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SPECIFICATIONS

Section 1

1.1 GENERAL SPECIFICATIONS

1.1.1 Recording Rate

DSR Model	Rate (cps)
1427, 1429	200
1337, 1339, 1437, 1439	300
1347, 1349, 1447, 1449	400
1357,	500

1.1.2 Inter-record Gap

1.1.2.1 7-Track units: minimum 0.75 inches, completed in under 280 milliseconds for 556 BPI units and under 120 milliseconds for 200 BPI units.

1.1.2.2 9-Track units: minimum 0.55 inches, completed in under 200 milliseconds.

1.1.3 Rewind operation completed in less than three minutes for the DSR 1400 series and less than two minutes for the DSR 1300 series.

1.1.4 Tape width: 0.5 inch standard.

1.1.5 Character Density

1.1.5.1 7-Track, 200 or 556 characters-per-inch, IBM compatibility guaranteed.

1.1.5.2 9-Track, 800 characters-per-inch, IBM compatibility guaranteed.

1.1.6 Number of Tracks: 7 or 9 tracks, IBM compatibility guaranteed.

1.1.7 Reel Size and Mounting:

1.1.7.1 DSR 1400 Series: 10.5 inch, coaxially mounted to conserve space.

1.1.7.2 DSR 1300 Series: 8.5 inch, coplanar mounting.

1.1.8 Vertical Parity

1.1.8.1 7-Track units: Odd or even parity internally generated, externally selected.

1.1.8.2 9-Track units: Odd parity internally generated.

1.1.9 Check Characters

1.1.9.1 7-Track units: Longitudinal Redundancy Check Character (LRCC) internally calculated during block recording, written on tape at IBM compatible spacing after inter-record gap is initiated.

1.1.9.2 9-Track units: Cyclic Redundancy Check Character (CRCC) and Longitudinal Redundancy Check Character (LRCC) internally calculated during block recording, written on tape at IBM compatible spacings after inter-record gap is initiated.

1.1.10 End of file (Tape mark): EOF gap, EOF character, and LRCC implemented from EOF switch on control panel or by remote EOF signal.

1.1.11 Tape load point: Actuation of the BOT switch or the remote start command causes the magnetic tape to advance to the beginning-of-tape reflective marker and stop. The first record on tape will be approximately 4.5 inches from the marker using the DSR 1400 Series and 0.5 inches from the marker using the DSR 1300 Series.

1.1.12 End of Tape: EOT reflective marker sensed photoelectrically to provide an output signal while marker is being recognized, recorder remains completely operative.

1.1.13 Broken Tape: Provides an output signal when tape is not tensioned or is improperly loaded.

1.1.14 Front panel controls and indicators

1.1.14.1 DSR 1400 Series:

ON/OFF Switch	controls 115VAC power to recorder (and to associated equipment if used)
MODE Switch	controls operating mode of recorder: Record or Rewind (also Read for units so equipped)
BOT Switch	advances tape synchronously
EOF Switch	activates end-of-file routine
STOP Switch	stops the tape from advancing synchronously
POWER Indicator	indicates recorder DC supply operative
BROKEN TAPE or TAPE Indicator	indicates loss of tape tension or tape improperly loaded.

1.1.14.2 DSR 1300 Series

MODE Switch	controls 115 VAC power to recorder (and to associated equipment if used) as well as the operating mode of the unit: Record or Rewind (also Read for units so equipped)
BOT Switch	advances tape synchronously
EOF Switch	activates end-of-file routine
POWER Indicator	Indicates recorder DC supply operative

1.1.15 Environmental limits: Recorder operable from 32°F to 131°F (0°C to 55°C) at 0 to 100 pct humidity relative without condensation.

1.2 ELECTRICAL SPECIFICATIONS

1.2.1 Definitions of input/output signals

1.2.1.1 Integrated Circuit Compatibility Option

logic "one" input:	+3.0VDC to +6.0VDC, into nominal 3k ohm impedance
logic "zero" input:	+0.5VDC maximum, current sink requirement of 10 microamperes maximum
logic "one" output	nominally +5. 0VDC $\pm$5pct, source impedance of 600 ohms. Consult factory for alternative values.
logic "zero" output:	less than +0.5VDC, maximum sink capability of 10 milliamperes.

1.2.1.2 High Level Logic Option

logic "one" input:	+6.0VDC to +18.0VDC, into nominal 15k ohm impedance
logic "zero" input:	+0.5VDC maximum, current sink requirement of 10 microamperes maximum
logic "one" output:	+12.0VDC, source impedance of 1.5k
logic "zero" output:	less than +0.5VDC, maximum sink capability of 10 milliamperes.

1.2.2 Record command: 50 usec minimum logic "one" pulse, return to zero level at least 50 usec prior to reactivation, causes DSR to record on magnetic tape the bit configuration present at the inputs. Must maintain zero level during IR gap time or BOT modes. Connected externally to STEP command for incremental recorder operation.

1.2.3	Step command:	50 usec minimum logic "one" pulse, return to zero at least 750 usec prior to reactivation, causes DSR to increment magnetic tape one character. Must maintain zero level during IR gap time, slew (BOT) mode, or readback mode. Connected externally to record command for incremental recorder operation.
1.2.4	Initiate Inter-record Gap (IRG)	50 usec minimum logic "one" pulse, return to zero level at least 2 msec prior to reactivation, causes DSR to move tape the prescribed inter-record gap distance and write the appropriate check character(s).
1.2.5	Data inputs:	To write, logic "one" level coincident with or earlier than leading edge of record command, must maintain a logic "one" level a minimum of 50 usec after leading edge of record command.
1.2.6	Remote start:	50 usec minimum logic "one" pulse, causes DSR to advance tape synchronously. Tape motion will stop at load point unless input maintained at a logic "one". Input must maintain a zero level during incremental operation.
1.2.7	Remote stop:	50 usec minimum logic "one" pulse, halts tape from BOT mode.
1.2.8	Remote rewind:	Logic "one" state causes DSR to enter rewind mode, return to logic "zero" halts rewind.
1.2.9	Remote EOF:	50 usec minimum logic "one" pulse, causes DSR to insert an IRG, write tape mark and LRCC, then insert another IRG. Total time required: less than 0.75 seconds.
1.2.10	Slew command (optional)	50 usec minimum logic "one" pulse, causes DSR to enter synchronous record mode. Logic "zero" level during internal end-of-IRG signal causes DSR to halt.

1.2.11 Head Current Echo Check (optional)

1.2.11.1 7-Track units: Both HCEC Odd Parity Error and HCEC Even Parity Error outputs are at zero level prior to recording the first character of a record. Approximately 60 usec after the leading edge of the record command these outputs signal the parity of the character written on tape. If the parity is even, the HCEC Odd Parity Error line transfers to a logical "one" state while the HCEC Even Parity Error line remained at a logical "zero". Should the character be odd parity, however, the opposite would occur.

The output states are maintained until the leading edge of the next record command, at which time they are returned to a logical "zero" level. Approximately 60 usec later the above process is repeated for the new character.

The output states of the last character in a record are maintained until 3.3 milliseconds after the leading edge of the inter-record gap command, at which time they are reset to a logical "zero" state. Both outputs assume the logical "one" state whenever the unit is operated in the Rewind or Read modes, or if the head supply voltage falls outside acceptable limits.

1.2.11.2 9-Track units: Both HCEC Parity Error and HCEC Parity Correct outputs are at zero level prior to recording the first character of a record. Approximately 60 usec after the leading edge of the record command these outputs signal the parity of the character written on tape. If the parity was even, the HCEC Parity Error line transfers to a logical "one" state while the HCEC Parity Correct line remains at a logical "zero". Should the character be odd parity, however, the opposite would occur.

The output states are maintained until the leading edge of the next record command, at which time they are returned to a

logical "zero" level. Approximately 60 usec later the above process is repeated for the new character.

The output states of the last character in a record are maintained until 3.3 milliseconds after the leading edge of the inter-record gap command, at which time they are reset to the logical "zero" state. The HCEC Parity Error line assumes the logical "one" state whenever the unit is operated in the Rewind or Read modes, or if the head supply voltage falls outside acceptable limits.

1.2.12 Inter-record gap indicator:

1.2.12.1 IR gap in process option: The IR gap in process output transfers to a logic "one" level 3.3 milliseconds after an IR gap is initiated, and remains so until the gap has been inserted, at which time it transfers to a logic "zero" level.

1.2.12.2 End IRG: The end IRG output provides a nominal one millisecond logic "one" level pulse, the leading edge of which signals a completed gap insertion.

1.2.13 EOT signal: A logic "one" level output while the EOT reflective marker is recognized by the photosensor. This occurs while the record head is 4.5 inches past the marker for the DSR 1400 Series and 0.5 inches for the DSR 1300 Series.

1.2.14 BOT signal: A nominal 20 millisecond logic "one" level pulse occurring when the BOT reflective marker is 4.5 inches past the record head for the DSR 1400 Series and 0.5 inches past the record head for the DSR 1300 Series.

1.2.15 Slew clock: (optional) A 50 usec logic "one" level pulse, occurring at the slew rate of the recorder, only when the unit is operating in the slew mode. This output is not present during insertion of IR gaps.

1.2.16 Broken tape: Normally at a logic "zero" level for proper operation, improper loading or a loss of tape tension transfers the output to a logic "one" level until the fault is corrected.

1.3 MECHANICAL SPECIFICATIONS

1.3.1 DSR 1400 Series

1.3.1.1 Size (in inches)

Model 1400-P (Portable) 7.75H x 11.5W x 17D

Model 1400-V (Vertical rack mount) 17.5H x 19W x 6.06D

Model 1400-H (Horizontal rack mount) 8.75H x 19W x 16.12D

1.3.1.2 Weights:

Models 1400-V and 1400-H: 40 pounds

Model 1400-P: 32 pounds

1.3.2 DSR 1300 Series

1.3.2.1 Size (in inches): 12.25H x 19W x 16D (13.25 rack depth)

1.3.2.2 Weight: 40 pounds

INSTALLATION

Section 2

2.1 UNPACKING

Digi-Data recorders are shipped in heavy, well-padded, packing cases which will protect the units during normal handling and transportation. These cases generally are reusuable and should be retained if other shipment is planned. A special extruded frame is fastened to 1300 series recorders to protect the units from shipping damage. Recorders should be inspected for shipping damage immediately upon unpacking.

2.2 MECHANICAL INSTALLATION

Refer to Appendix 1 for outline dimension drawings of the DSR 1300 and 1400 series recorders. All Digi-Data recorders are designed for standard RETMA rack mounting. The DSR 1300 and 1400H (horizontal) mount with chassis slides and holes are provided in the chassis for attaching these slides to the recorder. Slides are included with the purchase of a 1300 series recorder but are an extra cost option on 1400 series recorders. The use of slides require a 20" depth for the rear mounting angle. The DSR 1400V (vertical) is normally front panel mounted in a rack, although, it can be readily adapted to chassis slide mounting.

Regardless of mounting method, the recorders should be installed at a reasonable height above the floor to facilitate servicing as well as to minimize dust contamination of the recording process. Slides for the 1400 series have a latch disconnect for the two members. Slides for the 1300 series have a friction disconnect (or connect). After the slide inner member is fastened to the recorder and the stationary (outer) member is mounted in the rack, the recorder is mounted in the rack by forcing the inner member into the outer member and sliding the recorder back until the front panel of the recorder is snug against the mounting angle. The last 4" of travel will require more force the first time this is done, due to the positioning of the inner member on the ball roller assembly. After the

first time the recorder will move freely over 15" of travel. The recorder and inner member can be removed from the outer member by pulling the recorder out 15" and then pulling further, with considerably more force, over the friction detent. Two 1/4 turn fasteners hold the 1300 series recorder in the rack. These fasteners should not be tightened more than finger tight in order to preserve the accuracy of the main drive plate.

2.3 ELECTRICAL INSTALLATION

A mating connector is supplied with every Digi-Data recorder. In the case of DSR 1400P models, a separate A.C. cord is provided. A list of pin connections is given in DDC drawings LA-0101 and LA-0102. It is important that precisely the prescribed signals be used to guarantee proper operation. Check the printed circuit cards to insure they did not vibrate out of the connectors during shipment.

2.3.1 Plug in wired connector J1 and A.C. power cord.

2.3.2 Load tape on machine as described in Section 3, OPERATION. Turn on Power switch. Both power and tape tension lights should glow. The use of top brand heavy duty 800 BPI certified digital tape is highly recommended for use with recorder.

2.3.3 Push the BOT (load point) switch. The tape will advance to the load point marker and stop.

2.3.4 Apply appropriate step, record, inter-record gap, and data signals to the recorder and connect appropriate output signals to the external system.

2.3.5 Develop the tape using Magna See Solution Type PRR, available from Reeves Soundcraft Corporation and various local distributors. This solution offers a quick visual check of information on the tape. Unfortunately, the resolution of the solution is such that at 556 or 800 BPI the recording is only faintly visible where adjacent bits are present.

2.3.6 Where convenient, an actual computer dump is advisable after the recorder is completely integrated with an external system. Frequently, this will show up deficiencies in over-all system operation which might be overlooked with other checkout techniques.

OPERATION

Section 3

3.1 OPERATING CONTROLS AND INDICATORS, DSR 1400 SERIES

3.1.1 The MODE switch has two positions for a record only unit (Record and Rewind), and three positions for a record-read unit (Record, Read, and Rewind).

When in the record mode, the equipment can be utilized for incremental or slew (synchronous) operation, recording data on tape and inserting inter-record gaps as commanded.

When in the rewind mode, the tape on the upper (take-up) reel transfers to the lower (supply) reel at rewind speed. The record and erase heads are inhibited in this mode to prevent accidental erasure.

For those units so equipped, the read mode inhibits the write amplifiers and the erase head, to allow playback of a prerecorded tape without possibility of erasure. The playback electronics are always active, regardless of the position of the mode switch. The unit may be switched between any positions without loss of tape tension or damage to the tape.

3.1.2 Actuation of the BOT switch causes the tape to advance at slew (synchronous) speed.

3.1.3 Actuation of the EOF switch commands an inter-record gap, writes the end-of-file character (tape mark) and its LRCC, and inserts another tape gap. This process is completed in less than 0.75 seconds. For ultimate reliability, it is recommended that the EOF routine be actuated at least twice at the file end.

3.1.4 Actuation of the STOP switch halts the slew forward motion of the tape when the unit is operating in the BOT search mode.

3.1.5 The POWER switch applies AC to the unit, and optionally to peripheral equipment if required.

3.1.6 THE POWER indicator verifies operation of the DC power supply and indicates the unit is powered.

3.1.7 The TAPE indicator alarm actuates whenever tape tension is lost or the tape is improperly loaded.

3.2 OPERATING CONTROLS AND INDICATORS, DSR 1300 SERIES

3.2.1 The MODE switch has three positions for a record only unit (Record, Rewind, and OFF) and four positions for a record-read unit (Record, Read, Rewind, and Off).

With the mode switch in the off position, AC power is removed from the unit and the equipment is inoperable.

When in the record mode, the equipment can read as well as record, permitting a read-after-write function. When the mode switch is momentarily switched to the rewind position and then switched to Read or Record positions, the tape will be rewound to the BOT marker and then stop. If the mode switch is left in the Rewind position, the tape will be completely rewound onto the supply reel without stopping at the BOT marker. The record amplifiers and erase head are inhibited in this mode to prevent tape erasure.

For those units so equipped, the read mode inhibits the write amplifiers and the erase head, to allow playback of a pre-recorded tape without possibility of erasure. The playback electronics are always active whenever power is applied to the unit.

3.2.2 Actuation of the BOT switch causes the tape to advance at slew (synchronous) speed.

3.2.3 Actuation of the EOF switch commands an inter-record gap, writes the end-of-file character (tape mark) and its LRCC, and inserts another tape gap. This process is completed in less than 0.75 seconds. For ultimate reliability, it is recommended that the EOF routine be activated at least twice at the end of a file.

3.2.4 The POWER indicator verifies operation of the DC power supply and indicates that the unit is powered.

3.3 OPERATING PROCEDURES

3.3.1 Procedures applicable only to the DSR 1400 Series

3.3.1.1 To load tape, be sure the POWER switch is in the off position, then remove the take-up reel assembly by rotating the center knurled knob counter-clockwise while restraining the take-up reel. Lift assembly from recorder and lay aside. Install full reel of tape on center hub so that the tape unwinds when the reel is rotated clockwise. The take-up reel assembly is now installed by engaging the three pins on the assembly with three holes on the center hub. Depress and rotate clockwise the center knurled knob locking the take-up assembly in place. The tape is then threaded over roller guides, fixed guides, head(s), and capstan to be secured to the take-up reel by accumulating several turns of tape. Tape is threaded over the tension arms last. Refer to the tape threading diagram located on the unit for proper tape positioning.

3.3.1.2 To advance tape to the beginning-of-tape marker, turn the MODE switch to the record (or read) position then the POWER switch to on. The POWER indicator should illuminate, the tape reels rotate to the proper tensioning positions, and the pinch roller engage the

tape and capstan. Due to the detent action of the stepping motor drive, the capstan will be rigid and tape will not creep. Providing that the tape has been loaded correctly, the TAPE indicator will be extinguished. Actuating the BOT switch will advance the tape to the load point marker. The tape will stop at a position where the record head will be 4.5 inches past the marker (5.0 inches for read-record units). To read computer generated tapes it may be necessary to manually halt the tape using the STOP switch, so that the load point marker is over the read head. This is due to the ability of some recording systems to record data within one-half inch of the load point marker.

3.3.2 Procedures applicable only to the DSR 1300 Series

3.3.2.1 To load tape, be sure that mode switch is in the off position, then the full reel is installed on the left-hand reel hub, oriented such that the tape unwinds as the reel is rotated clockwise. Seat the reel firmly, insuring that the three posts are properly detenting. Install an empty take-up reel on the right-hand hub in the same manner. The tape is then threaded under the left fixed head tape guide, over the erase head and record head and/or read head, under the right head tape guide, between the pinch roller and capstan, and then onto the take-up reel where it is secured by accumulating several turns. The tape is then threaded over the tension arms last. Refer to the tape threading diagram for proper tape positioning.

3.3.2.2 To advance tape to the beginning-of-tape marker, turn the mode switch to the record (or read) position. The POWER indicator should illuminate, the tape reels rotate to proper tensioning positions, and the pinch roller engage the tape and capstan. Due to the detent action of the stepping motor drive, the capstan will be rigid and tape will not creep. Providing that the tape has been loaded properly, actuating the BOT switch (or remote start) will advance the tape

toward the load point marker. The tape will stop at a point where the record head will be 0.75 inches past the marker (2.0 inches for read-record units).

3.3.3 Procedures applicable to both DSR 1400 and 1400 series

3.3.3.1 To record data on tape, connect the appropriate step, record, data, and IRG inputs, observing the input/output requirements as specified in Section 1.2.1. The capstan will rotate as the step input is commanded. Due to the small incremental angular rotation, it is virtually impossible to see each tape increment individually, while higher stepping rates cause the tape to move at what appears to be even speed. The inter-record gap is inserted rapidly, causing a sudden motion of the tension arms, which indicates normal operation. Proper operation can be initially verified by developing the magnetic bit pattern on a test tape with Magna-See solution (see Section 2.3.5).

To read data recorded on tape, for those units so equipped, actuate the BOT switch or activate the remote start line to start the read operation, actuate the STOP switch (DSR 1400 only) or activate the remote stop line to terminate the read operation.

3.3.3.2 After a complete file has been written, as determined externally, the EOF switch or the remote EOF line should be actuated, to write the EOF routine. Because of the importance of proper computer recognition of the tape mark, more than one EOF routine at a file end increases system reliability considerably.

