CONTROL DATA®
MULTIPLE DISK DRIVE

BM1A5

THEORY OF OPERATION
DIAGRAMS
MAINTENANCE AIDS
WIRE LISTS

CONTROL DATA

CUSTOMER ENGINEERING MANUAL

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CONTROL DATA
CORPORATION

CUSTOMER ENGINEERING MANUAL

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PREFACE

All available customer engineering installation, operation, and maintenance information for the CONTROL DATA® BM1A5 Multiple Disk Drive is in three manuals.

Publication No. 70602400	General Description, Operation, Installation and Checkout, Maintenance
Publication No. 70602500	Theory of Operation, Diagrams, Maintenance Aids, Wire List
Publication No. 70601900	Illustrated Parts List

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SECTION 6

MAINTENANCE

Information for this section is included in BM1A5 Multiple Disk Drive.
Pub. No. 70602400

SECTION 6

MAINTENANCE

MAINTENANCE

This section contains the instructions required to maintain a MDD. The information is provided in the form of preventive maintenance, corrective maintenance and troubleshooting.

MAINTENANCE TOOLS

The special tools required to maintain a MDD are listed below:

Tool	Control Data Part Number
AC/DC Volt/Ohmmeter, Ballantine Labs Inc, Model 345 (or equivalent)	
CE Disk Pack	12211935 or 89259100
Card Extender	86416700
Card Puller	84146900
Carriage Alignment Tool	84251900
Current Probe, Tektronix P-6019 with passive terminator (or equivalent)	
Feeler Gages	
Head Adapter Cable	86053800
Head Adjustment Tool	84264200 or 87256300
Multimeter, Simpson 260 (or equivalent)	
Oil Injector Syringe	12209303
Oscilloscope, dual-trace, Tektronix 546 with Type CA preamplifier (or equivalent)	
Push-Pull Gage	12210797
Seal Inserting Tool	70808200

Tool	Control Data Part Number
Stone, Abrasive	
Syringe	
Tachometer	84264100
Tester Card	40072100

MAINTENANCE MATERIALS

The materials used in the procedures of this section are listed below:

Material	Source
Number 1 Tube gauze	Control Data 12209713
Hydraulic Fluid (bulk, fluid only)	Control Data 45583801
Hydraulic Fluid (2-quart container)	Control Data 70957000
Hydraulic Fluid (5-gallon container)	Control Data 46836301
Isopropyl Alcohol	Control Data 12210956
Loctite, Grade C	Loctite Corporation
Loctite Primer, Grade N	Loctite Corporation
Molykote, Type G	Dow Corning Corporation
Oil (bulk oil only)	Control Data 95020400
Oil (1/2-pint container)	Control Data 12208888
Plastic Spatulas (or tongue depressors)	Commercially available
Tape, Adhesive	Commercially available
Tape, Cartridge, Teflon 3/16	Control Data 95033400

PREVENTIVE MAINTENANCE

GENERAL

Performance of the MDD is dependent upon the proper and timely execution of a preventive maintenance routine. Such a routine is provided by the Preventive Maintenance Index following.

The index consists of five levels based on a calendar period or hours of operation (whichever comes first). The power supply SPINDLE elapsed time meter keeps a cumulative record of hours of operation. Perform preventive maintenance in accordance with the indication of this meter. The Preventive Maintenance Procedure column lists the title of the paragraph containing the required instructions.

PREVENTIVE MAINTENANCE INDEX

*LEVEL	PREVENTIVE MAINTENANCE PROCEDURE
2	Inspect and clean read/write heads
2	Inspect and clean disk pack
2	Clean shroud and spindle
2	Check for hydraulic fluid leaks
2	Check hydraulic fluid level
2	Check pack cleaning brushes
2	Change primary filter
2	Inspect cooling fans
3	Check power supply outputs
3	Lubricate detent pawl
4	Lubricate detent gear
4	Replace hydraulic fluid
4	Lubricate rack and pinion gears
4	Lubricate carriage rollerways
4	Lubricate head load latch
4	Replace absolute filter
4	Clean and lubricate lockshaft
5	Lubricate head load linkage
5	Check head/arm adjustment

*Level 1 - Weekly or 150 hours (no preventive maintenance scheduled)

Level 2 - Monthly or 500 hours

Level 3 - Quarterly or 1, 500 hours

Level 4 - Semiannually or 3,000 hours

Level 5 - Annually or 6, 000 hours

INSPECT AND CLEAN READ/WRITE HEADS

1. Stop spindle motor.
2. Extend deck drawer to rear.

NOTE

Use of a suitably bright and directional light during following steps is recommended.

3. Inspect heads as follows:

CAUTION

Use extreme care not to damage heads with dental mirror.

   a. Use dental mirror to inspect face of each head for reddish-brown oxide deposits. Clean head (instruction follow) if required.

   b. Use dental mirror to inspect face of each head for scratches and burrs. If scratches or burrs are found, refer to Preface of this manual to determine publication number of manual containing Maintenance Aids section for this equipment. Refer to that section for head replacement criteria.

4. Clean heads as follows:

   a. Wrap a piece of lint-free gauze around a plastic spatula (or a tongue depressor). Dampen gauze (do not soak) with isopropyl alcohol.

CAUTION

Do not touch the head face with fingers. Do not leave residue or lint on the head surface after cleaning. Residue or particles trapped between the heads and a disk surface cause scoring of the disk and the head, resulting in loss of the head and of the scored disk area. Do not breathe on the heads or the disk. Moisture in the breath condenses on the surface and causes dust to accumulate.

b. Thoroughly wipe the face of each head with the dampened gauze.

c. Thoroughly wipe the face of each head with dry gauze.

d. Repeat step 3a.

INSPECT AND CLEAN DISK PACK

1. Stop spindle motor.
2. Extend deck drawer to rear.
3. Install disk pack to be cleaned on spindle.
4. Release four half-turn fasteners securing right-hand (as viewed from front of MDD) shroud side cover.

CAUTION

The spindle lock mechanism must be enabled before the disk pack is removed.

5. Disable spindle lock mechanism (Figure 2-2).

NOTE

Use of a suitably bright and directional light during following steps is recommended.

6. Slowly revolve disk pack while observing each disk surface. If severe scratches (oxide coating removed from disk surface to point of baring substrate) are found, refer to Preface of this manual to determine publication

number of manual containing Maintenance Aids section for this equipment. Refer to that section for disk pack replacement criteria.

7. Wrap a piece of lint-free gauze around a plastic spatula (or a tongue depressor) and dampen (do not soak) with isopropyl alcohol.

8. Insert the spatula through pack cleaning brushes port in side of shroud until tip contacts hub of disk pack.

NOTE

Apply moderate and constant pressure to disk surface with spatula during following step.

9. Slowly rotate disk pack while very slowly withdrawing tip of spatula. Continue withdrawing spatula until tip is clear of disk pack circumference.

10. Repeat steps 7, 8, and 9 for a disk surface until gauze comes away clean from disk surface.

11. Wrap a clean, dry piece of gauze on spatula and repeat steps 8 and 9 to remove residue released by alcohol.

12. Repeat steps 7 through 11 for each remaining recording surface of disk pack.

13. Dampen a piece of gauze with isopropyl alcohol and wipe clean the exposed top surface of disk pack. Dry the surface.

14. Use alcohol dampened gauze to clean both pieces of disk pack container. Dry the container.

15. Enable spindle lock mechanism (Figure 2-2).

16. Remove disk pack from spindle (do not install bottom half of container). Invert container and inspect nylon mesh filter surrounding lower hub of disk pack. If filter is discolored (normally white), replace as follows:

    a. Release O-ring securing lower rim of filter.

    b. Remove dirty filter.

    c. Insert new filter (Control Data p/n 40050500) in cavity and secure with original O-ring.

17. Install bottom of disk pack container. Set pack and container aside.

CAUTION

Bearing damage may occur if alcohol runs into spindle.

18. Clean spindle cone of MDD thoroughly with alcohol dampened gauze.

CLEAN SHROUD AND SPINDLE

1. Stop spindle motor.
2. Extend deck drawer to rear.
3. Remove disk pack.
4. Clean shroud with a lint-free gauze that is slightly dampened with isopropyl alcohol. Wipe shroud to remove all dirt and smudges. Thoroughly wipe spindle surface.
5. After cleaning shroud, use a wad of adhesive-type tape and pick up any particles that were not picked up with gauze. Make certain that all particles are removed from interior of shroud.

CHECK FOR HYDRAULIC FLUID LEAKS

1. Extend deck drawer to rear.
2. Check for presence of hydraulic fluid on deck.

Is hydraulic fluid present?

yes →
1. Determine source. If other than detent block refer to Repair of Hydraulic Fluid Leakage procedure.
2. If leak source is detent block, tighten screws on block.

no ↓

Procedure completed

CHECK HYDRAULIC FLUID LEVEL

1. Stop spindle motor.
2. Extend deck drawer to rear.

CAUTION

Utmost care must be used so as not to introduce any foreign matter into sump.

3. Remove hydraulic actuator sump cover.

Is oil level between 1/4 and 3/8 inch from top of sump?

- no → 1. Fill sump to proper level with new hydraulic fluid (p/n 45583801).
- yes → Procedure completed

CHECK PACK CLEANING BRUSHES

1. Stop spindle motor.
2. Extend deck drawer to rear.
3. Check brushes for presence of dust or excessive wear.

Has dust accumulated on brushes?

- yes → 1. Clean brushes with vacuum cleaner.
- no →

Do any brushes show excessive wear (Figure 6-1)?

- yes → 1. Replace brushes (p/n 40024500). All brushes should be replaced at same time.
- no → Procedure completed

CHANGE PRIMARY FILTER

1. Set filter box UNIT POWER circuit breaker to OFF.
2. Open hinged lower front panel of cabinet.
3. Remove primary filter (Figure 6-2).
4. Install replacement filter (p/n 92682019).

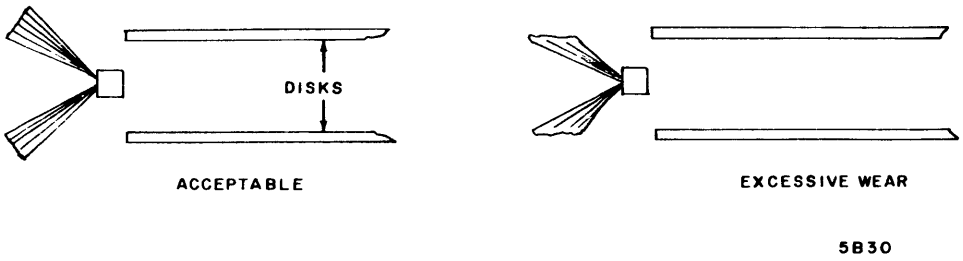


Figure 6-1. Pack Cleaning Brushes

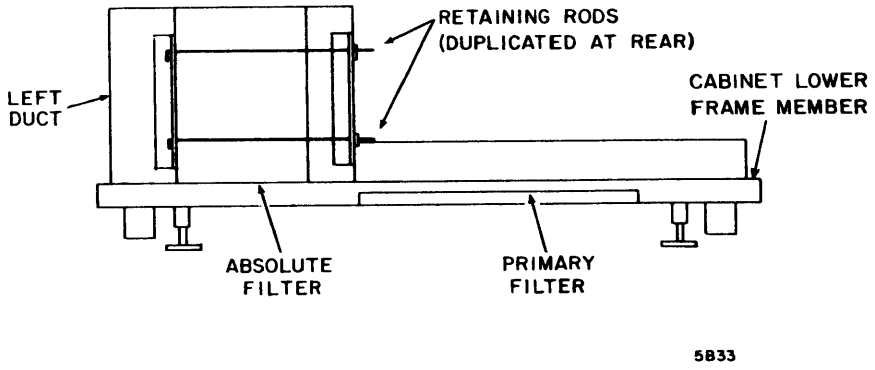
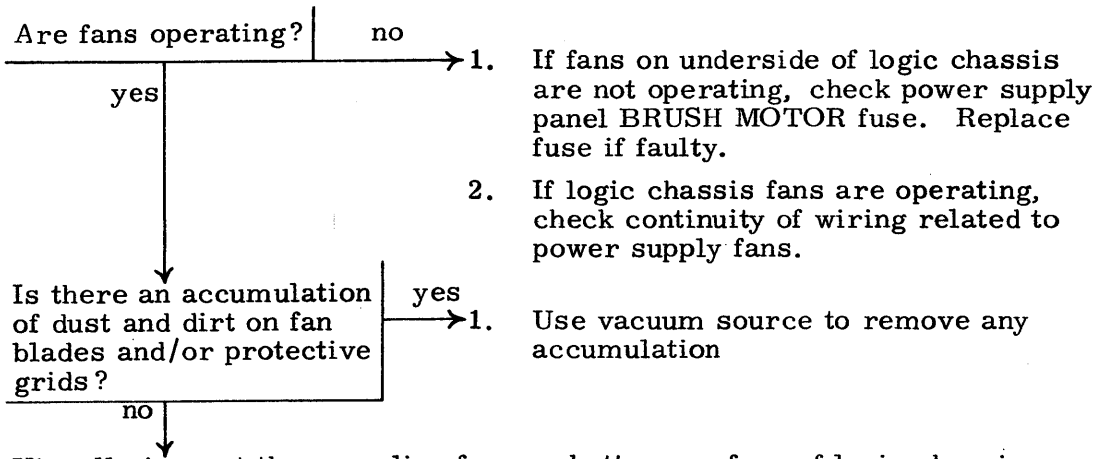


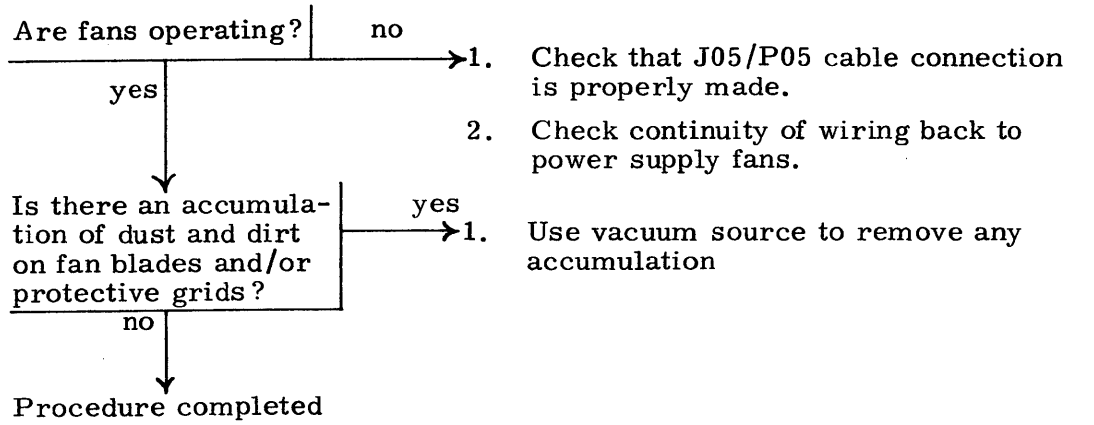
Figure 6-2. Cabinet Filters

INSPECT COOLING FANS

1. Open cabinet rear door and swing logic chassis open.
2. Set cabinet filter box panel UNIT POWER circuit breaker to ON.
   a. Visually inspect two cooling fans on top surface of power supply.



   b. Visually inspect three cooling fans on bottom surface of logic chassis.



CHECK POWER SUPPLY OUTPUTS

1. Open cabinet rear door and swing logic chassis open.
2. Start upper deck spindle motor and load heads.
3. Not applicable to 1X cabinet: Start lower deck spindle motor and load heads.

WARNING

Dangerous voltages are present in power supply. When making adjustments, use an insulated screwdriver and do not contact interior components other than those being adjusted.

4. Use an AC/DC volt/ohmmeter to measure output voltages at corresponding test jacks on logic chassis maintenance panel.

a. Measure +40 volts.

Does meter read +40 ± 0.8 volts? — no → 1. Release and lower power supply front panel. Adjust T03 in power supply for an indication of +40 volts.

yes ↓

b. Measure +20 volts.

Does meter read +20 ± 0.4 volts? — no → 1. Release and lower power supply front panel. Adjust T05 in power supply for an indication of +20 volts.

yes ↓

c. Measure -20 volts.

Does meter read -20 ± 0.4 volts? — no → 1. Release and lower power supply front panel. Adjust T04 in power supply for an indication of -20 volts.

yes ↓

d. Measure +6 volts.

Does meter read +6 ± 0.1 volts? — no → 1. Release and lower power supply front panel. Adjust T02 in power supply for an indication of +6 volts.

yes ↓

Procedure completed

LUBRICATE DETENT PAWL

1. Stop spindle motor.
2. Extend deck drawer to rear.
3. Use lint-free gauze to wipe excessive or old lubricant from pawl.
4. Apply a light coat of Molykote, Type G at pawl pivot point (Figure 6-3).

LUBRICATE DETENT GEAR

1. Stop spindle motor.
2. Extend deck drawer to rear.
3. Release four half-turn fasteners securing each shroud side cover. Set both covers aside.
4. Remove four screws and eight washers on inner bottom of shroud. Raise shroud clear of deck and set aside.

CAUTION

Never manually position the carriage past hydraulic home position without disabling head loading mechanism.

5. Unlatch head load cam (Manually Positioning Carriage paragraph).
6. Use lint-free gauze to wipe old lubricant from detent gear (Figure 6-3). Be sure to remove accumulations between gear teeth.
7. Apply a thin coat of oil (p/n 95020400) on gear. Check that no lubricant has accumulated on notched cylinder disk. Make certain that no lubricant is left in notches.
8. Continue to next procedure. Shroud will be installed later.

REPLACE HYDRAULIC FLUID

Refer to Hydraulic Fluid Removal and Replacement paragraph (Corrective Maintenance) and replace hydraulic fluid.

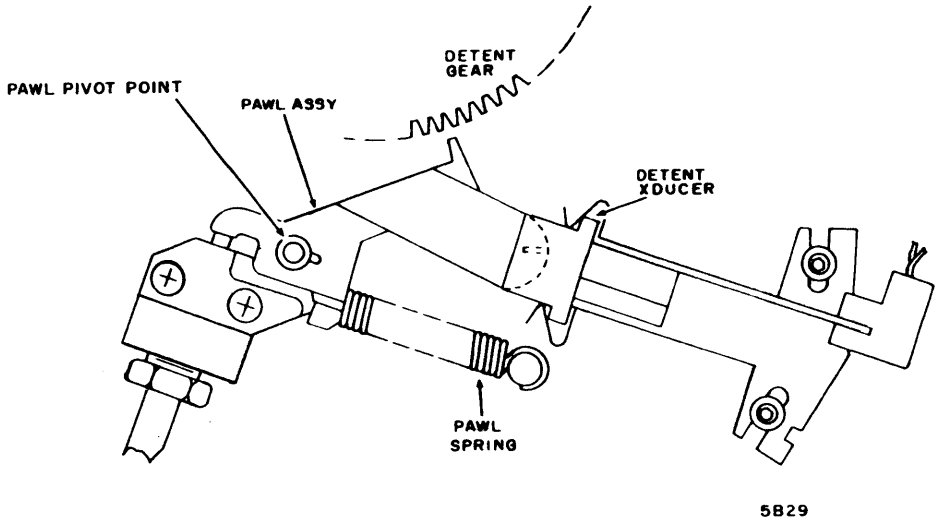


Figure 6-3. Detent Pawl and Gear Lubrication

LUBRICATE RACK AND PINION GEARS

NOTE

It is assumed that this procedure is being performed immediately after lubrication of the detent gear.

1. Saturate felt pads on front end of carriage (Figure 6-4) with oil (p/n 95020400).
2. Use lint-free gauze to clean rack and pinion gears (Figure 6-4).
3. Apply a light coat of oil (p/n 95020400) to both gears.

LUBRICATE CARRIAGE ROLLERWAYS

NOTE

It is assumed that this procedure is being performed immediately after lubrication of the rack and pinion gears.

1. Use lint-free gauze to wipe the carriage rollerways (Figure 6-4) clean.
2. Apply a light coat of oil (p/n 95020400) to carriage rollerway surfaces.

3. Return carriage to fully retracted position.
4. Replace shroud.
5. Perform Shroud Adjustment procedure (see CORRECTIVE MAINTENANCE).
6. Install shroud side covers.

LUBRICATE HEAD LOAD LATCH

1. Stop spindle motor.
2. Extend deck drawer to rear.
3. Apply a light coat of Molykote, Type G to the latch cam surface (Figure 6-5).
4. Apply Molykote, Type G to the pawl pivot point (Figure 6-5).

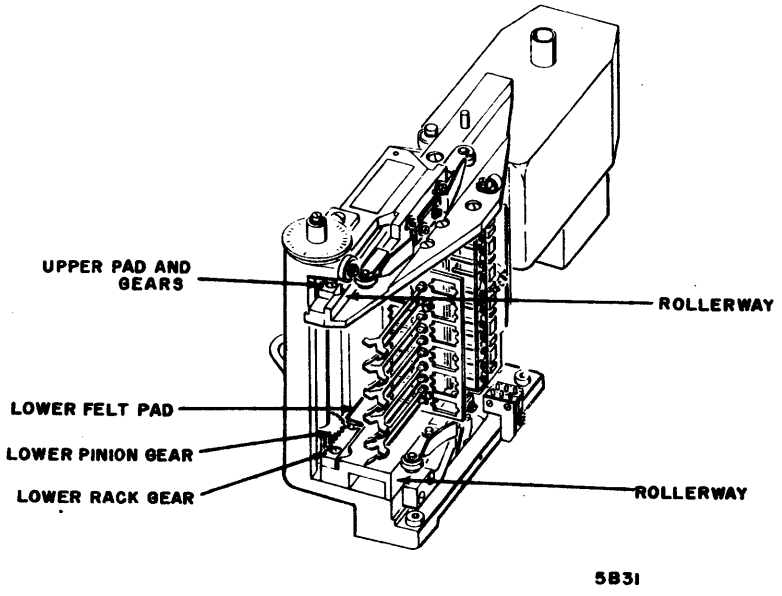


Figure 6-4. Carriage Lubrication

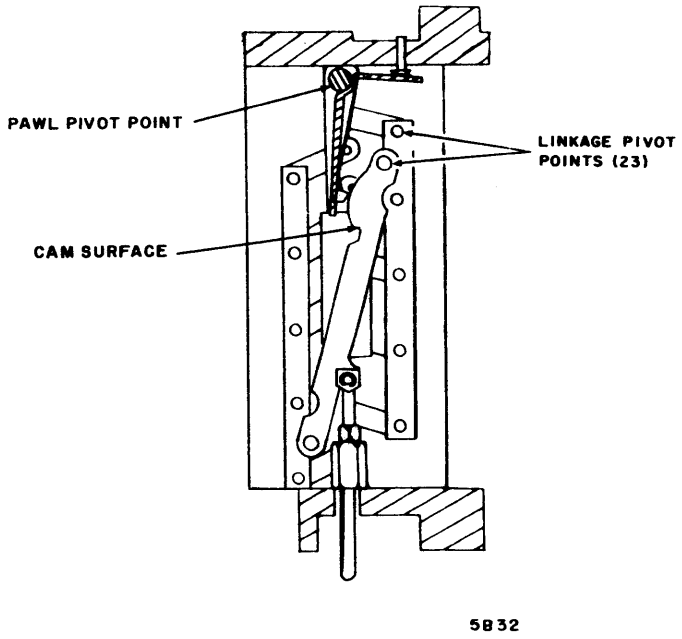


Figure 6-5. Head Latch Lubrication

REPLACE ABSOLUTE FILTER

1. Set filter box UNIT POWER circuit breaker to OFF.
2. Open hinged lower front panel.
3. Refer to Figure 6-2 and remove two front retaining rods securing filter. Loosen two retaining rods at rear of filter.
4. Move left duct slightly to left enough to allow removal of filter.
5. Install replacement filter (p/n 94301102).
6. Make certain that all seams (gasket foam) are tight and will not allow air to bypass filter.

CLEAN AND LUBRICATE LOCKSHAFT

1. Stop spindle motor.

2. Remove disk pack.
3. Extend deck drawer to rear.
4. Use lint-free gauze and a brush or sharp instrument to clean lockshaft threads on top end of spindle.
5. Apply a thin coat of oil (p/n 95020400) to threads.

LUBRICATE HEAD LOAD LINKAGE

1. Stop spindle motor.
2. Extend deck drawer to rear.

CAUTION

Never manually position carriage past hydraulic home position without disabling the head loading mechanism.

3. Unlatch head load cam (Manually Positioning Carriage paragraph).
4. Apply a small amount of Molykote, Type G to each pivot point in head loading linkage (Figure 6-5).
5. Apply a light coat of Molykote, Type G to bearing surfaces and pivot points of head loading mechanism located at bottom of carriage mount (head load cam and head load cam latch, Figure 6-12).

CHECK HEAD/ARM ADJUSTMENT

1. Stop spindle motor. Set associated ON LINE/OFF LINE switch to OFF LINE and set related DC/OFF switch to OFF.
2. Extend deck drawer to rear.
3. Remove SPL card at location C02 of open drawer.
4. Remove SPL card at location A17 (for upper deck) or B17 (for lower deck).

CAUTION

The CE disk pack contains specially recorded tracks of data. Extreme care must be taken so that this data is not modified.

5. Install CE disk pack (p/n 89259100).

6. Set DC/OFF switch to DC.

CAUTION

The MDD and disk pack must be temperature stabilized. To stabilize an MDD, extend drawer, install disk pack, close drawer, start spindle motor, load heads, and allow unit to operate for one hour. If MDD is turned off for less than 30 minutes after stabilizing, an additional ten-minute running period is required to restabilize. If MDD is turned off for 30 minutes or more, a one hour running period is required to stabilize. Any disk pack that is at room temperature, or warmer, requires only a ten-minute running period to stabilize.

7. Start spindle motor.

NOTE

In following procedure it is necessary to position heads to a specific track location. This command may be derived by either suitable software and the central processor or the tester card (p/n 40072100) if available. (Install tester card at location A03 for upper deck or B03 for lower deck.)

NOTE

If heads on other decks are to be checked when this deck is completed, time can be saved by starting the temperature stabilization of those decks at this time. Use standard disk pack for initial warmup (if CE disk packs are not available). When the check of this deck is complete, transfer CE disk pack to next deck, allow a ten-minute running period for stabilizing, and proceed with check from step 8.

8. Position carriage to track 73 and make certain that detent pawl is properly engaged.

9. Connect oscilloscope external trigger to test point C (Index) of SPL card at location A11 (for upper deck) or B11 (for lower deck).

10. Connect oscilloscope channels A and B to test points G and F of SPL card at location D01 of open drawer. Ground oscilloscope at test point A of same card.

11. Select desired (Figure 6-6) head by grounding (at test point Y or R of same card) similarly numbered test point located as follows:

Head/Test Point No.	Card Location	Head/Test Point No.	Card Location
0, 3, 4, 7, 8, 11, 12, 15, 16, and 19	D02	1, 2, 5, 6, 9, 10, 13, 14, 17, and 18	C01

12. Adjust oscilloscope sweep so that three cross-over points (nulls) span exactly 10 centimeters (Figure 6-7).

NOTE

Since one revolution of the pack equals 25 msec, in order to achieve the waveforms shown, the oscilloscope horizontal time base must be placed in the uncalibrated position.

13. Record position of center cross-over point relative to center vertical graticule line. The center cross-over must be within 1.5 cm.

14. If adjustment is required, the center cross-over must be adjusted within ±.8 cm of the center graticule.

NOTE

Insure proper CE pack stabilization prior to any head adjustment.

15. If requirement is not met, loosen screws through head/arm clamp assembly immediately above and below head to be adjusted.

16. Refer to Figure 6-8 and place slot in end of head adjustment tool (p/n 84264200 or 87256300) over head/arm assembly so that tips of tool enter carriage groove and bottom of tool slot engages head/arm notch.

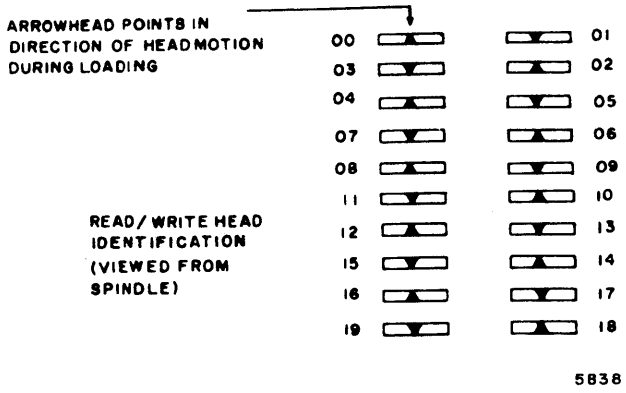


Figure 6-6. Head Identification

NOTE

Very little tool motion is required to make following adjustment.

17. Moving tool laterally (parallel to head/arm length), reposition head/arm until center cross-over point displayed on oscilloscope is within ±0.8 cm (± 2 ms) of center vertical graticule.

18. Remove adjustment tool and carefully tighten screws above and below adjusted head. Position established in step 17 must remain in-tolerance when screws are tight. Readjust if required.

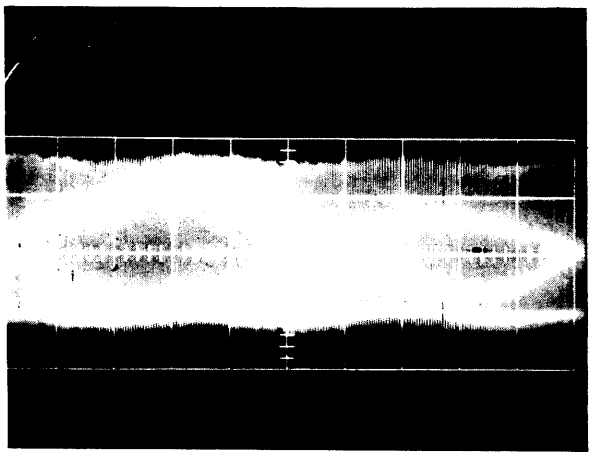
19. Repeat steps 11 through 18 for read/write heads immediately above and below head just adjusted.

20. Repeat steps 11 through 19 for any other head requiring adjustment.

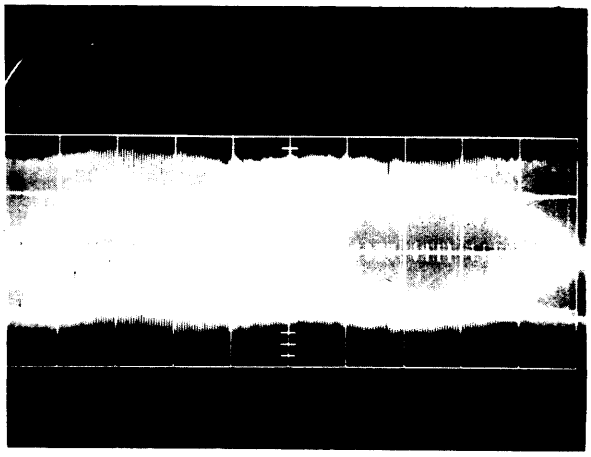
21. Stop spindle motor. Remove CE disk pack.

22. Disconnect oscilloscope.

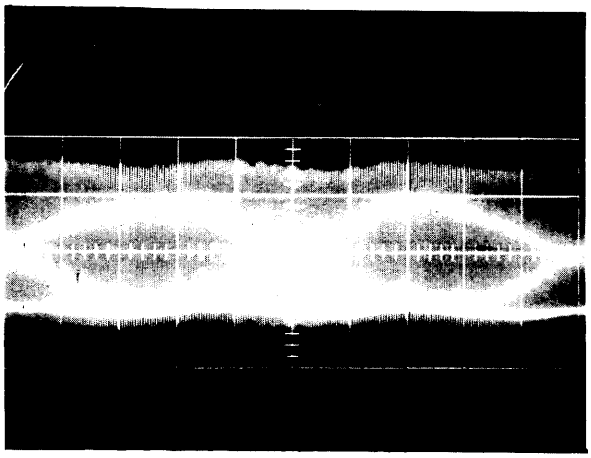
23. Set associated DC/OFF switch to OFF. Install SPL cards removed in steps 3 and 4.



A HEAD TOO FAR FROM SPINDLE



B HEAD TOO CLOSE TO SPINDLE



C HEAD ON TRACK 73

ALL TRACES :
HOR– ONE REVOLUTION (10 CM)
VERT– 0.5 V/CM

5835

Figure 6-7. Head Adjustment Trace

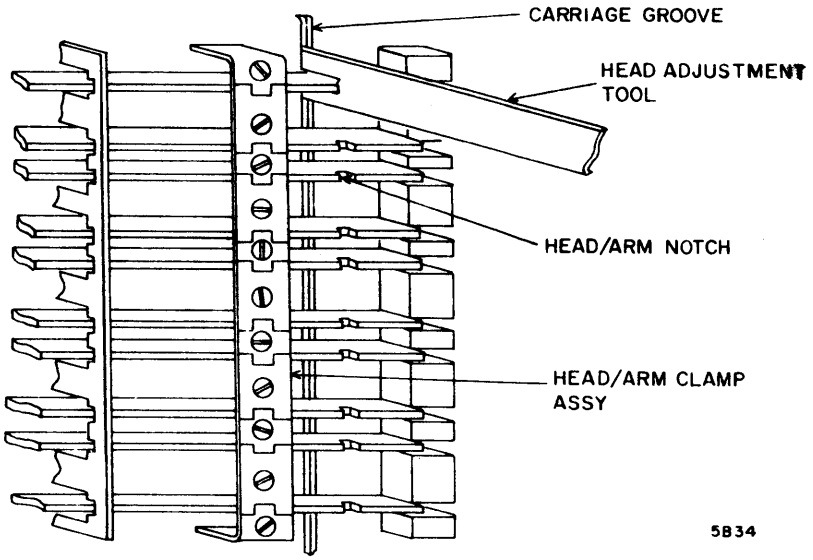


Figure 6-8. Head/Arm Assembly Adjustment

CORRECTIVE MAINTENANCE

The maintenance procedures for the MDD are provided on the basis of the Subassemblies of the unit. Detailed procedures (Check, Adjustment, Removal and/or Replacement) are provided as subparagraphs to the Subassembly heading.

Procedures are written for one deck and are applicable to both decks of a 2X cabinet. When test points are used, the row or deck location of the test point is given and related to the deck being maintained.

It is recommended that maintenance personnel read the entire procedure prior to performing the instructions of the procedure.

DRIVE BELT

Check (Figure 6-9)

1. Extend applicable deck drawer to rear.
2. Remove two screws and washers and release four half-turn fasteners securing drive belt cover assembly. Set cover aside.
3. Drive belt tension is correct when length of idler spring is 4(+0.25, -0.0) inches. Perform adjustment procedure if required.

Adjustment (Figure 6-9)

1. Loosen three screws securing drive motor assembly to underside of main deck.
2. Reposition drive motor assembly until idler spring length is 4(+0.25, -0.0) inches.
3. Securely tighten these screws.

Removal and Replacement (Figure 6-9)

1. Move free end of idler arm toward drive motor pulley and pull belt clear of idler arm pulley.
2. Disable spindle lock by engaging cam arm block and cam arm, Figure 2-2.
3. Place replacement drive belt close at hand.
4. Disconnect leadwires to pack-on switch and ground spring.

CAUTION

Support the spindle lock and switch assembly and manipulate the drive belt in following steps so that pack-on switch, ground spring, or spindle lock linkage is not damaged.

5. Remove three screws and lock washers securing spindle lock and switch assembly to spindle legs.
6. Carefully lower assembly until old belt can be removed.
7. Install smooth side of replacement belt against spindle drive pulley.

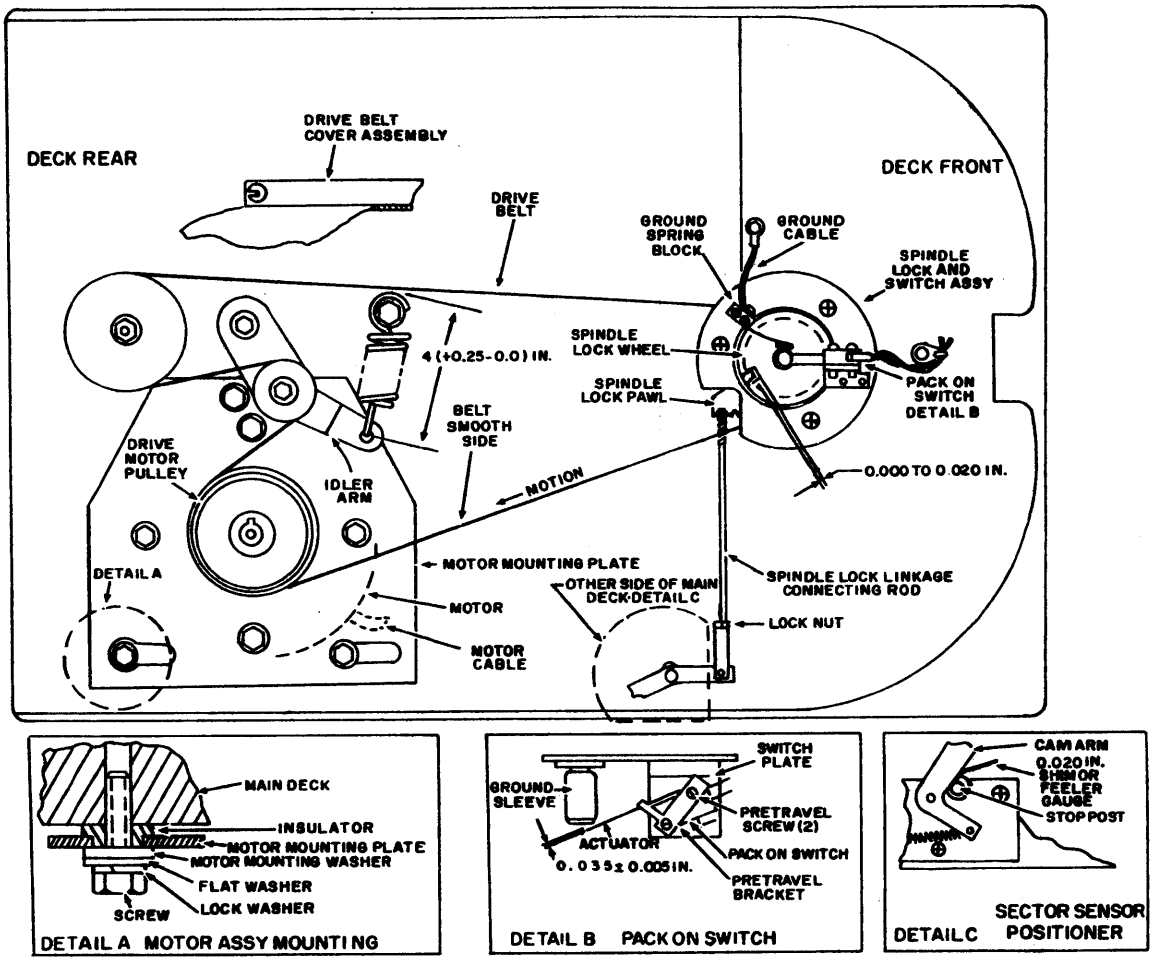


Figure 6-9. Main Deck Underside

8. Carefully secure spindle lock and switch assembly to spindle legs. Ground spring and pack-on switch actuating arm should be contacting spindle ground sleeve.

9. Restore electrical connections of step 4.

10. Thread drive belt according to Figure 6-9.

11. Perform Drive Belt Check procedure.

DRIVE MOTOR PULLEY

Check (Figure 6-9)

1. Extend applicable deck drawer to rear.
2. Remove two screws and washers and release four half-turn fasteners securing drive belt cover assembly. Set cover aside.
3. Adjacent surfaces of drive motor pulley and motor mounting plate should be separated by 19/32 ± 1/32 inch. Perform adjustment procedure if required.

Adjustment (Figure 6-9)

1. Loosen setscrew in hub of pulley.
2. Reposition pulley along motor shaft until dimension between adjacent surfaces of pulley and motor mounting plate is 19/32 ± 1/32 inch.
3. Tighten setscrew and recheck dimension.

Removal and Replacement (Figure 6-9)

1. Remove setscrew securing pulley to motor shaft.
2. Slide pulley off shaft.
3. Align pulley slot with shaft key and slide pulley on shaft.
4. Loosely secure pulley to shaft with setscrew.
5. Perform Drive Motor Pulley Adjustment procedure.
6. Check drive belt threading according to Figure 6-9.

DRIVE MOTOR REMOVAL AND REPLACEMENT (Figure 6-9)

The drive motor is not field repairable. If trouble is experienced, replace and return faulty unit to factory.

1. Set power supply SPINDLE circuit breaker to OFF.
2. Extend applicable deck drawer to rear.

3. Remove two screws and washers and release four half-turn fasteners securing drive belt cover assembly. Set cover aside.
4. Move free end of idler arm toward drive motor pulley and pull belt clear of idler arm pulley.
5. Disconnect drive motor cable plug.
6. Support drive motor assembly form below main deck and remove three screws securing assembly to deck.
7. Lower assembly clear of main deck.
8. Loosen setscrew and remove drive pulley from faulty motor.
9. Remove four screws and washers and separate motor from motor mounting plate.
10. Align motor cable exit with motor mounting plate, Figure 6-9. Secure plate to replacement motor.
11. Refer to detail A of Figure 6-9 and loosely secure motor assembly to main deck.
12. Check drive belt threading according to Figure 6-9.
13. Connect drive motor cable plug.
14. Perform Drive Belt Adjustment procedure.

SPINDLE AND LOCKSHAFT ASSEMBLY

Field repair of this assembly is limited to replacing the lockshaft. If the trouble being experienced cannot be remedied by replacing the lockshaft, replace the entire spindle and lockshaft assembly. Return the faulty assembly to the factory.

Lockshaft Removal and Replacement

1. Extend applicable deck drawer to front.

2. Refer to Figure 6-9 and remove two screws and washers and release four half-turn fasteners securing drive belt cover assembly. Set cover aside.
3. Disconnect ground cable (Figure 6-9) from underside of deck.
4. Observe leadwire connection scheme to pack on switch (Figure 6-9) and then disconnect each wire at switch.
5. Remove nut and lock washer from pivot screw so that spindle lock pawl (Figure 6-9) will come free of mounting plate during next step. Pawl need not be disconnected from spindle lock linkage.
6. Remove three screws and lock washers securing spindle lock and switch assembly to spindle legs. Lower assembly clear of spindle.
7. Remove ground sleeve nut and lock washer from lower end of lockshaft.
8. Remove lower lockshaft assembly by turning assembly counter-clockwise.
9. Carefully raise lockshaft out of top of spindle assembly.
10. Lower replacement lockshaft into top of spindle assembly.
11. Install CE disk pack.
12. Thread the lower lockshaft assembly onto the bottom of the replacement lockshaft until finger tight. Using suitable wrench tighten washer assembly three full revolutions.
13. Reassemble remaining components to spindle by reversing steps 3 through 7.
14. Perform Spindle Lock Pawl Check procedure.
15. Perform Pack On Switch Check procedure.
16. Perform Ground Spring Check and Adjustment procedure.
17. Install drive belt cover assembly using two screws and washers. Secure four half-turn fasteners.

Spindle and Lockshaft Assembly Removal and Replacement

1. Extend applicable deck drawer to rear.
2. Release four half-turn fasteners securing each shroud side cover. Set both covers aside.
3. Remove four screws and eight washers on inner bottom of shroud. Raise shroud clear of deck and set aside.
4. Remove four shroud standoffs.
5. Remove both SPL cards from C-row of logic on deck.

6. Remove three screws and six washers securing C-row card chassis to deck.

7. Disconnect plug to sector sensor.

8. Thread plug through circular cutout in C-row card chassis. Move C-row chassis clear of sector sensor.

9. Remove sector preamplifier card from transducer.

10. Install CE disk pack (p/n 89259100) on spindle.

11. Pivot sensor toward disk pack until stop is encountered. Pull up on cam arm block to hold sector sensor in position.

CAUTION

When measuring dimension A of Figure 6-21 accuracy is most essential, reference of this dimension will be needed to align the sector sensor assembly after installation of the replacement spindle assembly.

12. Rotate disk pack until notch in sector disk begins to enter sensor transducer. Using a feeler gage measure and record distance between the bottom of the disk pack sector disk and the transducer bottom notch. (Dimension A of Figure 6-21).

13. Release cam arm block to disengage sector sensor assembly.

14. Remove CE disk pack.

15. Remove four screws and lock washers securing air baffle to main deck.

16. Refer to Figure 6-9 and remove two screws and washers and release four half-turn fasteners securing drive belt cover assembly. Set cover aside.

17. Remove retaining ring that secures spindle lock linkage to spindle lock pawl. Check that pawl is clear of spindle lockwheel.

18. Disconnect leadwires to pack-on switch and ground spring block. Observe leadwire connections.

19. Remove three screws and lock washers securing spindle lock and switch assembly to spindle legs.

20. Move idler arm to put slack in drive belt and pull belt from spindle drive pulley.

21. Remove three screws and lock washers securing spindle and lockshaft assembly to main deck.

22. Lift faulty spindle and lockshaft assembly off main deck.

23. Install replacement spindle and lockshaft assembly in reverse order of removal (Steps 15 through 21).

24. Install CE disk pack.

25. Pivot sector sensor toward disk pack until stop is encountered. Pull up on cam arm block to hold sector sensor in position.

26. Rotate disk pack until notch in sector disk begins to enter sector sensor transducer.

27. Measure distance between bottom of disk pack sector disk and the transducer bottom notch (Dimension A of Figure 6-21).

28. Add or remove shims under sector sensor mount to obtain same dimension measured in step 12.

29. Reassemble components removed in steps 5 through 9 in reverse order.

30. Install drive belt cover assembly using two screws and washers. Secure four half-turn fasteners.

31. Install shroud using four screws and eight washers. Install four shroud stand offs.

32. Install shroud side covers by securing half-turn fasteners.

33. Perform Carriage and Carriage Mount Adjustment procedure.

34. Perform Spindle Lock Pawl Check procedure.

35. Perform Ground Spring Check and Adjustment procedure.

36. Perform Pack-on Switch Check procedure.

37. Perform Head/Arm Adjustment procedure (see Preventive Maintenance Index).

38. Perform Switch and Stop Check and Adjustment procedure.

39. Perform Index to Burst Check and Adjustment procedure.

40. Perform Shroud Adjustment procedure.

41. Perform Drive Belt Adjustment procedure.

SHROUD ADJUSTMENT

1. Make certain that four screws in bottom of shroud are loose enough to allow shroud to be positioned laterally.

2. Install disk pack.

3. Visually inspect clearance between entire circumference of disk pack sector disk and adjacent interior surface of shroud.

4. If clearance is uniform, remove disk pack from spindle. Tighten four screws in bottom of shroud. Make certain shroud does not shift from established position.

5. If clearance is not uniform, adjust as follows:

   a. Position shroud laterally to meet requirement of step 3.

   b. Remove disk pack from spindle.

   c. Tighten four screws in bottom of shroud making certain that shroud does not shift from original position.

SPINDLE LOCK PAWL

Check (Figure 6-9)

1. Extend applicable deck drawer to rear.

2. Remove two screws and washers and release four half-turn fasteners securing drive belt cover assembly. Set cover aside.

3. A gap of between 0.000 and 0.020 inch must exist between tip of spindle lock pawl and bottom of notch in spindle lock wheel. Spindle lock linkage connecting rod must move pawl before traveling 1/64-inch maximum. Perform adjustment procedure if required.

Adjustment (Figure 6-9)

1. Loosen lock nut on spindle lock linkage connecting rod.

2. Turn connecting rod until gap of between 0.000 and 0.020 inch exists between tip of spindle lock pawl and bottom of notch in spindle lock wheel.

3. Tighten lock nut.

PACK-ON SWITCH

Check (Figure 6-9)

1. Extend applicable deck drawer to rear.
2. Remove two screws and washers and release four half-turn fasteners securing drive belt cover assembly. Set cover aside.
3. Disconnect pack-on switch electrical connections. Use multimeter (set to Rx1) to monitor pack-on switch status.
4. Install a disk pack. Multimeter must indicate zero ohms. The pretravel bracket must limit any further upward travel of the actuator to absolute minimum.
5. If multimeter does not indicate zero ohms, pretravel bracket may not be allowing switch to function.
6. Check that 0.035 ± 0.005 inch gap exists between switch actuator and spindle ground sleeve, see detail B, Figure 6-9.
7. Remove disk pack from spindle.
8. Multimeter must indicate infinity.
9. Perform adjustment procedure if required.
10. Restore electrical connections to switch.

Adjustment (Figure 6-9)

1. If pretravel bracket does not satisfactorily limit travel, loosen pretravel screws and adjust bracket downward.
2. If multimeter failed to indicate zero ohms when ground sleeve was raised, loosen pretravel screws and adjust bracket upward. If multimeter still fails to indicate zero ohms, replace pack-on switch.

3. If gap between actuator and ground sleeve is incorrect, loosen two screws on opposite side of switch from pretravel screws. Reposition switch on mounting bracket until requirement is met.

Removal and Replacement (Figure 6-9)

1. Disconnect electrical connections to switch.
2. Remove two screws and four washers securing switch assembly to mounting bracket.
3. Remove two screws and four washers securing pretravel bracket and switch to switch plate.
4. Install replacement switch in reverse order of removal.
5. Perform Pack-on Switch Check procedure.

GROUND SPRING CHECK AND ADJUSTMENT

1. Extend applicable deck drawer to rear.
2. Refer to Figure 6-9 and remove two screws and washers and release four half-turn fasteners securing drive belt cover assembly. Set cover aside.
3. Hook a push-pull gage (12210797) to extreme free end of ground spring.

NOTE

Multimeter provides most accurate indication of physical separation.

4. Force (applied perpendicular to spring) required to separate ground spring from ground sleeve should be between 3.53 and 5.30 ounces.
5. If requirement is not met, reform the spring or replace it.

DISK CLEANER ASSEMBLY

Check (Figure 6-10)

1. Extend applicable deck drawer to front.
2. Release four half-turn fasteners securing right-hand shroud side cover.
3. Using feeler gage, make certain that dimensions A and B (Figure 6-10) are a minimum of 0.010 inch as brushes reach limits of their travel.
4. Using multimeter, check that continuity (zero ohms on meter) exists between brush switch (S301) posts 2 and 3 with brushes retracted. Meter must indicate infinity between posts 1 and 3 with brushes in this position.
5. With brushes extended, continuity must exist between switch posts 1 and 3.
6. Perform adjustment procedure if required.

Adjustment (Figure 6-10)

Unless otherwise specified, brushes must follow linkage movement (brush detenting mechanism engaged). Units S/N 1012 and below detent by use of ball plungers located in the brush arm assembly (Figure 6-10, part B). Units S/N 1013 and above detent by use of a cam brush link and grooved brush linkage (Figure 6-10, part C).

1. Make certain brush assembly detent mechanism is engaged (brushes follow movement of linkage).

NOTE

Units with ball plunger detent mechanism, do not attempt to adjust ball plungers.

2. Loosen four setscrews securing linkage to motor shaft and brush arm shaft or two setscrews securing linkage to motor shaft and two setscrews securing cam brush link to brush arm shaft, as applicable.
3. Set brush holder against brush stop with detent mechanism engaged. Align linkage according to part A of Figure 6-10. Tighten four setscrews (adjust cam brush link according to part C of Figure 6-10. Tighten cam link setscrews).

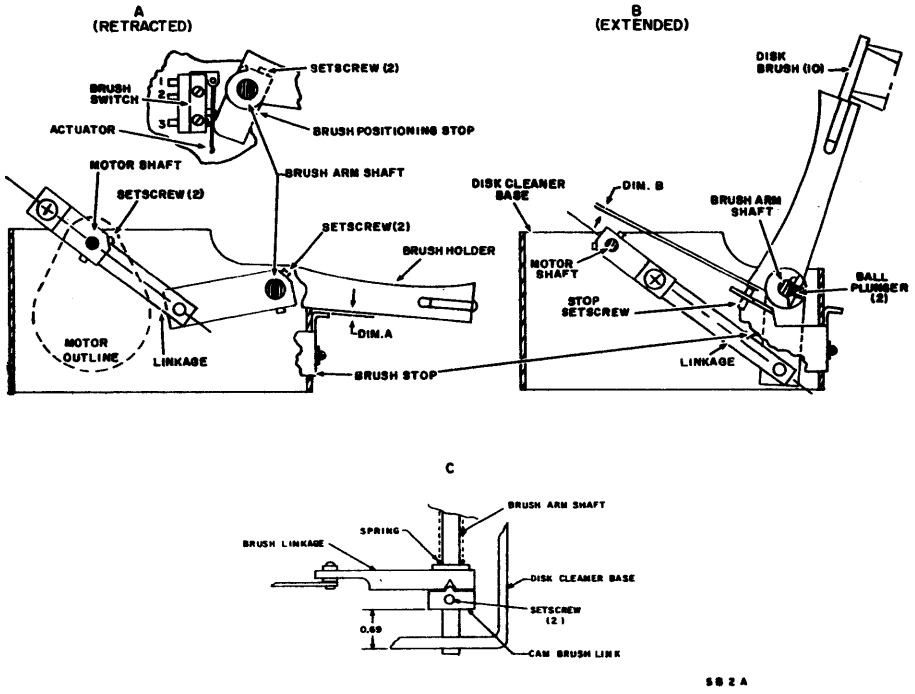


Figure 6-10. Disk Cleaner Adjustment

4. Loosen two screws securing brush stop. Place 0.020 inch thick shim or feeler gage between lower brush holder and brush stop (Dimension A, Figure 6-10). Remove slack in linkage by pressing brush stop toward brush holder and tighten two screws securing brush stop.

5. Align linkage according to part B of Figure 6-10. Using a shim or feeler gage, turn the stop setscrew to establish a 0.020 inch gap (Dimension B, Figure 6-10) between stop setscrew and brush holder.

6. Align linkage according to part A of Figure 6-10. Loosen two setscrews securing brush positioning stop. Rotate brush positioning stop against brush switch actuator until switch clicks. Rotate brush positioning stop an additional 2 or 3 degrees and tighten both setscrews.

Removal and Replacement (Figure 6-10)

No special instructions are required for removal and replacement except, when replacing motor or switch, use two drops of Grade C Loctite on the threads of each securing screw. Perform check procedure following any replacement.

DETENT ACTUATOR

Check (Figure 6-11)

Extend applicable deck drawer to rear and inspect entire detent actuator assembly for indications of hydraulic fluid leaks. Tightening hydraulic fluid fitting or four screws that secure head to block may stop leaks, in those areas. If not, replace actuator assembly. Replace actuator diaphragm to correct leaks around plunger.

Actuator Assembly Removal (Figure 6-11)

1. Disconnect pawl spring.
2. Remove retaining ring, spring, and washers (2) securing pawl.

NOTE

Use care to control hydraulic fluid spillage during following steps.

3. Disconnect hydraulic fluid fitting at actuator head.
4. Remove two screws and washers securing actuator assembly.
5. Raise assembly clear. If shims are present on base, keep them for use during replacement.

Actuator Assembly Replacement (Figure 6-11)

1. Check replacement assembly for a separation between bottom surfaces of head and block of between 0.001 and 0.010 inch (Dim. B, Figure 6-11). If dimension is incorrect, loosen four screws securing head to block, establish separation, and tighten screws.
2. Install replacement assembly by reversing removal steps 1 through 5. Prior to installing pawl, fill well at base of pawl pivot with Molykote, Type G and apply a light coat of Molykote to both pawl surfaces around pivot hole.

Actuator Assembly Adjustment (Figure 6-11)

1. Check dimension between top surfaces of pawl and detent gear (Dim. A, Figure 6-11).

2. Top surface of pawl should be from 0.001 inch above to 0.007 inch below top surface of detent gear.

3. Add or remove shims under detent actuator to gain proper dimension.

4. Tag and then disconnect leadwire from terminal 1 (forward solenoid) at rear of hydraulic actuator.

5. Install a disk pack on spindle.

6. Start spindle motor. Loosen detent actuator hydraulic fluid fitting very slowly until fluid begins to come out around threads. Tighten fitting.

7. Carriage is now stopped at hydraulic home position. Use feeler gage to make certain that pawl tip is located between 0.001 and 0.003 inch from tops of the detent gear teeth.

8. If requirement is not met, loosen two screws securing detent actuator assembly. Rotate assembly until dimension is achieved and tighten two screws. Recheck dimension.

9. Stop spindle motor. Connect leadwire at rear of hydraulic actuator.

10. Wipe up any spilled fluid and check for fluid leaks.

CAUTION

Utmost care must be used so as not to introduce any dust or dirt into sump.

11. Remove two screws securing sump cover to top of hydraulic actuator. Check that fluid level passes between solenoid terminal (rear of actuator) pins 2 and 1. If fluid is required use part no. 45583801. Replace sump cover.

Actuator Diaphragm Replacement (Figure 6-11)

1. Disconnect pawl spring.

NOTE

Use care to control hydraulic fluid spillage during following steps.

2. Disconnect hydraulic fluid fitting at actuator head.

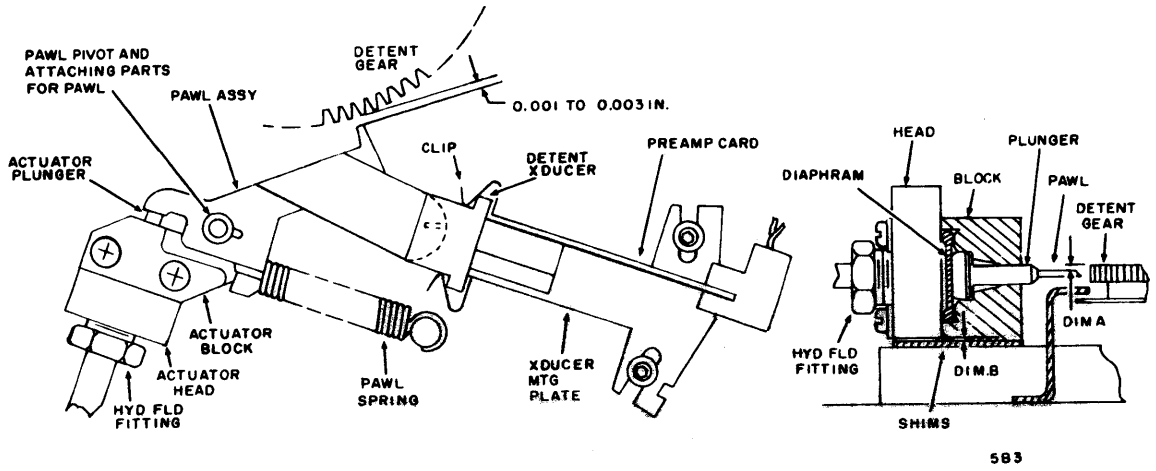


Figure 6-11. Detent Mechanism

3. Remove four screws and eight washers securing actuator head to actuator block. (Do not loosen screws in actuator block). Set head aside.

4. Remove faulty diaphragm from block and discard.

5. Slide plunger from block. Apply a light coat of Molykote, Type G to plunger shaft and install in block.

6. Apply a light coat of Molykote, Type G to replacement diaphragm. Install diaphragm in recess of block so that higher bead faces outward and away from head of plunger (Figure 6-11). Make certain that diaphragm fits smoothly into block and is completely inserted into recess.

7. Carefully place actuator head in position and secure evenly with four screws and washers **(units with socket head screws, torque each screw to 9.5 ± 0.7 inch pounds).**

8. Connect hydraulic fluid fitting to head.

9. Start spindle motor (LOCAL/REMOTE switch to LOCAL, bypass sector switch, Figure 2-2, and bypass pack-on switch with jumper if disk pack is not installed). Loosen hydraulic fluid fitting very slowly until fluid begins to come out around threads. Tighten fitting when all air is purged from actuator and pipe.

10. Wipe up any spilled fluid and check for fluid leaks.

CAUTION

Utmost care must be used so as not to introduce any dust or dirt into sump.

11. Remove two screws securing sump cover to top of hydraulic actuator. Check that fluid level passes between solenoid terminal (rear of actuator) pins 2 and 1. If fluid is required use part no. 45583801. Replace sump cover.

MANUALLY POSITIONING CARRIAGE

Special care must be used whenever carriage is manually positioned.

CAUTION

Never load read/write heads manually unless specifically instructed by procedure (instruction will include use of pads. Never allow heads to load unless disk pack is installed and up to speed.

1. Extend applicable deck drawer to rear. Manually disengage detent pawl from detent gear and move the carriage to approximately track 10.
2. Insert tip of small screwdriver through opening in lower roller assembly (Figure 6-12) and move head load cam latch to left. This will unlatch the head load cam and cause the right end of the cam to move upward and away from the actuators of the head load switches.

CAUTION

Inserting any instrument between detent actuator plunger and detent pawl may rupture the actuator diaphragm.

3. Carriage may now be positioned manually to any track within its range (when detent pawl is disengaged from detent gear) without danger of loading heads.
4. Head load cam will relatch automatically when carriage is returned to retracted position and heads will load on next access stroke.

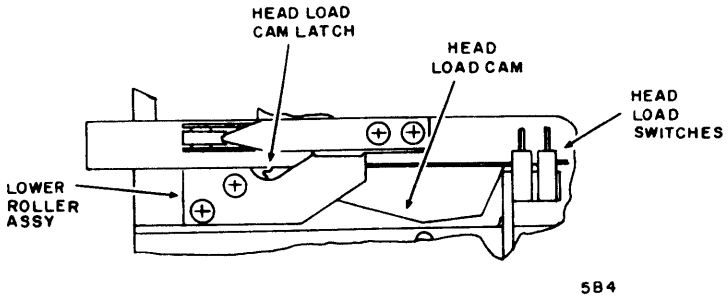


Figure 6-12. Automatic Head Loading Override

HYDRAULIC FLUID REMOVAL AND REPLACEMENT

1. Remove disk pack from spindle.
2. Refer to Manually Positioning Carriage paragraph and move carriage to track 202 without loading heads.

CAUTION

Utmost care must be used so as not to introduce any dust or dirt into sump.

3. Remove two screws securing sump cover to top of hydraulic actuator. Set cover aside.

CAUTION

Shield inside hydraulic actuator deflects fluid streams that occur when power is applied to spindle motor. This shield should remain in place.

4. Withdraw hydraulic fluid from hydraulic actuator with syringe.

CAUTION

Any hydraulic fluid added to actuator should be new.

5. Add new hydraulic fluid (p/n 45583801) to actuator until fluid level passes between solenoid terminal (rear of actuator) pins 2 and 1.

6. Set sump cover in place and start spindle motor.

CAUTION

Do not over tighten hydraulic fittings. If fluid leakage persists, refer to Repair of Hydraulic Fluid Leakage procedure.

7. Loosen hydraulic fluid fitting on detent actuator (Figure 6-11) very slowly until fluid begins to come out around threads. Tighten fitting when all air is purged from actuator and pipe.

8. Wipe up any spilled fluid and check for leaks.

9. Check that fluid level is still correct (step 5). Secure sump cover.

HYDRAULIC PUMP OR PUMP DRIVE REMOVAL AND REPLACEMENT (Figure 6-13)

1. Refer to Hydraulic Fluid paragraph and remove fluid from unit.

CAUTION

Use extreme care during following steps so as not to introduce any dust or dirt into pump or disconnected fittings.

2. Disconnect pipe at pump by removing pipe nut from bushing.

3. Go to step 4 to replace pump or step 5 to replace pump drive.

4. Replace pump as follows:
   a. Disconnect hose at pump by removing nut/collar.
   b. Remove two screws, two nuts, and four washers securing pump. Tag leadwires to pressure switch and disconnect them.
   c. Raise pump clear of pump drive.
   d. Remove pressure switch and two bushings from faulty pump and install on replacement unit.
   e. Place coupling on pump drive shaft. Position pump on top of pump drive so that pump shaft is received by coupling.
   f. Carefully remove collar and nut from end of hose. Slide new nut and collar (supplied with new pump) on end of hose according to original installation. Connect hose to pump.
   g. Connect leadwires to pressure switch.
   h. Go to step 6.

5. Replace pump drive as follows:

   a. Remove two screws, two nuts, and four washers securing pump.

   b. Raise pump clear of pump drive and set it on main deck.

   c. On underside of main deck remove nut and washers securing pulley to pump drive shaft. Remove pulley.

   d. Raise pump drive from main deck. Remove coupling and key from opposite ends of pump drive shaft.

   e. Lower replacement drive through main deck. Install key and pulley with two washers and nut.

   f. Place drive belt on pulley and check belt threading according to Figure 6-9.

   g. Place coupling on pump drive shaft. Position pump on top of pump drive so that pump shaft is received by coupling.

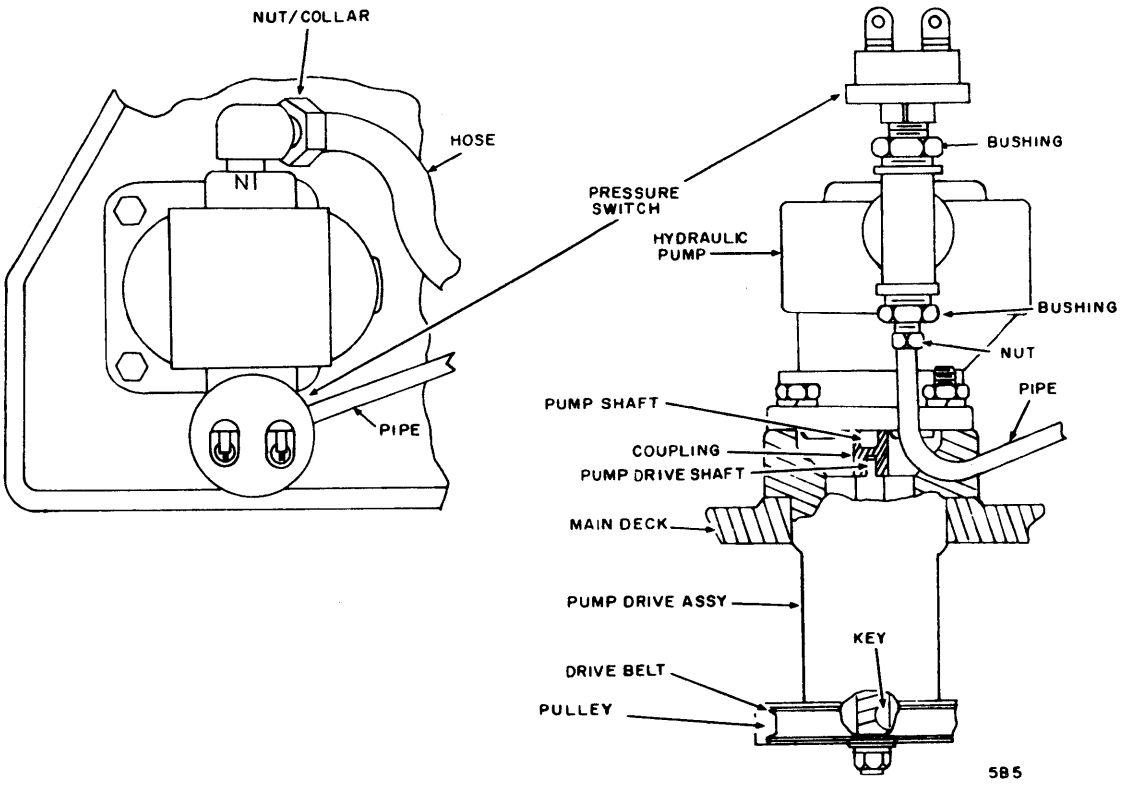


Figure 6-13. Hydraulic Pump and Pump Drive.

6. Secure pump with two screws, two nuts, and four washers. Tighten nuts and screws evenly.

CAUTION

Do not over tighten hydraulic fittings. If fluid leakage persists, refer to Repair of Hydraulic Fluid Leakage procedure.

7. Connect pipe to pump. If difficulty is encountered when starting threads, loosen pipe at hydraulic actuator, start threads, and tighten both ends.

8. Refer to Hydraulic Fluid paragraph and replace fluid.

HYDRAULIC ACTUATOR ASSEMBLY

Leak Check (Figure 6-14)

1. Extend applicable deck drawer to rear.

2. Inspect entire hydraulic actuator for presence of hydraulic fluid. Pay particular attention to rear cylinder cap, screws in valve block, drive piston seal, and fluid supply lines.

3. Most leaks detected at actuator can be remedied by performing Repair of Hydraulic Fluid Leakage procedure or performing a procedure in O-ring and Seal Replacement paragraph. However, if leakage is caused by damage to hydraulic actuator, replace actuator (below).

Removal and Replacement (Figure 6-14)

1. Refer to Hydraulic Fluid paragraph and remove fluid from unit.

CAUTION

Use extreme care during following steps so as not to introduce dust or dirt into disconnected fittings or replacement actuator.

2. Disconnect three hydraulic fittings at hydraulic actuator.

3. Tag each leadwire connected to solenoid terminal pins. Disconnect leadwires.

4. Unlatch head load cam (Manually Positioning Carriage paragraph) and move carriage until access is gained to actuator clamp (links drive rod ball tip to carriage). Remove three screws and six washers from actuator clamp.

5. Remove screw and two washers securing hydraulic actuator to carriage mount.

6. Remove three screws and washers securing hydraulic actuator to main deck. Raise actuator clear of deck.

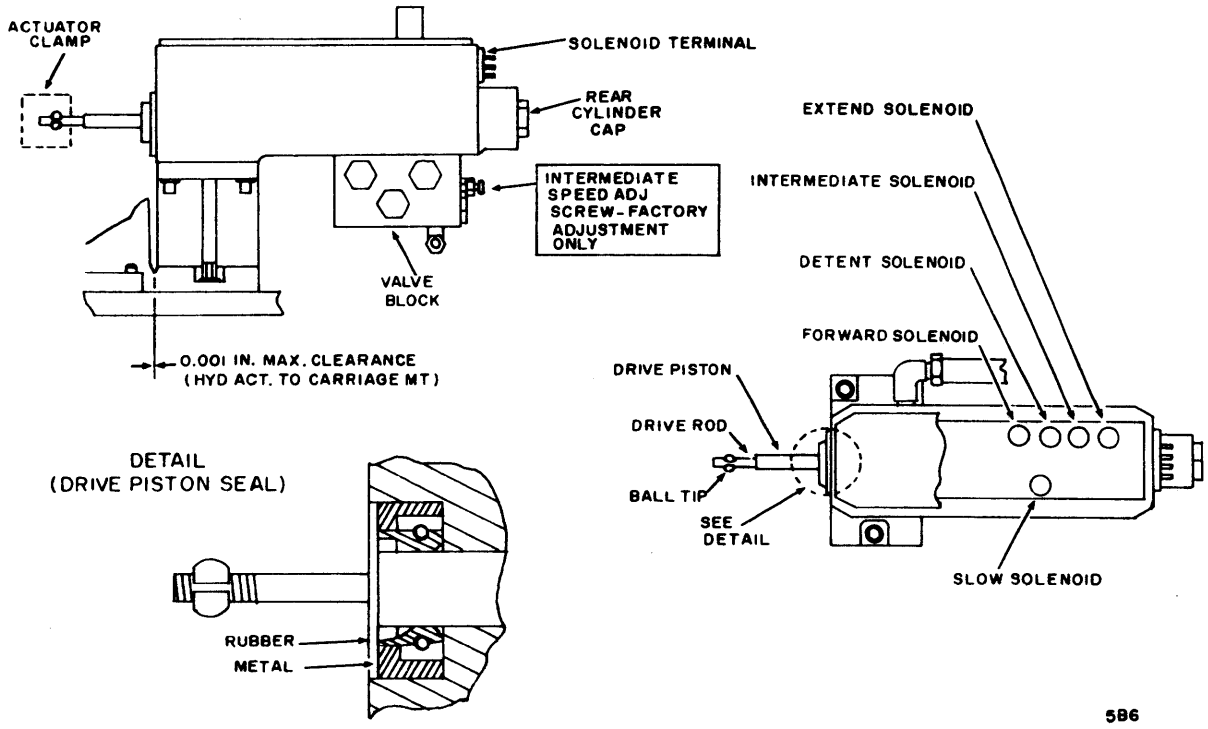


Figure 6-14. Hydraulic Actuator

7. Install replacement unit by reversing steps 1 through 6. Adjacent edges of hydraulic actuator and carriage mount must be flush to within 0.001 inch maximum (Figure 6-14).

