OPERATION AND MAINTENANCE MANUAL

DSR 1400 SERIES

DIGITAL STEPPING RECORDERS

DIGI-DATA CORPORATION

ADDENDUM

The logic in Digi-Data recorders is designed to be driven by external logic which has a saturated transistor for a "0" and a resistor to minus voltage for a "1" in the case of the PNP germanium unit or to a plus voltage for a "1" in the case of the NPN silicon unit. While other methods can be satisfactorily used for providing the "0" levels in both cases, it is strongly suggested that the factory be consulted when this type of installation is planned.

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SPECIFICATIONS

Section 1

1.1 GENERAL SPECIFICATIONS

1.1.1 Recording rates (characters per second): DSR 1420, 200; DSR 1430, 300; DSR 1440, 400; DSR 1450, 500. Recorders can be run in synchronous modes up to 7.5 ips, with starting and stopping accomplished in inter-record gaps.

1.1.2 Inter-record gap (200 characters per inch): DSR 1420, DSR 1430, DSR 1440, less than 130 ms; DSR 1450, 50 ms. For 556 characters per inch, inter-record times are proportionately longer.

1.1.3 Fast Forward and Rewind times are less than 4 minutes for either mode.

1.1.4 Tape width is 1/2-inch, standard.

1.1.5 Stepping increment: IBM-compatible, low-density (1/200-inch) or high density (1/556-inch); computer compatibility guaranteed.

1.1.6 Number of tracks: 7-track, IBM-compatible spacing.

1.1.7 Reel size and mounting: 10-1/2-inch IBM-type reels; reel mounting coaxial for minimum space.

1.1.8 Inter-record gap generation: 3/4-inch as required by most computers; high-speed to minimize data loss.

1.1.9 Longitudinal and lateral parity generation: Selectable odd and even lateral parities are generated; the longitudinal check character is recorded when inter-record gap is commanded.

1.1.10 End-of-file gap and mark generation: EOF Switch advances tape EOF gap distance and writes the EOF and longitudinal check characters.

1.1.11 Tape load point positioning: Beginning-of-tape (BOT) Switch advances

tape to load point reflective marker, which stops tape 3.4 inches beyond record head.

1.1.12 End-of-tape sensing: Reflective marker is sensed by photo cell.

1.1.13 Loss of tape tension: Provides signal level and activates reel brake.

1.1.14 Front panel controls and indicators: Controls are On-Off, Record, Fast Forward, Rewind, BOT (beginning-of-tape or load point) Switch, and EOF (end-of-file) Switch. Indicators are Tape Tension and Power.

1.1.15 Enviromental limits: 40-110°F. operation; humidity of 100 percent relative without condensation.

1.2 ELECTRICAL SPECIFICATIONS

1.2.1 Signal inputs: Binary 1 is -6 volts or greater; binary 0 is 0 to -1 volts; all impedances are to ground.

1.2.1.1 Data inputs: 7 lines; must be present during step and record command pulse; 7.5k impedance.

1.2.1.2 Step and record input: 50-700 μs negative pulse; 7.5k impedance.

1.2.1.3 Inter-record gap input: 10 μs or longer negative pulse; 15k impedance. IR gap command should occur no earlier than 3.3 ms after last step and record command to insure there has been time for this step to occur.

1.2.2 Signal outputs: Binary 1 is -12 volts; 1.5k impedance; binary 0 is 0 to -1 volt.

1.2.2.1 End of inter-record gap: 100 μs or longer negative pulse.

1.2.2.2 Lateral parity generation: Odd or even; wire back into C track input.

1.2.2.3 Head current parity check: Both even and odd parity, 20 μs

pulse outputs; one output represents parity correct and the other parity incorrect.

1.2.2.4 End of tape: Negative voltage when marker is present.

1.2.2.5 Loss of tape tensions: -12 volts when no tension; open circuit when tension exists.

1.2.3 Power consumption: 1.2 ampheres at 115 volts, 50-60 cycles; 400 cps operation available.

NOTE: Silicon units have NPN logic, requiring opposite polarity inputs; i.e., -6 volt or greater signals become +6 volts or greater, -12 volts become +12 volts.

1.3 MECHANICAL SPECIFICATIONS

1.3.1 Sizes are as follows: 7-3/4H x 11-1/2W x 17D for portable model; 17-1/2H x 19W x 6-1/16D for vertical rack-mounted model; and 8-3/4H x 19W x 16-1/8D for horizontal rack-mounted model.

1.3.2 Weights are as follows: 40 pounds for vertical and horizontal rack models, and 32 pounds for portable models.

INSTALLATION

Section 2

2.1 UNPACKING

Digi-Data Recorders are shipped in heavy, well-padded, dual-layer 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.

2.2 MECHANICAL INSTALLATION

Refer to Figure 1 or Figure 2, depending upon whether horizontal or vertical model is being used. The horizontal model mounts with slides which can be purchased from Digi-Data Corporation. The vertical model is not normally mounted on slides, although it can readily be adapted to such mounting. Holes are pre-drilled in the Recorder for mounting the slides. A service loop for the input-ouput cable is necessary to provide ease of motion in and out. The Recorder must be mounted in a rack at a reasonable distance from the floor to facilitate servicing of the swing-out electronics and minimize possibility of dust causing a drop-out in the recording process.

2.3 ELECTRICAL INSTALLATION AND CHECKOUT

A mating connector is supplied with every Digi-Data Recorder. In the case of portable models, a separate A.C. cord is provided. A list of pin connections is given in the accompanying diagram. 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 digital tape is highly recommended for use with recorder. The use of 556 BPI or 800 BPI certified tape is also advised since the additional cost is negligible.

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 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 check out techniques.

OPERATION

Section 3

3.1 OPERATING CONTROLS AND INDICATORS

3.1.1 Function Selector Switch normally has three positions for a record model (Fast Forward, Rewind, and Record) and four positions for a record-playback model (Fast Forward, Rewind, Record, and Playback). Fast Forward mode seldom will be used by the operator. Rewind mode normally will be used to rewind the tape to the lower (supply) reel, from which location it is removed and taken to the computer site.

3.1.2 Power On-Off applies A.C. power to the unit.

3.1.3 BOT (beginning-of-tape) Switch actuation causes tape to advance to load point.

3.1.4 EOF (end-of-file) Switch advances tape EOF gap and writes EOF mark.

3.1.5 Stop Switch causes tape to stop if BOT Switch is pushed accidentally after load point marker has been sensed.

3.1.6 Power Indicator indicates A.C. power has been applied and D.C. power supply is being supplied to the unit.

3.1.7 Tension Indicator indicates that tape tension is being maintained.

3.2 OPERATING PROCEDURES

3.2.1 Tape loading: When installing a new reel of tape, the full reel is loaded first, with the tape unwinding when the reel is rotated clockwise. After the supply reel (bottom reel) is installed, the take-up reel assembly consisting of the reel separator, captive take-up reel, and reel hold down hub is installed by engaging the three pins in the

main hub assembly. To do this, the take-up reel assembly is rotated until the pins fall into place. Do not push down on the spring loaded reel hold down knob during this operation. Once the pins fall into their holes, the spring loaded reel hold down knob is depressed and the take-up reel assembly is locked down by turning the knob in a clockwise direction. The tape is threaded over the various roller guides, head, and capstan and secured to the upper take-up reel. Reference should be made to the tape threading diagram included in the back of this manual. The tape is threaded as shown omitting the tension arms and wrapped around the take-up reel until it is firmly established on the reel. Following this the tape should be looped over the tension arms by means of one's forefinger.

3.2.2 Beginning-of-tape gap generation: Turn on Power Switch. The pilot light should glow and the reels should rotate slightly. This action is normal. The capstan should be very rigid, due to its detenting action. The BOT Gap Generator Switch should be actuated at this point, thus resetting the record flipflops and advancing the tape to a point 3.5 inches beyond the load point marker. The unit now is ready to receive data and step command signals.

3.2.3 Recording: Place the Function Selector Switch in the Record position. With the data and stepping inputs properly connected, the unit will record. A visual check of the recorded information may be made by dipping the tape in Magna See Solution. (See Section 2, INSTALLATION, Paragraph 2.3.5, for further information regarding Magna See Solution.)

3.2.4 Fast Forward and Rewind: Rapid movement of the tape in the forward or reverse direction may be obtained by placing the Function Selector Switch in the Fast Forward or Rewind position. The unit may be switched from either Fast Forward or Rewind modes to Record mode without loss of tape tension. However, when this is done, the record current is restored after a delay which in turn may write an error character on tape.

3.2.5 Read (optional): In this mode, the unit is capable of playback. The unit must be commanded to start and stop either by the front panel switches or by signals at the start and stop inputs at the connector.

3.2.6 End-of-file gap and marker generation: After a complete file has been recorded, as determined by external programming to the unit, the EOF Switch should be actuated to generate an EOF gap and marker.

3.2.7 Stop Switch: This switch normally is used only with the read option. On record models, it is provided for stopping the tape in case the BOT Switch is pushed accidentally after load point marker has passed the photo cell block which normally stops it. The Stop Switch also can be used as an emergency stop in case the BOT photo cell has failed. In this mode, the operator pushes the button when the reflective marker passes in front of the photo cell block.

3.2.8 Echo parity error and end-of-tape signal: Increased confidence in the recording process will result if the parity error signal is used to actuate a visual or audible parity alarm circuit external to the unit. Since both echo parities are brought out, it is frequently of value to use both signals; in effect, one output gives a pluse when parity is correct and the other gives pulses only when parity is wrong. Parity errors normally will indicate a malfunction in the unit--or in preceding units if the parity signal has been derived from them. The use of the echo parity or head current parity check outputs has been found to be a most powerful check of over-all system operation. It is strongly advised that the user monitor these signals with his external electronics. Failure to do so may cause the loss of valuable data and computer time. The end-of-tape signal which is derived from the end-of-tape marker should be connected to the external programming circuits to terminate the recording process at the end of the next complete record. It also can serve to set off a visual or audible alarm for the operator to terminate the record process.

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3.2.9 Computer Playback: Some computer operators fail to note the density at which the data was recorded, when playing back tapes. For this reason it may be advisable to label reels with the recording density.

THEORY OF OPERATION

Section 4

4.1 SYSTEM BLOCK DIAGRAM AND DESCRIPTION

A simplified block diagram of the unit is shown in Figure 1. The operation of the Stepping Recorder system may be divided into two basic sections: record electronics, and tape control electronics.

4.1.1 Record Electronics

4.1.1.1 Binary 0 to binary 10 converter (optional): This converter is used only for numeric BCD recordings and is useful where the BCD code of 4 or 6 0's is generated by data input source. This function is performed on the Record Amplifier Card and consists of a 4 or 6 input and-gate followed by or-gates into the 8 and 2 bit record amplifiers.

4.1.1.2 Even and odd parity generator: This section of the electronics consists of a chain of exclusive or-gates on the Parity and Gap Card (PG-*) which generate both parities. Normally, these are coupled back into the C track input at the connector.

4.1.1.3 Input and-gates: In these gates, the input data levels are sampled by the Record signal. (Usually, for incremental recording use, the step and record inputs are tied together and driven by the same signal.) These gates are resistor diode gates and are packaged on the Record Amplifier Card (RA-*).

*NOTE: The card nomenclature (PG-, RA-, etc.) has a blank for the card number, since these numbers are changed whenever an improvement is made in the card.

4.1.1.4 Record amplifiers (7 each): These consists of center trigger flipflops and are triggered by the trailing edge of the Record signal. (Note that the stepping action is initiated by the leading edge of the Step and Record signal.) A common reset for the amplifiers is derived from circuits in the gap generation circuitry. This reset causes the recording of an even parity mark called the longitudinal check character. Head drive currents are supplied from one collector of each flipflop through head current resistors of 680 ohms.

4.1.1.5 Head current sense amplifiers: These amplifiers are located on the Echo Check Card (EC-). They amplify the inductive surge from each head track and convert these surges to full-amplitude 12-volt signals. Separate amplifiers for each polarity head signal are provided and then amplified signals are or-ed together to provide the proper 1 signal.

4.1.1.6 Parity check circuits: These circuits also are located on the Echo Check Card and consist of a cascaded configuration of exclusive or-gates. Two-delay one-shots provide a sample pulse for the output gates at the peak of the inductive surges. Two polarities of echo check output are provided--one for even parity and one for odd parity. Depending on the parity used in the machine, one echo check output will give an output pulse only when parity is correct and the other output pulse will occur only when parity is incorrect. The parity incorrect signal can be used for alarm purposes. The parity correct signal can be used as a positive indication that the unit is operating correctly. This is important, since an incorrect parity signal will not occur in the event of a complete failure of the machine.

4.1.2 Tape Control Electronics

4.1.2.1 Gap generators: All gap generation electronics are located on the Parity and Gap Generator Card (PG-). A gated free-running multivibrator is used for stepping the motor in all gap generation functions. This multivibrator is controlled by different signal sources to program the various gaps. A description of these means of programming follows:

(1) BOT (beginning of tape)--load point: In this mode, a flipflop gates the clock multivibrator on and off. The BOT Switch sets the flipflop, which turns on the clock. The load point marker then actuates a photo cell and associated amplifier, which in turn reset the flipflop and turn off the clock.

(2) Inter-record gap: In this mode the clock multivibrator is gated on and off by the inter-record one-shot. This one-shot has an adjustable delay and can be set by means of a potentiometer adjustment (which is made at the factory to compensate the component tolerances and normally should not be moved). Input signals for this one-shot are derived from external systems through the input connector and from the trailing edge of the EOF one-shot. This latter input is necessary to provide the longitudinal check character after the EOF mark. The inter-record gap must be generated at periodic intervals to accomodate the input memory capacity of the particular computer being used. It also must be used before programming an EOF mark.

(3) EOF (end of file) gap: In this mode, the clock multivibrator is gated on by the EOF one-shot, which in turn is triggered by the EOF Switch. This gap has a

potentiometer adjustment in order to compensate for component variations; it should never be re-adjusted during normal service.

4.1.3 Power Supply

The power supply has several sections, which are described separately below.

4.1.3.1 Head voltage supply: This circuit is controlled by the right-hand potentiometer, looking at the component side of the board. This potentiometer is placed directly across the power supply zener diode and supplies a precise voltage to cascaded emitter followers. These stages provide the voltage for the common lead of the head windings. A transistor collector is connected to the center tap of the potentiometer. This stage is driven by the pressure roller delay circuit and thus brings the head supply voltage to ground whenever the pressure roller is disengaged. This pressure roller normally is disengaged during Rewind and Fast Forward.

4.1.3.2 Negative voltage regulator: This circuit compares the negative output voltage to a zener diode by means of a transistor amplifier. The output of the amplifier is fed to an emitter follower, which supplies the base drive for the series regulating transistors on the Heat Sink Card. The voltage is adjusted by means of the voltage-adjusting potentiometer, which is the left-handed potentiometer on the board. With the input voltage at 117 A.C., the voltage should be set at -12.0 volts. A voltage doubling circuit supplies extra collector voltage for the amplifying stage of the differential amplifier and emitter follower output.

4.1.3.3 Positive voltage regulator: The positive regulated voltage source is derived from a capacitor charge circuit, which in turn feeds a full-wave peak rectifier and zener diode regulator. The nominal voltage of this supply is 7 volts and depends on the particular zener diode voltage.

4.1.3.4 Pressure roller delay and drive circuits: The rubber pressure roller delay circuit serves to provide the pull in delay when going from Rewind to Record. It consists of an RC delay amplifier, a two-input nor-gate, and a transistor switch. The absence of the pressure roller drive signal is also used to drive the head supply voltage to ground during rewind and to reset all the record flipflops. This dual action places 0 volts across the head whenever the pressure roller is disengaged from the capstan. With this feature, the machine cannot erase tape when it is operating in any mode other than Record.

4.1.4 Reel Motor Control Circuits

4.1.4.1 Rewind and Fast Forward control: These circuits consist of a braking delay circuit and output emitter followers for driving the reel motor drive transistors on the Heat Sink Card. The braking delay circuit is or-ed into both the Rewind and Fast Forward circuits and provides a small amount of reverse braking when returning to the Record mode from Rewind or Fast Forward mode. The Fast Forward and Reverse switch positions provide a large current for the particular motor which is pulling and a very delicate holdback for the particular motor which is maintaining reel tension. These currents are supplied by resistive voltage dividers.

4.1.4.2 Reel tension control (Read and Record modes): These circuits are intimately associated with the Rewind and Fast

Forward control, since the reel motors are driven by the same power transistors in both cases. The or-ing for these two controls is accomplished by diode gates in the bases of the 2N404's which drive the power transistors. Signals for the takeup and supply motors are derived from a free-running multivibrator which runs at a frequency of several kilocycles. The output of the multivibrator is unsymmetrical because the two reel drives require different amounts of power.

4.1.5 Motor Programming and Motor Drive Section

This portion of the circuitry is located on two cards, MP- and MD- . The motor programming function consists of a complicated chain of counter-flipflops in the case of the DSR 1420. The purpose of the motor programming is the provision of proper rotating magnetic field inside the stepping motor.

The motor drive function consists of power amplifiers which provide the high currents required to drive the stepping motor windings.

4.2 MECHANICAL OPERATION

4.2.1 Reel Drive

4.2.1.1 The reels of DSR 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, aircraft-type, permanent-magnet D.C. motors.

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

4.2.1.3 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.

4.2.1.4 The stacked reel construction of the unit requires a means of transferring the tape from one level to another level. In the DSR Series Recorders, 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.)

