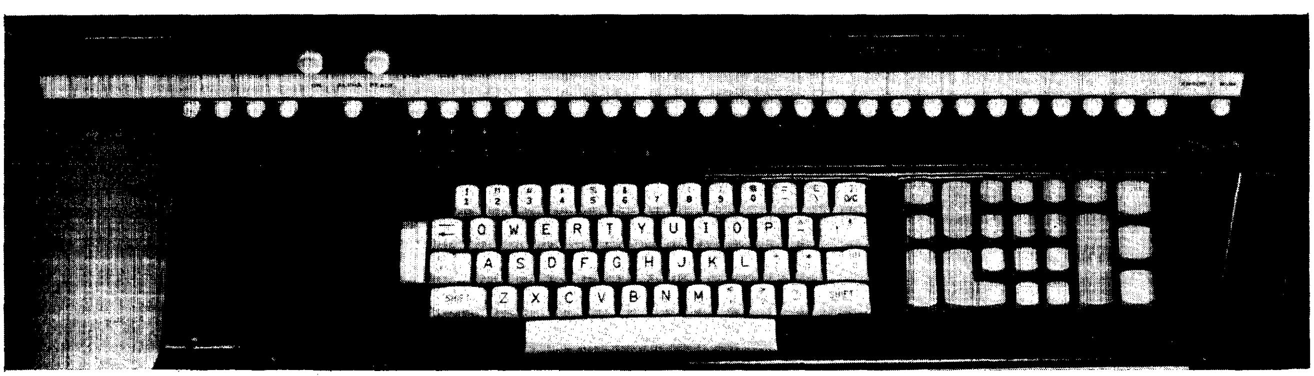

Fig. I-2 KEYBOARD AND INDICATORS

CONSOLE KEYBOARD

The Keyboard (see Figure I-2) is a motor driven, clutch controlled mechanism which generates a discrete code for each key. The keyboard is divided into four sections:

1. Ten key numeric keyboard
2. Alpha keyboard
3. Program select keys
4. Memory loader

The memory loader is a mechanical paper-tape reader which enables codes punched in paper tape to read into the processor. The prime purpose of the memory loader, as its name implies, is to allow the loading of basic software (Firmware, Interpreters).

INDICATORS

The Indicators (see Figure I-2)are divided into five groups A, B, C, D, and S, plus a power-on indicator. The power on indicator is illuminated when power is on to the Processor and the remainder are controlled by firmware..

Indicators groups A, B, and C, see Figure II-8, located above PSKs A1 through C8, are primarily used to indicate to the operator when a particular PSK is enabled. Indicator Group D, together with the Error Indicator, are used to inform the operator of certain error conditions which may arise in system operation. The Alpha or Numeric indicators are used to indicate when an input from the Numeric or Alpha Keyboard is expected, or enabled, by the firmware. The Ready indicator illuminates when the system is in the Ready mode awaiting the loading or starting of a program.

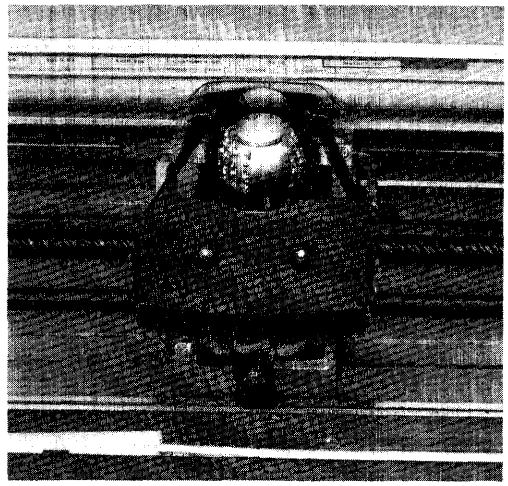

Fig. I-3 RIBBON CARTRIDGE AND PRINTER

CONSOLE PRINTER

The printer (see Figure I-3) consists of a spherical print-head which can be positioned to any one of 150 print positions (15" forms transport) or 256 print positions (26" forms transport) by the carrier mechanism. The required print character is selected by rotating and tilting the print head until the selected character is aligned with the ribbon

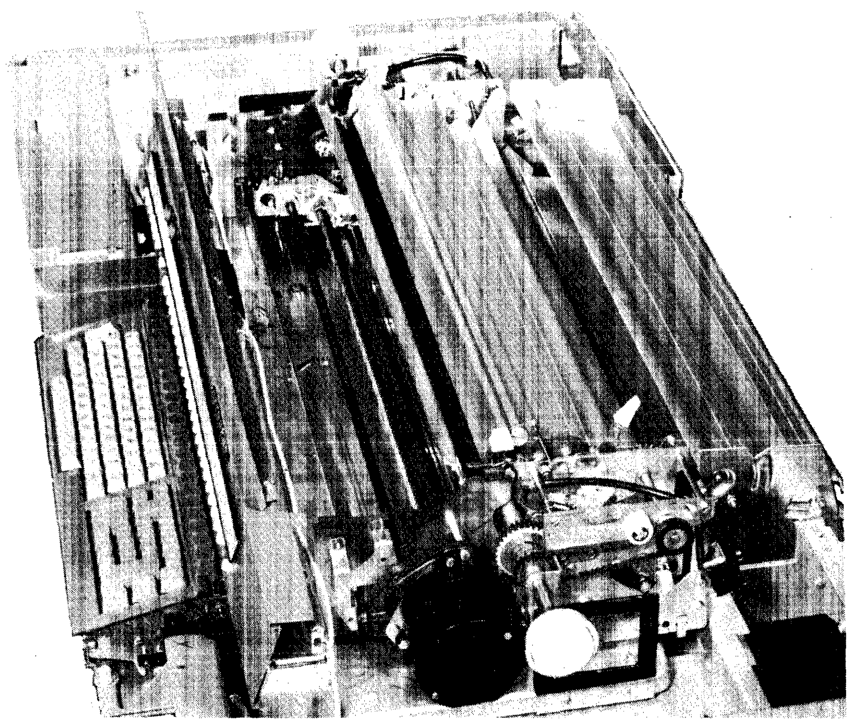

Fig. I-4 9343 CONSOLE SHOWING KB, CARRIER & FORMS MECHANISMS and print media. The rotating and tilting of the print head is controlled by the Decoder, which translates binary electrical codes received from the Processor into appropriate mechanical motion. This mechanical motion is transferred to the print head through the tilt and rotate bands.

Printing of the selected character is accomplished by driving the print-head rearward until it contacts the ribbon and print media. This function is controlled by the print-shaft clutch which in turn is controlled through the Decoder. The printing may be in Red or Black controlled by the vertical positioning of the two-color ribbon. This function is also controlled through the Decoder.

The rated speed of the printer is twenty characters per second.

CARRIER MECHANISM

The carrier mechanism (see Figure I-4) consists of a 24 D.C. motor, worm shaft, detent gear and latches, and a tachometer to monitor the speed of the assembly. Positioning of the printer is accomplished by rotating the motor and worm shaft in either direction so as to drive the printer to the left, or to the right. When in a selected position the assembly is held by the detent gear and latches.

The carrier uses two speeds to position the printer – high speed which is twenty inches per second, and low speed, which is three and one quarter (3.25) inches per second. In both cases the DDP logic uses the output of the Tachometer, a D.C. generator, to monitor and control the speed of the motor.

FORMS TRANSPORT

The forms transport mechanism (see Figure I-5 and I-6) provides capability to handle a wide range of rear fed journal rolls, front-feed forms and, optionally, pin-fed forms. The vertical spacing of the media, in 1/6" increments, is controlled by either, or both, the left and right platen advance mechanisms. The optionally split platen may thus be controlled as two separate mechanisms, or physically locked to form one platen assembly. When used as a single platen (unsplit), the forms advance is controlled by the left platen advance mechanism.

CONSOLE MECHANISM POWER-TRAIN

All of the Console mechanisms, except the carrier, are driven from a single 115VAC motor.

Referring to Figure I-9, the motor A, drives the print decoder input-shaft at 1200 rpm (1 rev. per 50 ms.), via a drive belt. Within the decoder the input shaft is gear-coupled to the output drive shaft and pulley E.

The output drive pulley, via a second drive belt, drives the Jack-shaft (B) and the Print-shaft pulley (F).

From the Jack-shaft an idler gear, and drive belt (D) transmit power to the keyboard mechanism.

The print-shaft pulley is a double pulley, and via a fourth drive belt (G) power is transmitted to the forms transport mechanism.

Attached to the print-shaft pulley is a clutch assembly (selectively actuated from the Decoder) through which power is transmitted to the Printer mechanism (J).

Within the Decoder is a transducer assembly which develops a timing signal (TU, Timer Unit) which is used by the Console DDP to synchronize logic functions with the Console mechanisms.

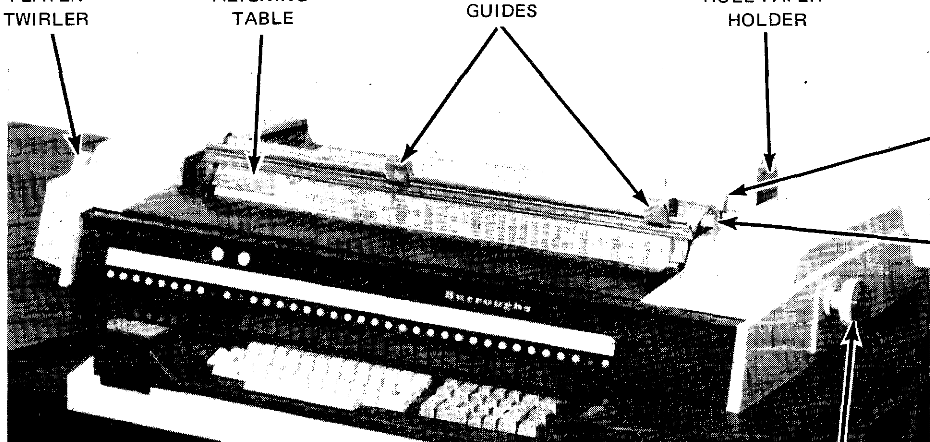

Fig. I-5 26" FRONT FEED FORMS HANDLER

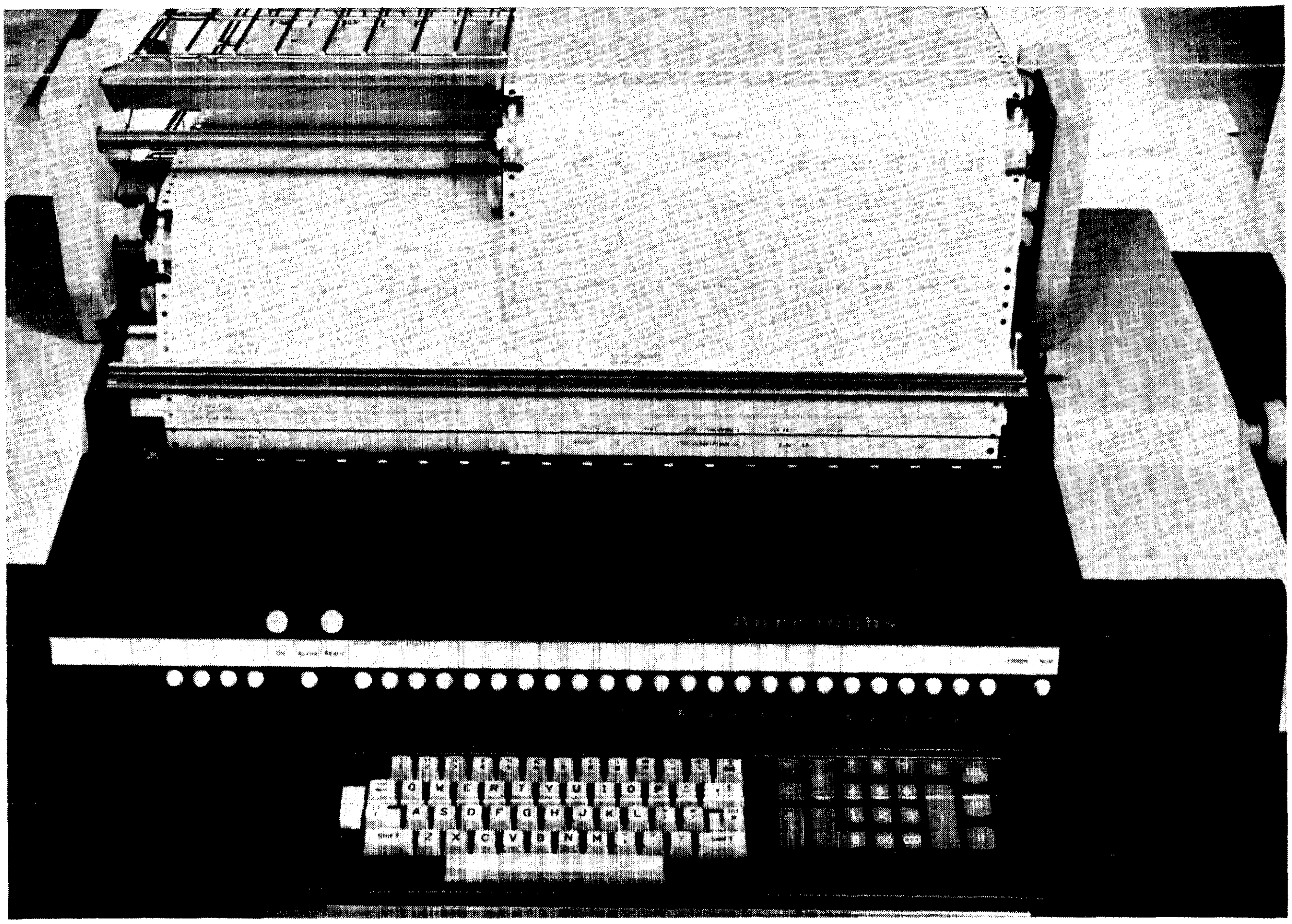

Fig. I-6 B9343 CONSOLE WITH PIN-FEED

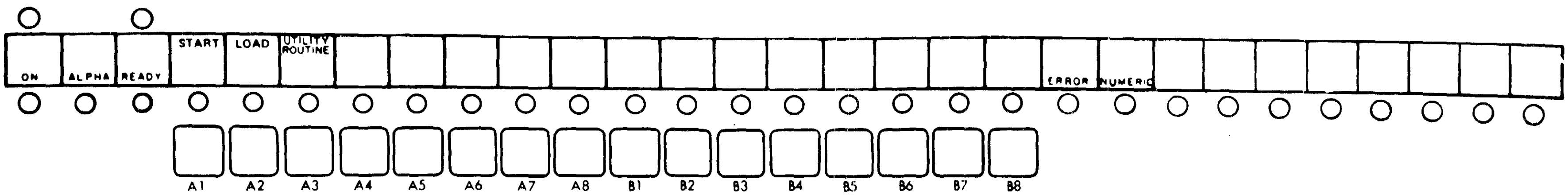

Fig. I-7 PROGRAM KEYS, LEGEND STRIP, AND INDICATOR LIGHTS – 15½" FORMS HANDLER

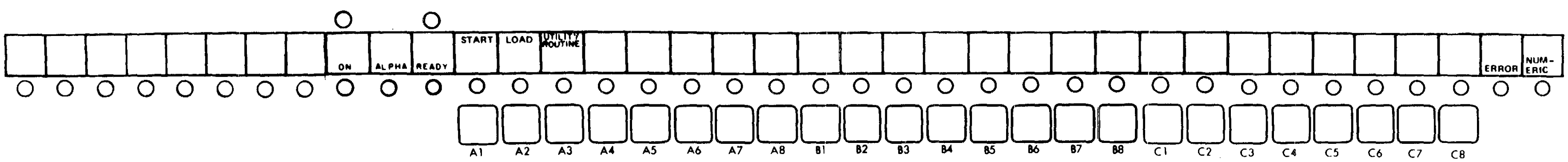

Fig. I-8 PROGRAM KEYS, LEGEND STRIP AND INDICATOR LIGHTS – 26" FORMS HANDLER

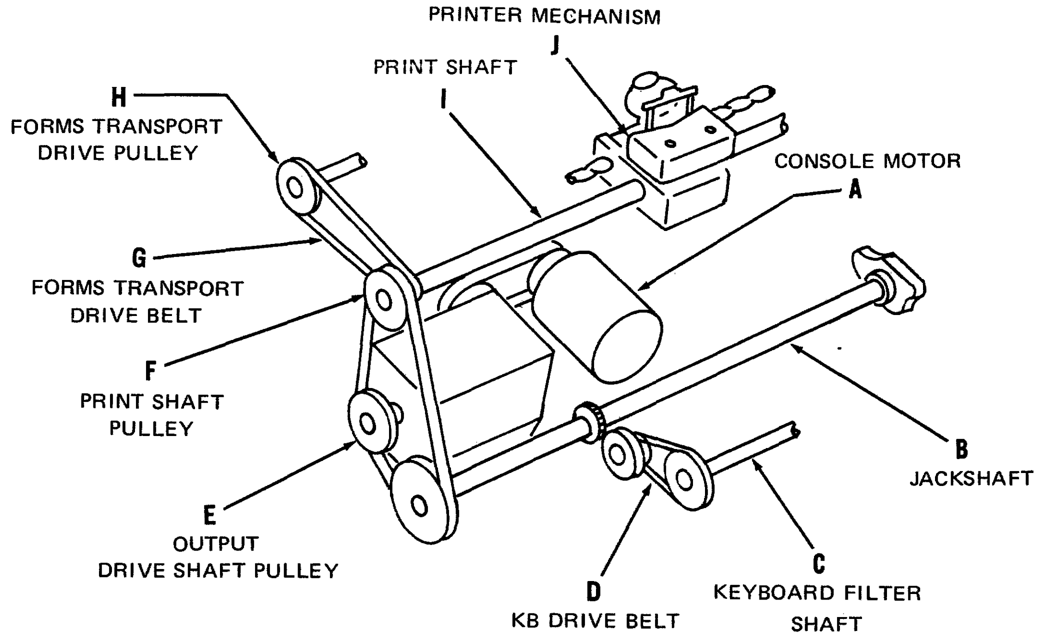

Fig. I-9 CONSOLE POWER TRAIN

GLOSSARY OF TERMS AND SYMBOLS

Following is a list of major signals associated with the Console DDP. Signals prefixed with CC are outputs from the Console DDP logic.

ACLK	System clock redeveloped through inverters.
ASR	Address and status request. Nano-instruction which causes PSU to enable the status of the highest priority DDP.
BCLK	System clock redeveloped through inverters.
BRCLK/	Buffer register clock. A low going clock pulse developed on receipt of a forms or printer control word used to load data into the Printer/Forms data buffer.
C24V+F	Carrier 24V positive, filtered.
CBSY	Carrier busy.
CCO thru CC9	Console control (DDP) PCB's type 0 through 9.
CCALARM/D	Audible alarm driver output signal.
CCAUDL/	Audible alarm signal to enable alarm driver.
CCCARR	Carrier, signal indicates the presence of a Carrier data word on the MIR lines.
CCCLR/	Clear
CCCLSP/	Close platen
CCCL+NP	Clear, or not print
CCCOUNT/	Count signal used to count down the carrier position data as the carrier moves.
CCCPR	Carrier position readout
CCCPRA	Carrier position readout amplifier
CCCRDI/	Carrier data interrupt
CCCRDLA	Carrier drive left amplifier
CCCRDLB/	Carrier drive left bias
CCCRDRA	Carrier drive right amplifier
CCCRDRB/	Carrier drive right bias
CCCRGL/	Carrier go left not
CCCRGR/	Carrier go right not
CCCRHS/	Carrier high speed not

CCCRH/	Carrier hold
CCCRIP/	Carrier interposer, signal used to drive the interposer solenoid.
CCCRLT/	Carrier left time
CCCR4A/	Carrier 4 amp.
CCCS	Core strobe
CCCTU	Timer unit
CCDINT	Data interrupt
CCDREAD	Data read, (INST/*READ)
CCDMIRn	Output from MIRn redeveloped through inverters
CCD125/	Delay 125, used to disable the CCCOUNT signal for 12.5 ms
CCEKDI/	Enable keyboard data interrupt
CCENSTA	Enable status
CCEQ1	Equal to 1, output from carrier buffer
CCFRMS	Forms
CCIAnF/	PK1 through PK8 (group A) indicator n
CCIAUF/	Start indicator PK9 through PK16
CCIBnF/	PK9 through PK16 (group B) indicator n
CCICnF/	PK17 through PK24 (group C) indicator n
CCIDnF	Left-most eight (group D) indicator n
CCIMSK/	One Mask, signal used to disable EQ1 for 10 ms and set LSLPF for a carrier movement of one position.
CCINITF	Initialize flip-flop
CCINTU/	Carrier interrupt TU not
CCIERF/	Error indicator
CCIn	Numeric indicator n
CCION/	On indicator
CCIRYF/	Indicator ready flip-flop
CCITYF/	Indicator alpha flip-flop
CCIUNF/	Indicator numeric flip-flop
CCIW	Instruction write
CCKBLn	Keyboard lower data n
CCKBn	Keyboard data n
CCKBST	Keyboard strobe
CCKBUn	Keyboard upper data n
CCKSTA/	Keyboard status not
CCLK/	System clock redeveloped through inverters
CCLPA/	Left platen advance
CCLTEQ6	Less than or equal to six, output from carrier buffer.
CCOCARR	Operate carrier – signal true when a carrier data word is not equal to zero.
CCOPNP/	Open platen
CCPCLR	CCCL+NP
CCPC/	Print clutch
CCPDRn/	Print decoder rotate n
CCPDTn	Print decoder tilt n
CCPRF	Printer flip-flop
CCPRI	Printer interrupt
CCPRNT	Print
CCPRRn/	Printer rotate n
CCPRTn/	Printer tilt n
CCPWRO/	Power off
CCRDY	Ready
CCRDYSW	Ready switch
CCROP1F/	Carrier operation #1 flip-flop
CCROP2F/	Carrier operation #2 flip-flop
CCRENST/	Enable status
CCRPA/	Right platen advance

CCRS/	Ribbon shift
CCRS8P/D	Ribbon shift for 64 character printers or expansion of rotate code to 96 characters.
CCRS96/	96-character printer ribbon shift
CCSKDI	Selected keyboard data interrupt
CCTACHBK	Tachometer feedback
CCTUA	Timer unit A – input to transducer coil.
CCTUF-1	Timer unit flip-flop (30 time – 3 time)
CCXCRGL/	Excape carrier, go left.
CCXCRGR/	Escape carrier, go right
CCXCR4A/	Escape carrier 4 amp.
CCZERO/	Signal indicates that the data on the MIR lines is not equal to zero.
CDSCLKB, C, D	Clock signal
CEND	Carrier end of travel
CICRFBG	Carrier feedback ground
CICRFBL	Carrier feedback level
CICRDLC/	Carrier drive left
CICRDRC/	Carrier drive right
CITACHR	Tachometer right. Output of carrier tachometer is grounded when moving left.
CITU	CCCTU
CLR/	Clear
COUNT	Enabling signal for CCCOUNT
CRCUR	Carrier current
CRHS	Carrier high speed
CRL	Carrier left
CRR	Carrier right
CRUTSL/	Carrier up to speed left
CRUTSR/	Carrier up to speed right
DCLK	System clock
DDP	Device dependent port
DINT8	Data interrupt
DMIR	Memory input register
ENINTF	Energize interposer flip-flop
ENINH	Enable interrupt not honored
EOERIND	Error indicator signal
EXTn	External bus line
FCLK/	Forms clock not
FDI/	Forms data interrupt not
FDIF	Forms data interrupt flip-flop
FMEN	Forms enable
FMENF	Forms enable flip-flop
FMF	Forms flip-flop
FMPR	Forms or print data
FMTU	Forms TU
F+PDATA	Forms or print data
HOLD	Hold
IND	Indicator
INTF	Interposer flip-flop
IWCLK/	Instruction write clock
KDI	Keyboard data interrupt
LEFT	Carrier direction left
LIFORT	Force Type II
LSLP	Low speed, low power
LUMIRn	Output from memory information register n
PCLK/	Print data clock

PDI	Printer data interrupt
PEXL/	Print escape left not
PRTU	Printer TU
PSENT8	Enable status from port selector
PSINST1	Port select instruction to DDP8
PSREAD8	Port select read 8. Read line from the port select unit to DDP8.
PSWRIT8	Port select write 8. Write line from the port select unit to DDP8.
RCLR/	Register clear not. Signal goes low to clear the printer/forms data register.
REV	Reverse carrier
STALF	Stall flip-flop
STALRVF	Stall reverse flip-flop
STINT8/	Status interrupt not
TACHL	Tachometer left. Output of carrier tachometer, is grounded when moving right.
TACHLTP	TACHL test point
TACHR	Tachometer right. Output of carrier tachometer is grounded when moving left.
TACHRTP	TACHR test point
TU	Timer unit
TUF	Timer unit flip-flop
XCARR	Execute carrier (operation)
XCCLR/	Execute carrier clear not. Signal goes low from CLR button or SR15F (stall) to disable carrier movement.
XCRGL/	Escape carrier go left not
XCRGR/	Escape carrier go right not
XKDI	Signal true while keyboard data interrupt is returned to processor. Allows KSTF to set SR14F (INH) if key depressed.

B 9343

CONSOLE AND DDP

SECTION

II

FUNCTIONAL DETAIL

Burroughs

FIELD ENGINEERING

TECHNICAL MANUAL

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GENERAL

Section II is divided into two parts. The first part describes the functional detail of the B9343 Console mechanisms, while the remainder describes the functional detail of the Console DDP logic.

Note that the 94 character printer, and its associated control logic, is an option and is, therefore, described in Section VIII.

CONSOLE KEYBOARD

The keyboard is a motor driven mechanical device which produces a discrete eight-bit code for each key (see keyboard code chart Figure II-23). The code produced by any key depression is generated by allowing a combination of metal flags, from a set of eight (one flag per bit of KB code), to position themselves between wire-wound transducer core assemblies and associated permanent magnets.

When a flag is not present between a core and its magnet, the associated magnetic field saturates the core and makes the inductive impedance of the core low. When a flag is present between a core and magnet assembly, it will provide a shunt path for the magnetic field. Thus, the core will be unsaturated and exhibit a high inductive impedance (see Sec. III).

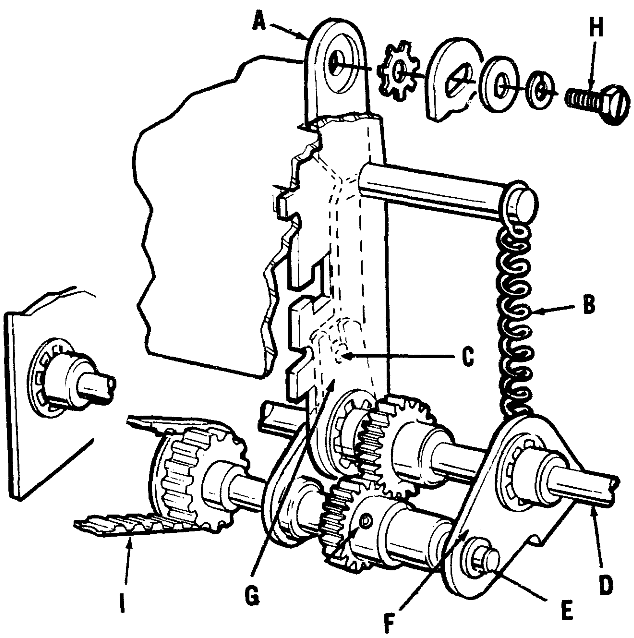


Fig. II-1

In addition to the eight flag assemblies which generate the keyboard codes, a ninth flag, transducer and magnet assembly controls a signal (KBST, keyboard strobe) on every key depression. The logic in the Console DDP continuously samples the transducers and is thus able to detect when a key is depressed, and load the generated code into a data buffer. The DDP will then generate an Interrupt signal to the Processor to inform it that a keyboard code is available in the buffer. When the processor unloads the keyboard character out of the buffer, the Interrupt signal is reset.

KEYBOARD DRIVE

Refer to Figure II-1. The Jack-shaft D is permanently coupled to Idler shaft E by brackets F and G, which pivot on the Jack-shaft. Spring B acts upon the bracket assembly to place the correct tension on keyboard drive belt I. The forked end of bracket G is coupled to moveable bracket A. When the keyboard drive belt has been tensioned by spring B, bracket A is locked in position by screw H. This prevents the bracket assembly from oscillating as the load on the keyboard drive belt varies.

The keyboard drive belt drives the clutch assembly on the keyboard filter shaft (see Figure II-2).

KEYLEVER ACTION

Figure II-2 shows all of the active components for a typical key on the keyboard. All of the keytops are mounted on keylevers (D) which pivot about a shaft at the rear of the keyboard and are controlled by springs (M) at the front of the keyboard.

When keylever D is depressed, its spring loaded passby pawl contacts and lowers interposer R, which has projections along its lower edge. Those align with the keyboard code bails (there are 8 similar to N). These lower projections correspond to the keyboard code required for that specific key, and each interposer is unique. Interposer R pivots about a shaft in the front of the keyboard and, when the keylever is depressed, its rear end is lowered to latch under latch spring B. This places the vertical step at the rear of the interposer R in alignment with filter shaft A. As interposer R is lowered, the upper projection, toward the rear of the interposer, is lowered into a ball type interlock (F, Figure II-4) and this only permits one interposer to be lowered at one time. All other key depressions are prevented until interposer R is restored.

Also, as interposer R is lowered, it rocks trip bail Q which rotates split collar S to release clutch bail T. Spring V raises latch bail T to permit the keyboard clutch to engage. Roll D, Figure II-3, is mounted just above latch bail A and limits its upward movement.

As filter shaft A begins to rotate, it contacts and drives interposer R forward so that the lower projections on the interposer will rock the selected keyboard code bails N. Also, the upper projection on the interposer moves forward and clear of the passby pawl on keylever D. (See Figure II-4.)

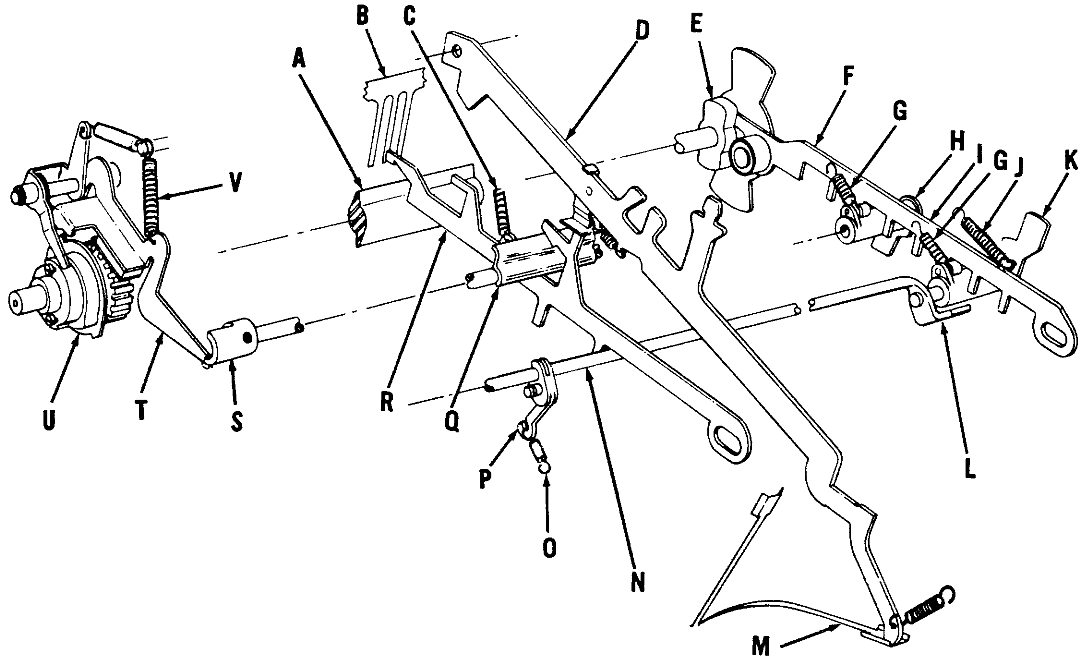


Fig. II-2 KEYLEVER MECHANISM

Rocking the keyboard code bail N (Figure II-2) causes foot L to unlatch the associated keyboard transducer flag K. See also Figure II-5. As the filter shaft A (Figure II-2) continues to rotate, cam E allows spring J to move slide F rearward, which in turn permits the unlatched flags to position between their magnets and cores. Also, the flag on the end of the filter shaft (part of E) passes between its magnet and transducer core to generate KBST, which is used as a strobe signal by the D.D.P. logic.

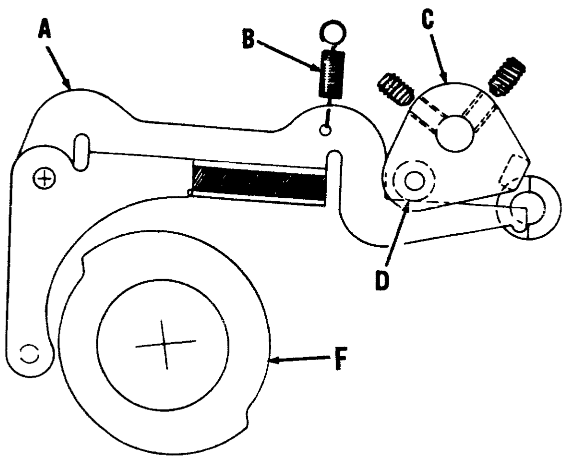


Fig. II-3 CLUTCH BAIL LIMIT

When the filter shaft A has driven interposer R fully forward from under latch spring B, it cams past the vertical step in the interposer and this permits spring C to restore the interposer upward and rearward. This removes the interposer from the ball lock to permit another key depression. If the keylever D is still held depressed at this time, the spring loaded passby pawl, A Figure II-4, moves to permit the rearward movement of the interposer. At the same time, cam F (Figure II-3) on the keyboard clutch mechanism restores latch bail A downward to disengage the keyboard clutch and permit collar E on the trip bail to restore above bail A.

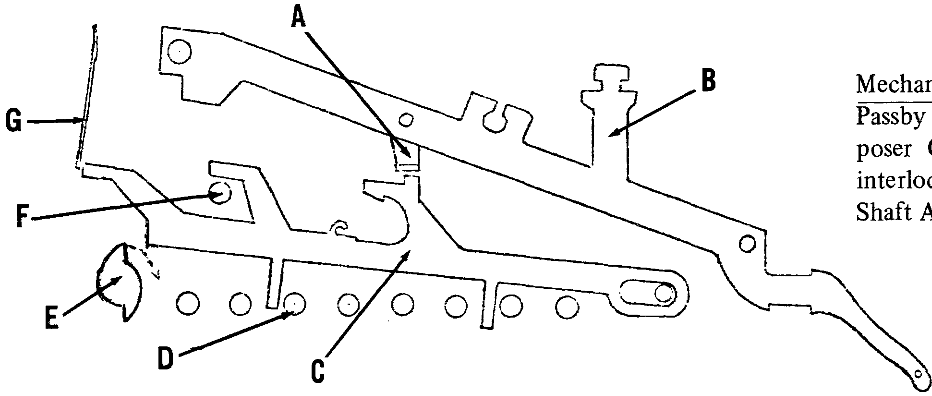
As the filter shaft completes its rotation, cam E Figure II-2, contacts the roll on slide F to drive it forward which in turn restores the keyboard transducer flags to their latched position.

When pressure is removed from keylever D, the passby pawl will be restored to its position above the upper projection on interposer R. Note that holding a key depressed does not prevent another key from being depressed after interposer R has been restored.

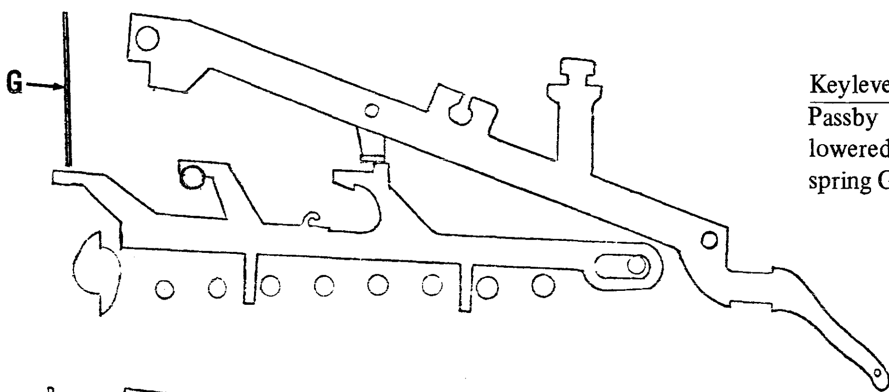
REPEAT KEYLEVER

The repeat keylever (Figure II-7) is designed to permit continuous operation of certain keyboard functions. This keylever is used for TAB, BACKSPACE, UNDER-SCORE and SPACE KEYS.

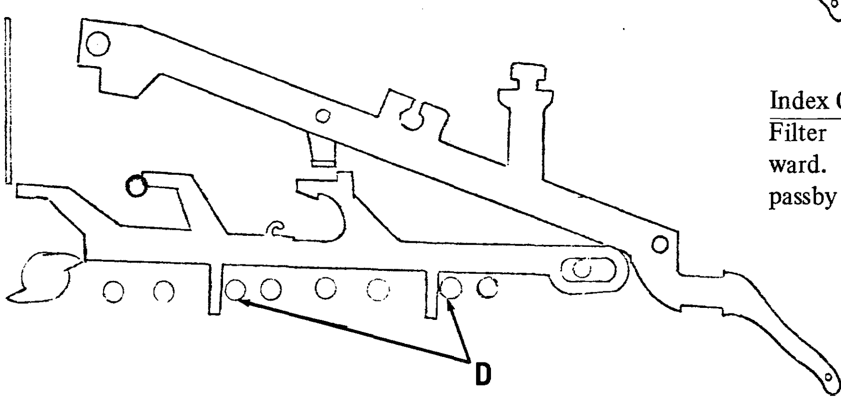
Depression of keylever at D lowers keylever A to contact and lower interposer G. This operation is the same as previously explained. The passby pawl on the keylever is used for single or first operation only.



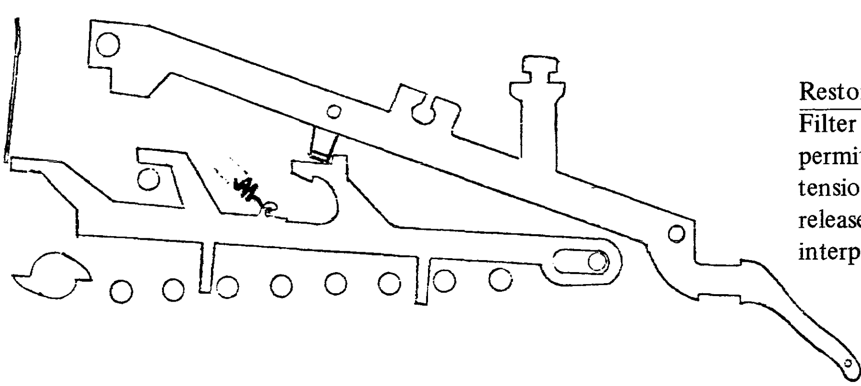
Mechanism at normal.
Passby pawl A above projection on interposer C. Forward projection on C above interlock balls F. Interposer clear of filter Shaft A.



Keylever depressed
Passby pawl contacts interposer. Interposer lowered into ball interlock, and latch by spring G. Keyboard clutch engaged.



Index Code
Filter shaft rotating drives interposer forward. Interposer clears latch spring, clears passby pawl, and rocks code bails D.



Restoring
Filter shaft clears interposer. Passby pawl permits interposer to restore under spring tension. Code bails restore. When keylever is released passby pawl will restore above the interposer.

Fig. II-4 KEYLEVER ACTION

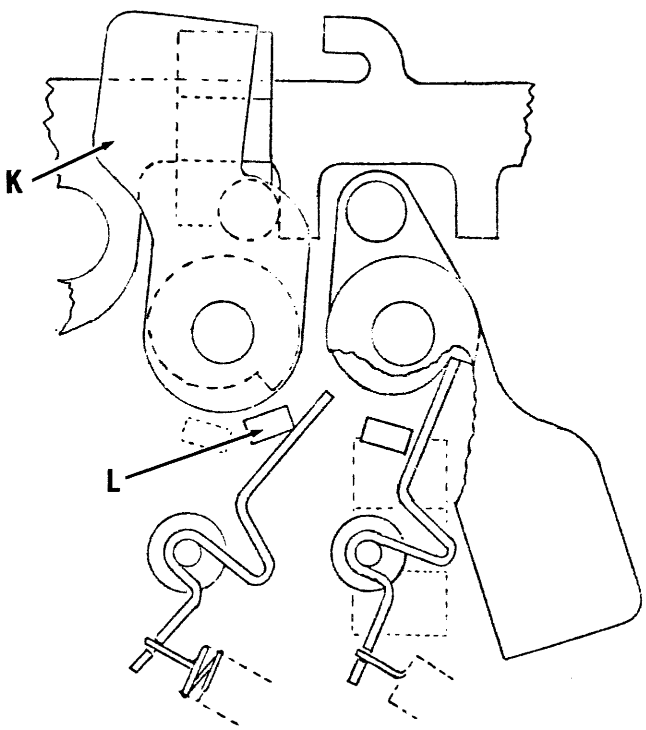


Fig. II-5 FLAG UNLATCHED

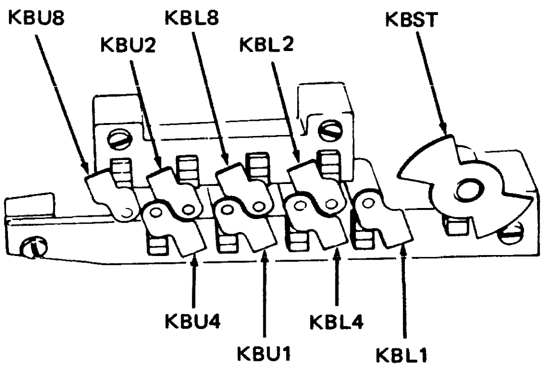


Fig. II-6 KEYBOARD FLAGS

When D is held depressed, shoe E contacts interposer G, holding it in an active position. Each time the filter shaft A (Figure II-2) contacts interposer G (Figure II-7) to restore it, compression spring C compresses, permitting interposer G to raise sufficiently for the filter shaft to clear the drive lip of interposer. Interposer G will restore, as explained previously, when pressure is removed from keylever at point D.

PROGRAM SELECT KEYS

The Program Select keys, arranged along the rear of the keyboard, are used to allow an operator to select various programmatic operations. Use of the keys is under control of the Interpreter and when such use is required, the associated indicators, mounted above the PSK's, are illuminated by the Interpreter. As with all other keys on the keyboard, the PSK's generate a discrete code which the Interpreter must interrogate to recognize. Figure II-9, shows all of the active components for a typical PSK.

When PSK I is depressed, PSK keylever H contacts keylever J to lower interposer K and trips the drive as for a normal key depression.

At the same time, PSK keylever H also contacts on bail D. which extends across the width of the keyboard to lower dummy keylever C and interposer A. Thus, interposer A is lowered on any PSK depression. Interposer K will operate the interlock balls L until it is restored, at which time the spring loaded latch B, on interposer A, will be lowered into the ball lock by spring N. This prevents the depression of any other key on the keyboard until PSK I is released and restored by spring G. Note that interposer A adds bits KBU2 and KBU4 to the code generated by interposer K, to form the PSK code. Most of the PSK's share an interposer similar to K with another key on the keyboard.

Keyboard timing diagram (Figure II-10) shows the relative movements of the code bails and the transducer flags for each 180° rotation of the filter shaft. Note that a 15.5 characters per second, one keyboard operation equals 64.52 ms.

The flags are unlatched between 50° and 74° of each cycle, signals from the keyboard transducers are true from 66° to 164° and KBST is true from 90° to 170°. Note that KBST = approximately 28.5 ms.

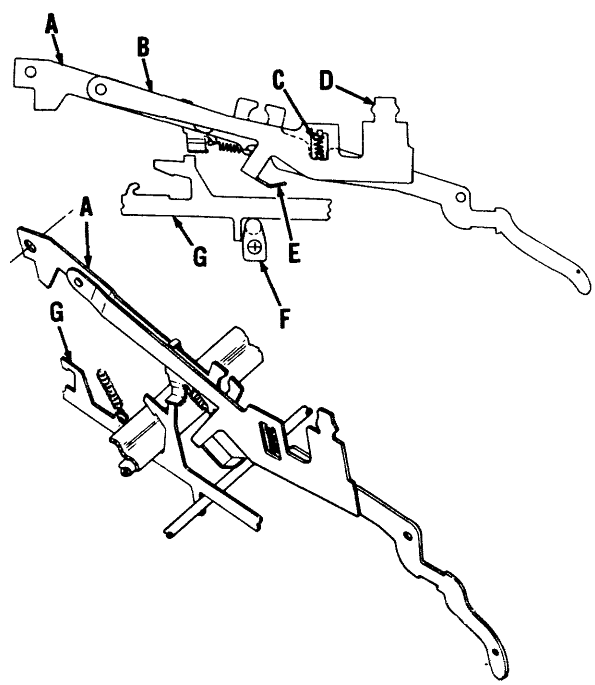


Fig. II-7 REPEAT KEYLEVER

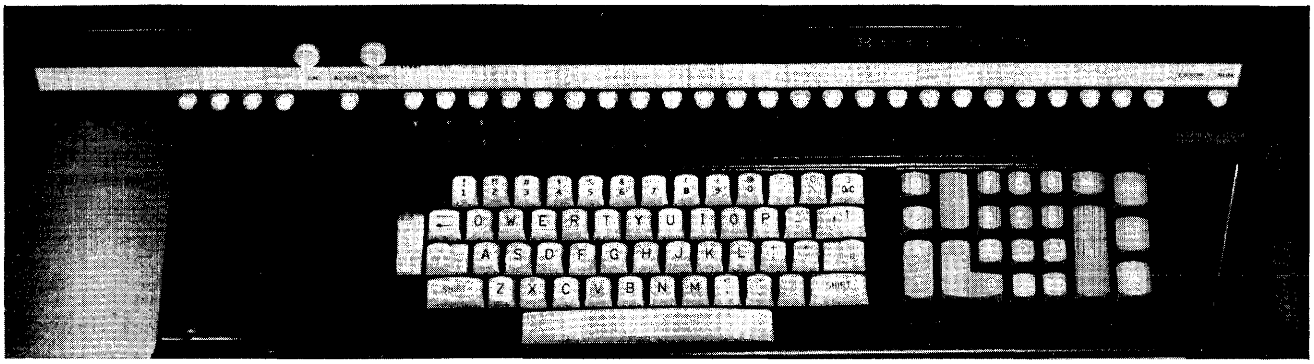


Fig. II-8 PROGRAM KEYS, 26" FORMS HANDLER

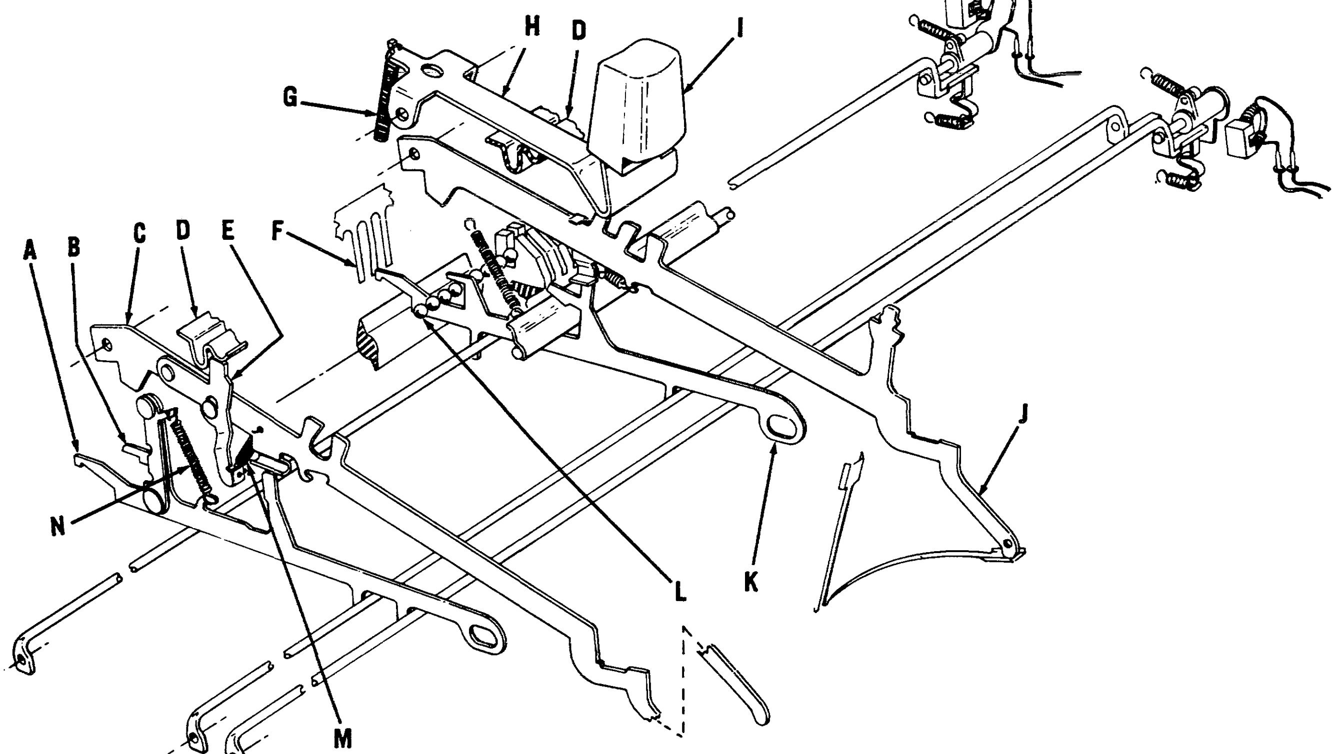


Fig. II-9 PROGRAM SELECT KEYS

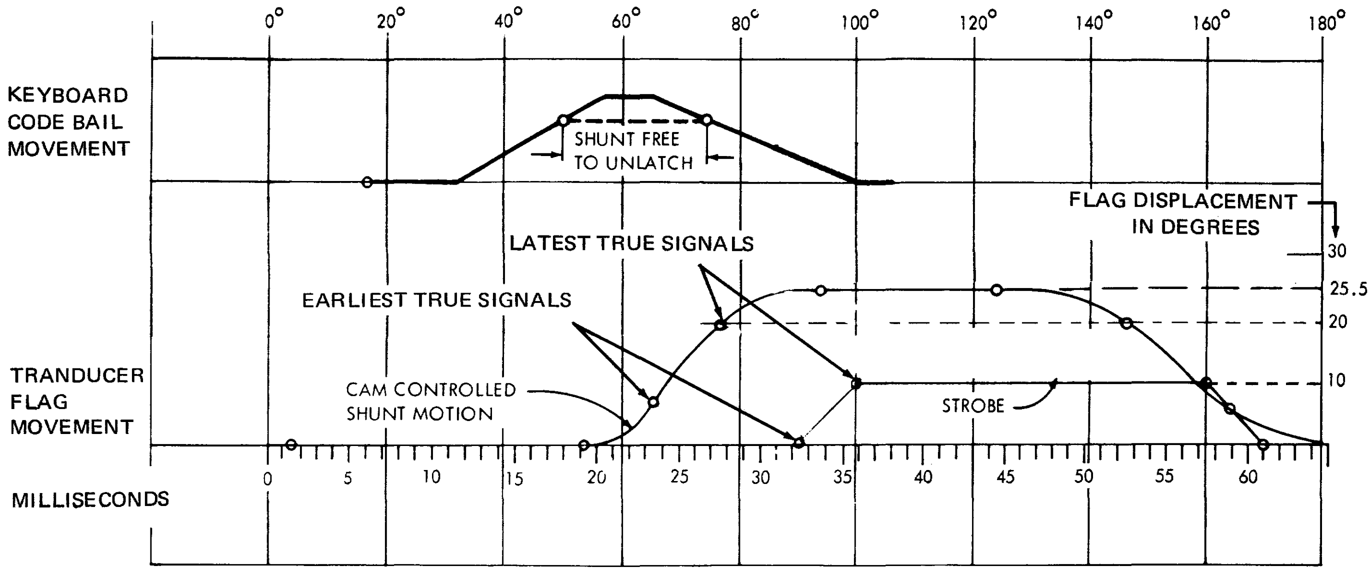


Fig. II-10 KEYBOARD TIMING DIAGRAM

TAPE CARTRIDGE

The tape cartridge provides the method of feeding punched tape through the Memory Loader. The tape must be manually fed into the lower slot of the tape cartridge (see Figure II-11). By rotating the feed sprocket, the tape may be fed around the drive pin-wheel and out of the upper slot. When the cartridge is inserted in the memory loader, a drive pawl will rotate the pin-wheel one tape code position for each keyboard cycle. Stripper block K, which engages in a slot in pin wheel J, prevents the punched tape from winding around the pin-wheel.

The design of the side frames (E & F Figure II-12), assists in aligning the tape with the pins of pin-wheel J. Spring G holds the tape against the pin-wheel so that pins A engage in the tape feed holes. Flat spring H exerts slight pressure to the pin-wheel to prevent overthrow when the feed pawl disengages from drive gear C.

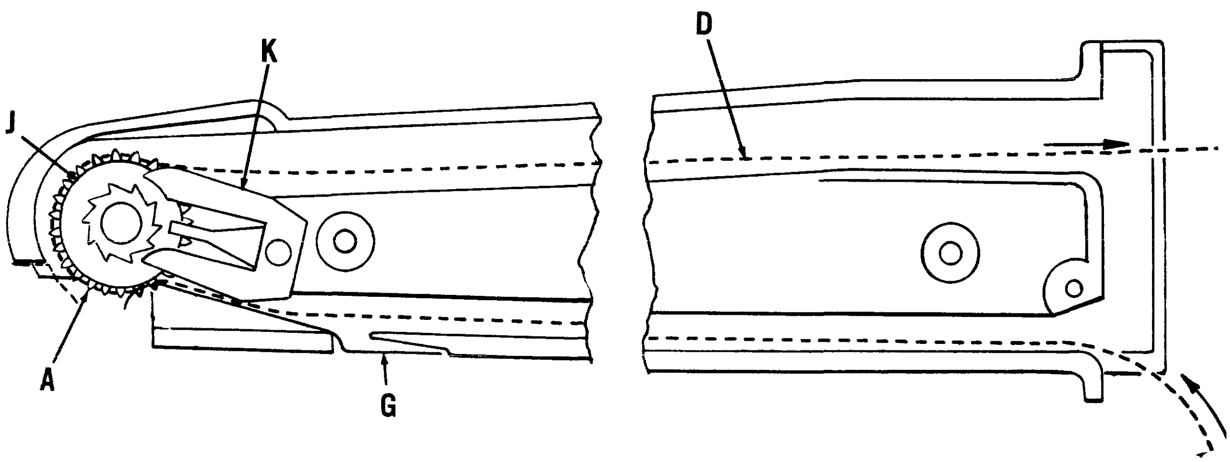


Fig. II-11 TAPE CARTRIDGE

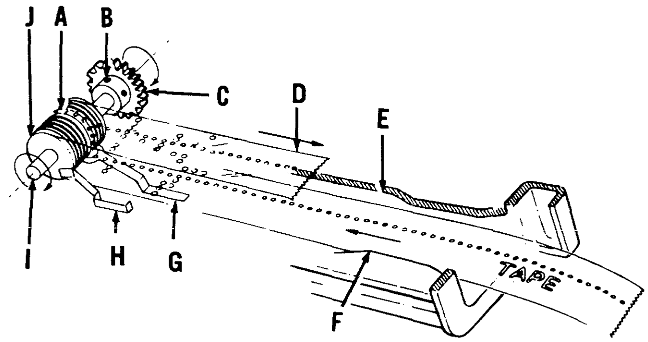


Fig. II-12 TAPE CARTRIDGE

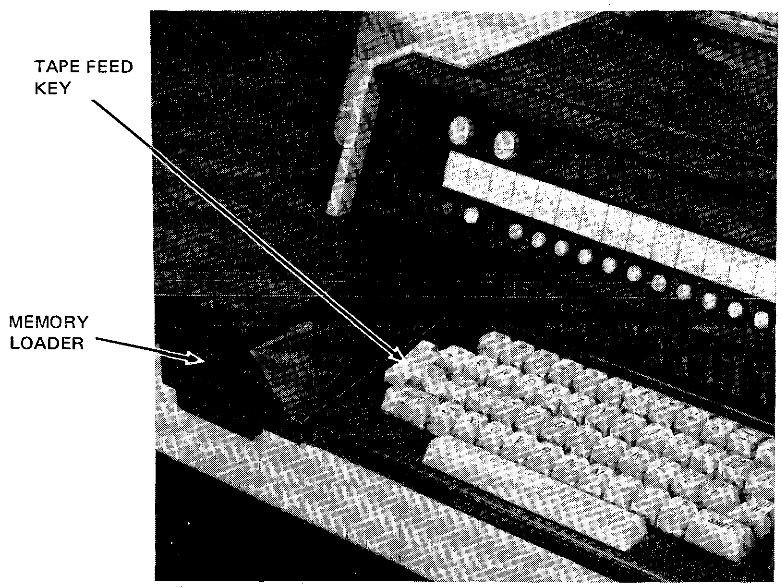


Fig. II-13 MEMORY LOADER AND TAPE FEED KEY

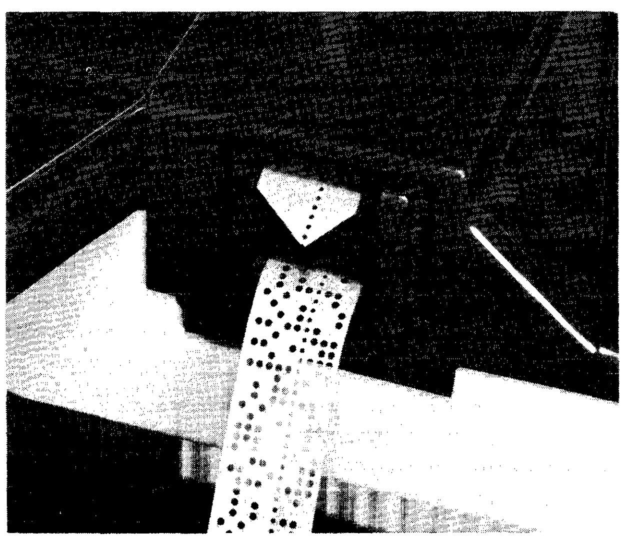
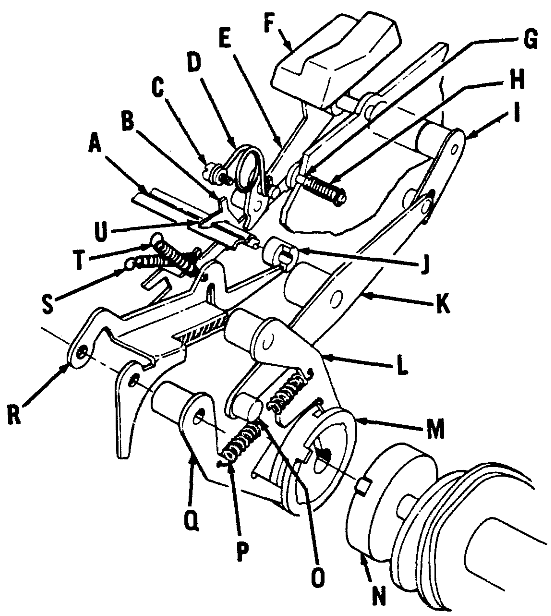


Fig. II-14 FEEDING PUNCHED TAPE



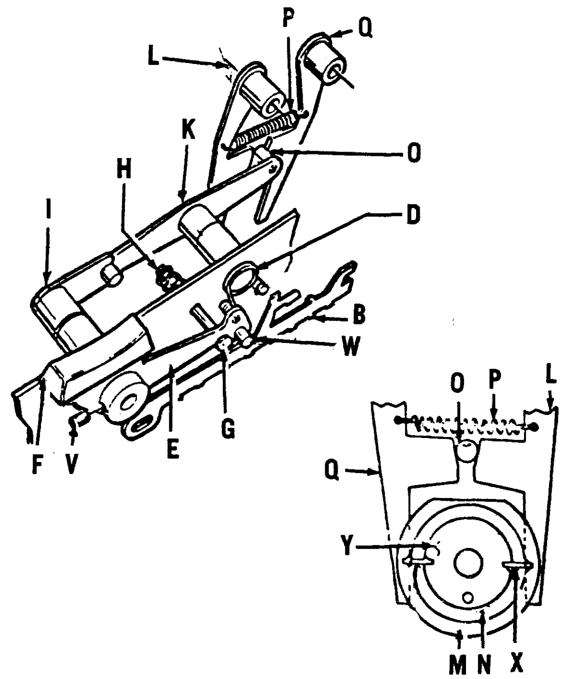


Fig. II-15 TAPE FEED KEY & MEMORY LOADER CLUTCH

MEMORY LOADER

The memory loader is a mechanical punched-tape reader attached to the keyboard mechanism. It will directly transfer code, punched in the tape, to the keyboard code bails (N Figure II-2), making the code available to the Processor at the maximum speed of the keyboard (15.5 characters per second).

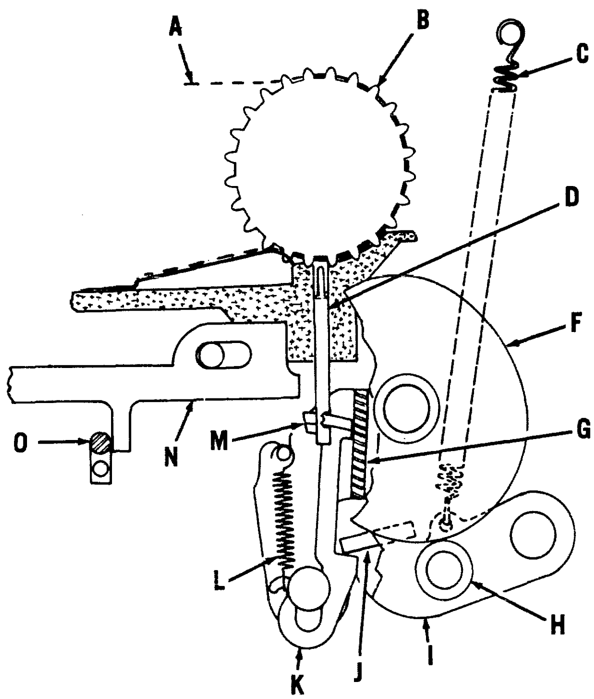


Fig. II-16 SENSING PIN LOWERED

The tape feed key (F Figure II-15) controls the drive clutch of the memory loader. When key F is depressed, the stud in the rear of keylever E contacts interposer B and lowers it. Interposer B will trip the keyboard clutch and actuate the ball interlock as described under Keylever Action.

At the same time, the tape feed key bellcrank I lowers the front end of lever K, stud O, at the rear end of lever K, is raised to clear the projections on clutch drivers L and Q. Spring P causes driver L or Q to drive the spring loaded clutch key X in, to couple drive disk Y with disk N.

Drive disk Y is attached to the keyboard filter shaft and rotation of the filter shaft is now transferred to the memory loader mechanism.

When the memory loader is inactive, Cam F (Figure II-16), contacting on roll H, holds restoring bail I in a lowered position. The horizontal part of bail I (J Figure II-16) holds interposer driver K in a lowered position. Lip M, on the interposer driver, engages in a slot in sensing pin D and holds it in a lowered position, clear of the punched tape path. There are eight interposer drivers and eight sensing pins, one for each channel in the tape.

With a tape cartridge, loaded with a punched tape, inserted into the memory loader and tape feed key (F Figure II-15) depressed, the keyboard filter shaft and the memory loader mechanism will rotate.

As Cam F (Figure II-16) rotates clockwise, spring C raises restoring bail I. Spring L now raises interposer driver K and sensing pin D. If there is no hole punched in the tape, the upward movement of sensing pin D and interposer driver K will be limited by the tape. At this time, Lip M on the interposer driver will be below the end of interposer N, see Figure II-17.

If a hole is punched in the tape, the interposer driver and sensing pin (K and D Figure II-18) will not be limited by the punched tape and lip M will be positioned behind interposer N. See Figure II-18.

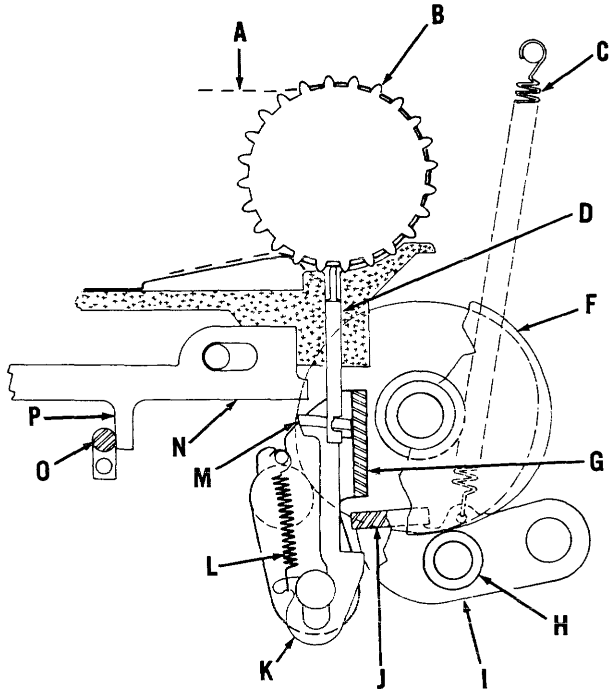


Fig. II-17 NO HOLE IN TAPE

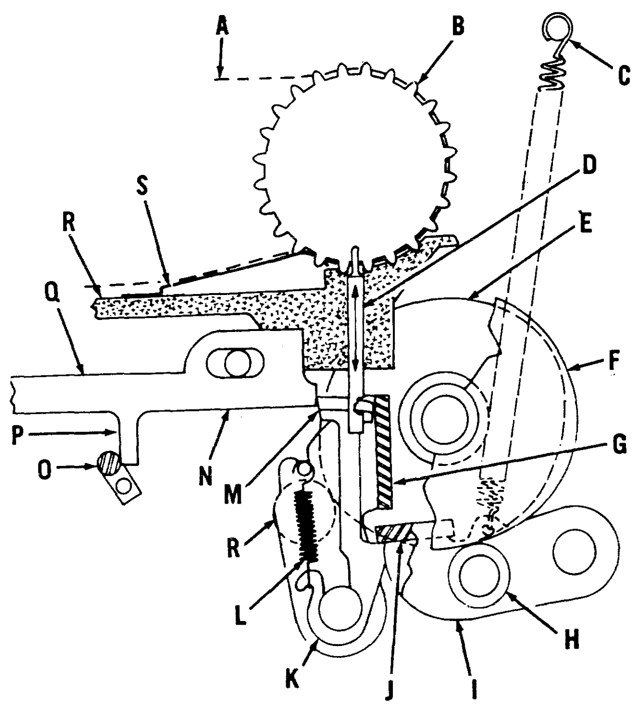


Fig. II-18 HOLE IN TAPE

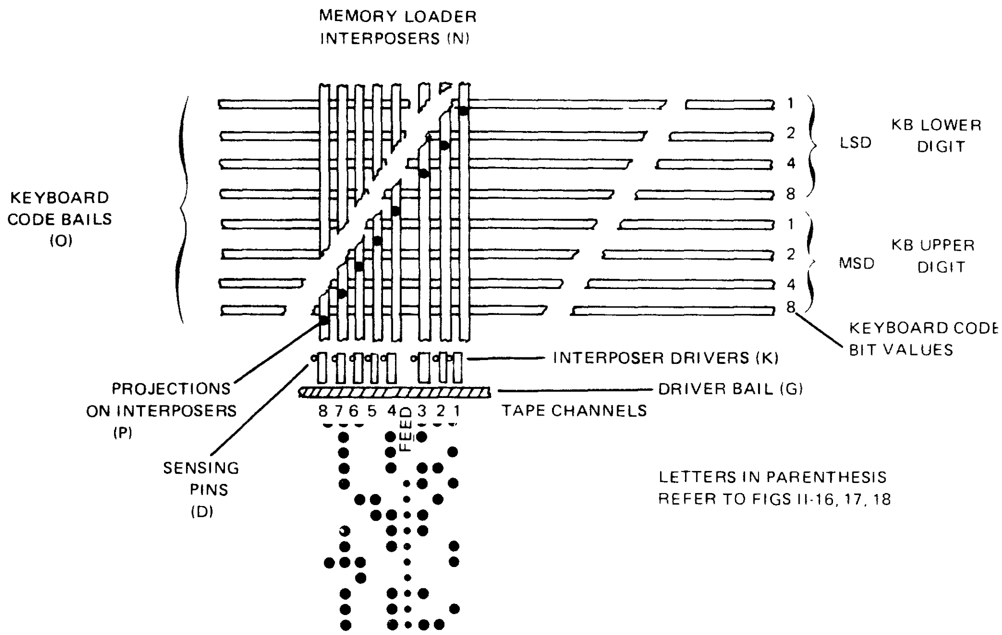


Fig. II-19 TAPE CODE TO KB CODE

As the memory loader mechanism continues to cycle, Cam E contacts the roller on driver bail G and rocks it rearward. Bail G contacts on interposer driver K and, if there is a hole in the punched tape, drives interposer N rearward. Interposer N will then rock code bail O through projection P to unlatch its associated transducer flag. There are eight interposers, one for each tape channel and keyboard code bail. In this manner, codes are read from the punched tape and transferred to the keyboard code bails. See Figure II-19.

SINGLE STEP

The Single Step feature enables punched tape to be fed through the memory loader one code at a time. This is particularly useful for debugging a keyboard or memory loader failure, or for testing a punched tape for correct data.

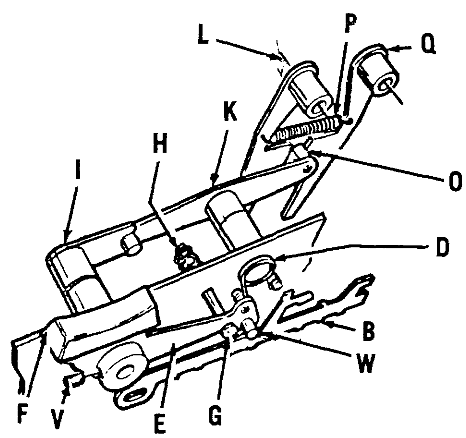


Fig. II-20 SINGLE STEP CONTROL

The Single Step function is enabled by moving spring loaded plunger H (Figure II-20) under keylever E and depressing tape feed key F, similar to a normal tape feed operation. Plunger H, when released, is now limited against keylever E and assists coil spring D to retain keylever E in a semi-lowered position.

In this position, stud O is lowered to engage the memory loader clutch. However, interposer B has not been lowered sufficiently to release the keyboard clutch.

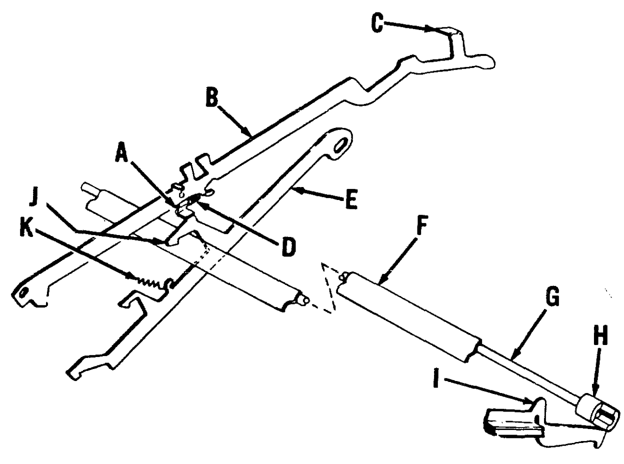


Fig. II-21 SINGLE STEP KEY

To complete a single step of the tape, it is required that the single step keylever B (Figure II-21) be depressed. Each depression of keylever B will actuate interposer E to release the keyboard clutch, similar to a normal key action. Note that interposer E has no projections to rock the keyboard code bails, the code being indexed through the memory loader.