3.3.3.3 The Head Current Echo Check option provides means for significantly increasing confidence in the recording process. Utilizing the "correct" line to signal an equipment operational status, while utilizing the "error" line to activate an operator alarm, provides a continuous

check of recorded data. In addition, the end-of-tape (EOT) signal should be utilized to end the recording process at the end of the next record.

3.3.3.4 The slew recording option of the recorders offers an easily controlled technique for writing tape at speeds of several thousand characters per second and for decreasing the time required for gap insertion. The equipment can write one record at a time in the slew mode, or it can write many. It can intersperse records of both slew mode or incremental recordings. To record one record utilizing the slew technique, actuate the slew command line with a minimum 50 usec positive pulse. Approximately ten milliseconds later the slew clock line will output positive 50 usec pulses at the slew rate of the recorder. These pulses are then routed back to the record input to provide the record command. When the record block is complete, the initiate IRG line is commanded coincident with the last record clock. The recorder will then insert the inter-record tape gap, as well as the check characters associated with the previous record block. During gap insertion, no slew clock output occurs. When insertion of the gap has been completed, the unit will output a signal indicating so. If the slew command line is at a logic "one" level then the recorder will continue in the slew mode, and the slew clock will once again appear. Should the slew command line be low however, the recorder will decelerate and stop the tape.

For units equipped with the "end IRG" signal option, another end IRG signal occurs when the recorder has stopped the tape.

THEORY OF OPERATION

Section 4

4.1 SYSTEM BLOCK DIAGRAM

Refer to Appendix I for simplified block diagrams of the 7-Track and 9-Track units and to the following description for a basic understanding of the operation. Since most of the circuitry is common to both recorders, the following is an integrated description appropriately noted as to 7 or 9 track applicability. The electronics portion is considered in three parts: record electronics, tape control electronics, and power supplies.

4.1.1 Record Electronics

4.1.1.1 Input gating: The external data source is buffered and sampled by eight two-input nand gates. The sample is delayed ten usec from the record command to permit simultaneous data and record commands. All eight gates are utilized by incoming data in the 9 track recorder, while only six are used by the 7 track recorder. One of the extra inputs is unused in 7 track recorders while the other is utilized as a parity selection input.

4.1.1.2 Parity generation: Seven exclusive-nor (coincidence) gates are used to develop the vertical parity written on tape. The inputs are the sampled input nand gates (inverted data) and a parity sample derived from the data sample. The generator develops odd parity from its eight inputs utilized in 9 track recorders. Odd or even parity is developed for 7 track recorders by manipulating one of the unused inputs.

4.1.1.3 Record amplifiers: The actual recording on tape is implemented by one binary trigger for each track. These flip-flops change state on negative input transistions derived from the input nand gates to represent an NRZI "one". Each flip-flop provides a low impedance

complementary output through a current setting resistor to the magnetic recording head. All flip-flops share a common reset line, which is actuated during the IR gap to write the LRCC on tape.

4.1.1.4 Head current echo check sense/storage (optional): One set-reset flip-flop for each track is directly connected to a track winding of the recording head and is set by the inductive voltage surges caused by changing the winding currents to write an NRZI "one" on tape. The character written on tape is then stored in the flip-flops so that the parity can be generated by an array of exclusive-nor gates. This information is then gated to the HCEC output lines to indicate whether an odd or even parity character was written.

One echo check output will transfer to a "one" only when recorded parity is correct while the other will transfer only when the recorded output is incorrect. The parity incorrect signal can be used for alarm purposes while the parity correct signal can be used as a positive indication that the recorder is operating normally. The normal operating indication is valuable since an incorrect signal cannot be obtained in event of a complete unit failure.

4.1.1.5 Cyclic Redundancy Check Character Generator (9 Track only): The circuitry required to provide this error correcting check character consists of twenty-two exclusive-nor gates and nine binary triggers, as well as their control circuitry.

The data pulse is sampled to determine which tracks are writing ones for each character. Through the exclusive-nor array, each track is added without carry to its corresponding bit in the CRCC nine binary register, then shifted one bit. The four central bit positions are complemented when a "one" is shifted from bits "seven" to "parity". Thus the state of the CRCC register changes for each character recorded.

When a record block is complete and the gap is commanded, the CRCC register is updated once with all zeroes input. A precision single-shot, the timing of which is determined by whether the unit is in the slew mode or not, determines at what time to write the CRCC character on tape. This is nominally four character spaces (0.005 inches) past the last character of the block. The CRCC character on tape is derived from the CRCC register by inverting all except the "two" and "four" bits.

Since the only data that is recorded on tape without a CRCC character is the EOF character or tape mark, circuitry is provided to inhibit writing the CRCC when the EOF routine is initiated. This is done by determining if a record command was received subsequent to the preceding IRG. If so, then the CRCC is not inhibited. If not, then the character being recorded is the tape mark and the CRCC is inhibited.

4.1.1.6 Binary zero to BCD ten converter (7 Track only): This converter is used for numeric BCD recording and is useful where the BCD code of four or six "zeroes" is generated by the input data source. This function is implemented by a sampled seven input nand gate which writes a "one" in tracks 2 and 8 only if all data lines are at "zero" when the record input is commanded and the recorder is externally programmed to write even parity.

4.1.2 Tape Control Electronics

4.1.2.1 Gap Generation: Due to the incremental nature of the stepping motor utilized as the tape transport device, clocking schemes are required to provide tape motion. To this end a stable, precision voltage controlled (VCO) is used to provide a programmable clock source individually controlled in the various gap generation modes. Descriptions of these modes are as follows:

(1) BOT (beginning of tape or load point search): In this mode, the BOT switch or a remote start command sets a flip-flop causing the VCO to generate an exponentially increasing clock frequency to a fixed limit. This clock then drives the Motor Control circuitry to advance the tape. When the BOT photocell senses the trailing edge of the BOT reflective marker, the flip-flop is reset, the clock frequency exponentially decreases to zero, and the tape halts. The tape can be similarly halted with the remote stop command or the STOP switch (DSR 1400 only).

(2) Slew (synchronous): In this mode, activating the slew command line sets the "slew" flip-flop causing the VCO to generate an exponentially increasing clock frequency to a fixed limit. This clock then drives the Motor Control circuitry to advance the tape. An adjustable single-shot inhibits the slew clock until the unit has reached synchronous speed, at which time the slew clocks appear at the output.

The slew flip-flop also gates internal timing changes to compensate for tape motion when writing inter-record gaps. Check character timing, as well as gap durations, are a function of slew mode or incremental mode of operation. Upon insertion of the gap, an internal end of gap signal attempts to reset the slew flip-flop. If the slew command line is at a logic "one" then it cannot be reset and the recorder continues in the slew mode. If the slew command line is low, the recorder halts.

(3) Inter-Record Gap: In this mode, the VCO is gated on for a fixed period (for a period dependent upon whether the unit is operating slew or incremental), exponentially increasing its frequency to a higher limit than in the slew or BOT modes. At the end of the fixed period, when the IR gap has been inserted on tape, the clock frequency is exponentially decreased to zero.

Several synchronous damping pulses are applied to the motor at a 300 cps rate to eliminate dynamic ringing.

(4) EOF (end-of-file) Gap: This mode of operation allows for insertion of the EOF character. Actuation of the EOF switch (or the remote EOF line) triggers a fixed delay which inserts an IRG, writing the check characters of the previous record block if the user had not commanded the gap, then writing the EOF character and its LRCC as well as another IRG.

4.1.2.2 Motor Control Circuitry: The motor programming and motor drive circuitry provides all tape motion control, with the exception of the rewind operation. The incremental nature of the stepping motor drive used in the recorder requires a digital control technique keyed to the motors various windings. This is provided by a binary up-down scale of eight counter. The method of counting differs from slew to normal incremental modes and includes provisions for vernier adjustment of the dynamic properties of the motor to obtain, electronically, a virtually perfect incremental operation, while maintaining the infinite stability inherent in a stepping motor.

4.1.2.3 Pressure Roller Circuitry: The pressure roller solenoid drive circuit actuates when power is on and the recorder mode switch is in the "record" (or "read") position. Should the mode switch be placed in the "rewind" position or a remote rewind command occur, the pressure roller drops out to free the tape. There is a delay when the recorder is returned to the "record" or "read" mode before the pressure roller re-engages. During this time the reel motors are being braked to a halt.

4.1.2.4 Reel Motor Control Circuitry: The reel drive circuitry provides proper tape tensioning drive to the reel motors. This is accomplished by averaging the power to the reel motors by means of a precision,

unbalanced duty cycle, astable multivibrator and two pulse stretching circuits.

In the "rewind" mode of operation, the supply reel motor is driven full on while the take-up reel drive is removed. Dynamic braking provided by the generator characteristics of the take-up reel motor in the rewind mode maintains slight tape drag to insure a snug windup.

4.1.3 Power Supply: The recorder requires several supply voltages, which are provided by circuitry described below:

(1) +12VDC regulated: This is derived from a well filtered unregulated +15VDC (minimum) provided by a transformer operated full-wave bridge and capacitor supply located on the equipment chassis. A differential amplifier compares a potentiometric sample of the regulated +12VDC to a zener reference, utilizing the output to drive an amplifier which in turn drives four parallel emitter-follower outputs. The voltage regulator is supplied from a voltage doubler circuit, driven from the transformer low voltage AC output to compensate for base-emitter drops in the output transistors. The output transistors are mounted on a massive heat sink to provide reliable operation over the environmental extremes.

(2) Head voltage supply: This is derived from the regulated +12VDC via a differential amplifier referenced to a resistive divider across the +12VDC. This causes the head voltage to track the +12VDC and remain exactly one-half its value. The +6VDC head supply is forced to ground when the recorder is operating in the rewind or read mode so that tape cannot be erased in these modes (the record amplifier drives to the head are also forced to ground).

(3) -7VDC Bias Supply: This is derived from a capacitor-diode charge circuit utilizing the transformer low voltage AC output to develop a negative voltage. It is then shunt regulated by a resistor-zener diode combination to approximately -7VDC.

4.2 MECHANICAL OPERATION

4.2.1 DSR 1400 Series Recorders

4.2.1.1 The reels of the 1400 series recorders are driven independently by separate reel motors. Special O-ring drive belts and pulleys are used to provide the necessary speed reduction for the drive motors. The reel motors are high-performance, permanent-magnet D.C. motors.

Brush life is nominally 1,000 hours at rated speed, which is the speed during Rewind. Therefore, the brush life in normal usage should be the life of the equipment.

The bearings in the reel drive assembly are heavy-duty, aircraft-type, torque-tube ball bearings which need no maintenance and which are designed to carry loads much greater than those encountered in the recorder.

4.2.1.2 The stacked reel construction of the unit requires a means of transferring the tape from one level to another level. This is done by means of a tilted drive plate. Obviously, the tape must conform to a change in plane; this is accomplished in proper fashion by rotating the tape slightly between two rollers which are rotated about an axis through their center point. (Note: There is absolutely no degradation of normal transport functions as a result of the stacked reel construction.)

4.2.2 DSR 1300 Series Recorders

4.2.2.1 The reels of the 1300 series recorders are independently driven directly by two high-performance, permanent-magnet DC motors. Brush life can be assumed to be the life of the equipment.

4.2.2.2 The reel retainers consist of three studs containing spring loaded balls. This design will accommodate all IBM type hubs and operates

with an absolute minimum of effort, allowing one-handed reel loading.

4.2.3 DSR 1300 and 1400 Series Recorders

4.2.3.1 The main drive plate of the DSR 1300 and 1400 series recorders is a monolithic plate fabricated from tool and jig plate which is precision machined and ground to provide an extremely accurate surface on which to mount tape guiding components.

4.2.3.2 Two spring-loaded arms are mounted on the drive plate to provide tape storage. This tape storage is necessary due to the rapid tape movement occurring during inter-record gap and end-of-file gap generation. Normally, no servo operation is provided from the tape storage arms in view of the complete simplicity and accompanying reliability of this arrangement. Since there is no servoing, the tape tension (and, therefore, the position of the spring loaded arms) will vary as a direct function of the radius of the tape on the reel.

4.2.3.3 Precision guides are mounted directly on the drive plate. These guides constrain the tape as it passes over the heads, thus limiting the skew which can occur. These guides are constructed from an extremely hard material which is absolutely necessary for long-term trouble-free operation of the equipment. In the event long-term usage results in the cutting of a groove by tape oxide acting as an abrasive, the guides may be presumed to have lost their usefulness and should be replaced with new guide pieces.

4.2.3.4 The pressure roller assembly on the drive plate is driven by a solenoid. Since this solenoid operates infrequently, it may be presumed to have infinite life. The pressure roller itself has a black neoprene coating which is not affected by the action of hydrocarbon solvents.

4.2.3.5 A cooling fan is used in all Digi-Data recorders. This fan ensures the longest possible life of the recorder by maintaining heat buildup

at a minimum level. Care must be taken to permit access for cooling air to enter the unit through the holes provided for this purpose.

MAINTENANCE

Section 5

5.1 GENERAL

The DSR 1300 and 1400 Series recorders have been designed to operate for extended periods without corrective maintenance. If an equipment malfunction is suspected, a call to the factory is recommended since it may save the user much time and effort. Generally, a factory expert can pinpoint a problem with rapidity due to his intimate familiarity with the recorder and interface problems.

5.2 ACCESS INSTRUCTIONS

5.2.1 Access to the DSR 1300 is by means of two removable plates at the top of the unit. Once the plates are removed, the printed circuit cards may be probed by mounting them on the extender card supplied with each recorder. Monitoring of various signals can also be made at the printed circuit card connectors. If the unit is to be operated longer than five minutes in this position, sufficient airflow must be provided to adequately cool the interior.

5.2.2 Access to the DSR 1400 Series recorders is by means of a removable bottom (rear) panel. This panel is held in place by 4 quarter-turn fasteners. (Note: this panel must be installed at all times except when troubleshooting, since it is required for proper cooling of the internal components of the unit.)

Once the cover is removed, the printed circuit card cage may then be swung out by loosening the quarter-turn fastener on the rack-mounted models or, on the portable models, by rotating both fasteners one-quarter turn in a counter-clockwise direction.

With the printed circuit card cage swung open, complete access is then gained to all components in the unit. If the unit is to be operating longer than five minutes in this position, sufficient airflow must be provided to adequately cool the interior.

Additional access to any printed circuit card is permitted by the use of an extender card. This card is offset to permit easier probing of points on the card. Monitoring of various signals can also be made at the printed circuit card connectors.

5.3 PREVENTIVE MAINTENANCE

The following routine maintenance should be performed after the removal of a recorded tape and prior to installation of a new tape.

5.3.1 Head and Roller Guide Cleaning

The magnetic head, roller guides, and rubber pressure roller of the tape transport should be cleaned before each new reel of tape is installed for best results. Denatured alcohol, heptane, or a similar solvent is recommended for cleaning these parts. The cleaner should be applied with a clean, lint-free cloth or swab. (Note: The purchase and use of heptane for general use as a cleaning agent for the transport is highly recommended, since it is a very mild solvent and dries rapidly. This is an excellent cleaner for painted surfaces and has the added advantage of being a good additive for Magna See in case of evaporative loss. Heptane is flammable, however, and the normal precautions should be employed when it is used.)

5.3.2 Stepping Motor Drive Maintenance

The stepping motor drive requires no maintenance.

5.3.3 Reel Drive Maintenance, DSR 1300 Series

Although the reel drive employs D.C. motors, the wear on these motors is so minimal they should never require replacement during normal service.

5.3.4 Reel Drive Maintenance, DSR 1400 Series

Although the reel drive employs D.C. motors, the wear on these motors is so minimal they should never require replacement during normal service.

The O-rings, likewise, suffer little wear and need to be replaced only twice a year (due to the aging process of rubber); this replacement is a simple process, requiring nothing more than stretching the ring so that it fits around the pulley. Commercially available O-rings can be used in this service for short periods of time as emergency backup; the O-ring size is 2-243. The O-ring belts supplied by Digi-Data Corporation, however, are composed of a special material specifically designed for this particular service, and the use of commercial compound O-rings is not recommended.

5.3.5 Cleaning of Plexiglas

The plexiglas window should be cleaned with Windex glass cleaner and a very soft, non-abrasive cloth.

5.3.6 Fan Maintenance

No maintenance is required because the fan is lubricated for the life of the equipment.

5.4 CORRECTIVE MAINTENANCE

5.4.1 Photo Sensor Bulb Replacement

The bulb for the BOT and EOT photo sensors is capable of long life as a result of voltage derating. In the event of burnout, the bulb can be replaced merely by removing the one screw in the front of the photo sensor cover, removing the cover, unscrewing the old photo sensor bulb, inserting the new bulb, and re-installing the photo sensor cover. Care should be exercised during this entire operation to insure there is no alteration in position of the two photo cells on either side of the bulb, as the photosensing capability of these devices may change as a result of such alteration.

5.4.2 Indicator Bulb Replacement

The indicator bulbs, like the photo sensor bulbs, are derated and should seldom need replacement. If required, simply unscrew the plastic lens cover, remove the old bulb, insert new bulb, and replace lens cover.

5.4.3 Troubleshooting Guide

Few of the following problems are likely to occur during normal operation. However, they are listed - together with the possible causes and recommended checks - to insure best possible service of the equipment. Frequently, a telephone call to the factory can save the user a great amount of time and effort in troubleshooting.

5.4.3.1 No signal recorded: If blown fuse - check fuse and replace if necessary; check unit for shorts and bad components, using standard troubleshooting techniques. If open head winding or open head cables - check for continuity through head windings and cables. If defective write flip-flops - check for presence of data and step command input signals at input to card; trace out signal path for defective components or replace card. If power supply failure - check for presence of plus or minus voltage as specified on schematic or replace Power Supply Card; check for head supply voltage.

5.4.3.2 Capstan motor not stepping properly: If no step command signal - check input to Motor Drive Card. If defective Motor Control Card replace card or check to see if motor drive flip-flops are operating; if the capstan motor is running properly, the D.C. average voltage at all the motor windings should be equal.

5.4.3.3 Improper D.C. voltages: If defective components or drift in component values - normal troubleshooting techniques will show bad rectifiers, zener diodes, or other components; replace card if spare is available. If adjustment - readjust voltage potentiometer as described under card description.

5.4.3.4 Improper head current echo check (HCEC): If defective components - check squaring circuits, operation of record flip-flops, and exclusive nor-circuits in parity generator.

5.4.3.5 Improper parity generation: If component failure - check operation of individual exclusive nor-gates.

5.4.3.6 Computer reads back with errors: If bad tape, playback transport set for wrong density, recorded with improper parity, dusty record conditions, dirt accumulation on head, tape slippage at capstan, worn guides, or defective motor drive electronics - find possible cause by process of elimination and then correct accordingly.

5.4.3.7 Improper reel tensions: If failure in D. C. voltage or oscillator driving reel tension circuits, check for defective transistors or diodes.