4.2.1.5 The main drive plate of the DSR 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 tapeguiding components.

4.2.1.6 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. The takeup arm actuates a microswitch in case of loss of tape tension. 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.

4.2.1.7 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 have an extremely hard surface coating which is absolutely necessary for long-term trouble-free operation of the equipment. In the event long-term usage results in the cutting through of this coating by tape oxide acting as an abrasive, the guides may be presumed to have lost their usefullness and should be replaced with new guide pieces.

4.2.1.8 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.

4.2.1.9 All rotational components on the drive plate revolve in sealed ball bearings. Due to the limited rotational requirements on the bearings, their life can be considered to be infinite.

4.2.1.10 The stepping motors employed in Digi-Data Recorders consist of a multi-tooth rotor mounted on ball bearings and a multi-tooth stator. The capstan is mounted directly on the rotor shaft. No wear occurs and no periodic adjustments or maintenance are required for this arrangement.

4.2.1.11 The DSR Series Recorders are constructed to operate in all planes and thus may be operated in positions other than those indicated by the model specifications. Care must be taken to permit access for cooling air to enter the unit through the holes provided for this purpose.

4.2.1.12 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.

MAINTENANCE

Section 5

5.1 GENERAL

The Digital Stepping Recorder has been designed for extended operation without corrective maintenance. If available, a set of spare plug-in printed circuit cards will greatly facilitate troubleshooting the unit and insure that operation is maintained during any critical usage period.

5.2 ACCESS INSTRUCTIONS

5.2.1 Access to all units 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.)

5.2.2 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.

5.2.3 With the printed circuit card cage swung open, complete access is then gained to all components in the unit.

5.2.4 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 quite 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 Head Demagnetization

Magnetization of the recording head can occur if a sudden large AC field occurs near the head. If this occurs it can cause serious loss of signal strength, with an accompanying rise in the noise level. Demagnetize the head if there exists a possibility of this occurrence. The following method of demagnetization is recommended.

5.3.2.1 Place a piece of cellophane tape over the pole pieces of a commercial-type head demagnetizer; this will prevent the demagnetizer pole pieces from touching and possibly damaging the head pole pieces.

5.3.2.2 Apply power to the demagnetizer and place the demagnetizer pole pieces near the head gap of the inner head track.

5.3.2.3 Slowly move the demagnetizer pole pieces across the head gaps and withdraw the demagnetizer at least a foot from the head before turning off the demagnetizer.

5.3.2.4 Remove the cellophane tape.

5.3.3 Stepping Motor Drive Maintenance

5.3.3.1 The stepping motor drives in the DSR series of recorders require no maintenance.

5.3.4 Reel Drive Maintenance

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 doors on rack model units contain a Plexiglas window which should be cleaned with Windex glass cleaner and a very soft non-abrasive cloth.

5.3.6 Fan Lubrication

The muffin fan used in all DSR series recorders should be lubricated annually with a special oil syringe, Rotron Part No. 16415. This syringe is available from most large wholesale electronics firms.

5.4 CORRECTIVE MAINTENANCE

5.4.1 Photo Sensor Bulb Replacement

The bulbs in the BOT and EOT photo sensors are capable of long life as a result of voltage derating. In the event of burnout from vibration or old age, however, replacement of a bulb can be accomplished

merely by removing the one screw in the back of the photo sensor cover, removing the cover, unscrewing the old photo sensor bulb, inserting the new bulb, and reinstalling 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.

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 flipflops--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 Drive Card--replace card or check to see if motor drive flipflop is operating; if the capstan motor is running properly, the D. C. average voltage at all the motor windings should be equal. (These windings can be monitored at resistors near the fan.)

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 is spare is available. If adjustment--readjust voltage potentiometers as described under card description.

5.4.3.4 Improper echo check: If defective components--check squaring circuits, operation of record flipflops, and exclusive or-circuits in parity generator.

5.4.3.5 Improper IR or EOF gap lengths: If out of adjustment due to drift in component values--adjust pots on card to give proper length.

5.4.3.6 Improper parity generation: If component failure-check operation of individual exclusive or-gates.

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

5.4.3.8 Improper reel tensions: If old O-rings, defective component in reel motor drive circuits, dragging safety brake, or defective reel motor--replace O-rings or troubleshoot reel tension circuits; check to see if safety brake drags, if so, loosen spring tension.

5.4.3.9 Tape tension switch not actuated by tape tension arms: If out of adjustment--bend microswitch arm as required.

5.4.3.10 Tape slippage at capstan: If dirty pressure roller or pressure roller out of adjustment--pressure roller can be adjusted by loosening set screw on yoke, placing 1/4" spacer between pressure roller lever arm and body of solenoid, turning on power, and while holding pressure roller against capstan, retighten the set screws.

5.5 RECOMMENDED SPARE PARTS LIST

The following list of spare parts is recommended where downtime must be held to a minimum and at remote sites where service will not be readily available.

Record amplifier card	$150.00
Motor drive card	125.00
Motor programmer card	165.00
Heat sink card	100.00
Echo check card	150.00
Parity generator card	165.00
Power supply card	150.00
Reel drive O-rings (2)	3.00
Record head (7-track, IBM-compatible)	275.00
Read amplifier, read parity check and deskewing circuits (3 cards; for playback option only)	600.00
Read head (for playback option only)	275.00
Bulb for photo sense block (Chicago Miniature 8697)	0.60
Bulb for indicator lights (General Electric 330)	0.60
Spare take up reel assembly	80.00

INPUT-OUTPUT SIGNAL DESCRIPTIONS for DSR 1400 Series Recorders

Record and Step Inputs — Negative 50-700 μs pulse, 6v or greater; 7.5k impedance to ground. Normally tied together for stepping operation.

Inter-record Gap — Negative 10 μs pulse, 6v or greater; 15k to ground.

Data Bits — 1, 2, 4, 8, A, B, and C; negative levels, 6v or greater; 7.5k impedance to ground. Must be present during step and record command.

Start and Stop Command * — Negative 10μs pulse, 6v or greater; 15k impedance to ground. Normally used only for continuous playback option. Read start command used in incremental head transports causes reading of the next character.

Odd and Even Parity — Negative 12v level occurring at same time as data inputs. Normally wired back into C input.

Echo Check — Negative 20 μs pulse odd and even parity error; 1.5k ohms to -12v.

End Inter-record Gap — Negative 100 μs pulse minimum; 1.5k ohms to -12v.

End of Tape — Negative 12v pulse when marker is sensed.

Read Clock* — Positive (ground) 20 μs pulse during clock; 1.5k to -12v when not present.

Read Bits 1 through C * — Negative 20 μs pulse; 1.5k to -12v.

Read Even and Odd Parity Errors * — Negative 20 μs pulse; 1.5k to -12v.

Loss of Tape Tension — Negative 12v pulse when no tension; open circuit when tension exists.

Negative 12 Volts — For reference use.

Ground — System ground.

(* used with continuous playback option only; playback clock rate is 1.5kc)

DIGI-DATA CORPORATION

Main Office and Plant: 4315 Baltimore Avenue, Bladensburg, Maryland 20710

Western Regional Office: 16048 E. Marlinton Drive, Whittier, California 90604

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.

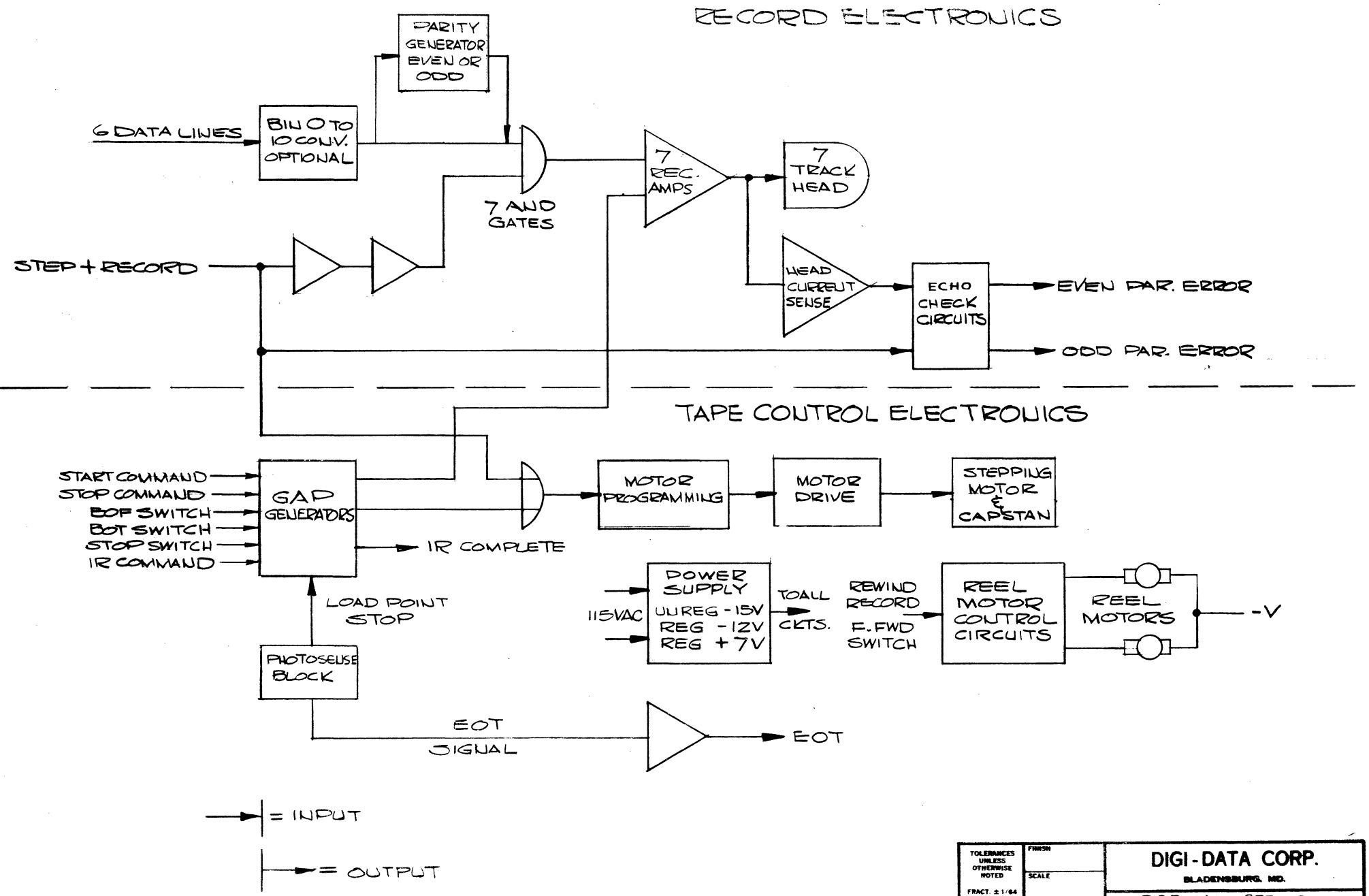
WARRANTY

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.

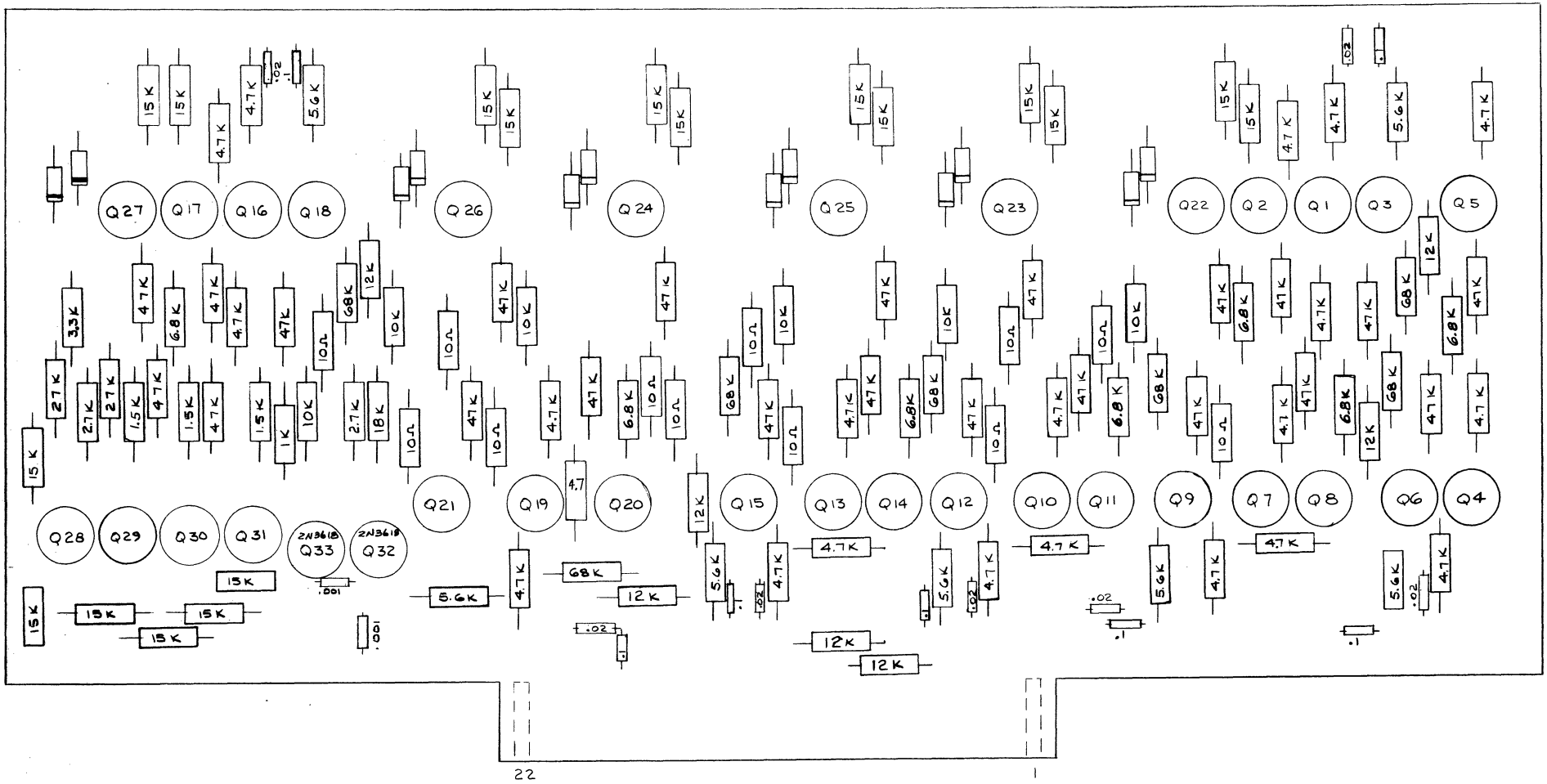
If any fault should develop in the Recorder, please notify Digi-Data Corporation, giving us full details of the irregularity and including the model and serial numbers of the Recorder. We will provide you with service instructions or shipping details immediately upon receipt of your notification.

SHIPPING

All shipments of Digi-Data equipment should be made via major air line or air freight carriers. 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.