Formed ear C, on keylever B, is positioned beneath a small hole in the keyboard top cover. Thus, the single step keylever may be actuated by inserting a piece of stiff wire or small allen wrench vertically into the hole in the top cover.

When the punched tape has been fed through the memory loader, or if the operator wishes to stop the loading process, the memory loader is turned off by restoring the tape-feed Key F (Figure II-22) to its off position. At this time, plunger H (Figure II-20) will be released, and restores under spring tension. Spring S will restore interposer B, and stud O on lever K will be lowered to cam clutch drivers L and Q out of the memory loader clutch. In turn, this allows the spring loaded clutch key X to restore into clutch housing M at the next slot. The clutch key then locks driver clutch disk N to the clutch housing M and rotation of the memory loader mechanism ceases.

At the same time, since interposer B has been allowed to restore, the keyboard drive clutch disengages and rotation of the filter shaft ceases (refer to Figure II-22).

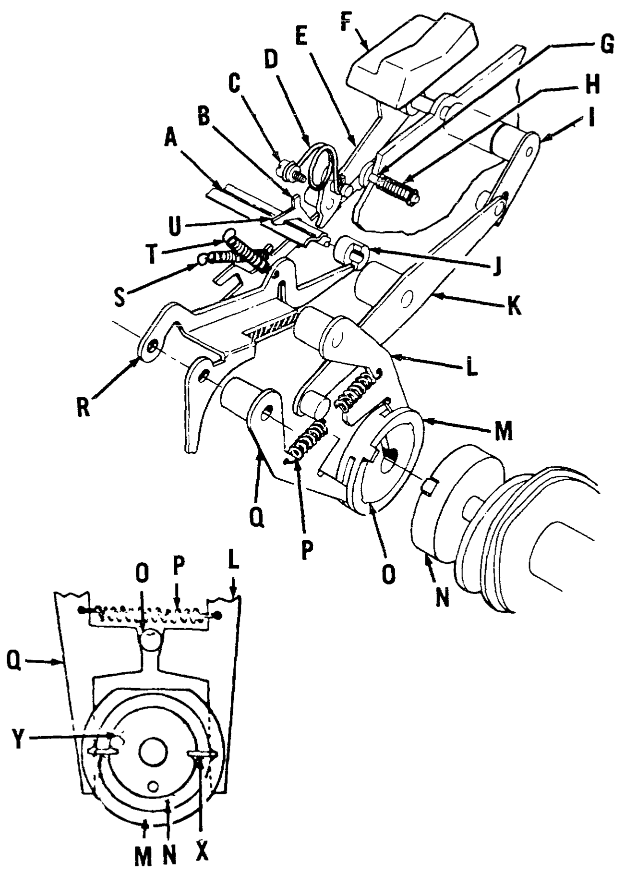


Fig. II-22 MEMORY LOADER CLUTCH

KB LOWER VALUE

KB UPPER VALUE

SHIFT KEY (rows 8–15)

	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
0																
1	0	1	2	3	4	5	6	7	8	9			←	↑ LEFT	O/C	RESET N
2	0 N	1 N	2 N	3 N	4 N	5 N	6 N	7 N	8 N	9 N	00 N	000 N	C N	RE N	M N	• N
3	SPACE					OCK I	OCK II		;	–	,	.	/	=	/	1/2
4	P	Q	R	S	T	U	V	W	X	Y	Z		OCK IIII N	OCK I N	OCK II N	OCK III N
5		A	B	C	D	E	F	G	H	I	J	K	L	M	N	O
6	PK 17	PK 18	PK 19	PK 20									PK 16	PK 21	PK 22	PK 23
7	PK 0	PK 1	PK 2	PK 3	PK 4	PK 5	PK 6	PK 7	PK 8	PK 9	PK 10	PK 11	PK 12	PK 13	PK 14	PK 15
8																
9	)	CR	@	#	$	%	¢	&	·	(			◊	↑ RIGHT	3/4	
10																
11						OCK III	OCK IIII		:	___	°	!	"	+	?	1/4
12																
13																
14																
15																

N = NUMERIC KEYBOARD

Fig. II-23 KB CODE CHART

KEYBOARD CODES

Figure II-23 shows the code generated by each key on the keyboard. Note that some of the shift and special characters will vary with different marketing styles of keyboard.

DECODER

The prime purpose of the decoder is to convert code, generated by the Processor, into mechanical movement, which is applied to the print head in order to align a required print character with the printer ribbon and print media (Journal roll, Front feed form, or Pin-fed form). Additionally, the decoder, acting upon signals from the Processor, controls the vertical positioning of the printer ribbon to print the selected character in red or black and controls the release of the print shaft clutch. When the print shaft clutch is released, the print shaft drives the printer mechanism to accomplish the actual printing of the character.

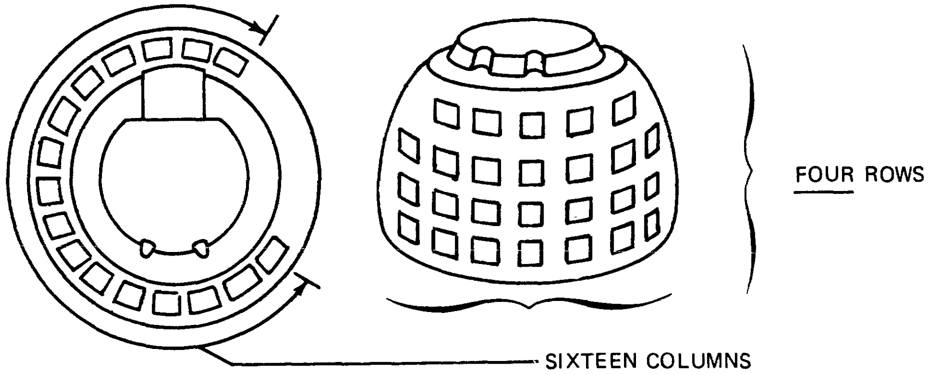


Fig. II-24 PRINT HEAD

ROW \ COLUMN	7	6	5	4	3	2	1	0	15	14	13	12	11	10	9	8
0	#	"	!	~	3	2	1	0	C	B	A	@	S	R	Q	P
1	.	&	%	$	7	6	5	4	G	F	E	D	W	V	U	T
2	+	*	)	(	;	:	9	8	K	J	I	H	[	Z	Y	X
3	,	.	-	,	?	>	=	<	O	N	M	L	—	∧	]	\

Fig. II-25 CHARACTER POSITION CHART

PRINT HEAD

The print characters of a sixty-four character printer are arranged about the periphery of the print head in sixteen columns, each of four rows. (See Figure II-24.)

To select a specific character, the print head must be tilted to select the row and rotated to select the column where the character is located. Figure II-25 shows the characters of a typical print head in relation to column and row.

Note that other styles of print head will have characters different to those shown, in certain character positions.

PRINT HEAD TILT

The tilting of the print head to one of four rows is controlled by two eccentrics in the decoder. Figure II-26 shows how eccentrics A and B are able to position bellcrank D to any one position by moving link C. Note how bellcrank D is not attached to the center of link C.

The top of bellcrank D controls the tilt band which transmits the decoder movement to the print head. This is described under Print Unit Tilt. (See Figure II-41.)

NOTE: The positioning of the eccentrics is described under DECODER CLUTCHES.

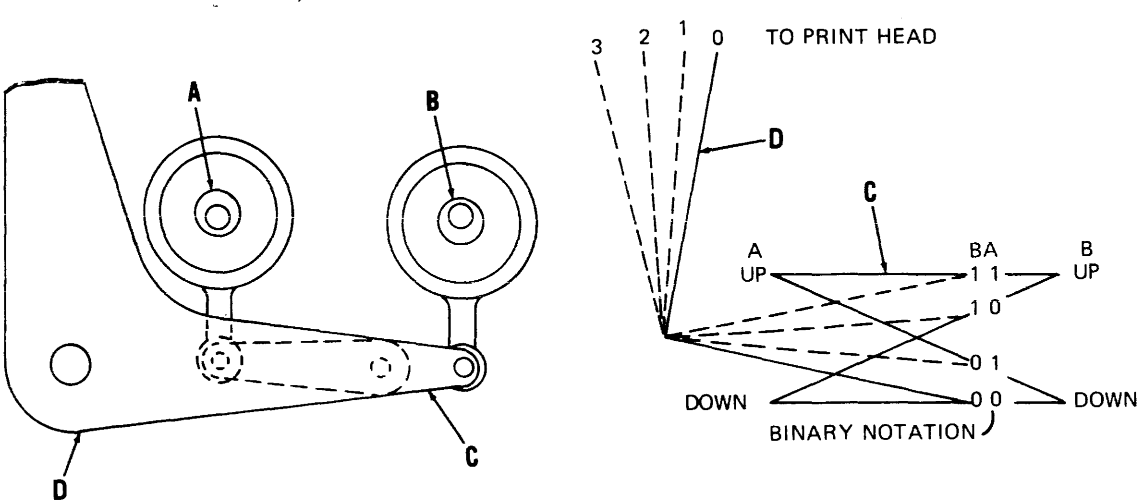


Fig. II-26 TILT ECCENTRICS

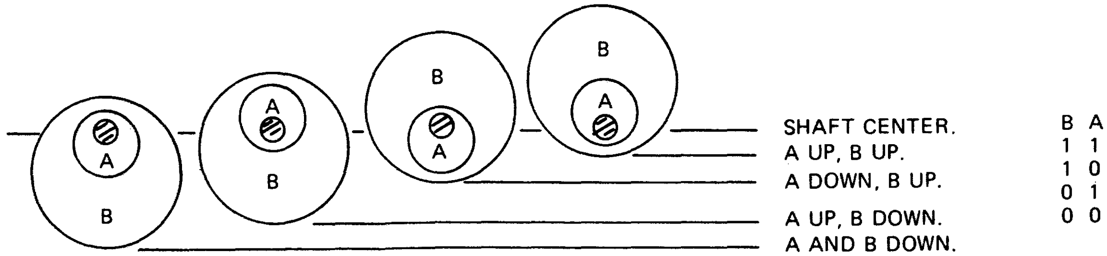


Fig. II-27 TWO ECCENTRICS, FOUR POSITIONS

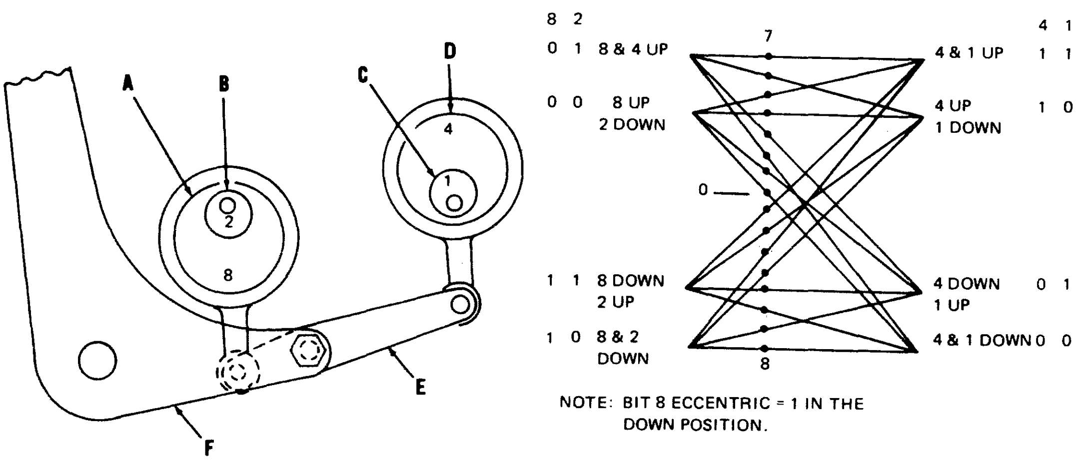


Fig. II-28 ROTATE ECCENTRICS

PRINT HEAD ROTATION

To rotate the print head to one of sixteen positions, four eccentrics are used. Figure II-27 shows how two eccentrics mounted together are used to select one of four positions.

Two pairs of eccentrics are then used to control link E and bellcrank F as shown in Figure II-28, in order to select one of sixteen positions for bellcrank F. The top of bellcrank F controls the complementary rotate bands which transmit the movement to the print head. The rotation of the print head is described under PRINT UNIT ROTATE. (See Figure II-42.)

NOTE: The positioning of the eccentrics is described under DECODER CLUTCHES.

RIBBON SHIFT

Referring to Figure II-29, Cam A has two static positions. The high point of Cam A can be immediately behind roll B or diametrically opposite, away from roll B.

When the Cam is rotated to position the high point behind roll B, link C is moved to rock bellcrank D and lower rod F. The top end of rod F protrudes through the top of the decoder, where the screw stud G actuates the ribbon mechanism to select the red portion of the ribbon. This action is described under PRINTER RIBBON SHIFT. When the high point of Cam A is positioned away from roll B, spring E restores bellcrank D and raises rod F to select the black portion of the ribbon.

The positioning of Cam A is described under DECODER CLUTCHES.

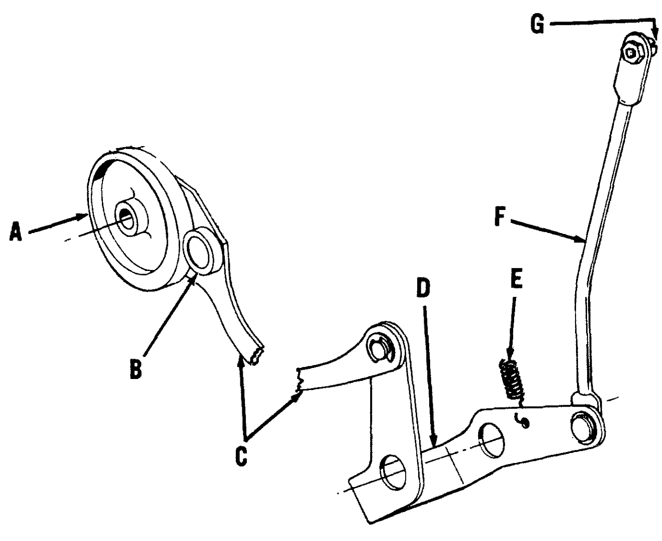


Fig. II-29 RIBBON SHIFT

PRINT CLUTCH

Referring to Figure II-30, the high point of Cam A can be positioned either behind roll B, or away from it.

When the high point of cam A is behind roll B, bellcrank C is rocked to lower rod E. Rod E protrudes through the top of the decoder where formed ear G releases the print shaft clutch. The function of the print shaft clutch is described under PRINT SHAFT CLUTCH.

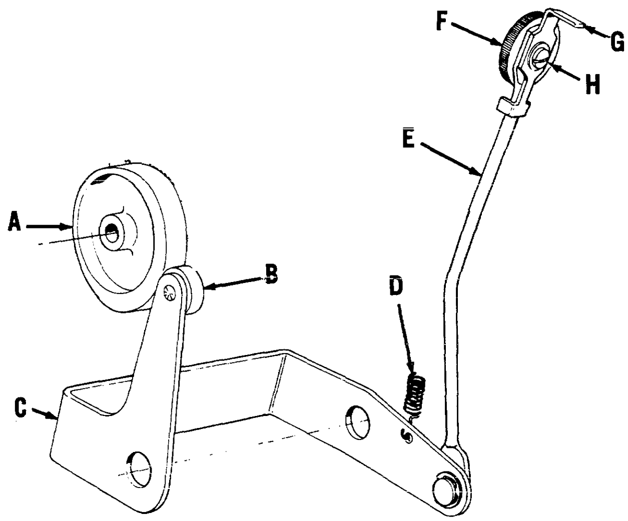


Fig. II-30 PRINT CLUTCH

When the high point of cam A is positioned away from roll B spring D restores bellcrank C and raises rod E to allow the print shaft clutch to disengage. The positioning of cam A is described under DECODER CLUTCHES.

DECODER CLUTCHES

All of the eccentrics and cams in the decoder (two tilt, four rotate, red ribbon, and print clutch) are driven and positioned by solenoid-controlled key clutches. Figure II-31 shows a typical key clutch assembly.

Driver disk H is attached to drive shaft E by set screw D. Drive shaft E is constantly rotating while the console printer motoris on. Driven disk G fits around and behind driver disk H, see sectional view. While the clutch is inactive, spring loaded clutch key I is engaged with driven disk G and clutch housing F. (Note clutch housing F is not free to rotate), therefore disk G and the eccentric N are held stationary.

Clutch driver links J and C are restored below solenoid clapper M during each cycle of the decoder mechanism by downward movement of shaft assembly L as shown.

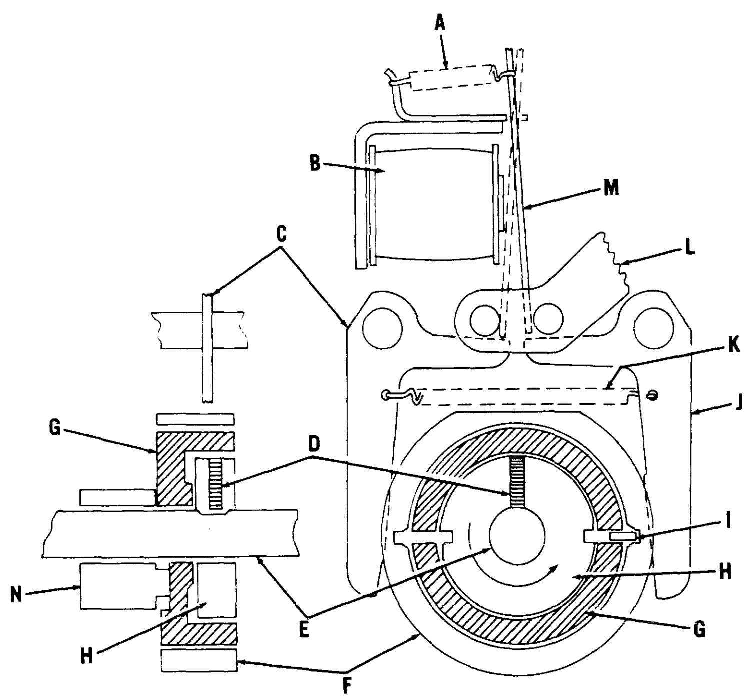


Fig. II-31 DECODER CLUTCH

While shaft assembly L is in the lower position, the solenoid B is either picked or dropped in order to position clapper M over either driver J or C. If the solenoid is picked (clapper over driver C), as shaft assembly L moves upward, spring K will cause driver J to contact clutch Key I. This is mechanically synchronized with the rotation of drive shaft E and occurs just prior to the driver disk reaching the position shown in Figure II-31.

Thus, driver J drives the clutch key into engagement with disk G and disk H. Continued rotation of driver disk H now rotates disk G and eccentric N to provide the associated decoder function.

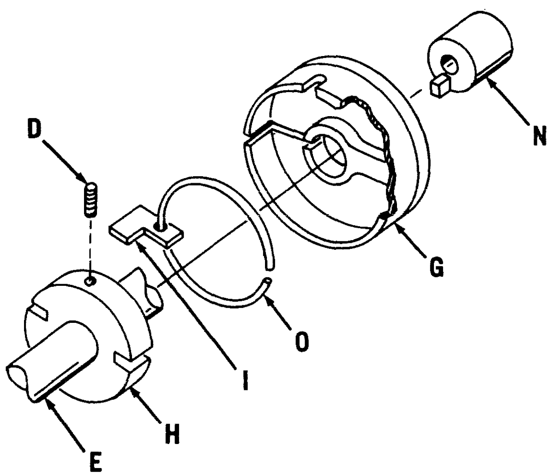


Fig. II-32 DECODER CLUTCH ASSEMBLY

All decoder clutches and eccentrics are mounted on two parallel drive shafts which are gear coupled and driven together. Figure II-33 shows the clutch assemblies mounted on the drive shafts.

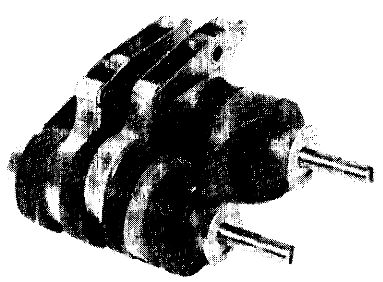


Fig. II-33 DECODER CLUTCHES

The reset shaft assembly which resets the clutch driver arms is driven by two cams on the input drive shaft, see Figure II-34.

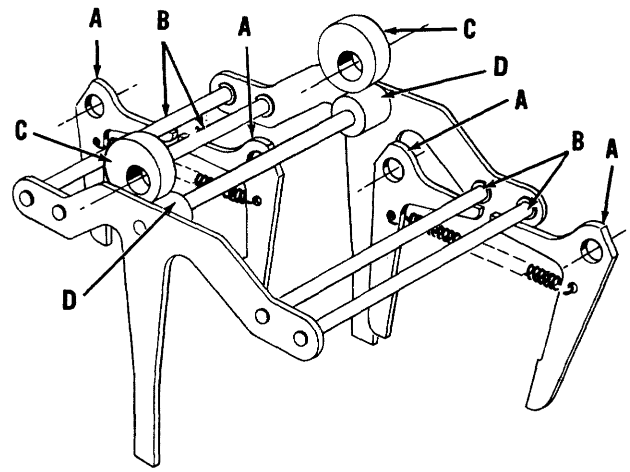


Fig. II-34 RESET SHAFT ASSEMBLY

ECCENTRIC GEAR DRIVE

The two clutch drive shafts are driven through an eccentric gear drive from the input drive shaft. The purpose of the eccentric drive is to reduce the velocity of the clutch shafts at the time that the clutch keys are being driven into, or out of, engagement with the driver disks (H, Figure II-31). When the clutch is engaged, and movement of the eccentrics take place, the eccentric drive accelerates the movement of the clutch drive shafts to maintain an effective gear ratio between the input and clutch drive shafts, of 2:1. Figure II-35 shows the principle of the eccentric gear drive.

Gear A is mounted on eccentric boss C, on the input drive shaft B, and drives gear I which is mounted on link H. Link J is also attached to eccentric boss C and link H pivots about shaft F. Therefore, as the input drive shaft and gear A rotate, the eccentric C rocks gear I and link H to and fro about the periphery of gear G. This means that the movement of gear I is alternately with and against the direction of drive. This causes the rotational velocity of gears G and D to vary between 230 rpm and 1050 rpm. Gears G and D are pinned to the clutch drive shafts F and E. Figure II-35 shows the gears in the low velocity position and Figure II-36 shows them in the high velocity position.

The mechanical timing is such that the clutch driver reset shaft assembly (B Figure II-34) moves upward to allow the actuation of a selected clutch key, while the clutch drive shafts are moving at low velocity. Downward movement of the shaft assembly, to reset the clutch driver arms and allow the solenoids to be picked or dropped, occurs while the clutch drive shafts are moving at high velocity.

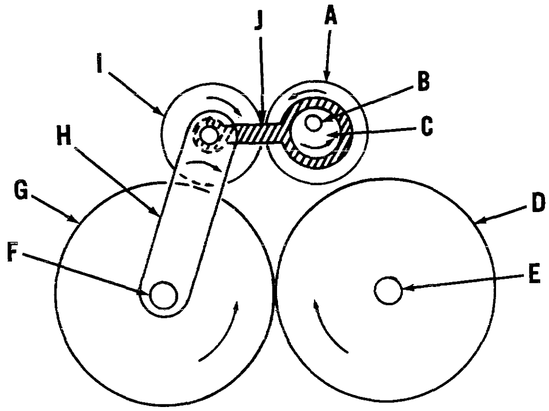


Fig. II-35 ECCENTRIC GEAR DRIVE

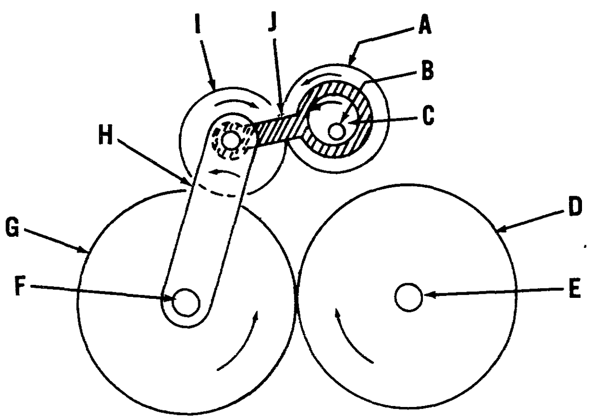


Fig. II-36 ECCENTRIC DRIVE – HIGH SPEED

SOLENOID ASSEMBLIES

The decoder clutch selecting solenoids are mounted on two brackets above the clutch assemblies. The solenoids are picked by signals from the processor which must be synchronized to the mechanical movement.

To ensure that the solenoid clappers are separated from the solenoid cores, when the solenoids are dropped, a mechanical knock-off bail is used. Figure II-37 shows the arrangement.

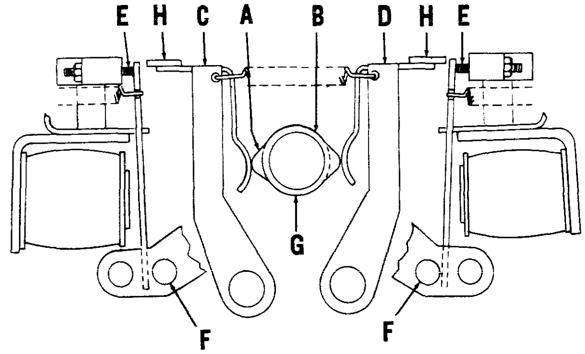


Fig. II-37 CLAPPER KNOCK-OFF

On each decoder input shaft revolution, cams A and B rock bails C and D (one cam for each bail). The top end of bails C and D then contact the upper part of the solenoid clappers to drive them away from the solenoid cores.

When a solenoid is not picked, the clapper limits on limit screw E. Limit screws E are adjusted so as to keep the bottom end of the solenoid clappers clear of clutch driver reset shafts F which are driven up and down on each decoder cycle.

The mechanical knock off of the clappers is timed to occur just prior to the pick signals from the processor.

TIMING SIGNAL – TU

To provide a timing signal to synchronize logic functions with the mechanical sections of the console, a transducer core, magnet, and flag assembly is mounted within the decoder.

In Figure II-38 flag A is mounted on the forward end of the input drive shaft. On each revolution of the input shaft, i.e. on each console mechanical cycle, flag A passes between transducer B and its associated magnet. The flag is present, and TU is true, from 30 time to 03 time.

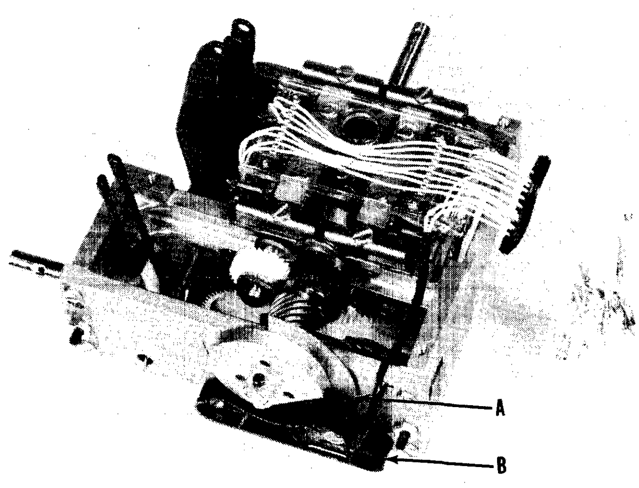


Fig. II-38 TU FLAG & TRANSDUCER

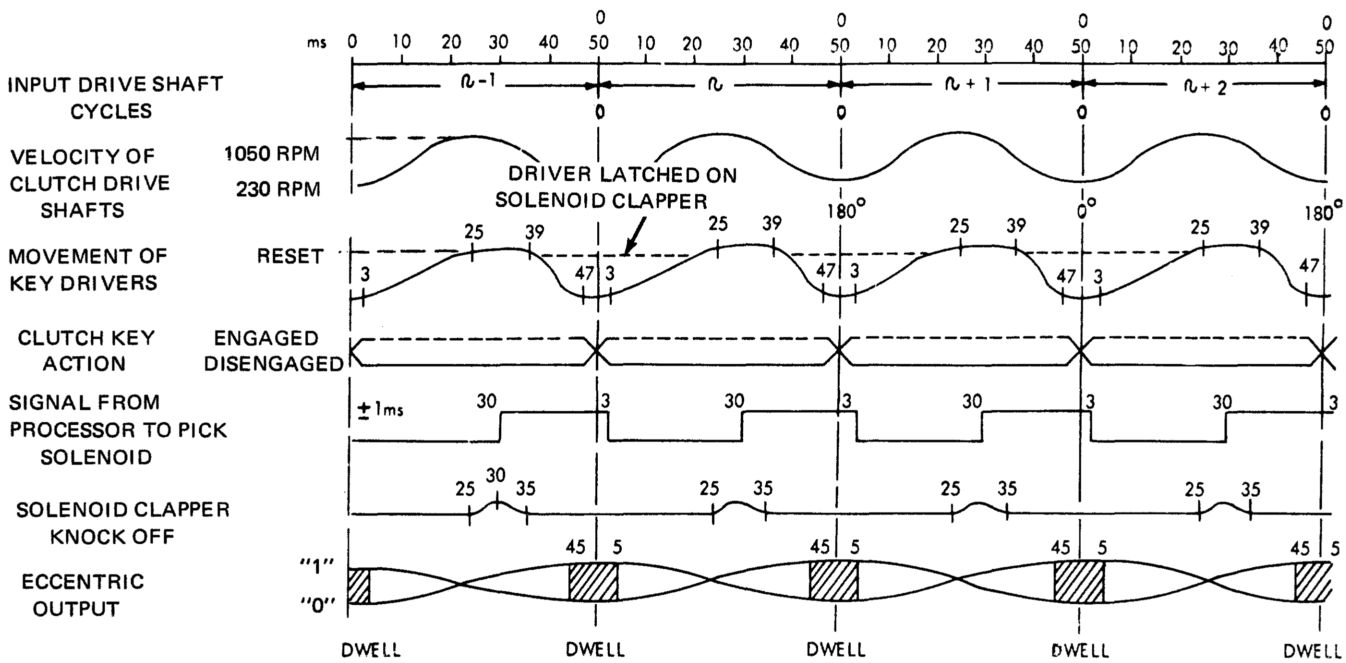


Fig. II-39 TIMING CHART

DECODER TIMING

Figure II-39 is a timing chart which shows the timing relationships between the drive shafts, solenoid controlled clutches, and eccentrics.

PRINTER UNIT

The printer unit is contained within a cradle assembly which is moved and positioned by the carrier mechanism. The spherical print head is rotated and tilted to select a specific character and the ribbon mechanism is shifted to index a red or black ribbon selection. Printing occurs when the print shaft clutch is released, enabling the print shaft to rotate 180°. This actuates the printer unit cams to shift the ribbon and drive the print head against the ribbon and print media.

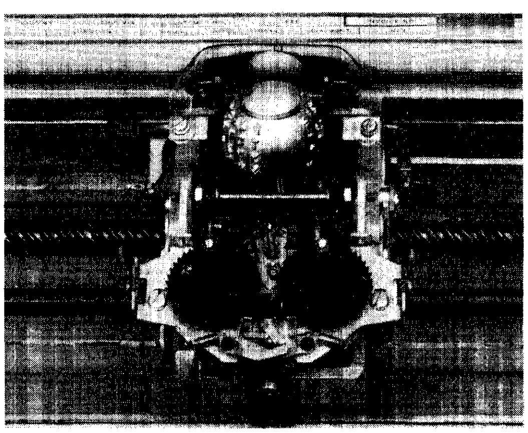


Fig. II-40 PRINTER WITH RIBBON CARTRIDGE REMOVED

PRINT UNIT TILT

Referring to Figure II-41, arm L and pulley A are positioned to one of four positions, 0 through 3, by the tilt clutches and eccentrics in the decoder (see Figure II-26). Pulley J is attached to the opposite end of the printer chassis.

Tilt band B is attached to another C, passes around pulleys A and J, then around guide I (part of H) and is attached to stud K in lever H. Spring G, also attached to stud K, maintains tension on band B and provides a means of returning the print head to tilt position 0. Movement of arm L to tilt positions 1, 2, or 3, lowers lever H, which through link D, pivots the print head carrier E to the selected position. Spring M is attached to arm L and compensates for spring G, thus removing the load spring G from the decoder. clutches. Anchor C and lever H are both adjustable to achieve a fine positioning of the print head.

Note how parts C through I, and J, are contained within the printer mechanism cradle, and are free to be moved to any printer position with band B passing around pulleys A and J.

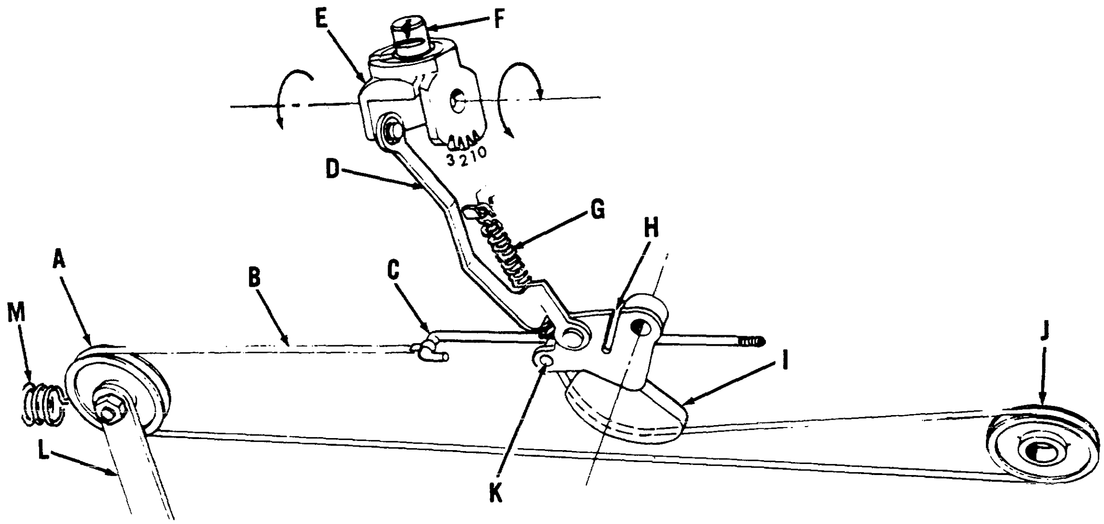


Fig. II-41 TILT MECHANISM

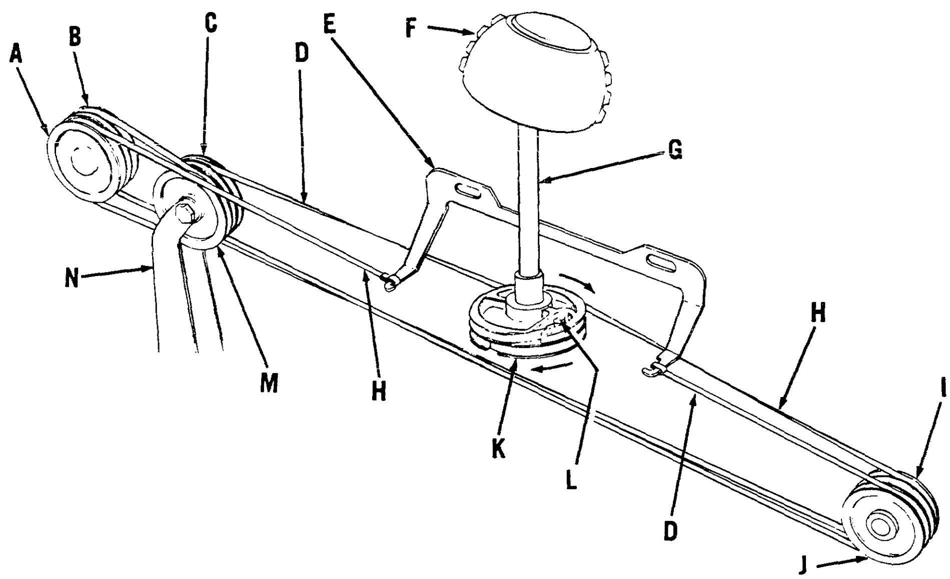


Fig. II-42 ROTATE MECHANISM

PRINT UNIT ROTATE

The rotate mechanism is not spring controlled, as is the tilt mechanism, but is controlled with two complementary bands working in opposition.

Referring to Figure II-42, arm N and pulleys M and C are positioned to one of sixteen positions by the rotate clutches and eccentrics in the decoder (see Figure II-28). Pulleys I and J are attached to the opposite end of the printer chassis. Band D is attached to the right side of anchor E, passes around pulleys I and C, then approximately half way around the lower part of rotate pulley K, where it is attached to a stud.

Band H is attached to the left side of anchor E, passes around pulleys A, M, B and I, then approximately half way around the upper part of rotate pulley K, where it is attached to stud L.

Figure II-43 shows the mechanism, not to scale, with the pulleys separated for clarity. Note how pulleys A, B, and M achieve a complementary action for band H. Thus movement of arm N results in rotation of pulley K, which through shaft G rotates the print head F.

NOTE: Shaft G is coupled to post F (Figure II-41) through a universal-joint which permits both rotation and tilting of post F.

Band anchor E (Figure II-42) is adjustable to achieve a fine positioning of the rotate mechanism. Note how parts E, F, G, and K are contained in the printer mechanism cradle, and are free to be moved to any printer position, with bands D and H passing around the pulleys.

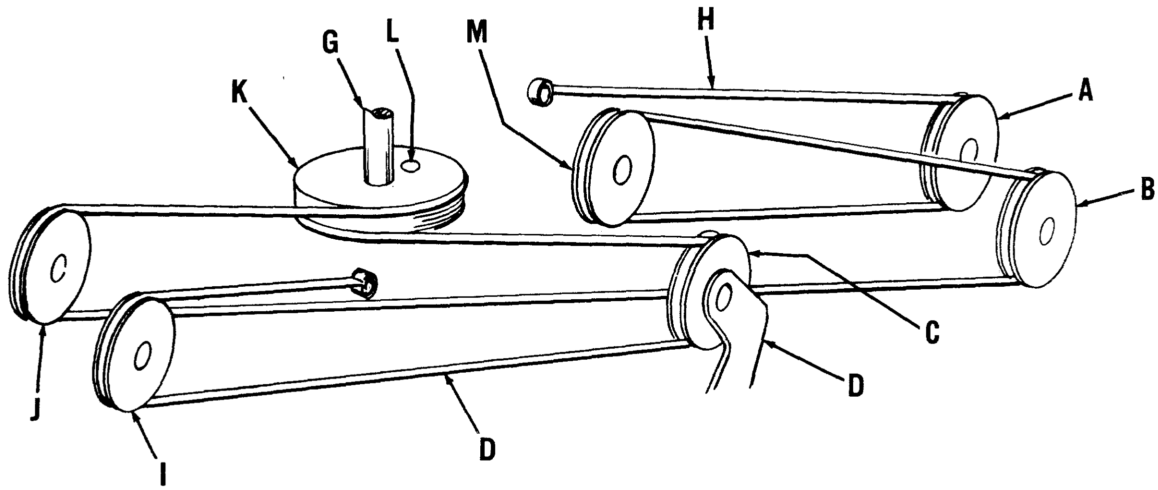


Fig. II-43 ROTATE & COMPLEMENTARY BANDS

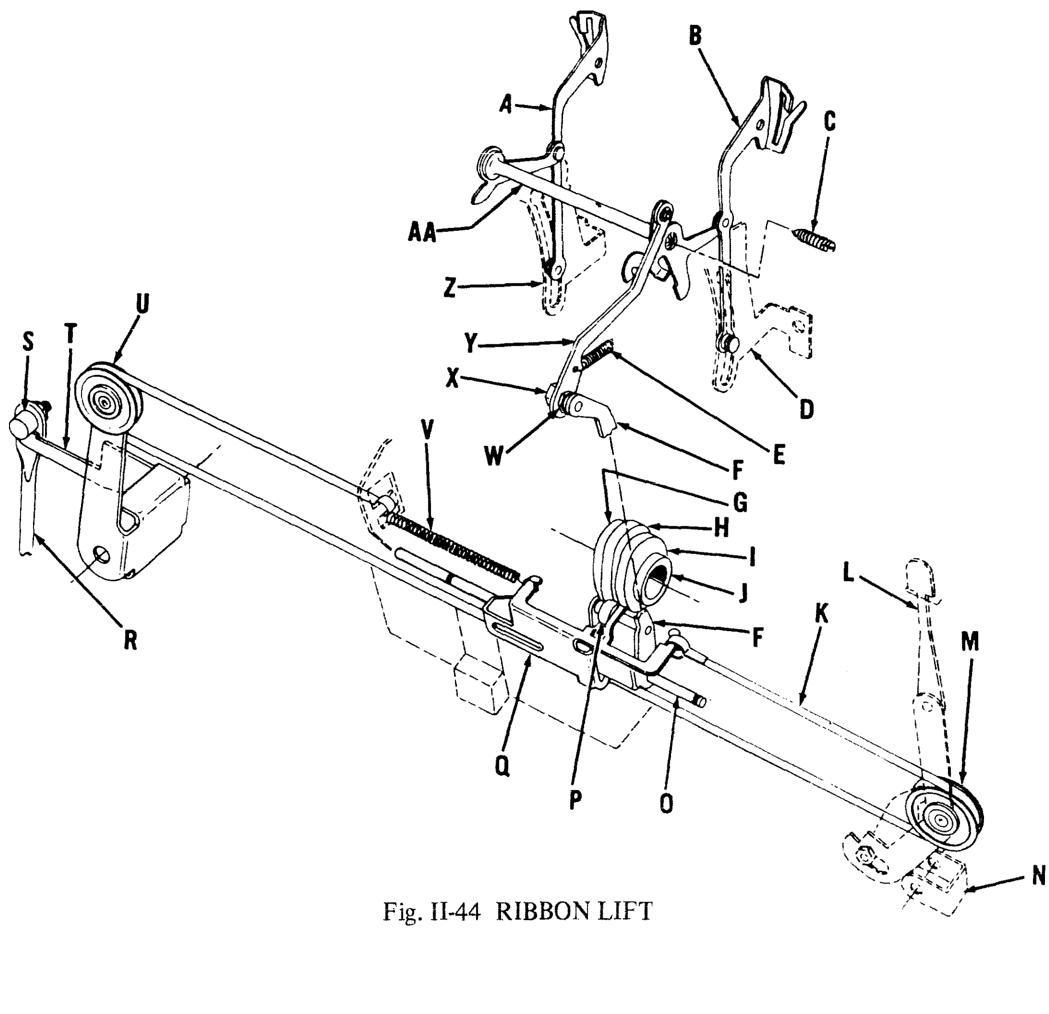


Fig. II-44 RIBBON LIFT

PRINTER RIBBON SHIFT

When the printer is not active, the printer ribbon is in a lowered position so that characters printed on the print media are visible to the operator. On each print cycle, a cam on the print shaft lifts the ribbon mechanism to align either the black or the red half of the ribbon with the print head.

Referring to Figure II-44, band K is attached to the left sideframe of the printer mechanism, passes around pulleys U and M, and is attached to slide Q in the printer cradle. Spring V holds slide Q to the left and maintains tension on band K. Slide Q controls the position of roll P on bail F.

Cam J, which is mounted on the print shaft, has three camming surfaces – G, H and I. Surfaces I and G will provide enough movement of the ribbon mechanism to align the black portion of the ribbon with the print head. Surface H has a higher lift profile and will align the red portion of the ribbon with the print head.

The normal position of slide Q holds roll F in alignment with surface G of cam J.

When a print cycle is executed, cam J rotates 180° and surface G rocks roll P and bail F. The upper end of bail F moves link Y forward to rock bail assembly AA, which pivots on screws C. This raises the ribbon lift arms A and B to position the black ribbon behind the print head. The studs in the bottom of lift arms A and B ride in slots in the lift arm stabilizers Z and D. When the print shaft and ribbon cam complete the cycle, spring E restores the mechanism to lower the ribbon below the printing line.

When a red ribbon operation is required, rod R and stud S are lowered by a clutch and eccentric in the decoder (see Figure II-29). Stud S rocks bail T, and pulley U, to move slide Q and align roll P with surface H of cam J. This results in the ribbon lift arms being raised higher during the print cycle to select the red ribbon. Eccentric W provides for a fine adjustment of the ribbon positioning.

MANUAL RIBBON SELECT

Pulley M is mounted on lever L which allows for a manual reversal of ribbon colors. When lever L is moved to the right, and latched, it causes roll F to be aligned with surface H of cam J to give a red ribbon operation at normal. When stud S is lowered from the decoder, roll P will become aligned with surface I of cam J, which selects the black ribbon. Thus, lever L reverses the function of the decoder eccentric. Note that lever L is adjustable to provide an adjustment for the positioning of roll P.

PRINT SHAFT CLUTCH

The print shaft provides the power to the printer mechanism to operate the ribbon lift cam and drive the print head. The rotation of the print shaft is controlled by the print shaft clutch, which is in turn controlled from the decoder.

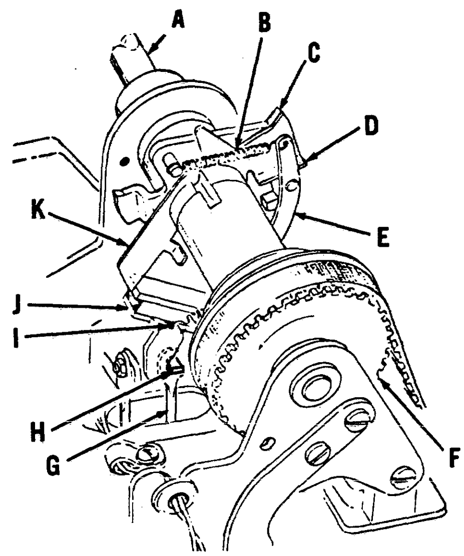


Fig. II-45 PRINT SHAFT CLUTCH

When the decoder lowers link G (Figure II-45), print clutch J is lowered, permitting print clutch dog E to be engaged in slot of print shaft A by spring B. As the print shaft rotates clockwise 180°, print clutch limit J is raised by spring I (if link G has been raised to non-print by the decoder) to limit clutch stop C. Lip D on actuator K will disengage clutch dog E from print shaft A. Print shaft gear F rotates continuously when the main motor is on.

If link G remains in its lowered position, printing will continue until the print clutch solenoid in the decoder is de-energized (see Figure II-30).

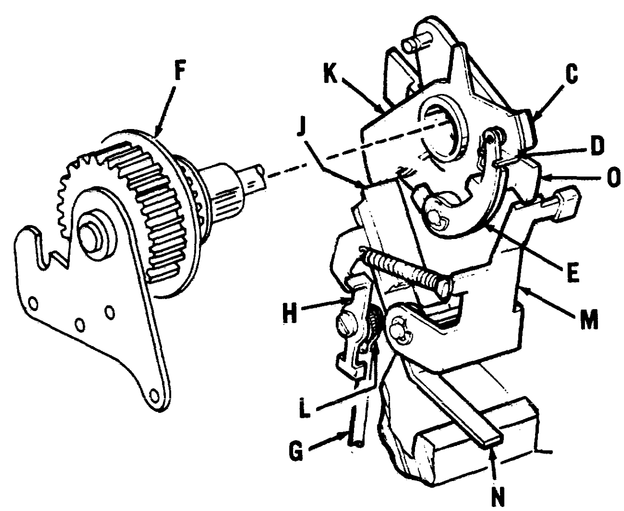


Fig. II-46 MANUAL RELEASE

When the print shaft clutch comes to the home position, and clutch dog E is disengaged from the print shaft, overthrow latch M (Figure II-46) engages behind part O, to hold the clutch disengaged. Lever N provides a means of manually releasing the print shaft clutch for troubleshooting purposes. Eccentric L provides a fine adjustment for the position of lip H to control the timing of the clutch operation.

PRINT UNIT DETENTS

During a print cycle, the print head and the print head tilt cradle (E Figure II-41) are latched in position in order to detent the print head in its selected position, while it strikes the ribbon and print media.

Referring to Figure II-47, cam A is mounted on the print shaft and at normal, one of its high points is under roll B. When the print shaft rotates 180° the low dwell in the cam permits a spring (not shown) to rock bellcrank C and lift link O.

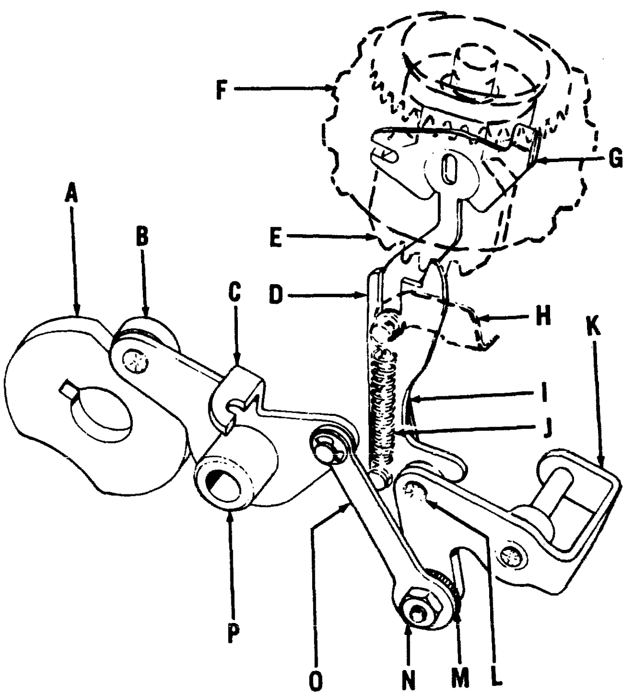


Fig. II-47 PRINT UNIT DETENTS

Link O rocks bellcrank K to raise stud L. Stud L engages in a slot in aligner D upward into engagement with the notches in tilt cradle E, locking the cradle in the selected tilt position.

At the same time, upward movement of stud L permits a spring (not shown) to raise link I and drive aligner G into engagement with the notches around the inside of the print head, locking the print head in its selected rotate position.

After the print head has struck the ribbon and print media, and as the print shaft completes its half cycle, the high point of cam A drives roll B and bellcrank C to lower link O, bellcrank K and stud L. Downward movement of stud L lowers aligner D and link I to unlatch the mechanism and permit the selection of another print character. Eccentric M provides an adjustment for the clearance of aligner D with cradle E when the mechanism is at normal.

PRINTING

When the print shaft clutch is released, the print shaft rotates 180° and drives the print head against the ribbon and print media.

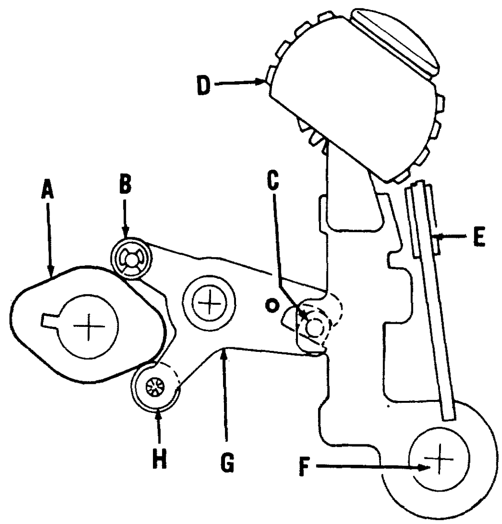


Fig. II-48 PRINT ACTION

When the print shaft rotates, cam A (Figure II-48) rocks bellcrank G, through roll H, to rock the print yoke assembly and drive print head D rearward toward the platen. Continued rotation of cam A restores bellcrank G and the print yoke assembly through roll B. Pad E limits the forward throw of the print head to prevent excessive overthrow.

RIBBON FEED

Referring to Figure II-49, on each print cycle cam G permits spring I to rock bail E rearward. This allows spring C to pull the feed pawl K forward.

After the print head has struck the ribbon and print media, and as the print shaft completes its half cycle, cam G rocks bail E forward. Bail E contacts bail D, which pivots about shaft J, to drive the feed pawl K rearward, which in turn rotates ribbon ratchet A to feed the ribbon.

RIBBON REVERSING

Figure II-50 shows the position of the ribbon REVERSE mechanism when the ribbon is being fed from the left spool to the right spool. Note that during the feed operation, feed pawl H will clear pawl A. When the ribbon is almost completely unwound from the feed spool, it permits pawl L (Figure II-51) to protrude from ribbon ratchet gear N.

This lowers pawl L in front of lever M (Figure II-50), which is mounted immediately below the ratchet gear. With continued feeding of the ribbon, pawl K contacts lever M which, through link K, rocks reverse lever J.

In Figure II-52, reverse lever J pivots about stud D. When reverse lever J pivots to the left, stud C rocks reverse arm A, which pivots about stud B, to the right. This places part I of the reverse arm in front of the formed ear on spring anchor F (Figures II-50 and II-52). At the same time, pawl A (Figure II-50) is positioned in front of feed pawl H.

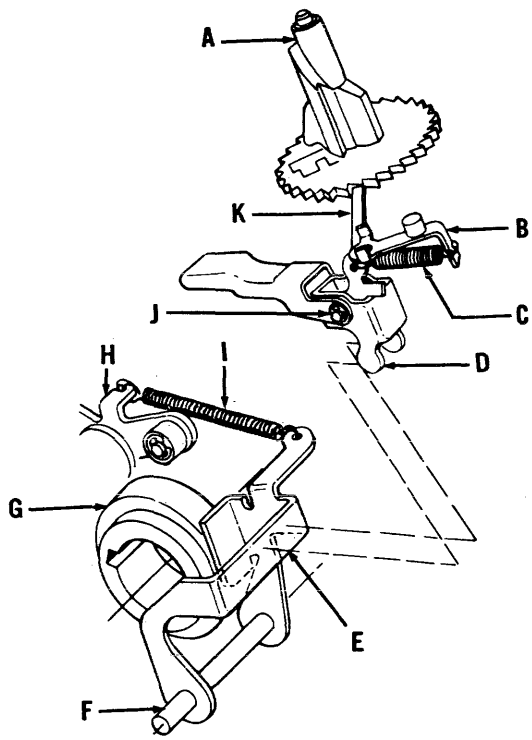


Fig. II-49 RIBBON FEED DRIVE

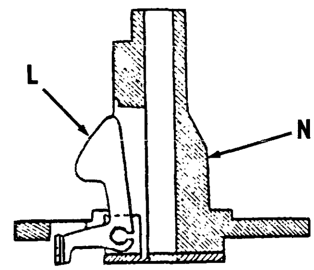


Fig. II-51 RIBBON REVERSE PAWL

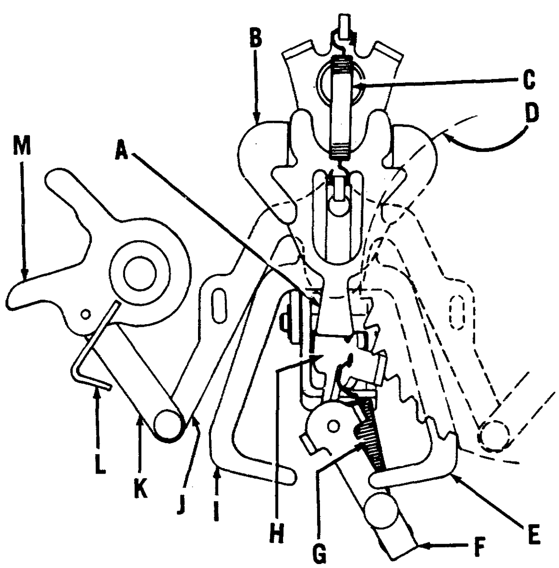


Fig. II-50 RIBBON FEED

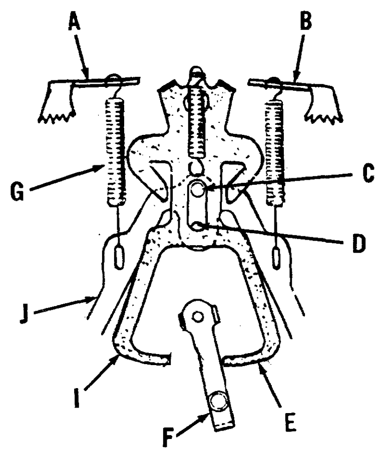


Fig. II-52 REVERSE ARM

On the next print cycle, feed pawl H drives the right ribbon ratchet D, and at the same time, drives pawl A and reverse arm I rearward. Reverse arm I then contacts spring anchor F to swing spring G to the left as shown in Figure II-53.

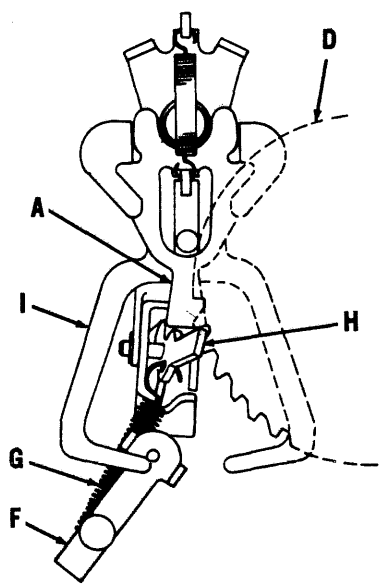


Fig. II-53 SPRING ANCHOR TO LEFT

Spring G will now pull feed pawl H so that it engages with the left ribbon ratchet gear N, thus reversing the direction of ribbon feed, see Figure II-54. When the right ribbon spool becomes empty, the same operation occurs except, of course, that all movements are in the opposite direction.

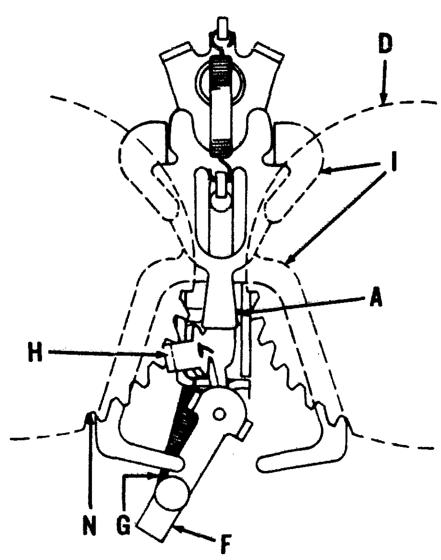


Fig. II-54 FEED PAWL REVERSE

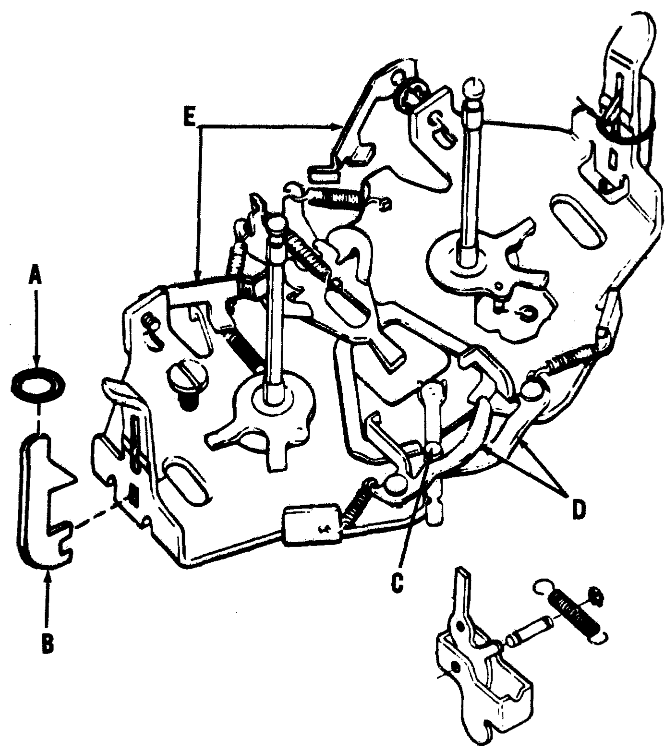


Fig. II-55

Figure II-55 shows the ribbon feed assembly with the ribbon cartridge, ribbon ratchet gears and feed pawl removed. Spring loaded levers D serve to detent spring anchor C either to the left or to the right and also act as backup latches for the ribbon ratchet gears. Note that spring anchor C will disable the backup latch from the feed ribbon ratchet gear. Springs E detent the ratchet gears.

CARRIER MECHANISM

The purpose of the carrier mechanism is to move and locate the printer mechanism to any of the .1" print positions across the platen. The printer mechanism is contained within a cradle assembly called the carrier. Because of the variety of possible carrier movements, the mechanism consists of several separately controlled assemblies. It is a function of the console DDP logic to coordinate the various mechanisms to achieve the required carrier movement.

The carrier itself is mounted on guide rails so that it may be moved over the width of the printer/forms chassis. (See Figure II-56.) Mounted in the right side-frame of the carrier is a pair of splined nylon collars which fit over the drive worm-shaft. Thus, rotation of the worm-shaft can drive the carrier to the left or the right along its guide rails.

The worm-shaft, which has five splines at 1.2" pitch, is directly driven from a 24V DC bi-directional motor. In normal operation the motor is controlled by the logic to drive the carrier at either of two speeds. High speed is when the carrier is moved at twenty inches per second and low speed is when the carrier is moved at three-and-one-quarter (3.25) inches per second. Additionally, the logic controls the power of the motor. High power, at either speed, is with 4 amp current flowing through the motor, and low power is with 2 amp flowing through the motor. The sequences of using the two speed and power controls are explained in the logic description of carrier control. Note that one revolution of the worm-shaft is equal to twelve print positions.

To hold the carrier in a selected position for the printer, a detent gear is mounted on the worm-shaft. This gear is held in a selected position by two solenoid clappers called interposer latches.

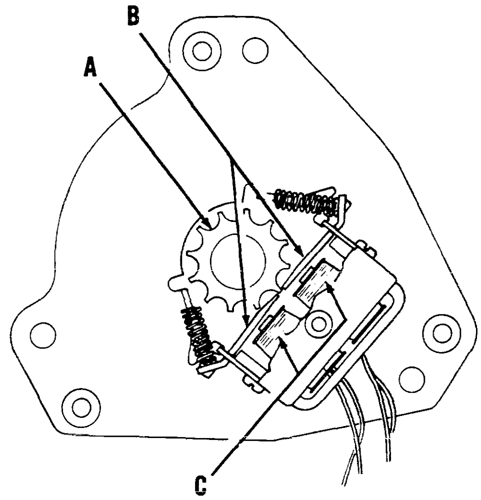


Fig. II-57 CARRIER INTERPOSERS

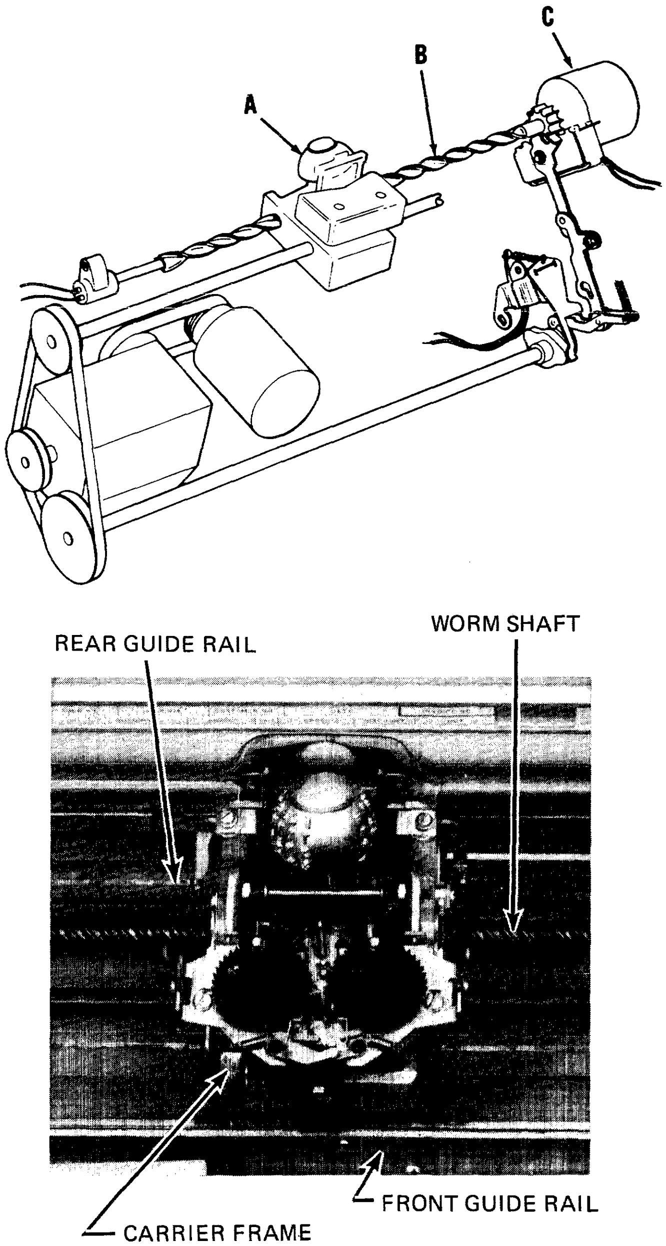


Fig. II-56 CARRIER

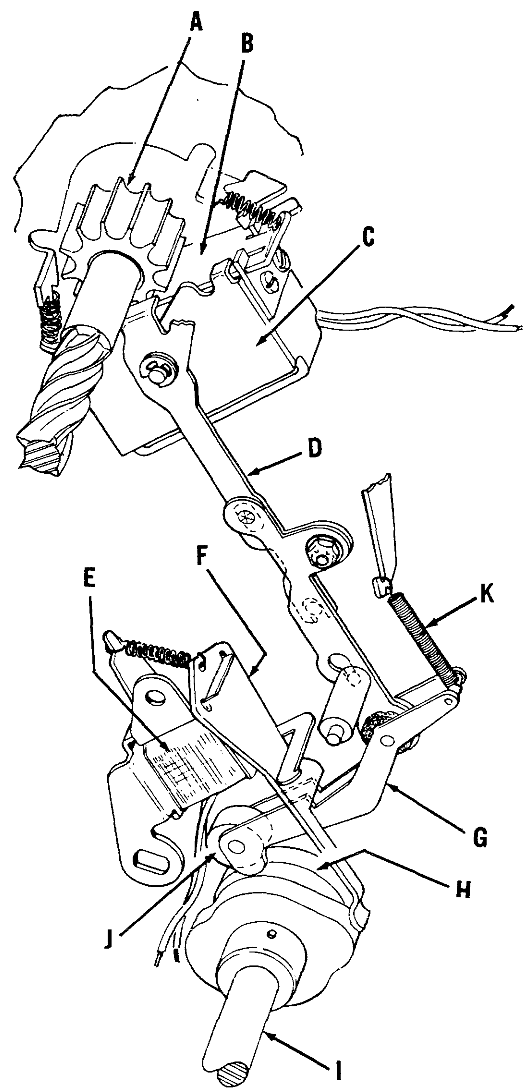


Fig. II-58

Referring to Figure II-57, gear A is held by interposer latches B. The coils C are the hold coils. The construction of the hold coils is such that they are unable to withdraw the interposer latches when they are energized. When a carrier movement is required, the interposer latches are mechanically withdrawn to a point where the energized hold coils can retain them. At the completion of the carrier movement, the hold coils are de-energized to drop the interposers and detent the carrier.

Referring to Figure II-58, solenoid E controls the mechanical withdrawal of the interposer latches; cam assembly H is mounted on the end of the jackshaft I. On each half-cycle, cam H drives roll J upward. With solenoid E de-energized, lever G pivots about the end of link D. When solenoid E is energized, clapper F is positioned over the step in lever G. Upward movement of roll J will now cause lever G to pivot about the end of clapper F, lowering link D and withdrawing the interposer latches to the hold coils. Note that clapper F is extended to contact cam assembly H. The profile of the cam is such that it holds off clapper F until roll J is in the fully lowered position. This ensures that clapper F can acquire a good hold over lever G when required. Spring K holds link D in a raised position at normal and maintains tension on lever G.

Mounted on the other end of the worm-shaft is a tachometer, A Figure II-59. This is a DC generator, the output of which is dependent on its rotational velocity. The logic uses the output of the tachometer to control the speed of the carrier movement. This function is covered in the logic description.

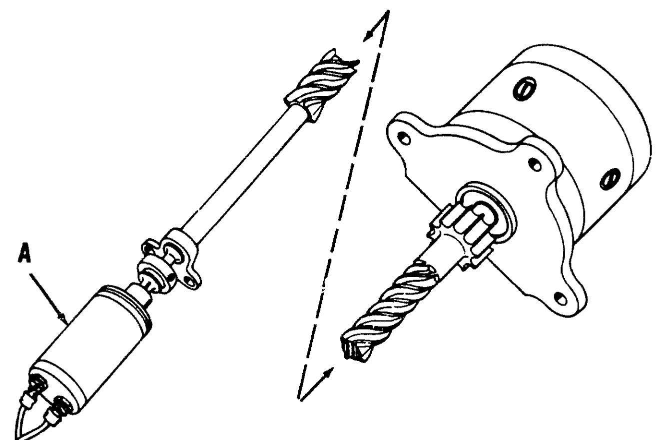


Fig. II-59 TACHOMETER

Mounted on the right end of the carrier motor shaft is a transducer flag assembly, A Figure II-60. The leading and trailing edges of the flag correspond to print positions in .1" increments across the platen. The logic uses the output of the transducer B, (CPR – Carrier Postion Readout), to monitor the movement of the carrier mechanism.

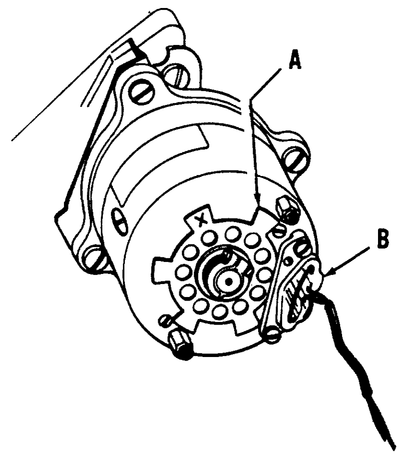


Fig. II-60 CPR FLAG & TRANSDUCER

FORMS TRANSPORT MECHANISM

The forms transport provides the capability of handling a wide range of journal rolls and/or front fed forms.

The whole mechanism is located on the printer/forms chassis by two locating pegs, and is retained by two screw and spring assemblies.

Referring to Figure II-61, the main frame of the transport consists of the two sideframes mounted on beams A and N. Beam A is located on two ball pivot pegs, the left one, M, being attached to the printer forms chassis K and is not adjustable. The righthand ball peg is mounted on plate G which is adjustably located on the printer/forms chassis through eccentric H. This provides a means of aligning the platen Q parallel with the printer carrier guide rails. The height of beam A is adjustable through screws B and locknuts C. The rear beam N is similarly supported by two adjustable screws O in the rear of the printer forms chassis. These screws provide a means of adjusting the vertical position of the platen to achieve a uniform printing density across the width of the platen.

Across the front of the forms transport is a clear plastic aligning table, which has a single red line scribed on it to assist an operator in aligning front fed forms. Around the platen are three sets of pressure rolls to hold the print media while printing takes place. Figure II-62 shows a sectional view of the transport in the area of the platen.