OUTPUTS

IC COMPATIBLE (STANDARD)

Logic Ø = Maximum +0.5 VDC, 10 ma sink capability

Logic 1 = Nominal +5.0 VDC, 600 ohm source impedance (consult factory for other levels)

HIGH LEVEL (OPTION)

Logic Ø = Maximum +0.5 VDC, 10 ma sink capability

Logic 1 = +12 VDC, 1.5k ohm source impedance

GAP IN PROCESS	Positive level during gap insertion
BOT SIGNAL	Nominal 20 msec positive pulse occurring when BOT reflective marker is sensed (bi-directional)
EOT SIGNAL	Positive level for duration EOT reflective marker is sensed (bi-directional)
BROKEN TAPE	Positive level when tape not tensioned or improperly loaded
DC POWER	+12VDC (2 pct regulation), -7VDC (10 pct regulation), DC common (Consult factory for available power)
HCEC ODD PARITY ERROR	Positive level, nominally 50 usec after record command, only if character being recorded on tape is even parity, output maintained until subsequent record command or initiate IRG, zero output when character is odd parity, and during IRG; positive level if head voltage fails or the unit is operated in rewind or read modes
HCEC EVEN PARITY ERROR	Positive level, nominally 50 usec after record command, only if character being recorded on tape is odd parity, output maintained until subsequent record command or initiate IRG. Zero output when character is even parity and during IRG; positive level if head voltage fails or the unit is operated in rewind or read modes
SLEW CLOCK (optional)	Nominal 50 usec positive pulse occurring at slew rate of recorde (1.0 to 2.5k Hz nominal) first clock approximately 10 msec after initiating slew operation from halt, zero output during IRG
* DATA (6 lines + parity 7/track) (8 lines + parity 9/track)	Nominal 10 usec positive pulse when bit is present, deskewed
* READ CLOCK	Nominal 10 usec positive pulse coincident with data
* READ EVEN PARITY	Nominal 10 usec positive pulse, coincident with data; only occurs when character parity is even
* READ ODD PARITY	Nominal 10 usec positive pulse, coincident with data; only occurs when character parity is odd

* Standard features with read option

IR 10/69

INCREMENTAL
INTERFACE REQUIREMENTS
DSR 1300 AND 1400 SERIES
+ 1500

INPUTS

IC COMPATIBLE (STANDARD)

Logic Ø = -5.0 VDC to +0.5 VDC, less than 10 ua sink

Logic 1 = +3.0 VDC to +6.0 VDC, into nominal 3.0k ohm impedance to ground

HIGH LEVEL (OPTION)

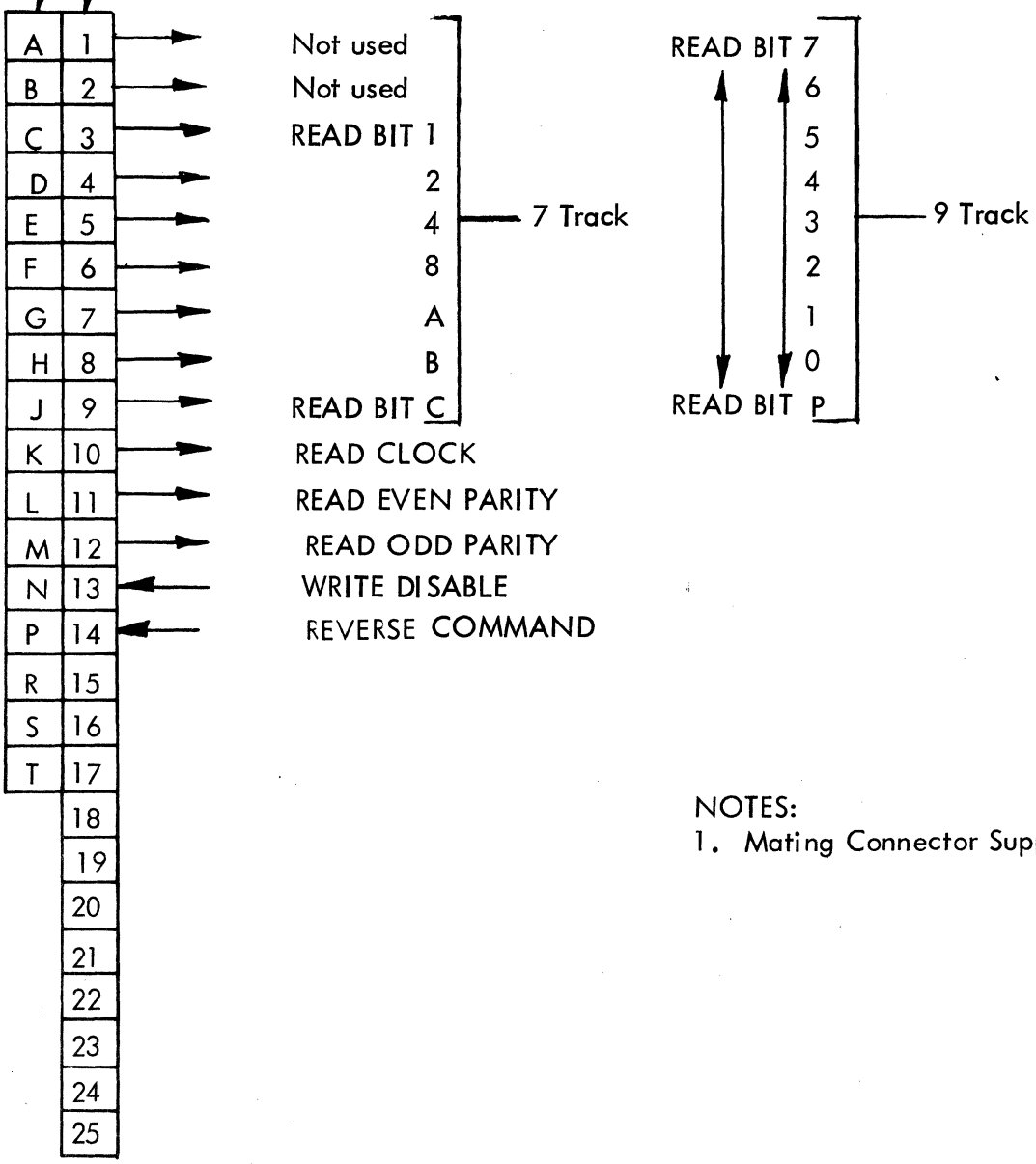
Logic Ø = -5.0 VDC to +0.5 VDC, less than 10 ua sink

Logic 1 = +6.0 VDC to +18.0 VDC, into nominal 15k ohm impedance to ground

DATA (6 lines - 7/track) (8 lines - 9/track)	Positive level, coincident with or spanning record command, to record NRZI "one". Zero level during IRG sequence.
RECORD	Minimum 50 usec positive pulse, return to zero minimum 50 usec before reactuation, records input data on tape
STEP	Minimum 50 usec positive pulse, return to zero minimum 750 usec before reactuation, increments tape one character space (4.7k impedance both options)
PARITY SELECT (7/Track)	Zero level (or open) to write odd parity, positive level to write even parity
INITIATE IRG	Minimum 50 usec positive pulse, return to zero minimum 2 msec before reactuation, writes CRCC (9 track) and LRCC on tape at four character spaces and 8 character spaces (9 track) respectively, inserts minimum .6 inches (9 track) or .75 inches (7 track) erased tape gap, can be coincident with last step command during incremental operation, must be coincident with last slew clock in slew mode
REMOTE START	Minimum 50 usec positive pulse, advances tape at slew speed (stops at BOT marker)
REMOTE STOP	Minimum 50 usec positive pulse, stops tape advance when in BOT mode (overrides remote start)
REMOTE EOF	Minimum 50 usec positive pulse, return to zero minimum 50 msec before reactuation, minimum 750 msec between reactuations; generates internal IRG routine, then writes tape mark and generates second internal IRG routine
REMOTE REWIND	Positive level maintains rewind, zero level terminates (4.7k impedance both options)
POWER	105-125 VAC, 50-60 Hz
SLEW COMMAND (optional)	Minimum 50 usec positive pulse, causes recorder to advance tape in slew mode, positive level at end of IRG insertion causes recorder to continue in slew mode while zero level will cause the recorder to halt
* REVERSE	Positive level to command synchronous reverse tape motion, zero level to enable synchronous forward tape motion

MS3102-20-29P (Amphenol or Equivalent) - Rack Model

DC-25S (Cinch-Jones or Equivalent) - Portable Model



NOTES:
1. Mating Connector Supplied

DIGI-DATA CORP.
BLADENSBURG, MD.
SHEET 1 OF 1
LA-0103 Rev.B

PIN ASSIGNMENT, READBACK
CONNECTOR J-15

Rack Model - MS3102A-28-21P (Amphenol or Equivalent)

Portable Model - DC-37S (Cinch-Jones or Equivalent)

A	1	RECORD
B	2	STEP
C	3	INITIATE IR GAP
D	4	Not used
E	5	PARITY SELECT (See Note 3)
F	6	DATA BIT 1 (LSB)
G	7	2
H	8	4
J	9	8
K	10	A
L	11	DATA BIT B(MSB)
M	12	REMOTE START
N	13	REMOTE STOP
P	14	REMOTE REWIND
R	15	HCEC ODD PARITY ERROR (optional)
S	16	HCEC EVEN PARITY ERROR (optional)
T	17	IR GAP IN PROCESS/END IRG
U	18	EOT SIGNAL
V	19	BOT SIGNAL
W	20	SLEW CLOCK (optional)
X	21	REMOTE EOF
Z	22	
a	23	
b	24	
c	25	
d	26	
e	27	
f	28	
g	29	-7VDC (@100 ma)
h	30	BROKEN TAPE
j	31	SLEW COMMAND (optional)
k	32	
m	33	See note 2
n	34	+12VDC (@ 1 amps)
p	35	DC COMMON
r	36	AC COM (optional)
s	37	SWITCHED AC LINE (optional)

7 Track

9 Track

DATA BIT 7 (LSB)

6

5

4

3

2

1

DATA BIT 0 (MSB)

NOTES:

1. Mating connectors supplied
2. Pin 33 of portable unit tied to chassis
3. Wire to +12V for Even Parity, DC Com for Odd)

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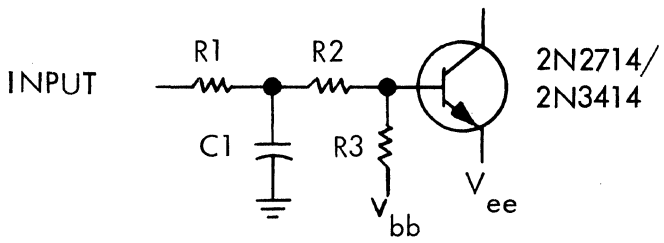
SHEET 1 OF 1

LA-0102 Rev. D

CONNECTOR PIN ASSIGNMENT - J1

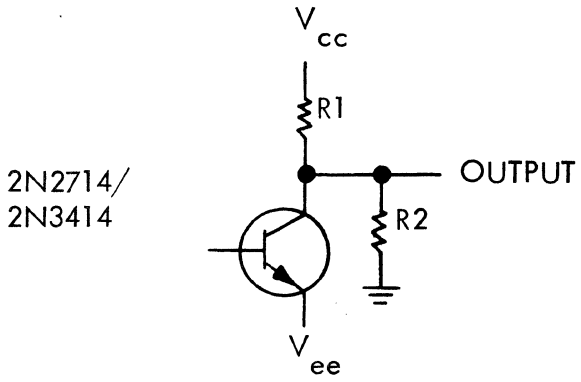


STANDARD INPUT INTERFACE

	LOW* LEVEL	HIGH* LEVEL
R1	1.5K	1.5K
R2	1.5K	15K
R3	15K	47K
C1	.001uf	.001 uf

$0VDC \leq V_{ee} \leq 0.2VDC$

$6.0VDC \leq V_{bb} \leq 8.0VDC$



STANDARD OUTPUT INTERFACE

	LOW* LEVEL	HIGH* LEVEL
R1	1.5K	1.5K
R2	1.0K	—

$0VDC \leq V_{ee} \leq 0.2VDC$

$11.5VDC \leq V_{cc} \leq 12.5VDC$

All resistors 1/4 watt, 5PCT, Metal Film; all capacitors disk ceramic, 10 PCT.
Consult factory for alternate values.

* Low Level - IC Compatible (Standard)
* High Level (Option)

SPARE PARTS LIST

(Models 13X7, 13X9, 14X7, & 14X9)

Based on operational experience, the following spare parts are recommended:

Minimum Spares:

Reel Drive O-rings (10-1/2") * (2 in a set)	$3.60
Delrin Sleeve for Take-up Reel Assembly *	$1.80
Bulb for Photo Sense Block	$1.20
Bulb for Indicator Lights	$1.20

* Model 1400 Only

In those cases where downtime must be held to an absolute minimum and at remote sites where service will not be readily available:

	7/Track	9/Track
Motor Control Card with Capstan Motor	$450.00	$450.00
Record Amplifier Card		
- without Head Current Echo Check	$180.00	$210.00
- with Head Current Echo Check	$300.00	$360.00
Cyclical Redundancy Check Character Card		$360.00
Power Supply Card	$300.00	$300.00
Parity Generator Card	$300.00	$360.00
Playback Amplifier Card (Read Option)	$300.00	$360.00
Read Storage Card (Read Option)	$300.00	$360.00
VR-01 (500 char/sec units)	$120.00	$120.00

NOTES:

1. Spares ordered for shipment with initial shipment of the tape unit are sold at 20% off above prices.
2. The Motor Control Card can be ordered without capstan motor for delivery with initial shipment, price $150.00.
3. The serial and model number of the tape unit should be supplied when ordering spare parts after initial shipment.

DIGI-DATA CORPORATION
4315 Baltimore Avenue
Bladensburg, Maryland 20710

301/277-9378

DRAWING LIST

Section 6

6.1 MECHANICAL AND REFERENCE DRAWINGS

LA-0102	Interconnection Diagram, 7 or 9 Track
LA-0103	Interconnection Diagram, 7 or 9 Track Read
LA-0108	Circuit Interface
RA-0044	Tape Loading Diagram, DSR 1300 Series
RA-0046	Card Locations
RA-0031	Outline Dimensions, DSR 1400P
RA-0004	Outline Dimensions, DSR 1400H
RA-0005	Outline Dimensions, DSR 1400V
RC-0086	Outline Dimensions, DSR 1300
RA-0022A	Inspection and Warranty

6.2 LOGIC DIAGRAMS

LC-0106	Simplified Block Diagram, 9 Track
LC-0107	Simplified Block Diagram, 7 Track

6.3 SCHEMATIC DIAGRAMS

SC-0101	Schematic Diagram, PS9-01, Power Supply
SC-0104	Schematic Diagram, CR9-01, Cyclic Redundancy Check Character Generator
SC-0105	Schematic Diagram, RA9-01, Record Amplifiers, 9-Track
SC-0106	Schematic Diagram, RA7-01, Record Amplifiers, 7-Track
SC-0112	Schematic Diagram, PG9-03, Parity & Gap Generator
SC-0113	Schematic Diagram, MC9-03, Motor Control
SB-0102	Schematic Diagram, RDC-01, Rectifier Supply
SC-0109	Control Schematic, DSR 1300 Series
SB-0101	Control Schematic, DSR 1400 Series

6.4 CARD ASSEMBLIES

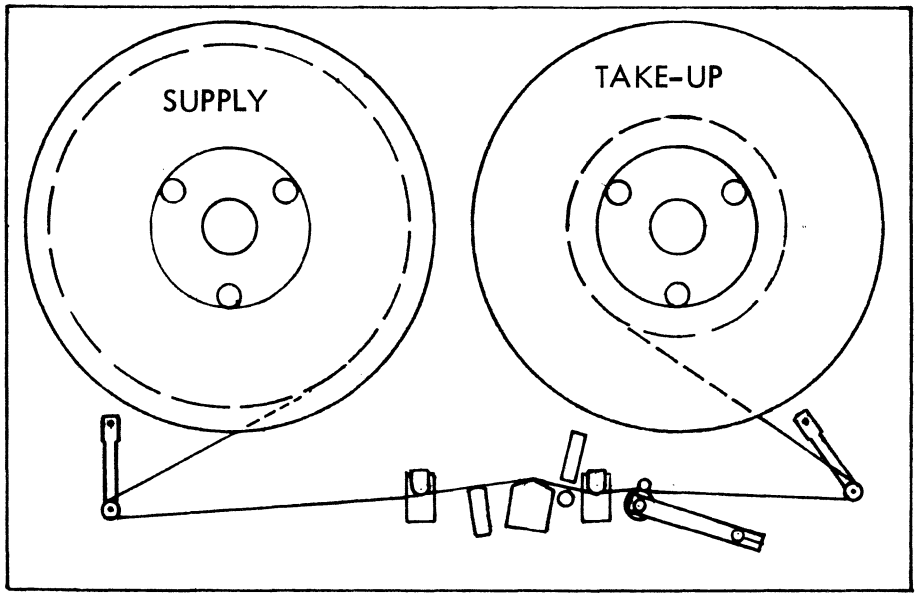
CC-0101	Assembly, PS9-01, Power Supply
CC-0102	Assembly, MC9-03, Motor Control
CC-0104	Assembly, CR9-01, Cyclic Redundancy Check Character Generator
CC-0105	Assembly, RA9-01, Record Amplifier, 9 Track
CC-0106	Assembly, RA7-01, Record Amplifier, 7 Track
CC-0109	Assembly, RDC-01, Rectifier Supply
CC-0112	Assembly, PG9-03, Parity & Gap Generator

SOCKET	DSR 1300		DSR 1400 H & V		DSR 1400P	
	7-TRACK	9-TRACK	7-TRACK	9-TRACK	7-TRACK	9-TRACK
J3						
J4						
J5						
J6					PG9-	PG9-
J7						CR9-
J8	RA7-	RA9-	RA7-	RA9-	RA7-	RA9-
J9		CR9-		CR9-		
J10	PG9-	PG9-	PG9-	PG9-		
J11	MC9-	MC9-	MC9-	MC9-	MC9-	MC9-
J12						
J13	PS9-	PS9-	PS9-	PS9-	PS9-	PS9-

CARD LOCATIONS
DSR 1300 and 1400 Series

DIGI-DATA CORP.
BLADENSBURG, MD.

SHEET 1 OF 1 | RA-0046



TAPE PATH DIAGRAM - 1300 SERIES	**DIGI-DATA CORP.** BLADENSBURG, MD.
DRAWN M. 9/5/68 SCALE 1/4	SHEET 1 OF 1 | RA-0044

INSPECTION AND WARRANTY

INSPECTION OF RECORDERS

The recorder should be inspected immediately after receipt. Press down on the printed circuit cards to insure that they are firmly in place in their sockets.

After visual inspection, the recorder should be operated and tested. All Digi-Data recorders are thoroughly tested at the factory and should be in perfect operating condition when received by the customer.

If the unit has been damaged in any way during shipment, a claim should be filed with the carrier and a copy of the claim forwarded to Digi-Data Corporation. We then will advise you of the best way to arrange repair of the damaged equipment.