TOLERANCES UNLESS OTHERWISE NOTED FRACT. ±1/64 DEC. ±.005 ANG. ±2°	FINISH	DIGI-DATA CORP. BLADENSBURG, MD.
	SCALE	
	DRAWN	DSR 1400 SERIES SYSTEM BLOCK DIAGRAM
	APPR.	LC-0003

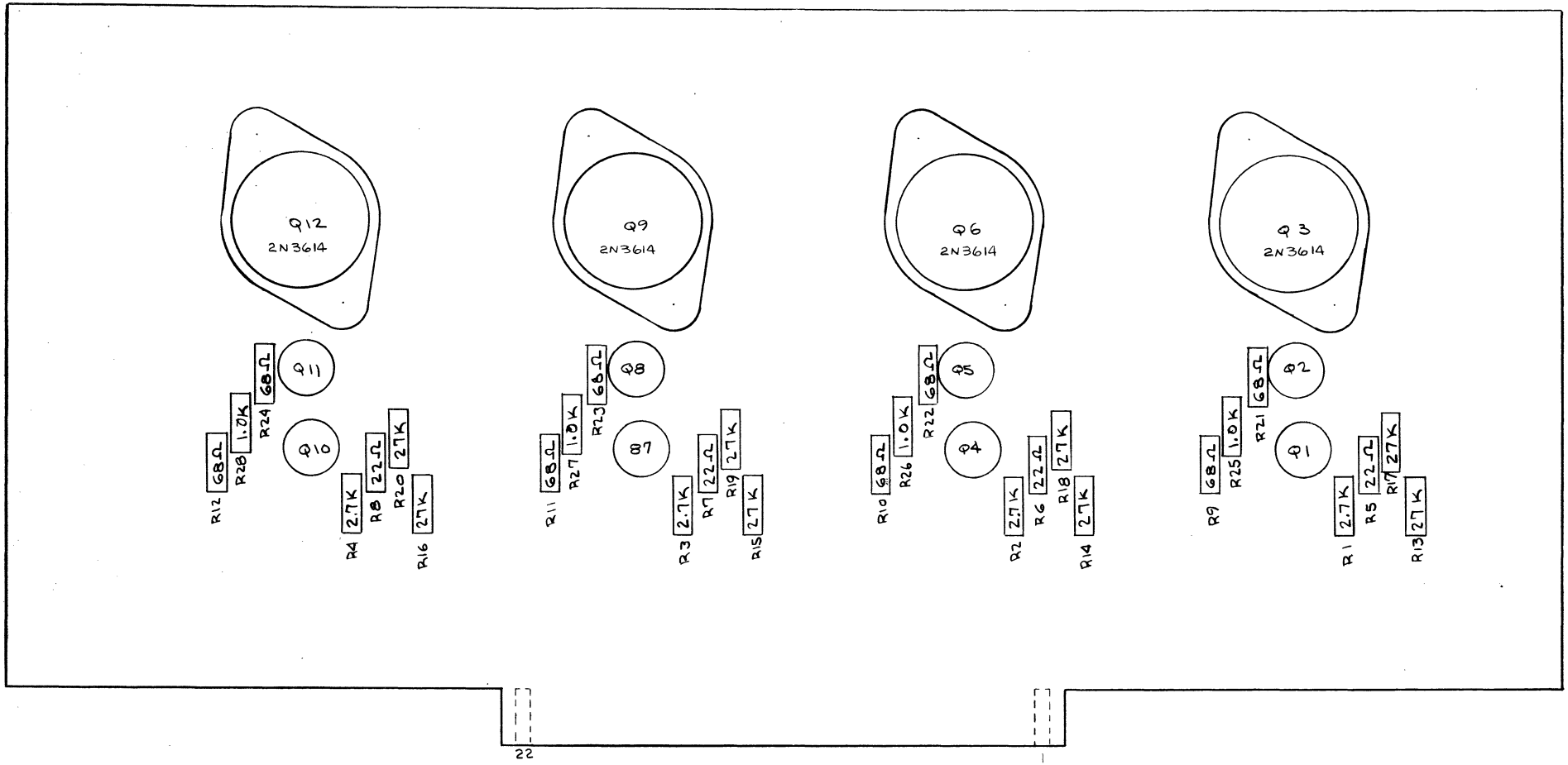


NOTE 8

1.- UNLESS OTHERWISE SPECIFIED
   a.- ALL CAPACITORS LARGER THAN 1 ARE IN μμf
   b.- ALL CAPACITORS SMALLER THAN 1 ARE IN μf

QTY	DESCRIPTION	QTY	DESCRIPTION
31	TRANSISTOR, 2N404	21	RESISTOR, 4.7K
2	2N3638	1	3.3K
12	DIODE, T1-51	2	2.7K
7	RESISTOR, 68K	3	1.5K
22	47K	1	1.0K
2	27K	12	10Ω
1	18K	7	CAPACITOR, CERAMIC, .1μf
18	15K	7	.02μf
7	12K	2	.001μf
6	10K		
2	6.8K		
7	5.6K		

TOLERANCES UNLESS OTHERWISE NOTED FRACT. ±1/64 DEC. ±.005 ANG. ±2°	FINISH	DIGI-DATA CORP. BLADENSBURG, MD.
	SCALE	
	DRAWN D.H. DINSMORE 3AUG 1964	LOGIC CARD ASSEMBLY, EC-05
	APPR.	CC-0003



ITEM	QTY	DESCRIPTION
	8	RESISTOR. 27K , 1/2W, 5%
	4	2.7K.
	4	1.0K.
	8	68Ω.
	4	RESISTOR, 22Ω, 1/2W ,5%
	8	TRANSISTOR, 2N404
	4	TRANSISTOR, 2N3614
	8	SCREW, 6-32 X 3/8 B.H.
	12	WASHER, FLAT, #6
	12	WASHER, LOCK, EX TOOTH #6
	8	NUT, 6-32

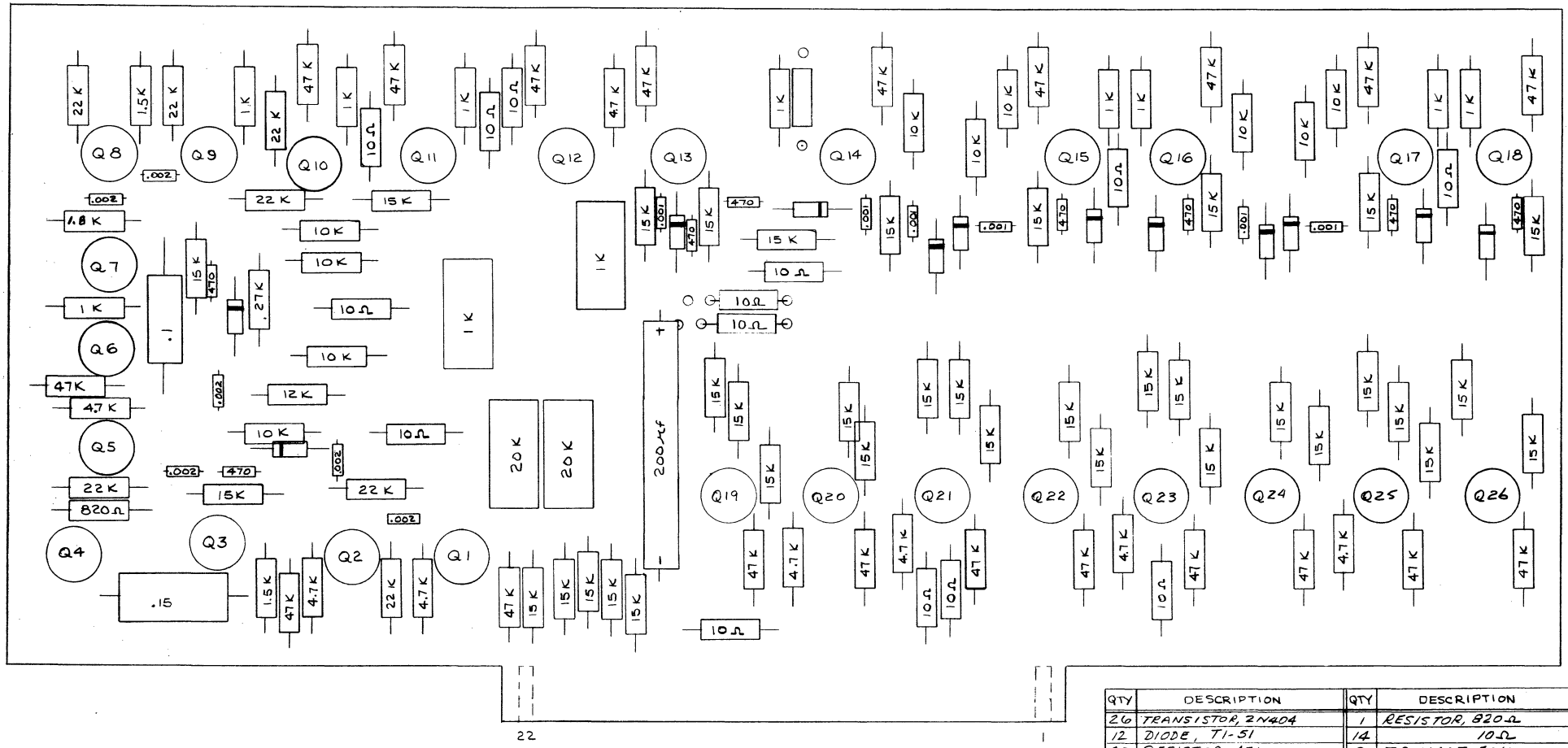
TOLERANCES UNLESS OTHERWISE NOTED
FRACT. ± 1/64
DEC. ± .005
ANG. ± 2°

FINISH
SCALE
DRAWN 4 AUG 64
APPR.

DIGI-DATA CORP.
BLADENSBURG, MD.

MOTOR DRIVER, MD-01

CC-0004

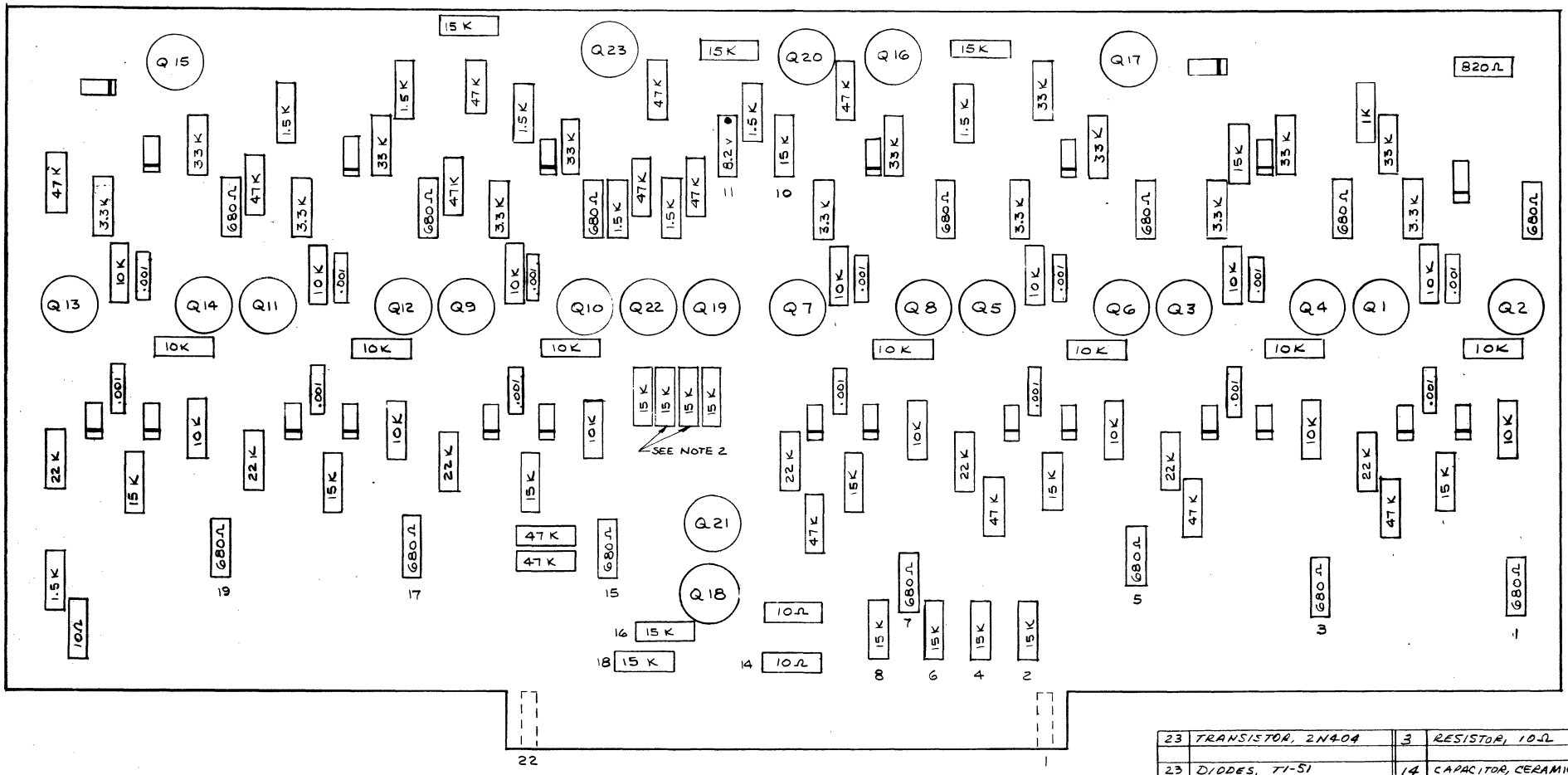


NOTES:

1.- UNLESS OTHERWISE SPECIFIED
   a.- ALL CAPACITORS LARGER THAN 1 ARE IN µµf
   b.- ALL CAPACITORS SMALLER THAN 1 ARE IN µf

QTY	DESCRIPTION	QTY	DESCRIPTION
26	TRANSISTOR, 2N404	1	RESISTOR, 820Ω
12	DIODE, T1-51	14	10Ω
20	RESISTOR, 47K	2	TRIMPOT, 20K
1	27K	2	1K
7	22K	1	CAPACITOR, ELECTROLYTIC, 200µf
36	15K	8	CERAMIC, 470µf
1	12K	6	.002µf
10	10K	6	.001µf
8	4.7K	1	MYLAR, .15µf
1	1.8K	1	.1µf
2	1.5K		
3	1.0K		

TOLERANCES UNLESS OTHERWISE NOTED FRACT. ±1/64 DEC. ±.005 ANG. ±2°	FINISH SCALE DRAWN D.H. DINSMORE 25 AUGUST 64 APPR.	DIGI-DATA CORP. BLADENSBURG, MD. LOGIC CARD ASSEMBLY MP-10 CC-0008



NOTES:

1.- UNLESS OTHERWISE SPECIFIED
   a.- ALL CAPACITORS LARGER THAN 1 ARE IN μμf
   b.- ALL CAPACITORS SMALLER THAN 1 ARE IN μf

2.- TO DISABLE 6BIT BINARY ZERO TO 10 CONVERTER REMOVE RESISTORS

QTY	DESCRIPTION	QTY	DESCRIPTION
23	TRANSISTOR, 2N404	3	RESISTOR, 10Ω
23	DIODES, T1-51	14	CAPACITOR, CERAMIC, .001μf
1	DIODE, ZENER, 8.2V		
14	RESISTOR, 47K		
8	33K		
7	22K		
21	15K		
21	10K		
7	3.3K		
8	1.5K		
1	1.0K		
14	680Ω, ±5%		
1	820Ω		

TOLERANCES UNLESS OTHERWISE NOTED
FRACT. ±1/64
DEC. ±.005
ANG. ±2°

FINISH
SCALE
DRAWN Wm A. MAHER 13 AUG 1965
APPR.

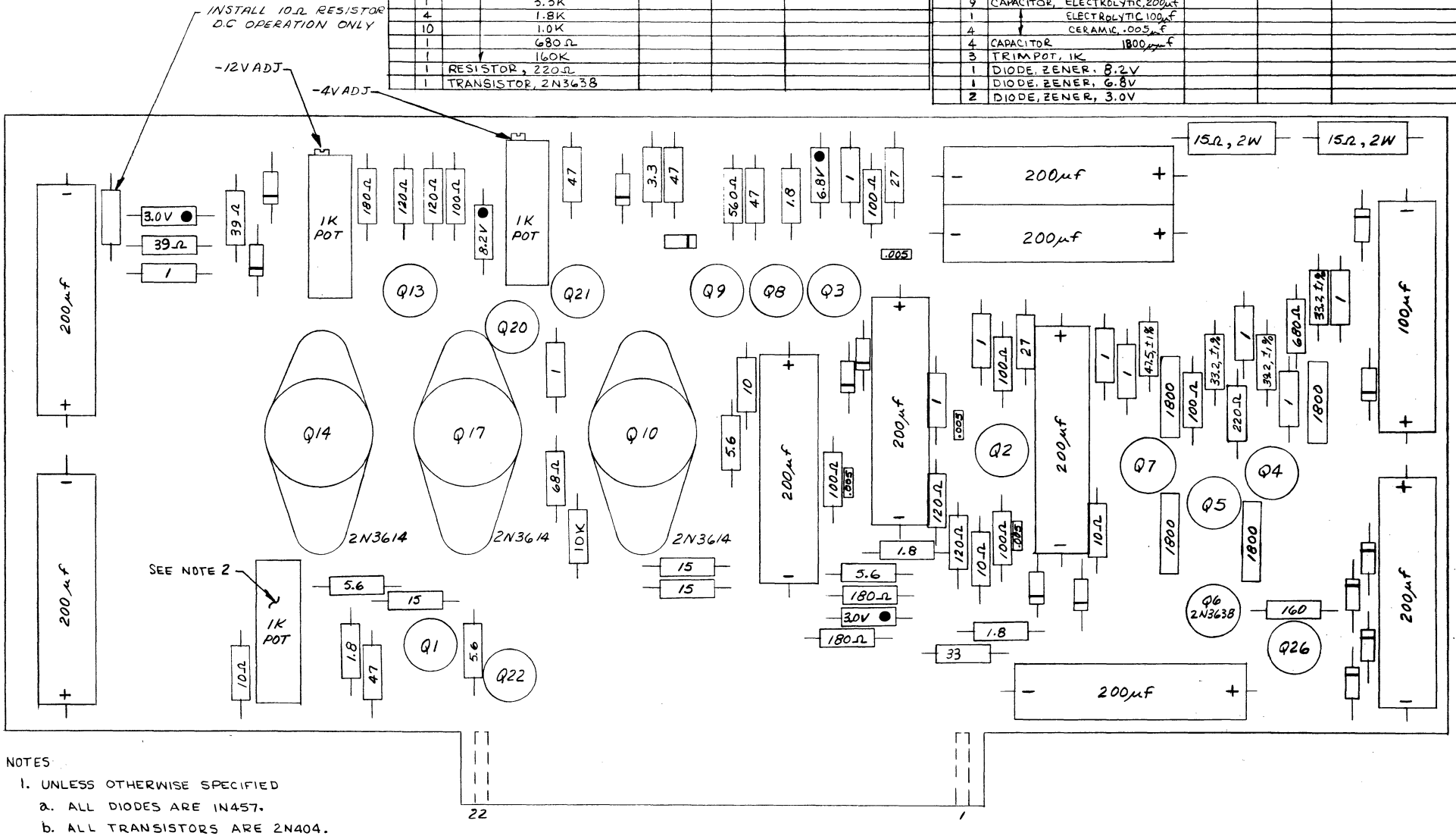
DIGI-DATA CORP.
BLADENSBURG, MD.