8. Perform Hydraulic Home Check and Adjustment procedure.

9. Perform Head/Arm Adjustment procedure (see Preventive Maintenance Index).

O-RING AND SEAL REPLACEMENT

CAUTION

Use extreme care during any following procedures so as not to introduce dust or dirt into actuator or valve block.

Rear Cylinder Cap O-Ring (Figure 6-14)

1. Place cloth below rear cylinder cap (to catch small amount of hydraulic fluid during next step).
2. Remove rear cylinder cap.
3. Remove faulty O-ring from cap.
4. Lubricate replacement O-ring (p/n 92074123) and cap with hydraulic fluid.
5. Carefully install O-ring on cap. O-ring must not be twisted or damaged when in place in cap groove.
6. Apply light coat of hydraulic fluid to O-ring and install cap in actuator.
7. Check hydraulic fluid level (see Hydraulic Fluid paragraph).

Valve Block O-Rings (Figure 6-14)

Replace any leaking valve block O-ring as follows:

1. Refer to Hydraulic Fluid paragraph and remove fluid from actuator.
2. Carefully remove plug and defective O-ring.
3. Lubricate replacement O-ring (p/n 92074119) with hydraulic fluid.

CAUTION

Use care not to lose any shims (plug or spring shims) that may be present.

4. Carefully mount O-ring so that it is not twisted or damaged.
5. Lubricate O-ring with hydraulic fluid and carefully install in valve block.
6. Install new hydraulic fluid (see Hydraulic Fluid paragraph).

Drive Piston Seal (Figure 6-14)

1. Refer to Hydraulic Fluid paragraph and remove fluid from actuator.
2. Unlatch head load cam (Manually Positioning Carriage paragraph) and move carriage until access is gained to actuator clamp (links drive rod ball tip to carriage). Remove three screws and six washers from actuator clamp.
3. Push drive piston to retracted position (leave carriage where it is).

CAUTION

Do not scratch seal cavity or drive piston with screwdriver.

4. Use small screwdriver to remove drive piston seal (force screwdriver tip through rubber to behind metal and carefully pry seal out).
5. Lubricate inner and outer dimeters of replacement seal (p/n 94302801) with hydraulic fluid.
6. Place seal over drive piston so that lip faces actuator. Place seal inserting tool (70808200) over piston so that one end engages metal face of seal. Carefully tap seal inserting tool with plastic mallet until seal is positioned at rear of actuator cavity.
7. Extend drive piston toward carriage and install actuator clamp.
8. Install new hydraulic fluid (see Hydraulic Fluid paragraph).
9. Perform Hydraulic Home Check and Adjustment procedure.

Extend Piston Seal

1. Refer to Hydraulic Fluid paragraph and remove fluid from actuator.
2. Remove rear cylinder cap.
3. Remove extend piston by hooking its exposed small diameter and pulling it clear of actuator.
4. Remove faulty seal from piston.
5. Lubricate replacement seal (p/n 94249335) with hydraulic fluid and install on piston.
6. Carefully insert piston in actuator and position it forward of hole at end of housing threads.
7. Replace O-ring on rear cylinder cap (see related paragraph).
8. Install cap on actuator.
9. Install new hydraulic fluid (see Hydraulic Fluid paragraph).
10. Perform Hydraulic Home Check and Adjustment procedure.

SOLENOID REMOVAL AND REPLACEMENT

CAUTION

Use extreme care during the following procedure so as not to introduce dust or dirt into actuator. If more than one solenoid is to be replaced, use care not to get the solenoid plungers and shims (if present) in incorrect holes.

1. Disconnect taper pins of faulty solenoid at inner pins of solenoid terminal (Figure 6-14).
2. Using a close fitting screwdriver (prevents burring of slot), remove defective solenoid and shims (if present) from actuator.
3. Install solenoid plunger and plunger shim (if present) in replacement solenoid (p/n 94249318).

CAUTION

Excess screwdriver torque may cause internal damage to solenoid.

4. Use screwdriver to thread solenoid into proper casting hole. Stop turning screwdriver when solenoid is seated securely.
5. Connect taper pins of replacement solenoid at solenoid terminal.

HEAD LOADING MECHANICS

Linkage Check and Adjustment (Figure 6-15)

CAUTION

This procedure requires that heads be loaded. To prevent damage to heads, pads must be used.

1. Remove disk pack from spindle.
2. Carefully place pads of 6 to 8 thicknesses of clean, dry, lint-free gauze between surfaces of read/write heads that approach each other as heads are loaded.
3. Extend applicable deck drawer to rear. Disconnect chassis harness plug P306 from J306 (to head latch magnet).

CAUTION

In next step, do not jumper +40 volts from logic chassis maintenance panel jack of an on-line unit. Voltage at jack is used by read/write circuit and errors may be caused.

4. Use jumper wires to apply +40 volts to J306 pins 2(+40V) and 3 (ground).

5. Manually disengage detent pawl from detent gear and position carriage to track 193 (heads will load, pads will provide required protection).

6. Head load pawl tip must fully engage latch slot in head load latch. Head load pawl must be pulled securely against both pole faces of head latch magnet. Adjust as follows:

   a. Loosen three screws securing head latch magnet.

   b. Reposition magnet until requirements are met and tighten screws.

   c. Recheck requirements.

   d. Disengage detent pawl and retract carriage.

7. Disengage detent pawl and slowly move carriage forward while observing vertical position of rod assembly. Stop moving carriage when rod reaches highest point.

8. Referring to Figure 6-15, measure gap between tip of head load pawl and adjacent edge of latch slot. If required adjust as follows:

   a. Disengage detent pawl and retract carriage. Remove push rod retaining ring and push rod.

   b. Loosen rod assembly locknut. Twist larger nut to change effective length of assembly. Tighten locknut.

   c. Install push rod (without retaining ring) and repeat step 7.

   d. When requirement is met replace retaining ring.

9. Disengage detent pawl.

10. Retract carriage while observing knock off pin.

11. Upper roller must contact knock off pin (can be felt and observed) causing heads to unlatch when carriage is positioned at some point between tracks -07 and -12.

    Adjust as follows:

    a. If roller assembly contacts pin too early or too late, loosen two screws securing upper roller assembly. Reposition roller assembly as required and tighten screws.

b. If roller assembly passes over pin without contacting or just brushes pin, reform head load pawl so that pin is held higher. If pawl is reformed, this procedure must be repeated from step 4.

c. If roller assembly contacts pin securely, but does not unlatch heads, check for burrs on head load pawl tip or in latch slot. Use a stone to carefully remove burrs. Check for binding at linkage bearing points. Lubricate with a small amount of Molykote, Type G as required.

12. Check that gauze pads are still in place on read/write heads.

13. Disengage detent pawl.

14. Move carriage forward to load and latch heads.

15. Disconnect jumper wires (+40v) connected to head latch magnet. Heads must unlatch and unload. Remedy fault as follows:

a. Check for burrs on head load pawl tip or in latch slot. Use a stone to carefully remove burrs.

b. Check for binding at linkage bearing points. Lubricate with a small amount of Molykote, Type G as required.

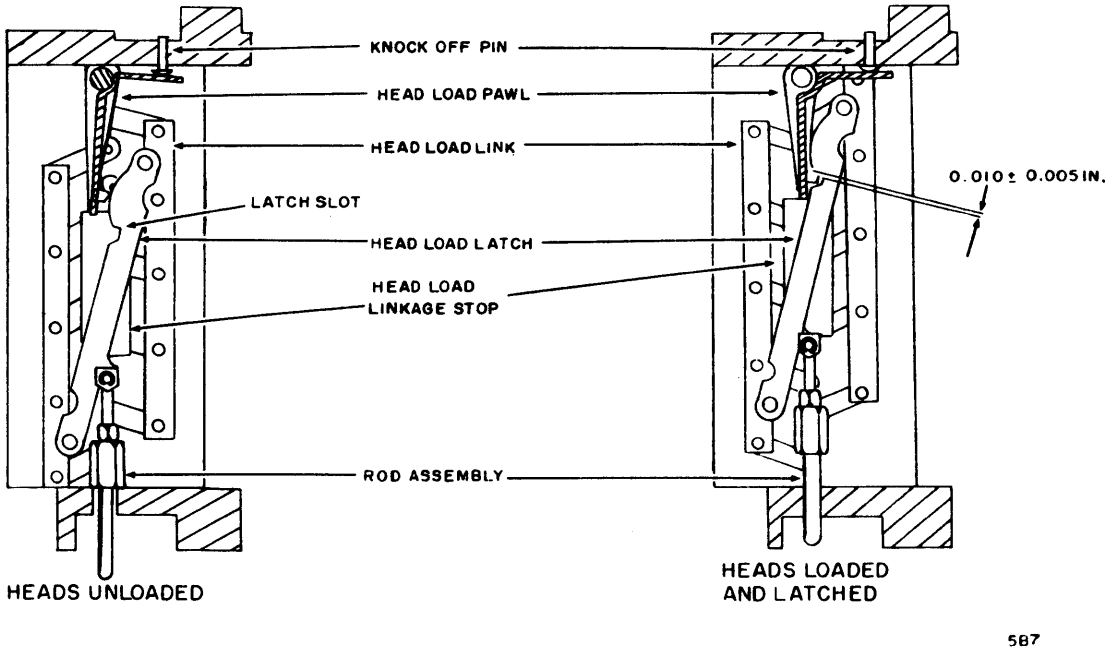


Figure 6-15. Head Load Linkage

Head Latch Switch Check and Adjustment (Figure 6-16)

CAUTION

This procedure requires that heads be loaded. To prevent damage to heads, pads must be used.

1. Remove disk pack from spindle.
2. Carefully place pads of 6 to 8 thicknesses of clean, dry, lint-free gauze between surfaces of read/write heads that approach each other as heads are loaded.
3. Extend applicable deck drawer to rear. Disconnect chassis harness plug P306 and J306 (to head latch magnet).

CAUTION

In next step, do not jumper +40 volts from logic chassis maintenance panel jack of an on-line unit. Voltage at jack is used by read/write circuit and errors may be caused.

4. Use jumper wires to apply +40 volts to J306 pins 2(+40v) and 3 (ground).
5. Manually disengage detent pawl from detent gear and position carriage forward until heads load (pads will provide required protection). Return carriage to track -05.
6. Refer to Figure 6-16 and disconnect leadwires to head latch switch.
7. Connect multimeter to head latch switch terminals. Multimeter should indicate continuity.
8. Insert a 0.010 inch feeler gage between switch actuator and head load pawl (keep feeler gage flat against pawl). Multimeter should indicate continuity.
9. Insert an additional 0.020 inch feeler gage (total of 0.030 inch) between switch actuator and head load pawl. Multimeter should now indicate an open circuit.
10. Remove only the 0.020 inch feeler gage. Multimeter should now indicate continuity.
11. If any of requirements in steps 7, 8, 9, or 10 are not met, loosen two screws (opposite side of nut plate) securing switch, reposition switch, and repeat check steps.

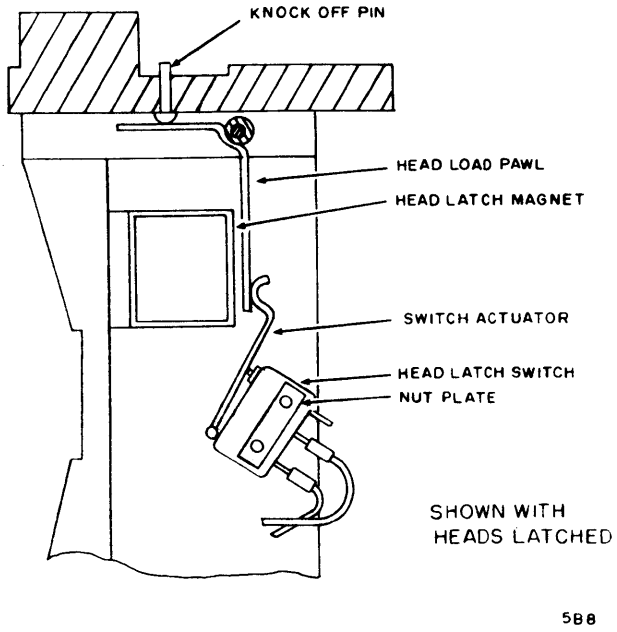


Figure 6-16. Head Latch Switch (S304) Adjustment (Shown without TB204)

Heads Loaded Switches

1. Remove power to spindle.
2. Make certain that head load cam is latched (Figure 6-12).

CAUTION

Do not load read/write heads.

3. Manually disengage detent pawl and position carriage to track -01.

NOTE

Transfer point is indicated by an audible click by switch.

4. Lift switch actuator from switch spring until switch transfers. Dimension between actuator and spring (Figure 6-17) must not exceed 1/16-inch.
5. Raise actuator to highest point and then lower it. Switch must transfer when actuator and spring are separated by not more than 1/16-inch.

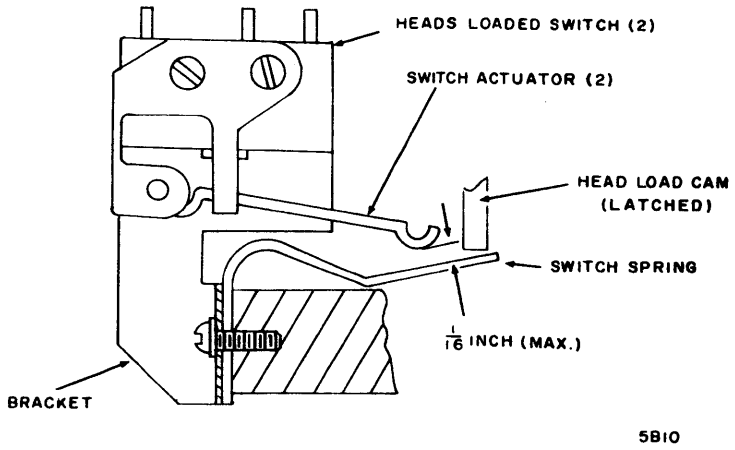


Figure 6-17. Heads Loaded Switch (S300A/S300B) Adjustment (Shown without TB302/TB303)

6. If either requirement is not met, adjust using clearance in switch mounting holes and/or bracket mounting holes, or reform switch actuator.

7. Repeat steps 4 through 6 for adjacent switch.

CARRIAGE AND CARRIAGE MOUNT

Removal and Replacement

Damage to carriage rack gear or detent gear requires replacement of carriage and carriage mount assembly.

1. Remove disk pack from spindle.

CAUTION

Do not touch face of read/write heads. Skin acids may etch and damage head.

2. Disconnect read/write head cable plugs. Loosen head/arm clamps and remove each head/arm assembly.

3. Disconnect all electrical connections to carriage and carriage mount.

4. Unlatch head load cam (Manually Positioning Carriage paragraph) and move carriage until access is gained to actuator clamp (links hydraulic actuator drive rod ball tip to carriage).

5. Remove three screws and six washers from actuator clamp. Move drive rod to retracted position.

6. Remove screws securing cylinder and detent transducer assemblies. Move assemblies clear of carriage mount.

7. Remove two screws securing detent actuator. Move it clear of carriage mount by gently bending the tubing attached to it.

8. Remove screw securing hydraulic actuator to carriage mount. Remove three screws and washers securing hydraulic actuator to main deck. Move actuator clear.

9. Remove four screws securing carriage and carriage mount to main deck (fourth screw is under detent mechanism).

10. Raise assembly vertically (until free of dowel pin in main deck) and move it clear of deck area.

11. Position replacement carriage and carriage mount on main deck dowel pin.

12. Perform Carriage and Carriage Mount Adjustment procedure.

13. Perform Head/Arm Replacement procedure.

14. Install hydraulic actuator with three screws and washers. Adjacent edges of actuator and carriage mount must be flush to within 0.001 inch maximum clearance (Figure 6-14).

15. Secure hydraulic actuator to carriage mount with one screw.

16. Install actuator clamp with 3 screws and six washers.

17. Reposition (approximately) and loosely secure detent actuator.

18. Perform Carriage and Carriage Mount Adjustment procedure.

19. Use a feeler gage to check gap between top surface of detent flag and bottom surface of transducer receiving slot (Figure 6-18). Add or remove shims between transducer to meet requirement. Secure transducer to deck and recheck gap.

20. Repeat step 19 for cylinder transducer and track position disk.

21. Perform Detent Actuator Adjustment procedure.

22. Perform Detent Transducer Check and Adjustment procedure.

23. Perform Hydraulic Home Check and Adjustment procedure.

24. Perform Cylinder Transducer Check and Adjustment procedure.

25. Perform Head/Arm Adjustment procedure (see Preventive Maintenance Index).

Adjustment

A carriage and carriage mount assembly is properly aligned when carriage motion is along a radial line to the spindle center. Following adjustment is required whenever carriage and carriage mount assembly is loosened from main deck or replaced.

1. Remove head/arm assembly 06 or 09 (Figure 6-19).

NOTE

Carriage Alignment tool (84251900) consists of a replacement arm tool and a replacement ring tool.

2. Install replacement arm tool in place of head removed in step 1 and tighten in place.

3. Install replacement ring tool on spindle.

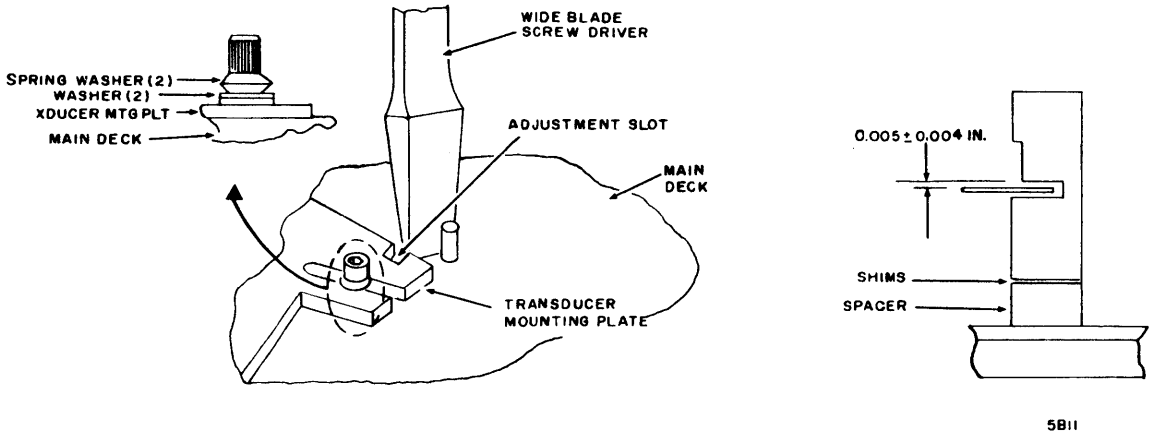


Figure 6-18. Transducer Adjustment

4. Unlatch head load cam (Manually Positioning Carriage paragraph) to disable head load mechanism. Disengage detent pawl and move carriage forward until replacement arm and ring tools are aligned approximately as shown in Figure 6-19.

NOTE

Threads of screws securing carriage mount to main deck contain thin coat of Loctite, Grade C and Loctite primer, Grade N. This coating should adequately lock threads for five installation and removal cycles. Reapply above compounds every fifth cycle according to manufacturer's instructions on container label.

5. Pivot carriage mount on main deck until required dimension (0.000 to 0.004 inch) is achieved. Carefully and evenly tighten four screws securing mount to deck.

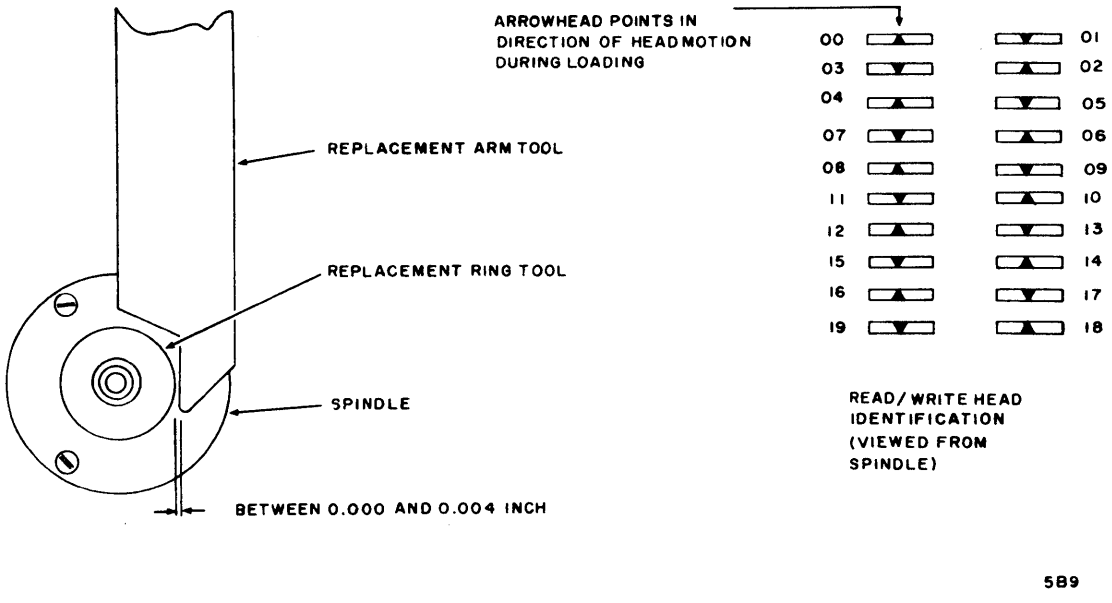


Figure 6-19. Carriage/Carriage Mount Alignment

HYDRAULIC HOME CHECK AND ADJUSTMENT

1. Stop spindle motor and remove disk pack.
2. Unlatch head load cam (Manually Positioning Carriage paragraph).

CAUTION

If misalignment is discovered in next step do not attempt to remedy by rotating dial. Misalignment beyond field remedy may result.

3. Manually disengage detent pawl and position carriage to track 00 and then track 73. Track number indicator and adjacent index mark should be aligned as close as possible at track 00 and within ±0.5 of a division (track) at track 73. If adjustment is required, loosen screw in index plate and reposition as required.
4. Return carriage to fully retracted position. Disconnect leadwire from terminal 1 (forward solenoid) at rear of hydraulic actuator.
5. Install a disk pack and start spindle motor (LOCAL/REMOTE switch to LOCAL, bypass sector switch, Figure 2-2).
6. Use feeler gage to check that pawl tip is located between 0.001 and 0.003 inch from tops of detent gear teeth (Figure 6-11). If requirement is not met, adjust as follows:
   a. Loosen two screws securing detent actuator assembly.
   b. Rotate assembly until dimension is correct. Hydraulic fluid tubing will require some slight bending to attain new position.
   c. Tighten two screws and recheck dimension.
7. Visually check that track number indicator reading is between track -01 and -01.5. If this requirement is met, check is complete. If requirement is not met, adjust as follows:
   a. Stop spindle motor. Unlatch head load cam.
   b. Position carriage to track 200.
   c. Loosen three screws in actuator clamp (Figure 6-14) only enough so that carriage drive piston and rod can be rotated, but not enough to allow axial motion on ball tip.

d. Return carriage to fully retracted position.

e. Start spindle motor.

NOTE

One-third of a revolution of drive rod changes track number indicator reading (and hydraulic home position) one full track. Rotating the drive rod CCW (as view from spindle) decreases a positive track number indicator reading and makes a negative reading more negative.

f. When carriage motion (to hydraulic home) stops, rotate drive rod until track number indicator reading is between -01 and -01.5.

g. Unlatch head load cam. Move carriage to track 200. Tighten three screws in actuator clamp.

DETENT TRANSDUCER

Check and Adjustment

NOTE

Transducer output is temperature sensitive. Unit must be operated with heads loaded and spindle rotating for a period of one hour immediately preceding performance of this procedure.

1. Stop spindle motor.
2. Connect oscilloscope probe to test point J (detent transducer preamplifier) of card at logic chassis location A11 (upper deck) or B11 (lower deck). Ground oscilloscope at test point A or Z of same card to which probe is connected.
3. Extend applicable deck drawer to rear. Manually disengage detent pawl and position carriage to track 00.
4. With detent engaged, oscilloscope must display a signal amplitude that is -1.5 ± 0.2 volts. If adjustment is required proceed as follows:

NOTE

Spring washers, used to mount transducer, allow movement of assembly without loosening screws.

a. Refer to Figure 6-18 and place screwdriver in adjustment slot and against dowel in main deck.

b. Pivot screwdriver on dowel pin and move detent transducer mounting plate as far as possible toward cylinder transducer.

c. Carefully move detent transducer mounting plate away from cylinder transducer until signal amplitude decreases to -1.5 volts.

5. Disconnect leadwire from terminal 1 (forward solenoid) at rear of hydraulic actuator.

6. Start spindle motor. Carriage will move to hydraulic home when jack reaches speed.

7. Oscilloscope should indicate a minimum amplitude of +1.5 volts. If this requirement is not met, correct the situation according to one of the following steps.

   a. Use feeler gage to check that pawl tip is located between 0.001 and 0.003 inch from tops of detent gear teeth (Figure 6-11). If adjustment is required, loosen two screws securing detent actuator assembly. Rotate assembly until dimension is correct. Tighten screws and recheck dimension.

   b. Perform Oscillator Check procedure. Replace oscillator if required.

   c. Check power supply ±20 volt outputs (Check Power Supply Outputs procedure, see Preventive Maintenance). Adjust outputs as required.

   d. Replace transducer preamplifier card.

   e. Replace transducer.

8. Stop spindle motor. Connect forward solenoid leadwire at rear of hydraulic actuator.

Transducer or Preamplifier Card Removal and Replacement (Figures 6-11 and 6-18)

1. To replace detent transducer proceed to step 2. Go to step 3 to replace detent preamplifier card.
2. Replace detent transducer as follows:
   a. Remove two screws, four spring washers, and four flat washers securing transducer mounting plate.
   b. Unclip preamplifier card from transducer.
   c. Release two screws securing transducer to mounting plate. Save spacer and shims.
   d. Assemble replacement transducer, spacer, and shims to mounting plate with two screws.
   e. Use feeler gage to check gap between top surface of detent flag and bottom surface of transducer receiving slot (Figure 6-18). Add or remove shims between transducer and spacer to meet requirement.
   f. Go to step 4.
3. Replace detent preamplifier card as follows:
   a. Disconnect plug at rear edge of preamplifier card.
   b. Unclip preamplifier card from transducer.
   c. Position replacement card at rear of transducer and clip in place.
   d. Connect plug to rear of card.
4. Perform Detent Transducer Check and Adjustment procedure.

CYLINDER TRANSDUCER

Check and Adjustment

NOTE

Transducer output is temperature sensitive. Unit must be operated with heads loaded and spindle rotating for a period of one hour immediately preceding performance of this procedure.

1. Stop spindle motor.
2. Connect oscilloscope probe to test point F (cylinder transducer preamplifier) of card at logic chassis location A11 (upper deck) or B11 (lower deck). Ground oscilloscope at test point A or Z of same card to which probe is connected.
3. Connect oscilloscope external trigger to test point B (I510, Any Seek) of card at location A08 (upper deck) or B08 (lower deck).
4. Start spindle motor.

NOTE

Following procedure requires MDD to perform seek operations. Commands controlling seek operations may be derived via a Tester Card (40072100) installed in logic chassis (position A03 for upper spindle or position B03 for lower spindle) or suitable software and the computer.

5. Make oscilloscope settings according to Figure 6-20.
6. Command MDD to perform 1-track forward sequential seek to track 202. Seek timing should allow adequate time to observe oscilloscope between each move.
7. Signal during each one track seek must meet requirement of Figure 6-20, Part A. Part B shows transducer/tachometer traces during 1-track reverse seek. These traces will occur when Part A is achieved. If requirement is not met, return to track with smallest peak-to-peak voltage.
   a. Refer to Figure 6-18 and place screwdriver in adjustment slot and against dowel pin in main deck.
   b. Pivot screwdriver on dowel pin and move cylinder transducer mounting plate as far as possible away from detent transducer.
   c. Carefully move cylinder transducer mounting plate toward the detent transducer while observing oscilloscope. (Signal will go to minimum and begin to increase.) Stop moving mounting plate when signal reaches maximum. Note amplitude of this signal.
   d. Reverse motion of step c and move cylinder transducer carefully away from detent transducer. Stop moving mounting plate when signal amplitude is 80 ± 10 percent of that of that noted in step c and +3.0 volts minimum.

e. If requirement of step d can be achieved, go to step 8. If not, correct correct situation according to one of the following steps.

f. Perform Oscillator Check Procedure. Replace oscillator if required.

g. Check power supply ±20 volt outputs (Check Power Supply Outputs procedure, see Preventive Maintenance). Adjust outputs as required.

h. Replace transducer preamplifier card.

i. Replace transducer.

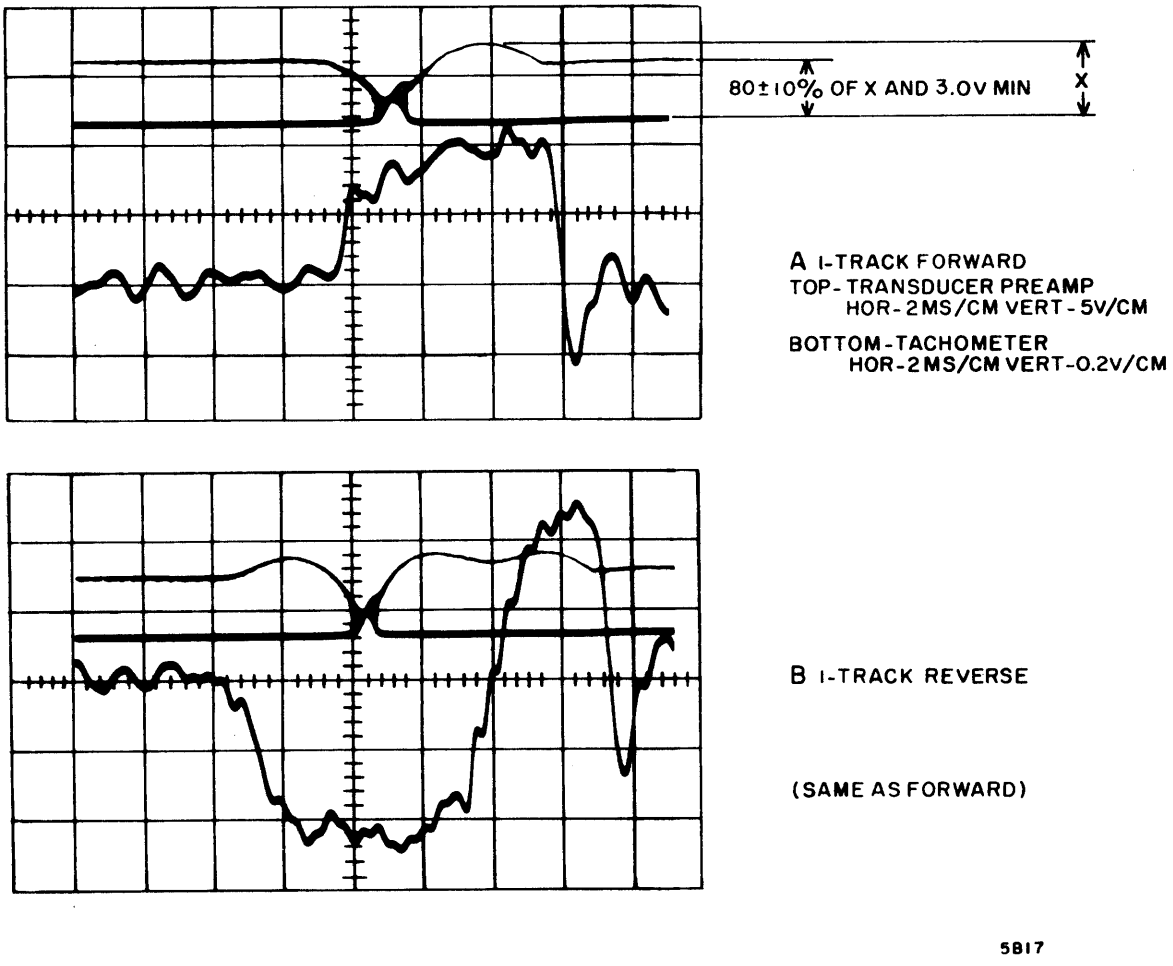


Figure 6-20. Cylinder Transducer Trace

8. Return carriage to track 00. Observe trace amplitude and manually apply a moderate, forward force to rear of carriage. Amplitude should decrease slightly. If signal amplitude increases, return to track with smallest peak-to-peak voltage and perform steps 7a through 7d.

Transducer or Preamplifier Card Removal and Replacement (Figure 6-18)

1. Release four half-turn fasteners securing shroud side covers. Set covers aside.
2. Remove four screws and eight washers on inner bottom of shroud. Raise shroud clear and set aside.
3. To replace cylinder transducer proceed to step 4. Go to step 5 to replace cylinder preamplifier card.
4. Replace cylinder transducer as follows:
   a. Remove two screws, four spring washers, and four flat washers securing transducer mounting plate.
   b. Unclip preamplifier card from transducer.
   c. Release two screws securing transducer to mounting plate. Save spacer and shims.
   d. Assemble replacement transducer, spacer, and shims to mounting plate with two screws.
   e. Use feeler gage to check gap between top surface of track position disk and bottom surface of transducer receiving slot (Figure 6-18). Add or remove shims between transducer and spacer to meet requirement.
   f. Go to step 6.
5. Replace cylinder preamplifier card as follows:
   a. Disconnect plug at rear edge of preamplifier card.
   b. Unclip preamplifier card from transducer.
   c. Position replacement card at rear of transducer and clip in place.
   d. Connect plug to rear of card.
   e. Go to step 7.

6. Perform Cylinder Transducer Check and Adjustment procedure.
7. Install shroud and side covers.
8. Perform Shroud Adjustment procedure.

SECTOR SENSOR ASSEMBLY

Switch and Stop Check and Adjustment

1. Stop spindle motor. Set associated ON LINE/OFF LINE switch to OFF LINE and set related DC/OFF switch to OFF.
2. Extend deck drawer to rear.
3. Remove disk pack from spindle.
4. Release four half-turn fasteners securing each shroud side cover. Set covers aside.
5. Remove four screws and eight washers on inner bottom of shroud. Raise shroud clear of deck and set aside.
6. Install CE disk pack (p/n 12211935) on spindle.
7. Pivot sensor toward disk pack until stop is encountered. Hold sensor in this position while rotating disk pack. Stop rotation when edge of disk surfaces 17 and 18 are nearest to top vertical notch in sensor.
8. Use feeler gage to measure vertical gap between sensor notch and edge of disk. Dimension must meet requirement of Figure 6-21. Adjust as follows:
   a. Remove both SPL cards from C-row of logic on deck.
   b. Remove three screws and six washers securing C-row card chassis to deck.
   c. Disconnect plug to sector sensor preamplifier card.
   d. Thread plug through circular cutout in C-row card chassis.
   e. Move C-row chassis clear of sector sensor.
   f. Remove two screws and washers securing positioning arm to transducer (Figure 6-21).
   g. Loosen locknut on stop adjust screw.

h. Pivot sensor toward disk pack until stop is encountered. Rotate stop adjust screw until required gap between sensor notch and edge of disk is achieved (Figure 6-21).

i. Tighten locknut and recheck dimension. Readjust if required. Continue to next step and adjust switch. Do not perform reassembly at this time.

NOTE

Switch transfer is checked in following steps. Transfer may be monitored either by observing a multimeter (continuity) or by listening for the audible click of the switch.

9. Refer to Figure 6-21 and place a 0.015-inch shim flat against the surface of the stop that is encountered by the stop adjust screw.

10. Pivot sensor toward disk pack until tip of stop adjust screw contacts feeler gage. Switch must transfer. Hold sensor firmly in this position.

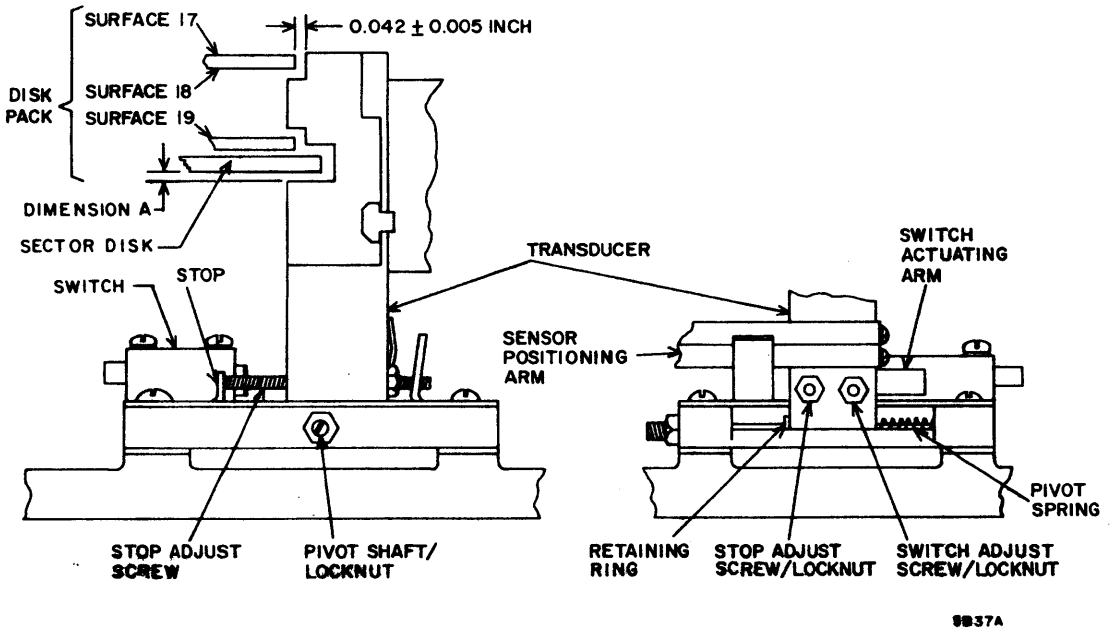


Figure 6-21. Sector Sensor

11. Slide a 0.010-inch feeler gage between first gage and the stop (total of 0.025-inch now between stop and tip of stop adjust screw). Switch must transfer.

12. Slide only the 0.010-inch feeler gage from between the stop and the screw. Switch must transfer. Release sensor.

13. If any of the above requirements (steps 10, 11, or 12) is not met, readjust as follows:

    a. If C-row logic cards are installed, perform steps 8a through 8f (above) and remove them.

    b. Loosen lock nut on switch adjust screw. Back switch adjust screw out until it no longer contacts switch actuating arm.

    c. Pivot sensor toward disk pack until stop is firmly encountered.

    d. Thread switch adjust screw into sensor until switch transfers (clicks). Rotate switch adjust screw clockwise an additional 1/2 to 3/4 turn. Tighten locknut.

    e. Install C-row logic cards by reversing steps 8a through 8f (above).

14. Remove CE disk pack from spindle.

15. Install shroud and perform Shroud Adjustment procedure.

16. Install shroud side covers.

Index to Burst Check and Adjustment

1. Stop spindle motor.

2. Set associated ON LINE/OFF LINE switch to OFF LINE and set related DC/OFF switch to OFF.

3. Extend deck drawer to rear.

4. Remove SPL card at location C02 of open drawer.

5. Remove SPL card at logic chassis location A17 (for upper deck) or B17 (for lower deck).

CAUTION

The CE disk pack contains specially recorded tracks of data. Extreme care must be taken so that this data is not modified.

6. Install CE disk pack (p/n 89259100).
7. Check hub of disk pack for presence of label specifying index to data period. If label is found, make note of value specified.
8. Set DC/OFF switch to DC.
9. Start spindle motor.

NOTE

In following procedure it is necessary to position heads to a specific track location. This command may be derived by either suitable software and the central processor or the tester card (p/n 40072100) installed in logic chassis (location A03 for upper spindle or B03 for lower spindle).

10. Position carriage to track 118.
11. Select head 9 by connecting a jumper wire between test points 9 and Y (ground) of SPL card at location C01 of open drawer.
12. Connect oscilloscope external trigger to test point C (Index) of SPL card at location A11 (for upper deck) or B11 (for lower deck).
13. Connect oscilloscope channels A and B to test points G and F of SPL card at location D01 of open drawer. Ground oscilloscope at test point A of same card.

NOTE

Following oscilloscope trace tends to be unstable. Instability or jitter results as oscillator phases itself. Include jitter in period measurement.

14. Refer to Figure 6-22 for oscilloscope settings. Compare traces. Period between Index pulse and peak of first Data pulse must be as follows: 3 ± 2 usec (including jitter) if no label was found on disk pack hub, or as specified on disk pack hub. If requirement is not met, adjust as follows:

    a. Loosen locknut on sector sensor pivot shaft (Figure 6-21).

    b. If period is too short, use screwdriver to turn pivot shaft clockwise until requirement is met, and then go to step c. If period is too long, use screwdriver to turn pivot shaft counterclockwise. Push sensor along shaft toward pivot spring. When displayed period is too short, turn pivot shaft clockwise until requirement is met.

    c. Tighten locknut. Check period and readjust if required.

15. Disconnect oscilloscope external trigger. Set triggering to internal.

16. Disconnect channel probes.

17. Connect channel A probe to test point C (Index) of SPL card at location A11 (for upper deck) or B11 (for lower deck).

18. Trace must indicate a logic "1" (+3 vdc) pulse with a width of 55.0 ± 7.5 usec. If requirement is not met, a failure has occurred in term Y509.

19. Disconnect oscilloscope.

20. Stop spindle motor and remove CE disk pack.

21. Install SPL cards removed in steps 4 and 5.

22. Remove jumper wire installed in steps 9 and 11.

Transducer Removal and Replacement

1. Stop spindle motor.

2. Set associated ON LINE/OFF LINE switch to OFF LINE and set related DC/OFF switch to OFF.

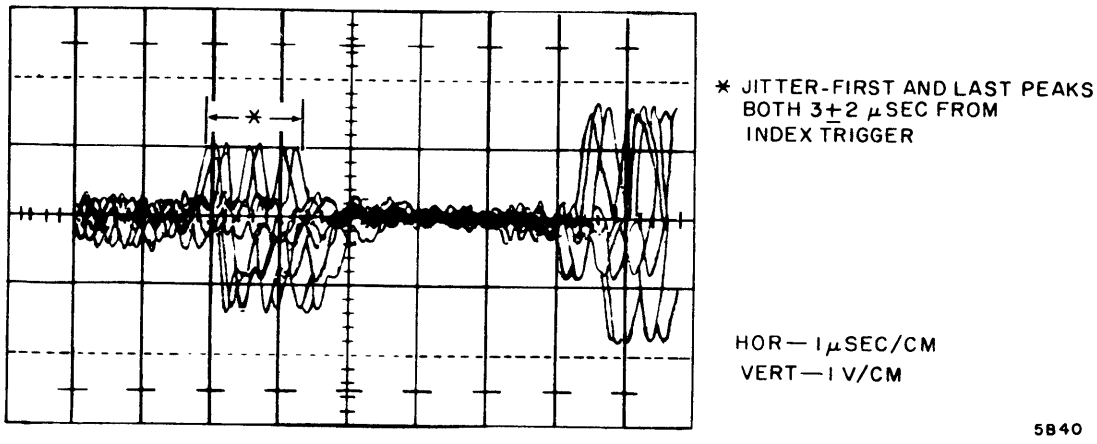


Figure 6-22. Index to Burst Period

3. Extend deck drawer to rear. Remove disk pack from spindle.
4. Release four half-turn fasteners securing each shroud side cover. Set covers aside.
5. Remove four screws and eight washers on inner bottom of shroud. Raise shroud clear of deck and set aside.
6. Remove both SPL cards from C-row logic chassis.
7. Remove three screws and six washers securing C-row logic chassis to deck.
8. Disconnect plug to sector sensor preamplifier card. Thread plug through circular cutout in C-row card chassis.
9. Unclip sector preamplifier card from transducer.
10. Install CD disk pack (p/n 89259100) on spindle.
11. Pivot sector sensor toward disk pack until stop post is encountered. Hold sector sensor in position by engaging cam arm block.
12. Rotate disk pack until notch in sector disk begins to enter transducer.
13. Using feeler gage measure and record distance between the disk pack sector disk bottom and the transducer bottom notch (Dimension A of Figure 6-21).
14. Disengage sector sensor assembly and remove disk pack.
15. Tag and then disconnect leadwires to sector switch.
16. Remove three screws and washers securing sensor assembly to deck. Raise assembly and stop adjust bracket clear of deck. Retain shims and stop bracket for use during reassembly.

17. Refer to Figure 6-21 and remove retaining ring from pivot shaft.

18. Remove locknut securing pivot shaft.

19. Turn pivot shaft clockwise until pivot shaft exits threaded hole in mounting block.

NOTE

Observe mounting position of pivot spring. Spring is double acting, provides tension and compression to transducer.

20. Slide pivot shaft through transducer, pivot spring, and free of mounting block.

21. Remove sensor positioning arm and two adjusting screw/locknuts from faulty transducer. Install these items on replacement transducer.

22. Position replacement transducer in sensor mount plate. Slide threaded end of pivot shaft through mount plate, transducer pivot spring and mount plate. (Install pivot spring to provide both tension and compression to transducer).

23. Install retaining ring in groove of pivot shaft.

24. Using original shims, three screws, and three washers, secure stop adjustment bracket and sector sensor assembly to deck.

25. Install CE disk pack used in step 10 on spindle.

26. Pivot sector sensor toward disk pack until stop post is encountered. Hold sensor in position.

27. Rotate disk pack until notch in sector disk begins to enter sensor transducer.

28. Using feeler gage measure distance between the disk pack sector disk bottom and the transducer bottom notch (Dimension A of Figure 6-9.1). Add or remove shims to sensor assembly to obtain same dimension recorded in step 13.

29. Disengage sector transducer from disk pack.

30. Connect leadwires to sector switch.

31. Perform steps 7 through 13 of Sector Sensor Assembly Switch and Stop Adjustment procedure (ignore disassembly and reassembly steps).

32. Remove CE disk pack.

33. Install C-row logic cards by reversing steps 8a through 8d of this procedure.

34. Install shroud and perform Shroud Adjustment procedure.

35. Install shroud side covers.

36. Perform Sector Sensor Transducer/Preamplifier Output Check procedure.

37. Perform Index to Burst Check and Adjustment.

Preamplifier Card Removal and Replacement

1. Extend deck drawer to rear.
2. Set associated ON LINE/OFF LINE switch to OFF LINE and set related DC/OFF switch to OFF.
3. Remove disk pack from spindle.
4. Release four half-turn fasteners securing each shroud side cover. Set covers aside.
5. Remove four screws and eight washers on inner bottom of shroud. Raise shroud clear of deck and set aside.
6. Disengage plug to preamplifier card.
7. Unclip preamplifier card from transducer.
8. Position replacement card at rear of transducer and clip in place. Connect plug to replacement preamplifier card.
9. Install shroud and perform Shroud Adjustment procedure.
10. Install shroud side covers.
11. Perform Sector Sensor Transducer/Preamplifier Output Check procedure.
12. Perform Index to Burst Check and Adjustment procedure.

Transducer/Preamplifier Output Check

1. Stop spindle motor.
2. Extend deck drawer to rear.
3. Set associated ON LINE/OFF LINE switch to OFF LINE.
4. Set associated DC/OFF switch to OFF.
5. Remove SPL card at location A11 (for upper deck) or B11 (for lower deck). Install card extender (p/n 86416700) at vacated position and replace the card.
6. Install a disk pack.
7. Set DC/OFF switch to DC.
8. Start spindle motor.
9. Connect oscilloscope channels A and B to pins 24 and 25 (card extender) of SPL card at location A11 (for upper deck) or B11 (for lower deck). Ground oscilloscope at test point A of same card.
10. Trigger oscilloscope positive at test point F of card at location A18 (for upper deck) or B18 (for lower deck).

11. Set oscilloscope mode controls to add and invert channel B. Set horizontal to 50 usec/cm and vertical to 1v/cm.

12. Oscilloscope trace amplitude must be 3.75 ± 1.5 volts peak to peak. If the requirement is not met, refer to remedies in steps 14a, b, c.

13. Connect oscilloscope channels A and B to test point C and pin 24 (card extender) of SPL card at location A11 (for upper deck) or B11 (for lower deck).

14. Refer to Figure 6-23 for oscilloscope settings. Compare traces. Leading edge of 50 usec pulses (test point C) must occur during positive going period of voltage pulses (pin 24). If requirement is not met, correct situation according to one of following:

    a. Perform Oscillator Check procedure. Repair oscillator if required.

    b. Replace transducer preamplifier card.

    c. Replace transducer.

15. Disconnect oscilloscope probe from pin 24 and connect at pin 25. Requirement of step 14 must be met. Disconnect channel probes.

16. Connect oscilloscope channel B probe to test point F (Index) of SPL card at location A18 (for upper deck) or B18 (for lower deck).

NOTE

Collector of transistor Q05 is biased at approximately +20 volts dc.

17. Connect oscilloscope channel A probe to collector of transistor Q05 (Figure 6-24) of SPL card at location A11 (for upper deck) or B11 (for lower deck).

18. Refer to Figure 6-24 for oscilloscope settings. Compare traces. First pulse should be a **10.75 ± 1.5 volt negative transition from the bias voltage.** Second pulse should occur approximately 100 usec after trigger and should be a negative voltage transition with an amplitude of at least 80 percent of the first pulse. If these requirements are not met, correct situation according to one of following:

    a. Check power supply ±20 volt outputs (see Preventive Maintenance). Adjust outputs as required.

    b. Replace transducer preamplifier card.

    c. Replace transducer.

    d. Troubleshoot logic term Y509.

19. Disconnect oscilloscope.

20. Stop spindle motor and remove CE disk pack.

21. **Set DC/OFF switch to OFF.**

22. **Install SPL card removed in step 5.**

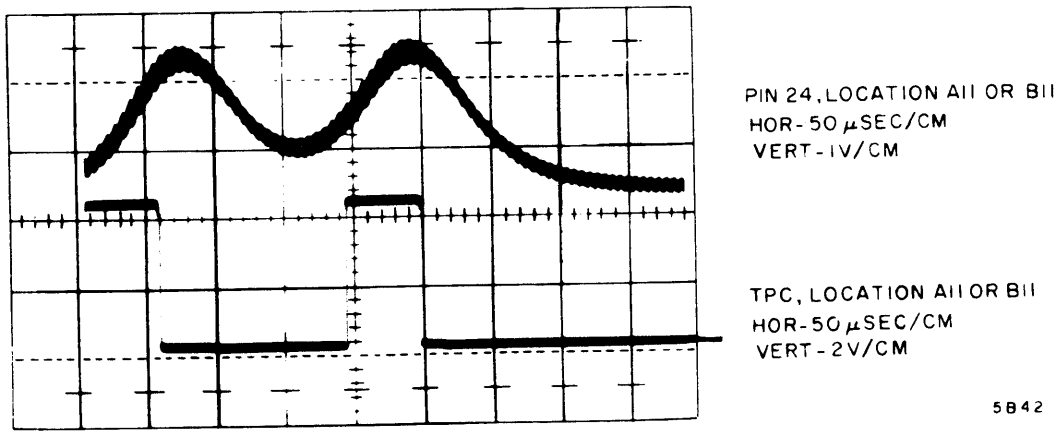


Figure 6-23. Sector Transducer Trace

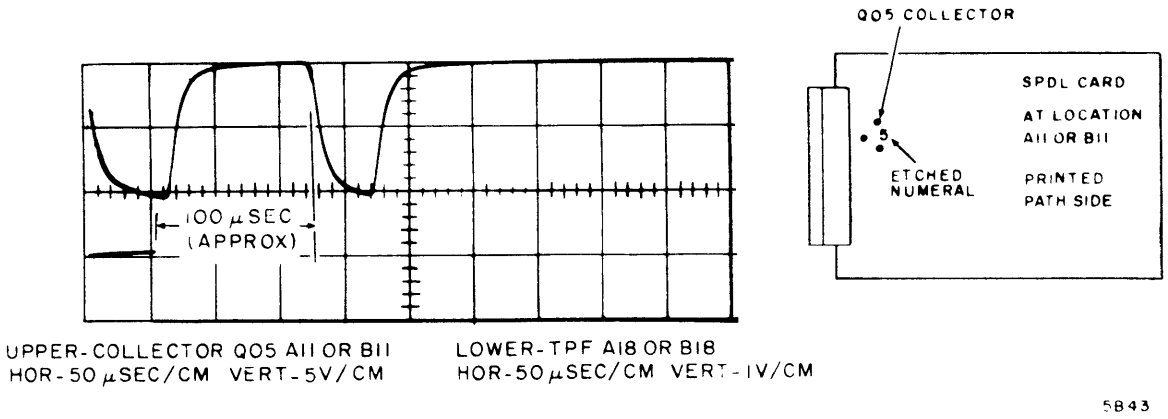


Figure 6-24. Detector Trace

Sector Sensor Positioner Check and Adjustment

1. Stop spindle motor.
2. Extend deck drawer forward.
3. Release four half-turn fasteners securing right-hand shroud side cover. Set cover aside.
4. Refer to Figure 6-25 and rotate cam arm toward shroud.
5. Pull upward on cam arm block and release cam arm so that it engages the 5/8-inch diameter of cam arm block.
6. Measure deflection of tip of transducer arm (distance tip of arm is displaced after sector sensor stop screw first contacts stop). Deflection must be between 3/32 and 4/32 inch. If requirement is not met, adjust as follows:
   a. Loosen three screws securing sensor positioner plate to deck.
   b. Reposition plate until requirement is met. Tighten screws.
7. Install shroud side cover.

OSCILLATOR CHECK

1. Connect oscilloscope probe to test point B of SPL card at location A11 (for upper deck) or B11 (for lower deck).
2. Oscillator output voltage must be 11.8 ± 1.0 volts peak-to-peak.
3. Period of one complete sine wave must be between 4.88 and 5.93 usec (187 kHz nominal).

READ / WRITE HEADS

Head/Arm Removal and Replacement

1. Stop spindle motor.
2. Set associated ON LINE/OFF LINE switch to OFF LINE and set related DC/OFF switch to OFF.
3. Extend deck drawer to rear.

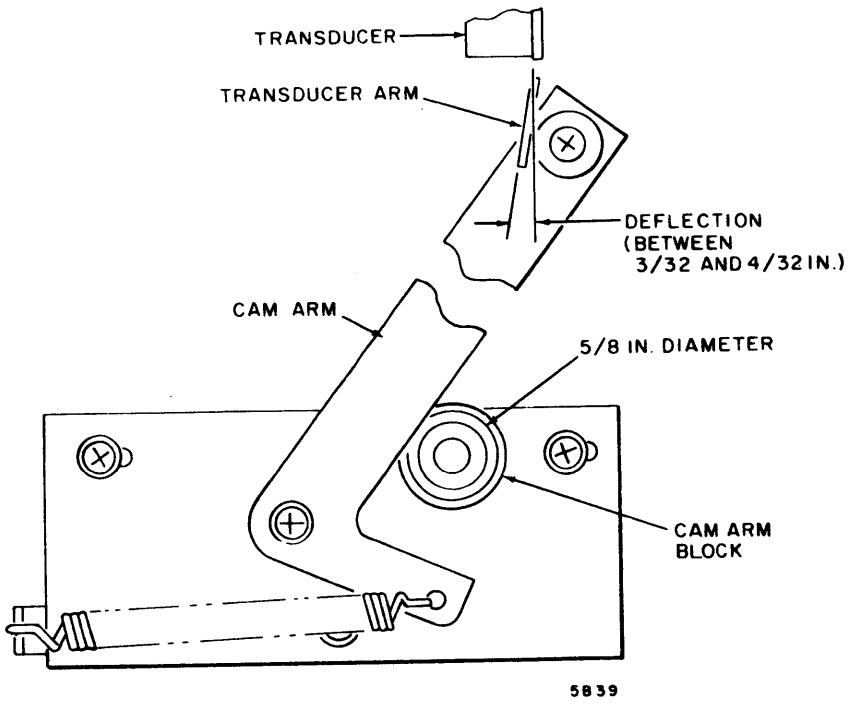


Figure 6-25. Sector Sensor Positioner

4. Remove disk pack.

5. Refer to Figure 6-26 to determine location of faulty head/arm assembly.

6. Disconnect head plug at card C01 or D02.

7. Loosen head/arm clamp assembly screws immediately above and below faulty head.

CAUTION

Do not touch the face of any head. Avoid contacting any head but the one being replaced.

8. Pull head/arm slowly toward spindle and clear of head/arm clamps and guide plate. Use care not to damage torsion rod.

9. Determine part number of replacement head by referring to Table 6-1. Orient face (up or down) of replacement head/arm according to Figure 6-26. Slide assembly through head/arm guide plate until the approximate original position is reached. Do not jam torsion rod with head/arm.

10. Connect head plug at card C01 or D02 (as applicable).

11. Inspect the replaced head/arm assembly. Torsion rod must engage head on raised load button. Make certain that head cable is oriented similarly to other adjacent cables.

12. Perform Head/Arm Adjustment procedure (see Preventive Maintenance Index).

13. Perform Adjacent Track Erase Check procedure.

TABLE 6-1. READ/WRITE HEAD REPLACEMENT DATA

READ/WRITE HEAD IDENTIFICATION NO. (SEE FIGURE 6-26)	READ/WRITE HEAD REPLACEMENT PART NO.
02, 06, 10, 14, 18	40040000
01, 05, 09, 13, 17	40040001
00, 04, 08, 12, 16	40040002
03, 07, 11, 15, 19	40040003

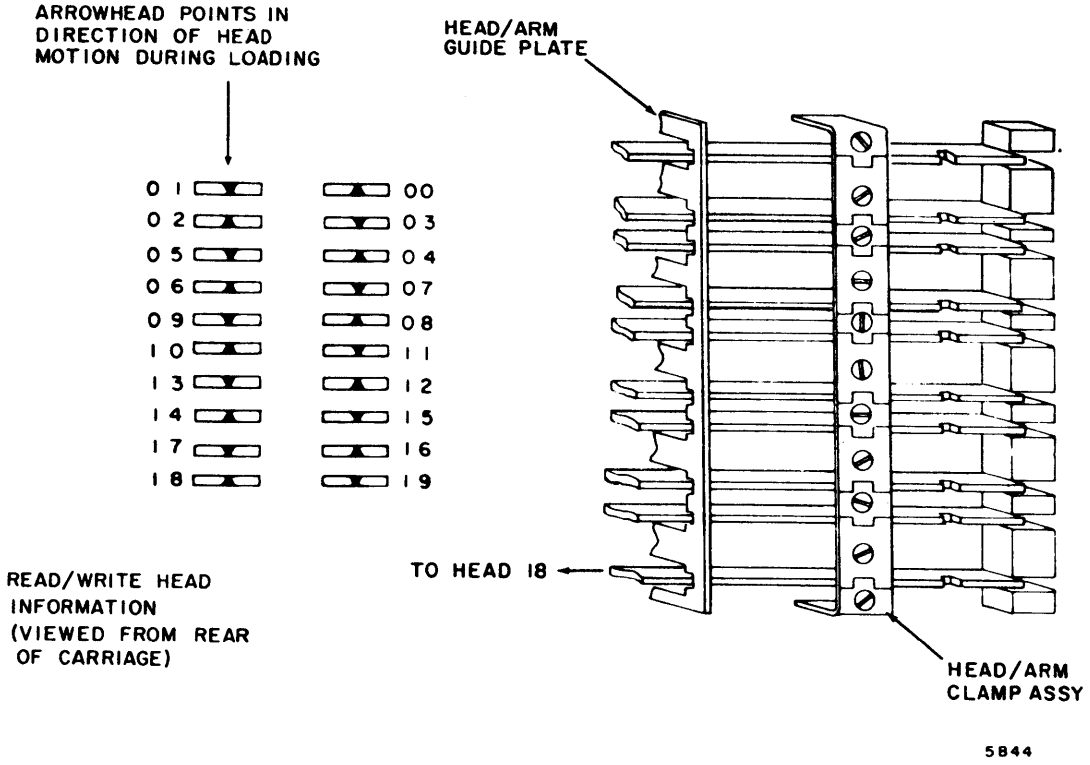


Figure 6-26. Head/Arm Replacement

Write And Erase Current Amplitude Check

1. Stop spindle motor.
2. Extend deck drawer to rear.
3. Set associated ON LINE/OFF LINE switch to OFF LINE and set related DC/OFF switch to OFF.
4. Identify head (Figure 6-26) to be checked and disconnect related head plug at card C01 or D02 as applicable.
5. Install a head adapter cable (p/n 86053800) between the head plug and card C01 or D02.
6. Set DC/OFF switch to DC.
7. Start spindle motor.
8. Connect oscilloscope external trigger to test point F (Index) of SPL card at location A18 (for upper deck) or B18 (for lower deck).
9. Connect a current probe to the oscilloscope. Clamp current probe around the thicker of the two loops on the head adapter cable.

NOTE

The following procedure requires that data be written on a disk pack. Write operation may be performed via MDD exerciser or the central processor.

10. Select head connected to oscilloscope. Write a pattern of all zeroes while observing oscilloscope.
11. Oscilloscope should display write current trace with a minimum amplitude of 80 ma peak-to-peak. Record minimum current amplitude.
12. Select head connected to oscilloscope. Write a pattern of all ones while observing oscilloscope.
13. Oscilloscope should display write current trace that has a minimum amplitude of 90 percent of that recorded in step 11.
14. Clamp current probe around the other (thinner) loop on the head adapter cable.
15. Select head connected to oscilloscope and perform a write operation.
16. Oscilloscope should display erase current trace with a minimum amplitude of 37.5 ma. Rise time (from 10 to 90 percent of amplitude) of observed trace must be a minimum of 5 usec.

Signal Amplitude Check

NOTE

In following procedure it is necessary to position heads to specific track locations. These commands may be derived by either suitable software and the central processor or the tester card (p/n 40072100) installed in logic chassis (location A03 for upper spindle or B03 for lower spindle). The procedure also requires that data be written on a disk pack. Write operation may be performed via MDD exerciser or the central processor.

1. Position the carriage to track 201.
2. Write a data pattern of all ones with each head.
3. Extend deck drawer to rear.
4. Connect channels of oscilloscope (to add and invert channel B) to test points S and T of SPL card at location C01 of open drawer. Ground oscilloscope at test point R or Y of same card.
5. Connect oscilloscope external trigger to test point F (Index) of SPL card at logic chassis location A18 (upper deck) or B18 (lower deck).
6. Select head number 1 for a read operation. Observe oscilloscope trace amplitude. Amplitude must be a minimum of 32 millivolts. Record head number and amplitude.
7. Repeat step 6 for read/write heads 2, 5, 6, 9, 10, 13, 14, 17, and 18.
8. Connect channels of oscilloscope (to add and invert channel B) to test points S and T of SPL card at location D02 of open drawer. Ground oscilloscope at test point R or Y of same card.
9. Repeat step 6 for read/write head 0, 3, 4, 7, 8, 11, 12, 15, 16, and 19.
10. Replace any read/write head that fails the above requirement.

Adjacent Track Erase Check

It is necessary to perform this check only on a read/write head that has been replaced.

NOTE

In following procedure it is necessary to position heads to specific track locations. These commands may be derived by either suitable software and the central processor or the tester card (p/n 40072100) installed in logic chassis (location A03 for upper spindle or B03 for lower spindle). The procedure also requires that data be written on a disk pack. Write operation may be performed via MDD exerciser or the central processor.

1. Position the carriage to track 201.
2. Write data pattern of all ones with the read/write head that was replaced.
3. Extend deck drawer to rear.
4. Connect channels of oscilloscope (to add and invert channel B) to test points S and T of SPL card at location C01 (for heads 1, 2, 5, 6, 9, 10, 13, 14, 17, or 18) or D02 (for all other heads) of open drawer. Ground oscilloscope at test point R or Y of same card.
5. Connect oscilloscope external trigger to test point F (Index) of SPL card at logic chassis location A18 (upper deck) or B18 (lower deck).
6. Select head (of step 2) for a read operation. Observe oscilloscope trace amplitude. Amplitude must be a minimum of 32 millivolts. Record amplitude.
7. Position carriage to track 200. Write data pattern of all ones with head from step 2.
8. Position carriage to track 202. Write data pattern of all ones with head from step 2.
9. Position carriage to track 201.
10. Select the head for read operation. Observe oscilloscope trace amplitude. Amplitude must be at least 85 percent of the amplitude recorded in step 6.
11. If the read/write head fails any of the above requirements, replace it.

NOTE

In following procedure it is necessary to position heads to specific track locations. These commands may be derived by either suitable software and the central processor or the tester card (p/n 40072100) installed in logic chassis (location A03 for upper spindle or B03 for lower spindle). The procedure also requires that data be written on a disk pack. Write operation may be performed via MDD exerciser or the central processor.

1. Position carriage to track 202.
2. Write a pattern of all ones with each head.
3. Extend deck drawer to rear.
4. Connect oscilloscope channels A and B to test points C and B (respectively) of SPL card at location A22 (upper deck) or B22 (lower deck). Set oscilloscope mode for add and invert channel B.
5. Connect oscilloscope time base B external trigger to test point F index of SPL card at location A18 (for upper deck) or B18 (for lower deck).
6. Connect oscilloscope time base A external trigger to test point C of SPL card at location A22 (for upper deck) or B22 (for lower deck).
7. Set oscilloscope horizontal so that channel A is delayed by channel B.
8. Select any head (via central processor or MDD exerciser) and read track 202.
9. Make oscilloscope settings and a trace comparison according to Figure 6-27. Displayed pulses must be symmetrical to within ±5 percent. If requirement is not met, adjust as follows:
   a. Use small allendriver to turn shaft of uppermost variable resistor (500 ohm) on edge of SPL card at logic chassis location A22 (upper deck) or B22 (lower deck).
   b. Stop turning shaft when requirement of step 9 is met.

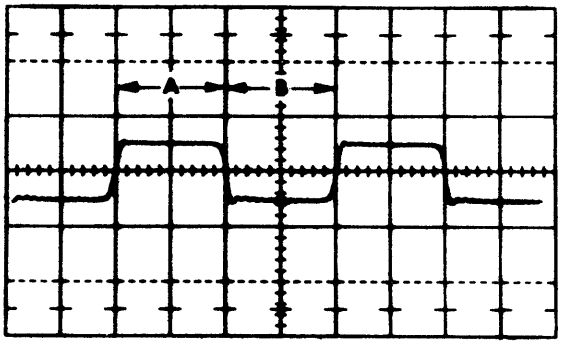


Figure 6-27. Symmetry Adjustment

10. Vertically align trace for equal amplitude above and below center horizontal grid line. Use a grease pencil to mark oscilloscope graticule very precisely with a fine vertical line at each point the trace crosses center horizontal grid line.

NOTE

Sync point must not change during following steps.

11. Remove channel B probe connection from logic chassis return channel B from invert to normal.
12. Set oscilloscope mode to alternate.
13. Connect channel B probe to test point D of SPL card at location A22 (upper deck) or B22 (lower deck).
14. Make oscilloscope settings and a trace comparison according to Figure 6-28, Trace D.
15. Turn shaft on variable capacitor (located between variable resistors) on edge of SPL card at location A22 (upper deck) or B22 (lower deck). Stop turning shaft when amplitude of trace is maximum. Trace amplitude must be 3.0 ± 0.5 volts peak-to-peak.
16. Move channel B probe to test point Y of SPL card at location A22 (upper deck) or B22 (lower deck).

17. Make trace comparison with Figure 6-28. Trace B (of figure) must be aligned to grease pencil marks as shown to within ±5 nsec. If requirement is met, go to step 18. If requirement is not met, adjust as follows:

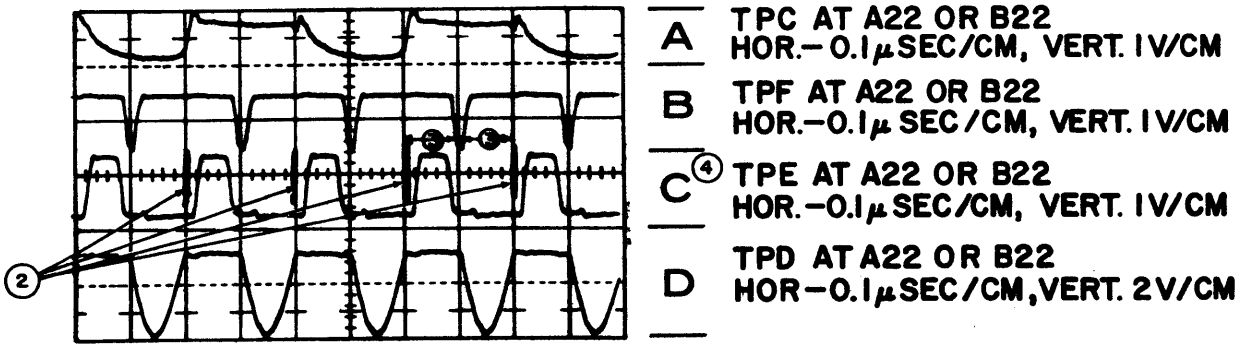
    a. Move channel B probe to test point Y of SPL card at location A22 (upper deck) or B22 (lower deck).

    b. Turn shaft on lower variable resistor (5K ohms) on edge of SPL card at location A22 (upper deck) or B22 (lower deck).

    c. Stop turning shaft when the centers of the trace B (of Figure 6-28) pulses are aligned midway between grease pencil marks on graticule to within ±5 nsec.

18. Repeat step 10 to make certain that trace still crosses horizontal grid line at original grease pencil marks. If trace has shifted, wipe graticule clean and repeat procedure from step 10.

19. Disconnect oscilloscope.



NOTES:

1. THIS FIGURE INTENDED TO SHOW GENERAL RELATIONSHIP OF FOUR TEST POINTS ONLY.

(2) GREASE PENCIL MARKS (SEE PROCEDURE).

(3) PERIODS FROM CENTER OF PULSE TO ADJACENT GREASE PENCIL MARKS ((2)) MUST AGREE TO WITHIN ± 5 NSEC.

(4) SHOWN FOR REFERENCE ONLY.

5848A

Figure 6-28. Tuned Amplifier Adjustment

TORSION ROD REMOVAL AND REPLACEMENT

1. Stop spindle motor.
2. Extend deck drawer to rear.
3. Remove disk pack.
4. Refer to Figure 6-29 and remove retaining ring securing end of faulty torsion rod to lever assembly.

CAUTION

Use extreme care during following steps so torsion rod does not scratch face of read/write heads. Do not touch face of any read/write head with hands. Avoid abusive contact with any part of a read/write head.

5. Carefully slide torsion rod out of receiver.
6. Check rotational freedom of related level assembly. If required, apply a light coat of Molykote, Type G to the points shown on Figure 6-29.
7. Apply a light coat of Molykote, Type G to shaft of replacement torsion rod.
8. Very carefully slide torsion rod into receiver and install retaining ring.
9. Make certain that torsion rod is engaging read/write heads on load button.
10. Use feeler gage to check gap between rear of grip rings and face of head/arm guide plate. Reposition grip rings along shaft until dimension is correct.

HEAD SELECT PREAMP CARD REMOVAL AND REPLACEMENT

1. Stop spindle motor.
2. Extend deck drawer to rear.
3. Set associated ON LINE/OFF LINE switch to OFF LINE and set related DC/OFF switch to OFF.
4. Release four half-turn fasteners securing shroud side covers enclosing head select preamp card to be removed. Set cover aside.
5. Disconnect each head cable plug connected to edge of card (Figure 6-30).