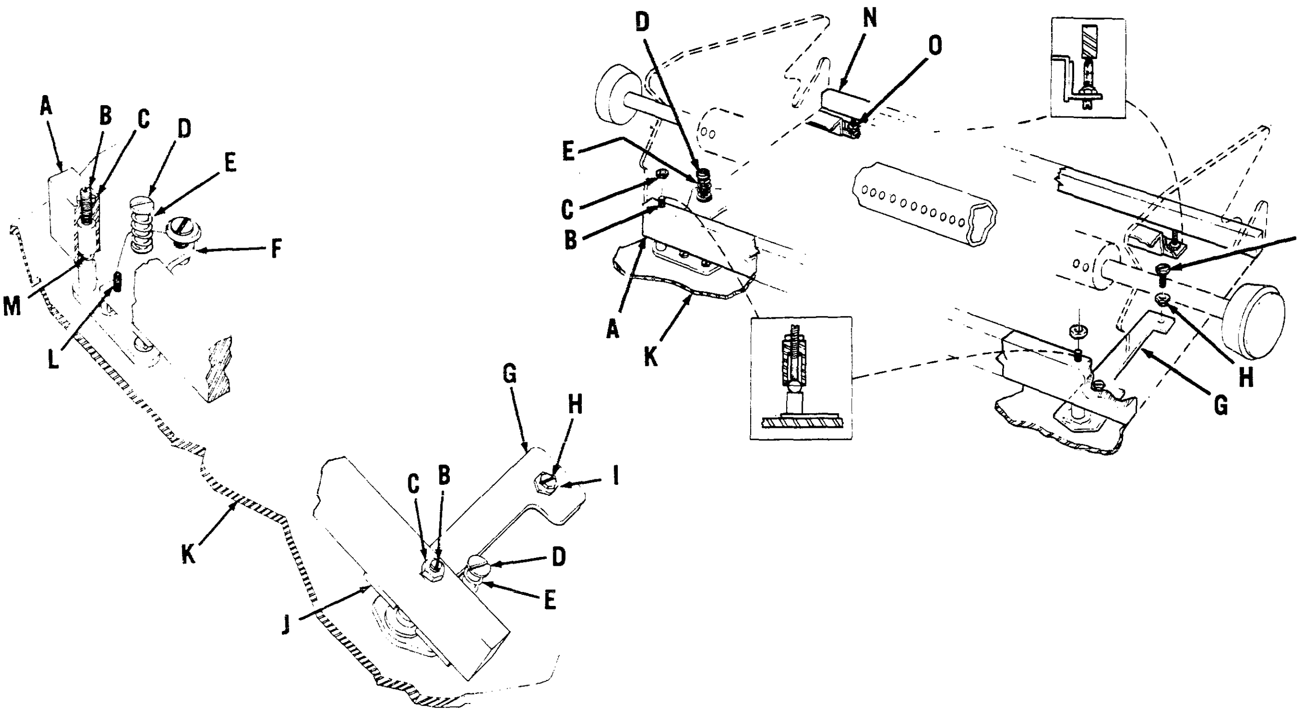


Fig. II-61 FORMS TRANSPORT MOUNTING

When the transport is closed, as shown in Figure II-62, form aligning table A is in a raised position, and pressure rolls M are sprung against the platen. Spring loaded pressure rolls F, in bridge assembly B, and pressure rolls I, hold any journal sheet which is fed around the platen.

When the transport is opened, aligning table A is lowered and pressure rolls M are driven away from the platen, to permit the insertion or withdrawal of front-fed forms In Figure II-63, O is the path for the front-fed forms.

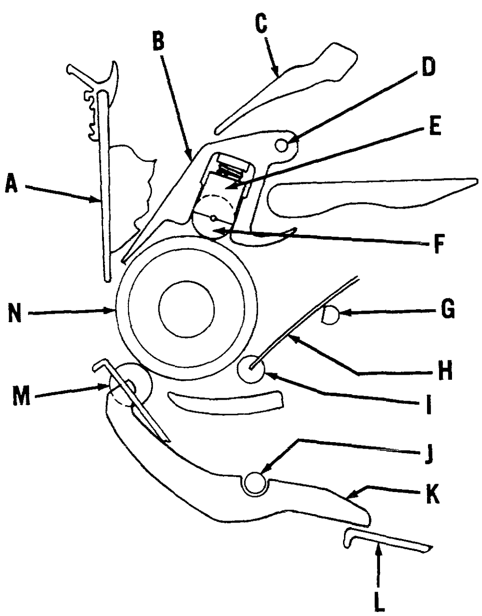


Fig. II-62 FORMS TRANSPORT CLOSED

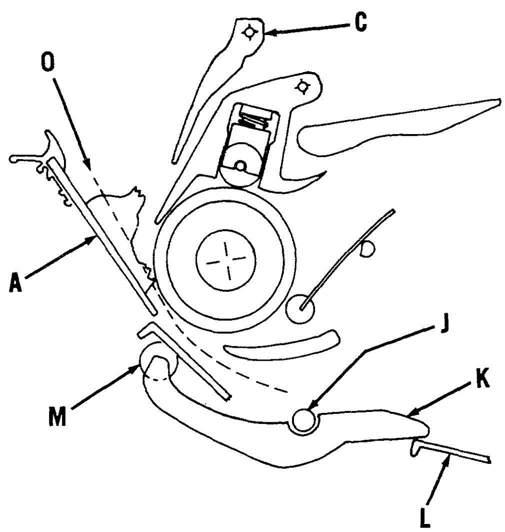


Fig. II-63 FORMS TRANSPORT OPEN

From either the open or closed positions, the upper pressure rolls may be lifted by manually raising the aligning table. Figure II-64 shows the aligning table raised and the top pressure rolls open. The rear journal pressure rolls I are controlled manually when shaft G is rotated. This permits the insertion of a journal roll or sheet around the platen.

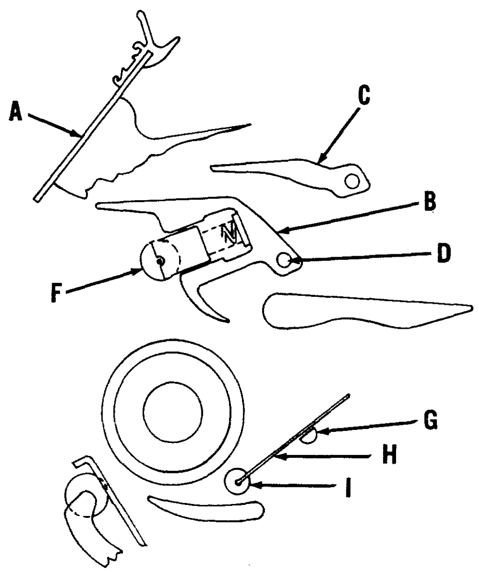


Fig. II-64 ALIGNING TABLE MANUALLY RAISED

TRANSPORT OPEN-CLOSE CLUTCHES

The open-close mechanism is driven from a camshaft which is controlled by a two-position clutch. The clutch is controlled in its two positions by two solenoid assemblies, one for opening the transport, the other for closing it.

Figure II-65 shows the principle of operation for one clutch solenoid. Gear K is the main drive pulley for the forms transport and is constantly driven while the console is turned on. Through a shaft, gear K drives double gear M and J, which in turn drives gear A.

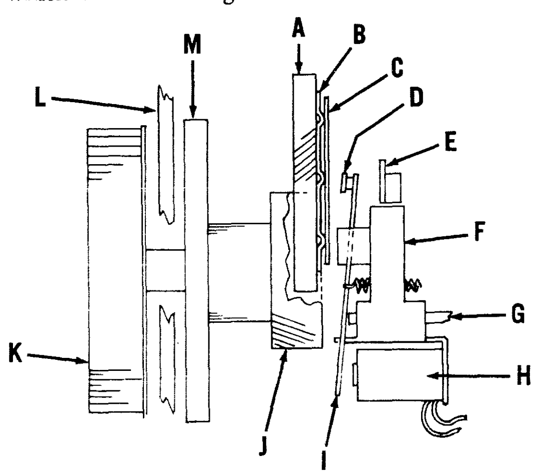


Fig. II-65 OPEN/CLOSE CLUTCH

Attached to gear A is the driving member of the open/close clutch (not shown). When solenoid H is energized, it pivots clapper I so that stud D contacts camming surface B on gear A. Cam surface B controls stud D to time its movement over cam surface C. This ensures that stud D acquires a good hold over cam C. As cam C rotates, it rocks the clapper I and solenoid H assembly which pivots about shaft G. The rearward part of the assembly, F, is the clutch limit bail, so this is now rocked clear of the clutch actuator E and permits the clutch to engage.

Figure II-66 shows the open clutch assembly. When the clutch is released, it will rotate drive shaft N and cams O and P 180°. The clutch will then be disengaged by the close clutch assembly (Figure II-67). When the solenoid H is de-energized, cam surface B will knock off stud D and clapper I.

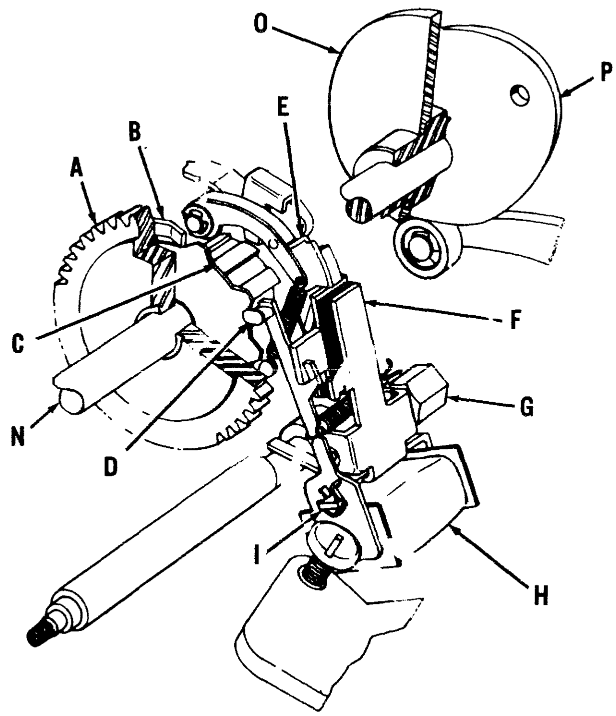


Fig. II-66 OPEN CLUTCH

Figure II-67 shows the close clutch assembly. When solenoid H is energized, the cam surfaces on gear A rock the solenoid and clapper assembly to release the clutch in exactly the same way as described for the open clutch. Release of the clutch from the close solenoid assembly permits shaft N to be rotated 180° until the clutch is disengaged in the open position.

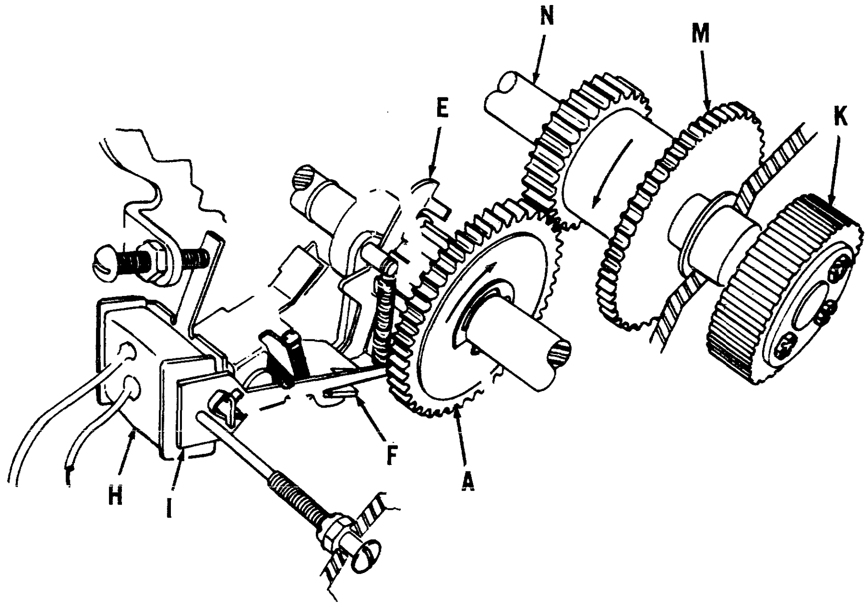


Fig. II-67 CLOSE CLUTCH ASSEMBLY.

ALIGNING TABLE OPEN-CLOSE

Figure II-68 shows the aligning table mechanisms in the closed position. Cam I is driven from the open/close clutch assemblies and, with the transport closed, its high point is under roll H.

When the open clutch solenoid is energized, cam I rotates 180° to put its high point away from roll H. This permits spring E to rock crank J, which pivots about stud K. Latch R is attached to crank J and engages on stud Q in arm B. This pivots arm B about shaft C so that its top end rocks forward and downward to lower the aligning table (refer to Figure II-62).

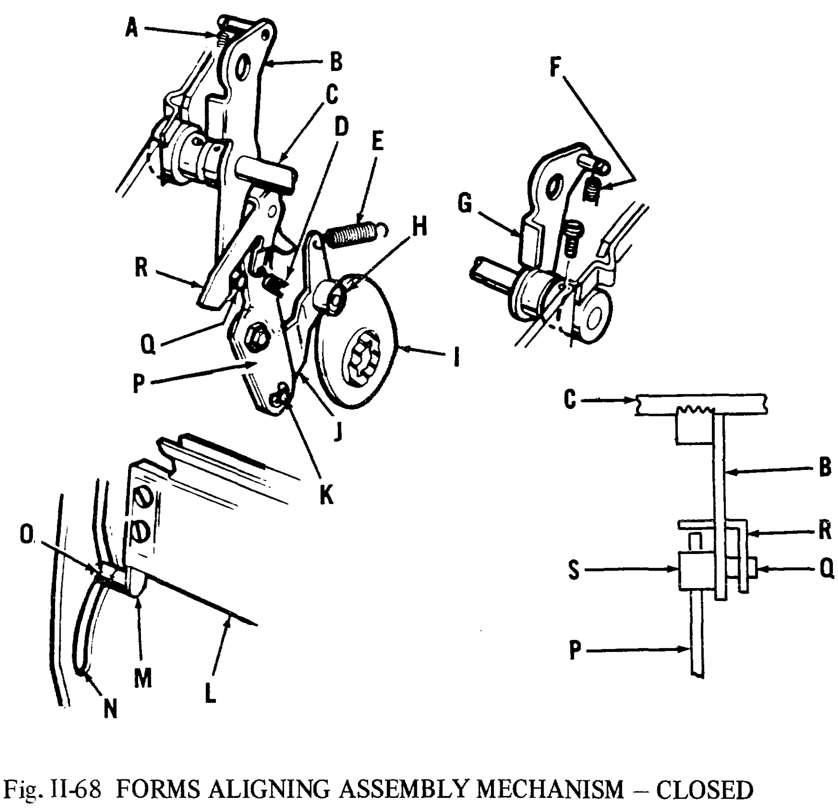


Fig. II-68 FORMS ALIGNING ASSEMBLY MECHANISM – CLOSED

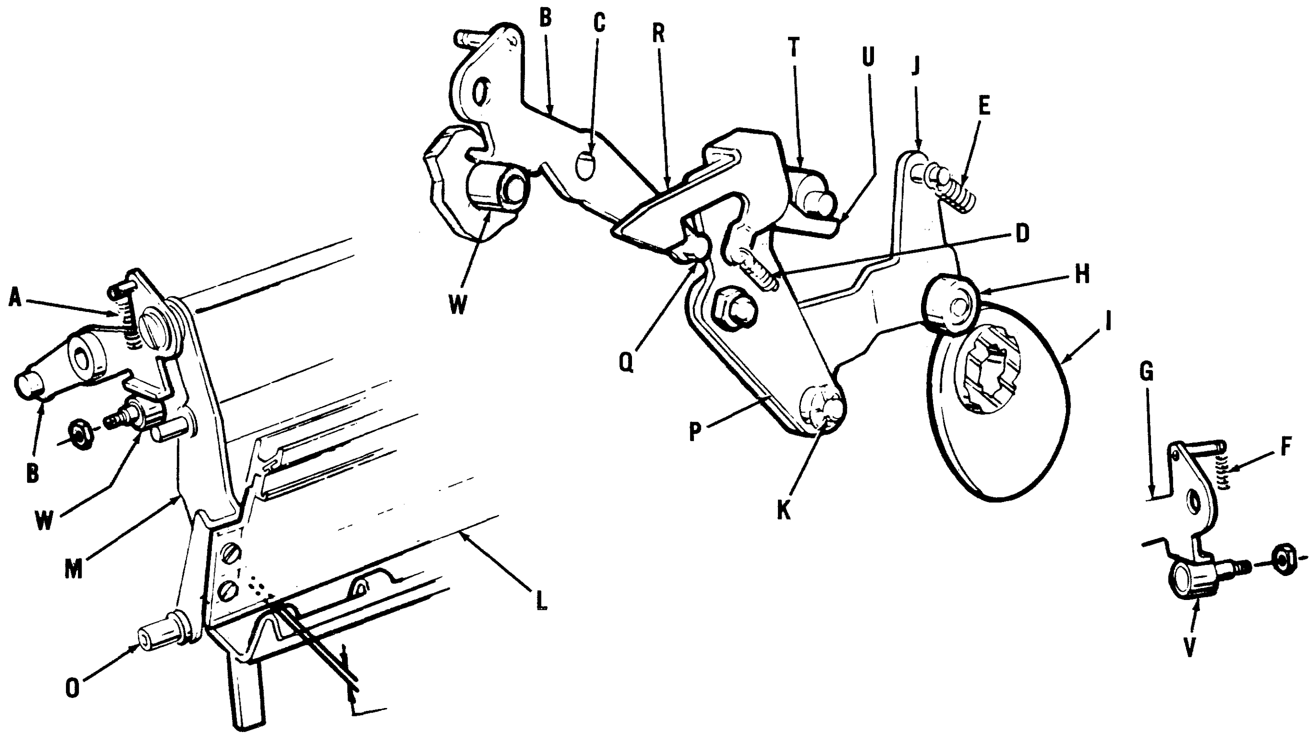


Fig. II-69 FORMS ALIGNING ASSEMBLY MECHANISM – OPENED

Figure II-69 shows the aligning table mechanism in the open position. Note that tail U of latch R contacts stud T. This lifts latch R clear of stud Q to permit the manual raising of the aligning table to open the upper pressure rolls (refer to Figure II-64). In the open position, the aligning table assembly is limited by studs W and V in the left and right transport sideframes.

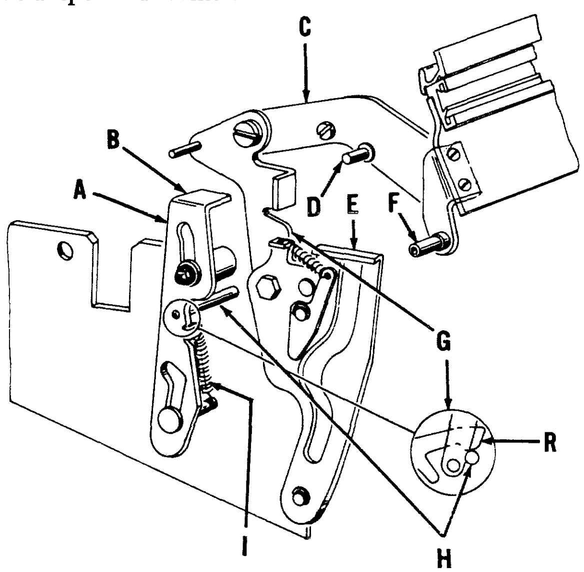


Fig. II-70

ALIGNING TABLE CLOSE

When the close clutch solenoid is energized, cam I rotates 180° to position its high point under roll H. This rocks crank J so that drive blade P contacts stud S (Figure II-68) in arm B. Arm B pivots about shaft C to raise the aligning table to the closed position, as in Figure II-68.

OPEN-CLOSE INTERLOCK

The aligning table assembly is interlocked to prevent a power open or close when the table has been manually raised and the upper pressure rolls are open, as in Figure II-64.

When the transport is manually raised, stud D, Figure II-70, contacts under lip B of interlock slide A to raise it. Stud H in slide A is then positioned as shown in the inset diagram. If the transport is open, stud H lifts latch R clear of stud Q (see also Figure II-69) to disable the closing function. If the transport is closed, then arm G and stud Q are moved to the position shown in Figure II-70 by the manual raising of the aligning table. Operation of the open clutch then results in latch R being driven forward and over stud Q to position over stud H. Thus the aligning table assembly cannot be driven under power, however the front pressure rolls may still be opened and closed under power.

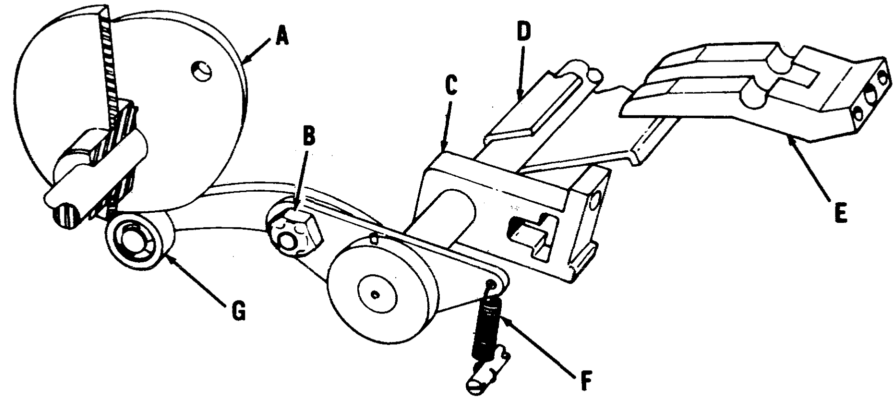


Fig. II-71

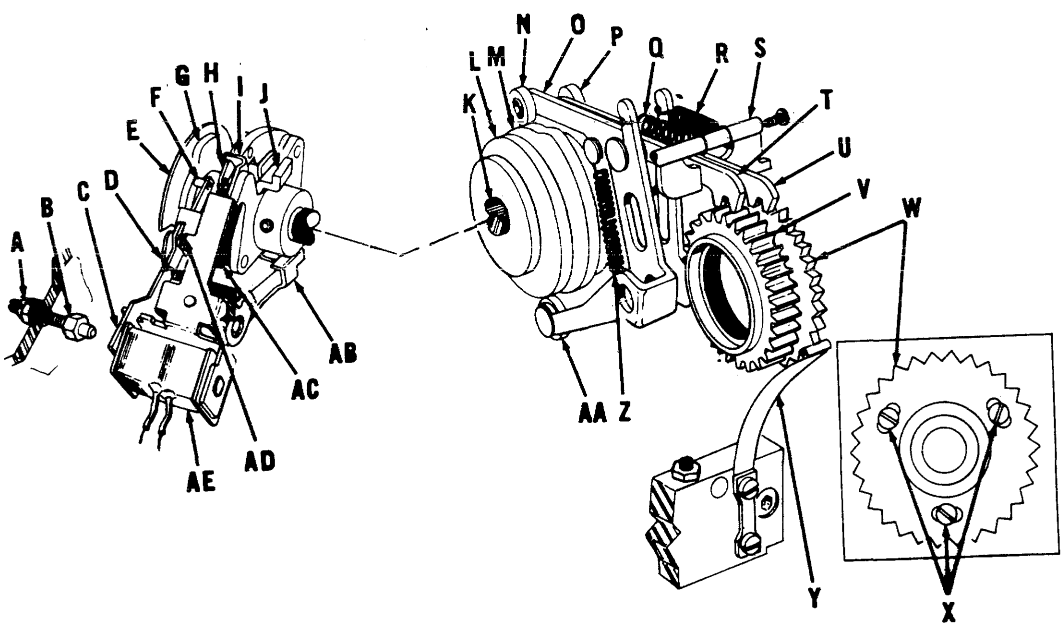


Fig. II-72 FORM ADVANCE

FRONT PRESSURE ROLLS

When the transport is opened, the front lower pressure rolls are driven away from the platen to permit the insertion or withdrawal of front-fed forms, as shown in Figure II-63.

In Figure II-71, cam A is mounted on the same assembly as the aligning table open/close cam, and is shown in the closed position. When the open clutch solenoid is energized, cam A is rotated 180° to place its high point behind roll G. This rocks bail assembly D, which in turn, contacts and rocks the pressure roll hangers E, to drive the pressure rolls away from the platen. When the close clutch solenoid is energized, cam A returns to the position shown in Figure II-71. Spring F stores bail assembly D to permit the pressure rolls to close.

The bail assembly is adjustable at point B to achieve the correct clearance between the pressure rolls and the platen when the transport is open.

FORMS ADVANCE

The forms transport is equipped with a split platen to handle a variety of side-by-side forms. The position of the split is optional. Each part of the platen may be separately controlled to advance the forms to a new print line. Figure II-72 shows a typical forms advance mechanism of which there is one at each end of transport. The picking of the clutch solenoids is controlled by the interpreter, through the console DDP logic.

Each 180° rotation of shaft K (Figure II-72) moves feed pawls T and U to active and inactive positions. The cams on shaft K are so designed that only one feed pawl is active.

When solenoid AE is energized, clapper C is pulled to the solenoid which moves stud F to position over cam G. As cam G rotates, it raises stud F which raises latch AC to permit 180° rotation of shaft K. As shaft K rotates, feed pawl U is lowered into platen gear V by a cam M under roller P. A cam L moves a roller AA downward to move feed pawl U rearward to advance platen gear V one tooth. Ratchet W through flat spring Y prevents overthrow of platen gear V.

As feed pawl U was moving rearward, cam L through roller AA and spring Z was moving feed pawl T forward to become active with platen gear V for the next platen advance.

Stud F causes the solenoid AE to move up and down following the contour of cam G as long as solenoid AE is energized. When the solenoid AE is de-energized, stud F is moved away from cam G by spring D. This permits spring AD to lower clutch release AC to raise clutch dog I out of engagement. Anti-backup pawl AB prevents overthrow of shaft assembly.

Note that each operation of the forms advance mechanism will advance the print media 1/6".

CONE CLUTCHES AND SPLIT PLATEN

The forms advance mechanism is coupled to the platen shaft by a cone clutch which can be manually disengaged by the operator. This provides a means for the operator to variably align the print media in less than 1/6" increments.

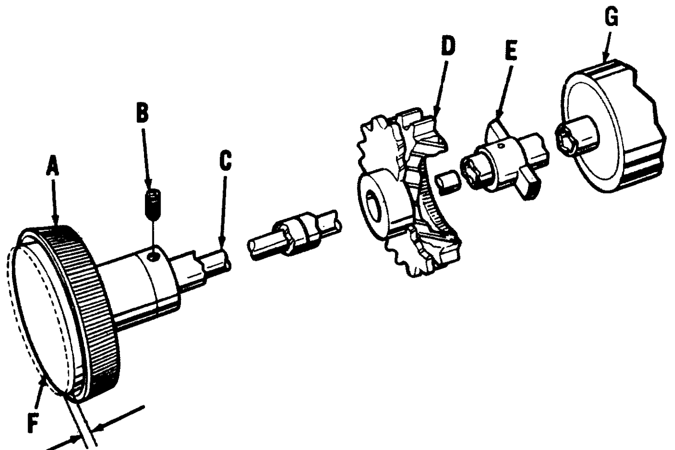


Fig. II-73 LEFT CONE CLUTCH ASSEMBLY

Figure II-73 shows the left platen twirler and cone clutch assembly. Gear D is driven from the forms advance mechanism. Clutch member E has two arms which are located in a collar (not shown) screwed to the platen shaft. The ends of the arms are splined and engage with splines on the inside of gear D. Clutch member E is spring loaded against gear D.

When button F in the twirler A is depressed, it slides shaft C to the right. Shaft C contacts clutch E to disengage it from gear D. Twirler A and platen G may now be manually rotated to align the print media leaving gear D in its detented position.

When button F is released, spring tension re-engages clutch E with gear D to detent the platen.

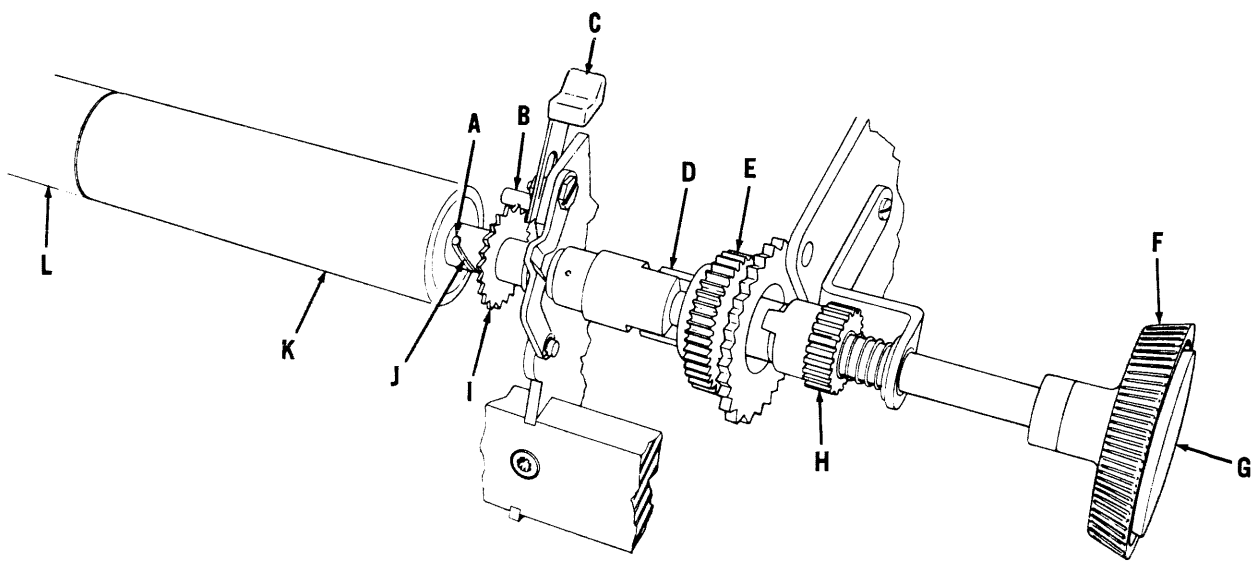


Fig. II-74 SPLIT PLATEN

Figure II-74 shows the right platen twirler and split platen mechanism in the locked (solid platen) position. To separate the platens, button C is depressed and the twirler F rotated forward.

When button C is depressed, stud B engages with gear I to detent platen K. If the cone clutch button G is depressed, and twirler F rotated forward, a shaft through the center of the platen rotates and cams stud A in cam slot J. This causes the center shaft (not shown) to move to the right and disengage platen K from platen L. At the same time clutch D is permitted to engage with gear E, to enable to right platen advance mechanism.

Note that when the platens are connected, only the left platen advance mechanism can advance the platens.

Gear H provides a drive to the pin-feed mechanism from gear E regardless of whether the platens are locked or split.

PRINTER INTERLOCK MECHANISM

The front feed forms transport is provided with a printer interlock to prevent the print head from firing when the forms transport is in the open position. When the forms transport is closed, the printer interlock mechanism is positioned as shown in Figure II-75 with lip B of cam follower E limiting on the high portion of cam C.

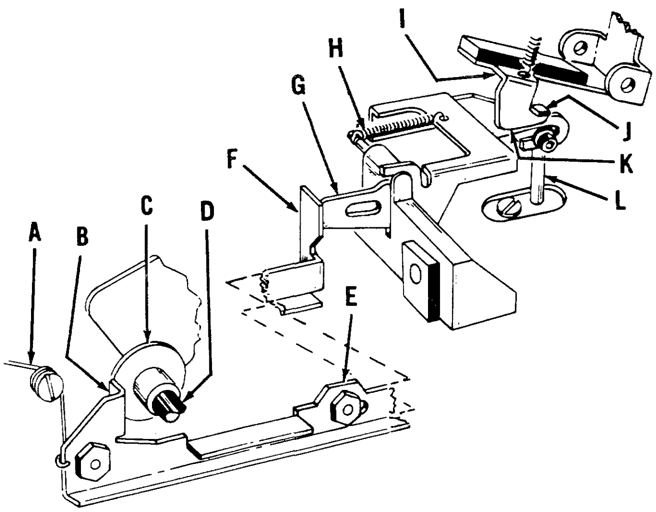


Fig. II-75 PRINTER INTERLOCK

When the forms transport is opened, camshaft D is rotated until cam C's low side contacts lip B permitting spring A to move cam follower E forward. Interlock G is moved and held in a forward position by lip F of cam follower E. While interlock G is held in its forward position, lip J of interlock G is positioned forward of tail K; therefore, when the decoder lowers link L, lip J will pass in front of tail K of print clutch limit I. Since print clutch limit I must be lowered to engage the print clutch, printing will be prevented.

When the forms transport is closed, cam C drives cam follower E rearward permitting spring H to restore interlock G in its active position as shown in Figure II-75. Lip J is positioned over tail K of print clutch limit I enabling decoder link L to lower clutch limit I and engage the print clutch.

REAR FORM GUIDES

The forms transport can be equipped with a variety of front and rear form guides to stabilize the print media. For more information, refer to the B700 Equipment Reference Manual, or the L7000 Equipment Reference Manual (Form 1054319). The L7000 uses a similar console mechanism. Figure II-76 shows a typical pair of rear form guides.

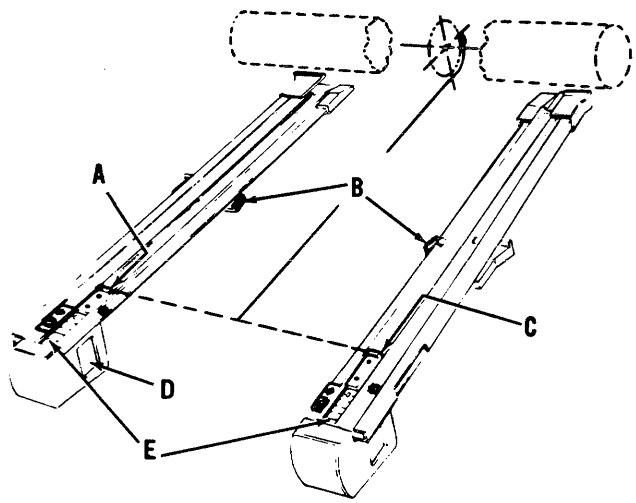


Fig. II-76 REAR FORM GUIDES

Each rear fòrm guide includes an adjustable limit. The limit provides a minimum of 1-5/16 inches to a maximum of 13-1/2 inches from the center line of the print to the bottom of the form. The limit is provided to stop the insertion of a form at a preset print depth.

The form limits are adjusted by depressing the lever found in opening D Figure II-76 and manually sliding limit stops A and C either forward or rearward to its desired position. When this lever is released, limit stops A and C are held in position by scales E.

ROLL PAPER HOLDER AND SUPPORT

Right and left roll paper holders A Figure II-77 are adjustable to accommodate roll paper of different widths. Locking lever B provides the means for adjusting the roll paper holder and locking the holder in place.

The roll paper holders are mounted on the roll holder support. When roll holder support C is raised, shaft D automatically latches the support in its raised position. When the release device F is pulled to the rear, shaft D retracts into the support and permits the support to be lowered.

FORM PATHS

Figure II-78 shows the routing for journal rolls, or sheets, and front feed forms, in the forms transport.

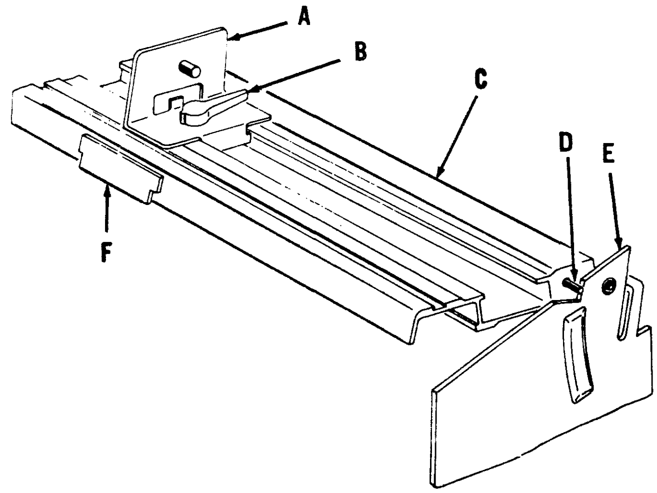


Fig. II-77 ROLL PAPER SUPPORT

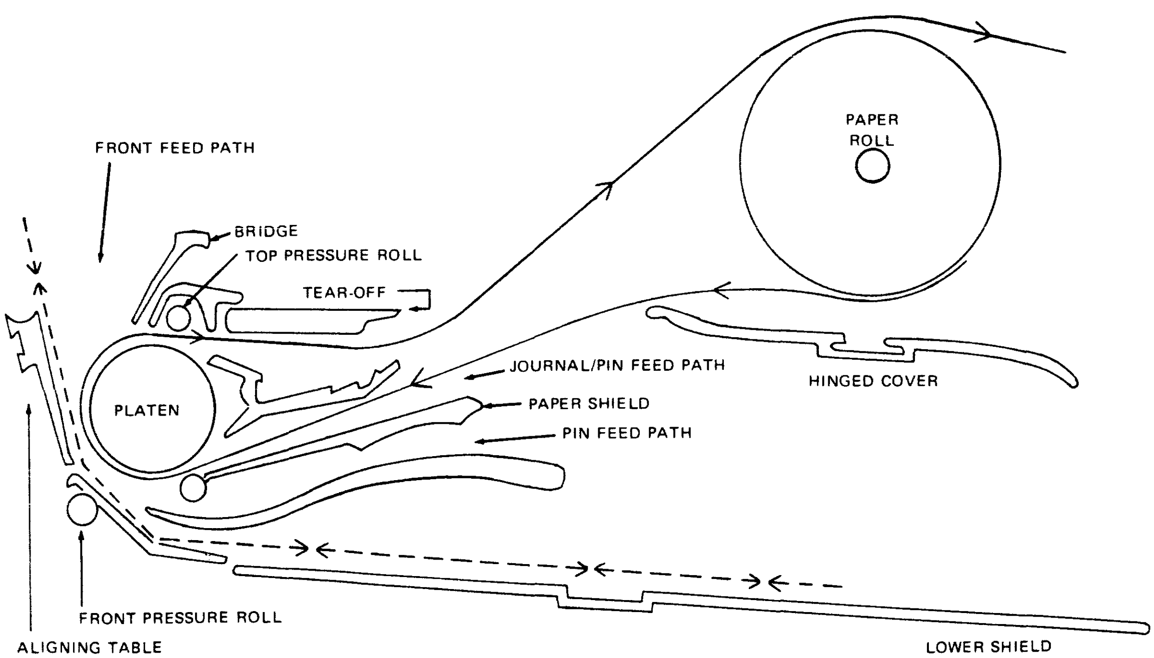


Fig. II-78 FRONT FEED AND JOURNAL PATHS, BASIC FRONT FEED FORM HANDLERS

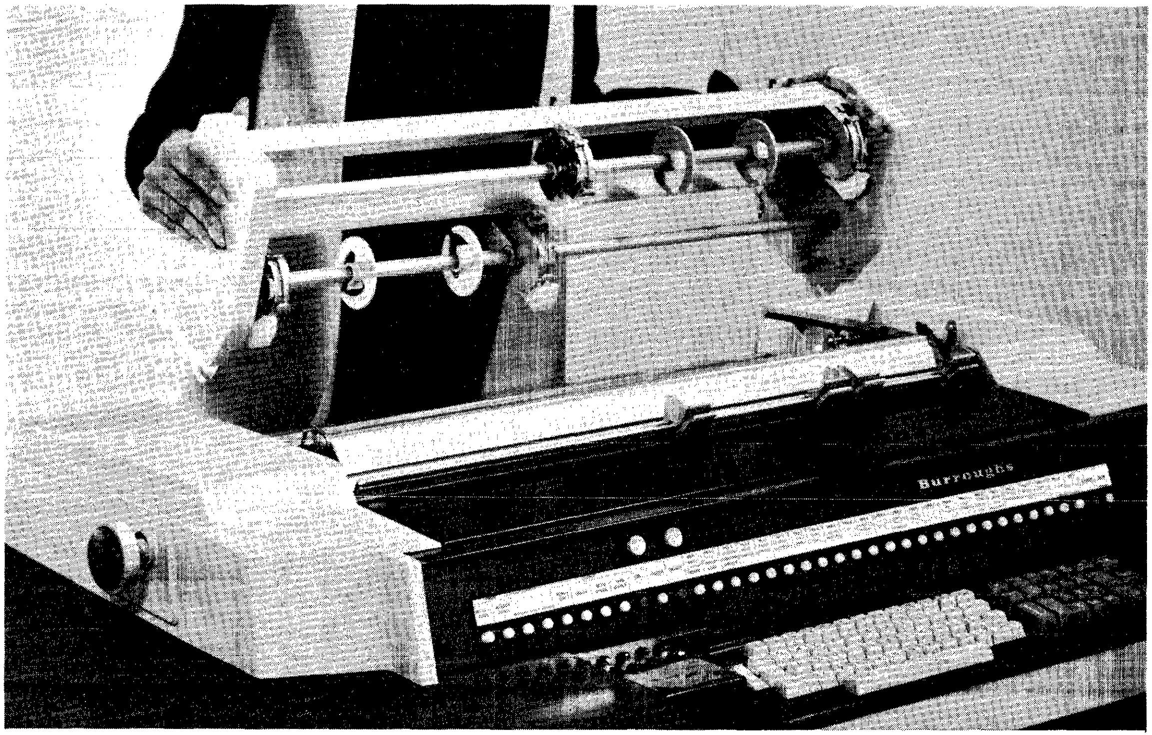


Fig. II-79 CONTINUOUS FORMS PIN FEED DEVICE, DUAL, 26" WIDTH

PIN FEED MECHANISMS

The forms transport may be optionally equipped with a mechanism to handle pin-fed continuous stationery. There are three basic styles of pin feed mechanism which are single synchronous, single independent, and dual pin feed. The pin feed mechanism is operator installable/removeable. Figure II-79 illustrates the installation of a dual pin feed device.

Two slots in the front of the pin feed sideframes engage on studs in the forms transport sideframes. Two latches at the rear of the pin feed mechanism retain it, in place, on the transport.

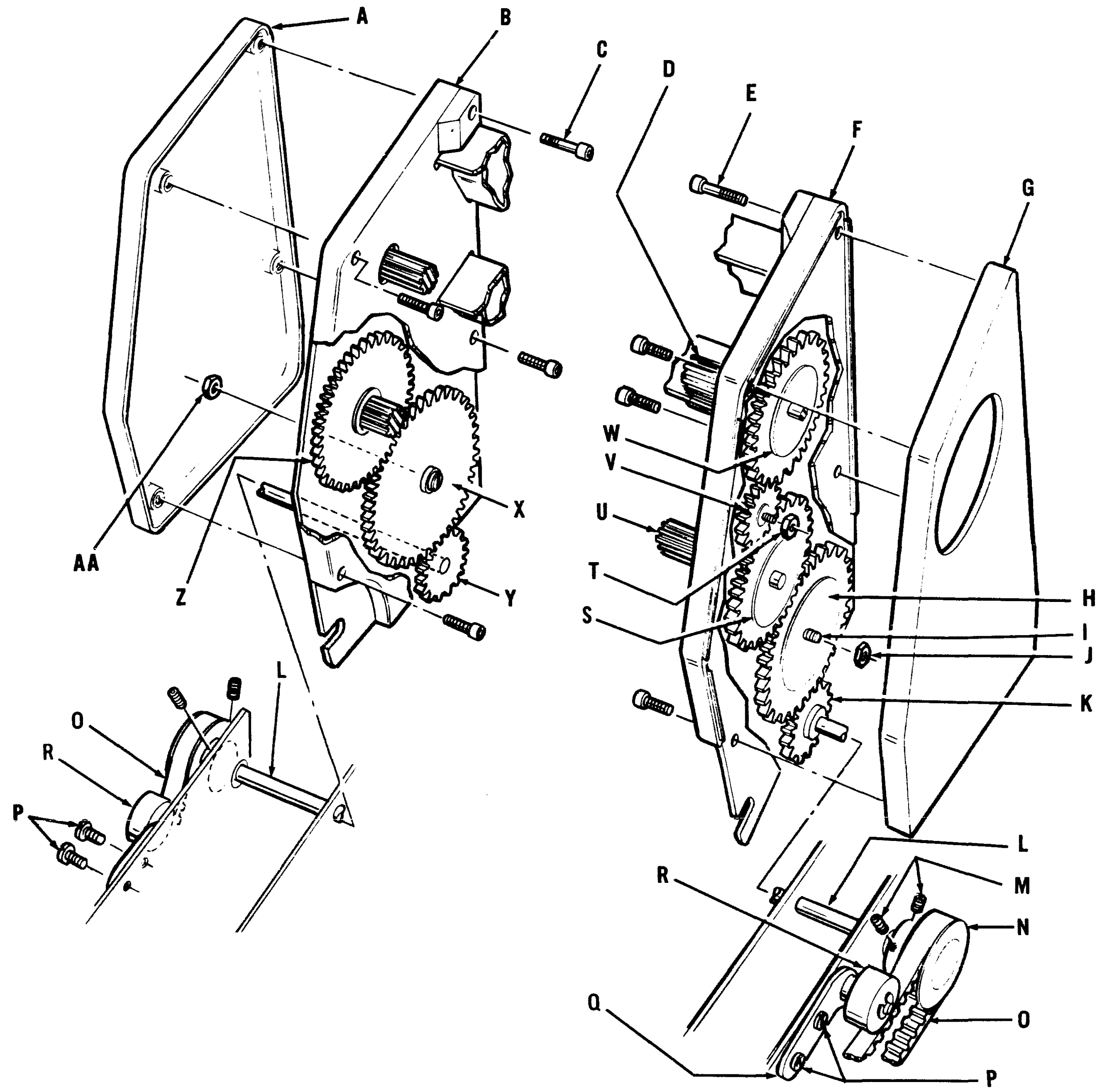


Fig. II-80 DUAL PIN FEED DRIVE

Figure II-80 shows the mechanism of a dual pin feed device. Gear Y is mounted on the left end of the forms transport mechanism and is rotated from the left platen advance mechanism through shaft L and pulley O. Gear K is similarly mounted on the right end of the forms transport and is driven from the right platen advance mechanism.

When the pin feed device is installed, gear Y meshes with gear X, in the pin feed. Thus, on each left advance, gear Y will drive gears X and Z to rotate lower feed shaft U. On the right side, gear K meshes with gear H so that with each right advance, gear K rotates gears H, S, V, and W to rotate upper feed shaft D.

Mounted on the feed shafts are the pin-wheel assemblies which feed the stationery. (See Figure II-81.) These pin wheels may be located in any position along the feed shaft and locked in position by the release/lock lever.

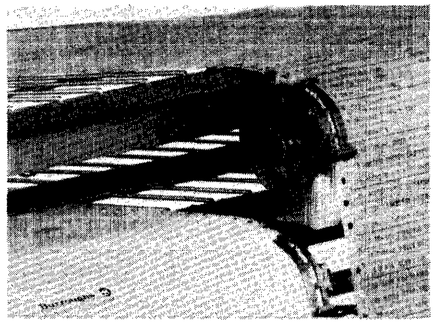


Fig. II-81 PIN WHEEL RELEASE – LOCK LEVER, STYLE 2

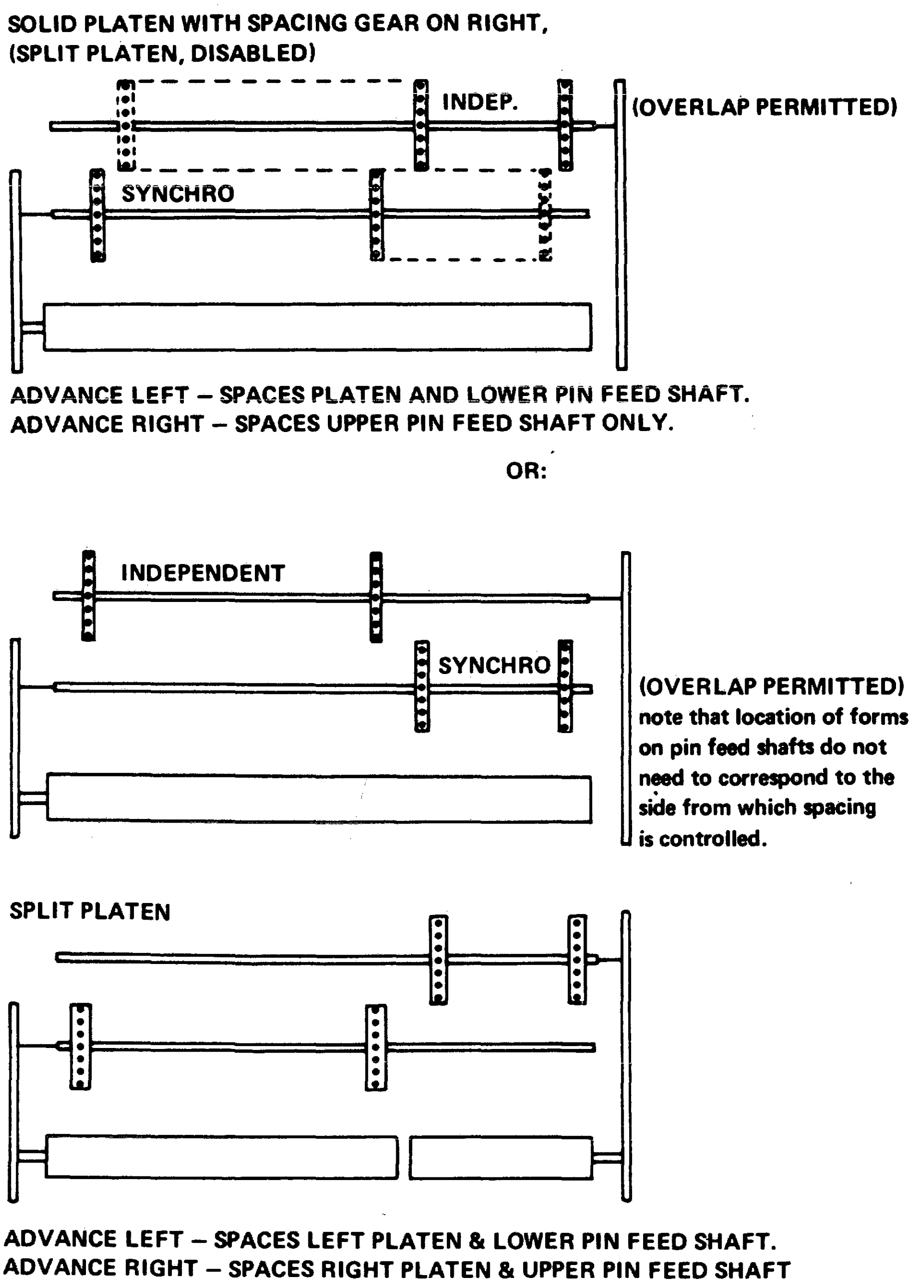


Fig. II-82 DUAL PIN FEED CONFIGURATIONS

Figure II-82 illustrates various configurations of the dual pin feed, with or without the platen split active.

The single pin feed devices only contain a lower feed shaft, similar to U, Figure II-80. The synchronous style contains only gears X and Z, so that the pin feed is actuated from the left platen advance mechanism. The independent style contains only gears H and S, with S connected to the feed shaft U. Thus, the pin feed is actuated from the right platen advance mechanism.

Figure II-83 illustrates the configuration of a single synchronous pin feed device, and Figure II-84 illustrates a single independent pin feed device.

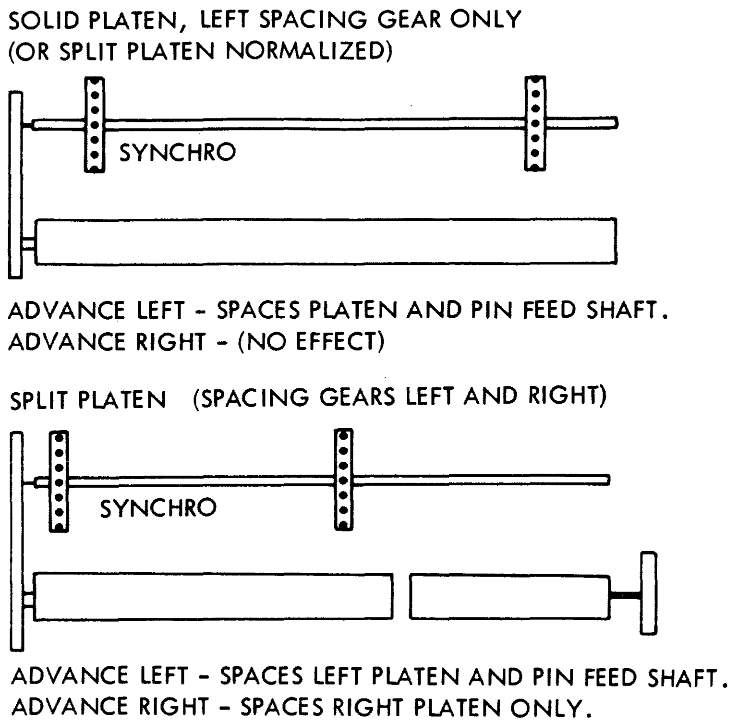


Fig. II-83 SINGLE SYNCHRONOUS ADVANCE

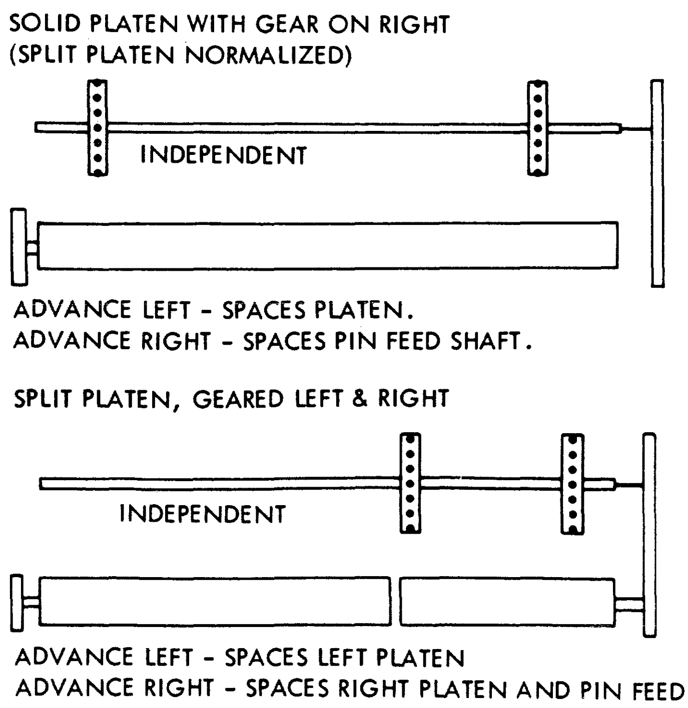


Fig. II-84 SINGLE INDEPENDENT ADVANCE

Figures II-85, and II-86, show the form paths for single, and dual, pin feed devices.

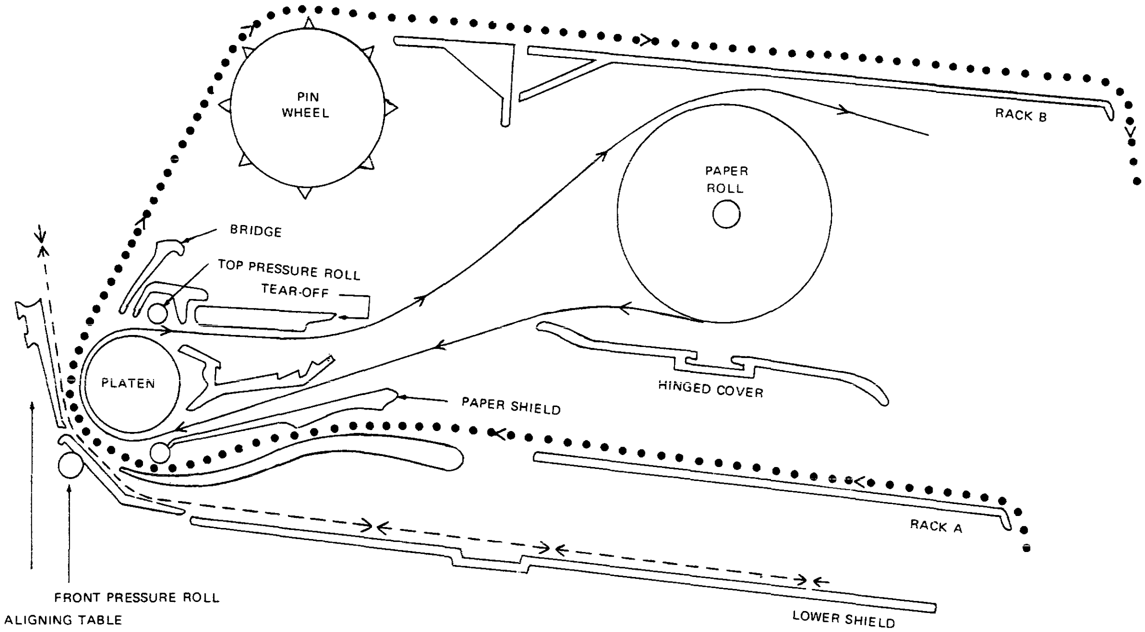


Fig. II-85 PATHS FOR FRONT FEED, ROLL JOURNAL, AND PIN FEED FORMS

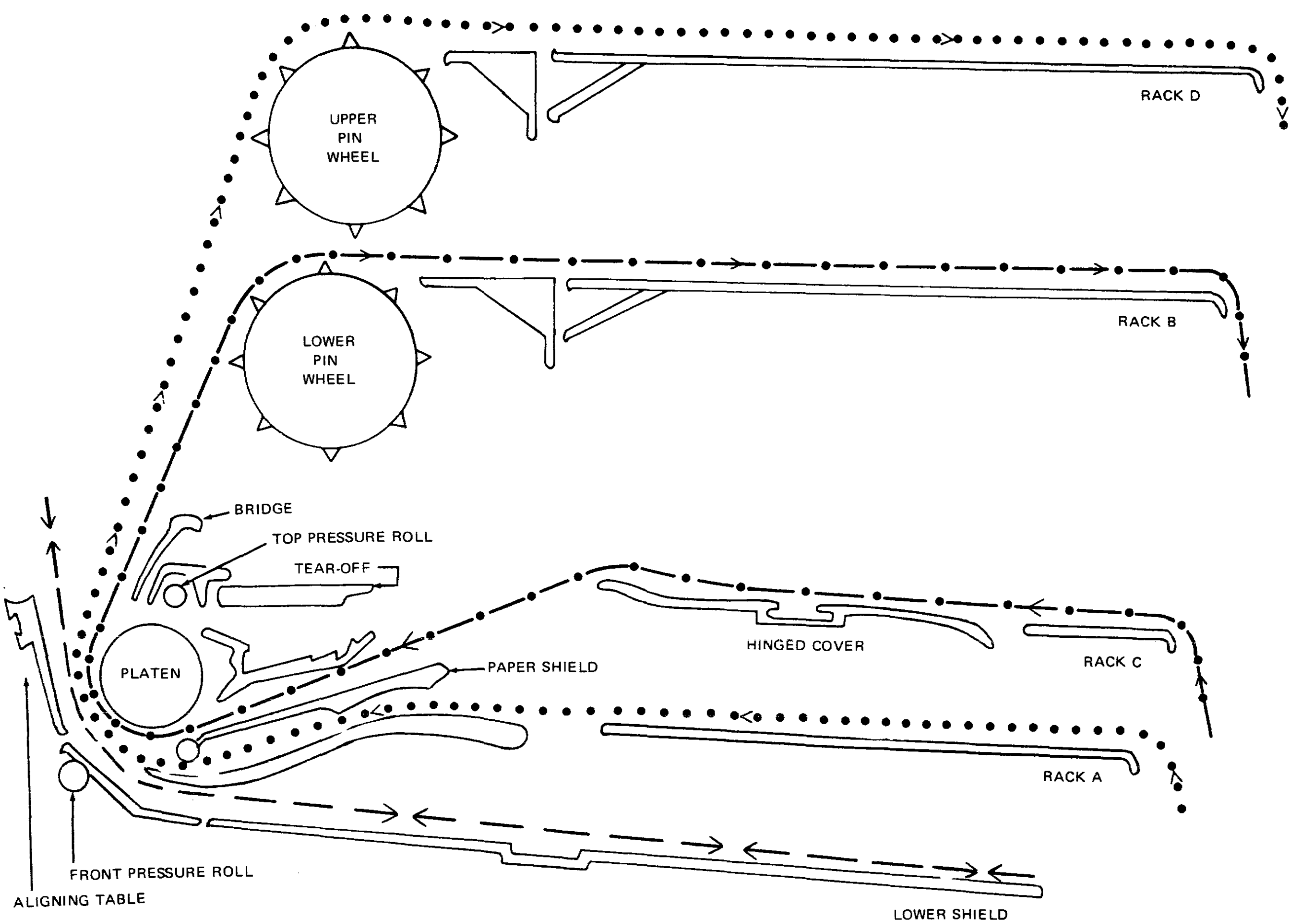


Fig. II-86 PATHS FOR FRONT FEED FORMS AND OVERLAPPING PIN FEED FORMS

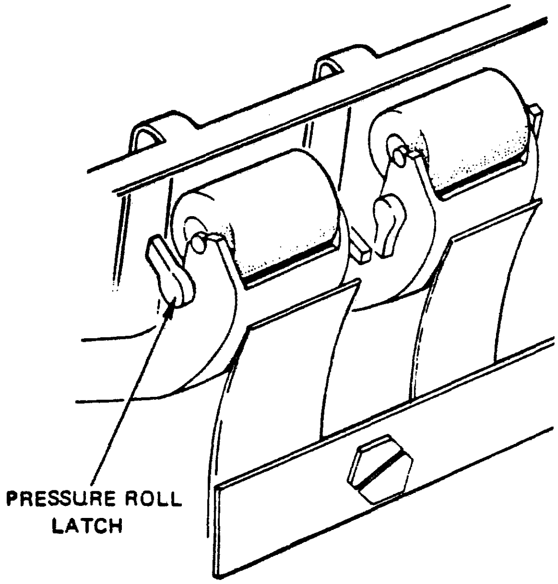


Fig. II-87 PRESSURE ROLL ASSEMBLY

DISABLE FRONT PRESSURE ROLLS

As shown in figure II-87, the front pressure rolls are fitted with small latching levers. When these are rotated to the horizontal position, they prevent the front pressure rolls from closing. This is necessary, when using pin-fed stationery, to avoid interference with the advancing of the forms by the pin-feed mechanism.

CONSOLE DDP

The Console DDP provides the necessary interface control between the B 711 Processor and the B9343 Console. Because of the variety of mechanical functions to be controlled, the Console DDP is not interchangeable, and has dedicated PCB locations in the logic backplane.

The logic divides into five main sections which are:

1. Keyboard Control
2. Indicator Control
3. Printer Control
4. Carrier Control
5. Forms Control

In addition, there is a small amount of common circuitry which is used by several sections (e.g., Transducer core sampling logic).

Because of the pin limitation of the printed circuit boards, three pairs of PCB's are interconnected by means of a foreplane connector block. Those boards connected in this manner are indicated in Figure II-88.

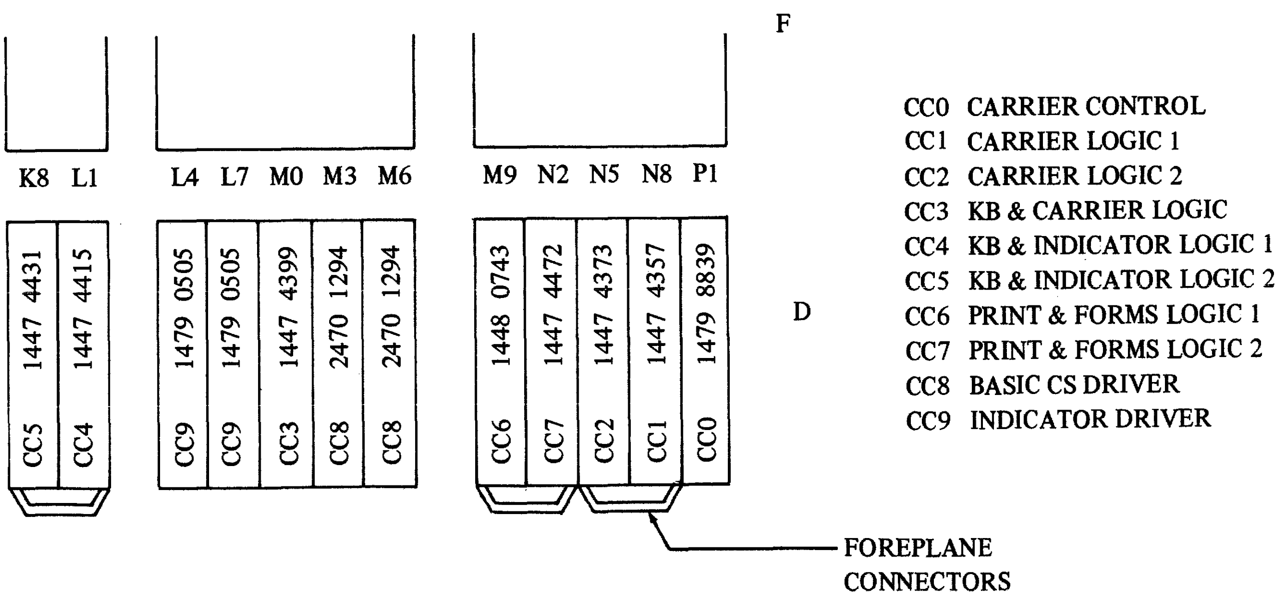


Fig. II-88 CONSOLE DDP CARD LOCATIONS

Functional Detail

	MSB 1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	LSB 16
CONTROL WORD	–	–	–	–	–	–	–	–	–	–	–	ENABLE CARRIER DINT	ENABLE FORMS DINT	ENABLE PRTR DINT	ENABLE KB DINT	–
KB DATA WORD	–	–	–	–	–	–	–	–	KBU8	KBU4	KBU2	KBU1	KBL8	KBL4	KBL2	KBL1
PRINTER DATA WORD	0	1	–	–	ESCAPE RIGHT	ESCAPE LEFT	RED RIBBON	PRINT	–	R8	–	R4/	T2	T1	R2	R1
INDICATOR DATA WORD	1	0	–	IND BNK A	IND BNK B	IND BNK C	IND BNK D	IND BNK S	IND 8	IND 7	IND 6	IND 5	IND 4	IND 3	IND 2	IND 1
CARRIER DATA WORD	0	0					INITIALISE	LEFT	128	64	NO. 32	OF POSI 16	TIONS T 8	O MOVE 4	2	1
FORMS DATA WORD	1	1								LEFT PLAT. ADV.		RIGHT PLAT. ADV.	OPEN TRANS.	CLOSE TRANS.	PWR OFF	ALARM
STATUS WORD	DATA REQUEST			16	DE 8	VICE AD 4	DRESS 2	1	CARR. RDY	FORMS RDY	PRTR RDY	KB RDY	READY BUTTON	INTRPT NOT HONORED	OVER-SPEED	STALL

Fig. II-89

Communication between the Processor and DDP is accomplished by means of "Control" words, "Data" words, and "Status" words. The formats of the various words are shown in Figure II-89.

To enable any of the Console mechanisms, the Processor must send a Control word, with the appropriate bit set (MIR 12, 13, 14 or 15). This enables the logic, associated with that mechanism, to generate a data-interrupt when the logic and mechanism is ready to receive a data-word.

The only exception is the indicator control logic which neither requires a control word, nor generates an interrupt. A data word may be addressed to the indicators at any time, and will be acted upon.

The status word is returned to the Processor when a device-read to the Console is executed with the instruction bit (most significant bit in the active base register) set, or when the Processor executes an ASR and the Console DDP happens to be the highest priority DDP generating a status interrupt.

The four bits, in a status word, associated with a data interrupt are MIR 9, 10, 11 and 12. MIR 13, 14, 15 and 16 are the bits associated with a status interrupt.

Note that the device address bits, necessary for the ASR operation, are not generated by the Console DDP, but are inserted by the Port select unit.

TRANSDUCER CORE SAMPLING

There are eleven transducer cores in the console mechanisms which the DDP logic must test on a continuous basis to detect, and synchronize with mechanical functions. These transducers control the following signals:

1. TU – Timer Unit, transducer in the printer decoder, signal used for synchronization with mechanical cycles.
2. CPR – Carrier position readout, transducer on the carrier drive motor, signal used to monitor the movement of the printer carrier.
3. KBUn – Keyboard upper bits (1, 2, 4, 8), transducers on the keyboard mechanism, signals indicate the value of the most significant digit of a keyboard code.
4. KBLn – Keyboard lower bits (1, 2, 4, 8), transducer on the keyboard mechanism, signals indicate the value of the least significant digit of a keyboard code.
5. KBST – Keyboard Strobe, transducer on the keyboard mechanism, signal indicates that a keyboard operation is taking place, and that the keyboard code is present on KBUn and KBLn.

To test the transducers, the signal CCCS is generated by three signal-shot devices and a JK flip-flop (see Figure II-90). This circuit produces a 10 micro-second pulse every 300 micro-seconds which is routed to the transducer core driver circuits. If a flag is NOT between a transducer and its associated magnet, then the field of the magnet saturates the transducer core so that it exhibits a low inductive impedance. Thus when CCCS is applied to the circuit, the output of the transducer will go false. If a flag IS present, it provides a shunt path for the magnetic field, the transducer core exhibits a high inductive impedance, and when CCCS is applied to the circuit, the output of the transducer will remain true.

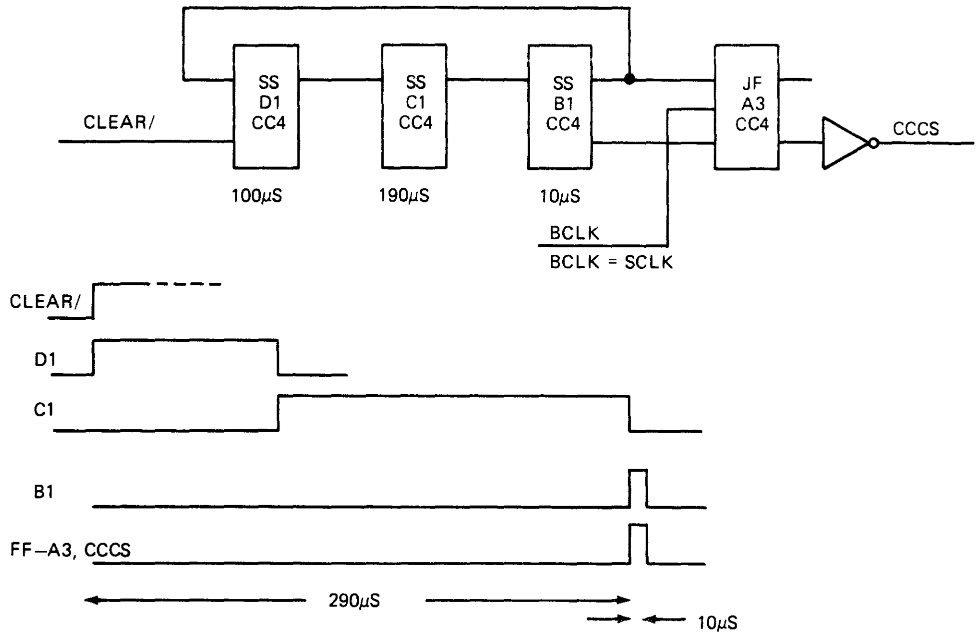


Figure II-90. CCCS GENERATION & TIMING

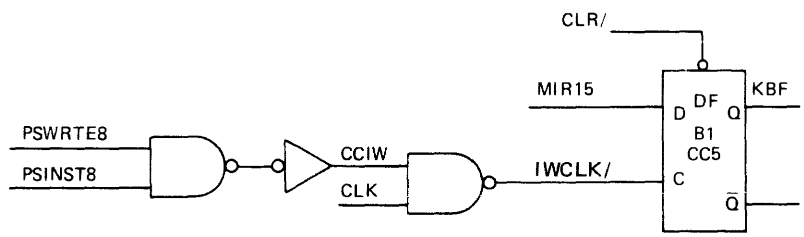


Fig. II-91 KBF CONTROL

KEYBOARD CONTROL

To enable data to be read from the console keyboard, the processor must send a control word, with MIR15=1, to the console, to enable the keyboard data interrupt. However, when the system is turned on, or if the halt and clear pushbutton is used, the keyboard data interrupt is automatically enabled.