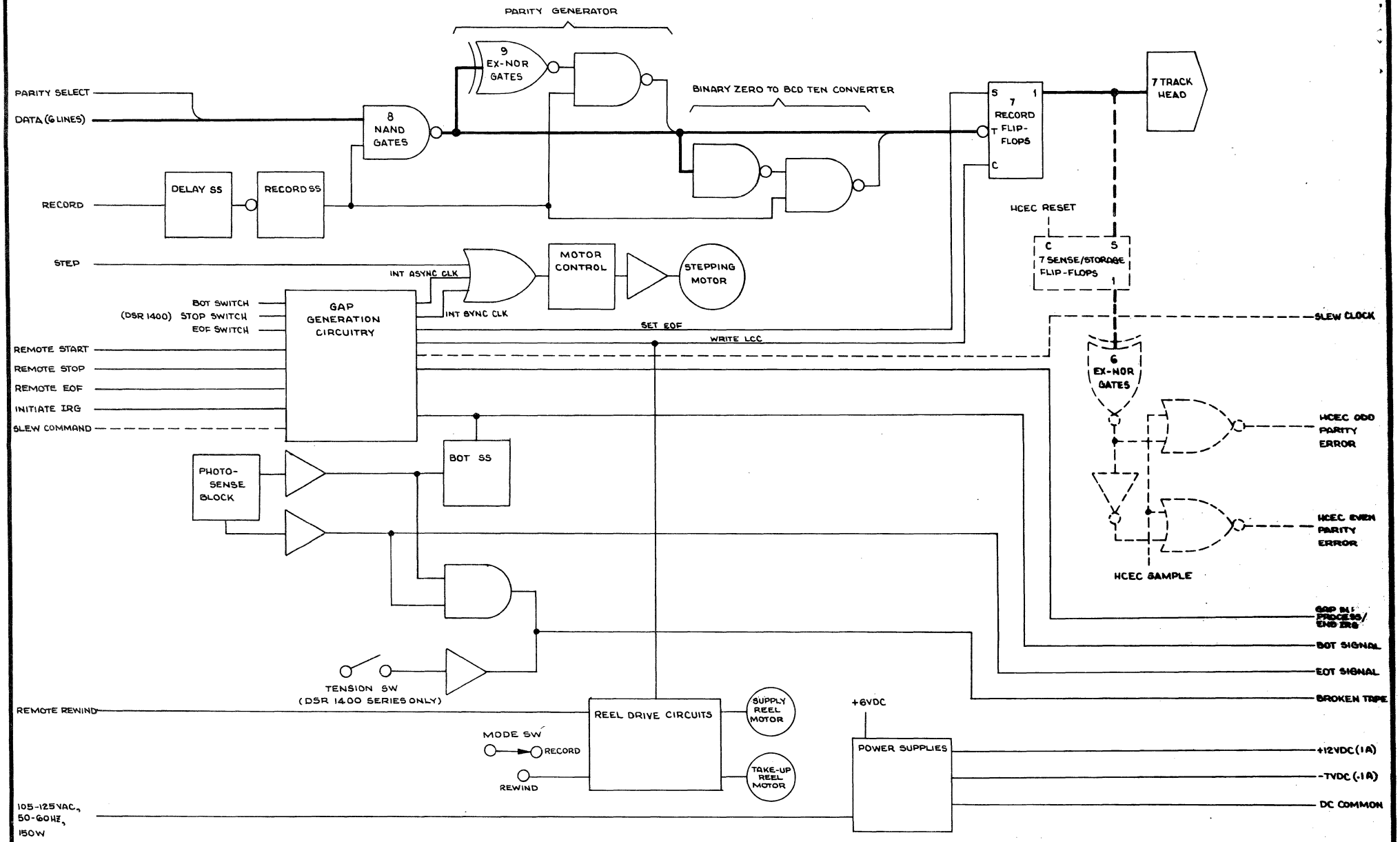
WARRANTY

Digi-Data Corporation warrants each recorder to be free from defects in material and workmanship. In support of this warranty, Digi-Data guarantees to service or adjust, for one year from the date of delivery of the recorder to the original purchaser, any defective parts, provided transportation charges have been prepaid by the customer and our inspection discloses to our satisfaction that the equipment is defective in material or workmanship. If misuse or abnormal conditions of operation are determined to be the cause of improper operation of the recorder, however, repairs will be billed at cost; in the latter situation, an estimate will be submitted to the customer prior to initiating repair of the equipment.

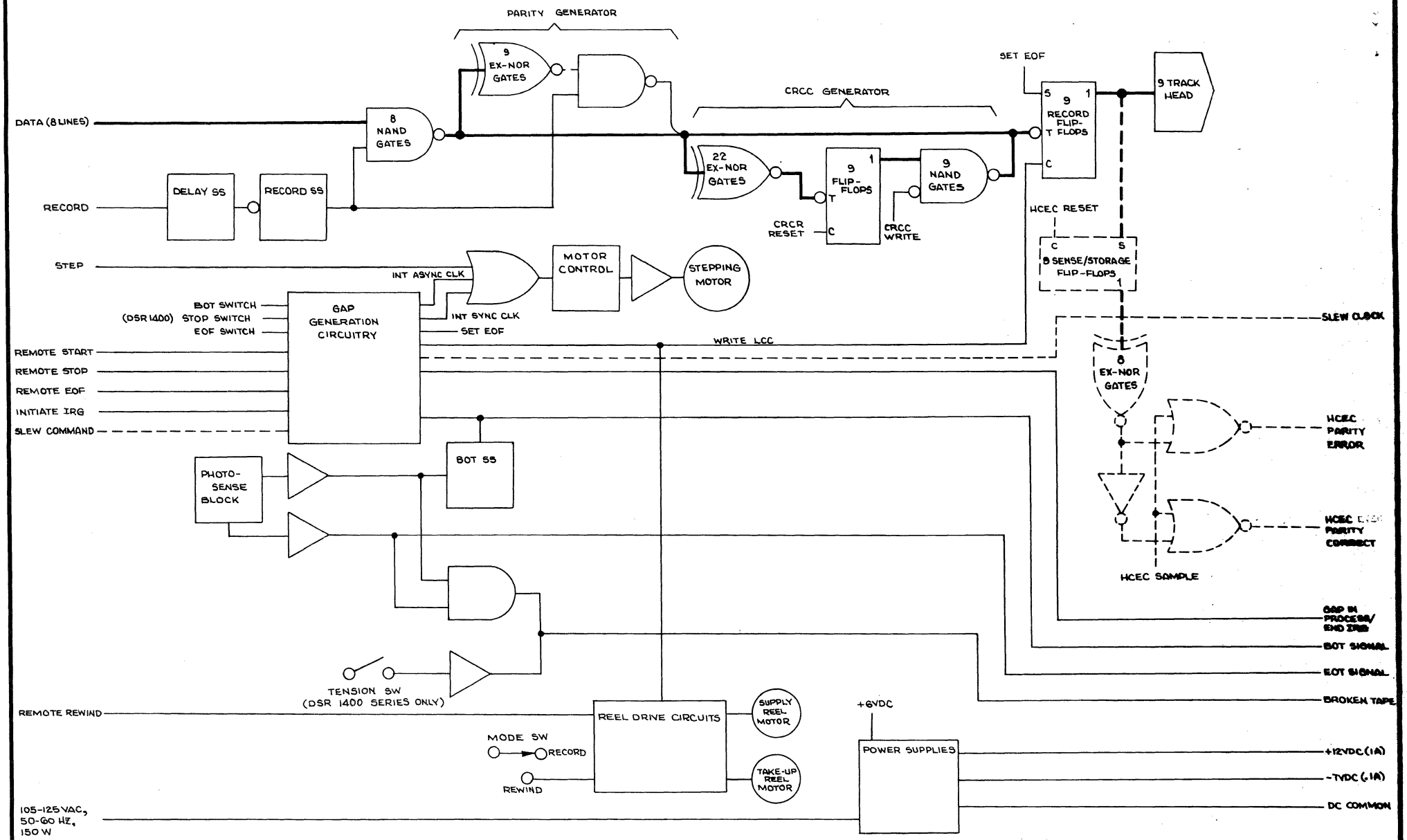
If any fault should develop in the recorder, please notify Digi-Data Corporation, giving us full details of the irregularity and including the model and serial numbers of the recorder. We will provide you with service instructions or shipping details immediately upon receipt of your notification.

SHIPPING

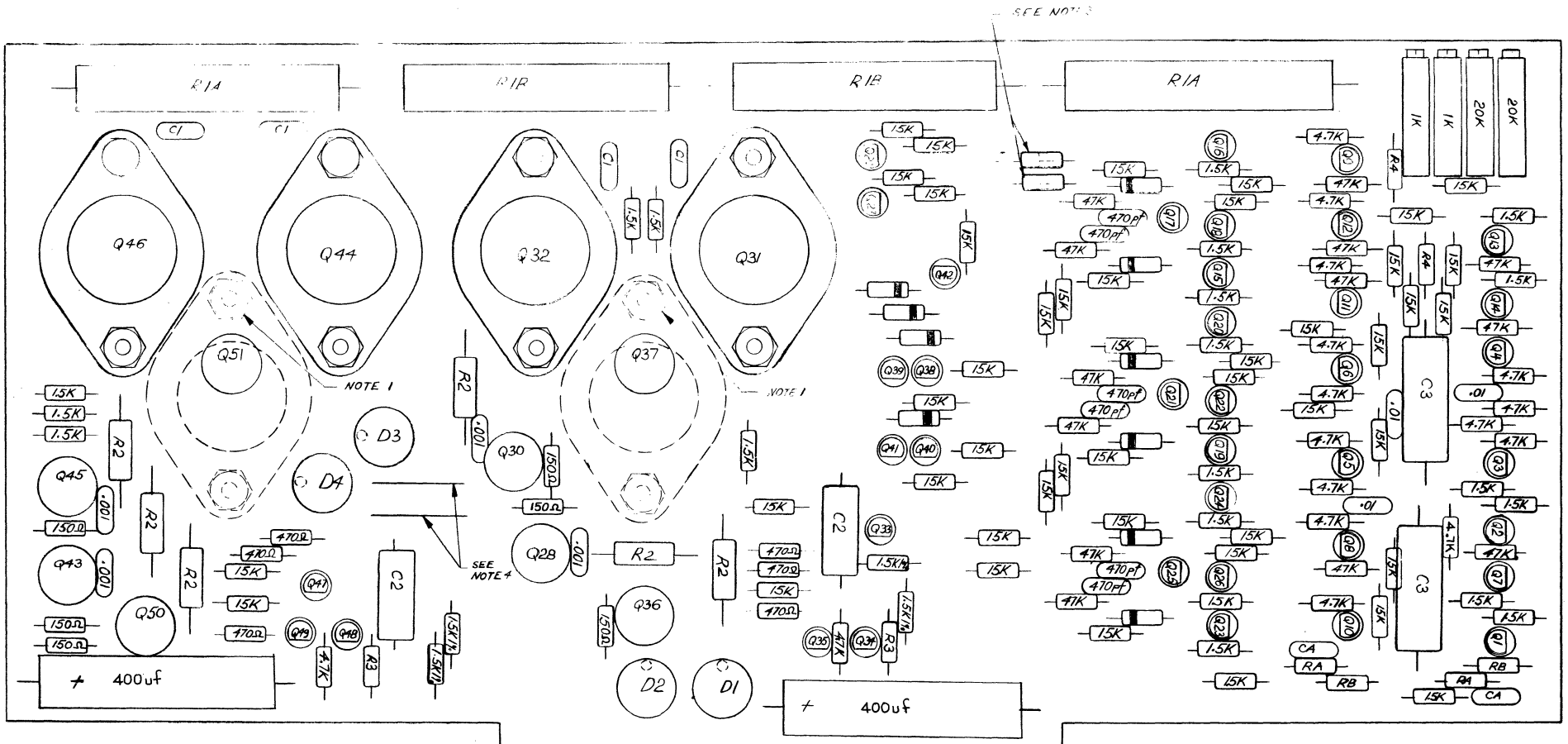
All shipments of Digi-Data equipment should be made via major airline or air freight carriers and within original containers if possible. Otherwise, recorders should be surrounded by not less than two inches of rubberized hair or similar shock-absorbing material and enclosed in heavy cardboard boxes. The initial cardboard box then must be packed in a wooden box or second heavy-weight cardboard box. Digi-Data Corporation assumes no responsibility for damage to recorders which have been improperly packed.



SIMPLIFIED BLOCK DIAGRAM, 7-TRACK DSR 1300 & 1400 SERIES	DIGI-DATA CORP. BLADENSBURG, MD.	
DRN: GHC III 7 SEP 68	SHEET 1 OF 1	LC - 0107



SIMPLIFIED BLOCK DIAGRAM, 9-TRACK DSR 1300 & 1400 SERIES	DIGI-DATA CORP. BLADENSBURG, MD.
DRN: GHC III 7 SEP 68	SHEET 1 OF 1 — LC-0106



	HIGH LEVEL	LOW LEVEL	
RA	15K	1.5K	
RB	47K	15K	
CA	.001μf	.001μf	

	-1 300CPS	-2 400CPS	-3 500CPS	-4	-5
R1A	6Ω 10W	1.8Ω 10W	JUMPER		
R1B	MATCHED	1.8Ω 10W			
R2	150Ω/1/2W	47Ω 3W	47Ω 3W		
R3	47.5K1%	22.1K1%	68.1K1%		
R4	15K	15K	15K		
C1	—	—	.01μf		
C2 *	.847μf	.1μf	.015μf		
C3	.1μf	.1μf	.068μf		
D1-D4	JUMPER	JUMPER	IN4997		
Q37, Q51	MM3004 OR EQUIV	2N3771	2N3771 SEE NOTE1		
Q28, 30, 36 43, 45, 50	2N4402	2N4402	2N4036 OR EQUIV.		
Q31, 32, 44 46	2N3771	2N3773	2N3773		

* 2% MYLAR

22 — FAR SIDE — 1

Z — NEAR SIDE — A

NOTES :

1. USE NYLON SCREW ON -3 ASSEMBLY
2. COMPONENTS ASSEMBLY SHOWN TYPICAL MINOR EQUIPMENT MODIFICATION MAY NECCESITATE DEVIATION FROM VALUES SHOWN
3. BOARD POSITION DETERMINED BY STEPPING MOTOR ADJUSTMENT (470Ω)
4. AWG #20 BUS, 2 PLACES
5. MM3004 EQUIVALENTS : MM2264, 2N3771, MJE 3055

QTY	DESCRIPTION		QTY	DESCRIPTION	
39	TRANSISTOR	2N2714/3714	3	CAPACITOR CERAMIC	.01μf
			4	—"— —"—	.001μf
10	DIODES	IN457	6	—"— —"—	470pf
			2	CAPACITOR ELECTROLYT.	400uf
12	RESISTOR 1/4 W 5%	47K			
44	—"— —"—	15K			
15	—"— —"—	4.7K			
23	—"— —"—	1.5K			
8	—"— —"—	470Ω			
6	RESISTOR 1/4 W 5%	150Ω			
2	POTENTIOMETER	20K			
2	—"—	1K			

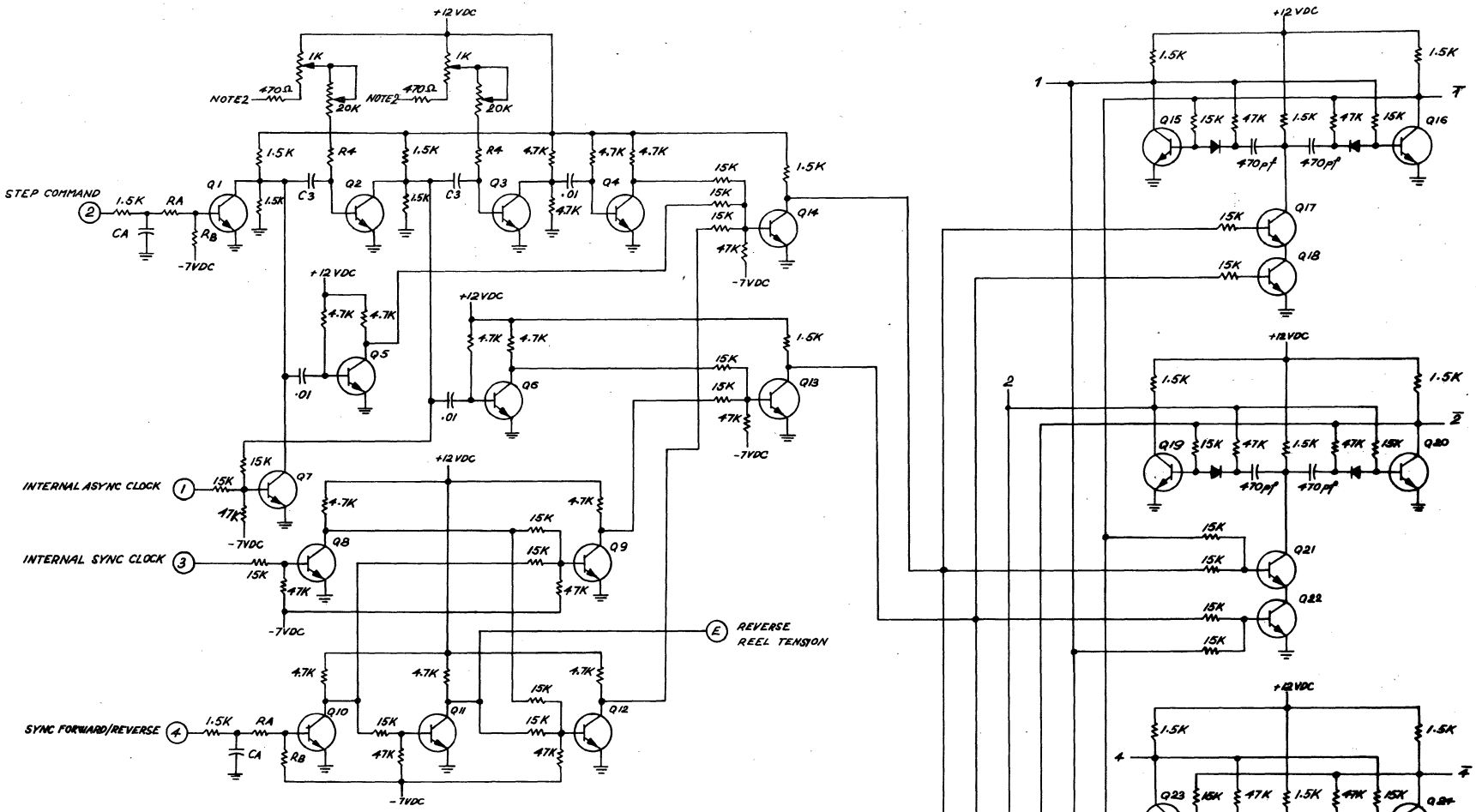
ASSEMBLY DIAGRAM MC 9-03

DRAWN · STOKLAS 7 JANUARY 1969

DIGI-DATA CORP.

BLADENSBURG, MD.