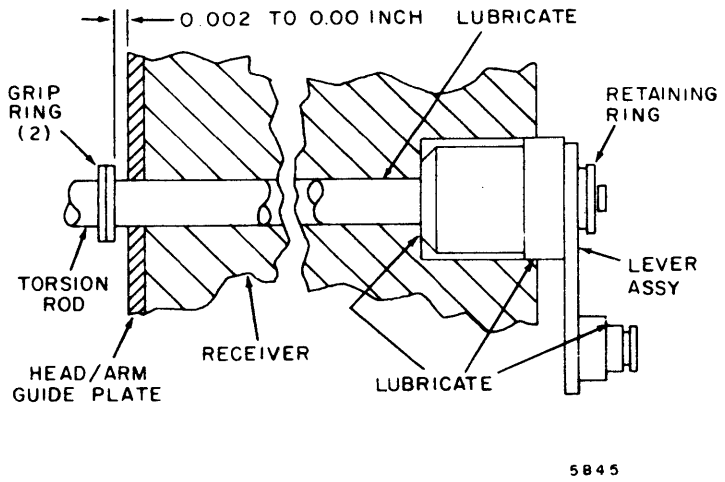


Figure 6-29. Torsion Rod

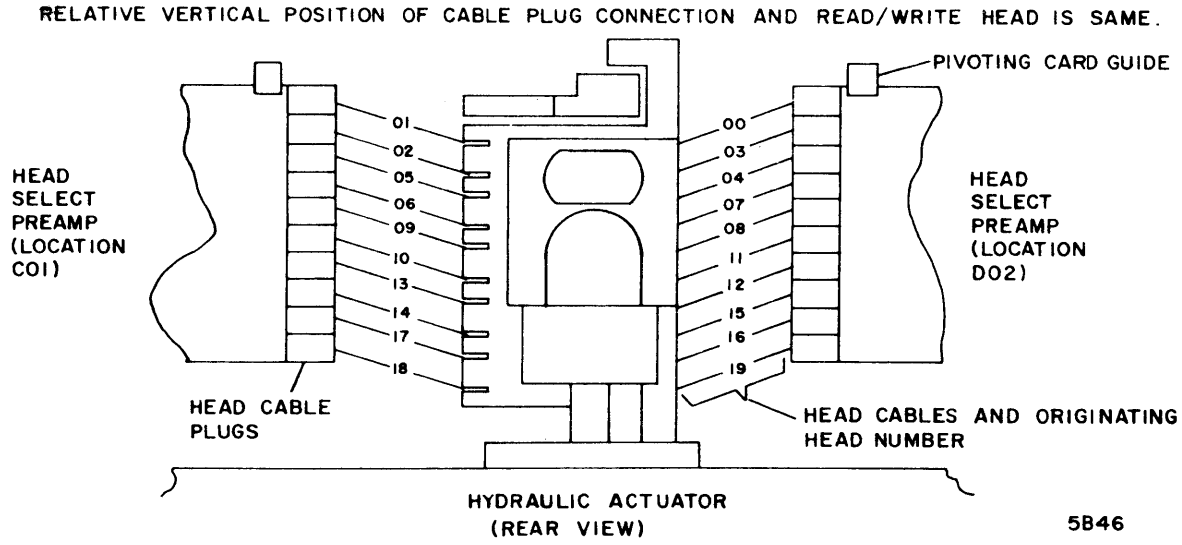


Figure 6-30. Read/Write Head Cable Connections

6. Raise pivoting card guide clear of top edge of card. Grasp notches in end of card with card puller (p/n 84146900).

7. Carefully extract card from chassis by pulling card straight away from connector.

8. Install repaired or new card carefully so that connector pins are not damaged.

9. Rotate pivoting card guide to engage edge of card.

NOTE

Head cables should not cross. Plug of top read/write connects to top position on edge of card. Plug of bottom read/write head connects to bottom position on edge of card.

10. Connect head cable plugs to edge of head select preamp card (Figure 6-30).

11. Install shroud side cover.

DETENT TROUBLESHOOTING

1. Perform Cylinder Transducer Check and Adjustment procedure.

NOTE

Following procedure requires MDD to perform seek operations. Commands controlling seek operations may be derived via a Tester Card (40072100) installed in logic chassis (position A03 for upper spindle or position B03 for lower spindle) or suitable software and the computer.

2. Connect oscilloscope probe to test point J (detent transducer preamplifier of card at logic chassis location A11 (upper deck) or B11 (lower deck). Ground oscilloscope at test point A or Z of same card to which probe is connected.
3. Attach a tachometer (84264100) to shaft in center of track number indicator dial.
4. Connect oscilloscope external trigger to test point B (I510, Any Seek) of card at location A08 (upper deck) or B08 (lower deck).
5. Connect tachometer leadwires to oscilloscope preamplifier input and preamplifier ground. Connection should be made so that forward seek causes a positive tachometer trace.
6. Start spindle motor.
7. Command MDD to perform 1-track repeat seek (one track forward and one trace reverse, continuously) centering on track 100.
8. Make oscilloscope settings and a trace comparison according to Part A of Figure 6-31. Point X of a properly adjusted transducer must occur during period Y. When requirement of Part A is met, a trace similar to Part B (forward seek) will be achieved.

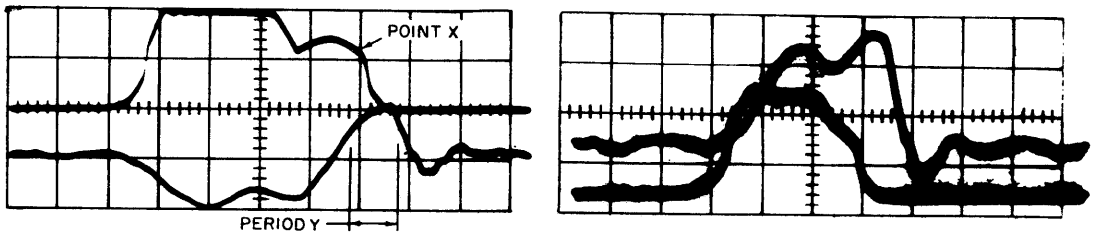


Figure 6-31. Detent Transducer Trace

HYDRAULIC ACTUATOR INTERMEDIATE SPEED TROUBLESHOOTING

CAUTION

Actuator intermediate speed shaft is adjusted and locked at factory. Normally this adjustment is adequate for the life of the actuator. Field adjustment of the shaft by inexperienced personnel could result in damage to the actuator or the detent pawl and/or detent gear mechanism.

The position of the intermediate speed shaft controls the actuator velocity during the intermediate speed portion of a seek operation. The net result of too much velocity during this phase can be that the seek operation stops beyond the desired track, and causes a seek error to be detected by the controller. If the velocity used during the intermediate speed segment of the seek is too low, the seek may terminate short of the desired track, and again cause a seek error.

Age of the actuator could cause a need for intermediate speed adjustment. However, the adjustment should be performed only after it is determined that the cylinder transducer and the detent transducer are properly adjusted and functioning correctly.

1. Install disk pack.
2. Start spindle motor, load heads, and allow a minimum warmup period of one hour.
3. Attach a tachometer (84264100) to shaft in center of track number indicator.
4. Connect tachometer leadwires to oscilloscope channel A preamplifier input and preamplifier ground so that a forward seek causes a positive-going tachometer trace.
5. Connect oscilloscope external trigger to test point C (Fwd. Latch) of SPL card at location A07 (for upper deck) or B07 (for lower deck).
6. Connect oscilloscope channel B probe to test point F (cylinder transducer preamplifier output) of card at location A11 (for upper deck) or B11 (for lower deck). Ground oscilloscope at test point A or Z of same card to which probe is connected.

NOTE

In following procedure it is necessary to command deck to perform certain seek operations. Commands may be derived by either suitable softward and central processor or tester card (p/n 40072100, installed at location A03 for upper deck or B03 for lower deck).

7. Command deck to perform 25-track repeat Seek (25 tracks forward and 25 tracks reverse, continuously) between tracks 25 and 50.
8. Make oscilloscope settings and compare oscilloscope traces with parts A and B of Figure 6-32. Point 3 should be approximately centered on point 4.

NOTE

To view a forward Seek, set oscilloscope to trigger on positive. Trigger negative for reverse.

9. Change oscilloscope settings according to parts C and D of Figure 6-32. Superimpose traces by adjusting vertical positioning. Point 3 must occur within $\pm$33% of point 5.

WARNING

A very small amount of movement of intermediate speed adjust screw is required in next step. If screw comes out of actuator, a rapid and massive loss of hydraulic fluid (under pressure) will occur.

10. If intermediate speed is to be adjusted, refer to Figure 6-14. Loosen locking nut on adjust screw. Adjust screw to obtain trace referenced in step 9. Tighten locking nut.

11. Command deck to perform 100-track repeat Seek between tracks 25 and 125.

12. Repeat steps 8 through 10.

13. Repeat steps 7 through 12 until overshoot on both 25-track and 100-track seeks is within tolerance.

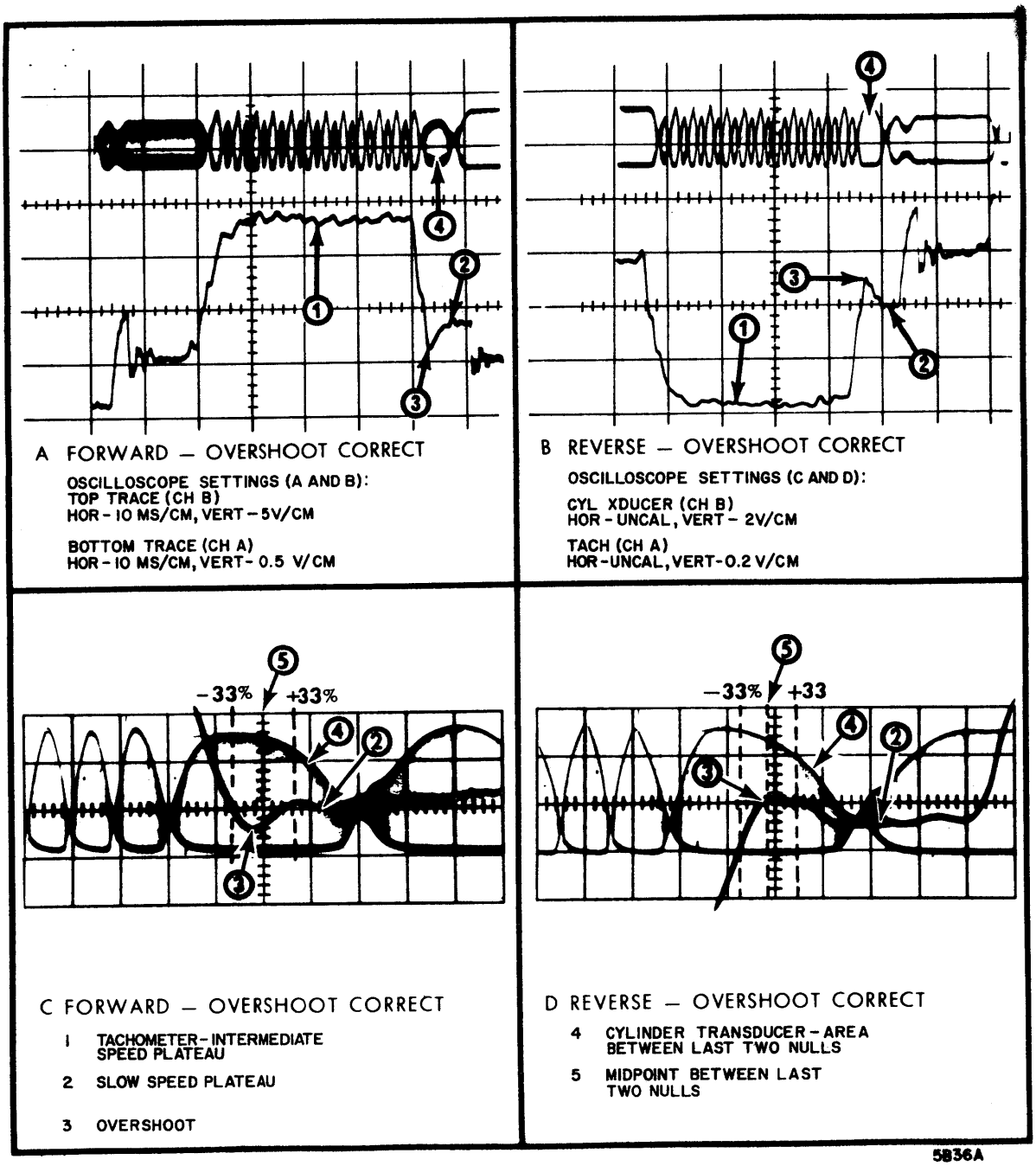


Figure 6-32. Intermediate Speed Characteristics

Repair of Hydraulic Fluid Leakage

1. Determine source. If it is necessary to tighten, turn or replace any hydraulic fitting, proceed as follows:

   a. Refer to Hydraulic Fluid Removal and Replacement procedure and remove fluid from unit.

   NOTE

   If the fitting being removed is located on the bottom of the actuator, remove actuator by performing steps 2 through 6 of the Hydraulic Actuator Assembly Removal and Replacement procedure.

   b. Disconnect hydraulic fitting.

   c. Check male and female threads for contaminants. Fittings must be free of dirt, grease or other contaminants. If necessary, clean fittings with Freon.

   d. Any loose accumulation of Loctite powder or Teflon tape must be removed. Film which adheres tightly must be removed.

   NOTE

   Teflon tape is used on male threads only.

   e. Apply Teflon tape (p/n 95033400) to male threads starting with the second thread. Assemble fittings and tighten in place.

2. If actuator was removed, proceed as follows:

   a. Perform steps 7, 8 and 9 of the Hydraulic Actuator Assembly Removal and Replacement procedure.

SECTION 7

MAINTENANCE AIDS

MAINTENANCE AIDS

GENERAL

Section 7 contains information on logic circuits, the criteria used in determining the further usability of read/write heads and disk packs, and the tester card used in the Maintenance section.

SPL LOGIC

The logic used in this device is generally termed SPL (Silicon Peripheral Logic). It consists of two styles of circuits: discrete component and Intebrid. Discrete component circuits contain individually identifiable resistors, capacitors, transistors, etc. An Intebrid circuit is a chip containing an integrated circuit(s).

PHYSICAL DESCRIPTION

All components of the SPL cards are mounted on one side of a printed circuit board (Figure 7-1) which is 6 inches wide and 4-3/4 inches high.

The cards are pluggable and are restricted in vertical and horizontal movement by card guide spacers when inserted into the panel connectors. A card puller (PN 84146900) which grips the upper and lower edges of the card is used for removing the cards. No special tools are required to insert a card.

Numerical designators (1 through 99) are etched on the non-component side of the board to identify each transistor. A 4-character alphanumeric designator is etched on the non-component side of the board to identify the card type. A matrix code (alphanumeric) also appears on this side. Non-amplifying components such as Intebrid chips, resistors, capacitors, diodes, etc., are not marked.

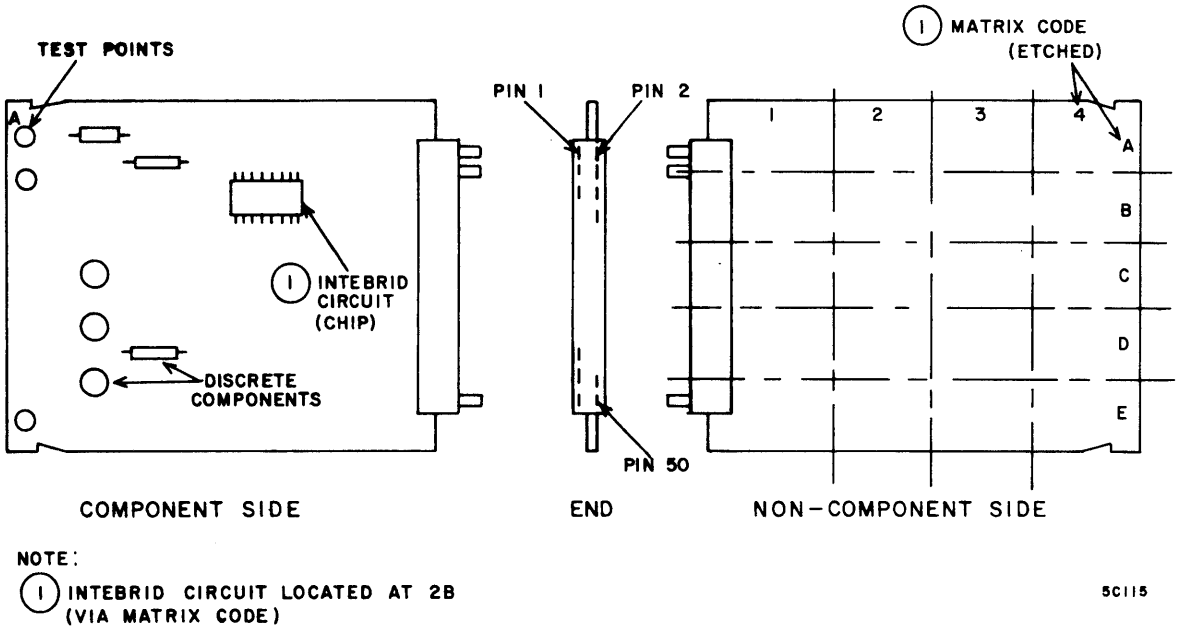


Figure 7-1. SPL Card

Pin Assignments

The module connector consists of a 37-pin male blade connector mounted along the 4-3/4 inch board dimension on the component side of the board.

Connector pins are numbered from the top starting with pin 1 and continuing through pin 50 on the bottom. Thirteen pin positions are omitted. These are 3, 7, 11, 15, 19, 23, 27, 31, 35, 39, 43, 47, and 49.

Six pins of the 37-pin connector are reserved as follows:

Pin 2	Ground
Pin 4	-6v
Pin 6	-20v
Pin 46	+20v
Pin 48	+6v
Pin 50	Ground

Test Points

Test points are located near the edge of the module opposite the connector and in other strategic places on the component side of the board. Test points are assigned alphabetically starting with A on the top, outer edge. In most cases, test points A and Z are available for ground reference.

USE OF RELATIVE LEVEL INDICATORS

The relative level indicator is a small circle located at the origin or termination of a signal line, and tangent to a logic symbol. The presence or absence of this indicator tells the conditions that are necessary to satisfy the function of the logic symbol. The presence of the circle indicates a 0 logic level on that line is needed to satisfy the function. The absence of the circle represents a logical 1 needed to satisfy the function.

AND FUNCTION

The relative level indicator used with an AND logic function may be interpreted in this way: Only under the stated input conditions will the stated output condition occur. Under all other input conditions, the stated output will not occur. For example, Figure 7-2 indicates that only when A and B are 0 logic level (indicated by the circle on their respective inputs) will the output of C be a logical 0 (indicated by the circle on the output line). Under all other input conditions, output C will be a logical 1.

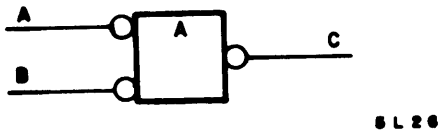


Figure 7-2. AND Function

OR FUNCTION

The relative level indicator used with an OR logic function may be considered as follows: If one or the other, or both of the stated inputs are present, then the stated output will occur. Only when both of the stated inputs are not present will the stated output be changed. For example, Figure 7-3 indicates that if either A is a logical 0 (represented by the circle on its input) or B is a logical 1 (represented by no circle on its input), or both A is a logical 0 and B is a logical 1, then output C will be a logical 0. Only when A is not a logical 0 and B is not a logical 1, will C not be a logical 0.

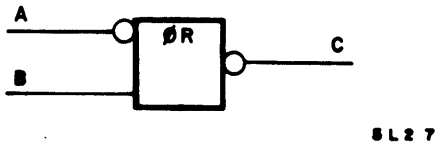


Figure 7-3. OR Function

A complete truth table for use with relative level indicators is given in Figure 7-4.

INFORMATION CONTAINED WITHIN LOGIC SYMBOLS

Discrete Component Circuits

Figure 7-5 shows a schematic (as shown on card schematic diagram) and the logical representation (as shown on logic diagrams) for the same discrete component circuit. Four lines of information are contained within the logic symbol. The top line is the function identifier and designates the broad logic function of that particular symbol. In this case, PA represents a high level amplifier, the logic function performed by the circuit. The third line, also an alphabetic code, designates the circuit type being used (HAB). The circuit type is a subdivision of the function identifier (a specific high level amplifier). By using the circuit type designator, detailed information on that particular circuit can be derived in the following paragraphs (see Discrete Component Circuit Descriptions).

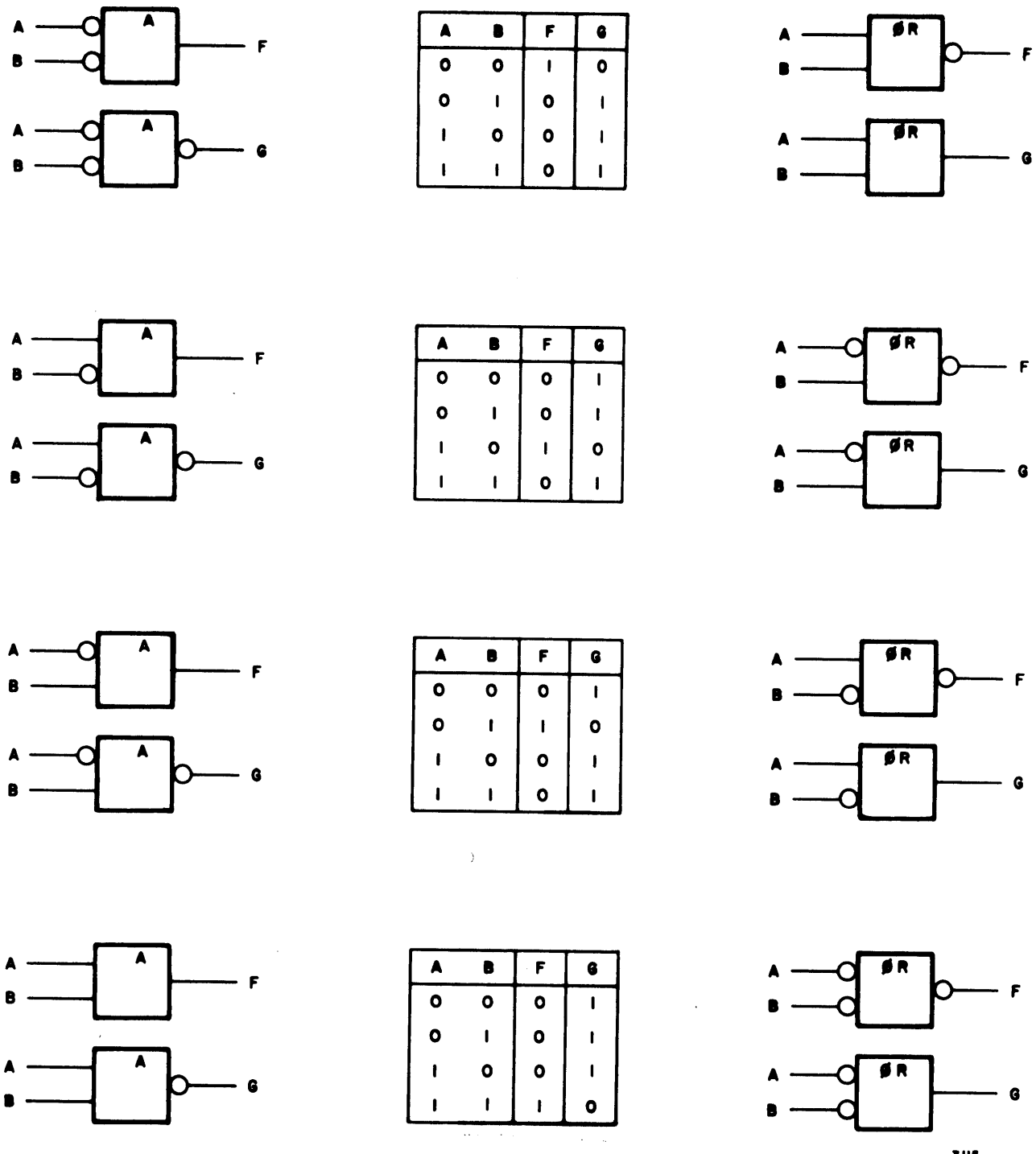


Figure 7-4. Truth Table

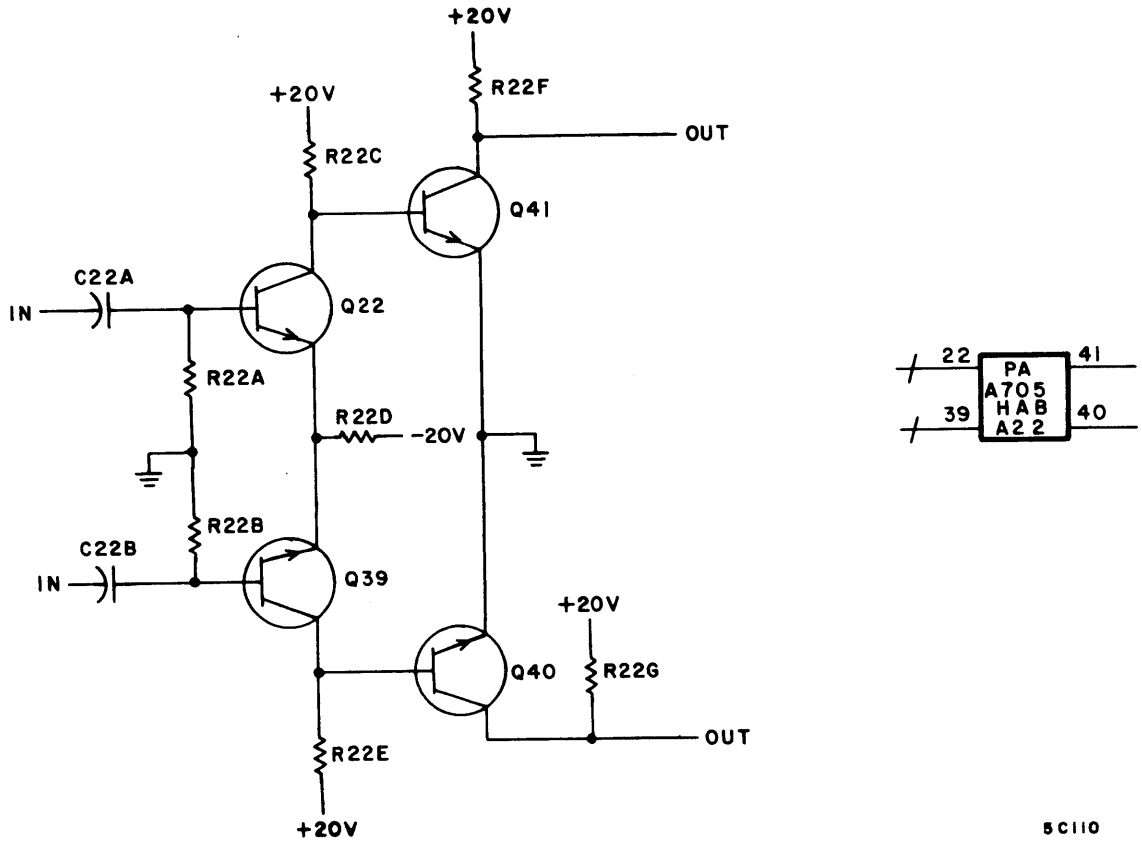


Figure 7-5. Discrete Component Circuit

The second line within the symbol is used to differentiate that particular symbol from similar symbols that appear in the logic diagram. It is called the logic term and consists of a one-letter prefix and an assigned identification number (in this case, A705).

The numbers on the input lines to the symbol indicate which transistor is driven by that input line. For example, the upper input has a number 22 on its line, showing that it drives transistor number 22 (ie., Q22 on the card schematic diagram).

The output lines also have numbers associated with them. These numbers indicate which transistor directly feeds the output line. For example, the lower output line has a number 40 above it, indicating that the output from transistor number 40 (Q40 on the

card schematic diagram) drives the lower output line. For other circuits additional transistor numbers may appear below the logic symbol. These numbers refer to internal transistors that are not directly connected to any input or output line, but are a part of the circuit.

Intebrid Circuits

Figure 7-6 shows the schematic version (as shown on card schematic diagram) and the logical representation (as shown on logic diagrams) for the same Intebrid circuit. The first and second lines of information inside both blocks are the same, and have the same meaning as for the discrete component circuit.

Line three identifies the Intebrid circuit type (D24), and on the logic symbol additionally identifies the section (B) of the circuit chip. (Refer to the Key to Logic Symbols sheet of the logic diagrams for detailed coverage of Intebrid circuit types being used and the number of sections in each chip.)

The fourth information line in the block is for location information. On the schematic version, 1C identifies the matrix block (Figure 7-1) in which the chip is located and B identifies the section of the chip. The fourth line of the logic identifies the card matrix location and it also identifies the logic chassis row (A) and the mating connector in the row (13).

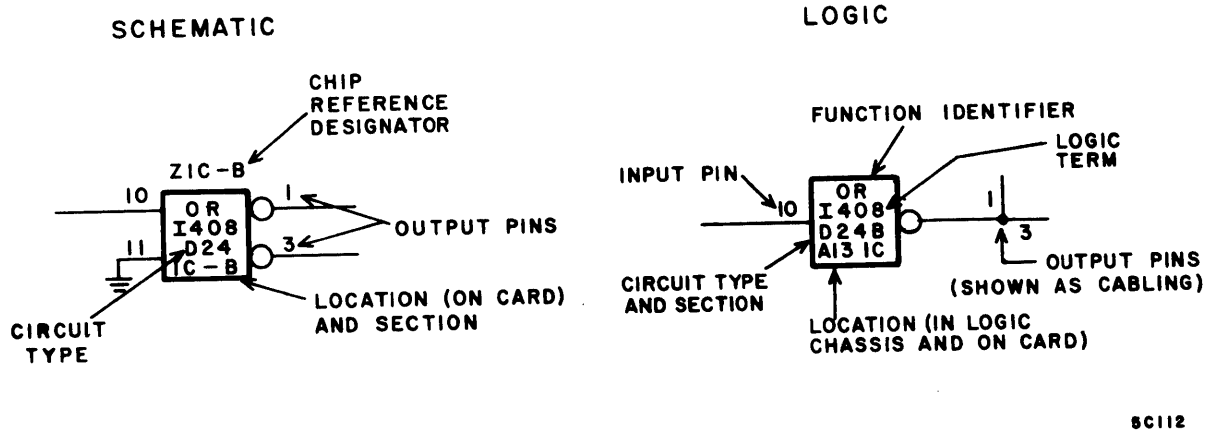


Figure 7-6. Intebrid Circuit

Pin information for the schematic and logic versions are similar with two exceptions. The logic version does not show unused chip pins, whereas the schematic version shows all unused pins connected to ground. Secondly, the schematic version shows a separate origin for each chip output pin, while the logic version may show a single origin and identify each pin as the line branches to its destination. This scheme is termed cabling and conserves space and preserves appearance.

WIRED FUNCTIONS

The logical representation for wired functions is shown in Figure 7-7. These functions are used where circuits have the capability of being combined as an AND function by having the outputs connected. This is simply a physical connection and no electrical or electronic components are involved. However, the logical interpretation of the wired function is consistent with the AND truth table in Figure 7-4. Arrowheads are used to depict logic flow into the gate. The gate output has no arrowhead.

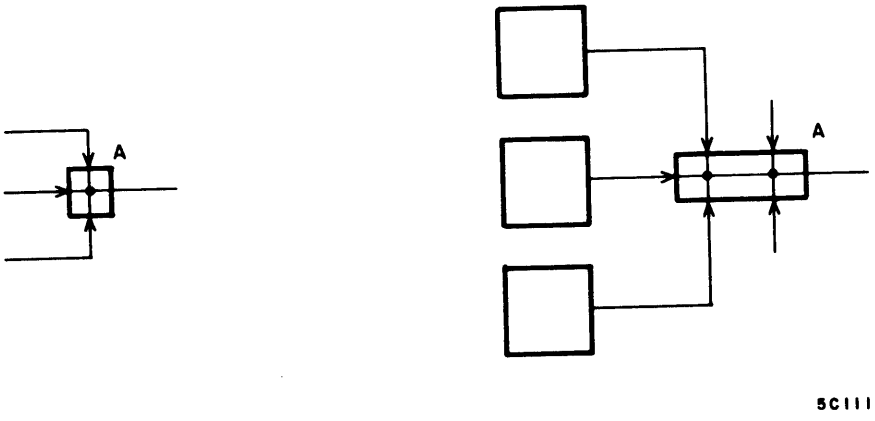


Figure 7-7. Wired Functions

STANDARD/NON-STANDARD LOGIC LEVEL INDICATOR

The input to a logic function at a voltage other than the standard logic level is represented by a slash across the non-standard level line. Absence of the slash (or absence of an A, see below) indicates a standard logic level on that line. Figure 7-5 illustrates the use of this symbol.

When the input signal to a logic function is an analog signal, the input line will have an A across it.

INTEBRID CIRCUIT DESCRIPTIONS

Detailed functional descriptions and schematic diagrams for Intebrid circuits are provided in CDC Pub. No. 60201000.

DISCRETE COMPONENT CIRCUIT DESCRIPTIONS

Figures 7-8 through 7-51 are the schematic diagrams for the discrete component circuits used in this device. A verbal description supports each circuit diagram.

The order of presentation is in accordance with the 3-letter alphabetical circuit type designator.

Low Level Amplifier - FAB

The FAB circuit (Figure 7-8) is a low level amplifier that amplifies the analog read signal from the head. Input B is a gate input.

When input B is +20v, diodes CRNA, CRNB, CRNC, CRND, CRNE and CRNF are forward biased. The voltage between CRNC and CRNE and between CRND and CRNF is clamped at approximately +2.0v. With all diodes forward biased, the read signal can pass to the amplifier.

When input B is ground, diodes CRNG and CRNH clamp the voltage at +0.6v. This reverse biases the input diodes. No read signal can enter.

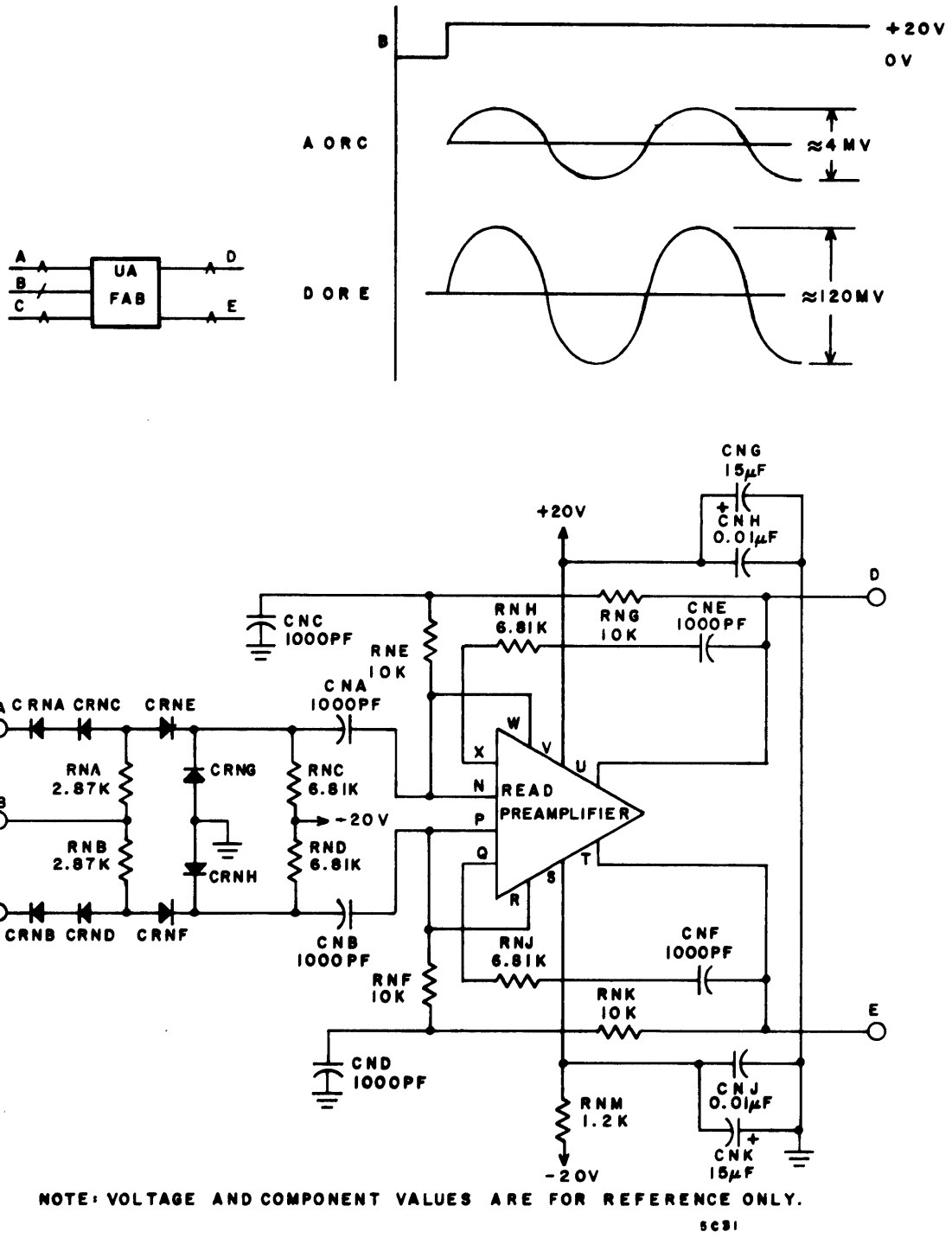
The preamplifier is a three stage amplifier using an emitter follower output stage for low output impedance. The integrated preamplifier has discrete component ac and dc feedback.

AC feedback is provided by CNE and RNH in the top half and CNF and RNJ in the lower half of the circuit. The signal is brought back to the emitters of the input stage to increase input impedance.

DC feedback is provided by RNG, RNE and CNC (to ground) in the upper half and RNK, RNF and CND (to ground) in the lower half of the circuit. This feedback helps to stabilize the output.

Capacitors CNG, CNH and CNJ, and CNK filter noise from the +20v and -20v power supplies, respectively. The electrolytic capacitors filter low frequency noise. The paper capacitors filter high frequency noise.

Open loop gain in the amplifier is approximately 180. Closed loop gain in the amplifier is approximately 30.



NOTE: VOLTAGE AND COMPONENT VALUES ARE FOR REFERENCE ONLY.

5c31

Figure 7-8. Low Level Amplifier - FAB

Gated Intermediate Level Amplifier - GJA

The GJA circuit (Figure 7-9) is an analog gate that is controlled by input B. When input B is +20v, both transistors are on. All analog signals pass through the circuit. Capacitors CNA and CNB ensure that only analog signals are passed. CNC filters noise spikes from the gating signal. Dc power for the transistors is supplied by the circuit in the next stage.

When input B is +0.2v, both transistors are off. No signals pass through the circuit.

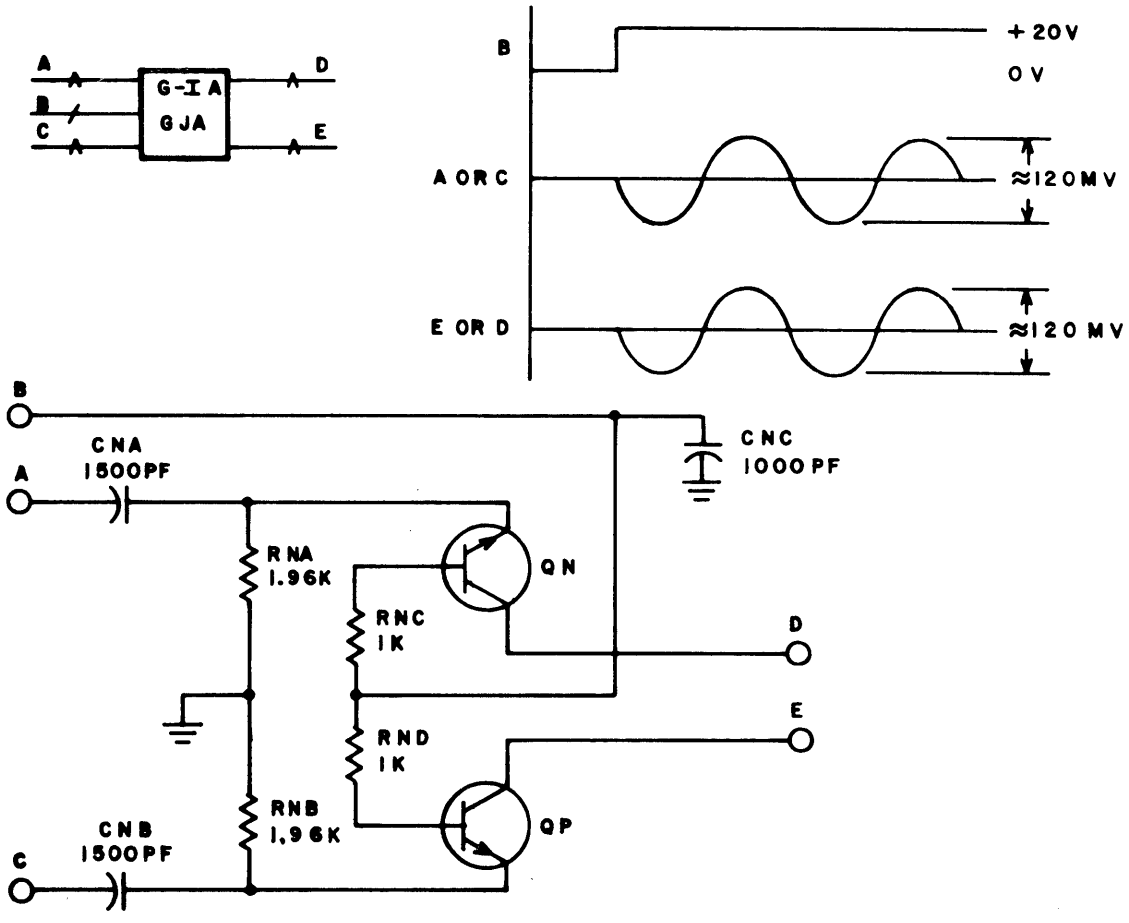


Figure 7-9. Gated Intermediate Level Amplifier - GJA

High Level Amplifier - HAA

The HAA circuit (Figure 7-10) is gated by an analog gate circuit (GJA) and provides the load and biasing for that circuit.

The preamplifier, ac feedback and dc feedback are identical to the FAB circuit. Capacitor CND is added to the output of the second stage to decouple high frequency noise.

High Level Amplifier - HAB

Input to the HAB circuit (Figure 7-11) is a balanced square wave. Output is also a balanced square wave that follows the input.

When input A is positive, B is at 0v. Transistor QN is on and QP is off. The base of QQ falls to near ground. Transistor QQ is off. Output C rises to approximately +0.7v. With QP off, QR turns on. Output D falls to ground.

When input B is positive, A is at ground. Transistor QN is off, QP is on, QQ is on and QR is off. Output C is at ground. Output B rises to +0.7v.

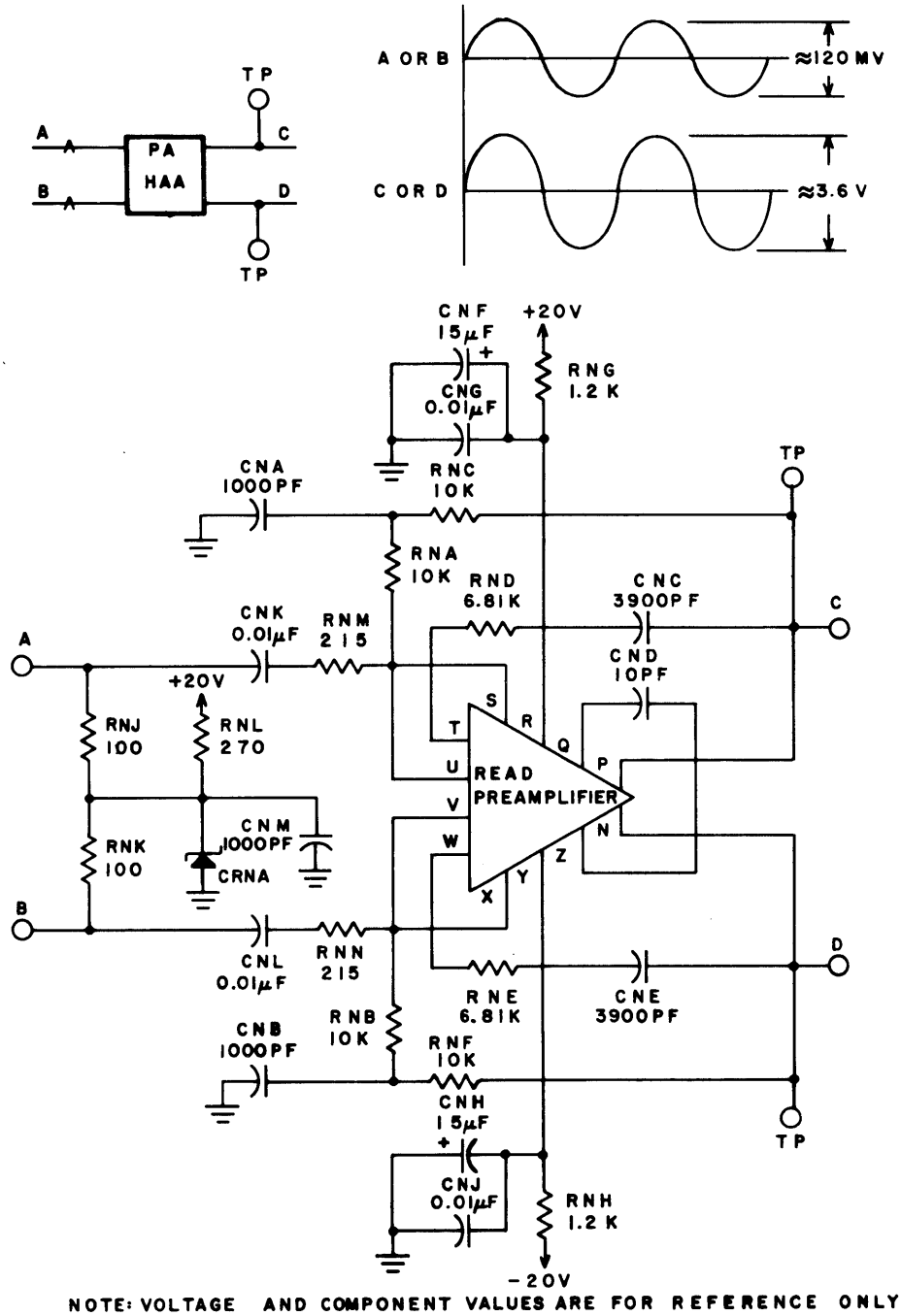
High Level Amplifier - HJA

The HJA circuit (Figure 7-12) increases the input signal power to transmit over a coaxial cable. The input is a differential signal of approximately 3.6v peak to peak.

The input signal across A and B is divided between resistors RNA and RNB. Transistors QN and QP are forward biased with a gain of 3. The -20v through resistor RNH and diodes CRNA and CRNB and through resistor RNJ and diodes CRNC and CRND forward biases QQ and QT, respectively. Transistors QQ and QT are in a common collector configuration to provide a current gain.

Transistors QR and QS are emitter followers that draw very little current from QQ and QT. They provide low impedance for discharging CNC and CND, thus reducing delay time when crossing the zero volt point.

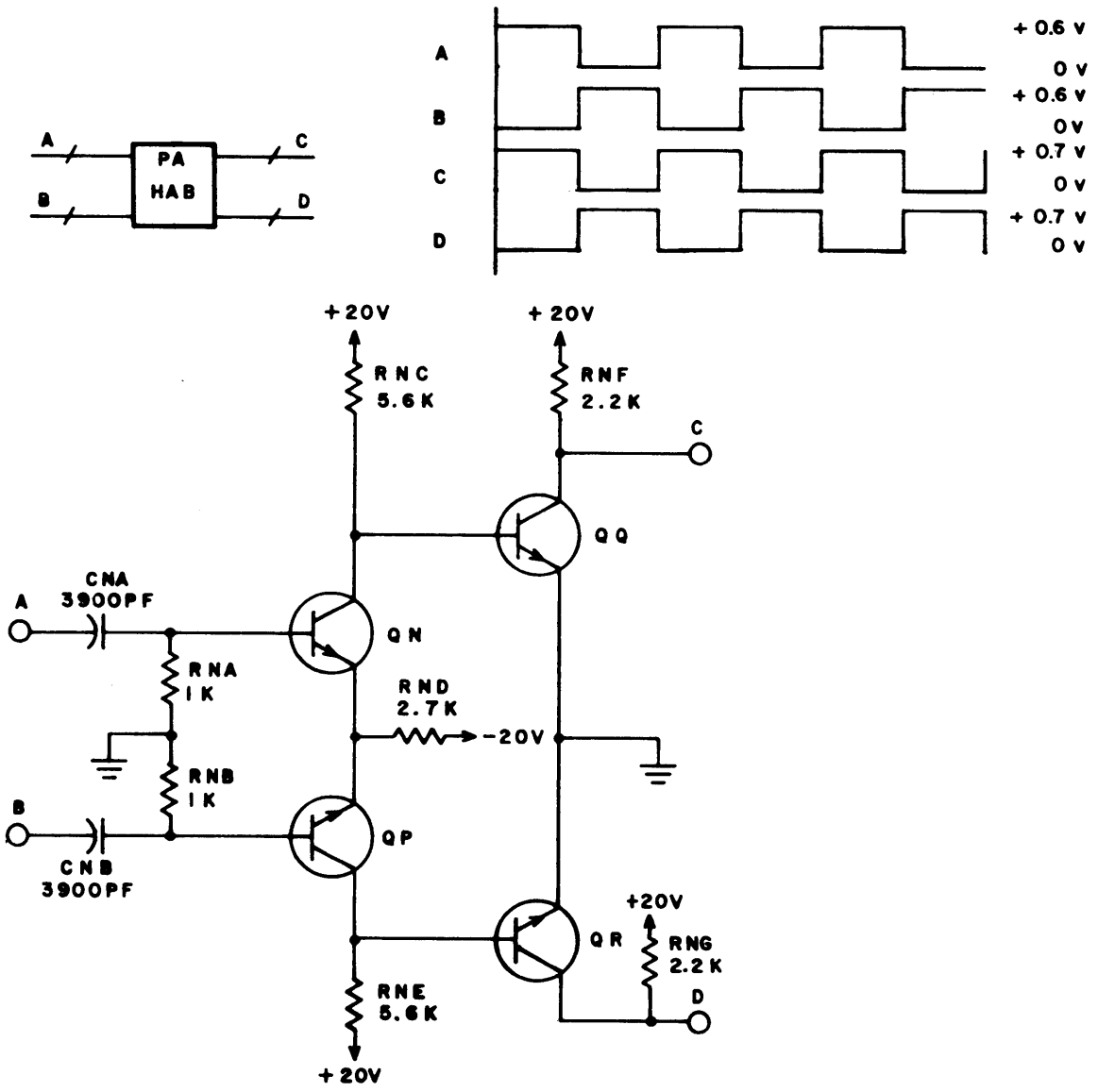
Output voltage is approximately the same as input voltage. Output current is 20 ma maximum.



NOTE: VOLTAGE AND COMPONENT VALUES ARE FOR REFERENCE ONLY.

5C30

Figure 7-10. High Level Amplifier - HAA



NOTE: VOLTAGE AND COMPONENT VALUES ARE FOR REFERENCE ONLY.

5C25

Figure 7-11. High Level Amplifier - HAB

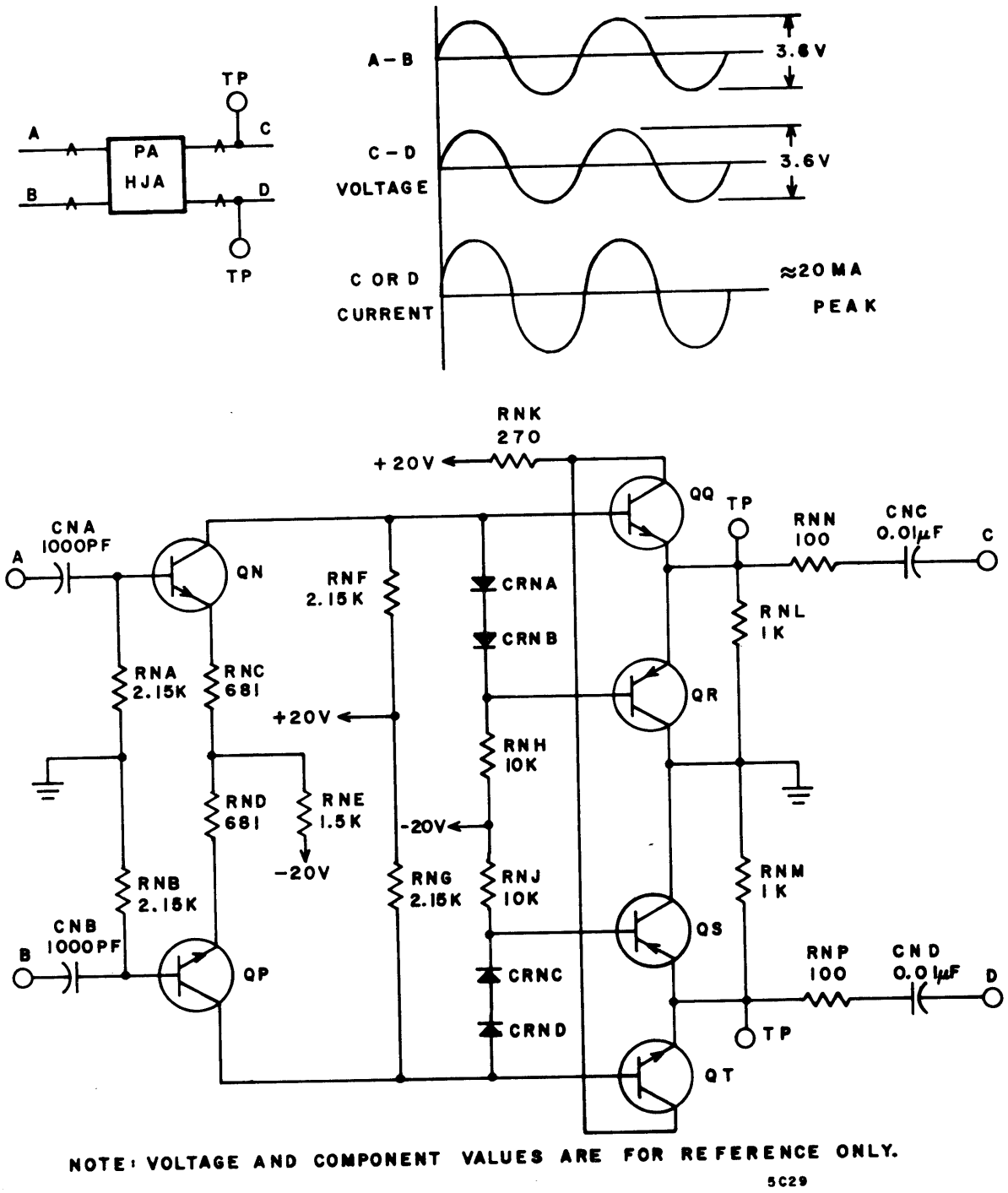
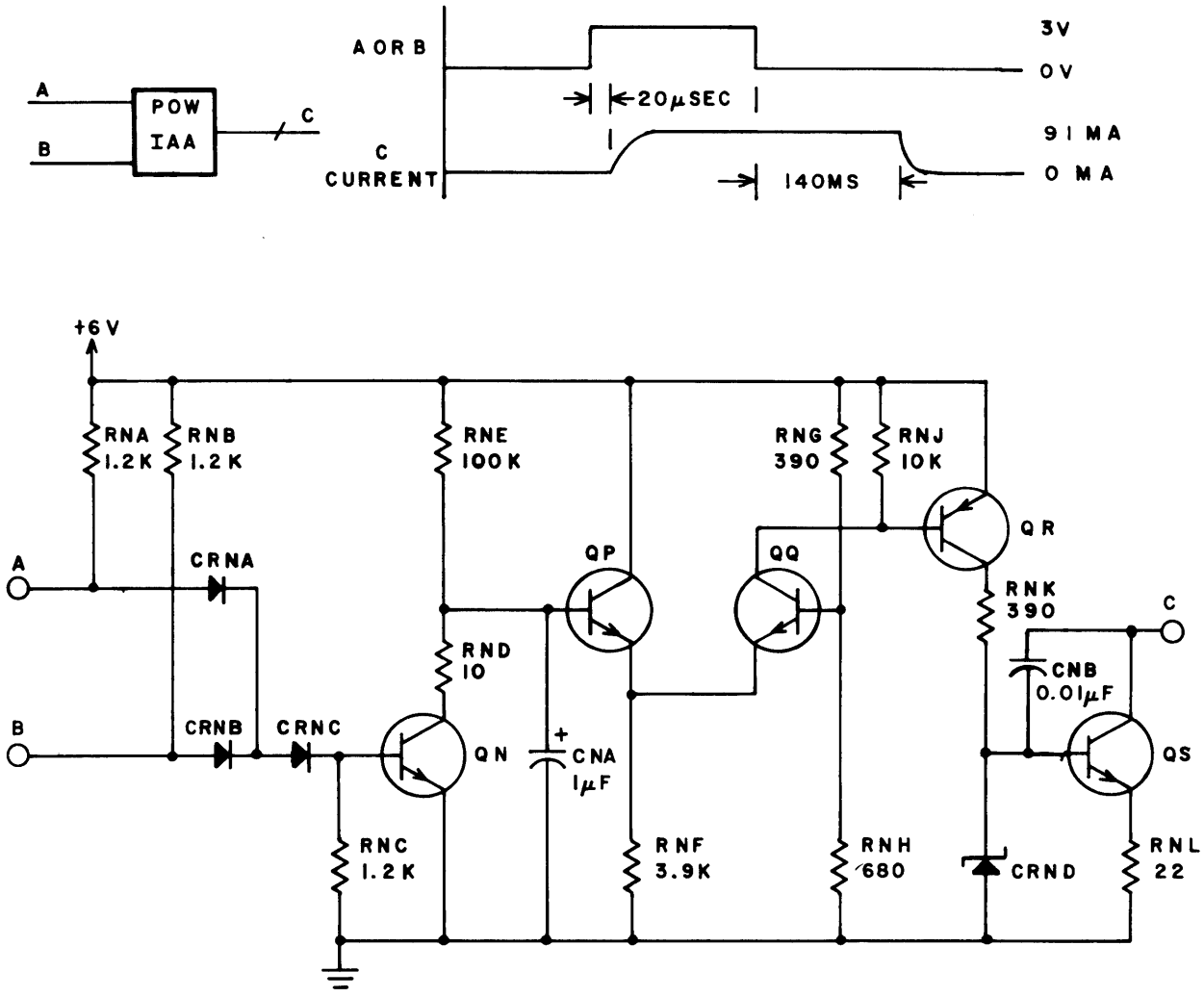


Figure 7-12. High Level Amplifier - HJA

Lamp Driver - IAA

The IAA Circuit (Figure 7-13) sinks a current of 91 ma to drive a lamp. Capacitor CNB slows down switching time of QS and provides a ramp output to prolong the life of the lamp. A "1" input at either A or B or both lights the lamp. Only when both A and B are "0" is the lamp extinguished.



NOTE: VOLTAGE AND COMPONENT VALUES ARE FOR REFERENCE ONLY.

5C35

Figure 7-13. Lamp Driver - IAA

A "1" at either or both inputs turns QN on. CNA discharges through RND and QN. The base of QP goes to ground. Transistor QP is off, so the base of QQ (3.8v) is more positive than its emitter. Transistor QQ is on, causing current to flow through RNJ. The voltage drop across RNJ (approximately 0.7v) turns QR on. Transistor QS turns on. Zener diode CRND clamps the voltage across RNL at 2.0v, which is a current of 91 ma.

A "0" at both inputs turns QN off. CNA charges through RNE until QP turns on. With QP on, QQ, QR and QS are off. No current flows in the lamp.

Lamp Driver - IBA

The IBA circuit (Figure 7-14) sinks a constant load current of 200 ma. Capacitor CNA ramps the output to prolong the life of the lamp connected to output B.

A "1" on input A turns QP on. The base of QN is at ground. Transistor QN is off. The base of QR is clamped at +2.7v by Zener diode CRNC. Transistor QR is on. A 2-volt drop across RNE assures a 200-ma current.

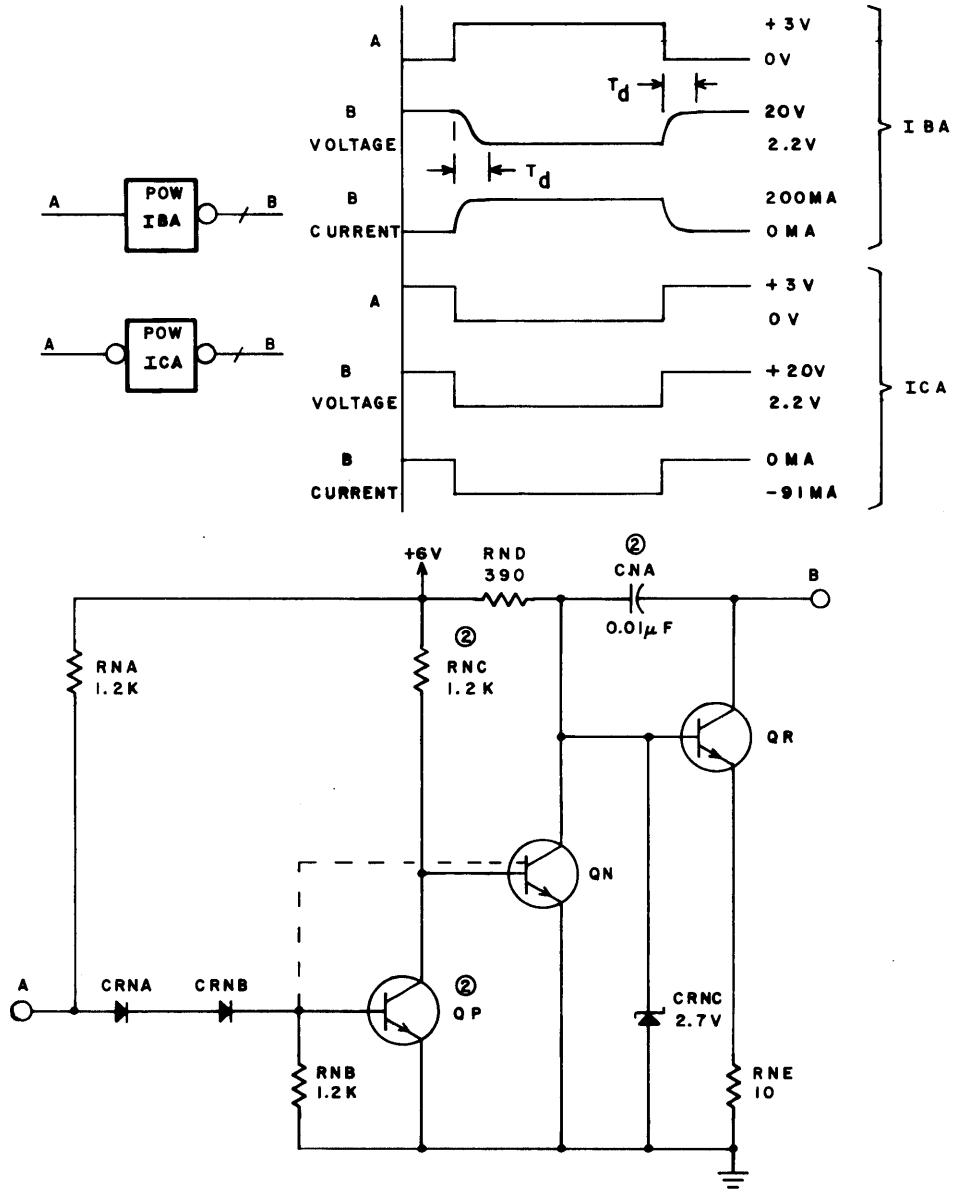
A "0" on input A turns QP off. The collector clamps at +0.7v when QN turns on. The base of QR goes to ground. Transistor QR is off. No current flows.

Lamp Driver - ICA

The ICA circuit (Figure 7-14) functions as a switch supplying current to a lamp at output B. When input A receives a "0" (ground) signal, the lamp turns on. When input A receives a "1" (+3v) signal, the lamp turns off.

Output B is connected through a lamp to a voltage supply, typically +20v. When input A receives a "0" signal, transistor QN turns off. This allows the +6v supply to forward bias transistor QR through resistor RND. Transistor QR turns on, conducting current from the voltage supply, through the lamp and RNE to ground. The lamp lights.

When input A receives a "1" signal, QN turns on. Transistor QN conducts current away from the base of QR, removing the forward bias. Transistor QR stops conducting. The lamp goes out.



NOTES:

1. VOLTAGE AND COMPONENT VALUES ARE FOR REFERENCE ONLY.
2. COMPONENT AND CONNECTING WIRES NOT USED ON ICA. DOTTED LINE SHOWS QN BASE CONNECTION FOR ICA, ENTIRE CIRCUIT (LESS DOTTED LINE) FOR IBA.

SCS

Figure 7-14. Lamp Driver - IBA, ICA

The voltage drop across RNE when QR conducts is directly proportional to the load current. At a load current of 200 ma, the voltage across RNE is 2 volts. The base of QR cannot go more positive than +2.7v because of Zener diode CRNC. Therefore, QR starts losing its forward bias when the load current reaches 200 ma (2 volts across RNE). Transistor QR is thereby protected against a short circuit.

Low Speed Driver - IDA

The IDA circuit (Figure 7-15) acts as a switch. Outputs B and C are connected through external resistors and a common load (typically a solenoid) to an external voltage supply. A "1" at input A causes current to flow through the external load. A "0" at input A shuts off the current flow.

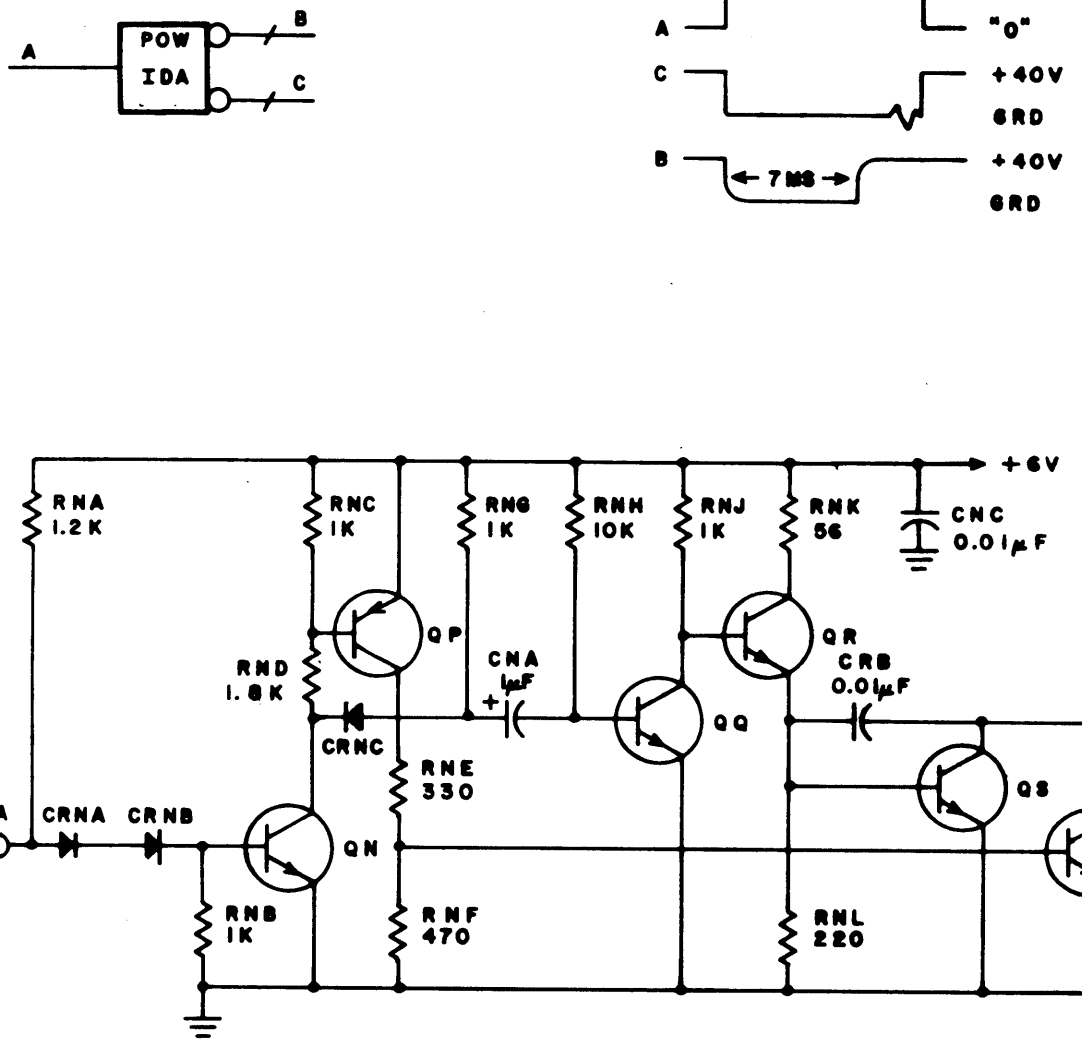
A "0" at input A turns off transistor QN. The emitter and base of QP are both at +6v. Transistor QP is, therefore, not conducting, which keeps QT from conducting. The left side of capacitor CNA charges to +6v, while the right side is held at approximately +0.7v by resistor RNH and the base-emitter voltage drop across QQ. Transistor QQ is held on by the current through RNH, driving the base of QR to ground. Transistor QR is off. The base of QS is at ground and is off. No current flows through the external load.

A "1" at input A turns on transistor QN. The base of QP goes to ground, turning QP on. This allows the +6v supply to flow through RNE to the base of QT, turning it on. Then, 200 ma of current flows through the external load and QT to ground.

When the collector of QN goes to ground, the left side of CNA also goes to ground. This back biases the base-emitter junction of QQ by approximately 5.3v (the original voltage across CNA). Transistor QQ turns off, allowing the base of QR to go positive. Transistor QR turns on and drives the base of QS positive. Transistor QS turns on and allows an additional 850 ma of current through the external load and QS to ground.

The base of QQ then rises toward +6v through the charging action of resistor RNH on CNA. When the base of QQ reaches +0.7v, QQ turns on and QR turns off. This stops the current flowing through QS by driving the base of QS to ground. The 850 ma of current through QS lasts approximately 7 ms.

CNB limits the rise and fall time of the 850-ma current pulse.



NOTE: VOLTAGE AND COMPONENT VALUES ARE FOR REFERENCE ONLY.

SC19

Figure 7-15. Low Speed Driver - IDA

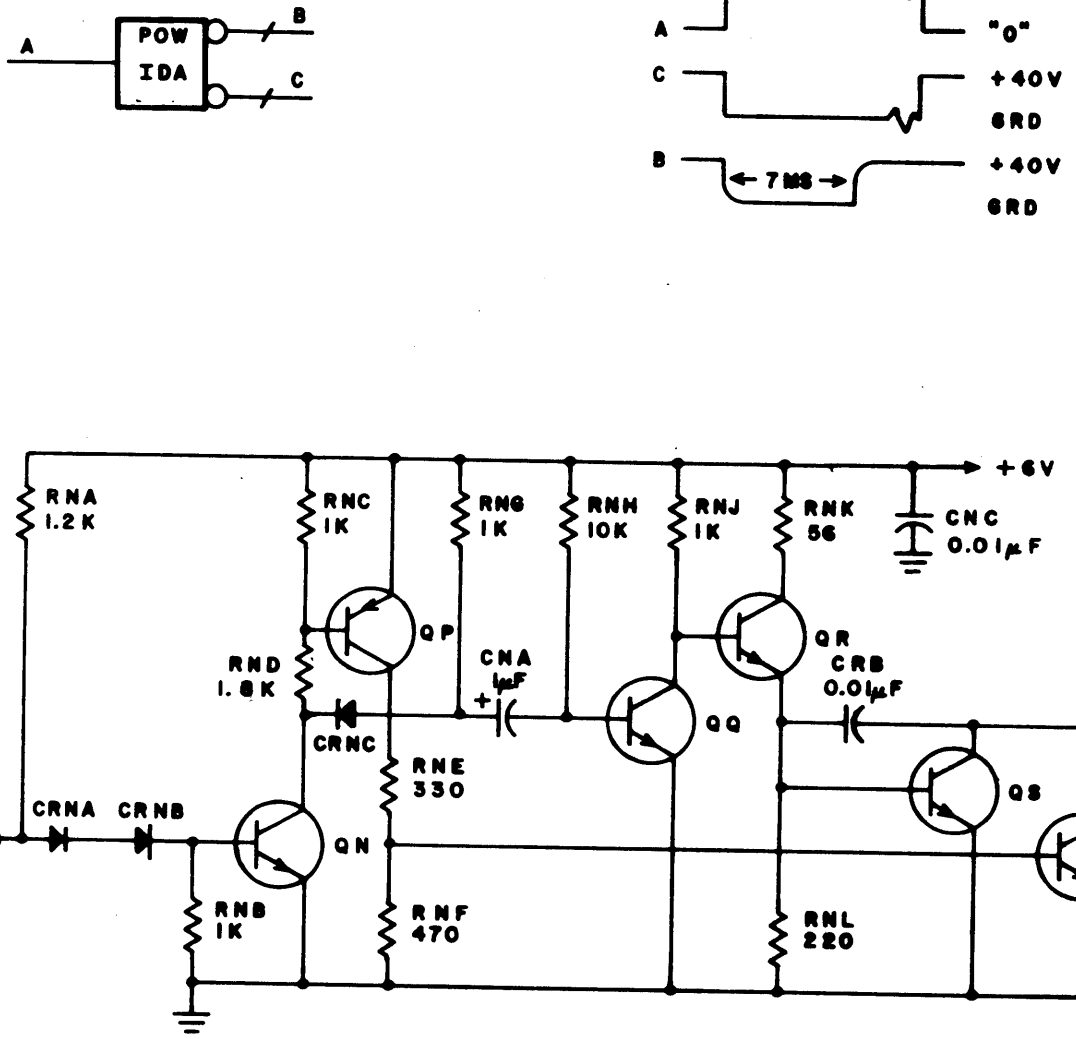
Write Driver - JAB

The JAB circuit (Figure 7-16) provides current to the write heads so that data may be recorded. Outputs E and F are connected to opposite ends of the write head, which is center tapped to ground. When input A is positive, current flows through output E to its half of the write head. When input B is positive, current flows through output F to its half of the write head. When A is positive and the unit is writing, B is negative. When A is negative and the unit is writing, B is positive. Therefore, only one half of the write head may be activated at any one instant while the unit is writing.