Figure II-91 shows the KBF circuit. When the processor executes a device write to the console, with the instruction bit set, PSWRTE8 * PSINST8 generate CCIW, which is gated with CLK to produce IWCLK. If MIR15 is true, then KBF is set. The CLR signal goes true at system power on, or if the halt and clear button is depressed, at this time CLR/ will direct-set KBF.

LOAD KB BUFFER & DATA INTERRUPT

Any key depressed at the keyboard generates KBST. In Figure II-92 KBST and CCCS are used to control KSTF, which will be set as long as the KBST flag is present between the transducer and its magnet. If KBF is set, then KSTF will set KBENF.

Together with the ouput of a flip-flop latch (ENKDI), KBENF and KSTF set the KDI flip-flop as shown in Figure II-93. KDI is gated with KBF and L1FORT2/ to make EKDI/ false which sends a data interrupt to the processor.

While the system is turned on CCCS, with EKDI/ true, constantly strobes the KBUn and KBLn data into the keyboard buffer. When EKDI/ goes false, it disables the gate (T2, B5, CC5) so that the generated keyboard code is trapped in the keyboard buffer.

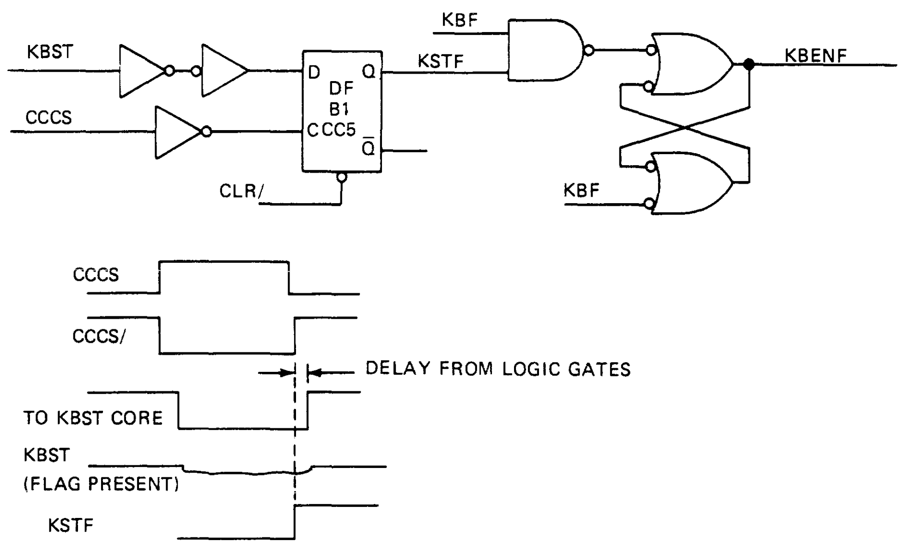


Fig. II-92 KSTF & KBENF

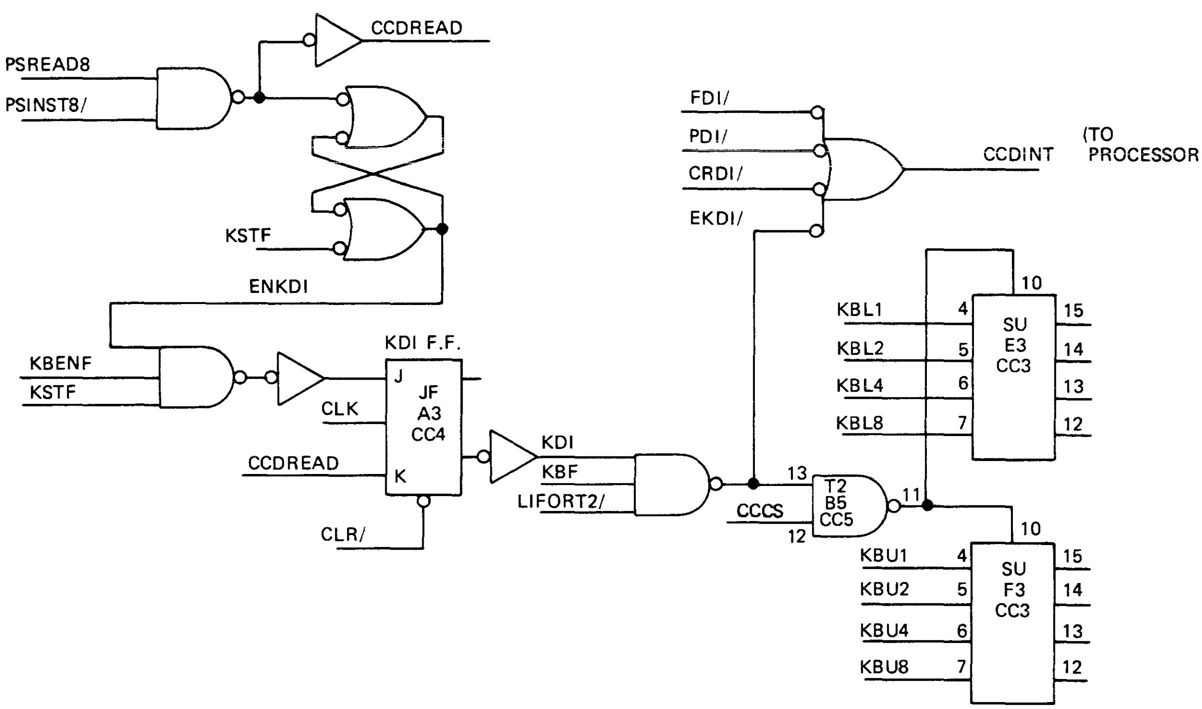


Fig. II-93 LOADING KB BUFFER & DATA-INTERRUPT

UNLOAD KB BUFFER

To retrieve the data from the keyboard buffer, the processor must respond to the data interrupt with a device read with the instruction bit reset.

In Figure II-93, PSREAD8 and PSINST8/ generate CCDREAD which resets the KDI flip-flop, which in turn resets the data interrupt to the processor. At the same time CCDREAD strobes the outputs of the keyboard buffer on to the EXT lines so that the processor may receive the keyboard code. (Figure II-94)

Returning to Figure II-93, it can be seen that PSREAD8 * PSINST8/ will set the latch flip-flop, which disables the set-input to the KDI flip-flop. The reason for this is that KSTF will be set for approximately 28.5 ms from a keyboard operation, however the processor may respond to a data interrupt in 1 micro-second. The latch flip-flop then ensures that only one data interrupt is generated per key depression, so that the keyboard code is only read once. When KSTF is reset, it will reset the latch flip-flop to enable further keyboard data interrupts.

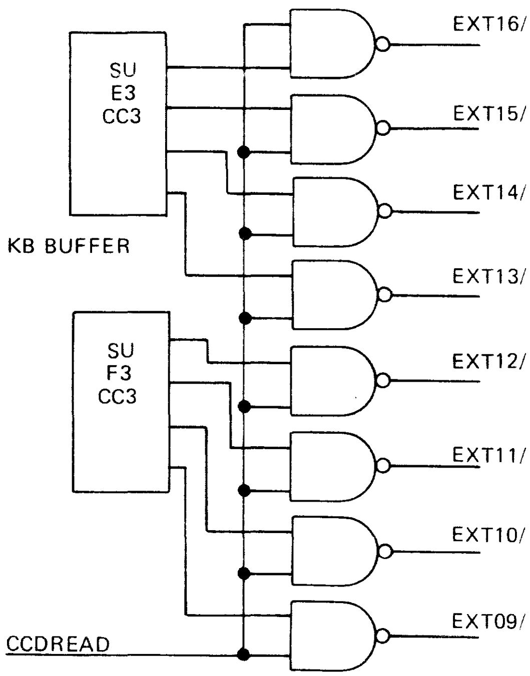


Fig. II-94 UNLOAD KB BUFFER

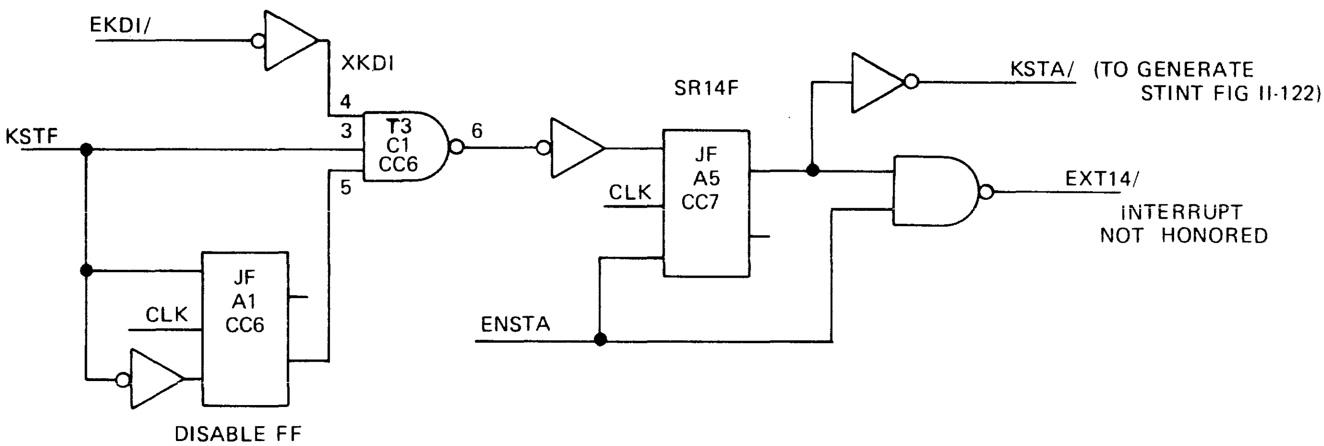


Fig. II-95 INTERRUPT NOT HONORED FLAG

INTERRUPT NOT HONORED

Since a key may be depressed on the keyboard, at any time, while the system is turned on, it is possible that an operator may depress more than one key before the software can respond to the data interrupt. This would not be a normal operation while the console is enabled, but could occur when the software is engaged with some other peripheral(s), say the 96-column card punch or disk unit. If this happens, a keyboard code(s) will be lost. To inform the interpreter of this condition, there is an Interrupt-not-honored flag.

In Figure II-95, when KSTF sets, it will set the Disable flip-flop at the same time that the KDI flip-flop is set, i.e. one clock time after KSTF (ref. Figure II-93). Therefore, the output of the gate (T3, C1, CC6) remains true. When KSTF resets the Disable flip-flop will also be reset. If KSTF now goes true again, before XKDI is reset, it will cause the INH flag, SR14F, to be set.

When the processor executes an ASR, or Device read with the instruction bit set, to read the status of the Console DDP, the signal ENSTA will gate SR14F to the EXT14 line and, with the clock pulse at the end of the status read operation, will reset SR14F.

When the processor receives the INH bit, it must enter a suitable error routine to have the operator re-index the keyboard characters.

INDICATOR CONTROL

The console indicators are each driven by an indicator driver circuit, see Section III and F.T.&R documentation for details. The indicator drivers are located on the CC9 PCB's.

To control the indicators, the software must send an indicator data word to the console DDP. Figure II-96 illustrates the format of the indicator data word.

				INDICATOR GROUP SELECT					SELECT INDICATORS WITHIN GROUPS							
MIR	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
	1	0	Ø	A	B	C	D	S	8	7	6	5	4	3	2	1

Fig. II-96

Indicator groups A, B, C, and D are each controlled by a pair of SU (TTL 9300) IC chips, which are used as data buffers. The indicators S use only one SU chip. The MIR lines 9 through 16 are gated to the inputs of the SU chips, and MIR lines 4 through 8 are used to gate clock pulse(s) to the selected indicator group(s) to strobe the data into the buffers. The outputs of the buffers are wired to the indicator drivers to control the selected indicators.

Figure II-97 is a simplified schematic of the indicator logic.

Note that Indicators D1, D2, D3, and D8 have alternative inputs. These inputs come from the EO control logic in the processor and are used to display memory parity errors.

Figure II-98 shows the layout of the indicators and PSK's on the keyboard. Together with the indicator data-word format.

TIMER UNIT FLIP-FLOP (TUF)

To enable the logic to synchronize with the mechanical cycle of the console, there is a transducer and flag assembly mounted inside the print decoder (see Figure II-38) which controls the signal TU. TU and CCCS are then used to control TUF which is set for 27 MS from 30T to 03T of each mechanical cycle, see Figure II-99.

TUF is used to time logic functions for the Printer, Carrier, and Forms mechanisms.

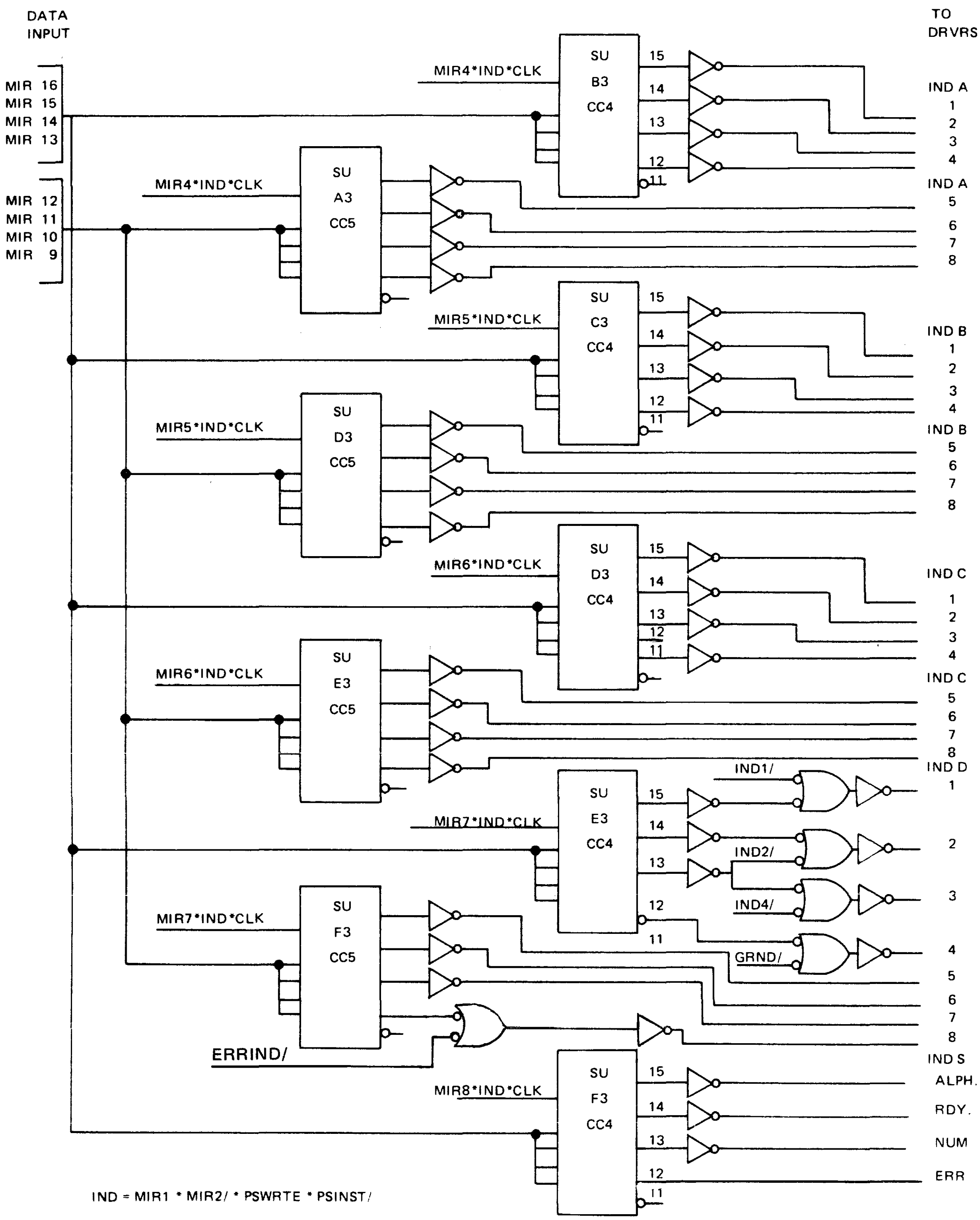
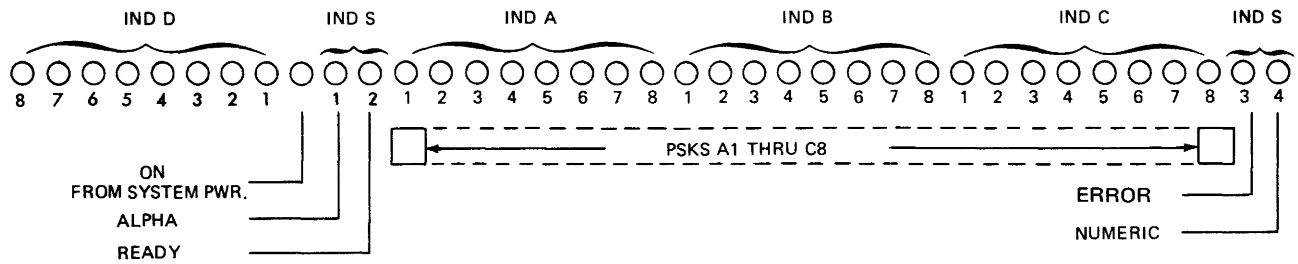


Fig. II-97 INDICATOR REGISTERS



	CONTROL								DATA								
MSB	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	LSB
	1	0	Ø					1	Ø	Ø	Ø	Ø	NUM	ERR	RDY	ALPH.	
	1	0	Ø				1		D8	D7	D6	D5	D4	D3	D2	D1	
	1	0	Ø			1			C8	C7	C6	C5	C4	C3	C2	C1	
	1	0	Ø		1				B8	B7	B6	B5	B4	B3	B2	B1	
	1	0	Ø	1					A8	A7	A6	A5	A4	A3	A2	A1	

1 = INDICATOR ILLUMINATED
0 = INDICATOR EXTINQUISHED

Fig. II-98 CONSOLE INDICATOR & PSK POSITIONS AND INDICATOR DATA WORD FORMAT

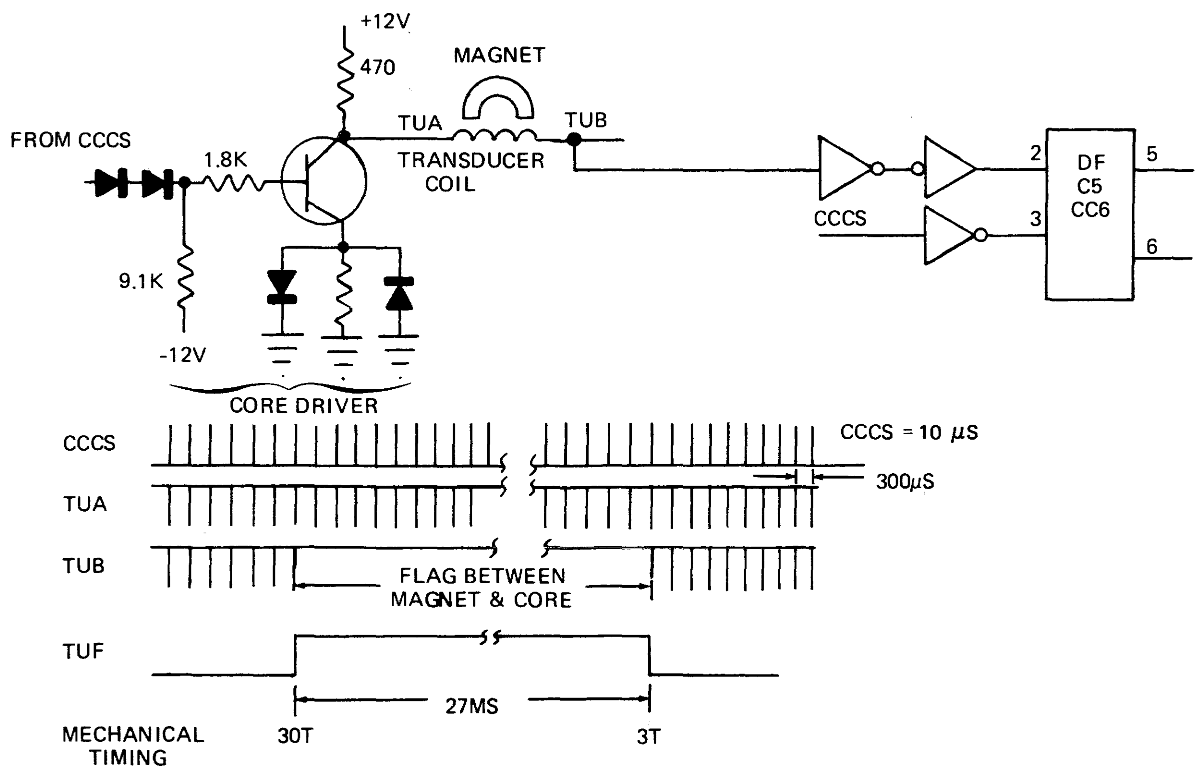


Fig. II-99 TUF CONTROL & TIMING

PRINTER CONTROL

To enable the printer data interrupt, the processor must send a control word with MIR14=1 to the Console DDP. Provided that any previously indexed Carrier operation is complete the DDP will return PDI (Printer Data Interrupt) to the processor.

When the Processor has a character to print it must wait for the data-interrupt before executing a device-write to send the data-word to the DDP. Figure II-100 shows the format of the printer data-word.

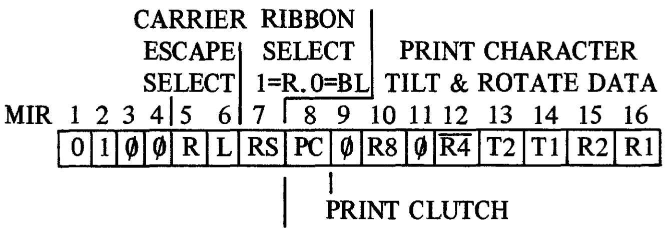


Fig. II-100 PRINTER DATA WORD

The printer logic will then store bits 5, 10, and 12 through 16 in a register, which is shared with the Forms logic, bits 6, 7, and 8 are stored in flip-flops. As it loads the register, and flip-flops, the printer logic turns off the data interrupt until the character has been transmitted to the mechanical sections.

The following description only covers those functions that are controlled by the Printer section, i.e. the functions of MIR bits 5 and 6, escape left, escape right, or neither (print in place), are covered in the description of the Carrier control logic.

PRINTER DATA INTERRUPT

Everytime a device-write to the console is executed, and the instruction bit is set, (MSB of Base register), a single low going IWCLK/ (Instruction Write Clock) is enabled by PSWRTE8 * INST8, as shown in Figure II-101.

If MIR14=1 then IWCLK/ will set PRF, Figure II-102. PRF is then gated with TUF and CROP1F/. Note that CROP1F/ true indicates that any previous carrier operation has been completed.

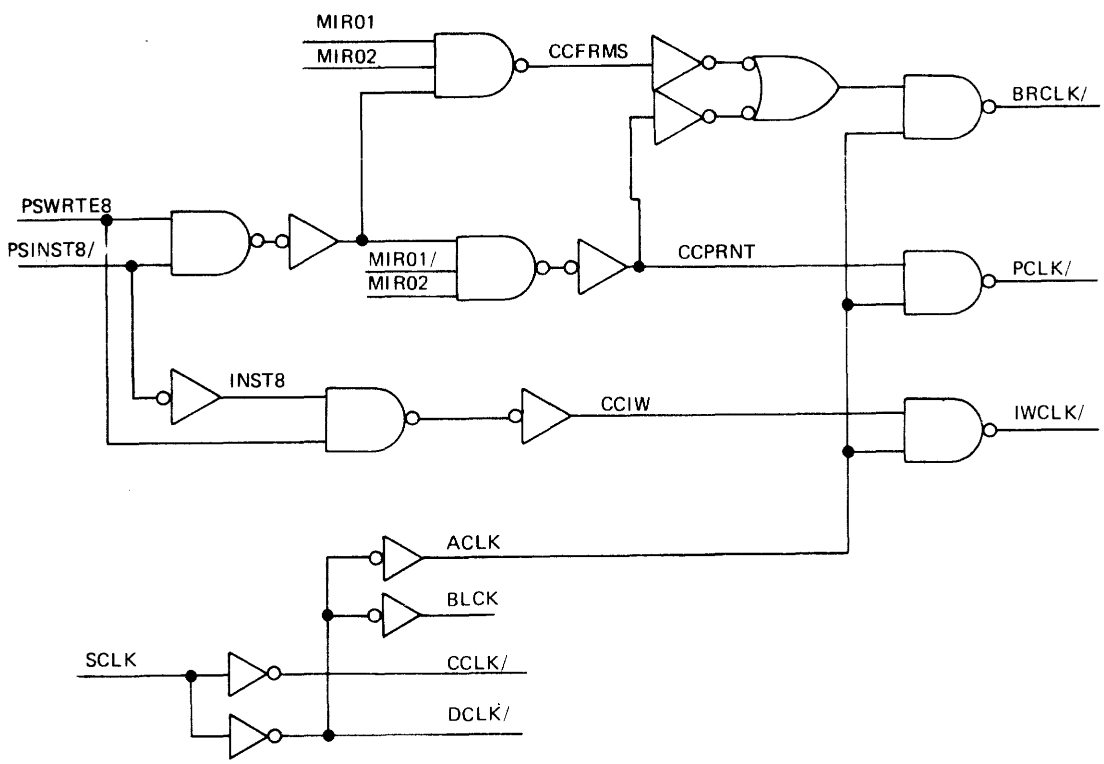


Fig. II-101 BRCLK, PCLK & IWCLK GENERATION

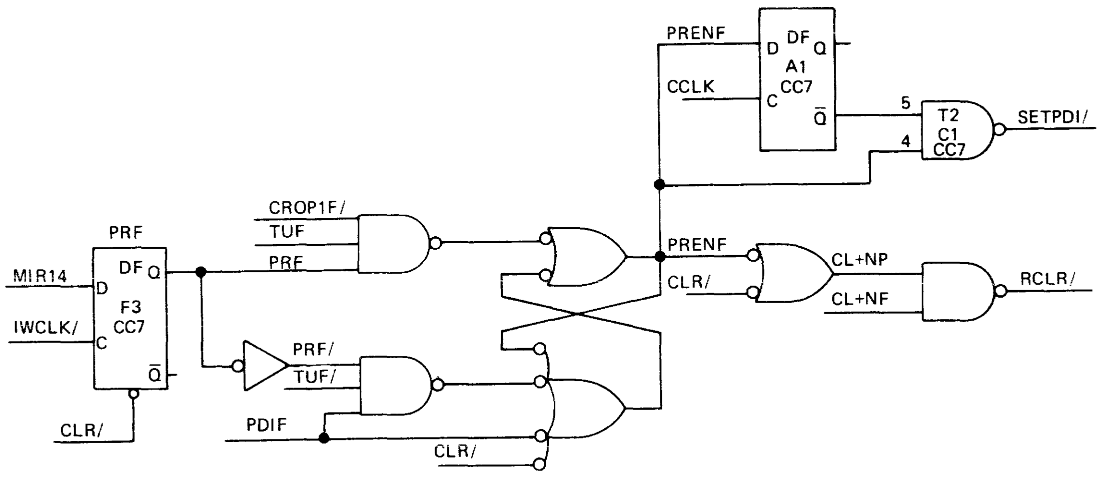


Fig. II-102 PRF & PRENF

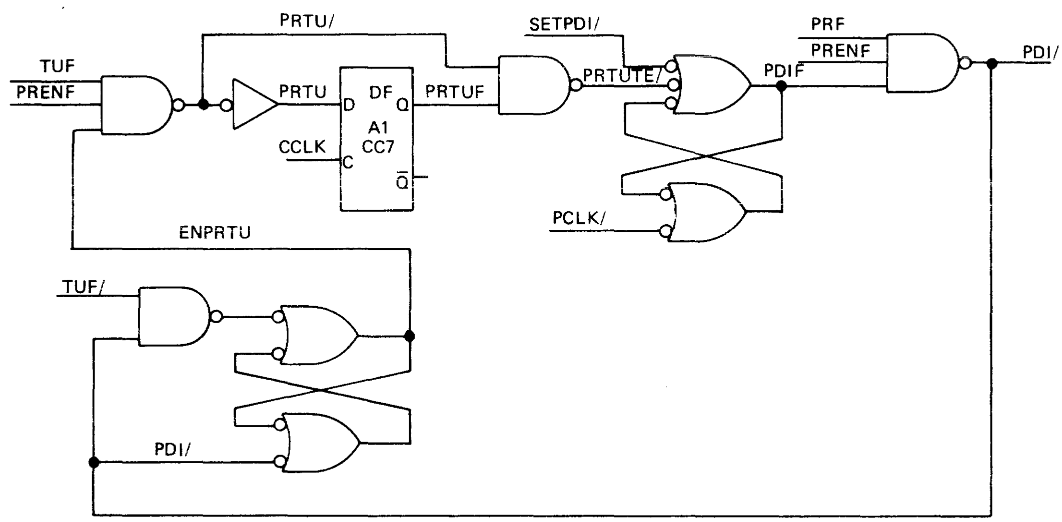


Fig. II-103 PDI CONTROL

PRENF then disables the signal CL+NP to make RCLR/ true. This removes the reset signal from the printer/forms data register (see Figure II-104) so that it may be loaded. At the same time PRENF is gated with the reset side of a DF to make SETPDI/ false. One clock time later the DF is set, by PRENF *CCLK, so SETPDI/ is false for 1 micro-second.

In Figure II-103, SETPDI/ false sets the PDI flip-flop which is gated with PRENF and PRF to make PDI/ false. This causes a data interrupt to be sent to the processor (Figure II-93). When PDI/ goes false, it resets the ENPRTU flip-flop to disable the PRTU circuit.

PRINTER DATA WORD

When the processor receives the data interrupt, it may execute a device-write with the instruction bit reset. If MIR01/ and MIR02 are both true, indicating a printer data word, the signal CCPRNT is generated, see Figure II-101. CCPRNT then enables two low going clock pulses, BRCLK/ and PCLK/. BRCLK is used to load the printer/forms data register (Figure II-104) and PCLK resets PDIF. (Figure II-103)

Resetting PDIF makes PDI/ true and turns off the data-interrupt to the processor. If, or when TUF is reset, PDI/ and TUF/ set the ENPRTU flip-flop to enable the following TUF to generate the signal PRTU.

Figure II-104 shows the printer/forms data register together with the PCF and RSF flip-flops. It can be seen how RCLR/ true, enables the buffers and how BRCLK/ strobes the MIR data into the buffers. When PRTU goes true the contents of the data register, and the flip-flops, is gated out to the printer decoder, for 27 m.s., to energize the clutch solenoids and index the required mechanical movement.

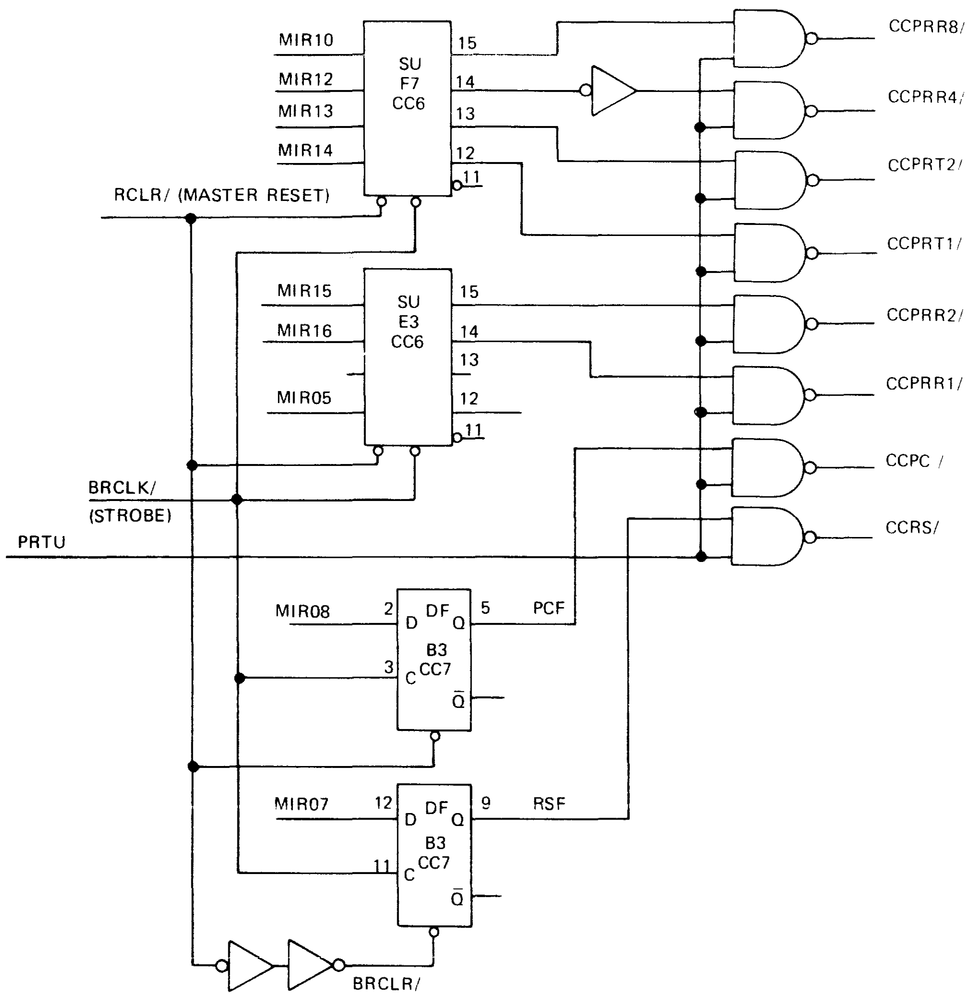


Fig. II-104 PRINTER/FORMS DATA REGISTER PCF. & RSF.

When TUF goes false (after 27 m.s.), PRTU goes false and disables the output of the data register and flip-flops. One clock-time later, the PRTUF flip will reset., Figure II-103, this means that PRTUTE/ is false for 1 micro-second, to again set PDIF. PDIF makes PDI/ false to send a data interrupt to the processor so that the next print-character, data word, may be sent to the Console DDP. PDI/ again resets the ENPRTU flip-flop, to disable PRTU until the next character is received.

Note that the Processor must respond to this, and following, data interrupt(s) within 23 milliseconds to achieve the maximum print speed of 20 characters-per-second.

When the Processor is finished with the console printer, it will execute a device-write with the instruction bit set and MIR14=0. This will cause PRF to be reset, Figure II-102. At the end of any existing print operations, PDIF will be set (from PRTUTE/), so PRF/ * PDIF * TUF/ will reset PRENF. PRF * PRENF/ will make PDI/ true and disable any further printer data-interrupts.

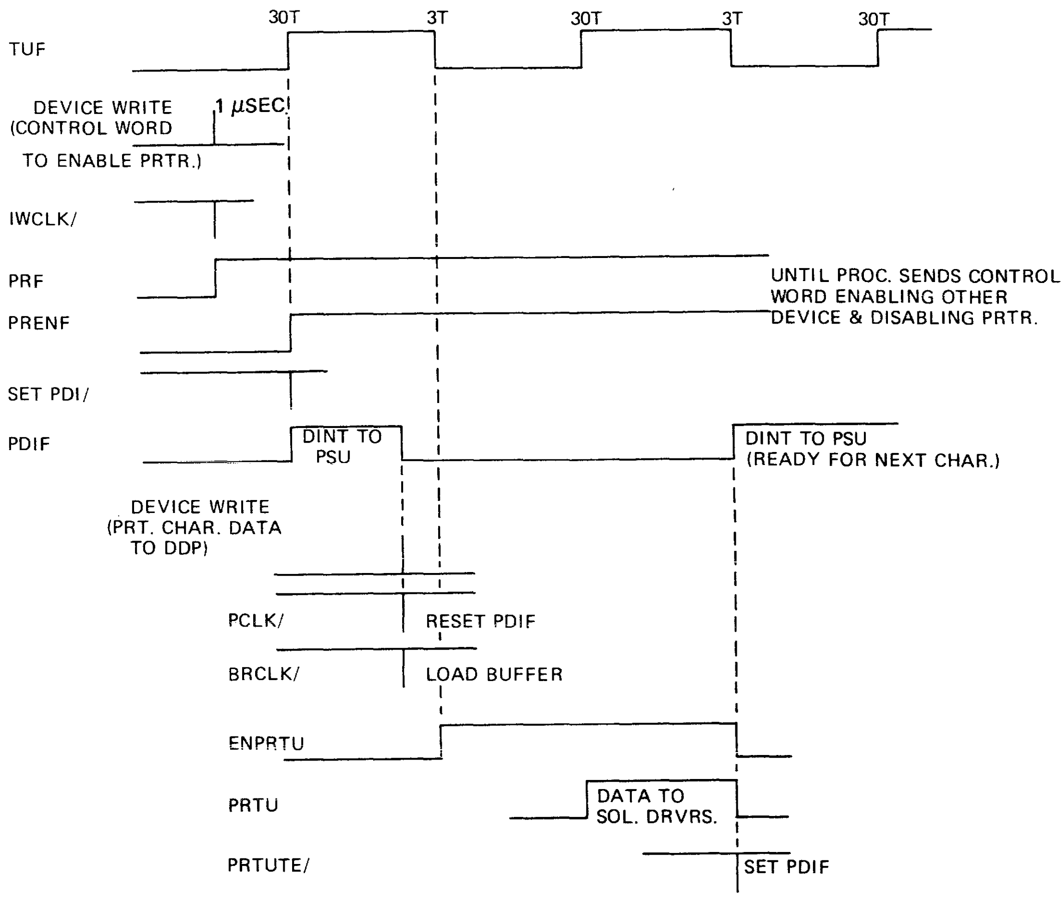


Fig. II-105 PRINT OPERATION TIMING

CARRIER MOTOR CONTROLS

The Carrier is driven by a bi-directional 24 V.D.C. motor which is controlled by the logic. In addition to controlling the direction of drive, the logic also controls the speed, and power of the motor.

The logic exercises control of the Carrier motor through five logic signals which are:

1. CRGL/ – Carrier go left not.
2. CRGR/ – Carrier go right not.
3. CRHS/ – Carrier high speed not.
4. CR4A/ – Carrier 4 amp not.
5. CRLT/ – Carrier left time not.

DIRECTION CONTROL

The Carrier motor is controlled by four driver circuits which must be selectively enabled to drive the carrier either to the left or to the right. Figure II-106 shows the Carrier motor, driver circuits and the directional control signals CRGR/ and CRGL/.

Drivers D1 and D2 provide the 24V supply to the motor and drivers D3 and D4 are connected to ground, via R1.

In order to drive the carrier to the right, drivers D2 and D3 must be enabled. As shown in the upper half of Figure II-106, if the logic makes CRGR/ false, leaving CRGL/ true, drivers D2 and D3 will be turned on and drivers D1 and D4 will be turned off. Thus a circuit from ground to C24V+F is enabled via D3, the motor, and D2, to drive the carrier to the right.

Note that G3 and G7 are AND gates and that their output is approximately equal to their lowest inputs, including the coupling from G8 and G4.

If the logic makes CRGL/ false, leaving CRGR/ true, then as shown in the lower half of Figure II-106, drivers D1 and D4 are turned on. Thus a circuit, to drive the Carrier to the left, is enabled via R1, D4, the motor, and D1.

Note that if CRGR/ and CRGL/ should be made false together, then the outputs of G2, G3, G6 and G7 will all be false. The outputs of G3 and G7 will clamp the outputs of G4 and G8 false also. Thus no drivers would turn on, and no Carrier movement would result.

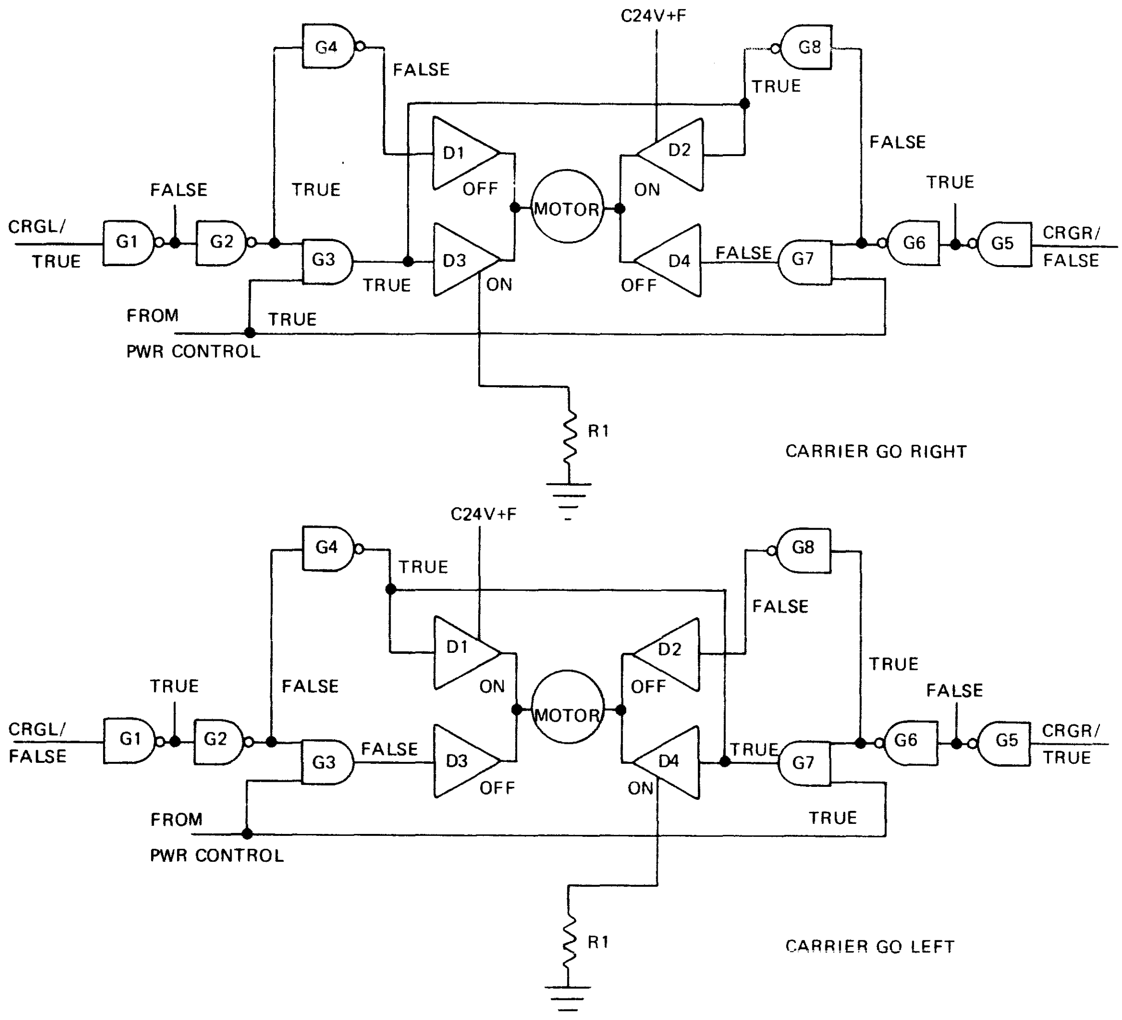


Fig. II-106 CARRIER MOTOR DIRECTION CONTROL

SPEED CONTROL

The output of the Tachometer is used to monitor and control the speed of the Carrier. It is a small D.C. generator, the output of which is proportional to its rotational velocity.

Referring to Figure II-107, it can be seen that the signal CRLT/ controls the selection of the Tachometer output. If the logic calls for the Carrier to move to the left then CRLT/ is made false. Through gates G17, G18, G19 and G20, CRLT/ false will ground TACHR and enable TACHL. When CRLT/ is true then TACHL is grounded and TACHR enabled.

C1 and C2 are comparators, their function is such that the output (Pin 7) is false until input pin 2 is equal to, or greater than, input pin 3. The input to pin(s) 3 of of C1, and C2, is controlled by a level generator, LG1, the input to which is CRHS/. When the logic calls for a low speed Carrier movement (3.25″ p.s.), CRHS/ is true and the output of LG1 is .5V. When a high speed Carrier movement (20″ p.s.) is required, CRHS/ is made false and the output of LG1 is 3V. With the carrier moving at 3.25″ per second, the output of the Tachometer is also .5V, and at 20″ per second it is 3V.

The outputs of the Tachometer and the level generator are fed to a comparator, and the result is used to control the selected motors drivers, either D1 and D4, or D2 and D3.

As an example: if a low-speed movement to the left is required, then CRHS/ is made true, and CRLT/ is made false. CRLT/ false enables TACHL to pin 2 of C1, and LG1 supplies .5V to pin 3 of C1. The output of C1 will remain false until the Carrier accelerates to 3.25" per second, at this speed TACHL equals the output of LG1 and the output of C1 goes true to make CRUTSL/ false. Through gates G10 and G11 CRUTSL/, false clamps the input to G2 false, which through G4, turns drivers D1 and D4 off. As a result, the Carrier motor slows down until TACHL is less than .5V, at this point, the output of LG1 goes false,

Functional Detail

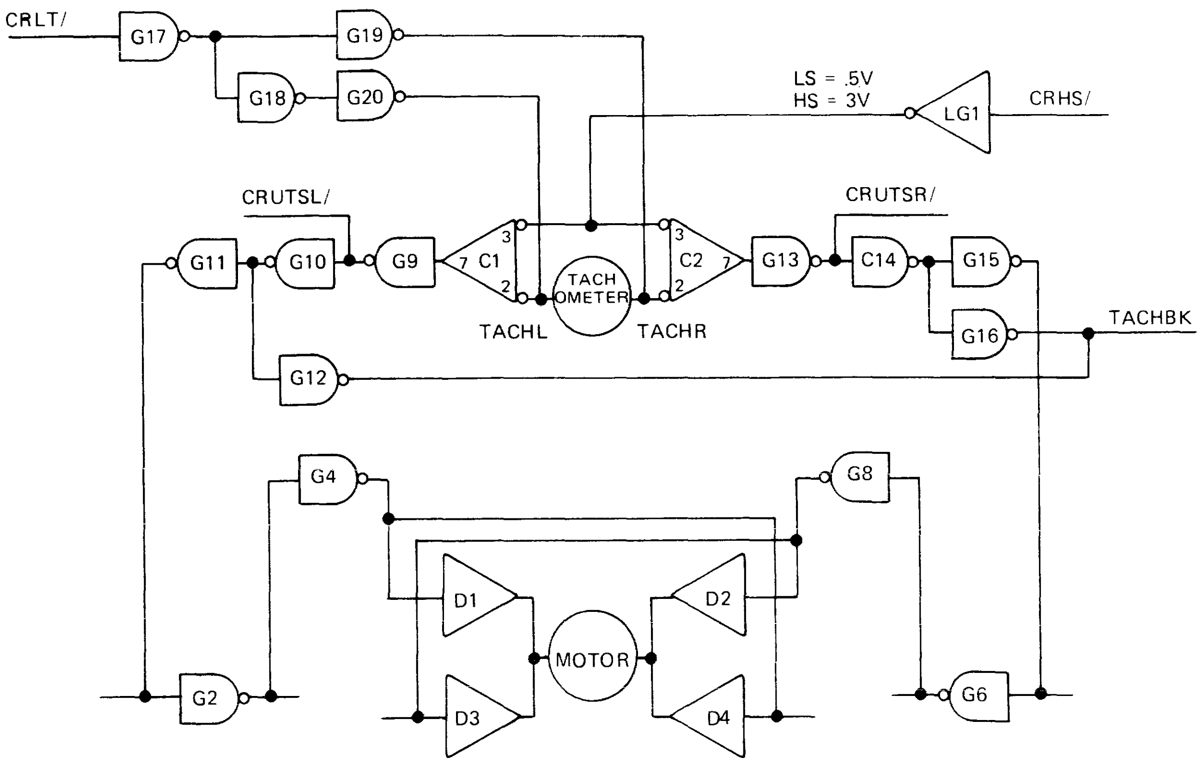


Fig. II-107 CARRIER SPEED CONTROL

CRUTSL/ goes true, and drivers D1 and D4 are turned on again. Thus under normal operation the TACHL or TACHR signals will be "hunting" about .5V, for low speed, and the drivers will be turning on and off to control the speed of the Carrier.

Note that the only difference between low speed and high speed movement is the higher output from LG1 for high speed. This requires the Tachometer to be rotated faster to generate 3V. It can also be appreciated that the accuracy of the Carrier speed is dependent upon the accuracy of the Tachometer output.

The signal TACHBK is false when the carrier is moving at, or faster than the selected speed. It is true when the carrier is travelling slower than the selected speed. This signal is fed back to the logic for control purposes.

MOTOR POWER CONTROL

At either high speed or low speed, the logic can control power of the Carrier motor. This is achieved by regulating the current through the motor drivers to either 4 amperes (high power) or 2 amperes (low power).

In Figure II-108 the signal CR4A/ controls a level generator LG2. When CR4A/ is true, the output of LG2 is .5V and when CR4A/ is false, the output of LG2 is 1V. The output of LG2 is connected to pin 3 of comparator C3.

The ground circuit for the motor drivers D3 or D4 is via R1, which is a precision .25Ω resistor. It can be seen that with 2 amps flowing through the circuit, the voltage across R1 will be .5V, and with 4 amps flowing through the circuit, the voltage across R1 will be 1V. The top of R1 is connected to input pin 2 of C3.

Whenever the voltage across R1 exceeds either .5V or 1V, depending on the power selected, the output of C3 will go true to increase conduction through driver D5. As D5 conducts more current, it lowers the voltage level input to gate(s) G3, or G7, thus reducing the output level from the active gate. This, in turn, will cause the active driver D3 or D4 to conduct less current, thereby reducing the motor power.

When the voltage across R1 falls below either .5V or 1V, the output of C3 goes false. Driver D5 will then conduct less current thereby raising the voltage level at G7 and D4, or G3 and D3, to increase the motor drive current.

In normal operation, the output of C3 and D5 will be constantly varying, about the selected level, to regulate the current through the motor.

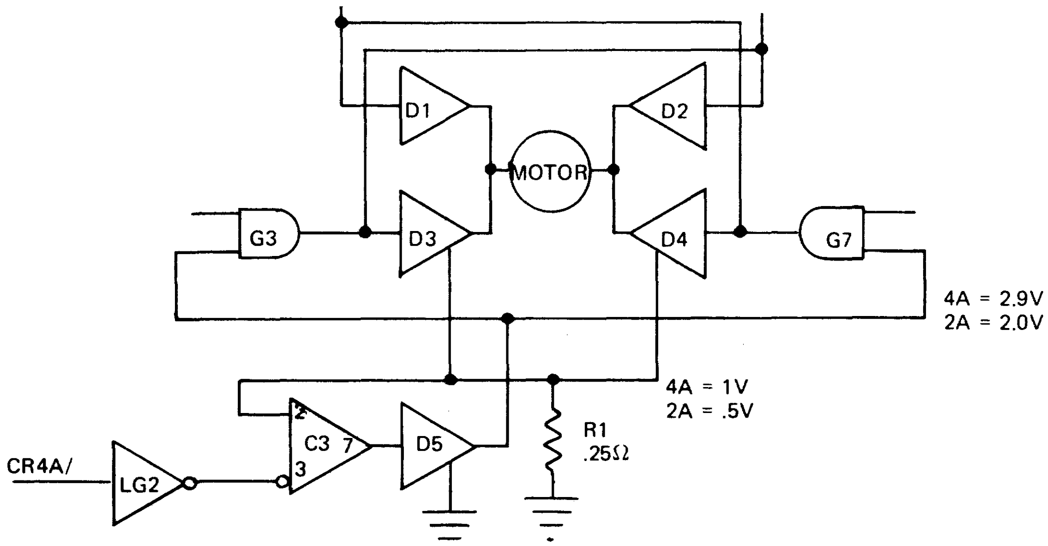


Fig. II-108 CARRIER MOTOR POWER CONTROL

Figure II-109 is a complete logical representation of Carrier control circuit and shows the voltage levels at most points of the circuit as they exist for either left or right direction, high or low speed and high or low power. The figures in parenthesis are the levels existing when the circuit is inactive, i.e. With CRGR/, CRGL/ and CR4A/ all true.

Figure II-110 shows the circuit in detail. It should be noted that most of the components are to be found on the CCO PCB. The exceptions are the drivers D1, D2, D3 and D4 which, together with some associated diodes and resistors, are mounted on a heat-sink panel in the Console.

GENERAL OPERATION

The logic can move the Carrier at high or low speed, with high or low power. The exact sequence depends upon the number of positions to be moved.

As an example, suppose that a move of twenty positions to the right is called for. Upon receipt of the Carrier data-word, the logic strobes MIR9 through 16 which contain the number of positions to be moved, into a buffer. It then energizes the Hold, and Interposer solenoids to release the Carrier and drives the Carrier to the right at high speed and full power. This is accomplished by making CRGR/ and CR4A/ both false. At the same time, it enables the CPR signal from the Carrier drive motor transducer, to count down the contents of the buffer by one for each print position.

When the Carrier reaches a position six away from the desired position, i.e. when the data buffer = 6, the logic reverses the drive signals to the Carrier by making CRGR/ true and CRGL/ false. This causes the motor to decelerate. At the same time, the logic calls for low speed by making CRHS/ true.

When the Carrier decelerates to 3.25” per second, the signal TACHBK goes true (ref. Carrier motor speed control). The logic then makes CRGR/ false and CRGL/ true, to again drive the Carrier in the original direction (right). However it now calls for low speed. (3.25” p.s.).

As the Carrier passes the position 1 away from the desired position, i.e. when the data buffer = 1, the logic releases the interposer hold coils and reduces the motor power to 2 amps by making CR4A/ true.

Thus the Carrier “coasts” into the desired position and is detented by the interposer latches.

MOVEMENT LESS THAN SIX POSITIONS

If a movement of six, or less, positions is called for the logic will commence by driving the Carrier at low speed and full power, again enabling CPR to count down the data buffer. When the data buffer = 1 then, as before, the Carrier motor power is reduced to 2 amps and the interposer latches are released to detent the Carrier.

ESCAPING

When a single stop position movement is required, as in printing sequential characters, then the hold coils are not used. The logic calls for low speed, full power, by making CRHS/ and CR4A/ both true, the direction is established through CRGR/ or GRGL/ being false and the interposer solenoid is energized. The resulting mechanical withdrawal of the interposer latches enables the Carrier to move one position.

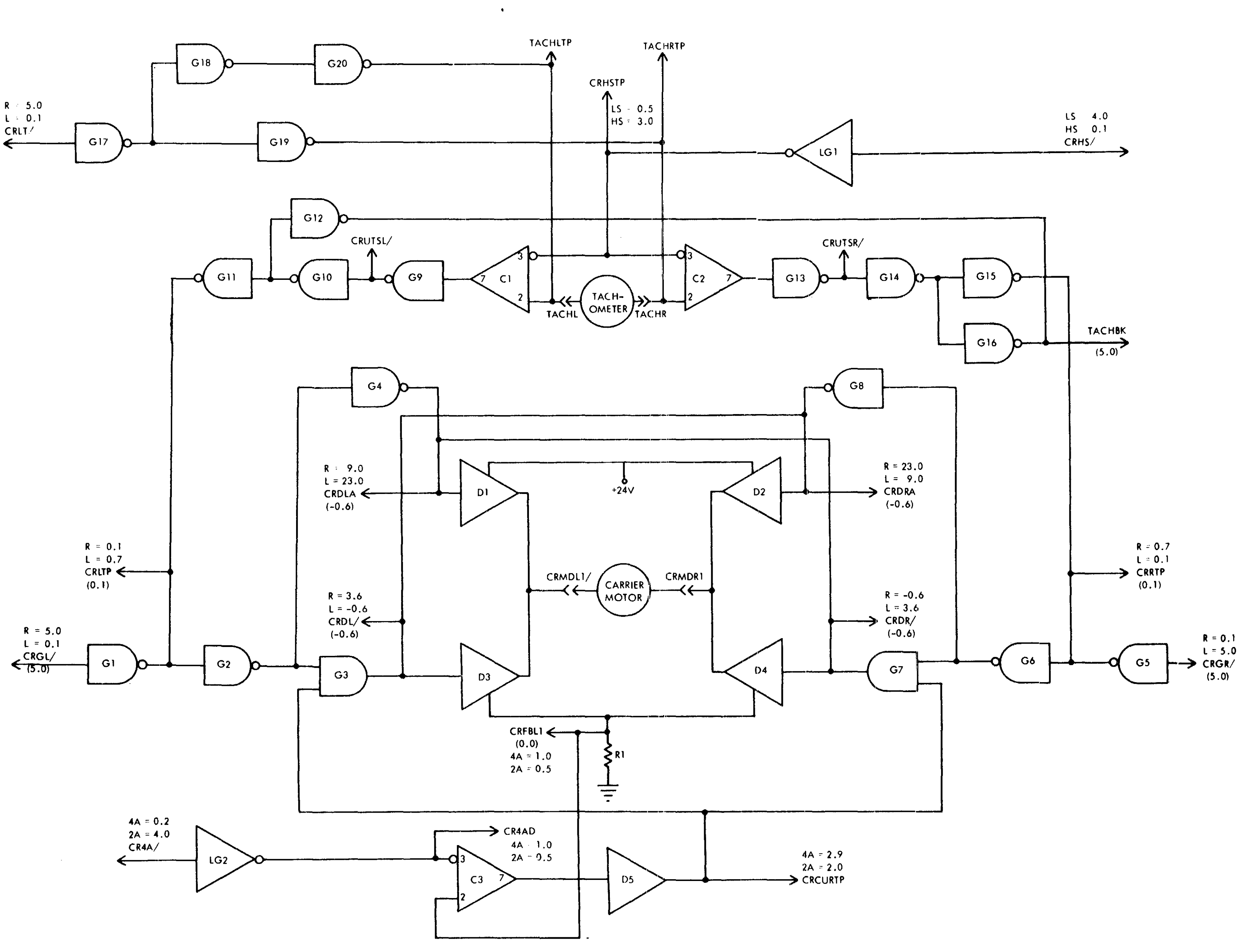


Fig. II-109 CARRIER CONTROL BLOCK DIAGRAM

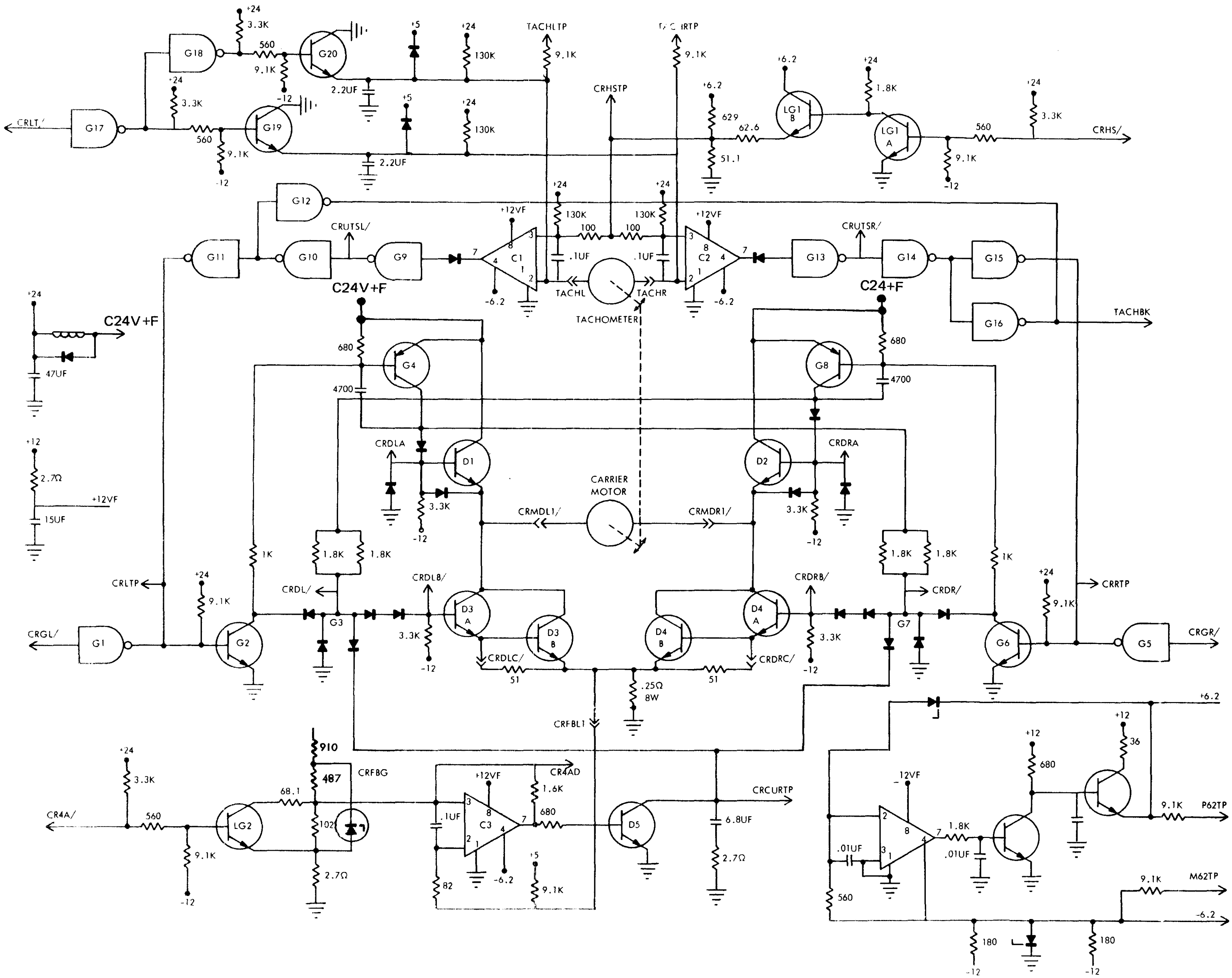


Fig. II-110 CARRIER CONTROL SCHEMATIC

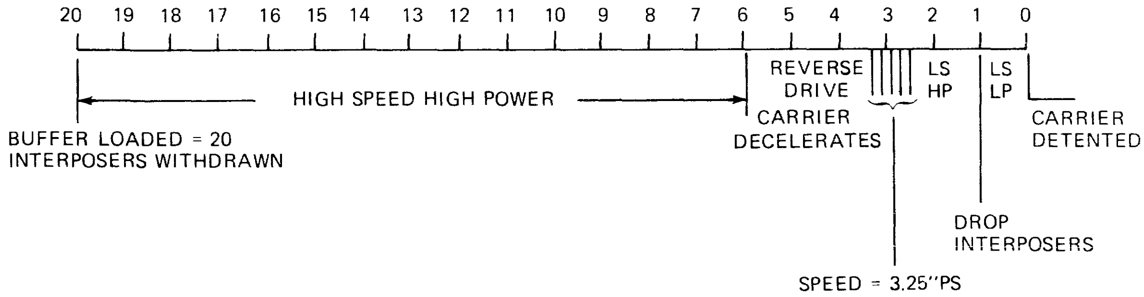


Fig. II-111 CARRIER MOVEMENT (20 POSITIONS, RIGHT)

CARRIER LOGIC

To enable the Carrier data-interrupt, the Processor must execute a device-write to the Console DDP with the instruction bit set and MIR12=1. This will set a flip-flop – CRF which, provided that any previously indexed print operation is complete, will return CRDI, Carrier data-interrupt, back to the Processor.

Upon receipt of interrupt, the processor may execute a device write, with the instruction bit reset, to transmit a Carrier data-word to the console DDP. The format of the data word is shown in Figure II-112.

MIR 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16
0 0 Ø Ø Ø Ø I D 128 64 32 16 8 4 2 1

INITIALIZE
(Move at low speed in direction spec. by D – ignore bits 9 thru 16.)

NUMBER OF PRINT POSITIONS TO MOVE

DIRECTION OF MOVEMENT
0 = RIGHT
1 = LEFT

Fig. II-112

The Interpreter instructs the Console DDP how many positions to move the Carrier. It is a function of the software to maintain a record of the actual position of the Carrier. The direction of movement is specified through MIR8. MIR 7 is only used when the Interpreter wishes to initialize the Carrier to the left or right end of the printer/forms chassis. When this bit is set, the Carrier will only move at low speed until it stalls against the bumper and any data in MIR9 through 16 is ignored.

CARRIER DATA INTERRUPT

When the Processor executes an instruction-write to transmit a control word to the Console DDP, IWCLK and MIR12 will set CRF, Figure II-113.

Provided that the Carrier and Printer mechanisms have completed any previously indexed operations, the signals CBSY and CL+NP will be true. These signals, gated with CRF, make CRDI/ false to return a data interrupt to the Processor.

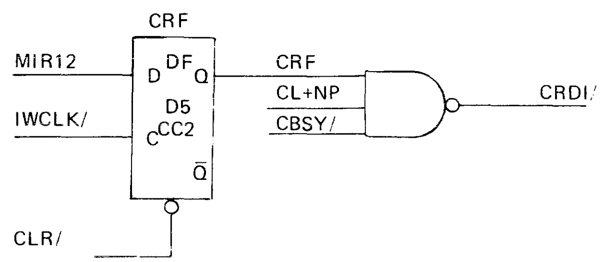


Fig. II-113 CRDI CONTROL

CARRIER DATA WORD

When the Processor receives the data interrupt, it may transmit a Carrier data word to the Console DDP to request a movement. INST/*WRITE is gated with MIR01/ and MIR02/ as shown in Figure II-114, to generate the signal CCCARR when a Carrier data-word is received by the DDP.

MIR9 through 16 are decoded and provided the data does not equal zero, the signal CCZERO/ goes true. CCCARR is gated with CCZERO/ to set CROP1F, by making the signal CCOCARR false and XCARR true. Setting CROP1F makes CBSY true which, in turn, makes CRDI/ true to turn off the data interrupt to the Processor.

LOAD CARRIER BUFFER

When CCOCARR goes false, it enables the clock pulse, at the end of the device-write operation, to strobe MIR9 through 16 into the data buffer.

The buffer, shown in Figure II-115, consists of two CB-N (Count-up counter) I.C.'s. Since the logic needs to be able to count down the position-data, the buffer is loaded with the complement of MIR9-16.

INTERPOSER AND HOLD CONTROL

When the XCARR signal is generated to set CROP1F (See Figure II-114), it also enables CRS1F to be set, Figure II-116. CRS1F is gated with TUF so that at the next 30T, CRS2F is set. CRS2F then allows the next clock pulse to reset CRS1F.

CRS2F is also gated with TUF/ to set ENINTF and HOLDF at the next 3T. Setting HOLDF, energizes the Carrier interposer hold coils. ENINTF is gated with CRS2F and TUF to set INTF at the following 30T. When INTF is set, it enables the next clock pulse to reset ENINTF; it is also gated with TUF/ to enable the clock pulse to reset CRS2F at the following 3T. When CRS2F is reset, it resets INTF. Thus INTF is set for 27 ms. to energize the Carrier interposer solenoid to index a mechanical withdrawal of the interposer latches (see Figure II-58).

Note that HOLDF remains set, holding the interposers until LSLPF, or STALF, is set.