SHEET 1 OF 1 | CC - 113 | REV E



NOTES:

1. UNLESS OTHERWISE SPECIFIED:
   ALL RESISTORS 1/4 W, ± 5 PCT
   ALL DIODES IN457
2. CONNECTED TO 1 OR $\overline{1}$ THRU BOARD POSITION

	HIGH LEVEL	LOW LEVEL	
RA	15K	1.5K	
RB	47K	15K	
CA	.001 μf	.001 μf	

	-1	-2	-3	-4	-5	-6
R1A	6Ω 10W	18Ω 10%	JUMPER			
R1B	MATCHED	18Ω 10W	JUMPER			
R2	150Ω 1/2 W	47Ω 3W	47Ω 3W			
R3	47.5K 1%	22.1K 1%	68.1K 1%			
R4	15K	15K	15K			
C1	—	—	.01 μf			
C2 *	.047 μf	.1 μf	.015uf			
C3	.1 μf	.1uf	.068 μf			

300 CPS 400 CPS 500 CPS

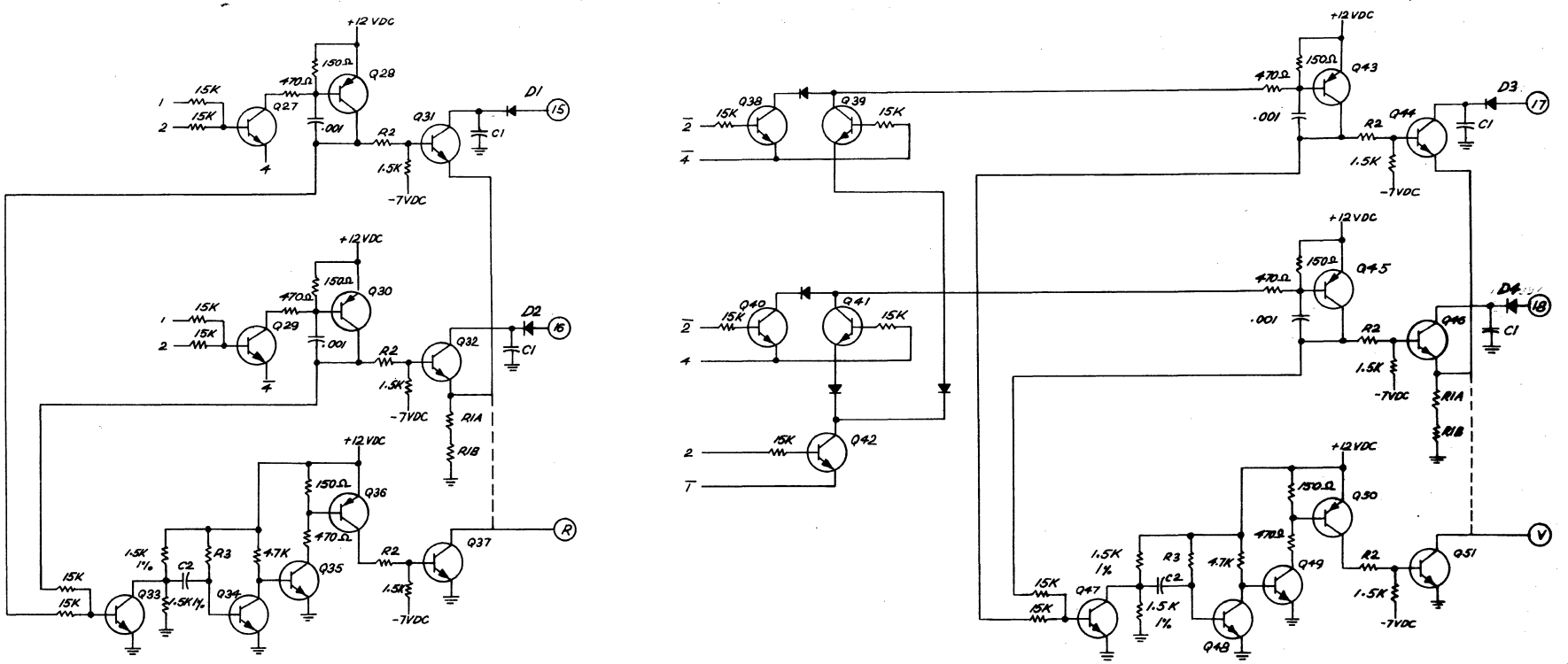
* 2% MYLAR

SCHEMATIC DIAGRAM MC9-03

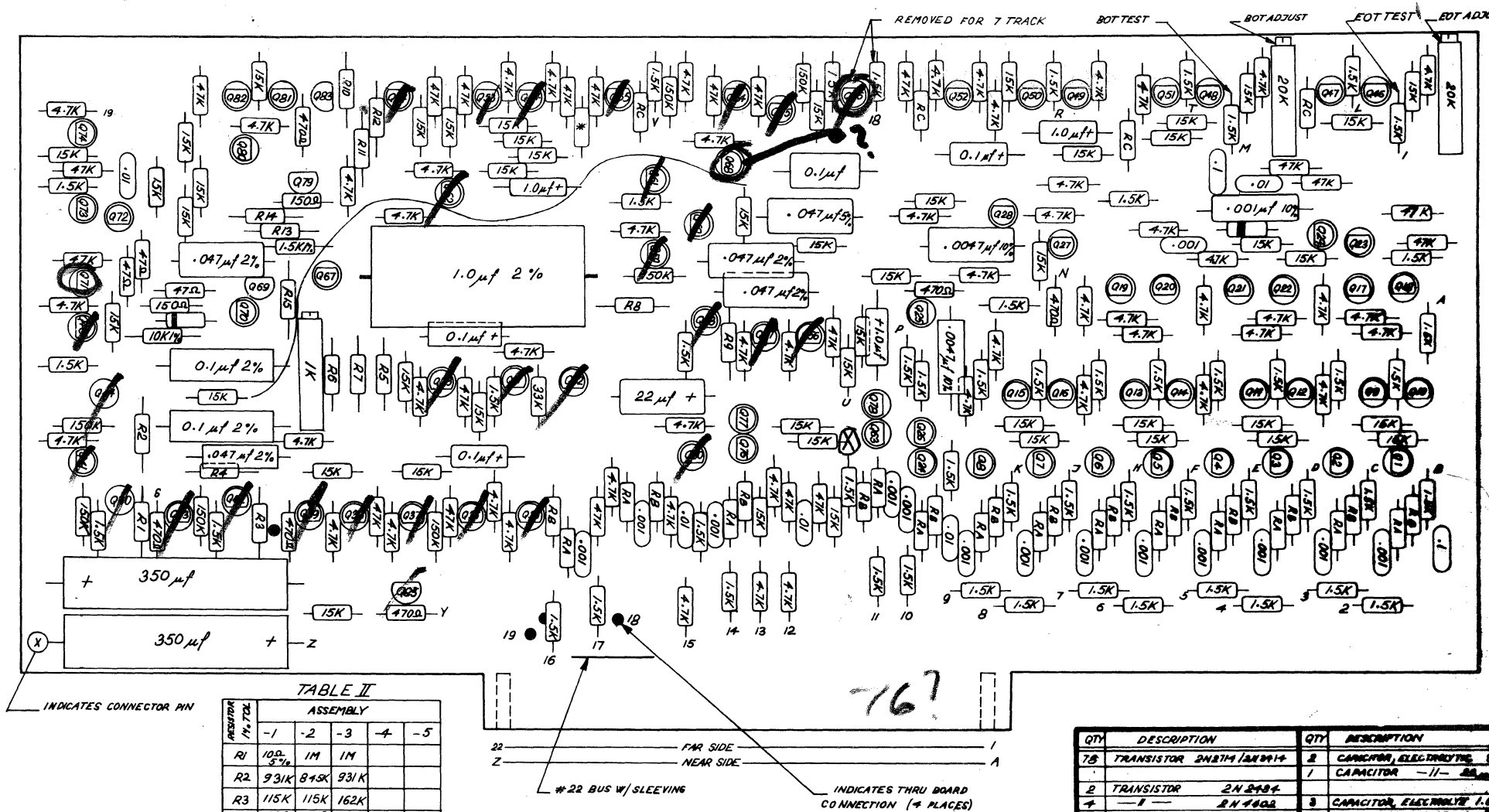
DIGI-DATA CORP.
BLADENSBURG, MD.

DRAWN: Stokes 12 DECEMBER 1968.

SHEET 1 OF 2 | SC - 113 | REV B



SCHEMATIC DIAGRAM MC9-03	DIGI-DATA CORP. BLADENSBURG, MD	
DRAWN: Nichols 13 DECEMBER 1968	SHEET 2 OF 2	SC-113 REV A



767

TABLE I

	INTERFACE	
	HIGH LEVEL	LOW LEVEL
RA	15K	1.5K
RB	4.7K	15K
RC	NOT INSTALLED	1.0K

TABLE II

RESIST. NO. TOL.	ASSEMBLY -1	-2	-3	-4	-5
R1	10Ω 5%	1M	1M		
R2	931K	845K	931K		
R3	115K	115K	162K		
R4	10Ω 5%	10Ω 5%	10Ω 5%		
R5	—	—	—		
R6	10Ω 5%	750K	1M		
R7	909K	1M	845K		
R8	274K	499K	499K		
R9	750K	931K	931K		
R10	274K	499K	499K		
R11	3.32K	12.1K	12.1K		
R12	4.02K	2.61K	2.61K		
R13	7.5K	7.5K	7.5K		
R14	4.02K	4.02K	4.02K		
R15	19.1K	19.1K	19.1K		
	200 BPI	556 BPI	800 BPI		

0-300 CPS UNITS

NOTES:

1. UNLESS OTHERWISE SPECIFIED:
   ALL RESISTORS 1/4 W, 5 PCT TOL.
   ALL CAPACITORS IN µF
   ALL TRANSISTORS 2N2714/2N3414
2. COMPONENTS LISTED IN TABLES I & II NOT INCLUDED IN PARTS LIST
3. COMPONENT VALUES SHOWN TYPICAL. MINOR EQUIPMENT MODIFICATIONS MAY REQUIRE ALTERNATE VALUES.
4. COMPONENTS DESIGNATED * NOT INSTALLED
5. TRANSISTOR Q79, 83, 85, 69 = 2N4402
   Q40, 44 = 2N2484

QTY	DESCRIPTION		QTY	DESCRIPTION
78	TRANSISTOR	2N2714/2N3414	2	CAPACITOR, ELECTROLYTIC [illegible]
			1	CAPACITOR —//— 22 µf
2	TRANSISTOR	2N2484		
4	—//—	2N4402	3	CAPACITOR, ELECTROLYTIC 1.0 µf
2	DIODE	IN457	1	CAPACITOR, MYLAR 1 µf 2%
7	RESISTORS	150K	4	CAPACITOR, ELECTROLYTIC 1 µf
23	—//—	47K	2	CAPACITOR, MYLAR .1 µf 2%
1	—//—	33K	4	—//— —//— .047 µf 5%
18	—//—	15K	1	—//— —//— .047 µf 5%
1	—//—	10K 1%	5	CAPACITOR, DISK CER .01 µf
53	—//—	4.7K	2	CAPACITOR, MYLAR .0047 µf 10%
50	—//—	1.5K	14	CAPACITOR, DISK CER .001 µf
1	—//—	1.5K 1%	1	CAPACITOR, MYLAR .001 µf 1%
6	—//—	470 Ω	2	CAPACITOR, DISC CER. .1 µf
2	—//—	150 Ω		
3	—//—	47 Ω		
2	POTENTIOMETER	20K		
1	—//—	1K		

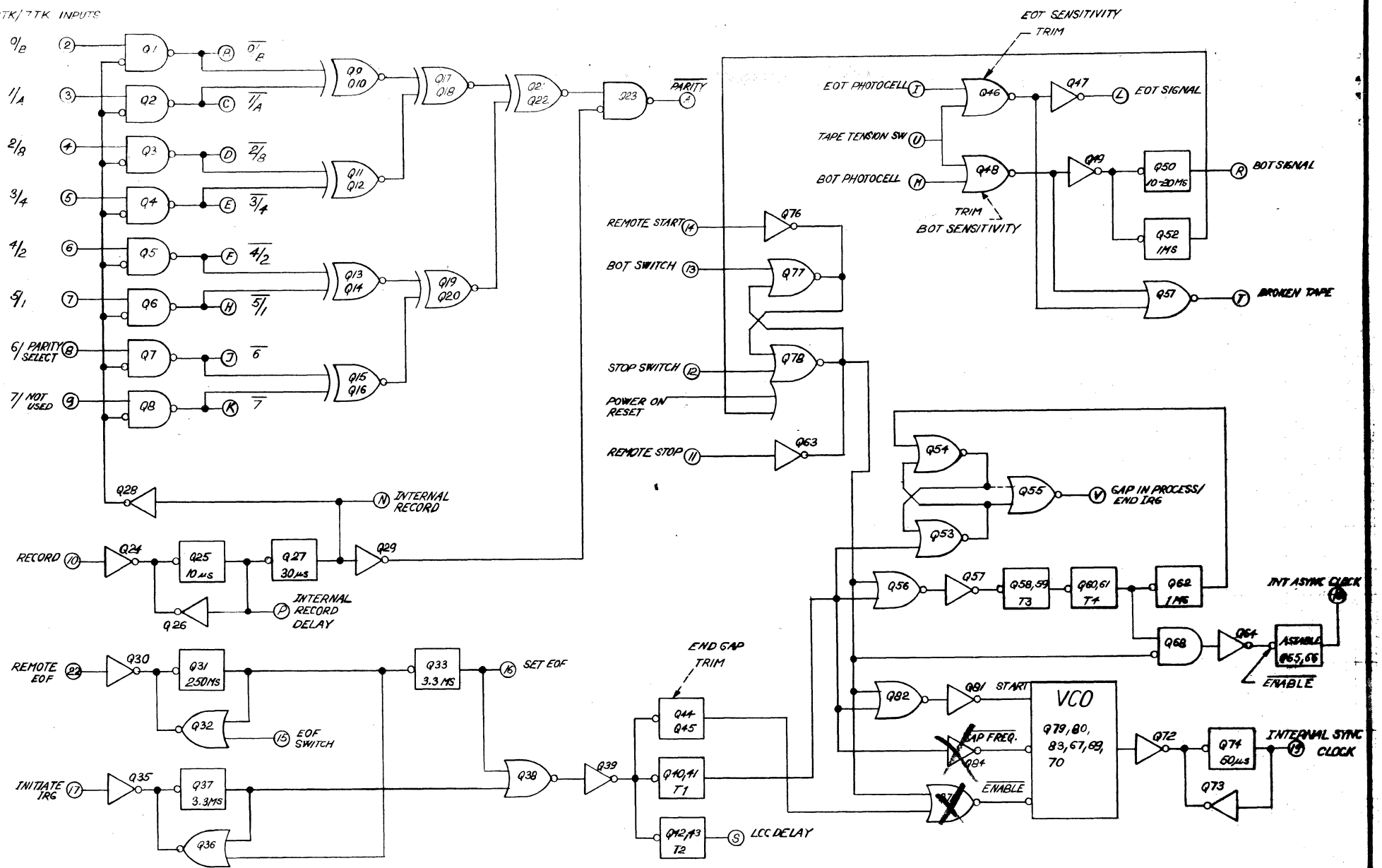
ASSEMBLY DIAGRAM PG9-03

DRAWN: Herbelan DECEMBER 11, 1968.

DIGI-DATA CORP.

BLADENSBURG, MD.

SHEET 1 OF 1 | CC - 112 | REV 0



NOTES:

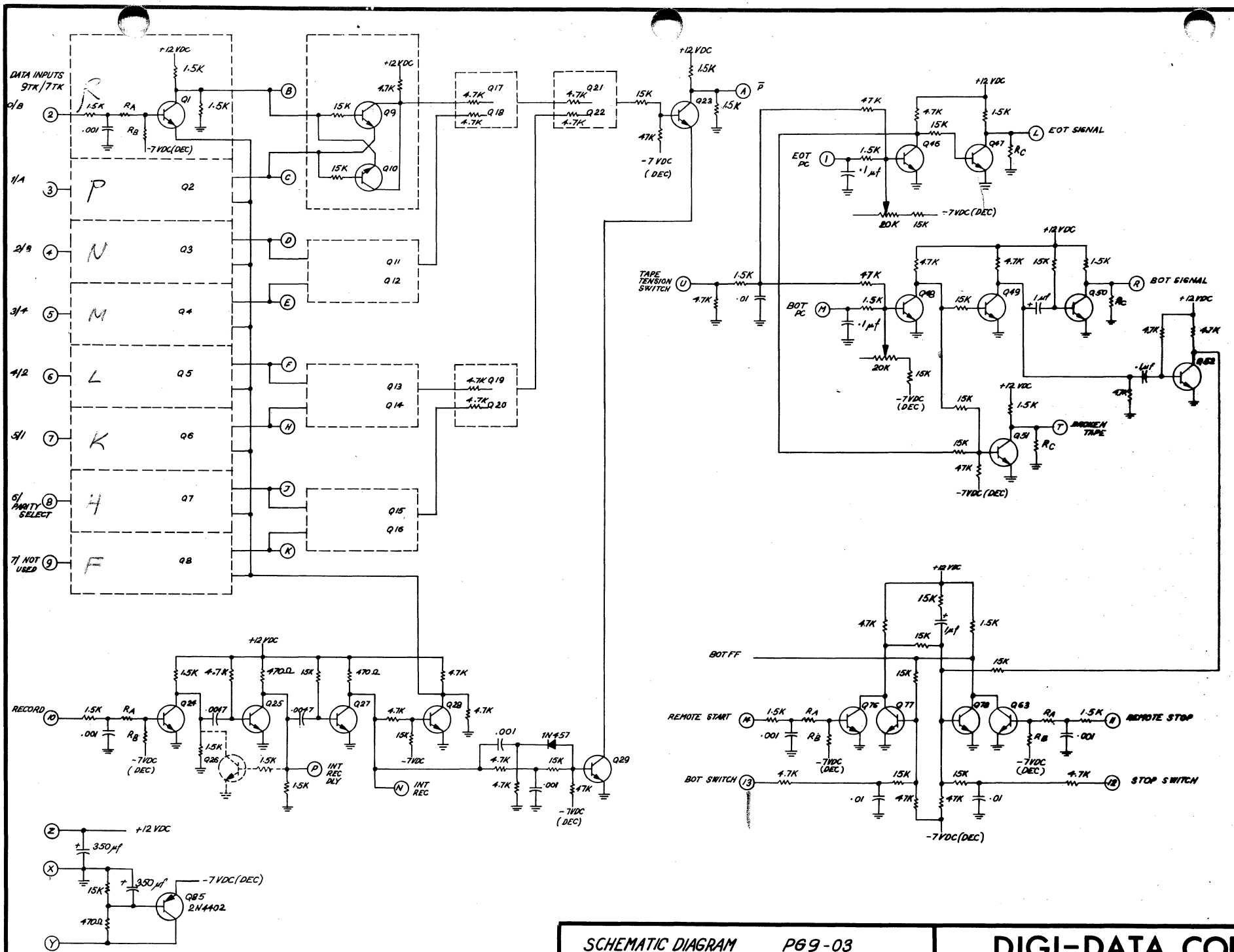
T1 GAP DURATION
T2 CHECK CHARACTER DELAY
T3 ASYNC DAMPING DELAY
T4 DAMPING DURATION

LOGIC DIAGRAM PG 9-03

DIGI-DATA CORP.
BLADENSBURG, MD.