LOGIC CARD ASSEMBLY RA-10/ RA 11

CC-0018

ITEM	QTY	DESCRIPTION	DRAWING NUMBER	MFG. NO.	REFERENCE
	13	TRANSISTOR		2N404	RCA
	3	TRANSISTOR		2N3614	
	14	DIODE		T1 51	T1
	2	RESISTOR, 15Ω, 2W			
	4	47K			
	1	33K			
	2	27K			
	3	15K			
	2	10K			
	4	5.6K			
	1	3.3K			
	4	1.8K			
	10	1.0K			
	1	680Ω			
	1	160K			
	1	RESISTOR, 220Ω			
	1	TRANSISTOR, 2N3638			

ITEM	QTY	DESCRIPTION	DRAWING NUMBER	MFG. NO.	REFERENCE
	1	RESISTOR. 560Ω			
	3	180Ω			
	4	120Ω			
	6	100Ω			
	1	68Ω			
	2	39Ω			
	3	10Ω			
	1	47.5K, ±1%			
	1	39.2K, ±1%			
	2	RESISTOR 33.2K, ±1%			
	9	CAPACITOR, ELECTROLYTIC, 200μf			
	1	ELECTROLYTIC 100μf			
	4	CERAMIC, .005μf			
	4	CAPACITOR 1800μμf			
	3	TRIMPOT, 1K			
	1	DIODE, ZENER. 8.2V			
	1	DIODE, ZENER, 6.8V			
	2	DIODE, ZENER, 3.0V			



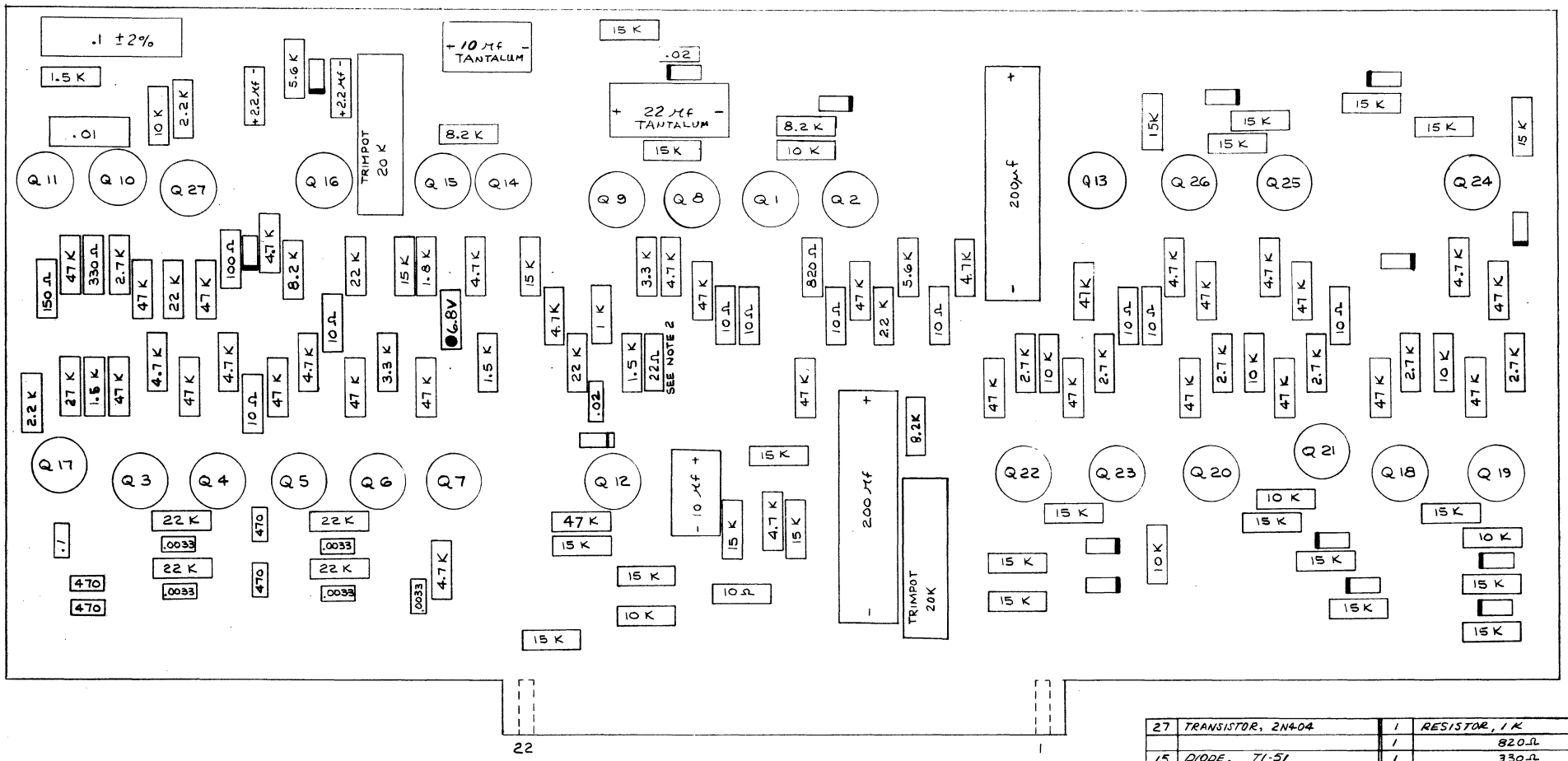
NOTES

1. UNLESS OTHERWISE SPECIFIED
   a. ALL DIODES ARE IN457.
   b. ALL TRANSISTORS ARE 2N404.
   c. ALL RESISTORS ARE IN K OHMS, 1/2 W, ±5%.
   d. ALL CAPACITORS ARE IN μμf.
2. ADJUST FOR +1.5V AT BASE OF Q22 WITH TAPE LOADED, BUT NOT AT REFLECTIVE MARKER
3. INSTALL 40251 IN PLACE OF 2N3614 FOR MPN SILICON

PS10 POWER SUPPLY

DIGI-DATA CORP.
BLADENSBURG, MD.

SHEET 1 OF 1 | CC - 0016



22 1

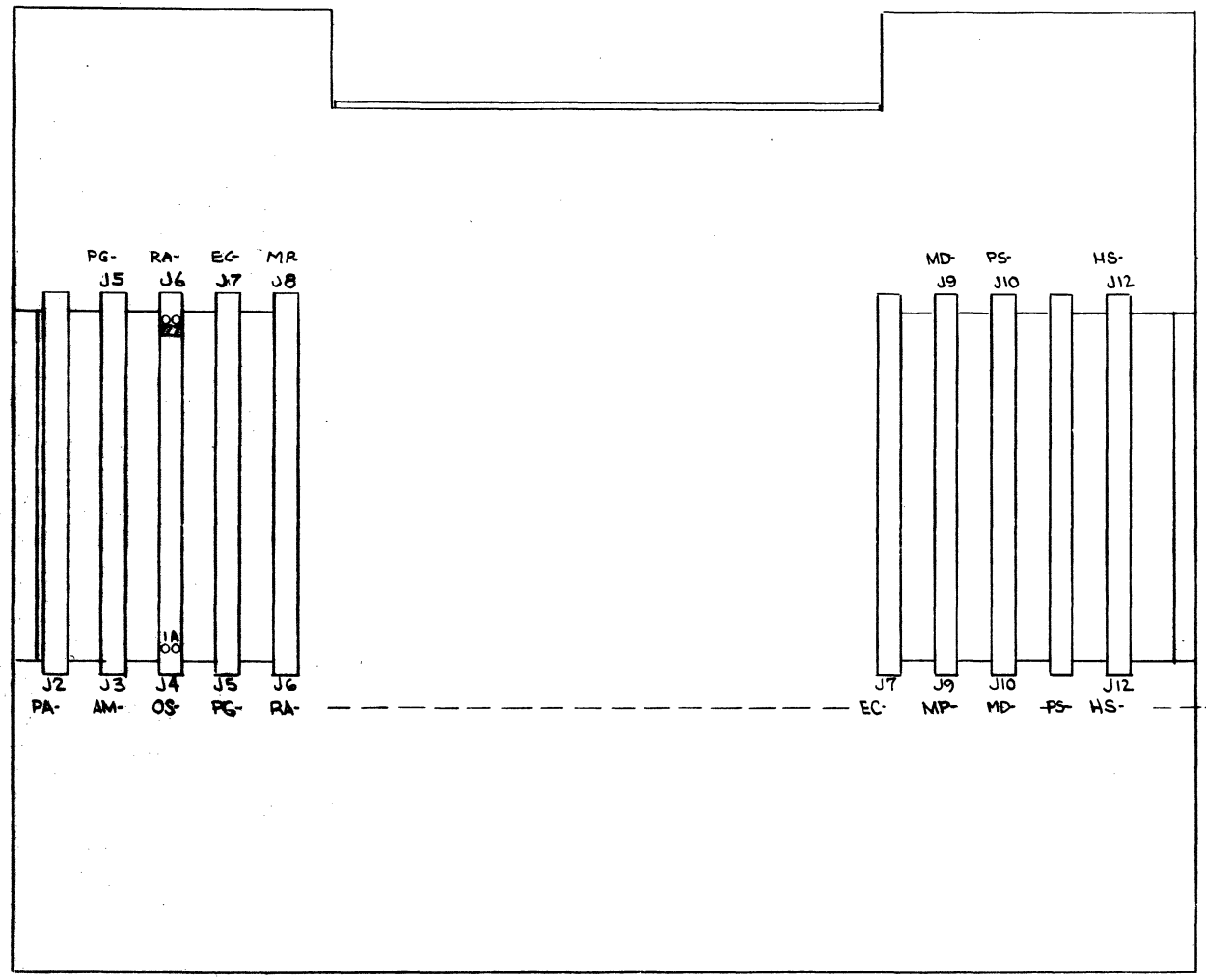
NOTES:

1.- UNLESS OTHERWISE SPECIFIED
   a.- ALL CAPACITORS LARGER THAN 1 ARE IN Mmf
   b.- ALL CAPACITORS SMALLER THAN 1 ARE IN Mf

2.- MOUNT 1/8" ABOVE SURFACE OF BOARD

QTY	DESCRIPTION	QTY	DESCRIPTION
27	TRANSISTOR, 2N404	1	RESISTOR, 1 K
		1	820Ω
15	DIODE, T1-51	1	330Ω
		1	150Ω
1	DIODE, ZENER, 6.8V	1	100Ω
		1	22Ω
22	RESISTOR. 47K	10	10Ω
		2	TRIMPOT, 20K
1	27K	2	CAPACITOR, ELECTR., 200μf
1	22K	1	,TANTALUM, 22 Mf
25	15K	2	10μf
9	10K		
4	8.2K	2	.2μf
2	5.6K	1	,MYLAR, .1μf, ±2%
12	4.7K	1	.01μf
2	3.3K	1	,CERAMIC, .1μf
7	2.7K	2	.02μf
3	2.2K		
1	1.8K	5	.0033μf
4	1.5K	4	470μf

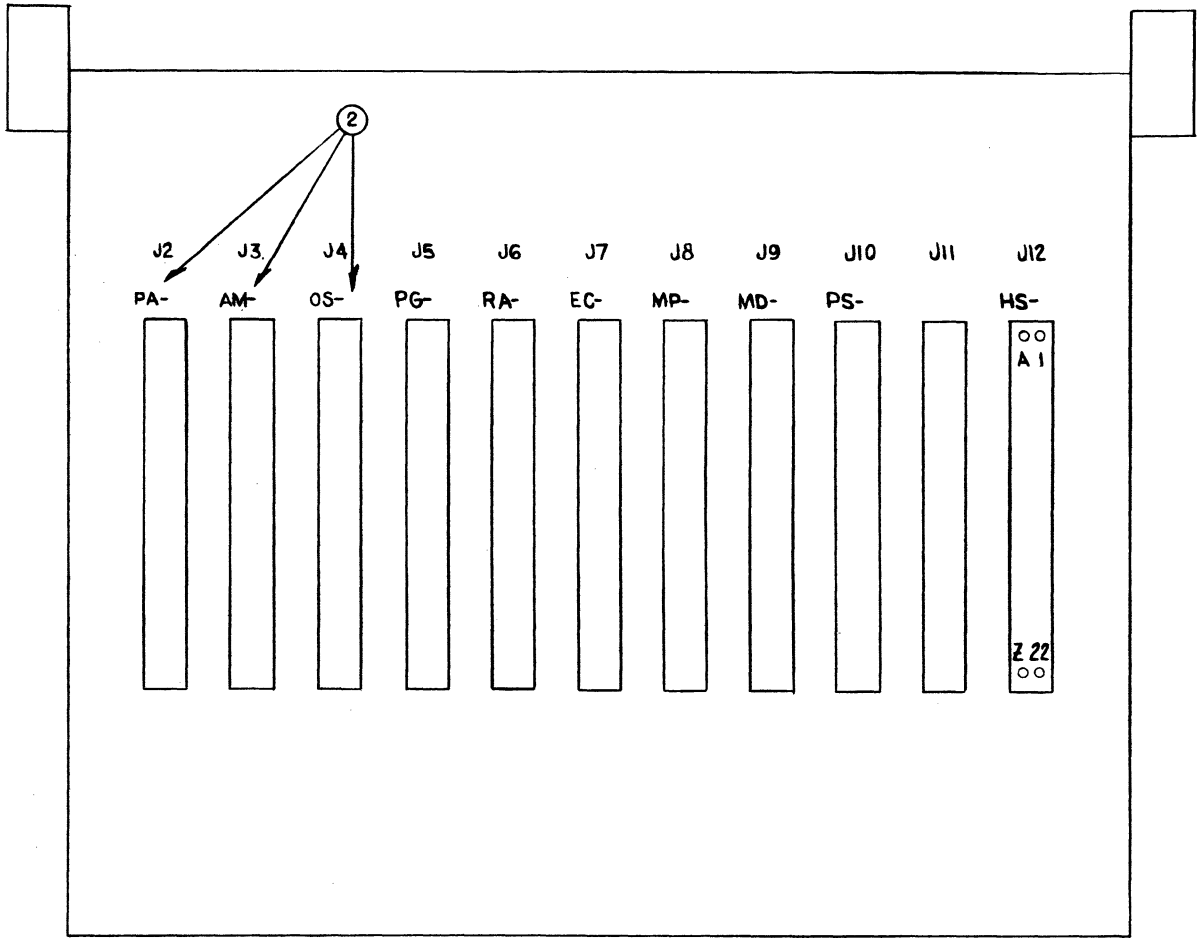
TOLERANCES UNLESS OTHERWISE NOTED FRACT. ±1/64 DEC. ±.005 ANG. ±2°	DRAWN SCALE DH. DINSMORE 22 SEPT 64 APPR.	DIGI-DATA CORP. BLADENSBURG, MD. LOGIC CARD ASSEMBLY, PG-11 DSR 1420-200 BPI CC-0022



BOTTOM VIEW

NOTES:
1. J1 (INPUT/OUTPUT CONNECTOR) NOT SHOWN.

DIGI-DATA CORP.	
CONNECTOR LOCATIONS	
DSR-1420(A DSR1440(P) DSR-1430(P)	RC-0001



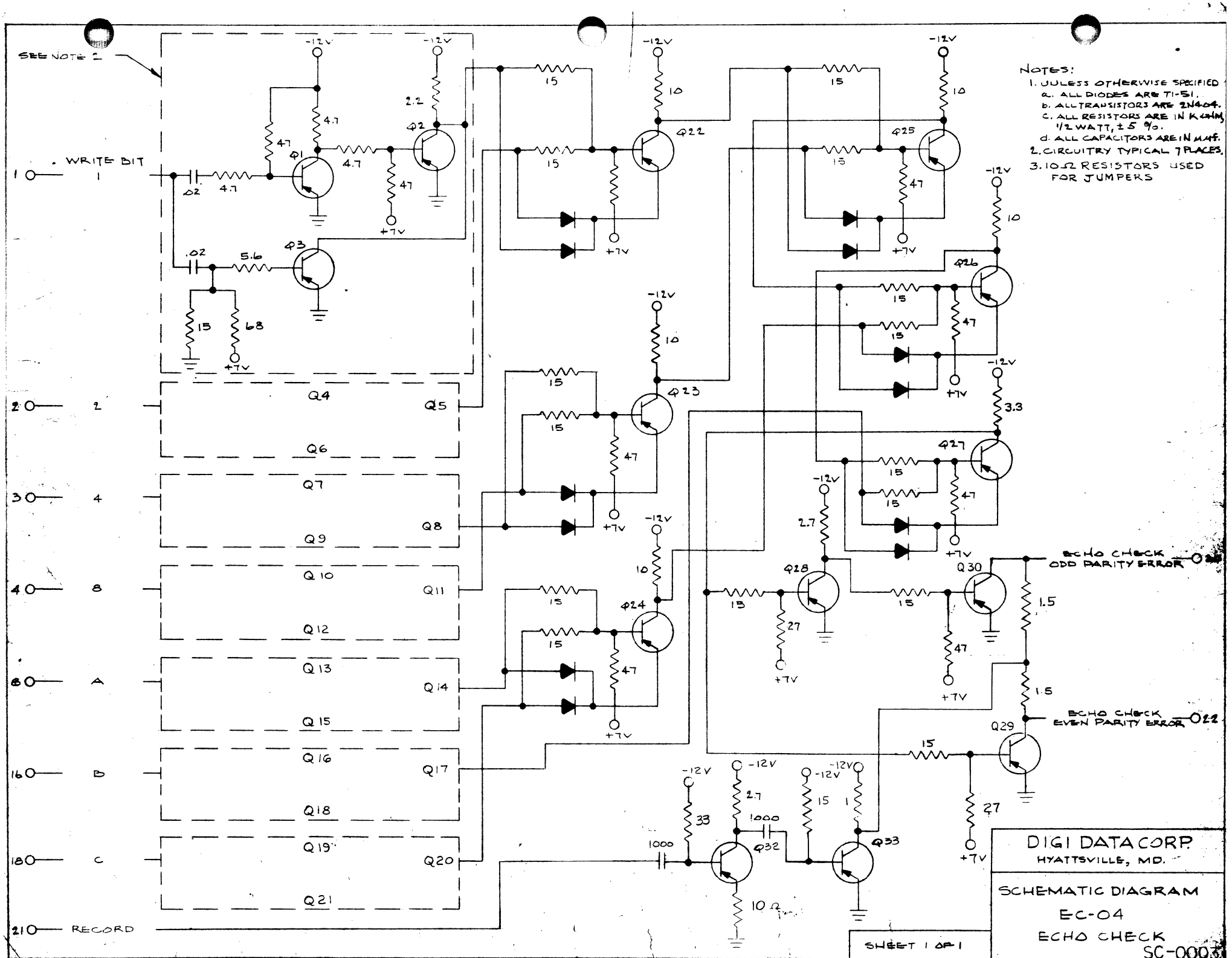
NOTES:
1.- J1 (INPUT / OUTPUT CONN) NOT SHOWN.
2.- WITH PLAYBACK OPTION ONLY.
3.- CHASSIS VIEWED FROM BOTTOM.