With a positive charge on input A transistor QN is off. The base of QR is positive and the emitter of QS is positive. The negative voltage at B turns transistor QT on. This drives the emitter of QR negative. Transistor QR conducts, driving the base of QQ to about -2v. Transistor QQ is an emitter follower, so the emitter of QQ is also near -2v. The -2v on the base of QP turns QP off. No current flows through output F (-20v through resistor RNA only reverse biases an external diode). With QT on, the base of QS goes slightly negative. Transistor QS is off, allowing the base of QU to go to +40v. Transistor QU is an emitter follower, so the emitter of QU also goes to about +40v. The +40v on the base of QV turns QV on. Current now flows from a +40v supply connected to output G through transistor QV and its half of the write head to ground. A resistor lies between output E and the write head to limit the current flow in the write head.

When input A goes negative and B goes positive, QN and QS are on and QR and QT are off. On the bases of QQ and QU are currents of +40v and -2v, respectively. The emitter of QQ goes to about +40v. The emitter of QU goes to about -2v. Transistor QV is off. No current flows through output E. Transistor QP is on. Current flows from the +40v source connected to output G through QP and its half of the write head to ground.

Input D supplies a negative voltage when the unit is writing to reverse bias diodes CRNA and CRNF. If the unit is not writing, D is grounded and both inputs A and B go negative. This turns on QR and QS. Transistors QP and QV are, therefore, off and no current flows through the write head.



NOTE: VOLTAGE AND COMPONENT VALUES ARE FOR REFERENCE ONLY.

SC19

Figure 7-15. Low Speed Driver - IDA

Write Driver - JAB

The JAB circuit (Figure 7-16) provides current to the write heads so that data may be recorded. Outputs E and F are connected to opposite ends of the write head, which is center tapped to ground. When input A is positive, current flows through output E to its half of the write head. When input B is positive, current flows through output F to its half of the write head. When A is positive and the unit is writing, B is negative. When A is negative and the unit is writing, B is positive. Therefore, only one half of the write head may be activated at any one instant while the unit is writing.

With a positive charge on input A transistor QN is off. The base of QR is positive and the emitter of QS is positive. The negative voltage at B turns transistor QT on. This drives the emitter of QR negative. Transistor QR conducts, driving the base of QQ to about -2v. Transistor QQ is an emitter follower, so the emitter of QQ is also near -2v. The -2v on the base of QP turns QP off. No current flows through output F (-20v through resistor RNA only reverse biases an external diode). With QT on, the base of QS goes slightly negative. Transistor QS is off, allowing the base of QU to go to +40v. Transistor QU is an emitter follower, so the emitter of QU also goes to about +40v. The +40v on the base of QV turns QV on. Current now flows from a +40v supply connected to output G through transistor QV and its half of the write head to ground. A resistor lies between output E and the write head to limit the current flow in the write head.

When input A goes negative and B goes positive, QN and QS are on and QR and QT are off. On the bases of QQ and QU are currents of +40v and -2v, respectively. The emitter of QQ goes to about +40v. The emitter of QU goes to about -2v. Transistor QV is off. No current flows through output E. Transistor QP is on. Current flows from the +40v source connected to output G through QP and its half of the write head to ground.

Input D supplies a negative voltage when the unit is writing to reverse bias diodes CRNA and CRNF. If the unit is not writing, D is grounded and both inputs A and B go negative. This turns on QR and QS. Transistors QP and QV are, therefore, off and no current flows through the write head.

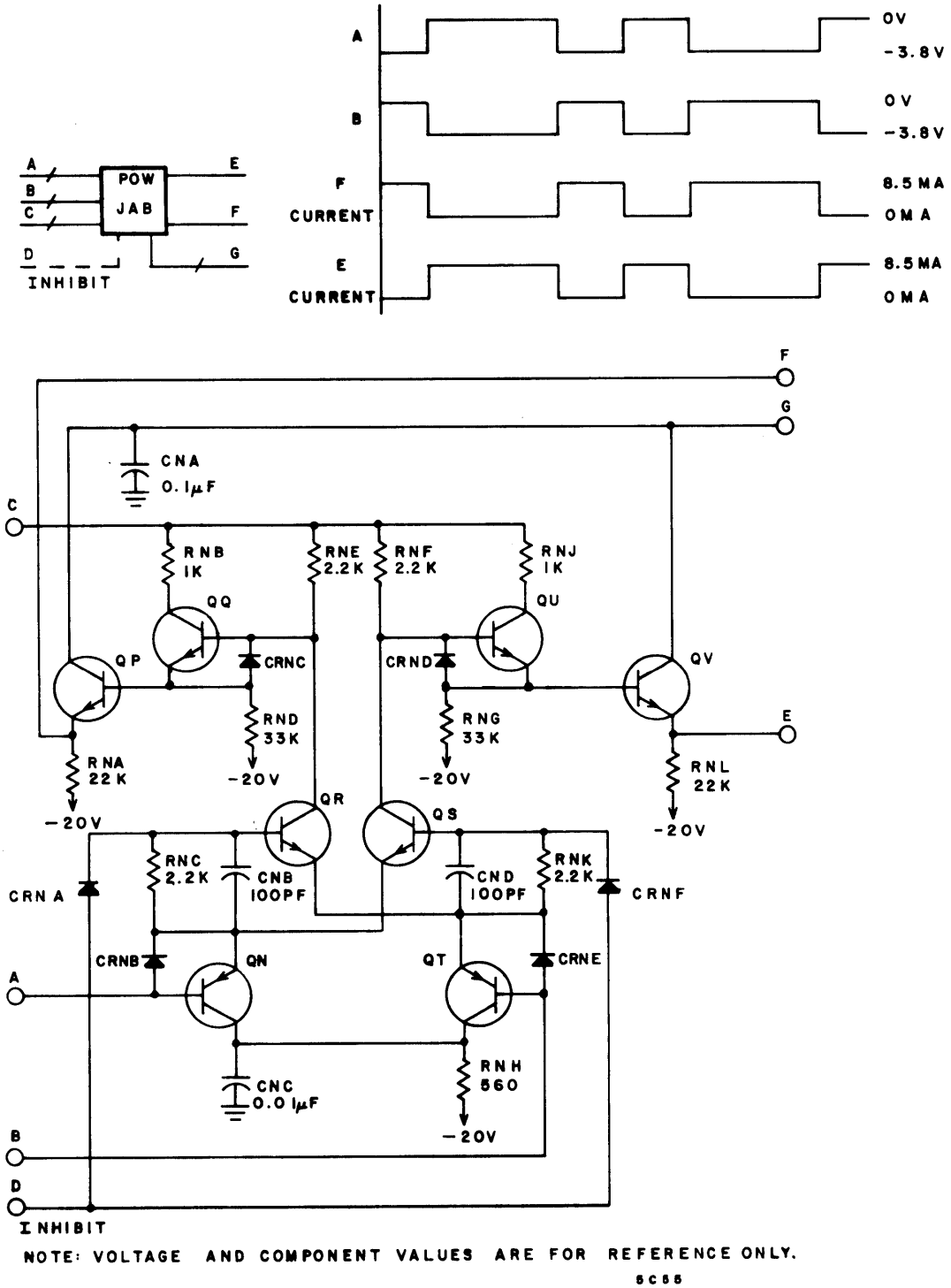


Figure 7-16. Write Driver - JAB

Erase Driver - JBB

The JBB circuit controls the current driving the erase heads. When input E (Figure 7-17) is a high voltage, output H provides current to erase heads.

When input E goes to a high voltage, capacitor CPA charges, causing a 10-μsec delay before transistors QR and QP turn on completely. Output G is connected to a +40v supply in a fault detect circuit. When QR is on, current flows from G through QR to the erase head connected to output H. The ramp output protects the information on neighboring tracks from being destroyed.

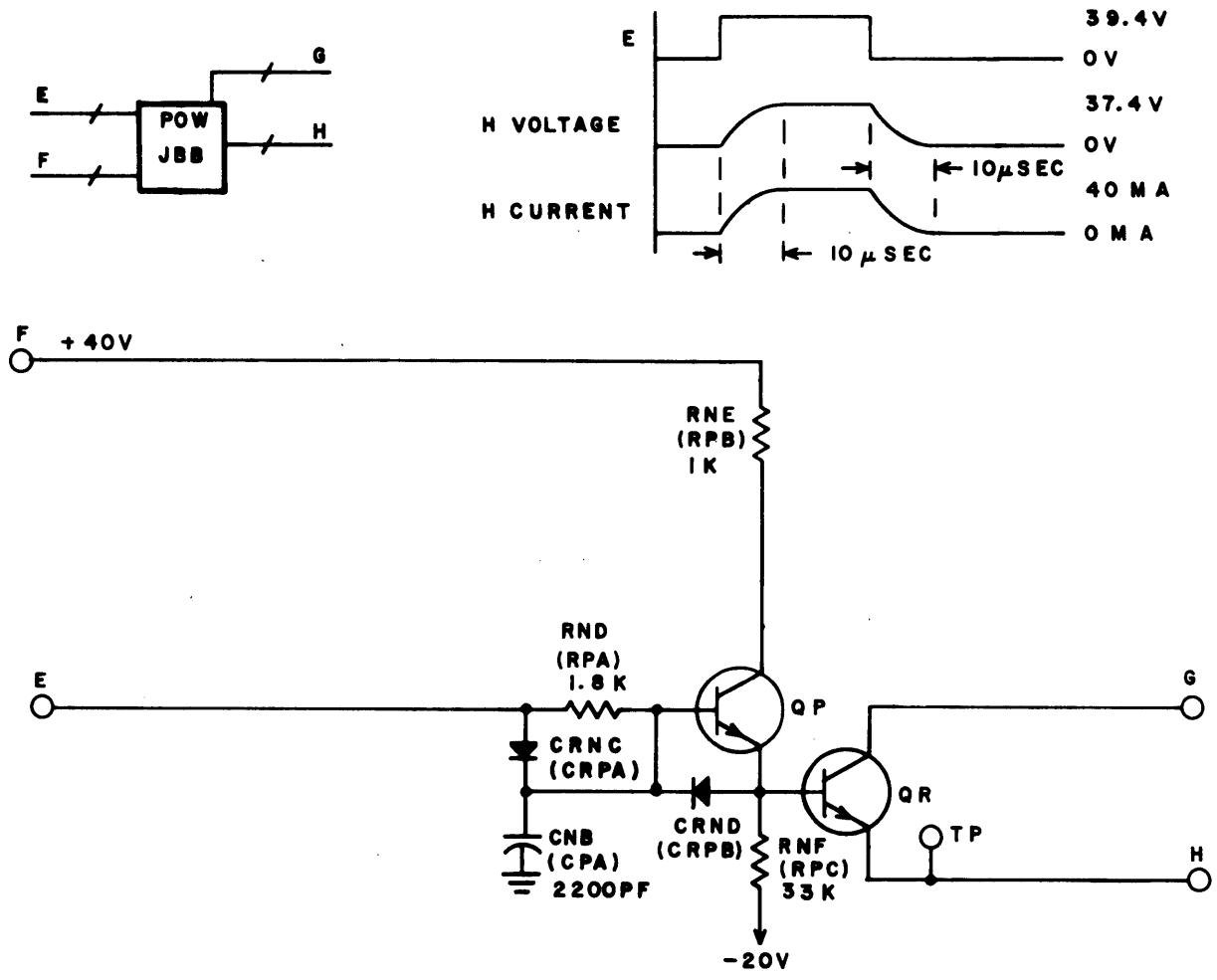
When E drops to 0v, CPA discharges through RPA. After 10 μsec, QP and QR are off. Output H is at 0v.

Line Transmitter - LAA

The LAA circuit (Figure 7-18) provides a positive voltage output at C and a negative voltage output at D when either A or B or both are a "1" input. When A and B are both "0", the output is determined by the external load circuit connected to C and D.

If both A and B are "0", QN is off. The base of QP goes positive and QP conducts. This causes the emitter of QQ to be more positive than its grounded base. Transistor QQ conducts. The collector voltages for QP and QQ will be approximately +0.9v and +0.2v, respectively. The difference in collector voltage is due to the positive charge on the base of QP and the grounded base of QQ. RNC is smaller than RND to compensate for this voltage difference. The emitters of QR and QS will be at +2.4v and -4.0v, respectively. The base of QR is held at about +4.9v by RNF and RNE. The base of QS is held at about -4.9v by RNG and RNH. Both QR and QS are off. The voltage at C and D is, therefore, dependent on any external voltage supply that may be present.

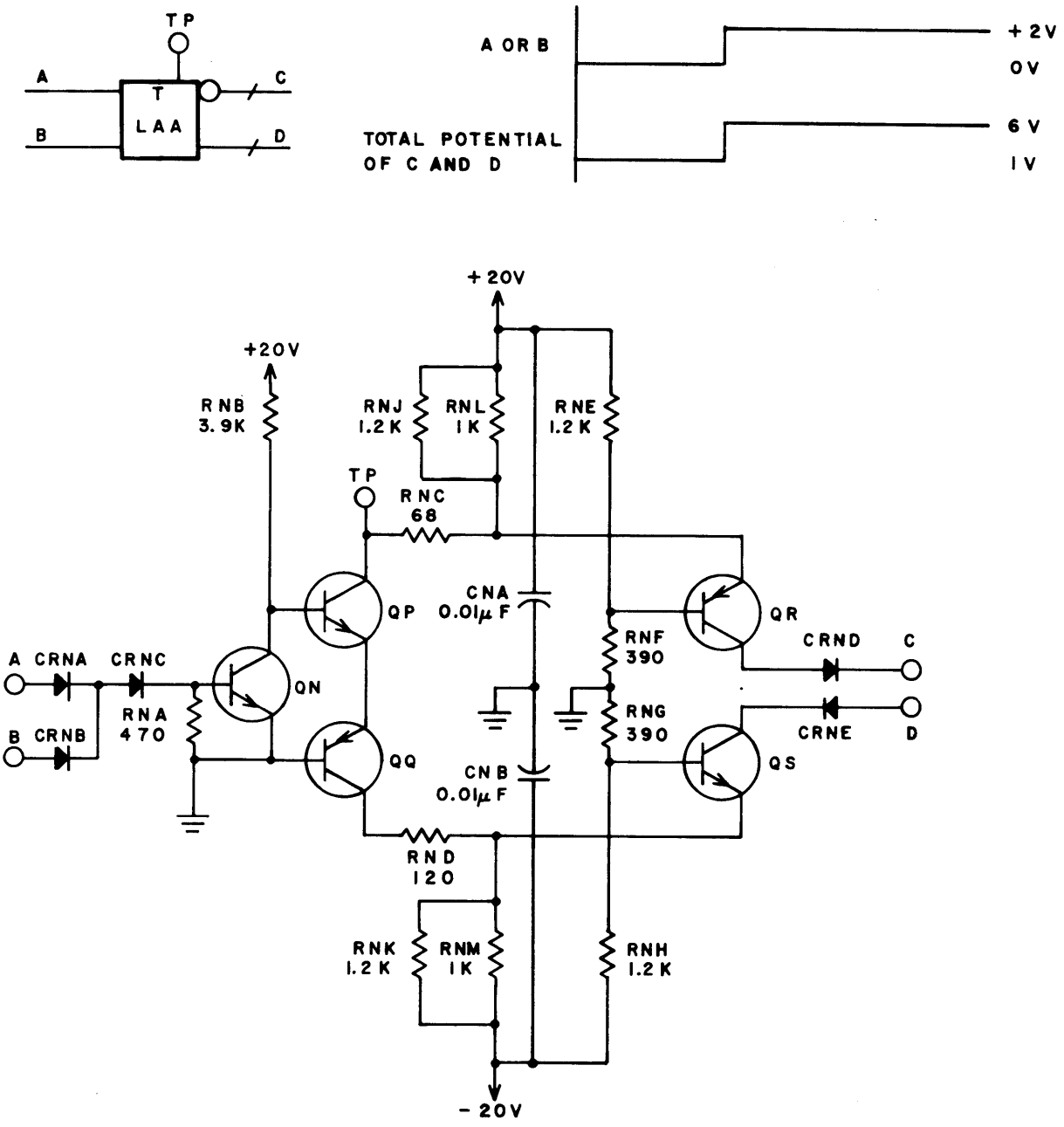
If either or both of the inputs go to "1", QN turns on. Current flows away from the base of QP turning QP off. Transistor QQ is, therefore, off. Transistors QR and QS are then forward biased and conduct about 25.0 ma of current. CRND and CRNE are forward biased and the output at C goes positive, while the output at D goes negative. The voltage of either output is determined by the current flow through the external load, but must be kept under 4.9v.



NOTES:

1 VOLTAGE AND COMPONENT VALUES ARE FOR REFERENCE ONLY.

Figure 7-17. Erase Driver - JBB



NOTE: VOLTAGE AND COMPONENT VALUES ARE FOR REFERENCE ONLY.

5C20

Figure 7-18. Line Transmitter - LAA

Oscillator - MAA

The MAA circuit (Figure 7-19) produces an amplified, oscillating signal at a prescribed frequency. The circuit description is divided into three parts: the D.C. conditions throughout the circuit; the oscillator section of the circuit; and the amplifier circuit.

D.C. Conditions

CRNA, RNA, RNB and RND hold the base of QN at approximately +17 volts. CRNB is reverse biased by 3 volts and does not conduct. The emitter of QN is held at about +16v, producing a collector current in QN of about 16 ma.

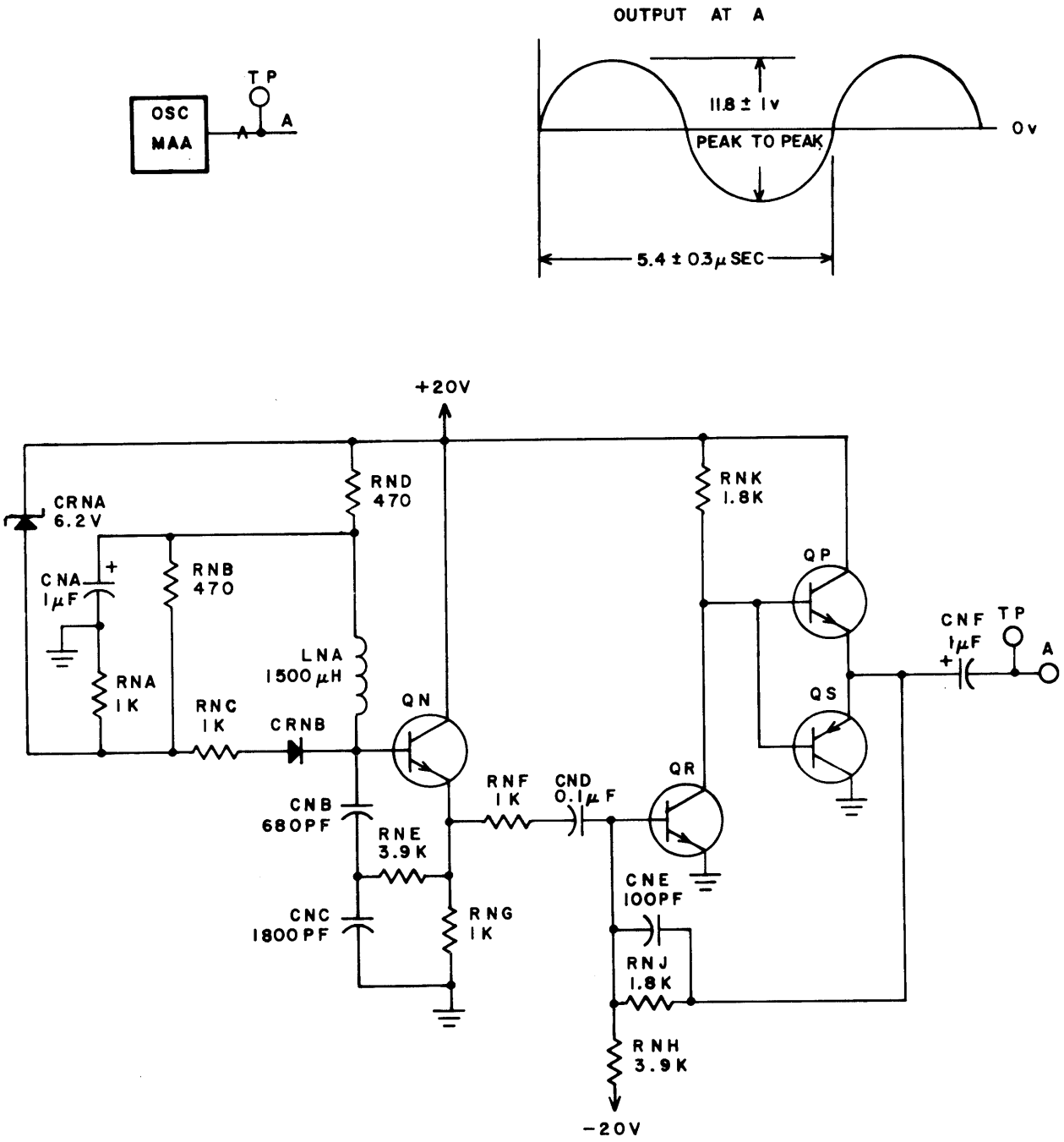
The base-emitter voltage drop across QR holds the base of QR near +0.7v. The current through RNH is then 5.1 ma. With the base current of QR at a low level, the 5.1 ma must flow through RNJ. The voltage at the junction of the emitters of QP and QS must then be about +10v. To maintain this +10v, the collector voltage of QR must be near +10v. The collector current of QR is, therefore, 5.55 ma.

Oscillator

Transistor QN acts as an emitter follower yielding a high current gain with nearly no voltage loss. CNB, CNC, and LNA form a resonant network. Near the resonant frequency, the signal voltage at the junction of LNA and CNB can be much greater than the voltage through RNE in the feed-back portion of the circuit. The gain around the loop formed by QN, RNE, CNB and LNA is greater than 1. The system, therefore, oscillates. When the signal at the base of QN exceeds 6v peak to peak, QN approaches saturation, thereby limiting the amplitude of the oscillation.

Amplifier

Transistor QR is a common emitter amplifier. The output of QR is directly connected to the bases of QP and QS. Transistors QP and QS are emitter followers that provide a low impedance output. Capacitor CNF isolates dc voltages from the load.



NOTE: VOLTAGE AND COMPONENT VALUES ARE FOR REFERENCE ONLY.

5C18

Figure 7-19. Oscillator - MAA

Waveform Generator - MBA

The MBA circuit (Figure 7-20) is a waveform generator whose output at C is normally at "0" when both inputs A and B are at a "0". When either or both of the inputs go to a "1", a "1" pulse is created at output C for a predetermined length of time.

When both inputs are at "0" (ground), transistor QN is turned off. Transistor QP is forward biased by the +6v source through RNF. Transistor QP then conducts current from output C directly to ground. The output is a "0". During this period the left side of CNA goes to about +5v, while the right side is held at +0.7v by the base-emitter voltage drop across QP.

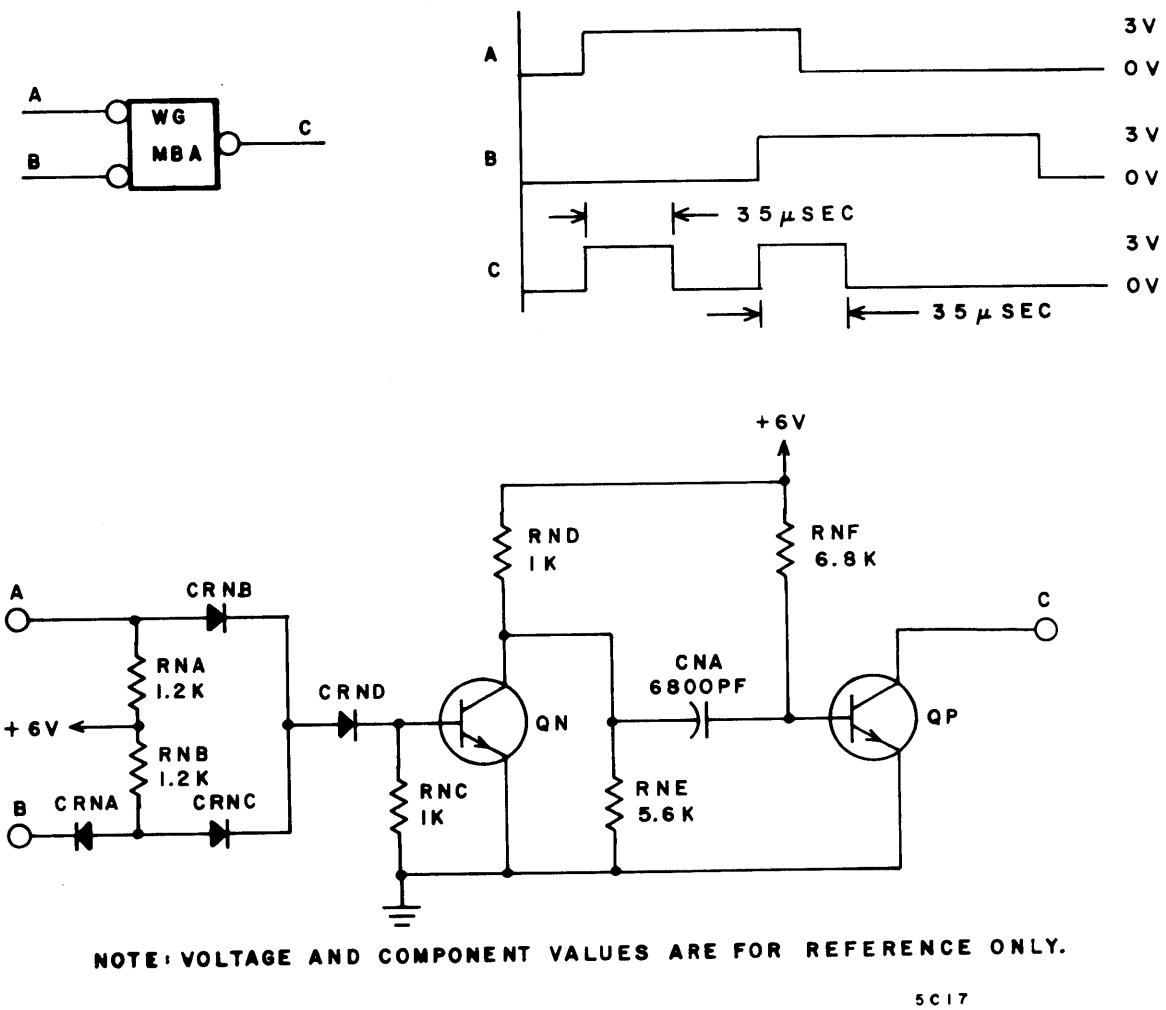


Figure 7-20. Waveform Generator - MBA

When either or both of the inputs experience a "1", QN turns on. Transistor QN then conducts current away from the left end of CNA, driving it to approximately ground. The voltage across CNA cannot change immediately, so the base of QP goes to about -4.3v, turning QP off. With QP not conducting the output goes to a "1" (voltage is supplied by the circuit driven by MBA). CNA now charges through RNF until the base of QP reaches approximately +0.6v. Transistor QP then begins to turn on and the output falls back to "0". The pulse width in this case is about 35 μsec.

When both inputs return to "0", QN is again turned off. The left side of CNA goes toward +5v through the voltage divider formed by RND and RNE. The right side of CNA is again held at +0.7v by the base-emitter voltage drop across QP.

Adjustable Waveform Generator - MBB

The MBB circuit (Figure 7-21) produces a sine wave output at B when driven by a series of negative data and clock pulses at input A. The circuit provides a flywheel effect that reduces a peak shifting in the data.

A series of negative pulses at A provide energy to the tank circuit connected to the collector of QN. The tank circuit is tuned to twice the frequency of the input data pulses (each data pulse falls between two clock pulses; absence of a data pulse is interpreted as a zero). Each input pulse (data or clock pulse) then energizes the tuned circuit at about the same point on the output sine wave. Transistor QP is an emitter follower and shapes the sine wave without distortion. Capacitor CNC passes the sine wave, but prevents any DC leakage from the circuit. The output at B is a shaped sine wave with a frequency equal to twice the input data pulse frequency.

Quantizing Detector - QAA

The input at A to the QAA circuit (Figure 7-22) is an AC signal. When input A is positive, output B is a "0" or ground. When input A is a null, output B is a "1".

When input A is positive, transistor QN is off. The base of QR goes toward -20v, but is held at about -0.7 volts by CRNA. Transistor QR is, therefore, off. This allows the base of QP to go positive. Transistor QP turns on, leaving output B at ground.

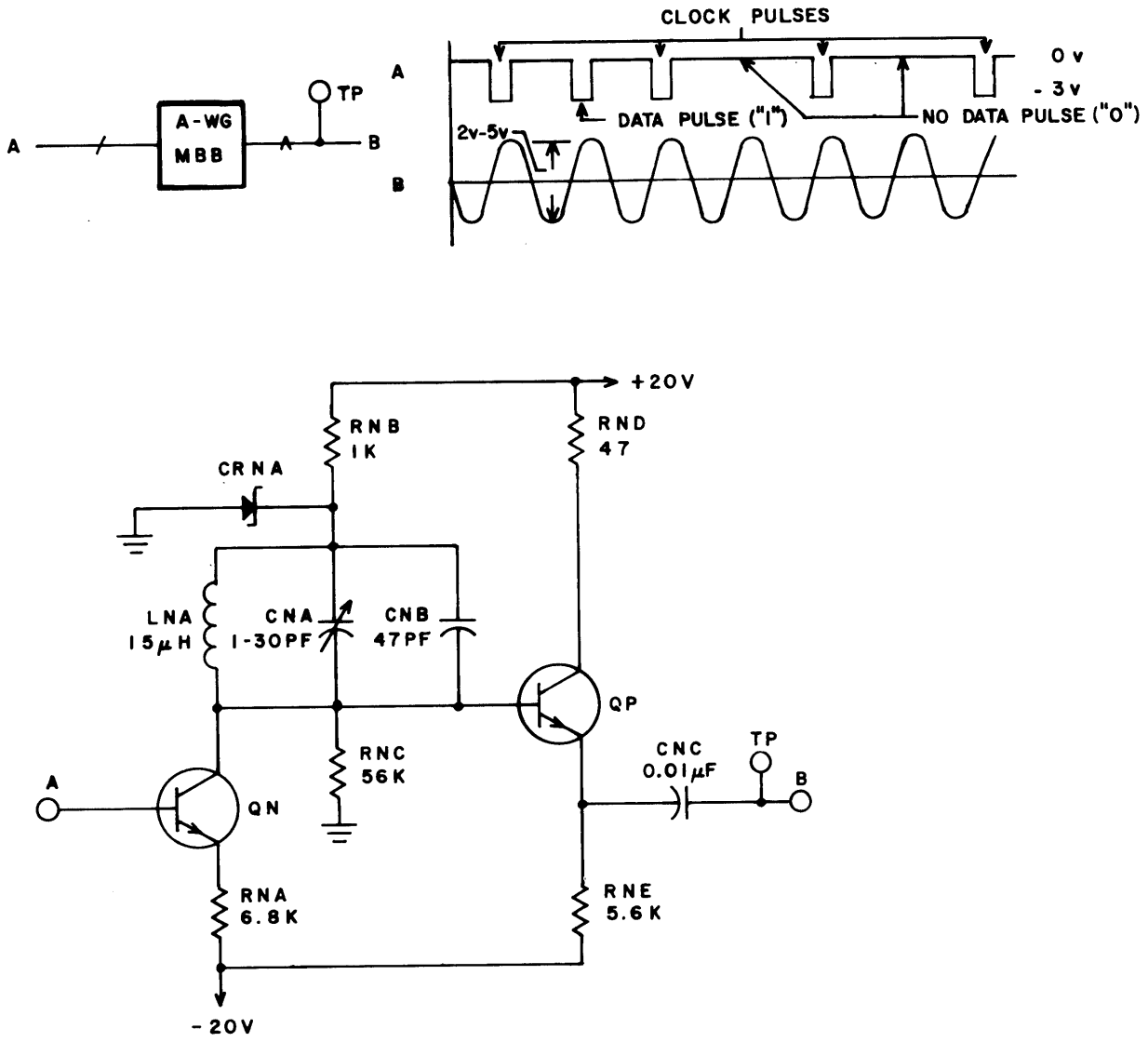
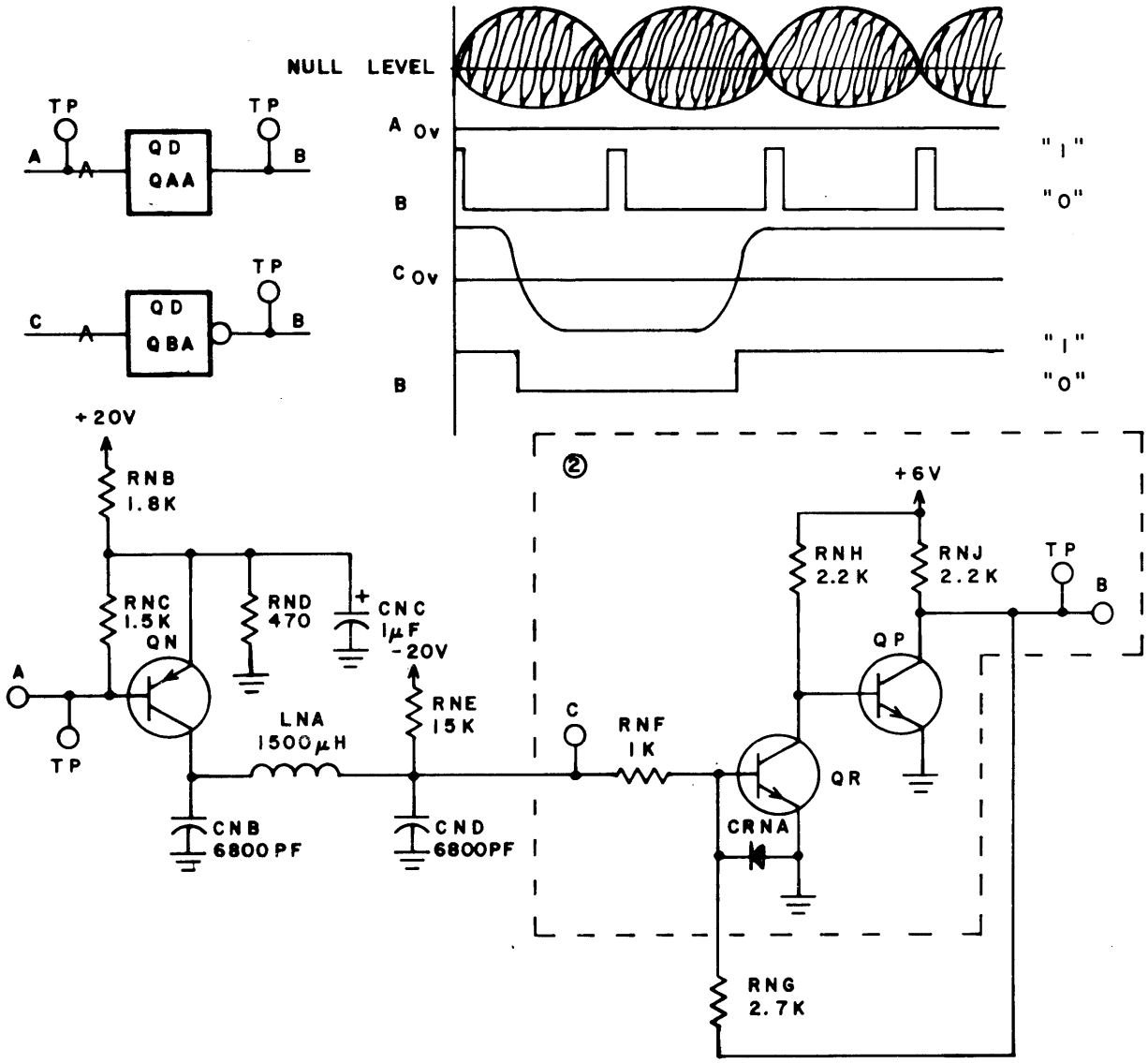


Figure 7-21. Adjustable Waveform Generator - MBB



NOTES:

1. VOLTAGE AND COMPONENT VALUES ARE FOR REFERENCE ONLY.
2. QAA USES ENTIRE SCHEMATIC. DOTTED LINE ENCLOSES SCHEMATIC FOR QBA.

5C16

Figure 7-22. Quantizing Detector - QAA, QBA

When the signal on input A drops to a null, QN turns on, applying a positive charge across CNB. CNB, LNA and CND filter the signal to remove any variations in the envelop on the input signal (waveform A). When CND charges to a positive voltage, QR turns on. This drives the base of QP to ground. QP turns off, allowing current to flow from the +6v source through RNJ to output B. A "1" (+3v) appears at B.

Quantizing Detector - QBA

The QBA circuit (Figure 7-22) gives a "0" output at B when input C is negative. When input C is positive, output B will be a "1".

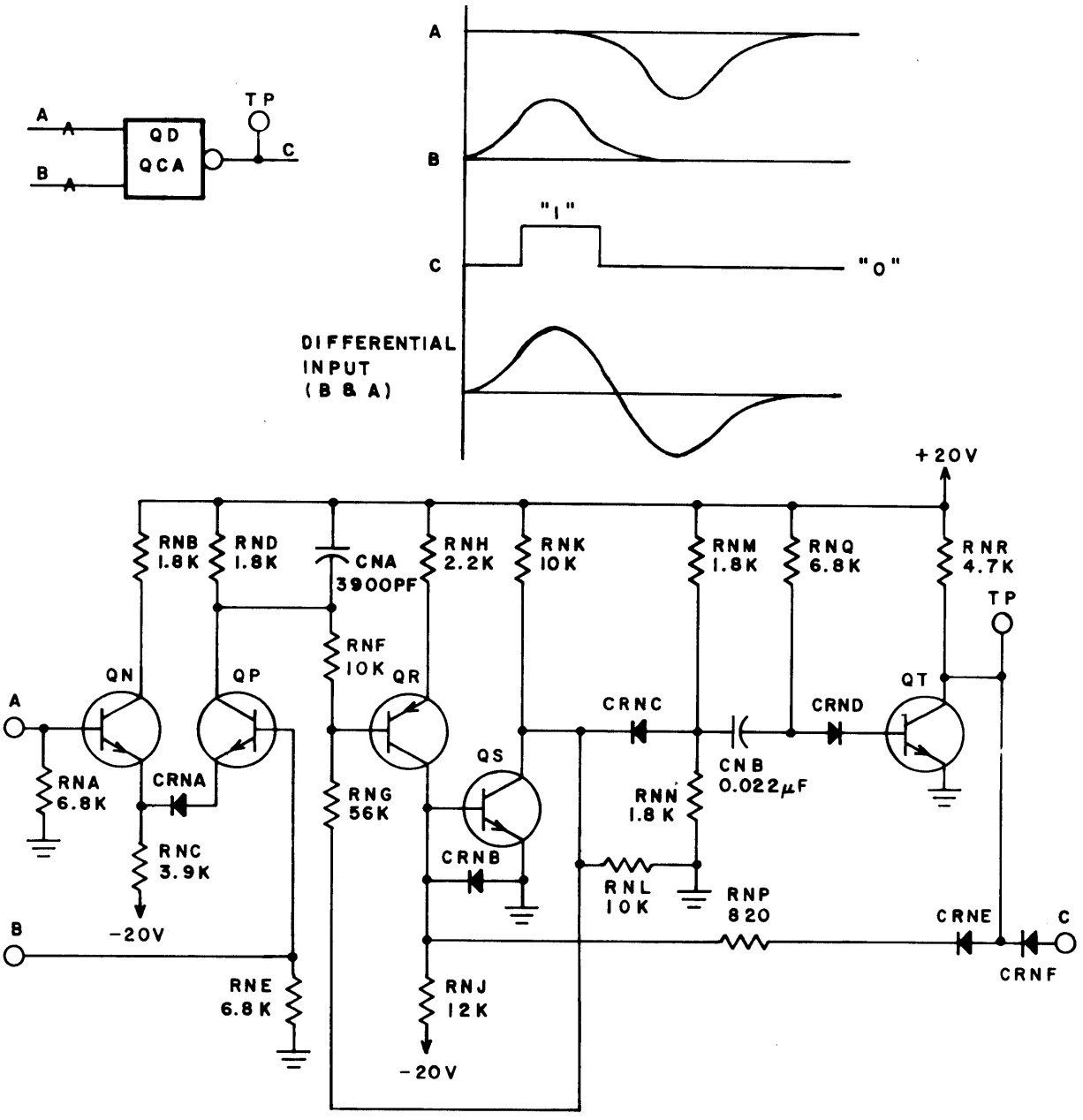
With a negative input at C, the base of QR is negative. The negative voltage is limited to about -0.7v by CRNA. Transistor QR turns off, driving the base of QP positive. Transistor QP, therefore, conducts current from the +6v source through RNJ to ground. Output B is at ground, or a "0".

With a positive signal at input C, the base of QR is positive. Transistor QR conducts current from the +6v supply through RNH to ground. The base of QP is, therefore, at ground and QP is off. A voltage of +3v is therefore felt at output B (a "1").

Quantizing Detector - QCA

Inputs A and B of the QCA circuit (Figure 7-23) are connected to the outputs of a sector transducer preamplifier. Each time a sector is detected by the transducer, a 55-μsec "1" (+3v) pulse appears at output C. The input at A and B is an analog signal. The output at C is a standard logic signal.

With a 0-volt differential input across A and B, diode CRNA holds transistor QP off, while transistor QN is on. The collector of QP is at about +19v. Transistor QR is, therefore, off. The base-emitter junction of QS is reversed biased through resistor RNJ. Transistor QS is off. Transistor QT is turned on by the forward bias supplied through resistor RNQ and diode CRND. With QT on, diode CRNF is forward biased and conducts current from output C through QT to ground. The output is near ground, or a "0".



NOTE: VOLTAGE AND COMPONENT VALUES ARE FOR REFERENCE ONLY.

5C22

Figure 7-23. Quantizing Detector - QCA

When a sector mark appears, the differential voltage across inputs A and B rises with B more positive than A. Transistor QP turns on and its collector voltage falls to about +11v. The drop in voltage is felt at the base of QR. Transistor QR turns on, raising the voltage on the base of QS. Transistor QS turns on. Transistors QS and QT comprise a single shot circuit whose pulse width is determined by resistor RNQ and capacitor CNB. Transistor QT turns off, reverse biasing diode CRNF. Output C rises to a "1" level. After 55 μsec, CNB charges sufficiently to turn on transistor QT. Diode CRNF is again forward biased and the output returns to a "0". Resistor RNP provides feedback to keep QS on while QT is off.

Speed Detector - QDA

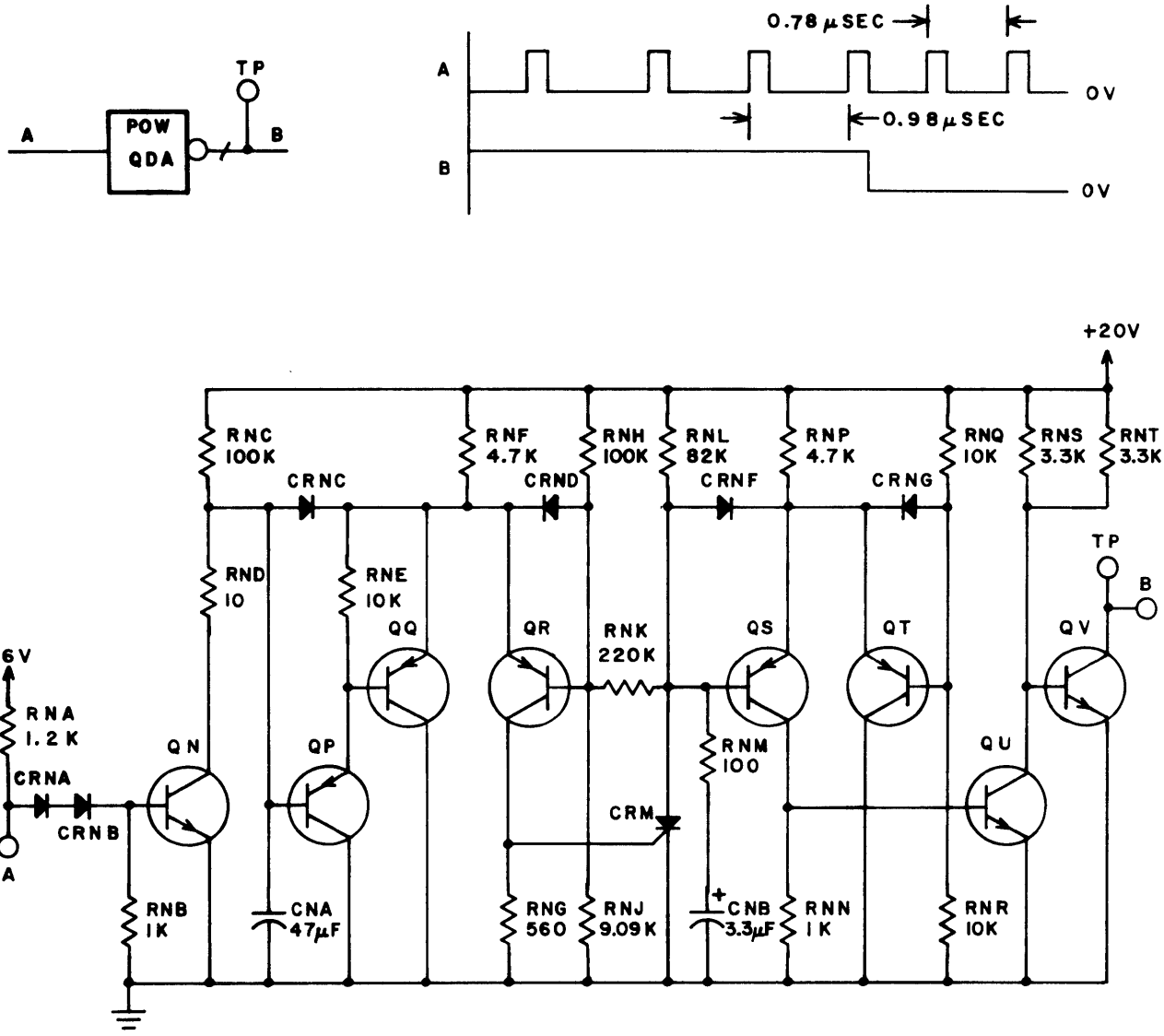
The QDA circuit (Figure 7-24) monitors sector pulses to determine whether the spindle is at a predetermined speed. If the spindle is below speed, no output is present. When the spindle reaches the desired speed, an output current activates the speed relay which signals the controller that the unit is up to speed.

Each time a sector is sensed, a short "1" pulse is applied at input A. Transistor QN conducts and completely discharges capacitor CNA through RND to ground. When the pulse is removed, CNA charges through RNC. When the base of QP reaches the voltage at the base of QR, QP and QQ turn off. Transistor QR conducts current to silicon controlled rectifier CRM, turning it on. CRM draws current from the base of QS driving it to ground, and from the base of QR through RNK. The base of QR falls to about 9.03 volts. OR then turns on firmly and prevents "runt spikes" on the signal to CRM. Once CRM is turned on, CNB begins discharging through RNM and CRM. CRM remains on until the discharge current from CNB falls below the holding current of CRM (typically 1 ma). With the base of QS near ground, QS conducts. Transistor QT turns off, QU is on, and QV is off. No output signal is felt at B.

If the spindle is below speed, pulses arrive at the input at a low repetition rate. CNA repeatedly discharges and recharges to the point where QP and QQ are turned off. The output of QR is a series of positive pulses with a pulse width determined by

$$T = T_I - T_C$$

where T_I is the time between input pulses and T_C is the time for CNA to change to the point where QP is turned off. The pulses repeatedly trigger CRM. CRM holds the voltage at the base of QS below the point where QS can turn off. Since QS is constantly on, QV is constantly off. No output is felt at B.



NOTE: VOLTAGE AND COMPONENT VALUES ARE FOR REFERENCE ONLY.

5C9

Figure 7-24. Speed Detector - QDA

When the spindle reaches the required speed, the pulses at input A have the same period as T_C. The pulse width out of QR becomes $T_I - T_C = 0$. Transistor QR never emits a pulse. With no pulses out of QR, CRM never turns on. This permits CNB to charge to the point where QS is constantly off. The higher voltage at the base of QS is fed back to the base of QR through RNK to raise the voltage required across CNA to turn off QP. This feedback prevents rapid fluctuation of the output when the spindle is near the required speed. With QS constantly off, QU is off and QV is on. Current flowing through QV activates the speed relay connected to B, and signals the controller that the unit is up to speed.

Or - QEA

The QEA circuit (Figure 7-25) detects any decrease in voltage supply greater than 15%. A fault condition will occur if:

1. -20 supply decreases below -17.0v
2. +40v supply decreases below +34.0v
3. +20v supply decreases below +17.0v
4. +6v supply decreases below +5.1v

If all positive supplies are normal, QQ, QR and QS are off. Their emitters are held at +5.8v by Zener diode CRNE and the value of RNW (determined by testing to give a precise collector voltage). Current is pulled through QT, causing a voltage drop across resistor RPA. This voltage drop turns QV on. Transistor QX turns off. If any of the voltage supplies drop below 15% of their operating values, the respective transistor turns on. Transistor QT will then be off. Transistor QV turns off. Transistor QX turns on, driving the output to ground.

The negative voltage segment of the circuit is similar to the positive section. A decrease in the -20v supply below 15% will turn QN on. Transistor QP turns off, causing QU to turn off. Transistor QW turns on causing a voltage drop across RNM which turns QY on. The output drops to ground.

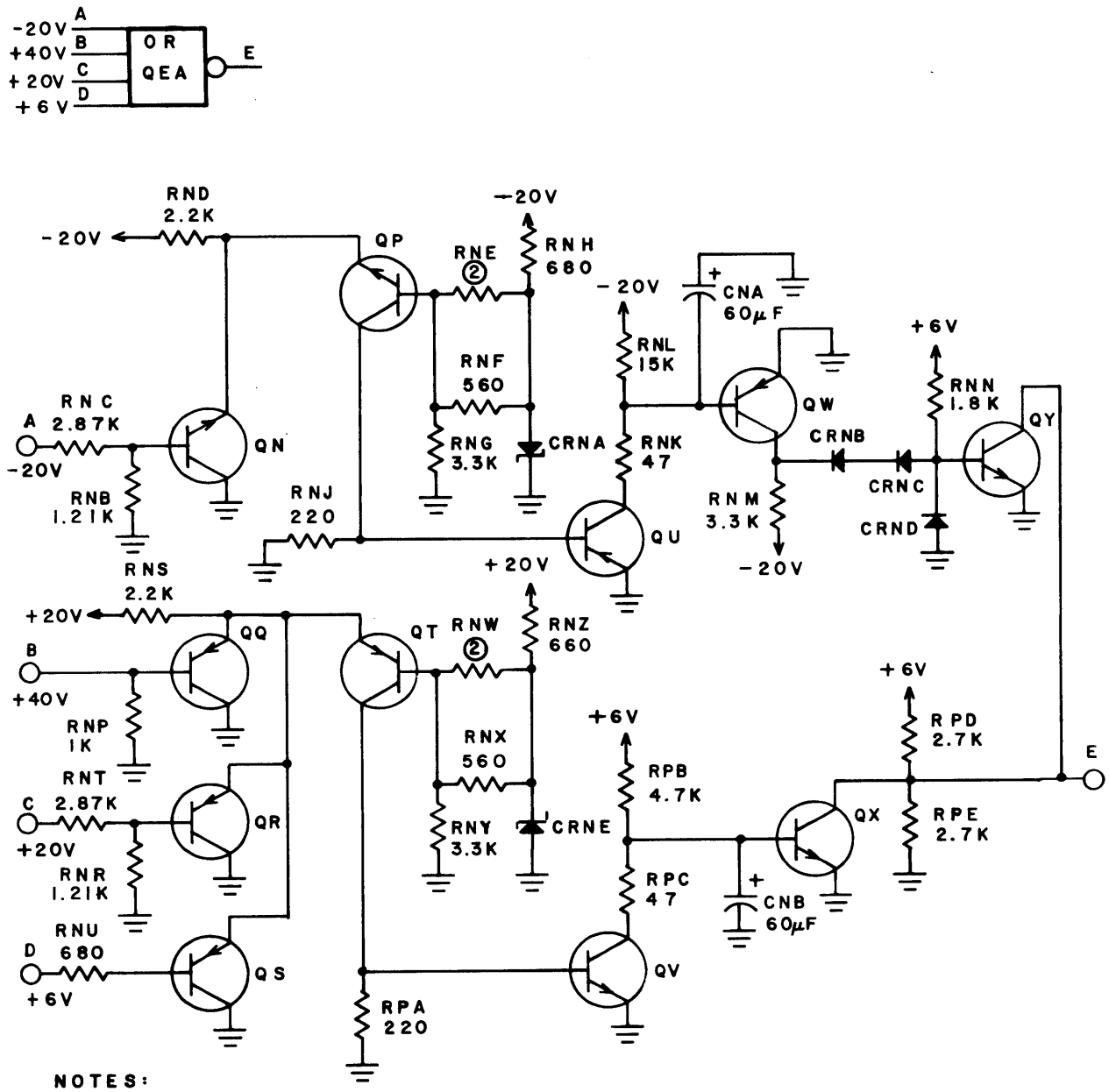


Figure 7-25. Or - QEA

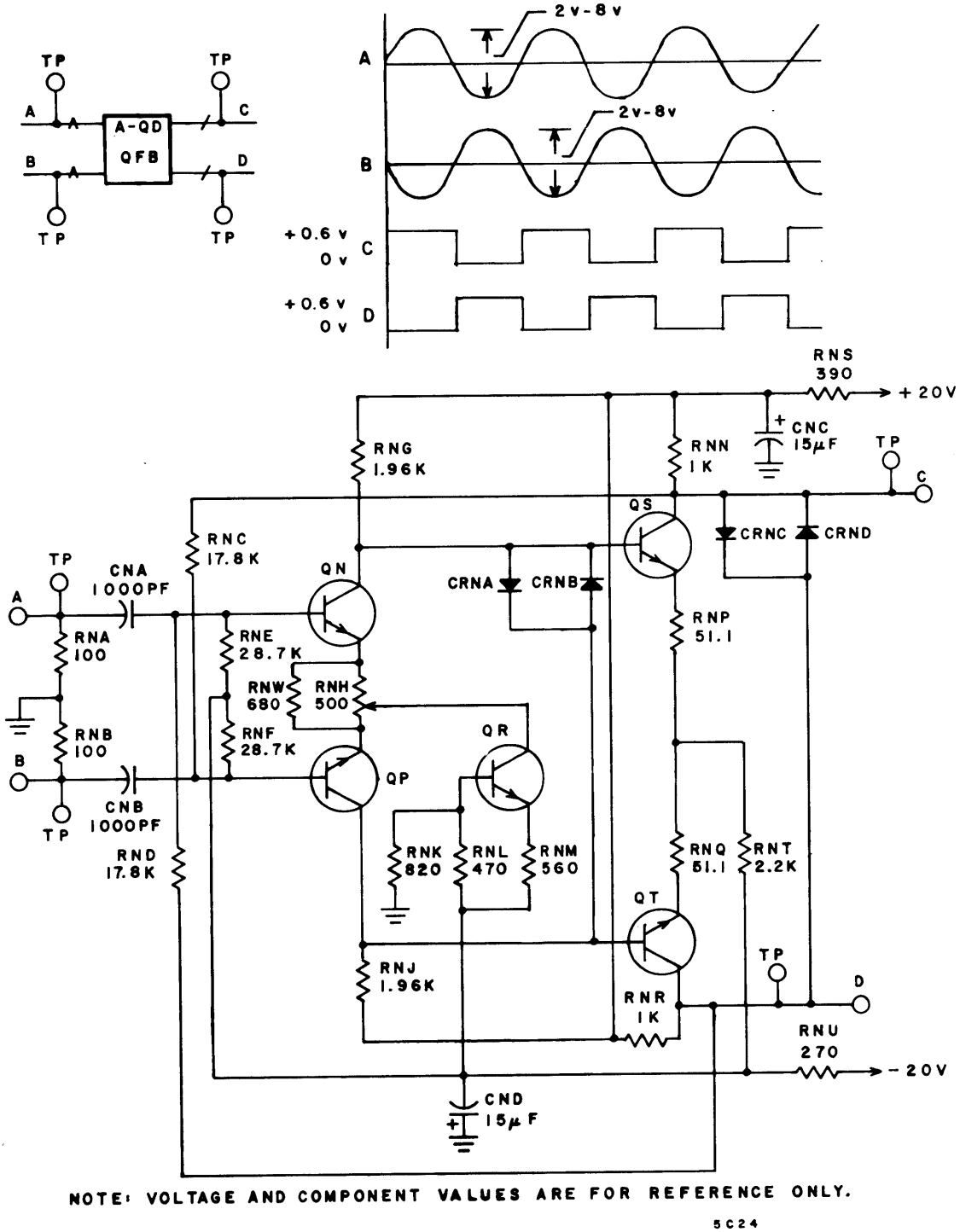


Figure 7-27. Quantizing Detector - QFB

Transistor QR is the current source for the differential amplifier stage consisting of QN and QP. Capacitors CNA and CNB filter out dc and low frequency noise and pass the input wave which alternately turns on QN and QP. The output at the collectors of QN and QP are clipped by diodes CRNA and CRNB to approximate a square wave. This square wave is fed to the bases of QS and QT for another stage of differential amplification. The square wave output at the collectors of QS and QT is again clipped by diodes CRNC and CRND. The output at C and D is a clipped, square wave between 0v and +0.6v corresponding to the rise and fall of the sine wave at inputs A and B, respectively.

Quantizing Detector - QFC

The QFC circuit (Figure 7-28) produces positive pulses at output B when a sine wave input is applied to A. The output pulse width can be adjusted.

Transistor QN acts as an amplifier-clipper. With a sine wave input at A, the collector of QN produces a saw-tooth waveform due to CND. Capacitor CNB filters out the dc component. The positive spike turns on transistor QR for the duration of the pulse. Transistors QP, QQ and QS form a single shot circuit. When transistor QR turns off, the positive going pulse at its collector triggers the single shot circuit. Variable resistor RNL is used to vary the width of the positive pulse at output B.

Line Receiver - RAA

The line receiver circuit, RAA, (Figure 7-29) provides a "1" output at C and D when the difference in input voltage (A minus B) is greater than +0.6v. Under any other input conditions, the output will be a "0".

Diode CRNA is used to maintain the threshold level at +0.6v. Without CRNA the threshold would be about +0.1v. That is, if input B were just 0.1v less positive than input A, the circuit would switch to an output of "1".

Resistor RNE supplies the emitters of QN and QP with a constant current of about 4.25 ma. If the current in one transistor increases, the current in the other transistor must decrease by an equal amount. If input B is more positive than input A (A minus B is negative), QP will be turned on and QN will be turned off. If the difference "A minus B" is only slightly negative, QP will conduct more than QN, but both will be on.

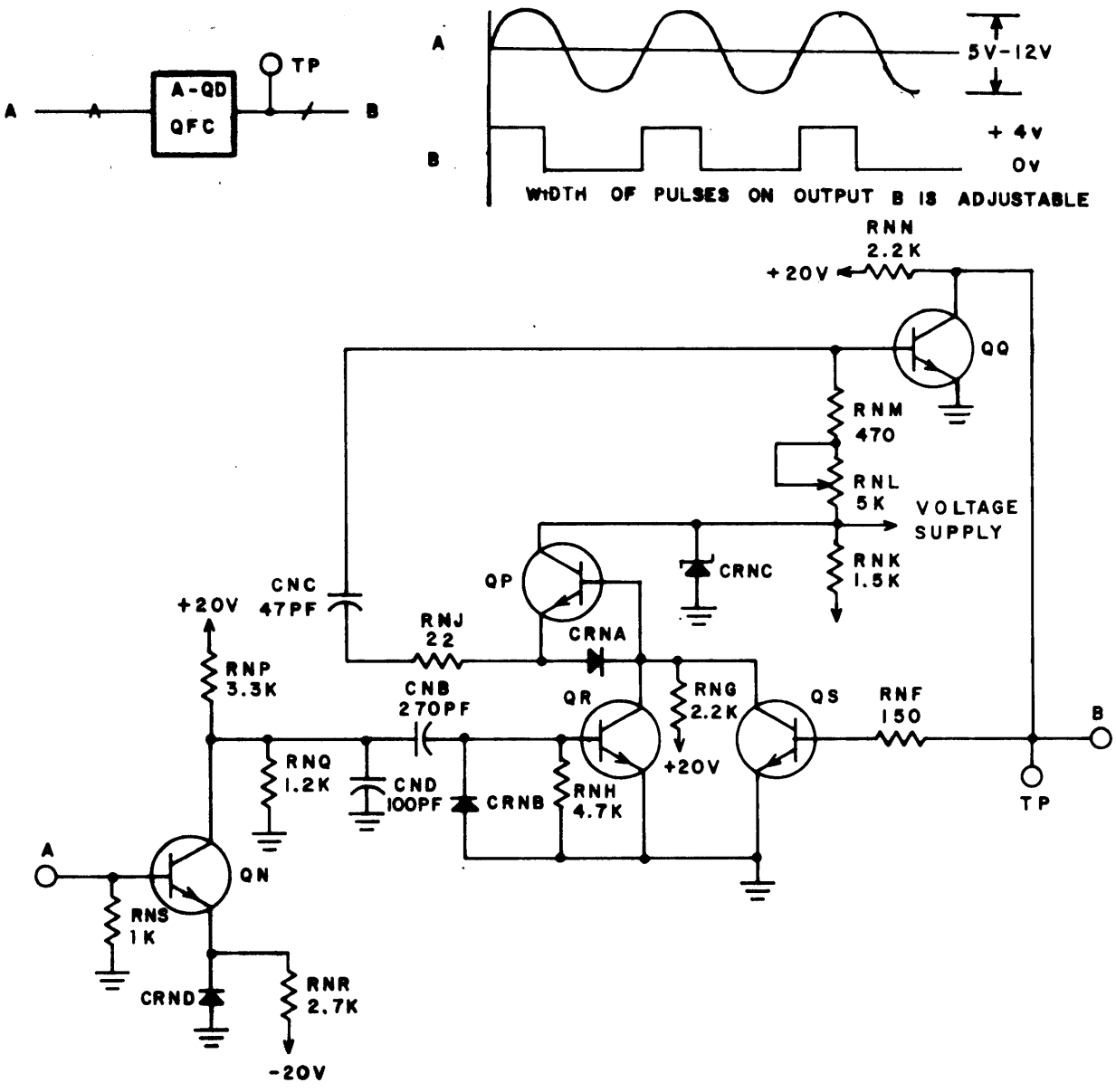
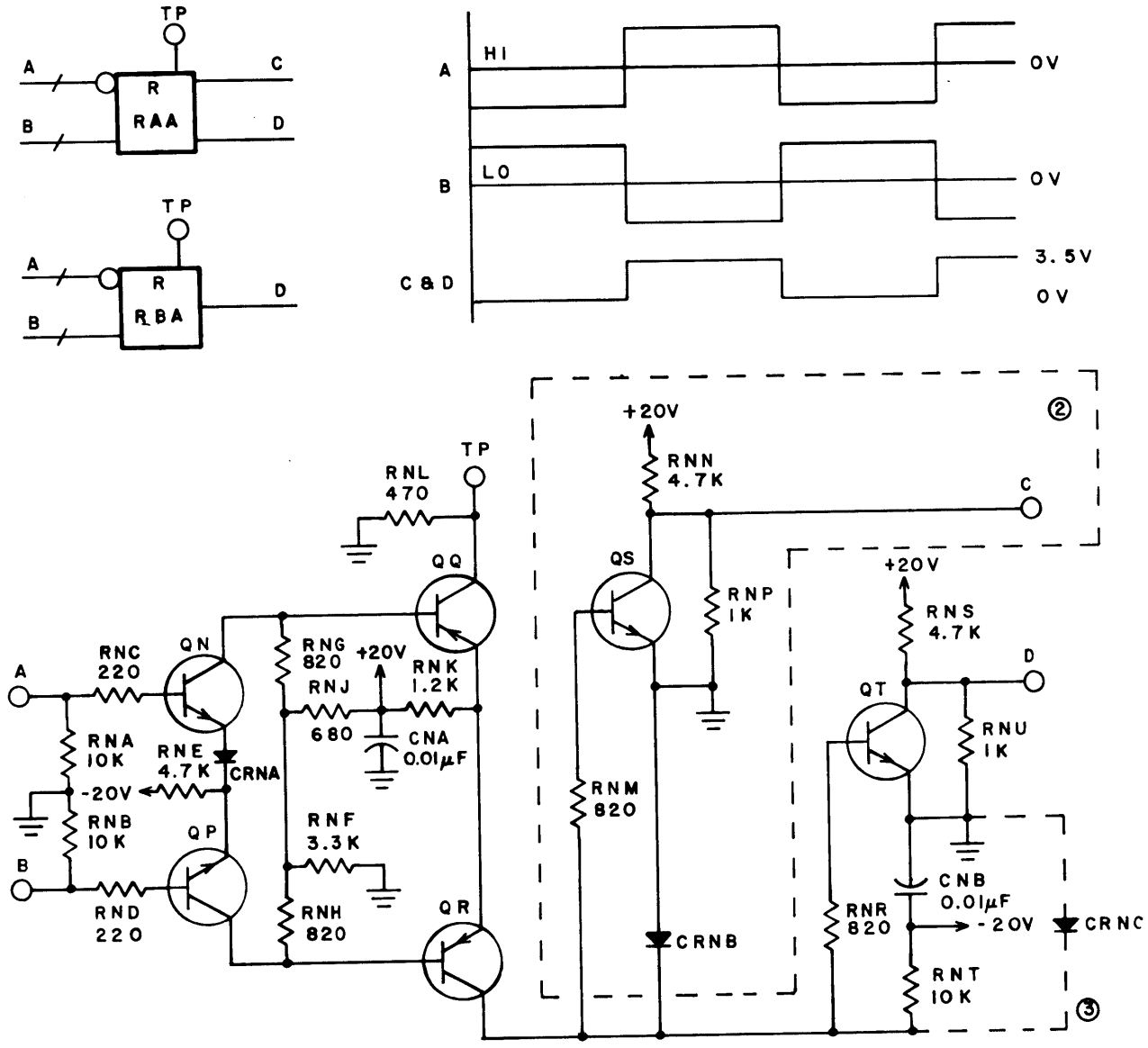


Figure 7-28. Quantizing Detector - QFC



NOTES:

1. VOLTAGE AND COMPONENT VALUES ARE FOR REFERENCE ONLY.
2. PORTION WITHIN DOTTED LINE IS USED FOR RAA ONLY.
3. CRNC USED ON RBA ONLY.

5C10

Figure 7-29. Line Receiver - RAA

The base of QR, therefore, becomes more negative than the base of QQ. Transistor QR turns on, driving its collector and the bases of QS and QT positive. Transistors QS and QT turn on, conducting current from the +20v supply through RNN and RNS, respectively, to ground. The output at C and D is near 0v or a "0".

If input A is at least +0.6v more positive than input B (A minus B is greater than or equal to +0.6v), QN turns on and QP turns off. The base of QQ is then more negative than the base of QR. Transistor QQ turns on conducting current from the +20v supply, through RNK and RNL to ground. Transistors QS and QT are turned off as there is no current to their bases. Current is then allowed to flow from the +20v supply, through the load resistors to outputs C and D. The value of the output voltage is tempered by the resistors RNP and RNU to ground, and is held at a "1" level. The output is a "1".

Line Receiver - RBA

The operation of the RBA circuit (Figure 7-29) is identical to the RAA circuit, except that output C and its related circuitry are omitted. Output D remains intact (with the addition of diode CRNC) and functions the same as output D in the RAA circuit. For a detailed discussion of the RBA circuit, refer to the discussion of the RAA circuit.

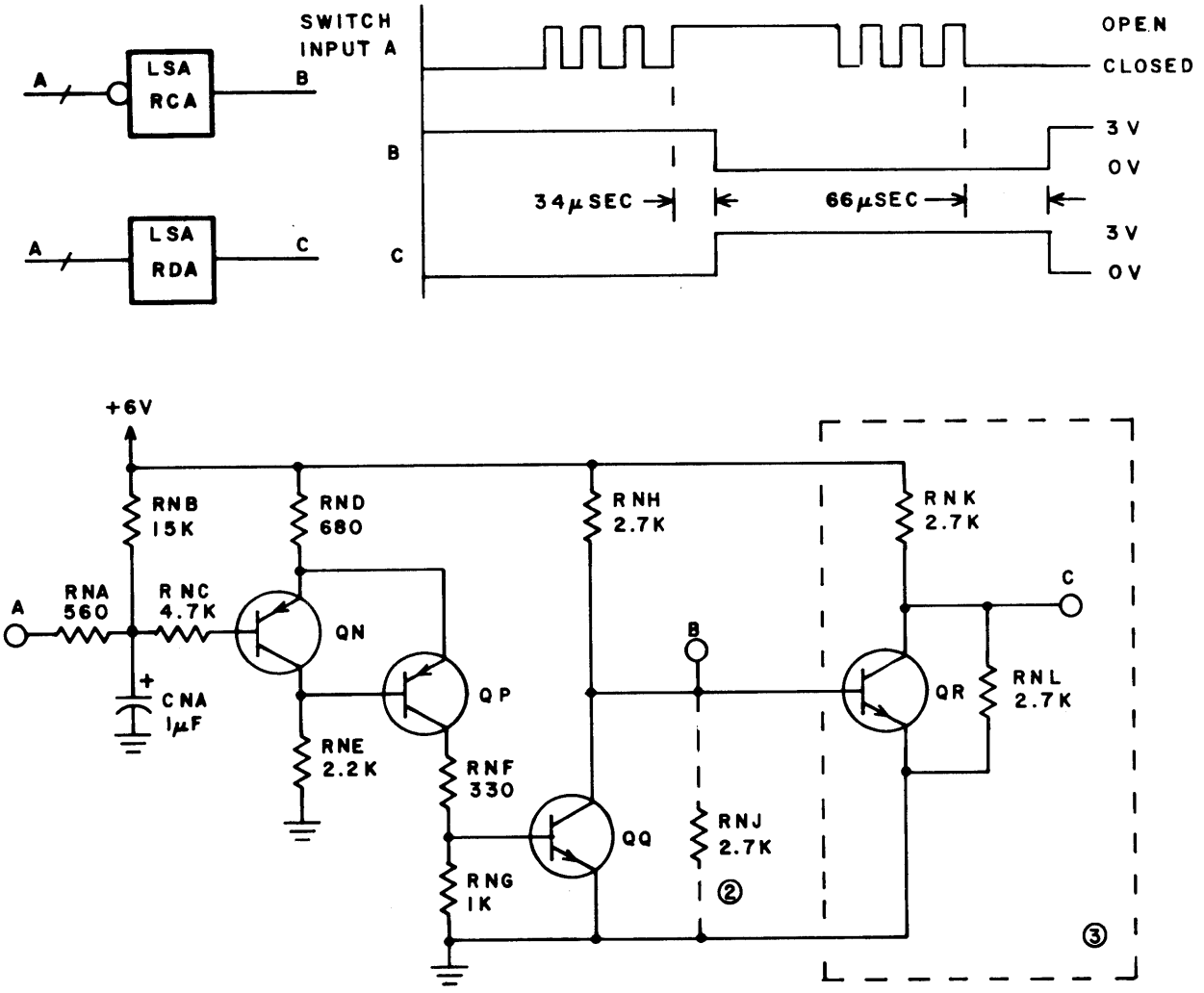
Switch Receiver - RDA

Switch Receiver RDA (Figure 7-30) produces a "1" (+3v) output at C when the grounded switch connected to input A is open. When the switch is closed a "0" (0v) is felt at output C.