DRAWN: Stoklas 20 MARCH 1969

SHEET 1 OF 1 | LC - 0112 | REV A



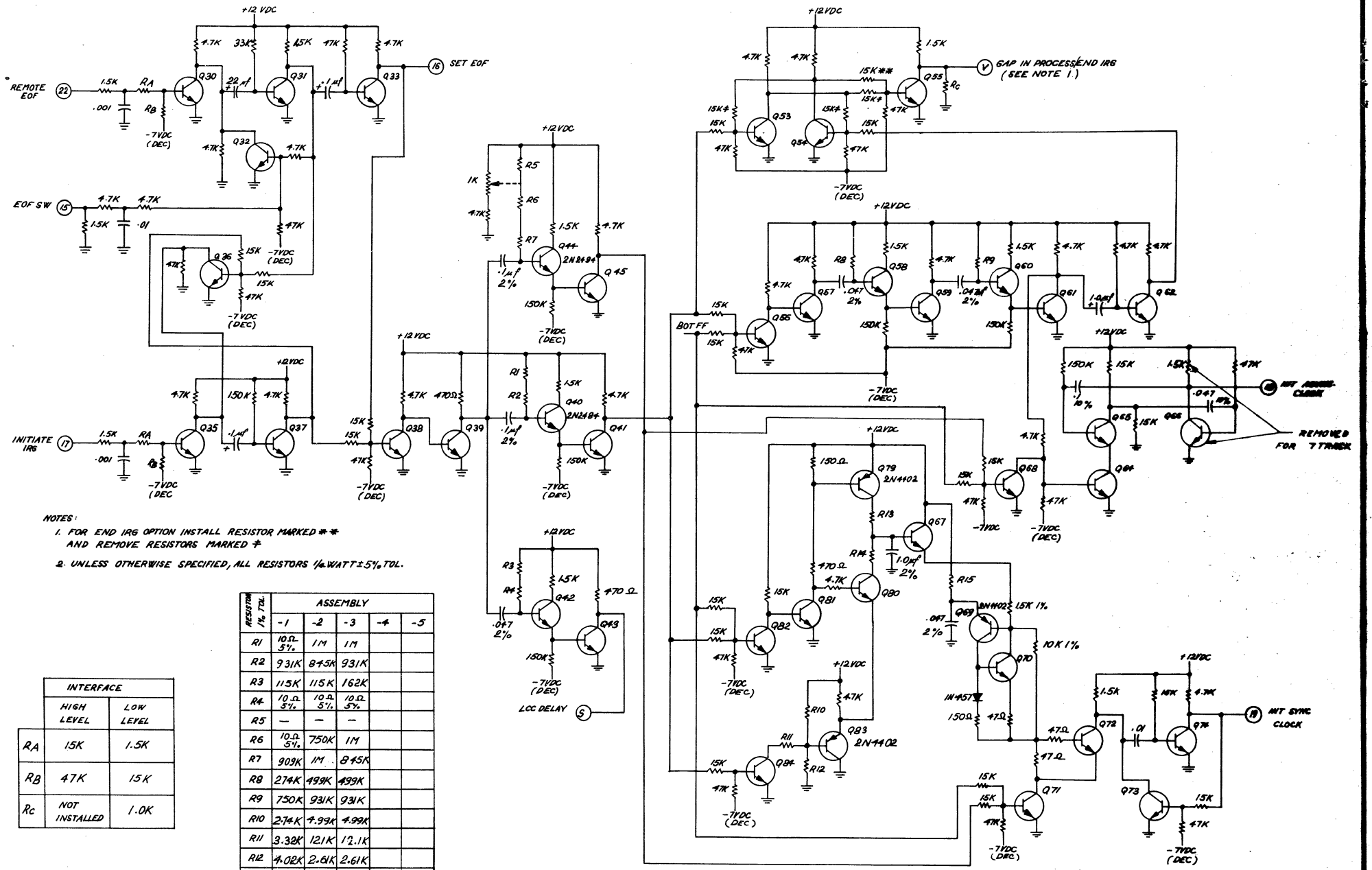
SCHEMATIC DIAGRAM PG9-03

DRAWN : Okubo 9 DECEMBER 1968.

DIGI-DATA CORP.

BLADENSBURG, MD.

SHEET 1 OF 2 | SC - 112 | REV B



NOTES:

1. FOR END IRG OPTION INSTALL RESISTOR MARKED ** AND REMOVE RESISTORS MARKED ≠
2. UNLESS OTHERWISE SPECIFIED, ALL RESISTORS 1/4 WATT ±5% TOL.

	INTERFACE	
	HIGH LEVEL	LOW LEVEL
RA	15K	1.5K
RB	47K	15K
Rc	NOT INSTALLED	1.0K

RESISTOR 1% TOL.	ASSEMBLY -1	-2	-3	-4	-5
R1	10Ω 5%	1M	1M		
R2	931K	845K	931K		
R3	115K	115K	162K		
R4	10Ω 5%	10Ω 5%	10Ω 5%		
R5	—	—	—		
R6	10Ω 5%	750K	1M		
R7	909K	1M	845K		
R8	274K	499K	499K		
R9	750K	931K	931K		
R10	2.74K	4.99K	4.99K		
R11	3.32K	12.1K	12.1K		
R12	4.02K	2.61K	2.61K		
R13	7.5K	7.5K	7.5K		
R14	4.02K	4.02K	4.02K		
R15	19.1K	19.1K	19.1K		
	200 BPI	556 BPI	800 BPI		

0-300 CAS UNITS

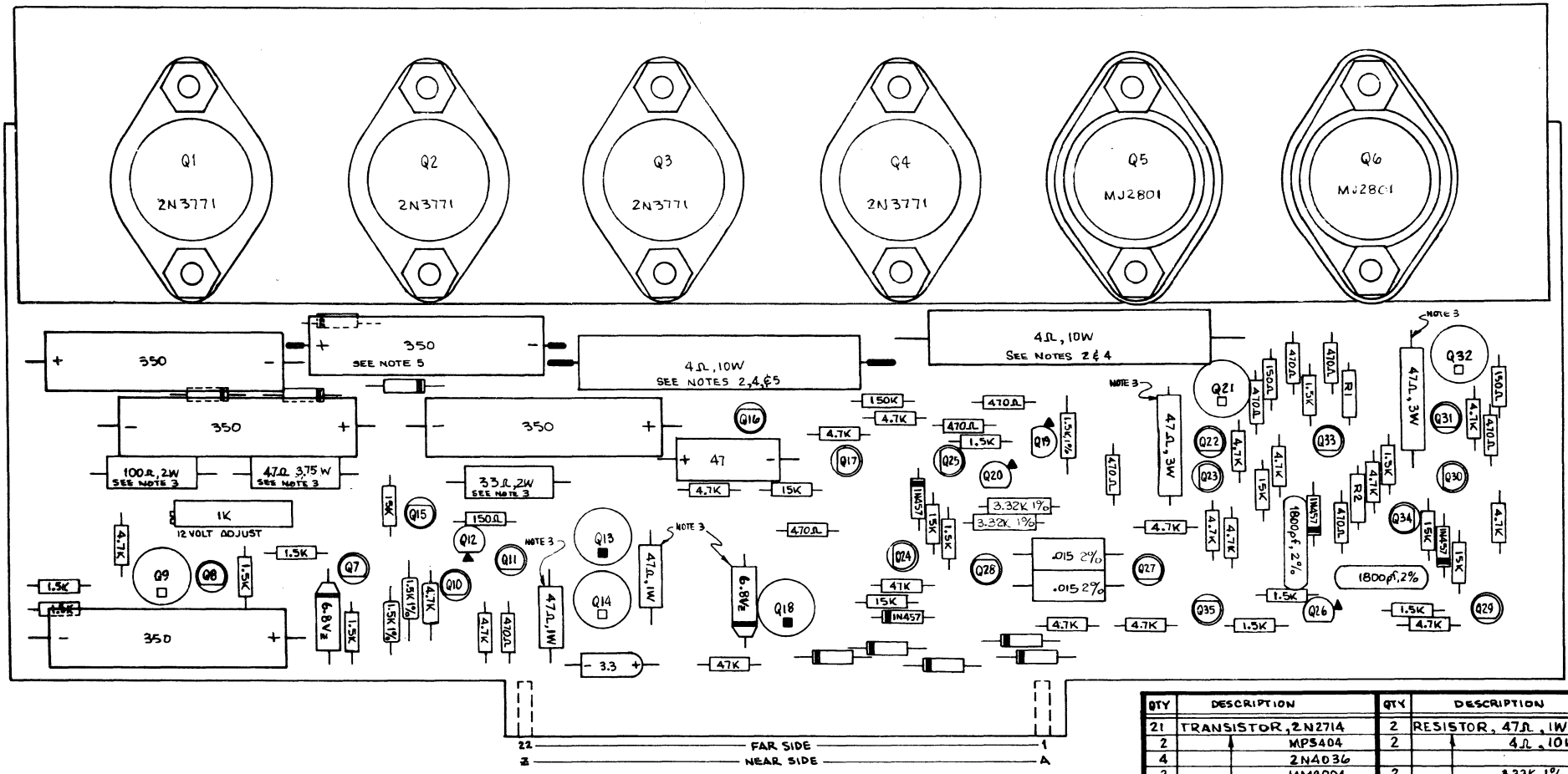
SCHEMATIC DIAGRAM PG9-03

DRAWN: Hoskins 10 DECEMBER 1968.

DIGI-DATA CORP.

BLADENSBURG, MD.

SHEET 2 OF 2 | SC - 112 | REV B



NOTES:

1. UNLESS SPECIFIED;
   ALL RESISTORS ARE 1/4 W, ± 5%
   ALL CAPACITORS ARE IN MICRO FARADS
2. COMPONENT COUNT EXCLUSIVE OF ONLY REFERENCE DESIGNATED COMPONENTS
3. MOUNT 1/8 IN. ABOVE SURFACE OF BOARD.
4. MOUNT 1/4 IN. ABOVE SURFACE OF BOARD.
5. SLEEVE LEADS ABOVE BOARD

▲ MPS 404 (2 PLACES)
□ 2N4036 (4 PLACES)
■ MM3004 (2 PLACES)

	DSR 1300	DSR 1400		
R1	10K	3.32K		
R2	10K	3.32K		

ABOVE RESISTORS $\frac{1}{8}$ W, 1 PCT

QTY	DESCRIPTION
21	TRANSISTOR, 2N2714
2	MPS404
4	2N4036
2	MM3004
2	MJ2801
4	TRANSISTOR, 2N3771
9	DIODE, IN4002/GE A14F
4	DIODE, IN457
2	DIODE, ZENER, 6.8VZ
1	RESISTOR, 150K
2	47K
7	15K
16	4.7K
12	1.5K
10	470Ω
3	150Ω
2	47Ω, 3W
2	100Ω, 2W
1	RESISTOR, 33Ω, 2W

QTY	DESCRIPTION
2	RESISTOR, 47Ω, 1W
2	4Ω, 10W
2	3.32K, 1%, 1/8W
3	RESISTOR, 1.5K, 1%, 1/8W
1	POTENTIOMETER, 1K
5	CAPACITOR, ELECTROLYTIC, 350 µfd
1	ELECTROLYTIC, 47 µfd
1	TANTALUM, 3.3 µfd
2	MYLAR, .015 µfd
2	CAPACITOR, CERAMIC, 1800 µfd, 2%

ASSEMBLY, LOGIC CARD, PS9-01

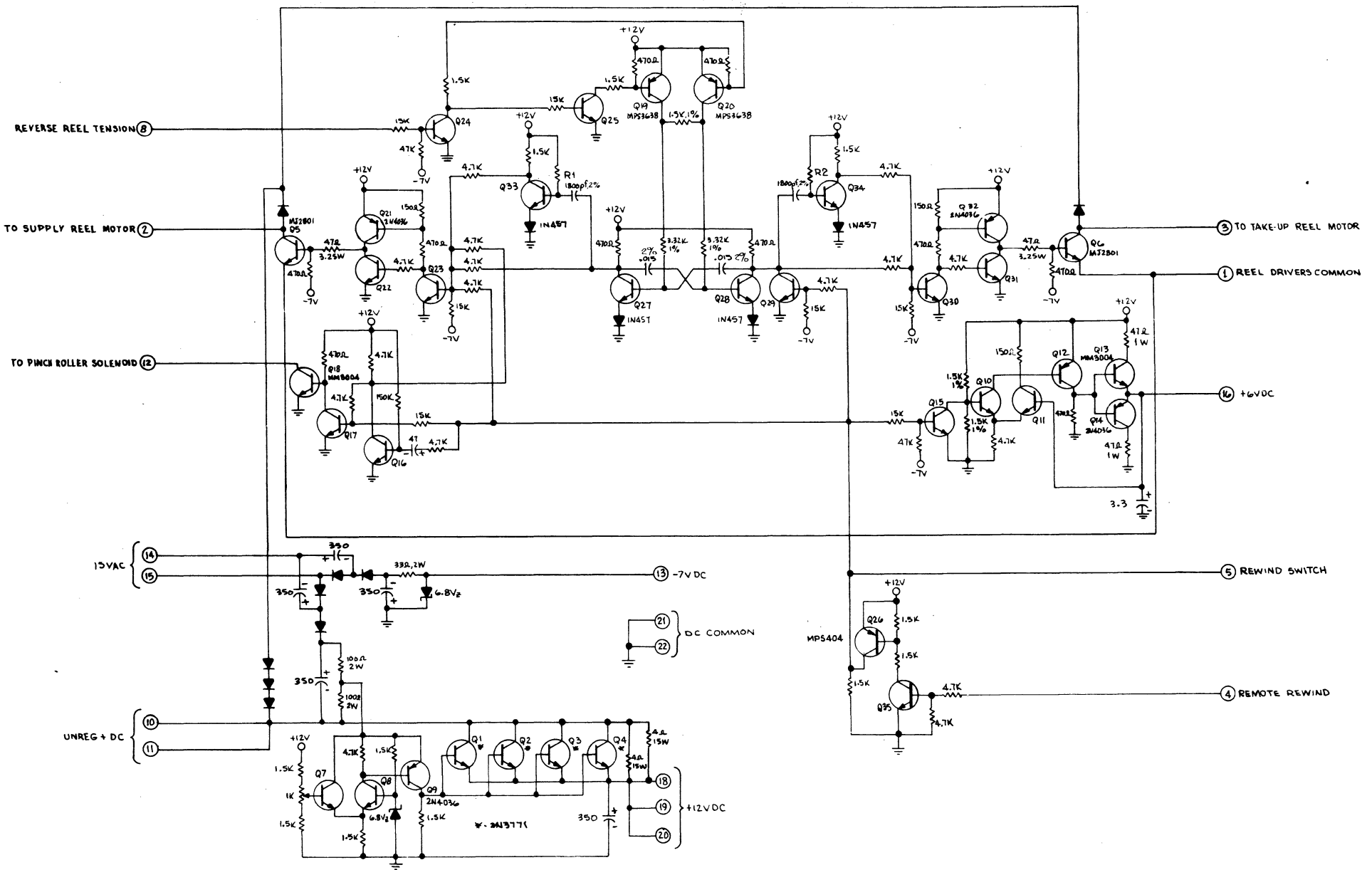
POWER SUPPLY

DRAWN: WM A. MAHER 21 MAR 1968

DIGI-DATA CORP.

BLADENSBURG, MD.

SHEET 1 OF 1 | CC-0101 | REV B



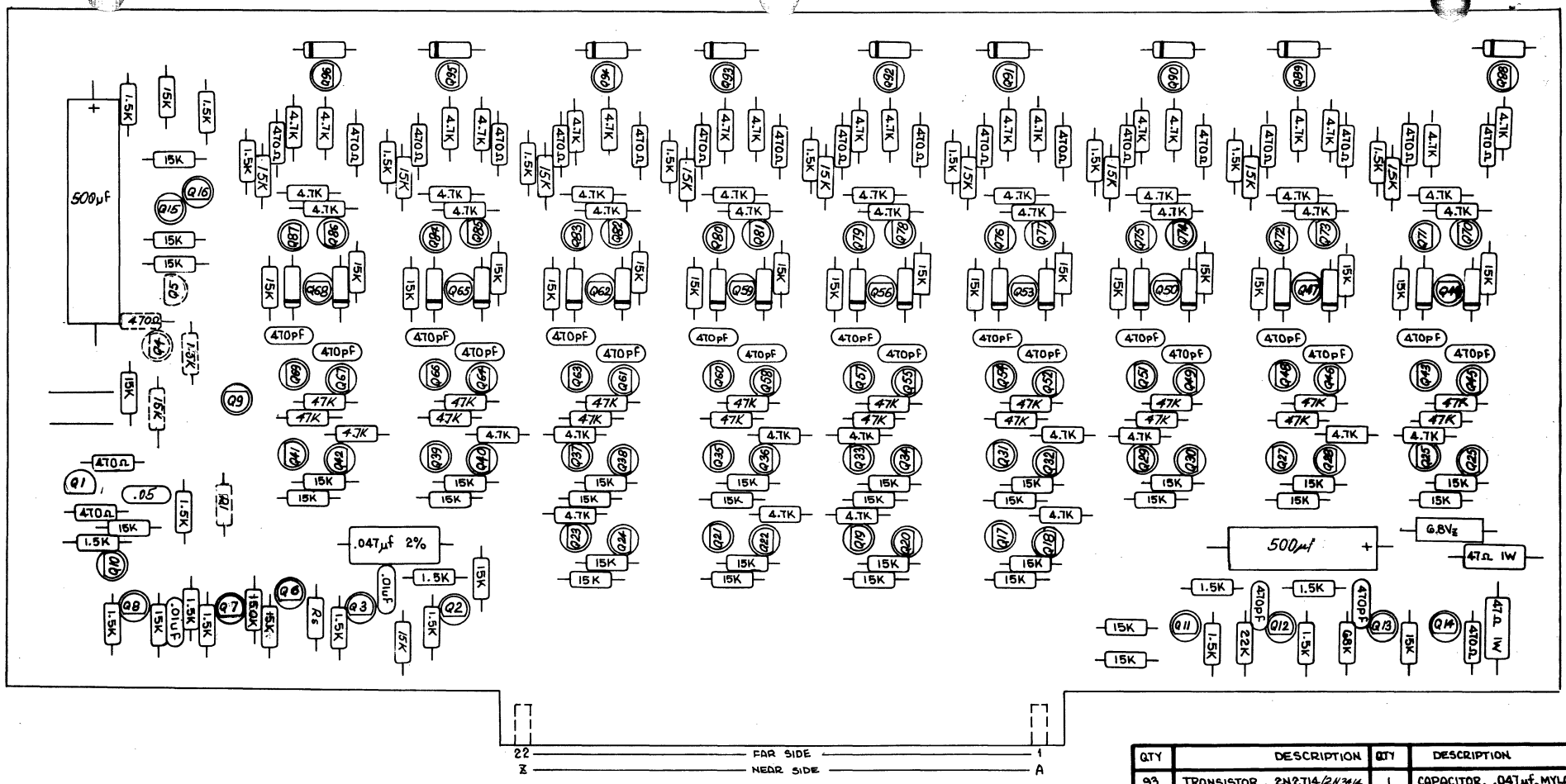
NOTES:
1. ALL TRANSISTORS ARE 2N2714 UNLESS SPECIFIED.
2. ALL RESISTORS ARE 1/4W, ±5%, UNLESS SPECIFIED.
3. ALL CAPACITORS ARE IN MICROFARADS, UNLESS SPECIFIED.
4. ALL DIODES ARE IN4002, UNLESS SPECIFIED.
5. SEE CC-0101 FOR REFERENCE DESIGNATED VALUES

SCHEMATIC DIAGRAM, PS9-01
POWER SUPPLY

DRAWN: WM A MAHER 21DEC1967

DIGI-DATA CORP.
BLADENSBURG, MD.