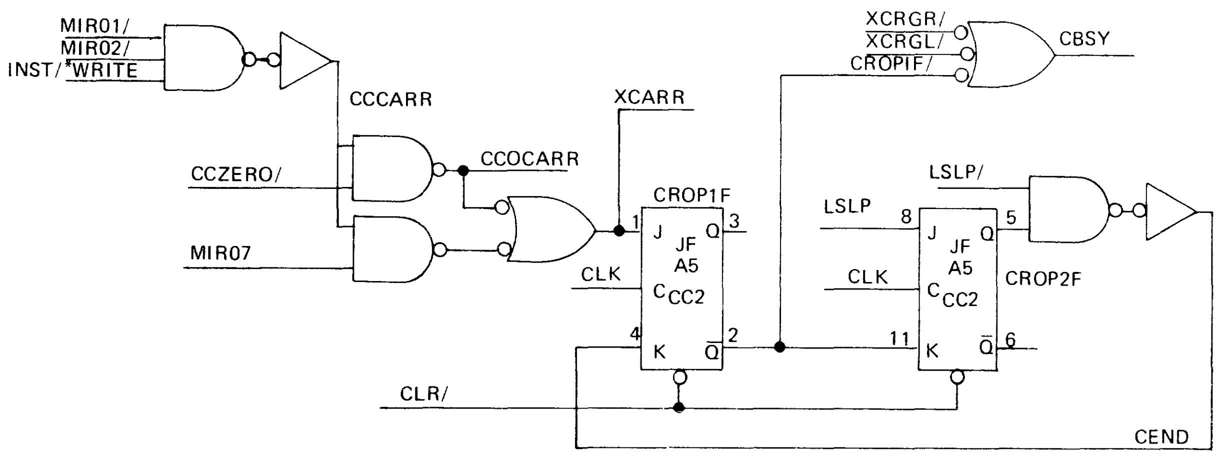


Fig. II-114 CROP1F, CROP2F & CBSY

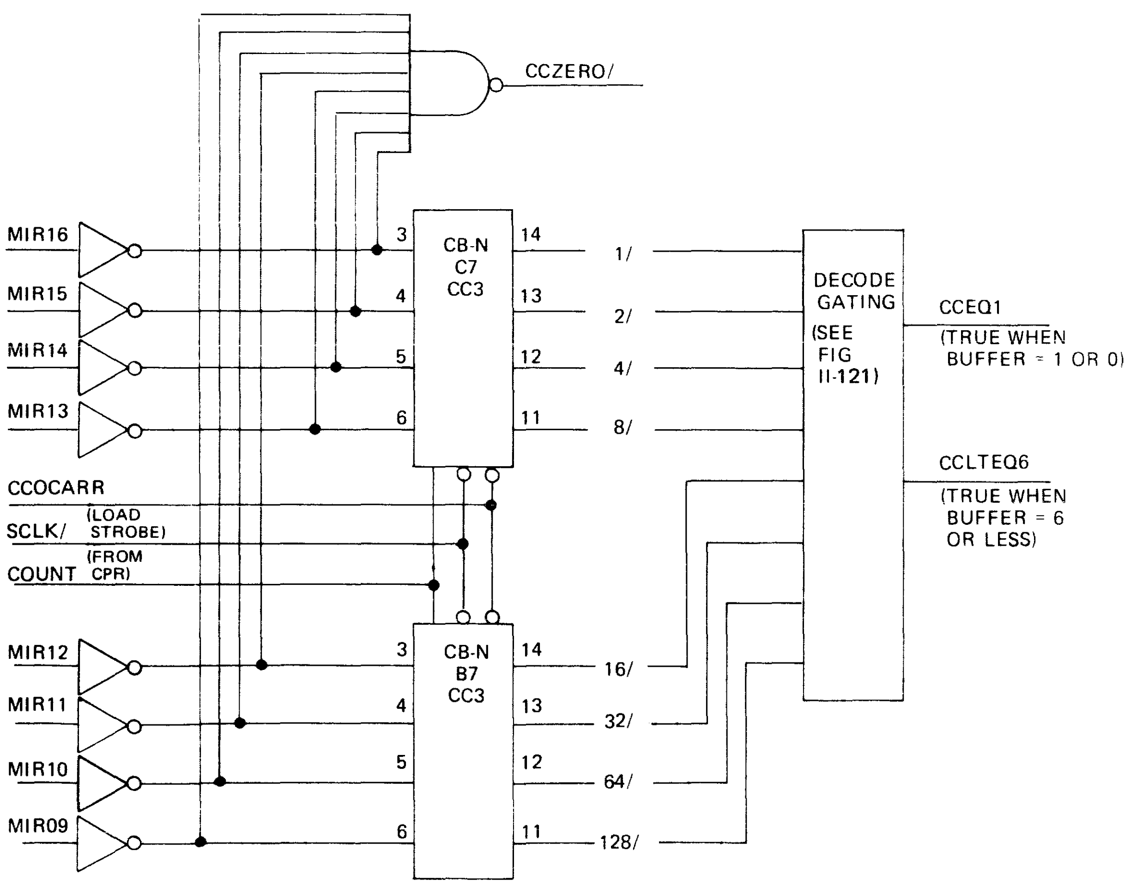


Fig. II-115 CARRIER DATA BUFFER

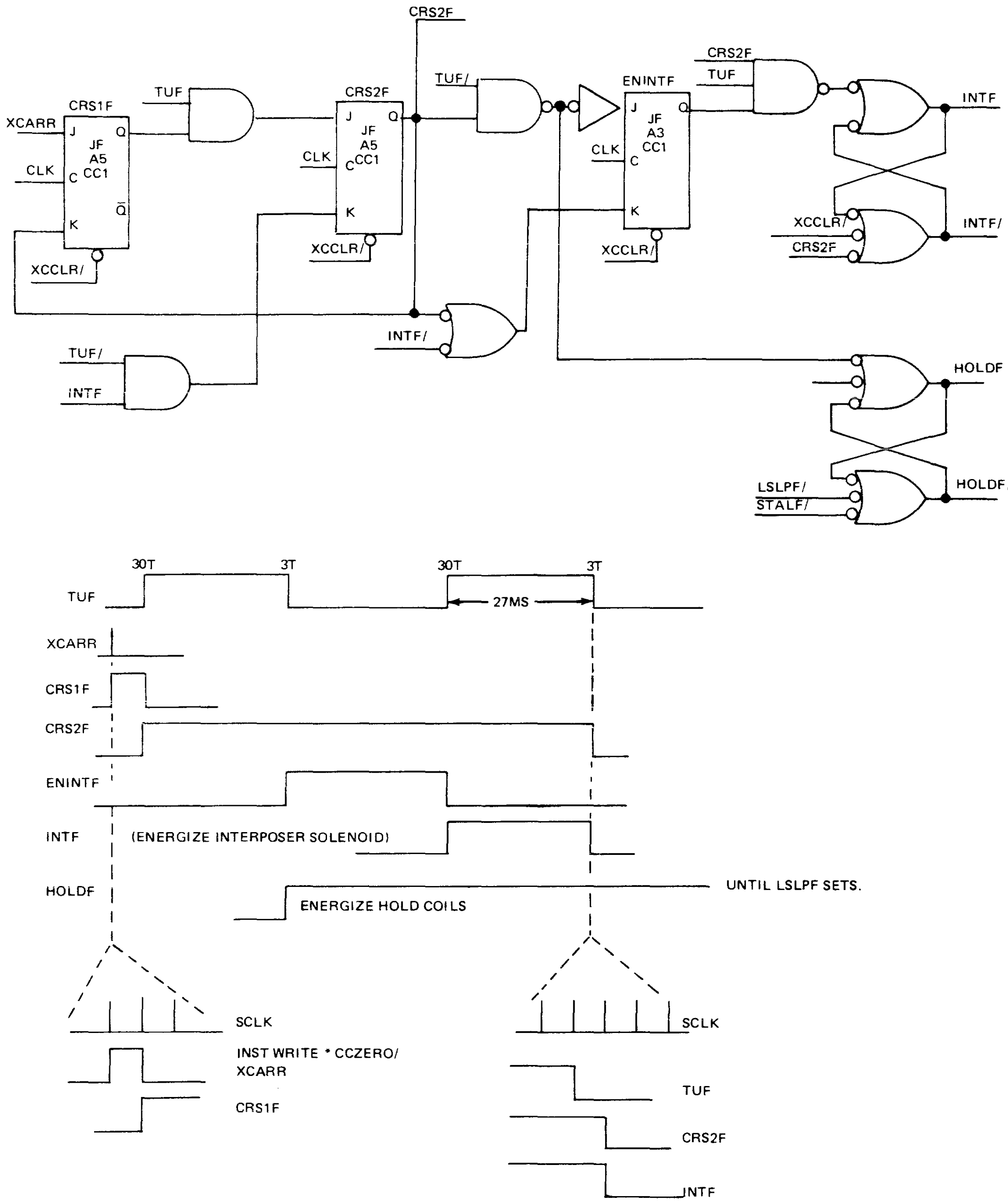


Fig. II-116 INTERPOSER & HOLD LOGIC

CARRIER SPEED AND POWER CONTROL

If the data loaded in the Carrier buffer calls for a movement of greater than six print positions, the initial Carrier movement will be at high speed and high power. This is determined from the output of the data buffer – CCLTEQ6, which is true only when the buffer contents equal 6 or less (ref. Figure II-115).

In Figure II-117, it can be seen that CCLTEQ6/ is gated with INTF and TUF/ to set CRHSF. CRHSF set will make CRHS/ and CR4A/ false to drive the Carrier at high speed and high power.

When CCLTEQ6 goes true, six print positions away from the final position, it sets REVF. REVF enables the next clock pulse to reset CRHSF and set LSHPF. At the same time, REVF reverses the signals CRGR and CRGL so that the Carrier motor rapidly decelerates (see Carrier Directional Control). Resetting CRHSF makes CRHS/ true, so that the logic calls for low speed movement.

Functional Detail

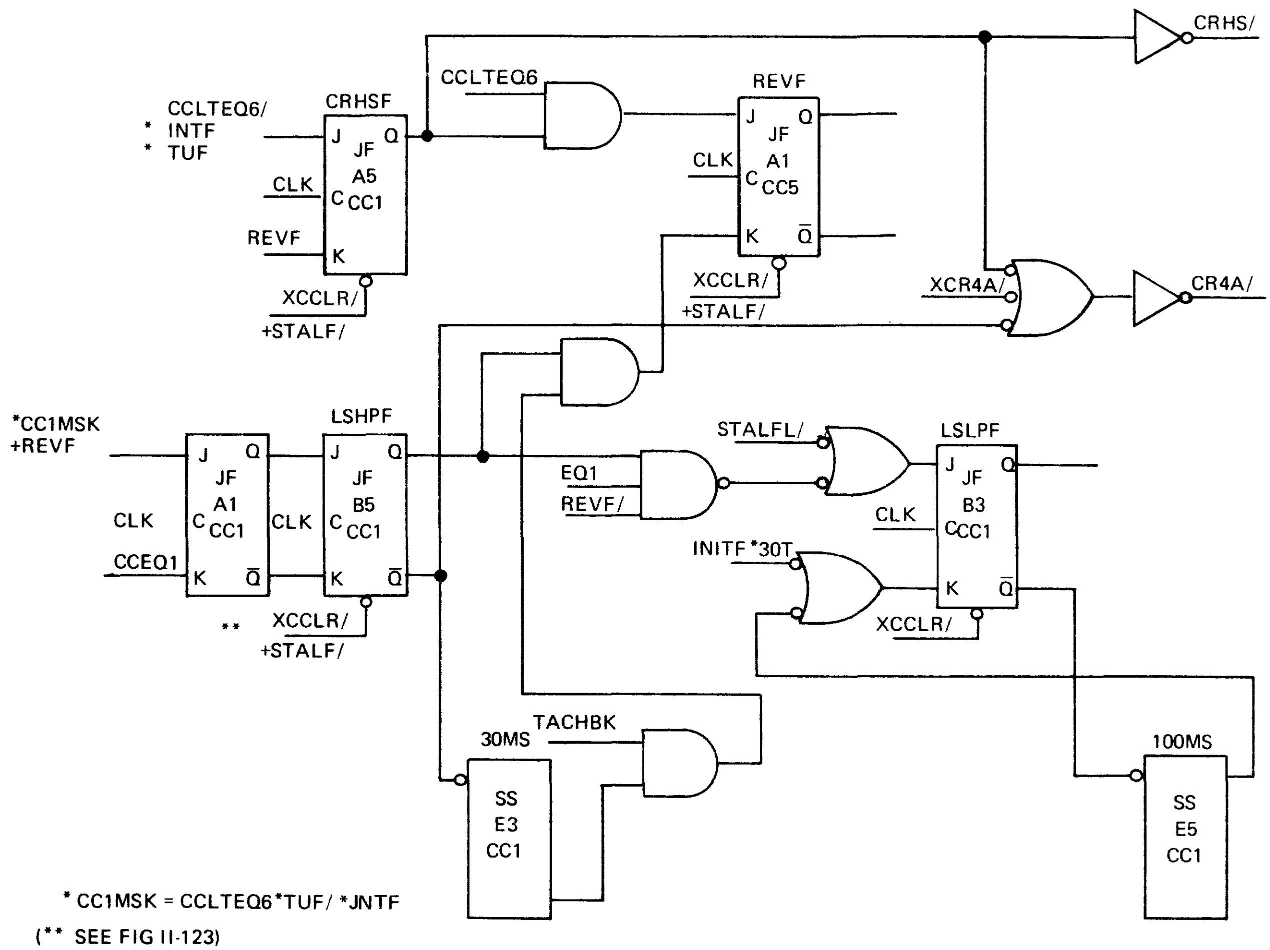


Fig. II-117 CARRIER SPEED & POWER CONTROL

When LSHPF sets, it triggers a 30 ms single-shot which disables the TACHBK gate. The reason for this is to block noise, which appears on the TACHBK line due to the input to the level generator (LG1, Figure II-109) changing as CRHSF resets. After 30 ms., the gate is enabled and TACHBK goes true when the Carrier decelerates to 3.25" p.s. The output of the gate is then gated with LSHPF to reset REVF.

When CCEQ1 goes true, LSHPF*REVF/*CCEQ1 sets LSLPF, at the same time LSHPF is reset, so CR4A/ goes true to drive the Carrier at half-power. When LSLPF sets, it resets HOLDF (Figure II-116) to release the Carrier interposers. At the same time, LSLPF triggers a 100 ms. single shot. Within 31 ms. (approximately – See Figure II-120), the Carrier will be detented in its final position, and when the 100 ms. single-shot times out, LSLPF will be reset and all drive signals will be removed from the Carrier (see Carrier Directional Control).

ENABLE CPR TO COUNT BUFFER

As the Carrier moves from one print position to another, the CPR signal will count the Carrier data buffer to enable the logic to track the Carrier. However, when the interposer latches are withdrawn, it takes the Carrier motor some interval of time before it can accelerate the Carrier. During this time, the CPR signal is unpredictable so it is prevented from generating a count signal for 12.5 ms.

Referring to Figure II-116, it should be noted that there is one clock-time delay between TUF going false and CRS2F and INTF resetting. INTF and TUF are gated together to generate a 1 micro-second pulse INTU. INTU triggers a single shot device which generates a low CCD125/ which is low for 12.5 ms. CCD125/ false then sets CNTF (Figure II-118) and disables the CCCOUNT/ gate. Note that CNTF can remain set only if HOLDF is set.

CPR from the Carrier motor transducer and CCCS are used to control CPR1F, which will be alternately set and reset for each print position. CPR1F is then used to control CPR2F. CPR2F will follow CPR1F, but is delayed by one clock time. The outputs of CPR1F and CPR2F are then gated together as shown in Figure II-118 to generate a count signal each time that CPR1F sets or resets.

When CCD125/ goes true, the CCCOUNT/ signal is enabled to count the Carrier data buffer. Since the Carrier

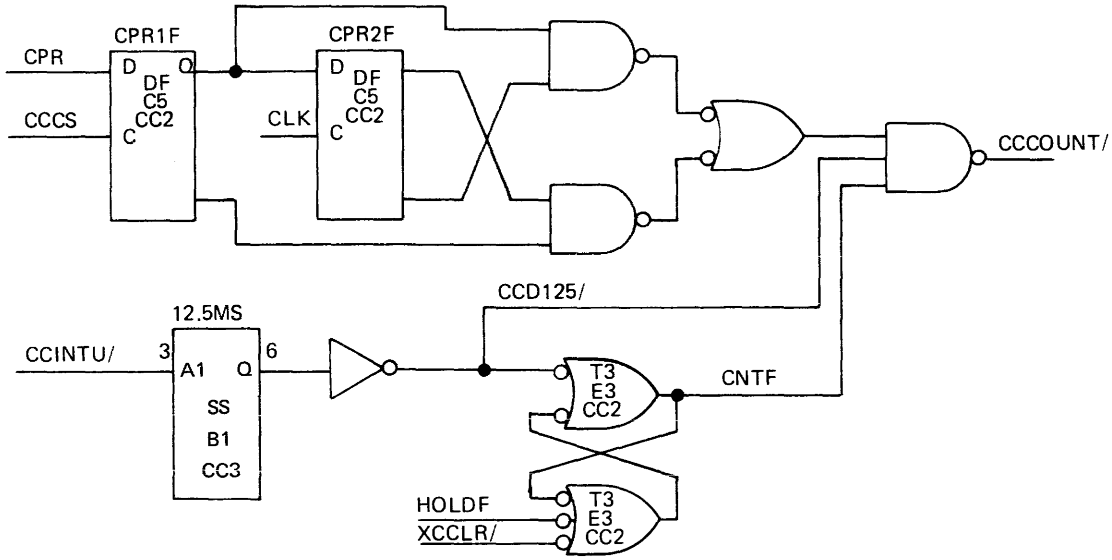


Fig. II-118 CC COUNT GENERATION

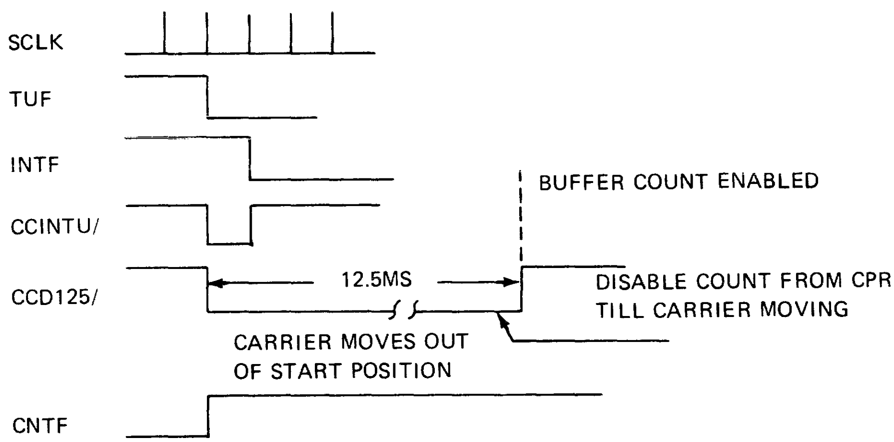


Fig. II-119 CC COUNT CONTROL TIMING

has a nominal acceleration of 400" p.s., 12.5 ms. represents approximately one-third of a print position movement from the start position (see Figure II-120).

CARRIER MOVE LESS THAN SIX

If the MIR9 through MIR16 data in a Carrier data word is equal to six or less, then the signal CCLTEQ6 will be true as soon as the data is strobed into the buffer (Figure II-115). This prevents the setting of CRHSF (Figure II-117).

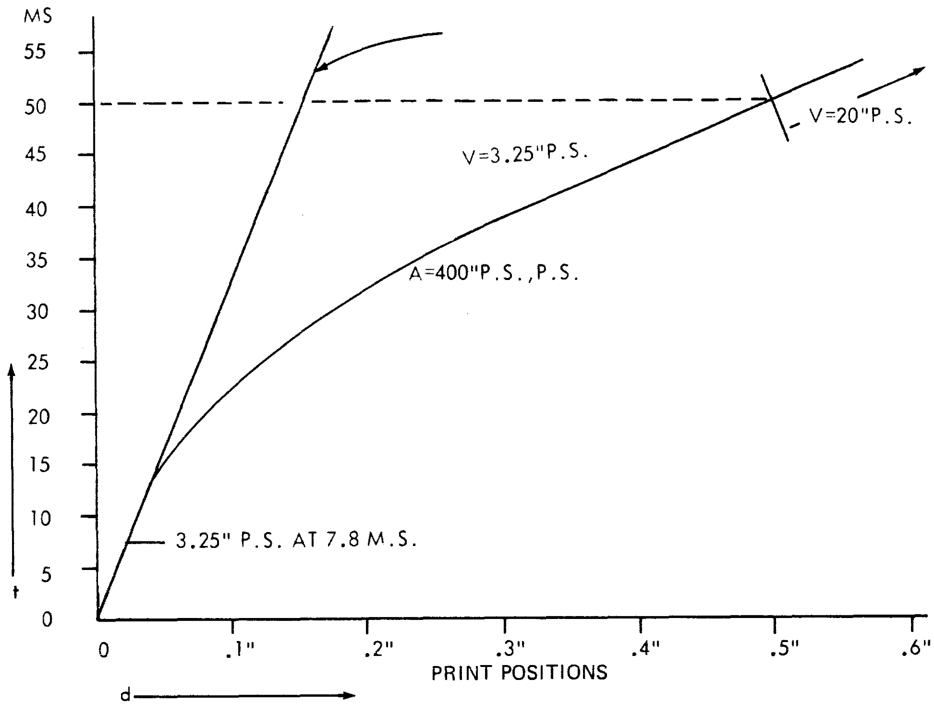
EQ6 is gated with TUF/ * INTF to make the signal CC1MSK false. CC1MSK/ then enables the next clock pulse to set LSHPF to initiate a low speed movement of the Carrier. Thus, the high speed and reverse functions are omitted. When the EQ1 comes true, LSHPF is reset and LSLPF is set to reduce Carrier power and drop the interposers as in a normal operation.

If the MIR9 through MIR16 data is equal to one stop position, the signal EQ1 could be true as soon as the data is loaded into the buffer. Since this signal resets the LSHPF to reduce the carrier motor power in a normal operation, it is necessary to disable EQ1 until the Carrier has moved out of its present position. This is accomplished as shown in Figure II-121. When CC1MSK/ goes false it triggers a single shot device which disables EQ1 for 10 ms.

Thus, LSHPF is guaranteed to be true for 10 ms. to drive the Carrier out of the present position before half power is applied.

NOTE. Referring to Figure II-120, it can be seen that 10 ms. enables the Carrier to accelerate to 3.25" p.s. and travel slightly less than one-third of a print position.

Functional Detail



AT 20" PER SEC. EACH PRINT POSITION = 5MS
AT 3.25" PER SEC. EACH PRINT POSITION = 30.77MS
CARRIER ACCELERATION = 400" PER SEC., PER SEC.
CARRIER DECELERATION = 800" PER SEC., PER SEC.

Fig. II-120 CARRIER ACCELERATION CHART

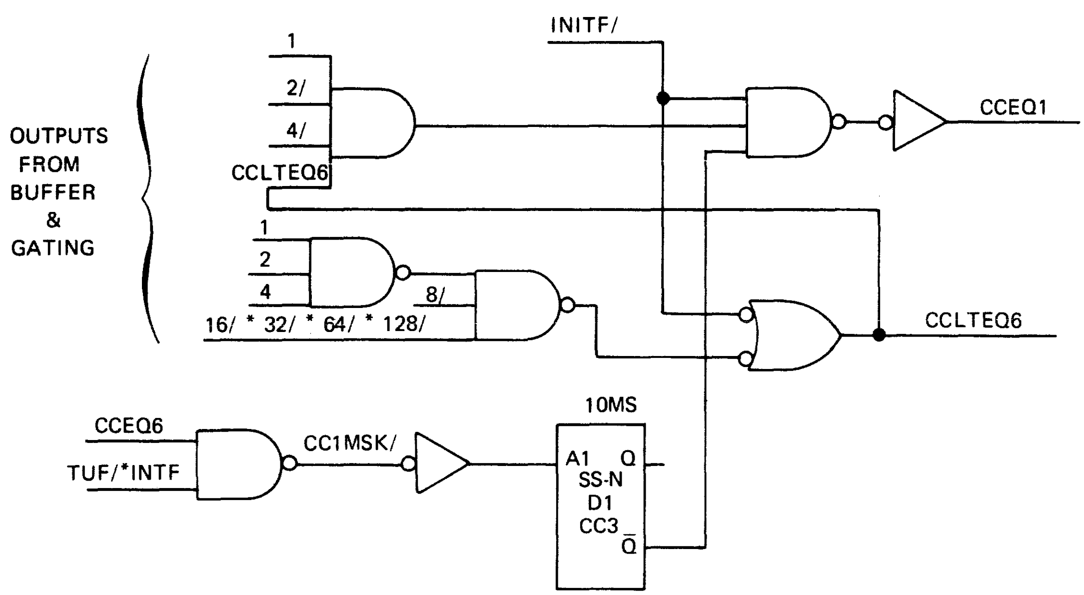


Fig. II-121 CARRIER BUFFER/CTR OUTPUT CONTROL

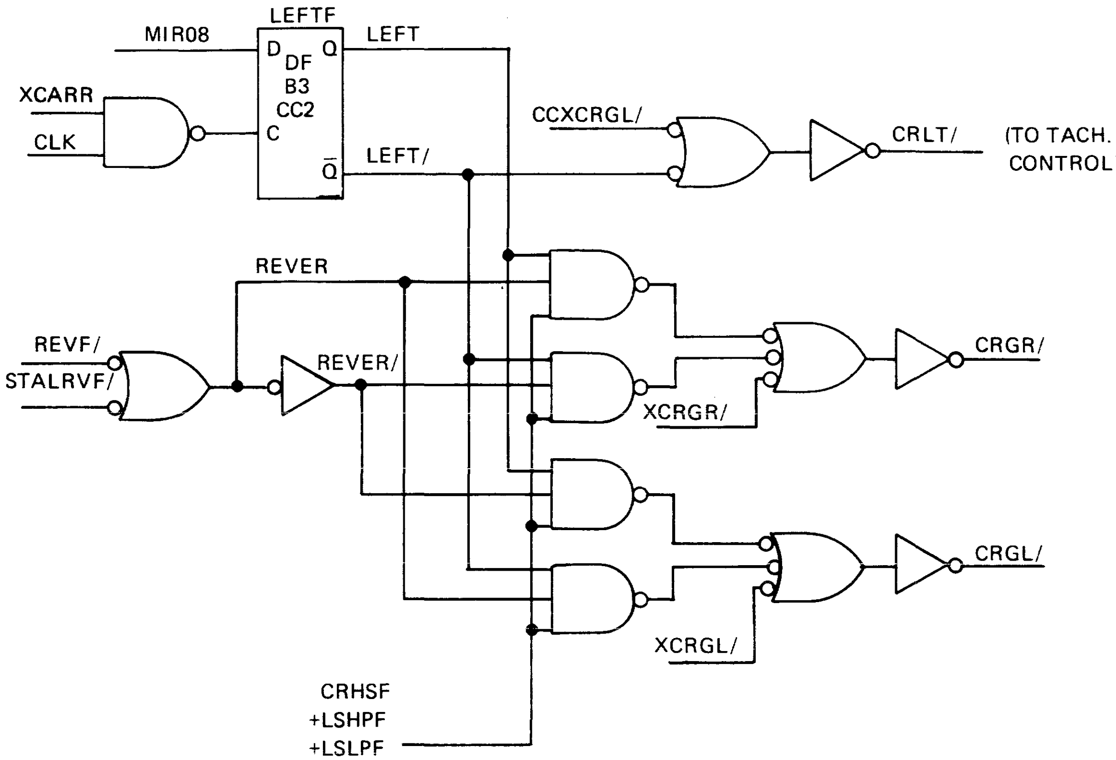


Fig. II-122 CARRIER DIRECTIONAL CONTROL

CARRIER DIRECTIONAL CONTROL

When the Carrier data word is transmitted to the Console DDP, MIR08 is used to set or reset the direction flip-flop LEFTF. LEFTF is then used to control the signals CRGR/ and CRGL/ which determine the direction of Carrier movement.

Referring to Figure II-122, XCARR controls the clock input to LEFTF, so that LEFTF is only set (or reset) when a Carrier operation is indexed. LEFTF and LEFTF/ are then gated with CRHSF + LSHPF + LSLPF also REVF/ to make either CRGL/ or CRGR/ false.

When REVF is set at six print positions away from the final position, it generates REVER to reverse the gating and decelerate the Carrier.

When LFLPF is reset and the Carrier is detented, the gates are disabled and CRGR/ and CRGL/ are both true.

OVERSPEED FLAG LOGIC

If REVF is still set at the time that CCEQ1 goes true, it indicates that the Carrier failed to decelerate to 3.25" p.s. in the normal time. If this happens, the Carrier drive is turned off and a flip-flop is set to indicate this condition to the Interpreter.

In Figure II-123, REVF and CCEQ1 will set SR15F, the overspeed flag. SR1SF/ false then makes XCCLR/ false which resets nearly all of the Carrier logic flip-flops with the exception of HOLDF. Thus, the Carrier drive is turned off but the interposers remain held while the mechanism comes to a halt. SR15F/ false makes STINT8/ false to send a status interrupt to the processor.

When the Processor executes an ASR, or device read with the instruction bit set, CCENSTA will strobe SR15F to EXT15 and enable the reset of SR15F.

STALL FLAG LOGIC

If, at any time, the Carrier mechanism is physically prevented from moving by some obstruction, the Carrier drive is turned off and a flip-flop is set to indicate the condition to the Interpreter. In Figure II-124, the signal XCHOLD goes true when CNTF is set and the 1.25 ms. single shot (CCD125/) has timed out.

CNT1F and CNT2F form a counter which may be counted by each setting of TUF. However, each CCCOUNT/ pulse from CPR directly resets CNT1F and CNT2F. If the Carrier is obstructed and stops moving, CPR will stop changing states and CCCOUNT/ will remain true. This enables the following TUF to count the flip-flops. After three TUF signals, TUF/ is gated with CNT1F * CNT2F to set STALF. When STALF sets STALF/ false directly resets CRHSF, LSHPF, and REVF (Figure II-117).

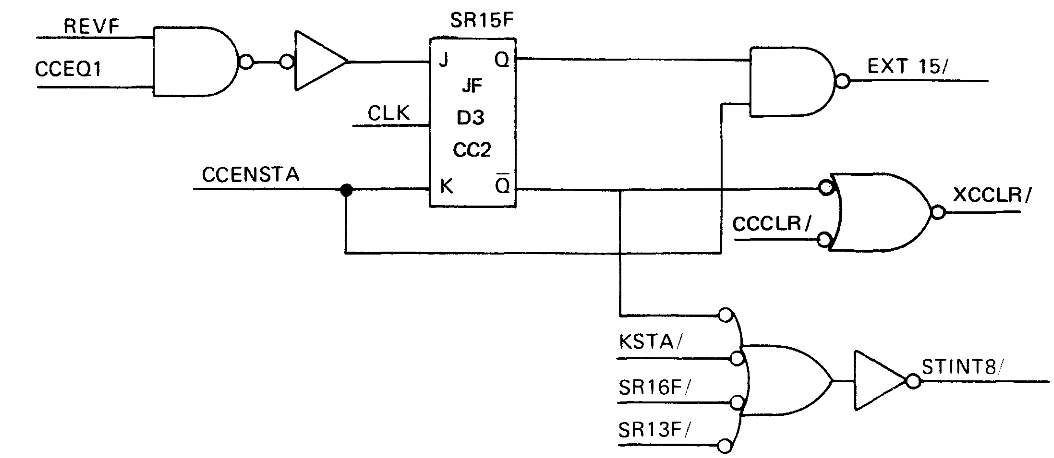


Fig. II-123 OVERSPEED FLAG & STATUS INTERRUPT

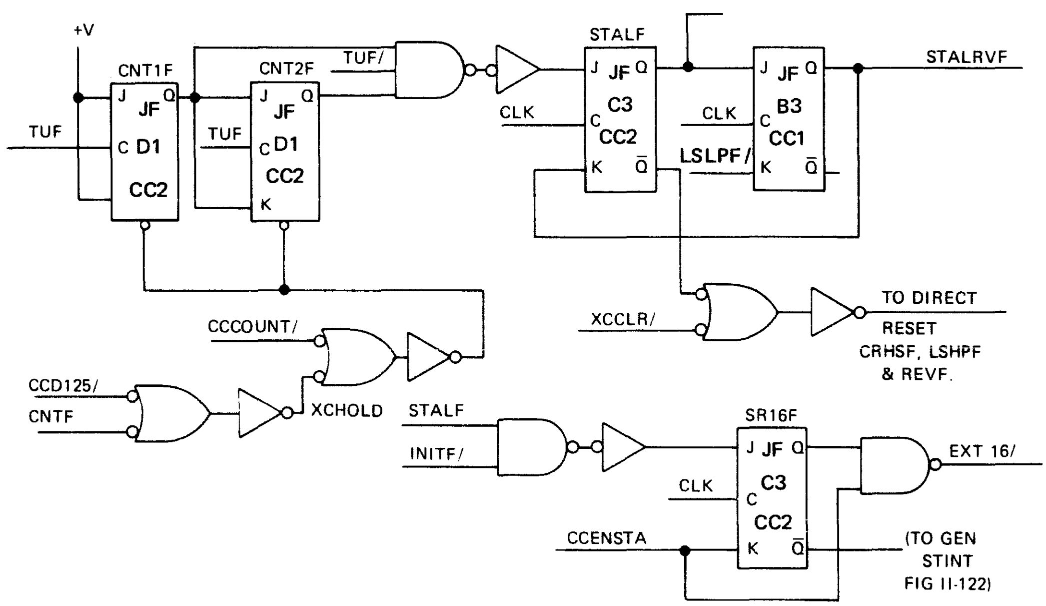


Fig. II-124 STALL FLAG

STALF also enables the next clock pulse to set LSLPF (Figure II-117), STALRVF, and SR16F, Figure II-124. LSLPF/ false resets HOLDF (Figure II-116) to drop the Carrier interposers and triggers the 100 ms. single-shot (Figure II-117).

STALRVF generates REVER to reverse the Carrier drive signals (CRGR/, CRGL/, Figure II-122) and enables the next clock pulse to reset STALF. When the single-shot times out LSLPF is reset and enables the next clock pulse to reset STALRVF.

When the Processor executes an ASR, or device-read with the instruction bit set, the signal CCENSTA strobes SR16F to EXT16, and enables the reset of SR16F.

CARRIER INITIALIZATION

When MIR07 = 1, in a Carrier data-word, it indicates that a low speed movement, in the direction specified by MIR08, is required. In Figure II-125, MIR7 true enables the CLK controlled by XCARR (Figure II-114) to set INITF. INITF/ disables the setting of SR16F, the stall flag, disables the signal CCEQ1, and forces the signal CCLTEQ6 true. Thus the logic drives the Carrier at low speed, and high power, in exactly the same manner as a move of less than six positions, except that the contents of the data buffer have no control on the logic. When the Carrier limits on the bumper, at the end of its travel, the stall logic will turn off the Carrier drive signals and detent the carrier.

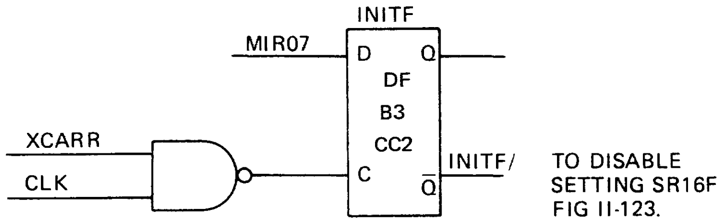


Fig. II-125 INITIALISE FF.

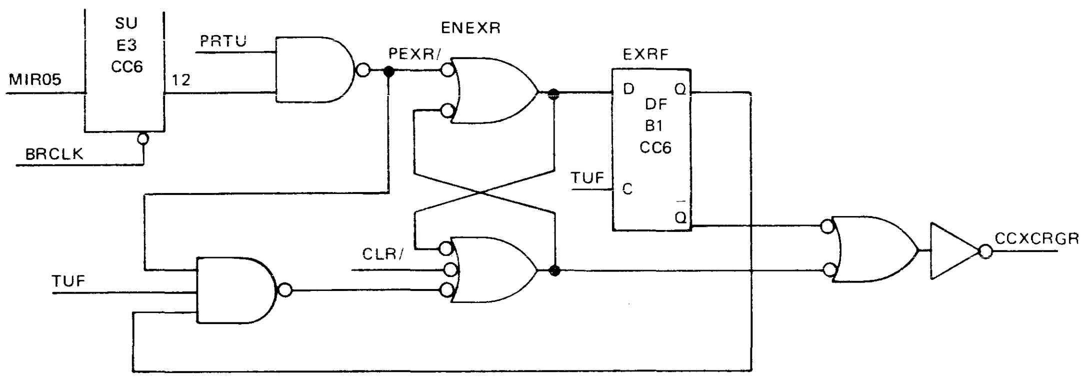


Fig. II-126 ESCAPE RIGHT

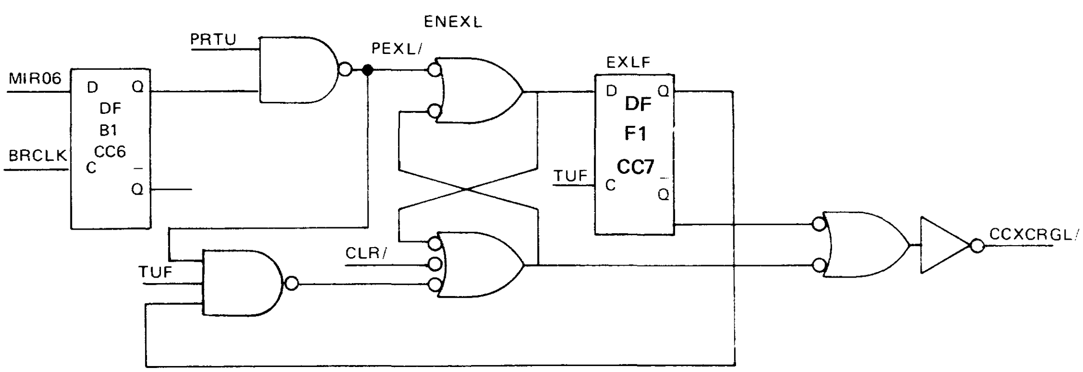


Fig. II-127 ESCAPE LEFT

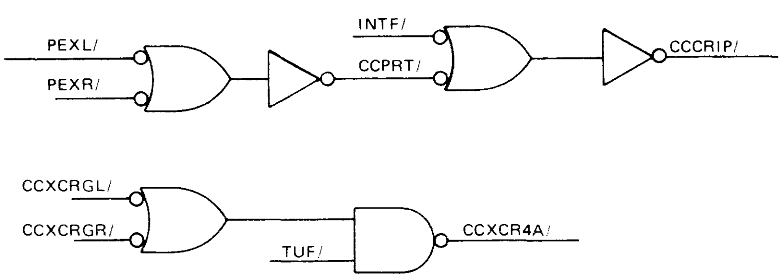


Fig. II-128 INTERPOSER & HIGH POWER CONTROL

CARRIER ESCAPING

When a printer data word is transmitted to the Console DDP, MIR05 or MIR06 specify an escape right or escape left. As BRCLK loads the printer forms data register (See PRINTER DATA-WORD), it loads MIR05 into the register and MIR06 into a DF. See Figures II-126 and II-127.

Functional Detail

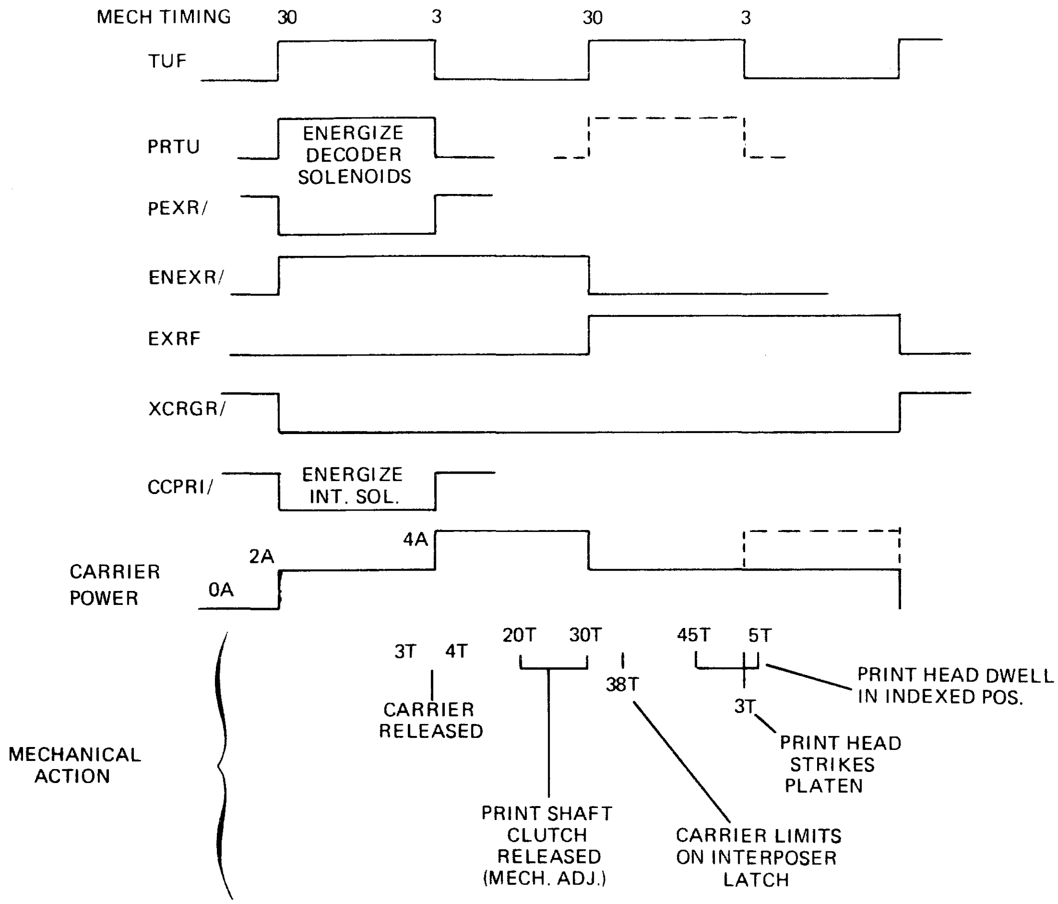


Fig. II-129 ESCAPE, PRINT TIMING

If an escape right is specified, then, as seen in Figure II-126, PRTU will make PEXR/ false to set ENEXR. This occurs at the same time that PRTU energises the decode solenoids.

At the following TUF, EXRF is set, which resets ENEXR. This means that unless another print character is loaded into the printer/forms data register, EXRF will be reset at the next TUF.

The reset outputs of ENEXR and EXRF are gated to make CCXCRGR/ false which turns on the carrier motor drivers (See Figures II-122 and II-109).

CCXCRGR is then gated with TUF/ to make CCXCR4A/ false to drive the carrier motor at high power when the interposer latches are withdrawn. (Fig. II-128.)

Figure II-129 shows the timing and mechanical actions of a print and escape operation.

FORMS CONTROL

To enable the Forms data interrupt, the processor must send a control word with MIR13 = 1, to the Console DDP. Provided that any previously indexed print operation is complete, the DDP will return FDI (Printer Data Interrupt) to the processor.

When the Processor needs to advance the forms, open or close the Forms transport, sound the alarm, or turn the Processor power off, it must wait for the data interrupt before executing a device-write to send the data-word to the DDP. Figure II-130 shows the format of the forms data-word.

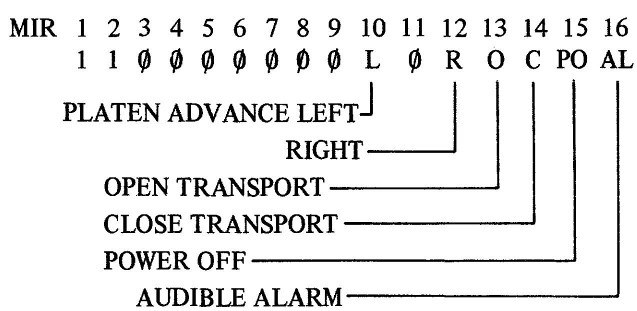


Fig. II-130

The logic will store bits 10 and 12 through 16 in the printer/forms register. As it loads the register, the logic turns off the data interrupt until the required action has been initiated.

FORMS DATA INTERRUPT

Every time a device-write to the console is executed, and the instruction bit is set, a single low going IWCLK/ is enabled by PSWRTE8*INST8. (See Figure II-101)

If MIR13 = 1, the IWCLK/ will set FMF, Figure II-131. FMF is gated with CL+NP and TUF to set FMENF. Note that CL+NP true indicates that any previous printer operation has been completed. FMENF then make CL+NF false to make RCLR/ true. This removes the reset signal from the printer/forms data register (see Figure II-104) so that it may be loaded.

FMENF/ false makes FMEN true which is gated with the set output of a DF to make SETFDI/ false. On the following clock pulse, the DF is set, therefore SETFDI/ is false for one micro-second.

In Figure II-132 SETEDI/ false sets the FDI flip-flop (FDIF), which is gated with FMF and FMEN to make FDI/ false. This causes a data interrupt to be sent to the processor (see Figure II-93). When FDI/ goes false, it resets the ENFMTU flip-flop to disable the FMTU signal.

FORMS DATA WORD

When the processor receives the data-interrupt, it may execute a device-write with the instruction bit reset, to transmit the data word to the DDP. If MIR01 and MIR02 are both true, indicating a forms data-word, the signal CCFRMS is generated, Figure II-101. CCFRMS enables two low going clock pulses, BRCLK/ and FCLK/. BRCLK is used to load the printer/forms data register and FCLK resets FDIF, to turn off the data-interrupt.

When (or if) TUF is reset, FDI/ and TUF/ set the ENFMTU flip-flop, which enables the following TUF to generate FMTU.

When FMTU goes true, the contents of the data register (Figure II-133) are gated out to the solenoid drivers for 27 ms., to initiate the required action. When TUF goes false, FMTU goes false and disables the output of the register, one clock time later FMTUF is reset, Figure II-132, this means that FMTUTE/ is false for one micro-second to again set FDIF. FDIF set makes FDI/ false to send a data-interrupt to the processor so that another forms data-word may be transmitted to the DDP.

When the Processor is finished with the console forms transport, it will execute a device-write, with the instruction bit set, and MIR13 = 0. This will cause FMF to be reset (Figure II-131). At the end of any existing forms operation, FDIF will be set(from FMTUTE/), so FMF/ * TUF/ * FDIF will reset FMENF. FMF and FMEN both false will make FDI/ true, and disable any further forms data-interrupts.

Figure II-134 gives an example forms operation to show the relative timing of the various signals.

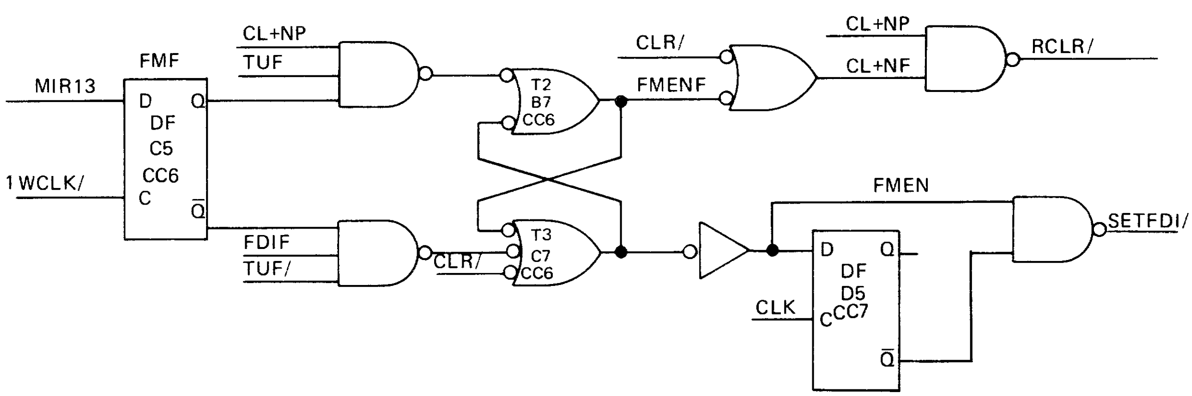


Fig. II-131 FMF. & FMENF

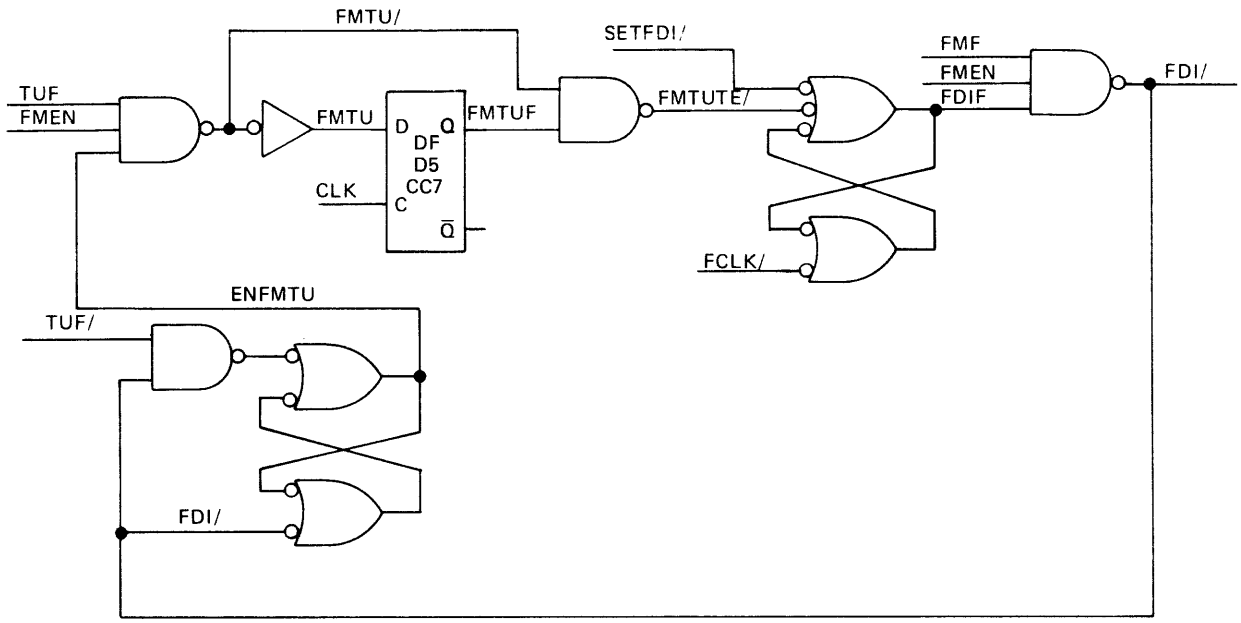


Fig. II-132 FDI CONTROL

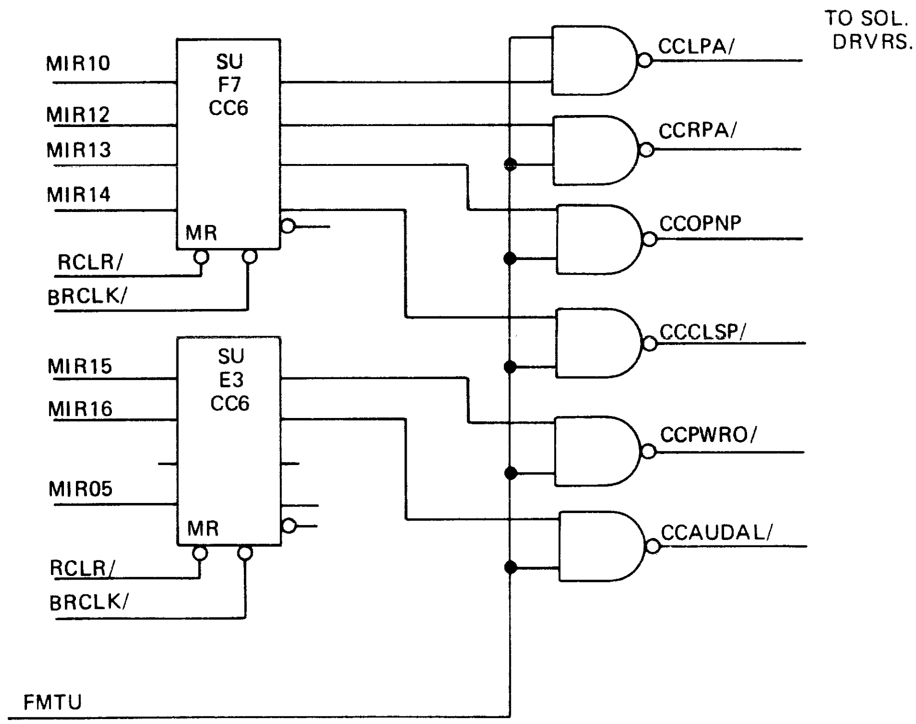


Fig. II-133 PRINTER/FORMS DATA REGISTER

Functional Detail

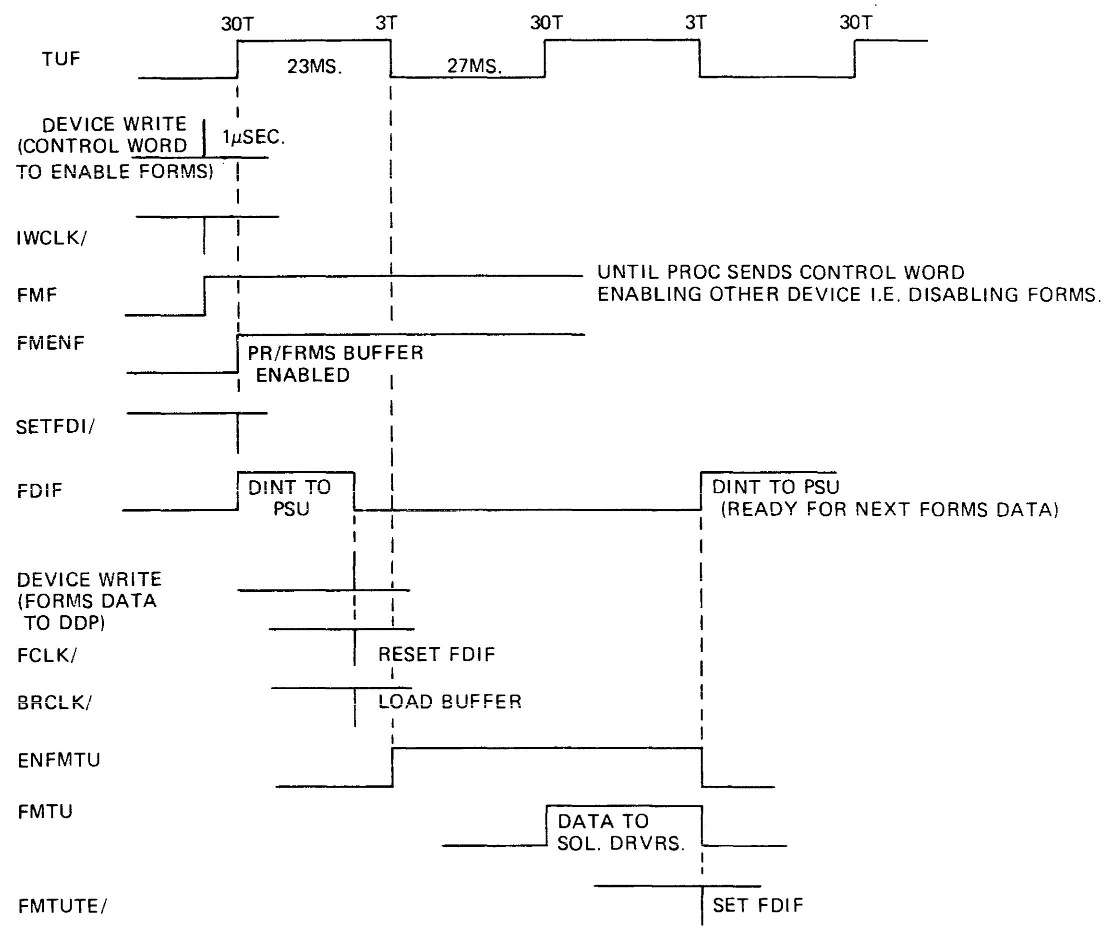


Fig. II-134 FORMS OPERATION TIMING

B 9343

CONSOLE AND DDP

SECTION

IV

Burroughs

FIELD ENGINEERING

TECHNICAL MANUAL

ADJUSTMENTS

Printed in U.S. America 6-29-74

For Form 1061173

KEYBOARD

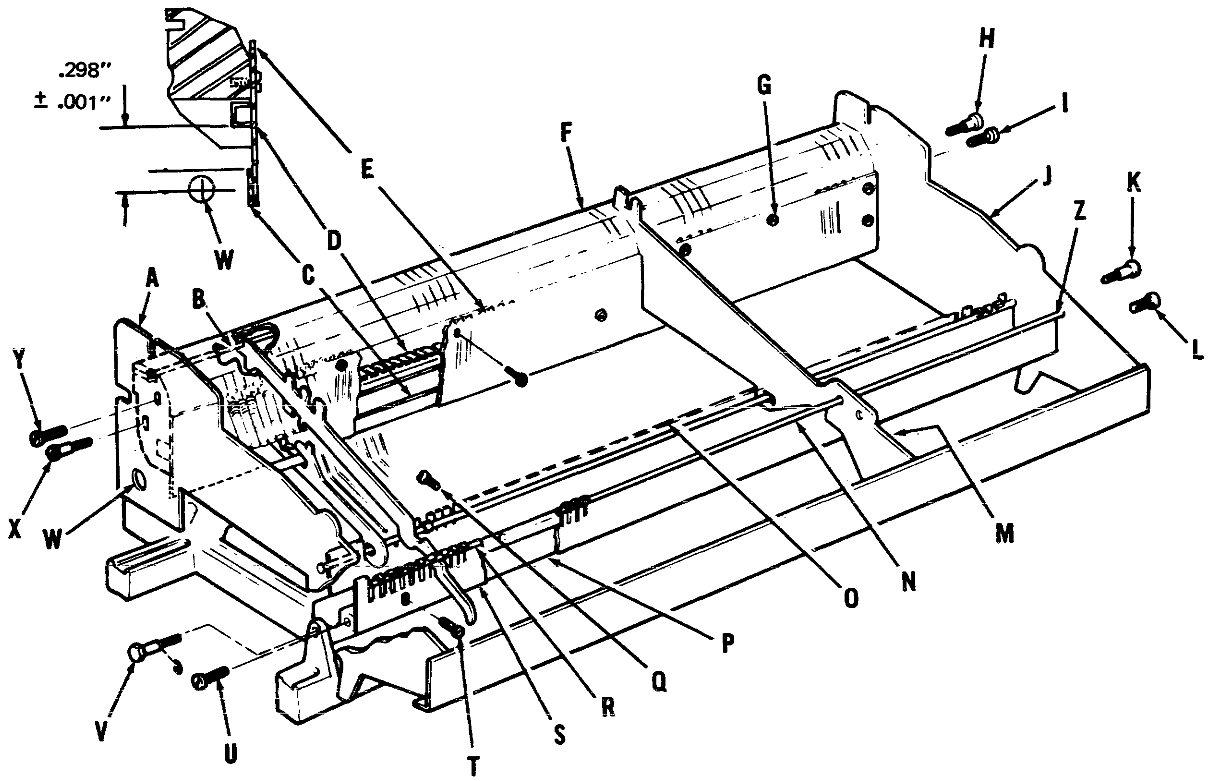


Fig. IV-1 KEYBOARD BASE

INTERPOSER ALIGNMENT

1. A. Rear interposer comb E (Figure IV-1) should be located on rear tie bar F to permit a dimension of .298 ± .001" between the top edge of interposer wear strip C and the bottom surface of ball raceway D.
   B. Right and left side frames J and A must be securely attached to front and rear tie bars P and F.
   C. Align inside of u-form of front comb S with holes Z in side frames.

To Adjust:

A. Locate upper edge of interposer wear strip .298 ± .001" below lower surface of ball raceway D and tighten eleven screws G.
B. Tighten screws to secure side frame A and J to rear and front tie bars in the following sequence: rear-tighten screws H, I, X, Y. Front, tighten screws K, U, L, V. One drop of locktite No. 59 (screw lock) to be applied to threads and shoulder of each screw.
C. Insert .125 Dia. shaft through holes Z in side frames. Hold comb S downward at each side frame and secure end screws T. Limit comb S against shaft at midpoint of comb and tighten remaining screws T.

Reason:

A. To establish a fixed relationship between limit surface on ball race D and upper edge of wear strip C.
B. To assure that the fixed relationship of component parts throughout the length of the keyboard remains consistent.
C. To position comb at correct position to have latching lead for interposers under leaf springs and restoring clearance between interposers and passby pawls on keylevers.

INTERPOSER LATCHING

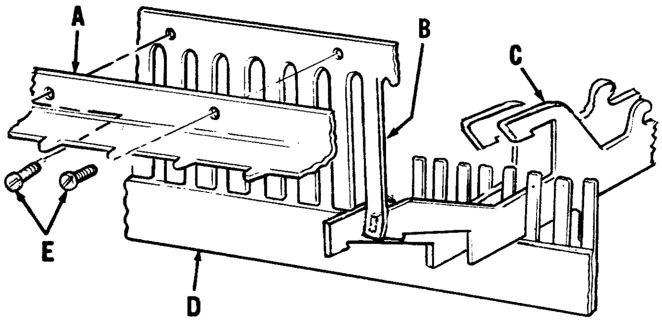


Fig. IV-2 INTERPOSER LATCHING

1. A. With interposers C (Figure IV-2) in their normal upward position, limiting against the ball raceway, the rear lower edges of the lowest interposers should be flush with bottoms of springs B.
   B. With interposers C latched on interposer latch springs, keylever springs inactive and keylevers resting on interposers there should be .008" to .015" clearance between keylevers and comb S (Figure IV-1).

To Adjust:

A. Loosen screws holding latch springs B, move springs up or down as required. Tighten screws.

B. Loosen screws T (Figure IV-1) holding combs to tie bar P. Place A .010" wire gauge between lowest keylevers and bottom of comb slots in right, left and center of comb. Move comb up until wire gauges limit on bottom of keylevers. Tighten screws.

Reason:

A. To assure that all interposers C latch under latch springs B at the same level and to provide a uniform relationship between interposers and keylevers.

B. To provide sufficient downward movement of keylevers to assure latching lead of interposers under latch springs.

REAMER SHAFT ASSEMBLY

1. There should be .005" axial play in reamer shaft assembly F (Figure IV-3) with strobe assembly I installed:

To Adjust:

A. Loosen cone point setscrew J.

B. With reamer shaft assembly F held to the right, place a .005" gauge between right sideframe H and strobe assembly I, move gauge and strobe assembly I against right sideframe H. Tighten setscrew J into slot G of reamer shaft F.

Reason: To ensure axial play in reamer shaft assembly F for free non-binding rotation.

2. Bearing shoe B should be located to permit free rotation of reamer shaft F and provide maximum stability to the reamer shaft.

To Adjust:

A. Loosen screws D and E just enough to permit movement of bracket C.

B. While rotating reamer shaft F, alternately tighten screw D and then screw E while holding bearing shoe B to permit bracket C and bearing shoe B to establish their normal location. Check reamer shaft F to be free to rotate.

Reason: To ensure free rotation and operating stability to reamer shaft F.

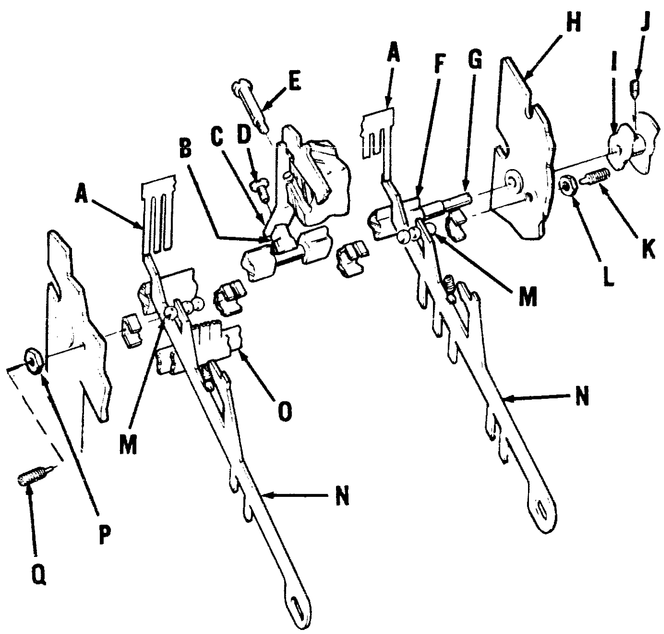


Fig. IV-3 REAMER SHAFT ASSEMBLY

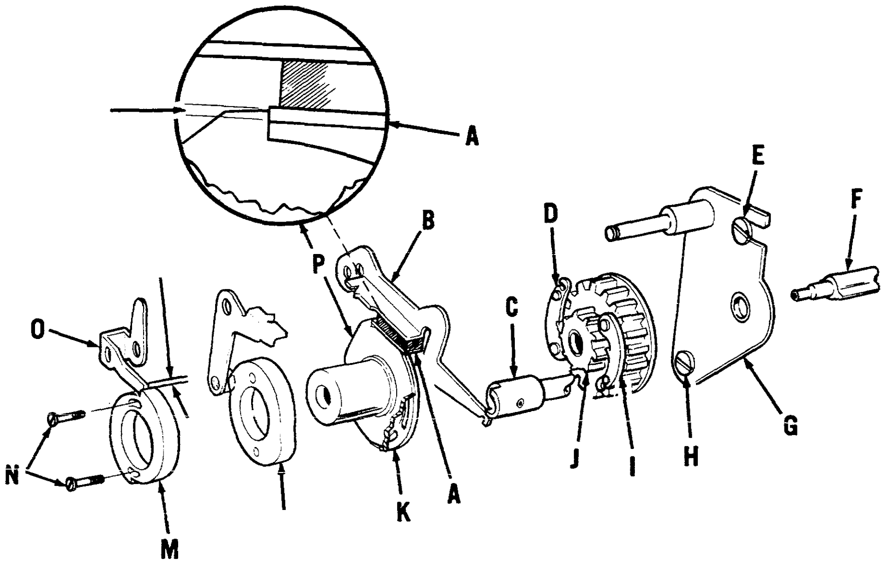


Fig. IV-4 REAMER SHAFT LATCH

REAMER SHAFT LATCHING

1. A. Manually rotate reamer shaft F (Figure IV-4) until the high point of cam L (at approximately 90°), drives latch B to its lowest position. At this time there should be .025" to .040" clearance between latch B and half collar C.

   B. With reamer shaft F and cam L in their normal position, stop plate A should have .025" to .035" hold on the vertical edge of stop plate P.

   To Adjust: Loosen screws E and H and rotate frame G as required. Tighten screws E and H.

   Reason:

   A. To permit half collar C to restore to its normal position.

   B. To prevent latch B from rebounding into the path of the vertical edge of stop plate P and to provide sufficient hold on the stop face surfaces of stop plates A and P.

2. Loosen setscrews D (Figure IV-5). Manually rotate half collar C to permit indexing of latch A. There should be .003" to .005" clearance between cam follower stud F and cam E when latch A is limiting against limit stud B.

   To Adjust: Place a .004" shim between cam follower stud F and cam E and locate limit stud B as required. Tighten setscrews D.

   Reason: To establish the upper limit of latch A.

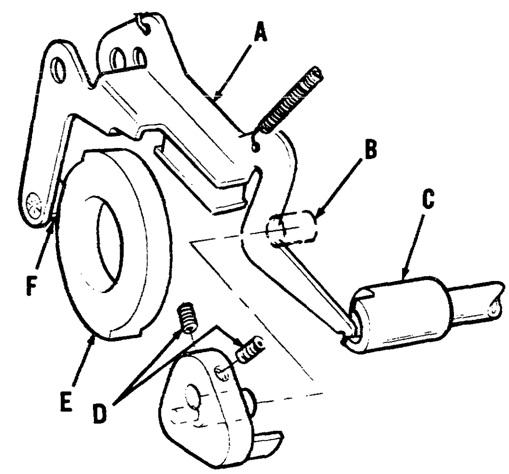


Fig. IV-5 TRIP BAIL LIMIT LATCH

3. With reamer shaft F (Figure IV-4) in its normal position
   actuator plate K, there should be .003" to .005" clearance between anti-backup pawl O and the vertical edge of anti-backup cam M.

   To Adjust: Loosen screws N and locate cam M as required.

   Reason: To prevent the teeth of clutch dogs D and I from contacting the teeth of ratchet J when clutch is latched.

KEYBOARD DRIVE CLUTCH

1. With keylevers C (Figure IV-6) and interposers D in their normal position, there should be clearance between the top of interposers D and by-pass pawls A of keylevers C.

   To Adjust: Open B of keylevers C as required until clearance (maximum .015") is obtained.

   Reason: To ensure that the keyboard drive clutch is tripped simultaneously or just prior to latching of an interposer D and to provide clearance for keylever by-pass pawl A to restore.

REPEAT KEY

1. With repeat keylever B (Figure IV-7) depressed, there should be .003" to .008" clearance between repeat interposer F and interposer wear strip E.

   To Adjust:

   A. Unhook spring D and remove compression spring C. Insert a .005" gauge between interposer F and interposer wear strip E.

   B. With the bottom of repeat keylever B limiting against keylever comb A, bend foot G so that it just contacts but does not bind interposer F.

   Reason: To prevent binding interposer F when repeat key B is depressed.

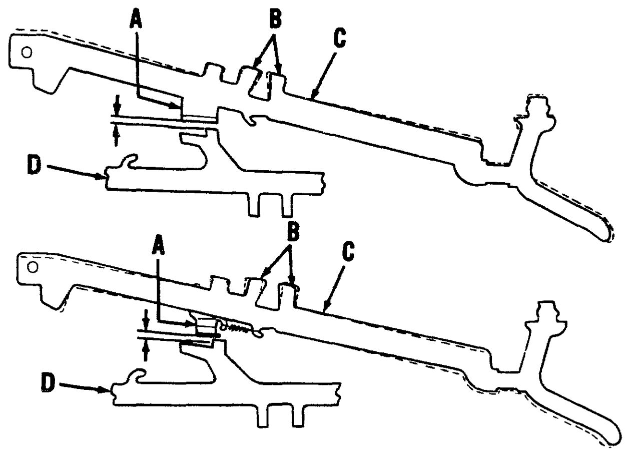


Fig. IV-6 KEYLEVER RELATION TO INTERPOSER

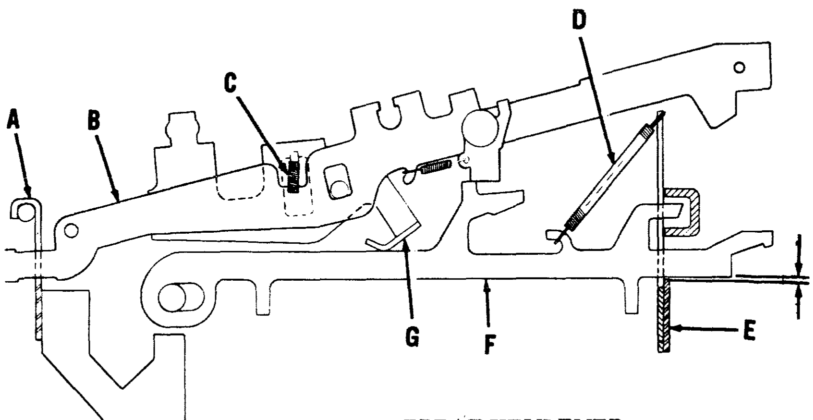


Fig. IV-7 REPEAT KEYLEVER

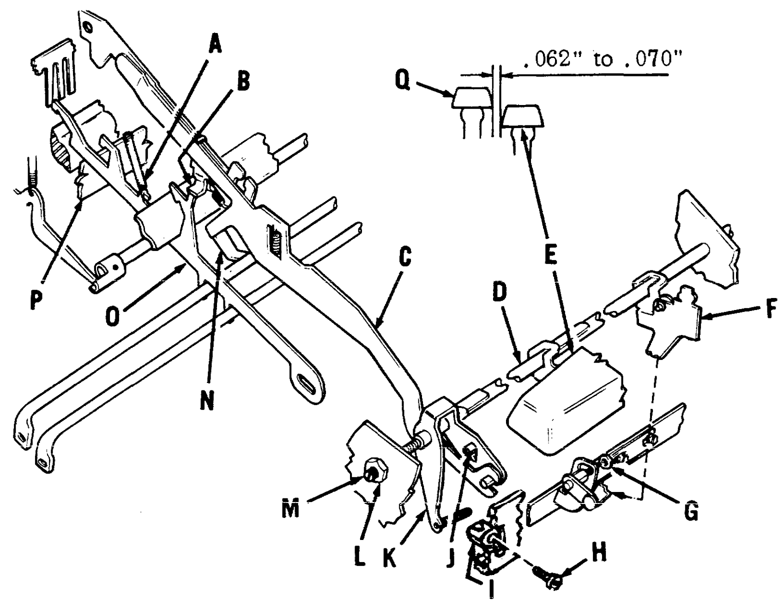


Fig. IV-8 SPACE BAR

SPACE BAR MECHANISM

1. Space bar shaft assembly D (Figure IV-8) should be free and have end play not to exceed .006".

   To Adjust: Loosen nut L, turn screw M as required and retighten nut L.

   Reason: To ensure free movement and full restoration of the space bar mechanism.

2. A. With the keyboard normal there should be .062" to .070" clearance between the rear edge of space bar E and the front edge of the first row of keytops Q.

   B. With space bar keylever C in its normal position, there should be .012" to .015" clearance between the top of interposer O and by-pass pawl B of keylever C.

   C. With space bar E and keylever C depressed, there should be .003" to .008" clearance between interposer O and interposer wear strip P.

   To Adjust:

   A. Loosen nut G and move keystem assembly F forward or rearward, thereby rotating shaft D as required. Tighten nut G.

   B. With space bar E manually held in its home position loosen screw J, locate keylever C and rotate link K as required. Tighten screw J.

   C. a. Unhook spring A. Insert a .005" feeler gauge between interposer O and interposer wear strip P.

      b. Loosen screw H, locate limit stud I so that when the space bar and keylever C are depressed, foot N will just contact but not bind interposer O. Tighten screw H, then remove feeler gauge and rehook spring.

   Reason:

   A. To reduce the possibility of accidental space bar depression when typing on the first row of keys.

   B. To ensure that the clutch trip and space bar interposer latching occurs at a level consistent with all other interposers throughout the keyboard assembly.

   C. To ensure that when space bar E is depressed to the repeat position, interposer O will continuously trip and cycle clutch without binding.

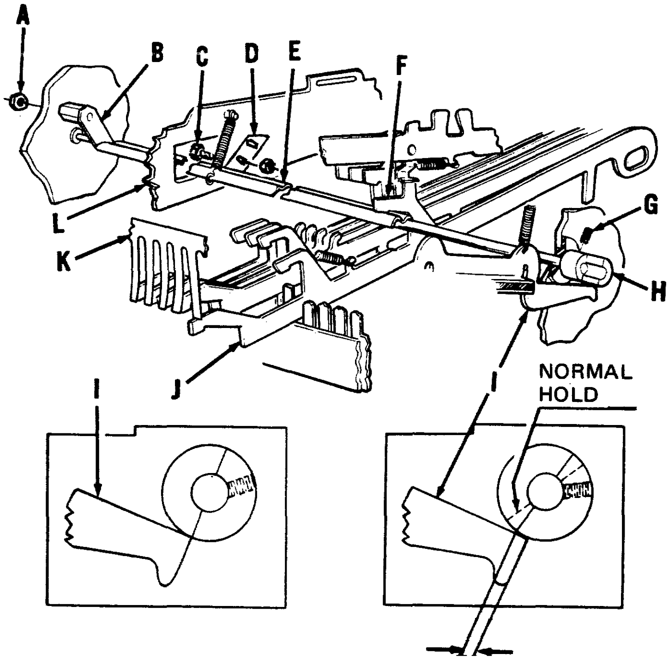


Fig. IV-9 TRIP BAIL ASSEMBLY

INTERPOSERS AND TRIP BAIL ASSEMBLY

1. A. There should be axial play in trip bail assembly E (Figure IV-9) not to exceed .006".
   B. With trip bail assembly E normal, center support D should just contact the under side of trip bail E but not raise it.
   C. When trip bail assembly E is rotated, half collar H should release latch I simultaneously or within .005" prior or .005" after latching interposers J by latch springs K. This should be checked at right, left and center of keyboard.