A switch to ground is connected to input A. When this switch is open, capacitor CNA approaches +6v and QN is shut off. Transistor QP is, therefore, on and conducts current to the base of QQ through resistor RNF. Transistor QQ turns on, driving the base of QR to ground. Transistor QR is off, which allows current to flow from the +6v supply through RNK to output C. The output is a positive voltage, or a "1".

When the switch is closed, the voltage across CNA rapidly increases through RNA and the switch to ground because of the short time constant of RNA and CNA. Any contact bounce on the switch will increase the discharge time. As the voltage across CNA decreases, QN begins to turn on. As QN conducts current to the base of QP, the forward bias on QP is decreased and QP begins to turn off. As QR turns off, the

current through RND decreases due to the higher lead resistance (RNE) of QN compared with QP (RNF). The current drop through RND causes a decrease in the voltage drop across RND. The bias on QN is, therefore, increased. The cycle goes rapidly to completion. Transistor QP is shut off. With QP off, the base of QQ is near ground, causing QQ to shut off. This allows the +6v supply to flow through RNH to the base of QR. Transistor QR, therefore, conducts current away from output C and the output is near ground or "0".



NOTES:

1. VOLTAGE AND COMPONENT VALUES ARE FOR REFERENCE ONLY.
2. DOTTED CONNECTION AND RESISTOR RNJ ARE FOR RCA ONLY.
3. CIRCUIT WITHIN BROKEN LINE BOX IS ADDED FOR RDA ONLY.

5C11

Figure 7-30. Switch Receiver - RDA, RCA

When the switch is opened again, CNA charges slowly to +6v due to the long time constant of RNB and CNA. Any contact bounce on the switch will hold CNA well below the switching level of QN until the bouncing ceases. As the voltage across CNA increases, QN begins to turn off. Transistor QP begins to conduct current away from the emitter of QN. Transistor QP turns on rapidly because of this positive feedback. The output then returns to "1".

Switch Receiver - RCA

The operation of the RCA circuit is similar to the RDA circuit, except that transistor QR is omitted and the output is taken directly from the collector of QQ at B (Figure 7-30). The output is, therefore, opposite from the output of the RDA circuit under the same switch condition. When the switch is open, the output at B is a "0". When the switch is closed, the output at B is a "1". For a detailed discussion of this circuit refer to the RDA circuit description.

Line Receiver - RFA

The RFA circuit (Figure 7-31) provides a non-standard "0" output at C when input A is at least 0.6v more negative than input B. Diode CRNA holds the threshold at 0.6v. Under all other input conditions the output will be a non-standard "1".

If the differential input (A-B) is greater than 0.6v, transistor QP turns on and QN turns off. This drives the base of transistor QR more positive than the base of QQ. Transistor QR conducts current from the -20v supply, through RNK to ground. The output at C is near 0v.

If the differential input (A-B) is less than 0.6v, QN turns on and QP turns off. The base of QQ goes more positive than the base of QR. Transistor QQ conducts and a negative voltage is felt at output C.

Since a "1" is defined in MDD logic as the most positive voltage, the 0v output in the first case is interpreted as a non-standard level "1". The negative voltage output in the second case is, therefore, a non-standard level "0".

The receiver is self-terminated with 56 ohms to ground on each line.

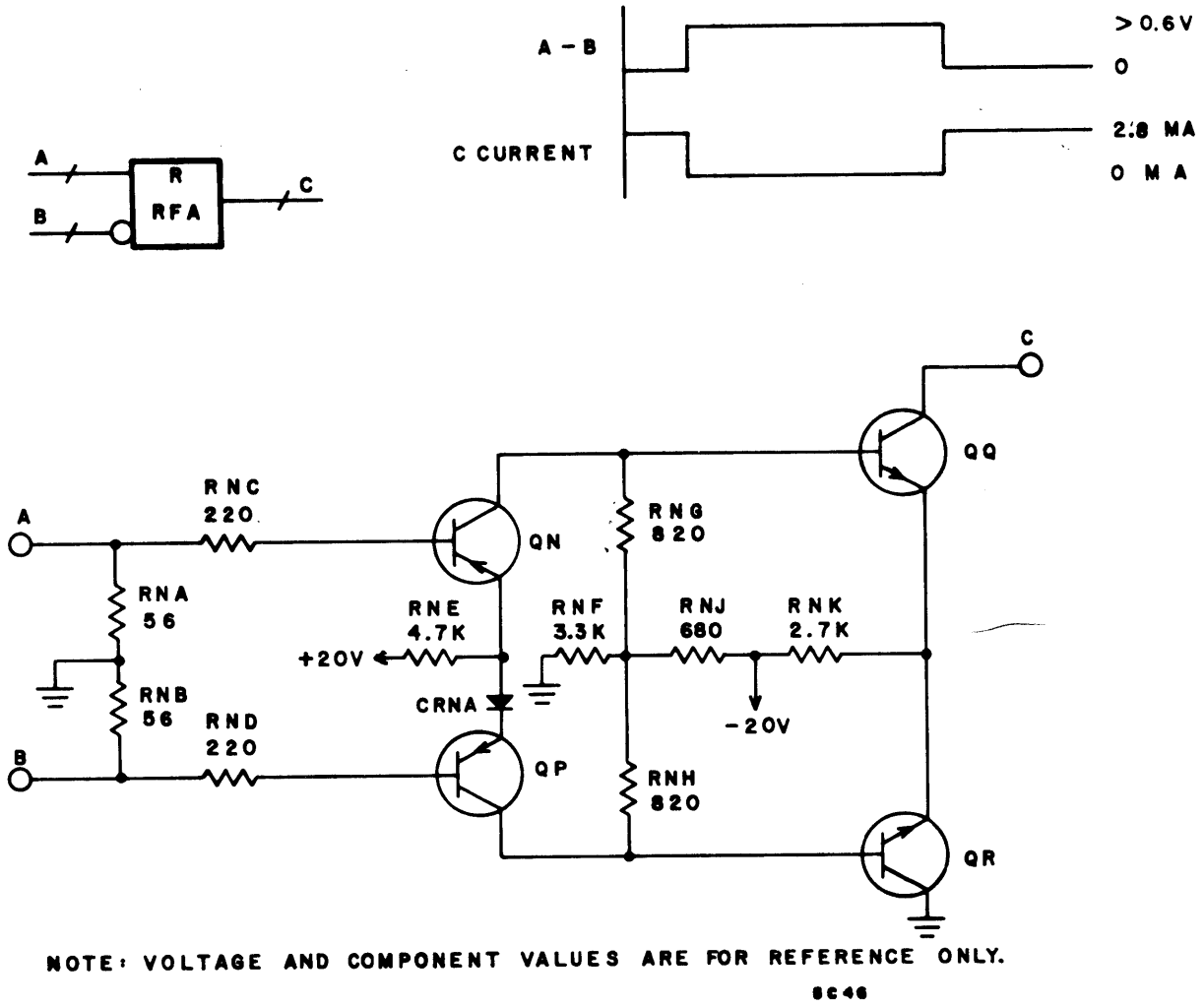


Figure 7-31. Line Receiver - RFA

Delay - UA-, UBA

The capacitive delay circuit (Figure 7-32) delays a "1" input at A for a specified period of time before providing a "1" output at B. The delay time for a "0" pulse is negligible. The delay circuit consists of a capacitor connected to ground.

Assume that a "0" (ground) enters at A. If the capacitor is discharged, it remains discharged. The output is an immediate "0". If the capacitor is charged when the "0" signal enters, it discharges almost instantaneously. The "0" appears at output B with no noticeable delay.

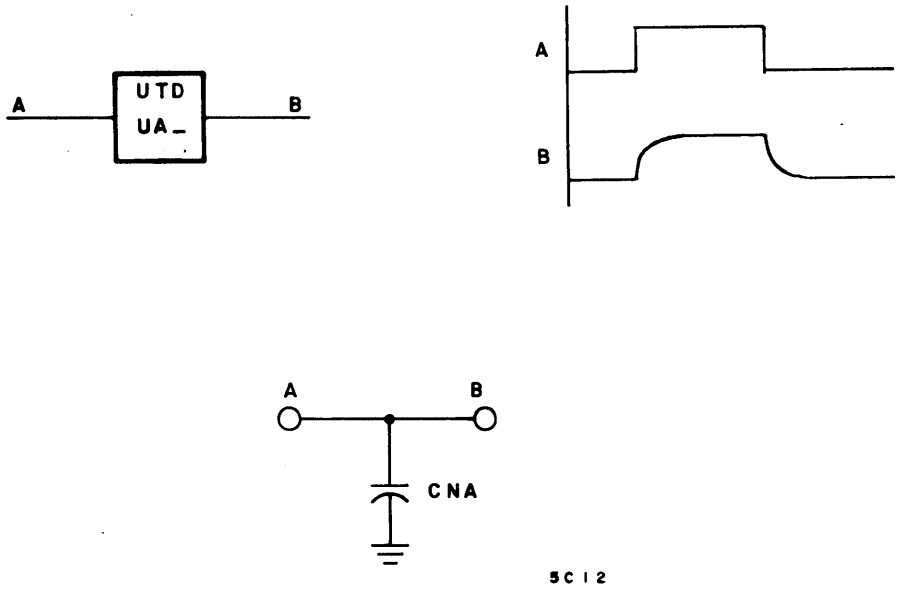


Figure 7-32. Delay - UA-, UBA

If a "1" (+3.0v) enters at A, and the capacitor is discharged, the capacitor must first charge to a minimum "1" voltage (typically +0.7v) before the "1" appears at output B. The time necessary to charge the capacitor to this minimum voltage is the delay time of the circuit. The charge time is dependent on the value of the capacitor, the value of an external resistor between the source voltage and the delay circuit, and the minimum voltage required to produce a "1" response.

Delay times for capacitive delays used in the MDD unit are as follows:

Delay	Time
UAA	0.3 μsec
UAB	0.4 μsec
UAC	0.2 μsec
UAD	1 μsec
UAE	500 μsec
UAF	2 μsec
UAG	0.1 μsec
UAL	10 μsec
UAM	8 μsec
UAN	5 μsec
UBA	15 μsec

Delay Circuit - UCA

The UCA circuit (Figure 7-33) provides a delayed "0" output signal at B a set time after a "0" is felt at input A. A "1" signal is not delayed.

The operation of the UCA circuit is similar to the UDA circuit except the final transistor QU (Figure 7-33) is omitted for the UCA circuit. This allows a "0" output when transistor QT (Figure 7-33) conducts, and a "1" output when QT is turned off. For a detailed discussion of this circuit, refer to the UDA circuit.

The time delay is still dependent upon the values of RNC and CNA. The delay for a UCA circuit will be slightly less than the delay for an identical UDA circuit due to the extra time taken for transistor QU to turn on in the UDA circuit.

Delay Circuit - UCB

The UCB circuit is identical in operation to the UCA circuit (Figure 7-33). The values of RNC and CNA are changed to produce a different time delay.

Delay Circuit - UCC

The UCC circuit is identical in operation to the UCA circuit (Figure 7-33). The values of CNA and several resistors are changed. In addition, a 10-ohm resistor is added in series with the collector of QN to increase the discharge time of CNA when QN is turned on.

Delay Circuit - UCD

The UCD circuit is identical in operation to the UCA circuit (Figure 7-33). The values of CNA and several resistors are changed. In addition, resistors RNA and RNB and their connections are omitted, CRNA and CRNB are replaced by a 1K resistor, and a 47-ohm resistor is added in series with the collector of QN to increase the discharge time of CNA.

Delay Circuit - UCE

The UCE circuit is identical in operation to the UCA circuit (Figure 7-33). The values of CNA, RNC and RNH are changed. In addition, a 47-ohm resistor is added in series with the collector of QN to increase the discharge time of CNA. The feedback to the base of QR through RNL is omitted. Resistor RNG is replaced by a 3.6v Zener diode to limit the voltage on the base of QR to +3.6v.

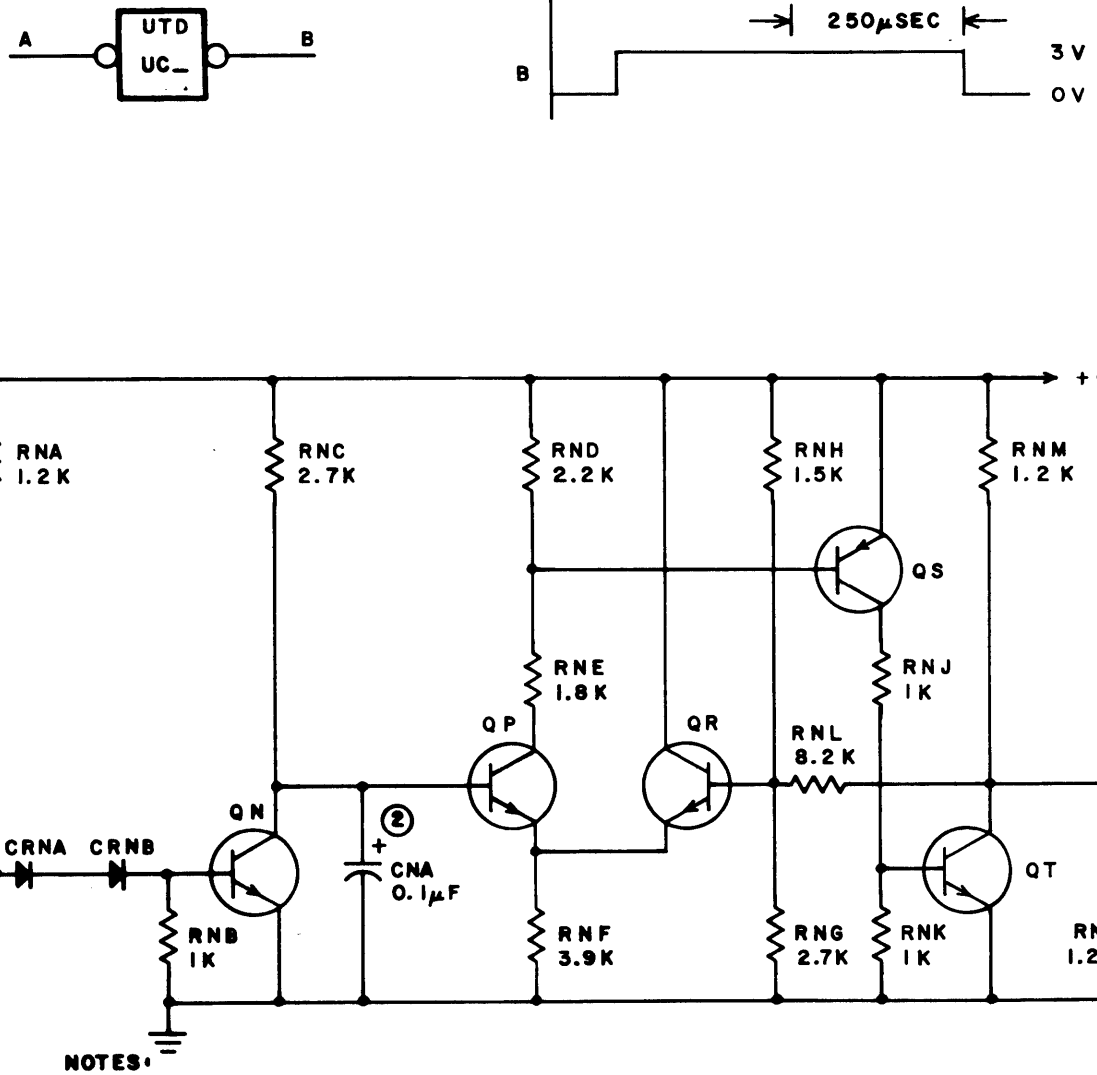


Figure 7-33. Delay Circuit - UCA, UCB, UCC, UCD, UCE

Delay - UDA

The UDA circuit (Figure 7-34) provides a "1" output at B a set length of time after a "0" enters at input A. There is no delay for a "1" input signal. The output is an immediate "0".

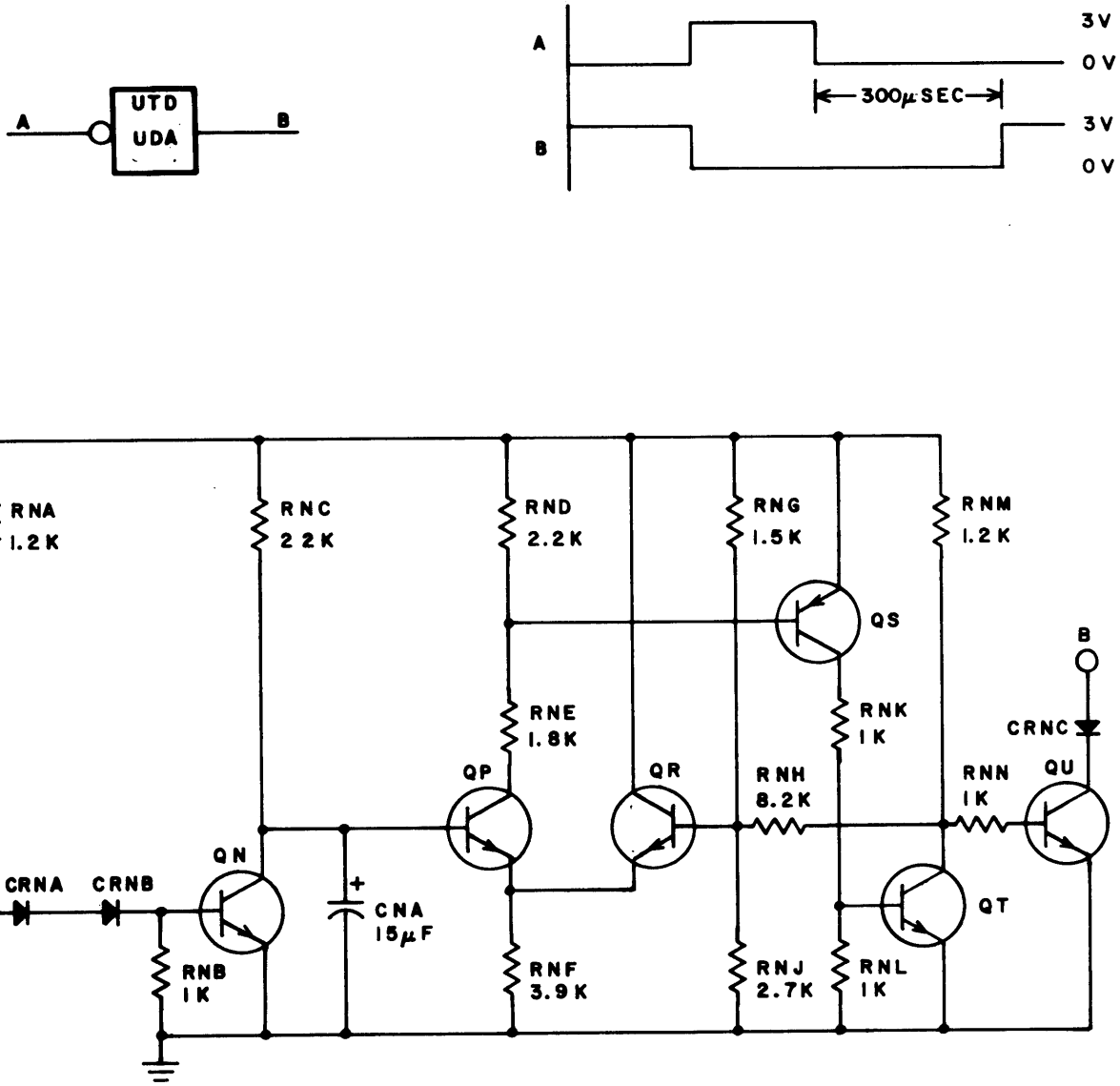
When a "1" appears at input A, QN conducts current from the +6v supply, through RNC to ground. The base of QP, therefore, approaches ground. The base of QR is held at approximately +3.8v by the voltage dividing action of RNG and RNJ. The emitters of QP and QR are, therefore, held at approximately +3 volts. QP is off. The base and emitter of QS remain at +6 volts, so QS is off. The base and emitter of QT are both at ground. Transistor QT is off. The collector of QT goes to approximately +2.4v due to the voltage dividing network formed by RNM, RNN and the base-emitter voltage drop across QU. Transistor QU is turned on and the output is held near ground, or a "0".

When a "0" (ground) appears at input A, QN turns off. This allows capacitor CNA to begin charging from the +6v supply through RNC. When the voltage at the base of QP reaches approximately +3.8v, QP starts to conduct, drawing current away from the base of QS. Transistor QS starts to turn on, forward biasing the base of QT. Transistor QT starts conducting. As the collector of QT approaches ground, the voltage on the base of QR is drawn off through RNH. This decreases the voltage on the emitters of QR and QP and drives QP to saturation. With QP saturated, QS and QT are also driven toward saturation. When QT conducts, the base of QN goes toward ground. Transistor QU is cut off and the output voltage rises to a "1" level.

The time delay is determined by the values of RNC and CNA.

Delay - UDB

The operation of the UDB circuit is identical to that of the UDA except the size of capacitor CNA (Figure 7-34) differs to cause a delay of 115 ±25 ms.



NOTE: VOLTAGE AND COMPONENT VALUES ARE FOR REFERENCE ONLY.

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Figure 7-34. Delay - UDA, UDB

Undirectional Time Delay - UEA

The UEA circuit (Figure 7-35) provides a 0.1-μsec delay between the time that a -3.5v signal appears at A and the time that transistor QP turns off. Output at B is either ground or an open circuit.

When input A is near ground, QN is off. Transistor QP is on. The output is ground.

When input A goes to -3.5v, capacitor CNA begins charging. After 0.1 μsec the base of QN is sufficiently negative to turn QN on. Transistor QP turns off. The output is an open circuit.

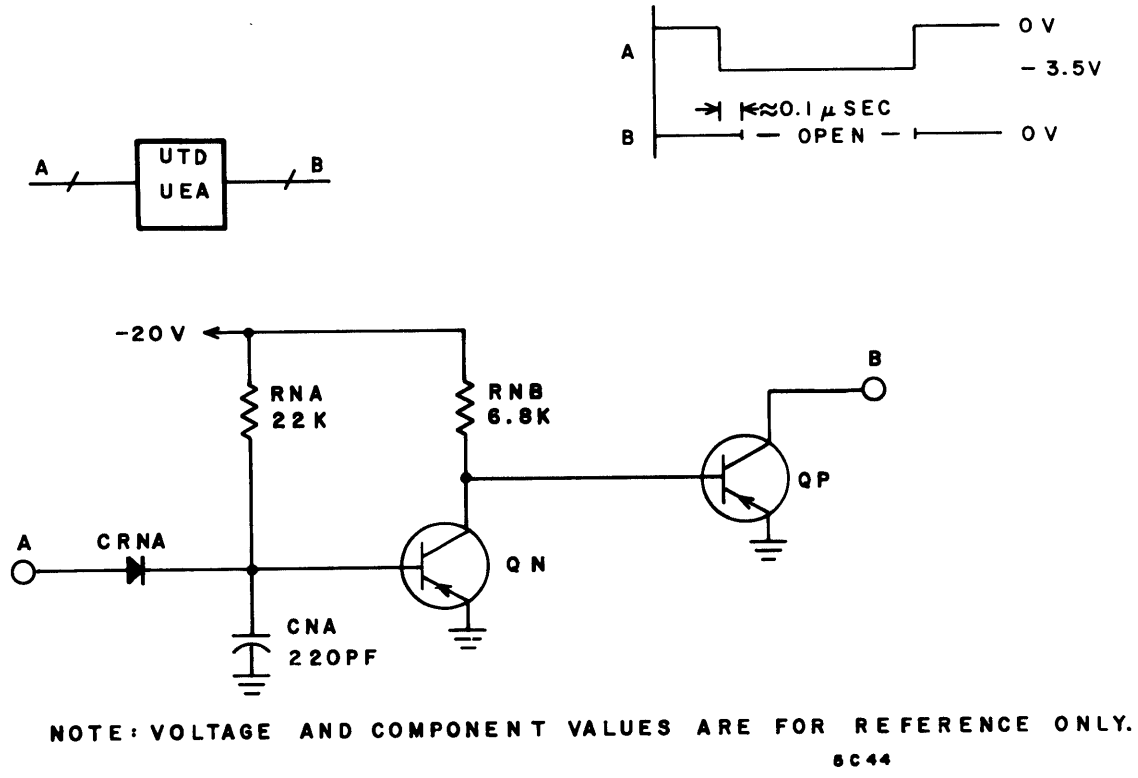


Figure 7-35. Undirectional Time Delay - UEA

And - VAA

The VAA circuit (Figure 7-36) consists of a single NPN transistor. When all inputs connected to A are at a "1" level, the output at B will be a "0". Any "0" appearing at A will result in a "1" output at B.

When the input to A is a "0", A is held at about +0.9v. This input is not sufficient to forward bias diodes CRNA and CRNB or transistor QN. Transistor QN is off. The output at B is a "1".

When the input to A is a "1", A rises to about +2.1v. This voltage forward biases CRNA, CRNB and QN. Transistor QN turns on, conducting current away from B to ground. Output B is left at about +0.9v, or a "0".

Diodes CRNA and CRNB provide noise immunity up to 1.4v. Resistor RNB connected to ground turns off QN when the positive voltage is removed from A.

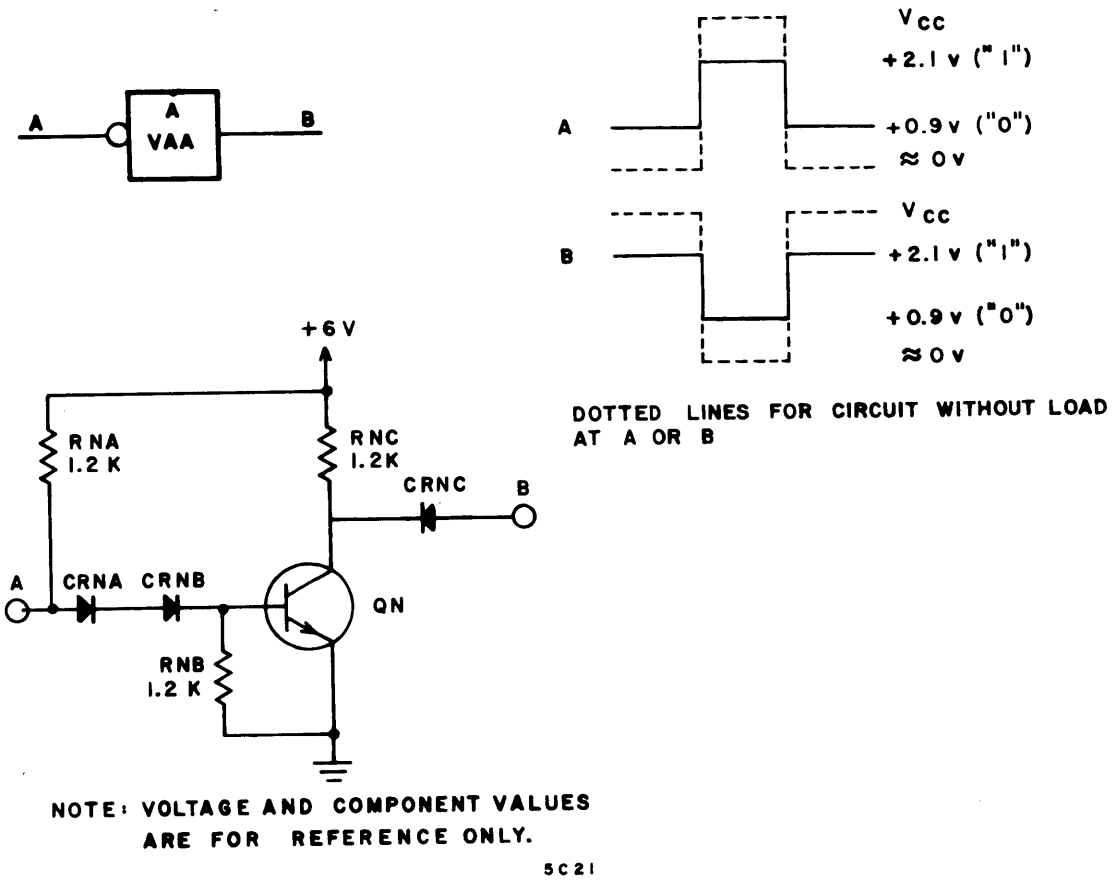


Figure 7-36. And - VAA

And - VAB

The VAB circuit (Figure 7-37) consists of two silicon peripheral logic inverters whose outputs share a common load resistor, RNE. When both inputs A and B are "0" (ground), the output at C will be a "1" (+3v). If either or both of the inputs are a "1", the output at C will be a "0". This is an AND gate for zeroes, or a NAND function.

When both A and B are at ground, QN and QP are off. The output at C is supplied from the +20v source through RNE. The output is a positive voltage, representing a non-logical "1". If input A experiences a positive voltage while B is at ground, QP turns on and conducts current from the +20v supply through RNE to ground. The "0" on B has no effect, as all the supply voltage is tapped to ground. The output at C is ground, or a "0". The situation is similar if A is "0" and B is "1". The output is "0". If both A and B have positive voltage applied to them, QN and QP both conduct. The output is "0".

Capacitors CNA and CNB provide a one's delay on input B and output C, respectively. They also maintain a noise barrier to isolate the circuit from stray pulses on the lines.

And/Or (Single Input) - VAC, VJW

The single input AND/OR or silicon peripheral logic (SPL) inverter (Figure 7-38) provides an inversion from input A to output B: A "1" on A produces a "0" on B, or a "0" on A produces a "1" on B. The inverter's output may be connected to the output of other inverters to form NAND functions or NOR functions.

The SPL inverter is a single NPN silicon transistor connected as a common emitter amplifier. When A is a "0" (between 0v and +0.3v) the transistor is off. This allows current to flow from the +20v supply, through RNB to output B. The output is a "1". When input A is a "1" (between +0.7v and +3.0v) the transistor turns on. The transistor conducts current from the +20v source, through RNB to ground. This leaves output B near ground, or a "0".

Since the base-emitter threshold for a silicon transistor is approximately +0.7v, the circuit ignores up to 0.5v of transient noise.

Power Driver - VJK

The VJK circuit (Figure 7-39) is similar to the VJS circuit with the addition of capacitor CNB and two outputs. CNB slows the switching time of QN and provides a ramp output. Output B connects to the center tap of the head. Output C contains a 10K resistor and is connected to a voltage supply in a fault detect circuit. If two heads are selected the effective resistance falls to 5K (two 10K resistors in parallel). The increase in current causes a Fault signal. Output D contains a diode that isolates each Write Gate.

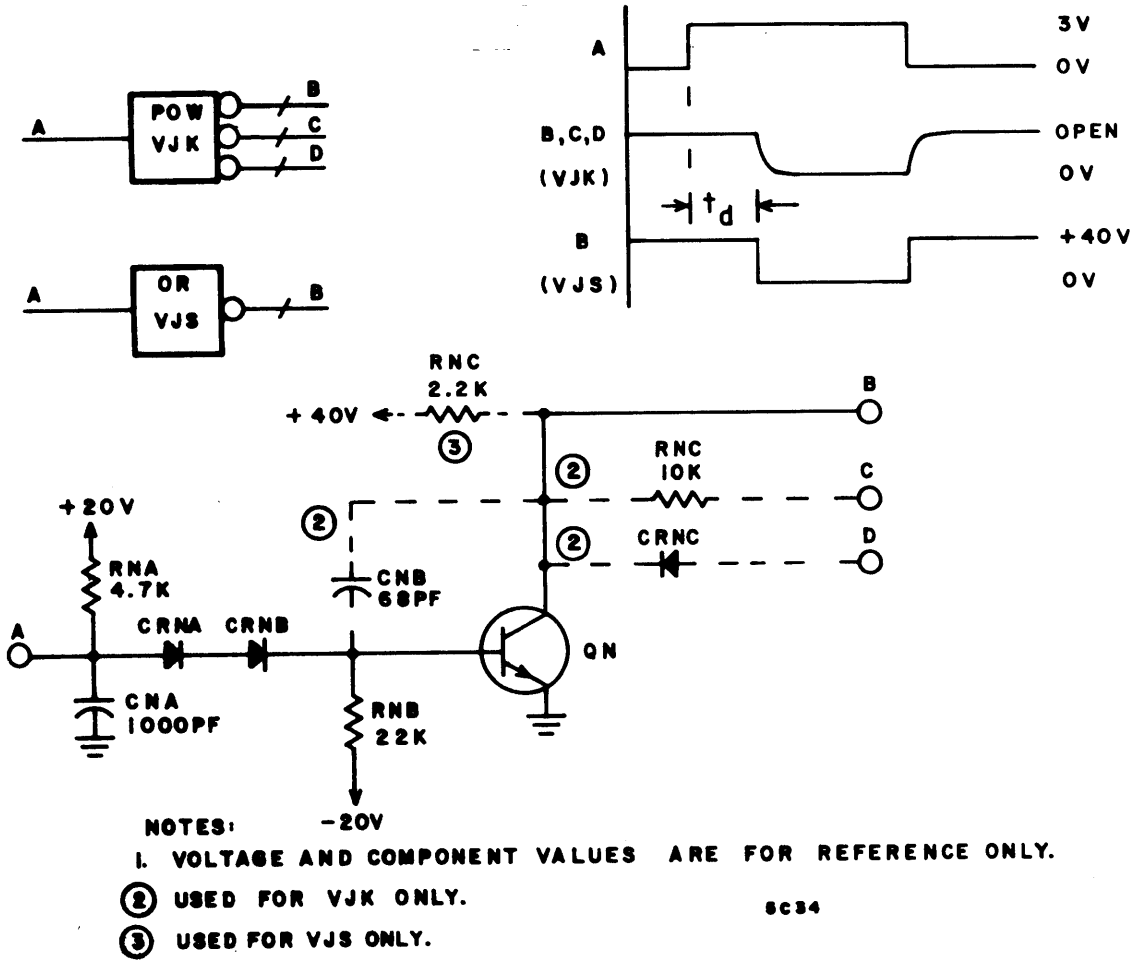


Figure 7-39. Power Driver - VJK

Power Driver - VJL

The VJL circuit (Figure 7-40) is a gate used to bias an analog gate.

If +20v appears at A, QN turns on. The base of QP goes to ground. Transistor QP is off. Capacitor CNA charges through RND to +20v. Output at B is a ramp to +20v.

A +0.2v signal at A turns QN off. When QP turns on, the collector voltage of QN clamps at +0.7v. CNA discharges rapidly through QP. Output B drops to ground.

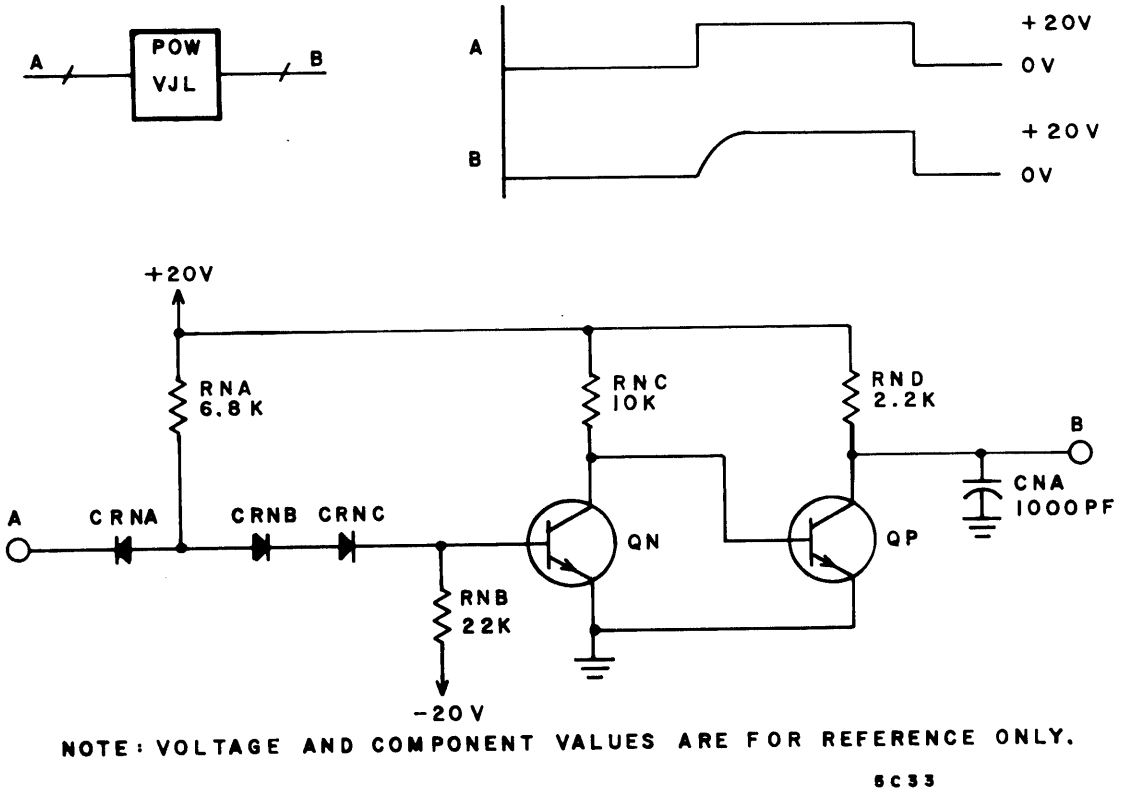


Figure 7-40. Power Driver - VJL

And - VJM

The VJM circuit (Figure 7-41) gates a particular receiver into operation. A "0" input at A results in an "open" enable signal to the receiver. A "1" input at A disables the receiver.

A "0" (0v) input forward biases diode CRNA. The +20v supply current is drawn through RNA and CRNA, leaving the base of QN reverse biased. Transistor QN is off. Output is held at -0.7v by the next stage.

A "1" input turns QN on. The output goes to ground. No receiver signal can pass into the receiver.

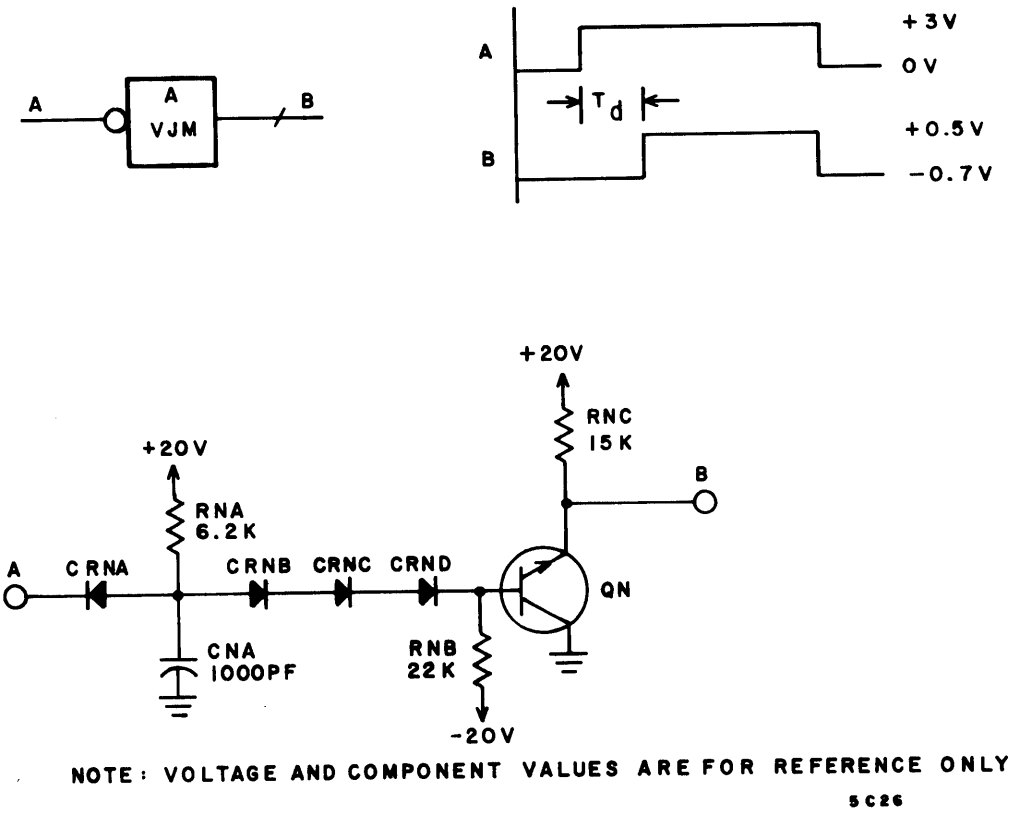


Figure 7-41. And - VJM

Or - VJN

The VJN circuit (Figure 7-42) is a NAND circuit that inverts the input signal. Input A is connected to the output of a receiver and to a gating circuit. If the Write gate is off, the base of QN is grounded. The circuit is disabled.

When the write gate is on, QN turns on and the receiver inputs a "0". Transistor QN turns on further and goes into saturation. Output voltage at B is approximately -0.2v.

When the receiver inputs a "1", QN comes out of saturation. Output at B is approximately -3.5v.

Whenever the write gate is on, QN is on to some degree. Only when the write gate is off is the base of QN at ground and QN off.

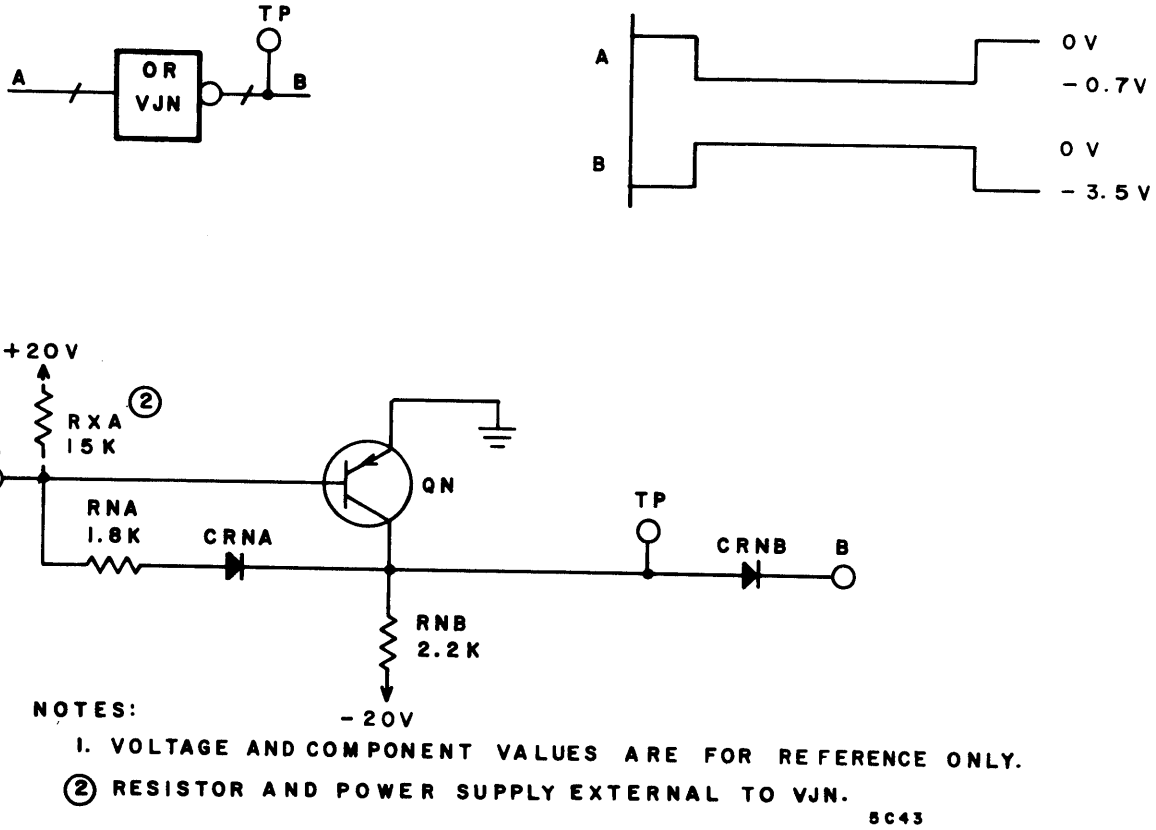


Figure 7-42. Or - VJN

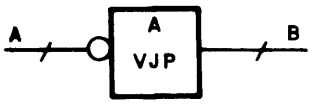
And - VJP

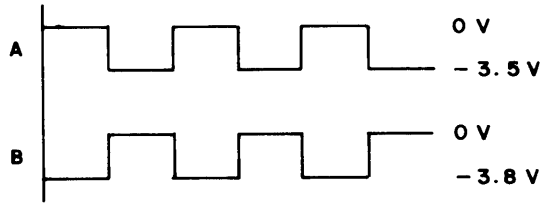
The VJP circuit (Figure 7-43) is normally used as the input circuit to a toggle flip-flop. It ties two receiver outputs to a single-ended output. Capacitor CNA is used to reduce the input impedance for faster switching.

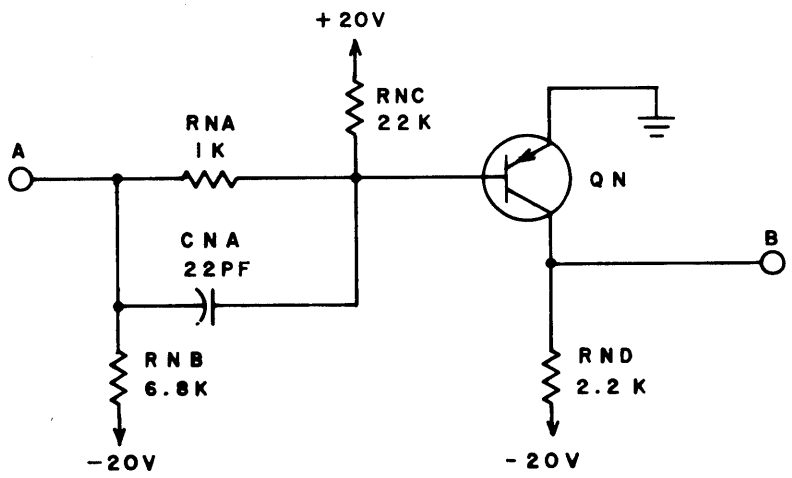
When input A is near ground the base of QN is at approximately +0.9v. Transistor QN is off. Output at B approaches -20v, but is clamped at -3.8v by a Zener diode in the following circuit.

When input A is -3.5v, QN turns on. Output drops to approximately -0.2v.

Input to A is short (100 nsec), negative, data pulses. Output B is also short pulses.







NOTE: VOLTAGE AND COMPONENT VALUES ARE FOR REFERENCE ONLY.

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Figure 7-43. And - VJP

Power Driver - VJR

The VJR circuit (Figure 7-44) is a +40v switch. A "1" on input A produces +40v at output B. A "0" on input A stops current flow.

A "1" input turns QN on. Transistor QN conducts current from the +40v supply, causing a voltage drop across resistor RNB. This voltage drop turns on QP. Output B is at +40v.

A "0" input turns QN off. Since current no longer flows, the emitter and base of QP are at equal voltage. Transistor QP is off. Output B goes to ground.

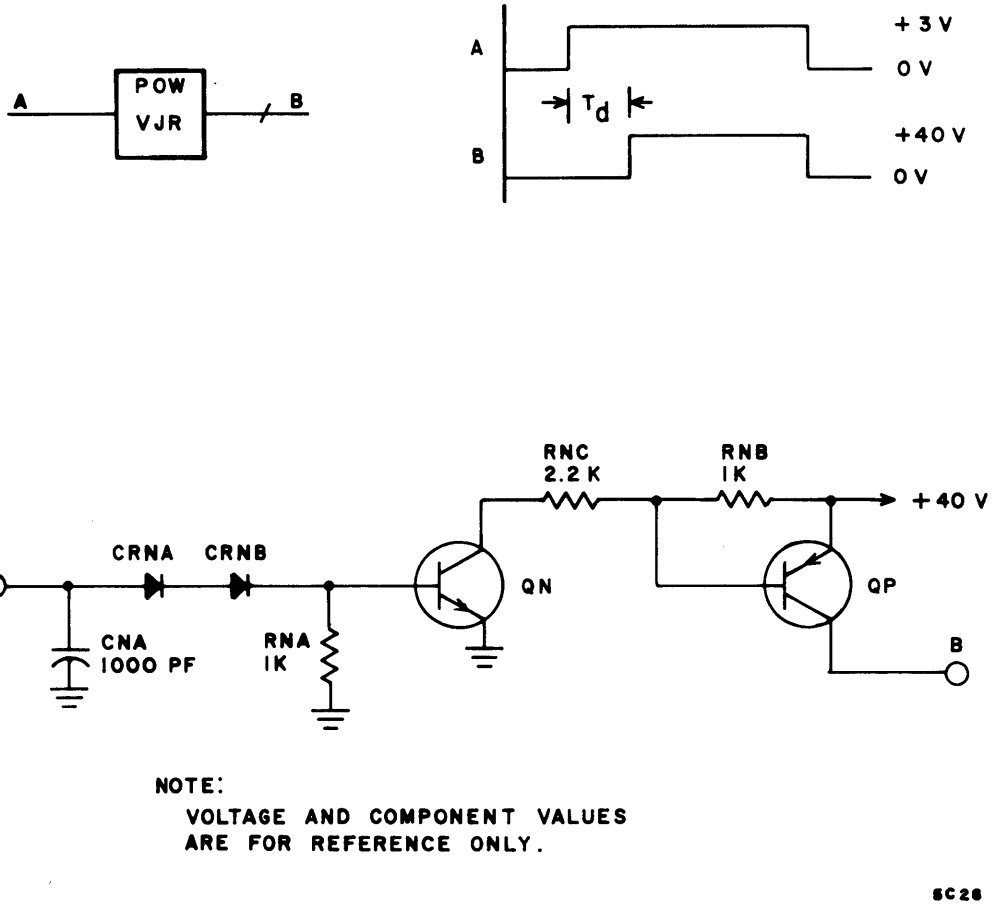


Figure 7-44. Power Driver - VJR

Or - VJS

The VJS circuit (Figure 7-39) is a standard inverter with a capacitor delay at the input. A "1" at input A pulls the output at B to ground. A "0" produces a +40v output.

Or - VJT

The VJT Circuit (Figure 7-45) is a gate to the WBB toggle flip-flop. A "1" input at A produces a ground at B, which keeps the flip-flop off. A "0" input at A produces a -3.5v output at B, which releases the flip-flop and presets it in a given state.

When a "0" is applied to input A, the base of QN goes to ground. Transistor QN is off. The base of QP is clamped at +0.6v by diode CRNC. Transistor QP is off. Output B is -3.5v derived from the voltage dividing network of RNF and RNG.

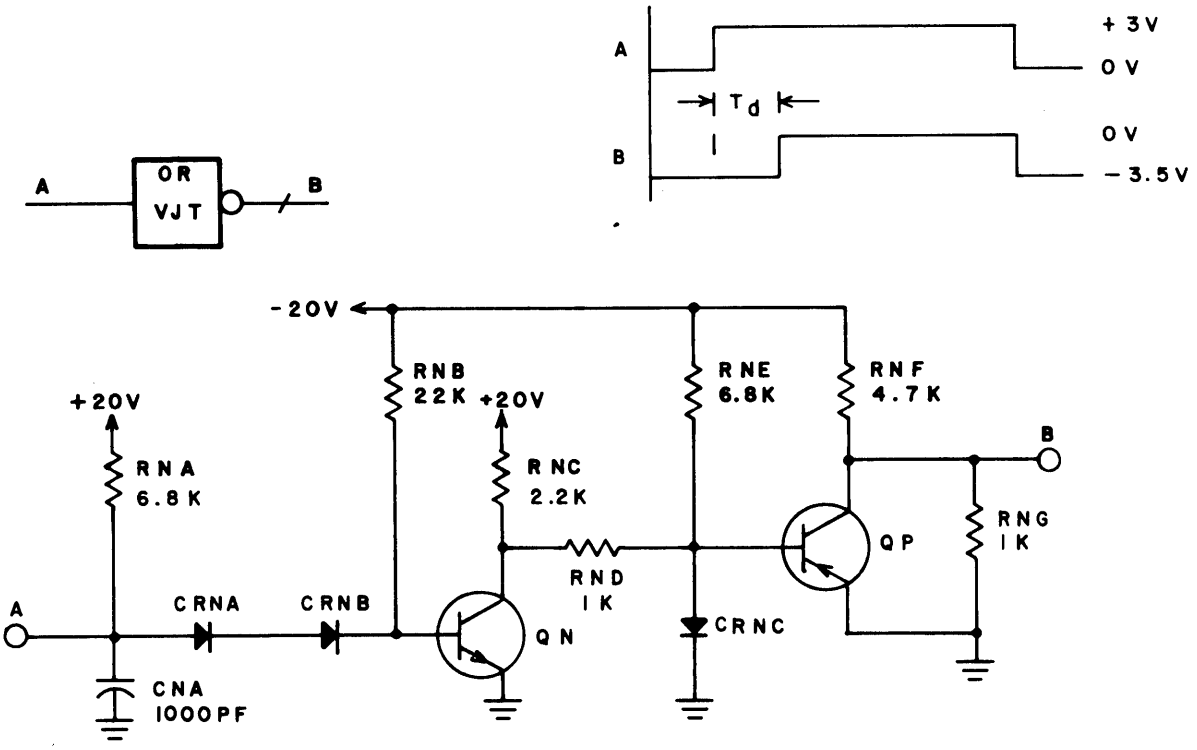


Figure 7-45. Or - VJT

When A goes to a "1", capacitor CNA charges. After a delay, the base of QN is positive enough to turn QN on. The base of QP goes negative through resistor RNE. Transistor QP turns on. The output at B drops to ground.

And - VJU, VJV

The VJU and VJV circuits (Figure 7-46) are functionally identical. They consist of a standard inverter circuit with a capacitive filter input. The capacitor also presents a delay.

A "1" on input A reverse biases diode CRNA. Capacitor CNA charges through RNA until it is clamped at about 3 diode voltages (approximately 2.1v). QN turns on. Output B falls to ground.

If input A is a "0", CNA discharges through CRNA. Transistor QN turns off. Output B rises to a "1" level due to the clamping by a Zener diode.

And/Or - VJW

Refer to circuit description for circuit type VAC.

Flip-Flop - WBB

The WBB circuit (Figure 7-47) is a toggle flip-flop with gate and data inputs.

Input B holds both transistors off by grounding the bases when the circuit is off. When a write operation is to be performed, the base of QP is released while QN is still grounded by input C. This sets an initial condition for the flip-flop: QP is on, QN is off.

After the flip-flop is pre-set it is toggled through input A by a series of negative data pulses. The leading edge of the negative data pulse begins charging capacitor CNB. Diode CRND becomes forward biased. QP is on. Output E is at ground. A voltage of -3.6v across Zener diode CRNK keeps CRNN reverse biased. CRNK and CRNM clamp the output of QN at -3.8v.

Quantizing Detector - QFA

The QFA circuit (Figure 7-26) detects a fault in the write and erase drivers or in the head select circuit. If there is an open in the head, either of the drivers is non-functional, or more than one head is selected, a fault signal occurs.

Inputs A and B are connected to the write and erase driver circuits and enter across a voltage bridge to the base of QP. Normally, both inputs are approximately 32v. All diodes are forward biased. Voltage on the base of QP is 32v and the emitter is at 31.4v due to a reverse bias 0.6v base-emitter voltage across QP. Transistor QP is off. All input current goes to ground through RND.

If input A is higher than input B by 1.4v, CRNB and CRNC are forward biased. CRNA and CRND are reverse biased. The voltage on the base of QP becomes that of input B. The emitter of QP is 0.7v higher than the base due to a 0.7v drop across CRNB. Transistor QP is on.

If input B is higher than input A by 1.4v, CRNA and CRND are forward biased. CRNB and CRNC are reverse biased. The base of QP is at the voltage of input A. The emitter of QP is 0.7v higher than the base. Transistor QP is on.

Input C is connected to the head select circuits. If more than one head is selected, the drop in effective resistance (due to external resistors in parallel) results in an increase in current through RNA. This increases the voltage drop across RNA, turning QN on.

If either QN or QP is on, QR turns on. Output D goes to ground to signify a fault condition.

Quantizing Detector - QFB

The QFB circuit (Figure 7-27) is used to amplify and shape an incoming wave. The input at A and B is a differential sine wave. The output at C and D is an amplified and clipped version of the input wave.

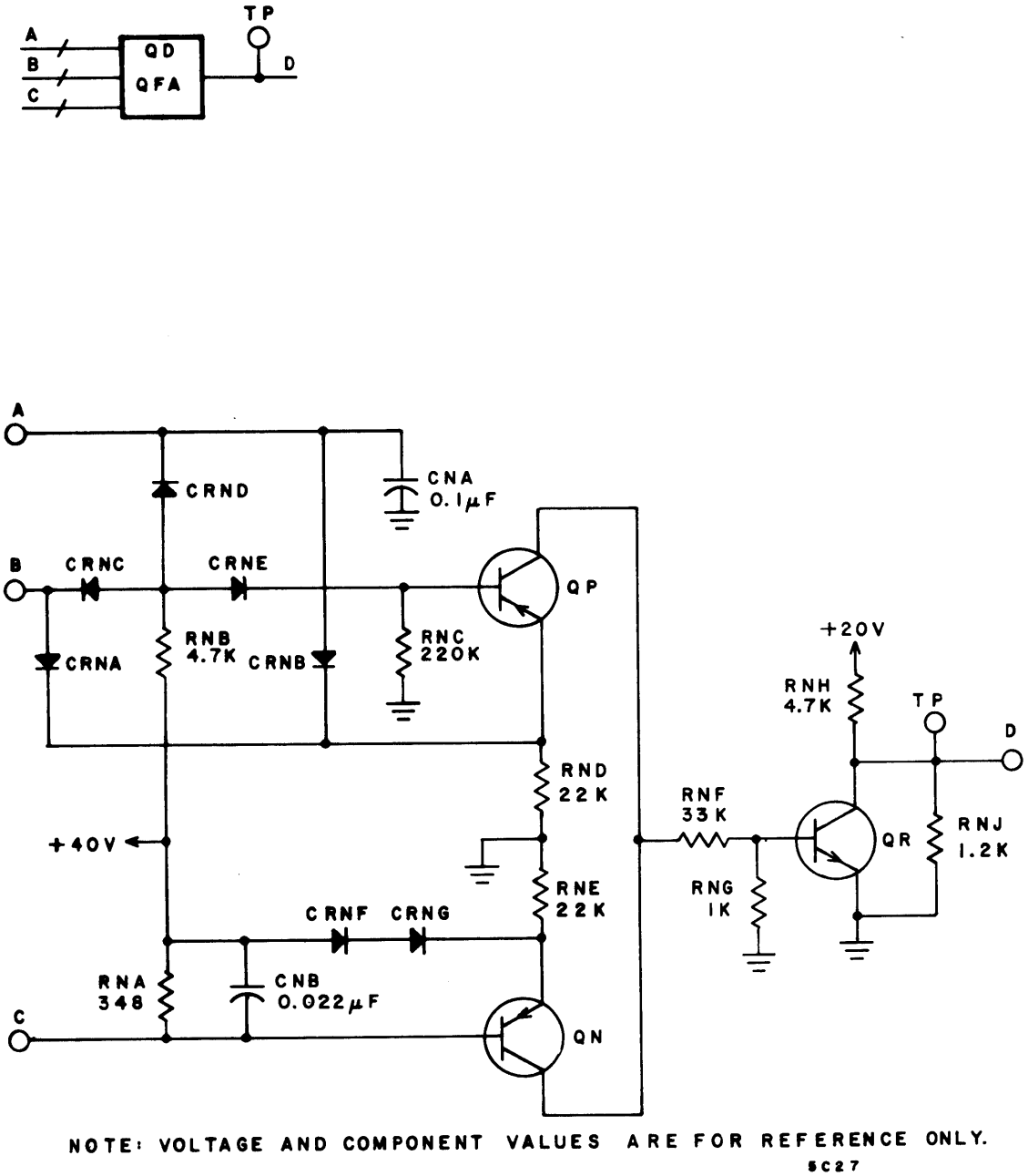
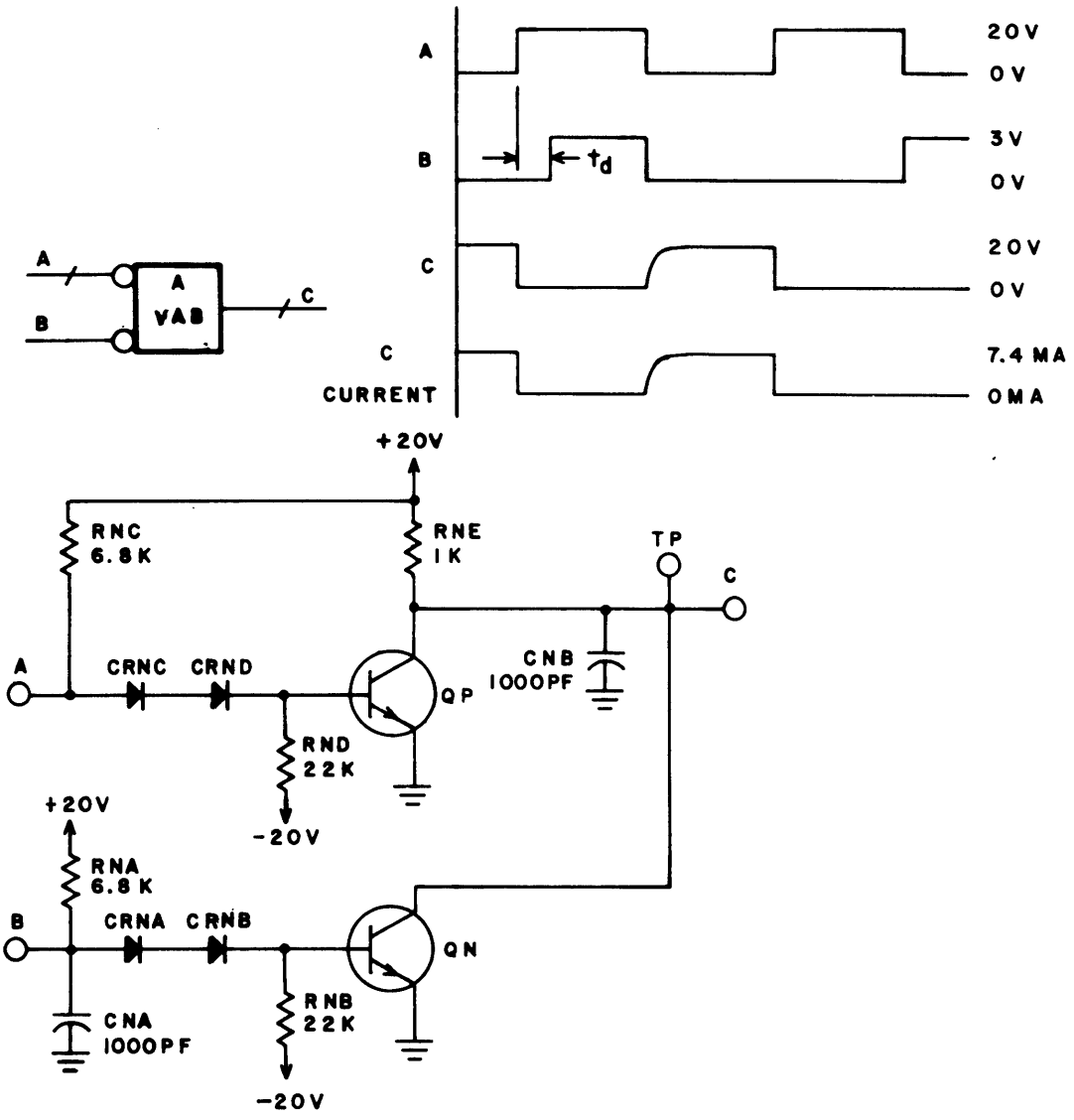


Figure 7-26. Quantizing Detector - QFA



NOTE: VOLTAGE AND COMPONENT VALUES ARE FOR REFERENCE ONLY.

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Figure 7-37. And - VAB

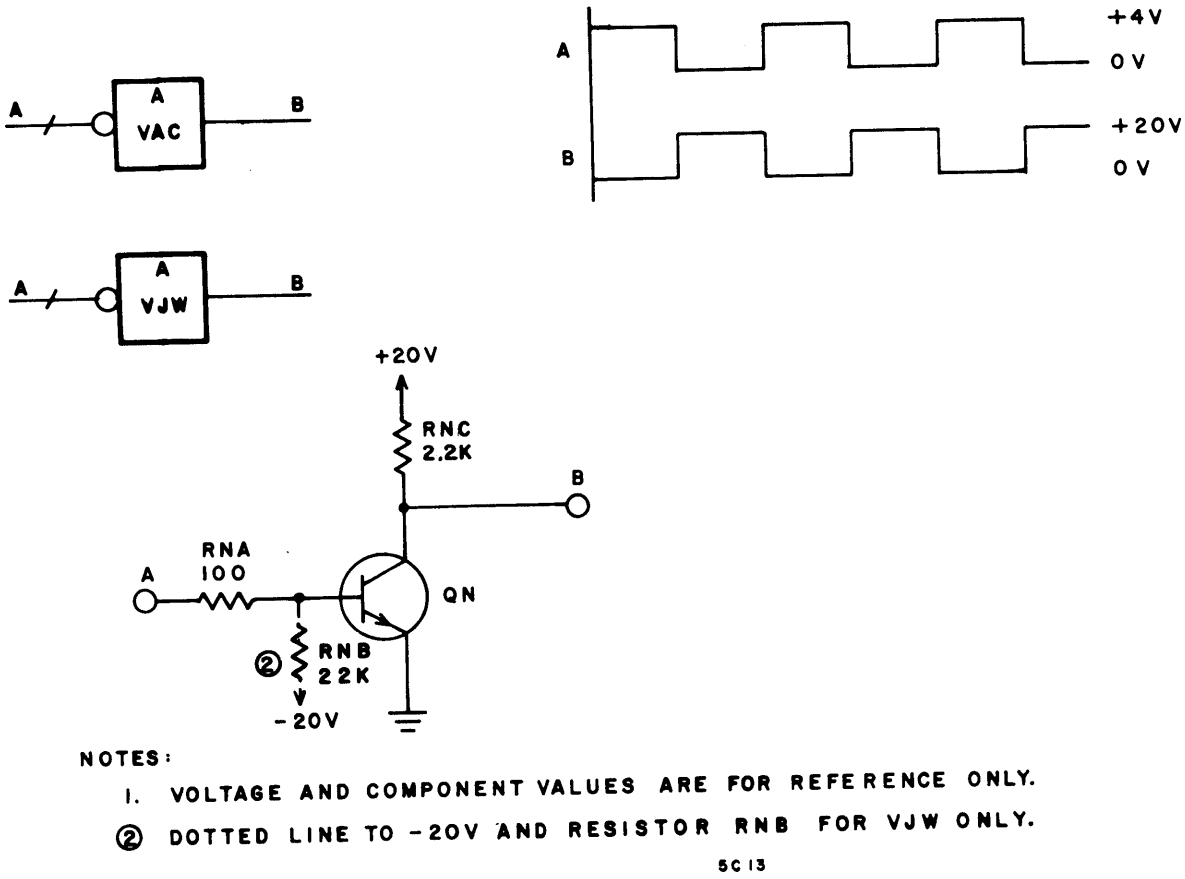


Figure 7-38. And/Or (Single Input) - VAC, VJW

If the circuit drives just one other transistor, the output may be connected directly to the base of the driven transistor. For a fan-out of 2 or more, a base isolation resistor is required for each driven transistor. This resistor ensures that the base drive provided to each of the driven transistors will be nearly independent of differences in base-emitter voltages. For a fan-out of 2 the collector load resistor must be reduced by one-half its value for driving one transistor to provide for the additional voltage drop across the isolation resistors.

Switching time for an inverter with a fan-out of 1 is typically 15 nsec.

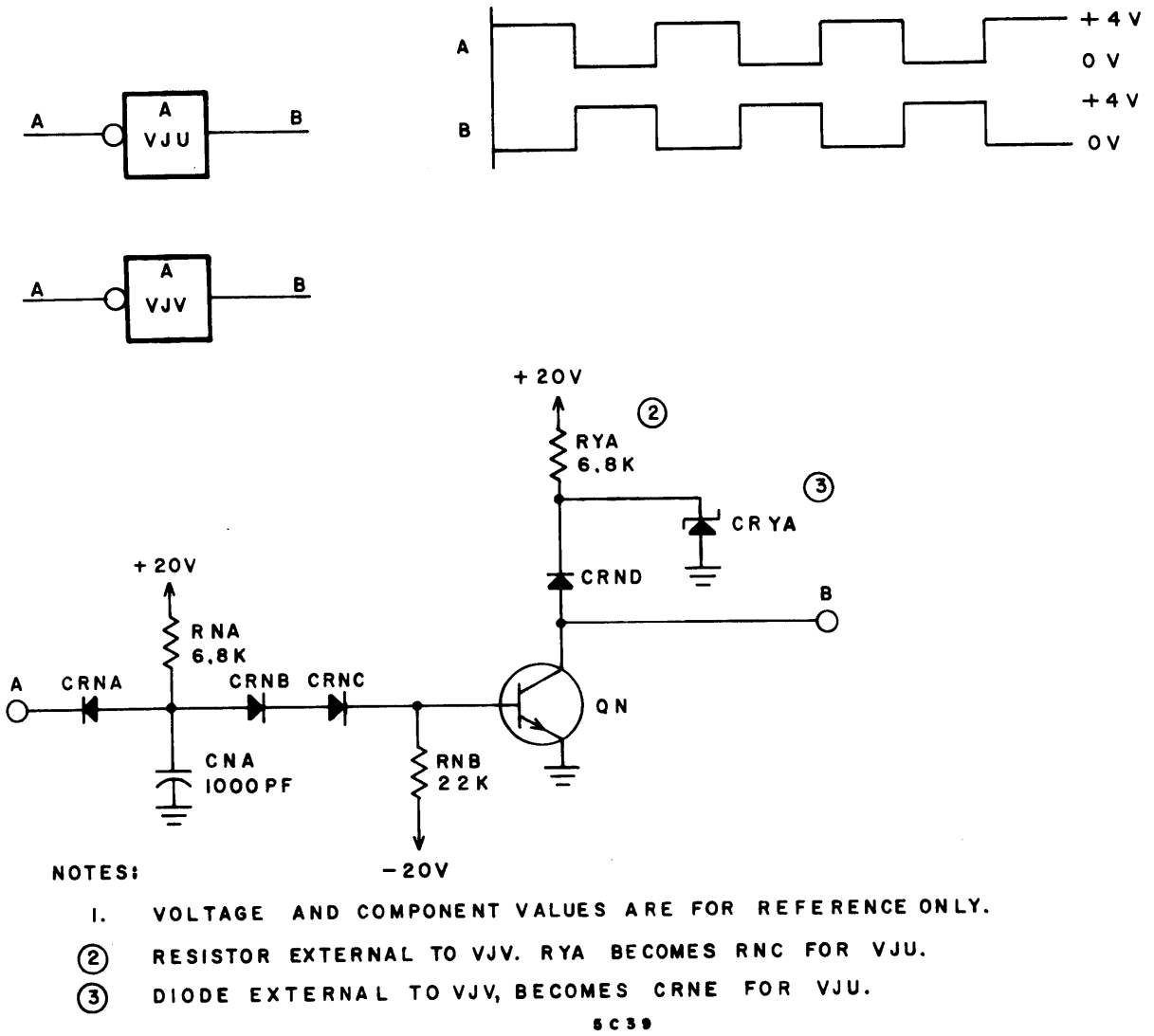


Figure 7-46. And - VJU, VJV

The trailing edge of the data pulse results in a positive pulse to the base of QP. Transistor QP turns off. Output E goes toward -4v. Both sides of CNA are at ground. Therefore, CRNC and CRNF are forward biased by the -20v source through RNC. The base of QN goes negative. Transistor QN turns on and Output D drops to ground. Diodes CRNM and CRNJ are now reverse biased. Since the collector of QP is more negative than the voltage across Zener diode CRNK (-3.6v), CRNN is forward biased. This clamps the voltage at output E at approximately -3.8v.