SHEET 1 OF 1 | SC-0101 | REV B



NOTES:

1. UNLESS OTHERWISE SPECIFIED:
   ALL RESISTORS 1/4W, ±5%
2. Rs VALUE SELECTED TO UNIT

QTY	DESCRIPTION	QTY	DESCRIPTION
93	TRANSISTOR, 2N2714/2N3114	1	CAPACITOR, .047µf, MYLAR, 2%
1	TRANSISTOR, MPS 404	2	CAPACITOR, ELECTROLYT. 500µf
27	DIODE, IN457		CAPACITOR, ELECTROLYTIC,
1	DIODE, ZENER, 6.8V	1	CAPACITOR, DISC CER .05µf
2	RESISTOR, 47Ω, 1W		
21	RESISTOR, 470Ω	18	RESISTOR 1/4W 5% 47K
30	RESISTOR, 1.5K		
49	RESISTOR, 4.7K		
48	RESISTOR, 15K		
1	RESISTOR, 150K		
1	RESISTOR, 68K		
1	RESISTOR, 22K		
1	RESISTOR, PRECISION,		
20	CAPACITOR, DISK CER, 470 pF		
2	CAPACITOR, DISK CER, .01µf		

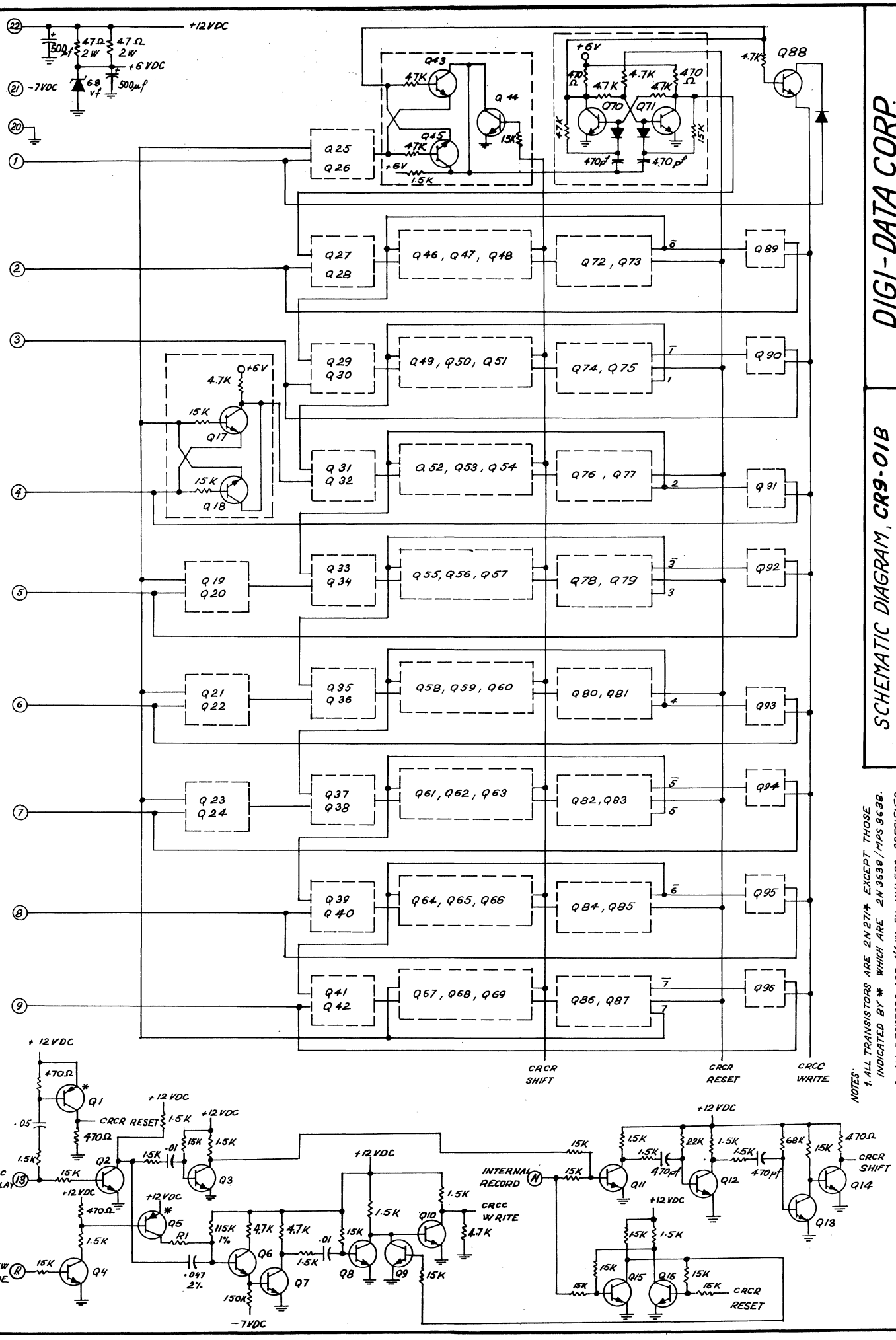
ASSEMBLY, CR9-01B

DWN: GHC III 25 OCT 68

DIGI-DATA CORP.

BLADENSBURG, MD.

SHEET 1 OF 1 | CC - 0104 | REV C



NOTES:
1. ALL TRANSISTORS ARE 2N2714 EXCEPT THOSE INDICATED BY * WHICH ARE 2N3638/MPS3638.
2. ALL RESISTORS ARE 1/4 W 5%, UNLESS SPECIFIED.
3. ALL CAPACITORS ARE IN MICROFARADS, UNLESS SPECIFIED.
4. ALL DIODES ARE IN457, UNLESS SPECIFIED.

DIGI-DATA CORP.
BLADENSBURG, MD

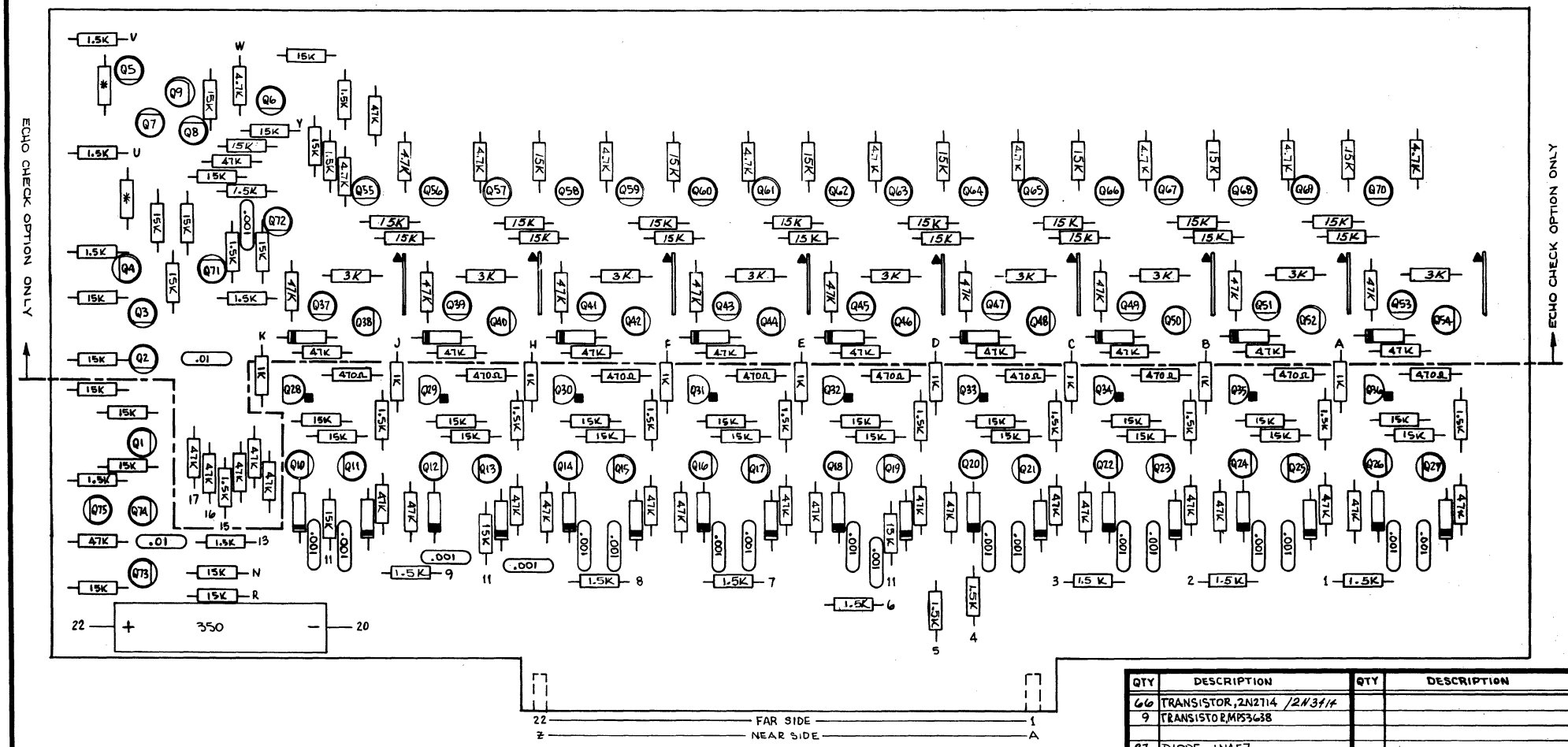
REV D

SCHEMATIC DIAGRAM, CR9-018
CYCLIC REDUNDANCY CHECK CHAR. GEN, DSP MOD 1439

SHEET 1 OF 1

SC - 0104

DRAWN: Hasan Iraf 22 OCTOBER 1968



NOTES:
1. UNLESS SPECIFIED;
   ALL RESISTORS ARE 1/4 W, ± 5%
   ALL CAPACITORS ARE IN MICRO FARADS

* SELECTED VALUE, INSTALLED FOR MICRO-CIRCUIT DRIVE COMPATABILITY ONLY.

▲ AWG 22 BUS WIRE (9 PLACES)

■ MPS 3638/MPS 4041 (9 PLACES)

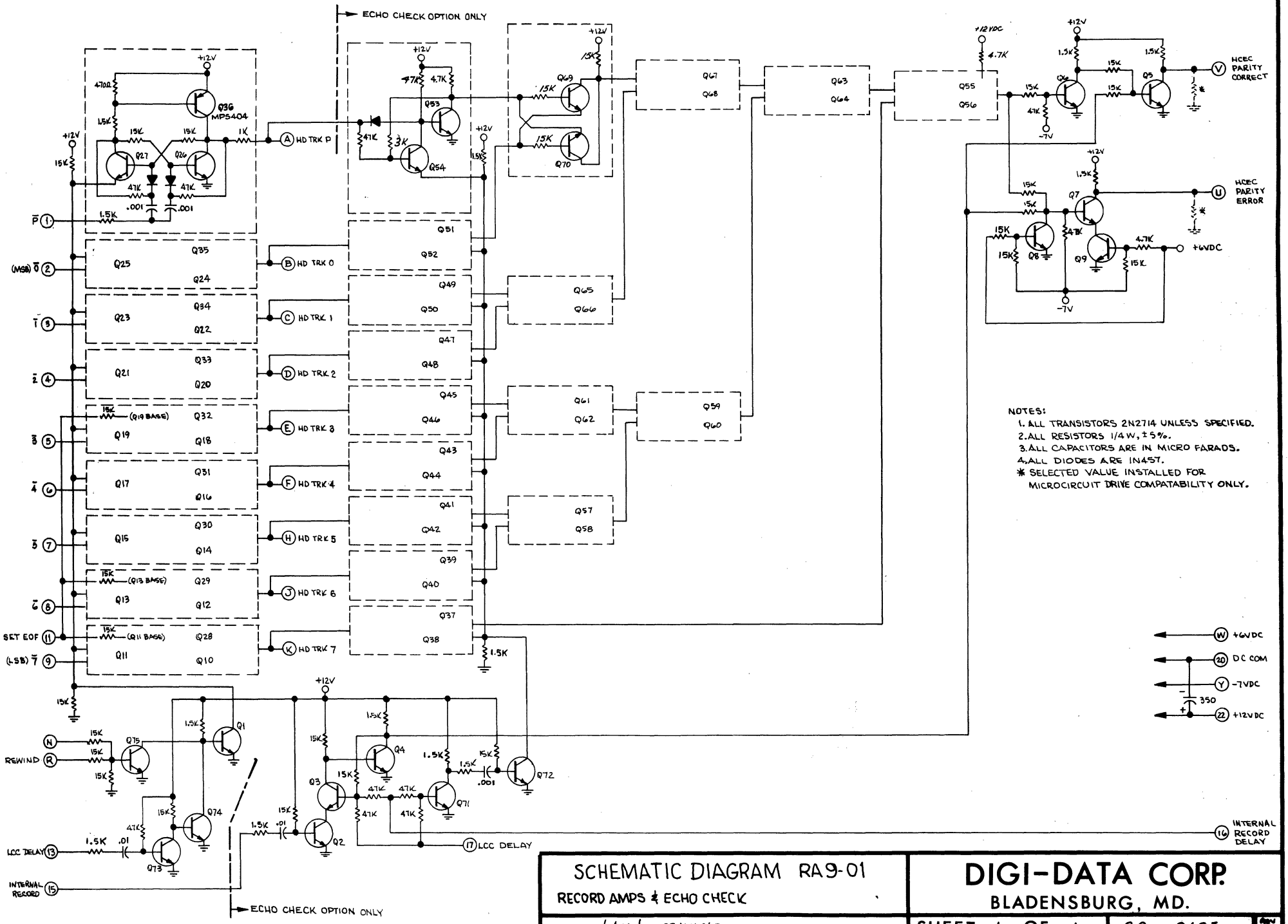
QTY	DESCRIPTION	QTY	DESCRIPTION
66	TRANSISTOR, 2N2714 /2N3114		
9	TRANSISTOR, MPS3638		
27	DIODE, 1N457		
60	RESISTOR, 47K		
7#	↕ 15K		
11	4.7K		
27	1.5K		
9	1K		
9	RESISTOR, 470Ω		
9	RESISTOR, 3K		
1	CAPACITOR, .350 μfd		
2	CAPACITOR, .01 μfd		
19	CAPACITOR, .001 μfd		

ASSEMBLY, LOGIC CARD, RA9-01
RECORD AMPS & ECHO CHECK,

DRAWN: WM. A. MAHER 13 MARCH 1968

DIGI-DATA CORP.
BLADENSBURG, MD.

SHEET 1 OF 1 | CC-0105 | REV D



SCHEMATIC DIAGRAM RA9-01

RECORD AMPS & ECHO CHECK

DRAWN; W.M.A. MAHER 25 JAN 1968

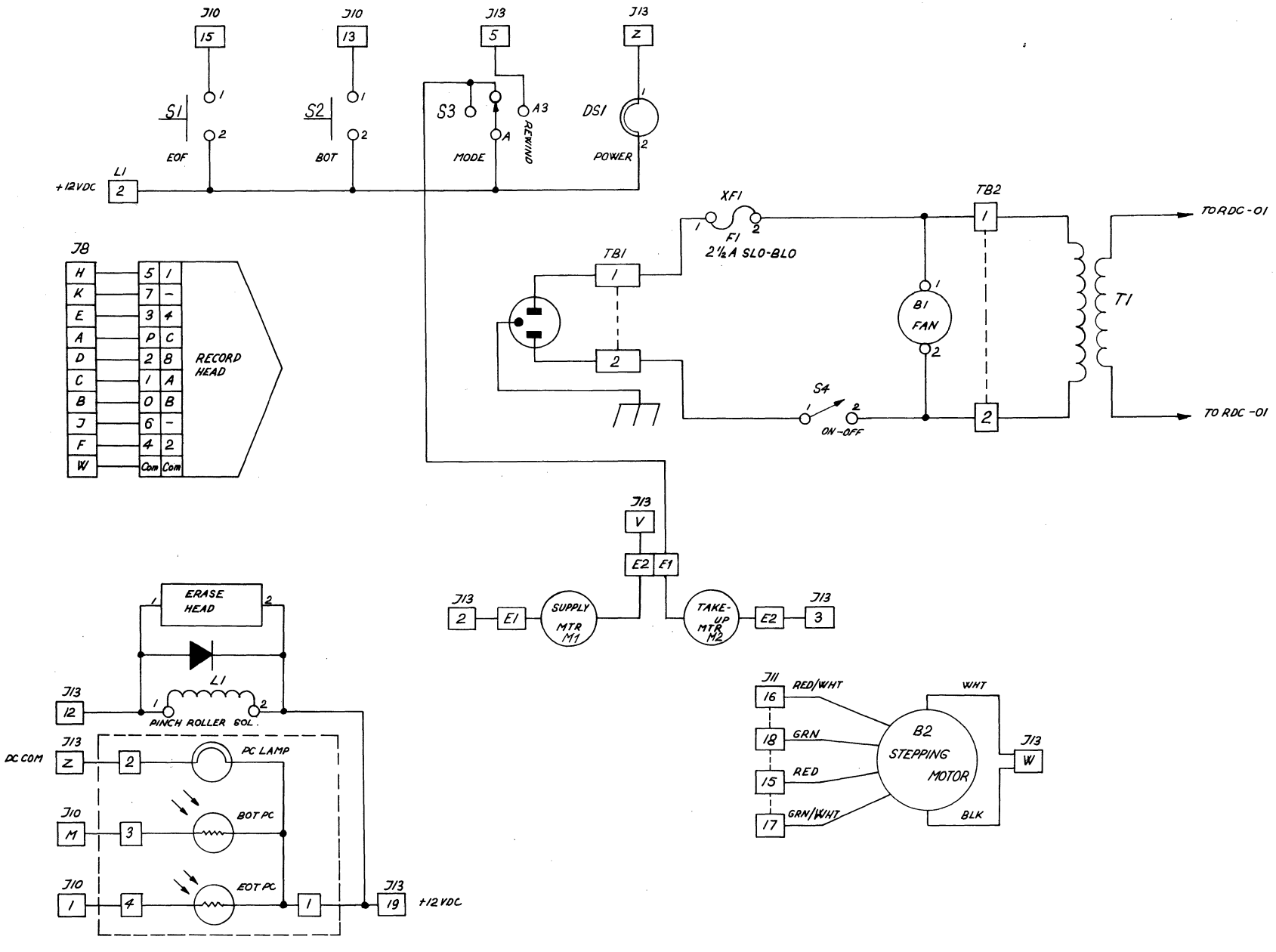
DIGI-DATA CORP.

BLADENSBURG, MD.