   To Adjust:
   A. Loosen setscrew G in half collar H. Hold play in trip bail assembly E to the left and locate half collar H.
   B. With screws holding auxiliary sideframe L tightened, turn eccentric C to locate center support D as required and tighten nut for eccentric C.
   C. With an interposer J held in latched position by latch spring K, and trip bail E limiting against bottom edge of interposer hook F, edge of latch I should align with edge of half collar H. Tighten setscrew G.

   Reason:
   A. To ensure free motion of trip bail assembly E.
   B. To prevent deflections and ensure proper displacement of trip bail assembly E.
   C. To ensure tripping keyboard cycle clutch simultaneously or within .005" prior to or after latching interposers J.

2. With interposers J in their normal position, upper surface of trip bail assembly E should be clear of bottom edge of all interposer hooks F.
   To Adjust: Loosen nut A and rotate limit stem B over top of trip bail E until the hold of half collar H on latch I has been reduced to .015" to .020".
   Reason: To prevent accidental tripping of keyboard cycle clutch when two interposers J are depressed simultaneously.

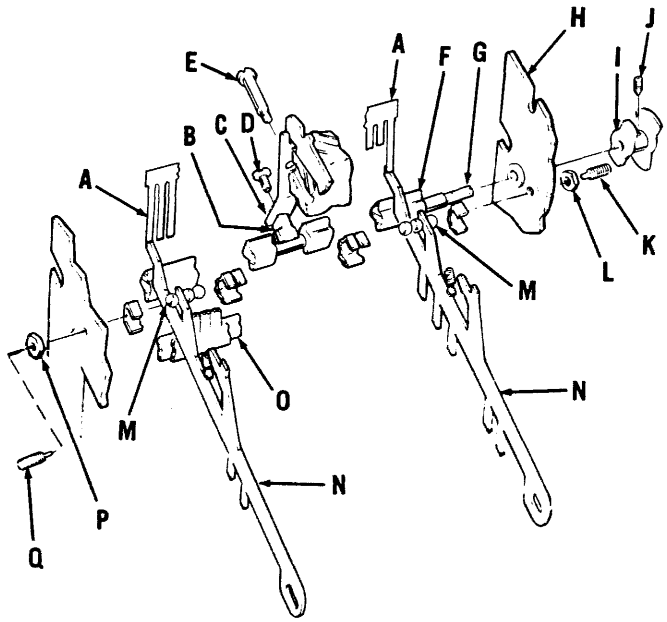


Fig. IV-10 REAMER SHAFT ASSEMBLY

3. With any interposer N (Figure IV-10) latched by springs A, a second interposer should be prevented from being driven between interlocking balls M.
   To Adjust: Loosen nuts L and P and dog point screws K and Q.
   A. LEFTMOST INTERPOSER:
      With ONLY leftmost interposer N manually held depressed against wear strip O, tighten left dog point screw Q until balls M bind interposer N and hold interposer against wear strip O.
      Loosen screw Q until interposer raises and limits against latch spring A. Loosen screw Q an additional ¼ turn. Tighten nut P.
   B. RIGHTMOST INTERPOSER:
      With ONLY rightmost interposer N depressed, perform the adjustment as outlined in step "A", by adjusting screw K and nut L.

   Reason: To minimize the space between interlocking balls M, thereby preventing the simultaneous indexing of more than one interposer N.

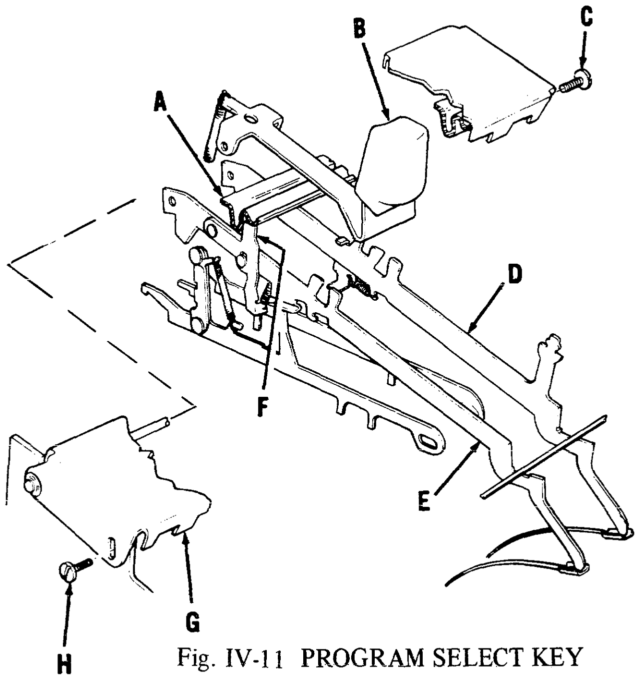


Fig. IV-11 PROGRAM SELECT KEY

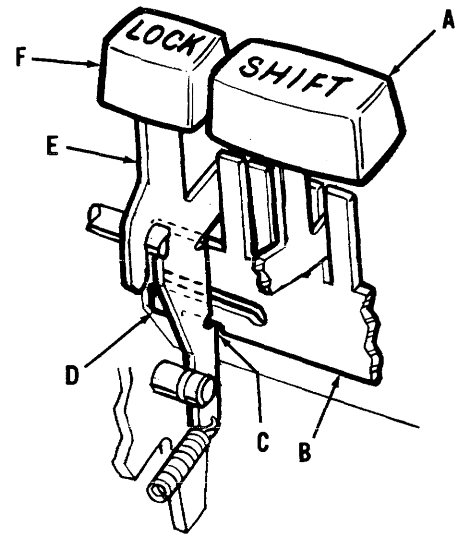


Fig. IV-12 SHIFT LOCK KEY MECHANISM

PK KEYLEVER DISPLACEMENT

1. With PK keylever E (Figure IV-11) in its normal upper positior and bail A resting on link F of keylever E, PK lever E (slightly right of 16th PK) should start its downward movement as soon as any keytop B is depressed.

   To Adjust: Loosen screws C and H and rotate PK comb assembly G as required. Tighten screws C and H.

   Reason: To ensure proper displacement of associated alpha and PK keylevers D and E when a PK keytop B is depressed.

SHIFT LOCK KEY MECHANISM

When shift lock key F (Figure IV-12) is slowly and fully depressed, notch C, in keylever E, should latch on the lower edge of keylever comb B and shift key A should be actuated downward and held in its depressed position. A subsequent depression of either right or left shift key A should release shift lock key F and allow the shift key to restore to its normal (raised) position

To Adjust: Adjust the end of tab D, on comb B, up or down as required.

Reason: To permit automatic or manual selection of upper-case symbols as indicated by the operator.

MEMORY LOADER

NOTE: Check camshaft assembly C (Figure IV-13) to turn freely in sideframe bearings.

1. The four rest pads of sideframes D and E must lie in approximately a true plane.

   To Adjust:

   A. Loosen eight nuts A. With the rest pads of sideframes D and E forced into contact with a true flat surface, tighten eight nuts A.

   B. Check the unit for excessive rocking on the test surface. A .003" shim should not pass under the high rest pad.

   Reason:

   A. To ensure free action and alignment of parts.

   B. To ensure alignment of the memory loader mounting holes to the four mounting studs in the keyboard base casting.

NOTE: Check reamer shaft L (Figure IV-14) to be held in its home position by stop plate M and back-up pawl K.

Adjustments

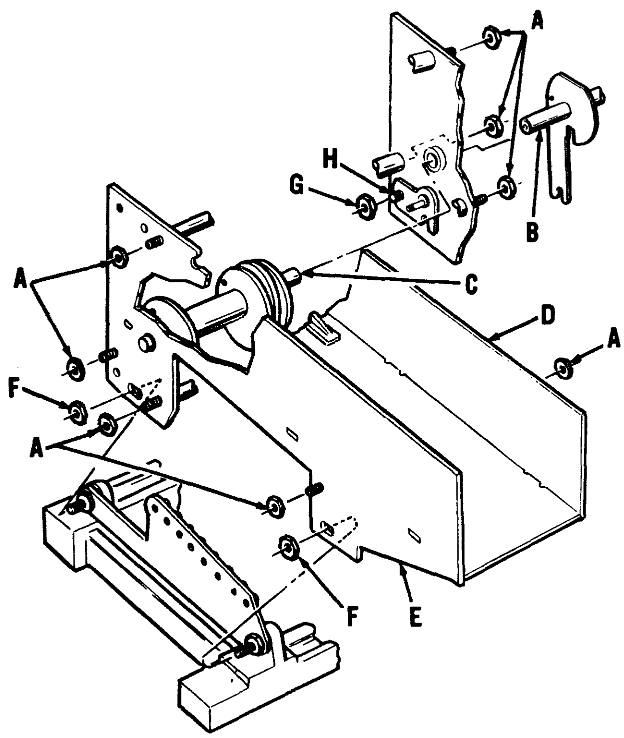


Fig. IV-13 MEMORY LOADER

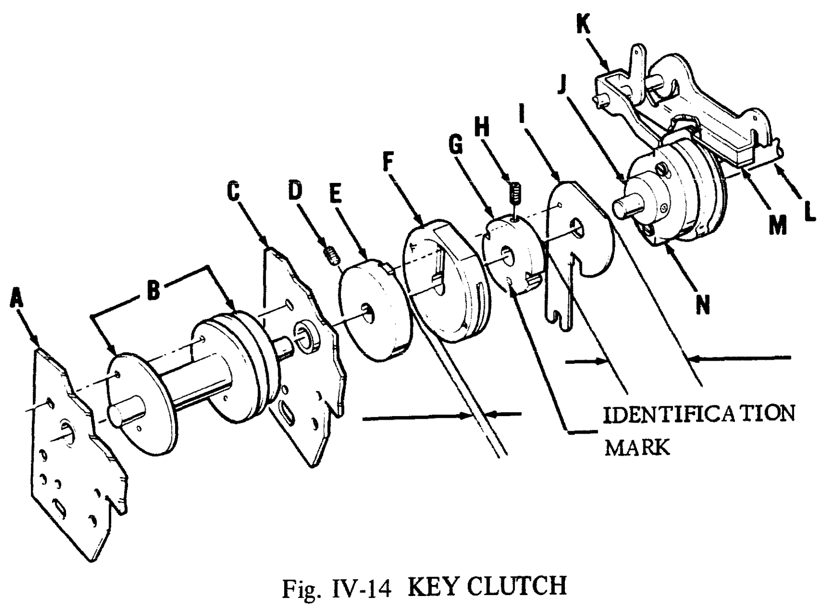


Fig. IV-14 KEY CLUTCH

2. A. With driver G assembled as illustrated, the rear slot in driver G should align with the hole in link I.

B. There should be clearance not to exceed .003" between driver G and link I.

To Adjust:

A. Assemble driver G with setscrew H aligned with flat on reamer shaft L. Insert a .052" diameter plug through the rear slot in driver G and the hole in link I.

B. With a .002" gauge between driver G and link I, move the driver and link against hub J of cam assembly N, and tighten setscrew H. Remove the .052" plug. Rotate reamer shaft L 180° (home position) and recheck the alignment of the plug to the slot in driver G and hole in link I.

Reason: To synchronize the key clutch assembly F with the keyboard and memory loader and to provide adequate engagement of clutch assembly F with keeper notch in link I.

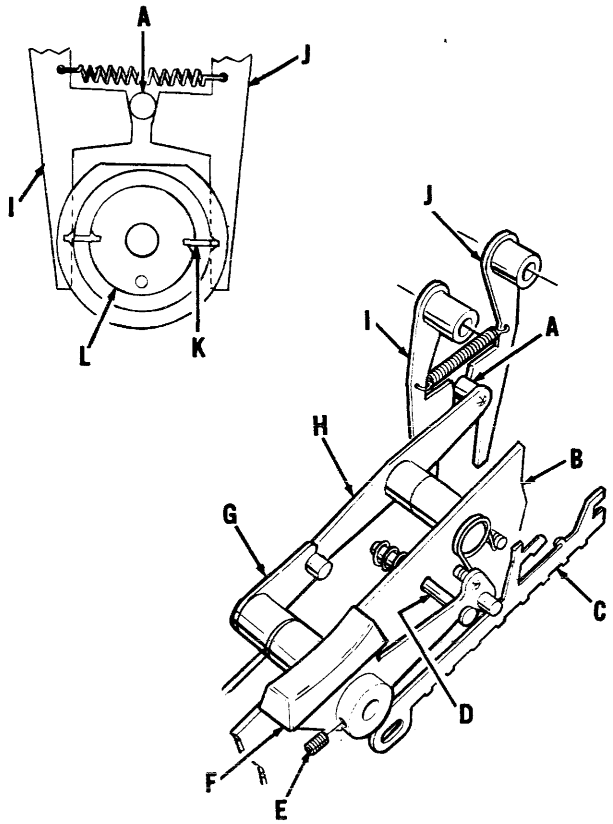


Fig. IV-15 KEYLEVER

3. A. With keylever assembly F (Figure IV-15) ing on spring loaded plunger D, stud A in arm H should just contact either link I or J.
   B. There should be clearance not to exceed .005" between hub of adjusting arm G and hub of sideframe B.

   To Adjust:
   A. Loosen setscrew E in keylever assembly F and locate adjusting arm G as required.
   B. Insert a gauge between hub of adjusting arm G and hub of sideframe B. Move keylever assembly F and adjusting arm G toward each other and tighten setscrew E.

   Reason:
   A. To ensure proper engagement of key K into slot of driver L.
   B. To ensure proper alignment and free action of component parts.

   NOTE: When interposer C is driven into the ball raceway by keylever assembly F, all other keyboard keys should be interlocked except the two shift keys. In normal operating mode, keylever F is not limited by plunger D.

   NOTE: Prior to making test and adjustment number 4 check reamer shaft L (Figure IV-14) to be held in its home position by stop plate M and anti-back-up pawl K. Insert a rod through left sideframe A hole in all cams B and right sideframe C of the memory loader.

4. With the memory loader assembled to the keyboard casting and drive tongue of disk E (Figure IV-14) inserted in the slot of clutch assembly F (as illustrated) there should be .003" to .006" clearance between disk E and clutch assembly F.

   To Adjust: Loosen setscrew D. Place a .005" gauge between disk E and clutch assembly F. Hold end play in reamer shaft L to the right and end play in memory loader camshaft to the left. Move disk E and gauge against clutch assembly F and tighten setscrew D. Remove gauge and rod.

   Reason: To synchronize the memory loader with the keyboard.

TRANSDUCER ASSEMBLY

1. A. There should be .005" to .010" clearance between all magnets A (Figure IV-16) and shunts B.
   B. There should be no less than .002" clearance between the face of all shunts B and inside surface of transducer package E.

   To Adjust:
   A. Bend shunts B as required.
   B. Assemble one .005" shim D when required between base casting C and transducer package E and tighten screw F.

   Reason:
   A. To ensure proper running clearance between magnets A and shunts B.
   B. To ensure proper running clearance between shunts B and inside surface of transducer package E.

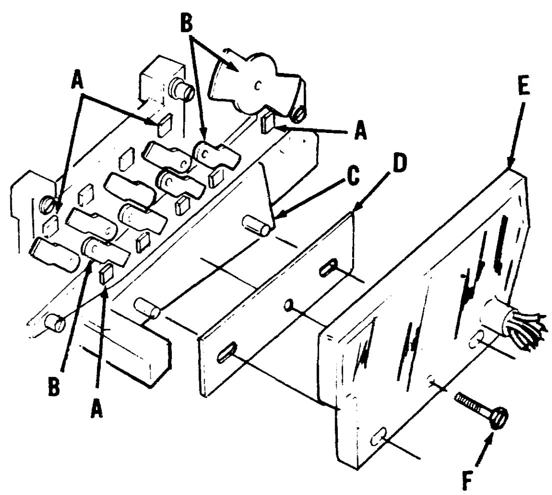


Fig. IV-16 KEYBOARD SHUNTS

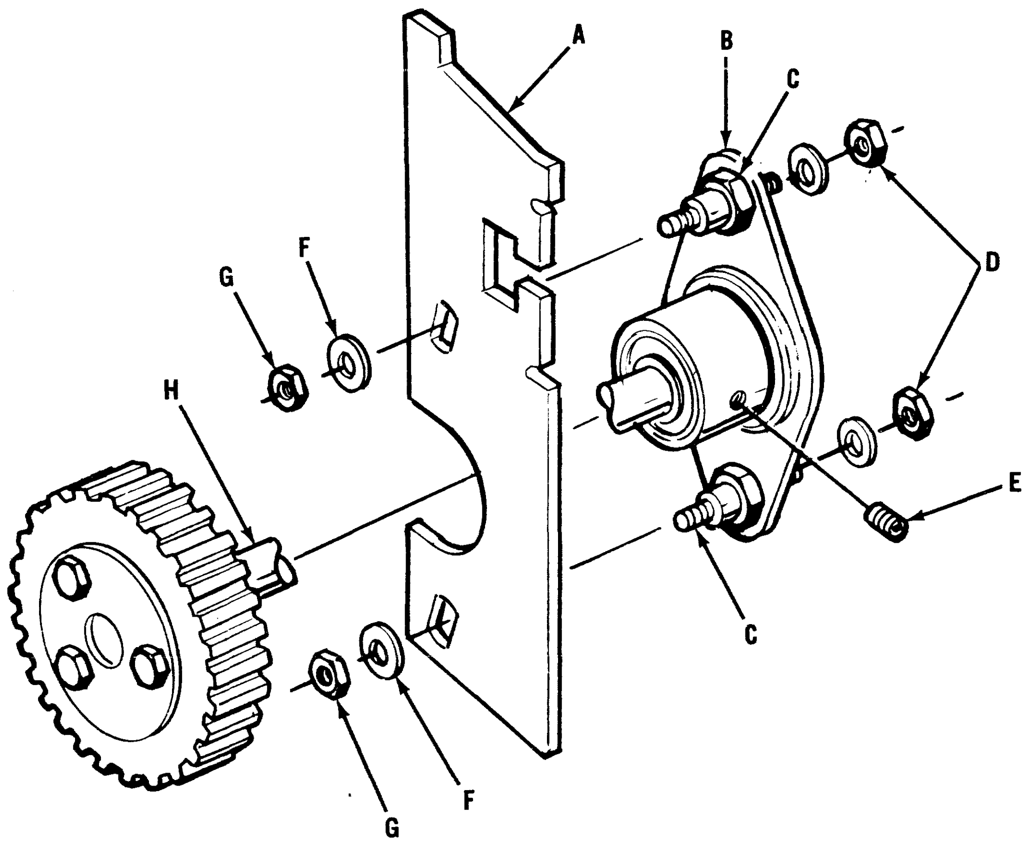


Fig. IV-17 KEYBOARD JACKSHAFT

KEYBOARD JACKSHAFT

NOTE: This test should be performed before the keyboard drive belt adjustment.

With jackshaft positioned on chassis by its mounting brackets, bearing B (Figure IV-17) should align with other shaft bearings and shaft should rotate freely.

To Adjust: With nuts D finger tight on eccentric posts C and setscrew E loose, slide bearing assembly toward mounting plate A (plate A attached to chassis). Rotate posts until journals align with slots in plate A. Continue to slide bearing assembly toward mounting plate. Journals of posts C should enter slots of plate A without any distortion of shaft. Tighten nuts D. Assemble washers F and nuts G. Tighten nuts G. Tighten setscrew E.

Reason:

1. To eliminate bearing wear caused by bearing misalignment.
2. To eliminate excessive load on motor caused by bearing misalignment.

KEYBOARD DRIVE BELT

1. A. With the keyboard properly positioned and bolted in place, pulley D (Figure IV-18) should align with the pulley on the keyboard clutch.
   B. With belt E assembled to pulley D and pulley on the keyboard clutch, belt E should be permitted to establish its proper tension.

To Adjust:

A. Loosen setscrew C and locate pulley D as required. Tighten setscrew C.
B. Loosen screw A to free lockwasher G and bracket F permitting spring B to establish belt tension. Tighten screw A.

Reason:

A. To ensure that belt E does not overlap the left edge of the keyboard clutch pulley.
B. To ensure proper belt tension.

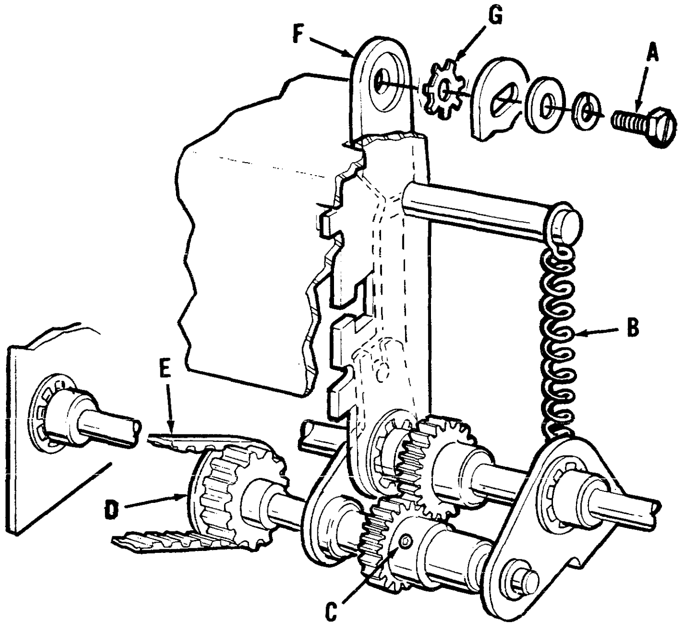


Fig. IV-18 KEYBOARD DRIVE BELT

TAPE CARTRIDGE

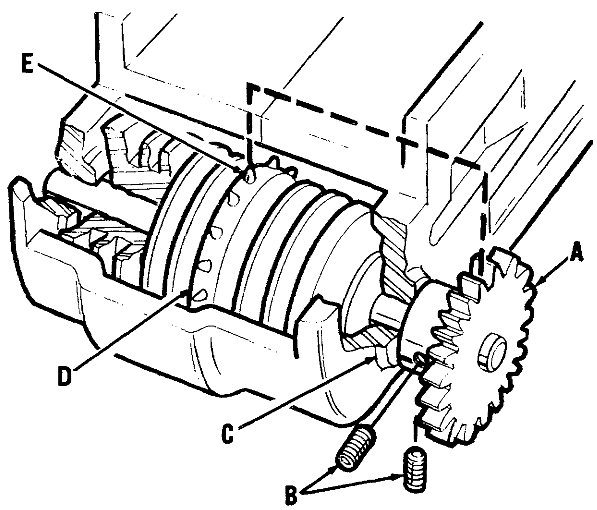


Fig. IV-19 CARTRIDGE ALIGNMENT

1. A. There should be .003" to .006" clearance between the hub of gear A (Figure IV-19) and the hub of housing C.
   B. Vertical tooth E of sprocket D and a tooth space of gear A should be in alignment.

   To Adjust: Loosen screws B. With the gauge properly positioned to the cartridge, locate gear A as required and tighten screws B.

   Reason: To ensure alignment of the cartridge to the memory loader.

NOTE: Prior to performing the following adjustment turn high side of eccentric B (Figure IV-20) toward centerline of support plate A.

2. Insert a loaded cartridge D into the memory loader. Manually cycle the loader. Sensing pins should align centrally with the holes in the program tape.

   To Adjust: Loosen nut C and turn eccentric B as required. Tighten nut C.

   Reason: To align cartridge D with sensing pins and prevent distortion of the holes in the program tape.

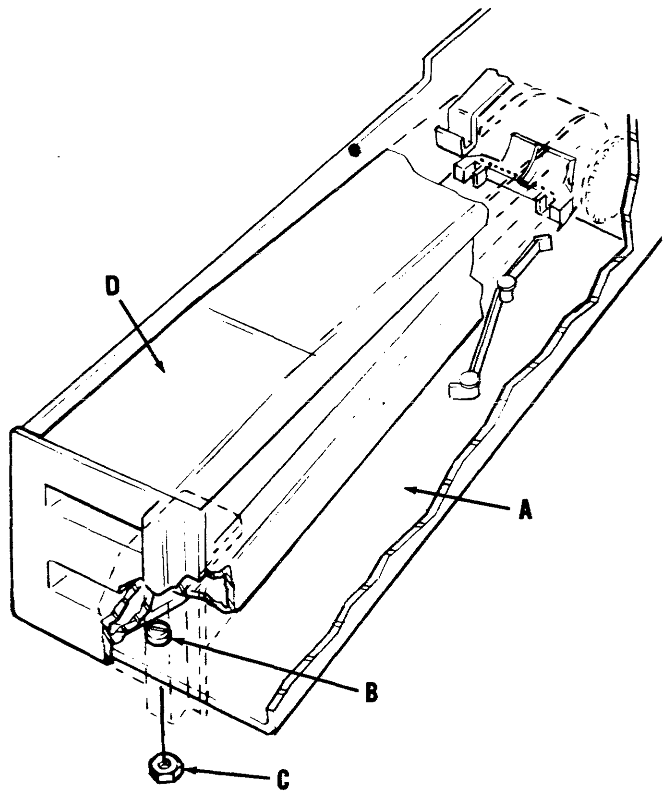


Fig. IV-20 CARTRIDGE ECCENTRIC

DECODER

DECODER TIMING

1. A. The holes in rotor assembly A (Figure IV-21) magnet assembly D and eccentric gear F should be aligned.
   B. With helical gear E held against bearing C, there should be .002" clearance between bearing C and rotor assembly A.

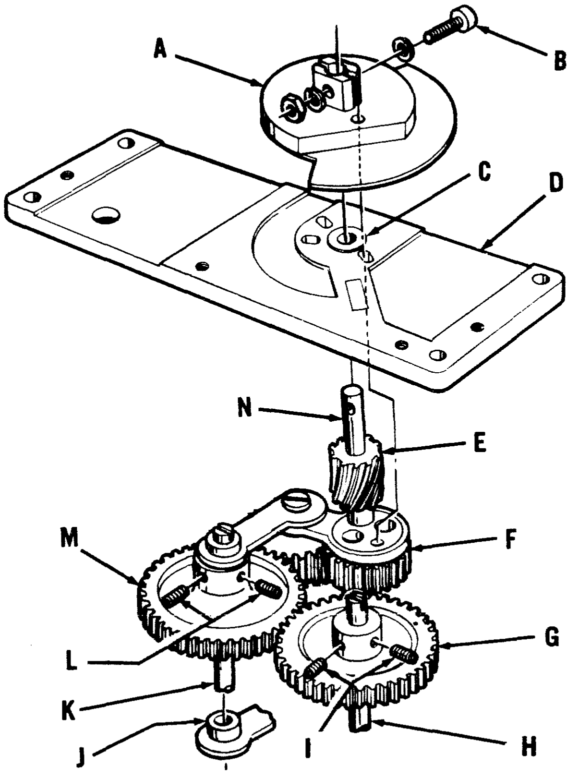


Fig. IV-21 DECODER TIMING

To Adjust:

A. Loosen screw B and rotate shaft N until a spring hook passes through all three holes.

B. Insert .002" gauge between bearing C and rotor assembly A. Hold helical gear E against bearing C and tighten screw B. Remove spring hook and .002" gauge.

Reason:

A. To establish correct timing relationship between rotor assembly A and shaft assembly N.

B. To ensure proper end play of shaft assembly N and rotor assembly A.

2. A. With the holes in rotor assembly A, magnet assembly D and eccentric gear F aligned, the slots of shafts H and K should align horizontally.
   B. There should be a minimum of .002" clearance between steel gear M and bearing J and plastic gear G should be flush with the backside of steel gear M.

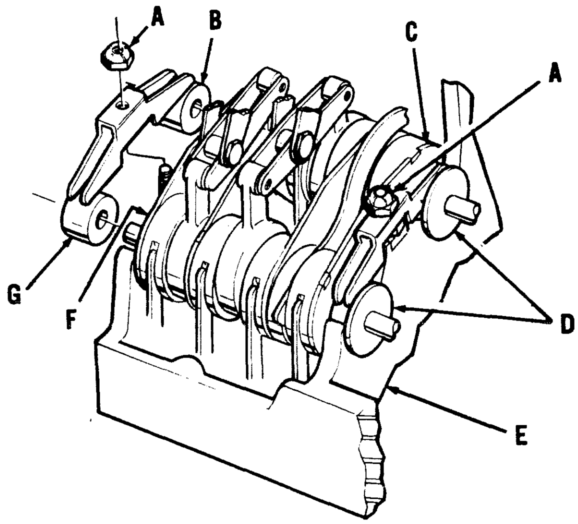


Fig. IV-22 CLUTCH ASSEMBLY

To Adjust:

A & B With rotor assembly A in zero position as described in test A, loosen setscrews I and L in gears G and M. Insert a .004" gauge between retainer plate F (Figure IV-22) and bearings B and G. Also insert a .002" gauge between steel gear M (Figure IV-21) and bearing J. Align slots in shafts H and K and tighten setscrews L in steel gear M. Align plastic gear G with back of steel gear M and tighten screws I in plastic gear G. Remove gauges.

Reason: To provide zero position to ensure proper timing and running clearance.

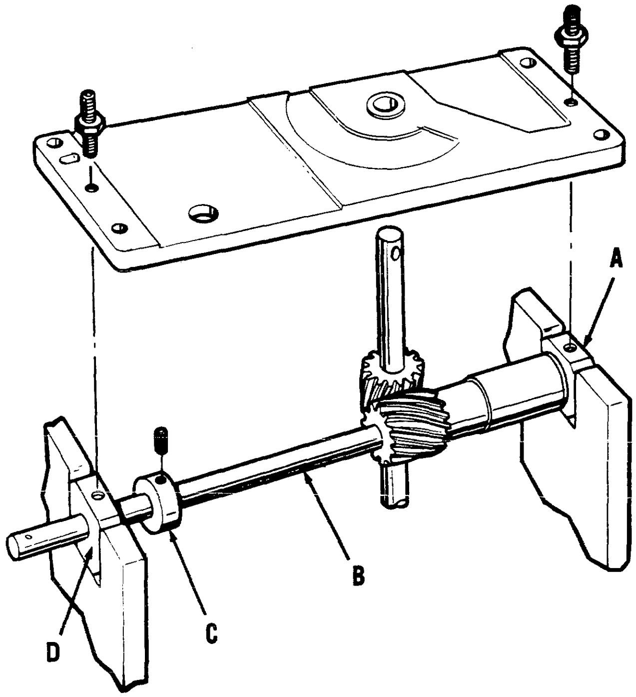


Fig. IV-23 HELICAL GEAR ASSEMBLY

HELICAL GEAR ASSEMBLY

With helical gear assembly B (Figure IV-23) held against right bearing A, there should be .002" clearance between left bearing D and set collar C.

To Adjust: Loosen setscrews in collar C. Hold helical gear assembly B against right bearing A. Insert a .002" gauge between set collar C and bearing D. Push set collar C against gauge and tighten screws.

Reason: To provide end play and running clearance of shaft assembly.

SOLENOID CLAPPER RELEASE

With hole of rotor assembly A (Figure IV-24) aligned with hole B in magnet assembly, there should be up to .004" clearance between bumpers C and G and their related clappers D and F.

To Adjust: Loosen screws E and H. Manually hold bumpers C and G against clappers D and F and tighten screws. Rotate rotor assembly A one revolution and recheck for correct relations.

Reason: To ensure release of clappers from solenoid cores.

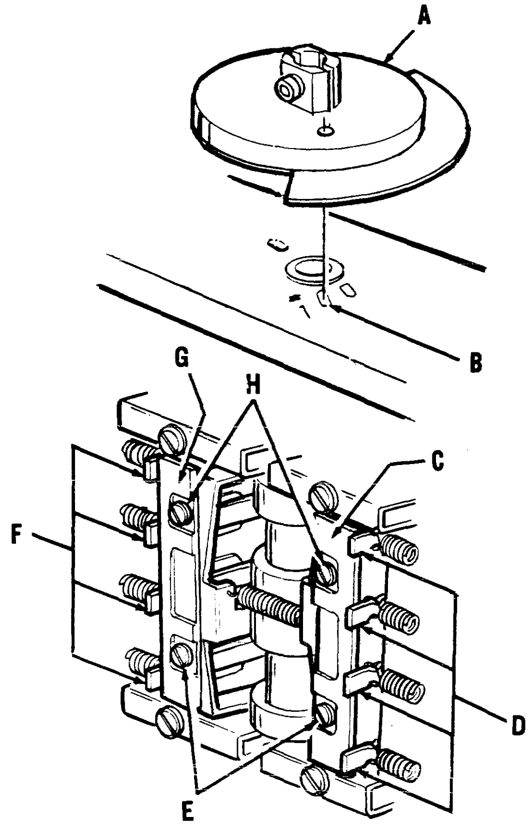


Fig. IV-24 SOLENOID CLAPPER RELEASE

DECODER HOUSING AND PULLEY ALIGNMENT

1. Prior to rebonding shaft seals to the decoder, the edges of top casting D (Figure IV-25) outside edges gasket G and shaft seal pads H and J should be flush

   To Adjust: With edges flush as described above, lightly tighten all mounting screws F. Align pads of oil pan I and edges of gasket G flush with edge of top casting D. Tighten mounting screws F.

   Reason: To prevent oil leakage between seals and casting.

2. A. Motor pulley M should be aligned with decoder pulley K.

   B. Belt L should be in grooves of decoder pulley M and pulley K. Belt L should not slip.

   To Adjust:

   A. Loosen screws N and adjust pulley M as required.

   B. Loosen motor cradle mounting screws E and turn screw A as required. Tighten mounting screws E and locknut B

   Reason: To prevent belt slippage, belt noise and bearing wear.

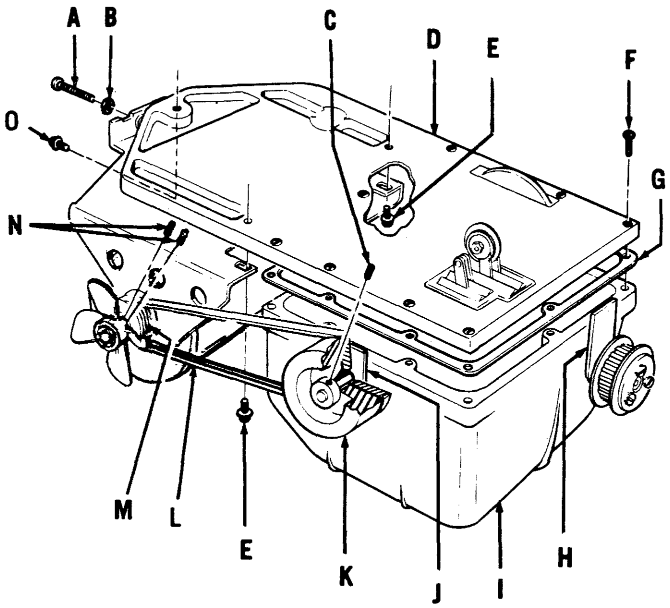


Fig. IV-25 DECODER HOUSING

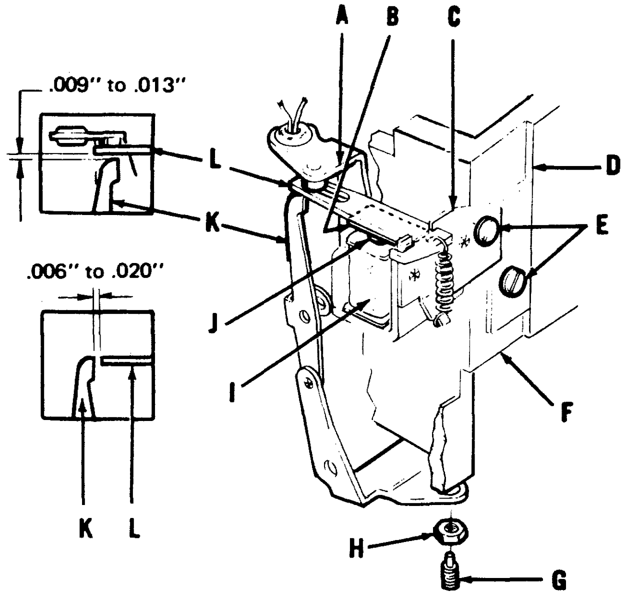


Fig. IV-26 RIBBCN SHIFT

94 CHARACTER PRINTER

RIBBON SHIFT

1. With solenoid I de-energized (Figure IV-26) , there should be .012" to .015" clearance between shim B and core J.

   To Adjust: Bend ear A as required. (Shim B must be seated at hinge C.)

   Reason: To minimize solenoid pull-in time.

2. With solenoid I de-energized and lever K cycled to its full throw position, there should be a .009" to .013" clearance between lever K and clapper L.

   To Adjust: Loosen screws E. With bracket F butted against surface D, slide the bracket up or down as required.

   Reason: To ensure maximum hold of lever K on clapper L.

3. With solenoid I energized, there should be .006" to .020" between clapper L and lever K.

   To Adjust: Loosen nut H and turn screw G as required.

   Reason: To provide latching lead and minimize lost motion.

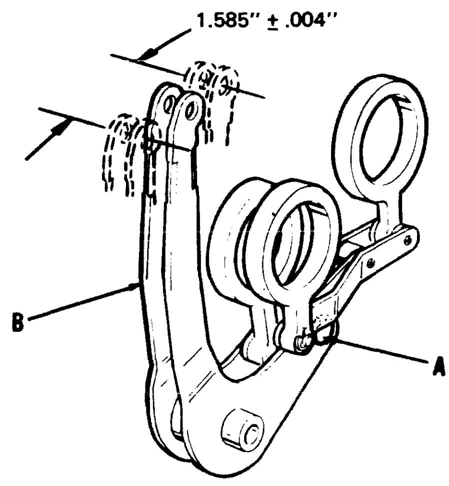


Fig. IV-27 ROTATE ARM

ROTATE ARM

With bellcrank B in the extreme position, the distance to the extreme right should be 1 19/32" (Figure IV-27) .

To Adjust: Loosen nut on eccentric screw A and adjust eccentric. Cycle decoder and re-check adjustment.

Reason: To ensure proper bellcrank movement.

PRINTING MECHANISM

YOKE AND CARRIER ASSEMBLY

1. Cradle A (Figure IV-28) should be aligned centrally to hub of yoke D and there should be no lateral play of cradle A when checked manually and cradle A should be free to tilt and remain in any tilt position.

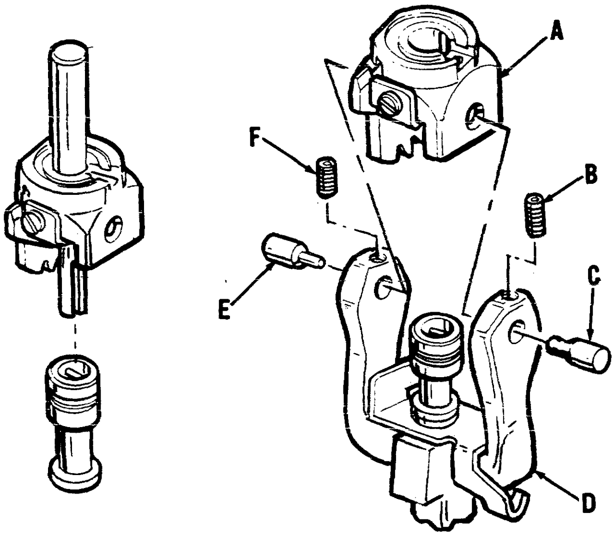


Fig. IV-28 CRADLE

To Adjust: Remove setscrews B and F, apply one drop of loctite to sides of setscrews. Holding pivot studs C and E firmly against cradle A reinsert setscrews B and F and tighten them down.
Reason: To ensure proper location of the print head and component parts.

2. With latch D (Figure IV-29) in its raised position there should be no more than .001" clearance between cradle A and the outside edge of latch D.
To Adjust: Remove screw C. Place a .001" shim between cradle A and latch D. Locate guide B and latch D against the shim, apply a drop of loctite to screw C reinsert and tighten down screw C.
Reason: To retain the print head in its printing position.

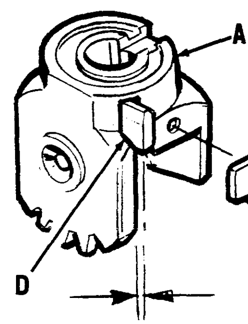


Fig. IV-29 BALL LATCH

3. Yoke assembly B (Figure IV-30) should seat firmly against the "V" grooves in frames A and C of the carrier.
To Adjust: Loosen screws E and G. Turn eccentrics D and F as required and retighten screws E and G.
Reason: To stabilize the yoke assembly for proper printing of characters.

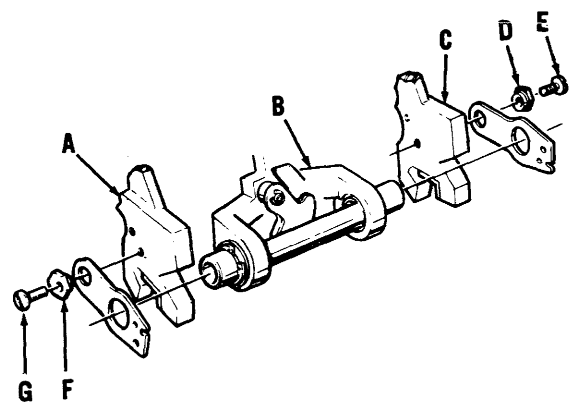


Fig. IV-30 YOKE

Adjustments

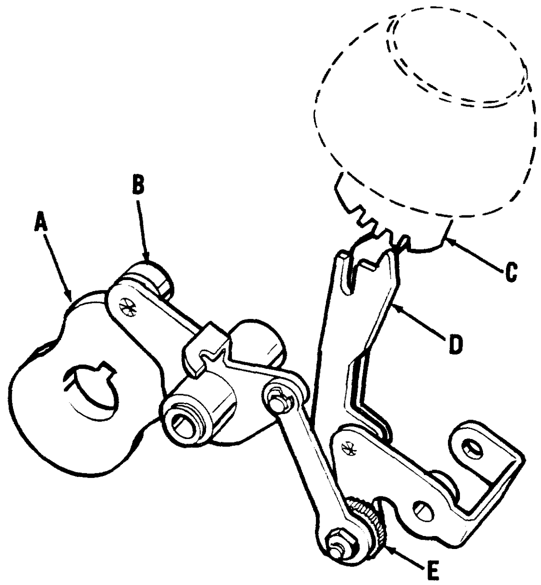


Fig. IV-31 CRADLE

4. With roller B (Figure IV-31) on high part of cam A there should be .010" to .020" clearance between the teeth on cradle C and aligner D.
   To Adjsut: Turn eccentric E as required.
   Reason: To ensure tilting of cradle C.
5. With the carrier positioned on rails B (Figure IV-32) and J:
   A. There should be clearance not to exceed .002" between the top of the lip of retainer H and the bottom edge of rail J.
   B. There should be clearance not to exceed .002" between bearing E and high points of rail B.

   To Adjust:
   A. Loosen screws K and L and place a .002" shim between guide block I and top of rail J. Turn eccentric screw L and tighten nut A and screw K. Remove the shim.

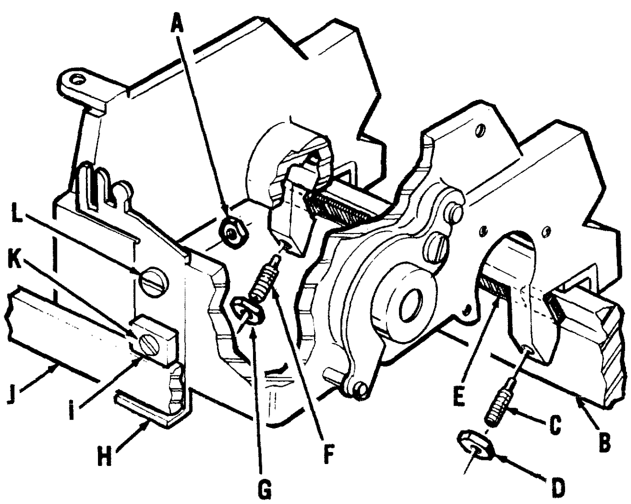


Fig. IV-32 CARRIER

   B. Loosen nuts D and G. Turn setscrews C and F and retighten nuts D and G.

   NOTE: CHECK CARRIER TO SLIDE FREELY ACROSS THE ENTIRE LENGTH OF RAILS "B" AND "J".
   Reason: To stabilize the carrier on rails B and J.

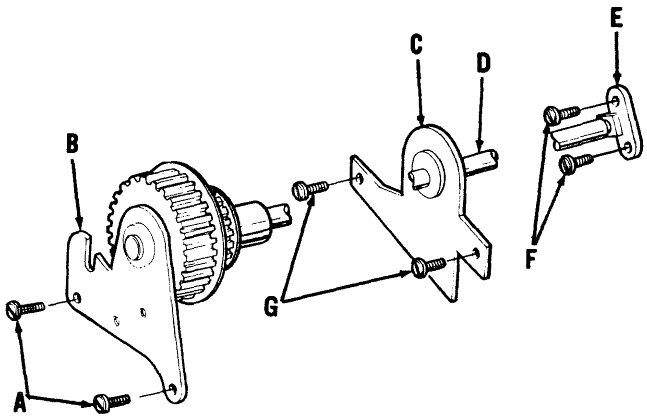


Fig. IV-33 PRINT SHAFT

6. Print shaft D (Figure IV-33) should be positioned to permit free lateral movement of the carrier across the print shaft.
   To Adjust:
   A. With screws A, F and G loosened, move carrier to the extreme right and tighten screws F in bearing E.
   B. Move carrier to extreme left and tighten screws G in support plate C.
   C. Move carrier to the extreme right and left ends several times to check for free movement. If a bind is detected, readjust as required.
   D. Tighten screws A in end plate B and recheck step C.

   Reason: To ensure free lateral movement of the carrier.
7. Lead screw A (Figure IV-34) should be positioned to permit free lateral movement of the carrier across the entire length of lead screw A.
   To Adjust:
   A. With screws B and C in plate D and screws F in bracket E loosened, move carrier to the extreme right and tighten screws B and C in plate D.

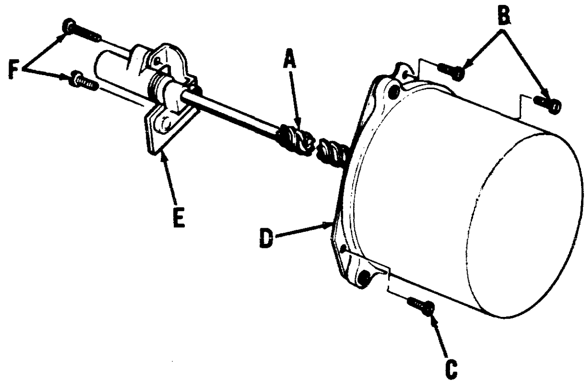


Fig. IV-34 LEAD SCREW

B. Move carrier to the extreme left and tighten screws F in bracket E.
C. Move carrier to the extreme right and left ends several times to check for free movement. If a slight bind is detected readjust as required.

Reason: To ensure free lateral movement of the carrier and that the total torque load does not exceed the power of the motor.

PRINT CLUTCH – FRONT FEED

NOTE: Pre-condition the machine by performing the following:

A. Install FE boards, and put SGL/NORM to SGL.
B. Disconnect P & J9 to decoder motor.
C. Jumper CCPC/ (DM3Q) to ground.
D. Turn power on.

CAUTION: CCPC/ must not be grounded for longer than 10 minutes, since the solenoid will be damaged.

1. A. With arm F (Figure IV-35) of latch L limiting against casting E, plate O of latch L should have .040" to .050" hold on the edge of clutch stop A.
   B. Upper edge B of pawl D should have a full hold under anti-backup flange of clutch stop A.

   To Adjust:
   A. Adjust arm F at point G as required.
   B. If necessary adjust arm C as required.

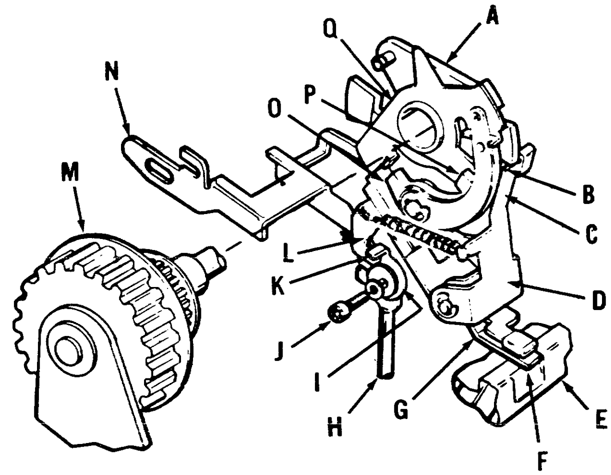


Fig. IV-35 PRINT CLUTCH – FRONT FEED

Reason:
A. To disengage the print clutch.
B. To prevent rebound of the print clutch.

NOTE: With clutch dog A and actuator Q retained by latch L and pawl D, pulley assembly M should be free to rotate without contacting clutch dog P.

2. With the decoder cycled until rod H is moved to its lowest position, there should be .005" to .015" clearance between plate O and actuator Q.
   To Adjust: Loosen screw J. Turn eccentric I as required and tighten screw J.
   Reason: To permit engagement of the print clutch.
3. With the print clutch and decoder normal, there should be slight passing clearance between formed ear K and step of latch L to permit free sliding of latch N.
4. With arm E (Figure IV-36) of latch F limiting against casing D and rubber sleeve C limiting against arm E, manually index latch G forward. There should be line to line contact of stud H of latch G and formed ear I.
   To Adjust: Adjust latch J at point B as required.
   Reason: To prevent accidental tripping of the print clutch and damage to print head A and sight bar K.
   NOTE: Anytime print clutch eccentric is readjusted after performing test and adjustment number 4, recheck the adjustment.

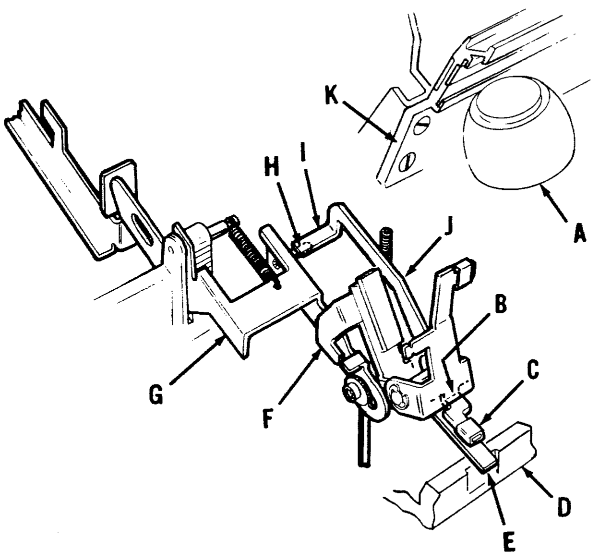


Fig. IV-36. PRINT CLUTCH – FRONT FEED

NON-PRINT ON SPLIT

NOTE: The following Test and Adjustment applies to SPLIT PLATEN machines only.

1. The distance from the split in a platen to two printed characters adjacent to the split should be as near equal as possible. If adjustment is required, determine how far the character should be moved to the left to obtain central condition.

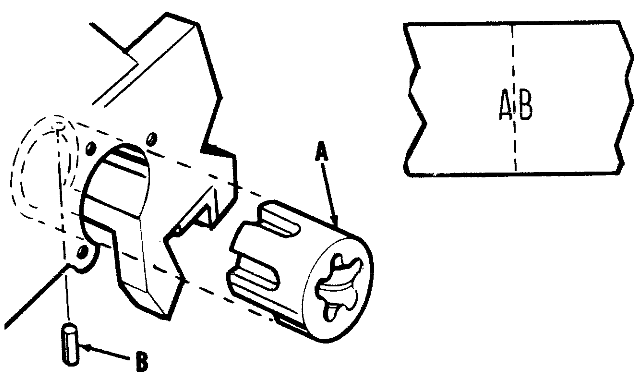


Fig. IV-37 NON-PRINT ON SPLIT

NOTE: When nut A (Figure IV-37) is rotated clockwise (viewed from right side) printed characters will be moved to the left as follows:
one slot ------- .040"
two slots ----- .080"
three slots --- .020"
four slots ---- .060"

To Adjust: Manually move forms handler to the left to free nut A from pin B. Relocate the carrier by turning nut A clockwise to the selected slot in nut A and position stud B over selected slot of nut A.

Reason: To prevent printing of characters on the split of a platen.

NOTE: If the above adjustment was performed, it will be necessary to readjust the zero position of the carrier as follows:

FOR 15" PLATEN

From the first character to the left of a platen split, manually move the carrier 6.4", 7.5", 8.5", 11.4" or 12.7" to the zero position according to the split location. Adjust the left bumper to have .030" to .045" clearance between the bumper and the left edge of the carrier casting. Then manually move carrier 15" to the right and adjust the right bumper correspondingly. Secure bumpers by tightening nuts.

FOR 26" PLATEN

From the first character to the left of a platen split, manually move the carrier 7.1", 8.5", 10.3", 13.4" 16.9" or 21.9" to the zero position according to the split location. Adjust the left bumper to have .030" to .045" clearance between the bumper and the left edge of the carrier casting. Then manually move carrier 25.5" to the right and adjust the right bumper correspondingly. Secure bumpers by tightening nuts.

CHARACTER SPACING

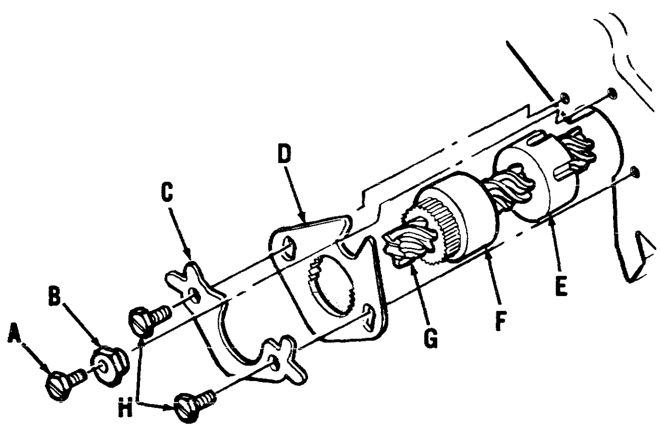


Fig. IV-38 CHARACTER SPACING

1. There should be no backlash of nuts F and E (Figure IV-38) on lead screw G and carrier should be free on lead screw G.
   To Adjust:
   A. Nut F should be rotated until it just contacts nut E.
   B. With retainer D properly positioned on nut F, assemble eccentric B with screw A and tighten screws H (alternately and not more than 1/4 turn at a time) until tight. Check for minimum movement. If movement is more than .002", loosen screws A and H and turn eccentric B as required. Tighten screw A and screws H as stated above.
   C. If movement is still too much reposition retainer D one tooth on space nut F and repeat adjustment B.

   Reason: To ensure proper spacing of printed characters.

   NOTE: A second identical line of characters printed in either direction should print over the characters previously printed. When the adjustment is completed, bend four ears of anchor C, to secure screws H.

RIBBON FEED AND REVERSE

1. With spring arm F (Figure IV-39)and reversing arm E manually positioned centrally to base plate C (Figure IV-40), visually check for clearance not to exceed .015" between the ends of the eyes of springs C, G and arm D (Figure IV-39).
   To Adjust: Bend ears A and B as required.
   Reason: To ensure proper positioning of reversing arm E.

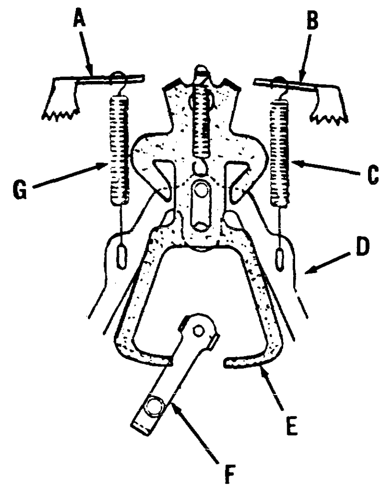


Fig. IV-39 REVERSE ARM

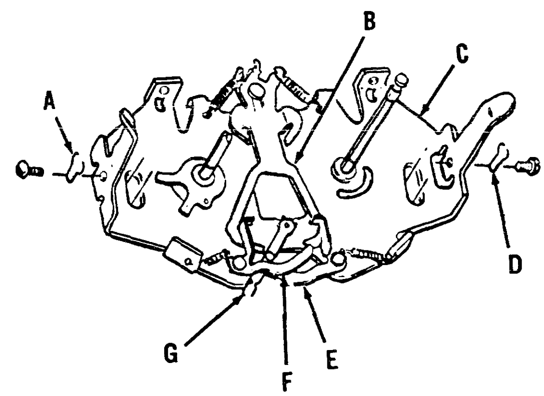


Fig. IV-40 RIBBON BASE PLATE

2. With the ribbon cartridge positioned on base plate C (Figure IV-40) there should be no upward or downward play of the cartridge.
   To Adjust: Loosen screws and locate spring clips A and D as required.
   Reason: To stabilize the ribbon cartridge when it is mounted to base plate C.
   NOTE: The following test and adjustment should be applied to both the left and right side of the mechanism.

3. A. With cam follower B (Figure IV-41)on the high part of cam A there should be .010" to .100" clearance between the ear of spring arm G and the right or left edge of base plate C (Figure IV-40) with spring arm G held toward the center of base plate C.

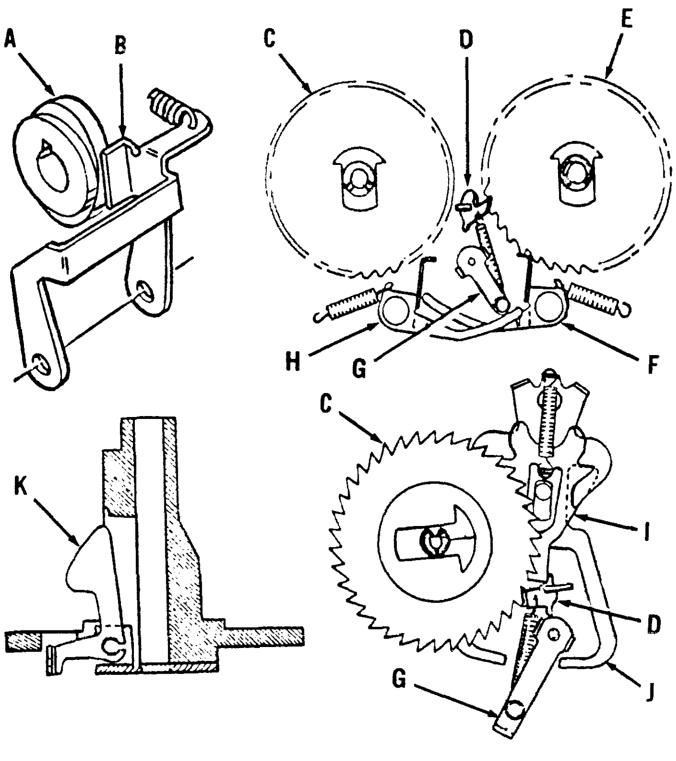


Fig. IV-41 RIBBON FEED

B. During a cycle of cam A (Figure IV-41) feed pawl D should advance the selected ratchet C or E two tooth spaces plus slight overthrow and detent F or H should seat in the tooth space.

To Adjust:

A. Loosen screws holding base plate C (Figure IV-40) and move the base plate partially forward.

B. Position cam follower B (Figure IV-41) on the high part of cam A.

C. With spring Arm G and ribbon feed pawl D positioned to the right or left, depress pawl K on the same side and turn the other ratchet opposite its driven direction, placing interposer I into the path of feed pawl D.

D. Move base plate C (Figure IV-40) rearward until spring arm G is transferred to the opposite side, maintaining base plate C square to the carrier.

Reason: To ensure proper feeding and reversing of the ribbon, when the ribbon is unwound from either spool.

RIBBON LIFT AND SHIFT

1. A. With an approximate equal number of threads of pivot screws E and F (Figure IV-42) exposed beyond the sides of the carrier, ribbon guides A and C must be centrally aligned to the veritcal projections of spring B and be free to restore from a raised position by their own weight.

B. Shaft Q should have no visual lateral movement when checked manually.

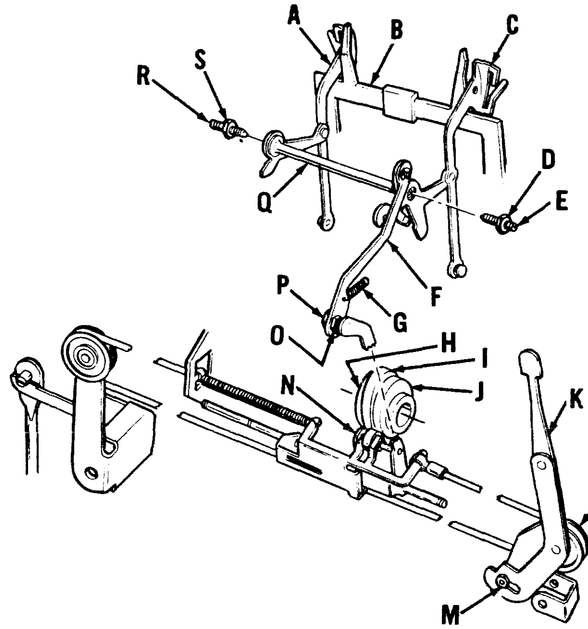


Fig. IV-42 RIBBON SHIFT

To Adjust:

A. Disconnect the rear portion of link F and spring G.

B. Loosen nuts D and S and turn pivot screws E and R to centralize ribbon guides A and C and tighten nuts D and S. Check ribbon guides A and C to drop freely and shaft Q to have no visual lateral movement.

C. If necessary, re-adjust eigher pivot screw E or R to meet the requirements of the test.

Reason: To ensure proper indexing and restoration of the ribbon shift mechanism.

2. With link F and spring G assembled, there should be .003" to .005" clearance between roller N and the low side of cams H, I, and J.

To Adjust: Loosen nut P and turn eccentric nut O as required. Tighten nut P.

Reason: To ensure that roller N will move freely in an axial direction from cam to cam.

3. With lever K latched in the right position visually check roller N to align centrally with cam I.

To Adjust: Loosen screw M and locate lever K and pulley L as required. Tighten screw M.

Reason: To ensure alignment of roller N with the correct cam during ribbon shift operations.

PRINT SHAFT SPRING WASHER AND PULLEY ASSEMBLY

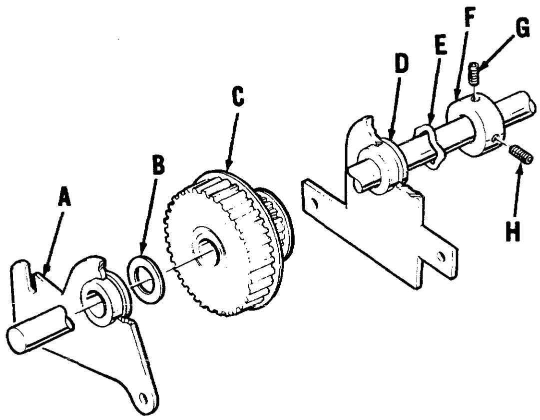


Fig. IV-43 PRINT SHAFT

1. FOR 15" FRONT AND REAR FEED
   Spring washer B (Figure IV-43) located between bearing D and set collar F should be compressed to .078" ± .002".
   FOR 26" FRONT FEED

   Spring washer E located between bearing D and set collar F should be compressed to .076" ± .001".
   To Adjust: Loosen setscrews G and H. Locate set collar F as required and tighten setscrews G and H.
   Reason: To decrease overthrow of the print shaft.
2. There should be clearance not to exceed .006" between the bearing in pulley assembly C and the bearing in end plate A.
   To Adjust: Assemble shims B as required between the two bearings.
   Reason: To establish the constant position of pulley assembly.

TILT, ROTATE AND COMPLEMENTARY BANDS

1. There should be an equilibrium condition between extension spring D (Figure IV-44) and rotate band B and complementary band C.
   To Adjust: With spring D and bands B and C assembled, manually hold lever assembly while loosening screw E. Slowly permit lever A to move toward the right side of the machine until an equilibrium condition exists.
   NOTE: Lever A must be manually controlled and never permitted to snap back. Tighten screw E.
   Reason: To ensure proper function of rotate and complementary bands.
2. Cradle I (Figure IV-45) should be located so that its tooth space clearance or overthrow is equal on both sides of fixed aligner J.

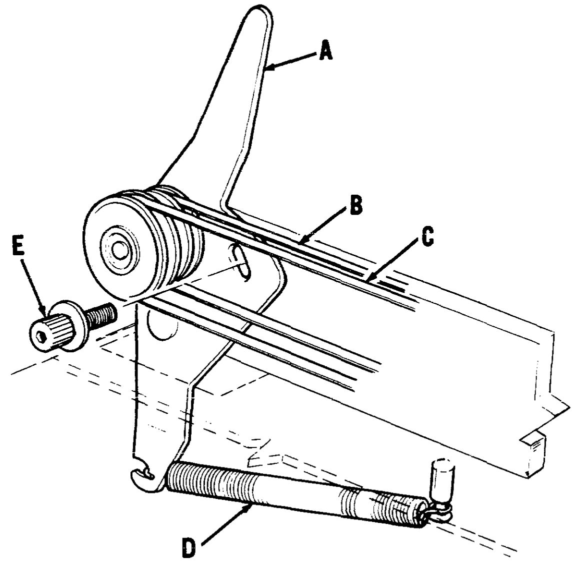


Fig. IV-44 ROTATE BANDS

To Adjust:

A. Locate cradle I by loosening nuts K on link H to centrally locate aligner J in tooth space "0" of cradle I.
B. Rotate print shaft until aligner J starts moving into engagement with tilt tooth space "0" of cradle I. Check for equal movement of cradle I both forward and rearward of aligner J. This movement should not cause any movement of spring C or band G. If movement is not equal on both sides of aligner J, readjust nuts K as required and repeat the preceding procedure.
C. Locate cradle I to tooth space 3. Rotate print shaft until aligner J starts moving into engagement with tilt tooth space 3. Check for equal movement of cradle I both forward and rearward of aligner J. If movement is not equal perform the following adjustment.
D. a. If excess movement is to the rear of aligner J, open slot B.
   b. If excess movement is to the front of aligner J, close slot B. Now recheck tilt tooth space 3. Then recheck tooth space 0. If movement is different equalize tilt position 0 and 3.

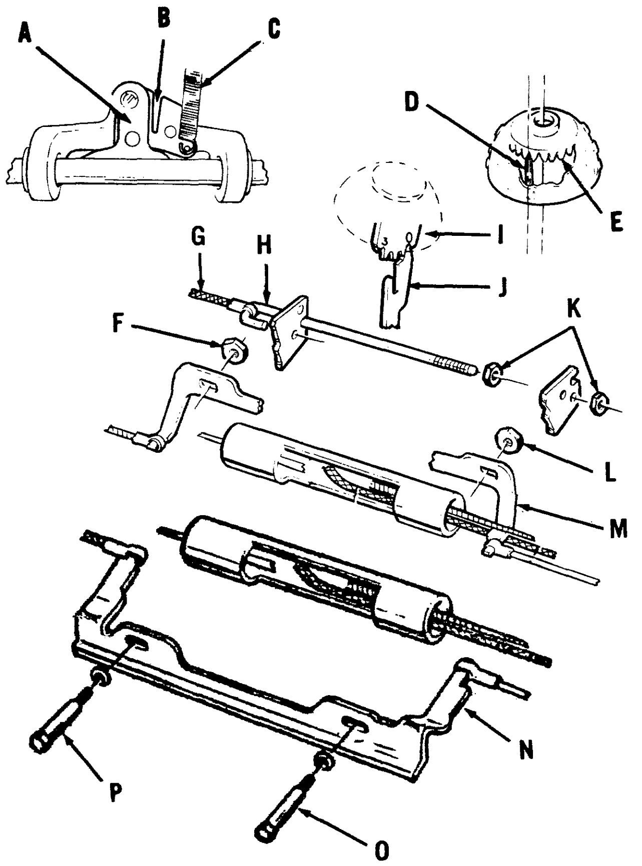


Fig. IV-45 TILT AND ROTATE BANDS

NOTE: When opening or closing of slot B is required, care must be taken not to damage rocker A.
Reason: To ensure central tilt alignment of the cradle teeth.

3. The print head should be located so that the gaps of internal aligner E have equal clearance or backlash around rotate aligner latch D.
   To Adjust:
   A. Engage rotate aligner latch D with the "0" aligner tooth gap of the print head. Loosen nuts F and L or screws O and P (depending upon style of hanger bracket on machine) a small amount (1/6 of a turn) to ensure free sliding of hanger bracket M or N.
   B. Move bracket M or N (depending upon style of bracket on machine) in both directions to establish total amount of free movement. Measure this amount of free movement.
      CAUTION: Do not force bands.
   C. Tighten nuts F and L or screws O and P on bracket M or N at the half way mark of free movement.
   D. Check the alignment of the print head in both extreme rotate positions, by rotating the print shaft to permit rotate aligner latch D to be partially engaged. Determine if equal condition of backlash exists by gently turning the print head in both directions.
   E. If step D results in a discrepancy of alignment, compensate it by slight movement of bracket M or N. Tighten nuts F and L or screws O and P and recheck "0" and both extreme rotate positions for equal clearance or backlash around rotate aligner latch D.

   Reason: To ensure proper rotate alignment and full print of characters.

CARRIER "ZERO" POSITION AND BUMPERS

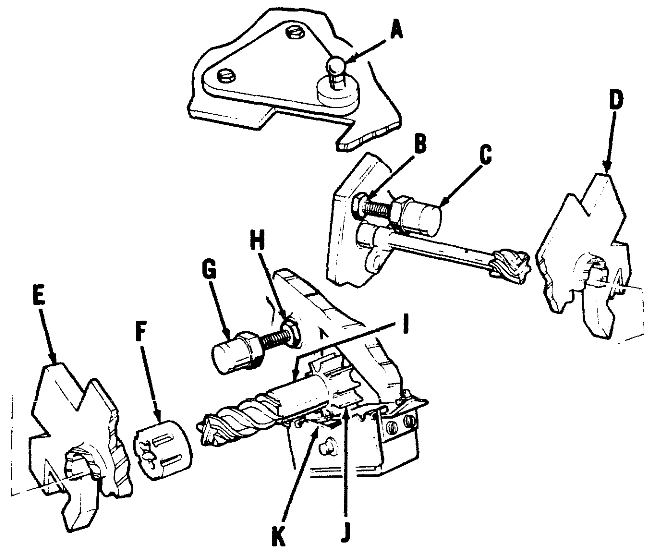


Fig. IV-46 BUMPERS

1. With lead screw detent I held by clappers J and K, (Figure IV-46), the left edge of carrier casting D should be 2.5" from the center line of pivot ball A.
   To Adjust: Locate the carrier by selecting one of five slots in nut F.
   Reason: To establish the normal "zero" position of the carrier.
2. With lead screw detent I held by clappers J and K and carrier in "zero" position, (2.5" from the center line of pivot ball A) there should be .030" to .045" clearance between bumper C and left edge of carrier casting D.

To Adjust: Loosen nut B. Turn bumper C as required and tighten nut B.
Reason: To prevent damage to carrier and to provide a position for initializing the carrier control mechanism.