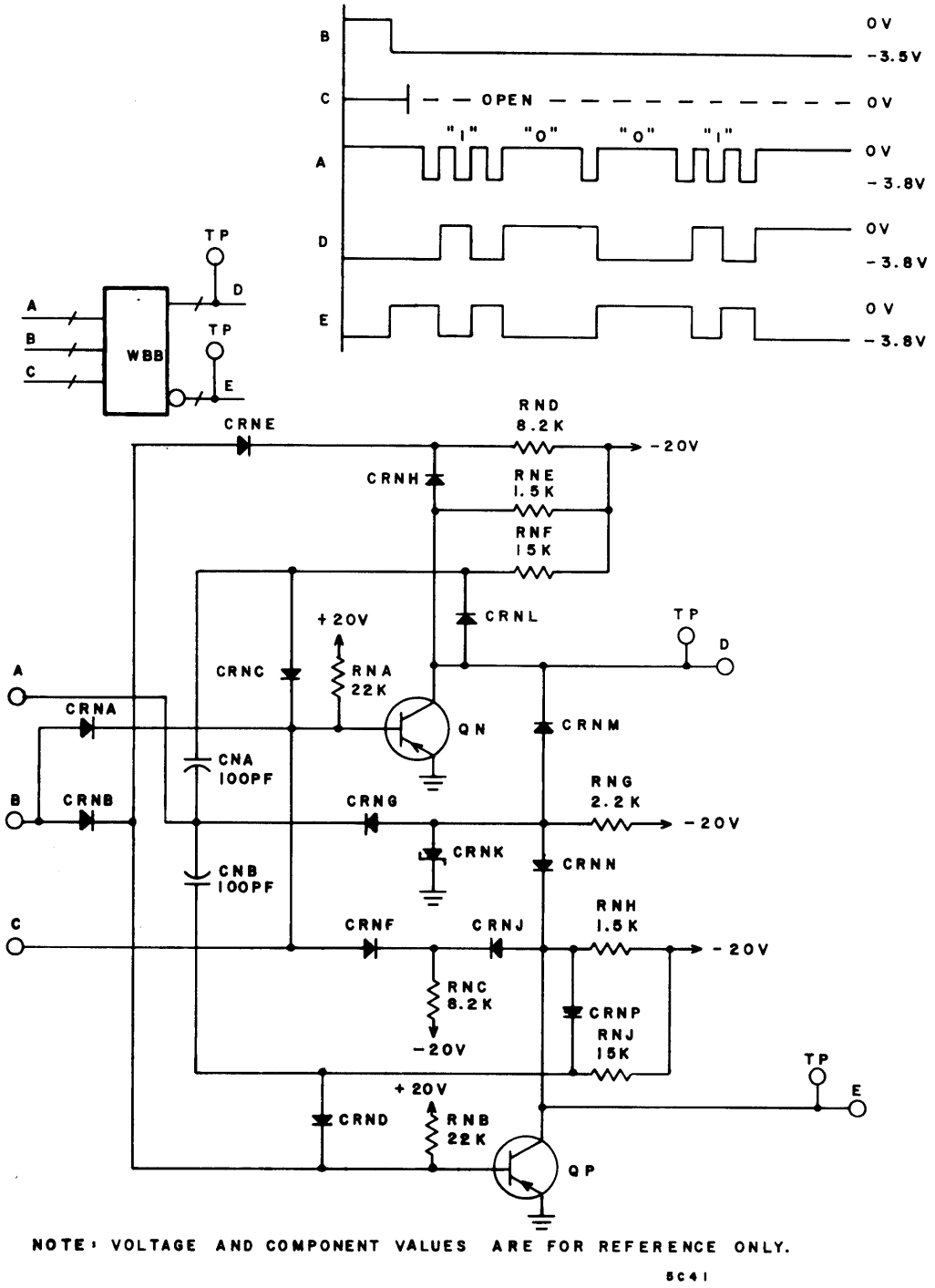


Figure 7-47. Flip-Flop - WBB

The leading edge of the next negative pulse charges CNA and discharges CNB since both sides of CNB are at about -3.8v. The flip-flop will toggle on the ground-going edge of the pulse in the same manner as described for the first pulse.

Toggle Flip-Flop - WBC

Inputs to A and B of the WBC flip-flop (Figure 7-48) are either a positive pulse or ground. If A has positive pulse, then B is at ground. If A is at ground then B has a positive pulse. If input A receives a positive pulse, output C will be at ground and output D will be a constant positive voltage. A positive pulse at B will toggle the flip-flop. C will then be a positive voltage and D will be at ground.

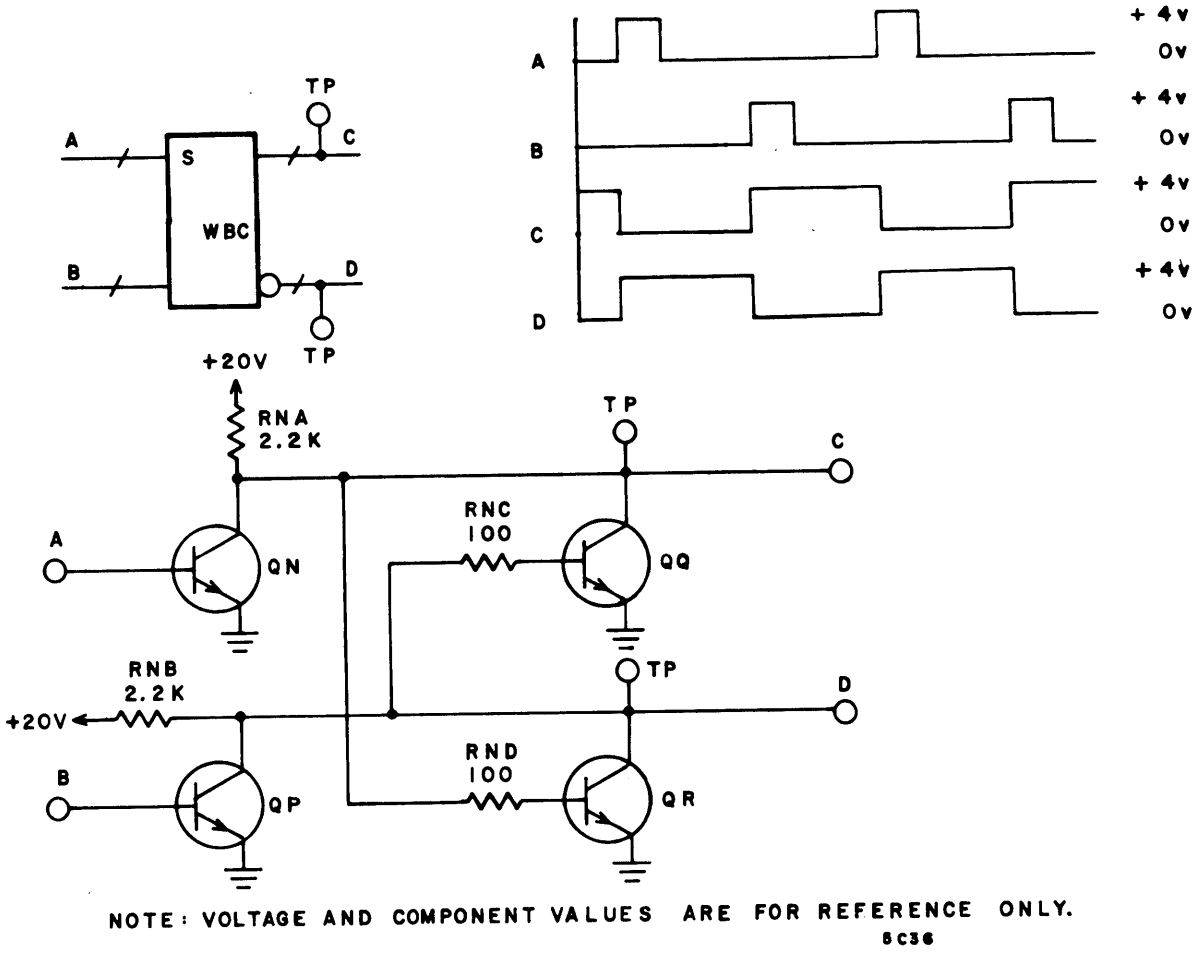


Figure 7-48. Toggle Flip-Flop - WBC

A positive pulse to input A turns on transistor QN, which drives the base of QR to ground. Transistor QR is turned off. Input B is at ground and QP is off. The base of QQ is, therefore, positive and QQ turns on. This latches the base of QR at ground and puts a ground on output C. With QP off and QR latched off, current flows from the +20v source through RNB to output D.

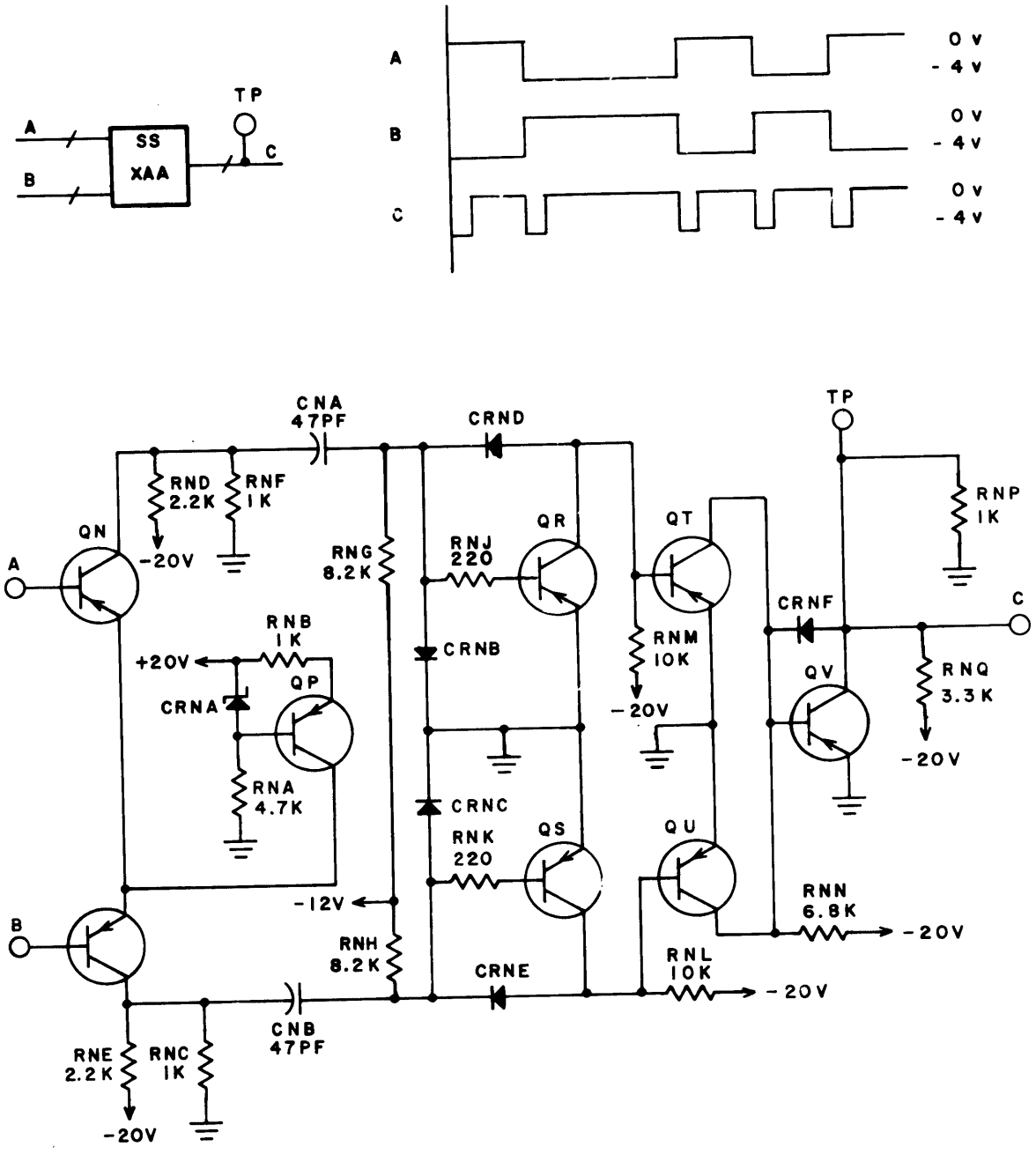
When a positive pulse is felt at B, QP turns on. This drives the base of QQ to ground, turning QQ off. Input A is at ground and QN is off. The base of QR is, therefore, positive. Transistor QR conducts, latching the base of QQ at ground and driving output D to ground. With QN and QQ off, output C is positive.

Pulse Shaper - XAA

The input to A and B (Figure 7-49) of the XAA circuit is a 0.7v balanced square wave centered around a positive voltage. Each time the inputs change polarity a short negative pulse is formed at output C.

The square wave input is sufficient to alternately turn QN and QQ on and off. A current of about 5.6 ma is alternately switched between QN and QQ. When input A is more positive than input B, QN turns off. The voltage at the collector of QN is about -20v. The voltage at the junction of RNG and RNJ is -1.6v. When the inputs switch, QN turns on. The collector of QN rises to about -8.7v. CNA forms a positive pulse to the base of QR. The positive pulse turns QR off, QT on and QV off for the duration of the pulse. The amplitude of the pulse is limited by CRNB. Charging time for CNA is about 100 nsec. When the inputs switch again, QQ turns on and QN turns off. CNB forms a positive pulse which turns QV off again for the duration of the pulse. The output at C is ground until QV is turned off. During the short time that QV is off, a negative pulse appears at output C.

Diodes CRND and CRNE prevent saturation of QR and QS. As the collectors of QR and QS approach ground, the negative voltage at the left ends of RNJ and RNK is limited to the sum of the voltage drops across QR and CRND or QS and CRNE, respectively. Diode CRNF prevents QV from saturating.



NOTE: VOLTAGE AND COMPONENT VALUES ARE FOR REFERENCE ONLY.

5C15

Figure 7-49. Pulse Shaper - XAA

Pulse Shaper - XAB

The input at A of the XAB circuit (Figure 7-50) is a balanced square wave between 0v and +4v. The output at B is normally positive, but drops to ground for a short time at the leading edge of the ground portion of the input wave.

During the positive portion of the input wave, transistors QN and QP are on. This leaves the bases of QQ and QR near ground. Transistors QQ and QR are off. The output at B is a positive voltage supplied through resistor RNE.

When the input wave goes to ground, transistors QN and QP turn off. With QP off, the base-emitter junction of QR is forward biased. Transistor QR conducts and the output at B drops to near ground. With QN off, capacitor CNA charges toward +20v. When the charge on CNA reaches a level sufficient to turn on QQ, the base of QR again drops to ground. Transistor QR turns off. The output at B returns to the positive level.

Pulse Shaper - XAC

The XAC circuit (Figure 7-51) produces a 100-nsec ground pulse at output C when the inputs at A and B change state. The output is normally positive. Input A is connected to the set side of a flip-flop and input B is connected to the clear side.

When the flip-flop is clear, the base of QR is positive. Transistor QR conducts 10 ma of current from the -20v supply through RND, RNC, QS, QR and RNB. The collector of QN is at +20v and the collector of QR is near +13v. Transistors QT and QU are on and QV and QW are off.

When the flip-flop sets, QR turns off and QN turns on. The collector of QN goes to +13v, which drives the base of QT to about -6v. This turns QT off, driving the base of QV positive. QV turns on and the output at C goes to ground. Capacitor CNA charges through RNE with a time constant of 135 nsec. After 100 nsec the voltage at the base of QT has risen to +0.7v and QT turns on. This drives the base of QV to ground. QV turns off and the output at C returns to a positive level.

When the flip-flop clears again, a 100-nsec ground pulse is formed at C by QR, CNB, QU and QW.

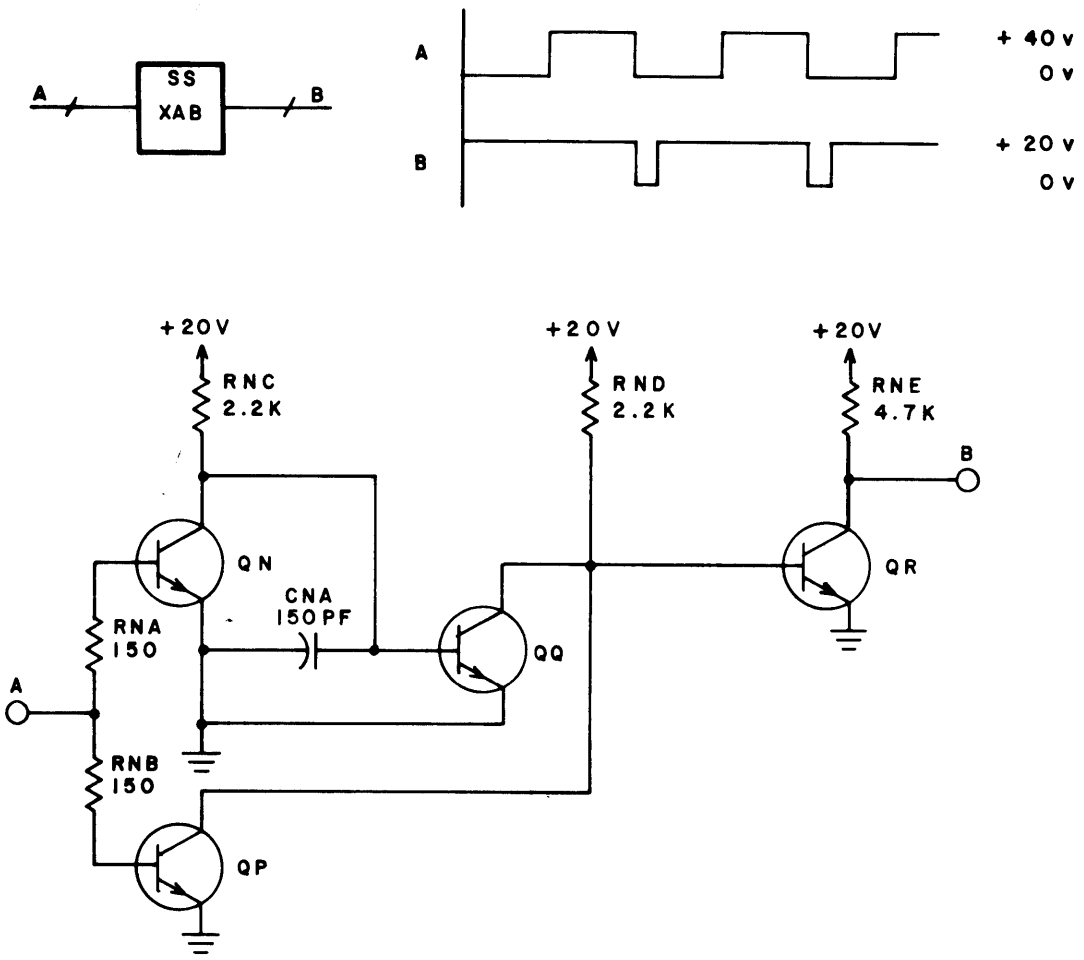
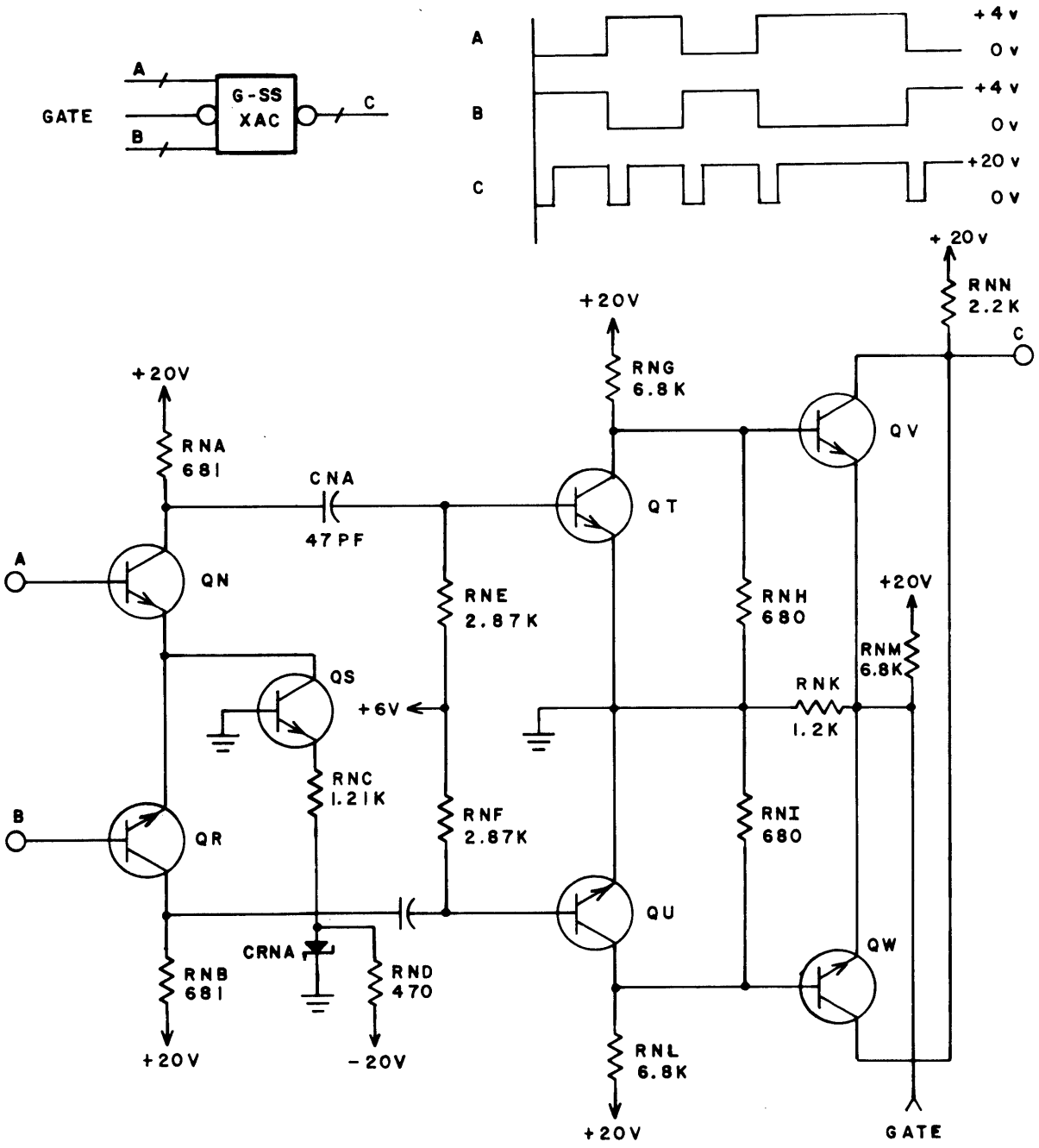


Figure 7-50. Pulse Shaper - XAB



NOTE: VOLTAGE AND COMPONENT VALUES ARE FOR REFERENCE ONLY.

5C6

Figure 7-51. Pulse Shaper - XAC

HEAD AND DISK PACK REPLACEMENT CRITERIA

HEAD REPLACEMENT CRITERIA

Heads of the MDD have been designed so that they should not need replacement if given proper preventive maintenance and care. If a head requires replacement refer to the Preface of this manual for the publication containing the Maintenance section. Refer to that section for Head/Arm Replacement procedure. A head is defective and needs replacing if any of the following conditions exist:

1. Consistent oxide buildup on head, indicating repeated head/disk impact.
2. Appreciable oxide buildup located primarily on the edge of the ferrite insert, indicating a warped head.
3. Oxide or wear over 1/2 of the head face surface.
4. A head which is scratched over 1/2 of the head face surface.
5. Concentric scratches on disk surface. Inspect the head for imbedded particles.
6. Audible ping indicating that the head is hitting the disk surface.

DISK PACK REPLACEMENT CRITERIA

The disk pack is designed to last the lifetime of the equipment. Replacement of the disk pack is required only if excessive runout (see Disk Pack Runout Check) is encountered or physical damage to the pack results in the loss of recording ability.

A disk pack is defective and needs replacement if any of the following conditions exist:

1. Damage to the disk pack resulting in a bent or broken disk. If a disk is bent perform Disk Pack Runout Check procedure.
2. Gouged or scored disk surface causing the loss of stored data.
3. Imbedded particles in a disk surface that cannot be removed by cleaning and are causing damage to the heads.

Disk Pack Runout Check

This procedure determines whether a bent disk pack may remain in use. If the disk pack fails to meet the requirements of the procedure, it should be returned to the manufacturer for reconditioning.

1. Extend the upper deck drawer forward.
2. Release four half-turn fasteners securing right-hand shroud side cover. Set the side cover aside.
3. Install the disk pack to be checked on the spindle of the upper deck.
4. Grasp the pack cleaning brushes, override the shaft detent mechanism, and rotate the brushes into the disk pack.
5. Place the disk pack runout gage (P/N 84357600) base against the underside of the upper deck shield and set the switch on the base of the gage to ON (Figure 7-52).
6. Turn the bezel of the dial indicator to indicate zero. Orient the dial indicator so that the plastic tip is not only contacting a disk surface but is deflected for an indication of approximately 0.020 inch. Tighten dial indicator in this position. Turn the bezel to set the dial indicator to zero.

NOTE

A mirror is required to observe dial indicator when some disk surfaces are checked.

7. Manually and slowly rotate the disk pack one full revolution while carefully observing the dial indicator. The sum of the deviations (to either side of zero) should not exceed 0.012 inch.
8. If a total deflection of 0.012 inch is encountered in step 7, recheck the indication. The total deflection must occur in a disk circumference of 4 inches or more.
9. Repeat steps 6 through 8 for the 19 remaining disk surfaces.
10. Rotate the pack cleaning brushes clear of the disk surfaces.
11. Remove the disk pack and the disk pack runout gage.
12. Install the shroud side cover.

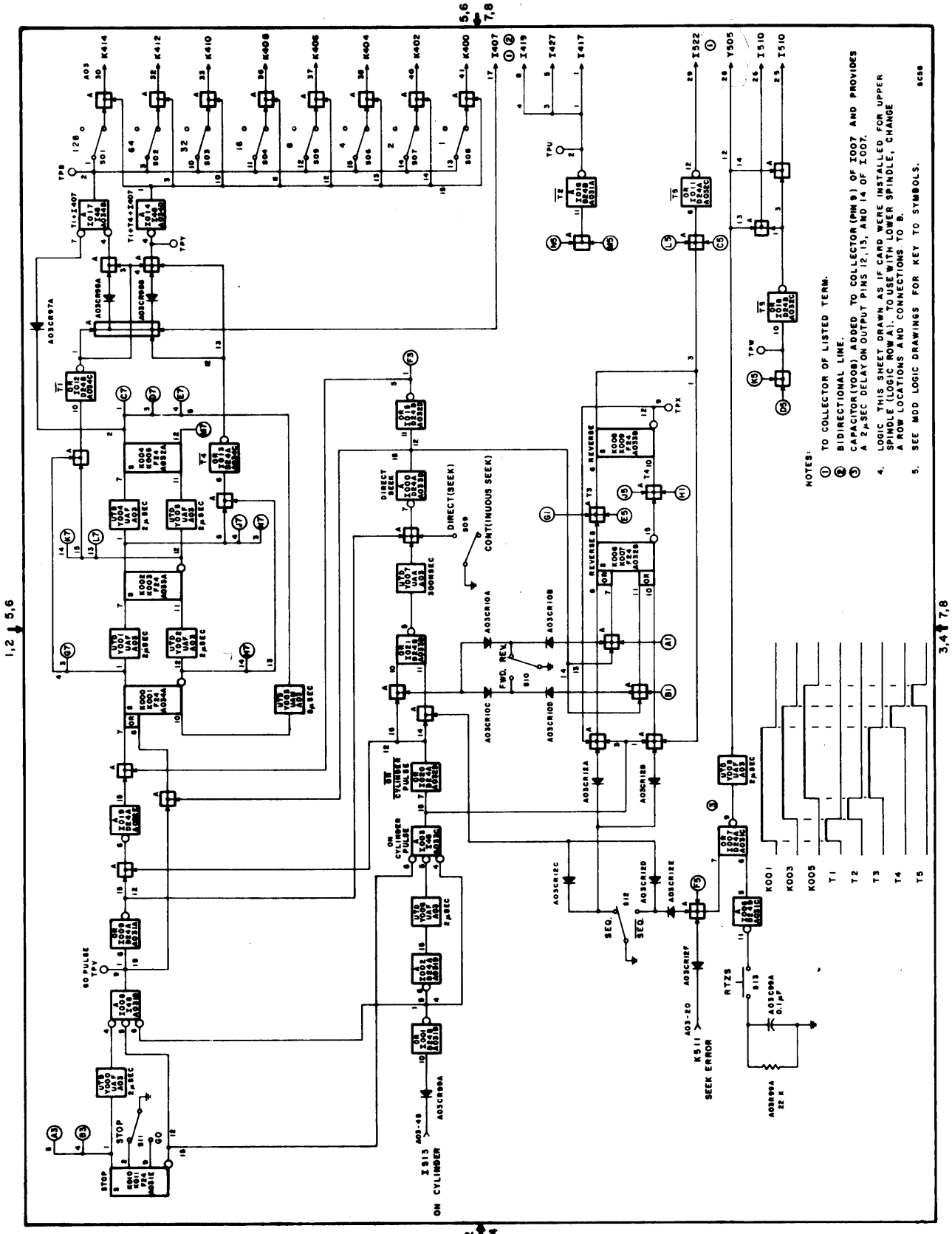


Figure 7-53. Logical Presentation of Tester Card

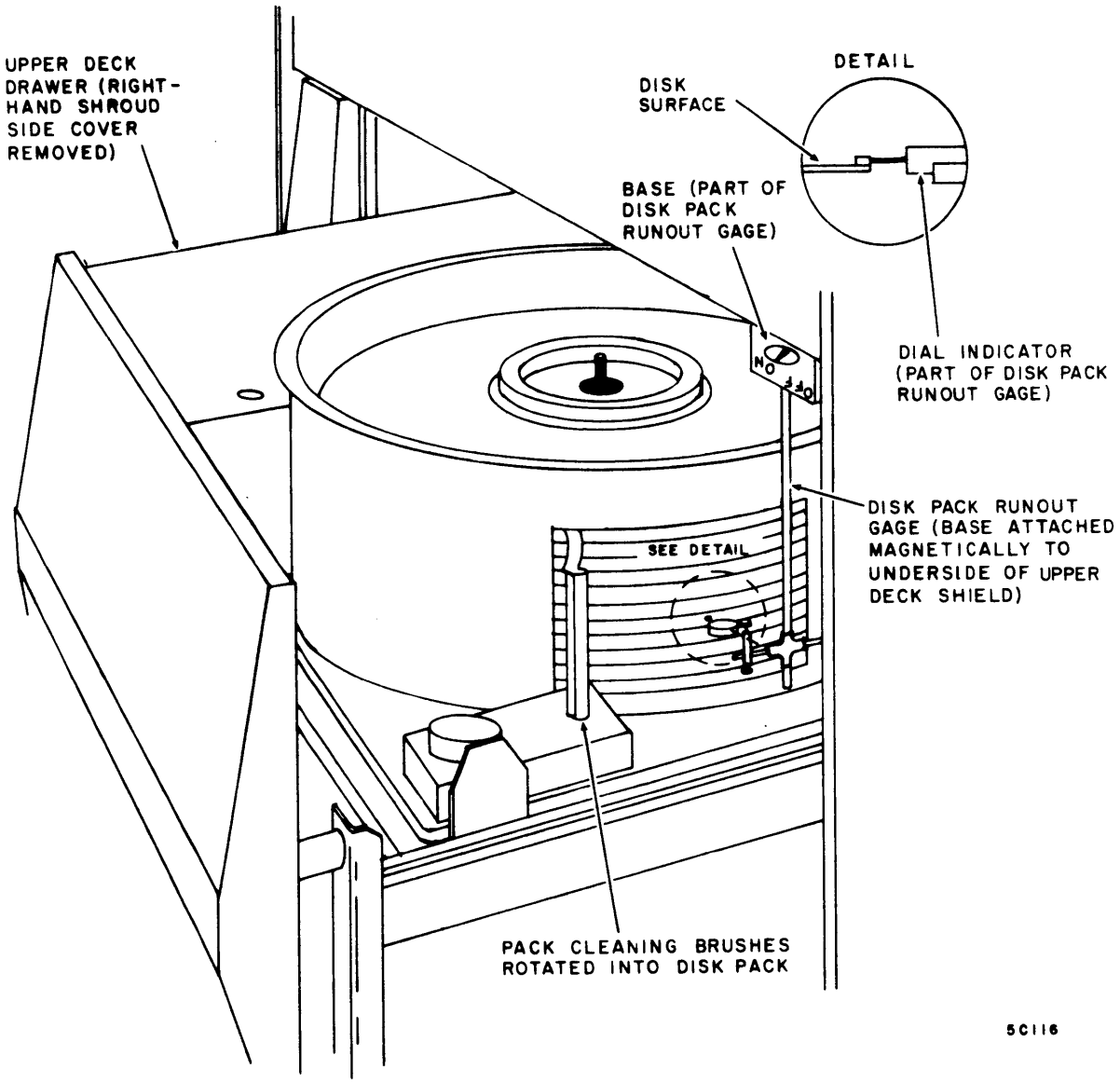


Figure 7-52. Disk Pack Runout Check

TESTER CARD

The Tester Card (P/N 40072100) is a special tool used extensively in the maintenance procedures of Section 6. As an aid in using the card, the schematic diagram (8FFN) is provided in Section 5 and Figure 7-53 is the logical portrayal of the same card.

SECTION 8

PARTS DATA

Information for this section is included in CONTROL DATA® BM1A5/BM1A6 Multiple Disk Drive Parts List Manual.
Pub. No. 70601900

SECTION 9

WIRE LISTS

WIRE LISTS

DESCRIPTION OF WIRE LISTS

The two types of wire lists are:

1. The line printer format which shows logic wiring.
2. The corporate (typed) form which shows non-logic wiring.

LOGIC WIRE LISTS

The following is an example of the logic wire lists with an identification, and an explanation of the columns.

Wire Identification	Wire Length	Wire Origin Location	Wire Origin Pin Number	Component Code	Wire Destination Location	Wire Destination Pin Number	Wire Size	Color Code	Change Order
AK50010	03	A14	28	O	A16	18			
AK50020	05	A14	25	O	A08	14			
AK50030	05	A14	14	O	A09	37			
AK50210	04	A07	10	O	A11	16			
AK50211	04	A11	16	O	A18	34			
1100520	02	B06	48	R	B07	48	20	222	1234
1100521	02	B07	48	R	B08	48	20	222	5678
1100522	02	B08	48	R	B09	48	20	222	
1100523	02	B09	48	R	B10	48	20	222	
1100524	02	B10	48	R	B11	48	20	222	

Wire Identification

If the identifier begins with a letter, the wire provides an input to a logic term; first letter identifies the logic row of the term, second letter and the first three digits identify the logic term receiving the input via this wire. If the identifier begins with a numeral, the wire is not directly providing an input to a logic term and is generally classified as a miscellaneous jumper. A sequential advance in the second to the last digit indicates additional inputs to the same term.

AK50010 - single input OR to K500
AK50020 - single input OR to K500

A sequential advance in the last digit indicates the interconnections of an AND input.

AK50210 }
AK50211 } Two input AND to K502

Wire Length

This column gives the wire length in inches.

Wire Origin Location

This column locates the origin of the wire on the logic chassis. Wires having a common signal at two or more locations are interconnected in series. In the sample, the fourth and fifth wires shown have a common signal. The Wire Destination Location of the first wire becomes the Wire Origin Location of the second so that the series string is from A07 pin 10 to A11 pin 16 to A13 pin 34. Note that the first four characters of the Wire Identification terms are the same for the three wires and that the sequencing is from 10 to 11 in the last two characters.

Wire Origin Pin Number

This column identifies the origin pin or terminal of the wire.

Component Code

This column identifies the components that are located in the Wire Origin Location and the Wire Destination Location columns. The code letters are identified as follows:

O - When both ends terminate at a logic card

R - When one end terminates at a miscellaneous component (switch, resistor, etc.)

X - When one end terminates at a jack (or connector pin)

Wire Desitnation Location

This column locates the destination of the wire on the logic chassis.

Wire Destination Pin Number

This column identifies the destination pin or terminal of the wire.

Wire Size

This column identifies the size (AWG) of the wire.

Color Code

Solid colored wires are identified by repeating (3 times) the code number in this column. Multicolored wires are identified by a number having two or three digits. Each digit of the number identifies one of the colors. The code numbers are identified as follows:

0 - Black	2 - Red	4 - Yellow	6 - Blue	8 - Gray	S - Shield
1 - Brown	3 - Orange	5 - Green	7 - Violet	9 - White	

Change Order

This column identifies the engineering, field, or publications change order that affected and/or altered that wire.

NON-LOGIC LISTS

CONTROL DATA
COMPUTER DIVISION

TITLE: WIRE LISTING

WL | DOCUMENT NO. | REV.

SHEET OF

CONDUCTOR IDENT.	FIND NO.	GAUGE (REF.)	COLOR (REF.)	LENGTH (APPROX)	ORIGIN		ACCESS FIND NO.	DESTINATION		ACCESS FIND NO.	REMARKS
20	29	24	993	03	X12	03		X12	09		
21	29	↑	993	03	X13	03		X13	09		
22	29		993	03	X14	03		X14	09		
23	29		993	03	X15	03		X15	09		
24	29		993	03	X16	03		X16	09		

Wire lists other than logic are on a standard corporate form. The remaining columns of the form contain information NOT normally applicable to field usage and therefore are not explained.

The other columns indicate:

Gauge (Ref) - Size of conductor (AWG)

Color (Ref) - Color information

Length (Approx) - Length of conductor in inches

Origin - Origin point of conductor

Destination - Destination point of conductor

Remarks - Useful comments

In multi-digit color codes, the first digit denotes base color and the remaining digits denote tracer colors. The color codes for the non-logic lists are the same as those for logic wiring.

CONTROL DATA	NORMANDALE DIVISION	CODE IDENT 19333	SHEET 1 OF 1	DN	DOCUMENT NO. 70951400	REV F

NOTES:

1. FOR MECH ASSY AND PL SEE 70951803.
2. FOR CARD PLACEMENT LIST SEE DWG 70957800 AND LOGIC SCHEMATIC 70954900.
3. INSTALL A SOLID BLACK JUMPER WIRE, FIND NO. 76 FROM PIN 2 AND PIN 50 OF EACH CONNECTOR, NUMBER A01 THRU A29 AND B01 THRU B29, TO THE CLOSEST HOLE IN THE CONNECTOR MOUNTING BAR FOR GROUNDING.
4. IF THE FIRST LETTER OF WIRE IDENTIFICATION IS A "X", "Y", OR "Z" IT MEANS THE WIRE IS INSTALLED IN THE LOGIC CHASSIS BUT A LOGIC ELEMENT BY THAT TERM NAME IS NOT SHOWN ON LOGIC SCHEMATIC OR USED IN SINGLE CHANNEL UNITS.

AA3185

PRINTED IN U.S.A.

DWN	R Rutkowski	8-26-69
CHKD	D Bailey	8-27-69
ENG	J Tarbox	8-27-69
MFG		
APPR		

CONTROL DATA

NRMOPS

CODE IDENT 19333

TITLE: LOGIC WIRE LIST
LOGIC CHASSIS (03)

PREFIX: LW

DOCUMENT NO.: 70951400

REV: F

FIRST USED ON: MULT. DISK DRIVE

SHEET 1 OF 1

SHEET REVISION STATUS

REVISION RECORD

REV	ECO	DESCRIPTION	DRFT	DATE	APP
A		RELEASED		9-3-69	ew
B	PM 5543	CHANGED 4 CARDS	EW	6-19-69	ew
C	PM 5546	ADDED & DELETED CARDS	EW	7-14-69	ew
D	PM 5496	EXTENSIVE CHANGES	EW	8-25-69	ew
E	PM 5453	ADDED SEVERAL CARDS	EW	9-23-69	ew
F	PE1111BA	CHANGED 2 CARDS	EW	12-8-69	ew

NOTES:

PRT OUT 70951400
DN 70951400
DETACHED LISTS

AA3180

PRINTED IN U.S.A.

LW70951400 MOD SINGLE CHANNEL REVISION F

AI11811	03	A16	44	0	A15	50	LOGIC CHASSIS (03)	
AI11820	06	A16	45	0	A25	38	LOGIC CHASSIS (03)	
AI12010	04	A16	41	0	A12	28	LOGIC CHASSIS (03)	
AI12110	06	A16	21	0	A25	44	LOGIC CHASSIS (03)	
AI12211	02	A16	42	0	A16	50	LOGIC CHASSIS (03)	
AI20010	05	A17	21	0	A12	36	LOGIC CHASSIS (03)	
AI20020	08	A17	25	0	A29	44	LOGIC CHASSIS (03)	
AI20120	02	A17	40	0	A17	21	LOGIC CHASSIS (03)	5546
AI21710	04	A18	05	0	A19	29	LOGIC CHASSIS (03)	
AI21810	05	A19	08	0	A25	24	LOGIC CHASSIS (03)	
AI22110	06	A19	12	0	A27	24	LOGIC CHASSIS (03)	
AI22310	07	A19	14	0	A29	32	LOGIC CHASSIS (03)	
AI22411	03	A19	18	0	A19	02	LOGIC CHASSIS (03)	
AI22510	07	A19	40	0	A29	24	LOGIC CHASSIS (03)	
AI22810	07	A19	42	0	A29	18	LOGIC CHASSIS (03)	
AI23010	03	A19	21	0	A18	21	LOGIC CHASSIS (03)	
AI23210	02	A19	34	0	A20	26	LOGIC CHASSIS (03)	
AI24910	03	A19	24	0	A17	28	LOGIC CHASSIS (03)	
AI30010	03	A06	01	0	A08	05	LOGIC CHASSIS (03)	
AI30210	04	A06	40	0	A06	50	LOGIC CHASSIS (03)	
AI30410	06	A06	17	0	A11	44	LOGIC CHASSIS (03)	
AI30420	08	A06	12	0	A18	20	LOGIC CHASSIS (03)	5453
AI34610	06	A18	36	0	A11	22	LOGIC CHASSIS (03)	
AI34710	02	A18	16	0	A18	02	LOGIC CHASSIS (03)	
AI34910	08	A18	41	0	A06	29	LOGIC CHASSIS (03)	
AI34911	08	A18	41	0	A06	45	LOGIC CHASSIS (03)	5453
AI40011	02	A12	05	0	A12	02	LOGIC CHASSIS (03)	
AI40020	08	A12	08	0	A25	32	LOGIC CHASSIS (03)	
AI40710	05	A12	36	0	A08	09	LOGIC CHASSIS (03)	
AI40720	03	A12	37	0	A14	29	LOGIC CHASSIS (03)	
AI40730	04	A12	32	0	A07	38	LOGIC CHASSIS (03)	
AI40910	03	A13	21	0	A12	10	LOGIC CHASSIS (03)	
AI40911	04	A12	10	0	A08	20	LOGIC CHASSIS (03)	
AI41010	05	A12	09	0	A08	21	LOGIC CHASSIS (03)	
AI41011	03	A12	09	0	A13	24	LOGIC CHASSIS (03)	
AI41210	04	A11	08	0	A12	40	LOGIC CHASSIS (03)	
AI41211	04	A12	40	0	A13	13	LOGIC CHASSIS (03)	
AI41221	04	A12	41	0	A13	17	LOGIC CHASSIS (03)	
AI41220	05	A11	05	0	A12	41	LOGIC CHASSIS (03)	
AI41310	04	A11	01	0	A12	34	LOGIC CHASSIS (03)	
AI41510	04	A11	12	0	A12	38	LOGIC CHASSIS (03)	
AI41511	04	A12	38	0	A13	09	LOGIC CHASSIS (03)	
AI41710	04	A13	45	0	A11	17	LOGIC CHASSIS (03)	
AI41810	03	A13	41	0	A11	29	LOGIC CHASSIS (03)	
AI42210	03	A12	20	0	A13	08	LOGIC CHASSIS (03)	
AI42220	04	A12	21	0	A13	01	LOGIC CHASSIS (03)	
AI42230	02	A12	22	0	A13	18	LOGIC CHASSIS (03)	
AI42710	04	A13	42	0	A11	13	LOGIC CHASSIS (03)	
AI50910	04	A08	16	0	A12	17	LOGIC CHASSIS (03)	
AI50920	04	A08	18	0	A12	12	LOGIC CHASSIS (03)	
AI50930	04	A08	17	0	A13	12	LOGIC CHASSIS (03)	
AI51310	05	A11	41	0	A07	09	LOGIC CHASSIS (03)	
AI51410	04	A11	21	0	A07	25	LOGIC CHASSIS (03)	
AI52010	06	A07	20	0	A14	38	LOGIC CHASSIS (03)	
AI52020	07	A07	14	0	A17	14	LOGIC CHASSIS (03)	

AI52030	02	A07	21	0	A08	09	LOGIC CHASSIS (03)	
AI52110	04	A11	36	0	A08	13	LOGIC CHASSIS (03)	
AI52210	04	A07	24	0	A11	32	LOGIC CHASSIS (03)	
AI52220	02	A07	32	0	A08	25	LOGIC CHASSIS (03)	
AI52230	03	A07	30	0	A08	16	LOGIC CHASSIS (03)	
AI52310	06	A08	29	0	A17	12	LOGIC CHASSIS (03)	
AI52320	11	A08	28	0	A27	38	LOGIC CHASSIS (03)	
AI52331	03	A08	30	0	A08	50	LOGIC CHASSIS (03)	
AI60010	11	A08	41	0	A27	32	LOGIC CHASSIS (03)	
AI60021	03	A08	44	0	A07	50	LOGIC CHASSIS (03)	
AI60210	06	A15	01	0	A08	33	LOGIC CHASSIS (03)	
AI60610	05	A15	26	0	A08	40	LOGIC CHASSIS (03)	
AI61210	05	A17	22	0	A11	36	LOGIC CHASSIS (03)	
AI62210	05	A14	05	0	A11	44	LOGIC CHASSIS (03)	
AI62310	02	A14	13	0	A15	05	LOGIC CHASSIS (03)	
AI62410	02	A14	16	0	A15	10	LOGIC CHASSIS (03)	
AI62510	02	A14	12	0	A15	18	LOGIC CHASSIS (03)	
AK10010	04	A16	33	0	A21	18	LOGIC CHASSIS (03)	
AK10011	02	A21	18	0	A21	13	LOGIC CHASSIS (03)	
AK10210	04	A16	25	0	A21	17	LOGIC CHASSIS (03)	
AK10211	02	A21	17	0	A21	16	LOGIC CHASSIS (03)	
AK10410	04	A16	22	0	A21	22	LOGIC CHASSIS (03)	
AK10411	03	A21	22	0	A21	10	LOGIC CHASSIS (03)	
AK10610	05	A16	12	0	A21	21	LOGIC CHASSIS (03)	
AK10611	02	A21	21	0	A21	14	LOGIC CHASSIS (03)	
AK10810	04	A16	37	0	A21	41	LOGIC CHASSIS (03)	
AK10811	02	A21	41	0	A21	33	LOGIC CHASSIS (03)	
AK11010	04	A16	29	0	A21	42	LOGIC CHASSIS (03)	
AK11011	03	A21	42	0	A21	30	LOGIC CHASSIS (03)	
AK11210	05	A16	18	0	A21	44	LOGIC CHASSIS (03)	
AK11211	03	A21	44	0	A21	29	LOGIC CHASSIS (03)	
AK11410	06	A16	08	0	A21	45	LOGIC CHASSIS (03)	
AK11411	03	A21	45	0	A21	36	LOGIC CHASSIS (03)	
AK20310	07	A19	22	0	A29	38	LOGIC CHASSIS (03)	
AK30110	02	A06	38	0	A06	21	LOGIC CHASSIS (03)	
AK40010	03	A13	32	0	A14	13	LOGIC CHASSIS (03)	
AK40210	02	A13	20	0	A14	12	LOGIC CHASSIS (03)	
AK40410	02	A13	12	0	A15	08	LOGIC CHASSIS (03)	
AK40610	05	A13	05	0	A15	41	LOGIC CHASSIS (03)	
AK40620	03	A13	30	0	A12	13	LOGIC CHASSIS (03)	
AK40710	03	A13	40	0	A12	26	LOGIC CHASSIS (03)	
AK40810	03	A12	25	0	A14	16	LOGIC CHASSIS (03)	
AK41010	04	A12	17	0	A16	29	LOGIC CHASSIS (03)	
AK41210	04	A12	12	0	A14	28	LOGIC CHASSIS (03)	
AK41410	04	A12	01	0	A16	08	LOGIC CHASSIS (03)	
AK50010	03	A14	28	0	A16	18	LOGIC CHASSIS (03)	
AK50020	05	A14	25	0	A08	14	LOGIC CHASSIS (03)	
AK50030	06	A14	14	0	A08	12	LOGIC CHASSIS (03)	5546
AK50210	04	A07	10	0	A11	16	LOGIC CHASSIS (03)	
AK50211	04	A11	16	0	A13	34	LOGIC CHASSIS (03)	
AK50310	02	A07	12	0	A06	05	LOGIC CHASSIS (03)	
AK50311	06	A06	05	0	A13	28	LOGIC CHASSIS (03)	
AK50610	04	A07	26	0	A11	14	LOGIC CHASSIS (03)	
AK50620	04	A07	33	0	A08	13	LOGIC CHASSIS (03)	
AK50710	05	A07	36	0	A11	09	LOGIC CHASSIS (03)	

LW70951400	MDD	SINGLE CHANNEL					REVISION F
AK50810	05	A07	42	0	A11	13	LOGIC CHASSIS (03)
AK50910	05	A07	40	0	A11	10	LOGIC CHASSIS (03)
AK51110	02	A11	32	0	A12	37	LOGIC CHASSIS (03)
AK60010	04	A15	05	0	A16	33	LOGIC CHASSIS (03)
AK60210	02	A15	18	0	A16	25	LOGIC CHASSIS (03)
AK60410	03	A15	08	0	A16	22	LOGIC CHASSIS (03)
AK60610	04	A15	41	0	A16	12	LOGIC CHASSIS (03)
AK60810	04	A15	10	0	A16	37	LOGIC CHASSIS (03)
AK61010	04	A17	36	0	A14	21	LOGIC CHASSIS (03)
AK61210	05	A17	37	0	A11	33	LOGIC CHASSIS (03)
AK61410	04	A17	17	0	A14	24	LOGIC CHASSIS (03)
AK61810	04	A17	24	0	A14	10	LOGIC CHASSIS (03)
AK62010	04	A17	01	0	A14	17	LOGIC CHASSIS (03)
AT00010	07	A24	01	0	A16	34	LOGIC CHASSIS (03)
AT00020	11	A24	05	0	B16	34	LOGIC CHASSIS (03)
AT00110	06	A24	12	0	A16	26	LOGIC CHASSIS (03)
AT00120	10	A24	14	0	B16	26	LOGIC CHASSIS (03)
AT00210	06	A24	17	0	A16	20	LOGIC CHASSIS (03)
AT00220	09	A24	18	0	B16	20	LOGIC CHASSIS (03)
AT00310	06	A24	25	0	A16	09	LOGIC CHASSIS (03)
AT00320	08	A24	26	0	B16	09	LOGIC CHASSIS (03)
AT00410	06	A24	30	0	A16	38	LOGIC CHASSIS (03)
AT00420	09	A24	32	0	B16	38	LOGIC CHASSIS (03)
AT00510	06	A24	36	0	A16	30	LOGIC CHASSIS (03)
AT00520	09	A24	37	0	B16	30	LOGIC CHASSIS (03)
AT00610	07	A24	41	0	A16	16	LOGIC CHASSIS (03)
AT00620	08	A24	42	0	B16	16	LOGIC CHASSIS (03)
AT00710	07	A26	01	0	A16	05	LOGIC CHASSIS (03)
AT00720	10	A26	05	0	B16	05	LOGIC CHASSIS (03)
AT00811	02	A26	12	0	A26	02	LOGIC CHASSIS (03)
AT00821	03	A26	14	0	A25	02	LOGIC CHASSIS (03)
AT01210	07	A28	01	0	A18	12	LOGIC CHASSIS (03)
AT01220	10	A28	05	0	B18	12	LOGIC CHASSIS (03)
AT01310	07	A28	12	0	A18	10	LOGIC CHASSIS (03)
AT01320	09	A28	14	0	B18	10	LOGIC CHASSIS (03)
AT01410	03	A28	17	0	A28	02	LOGIC CHASSIS (03)
AT01420	02	A28	17	0	A28	18	LOGIC CHASSIS (03)
AT01610	07	A28	25	0	A18	09	LOGIC CHASSIS (03)
AT01620	09	A28	26	0	B18	09	LOGIC CHASSIS (03)
AT01711	02	A19	16	0	A18	14	LOGIC CHASSIS (03)
AT01710	07	A28	30	0	A19	16	LOGIC CHASSIS (03)
AT01720	08	A28	32	0	B19	16	LOGIC CHASSIS (03)
AT01721	02	B19	16	0	B18	14	LOGIC CHASSIS (03)
AT01810	07	A28	36	0	A18	01	LOGIC CHASSIS (03)
AT01820	08	A28	37	0	B18	01	LOGIC CHASSIS (03)
AT01910	06	A26	17	0	A18	08	LOGIC CHASSIS (03)
AT01920	02	A26	18	0	A26	26	LOGIC CHASSIS (03)
AT02010	08	A26	25	0	B18	08	LOGIC CHASSIS (03)
AT02020	02	A26	26	0	A26	32	LOGIC CHASSIS (03)
AT02110	06	A26	30	0	A18	44	LOGIC CHASSIS (03)
AT02120	02	A26	32	0	A26	37	LOGIC CHASSIS (03)
AT02210	09	A26	36	0	B18	44	LOGIC CHASSIS (03)
AT02220	02	A26	37	0	A26	42	LOGIC CHASSIS (03)
AT02310	05	A28	41	0	A22	33	LOGIC CHASSIS (03)
AT02320	02	A28	42	0	A28	50	LOGIC CHASSIS (03)

LW70951400	MDD	SINGLE CHANNEL			REVISION F			
AT02410	08	A26	41	0	B22	33	LOGIC CHASSIS (03)	
AT02420	02	A26	42	0	A26	50	LOGIC CHASSIS (03)	
AY40410	05	A13	10	0	A07	08	LOGIC CHASSIS (03)	
AY51510	03	A08	24	0	A11	20	LOGIC CHASSIS (03)	
AY51511	06	A11	20	0	A18	37	LOGIC CHASSIS (03)	
AY60110	03	A17	10	0	A14	09	LOGIC CHASSIS (03)	
AY60410	04	A08	37	0	A11	40	LOGIC CHASSIS (03)	5543
AY60411	03	A11	40	0	A14	33	LOGIC CHASSIS (03)	5543
BI11811	03	B16	44	0	B15	50	LOGIC CHASSIS (03)	
BI11820	10	B16	45	0	A25	40	LOGIC CHASSIS (03)	
BI12010	04	B16	41	0	B12	28	LOGIC CHASSIS (03)	
BI12110	08	B16	21	0	A25	45	LOGIC CHASSIS (03)	
BI12211	02	B16	42	0	B16	50	LOGIC CHASSIS (03)	
BI20010	04	B17	21	0	B12	36	LOGIC CHASSIS (03)	
BI20020	09	B17	25	0	A29	45	LOGIC CHASSIS (03)	
BI20120	02	B17	40	0	B17	21	LOGIC CHASSIS (03)	5546
BI21710	04	B18	05	0	B19	29	LOGIC CHASSIS (03)	
BI21810	07	B19	08	0	A25	25	LOGIC CHASSIS (03)	
BI22110	08	B19	12	0	A27	25	LOGIC CHASSIS (03)	
BI22310	08	B19	14	0	A29	33	LOGIC CHASSIS (03)	
BI22411	03	B19	18	0	B19	02	LOGIC CHASSIS (03)	
BI22510	10	B19	40	0	A29	25	LOGIC CHASSIS (03)	
BI22810	11	B19	42	0	A29	20	LOGIC CHASSIS (03)	
BI23010	02	B19	21	0	B18	21	LOGIC CHASSIS (03)	
BI23210	02	B19	34	0	B20	26	LOGIC CHASSIS (03)	
BI24910	03	B19	24	0	B17	28	LOGIC CHASSIS (03)	
BI30010	03	B06	01	0	B08	05	LOGIC CHASSIS (03)	
BI30210	04	B06	40	0	B06	50	LOGIC CHASSIS (03)	
BI30410	06	B06	17	0	B11	44	LOGIC CHASSIS (03)	
BI30420	08	B06	12	0	B18	20	LOGIC CHASSIS (03)	5453
BI34610	06	B18	36	0	B11	22	LOGIC CHASSIS (03)	
BI34710	03	B18	16	0	B18	02	LOGIC CHASSIS (03)	
BI34910	08	B18	41	0	B06	29	LOGIC CHASSIS (03)	
BI34911	08	B18	41	0	B06	45	LOGIC CHASSIS (03)	5453
BI40011	02	B12	05	0	B12	02	LOGIC CHASSIS (03)	
BI40020	09	B12	08	0	A25	33	LOGIC CHASSIS (03)	
BI40710	05	B12	36	0	B08	09	LOGIC CHASSIS (03)	
BI40720	03	B12	37	0	B14	29	LOGIC CHASSIS (03)	
BI40730	04	B12	32	0	B07	38	LOGIC CHASSIS (03)	
BI40910	03	B13	21	0	B12	10	LOGIC CHASSIS (03)	
BI40911	04	B12	10	0	B08	20	LOGIC CHASSIS (03)	
BI41011	03	B12	09	0	B13	24	LOGIC CHASSIS (03)	
BI41010	05	B12	09	0	B08	21	LOGIC CHASSIS (03)	
BI41210	05	B11	08	0	B12	40	LOGIC CHASSIS (03)	
BI41211	04	B12	40	0	B13	13	LOGIC CHASSIS (03)	
BI41220	05	B11	05	0	B12	41	LOGIC CHASSIS (03)	
BI41221	04	B12	41	0	B13	17	LOGIC CHASSIS (03)	
BI41310	04	B11	01	0	B12	34	LOGIC CHASSIS (03)	
BI41510	04	B11	12	0	B12	38	LOGIC CHASSIS (03)	
BI41511	04	B12	38	0	B13	09	LOGIC CHASSIS (03)	
BI41710	04	B13	45	0	B11	17	LOGIC CHASSIS (03)	
BI41810	03	B13	41	0	B11	29	LOGIC CHASSIS (03)	
BI42210	03	B12	20	0	B13	08	LOGIC CHASSIS (03)	
BI42220	04	B12	21	0	B13	01	LOGIC CHASSIS (03)	
BI42230	02	B12	22	0	B13	18	LOGIC CHASSIS (03)	

LW70951400	MOD	SINGLE	CHANNEL				REVISION F
BI42710	04	B13	42	0	B11	13	LOGIC CHASSIS (03)
BI50910	04	B08	16	0	B12	17	LOGIC CHASSIS (03)
BI50920	04	B08	18	0	B12	12	LOGIC CHASSIS (03)
BI50930	04	B08	17	0	B13	12	LOGIC CHASSIS (03)
BI51310	05	B11	41	0	B07	09	LOGIC CHASSIS (03)
BI51410	04	A11	21	0	A07	25	LOGIC CHASSIS (03)
BI52010	06	B07	20	0	B14	38	LOGIC CHASSIS (03)
BI52020	07	B07	14	0	B17	14	LOGIC CHASSIS (03)
BI52030	03	B07	21	0	B08	09	LOGIC CHASSIS (03)
BI52110	04	B11	36	0	B08	13	LOGIC CHASSIS (03)
BI52210	04	B07	24	0	B11	32	LOGIC CHASSIS (03)
BI52220	03	B07	32	0	B08	25	LOGIC CHASSIS (03)
BI52230	03	B07	30	0	B08	16	LOGIC CHASSIS (03)
BI52310	06	B08	29	0	B17	12	LOGIC CHASSIS (03)
BI52320	12	B08	28	0	A27	40	LOGIC CHASSIS (03)
BI52331	03	B08	30	0	B08	50	LOGIC CHASSIS (03)
BI60010	12	B08	41	0	A27	33	LOGIC CHASSIS (03)
BI60021	03	B08	44	0	B07	50	LOGIC CHASSIS (03)
BI60210	06	B15	01	0	B08	33	LOGIC CHASSIS (03)
BI60610	05	B15	26	0	B08	40	LOGIC CHASSIS (03)
BI61210	05	B17	22	0	B11	36	LOGIC CHASSIS (03)
BI62210	05	B14	05	0	B11	44	LOGIC CHASSIS (03)
BI62310	02	B14	13	0	B15	05	LOGIC CHASSIS (03)
BI62410	02	B14	16	0	B15	10	LOGIC CHASSIS (03)
BI62510	02	B14	12	0	B15	18	LOGIC CHASSIS (03)
BK10010	04	B16	33	0	B21	18	LOGIC CHASSIS (03)
BK10011	02	B21	18	0	B21	13	LOGIC CHASSIS (03)
BK10210	04	B16	25	0	B21	17	LOGIC CHASSIS (03)
BK10211	02	B21	17	0	B21	16	LOGIC CHASSIS (03)
BK10410	04	B16	22	0	B21	22	LOGIC CHASSIS (03)
BK10411	03	B21	22	0	B21	10	LOGIC CHASSIS (03)
BK10610	05	B16	12	0	B21	21	LOGIC CHASSIS (03)
BK10611	02	B21	21	0	B21	14	LOGIC CHASSIS (03)
BK10810	04	B16	37	0	B21	41	LOGIC CHASSIS (03)
BK10811	02	B21	41	0	B21	33	LOGIC CHASSIS (03)
BK11010	04	B16	29	0	B21	42	LOGIC CHASSIS (03)
BK11011	03	B21	42	0	B21	30	LOGIC CHASSIS (03)
BK11210	05	B16	18	0	B21	44	LOGIC CHASSIS (03)
BK11211	03	B21	44	0	B21	29	LOGIC CHASSIS (03)
BK11410	06	B16	08	0	B21	45	LOGIC CHASSIS (03)
BK11411	03	B21	45	0	B21	36	LOGIC CHASSIS (03)
BK20310	08	B19	22	0	A29	40	LOGIC CHASSIS (03)
BK30110	02	B06	38	0	B06	21	LOGIC CHASSIS (03)
BK40010	03	B13	32	0	B14	13	LOGIC CHASSIS (03)
BK40210	02	B13	20	0	B14	12	LOGIC CHASSIS (03)
BK40410	02	B13	12	0	B15	08	LOGIC CHASSIS (03)
BK40610	05	B13	05	0	B15	41	LOGIC CHASSIS (03)
BK40620	03	B13	30	0	B12	13	LOGIC CHASSIS (03)
BK40710	03	B13	40	0	B12	26	LOGIC CHASSIS (03)
BK40810	03	B12	25	0	B14	16	LOGIC CHASSIS (03)
BK41010	04	B12	17	0	B16	29	LOGIC CHASSIS (03)
BK41210	04	B12	12	0	B14	28	LOGIC CHASSIS (03)
BK41410	04	B12	01	0	B16	08	LOGIC CHASSIS (03)
BK50010	03	B14	28	0	B16	18	LOGIC CHASSIS (03)
BK50020	05	B14	25	0	B08	14	LOGIC CHASSIS (03)

LW70951400	MDD SINGLE CHANNEL						REVISION F	
BK50030	06	B14	14	0	B08	12	LOGIC CHASSIS (03)	5546
BK50210	04	B07	10	0	B11	16	LOGIC CHASSIS (03)	
BK50211	04	B11	16	0	B13	34	LOGIC CHASSIS (03)	
BK50310	02	B07	12	0	B06	05	LOGIC CHASSIS (03)	
BK50311	06	B06	05	0	B13	28	LOGIC CHASSIS (03)	
BK50610	04	B07	26	0	B11	14	LOGIC CHASSIS (03)	
BK50620	04	B07	33	0	B08	13	LOGIC CHASSIS (03)	
BK50710	05	B07	36	0	B11	09	LOGIC CHASSIS (03)	
BK50810	05	B07	42	0	B11	13	LOGIC CHASSIS (03)	
BK50910	05	B07	40	0	B11	10	LOGIC CHASSIS (03)	
BK51110	02	B11	32	0	B12	37	LOGIC CHASSIS (03)	
BK60010	04	B15	05	0	B16	33	LOGIC CHASSIS (03)	
BK60210	02	B15	18	0	B16	25	LOGIC CHASSIS (03)	
BK60410	03	B15	08	0	B16	22	LOGIC CHASSIS (03)	
BK60610	04	B15	41	0	B16	12	LOGIC CHASSIS (03)	
BK60810	04	B15	10	0	B16	37	LOGIC CHASSIS (03)	
BK61010	03	B17	36	0	B14	21	LOGIC CHASSIS (03)	
BK61210	05	B17	37	0	B11	33	LOGIC CHASSIS (03)	
BK61410	04	B17	17	0	B14	24	LOGIC CHASSIS (03)	
BK61810	04	B17	24	0	B14	10	LOGIC CHASSIS (03)	
BK62010	04	B17	01	0	B14	17	LOGIC CHASSIS (03)	
BT00010	08	B24	01	0	A16	36	LOGIC CHASSIS (03)	
BT00020	07	B24	05	0	B16	36	LOGIC CHASSIS (03)	
BT00110	08	B24	12	0	A16	28	LOGIC CHASSIS (03)	
BT00120	08	B24	14	0	B16	28	LOGIC CHASSIS (03)	
BT00210	09	B24	17	0	A16	17	LOGIC CHASSIS (03)	
BT00220	06	B24	18	0	B16	17	LOGIC CHASSIS (03)	
BT00310	10	B24	25	0	A16	10	LOGIC CHASSIS (03)	
BT00320	06	B24	26	0	B16	10	LOGIC CHASSIS (03)	
BT00410	08	B24	30	0	A16	40	LOGIC CHASSIS (03)	
BT00420	06	B24	32	0	B16	40	LOGIC CHASSIS (03)	
BT00510	09	B24	36	0	A16	32	LOGIC CHASSIS (03)	
BT00520	06	B24	37	0	B16	32	LOGIC CHASSIS (03)	
BT00610	11	B24	41	0	A16	13	LOGIC CHASSIS (03)	
BT00620	06	B24	42	0	B16	13	LOGIC CHASSIS (03)	
BT00710	09	B26	01	0	A16	01	LOGIC CHASSIS (03)	
BT00720	06	B26	05	0	B16	01	LOGIC CHASSIS (03)	
BT00811	02	B26	12	0	B26	02	LOGIC CHASSIS (03)	
BT00821	03	B26	14	0	B25	02	LOGIC CHASSIS (03)	
BT01210	08	B28	01	0	A18	32	LOGIC CHASSIS (03)	
BT01220	07	B28	05	0	B18	32	LOGIC CHASSIS (03)	
BT01310	09	B28	12	0	A18	29	LOGIC CHASSIS (03)	
BT01320	07	B28	14	0	B18	29	LOGIC CHASSIS (03)	
BT01410	03	B28	17	0	A28	02	LOGIC CHASSIS (03)	
BT01420	02	B28	18	0	A28	17	LOGIC CHASSIS (03)	
BT01610	10	B28	25	0	A18	30	LOGIC CHASSIS (03)	
BT01620	07	B28	26	0	B18	30	LOGIC CHASSIS (03)	
BT01810	10	B28	36	0	A18	34	LOGIC CHASSIS (03)	
BT01820	07	B28	37	0	B18	34	LOGIC CHASSIS (03)	
BT01910	09	B26	17	0	A18	25	LOGIC CHASSIS (03)	
BT01920	02	B26	18	0	B26	26	LOGIC CHASSIS (03)	
BT02010	06	B26	25	0	B18	25	LOGIC CHASSIS (03)	
BT02020	02	B26	26	0	B26	32	LOGIC CHASSIS (03)	
BT02110	10	B26	30	0	A19	32	LOGIC CHASSIS (03)	
BT02111	03	A19	32	0	A18	45	LOGIC CHASSIS (03)	

BT02120	02	B26	32 0	B26	37	LOGIC CHASSIS (03)	
BT02211	02	B19	32 0	B18	45	(03)	
BT02210	06	B26	36 0	B19	32	(03)	
BT02220	02	B26	37 0	B26	42	LOGIC CHASSIS (03)	
BT02310	10	B28	41 0	A22	21	LOGIC CHASSIS (03)	
BT02320	02	B28	42 0	B28	50	LOGIC CHASSIS (03)	
BT02410	05	B26	41 0	B22	21	LOGIC CHASSIS (03)	
BT02420	02	B26	42 0	B26	50	LOGIC CHASSIS (03)	
BY40410	05	B13	10 0	B07	08	LOGIC CHASSIS (03)	
BY51510	03	B08	24 0	B11	20	LOGIC CHASSIS (03)	
BY51511	06	B11	20 0	B18	37	LOGIC CHASSIS (03)	
BY60110	03	B17	10 0	B14	09	LOGIC CHASSIS (03)	
BY60410	03	B08	37 0	B11	40	LOGIC CHASSIS (03)	5543
BY60411	03	B11	40 0	B14	33	LOGIC CHASSIS (03)	5543
XI10010	04	A21	13 0	A25	08	LOGIC CHASSIS (03)	5496
XI10020	08	A21	12 0	B25	08	LOGIC CHASSIS (03)	5496
XI10110	04	A21	16 0	A25	13	LOGIC CHASSIS (03)	5496
XI10120	08	A21	08 0	B25	13	LOGIC CHASSIS (03)	5496
XI10210	04	A21	10 0	A25	18	LOGIC CHASSIS (03)	5496
XI10220	09	A21	05 0	B25	18	LOGIC CHASSIS (03)	5496
XI10310	05	A21	14 0	A27	08	LOGIC CHASSIS (03)	5496
XI10320	08	A21	09 0	B27	08	LOGIC CHASSIS (03)	5496
XI10410	05	A21	33 0	A27	13	LOGIC CHASSIS (03)	5496
XI10420	08	A21	32 0	B27	13	LOGIC CHASSIS (03)	5496
XI10510	05	A21	30 0	A27	18	LOGIC CHASSIS (03)	5496
XI10520	07	A21	40 0	B27	18	LOGIC CHASSIS (03)	5496
XI10610	06	A21	29 0	A29	08	LOGIC CHASSIS (03)	5496
XI10620	07	A21	38 0	B29	08	LOGIC CHASSIS (03)	5496
XI10710	06	A21	36 0	A29	13	LOGIC CHASSIS (03)	5496
XI10720	08	A21	37 0	B29	13	LOGIC CHASSIS (03)	5496
XI10810	04	A21	01 0	A20	25	LOGIC CHASSIS (03)	5496
XI10910	02	A21	34 0	A19	29	LOGIC CHASSIS (03)	5496
XI11810	09	A16	44 0	B25	38	LOGIC CHASSIS (03)	5496
XI12210	09	A16	42 0	B25	44	LOGIC CHASSIS (03)	5496
XI20110	11	A17	29 0	B29	44	LOGIC CHASSIS (03)	5496
XI21510	03	A18	22 0	A20	25	LOGIC CHASSIS (03)	5496
XI22410	03	A19	18 0	A20	32	LOGIC CHASSIS (03)	5496
XI23310	09	A20	08 0	B25	24	LOGIC CHASSIS (03)	5496
XI23410	02	A20	05 0	A19	09	LOGIC CHASSIS (03)	5496
XI23420	02	A20	01 0	A19	10	LOGIC CHASSIS (03)	5496
XI23430	02	A20	09 0	A19	05	LOGIC CHASSIS (03)	5496
XI23440	02	A20	12 0	A19	17	LOGIC CHASSIS (03)	5496
XI23510	10	A20	10 0	B27	24	LOGIC CHASSIS (03)	5496
XI23610	10	A20	22 0	B29	32	LOGIC CHASSIS (03)	5496
XI23710	02	A20	21 0	A19	30	LOGIC CHASSIS (03)	5496
XI23810	10	A20	13 0	B29	24	LOGIC CHASSIS (03)	5496
XI23910	04	A20	17 0	A19	37	LOGIC CHASSIS (03)	5496
XI23920	04	A20	20 0	A19	38	LOGIC CHASSIS (03)	5496
XI23930	04	A20	14 0	A19	36	LOGIC CHASSIS (03)	5496
XI23940	04	A20	16 0	A19	41	LOGIC CHASSIS (03)	5496
XI24010	09	A20	18 0	B29	18	LOGIC CHASSIS (03)	5496
XI24110	02	A20	29 0	A19	21	LOGIC CHASSIS (03)	5496
XI24310	03	A20	37 0	A19	26	LOGIC CHASSIS (03)	5496
XI24410	04	A20	45 0	A19	13	LOGIC CHASSIS (03)	5496
XI25010	04	A20	41 0	A17	30	LOGIC CHASSIS (03)	5496