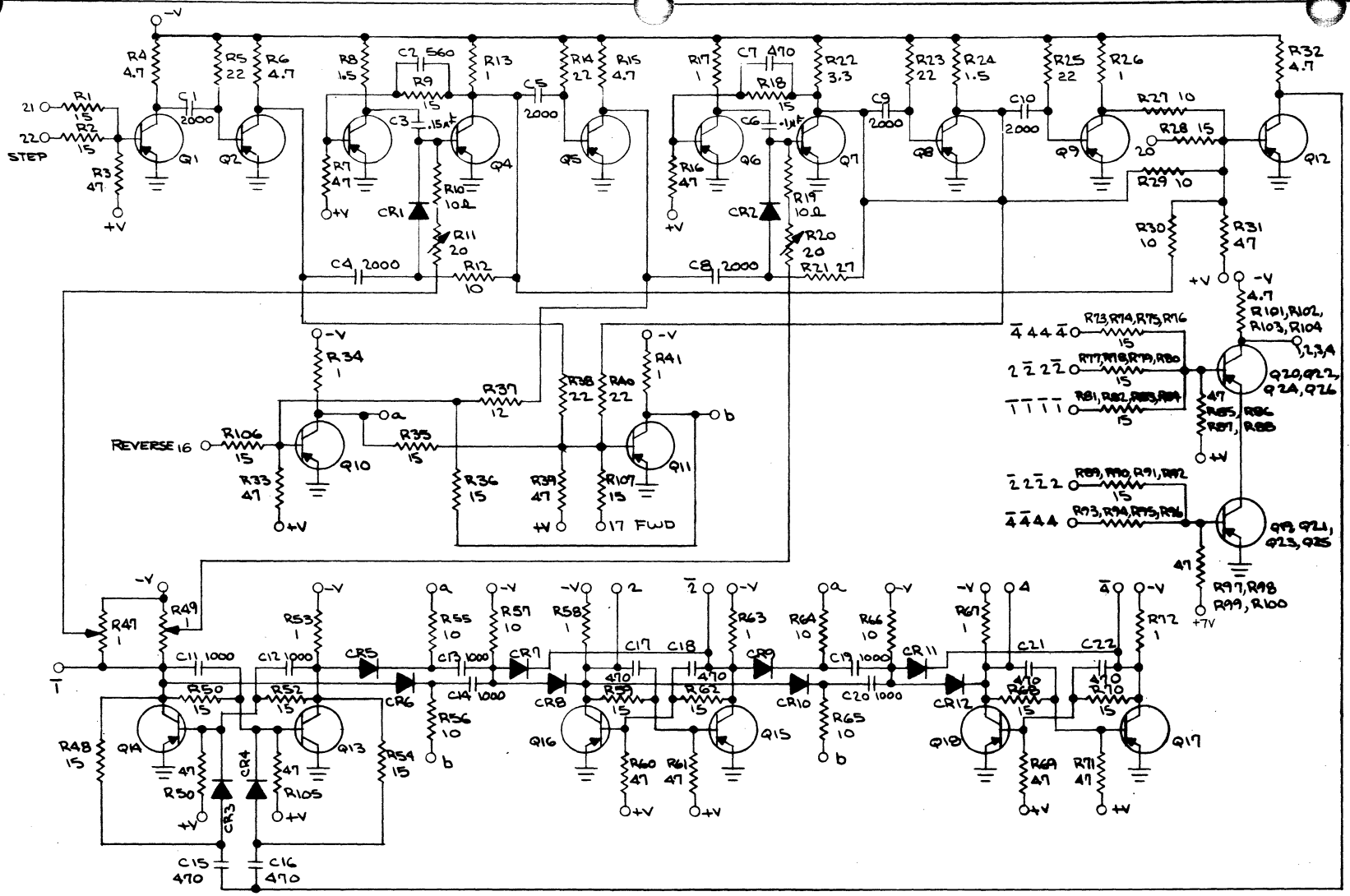
DIGI-DATA CORP.
BLADENSBURG, MD.

CONNECTOR LOCATIONS

DSR-1420 (H)(V) DSR 1440(H)(V)
DSR-1430(H)(V)

RB-0001


SEE NOTE 2
WRITE BIT
1
2
4
8
A
B
C
RECORD
Q1
Q2
Q3
Q4
Q5
Q6
Q7
Q8
Q9
Q10
Q11
Q12
Q13
Q14
Q15
Q16
Q17
Q18
Q19
Q20
Q21
Q22
Q23
Q24
Q25
Q26
Q27
Q28
Q29
Q30
Q32
Q33
-12V
+7V
ECHO CHECK ODD PARITY ERROR
ECHO CHECK EVEN PARITY ERROR
NOTES:
1. UNLESS OTHERWISE SPECIFIED
a. ALL DIODES ARE TI-51.
b. ALL TRANSISTORS ARE 2N404.
c. ALL RESISTORS ARE IN K OHM, 1/2 WATT, ± 5 %.
d. ALL CAPACITORS ARE IN MMF.
2. CIRCUITRY TYPICAL 7 PLACES.
3. 10 Ω RESISTORS USED FOR JUMPERS
DIGI DATA CORP.
HYATTSVILLE, MD.
SCHEMATIC DIAGRAM
EC-04
ECHO CHECK
SHEET 1 OF 1
SC-0003

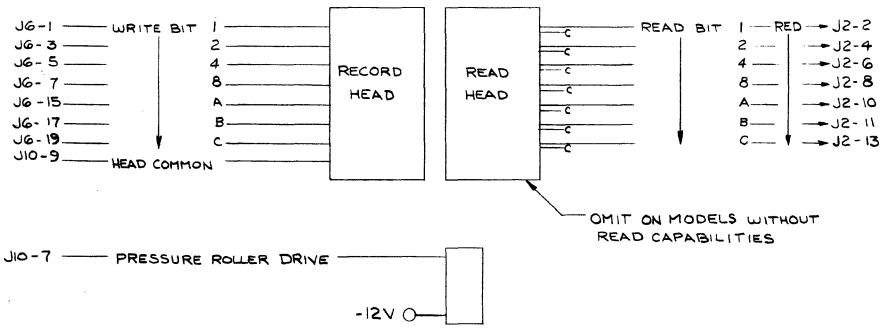


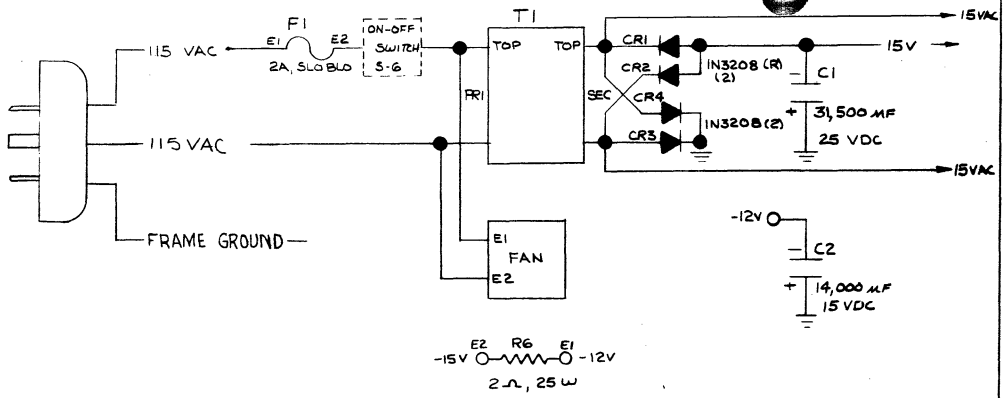
GRD - PIN 7
-12V - PIN 10
+6.8V - PIN 5
C23 200mf

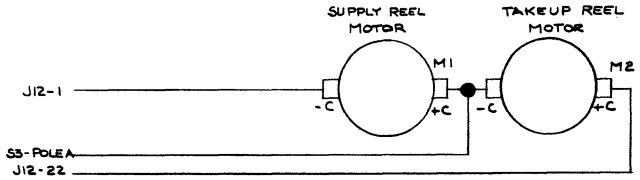
NOTES:
1. UNLESS OTHERWISE SPECIFIED:
   a. ALL DIODES ARE T1-51
   b. ALL TRANSISTORS ARE 2N404
   c. ALL RESISTORS ARE IN K OHMS ½WATT, 5%
   d. ALL CAPACITORS ARE IN mmf
   e. 10Ω RESISTORS USED FOR JUMPERS

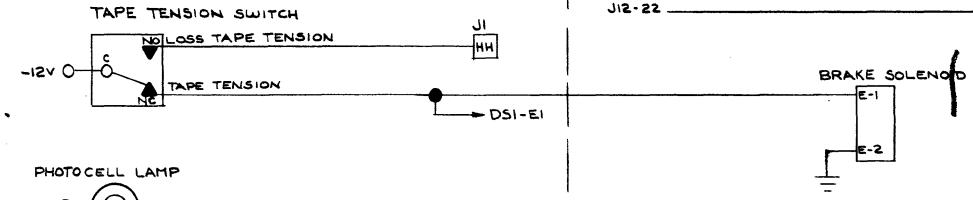
DIGI-DATA CORP. HYATTSVILLE MD	
SCHEMATIC DIAGRAM	
MP 10	SC-0006

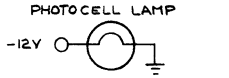
DRIVE PLATE ASSEMBLY

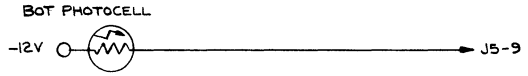


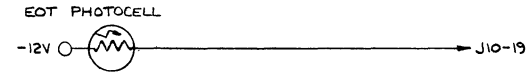


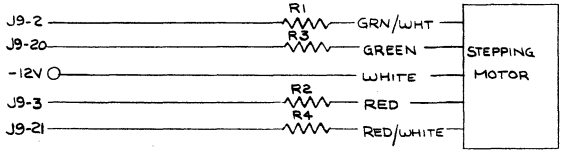




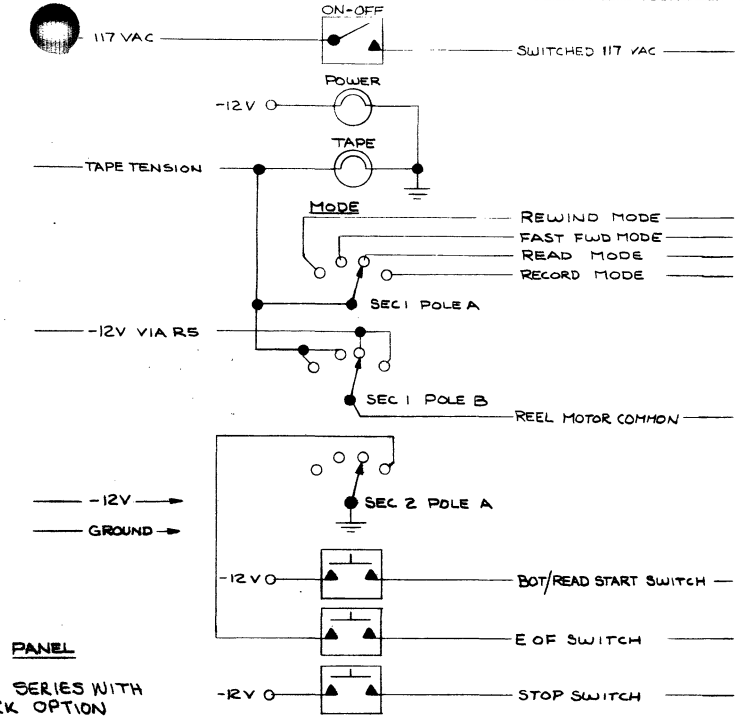






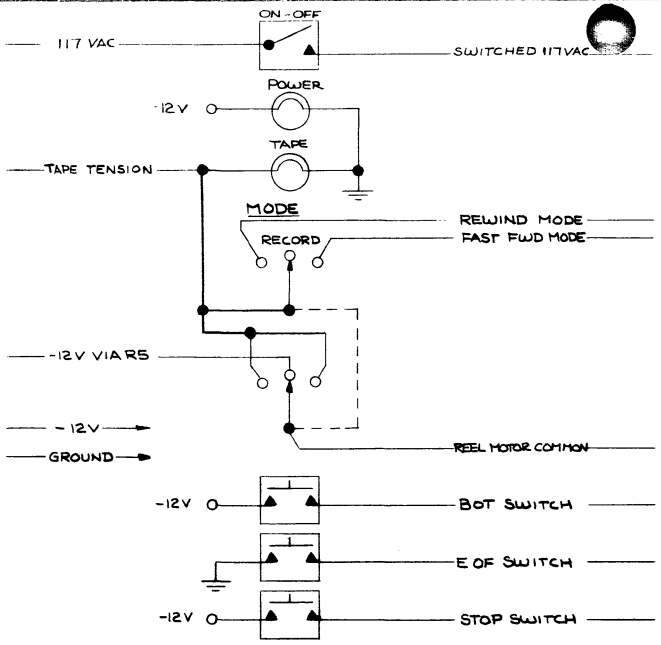


DIGI-DATA CORP BLADENSBURG, MD.	SCALE	
	DRAWN D.H. DINSMORE 20 JULY 1964	TOLERANCES UNLESS OTHERWISE NOTED
SCHEMATIC DIAGRAM DRIVE PLATE ASSY, POWER SUPPLY & REEL MOTOR	APPR.	
DSR 1400 SERIES		SC-0009



CONTROL PANEL

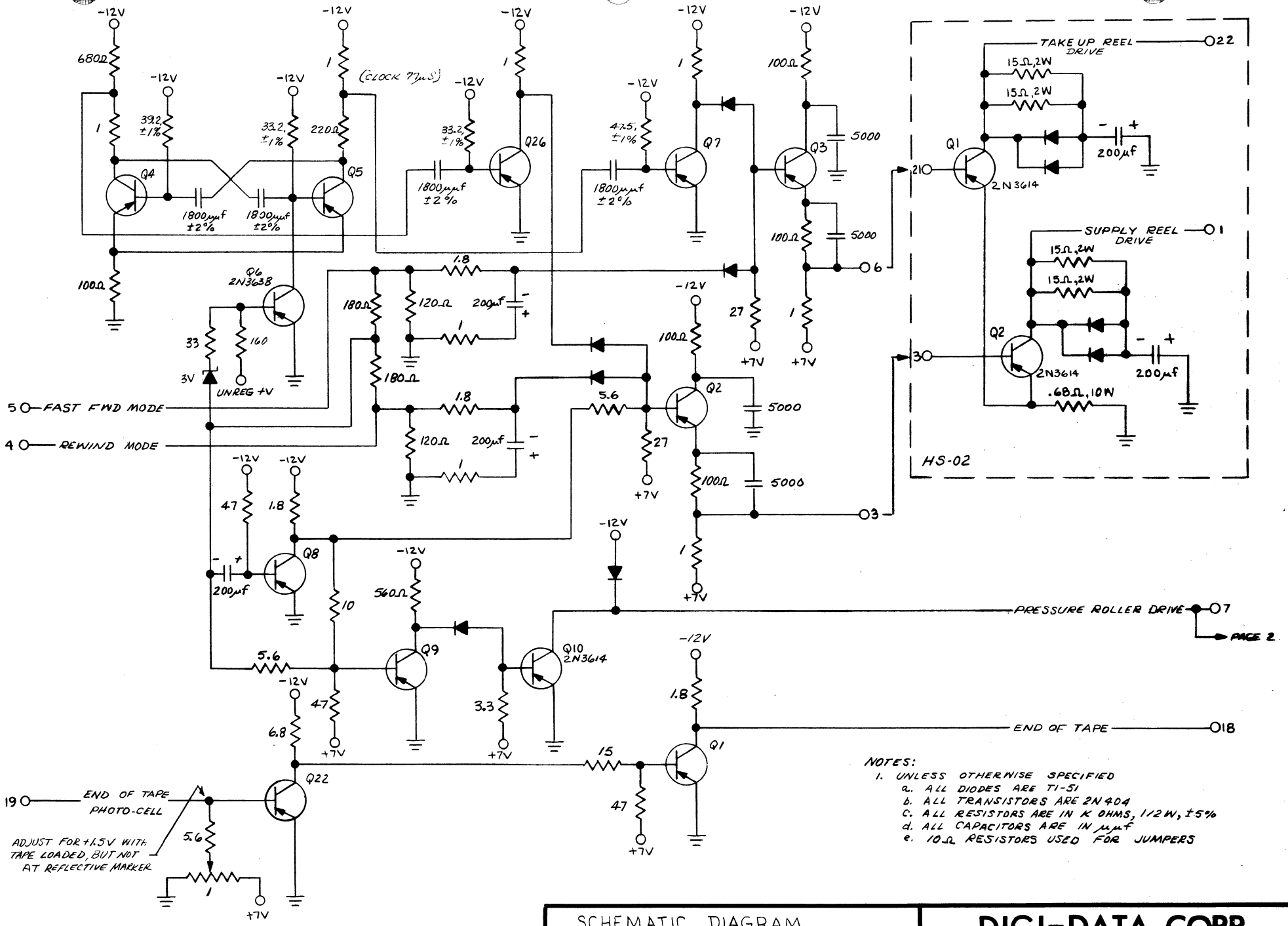
DSR 1400 SERIES WITH READBACK OPTION



CONTROL PANEL

DSR 1400 SERIES

TOLERANCES UNLESS OTHERWISE NOTED FRACT. ±1/64 DEC. ±.005 ANG. ±2°	FINISH SCALE DRAWN D.H. DINSMORE 3 SEPT 64 APPR.	DIGI-DATA CORP. GLADENSBURG, MD. CONTROL PANEL DSR 1400 SERIES SC-0010