3. FOR 15" PLATEN
Move carrier 15 inches to the right of the carrier "zero" position and with lead screw detent I held by clappers J and K, there should be .030" to .045" clearance between bumper G and right edge of carrier casting E.
FOR 26" PLATEN
Move carrier 25.5 inches to the right of the carrier "zero" position and with lead screw detent I held by clappers J and K, there should be .030" to .045" clearance between bumper G and right edge of carrier casting E.
To Adjust: Loosen nut H. Turn bumper G as required and tighten nut H.
Reason: To prevent damage to the carrier.

NOTE: On split platen machines perform adjustment: –
"NON-PRINT ON SPLIT" See Section IV page 18.

CARRIER POSITION ESCAPE MECHANISM

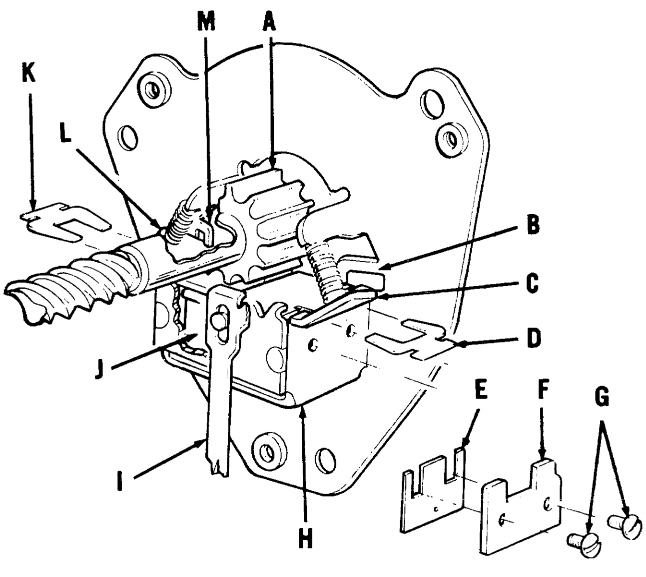


Fig. IV-47 SOLENOID CLAPPER

1. With shims D and K (Figure IV-47) of clappers C and L limiting against the cores of solenoids J and the play removed in a direction to separate clappers C and L, there should be .040" clearance between clappers C and L.
To Adjust: Loosen screws G. Check for shims E between frame H and plates F on each side of frame H as required and tighten screws G. The number of shims E on each side should be equal within one shim.
Reason: To ensure the proper clearance with detent A.
2. With clappers C and L manually depressed to limit shims D and K against the core of solenoids J, there should be .010" clearance between clappers C and L and projections B and M.
To Adjust: Bend projections B and M as required.
Reason: To prevent clappers C and L from tilting when actuated by link I.

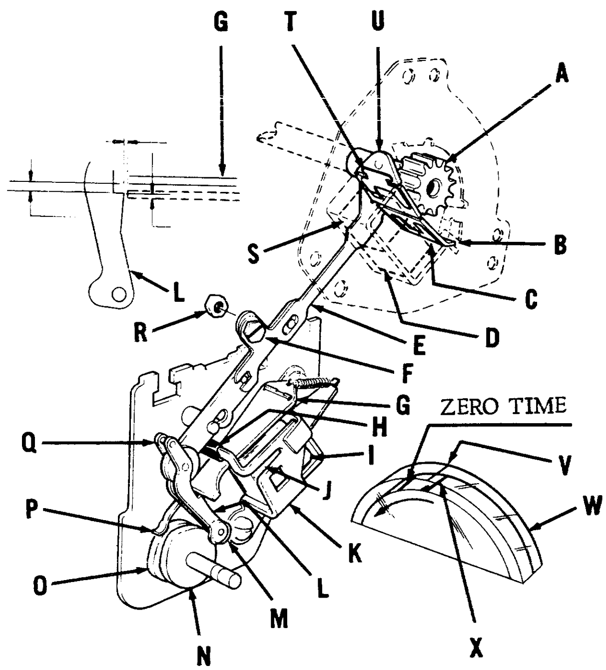


Fig. IV-48 SOLENOID INTERPOSER POSITION

3. With clappers C (Figure IV-48) manually depressed to limit on the core of solenoid I, there should be .044" to .048" clearance between the top of clapper G and limit H.
To Adjust: Bend arm J of bracket K as required.
Reason: To provide the proper air gap.
4. Manually cycle the decoder until roller M on rocker arm assembly Q is on the low side of cam N. Insert a .003" gauge between clapper G and core of solenoid I. With clapper G depressed to limit the .003" gauge on core of solenoid I, proceed with step "A".

A. 1. The interposing edge of clapper G should have .040" to .050" hold on surface L of rocker arm assembly Q.
   2. There should be .002" to .004" passing clearance between the interposing edge of clapper G and surface L of rocker arm assembly Q.

B. With clapper G limiting against limit H, surface L of rocker arm assembly Q should pass under clapper G with no less than .005" clearance maintaining the .040" to .050" clearance requested in step "A" (1).

To Adjust: Locate solenoid bracket K as required.
Reason: To ensure correct position of interposer solenoid I.

5. Manually cycle the decoder until the low side of cam O is under formed portion of P of clapper G. Insert a .003" gauge between clapper G and core of solenoid I. With clapper G depressed to limit the .003" gauge on core of solenoid I, there should be clearance not to exceed .003" between formed portion P of clapper G and the low side of cam O.
To Adjust: If necessary, tip the formed portion P of clapper G as required.
Reason: To prevent a false limit of clapper G.
NOTE: Prior to performing the following test and adjustment, synchronizing the print shaft must be performed as outlined in step number 2 under PRINT SHAFT SYNCHRONIZATION and TIMING BELT TENSION adjustments.

6. Manually cycle the decoder and cams N and O (Figure IV-48) until clapper G can be depressed into the path of rocker arm assembly Q. With clapper G depressed, continue to cycle the decoder until timing line X (long line with one short marked line) is in line with reference line V on plastic cover W. With these conditions established, there should be clearance not to exceed .004" between clappers B and U and the teeth on detent A.
To Adjust: Loosen nut R and turn eccentric screw F as required. Tighten nut R.
Reason: To ensure correct timing for carrier detent clappers B and U.

NOTE: Manually cycle the decoder and cams N and O until clapper G can be depressed into the path of rocker arm assembly Q. With clapper G depressed and while trying to manually move the carrier, cycle the decoder until the carrier just starts to move. The first timing line X (long line with one short marked line) should be in line with or up to .100" past reference line V on plastic cover W. This check should be made for both directions of carrier movement.

7. Manually cycle the decoder and cams N and O until clapper G can be depressed into the path of rocker arm assembly Q. With clapper G depressed continue to cycle the decoder until roller M is on the high side of cam N. At this time, through the indexing of link E there should be .002" to .005" clearance between shims C and T and the core of solenoids D and S.
To Adjust: Recheck adjustment number 7.
Reason: To control the depth hold of clappers with detent A and to prevent driving component parts into a bind.

8. Jack shaft I (Figure IV-49) should have end play not to exceed .005".
To Adjust: With jack shaft I held to the left to locate cams D against the bearing in plate C, loosen setscrew E, locate set collar J as required and tighten setscrew E.

Reason: To maintain the alignment of cams D with the cam followers.

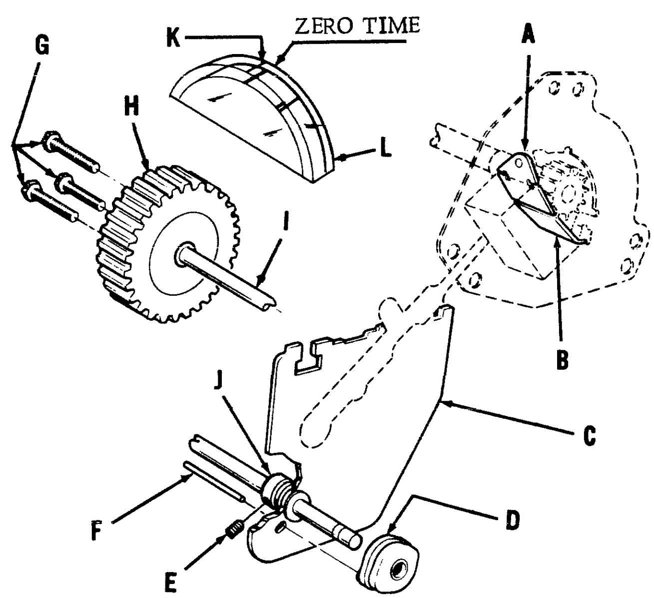


Fig. IV-49 TIMING CARRIER DETENT CLAPPERS

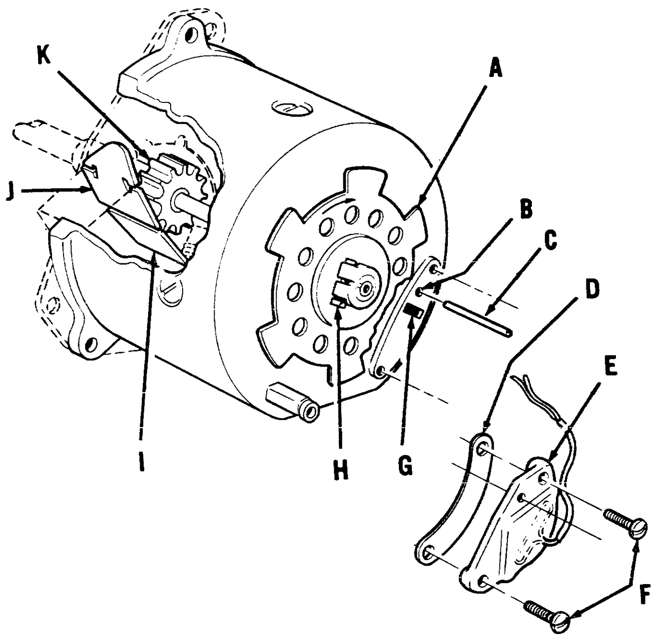


Fig. IV-50 CORE & MAGNET

9. A. There should be .005" to .015" clearance between the face of magnet C (Figure IV-50) and the inside surface of each projection of readout wheel A and readout wheel A must be in phase with detent K.

B. There should be .005" to .015" clearance between the outside surface of each projection of readout wheel A and the surface of the core in core holder E.

To Adjust:

A. With detent K held by clappers I and J, insert a rod C in hole B and rotate readout wheel A in direction indicated by arrow to limit a projection against rod C. With a .010" gauge between the left side of the projection on readout wheel A, position readout wheel A and gauge against magnet G. Tighten screw H. Do not remove gauge.

B. Remove screws F. Check if shims D are as required. Replace screws F. Remove gauge and rod.

Reason: To position readout wheel A between magnet G and core E and place it in phase with detent K.

NOTE: With carrier manually moved in both directions, readout wheel A must not contact magnet G or core E.

TACHOMETER

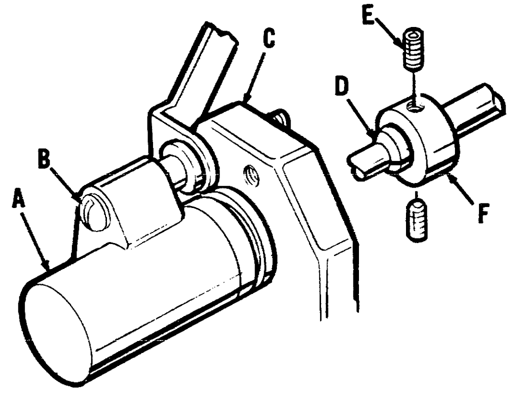


Fig. IV-51 TACHOMETER

1. There should be .025" to .055" clearance between casting C (Figure IV-51) and the right end of the full body diameter of tachometer A.

   To Adjust:

   A. Loosen screw B and screw E in set collar F.
   B. Place a .040" gauge between the end of tachometer A at its full body diameter and casting C.
   C. Supporting tachometer A from sagging at its left end, position tachometer and gauge against casting C.
   D. Move set collar F against flange of coupling D and tighten setscrew E.
   E. Supporting tachometer A from sagging at its left end, tighten screw B.

   Reason: To establish the correct location of tachometer A.

2. With the carrier manually moved in both directions, the left portion of tachometer A should not run out of concentricity by more than .010".

   To Adjust: Loosen screw B and E. Rotate tachometer shaft coupling D approximately 1/4 turn in either direction. Tighten screw E. Support tachometer from sagging and tighten screw B.

   Reason: To establish the current location of tachometer A.

FORMS HANDLER

OPEN/CLOSE AND FORMS SPACING MECHANISMS

There should be no forward or rearward movement of Open/Close and Forms Spacing camshaft assemblies D and B (Figure IV-52) when in their normal, latched positions.
To Adjust: Loosen nuts and adjust eccentric screws C and E as required.

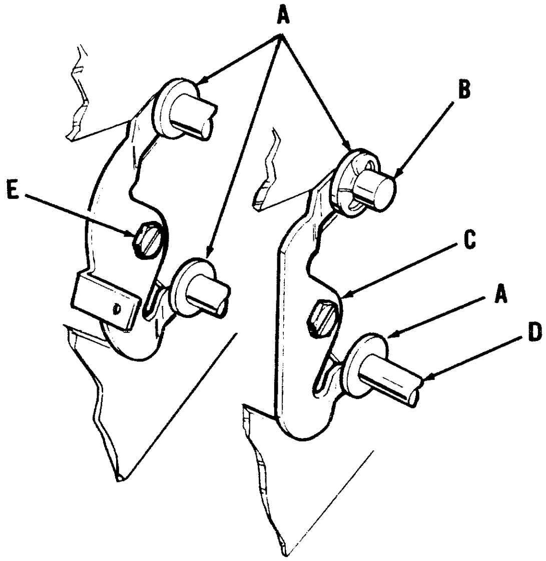


Fig. IV-52 OPEN/CLOSE AND FORMS CAMSHAFTS

NOTE: DO NOT crush oilite bearings A. Adjust eccentrics only sufficiently to prevent bearings A from rotating when machine is cycled under power.
Reason: To ensure proper operation of camshaft assemblies and related parts.

Space Pawls

1. With rollers B (Figure IV-53) of space pawls E and F in the dwell of cams A (home position) and screws G loose, manually move the active (forward) space pawl E or F into mesh with platen space gear L. The gear should not move. Tighten screws G and cycle mechanism to move second space pawl E or F into active position and test as above.

   To Adjust: If space pawl E or F moves space gear L during entry of tooth, balance entry of space pawls by loosening screws K and positioning detent spring J.

   Reason: To ensure proper entry of space pawls in teeth of space gear.

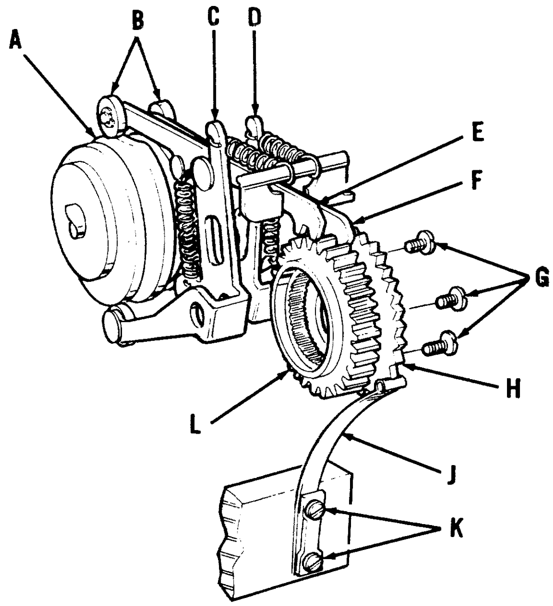


Fig. IV-53 SPACING

Open/Close Clutch Mechanisms

1. A. There should be .020" to .022" clearance between clapper C and core of "open" solenoid A (Figure IV-54).

   B. With "open" solenoid clapper C in its normal (inactive) position, there should be .010" to .050" clearance between clapper stud H and the face of the clutch latch release cam K. When clapper is in active position, there should be .003" to .008" clearance between knock-off cam J and clapper stud H.

   To Adjust:

   A. Insert .021" gauge between clapper C and core of solenoid A. Adjust clapper limit screw B until gauge can be moved with light, rubbing action.

   B. Weave the arm of clapper C near the spring cutout area as required.

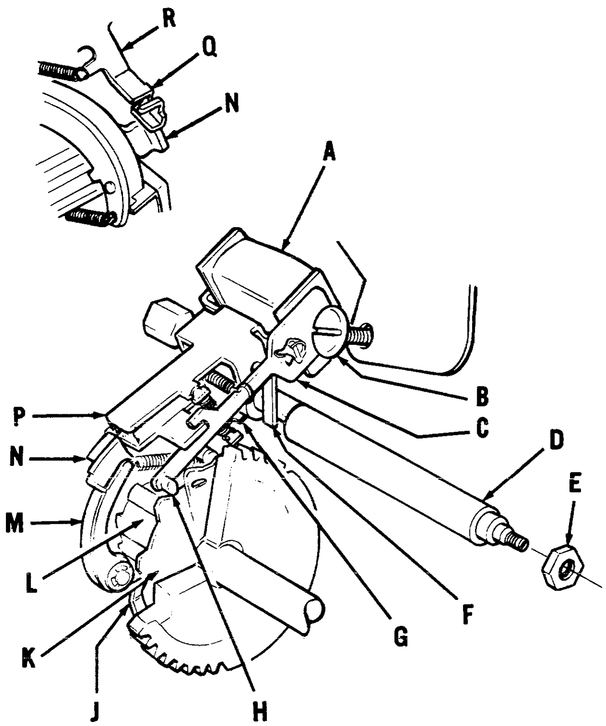


Fig. IV-54 OPEN CLUTCH MECHANISM

Reason:

A. To ensure proper action of solenoid clapper.

B. To prevent interference between clapper arm and cam.

2. With the open/close clutch in the normal position and latched by the "open" latch P, the clutch dog M should be disengaged from the drive hub L and the clutch stop plate N should have a full hold on the bottom plate of rubber latch assembly P.

   To Adjust: Loosen nut E and turn eccentric shaft D as required. If necessary, bend tail F of latch assembly.

   Reason: To ensure proper disengagement of clutch dog from drive gear.

3. With open/close clutch in the normal position and latched by the "open" latch P, manually cycle the drive until clapper stud H is positioned over the low radius of clutch latch release cam K. Hold clapper C in the active position and continue to cycle the drive. The latch P should be released before the stud H reaches the high point of the release cam K. With stud H on the high point of cam K, there should be a minimum of .010" clearance between the latch P and outer radius of the stop plate N.

   To Adjust: Bend solenoid clapper C near the spring cutout area as required.

   Reason: To ensure proper release of clutch dog.

4. A. With the 'open/close' clutch in the normal position and latched by the 'close' latch R (Figure IV-55), release the 'close' latch and slowly rotate clutch assembly using drive pulley until drive pawl M (Figure IV-54) releases (motion of stop plate N ceases). Anti-backup latch R should not engage stop plate N. Manually rotate stop plate N until anti-backup latch R engages stop N. Stop plate N should move at least .010" before engagement occurs.

   B. With unit operated under power, anti-backup latch R should engage stop plate N when clutch is disengaged by open latch P.

   To Adjust: (A & B) Open or close slot Q of anti-backup latch R as required.

   Reason: To ensure engagement of anti-backup latch R and to prevent clutch chatter.

5. A. With shaft held in direction of arrow, there should be .001" to .003" clearance between set collar H and flange of bearing J (Figure IV-55).

   B. There should be .020" to .022" clearance between clapper N and core S of 'close' solenoid.

   C. With 'close' solenoid clapper N in its normal (inactive) position, there should be .010" to .050" clearance between clapper stud E and the face of the clutch latch release cam G. When clapper is in active position, there should be .003" to .008" clearance between knock-off cam plate K and clapper stud L.

   To Adjust:

   A. Loosen set screws in collar H. Insert .002" gauge between collar H and flange of bearing J. Hold shaft in direction of arrow, hold collar H against gauge and tighten setscrews.

   B. Insert .021" gauge between clapper N and solenoid core S. Adjust clapper limit screw M until gauge can be moved with light, rubbing action.

   C. Weave the arm of clapper N near the spring cutout area as required.

   Reason:

   A. To reduce end play and to maintain adjustment (c).

   B. To ensure proper action of solenoid clapper.

   C. To prevent interference between clapper arm and cam.

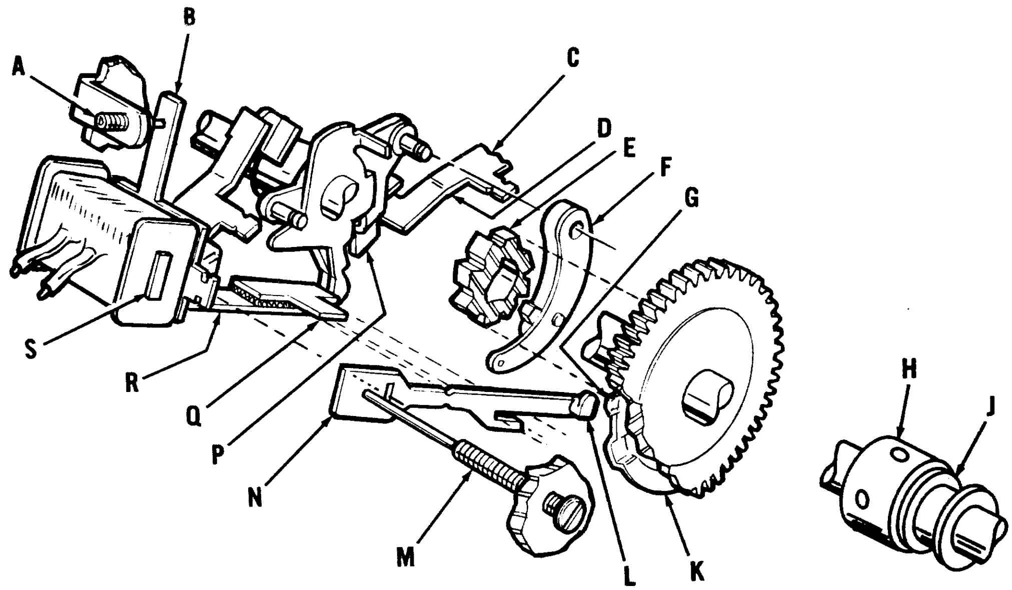


Fig. IV-55 CLOSE CLUTCH MECHANISM

6. With the open/close clutch in the normal position and latched by the 'close' latch R, the clutch dog F should be disengaged from the drive hub E and the clutch stop plate P should have a full hold of the metal plate Q of rubber latch assembly R.
   To Adjust: Turn adjusting screw A as required. If necessary, bend tail B of latch assembly.
   Reason: To ensure proper disengagement of clutch dog from drive gear.
7. With open/close clutch in the normal position and latched by the 'close' latch R, manually cycle the drive until clapper stud L is positioned over the low radius of clutch latch release cam G. Hold clapper N in the active position and continue to cycle the drive. The latch R should be released before the stud L reaches the high point of the release cam G. With stud L on the high point of cam G, there should be a minimum of .010" clearance between the latch Q and outer radius of the stop plate P.
   To Adjust: Bend solenoid clapper N near the spring cutout area as required.
   Reason: To ensure proper release of clutch dog.
8. With the open/close clutch in the normal position and latched by the 'close' latch R, hold clutch stop plate P firmly against the metal plate Q of the rubber latch assembly R. There should be clearance not to exceed .005" between the 'open' anti-backup latch C and the clutch stop plate P.
   To Adjust: Bend the anti-backup latch C at formed point D as required.
   Reason: To ensure clutch remains latched in the home position.
9. A. There should be .020" to .022" clearance between clapper N and core of forms spacing solenoid L (Figure IV-56).
   B. With forms spacing solenoid clapper N in its normal (inactive) position, there should be .010" to .050" clearance between clapper stud and the face of the clutch latch release cam C. When clapper is in active position, there should be .003" to .008" clearance between knock-off cam plate P and clapper stud D.

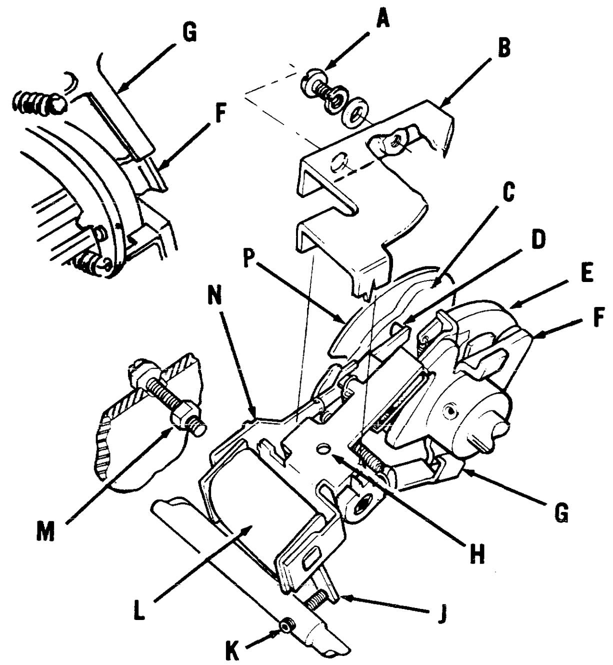


Fig. IV-56 CLAPPER & SOLENOID

To Adjust:

A. Insert a .021" gauge between clapper N and core of solenoid L. Adjust clapper limit screw M until gauge can be moved with light, rubbing action.

B. Weave the arm of clapper N near the spring cutout area as required.

Reason:

A. To ensure proper action of solenoid clapper.

B. To prevent interference between clapper arm and cam.

10. With the forms spacing clutch in the normal position and latched by forms spacing latch H, clutch dog E should be disengaged from the drive hub and stop plate F should have a full hold of the bottom plate of rubber latch assembly H.

To Adjust: Turn adjusting screw K as required. If necessary, bend tail J of latch assembly.

Reason: To ensure proper disengagement of clutch dog from drive gear.

11. With forms spacing clutch in the normal position and latched by forms spacing latch H, manually cycle the drive until clapper stud D is positioned over the low radius of clutch latch release cam C. Hold clapper N in the active position and continue to cycle the drive. The latch H should be released before the stud D reaches the high point of the release cam C. With stud D on the high point of cam C, there should be a minimum of .010" clearance between latch H and the outer radius of stop plate F.

NOTE: Check both sides of clutch stop plate F by rotating forms spacing camshaft 180° and repeat above test.

To Adjust: Bend solenoid clapper N near the spring cutout area as required.

Reason: To ensure proper release of clutch dog.

12. A. With the forms spacing clutch in the normal position and latched by forms spacing latch H, hold clutch stop plate F firmly against the metal stop plate of the rubber latch assembly H. There should be clearance not to exceed .005" between anti-backup latch G and clutch stop plate F.

B. Rotate forms spacing camshaft 180° and repeat test A with the exception that clearance should not exceed .008" between backup latch G and clutch stop plate F.

To Adjust:

A. Loosen screws A and position latch support bracket B as required.

B. Loosen screws A and readjust bracket B to decrease clearance in test A.

Reason: To ensure clutch remains in home position.

FRONT FEED MECHANISMS

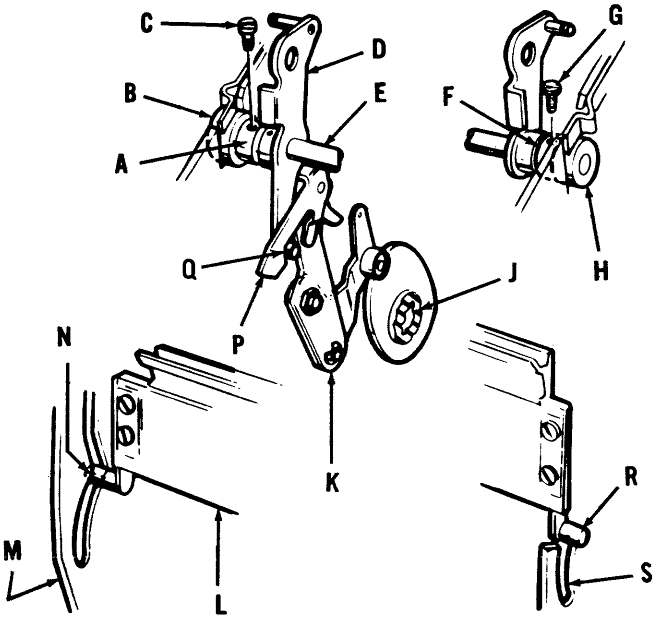


Fig. IV-57 OPEN/CLOSE SHAFT

Open/Close Shaft

1. A. With forms handler drive blade assembly K (Figure IV-57) in the closed position and drive latch P limiting on stud Q at the lower end of left drive link D, there should be .025" to .030" clearance between drive latch P and drive link D.

   B. With sight bar L in the closed position and drive latch P in the open position, drive latch P should fully latch on stud Q as the latch is moved to the closed position.

To Adjust:

A. Slide open/close shaft E along its axis until the required clearance is achieved. Place a .001" shim between collar A and shaft bearing B and collar F and shaft bearing H at each end of the forms handler and tighten screws C and G.

B. With the forms handler and drive latch P in the open position, manually move sight bar L to the extreme closed position (rollers N and R limiting on cam blanks M and S) and hold it there while rotating camshaft J to bring drive latch P to the closed position. When sight bar L is released, drive latch P should drop over stud Q, producing an audible click. If latching does not occur, loosen screws C and•G and readjust collars A and F, using .001" shims.

Reason:

A. To ensure proper running clearance.

B. To prevent binding of collars A and F on their related shaft bearings B and H and to ensure proper latch operations.

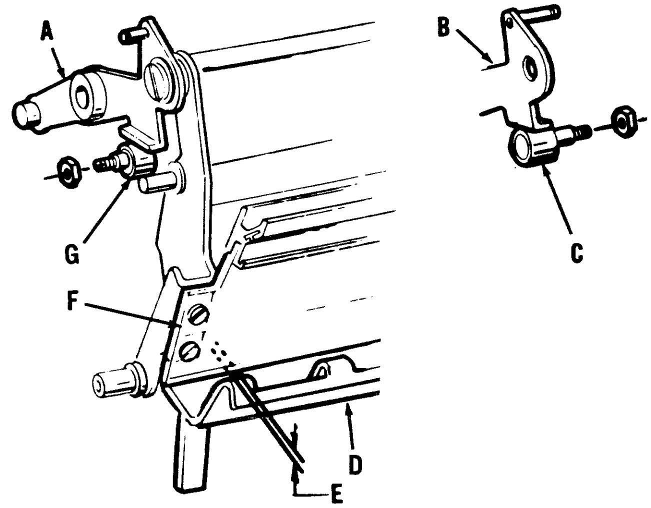


Fig. IV-58 FORMS HANDLER OPEN STOPS

Forms Handler Open Stops

With eccentric stops C and G (Figure IV-58) positioned at their approximate center of travel, and drive links A and B held lightly against stops C and G, there should be .050"' ± .005" clearance between the sight bar and rail assembly F and lower paper chute D at all points along the lower paper chute.

To Adjust: Loosen nuts and position stops C and G as required. Both drive links must contact the stops when the assembly is in the open position.

Reason: To ensure proper clearance between the sight bar and rail assembly F and lower paper chute D.

Drive Blade Eccentrics

With open/close cam follower E (Figure IV-58) on the low point of cam F and left and right drive links B lightly contacting eccentric stops A, there should be .005" - .010" clearance between drive blade K and stud J at the lower end of left drive link B.

To Adjust: Loosen clamping screw G and position eccentric hub H as required.

Reason: To ensure proper forms handler motion.

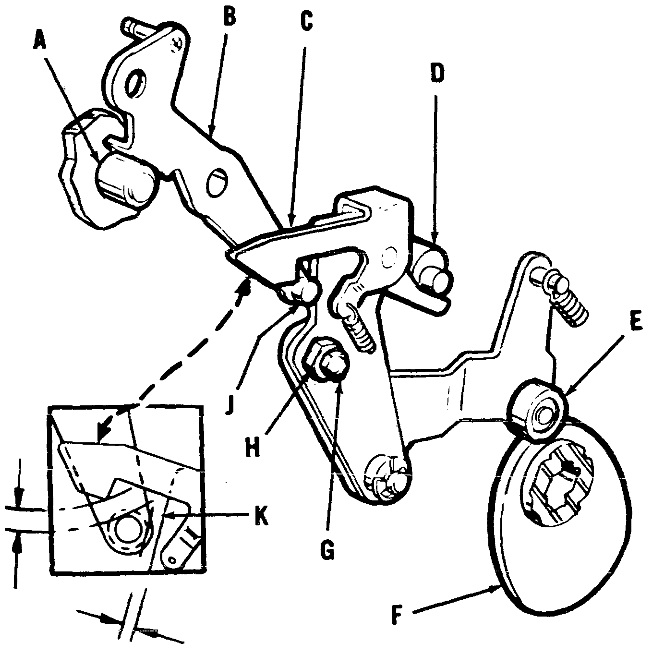


Fig. IV-58 DRIVE BLADE ECCENTRIC

Drive Latch Limit

With cam follower E (Figure IV-58) on the low point of cam F, there should be .062" - .067" clearance at the minimum clearance position between left drive link stud J and drive latch C when the forms handler is manually moved from the open to the close position.

To Adjust: Position eccentric nut D as required.

Reason: To ensure that the drive mechanism is totally in the open position.

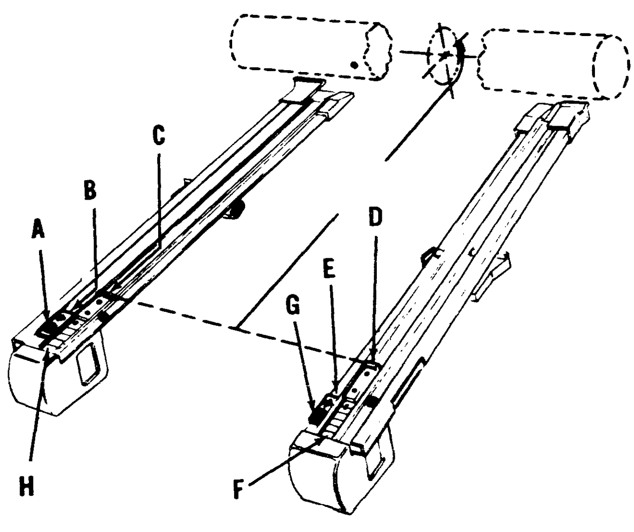


Fig. IV-60 REAR FORM GUIDES

Rear Form Guides

1. A. With the right and left rear form guides installed in the machine, establish a 13.5" dimension between limit stops C and D (Figure IV-60) and the horizontal center line of the print. The arrows of index plates B and E should be aligned with the zero mark on form limit tapes F and H.

   B. With limit stops C and D located in the zero position and a form inserted against the stops, print on the form. There should be 13.5" ± .020" between the horizontal center line of the print and the bottom edge of the form.

   To Adjust:

   A & B Position limit stops C and D to establish the 13.5" dimension. Loosen screws A and G and slide index plates B and E as required.

   Reason: To calibrate the scale-index combination.

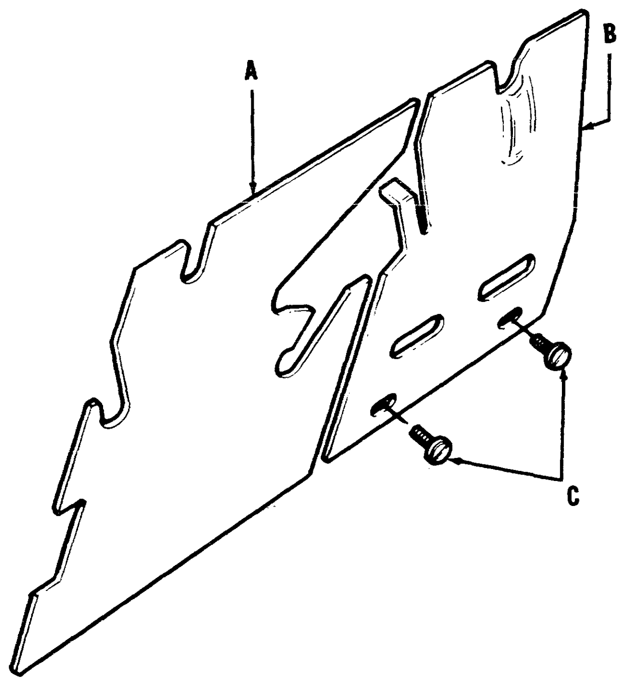


Fig. IV-61 JOURNAL ROLL SIDE FRAMES

Journal Roll Side Frames

With journal roll sideframes B (Figure IV-61) mounted on the main machine frame, there should be .120" ± .010" clearance between main sideframe A and journal roll sideframe B. Check both ends.

To Adjust: Loosen mounting screws C and position journal roll sideframe B as required.

Reason: To ensure proper journal roll paper tracking.

Pressure Roll Assembly

1. A. With the pressure roll assembly in the open position and the high point of cam A (Figure IV-62) on roller J of the pressure roll opening shaft, visually determine which pressure roll F projects forward more than the others. There should be .960" ± .005" clearance between the front of the selected roll and the front of tie bar G.
   B. With the pressure roll assembly in the closed position, all pressure rolls F should contact platen E and there should be .015" - .030" clearance between pressure roll bail H and the tails of pressure roll arms D.

To Adjust:

A & B Loosen screw C in the left arm of the pressure roll opening shaft and adjust eccentric B as required. If necessary, replace individual pressure roll assemblies.

Reason: To ensure proper clearance between the platen and pressure rolls for form insertion.

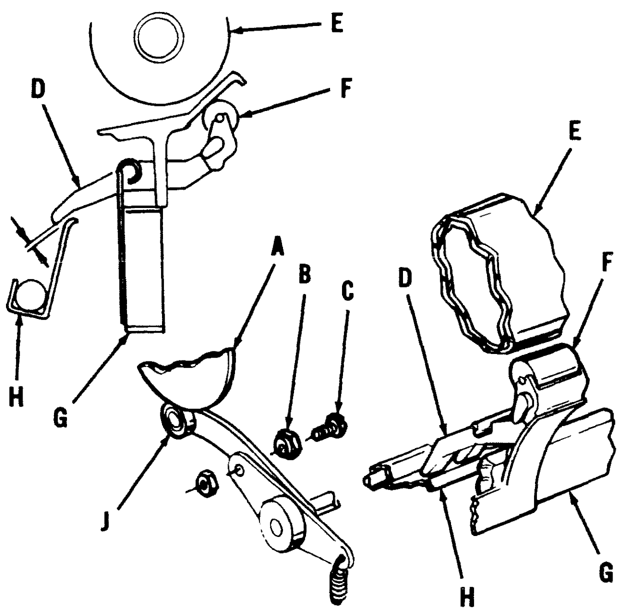


Fig. IV-62 PRESSURE ROLL ASSEMBLY

Deflector Extrusion

1. A. With the lower forms loading assembly installed on the forms handler there should be .004" - .034" clearance between the surface of platen A (Figure IV-63)and deflector extrusion C.
   B. Deflector extrusion C should be parallel to platen A within .010".

To Adjust:

A & B Loosen clamping screws B (both sides) and position extrusion C as required.

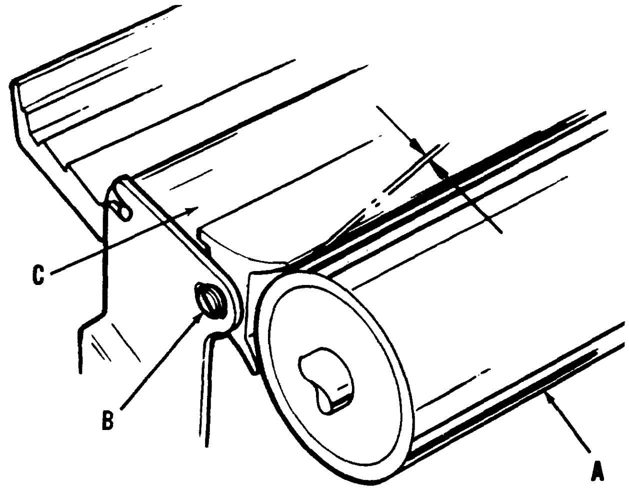


Fig. IV-63 DEFLECTOR EXTRUSION

Reason: To ensure proper clearance between the deflector extrusion and the platen.

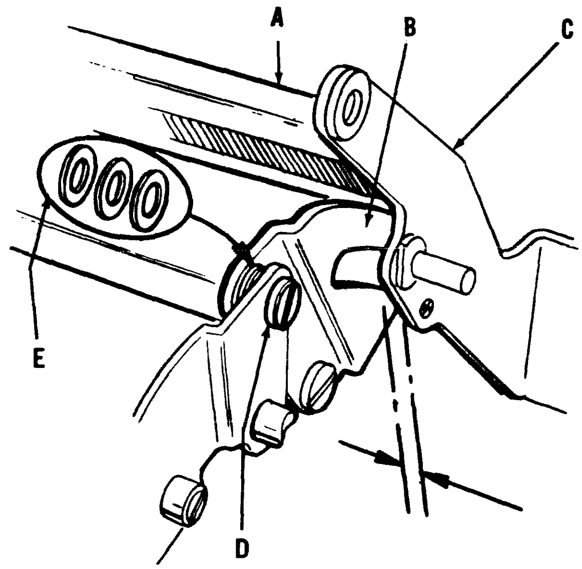


Fig. IV-64 OVER-CENTER CAM/DEFLECTOR

Over-Center Cam/Deflector Extrusion

1. A. There should be .020" - .030" clearance between left over-center cam blank B (Figure IV-64) and left sight bar bracket C.
   B. Deflector extrusion A should have side play not to exceed .005".

To Adjust:

A & B Remove screws D (both sides) and add spacers E as required.

Reason: To prevent binding of the open/close mechanism.

Over-Center Cams

1. A. With the forms handler closed, there should be .020" ± .005" clearance between left and right over-center cams E (Figure IV-65) and right and left tear strip mounting brackets A.
   B. Over-center cams E should have at least a full hold on their related cam rollers D.

To Adjust:

A. Adjust over-center cams E at offset F as required.
B. Adjust cam follower arms B at offset C as required.

Reason: To ensure proper clearance to the open/close drive mechanism and proper operation of the over-center cam mechanism.

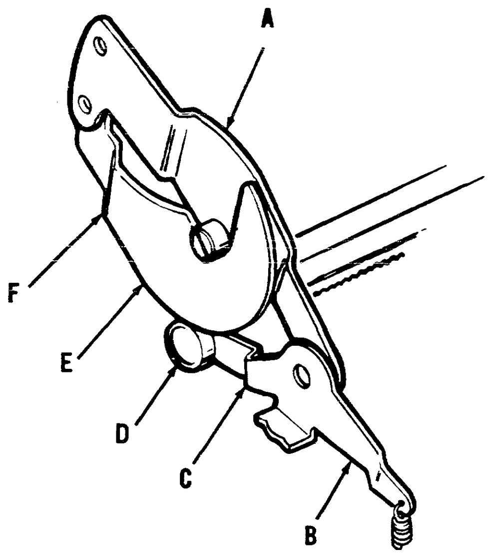


Fig. IV-65 OVER-CENTER CAM

Printer Interlock

1. With the forms handler closed, there should be .001" to .006" clearance between printer interlock A (Figure IV-66) and forms handler interlock C.

To Adjust: Bend tab B of interlock C as required.

Reason: To prevent printing when the forms handler is open.

2. With machine at normal, the ear of interlock link B (Figure IV-67) should have .030" to .050" hold on interlock cam A.

To Adjust: Loosen nut D and position eccentric C to raise or lower link B as required.

Reason: To ensure sufficient hold of link B on cam A and prevent ear of link from sliding under point of cam until machine operates.

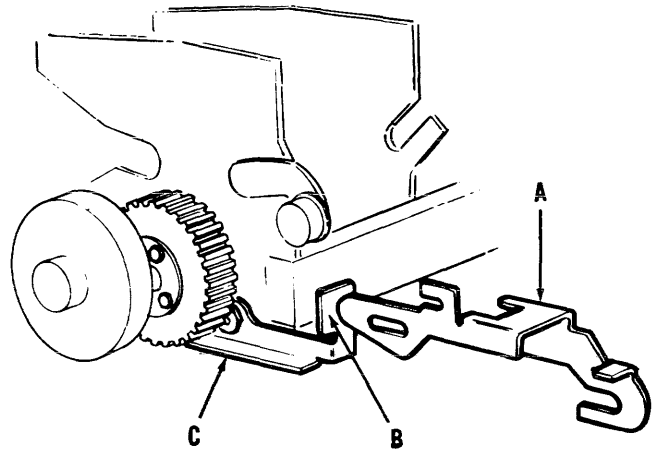


Fig. IV-66 PRINTER INTERLOCK

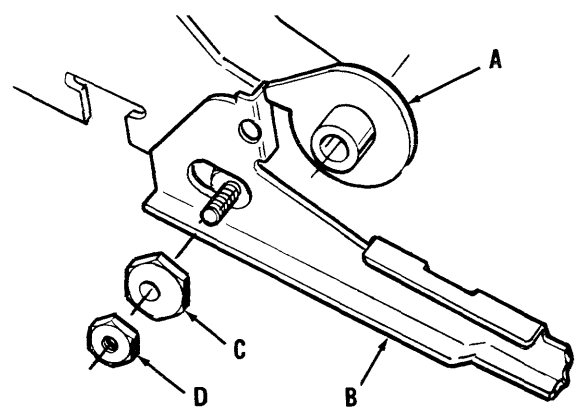


Fig. IV-67 PRINTER INTERLOCK–CAM

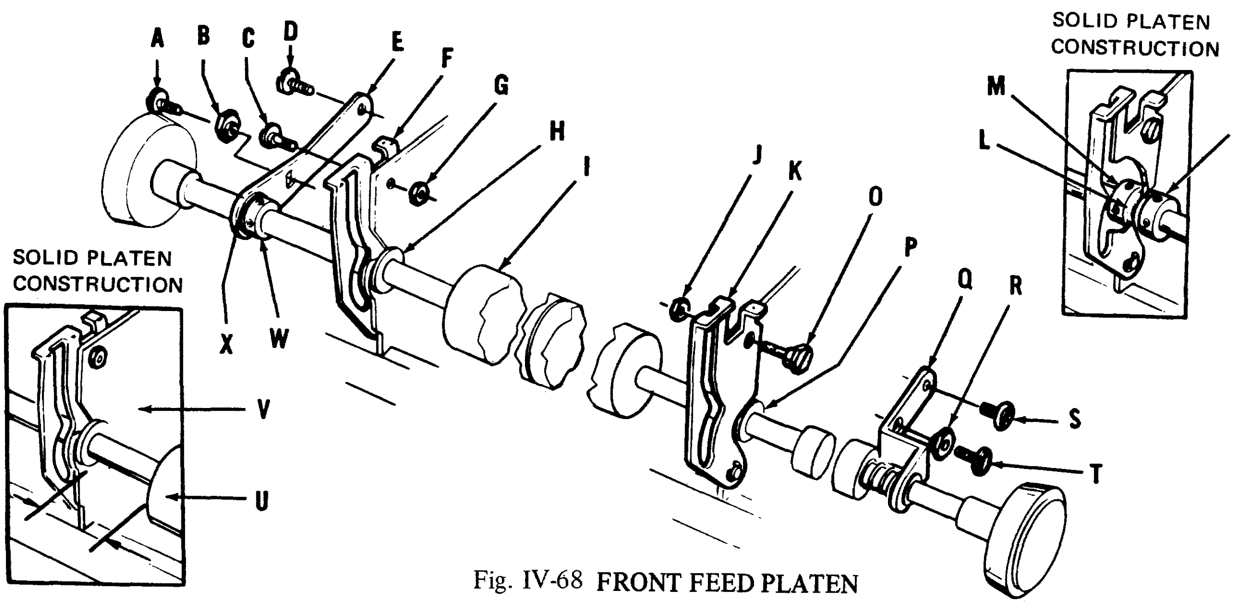


Fig. IV-68 FRONT FEED PLATEN

PLATEN ALIGNMENT – FRONT FEED

1. Platen I (Figure IV-68) should be free to turn and there should be no play in platen shaft bearings H and P.

   To Adjust: Loosen nuts G and J and turn eccentric screws C and O to position cam plate assemblies F and K as required. Adjust eccentrics just enough to prevent the bearings from rotating when the platen is revolved.

   NOTE: The Forms Aligning Assembly rollers must move freely in cam plates F and K. If binding occurs, reduce the clamping force by readjusting eccentric screws C and O.

   Reason: To ensure proper operation of the platen and the forms handler open/close mechanism.

   NOTE: Before continuing with tests and adjustments 2, 3, 4 and 5, perform the following adjustments and procedures.

   A. Loosen screws S (Figure IV-69) to relieve all tension of hold-down springs R (both ends).
   B. Loosen locking nuts Q and adjust leveling screws P for 1/2" clearance at both ends between chassis plate M and bottom of front support bar N as shown at L.
   C. Loosen front clamp screw K and screw G and set eccentric bushing H in neutral position. Tighten screws K and G.

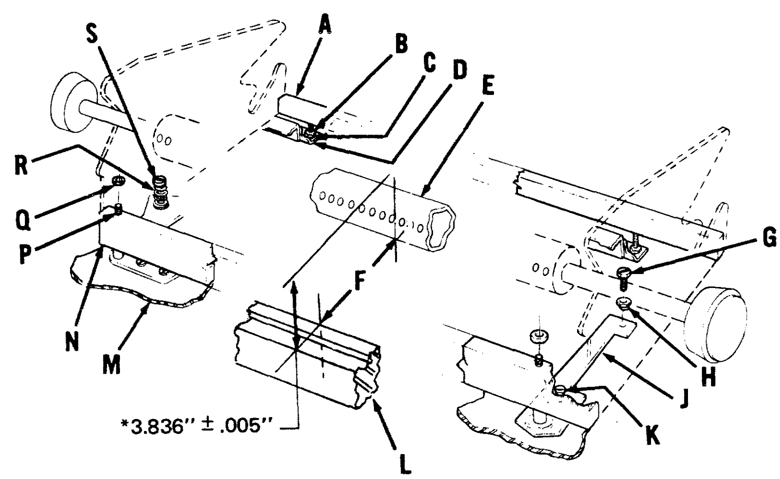


Fig. IV-69 TRANSPORT

D. Adjust rear screws B for 5/8" clearance at both ends, between the bottom of rear support bar A and upper surface of bracket D as shown at F.

E. The forms handler should rest uniformly on all four supports and should not rock. If necessary, adjust rear screws B only.

F. Tighten screws S on hold-down springs R. Turn screws until their shoulders limit.

G. Make Forms Handler Drive Belt tension adjustment.

H. Make Forms Handler Drive Timing adjustment.

I. Perform the following static check of the printer to platen gap before operating the printer under power:

   a. Manually turn printer camshaft until the cam follower assembly is on the high point of the cams, so that the print yoke is positioned in the forward position.

   b. Manually push the print head and yoke assembly forward so that it is limited by the impression control spring.

   c. With the print head and yoke assembly positioned as described in step b manually release the carrier escape latch and slide the printer and carrier assembly across the length of the platen. Adjust eccentric bushing H (loosen screws K and G) so that the gap between the print head and the platen is approximately uniform over the length of the platen. Ensure that this gap is not less than .007".

   d. Tighten screws K and G.

   e. Restore printer camshaft to the home position and latch printer drive clutch before turning on machine power.

NOTE: Ensure that the forms handler is in the closed position before performing the following procedure.

J. Print a line of Z's across the full width of the platen (printer should print at 20 characters per second) according to the following procedure:

   a. Install F.E. boards.

   b. Load CONSMTR program (Tape #1448 6997).

   c. Press FST.

   d. Press Ready pushbutton twice.

   e. Press FST. (Numeric KB enabled).

   f. Press Numeric KB 4 key. The program will print a row of Z's from left to right and then overprint the Z's from right to left. To observe a single printed row the Clear pushbutton should be depressed after the left to right row of characters has been printed.

2. If a printed image does not appear after adjustments and procedures A through J-f have been completed, adjust as follows:
   To Adjust: Turn screws B equally to raise the forms handler and move platen E forward until a printed image appears.
   NOTE: The printed characters may not be fully legible at this point.
   Reason: To achieve character image on platen and set preliminary gap between platen and print head.

3. Print as outlined in adjustment J through J-f. The entire printed line should have uniform density from the left side to the right side of platen E.
   To Adjust: Loosen front clamp screw K and adjust eccentric bushing H as required. Tighten screws G and K.
   Reason: To ensure the same printing density along the entire length of the platen.
   NOTE: Adjustment number 4 pertains to split platen machines.

4. Print as outlined in procedures J through J-f. The printed image should have equal density and clarity on both sides of the platen split.
   To Adjust: Loosen screws A, D, S and T (Fig. IV-68) and adjust eccentric hubs B and R. Move braces E and Q forward to decrease density, or move them rearward to increase density in the area of the platen split.
   Reason: To ensure equal density and clarity of print at platen split.

5. Print as outlined in steps J through J-f. The character image should be symmetrically located above and below the centerline of the platen with uniform density at top and bottom.
   To Adjust: Loosen nuts Q (Fig. IV-69) and adjust leveling screws P as required. Turn screws P clockwise to raise platen E to clarify upper portion of characters. Turn screws P counterclockwise to lower platen E to clarify lower portion of characters.
   Reason: To ensure a level platen and uniform horizontal printing.

6. A. Print as outlined in steps J through J-f. The entire printed line should have good legibility and clarity and be uniformly dense over its entire length.

   B. The adjustment should be limited between the extremes of: 1) a full and clear print out and 2) no visible embossment on back side of journal paper.

   C. Remove paper and ribbon. Position print head and yoke assembly as described in procedure J-b. Manually release the carrier escape latch and slide the printer and carrier assembly across the length of the platen. There should be .004" minimum clearance between print ball and platen.

To Adjust:

A&B Adjust rear screws B as required. Raise screws B to move platen E forward, or lower screws B to move platen E rearward. Screws B must be adjusted equally to maintain the horizontal alignment of platen E.

C. Re-check adjustments in step 3, step 5, and (A & B) above.

Reason:

A&B To ensure a clear, legible print without undue force of printer on platen.

C.1. To prevent damage to print ball.

C.1. To prevent interference between form aligning table and ribbon lift arms on front feed carrier.

NOTE: Adjustment number 7 pertains to split platen machines.

7. With platen I assembled on machine, it should be free with approximately .005" side play.

To Adjust: With the play of the platen held to the right, place a .005" feeler gauge between bearing X and collar W. Loosen the collar setscrews, move collar W against the gauge and retighten the screws.

Reason: To properly position the platen on the machine and to ensure a free platen.

NOTE: Adjustment number 8 pertains to solid platen machines.

8. A. The distance between inner left side frame V and the left end of the platen should be .910" ± .005".

B. With platen U assembled on the machine, it should be free with approximately .005" side play.

To Adjust:

A. Loosen collars M and N. Hold platen U to the required dimension and tighten collar N.

B. With the play of platen U held to the left, place a .005" feeler gauge between collar M and bearing L. Hold collar M against the gauge and tighten collar M.

Reason: To ensure a free platen and proper clearance to the forms handler.

9. Repeat step J for 15 lines with two spaces per line so that the platen spaces for one full revolution. Uniform density of printing will ensure that there are no low areas on the platen or that no excessive platen runout exits.

VARIABLE LINE LOCATION

There should be .030" to .060" movement of button F (Figure IV-70) before shaft C contacts cone clutch E to disengage clutch from space gear D.

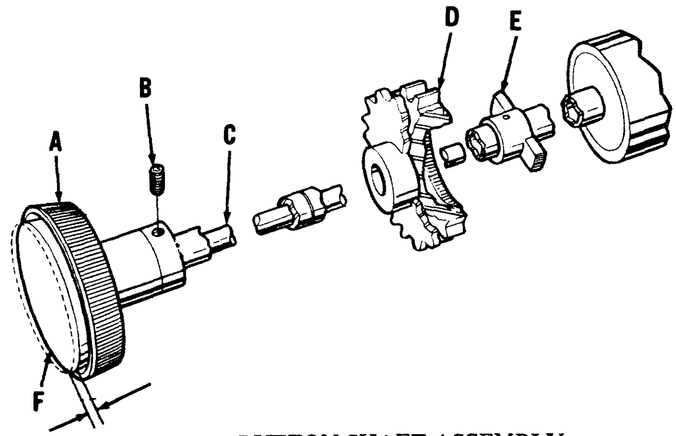


Fig. IV-70 BUTTON SHAFT ASSEMBLY

To Adjust: Loosen setscrew B and position twirler assembly A as required.

Reason: To ensure that cone clutch E completely engages serrations in space gear D when button F is released.

Scale Adjustment

The first print position on scales A, B, C, Dand E (Figure IV-71) should be in line with the center line of a character printed in the first print position within .010".

To Adjust: Slide scales for proper alignment.

Reason: To ensure proper scale calibration.

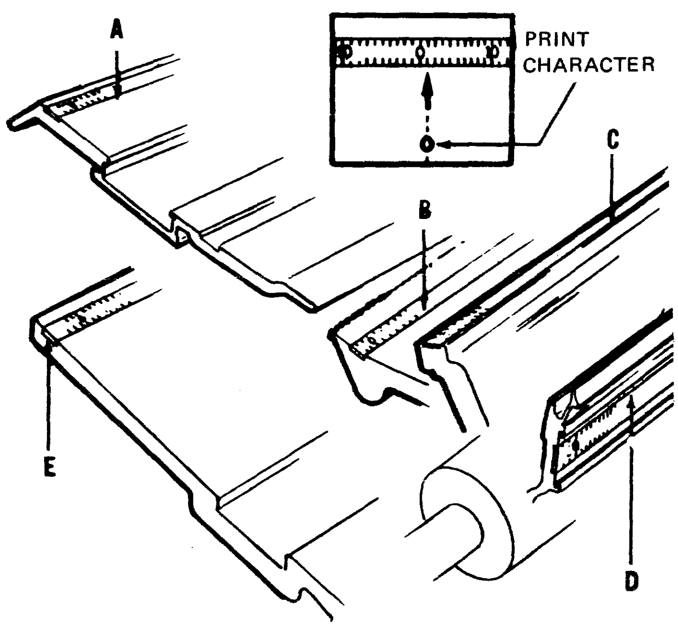


Fig. IV-71 SCALE ADJUSTMENT

FORMS HANDLER DRIVE BELT

1. The idler roller D (Figure IV-72) should apply 1.5 to 2 pounds tension to the belt B.
   To Adjust: Loosen screws A. Attach a spring scale to idler shaft E and pull idler D upward (in direction of arrow C) against belt B. Hold idler when proper tension is reached and tighten screws A.
   NOTE: Re-check adjustments 1-B and 1-D, platen alignment – rear feed.
   Reason: To minimize belt slippage and noise and prevent undue wear of belt and bearings.

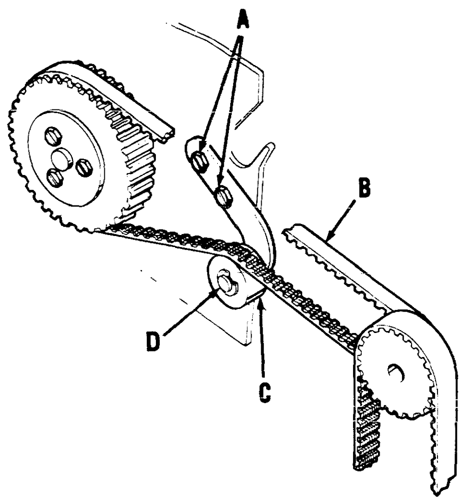


Fig. IV-72 FORMS HANDLER DRIVE BELT

FORMS HANDLER DRIVE TIMING

NOTE: Tests and Adjustments for PLATEN ALIGNMENT AND FORMS HANDLER DRIVE BELT must be completed before this test and adjustment is performed.

1. Forms handler drive jackshaft I (Figure IV-73) must be synchronized with the print shaft and the decoder.
   To Adjust:
   A. Manually rotate drive motor counterclockwise to actuate the forms handler drive to position forms spacing camshaft J at zero. The zero position is set by inserting a spring hook stock through hole A of side frame B and through the corresponding hole C of forms spacing clutch release cam D. The spring hook must be at right angle to the sideframe.
   B. Loosen (3) screws H in pulley G to free pulley from drive hub.
   C. Manually turn drive motor counterclockwise until zero time (red line on rotor in decoder) is in line with reference line E on plastic cover F.
   D. Tighten pulley screws H.
   E. Remove spring hook from sideframe.

   Reason: To synchronize the forms handler drive with the print shaft and decoder.

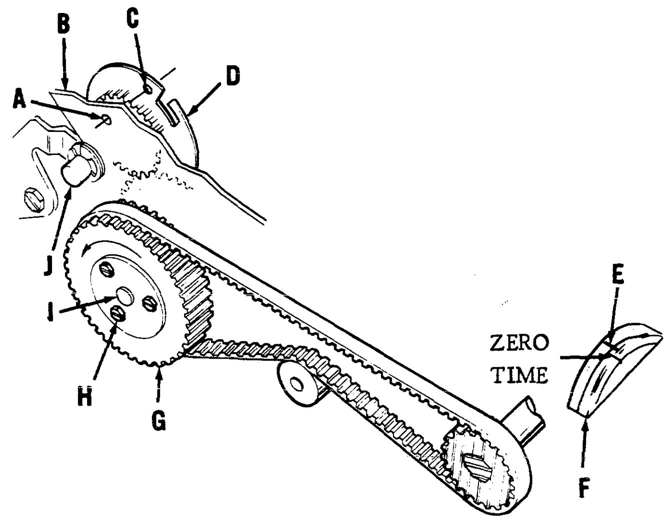


Fig. IV-73 FORMS HANDLER DRIVE TIMING

SINGLE PIN FEED MECHANISMS

1. There should be .005" maximum end play of left and right transfer shaft assemblies L (Figure IV-74).
   To Adjust: Loosen setscrews M and position pulley N as required.
   Reason: To prevent bind of transfer shaft assemblies.
2. Pin feed drive pulley B (Figure IV-75) on left end of platen and transfer shaft pulley D should be aligned with each other.
   To Adjust: Loosen screws A and position pulley B as required.
   Reason: To ensure a smooth, non-binding operation of belt C and to prevent any portion of the belt from slipping off the pulleys.
3. Idler rollers R (Figure IV-74) should apply pressure to the top of transfer shaft drive belts O.
   To Adjust: Loosen screws P. Apply downward vertical pressure on idler roller R until teeth of belts O are seated in pulleys N.
   Reason: To prevent belt slippage, noise and reduce wear of transfer shaft bearings.
4. There should be .035" to .040" clearance between pinwheel E and pressure plate G (Figure IV-76).

To Adjust: Adjust tab D of plate assembly at offset as required.
Reason: To ensure free travel of forms through the pinwheel assembly while holding an adequate length of the form securely on the pins of the pinwheel.

5. A. With release handle F in the unlocked position, the pinwheel assembly should slide freely on its spline shaft C and stripper plate H should not bind at any point on indicator brace A.

B. The pinwheel assembly should have minimum angular play.

To Adjust:
A & B Place release handle F in unlocked position. Loosen screws B and position stripper plate H as required.
Reason: To ensure free movement and minimum angular play of pinwheel assembly on spline shaft.

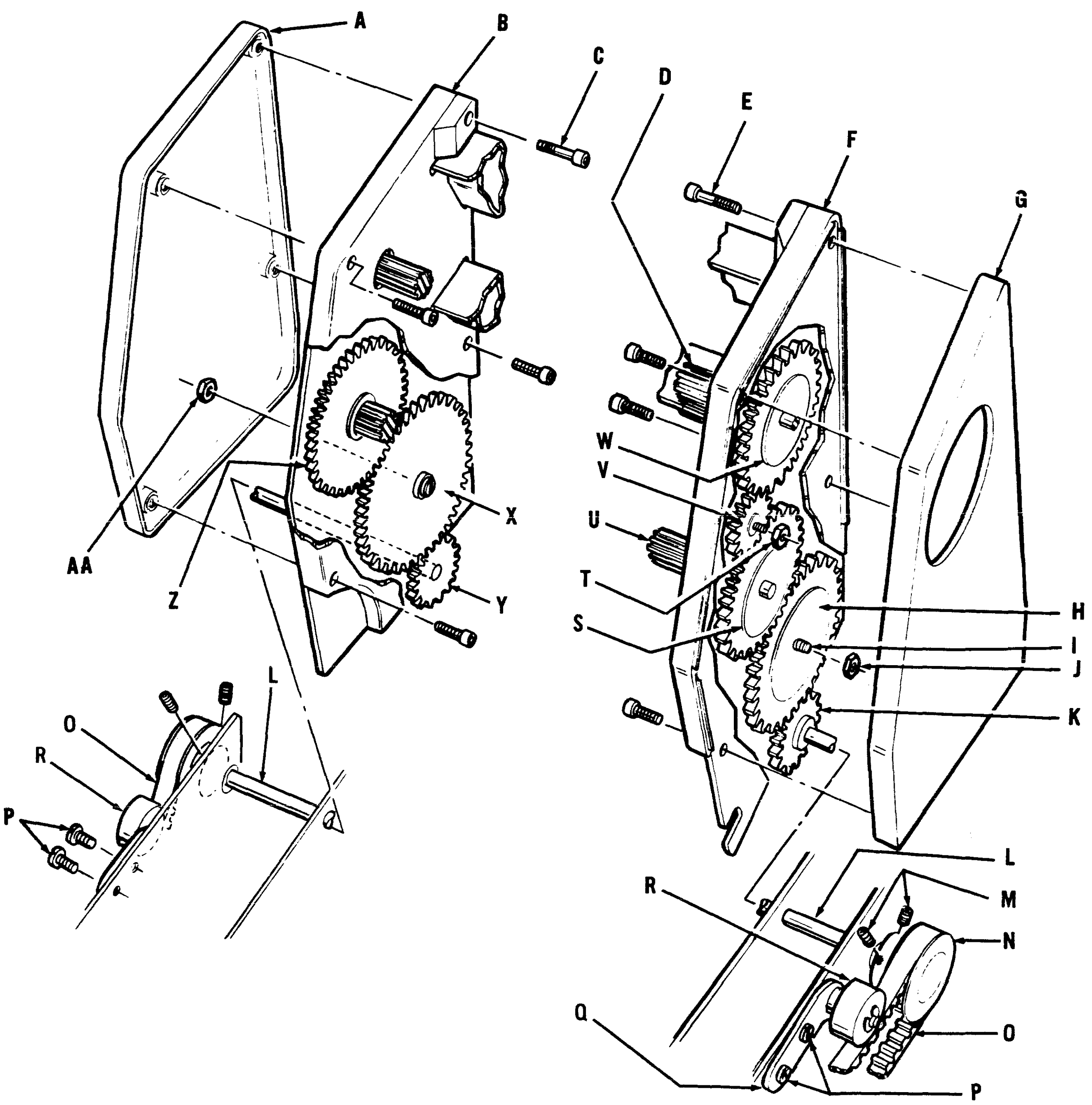


Fig. IV-74 DUAL PIN FEED MECHANISM

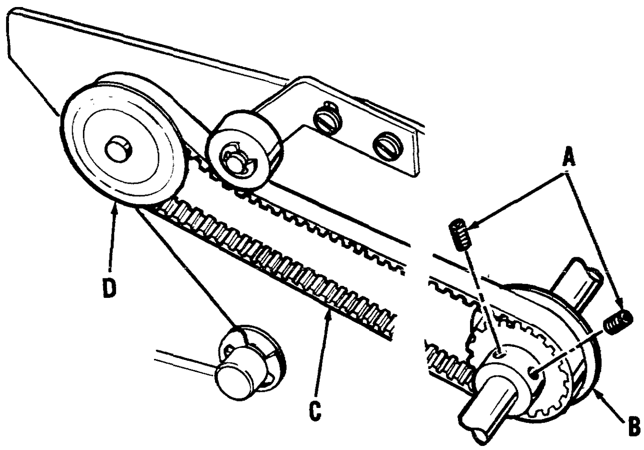


Fig. IV-75 TRANSFER SHAFT PULLEY

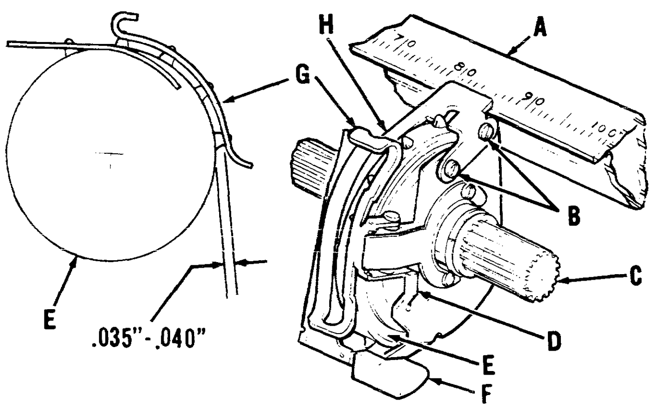


Fig. IV-76 PIN WHEEL

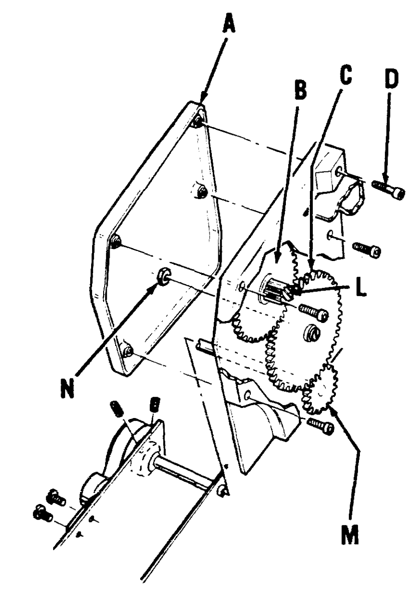


Fig. IV-77 SINGLE SYNCHRONOUS PIN FEED DRIVE

6. A. Single Synchronous Pin Feed Drive:
   Turn spline shaft L (Figure IV-77) and check idler gear C for equal mesh with minimum backlash and no bind between spline shaft gear B and left transfer shaft gear M.

   B. Single Independent Pin Feed Drive:
   Turn spline shaft L (Figure IV-78) and check idler gear F for equal mesh with minimum backlash and no bind between spline shaft gear K and right transfer shaft gear J.

To Adjust:

A. Remove all screws D and cover A. Loosen nut N and position idler gear C as required.

B. Remove all screws E and cover H. Loosen nut G and position idler gear F as required.

Reason: To ensure immediate response of spline shaft with minimum backlash and no bind when driven by transfer shaft gears J and M.

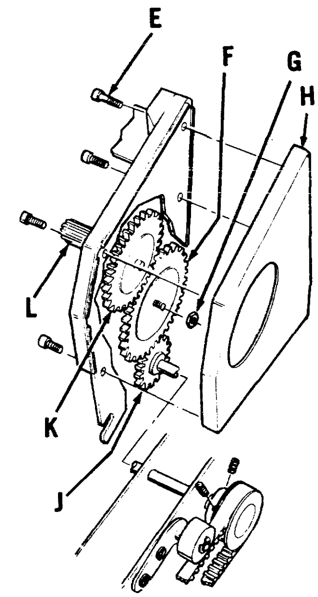


Fig. IV-78 SINGLE INDEPENDENT PIN FEED DRIVE

7. A. With play of braces B (Figure IV-79) and E held outward and form tray A slowly lowered, the arms of braces B and E should not contact side covers C and H, and cutouts of the arms should contact cover studs D and G simultaneously.

   B. With brace tabs F and J limiting on bottom of form tray A and tray lowered, the cutouts on arms of braces B and E should be centrally aligned with their limit studs D and G.

To Adjust:

A. Bend braces B and E at offset as required.

B. Bend limit tabs F and J as required.

Reason: To ensure that braces accurately limit on studs without interference.