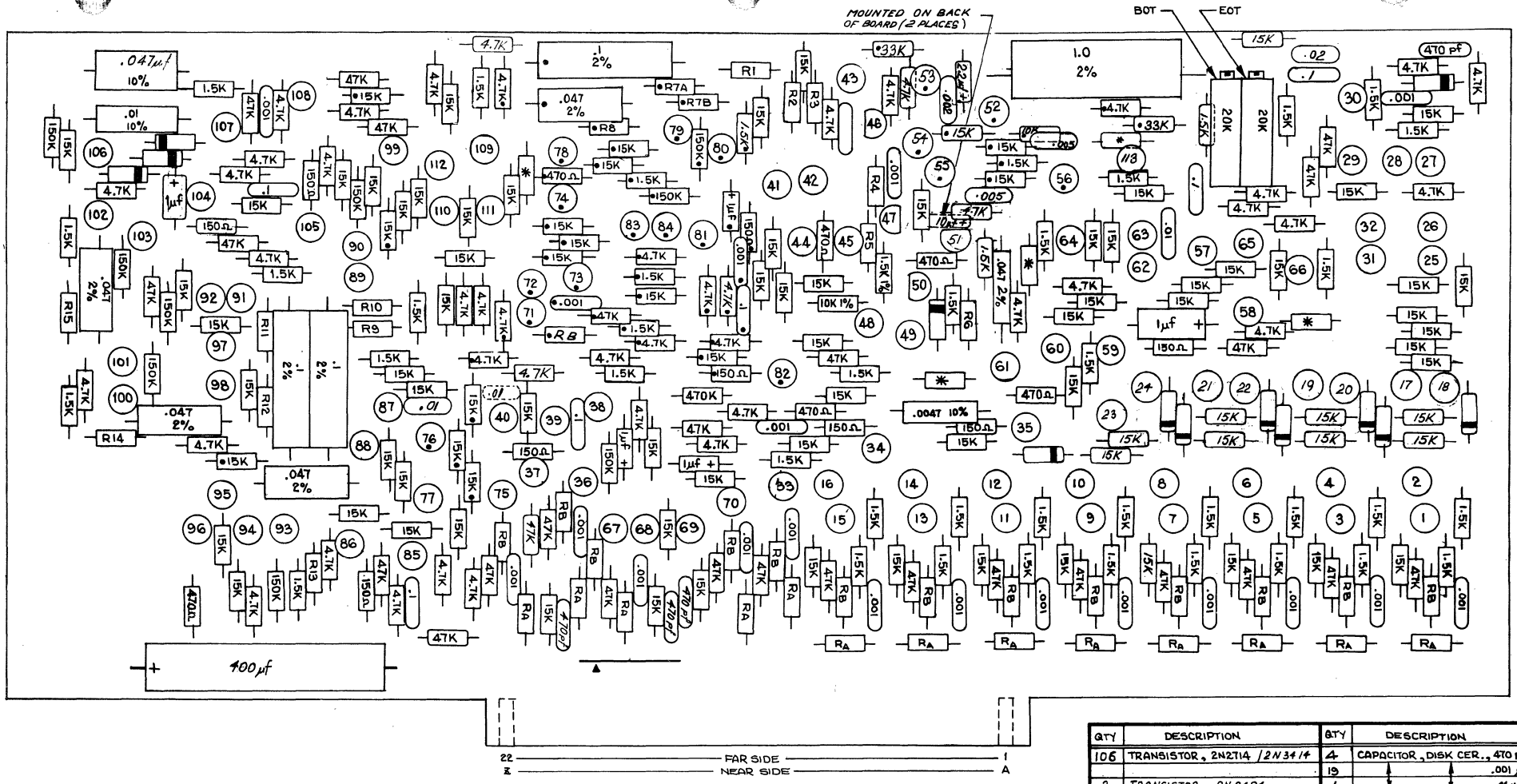
SHEET 1 OF 1

SC - 0105

REV F



SCHEMATIC, CONTROL DSR 1300, 1500	DIGI-DATA CORP. BLADENSBURG, MD.	
DRAWN: [illegible] 5 FEBRUARY 1969.	SHEET 1 OF 1	SC - 0109 REV B



NOTES:

1. UNLESS SPECIFIED:
   ALL RESISTORS = 1/4 W, ±5%
   ALL CAPACITORS IN MICROFARADS
   ◠ = MPS3638/MPS404 TRANSISTOR
   ALL OTHER TRANSISTORS = 2N2714 /2N3414
2. SLEW OPTION ONLY COMPONENTS DESIGNATED BY •
3. TRANSISTOR Q79, 89, 91 = 2N2484
   Q46, 47, 50, 51 = 2N4402

▲ AWG #22 BUS, W/SLEEVING

* SELECTED VALUE INSTALLED FOR MICROCIRCUIT DRIVE COMPATABILITY ONLY
ALL DIODES = IN457

	200 BPI	556 BPI	800 BPI
R1	3.01K	2.61K	2.61K
R2	2.74K	17.4K	17.4K
R3	3.32K	4.99K	4.99K
R4	4.02K	4.02K	4.02K
R5	7.5K	7.5K	7.5K
R6	19.1K	19.1K	19.1K
RTA	COMPONENT VALUES SELECTED		
RTB	ACCORDING TO DENSITY AND		
R8	SLEW SPEED		
R9	10Ω 5%	1M	1M
R10	1M	1M	1M
R11	10Ω 5%	1M	1M
R12	931K	845K	931K
R13	115K	115K	162K
R14	274K	499K	499K
R15	511K	1M	1M

(ABOVE VALUES 1/8 W, 1% PRECISION RESISTORS)

	HIGH LEVEL	IC COMPATIBL
RA	1.5K	1.5K
RB	15K	1.5K

COMPONENT COUNT EXCLUSIVE OF REFERENCE DESIGNATED COMPONENTS

QTY	DESCRIPTION	QTY	DESCRIPTION
106	TRANSISTOR, 2N2714 /2N3414	4	CAPACITOR, DISK CER., 470 pf
		19	" " .001 µf
3	TRANSISTOR, 2N2484	1	" " .01µf
4	TRANSISTOR, 2N4402	6	CAPACITOR, DISK CER., .1 µf
13	DIODE, IN457	1	CAPACITOR, MYLAR, 10%, .0047µf
1	RESISTOR, 1/4W, 5%, 470K	1	" " " .01µf
9	" " " 150K	1	CAPACITOR, MYLAR, 10%, .047µf
27	" " " 47K	4	CAPACITOR, MYLAR, 2%, .047µf
89	" " " 15K	2	" " " .1 µf
47	" " " 4.7K	1	CAPACITOR, MYLAR, 2%, 1.0 µf
41	" " " 1.5K	3	CAPACITOR, TANTALUM, 1.0 µf
6	" " " 470Ω	1	CAPACITOR, ELECTRLYTIC, 10 µf
9	RESISTOR, 1/4W, 5%, 150Ω	1	CAPACITOR, ELECTROLYT. 400µf
1	RESISTOR, 1/4, 5%, 33K	1	CAPACITOR, DISK CER. .02µf
1	RESISTOR, 1/8W, 1%, 1.5K	1	CAPACITOR TANTALUM 2.2µf
1	RESISTOR, 1/8W, 1%, 10K	2	CAPACITOR DISC CER .005µf
1	RESISTOR 1/4 W 5% 10K	1	" " .002µf

ASSEMBLY DIAGRAM, PG9-020

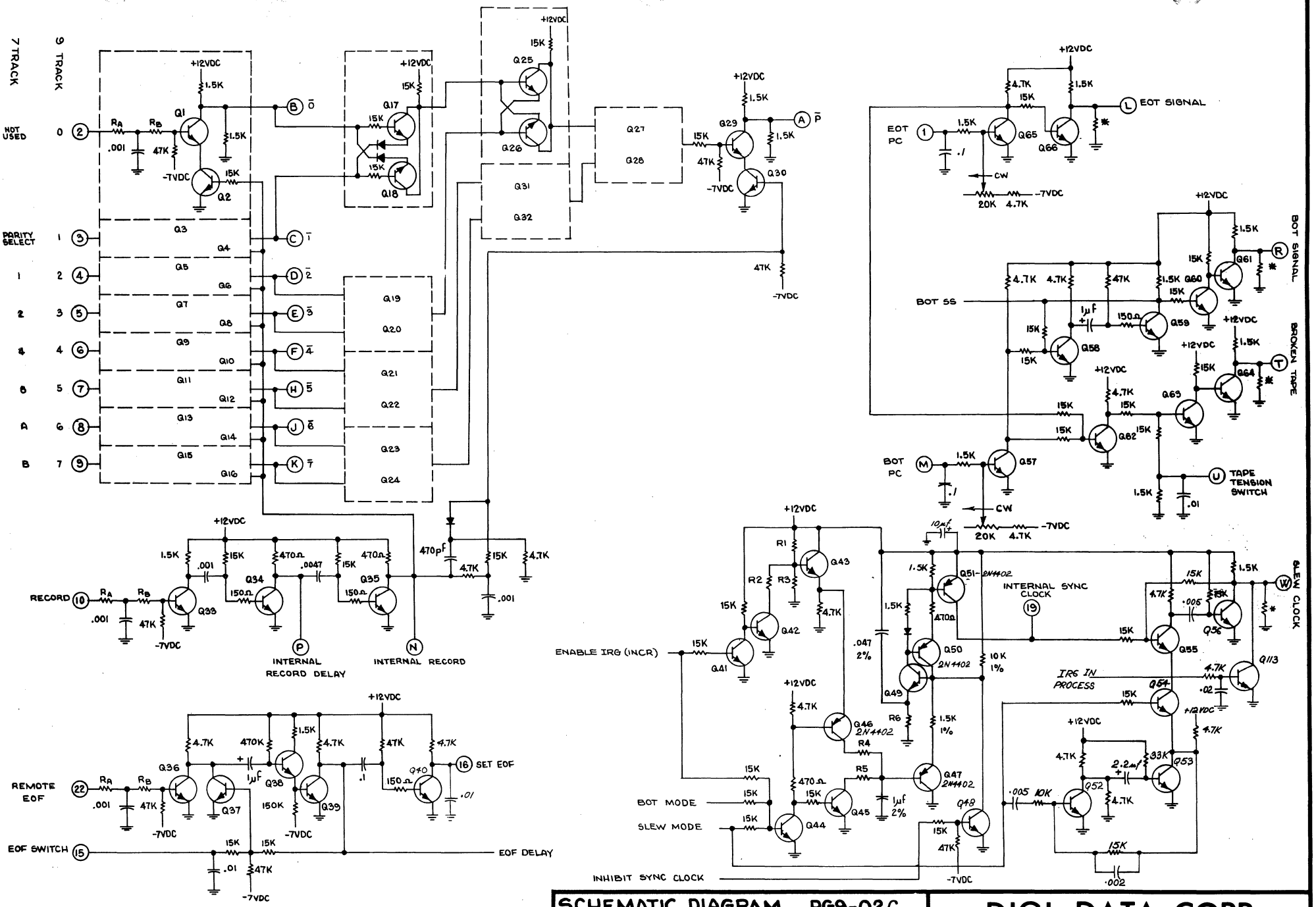
PARITY & GAP GENERATOR

DWN: GHC III 12 AUG 68

DIGI-DATA CORP.

BLADENSBURG, MD.

SHEET 1 OF 1 | CC-0108 | REV D



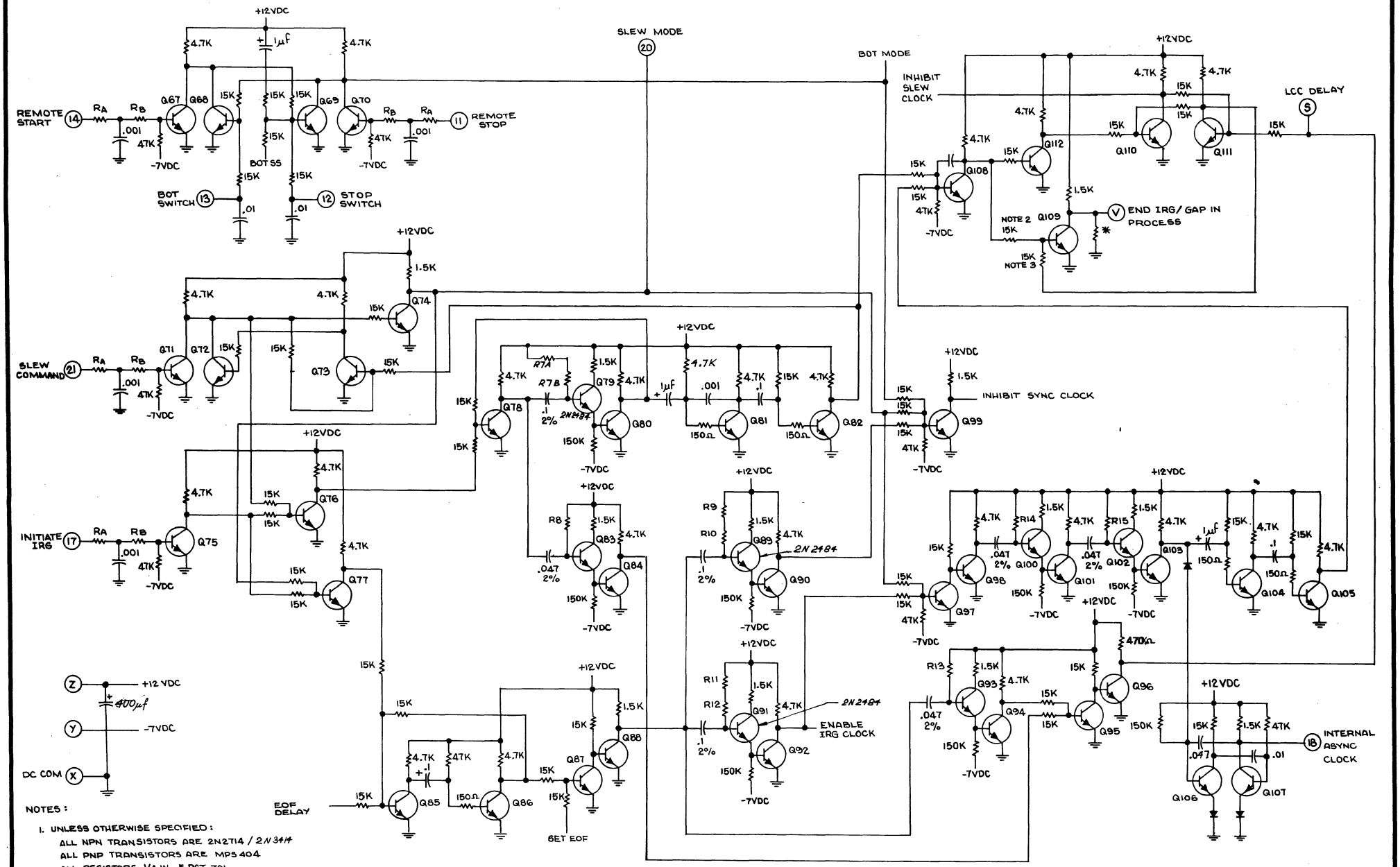
SCHEMATIC DIAGRAM PG9-02C

DWN : GHC III 30 AUG 68

DIGI-DATA CORP.

BLADENSBURG, MD.

SHEET 1 OF 2 | SC - 0108 | REV C



NOTES:

1. UNLESS OTHERWISE SPECIFIED:
   ALL NPN TRANSISTORS ARE 2N2714 / 2N3414
   ALL PNP TRANSISTORS ARE MPS404
   ALL RESISTORS 1/4 W, 5 PCT TOL
   ALL CAPACITORS IN µf
   ALL DIODES IN457
2. REMOVE FOR GAP IN PROCESS
3. REMOVE FOR END IRG
4. SEE DWG CC-0108 FOR UNDESIGNATED COMPONENT VALUES
5. COMPONENT VALUES SHOWN TYPICAL, MINOR EQUIPMENT MODIFICATIONS MAY NECCESITATE DEVIATION FROM THOSE SHOWN

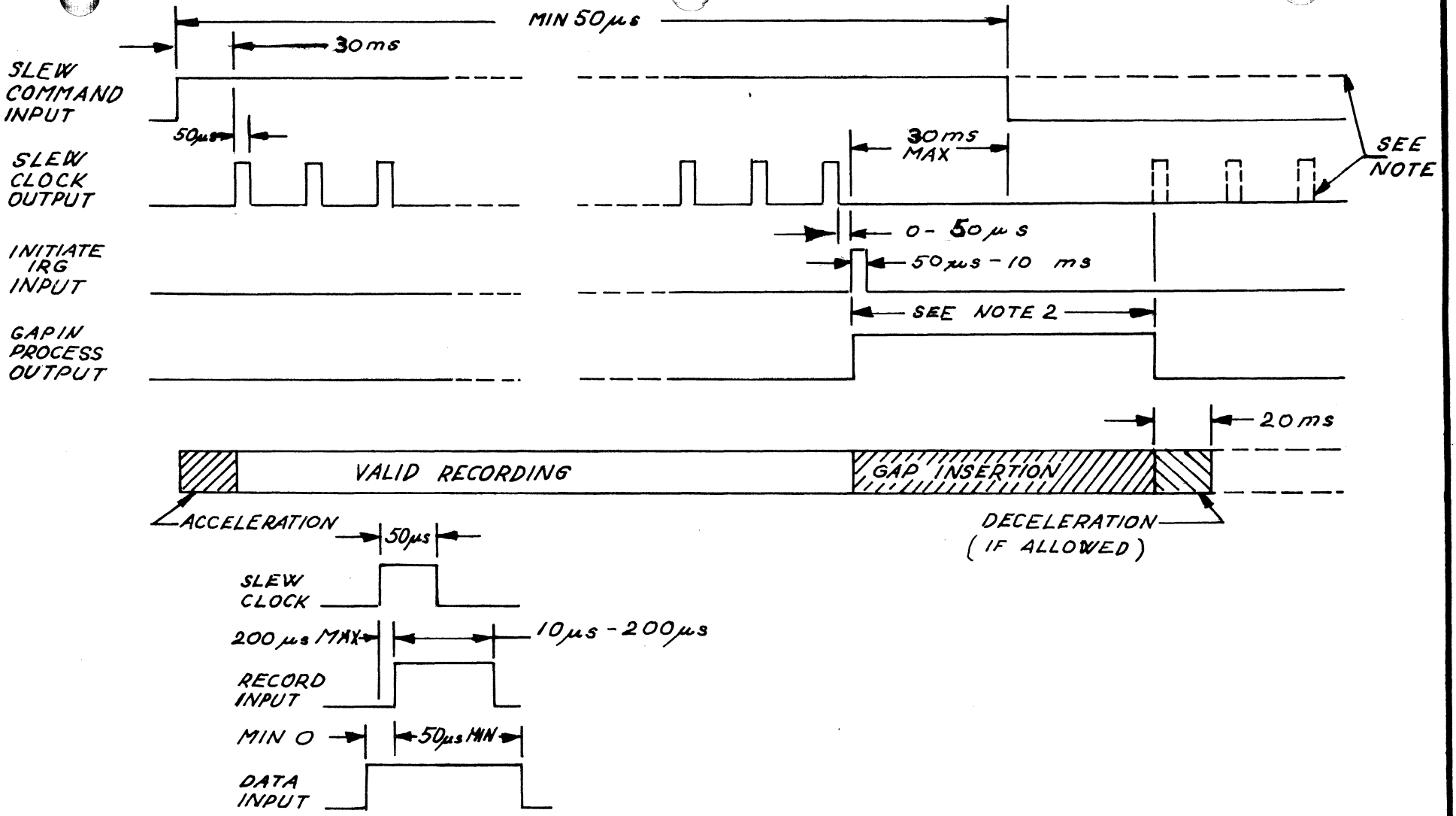
* SELECTED VALUE INSTALLED FOR MICROCIRCUIT DRIVE COMPATABILITY ONLY

SCHEMATIC DIAGRAM PB9-02C

DWN: GHC III 30 AUG 68

DIGI-DATA CORP.
BLADENSBURG, MD.

SHEET 2 OF 2 | SC - 0108 | REV A



RECORD & DATA INPUT DETAIL

NOTES:

1. MAINTAIN "SLEW COMMAND" HIGH TO WRITE SUCCEEDING RECORDS WITHOUT DECELERATION TO TAPE HALT AT END OF GAP
2. "GAP IN PROCESS" DURATION DEPENDENT UPON PACKING DENSITY

TIMING DIAGRAM SLEW RECORD TECHNIQUE	**DIGI-DATA CORP.** **BLADENSBURG, MD.**
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APPLICATION NOTE

* SLEW RECORDING TECHNIQUE - INCREMENTAL RECORDERS

MODELS 13X7, 13X9, 14X7 & 14X9

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1. In order to initiate the slew record function, the SLEW COMMAND input is transferred to the logical one state (minimum duration 50 microseconds).

2. After about a 30 millisecond delay, 50 microsecond positive pulses appear at the SLEW CLOCK output. It is desirable to shape up this pulse by means of a one-shot.

3. The SLEW CLOCK itself may be utilized to command the RECORD input, or the RECORD input can be commanded up to 200 microseconds after the leading edge of the SLEW CLOCK.

4. When an inter-record gap is desired, the INITIATE IR GAP input is commanded by a 50 microsecond to 100 millisecond pulse, coincident with or up to 50 microseconds after the trailing edge of the last RECORD command.

5. The SLEW CLOCK is inhibited during the inter-record gap, the duration of which is dependent on the recorder packing density.

6. Upon completing gap insertion, and providing that the SLEW COMMAND input is at the logical one state, SLEW CLOCK pulses reappear.

7. If the user wishes to stop recording, the SLEW COMMAND line must be transferred to the logical zero state not later than 30 milliseconds after the inter-record gap is initiated. This will halt the recorder at the completion of the gap.

8. Slew writing and incremental writing can be done on the same machine and the same tape, with interspersed records of both modes.

9. Basic slew rates are 1.5 kc for 200 BPI recorders and 3 kc for 556 BPI recorders. Other speeds available at extra cost.

* The slew recording option must be included in the unit to use this technique.

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