LW70951400	MDD SINGLE CHANNEL						REVISION F	
XI40010	11	A12	05	0	B25	32	LOGIC CHASSIS (03)	5496
XI52330	13	A08	30	0	B27	38	LOGIC CHASSIS (03)	5496
XI52340	07	A08	32	0	A17	13	LOGIC CHASSIS (03)	5496
XI60020	12	A08	44	0	B27	32	LOGIC CHASSIS (03)	5496
XK20210	03	A19	28	0	A20	44	LOGIC CHASSIS (03)	5496
XK20510	09	A20	40	0	B29	38	LOGIC CHASSIS (03)	5496
XT00810	05	A26	12	0	A20	28	LOGIC CHASSIS (03)	5496
XT00820	10	A26	14	0	B20	28	LOGIC CHASSIS (03)	5496
XT02111	03	A18	44	0	A20	38	LOGIC CHASSIS (03)	5496
XT02211	03	B18	44	0	B20	38	LOGIC CHASSIS (03)	5496
YI10010	08	B21	13	0	A25	10	LOGIC CHASSIS (03)	5496
YI10020	04	B21	12	0	B25	10	LOGIC CHASSIS (03)	5496
YI10110	08	B21	16	0	A25	14	LOGIC CHASSIS (03)	5496
YI10120	04	B21	08	0	B25	14	LOGIC CHASSIS (03)	5496
YI10210	08	B21	10	0	A25	20	LOGIC CHASSIS (03)	5496
YI10220	04	B21	05	0	B25	20	LOGIC CHASSIS (03)	5496
YI10310	09	B21	14	0	A27	10	LOGIC CHASSIS (03)	5496
YI10320	05	B21	09	0	B27	10	LOGIC CHASSIS (03)	5496
YI10410	10	B21	33	0	A27	14	LOGIC CHASSIS (03)	5496
YI10420	05	B21	32	0	B27	14	LOGIC CHASSIS (03)	5496
YI10510	09	B21	30	0	A27	20	LOGIC CHASSIS (03)	5496
YI10520	05	B21	40	0	B27	20	LOGIC CHASSIS (03)	5496
YI10610	10	B21	29	0	A29	10	LOGIC CHASSIS (03)	5496
YI10620	06	B21	38	0	B29	10	LOGIC CHASSIS (03)	5496
YI10710	10	B21	36	0	A29	14	LOGIC CHASSIS (03)	5496
YI10720	06	B21	37	0	B29	14	LOGIC CHASSIS (03)	5496
YI10810	04	B21	01	0	B20	25	LOGIC CHASSIS (03)	5496
YI10910	02	B21	34	0	B19	29	LOGIC CHASSIS (03)	5496
YI11810	09	B16	44	0	B25	40	LOGIC CHASSIS (03)	5496
YI12210	07	B16	42	0	B25	45	LOGIC CHASSIS (03)	5496
YI20110	08	B17	29	0	B29	45	LOGIC CHASSIS (03)	5496
YI21510	03	B18	22	0	B20	25	LOGIC CHASSIS (03)	5496
YI22410	03	B19	18	0	B20	32	LOGIC CHASSIS (03)	5496
YI23310	05	B20	08	0	B25	25	LOGIC CHASSIS (03)	5496
YI23410	02	B20	05	0	B19	09	LOGIC CHASSIS (03)	5496
YI23420	02	B20	01	0	B19	10	LOGIC CHASSIS (03)	5496
YI23430	02	B20	09	0	B19	05	LOGIC CHASSIS (03)	5496
YI23440	02	B20	12	0	B19	17	LOGIC CHASSIS (03)	5496
YI23510	06	B20	10	0	B27	25	LOGIC CHASSIS (03)	5496
YI23610	07	B20	22	0	B29	33	LOGIC CHASSIS (03)	5496
YI23710	02	B20	21	0	B19	30	LOGIC CHASSIS (03)	5496
YI23810	07	B20	13	0	B29	25	LOGIC CHASSIS (03)	5496
YI23910	04	B20	17	0	B19	37	LOGIC CHASSIS (03)	5496
YI23920	04	B20	20	0	B19	38	LOGIC CHASSIS (03)	5496
YI23930	04	B20	14	0	B19	36	LOGIC CHASSIS (03)	5496
YI23940	04	B20	16	0	B19	41	LOGIC CHASSIS (03)	5496
YI24010	07	B20	18	0	B29	20	LOGIC CHASSIS (03)	5496
YI24110	02	B20	29	0	B19	21	LOGIC CHASSIS (03)	5496
YI24310	03	B20	37	0	B19	26	LOGIC CHASSIS (03)	5496
YI24410	04	B20	45	0	B19	13	LOGIC CHASSIS (03)	5496
YI25010	03	B20	41	0	B17	30	LOGIC CHASSIS (03)	5496
YI40010	09	B12	05	0	B25	33	LOGIC CHASSIS (03)	5496
YI52330	11	B08	30	0	B27	40	LOGIC CHASSIS (03)	5496
YI52340	07	B08	32	0	B17	13	LOGIC CHASSIS (03)	5496
YI60020	11	B08	44	0	B27	33	LOGIC CHASSIS (03)	5496

LW70951400	MDD SINGLE CHANNEL						REVISION F	
YK20210	03	B19	28	0	B20	44	LOGIC CHASSIS (03)	5496
YK20510	06	B20	40	0	B29	40	LOGIC CHASSIS (03)	5496
YT00810	08	B26	12	0	A19	25	LOGIC CHASSIS (03)	5496
YT00820	05	B26	14	0	B19	25	LOGIC CHASSIS (03)	5496
YT01710	10	B28	30	0	A20	24	LOGIC CHASSIS (03)	5496
YT01711	04	A20	24	0	A18	33	LOGIC CHASSIS (03)	5496
YT01720	06	B28	32	0	B20	24	LOGIC CHASSIS (03)	5496
YT01721	03	B20	24	0	B18	33	LOGIC CHASSIS (03)	5496
Z203910	08	B25	26	0	A20	36	LOGIC CHASSIS (03)	5496
Z204010	04	B25	34	0	B20	36	LOGIC CHASSIS (03)	5496
Z204710	08	B27	26	0	A20	36	LOGIC CHASSIS (03)	5496
Z204810	05	B27	34	0	B20	36	LOGIC CHASSIS (03)	5496
Z206710	03	A22	18	0	A21	01	LOGIC CHASSIS (03)	5496
Z207010	04	B22	18	0	B21	01	LOGIC CHASSIS (03)	5496
0100110	05	A18	21	0	A14	44	LOGIC CHASSIS (03)	
0100210	02	A18	24	0	A17	22	LOGIC CHASSIS (03)	
0100310	02	A18	18	0	A17	20	LOGIC CHASSIS (03)	
0100410	03	A18	20	0	A17	37	LOGIC CHASSIS (03)	
0100510	04	A18	17	0	A14	05	LOGIC CHASSIS (03)	
0100710	05	B18	21	0	B14	44	LOGIC CHASSIS (03)	
0100810	02	B18	24	0	B17	22	LOGIC CHASSIS (03)	
0100910	02	B18	18	0	B17	20	LOGIC CHASSIS (03)	
0101010	03	B18	20	0	B17	37	LOGIC CHASSIS (03)	
0101110	04	B18	17	0	B14	05	LOGIC CHASSIS (03)	
0200110	02	A25	01	0	A24	08	LOGIC CHASSIS (03)	
0200210	02	A25	05	0	A24	09	LOGIC CHASSIS (03)	
0200310	02	A25	09	0	A24	13	LOGIC CHASSIS (03)	
0200410	02	A25	12	0	A24	16	LOGIC CHASSIS (03)	
0200510	02	A25	16	0	A24	21	LOGIC CHASSIS (03)	
0200610	02	A25	17	0	A24	24	LOGIC CHASSIS (03)	
0200710	05	A25	26	0	A19	44	LOGIC CHASSIS (03)	
0200810	09	A25	34	0	B19	44	LOGIC CHASSIS (03)	
0200910	04	A26	21	0	A30	12	LOGIC CHASSIS (03)	
0201010	04	A26	24	0	A30	14	LOGIC CHASSIS (03)	
0201110	04	A26	28	0	A30	13	LOGIC CHASSIS (03)	
0201210	04	A26	29	0	A30	16	LOGIC CHASSIS (03)	
0201310	04	A26	33	0	A30	17	LOGIC CHASSIS (03)	
0201410	04	A26	34	0	A30	18	LOGIC CHASSIS (03)	
0201510	05	A26	38	0	A30	20	LOGIC CHASSIS (03)	
0201610	05	A26	40	0	A30	22	LOGIC CHASSIS (03)	
0201710	05	A26	44	0	A30	09	LOGIC CHASSIS (03)	
0201810	05	A26	45	0	A30	10	LOGIC CHASSIS (03)	
0201910	06	A27	26	0	A19	44	LOGIC CHASSIS (03)	
0202010	09	A27	34	0	B19	44	LOGIC CHASSIS (03)	
0202110	04	A27	01	0	A24	28	LOGIC CHASSIS (03)	
0202210	04	A27	05	0	A24	29	LOGIC CHASSIS (03)	
0202310	04	A27	09	0	A24	33	LOGIC CHASSIS (03)	
0202410	04	A27	12	0	A24	34	LOGIC CHASSIS (03)	
0202510	04	A27	16	0	A24	38	LOGIC CHASSIS (03)	
0202610	04	A27	17	0	A24	40	LOGIC CHASSIS (03)	
0202710	05	A28	44	0	A30	05	LOGIC CHASSIS (03)	
0202810	05	A28	45	0	A30	08	LOGIC CHASSIS (03)	
0202910	06	A29	01	0	A24	44	LOGIC CHASSIS (03)	
0203010	06	A29	05	0	A24	45	LOGIC CHASSIS (03)	
0203110	04	A29	09	0	A26	08	LOGIC CHASSIS (03)	

LW70951400	MDD	SINGLE CHANNEL				REVISION F		
0203210	03	A29	12	0	A26	09	LOGIC CHASSIS (03)	
0203310	02	B25	01	0	B24	08	LOGIC CHASSIS (03)	
0203410	02	B25	05	0	B24	09	LOGIC CHASSIS (03)	
0203510	02	B25	09	0	B24	13	LOGIC CHASSIS (03)	
0203610	02	B25	12	0	B24	16	LOGIC CHASSIS (03)	
0203710	02	B25	16	0	B24	21	LOGIC CHASSIS (03)	
0203810	02	B25	17	0	B24	24	LOGIC CHASSIS (03)	
0204110	04	B27	01	0	B24	28	LOGIC CHASSIS (03)	
0204210	04	B27	05	0	B24	29	LOGIC CHASSIS (03)	
0204310	04	B27	09	0	B24	33	LOGIC CHASSIS (03)	
0204410	04	B27	12	0	B24	34	LOGIC CHASSIS (03)	
0204510	04	B27	16	0	B24	38	LOGIC CHASSIS (03)	
0204610	04	B27	17	0	B24	40	LOGIC CHASSIS (03)	
0204910	04	B26	21	0	B30	12	LOGIC CHASSIS (03)	
0205010	04	B26	24	0	B30	14	LOGIC CHASSIS (03)	
0205110	04	B26	28	0	B30	13	LOGIC CHASSIS (03)	
0205210	04	B26	29	0	B30	16	LOGIC CHASSIS (03)	
0205310	04	B26	33	0	B30	17	LOGIC CHASSIS (03)	
0205410	04	B26	34	0	B30	18	LOGIC CHASSIS (03)	
0205510	05	B26	38	0	B30	20	LOGIC CHASSIS (03)	
0205610	05	B26	40	0	B30	22	LOGIC CHASSIS (03)	
0205710	05	B26	44	0	B30	09	LOGIC CHASSIS (03)	
0205810	05	B26	45	0	B30	10	LOGIC CHASSIS (03)	
0205910	05	B28	44	0	B30	05	LOGIC CHASSIS (03)	
0206010	05	B28	45	0	B30	08	LOGIC CHASSIS (03)	
0206110	06	B29	01	0	B24	44	LOGIC CHASSIS (03)	
0206210	06	B29	05	0	B24	45	LOGIC CHASSIS (03)	
0206310	03	B29	09	0	B26	08	LOGIC CHASSIS (03)	
0206410	03	B29	12	0	B26	09	LOGIC CHASSIS (03)	
0206510	06	A22	13	0	A14	18	LOGIC CHASSIS (03)	
0206610	03	A22	25	0	A21	34	LOGIC CHASSIS (03)	
0206810	06	B22	13	0	B14	18	LOGIC CHASSIS (03)	
0206910	03	B22	25	0	B21	34	LOGIC CHASSIS (03)	
0207110	04	A14	26	0	A17	16	LOGIC CHASSIS (03)	
0207210	04	B14	26	0	B17	16	LOGIC CHASSIS (03)	
0207310	09	A06	44	0	A20	29	LOGIC CHASSIS (03)	5453
0207410	09	B06	44	0	B20	29	LOGIC CHASSIS (03)	5453
0300110		IJ200	01	X	A25	01	LOGIC CHASSIS (03)	000
0300210		IJ200	04	X	A25	05	LOGIC CHASSIS (03)	444
0300310		IJ200	02	X	A25	09	LOGIC CHASSIS (03)	000
0300410		IJ200	05	X	A25	12	LOGIC CHASSIS (03)	444
0300510		IJ200	03	X	A25	16	LOGIC CHASSIS (03)	000
0300610		IJ200	07	X	A25	17	LOGIC CHASSIS (03)	444
0300710		IJ200	08	X	A27	01	LOGIC CHASSIS (03)	000
0300810		IJ200	12	X	A27	05	LOGIC CHASSIS (03)	444
0300910		IJ200	10	X	A27	09	LOGIC CHASSIS (03)	000
0301010		IJ200	13	X	A27	12	LOGIC CHASSIS (03)	444
0301110		IJ200	11	X	A27	16	LOGIC CHASSIS (03)	000
0301210		IJ200	14	X	A27	17	LOGIC CHASSIS (03)	444
0301310		IJ200	15	X	A29	01	LOGIC CHASSIS (03)	000
0301410		IJ200	18	X	A29	05	LOGIC CHASSIS (03)	444
0301510		IJ200	16	X	A29	09	LOGIC CHASSIS (03)	000
0301610		IJ200	20	X	A29	12	LOGIC CHASSIS (03)	444
0301710		IJ200	17	X	A25	36	LOGIC CHASSIS (03)	000
0301810		IJ200	21	X	A25	37	LOGIC CHASSIS (03)	444

0301910	IJ200 22 X	A27	28	LOGIC CHASSIS (03)	000
0302010	IJ200 25 X	A27	29	LOGIC CHASSIS (03)	444
0302110	IJ200 23 X	A25	28	LOGIC CHASSIS (03)	000
0302210	IJ200 26 X	A25	29	LOGIC CHASSIS (03)	444
0302310	IJ200 24 X	A27	36	LOGIC CHASSIS (03)	000
0302410	IJ200 27 X	A27	37	LOGIC CHASSIS (03)	444
0302510	IJ200 28 X	A25	41	LOGIC CHASSIS (03)	000
0302610	IJ200 31 X	A25	42	LOGIC CHASSIS (03)	444
0302710	IJ200 29 X	A27	41	LOGIC CHASSIS (03)	000
0302810	IJ200 32 X	A27	42	LOGIC CHASSIS (03)	444
0302910	IJ200 30 X	A28	21	LOGIC CHASSIS (03)	000
0303010	IJ200 33 X	A28	24	LOGIC CHASSIS (03)	444
0303110	IJ200 34 X	A28	08	LOGIC CHASSIS (03)	000
0303210	IJ200 37 X	A28	09	LOGIC CHASSIS (03)	444
0303310	IJ200 35 X	A28	13	LOGIC CHASSIS (03)	000
0303410	IJ200 38 X	A28	16	LOGIC CHASSIS (03)	444
0303510	IJ200 40 X	A25	21	LOGIC CHASSIS (03)	000
0303610	IJ200 43 X	A25	22	LOGIC CHASSIS (03)	444
0303710	IJ200 41 X	A27	21	LOGIC CHASSIS (03)	000
0303810	IJ200 44 X	A27	22	LOGIC CHASSIS (03)	444
0303910	IJ200 42 X	A29	21	LOGIC CHASSIS (03)	000
0304010	IJ200 45 X	A29	22	LOGIC CHASSIS (03)	444
0304110	IJ200 46 X	A29	16	LOGIC CHASSIS (03)	000
0304210	IJ200 49 X	A29	17	LOGIC CHASSIS (03)	444
0304310	IJ200 47 X	A29	28	LOGIC CHASSIS (03)	000
0304410	IJ200 50 X	A29	29	LOGIC CHASSIS (03)	444
0304510	IJ200 58 X	A28	28	LOGIC CHASSIS (03)	000
0304610	IJ200 62 X	A28	29	LOGIC CHASSIS (03)	444
0304710	IJ200 59 X	A28	33	LOGIC CHASSIS (03)	000
0304810	IJ200 63 X	A28	34	LOGIC CHASSIS (03)	444
0304910	IJ200 60 X	A28	38	LOGIC CHASSIS (03)	000
0305010	IJ200 64 X	A28	40	LOGIC CHASSIS (03)	444
0305110	IJ200 65 X	A29	36	LOGIC CHASSIS (03)	000
0305210	IJ200 70 X	A29	37	LOGIC CHASSIS (03)	444
0305310	IJ200 66 X	A26	13	LOGIC CHASSIS (03)	000
0305410	IJ200 71 X	A26	16	LOGIC CHASSIS (03)	444
0305510	IJ200 67 X	A29	41	LOGIC CHASSIS (03)	000
0305610	IJ200 72 X	A29	42	LOGIC CHASSIS (03)	444
0400110	IJ201 01 X	A24	08	LOGIC CHASSIS (03)	000
0400210	IJ201 04 X	A24	09	LOGIC CHASSIS (03)	444
0400310	IJ201 02 X	A24	13	LOGIC CHASSIS (03)	000
0400410	IJ201 05 X	A24	16	LOGIC CHASSIS (03)	444
0400510	IJ201 03 X	A24	21	LOGIC CHASSIS (03)	000
0400610	IJ201 07 X	A24	24	LOGIC CHASSIS (03)	444
0400710	IJ201 08 X	A24	28	LOGIC CHASSIS (03)	000
0400810	IJ201 12 X	A24	29	LOGIC CHASSIS (03)	444
0400910	IJ201 10 X	A24	33	LOGIC CHASSIS (03)	000
0401010	IJ201 13 X	A24	34	LOGIC CHASSIS (03)	444
0401110	IJ201 11 X	A24	38	LOGIC CHASSIS (03)	000
0401210	IJ201 14 X	A24	40	LOGIC CHASSIS (03)	444
0401310	IJ201 15 X	A24	44	LOGIC CHASSIS (03)	000
0401410	IJ201 18 X	A24	45	LOGIC CHASSIS (03)	444
0401510	IJ201 16 X	A26	08	LOGIC CHASSIS (03)	000
0401610	IJ201 20 X	A26	09	LOGIC CHASSIS (03)	444
0401710	IJ201 17 X	A25	36	LOGIC CHASSIS (03)	000

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0401810	IJ201 21 X	A25	37	LOGIC CHASSIS (03)	444
0401910	IJ201 22 X	A27	28	LOGIC CHASSIS (03)	000
0402010	IJ201 25 X	A27	29	LOGIC CHASSIS (03)	444
0402110	IJ201 23 X	A25	28	LOGIC CHASSIS (03)	000
0402210	IJ201 26 X	A25	29	LOGIC CHASSIS (03)	444
0402310	IJ201 24 X	A27	36	LOGIC CHASSIS (03)	000
0402410	IJ201 27 X	A27	37	LOGIC CHASSIS (03)	444
0402510	IJ201 28 X	A25	41	LOGIC CHASSIS (03)	000
0402610	IJ201 31 X	A25	42	LOGIC CHASSIS (03)	444
0402710	IJ201 29 X	A27	41	LOGIC CHASSIS (03)	000
0402810	IJ201 32 X	A27	42	LOGIC CHASSIS (03)	444
0402910	IJ201 30 X	A28	21	LOGIC CHASSIS (03)	000
0403010	IJ201 33 X	A28	24	LOGIC CHASSIS (03)	444
0403110	IJ201 34 X	A28	08	LOGIC CHASSIS (03)	000
0403210	IJ201 37 X	A28	09	LOGIC CHASSIS (03)	444
0403310	IJ201 35 X	A28	13	LOGIC CHASSIS (03)	000
0403410	IJ201 38 X	A28	16	LOGIC CHASSIS (03)	444
0403510	IJ201 40 X	A25	21	LOGIC CHASSIS (03)	000
0403610	IJ201 43 X	A25	22	LOGIC CHASSIS (03)	444
0403710	IJ201 41 X	A27	21	LOGIC CHASSIS (03)	000
0403810	IJ201 44 X	A27	22	LOGIC CHASSIS (03)	444
0403910	IJ201 42 X	A29	21	LOGIC CHASSIS (03)	000
0404010	IJ201 45 X	A29	22	LOGIC CHASSIS (03)	444
0404110	IJ201 46 X	A29	16	LOGIC CHASSIS (03)	000
0404210	IJ201 49 X	A29	17	LOGIC CHASSIS (03)	444
0404310	IJ201 47 X	A29	28	LOGIC CHASSIS (03)	000
0404410	IJ201 50 X	A29	29	LOGIC CHASSIS (03)	444
0404510	IJ201 58 X	A28	28	LOGIC CHASSIS (03)	000
0404610	IJ201 62 X	A28	29	LOGIC CHASSIS (03)	444
0404710	IJ201 59 X	A28	33	LOGIC CHASSIS (03)	000
0404810	IJ201 63 X	A28	34	LOGIC CHASSIS (03)	444
0404910	IJ201 60 X	A28	38	LOGIC CHASSIS (03)	000
0405010	IJ201 64 X	A28	40	LOGIC CHASSIS (03)	444
0405110	IJ201 65 X	A29	36	LOGIC CHASSIS (03)	000
0405210	IJ201 70 X	A29	37	LOGIC CHASSIS (03)	444
0405310	IJ201 66 X	A26	13	LOGIC CHASSIS (03)	000
0405410	IJ201 71 X	A26	16	LOGIC CHASSIS (03)	444
0405510	IJ201 67 X	A29	41	LOGIC CHASSIS (03)	000
0405610	IJ201 72 X	A29	42	LOGIC CHASSIS (03)	444
0500110	IJ202 B X	A26	21	LOGIC CHASSIS (03)	000
0500210	IJ202 D X	A26	24	LOGIC CHASSIS (03)	444
0500310	IJ202 BB X	A26	28	LOGIC CHASSIS (03)	000
0500410	IJ202 DD X	A26	29	LOGIC CHASSIS (03)	444
0500510	IJ202 E X	A26	33	LOGIC CHASSIS (03)	000
0500610	IJ202 H X	A26	34	LOGIC CHASSIS (03)	444
0500710	IJ202 EE X	A26	38	LOGIC CHASSIS (03)	000
0500810	IJ202 HH X	A26	40	LOGIC CHASSIS (03)	444
0500910	IJ202 F X	A28	44	LOGIC CHASSIS (03)	000
0501010	IJ202 J X	A28	45	LOGIC CHASSIS (03)	444
0501110	IJ202 FF X	A26	44	LOGIC CHASSIS (03)	000
0501210	IJ202 JJ X	A26	45	LOGIC CHASSIS (03)	444
0600110	IIJ20001 X	B25	01	LOGIC CHASSIS (03)	000
0600210	IIJ20004 X	B25	05	LOGIC CHASSIS (03)	444
0600310	IIJ20002 X	B25	09	LOGIC CHASSIS (03)	000
0600410	IIJ20005 X	B25	12	LOGIC CHASSIS (03)	444

0600510	IIJ20003	X	B25	16	9LOGIC CHASSIS (03)	000
0600610	IIJ20007	X	B25	17	LOGIC CHASSIS (03)	444
0600710	IIJ20008	X	B27	01	LOGIC CHASSIS (03)	000
0600810	IIJ20012	X	B27	05	LOGIC CHASSIS (03)	444
0600910	IIJ20010	X	B27	09	LOGIC CHASSIS (03)	000
0601010	IIJ20013	X	B27	12	LOGIC CHASSIS (03)	444
0601110	IIJ20011	X	B27	16	LOGIC CHASSIS (03)	000
0601210	IIJ20014	X	B27	17	LOGIC CHASSIS (03)	444
0601310	IIJ20015	X	B29	01	LOGIC CHASSIS (03)	000
0601410	IIJ20018	X	B29	05	LOGIC CHASSIS (03)	444
0601510	IIJ20016	X	B29	09	LOGIC CHASSIS (03)	000
0601610	IIJ20020	X	B29	12	LOGIC CHASSIS (03)	444
0601710	IIJ20017	X	B25	36	LOGIC CHASSIS (03)	000
0601810	IIJ20021	X	B25	37	LOGIC CHASSIS (03)	444
0601910	IIJ20022	X	B27	28	LOGIC CHASSIS (03)	000
0602010	IIJ20025	X	B27	29	LOGIC CHASSIS (03)	444
0602110	IIJ20023	X	B25	28	LOGIC CHASSIS (03)	000
0602210	IIJ20026	X	B25	29	LOGIC CHASSIS (03)	444
0602310	IIJ20024	X	B27	36	LOGIC CHASSIS (03)	000
0602410	IIJ20027	X	B27	37	LOGIC CHASSIS (03)	444
0602510	IIJ20028	X	B25	41	LOGIC CHASSIS (03)	000
0602610	IIJ20031	X	B25	42	LOGIC CHASSIS (03)	444
0602710	IIJ20029	X	B27	41	LOGIC CHASSIS (03)	000
0602810	IIJ20032	X	B27	42	LOGIC CHASSIS (03)	444
0602910	IIJ20030	X	B28	21	LOGIC CHASSIS (03)	000
0603010	IIJ20033	X	B28	24	LOGIC CHASSIS (03)	444
0603110	IIJ20034	X	B28	08	LOGIC CHASSIS (03)	000
0603210	IIJ20037	X	B28	09	LOGIC CHASSIS (03)	444
0603310	IIJ20035	X	B28	13	LOGIC CHASSIS (03)	000
0603410	IIJ20038	X	B28	16	LOGIC CHASSIS (03)	444
0603510	IIJ20040	X	B25	21	LOGIC CHASSIS (03)	000
0603610	IIJ20043	X	B25	22	LOGIC CHASSIS (03)	444
0603710	IIJ20041	X	B27	21	LOGIC CHASSIS (03)	000
0603810	IIJ20044	X	B27	22	LOGIC CHASSIS (03)	444
0603910	IIJ20042	X	B29	21	LOGIC CHASSIS (03)	000
0604010	IIJ20045	X	B29	22	LOGIC CHASSIS (03)	444
0604110	IIJ20046	X	B29	16	LOGIC CHASSIS (03)	000
0604210	IIJ20049	X	B29	17	LOGIC CHASSIS (03)	444
0604310	IIJ20047	X	B29	28	LOGIC CHASSIS (03)	000
0604410	IIJ20050	X	B29	29	LOGIC CHASSIS (03)	444
0604510	IIJ20058	X	B28	28	LOGIC CHASSIS (03)	000
0604610	IIJ20062	X	B28	29	LOGIC CHASSIS (03)	444
0604710	IIJ20059	X	B28	33	LOGIC CHASSIS (03)	000
0604810	IIJ20063	X	B28	34	LOGIC CHASSIS (03)	444
0604910	IIJ20060	X	B28	38	LOGIC CHASSIS (03)	000
0605010	IIJ20064	X	B28	40	LOGIC CHASSIS (03)	444
0605110	IIJ20065	X	B29	36	LOGIC CHASSIS (03)	000
0605210	IIJ20070	X	B29	37	LOGIC CHASSIS (03)	444
0605310	IIJ20066	X	B26	13	LOGIC CHASSIS (03)	000
0605410	IIJ20071	X	B26	16	LOGIC CHASSIS (03)	444
0605510	IIJ20067	X	B29	41	LOGIC CHASSIS (03)	000
0605610	IIJ20072	X	B29	42	LOGIC CHASSIS (03)	444
0700110	IIJ20101	X	B24	08	LOGIC CHASSIS (03)	000
0700210	IIJ20104	X	B24	09	LOGIC CHASSIS (03)	444
0700310	IIJ20102	X	B24	13	LOGIC CHASSIS (03)	000

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0700410	IIJ20105 X	B24	16	LOGIC CHASSIS (03)	444
0700510	IIJ20103 X	B24	21	LOGIC CHASSIS (03)	000
0700610	IIJ20107 X	B24	24	LOGIC CHASSIS (03)	444
0700710	IIJ20108 X	B24	28	LOGIC CHASSIS (03)	000
0700810	IIJ20112 X	B24	29	LOGIC CHASSIS (03)	444
0700910	IIJ20110 X	B24	33	LOGIC CHASSIS (03)	000
0701010	IIJ20113 X	B24	34	LOGIC CHASSIS (03)	444
0701110	IIJ20111 X	B24	38	LOGIC CHASSIS (03)	000
0701210	IIJ20114 X	B24	40	LOGIC CHASSIS (03)	444
0701310	IIJ20115 X	B24	44	LOGIC CHASSIS (03)	000
0701410	IIJ20118 X	B24	45	LOGIC CHASSIS (03)	444
0701510	IIJ20116 X	B26	08	LOGIC CHASSIS (03)	000
0701610	IIJ20120 X	B26	09	LOGIC CHASSIS (03)	444
0701710	IIJ20117 X	B25	36	LOGIC CHASSIS (03)	000
0701810	IIJ20121 X	B25	37	LOGIC CHASSIS (03)	444
0701910	IIJ20122 X	B27	28	LOGIC CHASSIS (03)	000
0702010	IIJ20125 X	B27	29	LOGIC CHASSIS (03)	444
0702110	IIJ20123 X	B25	28	LOGIC CHASSIS (03)	000
0702210	IIJ20126 X	B25	29	LOGIC CHASSIS (03)	444
0702310	IIJ20124 X	B27	36	LOGIC CHASSIS (03)	000
0702410	IIJ20127 X	B27	37	LOGIC CHASSIS (03)	444
0702510	IIJ20128 X	B25	41	LOGIC CHASSIS (03)	000
0702610	IIJ20131 X	B25	42	LOGIC CHASSIS (03)	444
0702710	IIJ20129 X	B27	41	LOGIC CHASSIS (03)	000
0702810	IIJ20132 X	B27	42	LOGIC CHASSIS (03)	444
0702910	IIJ20130 X	B28	21	LOGIC CHASSIS (03)	000
0703010	IIJ20133 X	B28	24	LOGIC CHASSIS (03)	444
0703110	IIJ20134 X	B28	08	LOGIC CHASSIS (03)	000
0703210	IIJ20137 X	B28	09	LOGIC CHASSIS (03)	444
0703310	IIJ20135 X	B28	13	LOGIC CHASSIS (03)	000
0703410	IIJ20138 X	B28	16	LOGIC CHASSIS (03)	444
0703510	IIJ20140 X	B25	21	LOGIC CHASSIS (03)	000
0703610	IIJ20143 X	B25	22	LOGIC CHASSIS (03)	444
0703710	IIJ20141 X	B27	21	LOGIC CHASSIS (03)	000
0703810	IIJ20144 X	B27	22	LOGIC CHASSIS (03)	444
0703910	IIJ20142 X	B29	21	LOGIC CHASSIS (03)	000
0704010	IIJ20145 X	B29	22	LOGIC CHASSIS (03)	444
0704110	IIJ20146 X	B29	16	LOGIC CHASSIS (03)	000
0704210	IIJ20149 X	B29	17	LOGIC CHASSIS (03)	444
0704310	IIJ20147 X	B29	28	LOGIC CHASSIS (03)	000
0704410	IIJ20150 X	B29	29	LOGIC CHASSIS (03)	444
0704510	IIJ20158 X	B28	28	LOGIC CHASSIS (03)	000
0704610	IIJ20162 X	B28	29	LOGIC CHASSIS (03)	444
0704710	IIJ20159 X	B28	33	LOGIC CHASSIS (03)	000
0704810	IIJ20163 X	B28	34	LOGIC CHASSIS (03)	444
0704910	IIJ20160 X	B28	38	LOGIC CHASSIS (03)	000
0705010	IIJ20164 X	B28	40	LOGIC CHASSIS (03)	444
0705110	IIJ20165 X	B29	36	LOGIC CHASSIS (03)	000
0705210	IIJ20170 X	B29	37	LOGIC CHASSIS (03)	444
0705310	IIJ20166 X	B26	13	LOGIC CHASSIS (03)	000
0705410	IIJ20171 X	B26	16	LOGIC CHASSIS (03)	444
0705510	IIJ20167 X	B29	41	LOGIC CHASSIS (03)	000
0705610	IIJ20172 X	B29	42	LOGIC CHASSIS (03)	444
0800110	IIJ202 B X	B26	21	LOGIC CHASSIS (03)	000
0800210	IIJ202 D X	B26	24	LOGIC CHASSIS (03)	444

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0800310		IIJ202BB	X	B26	28	LOGIC CHASSIS (03)			000	
0800410		IIJ202DD	X	B26	29	LOGIC CHASSIS (03)			444	
0800510		IIJ202 E	X	B26	33	LOGIC CHASSIS (03)			000	
0800610		IIJ202 H	X	B26	34	LOGIC CHASSIS (03)			444	
0800710		IIJ202EE	X	B26	38	LOGIC CHASSIS (03)			000	
0800810		IIJ202HH	X	B26	40	LOGIC CHASSIS (03)			444	
0800910		IIJ202 F	X	B28	44	LOGIC CHASSIS (03)			000	
0801010		IIJ202 J	X	B28	45	LOGIC CHASSIS (03)			444	
0801110		IIJ202FF	X	B26	44	LOGIC CHASSIS (03)			000	
0801210		IIJ202JJ	X	B26	45	LOGIC CHASSIS (03)			444	
0900110	04	A03	45	O	A06	17	LOGIC CHASSIS (03)			
0900210	06	A03	20	O	A11	33	LOGIC CHASSIS (03)			
0900310	06	A03	30	O	A12	45	LOGIC CHASSIS (03)			
0900410	07	A03	32	O	A12	14	LOGIC CHASSIS (03)			
0900510	06	A03	33	O	A12	44	LOGIC CHASSIS (03)			
0900610	06	A03	36	O	A12	42	LOGIC CHASSIS (03)			
0900710	07	A03	37	O	A13	38	LOGIC CHASSIS (03)			
0900810	07	A03	38	O	A13	37	LOGIC CHASSIS (03)			
0900910	07	A03	40	O	A13	36	LOGIC CHASSIS (03)			
0901010	07	A03	41	O	A13	33	LOGIC CHASSIS (03)			
0901110	07	A03	17	O	A12	33	LOGIC CHASSIS (03)			
0901210	04	A03	29	O	A07	16	LOGIC CHASSIS (03)			
0901310	04	A03	25	O	A08	10	LOGIC CHASSIS (03)			
0901510	05	A03	28	O	A08	08	LOGIC CHASSIS (03)			
0901610	07	A03	08	O	A13	10	LOGIC CHASSIS (03)			
0901710	07	A03	05	O	A13	44	LOGIC CHASSIS (03)			
0901810	08	A03	01	O	A13	45	LOGIC CHASSIS (03)			
1000110	04	B03	45	O	B06	17	LOGIC CHASSIS (03)			
1000210	06	B03	20	O	B11	33	LOGIC CHASSIS (03)			
1000310	06	B03	30	O	B12	45	LOGIC CHASSIS (03)			
1000410	07	B03	32	O	B12	14	LOGIC CHASSIS (03)			
1000510	06	B03	33	O	B12	44	LOGIC CHASSIS (03)			
1000610	06	B03	36	O	B12	42	LOGIC CHASSIS (03)			
1000710	07	B03	37	O	B13	38	LOGIC CHASSIS (03)			
1000810	07	B03	38	O	B13	37	LOGIC CHASSIS (03)			
1000910	07	B03	40	O	B13	36	LOGIC CHASSIS (03)			
1001010	07	B03	41	O	B13	13	LOGIC CHASSIS (03)			
1001110	07	B03	17	O	B12	33	LOGIC CHASSIS (03)			
1001210	04	B03	29	O	B07	16	LOGIC CHASSIS (03)			
1001310	04	B03	25	O	B08	10	LOGIC CHASSIS (03)			
1001510	05	B03	28	O	B08	08	LOGIC CHASSIS (03)			
1001610	07	B03	08	O	B13	10	LOGIC CHASSIS (03)			
1001710	07	B03	05	O	B13	44	LOGIC CHASSIS (03)			
1001810	08	B03	01	O	B13	45	LOGIC CHASSIS (03)			
1100010	02	A01	06	R	A02	06	LOGIC CHASSIS (03)	20	666	
1100011	02	A02	06	R	A03	06	LOGIC CHASSIS (03)	20	666	
1100012	02	A03	06	R	A04	06	LOGIC CHASSIS (03)	20	666	
1100013	02	A04	06	R	A05	06	LOGIC CHASSIS (03)	20	666	
1100020	02	A06	06	R	A07	06	LOGIC CHASSIS (03)	20	666	
1100021	02	A07	06	R	A08	06	LOGIC CHASSIS (03)	20	666	
1100022	02	A08	06	R	A09	06	LOGIC CHASSIS (03)	20	666	
1100023	02	A09	06	R	A10	06	LOGIC CHASSIS (03)	20	666	
1100024	02	A10	06	R	A11	06	LOGIC CHASSIS (03)	20	666	
1100030	02	A12	06	R	A13	06	LOGIC CHASSIS (03)	20	666	
1100031	02	A13	06	R	A14	06	LOGIC CHASSIS (03)	20	666	

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1100032	02	A14	06	R	A15	06	LOGIC CHASSIS (03)	20 666	
1100033	02	A15	06	R	A16	06	LOGIC CHASSIS (03)	20 666	
1100034	02	A16	06	R	A17	06	LOGIC CHASSIS (03)	20 666	
1100040	02	A18	06	R	A19	06	LOGIC CHASSIS (03)	20 666	
1100041	02	A19	06	R	A20	06	LOGIC CHASSIS (03)	20 666	
1100042	02	A20	06	R	A21	06	LOGIC CHASSIS (03)	20 666	
1100043	02	A21	06	R	A22	06	LOGIC CHASSIS (03)	20 666	
1100044	02	A22	06	R	A23	06	LOGIC CHASSIS (03)	20 666	
1100051	02	A25	06	R	A26	06	LOGIC CHASSIS (03)	20 666	
1100050	02	A24	06	R	A25	06	LOGIC CHASSIS (03)	20 666	
1100061	02	A28	06	R	A29	06	LOGIC CHASSIS (03)	20 666	
1100060	02	A27	06	R	A28	06	LOGIC CHASSIS (03)	20 666	
1100110	02	A01	46	R	A02	46	LOGIC CHASSIS (03)	20 222	
1100111	02	A02	46	R	A03	46	LOGIC CHASSIS (03)	20 222	
1100112	02	A03	46	R	A04	46	LOGIC CHASSIS (03)	20 222	
1100113	02	A04	46	R	A05	46	LOGIC CHASSIS (03)	20 222	
1100120	02	A06	46	R	A07	46	LOGIC CHASSIS (03)	20 222	
1100121	02	A07	46	R	A08	46	LOGIC CHASSIS (03)	20 222	
1100122	02	A08	46	R	A09	46	LOGIC CHASSIS (03)	20 222	
1100123	02	A09	46	R	A10	46	LOGIC CHASSIS (03)	20 222	
1100124	02	A10	46	R	A11	46	LOGIC CHASSIS (03)	20 222	
1100130	02	A12	46	R	A13	46	LOGIC CHASSIS (03)	20 222	
1100132	02	A14	46	R	A15	46	LOGIC CHASSIS (03)	20 222	
1100131	02	A13	46	R	A14	46	LOGIC CHASSIS (03)	20 222	
1100133	02	A15	46	R	A16	46	LOGIC CHASSIS (03)	20 222	
1100134	02	A16	46	R	A17	46	LOGIC CHASSIS (03)	20 222	
1100140	02	A18	46	R	A19	46	LOGIC CHASSIS (03)	20 222	
1100141	02	A19	46	R	A20	46	LOGIC CHASSIS (03)	20 222	
1100143	02	A21	46	R	A22	46	LOGIC CHASSIS (03)	20 222	
1100142	02	A20	46	R	A21	46	LOGIC CHASSIS (03)	20 222	
1100144	02	A22	46	R	A23	46	LOGIC CHASSIS (03)	20 222	
1100150	02	A24	46	R	A25	46	LOGIC CHASSIS (03)	20 222	
1100151	02	A25	46	R	A26	46	LOGIC CHASSIS (03)	20 222	
1100160	02	A27	46	R	A28	46	LOGIC CHASSIS (03)	20 222	
1100161	02	A28	46	R	A29	46	LOGIC CHASSIS (03)	20 222	
1100210	02	A01	48	R	A02	48	LOGIC CHASSIS (03)	20 222	
1100211	02	A02	48	R	A03	48	LOGIC CHASSIS (03)	20 222	
1100212	02	A03	48	R	A04	48	LOGIC CHASSIS (03)	20 222	
1100213	02	A04	48	R	A05	48	LOGIC CHASSIS (03)	20 222	
1100220	02	A06	48	R	A07	48	LOGIC CHASSIS (03)	20 222	
1100221	02	A07	48	R	A08	48	LOGIC CHASSIS (03)	20 222	
1100222	02	A08	48	R	A09	48	LOGIC CHASSIS (03)	20 222	
1100223	02	A09	48	R	A10	48	LOGIC CHASSIS (03)	20 222	
1100230	02	A12	48	R	A13	48	LOGIC CHASSIS (03)	20 222	
1100231	02	A13	48	R	A14	48	LOGIC CHASSIS (03)	20 222	
1100232	02	A14	48	R	A15	48	LOGIC CHASSIS (03)	20 222	
1100233	02	A15	48	R	A16	48	LOGIC CHASSIS (03)	20 222	
1100234	02	A16	48	R	A17	48	LOGIC CHASSIS (03)	20 222	
1100235	02	A11	48	R	A12	48	LOGIC CHASSIS (03)	20 222	11118A
1100243	02	A21	48	R	A22	48	LOGIC CHASSIS (03)	20 222	
1100240	02	A18	48	R	A19	48	LOGIC CHASSIS (03)	20 222	
1100241	02	A19	48	R	A20	48	LOGIC CHASSIS (03)	20 222	
1100242	02	A20	48	R	A21	48	LOGIC CHASSIS (03)	20 222	
1100244	02	A22	48	R	A23	48	LOGIC CHASSIS (03)	20 222	
1100310	02	B01	06	R	B02	06	LOGIC CHASSIS (03)	20 666	

LW70951400	MDD SINGLE CHANNEL						REVISION F	
1100311	02	B02	06	R	B03	06	LOGIC CHASSIS (03)	20 666
1100312	02	B03	06	R	B04	06	LOGIC CHASSIS (03)	20 666
1100313	02	B04	06	R	B05	06	LOGIC CHASSIS (03)	20 666
1100320	02	B06	06	R	B07	06	LOGIC CHASSIS (03)	20 666
1100321	02	B07	06	R	B08	06	LOGIC CHASSIS (03)	20 666
1100322	02	B08	06	R	B09	06	LOGIC CHASSIS (03)	20 666
1100323	02	B09	06	R	B10	06	LOGIC CHASSIS (03)	20 666
1100324	02	B10	06	R	B11	06	LOGIC CHASSIS (03)	20 666
1100332	02	B14	06	R	B15	06	LOGIC CHASSIS (03)	20 666
1100330	02	B12	06	R	B13	06	LOGIC CHASSIS (03)	20 666
1100331	02	B13	06	R	B14	06	LOGIC CHASSIS (03)	20 666
1100333	02	B15	06	R	B16	06	LOGIC CHASSIS (03)	20 666
1100334	02	B16	06	R	B17	06	LOGIC CHASSIS (03)	20 666
1100340	02	B18	06	R	B19	06	LOGIC CHASSIS (03)	20 666
1100341	02	B19	06	R	B20	06	LOGIC CHASSIS (03)	20 666
1100342	02	B20	06	R	B21	06	LOGIC CHASSIS (03)	20 666
1100343	02	B21	06	R	B22	06	LOGIC CHASSIS (03)	20 666
1100344	02	B22	06	R	B23	06	LOGIC CHASSIS (03)	20 666
1100350	02	B24	06	R	B25	06	LOGIC CHASSIS (03)	20 666
1100351	02	B25	06	R	B26	06	LOGIC CHASSIS (03)	20 666
1100360	02	B27	06	R	B28	06	LOGIC CHASSIS (03)	20 666
1100361	02	B28	06	R	B29	06	LOGIC CHASSIS (03)	20 666
1100410	02	B01	46	R	B02	46	LOGIC CHASSIS (03)	20 222
1100411	02	B02	46	R	B03	46	LOGIC CHASSIS (03)	20 222
1100412	02	B03	46	R	B04	46	LOGIC CHASSIS (03)	20 222
1100413	02	B04	46	R	B05	46	LOGIC CHASSIS (03)	20 222
1100420	02	B06	46	R	B07	46	LOGIC CHASSIS (03)	20 222
1100421	02	B07	46	R	B08	46	LOGIC CHASSIS (03)	20 222
1100422	02	B08	46	R	B09	46	LOGIC CHASSIS (03)	20 222
1100423	02	B09	46	R	B10	46	LOGIC CHASSIS (03)	20 222
1100424	02	B10	46	R	B11	46	LOGIC CHASSIS (03)	20 222
1100430	02	B12	46	R	B13	46	LOGIC CHASSIS (03)	20 222
1100431	02	B13	46	R	B14	46	LOGIC CHASSIS (03)	20 222
1100432	02	B14	46	R	B15	46	LOGIC CHASSIS (03)	20 222
1100433	02	B15	46	R	B16	46	LOGIC CHASSIS (03)	20 222
1100434	02	B16	46	R	B17	46	LOGIC CHASSIS (03)	20 222
1100440	02	B18	46	R	B19	46	LOGIC CHASSIS (03)	20 222
1100441	02	B19	46	R	B20	46	LOGIC CHASSIS (03)	20 222
1100442	02	B20	46	R	B21	46	LOGIC CHASSIS (03)	20 222
1100443	02	B21	46	R	B22	46	LOGIC CHASSIS (03)	20 222
1100444	02	B22	46	R	B23	46	LOGIC CHASSIS (03)	20 222
1100451	02	B25	46	R	B26	46	LOGIC CHASSIS (03)	20 222
1100450	02	B24	46	R	B25	46	LOGIC CHASSIS (03)	20 222
1100460	02	B27	46	R	B28	46	LOGIC CHASSIS (03)	20 222
1100461	02	B28	46	R	B29	46	LOGIC CHASSIS (03)	20 222
1100510	02	B01	48	R	B02	48	LOGIC CHASSIS (03)	20 222
1100511	02	B02	48	R	B03	48	LOGIC CHASSIS (03)	20 222
1100512	02	B03	48	R	B04	48	LOGIC CHASSIS (03)	20 222
1100513	02	B04	48	R	B05	48	LOGIC CHASSIS (03)	20 222
1100520	02	B06	48	R	B07	48	LOGIC CHASSIS (03)	20 222
1100521	02	B07	48	R	B08	48	LOGIC CHASSIS (03)	20 222
1100522	02	B08	48	R	B09	48	LOGIC CHASSIS (03)	20 222
1100523	02	B09	48	R	B10	48	LOGIC CHASSIS (03)	20 222
1100530	02	B12	48	R	B13	48	LOGIC CHASSIS (03)	20 222
1100531	02	B13	48	R	B14	48	LOGIC CHASSIS (03)	20 222

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1100532	02	B14	48	R	B15	48	LOGIC CHASSIS (03)	20 222	
1100533	02	B15	48	R	B16	48	LOGIC CHASSIS (03)	20 222	
1100534	02	B16	48	R	B17	48	LOGIC CHASSIS (03)	20 222	
1100535	02	B11	48	R	B12	48	LOGIC CHASSIS (03)	20 222	11118A
1100540	02	B18	48	R	B19	48	LOGIC CHASSIS (03)	20 222	
1100541	02	B19	48	R	B20	48	LOGIC CHASSIS (03)	20 222	
1100542	02	B20	48	R	B21	48	LOGIC CHASSIS (03)	20 222	
1100543	02	B21	48	R	B22	48	LOGIC CHASSIS (03)	20 222	
1100544	02	B22	48	R	B23	48	LOGIC CHASSIS (03)	20 222	

10113

CONTROL DATA	TITLE		DOCUMENT NO.	REV.
MINNEAPOLIS, MINNESOTA	WIRE LIST - LOGIC CHASSIS HARNESS ASSY	WL	40017600	E
	PRODUCT: MULTIPLE DISK DRIVE	SHEET 1 OF 22		

REVISION STATUS OF SHEETS

REVISIONS

REV.	ECO	DESCRIPTION	DRFT.	DATE	CHKD.	APPD.
A		RELEASED		11/29/68		MH
B	PM4660	SEE CO	DB	2-18-69	97	[illegible]
C	PM5578	SEE CO	GV	7-10-69	BCH	7-18
D	PM5578A	SEECO	GV	7-10-69	BCH	7-18
E	PE 11118	SEE CO	DS	9-17-69	97	9-18-9

NOTES:

1. A HEXAGON IN THE ACCESS FIND NO. COLUMN INDICATES THAT THE CONDUCTOR IS ONE OF SEVERAL (ALL WITH THE SAME NUMBER IN THE HEXAGON) GOING INTO THE SAME TERMINAL. THE NUMBER IN FRONT OF A HEXAGON IS THE TERMINAL FIND NO.
2. FOR MECH ASSY AND PL SEE 40017500.

COPIES TO

BY	SD	DATE 10-10	CHKD.	C.M.	DATE 11/11/68	ENGR	[illegible]	DATE 11/13/68

FORM AA 1672

CONTROL DATA	TITLE		DOCUMENT NO.	REV.
MINNEAPOLIS, MINNESOTA	WIRE LISTING	WL	40017600	E
		SHEET 2 OF		

CONDUCTOR IDENT.	FIND NO.	GAUGE (REF.)	COLOR (REF.)	LENGTH (APPROX.)	ORIGIN		ACCESS. FIND NO.	DESTINATION		ACCESS. FIND NO.	REMARKS
1	11	20	4		J204	42	13	J206	M	19	
2					J206	N	19	J204	43	13	
3					J204	45	13	J206	R	19	
4					J206	S	19	J204	46	13	
5					J204	48	9 ⬡1	IJ202	U	13	
6					IJ202	U	13	J204	48	⬡1	
7					J204	51	13	J206	J	19	
8					J206	k	19	J204	52	13	
9					J204	53	13	J206	HH	19	
10					J206	m	19	J204	54	13	
11					J204	55	13	J206	n	19	
12					J206	p	19	J204	56	13	
13					J204	57	13	J206	r	19	
14					J206	s	19	J204	58	13	
15					J204	60	13	J206	u	19	
16					J206	v	19	J204	62	13	
17					J204	64	9 ⬡2	IJ202	X	13	
18					IJ202	X	13	J204	64	⬡2	
19	11	20	4		J204	65	9 ⬡3	IJ202	Y	13	

FORM AA 1669

CONTROL DATA
MINNEAPOLIS, MINNESOTA

TITLE: WIRE LISTING

WL | DOCUMENT NO. 40017600 | REV. E

SHEET 3 OF

CONDUCTOR IDENT.	FIND NO.	GAUGE (REF.)	COLOR (REF.)	LENGTH (APPROX.)	ORIGIN		ACCESS. FIND NO.	DESTINATION		ACCESS. FIND NO.	REMARKS
20	11	20	4		IIJ202	Y	13	J204	65	(3)	
21					J204	66	9 (4)	IJ202	Z	13	
22					IIJ202	Z	13	J204	66	(4)	
23					J204	16	13	A4J205	21	19	
24					A3J205	18	19	J204	24	13	
25					J204	26	13	A3J205	21	19	
26					A4J205	18	19	J204	33	13	
27					J204	36	13	J206	E	19	
28					J206	F	19	J204	37	13	
29					J204	39	13	J206	J	19	
30					J206	K	19	J204	40	13	
31					J204	41	13	J206	L	19	
32					J206	T	19	A3J205	25	19	
33					A3J205	32	19	TB203	1	32 (5)	
34					TB203	3	32	A3J205	35	19	
35					A3J205	36	19	TB203	7	15 (6)	
36					TB203	8	32	A4J205	36	19	
37					A4J205	35	19	TB203	4	32	
38	11	20	4		TB203	2	32 (6)	A4J205	32	19	

FORM AA 1669

CONTROL DATA
MINNEAPOLIS, MINNESOTA

TITLE: WIRE LISTING

WL | DOCUMENT NO. 40017600 | REV. E

SHEET 4 OF

CONDUCTOR IDENT.	FIND NO.	GAUGE (REF.)	COLOR (REF.)	LENGTH (APPROX.)	ORIGIN		ACCESS. FIND NO.	DESTINATION		ACCESS. FIND NO.	REMARKS
39	11	20	4		A4J205	25	19	J206	W	19	
40					A3TB202	35	21 (7)	A3TB202	33	21 (8)	
41					A3TB202	33	(8)	A3TB202	27	21 (9)	
42					A3TB202	27	(9)	A3TB202	21	21 (10)	
43					A3TB202	21	(10)	A3TB202	15	21 (11)	
44					A3TB202	15	(11)	A3TB202	9	27	
45					A4TB202	35	21 (12)	A4TB202	33	21 (13)	
46					A4TB202	33	(13)	A4TB202	27	21 (14)	
47					A4TB202	27	(14)	A4TB202	21	21 (15)	
48					A4TB202	21	(15)	A4TB202	15	21 (16)	
49					A4TB202	15	(16)	A4TB202	9	27	
50					TB203	3	15 (17)	A23	46	29,30	
51					A17	46	29,30	TB203	3	(17)	
52					TB203	3	15 (18)	A11	46	29,30	
53					B23	46	29,30	TB203	4	15 (19)	
54					TB203	4	(19)	B17	46	29,30	
55					B11	46	29,30	TB203	4	15 (1)	
56					TB203	5	32	A29	46	29,30	
57	11	20	4		B29	46	29,30	TB203	5	32	

FORM AA 1669

CONTROL DATA
MINNEAPOLIS, MINNESOTA

TITLE: WIRE LISTING

WL | DOCUMENT NO. 40017600 | REV. E

SHEET 5 OF

CONDUCTOR IDENT.	FIND NO.	GAUGE (REF.)	COLOR (REF.)	LENGTH (APPROX.)	ORIGIN		ACCESS. FIND NO.	DESTINATION		ACCESS. FIND NO.	REMARKS
58	11	20	4		TB203	5	32	A26	46	29,30	
59					B26	46	29,30	TB203	5	32	
60					TB203	6	32	A29	6	29,30	
61					B29	6	29,30	TB203	6	32	
62					TB203	6	32	A26	6	29,30	
63					B26	6	29,30	TB203	6	32	
64					TB203	7	15 (20)	A23	6	29,30	
65					A17	6	29,30	TB203	7	15 (21)	
66					TB203	7	(21)	A11	6	29,30	
67					B23	6	29,30	TB203	8	15 (22)	
68					TB203	8	15,49	B17	6	29,30	
69					B11	6	29,30	TB203	8	(49)	
70					TB203	9	15 (23)	A23	48	29,30	
71					A17	48	29,30	TB203	9	32	
72					TB203	9	15 (24)	A10	48	29,30	
73					B23	48	29,30	TB203	10	15 (25)	
74					TB203	10	15 (26)	B17	48	29,30	
75					B10	48	29,30	TB203	10	32	
76	11	20	4		TB203	13	15 (27)	IJ202	R	13	

FORM AA 1669

CONTROL DATA
MINNEAPOLIS, MINNESOTA

TITLE: WIRE LISTING

WL | DOCUMENT NO. 40017600 | REV. E

SHEET 6 OF

CONDUCTOR IDENT.	FIND NO.	GAUGE (REF.)	COLOR (REF.)	LENGTH (APPROX.)	ORIGIN		ACCESS. FIND NO.	DESTINATION		ACCESS. FIND NO.	REMARKS
77	11	20	4		IIJ202	R	13	TB203	16	15 (28)	
78					A3TB202	36	27	A3TB202	6	21 (29)	
79					A3TB202	6	(29)	TB203	1	15 (30)	
80					TB203	1	(30)	A4TB202	6	21 (31)	
81					A4TB202	6	(31)	A4TB202	36	27	
82					TB203	4	(51)	B05	46	29,30	
83					B05	48	29,30	TB203	10	(26)	
84					TB203	3	(18)	A05	46	29,30	
85					A05	48	29,30	TB203	9	(24)	
86					A05	6	29,30	TB203	7	(46)	
87					TB203	8	32	B05	6	29,30	
88					A26	48	29,30	TB203	9	32	
89	11	20	4		TB203	10	32	B26	48	29,30	
90	12	24	4		A3TB204	1	22	J204	44	14	
91					J204	49	13 (32)	IJ202	V	14	
92					IIJ202	V	14	J204	49	(32)	
93					J204	50	13 (33)	IJ202	W	14	
94					IIJ202	W	14	J204	50	(33)	
95	12	24	4		J204	59	14	A4TB204	1	22	

FORM AA 1669

CONTROL DATA
MINNEAPOLIS, MINNESOTA

TITLE
WIRE LISTING

WL | DOCUMENT NO. 40017600 | REV. E

SHEET 7 OF

CONDUCTOR IDENT.	FIND NO.	GAUGE (REF.)	COLOR (REF.)	LENGTH (APPROX.)	ORIGIN		ACCESS. FIND NO.	DESTINATION		ACCESS. FIND NO.	REMARKS
96	12	24	4		A3TP201	-	22	J204	67	14	
97	↑	↑	↑		J204	70	14	A4TP201	-	22	
98					A3J205	39	20	A8	1	23,24	
99					A7	13	23,24	A3J205	23	20	
100					J204	4	14	B7	37	16,17	
101					B8	45	16,17	J204	5	14	
102					J204	7	14	A8	45	16,17	
103					A7	37	16,17	J204	8	14	
104					J204	10	14	J206	Z	20	
105					J206	CC	20	J204	22	14	
106					J204	15	14	A4J205	22	20	
107					J206	H	20	J204	25	14	
108					J204	27	14	A3J205	22	20	
109					A3J205	26	20	A8	2	16,17	
110					A8	1	16,17	A3J205	27	20	
111					A3J205	28	20	A3TB204	2	22	
112	↓	↓	↓		A11	30	16,17	A3J205	37	20	
113					A3J205	38	20	A11	45	16,17	
114	12	24	4		A14	1	16,17	A3J205	47	20	

FORM AA 1669

CONTROL DATA
MINNEAPOLIS, MINNESOTA

TITLE
WIRE LISTING

WL | DOCUMENT NO. 40017600 | REV. E

SHEET 8 OF

CONDUCTOR IDENT.	FIND NO.	GAUGE (REF.)	COLOR (REF.)	LENGTH (APPROX.)	ORIGIN		ACCESS. FIND NO.	DESTINATION		ACCESS. FIND NO.	REMARKS
115	12	24	4		A3J205	50	20	A14	8	16,17	
116	↑	↑	↑		A17	16	16,17	A3J205	51	20	
117					A3J205	52	20	A14	20	16,17	
118					A14	42	16,17	A3J205	53	20	
119					A3J205	54	20	A14	37	16,17	
120					A14	36	16,17	A3J205	55	20	
121					A3J205	56	20	A15	42	16,17	
122					A15	45	16,17	A3J205	57	20	
123					A3J205	58	20	A15	9	16,17	
124					A15	29	16,17	A3J205	59	20	
125					A3J205	60	20	A15	24	16,17	
126					A15	13	16,17	A3J205	62	20	
127					A3J205	63	20	A15	22	16,17	
128					A15	40	16,17	A3J205	64	20	
129					A3J205	65	20	A15	33	16,17	
130					A15	14	16,17	A3J205	66	20	
131	↓	↓	↓		A3J205	67	20	A15	28	16,17	
132					A15	34	16,17	A3J205	70	20	
133	12	24	4		A3J205	71	20	A15	12	16,17	

FORM AA 1669

CONTROL DATA
MINNEAPOLIS, MINNESOTA

TITLE
WIRE LISTING

WL | DOCUMENT NO. 40017600 | REV. E

SHEET 9 OF

CONDUCTOR IDENT.	FIND NO.	GAUGE (REF.)	COLOR (REF.)	LENGTH (APPROX.)	ORIGIN		ACCESS. FIND NO.	DESTINATION		ACCESS. FIND NO.	REMARKS
134	12	24	4		A15	21	16,17	A3J205	72	20	
135					A3J205	73	20	A15	20	16,17	
136					A15	38	16,17	A3J205	74	20	
137					A3J205	75	20	A15	36	16,17	
138					A15	16	16,17	A3J205	76	20	
139					A3J205	77	20	A15	17	16,17	
140					A15	25	16,17	A3J205	78	20	
141					A4J205	39	20	B8	1	16,17	
142					B7	13	16,17	A4J205	23	20	
143					A4J205	24	20	J206	$\overline{d}$	20	
144					A4J205	26	20	B8	2	16,17	
145					B8	1	16,17	A4J205	27	20	
146					A4J205	28	20	A4TB204	2	22	
147					B11	30	16,17	A4J205	37	20	
148					A4J205	38	20	B11	45	16,17	
149					B14	1	16,17	A4J205	47	20	
150					A4J205	50	20	B14	8	16,17	
151					B17	16	16,17	A4J205	51	20	
152	12	24	4		A4J205	52	20	B14	20	16,17	

FORM AA1659

CONTROL DATA
MINNEAPOLIS, MINNESOTA

TITLE
WIRE LISTING

WL | DOCUMENT NO. 40017600 | REV. E

SHEET 10 OF

CONDUCTOR IDENT.	FIND NO.	GAUGE (REF.)	COLOR (REF.)	LENGTH (APPROX.)	ORIGIN		ACCESS. FIND NO.	DESTINATION		ACCESS. FIND NO.	REMARKS
153	12	24	4		B14	42	16,17	A4J205	53	20	
154					A4J205	54	20	B14	37	16,17	
155					B14	36	16,17	A4J205	55	20	
156					A4J205	56	20	B15	42	16,17	
157					B15	45	16,17	A4J205	57	20	
158					A4J205	58	20	B15	9	16,17	
159					B15	29	16,17	A4J205	59	20	
160					A4J205	60	20	B15	24	16,17	
161					B15	13	16,17	A4J205	62	20	
162					A4J205	63	20	B15	22	16,17	
163					B15	40	16,17	A4J205	64	20	
164					A4J205	65	20	B15	33	16,17	
165					B15	14	16,17	A4J205	66	20	
166					A4J205	67	20	B15	28	16,17	
167					B15	34	16,17	A4J205	70	20	
168					A4J205	71	20	B15	12	16,17	
169					B15	21	16,17	A4J205	72	20	
170					A4J205	73	20	B15	20	16,17	
171	12	24	4		B15	38	16,17	A4J205	74	20	

FORM AA1659

CONTROL DATA
MINNEAPOLIS, MINNESOTA

TITLE: WIRE LISTING

WL | DOCUMENT NO. 40017600 | REV. E

SHEET 11 OF

CONDUCTOR IDENT.	FIND NO.	GAUGE (REF.)	COLOR (REF.)	LENGTH (APPROX.)	ORIGIN		ACCESS. FIND NO.	DESTINATION		ACCESS. FIND NO.	REMARKS
172	12	24	4		A4J205	75	20	B15	36	16,17	
173					B15	16	16,17	A4J205	76	20	
174					A4J205	77	20	B15	17	16,17	
175					B15	25	16,17	A4J205	78	20	
176					J206	B	20	A17	34	16,17	
177					A17	08	16,17	J206	D	20	
178					J206	C	20	TB203	3	32 (34)	
179					TB203	1	32 (35)	J206	U	20	
180					J206	V	20	A19	1	16,17	
181					A19	20	16,17	J206	W	20	
182					J206	X	20	A19	33	16,17	
183					A19	45	16,17	J206	Y	20	
184					J206	P	20	A3TB204	3	22	
185					A4TB204	3	22	J206	$\bar{t}$	20	
186					J206	$\bar{h}$	20	B17	08	16,17	
187					B17	34	16,17	J206	$\bar{e}$	20	
188					J206	$\bar{f}$	20	TB203	4	32 (36)	
189					TB203	2	32 (37)	J206	$\bar{x}$	20	
190	12	24	4		J206	$\bar{y}$	20	B19	1	16,17	

FORM AA1669

CONTROL DATA
MINNEAPOLIS, MINNESOTA

TITLE: WIRE LISTING

WL | DOCUMENT NO. 40017600 | REV. E

SHEET 12 OF

CONDUCTOR IDENT.	FIND NO.	GAUGE (REF.)	COLOR (REF.)	LENGTH (APPROX.)	ORIGIN		ACCESS. FIND NO.	DESTINATION		ACCESS. FIND NO.	REMARKS
191	12	24	4		B19	20	16,17	J206	$\bar{z}$	20	
192					J206	AA	20	B19	33	16,17	
193					B19	45	16,17	J206	BB	20	
194					A3TB202	7	21,(40)	A3TB202	2	27	
195					A3TB202	5	21 (38)	A3TB202	1	27	
196					A3TB202	30	27	A3TB202	31	27	
197					A3TB202	24	27	A3TB202	25	27	
198					A3TB202	18	27	A3TB202	19	27	
199					A3TB202	12	27	A3TB202	13	27	
200					A3TB202	34	27	A3TB202	31	27	
201					A3TB202	28	27	A3TB202	25	27	
202					A3TB202	22	27	A3TB202	19	27	
203					A3TB202	16	27	A3TB202	14	27	
204					A3TB202	5	(38)	A3TB202	8	27	
205					A3TB202	7	(40)	A3TB202	10	27	
206					A4TB202	7	21,(39)	A4TB202	2	27	
207					A4TB202	5	21 (39)	A4TB202	1	27	
208					A4TB202	30	27	A4TB202	31	27	
209	12	24	4		A4TB202	24	27	A4TB202	25	27	

FORM AA1669

CONTROL DATA
MINNEAPOLIS, MINNESOTA

TITLE: WIRE LISTING

WL | DOCUMENT NO. 40017600 | REV. E

SHEET 13 OF

CONDUCTOR IDENT.	FIND NO.	GAUGE (REF.)	COLOR (REF.)	LENGTH (APPROX.)	ORIGIN		ACCESS. FIND NO.	DESTINATION		ACCESS. FIND NO.	REMARKS
210	12	24	4		A4TB202	18	27	A4TB202	19	27	
211					A4TB202	12	27	A4TB202	13	27	
212					A4TB202	34	27	A4TB202	31	27	
213					A4TB202	28	27	A4TB202	25	27	
214					A4TB202	22	27	A4TB202	19	27	
215					A4TB202	16	27	A4TB202	14	27	
216					A4TB202	5	39	A4TB202	8	27	
217					A4TB202	7	49	A4TB202	10	27	
218					TB203	1	5	A3TP200	—	22	
219					A3TP203	—	22	TB203	3	34	
220					TB203	2	6	A4TP200	—	22	
221					A4TP203	—	22	TB203	4	36	
222					TB203	7	20	A3TP204	—	22	
223					A3TP202	—	22	TB203	9	23	
224					TB203	8	22	A4TP204	—	22	
225					A4TP202	—	22	TB203	10	25	
226					TB203	13	15 27	IJ202	N	14	
227					IJ200	80	20	TB203	13	32 40	
228	12	24	4		TB203	13	40	IJ201	80	20	

FORM AA1669

CONTROL DATA
MINNEAPOLIS, MINNESOTA

TITLE: WIRE LISTING

WL | DOCUMENT NO. 40017600 | REV. E

SHEET 14 OF

CONDUCTOR IDENT.	FIND NO.	GAUGE (REF.)	COLOR (REF.)	LENGTH (APPROX.)	ORIGIN		ACCESS. FIND NO.	DESTINATION		ACCESS. FIND NO.	REMARKS
229	12	24	4		A30	2	16,17	TB203	13	32 41	
230					TB203	13	41	A30	50	16,17	
231					IIJ202	N	14	TB203	16	28	
232					TB203	16	32 42	IIJ200	80	20	
233					IIJ201	80	20	TB203	16	42	
234					TB203	16	32 43	B30	2	16,17	
235					B30	50	16,17	TB203	16	43	
236					TB203	1	35	A3TB204	7	22	
237					A3TB204	4	22	A14	45	16,17	
238					B14	45	16,17	A4TB204	4	22	
239					A4TB204	7	22	TB203	2	37	
240					A3TB202	36	27	A3TB202	37	27	
241					A4TB202	36	27	A4TB202	37	27	
242					A22	25	16,17	A3J205	40	20	
243					A3J205	41	20	A22	18	16,17	
244					B22	25	16,17	A4J205	40	20	
245					A4J205	41	20	B22	18	16,17	
246					A3J205	24	20	J206	A	20	
247	12	24	4		A4S202	3	22	B17	9	16,17	

FORM AA1669

CONTROL DATA
MINNEAPOLIS, MINNESOTA

TITLE: WIRE LISTING

WL | DOCUMENT NO. 40017600 | REV. E

SHEET 15 OF

CONDUCTOR IDENT.	FIND NO.	GAUGE (REF.)	COLOR (REF.)	LENGTH (APPROX.)	ORIGIN		ACCESS. FIND NO.	DESTINATION		ACCESS. FIND NO.	REMARKS
248	12	24	4		A3S202	2	22	A17	33	16,17	
249					A3S202	3		A17	9		
250					A3S202	4		A17	26		
251					A3S202	5		A17	5		
252					A4S202	C		B17	32		
253					A4S202	1		B17	44		
254	12	24	4		A4S202	2	22	B17	33	16,17	
255	10	16	4		A3J205	1	18	TB203	3	15	
256					TB203	7	15	A3J205	2	18	
257					A3J205	3	18	J204	21	9	
258					A3J205	20	18	TB203	1	34,50	
259					TB203	1	51	J204	1	9	
260					J204	2	9	TB203	1	15	
261					TB203	2	15	J204	3	9	
262					J204	11	9	TB203	6	15	
263					TB203	5	15	J204	12	9	
264					J204	13	9	TB203	9	15	
265					TB203	10	15	J204	14	9	
266	10	16	4		J204	17	9	A3TB202	35	21	