Adjustments

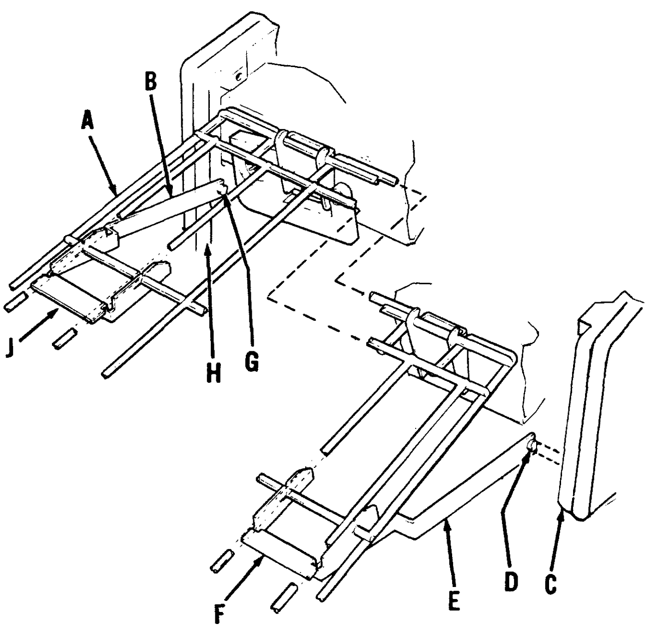


Fig. IV-79 FORMS TRAY

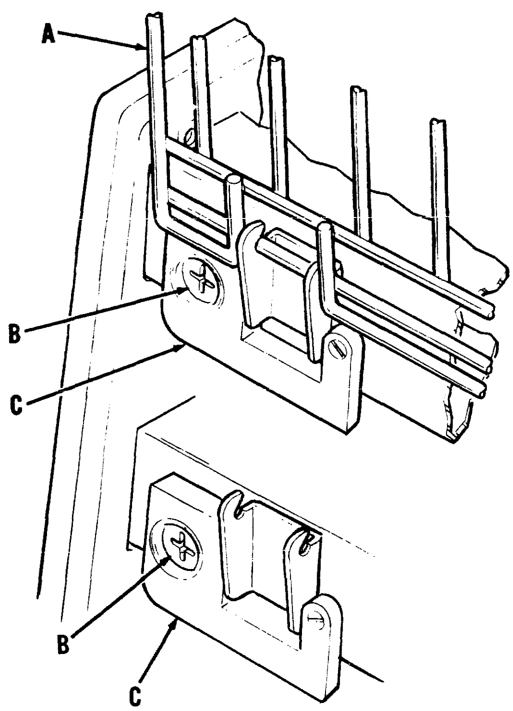


Fig. IV-80 TRAY LATCHES

8. With the two upper form trays A (Figure IV-80) raised to their vertical position, the trays should be latched by latches C at approximately 10° from the vertical toward the rear and should appear parallel to each other.

To Adjust: With latches C in the home position, turn threaded plugs B to position upper form trays A as required.

Reason: To prevent the possibility of trays A falling when raised and to establish a stable upper latched storage position.

9. A. With tear-off blade C (Figure IV-81) slowly lowered from a raised position, arms D of spring braces B should simultaneously contact indicator brace E.
   B. With tear-off blade C in its normal position, there should be .250" clearance between blade C and indicator brace E measured at both ends and center of the blade.

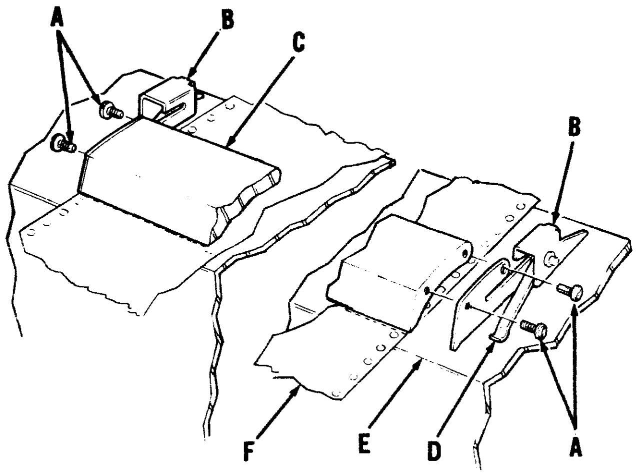


Fig. IV-81 TEAR OFF BLADE

NOTE: Before performing test C, a length of pin feed form from 15" to 15 ½" wide should be loaded on the pinwheels and properly squared.

C. With tear-off blade C manually depressed, the edge of blade C should be parallel with the perforations of form F.

To Adjust:

A & B Bend arms D (only) of spring brackets B as required.

C. Loosen screws A. Depress tear-off blade C and position blade as required. Tighten screws A while tear-off blade C is held depressed.

Reason:

A. To ensure that tear-off blade C limits equally across the entire width of form F when depressed.

B. To ensure minimum resistance to motion of form F under blade C.

C. To ensure a clean tear of forms at perforations.

DUAL PIN FEED MECHANISM

1. There should be .005" maximum end play of left and right transfer shaft assemblies L (Figure IV-74).
   To Adjust: Loosen setscrews M and position pulley N as required.
   Reason: To prevent bind of transfer shaft assemblies.
2. Pin feed drive pulley B (Figure IV-75) on left end of platen and transfer shaft pulley D should be aligned with each other.
   To Adjust: Loosen screws A and position pulley B as required.
   Reason: To ensure a smooth, non-binding operation of belt C and to prevent any portion of the belt from slipping off the pulleys.
3. Idler rollers R (Figure IV-74) should apply pressure to the top of transfer shaft drive belts O.
   To Adjust: Loosen screws P. Apply downward vertical pressure on idler roller R until teeth of belts O are seated in pulleys N.
   Reason: To prevent belt slippage, noise and reduce wear of transfer shaft bearings.
4. There should be .035" to .040" clearance between pinwheel E and pressure plate G (Figure IV-76).
   To Adjust: Adjust tab D of plate assembly at offset as required.
   Reason: To ensure free travel of forms through the pinwheel assembly while holding an adequate length of the form securely on the pins of the pinwheel.
5. A. With release handle F in the unlocked position, the pinwheel assembly should slide freely on its spline shaft C and stripper plate H should not bind at any point on indicator brace A.
   B. The pinwheel assembly should have minimum angular play.
   To Adjust:
   A & B Place release handle F in unlocked position. Loosen screws B and position stripper plate H. as required.
   Reason: To ensure free movement and minimum angular play of pinwheel assembly on spline shaft.
6. Upper idler gear (Figure IV-74) should have equal mesh with minimum backlash and no bind when meshing with idler gear S and upper spline shaft gear W.
   To Adjust: Remove (4) screws E and remove right outer cover G. Loosen nut T and position idler gear V as required.
   Reason: To ensure minimum backlash and no bind between upper spline shaft drive gear W and idler gear S.
7. A. Turn upper spline shaft D and check lower idler gear H for equal mesh with minimum backlash and no bind between lower spline shaft idler gear S and right transfer shaft gear K.
   B. Turn lower spline shaft U and check lower idler gear X for equal mesh with minimum backlash and no bind between lower spline shaft gear Z and left transfer shaft gear Y.
   To Adjust:
   A. Remove all screws E and cover G. Loosen nut J and position idler gear H as required.
   B. Remove all screws C and cover A. Loosen nut AA and position idler gear X as required.
   Reason:
   A & B To ensure immediate response of spline shafts D and U with minimum backlash and no bind when driven by transfer shaft gears K and Y.
8. A. With play of braces B (Figure IV-79) and E held outward and form tray A slowly lowered, the arms of braces B and E should not contact side covers C and H, and cutouts of the arms should contact cover studs D and G simultaneously.
   B. With brace tabs F and J limiting on bottom of form tray A and tray lowered, the cutouts on arms of braces B and E should be centrally aligned with their limit studs D and G.
   To Adjust:
   A. Bend braces B and E at offset as required.
   B. Bend limit tabs F and J as required.
   Reason: To ensure that braces accurately limit on studs without interference.
9. With the two upper form trays A (Figure IV-80) raised to their vertical position, the trays should be latched by latches C at approximately 10° from the vertical toward the rear and should appear parallel to each other.
   To Adjust: With latches C in the home position, turn threaded plugs B to position upper form trays A as required.
   Reason: To prevent the possibility of trays A falling when raised and to establish a stable upper latched storage position.
10. A. With tear-off blade C (Figure IV-81) slowly lowered from a raised position, arms D of spring braces B should simultaneously contact indicator brace E.
    B. With tear-off blade C in its normal position, there should be .250" clearance between blade C and indicator brace E measured at both ends and center of the blade.

NOTE: Before performing test C, a length of pin feed form from 15" to 15 ½" wide should be loaded on the pinwheels and properly squared.

C. With tear-off blade C manually depressed, the edge of blade C should be parallel with the perforations of form F.

To Adjust:

A & B Bend arms D (only) of spring brackets B as required.

C. Loosen screws A. Depress tear-off blade C and position blade as required. Tighten screws A while tear-off blade C is held depressed.

Reason:

A. To ensure that tear-off blade C limits equally across the entire width of form F when depressed.

B. To ensure minimum resistance to motion of form F under blade C.

C. To ensure a clean tear of forms at perforations.

CONE CLUTCH COUPLING

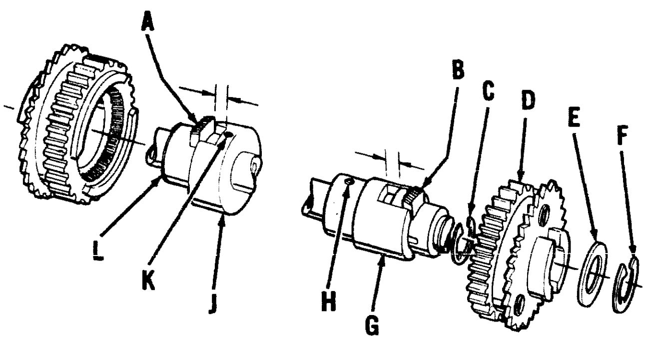


Fig. IV-82 CONE CLUTCH

1. A. For Left End of Platen:
With cone clutch A (Figure IV-82) limiting against retaining clip L, there should be .200" ± .010" between the right face of cone clutch A and the bottom of cutout in coupling J.

B. For Right End of Split Platen Construction:
With platen in the split position, space gear D held in position by washer E and retaining clips C and F, and cone clutch B fully in mesh with space gear D, there should be .280" between the leading edge of cone clutch B and bottom of cutout in coupling G.

To Adjust:

A. Loosen setscrew K in coupling J and position coupling as required.

B. Loosen setscrew H in coupling G and position coupling as required.

Reason: To ensure proper relationship between cone clutches A and B with their related torque couplings.

SYNCHRONIZATION OF CONSOLE MECHANISMS

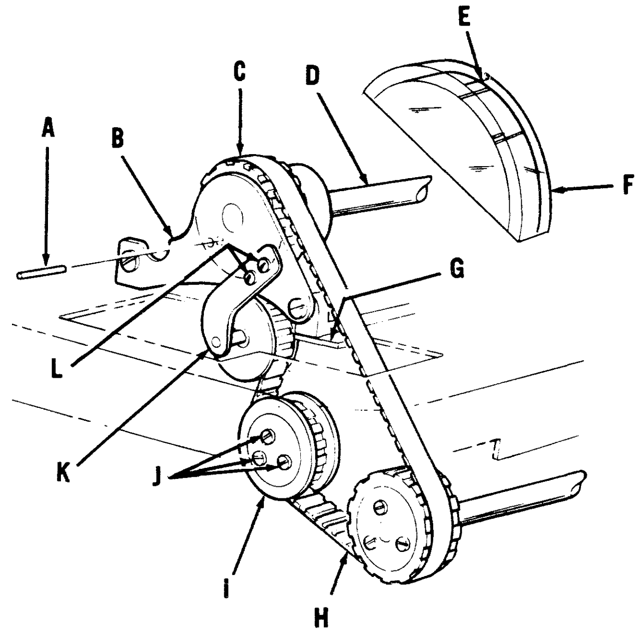


Fig. IV-83 PRINT SHAFT AND TIMING BELT

1. With a force applied opposite edge G (Figure IV-83) the belt should just contact edge G of the cutout in the chassis.
To Adjust: Loosen screws L and locate idler pulley bracket K as required.
Reason: To prevent belt slippage and minimize belt noise and bearing wear.

2. Print shaft D should be synchronized with the decoder.
To Adjust:
   A. Loosen screws J in decoder output pulley I. Rotate the decoder until zero time (red line on rotor in decoder) is in line with reference line E on plastic cover F.
   B. Rotate pulley C until the holes in pulley C and bracket B are in alignment. Insert a rod A.
   C. Tighten screws J in decoder output pulley I. Remove rod A.
   D. Manually cycle decoder and recheck alignment of holes in pulley C and bracket B.

Reason: To synchronize the print shaft with the decoder.
NOTE: Tension of belt H should be correct prior to synchronizing of machine.

3. Jack shaft I (Figure IV-84) should be synchronized with the decoder.

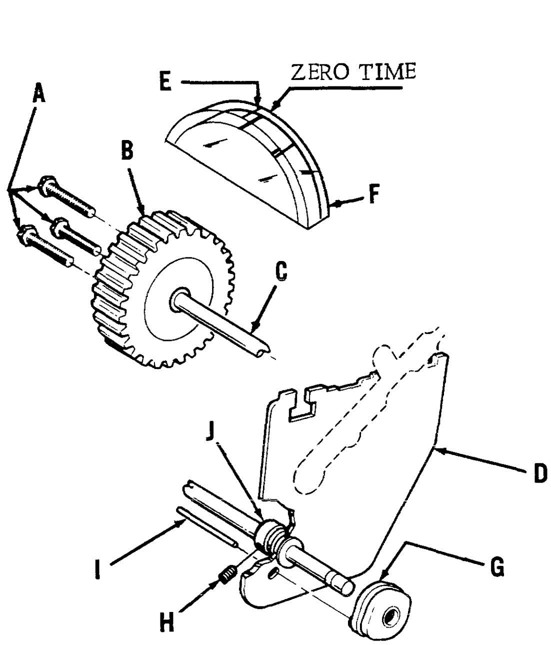


Fig. IV-84 JACKSHAFT TIMING

To Adjust:

A. Rotate the decoder until zero time (single long line on decoder) is in line with reference line E on plastic cover F.

B. Loosen three screws A in pulley B.

C. Insert a rod I through slot in right side frame D. Rotate jack shaft C clockwise (viewed from right side) until rod I enters the timing hole in cam G.

D. Tighten screws A and remove rod I.

Reason: To ensure correct timing for carrier detent clappers.

NOTE: Manually cycle the decoder and recheck the alignment of holes in pulley C and bracket B (Figure IV-83) and holes in side frame D and cam G (Figure IV-84).

4. The idler roller D (Figure IV-85) should apply 1.5 to 2 pounds tension to the belt B. (Forms handler drive)

To Adjust: Loosen screws A. Attach a spring scale to idler shaft E and pull idler D upward (in direction of arrow C) against belt B. Hold idler when proper tension is reached and tighten screws A.

Reason: To minimize belt slippage and noise and prevent undue wear of belt and bearings.

NOTE: Tests and Adjustments for PLATEN ALIGNMENT AND FORMS HANDLER DRIVE BELT must be completed before the following test and adjustment is performed.

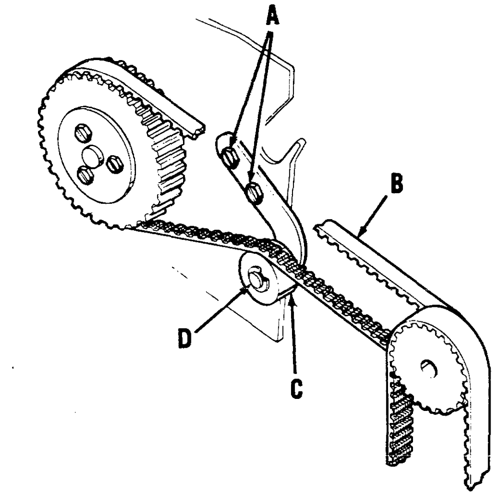


Fig. IV-85 FORMS HANDLER DRIVE BELT

5. Forms handler drive jackshaft I (Figure IV-86) must be synchronized with the print shaft and the decoder. To Adjust:

A. Manually rotate drive motor counterclockwise to actuate the forms handler drive to position forms spacing camshaft J at zero. The zero position is set by inserting a spring hook stock through hole A of side frame B and through the corresponding hole C of forms spacing clutch release cam D. The spring hook must be at right angle to the sideframe.

B. Loosen (3) screws H in pulley G to free pulley from drive hub.

C. Manually turn drive motor counterclockwise until zero time (red line on rotor in decoder) is in line with reference line E on plastic cover F.

D. Tighten pulley screws H.

E. Remove spring hook from sideframe.

Reason: To synchronize the forms handler drive with the print shaft and decoder.

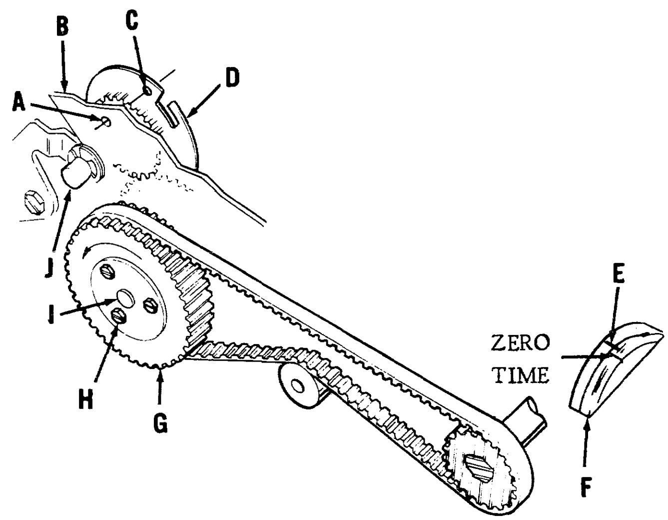


Fig. IV-86 FORMS HANDLER DRIVE TIMING

B 9343

CONSOLE AND DDP

SECTION

V

Burroughs

FIELD ENGINEERING

TECHNICAL MANUAL

MAINTENANCE
PROCEDURES

For Form 1061173

Printed in U.S. America 6-29-74

MAINTENANCE PHILOSOPHY

The approach used in detecting, diagnosing, and repairing failures in the Console DDP is to run the appropriate Maintenance Test Routine (CONSMTR or CONS96MTR) and then replace or repair defective circuit chips or discrete components in accordance with the diagnostic information obtained from the MTR. Additional manual diagnostic operations, using this technical manual, FT&R documentation, and test equipment may be required by the Field Engineer to further diagnose and repair failures if the MTR does not locate the defective component/circuit.

Mechanical failures in the console are corrected by adjustments or by removal and replacement of the faulty component.

MAINTENANCE TEST ROUTINES (MTR'S)

Each B700 system installation is provided a set of MTR'S that are tailored to the installation configuration and revision level. The MTR Configuration Document (2601 8200), issued by the respective branch office to each installation, provides a complete list of MTR reference data, including the revision status and applicability.

The MTR provided for the B9343 Console DDP is the CONSMTR (1448 6997) or the CONS96 MTR (1449 0940). A program listing, complete operating instructions, a failure dictionary, and other pertinent data are provided in the MTR Operator Instructions Documents, 1448 6997 and 1449 0866.

When implemented, the MTR detects and diagnoses failures within the Console DDP, or validates the operation of the DDP and interfacing console. The MTR cannot diagnose a failure in the console, but results can be interpreted to indicate or point to a failure in the console.

Note that, for complete diagnosis or validation of the console and DDP operations, the FEMT, MEMLDR, PROC, BSW, and MCU MTR's must be run in the sequence indicated before the CONSMTR or CONS96MTR is run. Refer to Section V of the B700 Processor Manual, Form 1064482, for a description of the MTR implementation and diagnostic process.

PREVENTIVE MAINTENANCE GUIDE

The following paragraphs contain the procedures and references required to implement preventive maintenance on the Console.

INITIAL PROCEDURE

Prior to any mechanical work, perform the following steps:

1. Question the operator about any condition or conditions noticed that may require correction.
2. Closely check the overall operation of the machine.
3. Remove the printer covers, rear panel, and the front kick panel.

APPROVED LUBRICANTS AND CLEANING AGENTS

1. Machine grease 1624 9369; used on cams, loops of springs, surfaces and profiles of gears and the rotate detent in the print head.
2. Turbine oil 1624 8734; used on the worm portion of the lead screw shaft, on bearings, and on the entire length of the bands. (Use a thin film of oil.)
3. Machine oil 1624 8585; used on Oilite bearings.
4. Machine oil 1473 7894; used in the decoder.

GENERAL INSTRUCTIONS

The following inspections should be performed systematically to cover all sections of the console. Areas on or in the machine where experience has indicated that trouble might exist should be given special attention:

1. All sections should be inspected for any broken, worn, or defective parts. Replace any faulty parts.
2. All loose nuts and screws should be tightened.
3. The condition of all wiring and terminals should be closely checked.
4. All parts and mechanisms should be properly cleaned of all grease, dust and foreign matter; then properly lubricate the parts and mechanisms.
5. All parts and mechanisms should operate freely and meet all test and adjustment requirements.
6. Check oil level in decoder.

NOTE: The oil in the decoder should be changed at least once every two years.

7. All Reliability Improvement Notice (RIN) parts should be installed to maintain the machine in the best condition.

SPECIFIC INSTRUCTIONS

1. Every service call should consist of: cleaning the printer area, wiping the printer control bands, and checking the print head detent.
2. Run the CONSMTR or CONS96MTR after any and all adjustments, replacements, or other repairs on the console.

NOTE: After completion of the inspection, direct the operator to test the machine. (Prepare the service reports during this test.)

The average time required to perform PM on the console is 1½ hours, semi-annually.

REMOVAL AND REPLACEMENT PROCEDURES

CASE PANELS

Removal

1. Lift printer mechanism panel A (Fig. V-1) to vertical position and loosen (do not remove) screws B, then remove panel by sliding it toward front of the machine.

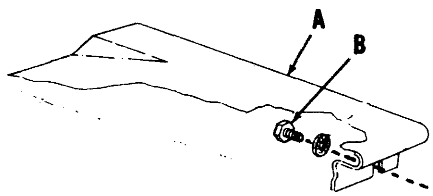


Fig. V-1 PRINTER MECHANISM PANEL

2. Back panel A (Fig. V-2) may be removed by turning the screws across the top ¼ turn counterclockwise, and lifting panel off of the clips which are located on the lower frame.
3. The front kick panel H (Fig. V-2) may be removed by loosening the screws across the top ¼ turn, and lifting panel off the pins which support the bottom of panel at each side.
4. Right and left side panels F and L (Fig. V-2) may be removed by loosening the screws across the top ¼ turn, and lifting panel off of the clips attached to the lower frame.
5. Both printer covers B and D (Fig. V-3) may be removed by removing screws at rear and loosening the front retaining screws (under the printer mechanism panel, behind indicator panel).
6. Keyboard covers A and E (Fig. V-3) may be removed by loosening the screw inserted from the bottom of each cover or, on machines of

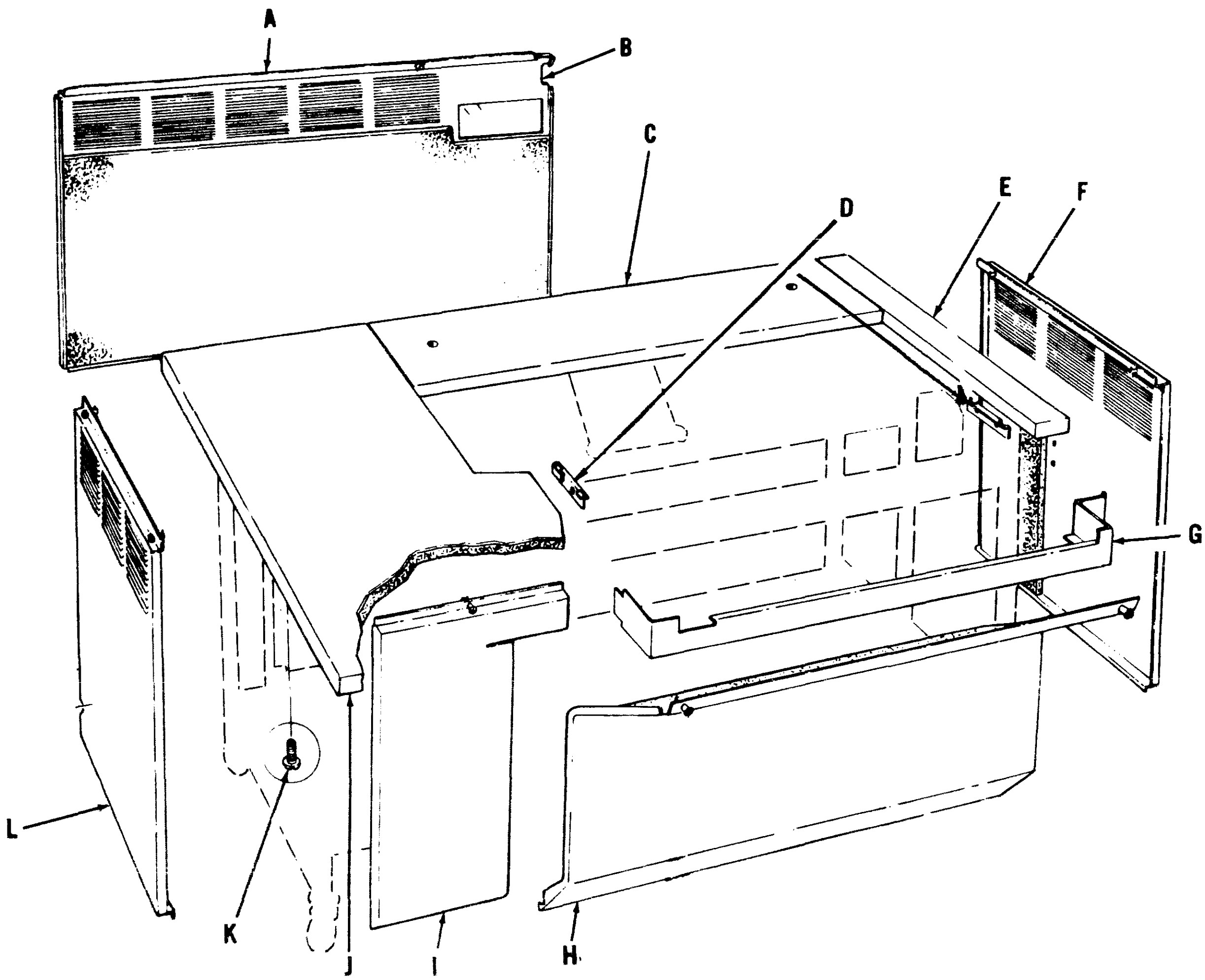


Fig. V-2 CASE PANELS

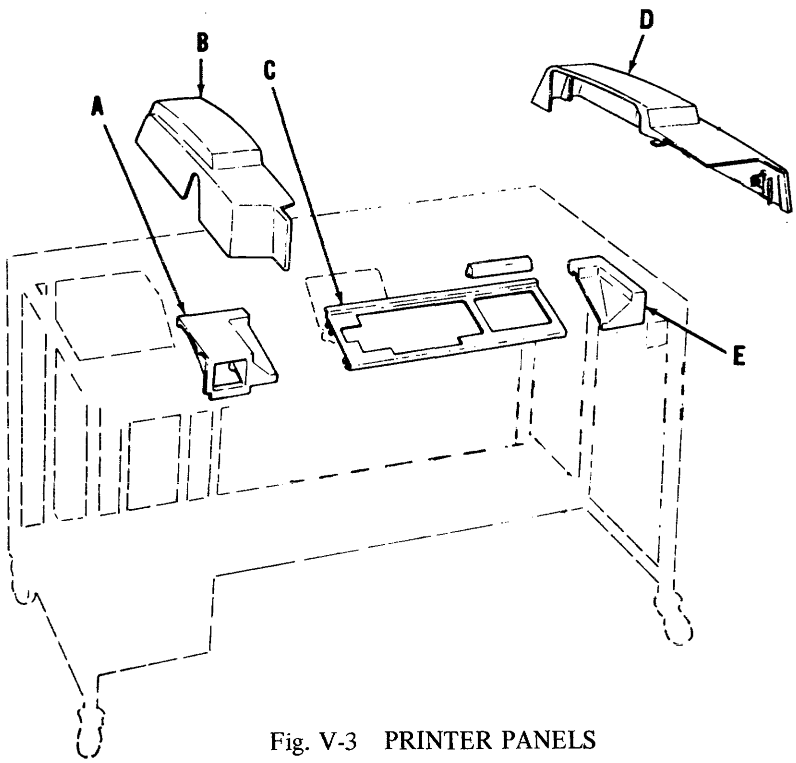


Fig. V-3 PRINTER PANELS

later construction, releasing the spring and clip at the same location. Note that each cover has a tab which fits into a slot of bracket D (Fig. V-2).

7. Keyboard cover C (Fig. V-3) may be removed by carefully lifting it to clear the cover support pins and then lifting it upward and forward.
8. Front cover G (Fig. V-2) may be removed by loosening the four screws (located under front edge) ¼ turn.
9. Front wrap-around panel I (Fig. V-2) may be removed by loosening the screw at the top ¼ turn and lifting the panel from support hooks and bottom clips. Remove panel carefully so that the Initialize button is not damaged.
10. Table tops E and J (Fig. V-2) may be removed by removing the mounting screws K (Fig. V-2) which are inserted on underside of tabletops around back and sides of machine.

Replacement

Reverse the removal procedure.

KEYBOARD

Removal

1. Remove panels, as required (refer to case panel removal procedure).
2. Loosen tension adjusting screw A and slip keyboard drive belt C from pulley B (Fig. V-4).

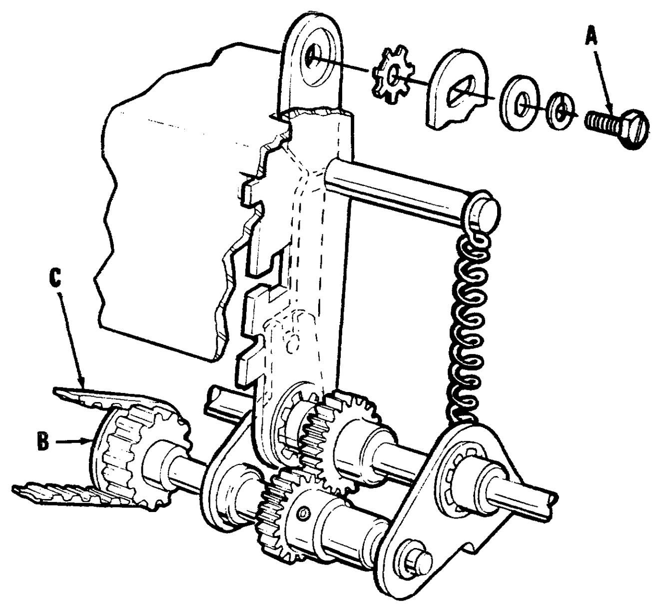


Fig. V-4 KEYBOARD DRIVE

3. Remove one screw, then remove transducer from right end of keyboard assembly. CAUTION: Use care to ensure that shims (if contained behind transducer) are not bent during removal.
4. Remove retaining bolt and nut from both ends of keyboard casting A (Fig. V-5).
5. Remove keyboard by carefully lifting it up and toward front of machine to clear PK keylevers.

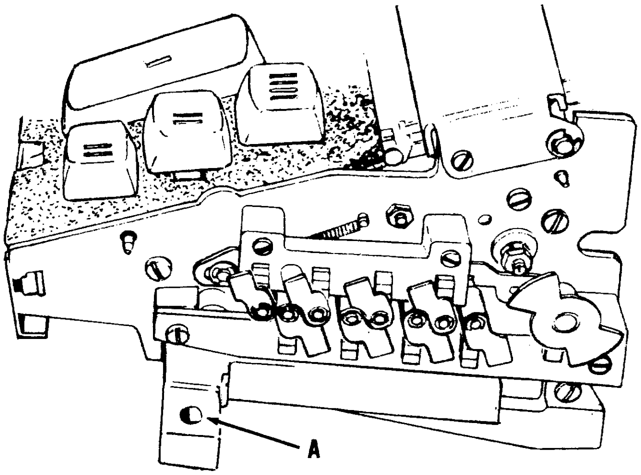


Fig. V-5 KEYBOARD CASTING

Replacement

Perform the reverse of the removal procedure; make certain that all shims removed in step 3 are replaced.

NOTES:

1. Ensure that self-leveling washers under each end of casting A (Fig. V-5) have the convex side of top washer fitting into the concave side of the lower washer.
2. Refer to Sec. IV for Keyboard Drive Belt adjustment.

FORMS HANDLER

Removal

1. Remove left and right plastic printer covers.
2. Disconnect two plugs from the rear of forms handler.
3. Remove forms handler drive belt.
4. Loosen two forms handler screws to relieve tension of hold-down springs.
5. Remove forms handler.

Replacement

Perform the reverse of the removal procedure and readjust synchronization of the carriage drive jackshaft with the print shaft and the decoder. (Refer to Sec. IV.)

DECODER

Removal

1. Remove right and left printer covers.
2. Remove forms handler. (Refer to removal procedures for the forms handler.)
3. Remove drip pan.
4. Loosen keyboard drive belt adjusting plate and disconnect keyboard drive belt.
5. Disconnect plugs for decoder and motor, and disconnect plug for carrier motor and two chassis grounds.
6. Remove decoder motor.
7. Remove four screws holding the transport plate, then lift transport plate and lock it into the raised position with the support bracket, if required.
8. Remove belt from pulley on print clutch shaft and decoder pulley.
9. Unhook spring on tilt decoder arm.
10. Remove screw and nut which secure pulley to tilt arm of decoder.
11. Remove tilt band and pulley (as a unit) and insert a spring hook (or equivalent) through pulley.
12. Remove screw and nut which secure rotate band and complementary band to decoder arm.
13. Remove rotate and complementary bands and pulleys (as a unit) and insert the spring hook from the tilt pulley through rotate and complementary band pulleys; then insert spring hook into hole below tachometer frame.
14. While manually controlling the decoder, remove the four screws that secure decoder to the transport. As decoder is being removed, carefully maneuver screw G and lip G (Sec. II figures, II-29 and II-30) away from the print clutch mechanism.

Replacement

Perform the reverse of the removal procedure.

NOTE: When replacing a new decoder, remove screw G and lip G from old decoder and install screw on new decoder. After replacement, readjust the mechanical timing, the print clutch and the ribbon shift. In addition, readjustment of the tilt, rotate, and complementary bands may be necessary.

CARRIER MOTOR

Removal

1. Remove front kick panel, right side panel, back panel, right table top, and both printer covers.
2. Disconnect plug P3 from J3 (Fig. VI-2).
3. Remove two screws that hold bracket of J3 to main chassis.
4. Locate four wire leads from carrier motor at J3 and note pin locations; then remove pins using P and J Pin Extractor tool. Pull wires up through main chassis.
5. Loosen screw C in set collar D (Figure V-6).
6. Remove three E screws.

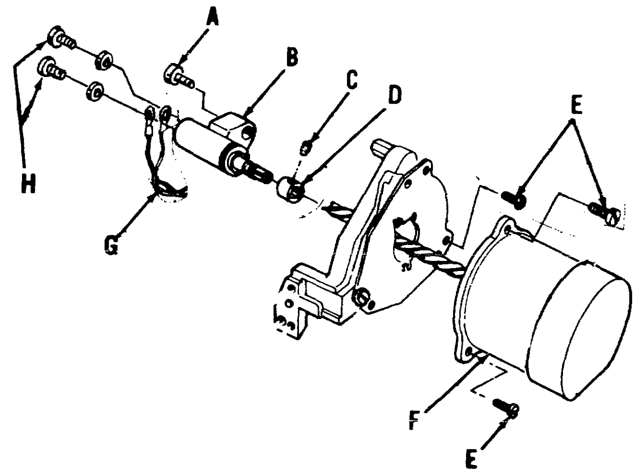


Fig. V-6. CARRIER MOTOR AND TACHOMETER

7. Move carrier motor laterally to the right until right side of motor contacts frame assembly. Hold motor in this position and move carrier to left bumper.

The motor may now be removed by raising it clear of the frame assembly and laterally to the right.

NOTE: It may be necessary to rotate the lead screw a few turns to free it from the carrier.

Replacement

Reverse removal procedures and repeat all necessary carrier assembly adjustments.

TACHOMETER

NOTE: To prevent damage to the machine, ensure that the machine cannot be energized while the tachometer is removed (or is being removed).

Removal

1. Remove back panel and left printer cover.
2. Remove wire assembly G from tachometer B by removing two screws H, Figure V-6.
3. Loosen setscrew C in collar D.
4. Remove tachometer.

Replacement

Perform the reverse of the removal procedure and repeat all necessary tachometer adjustments.

CARRIER HOLD COIL ASSEMBLY

Removal

1. Perform carrier motor removal, steps 1 through 7.
2. Remove clip from link B (Figure V-7), which is attached to hold coils.
3. Locate two twin leads from hold coils at jack J3. Note pin locations, then remove pins at jack end using P and J Extractor tool. Pull leads up through main chassis.
4. Remove three A screws.
5. Guide carrier hold coil assembly up and toward the rear of machine.

Replacement

Perform the reverse of the removal procedures and repeat all broken adjustments.

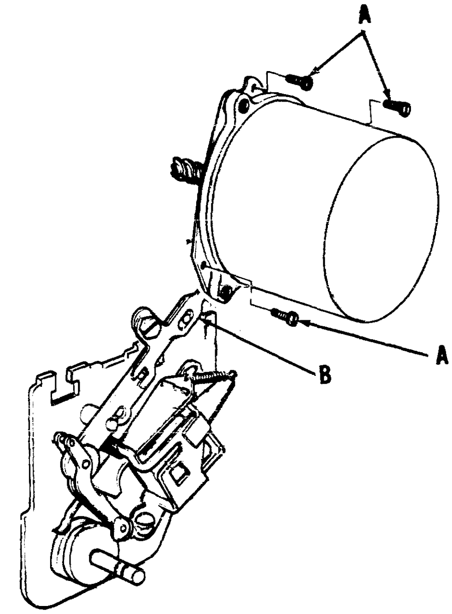


Fig. V-7. CARRIER HOLD COIL ASSEMBLY

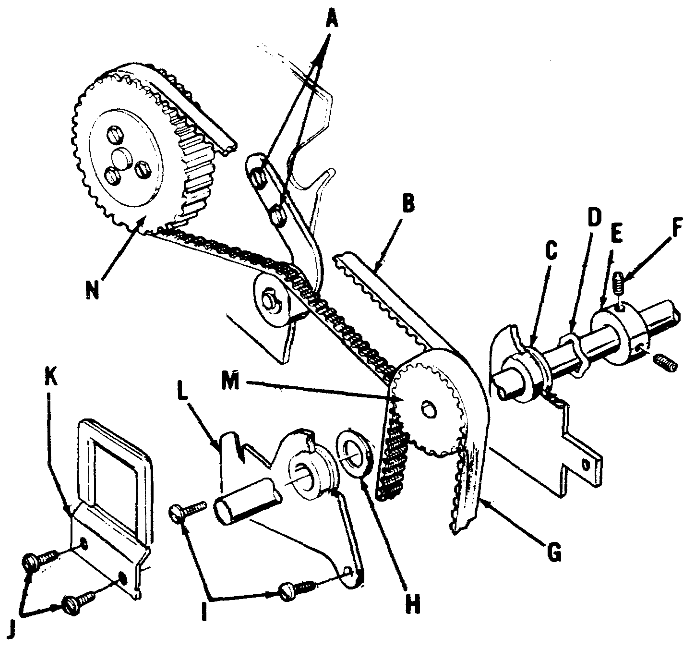


Fig. V-8. PRINT SHAFT ASSEMBLY

PRINT SHAFT

Removal

1. Remove back panel, left side panel, front wrap-around panel, left table top and left printer cover.
2. Remove two J screws, left main chassis handle K, two I screws, end plate L, and washer H (Figure V-8).
3. Loosen two A screws and remove belt B from pulley N.
4. Remove belts G and B from pulley M.
5. Manually move carrier to right bumper.
6. Loosen setscrew F until collar E is free to move along print shaft.
7. Hold collar E and spring washer D while moving print shaft laterally to the left and out of bearing C.

Replacement

Perform the reverse of the removal procedure and repeat all necessary timing adjustments.

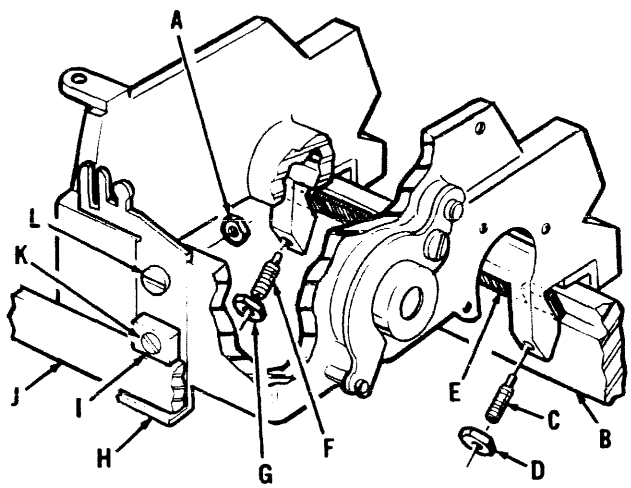


Fig. V-9. CARRIER ASSEMBLY

CARRIER

Removal

1. Perform carrier motor removal steps 1 through 7 and print shaft removal steps 1 through 7.
2. Remove all bands.
3. Remove nuts D and G, setscrews C and F, bearing E (Figure V-9), and ribbon feed assembly.
4. Loosen screw K.
5. Remove shoulder screw L and nut A.
6. Push retainer H down for maximum clearance between top of lip on retainer H and bottom edge of rail J.
7. Tilt rear of carrier upward and lift carrier off of rails at an angle toward rear of the machine.

Replacement

Perform the reverse of the removal procedure and repeat all necessary adjustments.

ROTATE AND COMPLEMENTARY BANDS

NOTE: Viewing reference for the following removal and replacement procedures is from the rear of the machine.

Removal

1. Remove right and left printer covers.
2. Remove carriage; then move the carrier to the center of the worm drive shaft.
3. Remove carrier end-shield near carrier motor.
4. Loosen screw B of tension lever A (Figure V-10) enough to allow tension lever A to be moved to the right until there is sufficient slack to remove the desired band or bands.

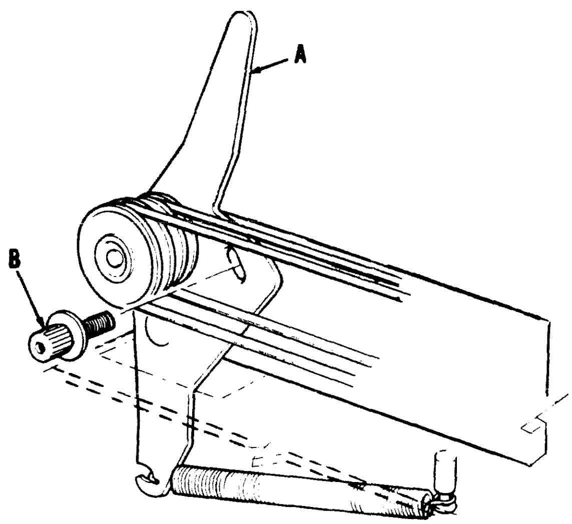


Fig. V-10. BAND TENSION LEVER (REAR VIEW)

Replacement

NOTE: If the removal procedures for the bands have been completed, omit steps 1 through 4.

1. Remove right and left printer covers.
2. Remove carriage; then move the carrier to the center of the worm drive shaft.
3. Remove carrier end-shield near carrier motor.
4. Loosen screw B of tension lever A (Figure V-10) enough to allow tension lever A to be moved to the right sufficiently to allow replacement of the rotate and/or complementary band.

Maintenance Procedures

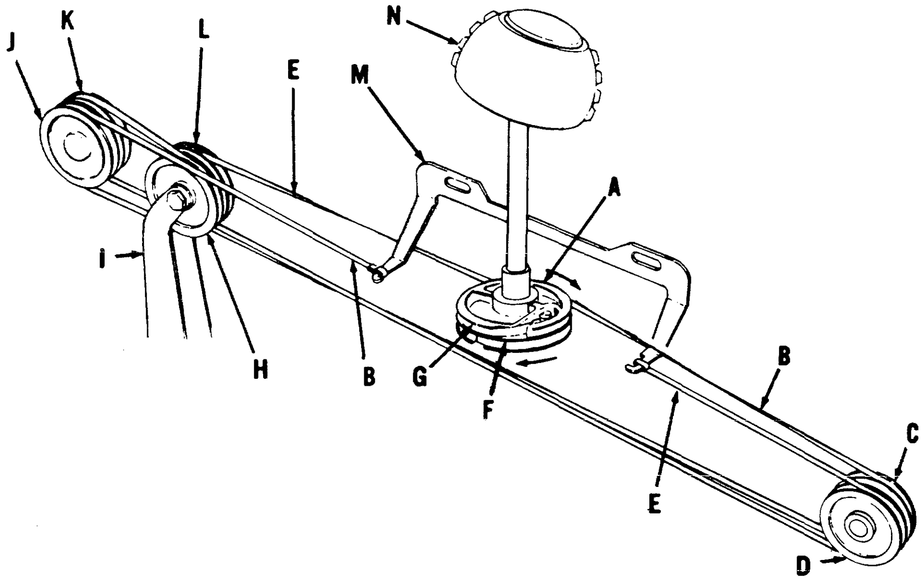


Fig. V-11. ROTATE AND COMPLEMENTARY BANDS (FRONT VIEW)

5. Remove rear panel from machine.
6. Manually release print clutch, position print head N (Figure V-11) to the letter Q position, then rotate the decoder fan in a clockwise direction until print head N is detented.
7. Insert rotate (short) band E into right side of band tube and attach it to stud underneath lower track F of pulley A. (A small mirror is useful at this time to observe the stud on the bottom of pulley A.)
8. Run rotate band E to the right (while applying a ¼ twist to the band toward the front of the machine) over and around pulley L, through pulley bracket I, through the nylon guide, under and around pulley D, then back to the right to the carrier. The free end of rotate band E should reach approximately to the center of the carrier.
9. Using the same hand holding rotate band E, also hold print head N, then with the other hand, release the detent in print head N. Rotate print head N in a clockwise direction approximately 1¼ turns to position 6 on the print head. The rotate band should now be approximately 1½ inches from left side of carrier.

ROT. POSN.	7	6	5	4	3	2	1	0	15	14	13	12	11	10	9	8
TOP ROW OF CHARACTERS ON BALL	*	*	*	*	3	2	1	0	C	B	A	@	S	R	Q	P

NOTE: Positions with asterisk are special characters and may vary in accordance with the print head used.

10. Attach one end of a spring (or rubber band) to free end of rotate band E; then attach other end of the spring (or rubber band) to bracket M (keeps tension on rotate band while replacing the complementary band).

CAUTION: DO NOT RELEASE THE DETENT IN PRINT HEAD N UNTIL STEP 13 HAS BEEN COMPLETED.

11. Position complementary (long) band B into the left side of the band tube and attach it to the stud on top of track G of pulley A.
12. Run band B to the left over the arm of bracket M (while applying a ¼ twist to the band toward the front of the machine) over and around pulley C, then to the right through the nylon guide, through pulley bracket I, under and around stationary pulley K, across to and over pulley H, around pulley J, and to the left toward the carrier. The end of band B should now be approximately at the center of the carrier.
13. Unhook spring (or rubber band) from bracket M and hook it to free end of complementary band B.

NOTE: Do not unhook the spring (or rubber band) from the end of rotate band E at this time.

14. Release detented print head N and rotate print head N to the numeric zero position. (The ends of both bands should be lined up approximately with their respective anchor points on bracket M.)

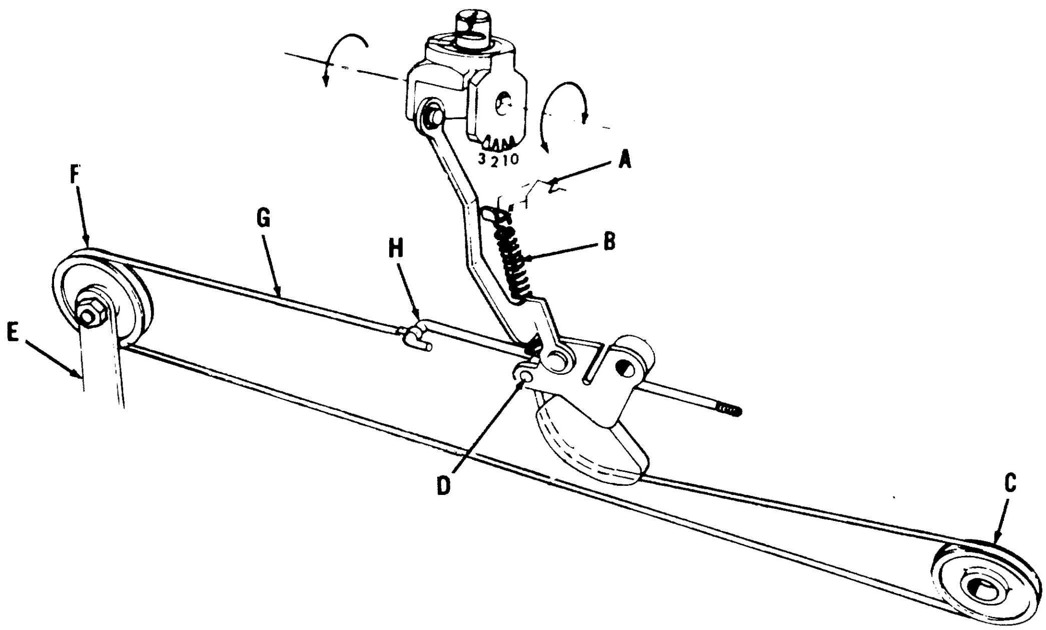


Fig. V-12. TILT BAND (FRONT VIEW)

15. Unhook spring (or rubber band) from one of the two bands (maintain tension on the other band) and hook it to the end of bracket M.
16. Remove spring (or rubber band) from the end of the remaining band and hook the band to the end of bracket M.
17. Manually controlling tension lever A (Figure V-11), loosen screw B and allow tension lever A to seek its own tension easily. Tighten screw B.

CAUTION: IF LEVER IS ALLOWED TO SNAP BACK, BAND BREAKAGE MAY RESULT.

18. Replace carrier end-shield, carriage, and rear panel. Repeat timing adjustments and replace right and left printer covers.

TILT BAND

Removal

1. Remove right and left printer covers.
2. Remove carriage.
3. Remove carrier end-shields.
4. Remove tilt band by loosening nut at end of link H (Figure V-12) enough to permit removal of tilt band from U-shaped end of link H.

Replacement

1. Loosen nut at end of link H (Figure V-12) enough to permit attachment of tilt band G to U-shaped end of link H in a later step.
2. Unhook spring B from tilt detent A.
3. Insert one end of tilt band G through tube in side of yoke; then hook band onto stud D.
4. Rehook tilt detent spring B to tilt detent A.
5. Loop free end of tilt band G around pulley C, then back to the right around pulley F. Keep tension on band G, manually hold link H, and attach end of tilt band G to U-shaped end of link H.
6. Take up band slack by tightening nut at end of link H.
7. Check and repeat, if necessary, adjustment number 2 under TILT, ROTATE AND COMPLEMENTARY TAPES, (Section IV).

CHECKING DECODER OIL LEVEL

Remove filler plug from top of decoder by using 3/16-inch Allen wrench (1623 9394). Insert oil level dip stick (1622 4560) until ring tong connector contacts top of decoder. Maximum oil level should not exceed 1¾-inch from bottom of dip stick. Minimum oil level is 1-inch from bottom of dip stick. Fill to 1¾-inch level, if required, with oil kit (1473 7894). (Refer to Installation Procedures for proper method of filling.)

DRAINING DECODER

Remove filler plug from top of decoder using Allen wrench (1623 9394). Insert 3-inch pipe nipple (1622 4578) into filler hole. Wrap a rag around pipe nipple to prevent spilling oil onto top of decoder and surrounding area. Using oil gun (1623 8008) with 7¾-inch plastic tube (1622 4586), insert tube until oil gun contacts pipe nipple. Fill gun with oil. Place removed oil in empty container from oil kit (1473 7894). When oil level nears low mark (after approximately 20 removals), pull slowly on oil gun to prevent air from getting into tube. (Approximately 25 guns-full of oil will drain decoder.) If oil is being drained for shipping purposes, be sure to remove 3-inch pipe nipple. Whenever oil is drained for any reason, replace with fresh oil kit (1473 7894).

DDP MAINTENANCE

Any errors occurring in the DDP logic are diagnosed by running the Console MTR (CONSMTR or CONS96MTR).

The Console MTR provides separate subtests for each of the Console mechanisms and associated logic. For more detail, refer to the operating instructions (1448 6864).

B 9343

CONSOLE AND DDP

SECTION

VI

Burroughs

FIELD ENGINEERING

TECHNICAL MANUAL

INSTALLATION
PROCEDURES

Printed in U.S. America 6-29-74

For Form 1061173

INSTALLATION PROCEDURES

The three Console cables must be installed before any of the Console case panels and covers are fitted. The cables are equipped with various types of plugs and push-on and screw terminators, each of which is identified by a label. The cables are designed to permit installation of the console on either the left or right side of the Processor cabinet.

CONSOLE CABLE INSTALLATION

The following is a recommended sequence for installing the cables.

CONNECTING TO CONSOLE

1. Connect cable 1448 0834 to the following points (Figures VI-1 and VI-2):
   a. Switch S2, clear pushbutton, three leads.
   b. DS13, audible alarm, two leads.
   c. TB11-4, indicator block D (26-inch console) or A (15.5-inch console), one lead. This wire must be routed alongside the indicator harness, from IAJ4; take care to avoid the decoder pulley and keyboard jack-shaft drive belt.
   d. J6, left forms transport connector.
   e. J4, carrier motor control connector, mounted on carrier motor driver assembly.
   f. J5, keyboard transducer connector, mounted on carrier motor driver frame.
   g. J3, carrier motor, and interposer solenoid connector.
   h. J7, right forms transport connector.

After the above connections have been made, the cable must be attached to the cable channels in the Console frame (under the main chassis) by means of the plastic tie-wrap snap-in fasteners which are fitted on the cable.

2. Connect cable 1448 9859 to the following points (Figures VI-1 and VI-2):
   a. IAJ4, Console indicator connector.
   b. J8, decoder solenoids and TU Transducer connector.

After the above connections are made the cable must be attached to the cable channel; take care that the cable clears the Console motor fan and decoder drive belt.

3. Connect cable 1448 0842 to the following points (Figures VI-1 and VI-2):
   a. Switch S4, system power-on microswitch C, and NO.
   b. E23 (one green/yellow wire) and E24 (two green/yellow wires).
   c. J9, Console motor connector.
   d. Switch S1, emergency power-off switch.

The switch must be removed from the Console frame, and its protective plastic cover must be removed to facilitate connections to the switch.

After the above connections have been made, the cable must be attached to the cable channel in the Console frame.

After installation, all three Console cables should be routed through, and firmly held by the cable clamps in the bottom of the Console frame.

CONNECTING TO PROCESSOR

The three Console cables should be routed up through the Processor cabinet and through the cable guide (Figure VI-3) and connected as follows:

1. Connect cable 1448 0859 to PA90 on the Processor backplane, with one red wire routed under the backplane and connected to TB2 B7Y on top of power supply assembly.
2. Connect cable 1448 9834 to the following points:
   a. PA89
   b. Clear pushbutton, three connectors
   c. TB2 BOX, white/purple wire.
   d. TB2 AOX, white/yellow wire.
   e. TB2 B5, 6, 7, and 8.
3. Connect 1448 0842 to J11 on the power supply. (See Figure VI-3.)

After the cables have been connected, they should be firmly fixed in the cable clamps at the bottom of the Processor cabinet.

CONSOLE MECHANISMS

NOTE: The following steps 1 through 5 should be performed prior to applying power to the system.

1. Fill decoder with oil by performing the following:
   a. Remove filler plug from top of decoder by using Allen wrench (1623 9394).
   b. Insert 3-inch pipe nipple (1622 4578) into filler hole.
   c. Wrap a rag around pipe nipple to prevent spilling oil on the top of decoder or surrounding area, then insert spout of Oil Kit (1473 7894) into pipe nipple and deposit entire contents (18 oz. of oil) into the decoder.
   d. Remove the 3-inch pipe nipple and replace filler plug.
2. Seat decoder in shock mounts by first loosening the two copper-colored shipping screws in top of decoder. Tap the top of each screw sharply and then remove the shipping screws.
3. Refer to Section IV Synchronization of Con-

sole Mechanisms of this manual and ensure that the adjustment is correct.

4. Manually move the carrier to the right bumper and back to the left bumper to ensure free movement along entire length of lead screw. While moving the carrier, visually check tachometer to be concentric. (Refer to Section IV of this manual.)
5. Visually check entire system for any obvious defects.

NOTE: Before applying power to the system, ensure that the print clutch is in the latched condition.

6. Using the procedure in Section IV of this manual, check the print clutch adjustment.
7. Test the console operation by running the Console MTR.

MISCELLANEOUS ACCESSORY OR HARDWARE ITEMS

After verifying the correct operation of the Console, the loose hardware should be installed on the machine. The following should be included in the accessory box:

Accessory or Hardware Item	Qty.
Documentation package	1
Decoder oil kit	1
Machine cover	1
Tape cartridge	1
Left keyboard cover (D Fig. VI-4)	1
Right keyboard cover (C Fig. VI-4)	1
Brackets for keyboard cover (G Fig. VI-4)	2
Screws for keyboard cover brackets (F Fig. VI-4)	4
Springs for keyboard covers (E Fig. VI-4)	2
Spring anchors for keyboard covers	2
Screws for rear of printer cover	2
Retaining clips for printer cover screws	2
Screws for desk tops	9
Casters	4
Form guides: right rear	2
left rear	2
right front	2
left front	2
Form deflector front	2
Journal roll bracket	2

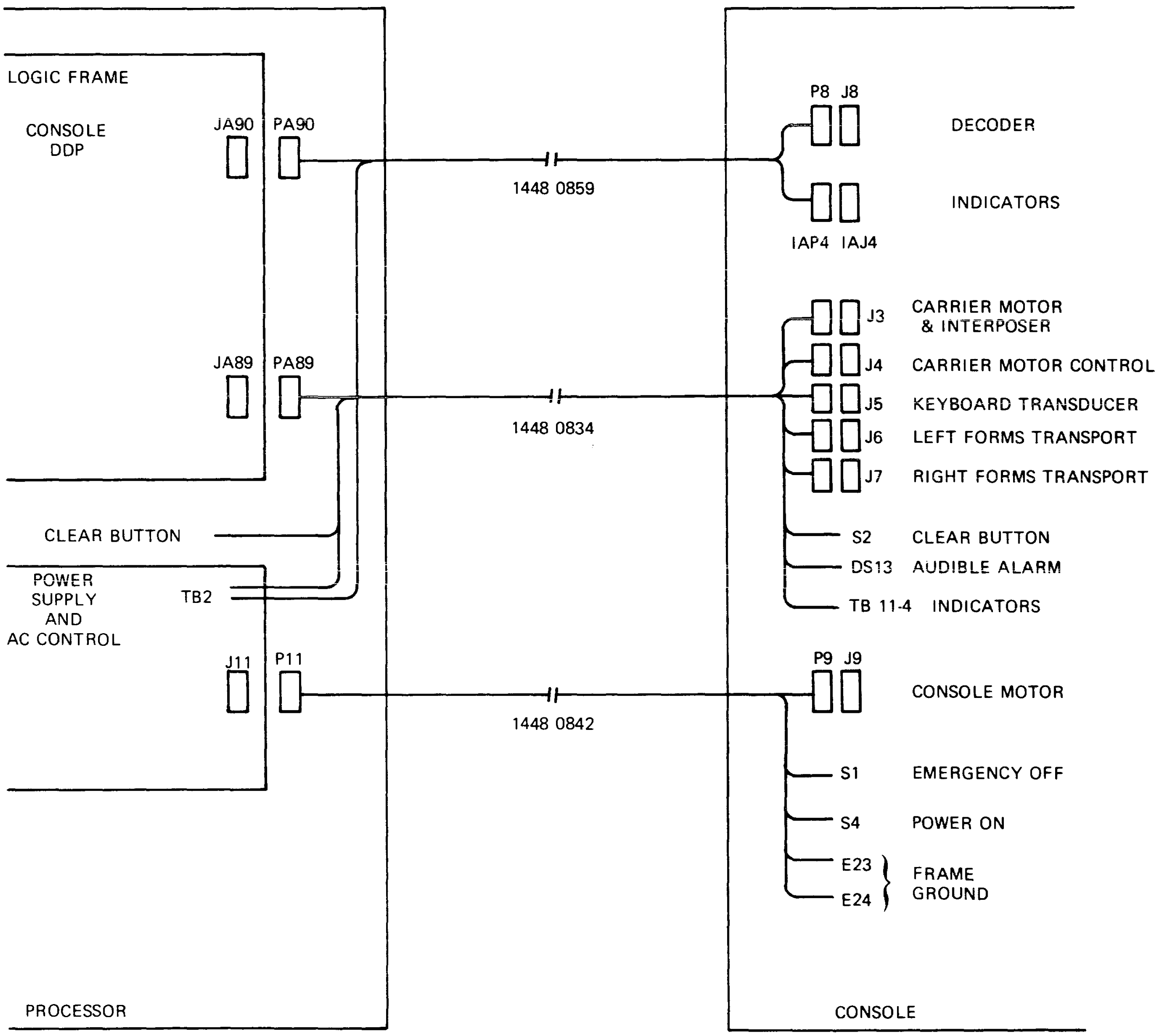


Fig. VI-1 CONSOLE CABLES

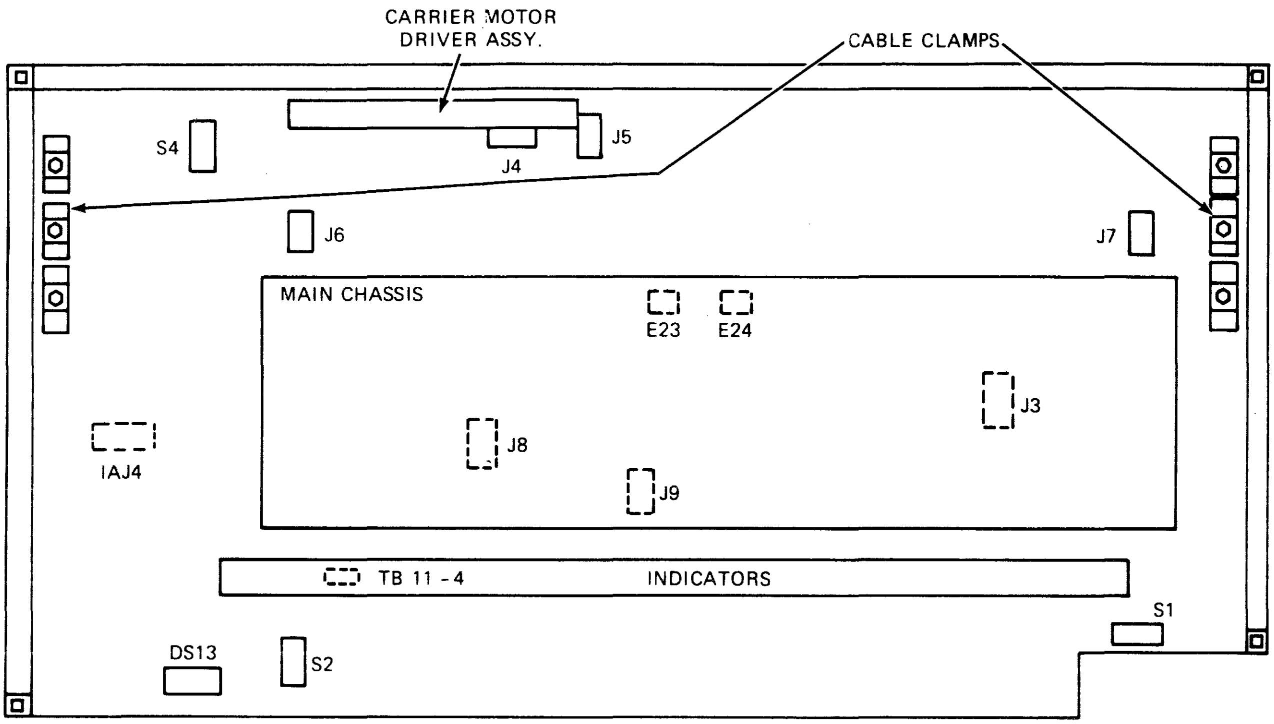


Fig. VI-2 CONSOLE CABLE CONNECTIONS

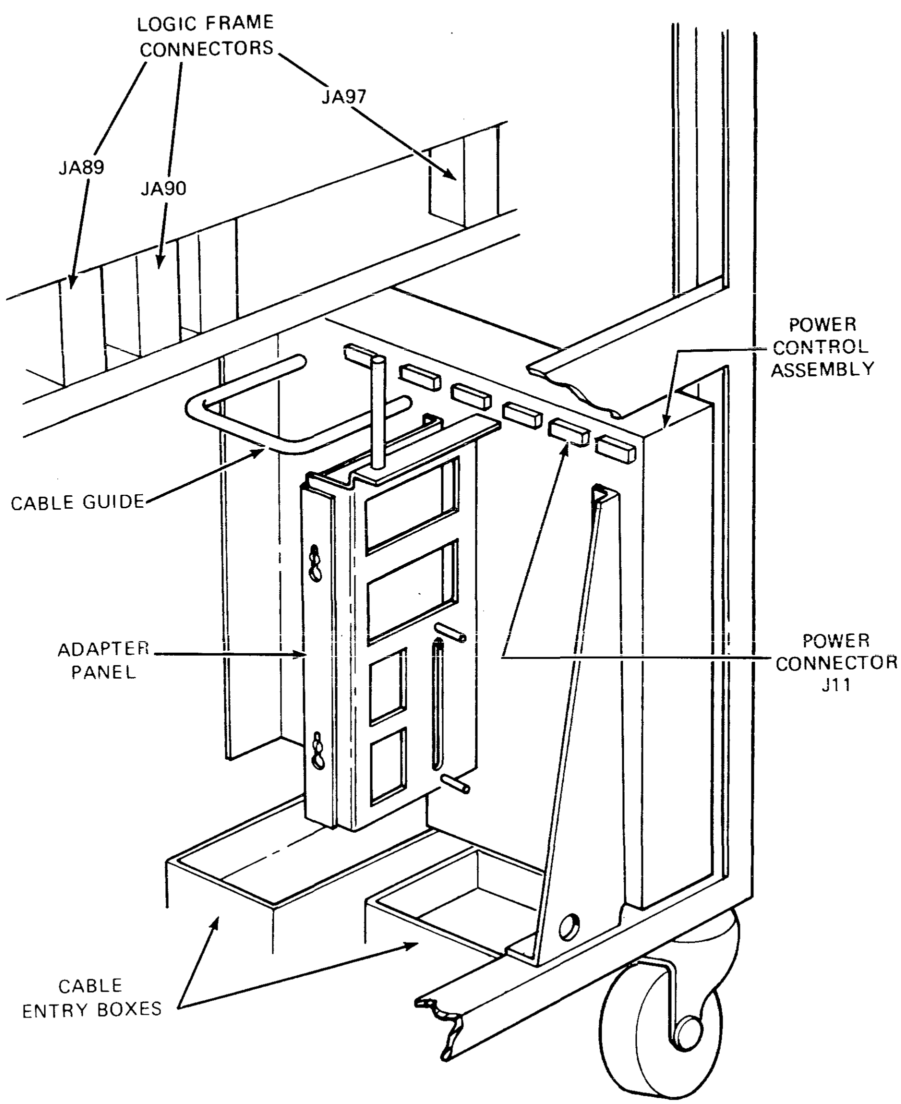


Fig. VI-3 PROCESSOR CABINET

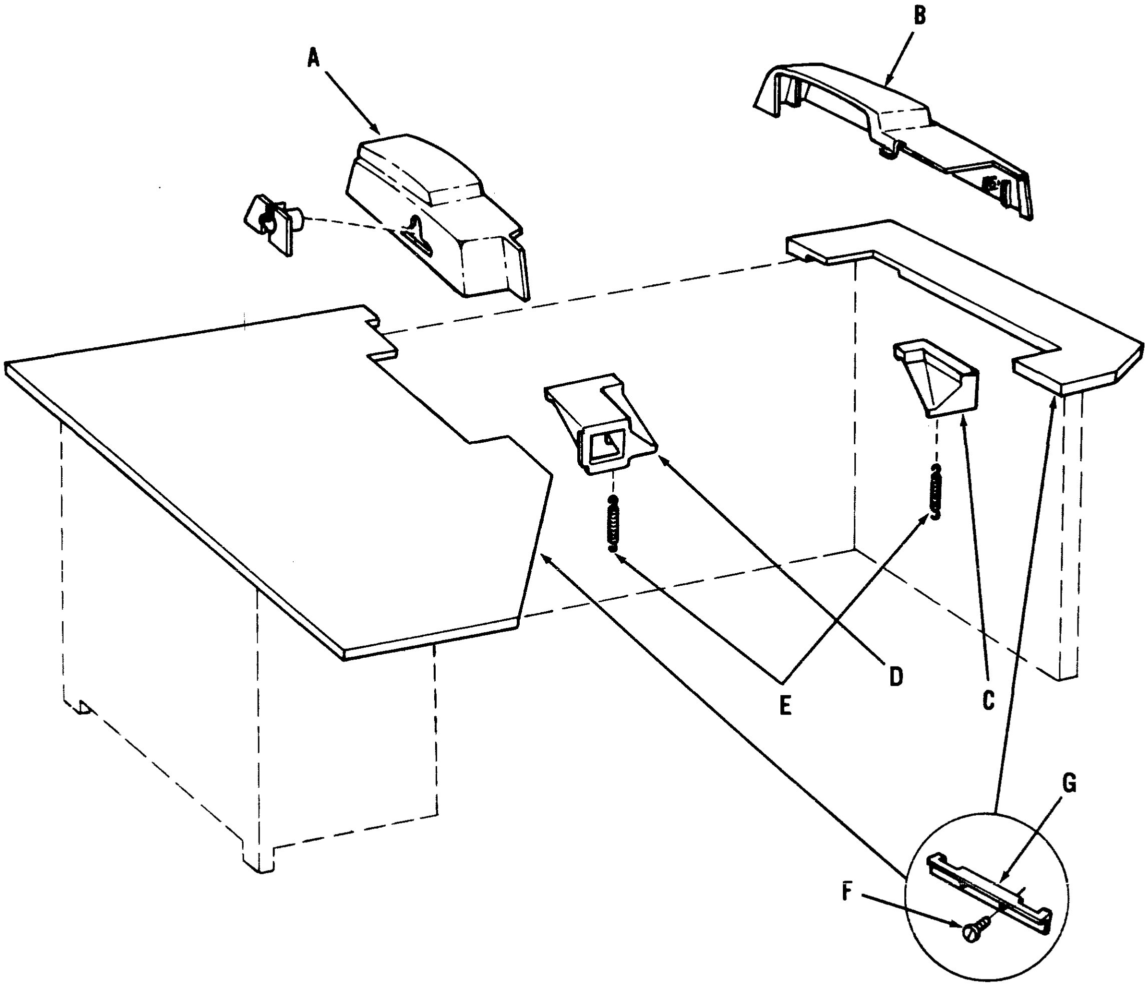


Fig. VI-4 CONSOLE MISCELLANEOUS HARDWARE