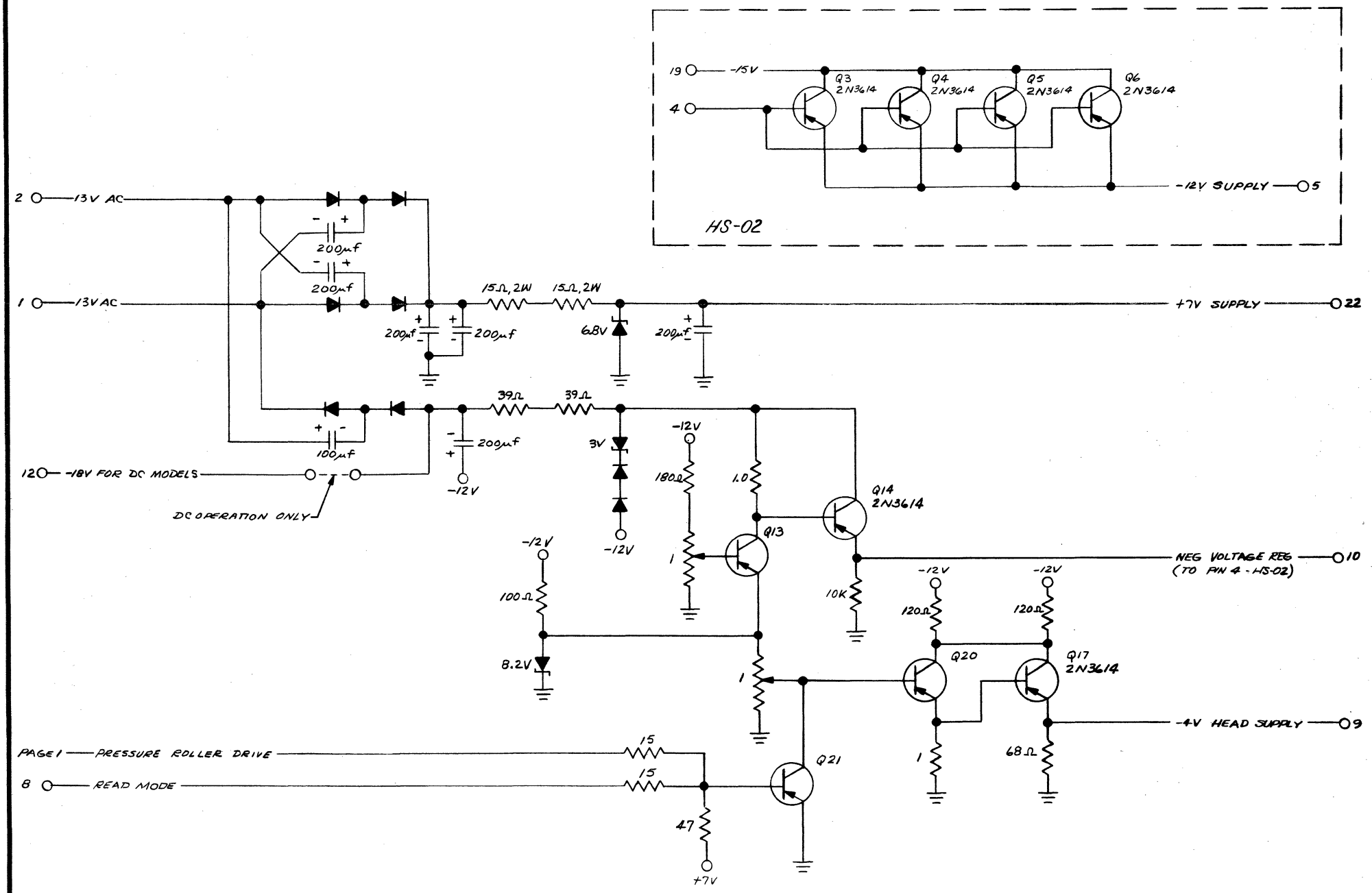
NOTES:
1. UNLESS OTHERWISE SPECIFIED
   a. ALL DIODES ARE TI-51
   b. ALL TRANSISTORS ARE 2N404
   c. ALL RESISTORS ARE IN K OHMS, 1/2W, ±5%
   d. ALL CAPACITORS ARE IN μμf
   e. 10Ω RESISTORS USED FOR JUMPERS

SCHEMATIC DIAGRAM
PS-10 AND HS-02
POWER SUPPLY

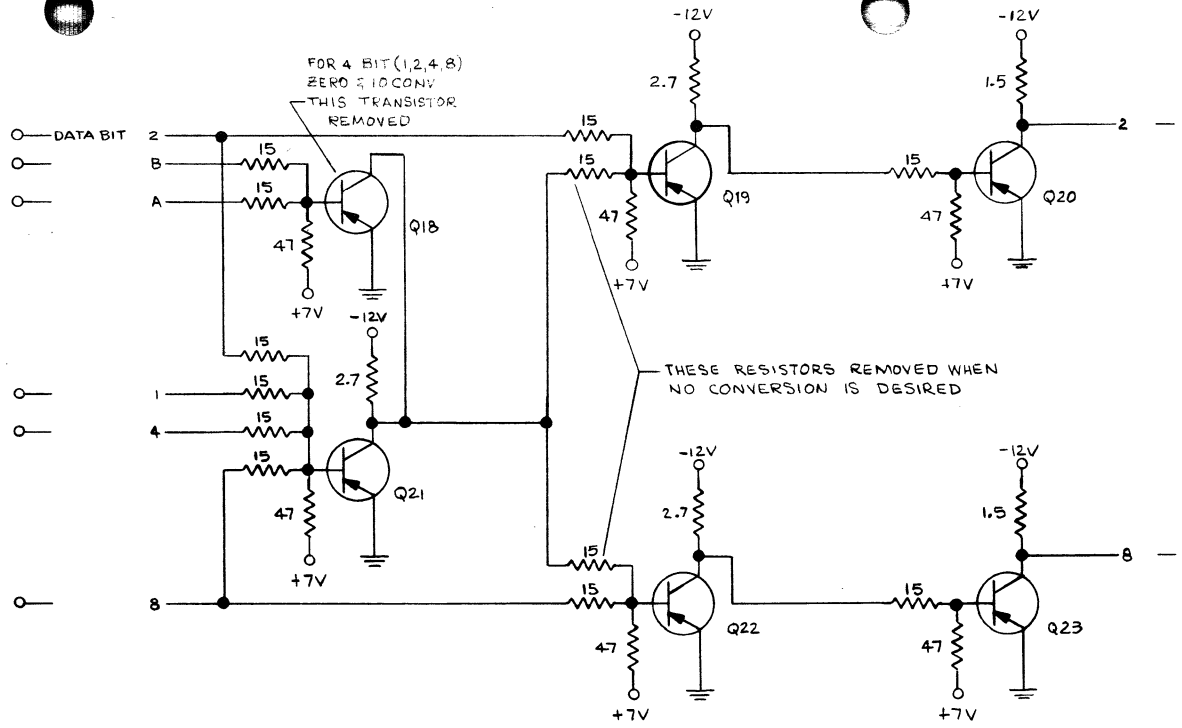
DR- WM. A. MAHER 8-7 65

DIGI-DATA CORP.
BLADENSBURG, MD.

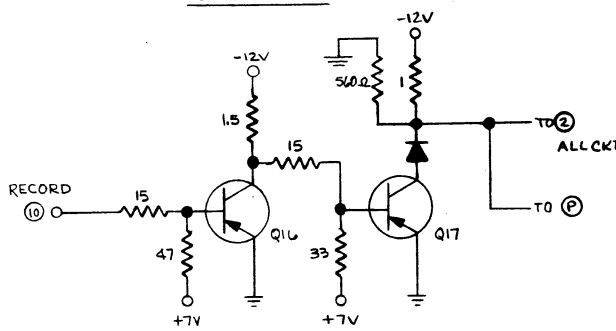
SHEET 1 OF 2 | SC - 0019



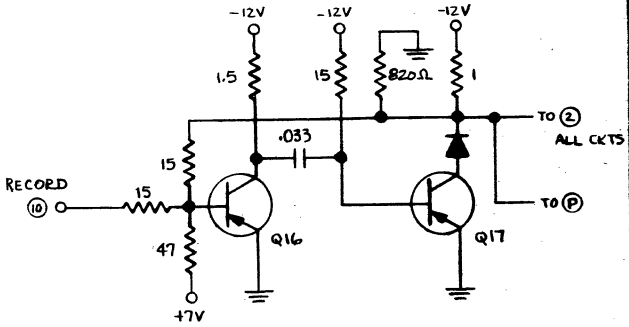
SCHEMATIC DIAGRAM PS-10 AND HS-02 POWER SUPPLY	**DIGI-DATA CORP.** **BLADENSBURG, MD.**	
DR- WM. A MAHER 8-7-65	**SHEET 2 OF 2**	SC - 0019



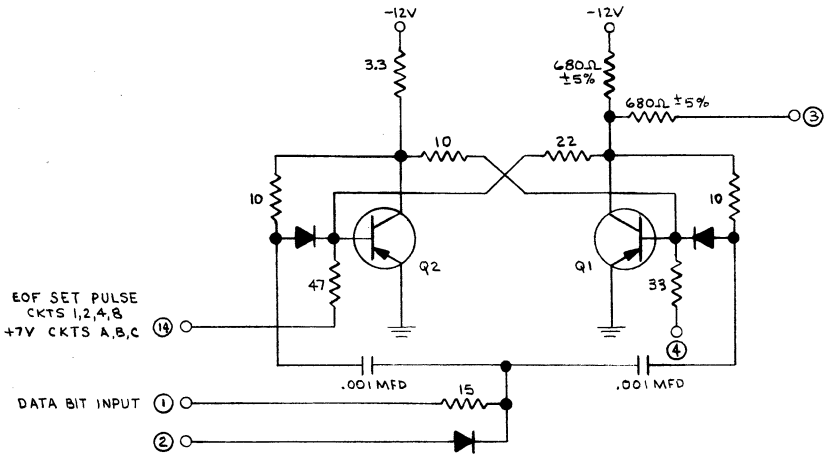
GATE DRIVER



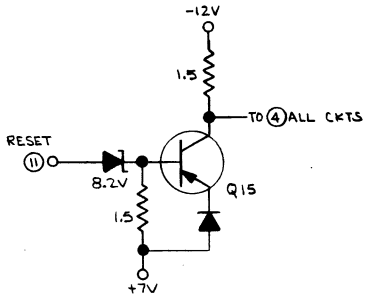
ALTERNATE GATE DRIVER



TYPICAL CKTS 1,2,4,8,A,B,C



RESET DRIVER



NOTES

1. UNLESS OTHERWISE SPECIFIED
   ALL TRANSISTORS 2N404
   ALL DIODES T1-51
   ALL RESISTORS IN K OHMS

7 TRACK CARD CONNECTIONS

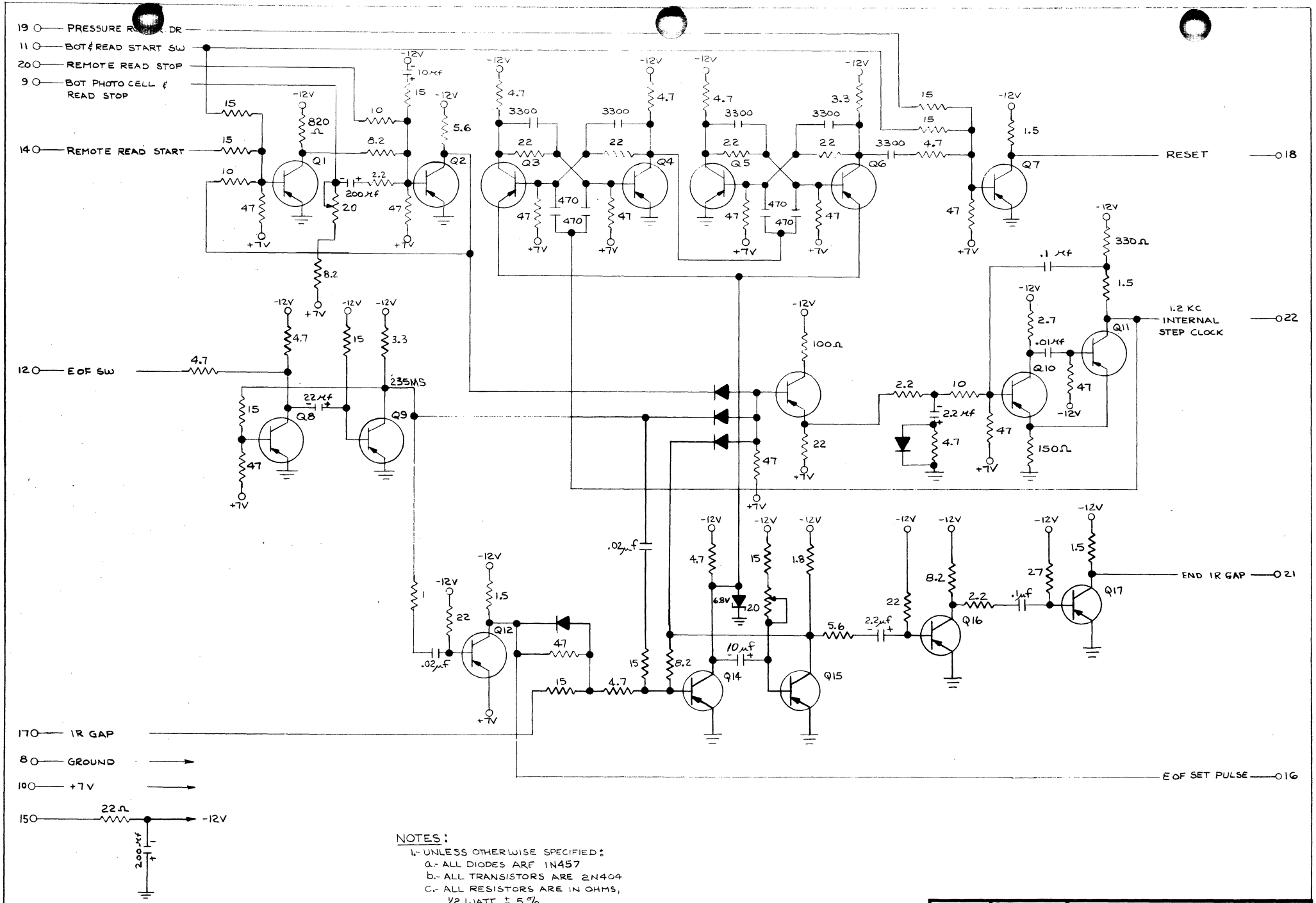
CKT	1	3	REF
1	2	1	Q1,2
2	4	3	Q3,4
4	6	5	Q5,6
8	8	7	Q7,8
A	16	15	Q9,10
B	18	17	Q11,12
C	20	19	Q13,14

SCHEMATIC DIAGRAM
RA-10 / RA-11

DR. WM. A. MAHER 20 AUG 1965

DIGI-DATA CORP.
BLADENSBURG, MD.