FORM AA1669

CONTROL DATA
MINNEAPOLIS, MINNESOTA

TITLE: WIRE LISTING

WL | DOCUMENT NO. 40017600 | REV. E

SHEET 16 OF

CONDUCTOR IDENT.	FIND NO.	GAUGE (REF.)	COLOR (REF.)	LENGTH (APPROX.)	ORIGIN		ACCESS. FIND NO.	DESTINATION		ACCESS. FIND NO.	REMARKS
267	10	16	4		TB203	3	15	J204	18	9	
268					J204	20	9	TB203	4	15	
269					TB203	7	15	J204	28	9	
270					J204	29	9	TB203	8	15	
271					A4J205	3	18	J204	30	9	
272					J204	35	9	A4TB202	35	21	
273					TB203	4	15	A4J205	1	18	
274					A4J205	20	18	TB203	2	15	
275					TB203	1	15	TOP BUSS BAR	—	23,24	
276					MIDDLE BUSS BAR	—	23,24	TB203	2	34	
277					TB203	2	52	BOTTOM BUSS BAR	—	23,24	
278	10	16	4		TB203	8	15	A4J205	2	18	
279	12	24	4		A3S201	1	16	A17	41	16,17	
280					A4S201	1	16	B17	41		
281					A30S200	B	27	A17	42		
282					A4DS200	B	27	B17	42		
283					A3S202	C	22	A17	32		
284	12	24	4		A3S202	1	22	A17	44	16,17	

FORM AA1669

CONTROL DATA
MINNEAPOLIS, MINNESOTA

TITLE: WIRE LISTING

WL | DOCUMENT NO. 40017600 | REV. E

SHEET 17 OF

CONDUCTOR IDENT.	FIND NO.	GAUGE (REF.)	COLOR (REF.)	LENGTH (APPROX.)	ORIGIN		ACCESS. FIND NO.	DESTINATION		ACCESS. FIND NO.	REMARKS
285	25	24									
285A			0		A3J205	4	20	A3TB202	35	(7)	
285B			4		A3J205	8	20	A3TB202	37	27	
286	25	24									
286A			0		A3TB202	9	27	A3J205	5	20	
286B			4		A3TB202	7	27	A3J205	10	20	
287	25	24									
287A			0		A3J205	7	20	A3TB202	15	27	
287B			4		A3J205	11	20	A3TB202	11	27	
288	25	24									
288A			0		A3TB202	21	27	A3J205	12	20	
288B			4		A3TB202	17	27	A3J205	15	20	
289	25	24									
289A			0		A3J205	13	20	A3TB202	27	27	
289B			4		A3J205	16	20	A3TB202	23	27	
290	25	24									
290A			0		A3TB202	33	27	A3J205	14	20	
290B			4		A3TB202	29	27	A3J205	17	20	

FORM AA1669

CONTROL DATA
MINNEAPOLIS, MINNESOTA

TITLE: WIRE LISTING

WL | DOCUMENT NO. 40017600 | REV. E

SHEET 18 OF

CONDUCTOR IDENT.	FIND NO.	GAUGE (REF.)	COLOR (REF.)	LENGTH (APPROX.)	ORIGIN		ACCESS. FIND NO.	DESTINATION		ACCESS. FIND NO.	REMARKS
291	25	24									
291A			0		A3J205	31	20	A11	25	16,17	
291B			4		A3J205	34	20	A11	24	16,17	
292	25	24									
292A			0		IJ202	K	14	A3J205	45	20	
292B			4		IJ202	M	14	A3J205	46	20	
293	25	24									
293A			0		A3J205	48	20	IIJ202	K	14	
293B			4		A3J205	49	20	IIJ202	M	14	
294	25	24									
294A			0		A4J205	4	20	A4TB202	35	(12)	
294B			4		A4J205	8	20	A4TB202	37	27	
295	25	24									
295A			0		A4TB202	9	27	A4J205	5	20	
295B			4		A4TB202	7	27	A4J205	10	20	
296	25	24									
296A			0		A4J205	7	20	A4TB202	15	27	
296B			4		A4J205	11	20	A4TB202	11	27	

FORM AA1669

CONTROL DATA
MINNEAPOLIS, MINNESOTA

TITLE: WIRE LISTING

WL | DOCUMENT NO. 40017600 | REV. E

SHEET 19 OF

CONDUCTOR IDENT.	FIND NO.	GAUGE (REF.)	COLOR (REF.)	LENGTH (APPROX.)	ORIGIN		ACCESS. FIND NO.	DESTINATION		ACCESS. FIND NO.	REMARKS
297	25	24									
297A			0		A4TB202	21	27	A4J205	12	20	
297B			4		A4TB202	17	27	A4J205	15	20	
298	25	24									
298A			0		A4J205	13	20	A4TB202	27	27	
298B			4		A4J205	16	20	A4TB202	23	27	
299	25	24									
299A			0		A4TB202	33	27	A4J205	14	20	
299B			4		A4TB202	29	27	A4J205	17	20	
300	25	24									
300A			0		A4J205	31	20	B11	25	16,17	
300B			4		A4J205	34	20	B11	24	16,17	
301	25	24									
301A			0		IJ202	KK	14	A4J205	45	20	
301B			4		IJ202	MM	14	A4J205	46	20	
302	25	24									
302A			0		A4J205	48	20	IIJ202	KK	14	
302B			4		A4J205	49	20	IIJ202	MM	14	

FORM AA1669

CONTROL DATA
MINNEAPOLIS, MINNESOTA

TITLE: WIRE LISTING

WL | DOCUMENT NO. 40017600 | REV. E

SHEET 20 OF

CONDUCTOR IDENT.	FIND NO.	GAUGE (REF.)	COLOR (REF.)	LENGTH (APPROX.)	ORIGIN		ACCESS. FIND NO.	DESTINATION		ACCESS. FIND NO.	REMARKS
303	25	24									
303A			0		A7	1	16,17	A3TB202	20	27	
303B			4		A7	5	16,17	A3TB202	18	27	
304	25	24									
304A			0		A3TB202	14	27	A7	18	16,17	
304B			4		A3TB202	12	27	A7	17	16,17	
305	25	24									
305A			0		A7	28	16,17	A3TB202	32	27	
305B			4		A7	29	16,17	A3TB202	30	27	
306	25	24									
306A			0		A3TB202	26	27	A7	44	16,17	
306B			4		A3TB202	24	27	A7	45	16,17	
307	25	24									
307A			0		B7	1	16,17	A4TB202	20	27	
307B			4		B7	5	16,17	A4TB202	18	27	
308	25	24									
308A			0		A4TB202	14	27	B7	18	16,17	
308B			4		A4TB202	12	27	B7	17	16,17	

FORM AA1669

CONTROL DATA
MINNEAPOLIS, MINNESOTA

TITLE: WIRE LISTING

WL | DOCUMENT NO. 40017600 | REV. E

SHEET 21 OF

CONDUCTOR IDENT.	FIND NO.	GAUGE (REF.)	COLOR (REF.)	LENGTH (APPROX.)	ORIGIN		ACCESS. FIND NO.	DESTINATION		ACCESS. FIND NO.	REMARKS
309	25	24									
309A			0		B7	28	16,17	A4TB202	32	27	
309B			4		B7	29	16,17	A4TB202	30	27	
310	25	24									
310A			0		A4TB202	26	27	B7	44	16,17	
310B			4		A4TB202	24	27	B7	45	16,17	
311	12	24	4		A4S202	4	22	B17	26	16,17	
312	12	24	4		J206	$\overline{b}$	20	A18	42	16,17	
313	12	24	4		J206	EE	20	B18	42	16,17	
315	28	20									
315A			SHIELD		A3J205	29	19	A11	28	29,31	
315B			0		A3J205	30	19	A11	26	29,30	
315C			2		A3J205	33	19	A11	18	29,30	
316	28	20									
316A			SHIELD		A4J205	29	19	B11	28	29,31	
316B			0		A4J205	30	19	B11	26	29,30	
316C			2		A4J205	33	19	B11	18	29,30	

FORM AA1669

CONTROL DATA
MINNEAPOLIS, MINNESOTA

TITLE: WIRE LISTING

WL | DOCUMENT NO. 40017600 | REV. E

SHEET 22 OF 22

CONDUCTOR IDENT.	FIND NO.	GAUGE (REF.)	COLOR (REF.)	LENGTH (APPROX.)	ORIGIN		ACCESS. FIND NO.	DESTINATION		ACCESS. FIND NO.	REMARKS
320	33	24									
320A			SHIELD		A3J205	79	19 (44)	A22	8	16,17	
320B			9		A3J205	80	20	A22	5	16,17	
321	33	24									
321A			SHIELD		A22	8	16,17	A3J205	79	(44)	
321B			9		A22	9	16,17	A3J205	82	20	
322	33	24									
322A			SHIELD		A4J205	79	19 (45)	B22	8	16,17	
322B			9		A4J205	80	20	B22	5	16,17	
323	33	24									
323A			SHIELD		B22	8	16,17	A4J205	79	(45)	
323B			9		B22	9	16,17	A4J205	82	20	
324	11	20	4		A29	48	29,30	TB203	9	32	
325	11	20	4		TB203	10	32	B29	48	29,30	
326	12	24	4		A3J205	42	20	TB203	2	(47)	
327	↕	↕	↕		A4J205	42	↕	TB203	2	(47) 35	
328					A3J205	43		J206	$\overline{a}$	20	
329					A4J205	43	20	J206	DD	20	
330	12	24	4		A4S202	05	22	B17	5	16,17	

CONTROL DATA
MINNEAPOLIS, MINNESOTA

TITLE: WIRE LIST -DECK ASSY
PRODUCT: MULTIPLE DISK DRIVE
WL | DOCUMENT NO. 40099000 | REV. G
SHEET 1 OF 12

REVISION STATUS OF SHEETS

REVISIONS

REV.	ECO	DESCRIPTION	DRFT.	DATE	CHKD.	APPD.
A		RELEASED		1-14-69		MH
B	PM4733	DWG. NO. WAS 40064000	CC	3-21-69	DCH	
C	PM4834	DN CHANGE ONLY	SS	4-14-69	DCH	
D	PM5578	SEE CO	GV	7-15-69	DCH	
E	PE11067	NO CHG	GV	7-31-69	DCH	
F	PE11067A	CANCELLED ECO	GV	8-1-69	DCH	
G	PM5578D	SEE CO	DS	9-22-69	97	9-22-9

NOTES:

DN 40099000
DETACHED LISTS

COPIES TO

BY DM 11-22-68 | CHKD. C.M. 11/22/68 | ENGR 7WE 11-22-68

FORM AA 1672

CONTROL DATA
MINNEAPOLIS, MINNESOTA

TITLE: WIRE LISTING
DECK ASSY

WL | DOCUMENT NO. 40099000 | REV. G
SHEET 2 OF

CONDUCTOR IDENT.	FIND NO.	GAUGE (REF.)	COLOR (REF.)	LENGTH (APPROX.)	ORIGIN		ACCESS. FIND NO.	DESTINATION		ACCESS. FIND NO.	REMARKS
1	8	24	4		P205	21	5	TB306	3	38	
2					TB306	2	38	P205	23	5	
3					P205	22	5	TB306	4	38	
4					P305	1	19	TB300	3	18	
5					TB300	3	18	P303	6	19	
6					P303	5	19	TB300	4	18	
7					TB300	4	18	P304	2	19	
8					P304	1	19	TB300	3	18	
9					TB300	4	18	P305	2	19	
10					TB302	1	38	P205	24	5	
11					P205	26	5	TB303	2	38	
12					TB303	3	38	P205	27	5	
13					P205	28	5	TB302	4	38	
14					C1	33	17,20	D1	9	17,20	
15					TB300	5	18	P303	4	19	
16					P303	3	19	P205	37	5	
17					P205	38	5	P304	4	19	
18	8	24	4		P304	3	19	TB300	5	18	
19											

FORM AA 1669

	TITLE		DOCUMENT NO.	REV.
	WIRE LISTING DECK ASSY	WL	40099000	G
		SHEET 3 OF		

CONDUCTOR IDENT.	FIND NO.	GAUGE (REF.)	COLOR (REF.)	LENGTH (APPROX.)	ORIGIN		ACCESS. FIND NO.	DESTINATION		ACCESS. FIND NO.	REMARKS
20	8	24	4		P306	1	15	P205	39	5	
21					P205	47	5	C2	41	17,20	
22					C2	24	17,20	P205	50	5	
23					P205	51	5	C2	45	17,20	
24					C2	9	17,20	P205	52	5	
25					P205	54	5	C1	32	17,20	
26					C1	44	17,20	P205	57	5	
27					P205	58	5	C1	42	17,20	
28					C1	40	17,20	P205	62	5	
29					P205	63	5	C1	38	17,20	
30					C1	37	17,20	P205	66	5	
31					P205	67	5	C1	13	17,20	
32					C1	14	17,20	P205	72	5	
33					P205	73	5	C1	12	17,20	
34					C1	9	17,20	P205	76	5	
35					P205	77	5	C1	10	17,20	
36					D2	44	17,20	P205	78	5	
37					P205	75	5	D2	42	17,20	
38	8	24	4		D2	40	17,20	P205	74	5	

FORM AA1589

CONTROL DATA MINNEAPOLIS, MINNESOTA	TITLE		DOCUMENT NO.	REV.
	WIRE LISTING DECK ASSY	WL	40099000	G
		SHEET 4 OF		

CONDUCTOR IDENT.	FIND NO.	GAUGE (REF.)	COLOR (REF.)	LENGTH (APPROX.)	ORIGIN		ACCESS. FIND NO.	DESTINATION		ACCESS. FIND NO.	REMARKS
39	8	24	4		P205	71	5	D2	38	17,20	
40					D2	37	17,20	P205	70	5	
41					P205	65	5	D2	13	17,20	
42					D2	14	17,20	P205	64	5	
43					P205	60	5	D2	12	17,20	
44					D2	9	17,20	P205	59	5	
45					P205	56	5	D2	10	17,20	
46					D2	32	17,20	P205	55	5	
47					P205	53	5	Q2	44	17,20	
48	8	24			C2	12	17,20	D2	41	17,20	
49	9	20			P205	18	6	S303	NO	18	
50					S303	C	18	S302	NC	18	
51					S302	C	18	P205	25	6	
52					P205	32	6	TB300	3	18	
53					TB300	4	18	P205	35	6	
54					P205	36	6	TB300	5	18	
55					C2	46	21,22	D2	46	21,22	
56					D2	48	21,22	C2	48	21,22	
57	9	20	4		C2	6	21,22	D2	6	21,22	

FORM AA1669

CONTROL DATA
MINNEAPOLIS, MINNESOTA

TITLE
WIRE LISTING
DECK ASSY

WL | DOCUMENT NO. 40099000 | REV. G

SHEET 5 OF

CONDUCTOR IDENT.	FIND NO.	GAUGE (REF.)	COLOR (REF.)	LENGTH (APPROX.)	ORIGIN		ACCESS. FIND NO.	DESTINATION		ACCESS. FIND NO.	REMARKS
58	10	16	4		C	GRD	13	D	GRD	13	
59	↑	↑	↑		P205	1	7	D1	48	24,25	
60					D1	46	24,25	P205	3	7	
61	↓	↓	↓		P205	2	7	D1	6	24,25	
62	10	16	4		D	GRD	13	P205	20	7	
63	11	24									
63A			0		P306	2	15	P205	4	5	
63B			4		P306	3	15	P205	8	5	
64	11	24									
64A			0		P205	5	5	J310	8	16,29	
64B			4		P205	10	5	J310	5	16,29	
65	11	24									
65A			0		J310	7	16,29	P205	12	5	
65B			4		J310	4	16,29	P205	15	5	
66	11	24									
66A			0		P205	7	5	J310	6	16,29	
66B			4		P205	11	5	J310	1	16,29	

FORM AA1669

CONTROL DATA
MINNEAPOLIS, MINNESOTA

TITLE
WIRE LISTING
DECK ASSY

WL | DOCUMENT NO. 40099000 | REV. G

SHEET 6 OF

CONDUCTOR IDENT.	FIND NO.	GAUGE (REF.)	COLOR (REF.)	LENGTH (APPROX.)	ORIGIN		ACCESS. FIND NO.	DESTINATION		ACCESS. FIND NO.	REMARKS
67	11	24									
67A			0		J310	10	16,29	P205	14	5	
67B			4		J310	2	16,29	P205	17	5	
68	11	24									
68A			0		P205	13	5	J310	9	16,29	
68B			4		P205	16	5	J310	3	16,29	
69	11	24									
69A			0		P205	48	5	C2	13	17,20	
69B			4		P205	49	5	C2	16	17,20	
70	11	24									
70A			0		C2	1	17,20	P205	45	5	
70B			4		C2	10	17,20	P205	46	5	
71	11	24									
71A			0		P205	31	5	P305	3	19	
71B			4		P205	34	5	P305	4	19	
72	11	24									
72A			0		P305	5	19	TB300	1	18	
72B			4		P305	6	19	TB300	2	18	

FORM AA1669

CONTROL DATA
MINNEAPOLIS, MINNESOTA

TITLE
WIRE LISTING
DECK ASSY

WL | DOCUMENT NO. 40099000 | REV. G
SHEET 7 OF

CONDUCTOR IDENT.	FIND NO.	GAUGE (REF.)	COLOR (REF.)	LENGTH (APPROX.)	ORIGIN		ACCESS. FIND NO.	DESTINATION		ACCESS. FIND NO.	REMARKS
73	11	24									
73A			0		TB300	1	18	P304	5	19	
73B			4		TB300	2	18	P304	6	19	
74	11	24									
74A			0		P303	2	19	TB300	1	18	
74B			4		P303	1	19	TB300	2	18	
75	12	20									
75A			SHIELD		(4)			P205	29	6	
75B			0		TB300	1	18	P205	30	6	
75C			2		TB300	2	18	P205	33	6	
76	31	24									
76A			SHIELD		P205	79	6 (1)	(4)			
76B			9		P205	80	5	D1	36	17,20	
77	31	24									
77A			SHIELD		(4)			P205	79	(1)	
77B			9		D1	37	17,20	P205	82	5	
78	31	24									
78A			SHIELD		(4)			C1	22	17,20	
78B			9		D1	12	17,20	C1	21	17,20	

FORM AA1669

CONTROL DATA
MINNEAPOLIS, MINNESOTA

TITLE
WIRE LISTING
DECK ASSY

WL | DOCUMENT NO. 40099000 | REV. G
SHEET 8 OF

CONDUCTOR IDENT.	FIND NO.	GAUGE (REF.)	COLOR (REF.)	LENGTH (APPROX.)	ORIGIN		ACCESS. FIND NO.	DESTINATION		ACCESS. FIND NO.	REMARKS
79	31	24									
79A			SHIELD		C1	26	17,20	(4)			
79B			9		C1	24	17,20	D1	13	17,20	
80	31	24									
80A			SHIELD		D2	20	17,20	C1	20	17,20	
80B			9		D2	18	17,20	C1	18	17,20	
81	31	24									
81A			SHIELD		C1	17	17,20	D2	17	17,20	
81B			9		C1	16	17,20	D2	16	17,20	
82	31	24									
82A			SHIELD		D2	34	17,20	C1	34	17,20	
82B			9		D2	36	17,20	C1	36	17,20	
83	8	24	4		P205	40	5	C2	5	17,20	
84	8	24	4		P205	41	5	C2	17	17,20	
85	9	20	4		P205	42	5	TB305	3	38	
86	9	20	4		P205	43	5	TB305	2	38	
87											
88											
89											

FORM AA1669

CONTROL DATA	WIRE LISTING DECK ASSY	CODE IDENT	SHEET 9	WL	DOCUMENT NO. 40099000	REV. G

CONDUCTOR IDENT.	FIND NO.	GAUGE (REF.)	COLOR (REF.)	LENGTH (APPROX)	ORIGIN		ACCESS FIND NO.	DESTINATION		ACCESS FIND NO.	REMARKS
90											
91											
92											
93											
94											
95											
96											
97											
100	26	24	4	3	C2	40	27,28	R300	2	29	
101	43	20	4	5	C2	37	41,42	TB301	4	25	
102	26	24	4	3	C2	32	27,28	R303	2	29	
103	38	24	94		C1	41	-	C2	14	-	
104	43	20	4	5	C2	25	41, 42	TB301	2	25	
105	26	24	4	2	C2	28	27,28	R302	2	29	
106	26	24	4	2	C2	36	27,28	TB301	1	25	
107	26	24	4	5	C1	16	27,28	R302	1	29,39	
108	26	24	4	5	C1	18	27,28	R303	1	29,39	
109	26	24	4	5	C1	36	27,28	R300	1	29,39	
110	26	24	4	2	TB301	1	25	TB301	3	25	

AA3183 PRINTED IN U.S.A.

CONTROL DATA	WIRE LISTING DECK ASSY	CODE IDENT	SHEET 10	WL	DOCUMENT NO. 40099000	REV G

CONDUCTOR IDENT.	FIND NO.	GAUGE (REF.)	COLOR (REF.)	LENGTH (APPROX)	ORIGIN		ACCESS FIND NO.	DESTINATION		ACCESS FIND NO.	REMARKS
111	31	18	2		C2	48	-	C1	48	-	
112	32	18	6		C2	6	-	C1	6	-	
113	31	18	2		C2	46	-	C1	46	-	
114	33	16	0	8	C2	50	34,35	GRD		36	
115	33	16	0	8	C1	50	34,35	GRD		36	
116	33	16	0	2	C2	2	34,35	GRD		36	
117	33	16	0	2	C1	2	34,35	GRD		36	
118											
119											
120	23	24	93		D2	24	-	D1	8	-	
121	23	24	93		D2	21	-	D1	5	-	
122	24	24	94		D2	33	-	D1	1	-	
123	17	18	2		D2	48	-	D1	48	-	
124	18	18	6		D2	6	-	D1	6	-	
125	17	18	2		D2	46	-	D1	46	-	
126	19	16	0	2	D2	50	20,21	GRD		22	
127	19	16	0	2	D1	50	20,21	GRD		22	
128	19	16	0	8	D2	2	20,21	GRD		22	
129	19	16	0	8	D1	2	20,21	GRD		22	
130											

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WIRE LISTING DECK ASSY

CONTROL DATA	NORMANDALE OPERATION	CODE IDENT 19333	SHEET 11	WL	DOCUMENT NO. 40099000	REV. G

CONDUCTOR IDENT.	FIND NO.	GAUGE (REF.)	COLOR (REF.)	LENGTH (APPROX)	ORIGIN		ACCESS FIND NO.	DESTINATION		ACCESS FIND NO.	REMARKS
131											
132											
133											
134	4	20	4	15"	TB305	3	7	S305	C	5,6	
135	4	20	4	15"	TB305	1	7	S305	NO	5,6	
136	4	24	4	4"	TB306	1	7	S301	NO	5,6	
137	4	24	4	4"	TB306	3	7	S301	C	5,6	
138	4	24	4	4"	TB306	4	7	S301	NC	5,6	
139											
140	4	24	4	1"	TB302	3	4	S300B	NO	5,6	
141	4	24	4	1"	TB302	4	4	S300B	C	5,6	
142	4	24	4	1"	TB303	1	4	S300A	NC	5,6	
143	4	24	4	1"	TB303	2	4	S300A	C	5,6	
144											
145											
146											
147	2										
147A			5		J306	1	4	TB304	1	6	
147B			2		J306	2	4	L300		13,6	
147C			6		J306	3	(3) 4	L300		13,6	

AA3183

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WIRE LISTING DECK ASSY

CONTROL DATA	NORMANDALE OPERATIONS	CODE IDENT 19333	SHEET 12 OF 12	WL	DOCUMENT NO. 40099000	REV. G

CONDUCTOR IDENT.	FIND NO.	GAUGE (REF.)	COLOR (REF.)	LENGTH (APPROX)	ORIGIN		ACCESS FIND NO.	DESTINATION		ACCESS FIND NO.	REMARKS
147D			9		J306	3	(3)	GRD		7	
148											
149											
150											
151											
152											
153	42	24	4	2"	TB304	3	51	S304	NO	39,40	
154	42	24	4	2"	S304	C	39,40	TB304	4	51	
155	42	24	4	8"	TB304	4	51	GRD		41	

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CONTROL DATA		CODE IDENT	SHEET 1 OF 1	DN	DOCUMENT NO. 40099000	REV. G

1. FOR FIND NO. REFERENCED IN CONDUCTORS 1 THRU 86 SEE PL 40098900, DECK CABLE ASSY.
2. FOR FIND NO. REFERENCED IN CONDUCTORS 100 THRU 117 SEE PL 40099800, RIGHT PRE-AMP CHASSIS ASSY.
3. FOR FIND NO. REFERENCED IN CONDUCTORS 120 THRU 129 SEE PL 40099900 LEFT PRE-AMP CHASSIS ASSY.
4. INDICATES END OF SHIELD IS FLOATING.
5. A HEXAGON IN THE ACCESS FIND NO. COLUMN INDICATES THAT THE CONDUCTOR IS ONE OF SEVERAL (ALL WITH THE SAME NUMBER IN THE HEXAGON) GOING INTO THE SAME TERMINAL. THE NUMBER IN FRONT OF A HEXAGON IS THE TERMINAL FIND NO.
6. FOR FIND NO. REFERENCED IN CONDUCTORS 134 THRU 135 SEE PL 70804600, SWITCH SUPPRESSION ASSY; FOR FIND NO. 136 THRU 138 SEE PL 70804601, SWITCH SUPPRESSION ASSY.
7. FOR FIND NO. REFERENCED IN CONDUCTORS 140 THRU 141 SEE PL 70959501, COMPONENT ASSY; FOR FIND NO. 142 THRU 143 SEE PL 70959502, COMPONENT ASSY.
8. FOR FIND NO. REFERENCED IN CONDUCTORS 147,A,B,C,D SEE PL 41279400 MAGNET ASSY.
9. FOR FIND NO. REFERENCED IN CONDUCTORS 153 THRU 155 SEE PL 40014100 HEAD CARRIAGE ASSY.

AA3185

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CONTROL DATA MINNEAPOLIS, MINNESOTA	TITLE: WIRE LIST - 2X FINAL ASSEMBLY	WL	DOCUMENT NO. 40064500	REV. B
	PRODUCT: MULTIPLE DISK DRIVE		SHEET 1 OF 3	

REVISION STATUS OF SHEETS

REVISIONS

REV.	ECO	DESCRIPTION	DRFT.	DATE	CHKD.	APPD.
A		RELEASED		1-14-69		MH
B	PM-5197	SEE CO.	BL	5-5-69	JCH	5-7

NOTES:

1. FOR FIND NO. REFERENCED IN CONDUCTORS 1 THRU 6 SEE PL 40016900, CABLE ASS W9.
2. FOR FIND NO. REFERENCED IN CONDUCTORS 10 THRU 12 SEE PL 40017400, CABLE ASSY W16.
3. INDICATES END OF SHIELD IS FLOATING.

COPIES TO

BY	D.M.	DATE 10-29-68	CHKD.	C.M.	DATE 11/15/68	ENGR	WE	DATE 11/18/68

FORM AA 1672

		CODE IDENT	SHEET 2	WL	DOCUMENT NO. 40064500	REV. B

CONDUCTOR IDENT.	FIND NO.	GAUGE (REF.)	COLOR (REF.)	LENGTH (APPROX)	ORIGIN		ACCESS FIND NO.	DESTINATION		ACCESS FIND NO.	REMARKS
1	1	12	4		FL01	L	2	CB02	AT	2	1 Ø A
2	1	12	4		FL02	L	2	CB02	BT	2	Ø B
3	1	12	4		FL03	L	2	CB02	CT	2	Ø C
4	1	12	4		FL04	L	2	TB01	1	3	NEUTRAL
5	1	12	4		FILTER BOX FRAME		2	TB01	4	3	A C GRD
6	4	20	4		FILTER BOX FRAME		5	SHIELD	-	6	1
7											
8											
9											
10	3	20									
10A			SHIELD		P05	3	5,2	3			2
10B			0		P05	1	5	B200	1	6,7	
10C			2		P05	2	5	B200	2	6,7	
11	3	20									
11A			SHIELD		P05	6	5,2	3			
11B			0		P05	4	5	B201	1	6,7	
11C			2		P05	5	5	B201	2	6,7	
12	3	20									
12A			SHIELD		P05	9	5,2	3			2

AA3183

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	WIRE LISTING 2X FINAL ASSEMBLY	CODE IDENT	SHEET 3 OF 3	WL	DOCUMENT NO. 40064500	REV. B

CONDUCTOR IDENT.	FIND NO.	GAUGE (REF.)	COLOR (REF.)	LENGTH (APPROX)	ORIGIN		ACCESS FIND NO.	DESTINATION		ACCESS FIND NO.	REMARKS
12B			0		P05	7	5	B202	1	6,7	2
12C			2		P05	8	5	B202	2	6,7	2

AA3183

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CONTROL DATA
MINNEAPOLIS, MINNESOTA

TITLE: WIRE LIST - CONTROL PANEL

PRODUCT: RESOB

WL | DOCUMENT NO. 40065200 | REV. B

SHEET 1 OF 3

REVISION STATUS OF SHEETS

REVISIONS

REV.	ECO	DESCRIPTION	DRFT.	DATE	CHKD.	APPD.
A		RELEASED				
B	PM4506	SEE CO	TM	2-12-69	DCH	2-13-69

NOTES:

1. FOR MECHANICAL ASSY AND PARTS LIST SEE 40011500.

COPIES TO

BY [illegible] DATE 7-16-68 | CHKD. [illegible] DATE 7-16-68 | APPD. [illegible] DATE 7/22/68

FORM 4696A

CONTROL DATA
MINNEAPOLIS, MINNESOTA

TITLE: WIRE LISTING

WL | DOCUMENT NO. 40065200 | REV. B

SHEET 2 OF 3

CONDUCTOR IDENT.	FIND NO.	GAUGE (REF.)	COLOR (REF.)	LENGTH (APPROX.)	ORIGIN		ACCESS. FIND NO.	DESTINATION		ACCESS. FIND NO.	REMARKS
1	21	24	4	11	J600	A	24	XDS504	4	14	
2	↑	↑	↑	9	J600	B	↑	S503	NO	↑	
3				7	J600	C	↓	XDS503	1		
4				6	J600	D	24	XDS503	3	↓	
5				7	XDS501	2	14	S503	C	14	
6				10	XDS504	1	14	XDS502	2	14,26	
7				8	J600	P	24	XDS500	1	14	
8				7	J600	U	↑	XDS502	3	14,26	
9				7	J600	V		XDS502	7	↑	
10				7	J600	W		XDS502	8		
11				7	J600	X		XDS502	9	↓	
12				7	J600	Y	↓	XDS502	10	14,26	
13				10	J600	Z	24	XDS501	4	14	
14	↓	↓		6	XDS503	2	14	XDS504	2	14	
15	21	24		7	J600	b	24	XDS502	1	14,26	
16	22	20		10	J600	E	23	XDS501	1	14	
17	↑	↑		7	J600	F	↑	XDS500	3	14	
18	↓	↓	↓	11	J600	H	↓	S501B	C	14	
19	22	20	4	11	J600	J	23	S501C	C	14	

FORM AA 1689

[redacted]	NORMANDALE OPERATIONS	CODE IDENT	SHEET 3 OF 3	WL	DOCUMENT NO. 40065200	REV. B

CONDUCTOR IDENT.	FIND NO.	GAUGE (REF.)	COLOR (REF.)	LENGTH (APPROX)	ORIGIN		ACCESS FIND NO.	DESTINATION		ACCESS FIND NO.	REMARKS
20	22	20	4	11	J600	K	23	S501C	NC	14	
21	↑	↑	↑	11	J600	L	↑	S501C	NO	↑	
22				11	J600	M		S501B	NO		
23				11	J600	N		S501B	NC		
24				11	J600	R		S501A	NC		
25	↓	↓	↓	11	J600	S	↓	S501A	NO	↓	
26	22	20	4	11	J600	T	23	S501A	C	14	
27	24	24	4	11	J600	a	24	XDS504	3	14	

AA3183

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CONTROL DATA
MINNEAPOLIS, MINNESOTA

TITLE: WIRE LIST-FILTER BOX ASSY
PRODUCT: MULT DISK DRIVE
WL | DOCUMENT NO. 40065300 | REV. B
SHEET 1 OF 2

REVISION STATUS OF SHEETS

REVISIONS

REV.	ECO	DESCRIPTION	DRFT.	DATE	CHKD.	APPD.
A		RELEASED		1.16.69		MK
B	PM5548	NOTE 1. NO. CHG. ONLY	GV	6-25-69	DCH	6-26

NOTES:
1. FOR MECH ASSY AND FL SEE 70806500.

COPIES TO

BY	C.M.	DATE 11/18/68	CHKD.	C.M.	DATE 11/22/68	ENGR	FWE	DATE 11-22-68

FORM AA 1672

CONTROL DATA | WIRE LIST-FILTER BOX ASSY | CODE IDENT | SHEET 2 OF 2 | WL | DOCUMENT NO. 40065300 | REV B

CONDUCTOR IDENT	FIND NO.	GAUGE (REF.)	COLOR (REF.)	LENGTH (APPROX)	ORIGIN		ACCESS FIND NO.	DESTINATION		ACCESS FIND NO.	REMARKS
1	23	12	0	6	CB01	AB	19	FL01	R	19	
2	24	12	2	6	CB01	BB	19	FL02	R	19	
3	25	12	3	6	CB01	CB	19	FL03	R	19	

AA 3183
PRINTED IN U.S.A.

CONTROL DATA
MINNEAPOLIS, MINNESOTA

TITLE: WIRE LIST - POWER SUPPLY ASSY
PRODUCT: MULTIPLE DISK DRIVE

WL | DOCUMENT NO. 40019800 | REV. H

SHEET 1 OF 25

REVISION STATUS OF SHEETS

REVISIONS

REV	ECO	DESCRIPTION	DRFT.	DATE	CHKD.	APPD
A		RELEASED		1-17-69		
B	PM4734	SEE CO	TEM	3-10-69	DCH	3-13-9
C	PM5243	SEE CO	GV	6-8-69	97	6-12-69
D	PM3578	SEE CO	GV	7-15-69	DCH	7-21
E	PE11066	SEE CO	GV	7-18-69	DCH	7-21
F	PE11088	SEE CO	GV	8-14-69	DCH	8-18
G	PM5578C	SEE CO S/N 311	GV	8-14-69	DCH	8-18
H	PE11148	INACTIVE, SERVICE USE ONLY,				
	S/N 575	SUPERSEDED BY 70821700	DS	9-18-69	97	9-24-9

NOTES:

INACTIVE

DN 40019800
DETACHED LISTS

COPIES TO

BY O. M. 11-14-69 CHKD. C. M. 12-8-69 ENGR 12-9-69

FORM AA 1672

CONTROL DATA
MINNEAPOLIS, MINNESOTA

TITLE: WIRE LISTING
POWER SUPPLY ASSY

WL | DOCUMENT NO. 40019800 | REV. H

SHEET 2 OF

CONDUCTOR IDENT.	FIND NO.	GAUGE (REF.)	COLOR (REF.)	LENGTH (APPROX)	ORIGIN		ACCESS FIND NO.	DESTINATION		ACCESS. FIND NO.	REMARKS
1	3	16	4		C14	L	4	T01	3	7 (1)	
2					T01	3	(1)	CR04	4	4,15	
3					CR04	3	4,15	C05	N	9 (2)	
4					C05	N	(2)	C09	N	11 (3)	
5					C09	N	(3)	TB02	4	4	
6					TB02	2	4	C06	N	11 (4)	
7					C06	N	(4)	R02	R	4,15	
8					R02	L	4,15	C06	P	9 (5)	
9					C06	P	(5)	CR05	1	4,15	
10					CR05	4	4,15	T01	9	1	
11					T01	10	1	CR05	2	4,15	
12					CR05	3	4,15	C06	N	(4)	
13					C08	8	6	R04	L	10	
14					R04	R	10	C04	P	6	
15					T08	1	4,15	T05	3	4	
16					T05	1	4	T01	8	7 (6)	
17					T01	8	(6)	T03	1	4	
18					T03	3	4	T09	1	4	
19	3	16	4		T09	2	4	T01	6	1	

FORM AA 1669

CONTROL DATA
MINNEAPOLIS, MINNESOTA

TITLE
WIRE LISTING
POWER SUPPLY ASSY

WL | DOCUMENT NO. 40019800 | REV. H

SHEET 3 OF

CONDUCTOR IDENT.	FIND NO.	GAUGE (REF.)	COLOR (REF.)	LENGTH (APPROX)	ORIGIN		ACCESS. FIND NO.	DESTINATION		ACCESS. FIND NO.	REMARKS
20	3	16	4		T01	4	1	T09	3	4	
21	↑	↑	↑		T09	4	4	CR04	2	4,15	
22					CR04	1	4,15	C05	P	9(7)	
23					C05	P	(7)	C09	P	9(8)	
24					C09	P	(8)	R03	T	5 12	
25					R03	B	5,15	C09	N	(8)	
26					C02	N	6	R01	B	5,12	
27					R01	T	5,12	C02	P	6	
28					T05	4	4	T01	5	7(9)	
29					T01	5	(9)	T03	4	4	
30					T02	1	4	T01	8	7(10)	
31					T01	8	(10)	T04	1	4	
32					T04	3	4	T07	1	4	
33					T07	2	4	T01	7	7(11)	
34					T01	7	(11)	T08	2	4,15	
35					T08	3	4	TB08	3	4	
36					TB07	2	4	T07	3	4,15	
37					T07	4	4	C07	N	6	
38	3	16	4		T07	5	4	TB08	2	4	

FORM AA1969

CONTROL DATA
MINNEAPOLIS, MINNESOTA

TITLE
WIRE LISTING
POWER SUPPLY ASSY

WL | DOCUMENT NO. 40019800 | REV. H

SHEET 4 OF

CONDUCTOR IDENT.	FIND NO.	GAUGE (REF.)	COLOR (REF.)	LENGTH (APPROX)	ORIGIN		ACCESS. FIND NO.	DESTINATION		ACCESS. FIND NO.	REMARKS
39	3	16	4		TB07	3	4	T08	6	4	
40	↑	↑	↑		C14	R	4	T01	8	1	
41					T01	5	7(12)	T02	4	4	
42	3	16			T04	4	4	T01	5	(12)	
43	2	14			TB07	1	8	T01	13	7	
44	↑	↑			T01	12	7	C07	P	9	
45					C07	P	9	C03	N	9	
46					C03	P	9	T08	5	8	
47					TB08	1	8	T01	11	7	
48					T01	15	7	C01	N	9	
49					C01	N	9	C02	N	9	
50					C02	P	9	L01	2	8	
51					L01	1	8	C01	P	9	
52					C04	N	9	C08	P	9	
53					C08	P	9	C07	P	9	
54	↓	↓	↓		C08	P	9	TB02	3	8	
55	2	14	4		TB02	1	8	C02	N	9	
56											
57											

FORM AA1969

CONTROL DATA
MINNEAPOLIS, MINNESOTA

TITLE
WIRE LISTING
POWER SUPPLY ASSY

WL | DOCUMENT NO. 40019800 | REV. H
SHEET 5 OF

CONDUCTOR IDENT.	FIND NO.	GAUGE (REF.)	COLOR (REF.)	LENGTH (APPROX.)	ORIGIN		ACCESS. FIND NO.	DESTINATION		ACCESS. FIND NO.	REMARKS
58											
59											
60											
61											
62											
63											
64											
65											
66											
67											
68											
69											
70											
71											
72											
73											
74											
75											
76											

FORM AA1669

CONTROL DATA
MINNEAPOLIS, MINNESOTA

TITLE
WIRE LISTING
POWER SUPPLY ASSY

WL | DOCUMENT NO. 40019800 | REV. H
SHEET 6 OF

CONDUCTOR IDENT.	FIND NO.	GAUGE (REF.)	COLOR (REF.)	LENGTH (APPROX.)	ORIGIN		ACCESS. FIND NO.	DESTINATION		ACCESS. FIND NO.	REMARKS
77	4	16	4		C803	AT	8	C802	AT	9 (1)	
78	↑	↑	↑		C802	AT	(1)	C8103	AT	8	
79					C803	AB	8	C21	ME	5	12
80					TB11	1	5	J03	1	13	
81					J03	2	13	FL12	CAP-B	5	
82					C22	ME	5	C803	BB	8	15
83					C8103	BT	8	C802	BT	9 (3)	
84					C802	BT	(3)	C803	BT	8	
85					C802	AB	8	J02	1	13	
86					J02	2	13	C802	BB	8	
87					C803	CT	8	C802	CT	12 (4)	
88					C802	CT	(4)	C8103	CT	8	
89					C803	CB	8	C23	ME	5	13
90					FL13	CAP-B	5	J03	3	13	
91					J02	3	13	C802	CB	8	
92	↓	↓	↓		C802	AT	9 (5)	XF03	T	10	
93	4	16	4		XF03	B	10	TB11	2	5	
94											
95	4	16	4		C123	ME	5	C8103	CB	8	14

FORM AA1669

CONTROL DATA
MINNEAPOLIS, MINNESOTA

TITLE
WIRE LISTING
POWER SUPPLY ASSY

WL | DOCUMENT NO. 40019800 | REV. H
SHEET 7 OF

CONDUCTOR IDENT.	FIND NO.	GAUGE (REF.)	COLOR (REF.)	LENGTH (APPROX.)	ORIGIN		ACCESS. FIND NO.	DESTINATION		ACCESS. FIND NO.	REMARKS
96	4	16	4		CB103	BB	8	C122	ME	5	13
97					FL113	CAP-T	5	J103	3	13	
98					J103	2	13	FL112	CAP-T	5	
99					TB111	1	5	J103	1	13	
100					C121	ME	5	CB103	AB	8	13
101					XF04	B	10	FL05	L	8	
102					FL06	L	8	XF05	B	10	
103					XF06	T	10	CB02	CT	4	
104	4	16			CB02	BT	9 9	XF04	T	10	
105	3	20			TB03	11	10	TB03	9	10	
106					TB03	9	10	TB03	7	10	
107					TB03	1	10	CB02	AT	5	
108					CB02	BT	9	TB03	3	10	
109					TB03	5	10	CB02	CT	8 10	
110					CB02	CT	10	DS04	B	10	
111					DS04	T	10	TB01	1	11	
112					TB01	1	11	P106	2	14	
113					P106	1	14	TB111	1	5	
114	3	20	4		FL114	CAP-T	5	J103	6	14	

FORM AA1669

CONTROL DATA
MINNEAPOLIS, MINNESOTA

TITLE
WIRE LISTING
POWER SUPPLY ASSY

WL | DOCUMENT NO. 40019800 | REV. H
SHEET 8 OF

CONDUCTOR IDENT.	FIND NO.	GAUGE (REF.)	COLOR (REF.)	LENGTH (APPROX.)	ORIGIN		ACCESS. FIND NO.	DESTINATION		ACCESS. FIND NO.	REMARKS
115	3	20	4		J103	7	14	TB01	2	11	
116					TB01	2	11	J03	7	14	
117					J03	6	14	FL14	CAP-B	5	
118					TB11	2	5	J05	1	14	
119					J05	2	14	TB01	1	11	
120					TB01	1	11	TB03	7	10	
121					J03	8	14	TB01	4	11	
122					TB01	4	11	J103	8	14	
123					J103	5	14	TB01	3	11	
124					TB01	3	11	J05	3	14	
125					J05	4	14	TB111	2	5	
126					TB111	2	5	J05	7	14	
127					J05	8	14	TB01	2	11	
128					TB01	2	11	J05	5	14	
129					J05	6	14	TB01	4	11	
130					TB01	4	11	J05	9	14	
131					J103	4	14	TB01	3	11	
132					TB01	3	11	J03	5	14	
133	3	20	4		J03	4	14	TB01	3	11	

FORM AA1669

CONTROL DATA
MINNEAPOLIS, MINNESOTA

TITLE: WIRE LISTING
POWER SUPPLY ASSY

WL | DOCUMENT NO. 40019800 | REV. H

SHEET 9 OF

CONDUCTOR IDENT.	FIND NO.	GAUGE (REF.)	COLOR (REF.)	LENGTH (APPROX.)	ORIGIN		ACCESS. FIND NO.	DESTINATION		ACCESS. FIND NO.	REMARKS
134	1	20	4		TB01	1	11	P06	2	14	
135	↓	↓	↓		P06	1	14	TB11	1	5	
136					J02	4	14	TB01	3	11	
137					TB01	4	11	J02	5	14	
138					TB03	2	10	TB03	8	10	
139					TB03	10	10	TB03	4	10	
140					TB03	6	10	TB03	12	10	
141					B01	L	17,18	TB11	2	5	
142					TB11	2	5	B02	L	17,18	
143	↓	↓	↓		B02	R	17,18	TB01	2	11	
144	3	20	4		TB01	2	11	B01	R	17,18	
145											
146											
147											
148											
149											
150											
151											
152											

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CONTROL DATA
MINNEAPOLIS, MINNESOTA

TITLE: WIRE LISTING
POWER SUPPLY ASSY

WL | DOCUMENT NO. 40019800 | REV. H

SHEET 10 OF

CONDUCTOR IDENT.	FIND NO.	GAUGE (REF.)	COLOR (REF.)	LENGTH (APPROX.)	ORIGIN		ACCESS. FIND NO.	DESTINATION		ACCESS. FIND NO.	REMARKS
153	10	16	4		CB07	T	2	C02	P	7 (1)	
154	↓	↓	↓		C02	P	(1)	CB107	T	2	
155					CB106	T	2	C09	P	7 (2)	
156					C09	P	(2)	CB06	T	2	
157					CB06	B	2	C32	ME	5	19
158					FL15	ME	5	TB02	11	12	18
159					TB02	11	12	J04	21	3	
160					J04	20	3	K102	1A	23	
161					K102	1C	12,25	CB04	B	13 (4)	
162					CB04	B	(4)	K02	1C	12,25	
163					K02	1A	23	J04	18	3	
164					J04	17	3	TB02	13	12	
165					FL16	ME	5	TB02	L3	12	18
166					C33	ME	5	XF02	B	16	19
167					XF02	T	16	C06	P	7 (6)	
168					C06	P	(6)	XF102	T	16	
169					XF102	B	16	C133	ME	5	19
170	↓	↓	↓		FL116	ME	5	TB02	14	12	18
171	10	16	4		TB02	14	12	J04	35	3	

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CONTROL DATA
MINNEAPOLIS, MINNESOTA

TITLE
WIRE LISTING
POWER SUPPLY ASSY

WL | DOCUMENT NO. 40019800 | REV. H | SHEET 11 OF

CONDUCTOR IDENT.	FIND NO.	GAUGE (REF.)	COLOR (REF.)	LENGTH (APPROX.)	ORIGIN		ACCESS. FIND NO.	DESTINATION		ACCESS. FIND NO.	REMARKS
172	10	16	4		J04	29	3	K102	3A	23	
173					K102	3C	12,25	CB05	B	13 (8)	
174					CB05	B	(8)	K02	3C	12,25	
175					K02	3A	23	J04	28	3	
176					J04	30	3	TB02	12	12	
177					FL115	ME	5	TB02	12	12	45
178					C132	ME	5	CB106	B	2	43
179					CB107	B	2	K102	2C	12,25	
180					K102	2A	23	J04	14	3	
181					J04	13	3	K02	2A	23	
182					K02	2C	12,25	CB07	B	2	
183					CB04	T	2	C04	P	2	
184					C08	N	2	CB05	T	2	
185					CB05	B	(8)	J04	11	3	
186					J04	3	3	TB02	5	12	
187					TB02	5	12	J04	2	3	
188					J04	1	3	TB02	6	12	
189					TB02	7	12	XF01	A	16	
190	10	16	4		XF01	T	16	C03	P	2	

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CONTROL DATA
MINNEAPOLIS, MINNESOTA

TITLE
WIRE LISTING
POWER SUPPLY ASSY

WL | DOCUMENT NO. 40019800 | REV. H | SHEET 12 OF

CONDUCTOR IDENT.	FIND NO.	GAUGE (REF.)	COLOR (REF.)	LENGTH (APPROX.)	ORIGIN		ACCESS. FIND NO.	DESTINATION		ACCESS. FIND NO.	REMARKS
191	10	16	4		TB02	3	12	TB04	2	16	
192	10	16			CB04	B	(4)	J04	12	3	
193	21	20			J04	33	4	K101	R3	15,24	
194					TB02	7	14 (12)	J04	48	4	
195					J04	46	4	TB09	11	5	
196					TB	5	5	J04	45	4	
197					J04	43	4	S07	B1	11,25	
198					S07	B3	11,25	J04	42	4	
199					J04	41	4	S07	C1	11,25	
200					S07	C3	11.25	J04	40	4	
201					J04	39	4	K05	L8	15,24	
202					K05	R2	15,24	TB02	2	11	
203					TB02	2	11	K105	R2	15,24	
204					K105	L8	15,24	J04	54	4	
205					J04	55	4	S107	C3	11.25	
206					S107	C1	11,25	J04	56	4	
207					J04	57	4	S107	B3	11,25	
208					S107	B1	11,25	J04	58	4	
209	21	20	4		J04	65	4	S107	C2	12 (47) 25	

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CONTROL DATA
MINNEAPOLIS, MINNESOTA

TITLE
WIRE LISTING
POWER SUPPLY ASSY

WL | DOCUMENT NO. 40019800 | REV. H

SHEET 13 OF

CONDUCTOR IDENT.	FIND NO.	GAUGE (REF.)	COLOR (REF.)	LENGTH (APPROX.)	ORIGIN		ACCESS. FIND NO.	DESTINATION		ACCESS. FIND NO.	REMARKS
210	21	20	4		S107	B2	25 12 (48)	S107	C2	(47)	
211					S107	B2	(48)	K101	L3	15,24	
212					K101	L2	15,24	J04	64	4	
213					J04	62	4	TB109	11	5	
214					TB109	5	5	J04	60	4	
215					J04	52	4	TB02	7	(12)	
216					TB02	7	14	J04	37	4	
217					J04	53	4	J04	66	3 (14)	
218					J04	66	(14)	K105	L9	15,24	
219					J04	51	4	TB02	5	11	
220					TB02	5	11	J04	36	4	
221					J04	26	4	TB02	3	11	
222					TB02	3	11	J04	16	4	
223					J04	24	4	K01	R3	15,24	
224					K01	R2	15,24	S02	B2	25,11	
225					S02	B3	25,11	TB02	9	11	
226					TB02	9	11	K03	L2	15,24	
227					K03	1	15,24	TB02	9	11	
228	21	20	4		TB02	9	11	K05	1	15,24	

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CONTROL DATA
MINNEAPOLIS, MINNESOTA

TITLE
WIRE LISTING
POWER SUPPLY ASSY

WL | DOCUMENT NO. 40019800 | REV. H

SHEET 14 OF

CONDUCTOR IDENT.	FIND NO.	GAUGE (REF.)	COLOR (REF.)	LENGTH (APPROX.)	ORIGIN		ACCESS. FIND NO.	DESTINATION		ACCESS. FIND NO.	REMARKS
229	21	20	4		K05	R3	15,24	K02	L2	14 (15)	
230					K02	L2	(15)	TB04	8	16	
231					TB04	8	16	K01	L6	15,24	
232					K01	L5	15,24	TB02	2	14 (16)	
233					TB02	2	(16)	K101	L5	15,24	
234					K101	L6	15,24	K102	L2	14 (17)	
235					K102	L2	(17)	TB04	22	16	
236					TB04	22	16	K105	R3	15,24	
237					K105	R5	15,24	TB02	4	14 (18)	
238					TB02	4	(18)	SSW104	4	11	
239					SSW103	4	14 (19)	SSW102	4	14 (20)	
240					SSW102	4	(20)	SSW101	4	11	
241					SSW103	4	(19)	TB02	8	11	
242					TB02	4	11	SSW04	4	11	
243					SSW04	3	11	K04	L3	15,24	
244					K04	L2	15,24	TB02	9	11	
245					TB02	10	11	S102	B3	11,25	
246					S102	A2	12 (50)	TB04	21	16	
247	21	20	4		TB04	7	16	S02	B2	12 (49)	

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CONTROL DATA
MINNEAPOLIS, MINNESOTA

TITLE
WIRE LISTING
POWER SUPPLY ASSY

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SHEET 15 OF

CONDUCTOR IDENT.	FIND NO.	GAUGE (REF.)	COLOR (REF.)	LENGTH (APPROX.)	ORIGIN		ACCESS. FIND NO.	DESTINATION		ACCESS. FIND NO.	REMARKS
248	21	20	4		S02	A3	11,25	C807	3D	5	
249	↓	↓	↓		S02	A2	(46)	K02	L1	11	
250	↓	↓	↓		K102	L1	11	S102	A2	(50)	
251	21	20	4		S102	A3	11,25	C8107	3D	5	
252											
253	21	20	4		TB02	7	12 (21)	C802	5B	5	
254	↓	↓	↓		C802	3D	5	C804	5B	5	
255					C804	3D	5	C805	5B	5	
256					C805	3D	5	C8107	5B	5	
257					DS109	B	8	TB02	12	11	
258					TB02	14	11	DS106	B	8	
259					DS06	B	8	TB02	13	11	
260					TB02	11	11	DS09	B	8	
261					C807	5B	5	C805	3D	5	
262					TB02	4	11	SSW03	4	14 (22)	
263					SSW03	4	(22)	SSW02	4	14 (23)	
264					SSW02	4	(23)	SSW01	4	11	
265	↓	↓	↓		SSW01	3	14 (24)	SSW02	3	14 (25)	
266	21	20	4		SSW02	3	(25)	SSW03	3	14 (26)	

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CONTROL DATA
MINNEAPOLIS, MINNESOTA

TITLE
WIRE LISTING
POWER SUPPLY ASSY

WL | DOCUMENT NO. 40019800 | REV. H
SHEET 16 OF

CONDUCTOR IDENT.	FIND NO.	GAUGE (REF.)	COLOR (REF.)	LENGTH (APPROX.)	ORIGIN		ACCESS. FIND NO.	DESTINATION		ACCESS. FIND NO.	REMARKS
267	21	20	4		SSW03	3	(26)	K03	L3	15,24	
268	↑	↑	↑		K04	1	15,24	SSW01	3	(24)	
269					SSW101	3	14 (27)	SSW102	3	14 (28)	
270					SSW102	3	(28)	SSW103	3	14 (29)	
271					SSW103	3	(29)	K103	L3	15,24	
272					K103	L2	15,24	TB02	10	11	
273					TB02	10	11	K103	1	15,24	
274					K105	1	15,24	TB02	10	11	
275					TB02	10	11	K104	L2	15,24	
276					K104	1	15,24	SSW101	3	(27)	
277	↓	↓	↓		SSW104	3	11	K104	L3	15,24	
278	21	20	4		K101	B2	15,24	S102	B2	11,25	
279											
280	21	20	4		S07	B2	25 12 (15)	K01	L3	15,24	
281	17	24			K02	2A	11	DS05	B	8	
282	↑	↑			DS05	T	8	TB02	6	11 (30)	
283					TB02	6	(30)	DS105	T	8	
284	↓	↓	↓		DS105	B	8	K102	2A	11	
285	17	24	4		K102	1A	11	DS107	B	8	

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CONTROL DATA — MINNEAPOLIS, MINNESOTA

TITLE: WIRE LISTING — POWER SUPPLY ASSY

WL | DOCUMENT NO. 40019800 | REV. H | SHEET 17 OF

CONDUCTOR IDENT.	FIND NO.	GAUGE (REF.)	COLOR (REF.)	LENGTH (APPROX.)	ORIGIN		ACCESS. FIND NO.	DESTINATION		ACCESS. FIND NO.	REMARKS
286	17	24	4		DS107	T	8	TB02	1	11 (31)	
287	↑	↑	↑		TB02	1	(31)	DS07	T	8	
288					DS07	B	8	K02	1A	//	
289					K02	3A	//	DS08	B	8	
290					DS08	T	8	TB02	6	11 (32)	
291					TB02	6	(32)	DS108	T	8	
292					DS108	B	8	K102	3A	//	
293					K102	4C	11,25	TB02	8	11 (33)	
294					TB02	8	(33)	K05	L9	9,24	
295					K05	R1	9,24	K04	2	24,15 (34)	
296					K04	2	(34)	J04	27	6	
297					J04	25	6	TB02	8	11 (35)	
298					TB02	8	(35)	K101	1	9,24	
299					K101	2	24,9	TB02	4	11	
300					TB02	1	11, (36)	DS10	T	8	
301					DS10	B	8	TB02	7	(21)	
302					TB02	7	11 (40)	S01	A3	11,25	
303	↓	↓	↓		S01	B2	11,25	TB02	2	11 (37)	
304	17	24	4		TB02	2	(37)	K05	R5	9,24	

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CONTROL DATA — MINNEAPOLIS, MINNESOTA

TITLE: WIRE LISTING — POWER SUPPLY ASSY

WL | DOCUMENT NO. 40019800 | REV. H | SHEET 18OF

CONDUCTOR IDENT.	FIND NO.	GAUGE (REF.)	COLOR (REF.)	LENGTH (APPROX.)	ORIGIN		ACCESS. FIND NO.	DESTINATION		ACCESS. FIND NO.	REMARKS
305	17	24	4		K05	R6	9,24	K03	L5	9,24	
306	↑	↑	↑		K03	L6	9,24	J04	8	6	
307					J04	7	6	K05	2	9,24	
308					K01	2	9,24	TB02	1	(36)	
309					TB02	1	11 (38)	S102	C2	11,25	
310					S102	C1	11,25	TB04	20	8	
311					TB04	20	8	J04	59	6	
312					J04	49	6	S01	A2	11, 25 (43)	
313					S01	A2	(43)	K02	4C	25 11 (39)	
314					K02	4C	(39)	K01	1	9,24	
315					K01	L2	9,24	TB02	7	(40)	
316					TB02	6	11	K03	2	9,24	
317					J04	50	6	K02	4A	11	
318					K102	4A	11	S07	C2	25 11 (44)	
319					S07	C2	(44)	S07	B2	(45)	
320					S02	C1	11,25	TB04	6	8	
321					TB04	6	8	J04	44	6	
322	↓	↓	↓		J04	22	6	DS111	B	8	
323	17	24	4		DS111	T	8	TB02	3	11 (41)	

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CONTROL DATA
MINNEAPOLIS, MINNESOTA

TITLE
WIRE LISTING
POWER SUPPLY ASSY

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SHEET 19 OF

CONDUCTOR IDENT.	FIND NO.	GAUGE (REF.)	COLOR (REF.)	LENGTH (APPROX.)	ORIGIN		ACCESS. FIND NO.	DESTINATION		ACCESS. FIND NO.	REMARKS
324	17	24	4		TB02	3	(41)	DS11	T	8	
325					DS11	B	8	J04	10	6	
326					J04	15	6	K104	2	24,15 (42)	
327					K104	2	(42)	K105	R1	9,24	
328					K105	2	9,24	J04	5	6	
329					J04	4	6	K103	L6	9,24	
330					K103	L5	9,24	K105	R6	9,24	
331					K103	2	9,24	TB02	3	11	
332					TB02	1	(38)	S02	C2	11,25	
333					DS09	T	8	TB04	1	8	
334					TB04	15	8	DS109	T	8	
335					S01	B3	11,25	TB04	5	8	
336					TB04	5	8	TB04	19	8	
337					TB04	17	8	DS106	T	8	
338					DS06	T	8	TB04	3	8	
339					TB02	11	11	J04	67	6	
340	17	24	4		J04	70	6	TB02	12	11	
341	21	20	4		TB04	2	16	TB04	4	16	
342	21	20	4		TB04	4	16	TB04	16	16	

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CONTROL DATA
MINNEAPOLIS, MINNESOTA

TITLE
WIRE LISTING
POWER SUPPLY ASSY

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SHEET 20 OF

CONDUCTOR IDENT.	FIND NO.	GAUGE (REF.)	COLOR (REF.)	LENGTH (APPROX.)	ORIGIN		ACCESS. FIND NO.	DESTINATION		ACCESS. FIND NO.	REMARKS
343	21	20	4		TB04	16	16	TB04	18	16	
344	21	20	4		TB09	21	5	S07	A3	25,11	
345	21	20	4		TB09	25	5	S07	A1	25,11	
346											
347	21	20	4		C25	ONE	5	CB07	3D	5	(14)
348	21	20	4		TB09	13	5	S07	A2	25,11	
349	21	20	4		TB109	21	5	S107	A3	25,11	
350	21	20	4		TB109	25	5	S107	A1	25,11	
351											
352	21	20	4		TB109	13	5	S107	A2	25,11	
353	21	20	4		C125	ONE	5	CB107	3D	5	(14)
354											
355											
356											
357											
358											
359											
360											
361											

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CONTROL DATA
MINNEAPOLIS, MINNESOTA

TITLE
WIRE LISTING
POWER SUPPLY ASSY

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SHEET 21 OF

CONDUCTOR IDENT.	FIND NO.	GAUGE (REF.)	COLOR (REF.)	LENGTH (APPROX.)	ORIGIN		ACCESS FIND NO.	DESTINATION		ACCESS FIND NO.	REMARKS
362	△1	16		12	T06	1		T01	6	57	
363		12		12	T06	2		T01	14	56	
364		12		11	T06	3		TB06	3	53	
365		16		10	T06	4		T02	3	51	
366		12		11	T06	5		TB06	2	53	
367		12		12	T06	6		T01	16	56	
368		16		6	L02	1		C03	P	50	
369		16		6	L02	2		C04	P	50	
370		16		5	L03	1		C07	N	50	
371	△1	16		5	L03	2		C08	N	50	
372	52	16	4	12	C01	P	50	TB06	1	51	
373	54	14	4	4	T08	5	58	TC8	4	53	
374											
375											
376											
377											
378											
379											
380											

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CONTROL DATA | NORMANDALE DIVISION | CODE IDENT 19333 | SHEET 22 | WL | DOCUMENT NO 40019800 | REV. H

CONDUCTOR IDENT	FIND NO	GAUGE (REF)	COLOR (REF)	LENGTH (APPROX)	ORIGIN		ACCESS FIND NO	DESTINATION		ACCESS FIND NO	REMARKS
381	67	16	4	10	FL05	R	68	T01	1	68	
382	67	16	4	10	FL06	R	68	T01	2	68	
383	67	16	4	10	PANEL BASE	GRD	68	FRONT PANEL	GRD	68	△15
384	5	24	4	11	TB09	24	7	FRONT PANEL	GRD	6	△15
385	5	24	4	11	TB109	24	7	FRONT PANEL	GRD	6	△15
386											
387											
388											
389											
390											
391											
392											
393											
394											
395											
396											
397											
398											
399											
400	11	20	4	7	TB09	13	12	C25	ME	12	△15

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PRINTED IN U.S.A.

CONTROL DATA	NORMANDALE DIVISION	CODE IDENT 19333	SHEET 23	WL	DOCUMENT NO. 40019800	REV H

CONDUCTOR IDENT.	FIND NO	GAUGE (REF.)	COLOR (REF.)	LENGTH (APPROX)	ORIGIN		ACCESS FIND NO.	DESTINATION		ACCESS FIND NO.	REMARKS
401	11	20	4	4	TB109	13	12	C125	ME	12	15
402											
403											
404											
405											
406											
407											
408											
409											
410											
411											
412											
413											
414											
415	22	16	4	3	C21	OME	18	SSW01	1	19	15 14
416	22	16	4	3	C22	OME	18	SSW02	1	19	15 14
417	22	16	4	3	C23	OME	18	SSW03	1	19	15 14
418	22	16	4	3	C24	OME	18	SSW04		19	15 14
419	22	16	4	4	SSW01	2	19	FL11	COIL-B	18	15
420	22	16	4	4	SSW02	2	19	FL12	COIL-B	18	15

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PRINTED IN U.S.A.

CONTROL DATA	NORMANDALE DIVISION	CODE IDENT 19333	SHEET 24	WL	DOCUMENT NO. 40019800	REV H

CONDUCTOR IDENT	FIND NO	GAUGE (REF)	COLOR (REF)	LENGTH (APPROX)	ORIGIN		ACCESS FIND NO.	DESTINATION		ACCESS FIND NO.	REMARKS
421	22	16	4	4	SSW03	2	19	FL13	COIL-B	18	15
422	21	20	4	4	SSW04	2	20	FL14	COIL-B	18	15
423	22	16	4	6	TB11	2	18	C24	ME	18	15 13
424	22	16	4	5	FL11	CAP-B	18	TB11	1	18	15
425	22	16	4	3	TB11	2	18	TB111	2	18	15
426	22	16	4	4	TB111	2	18	C124	ME	18	15 13
427	22	16	4	4	C121	OME	18	SSW101	1	19	15 14
428	22	16	4	4	C122	OME	18	SSW102	1	19	15 14
429	22	16	4	4	C123	OME	18	SSW103	1	19	15 14
430	22	16	4	4	C124	OME	18	SSW104	1	19	15 14
431	22	16	4	6	SSW101	2	19	FL111	COIL-T	18	15
432	22	16	4	6	SSW102	2	19	FL112	COIL-T	18	15
433	22	16	4	6	SSW103	2	19	FL113	COIL-T	18	15
434	21	20	4	6	SSW104	2	19	FL114	COIL-T	18	15
435	22	16	4	6	FL111	CAP-T	18	TB111	1	18	15
436											
437											
438											
439											
440	15	16	4	5	C32	OME	13	K05	L2	14,12	15 14

AA3183

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CONTROL DATA	NORMANDALE DIVISION	CODE IDENT 19333	SHEET 25 OF 25	WL	DOCUMENT NO. 40019800	REV H

CONDUCTOR IDENT	FIND NO.	GAUGE (REF.)	COLOR (REF.)	LENGTH (APPROX.)	ORIGIN		ACCESS FIND NO.	DESTINATION		ACCESS FIND NO.	REMARKS
441	15	16	4	7	K05	L3	14,12	TB10	10	13	△15
442	15	16	4	4	TB10	9	13	FL15	OME	13	△15 △14
443	15	16	4	5	C33	OME	13	K05	L5	14,12	△15 △14
444	15	16	4	7	TB10	12	13	K05	L6	14,12	△15
445	15	16	4	4	TB10	11	13	FL16	OME	13	△15 △14
446	15	16	4	5	C132	OME	13	K105	L2	14,12	△15 △14
447	15	16	4	7	TB110	10	13	K105	L3	14,12	
448	15	16	4	4	TB110	9	13	FL115	OME	13	△15 △13
449	15	16	4	5	C133	OME	13	K105	L5	14,12	△15 △14
450	15	16	4	7	K105	L6	14,12	TB110	12	13	△15
451	15	16	4	4	TB110	11	13	FL116	OME	13	△15 △14
452	9	24	4	2	TB10	4	6	GRD		8	△15
453	9	24	4	2	TB110	4	6	GRD		8	△15

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CONTROL DATA	NORMANDALE DIVISION	CODE IDENT 19333	SHEET 1 OF 1	DN	DOCUMENT NO 40019800	REV H

△1. COMPONENTS T06, L02 & L03 USE EXISTING LEADS.

2. FOR FIND NO. REFERENCED IN CONDUCTORS 1 THRU 55 SEE PL 40017800; D.C. PANEL HARNESS.

3. FOR FIND NO. REFERENCED IN CONDUCTORS 77 THRU 144 SEE PL 41296100; A.C. HARNESS.

4. FOR FIND NO. REFERENCED IN CONDUCTORS 153 THRU 353 SEE PL 41294000; D.C. HARNESS.

5. FOR FIND NO. REFERENCED IN CONDUCTORS 362 THRU 373 SEE PL 40011800, 01; MISC. D.C. PANEL WIRING.

6. FOR FIND NO. REFERENCED IN CONDUCTORS 381 AND 383 SEE PL 40018600, 01; MISC POWER SUPPLY WIRING.

7. A HEXAGON IN THE ACCESS FIND NO. COLUMN INDICATES THAT THE CONDUCTOR IS ONE OF SEVERAL (ALL WITH THE SAME NUMBER IN THE HEXAGON) GOING INTO THE SAME TERMINAL. THE NUMBER IN FRONT OF A HEXAGON IS THE TERMINAL FIND NO.

8. FOR FIND NO. REFERENCED IN CONDUCTORS 384 AND 385 SEE PL 70805100; D.C. AND START TERMINAL BOARD ASSY.

9. FOR FIND NO. REFERENCED IN CONDUCTORS 400AND 401 SEE PL 70807500; SWITCH - SUPPRESSION, POWER SUPPLY.

10. FOR FIND NO. REFERENCED IN CONDUCTORS 415 THRU 435 SEE PL 41296300; A.C. PANEL ASSY.

11. FOR FIND NO. REFERENCED IN CONDUCTORS 440 THRU 451 SEE PL 70807900; D.C. RELAY PANEL ASSY.

12. FOR FIND NO. REFERENCED IN CONDUCTORS 452 THRU 453 SEE PL 70805400-01; D.C. RELAY TERMINAL BOARD ASSY.

△13. ME STANDS FOR CONNECTION NEAREST THE MOUNTED END.

△14. OME STANDS FOR CONNECTION OPPOSITE THE MOUNTED END.

△15. NOT IN HARNESS.

INACTIVE

AA3185

CONTROL DATA	TITLE		DOCUMENT NO.	REV.
MINNEAPOLIS, MINNESOTA	WIRE LIST - MAINTENANCE PANEL ASSEMBLY	WL	40016700	C
	PRODUCT: MULT. DISK DRIVE		SHEET 1 OF 2	

REVISION STATUS OF SHEETS

REVISIONS

REV.	ECO	DESCRIPTION	DRFT.	DATE	CHKD.	APPD.
A		RELEASED		11-18-68		MH
B	PM3578	SEE CO	GV	7-10-69	DCH	7-17
C	PM3578A	SEE CO	GV	7-10-69	DCH	7-17

NOTES:

1. FOR MECH ASSY AND PL SEE 40066300.

COPIES TO					BY	C.M.	10/25	CHKD.	C.M.	10/25/68	ENGR	[illegible]	10/29/68

FORM AA 1672

	TITLE		DOCUMENT NO.	REV.
MINNEAPOLIS, MINNESOTA	WIRE LISTING MAINTENANCE PANEL ASSEMBLY	WL	40016700	C
			SHEET 2 OF 2	

CONDUCTOR IDENT.	FIND NO.	GAUGE (REF.)	COLOR (REF.)	LENGTH (APPROX.)	ORIGIN		ACCESS. FIND NO.	DESTINATION		ACCESS. FIND NO.	REMARKS
1	6	20	-	1	A3S200	A2	7	A3S200	B2	7	
2	11	24	4	3	A3S200	A2	7	A3S201	3	13,14	
3	11	24	4	4	A3DS200	T	12	A3TP203	-	7	
4	6	20	-	1	A4S200	A2	7	A4S200	B2	7	
5	11	24	4	3	A4S200	A2	7	A4S201	3	13,14	
6	11	24	4	4	A4DS200	T	12	A4TP203	-	7	
7	11	24	4	3	A3TB204	5	7	A3S200	B1	7	
8	11	24	4	3	A4TB204	5	7	A4S200	B1	7	
9	11	24	4	3	A3TB204	7	7	A3S200	B2	7	
10	11	24	4	3	A4TB204	7	7	A4S200	B2	7	
11	11	24	4	3	A3TB204	8	7	A3S200	A3	7	
12	11	24	4	3	A4TB204	8	7	A4S200	A3	7	
13	11	24	4	3	A3TB204	6	7	A3S200	B3	7	
14	11	24	4	3	A4TB204	6	7	A4S200	B3	7	

FORM AA 1669

COMMENT SHEET

MANUAL TITLE CONTROL DATA BM1A5 Multiple Disk Drive

Customer Engineering Manual, Diagrams, Wire Lists

PUBLICATION NO. 70602500 REVISION _____

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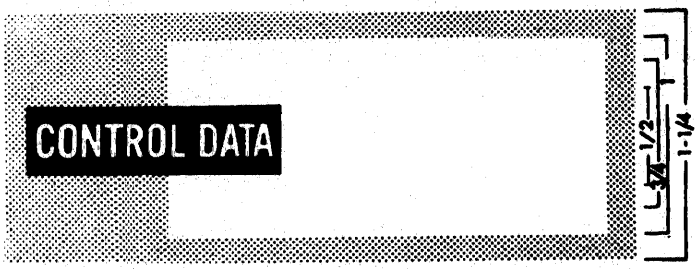

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