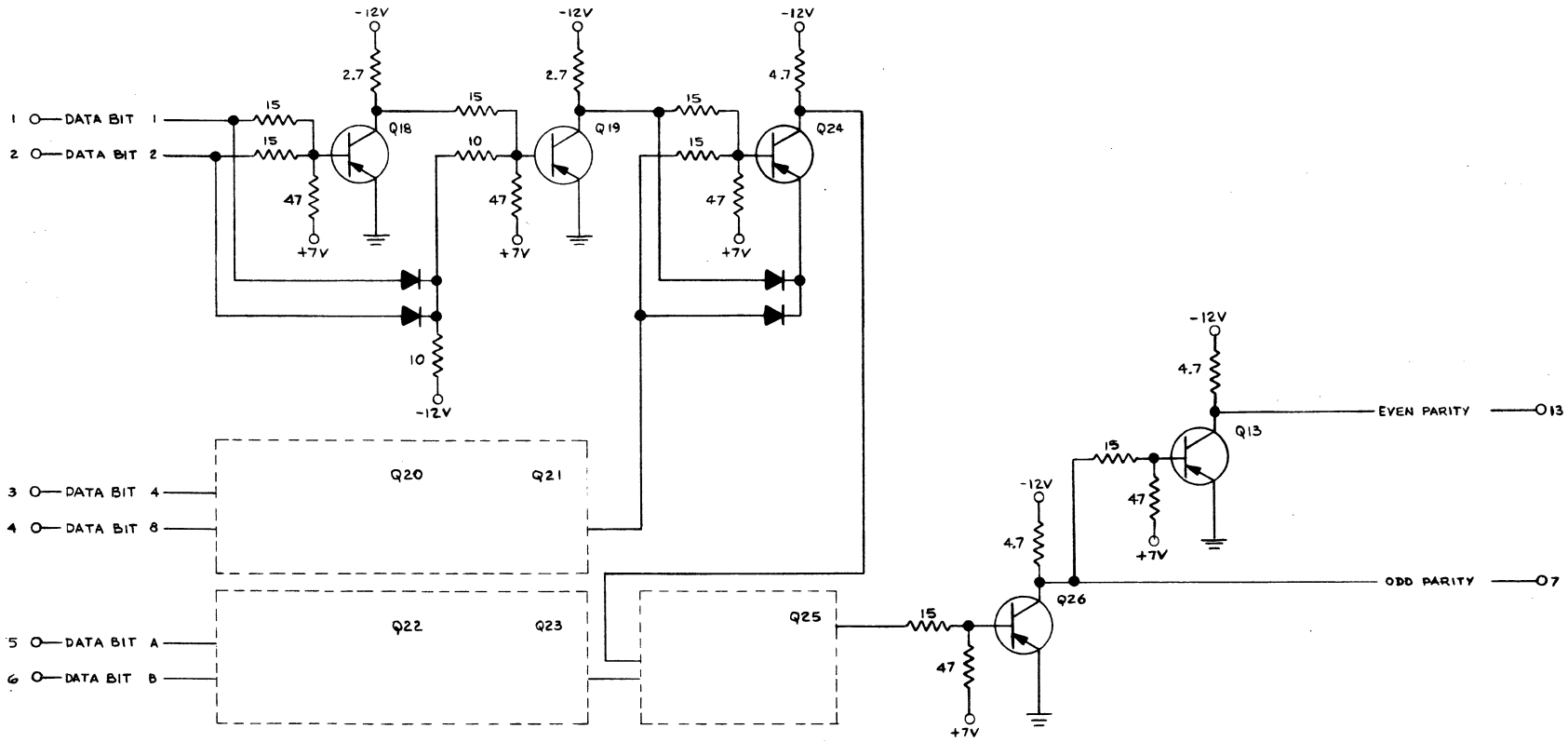
SHEET 1 OF 1 | SC - 0021



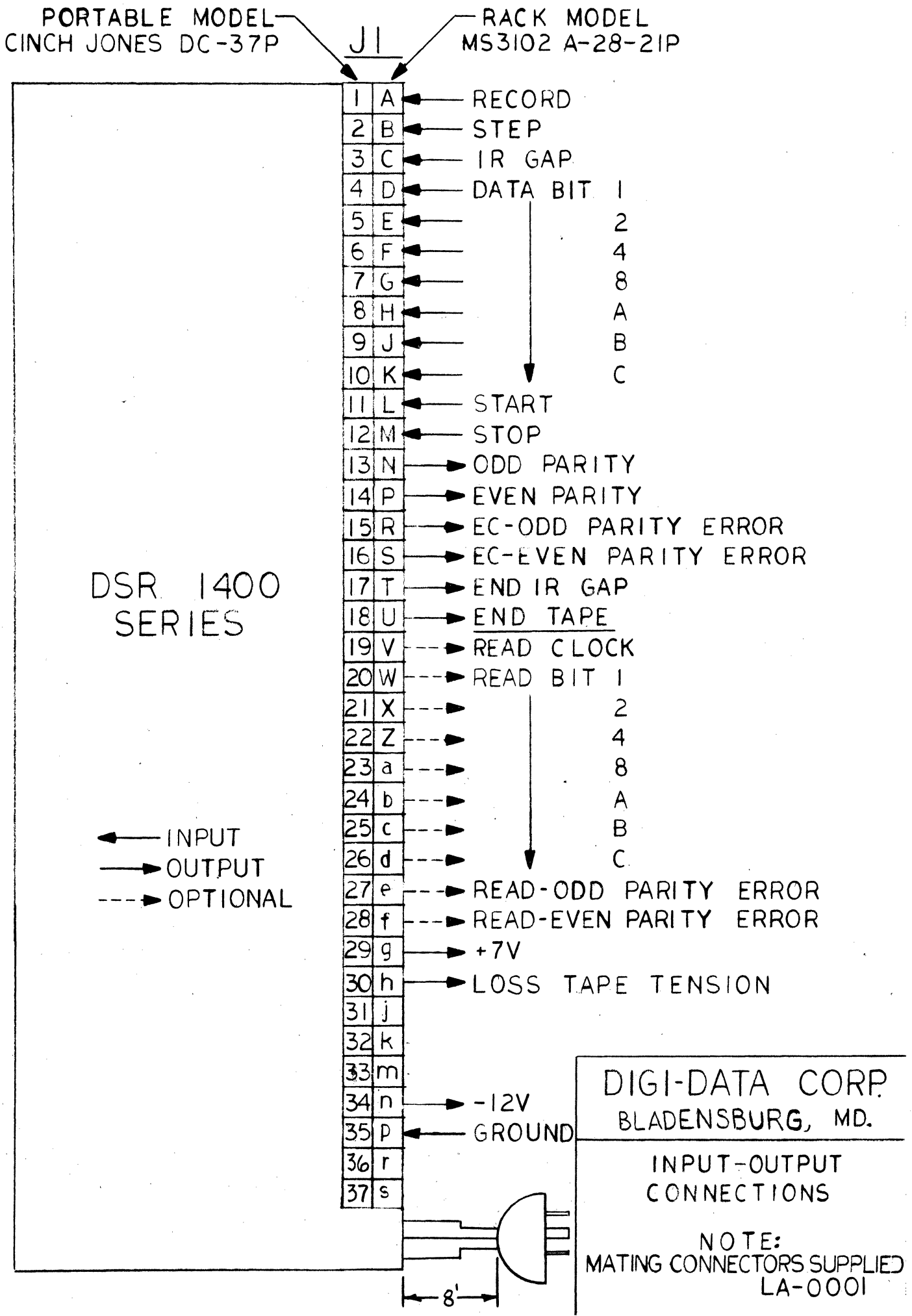
NOTES:

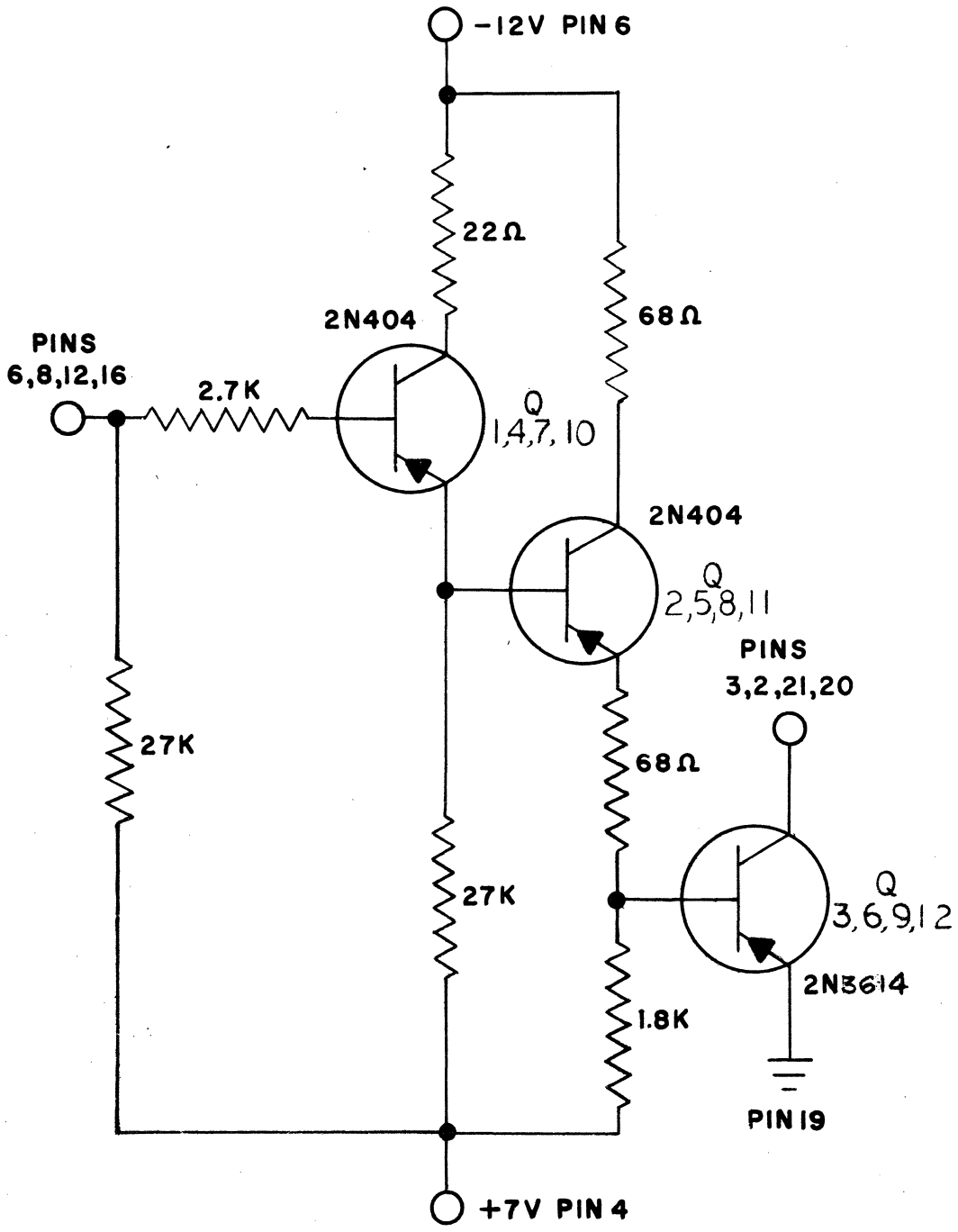
1.- UNLESS OTHERWISE SPECIFIED:
- a.- ALL DIODES ARE 1N457
- b.- ALL TRANSISTORS ARE 2N404
- c.- ALL RESISTORS ARE IN OHMS, 1/2 WATT ± 5%
- d.- ALL CAPACITORS ARE IN µµf
- e.- 10Ω RESISTORS USED FOR JUMPERS

TOLERANCES UNLESS OTHERWISE NOTED FRACT. ± 1/64 DEC. ± .005 ANG. ±2°	FINISH SCALE DRAWN D.H. DINSMORE 4 SEPT 69 APPR.	DIGI-DATA CORP. BLADENSBURG, MD. SCHEMATIC DIAGRAM PG-11 GAP GENERATOR 200 BPI SHEET 1 OF 2 SC-0025



SCHEMATIC DIAGRAM PARITY GENERATOR PG-11 200 BPI	**DIGI-DATA CORP.** BLADENSBURG, MD.	
DR. WM. A. MAHER 19 AUG, 1965	SHEET 2 OF 2	SC - 0025


PORTABLE MODEL
CINCH JONES DC-37P
J1
RACK MODEL
MS3102 A-28-21P
1 A RECORD
2 B STEP
3 C IR GAP
4 D DATA BIT 1
5 E 2
6 F 4
7 G 8
8 H A
9 J B
10 K C
11 L START
12 M STOP
13 N ODD PARITY
14 P EVEN PARITY
15 R EC-ODD PARITY ERROR
16 S EC-EVEN PARITY ERROR
17 T END IR GAP
18 U END TAPE
19 V READ CLOCK
20 W READ BIT 1
21 X 2
22 Z 4
23 a 8
24 b A
25 c B
26 d C
27 e READ-ODD PARITY ERROR
28 f READ-EVEN PARITY ERROR
29 g +7V
30 h LOSS TAPE TENSION
31 j
32 k
33 m
34 n -12V
35 p GROUND
36 r
37 s
DSR 1400
SERIES
INPUT
OUTPUT
OPTIONAL
8'
DIGI-DATA CORP.
BLADENSBURG, MD.
INPUT-OUTPUT
CONNECTIONS
NOTE:
MATING CONNECTORS SUPPLIED
LA-0001



TYPICAL OF FOUR CIRCUITS

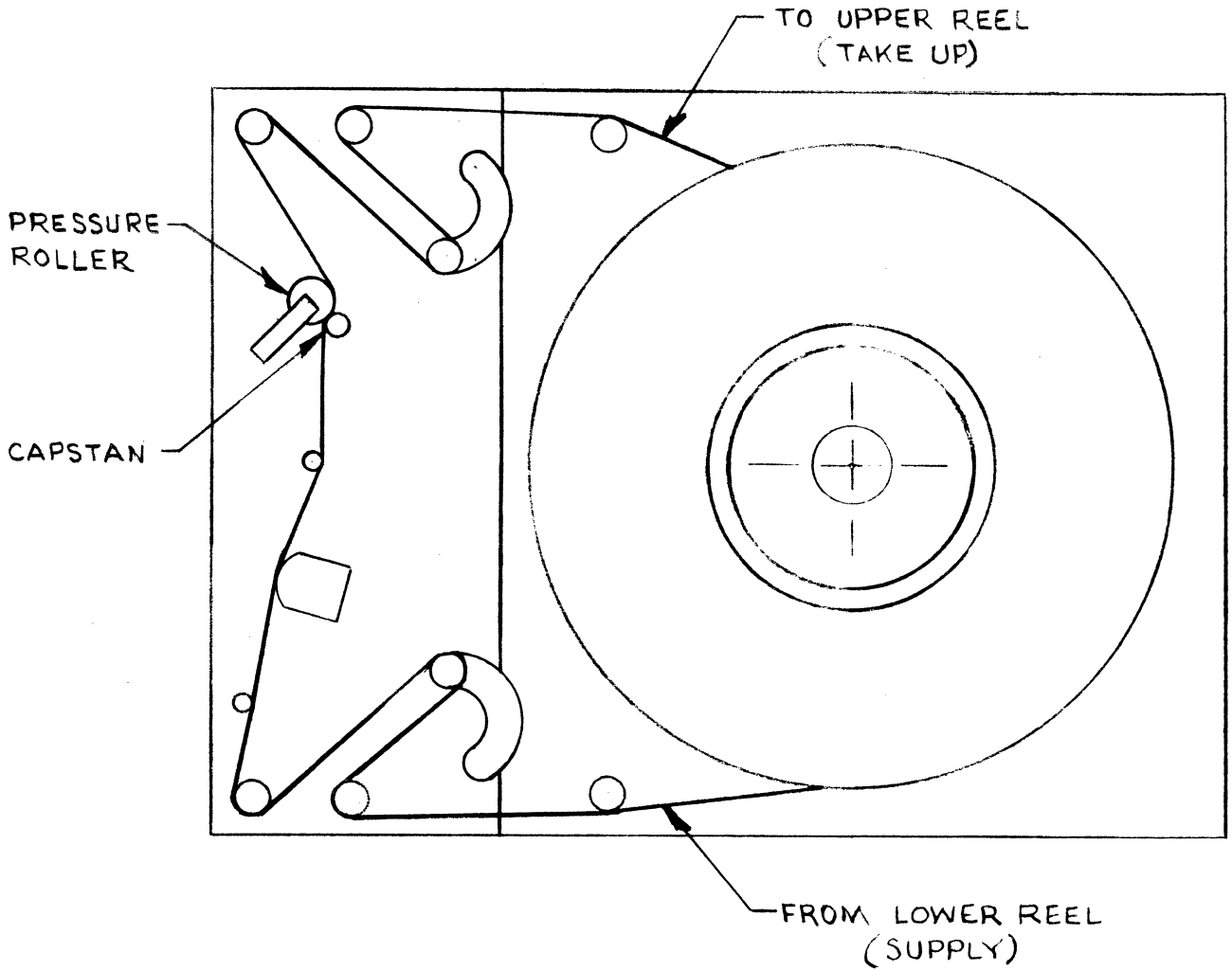
DIGI-DATA CORP

SCHEMATIC DIAGRAM

MD-01

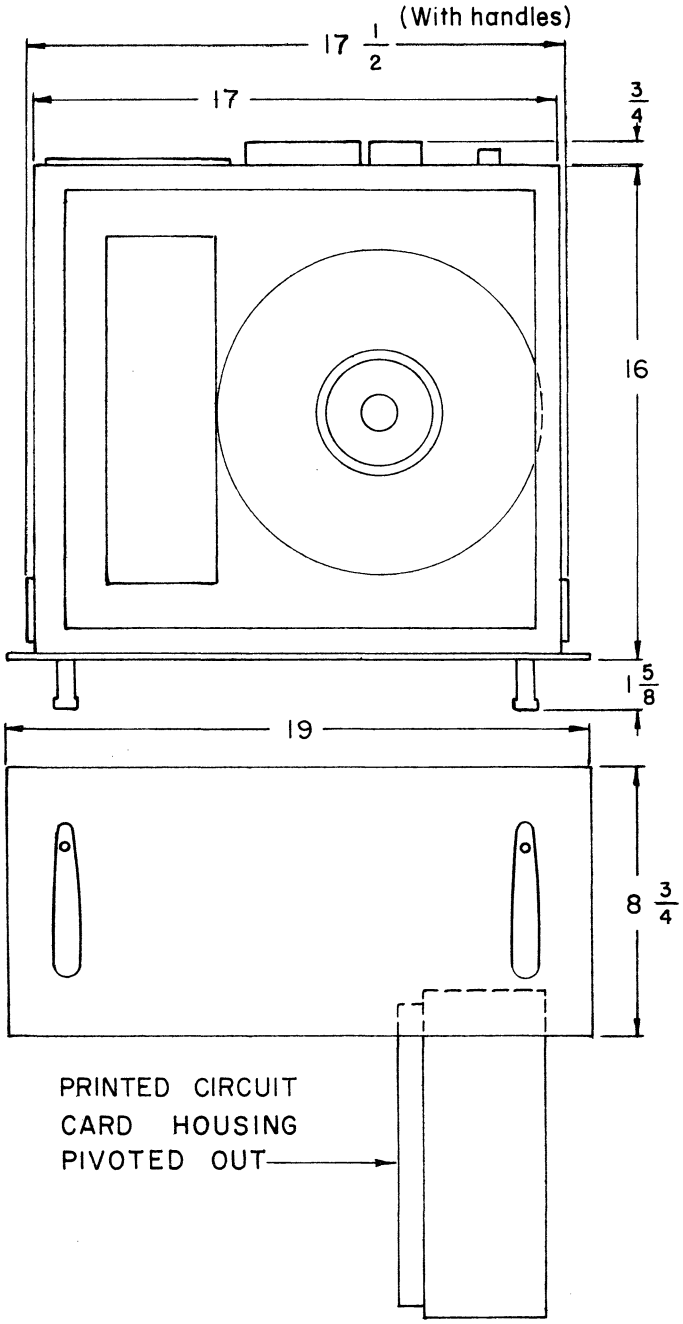
MOTOR DRIVER

SA-0001

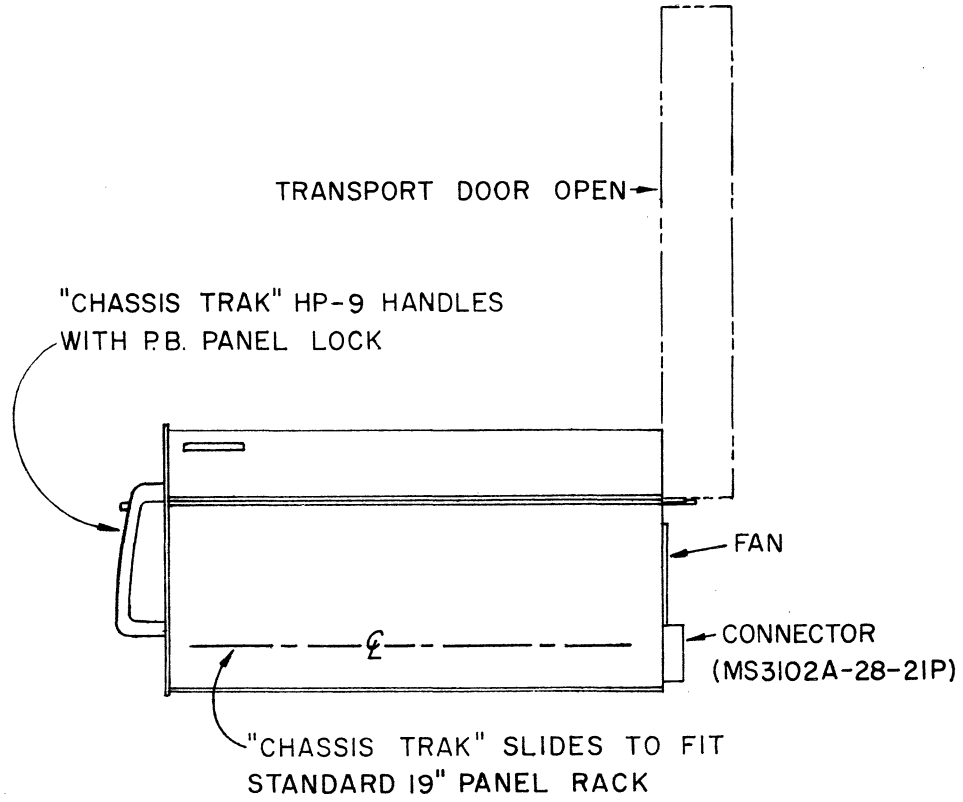


NOTE:
FOR EASE OF LOADING, DO NOT THREAD TENSION ARMS UNTIL TAPE IS SECURED TO THE TAKEUP REEL.

TAPE PATH DIAGRAM DSR 1400 SERIES	**DIGI-DATA CORP.** BLADENSBURG, MD.
	SHEET 1 OF 1 | RA-0002



STD. COLOR - FED-STD 595 COLOR 26492



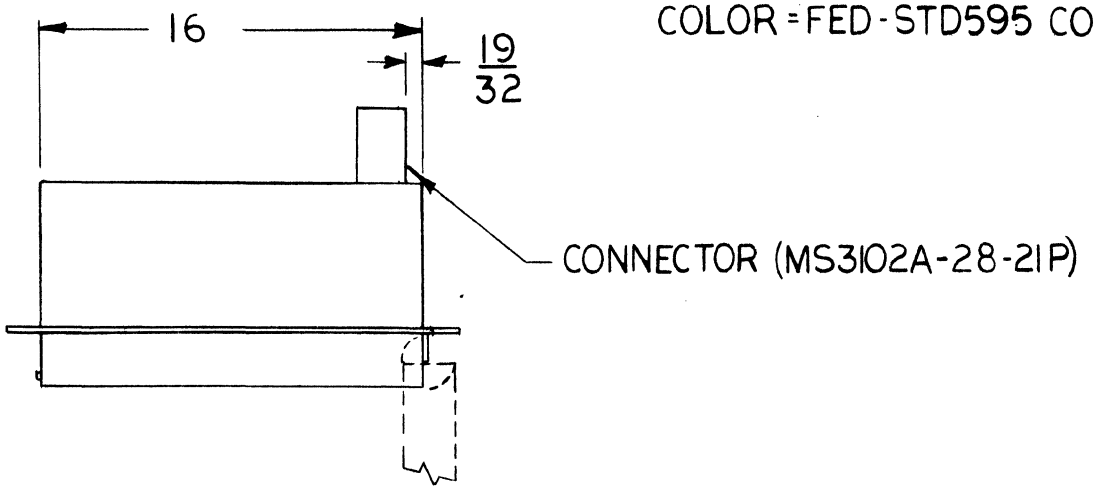
DIGI-DATA CORP

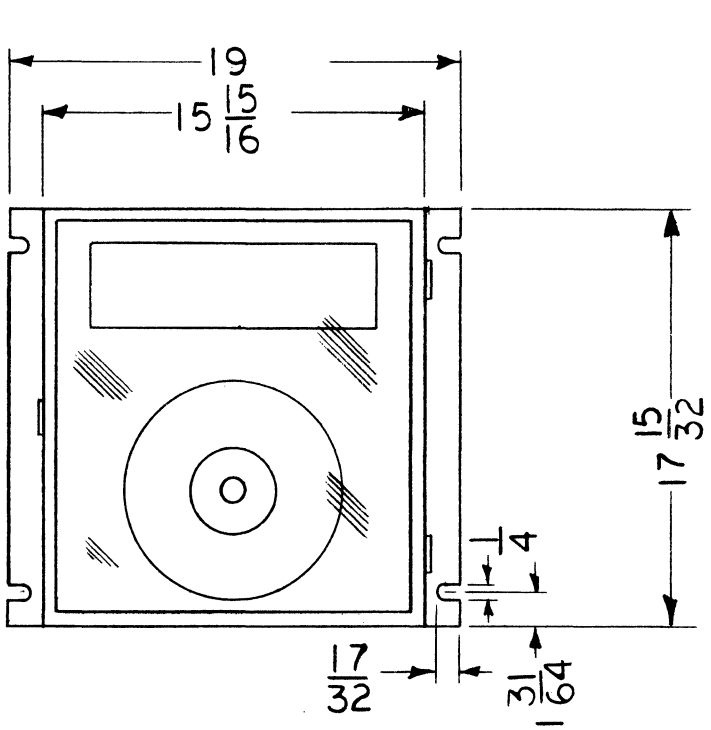
DSR 1400 SERIES

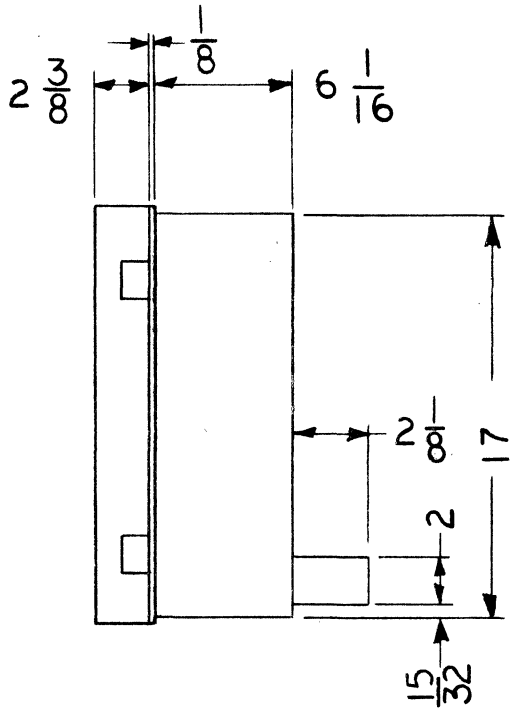
OUTLINE DIMENSIONS (RACK MODEL)

RA-0004

COLOR = FED-STD595 COLOR 26492







TYP. 4 CORNERS

DIGI-DATA CORP. HYATTSVILLE, MD.	SCALE 1:8
DSR 1400 SERIES OUTLINE DRAWING VERTICAL RACK MOUNT	RA-0005

ITEM	FROM	TO	WIRE	ROUTING	REFERENCE
	J1-A	J6-10	White		Record
	J1-B	J8-22	White		Step
	J1-C	J5-17	White		IR Gap
	J1-D	J5-1	White		Data Bit 1
	J1-E	J5-2	White		Data Bit 2
	J1-F	J5-3	White		Data Bit 4
	J1-G	J5-4	White		Data Bit 8
	J1-H	J5-5	White		Data Bit A
	J1-J	J5-6	White		Data Bit B
	J1-K	J6-20	White		Data Bit C
	J1-L	J5-14	White		Start
	J1-M	J5-20	White		Stop
	J1-N	J5-7	White		Odd Parity
	J1-P	J5-13	White		Even Parity
	J1-R	J7-20	White		Echo Check--OPE
	J1-S	J7-22	White		Echo Check--EPE
	J1-T	J5-21	White		End IR Gap
	J1-U	J10-18	White		End of Tape
	J1-V		White		
	J1-W		White		
	J1-X		White		
	J1-Y		White		
	J1-Z		White		
	J1-a				
	J1-b				
	J1-c				
	J1-d				
	J1-e				
	J1-f				
	J1-g	J10-V	Red		+7v
	J1-h	TB1-6R	White		Loss Tape Tension
	J1-j				
	J1-k				
	J1-m				
	J1-n	R5-E1	Violet		-12v
	J1-p	C1-Pos	Black		Ground
	J1-p	C2-Pos	Black		Ground
	J1-r	Fuse E1	Gray		115v AC
	J1-s	Fan E2	Gray		115v AC
	R1-E2	J9-2	White		Step. Mtr. Drive
	R2-E2	J9-3	White		Step. Mtr. Drive
	R3-E2	J9-20	White		Step. Mtr. Drive
	R4-E2	J9-21	White		Step. Mtr. Drive
	M1 (-c)	J12-1	White		Supply Reel Drive
	M2 (+c)	J12-22	White		Take-up Reel Dr.
	C2+	J12-7	Black		Grnd to Heat Sink
	C2+	J10-20	Black		Grnd to Card Cage
	C2-	J10-21	Violet		-12 to Card Cage

NOTES:

DIGI-DATA CORP.
BLADENSBURG, MARYLAND

WIRING LIST WA-0003

DSR 1420, 1430, 1440 (H)(V)

SHEET 1 OF 4

ITEM	FROM	TO	WIRE	ROUTING	REFERENCE
	C1+	J9-19	Black		Grnd to Mtr Dr.
	C1-	J12-19	Blue		-15v to Heat Sink
	CR3-A	J10-1	White		13v AC
	CR4-A	J10-2	White		13v AC
	M1+C	M2-C	White		
	R5-E1	R6-E1	Violet		
	S1-1T	S3-Pole B	Violet		-12v
	S3-Pole B	S5-1B	Violet		-12v
	S5-1B	DS2-E1	Violet		-12v
	DS1-E2	DS2-E2	Black		Ground
	DS2-E2	S4-1T	Black		Ground
	S3-A5	S3-A3, S8-A2, S3-Pole B	Buss		
	C1-	R6-E2	Blue		-15v
	C1-	CR1-A	Blue		-15v
	C1+	CR4-C	Black		Ground
	C1+	TB1-3	Black		Ground
	C2+	Brake E2	Black		Ground
	C2-	R6-E1	Violet		-12v
	F1-E1	S6-E1	Gray		115v AC
	Fan E2	S6-E2	Gray		Switched 115 AC
	M2-C	S3-Pole A	White		Reel Mtr Common
	Brake E1	TS1-7R	White		Brake Supply
	R6-E1	DS2-E1	Violet		-12v
	TB1-3	DS1-E2	Black		Ground
	TB1-7	DS1-E1	White		Tape Tension
	R5-E2	S3-A4	White		-12v via R5
	R5-E1	TB1-2	Violet		-12v
	T1-PR1	Fan E1	use T leads		
	T1-PR1	Fan E2			
	T1-Sec	CR4-A, CR1-C			
	T1-Sec	CR3-A, CR2-C			
	CR1-A	CR2-A	Blue		
	CR3-C	CR4-C	Black		
	STEPPING MOTOR				
	Grn/Wht	R1-E1			Motor Leads
	Red	R2-E1			
	Black	R3-E1			
	Red/Wht	R4-E1			
	White	Pressure Roller E1			
	PRESSURE ROLLER				
	E1	TB1-2	Violet		
	E2	TB1-1	White		
	TAPE SWITCH				
	C	TB1-2	Violet		-12v
	NC	TB1-6	White		

NOTES:

DIGI-DATA CORP.
BLADENSBURG, MARYLAND

WIRING LIST WA-0003

DSR 1420, 1430, 1440 (H)(V)

SHEET 2 OF 4

ITEM	FROM	TO	WIRE	ROUTING	REFERENCE
	NO	TB1-7	White		
	PHOTO DIODE ASSEMBLY				
	(3) Viol.	Pressure Roller E1	use only 1		-12v
	Black	TB1-3			Ground
	White	TB1-4			BOT
	White	TB1-5			EOT
	J5-L10	J6-Z22, J7-S15, J8-S15, J9-D4,	Red		+7v
		J10-Z22	Red		+7v
	J5-S15	J6-Y21, J7-R14, J8-L10, J9-E5,	Violet		-12v
		J12-E5	Violet		-12v
	J5-J8	J6-N12, J7-P13, J8-H7, J10-X20	Black		Ground
	Hd1 Trk1	J6-1	White		Write 1
	Hd1 Trk2	J6-3	White		Write 2
	Hd1 Trk4	J6-5	White		Write 4
	Hd1 Trk8	J6-7	White		Write 8
	Hd1 TrkA	J6-15	White		Write A
	Hd1 TrkB	J6-17	White		Write B
	Hd1 TrkC	J6-19	White		Write C
	Common	J10-9	White		Head Common
	TB1-1	J10-7	White		Pressure Roller
	TB1-4	J5-9	White		BOT Photocell
	TB1-5	J10-19	White		EOT Photocell
	S5-1B	J5-11	White		BOT
	S4-1B	J5-12	White		EOF Switch
	S3-B5	J10-5	White		Fast Forward
	S3-B3	J10-4	White		Rewind
	J6-1	J7-1	White		Write Hd Trk 1
	J6-3	J7-2	White		Write Hd Trk 2
	J6-5	J7-3	White		Write Hd Trk 4
	J6-7	J7-6	White		Write Hd Trk 8
	J6-15	J7-8	White		Write Hd Trk A
	J6-17	J7-16	White		Write Hd Trk B
	J6-19	J7-18	White		Write Hd Trk C
	J6-10	J7-21	White		Record
	J6-2	J5-1	White		Data Bit 1
	J6-4	J5-2	White		Data Bit 2
	J6-6	J5-3	White		Data Bit 4
	J6-8	J5-4	White		Data Bit 8
	J6-16	J5-5	White		Data Bit A
	J6-18	J5-6	White		Data Bit B
	J5-16	J6-14	White		EOF Set Pulse
	J5-18	J6-11	White		Reset
	J5-22	J8-20	White		Int. Step Clock
	J10-7	J5-19	White		Press. Roller Dr.
	J10-3	J12-3	White		Lwr. Reel Base Dr.
	J10-6	J12-21	White		Upper Reel Base Dr.
	J10-10	J12-4	White		Neg. Voltage Bus

NOTES:

DIGI-DATA CORP.
BLADENSBURG, MARYLAND

WIRING LIST WA-0003

DSR 1420, 1430, 1440 (H)(V)

SHEET 3 OF 4

ITEM	FROM	TO	WIRE	ROUTING	REFERENCE
	J8-1	J9-16	White		Step.Mtr.Base Dr.
	J8-2	J9-12	White		Step.Mtr.Base Dr.
	J8-3	J9-6	White		Step.Mtr.Base Dr.
	J8-4	J9-8	White		Step.Mtr.Base Dr.

NOTES:

DIGI-DATA CORP.
BLADENSBURG, MARYLAND

WIRING LIST WA-0003

DSR 1420, 1430, 1440 (H)(V)

SHEET 4 OF 4