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P/N 122-590013-49

Volume 1 of 1

STARSHIP

NOTE: PRINTING

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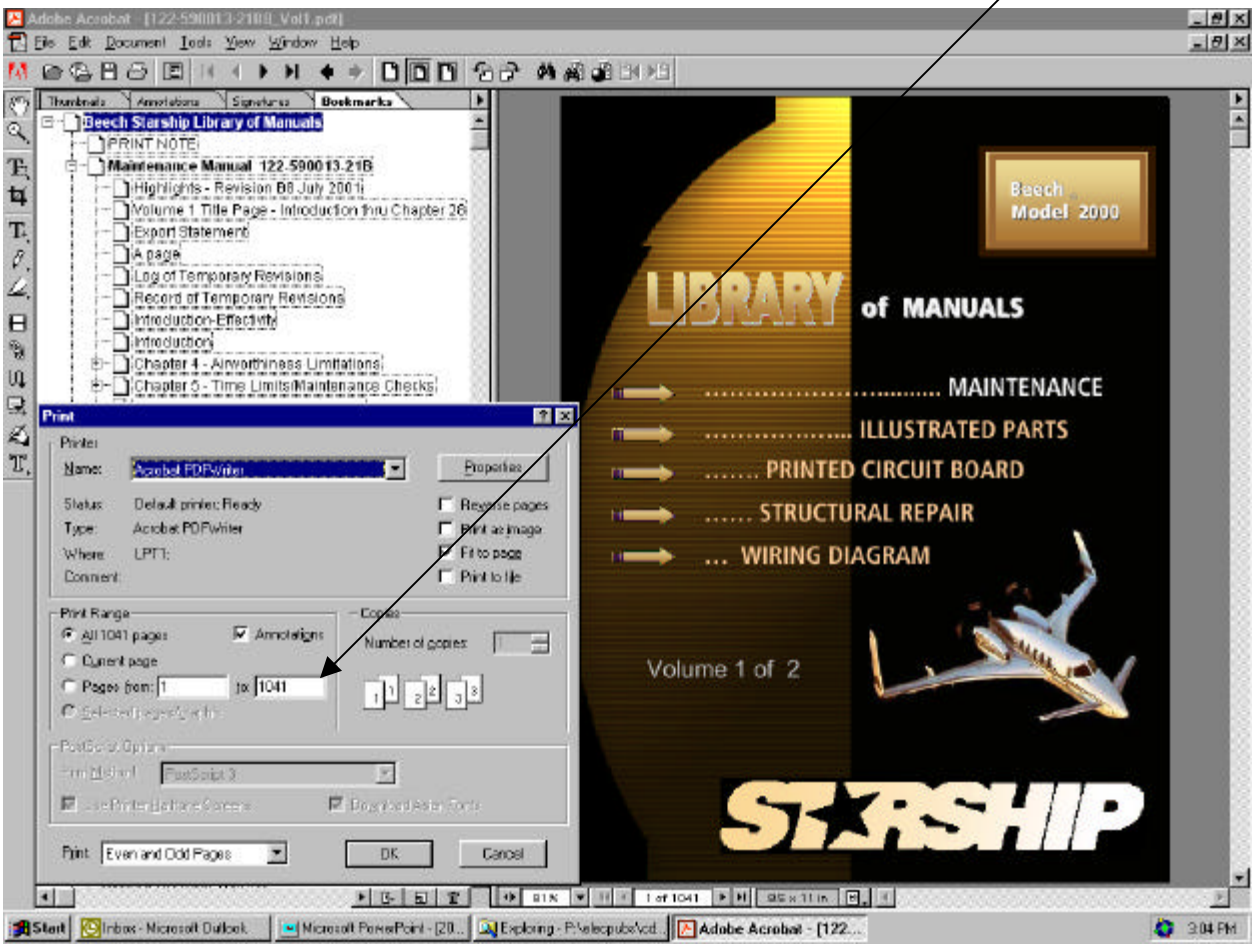

Beechcraft®

STARSHIP 1®

Model 2000

NC-4 and after

Printed Circuit Board Manual

THIS MANUAL INCLUDES THE MAINTENANCE INFORMATION REQUIRED TO BE AVAILABLE BY FAR PART 23.

P/N 122-590013-49

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LIST OF EFFECTIVE REVISIONS

Always destroy superseded pages when you insert revised pages

PART NUMBER	DATE	CHAPTERS AFFECTED
122-590013-49	February 25, 1994	Original Issue

NOTE: A list of effective pages will be found in the front of each chapter.

Basic publications are assigned a part number which appears on the title page with the date of the issue. Subsequent revisions are identified by the addition of a revision code after the part number. A1 after a part number denotes the first revision to the basic publication, A2 the second, etc. Occasionally, it is necessary to completely reissue and reprint a publication for the purpose of obsoleting a previous issue and all outstanding revisions thereto. As these replacement reissues are made, the code will also change to the next successive letter of the alphabet at each issue. For example, B for the first reissue, C for the second reissue, etc.

When ordering a handbook, give the basic number, and the reissue code when applicable, if a complete up-to-date publication is desired. Should only revision pages be required, give the basic number and revision code for the particular set of revision pages you desire.

Beechcraft
STARSHIP 1
PRINTED CIRCUIT BOARD MANUAL

Record of Revisions

Rev. No.	Date Inserted	By	Rev. No.	Date Inserted	By	Rev. No.	Date Inserted	By

When a revision is inserted, the revision number, the date the revision is inserted into the manual, and the initials of the person(s) inserting the revision should be recorded on this page.

INTRODUCTION

LIST OF PAGE EFFECTIVITY

CHAPTER-SECTION-SUBJECT	*PAGE*	*DATE*
Introduction-Effectivity	1	Feb 25/94
Introduction	1	Feb 25/94
	2	Feb 25/94
	3	Feb 25/94

INTRODUCTION (Effectivity: All)

CAUTION

Anytime maintenance is performed on or around printed circuit boards, it is essential that all Electrostatic Discharge (ESD) precautions are strictly observed. Refer to Chapter 20-00-00 of this manual for detailed information on the handling of ESD sensitive equipment.

NOTE

Service Publication reissues or revisions are not automatically provided to the holder of this manual. For information on how to obtain reissues or revisions applicable to this manual, refer to the latest revision of the BEECHCRAFT Service Bulletin No. 2001.

The BEECHCRAFT Starship 1 Printed Circuit Board Manual is prepared in accordance with the GAMA (General Aviation Manufacturers Association) Specification No. 2 format. It also meets the intent of the requirements of the ATA Specification 100 (Air Transport Association of America) with respect to the arrangement and content of the System/Chapters within the designated chapter-numbering system. This printed circuit board manual is supplemented by the following publications:

NOTE

It shall be the responsibility of the owner/operator to ensure that the latest revision of publications referenced in this handbook are utilized during operation, servicing, and maintenance of the airplane.

- The BEECHCRAFT Starship 1 Parts Catalog, P/N 122-590013-11
- The BEECHCRAFT Starship 1 Wiring Diagram Manual, P/N 122-590013-13
- The BEECHCRAFT Starship 1 Component Maintenance Manual, P/N 122-590013-9
- The BEECHCRAFT Starship 1 Maintenance Manual, P/N 122-590013-21
- The BEECHCRAFT Starship 1 Structural Repair Manual, P/N 122-590013-7

NOTE

Beech Aircraft Corporation expressly reserves the right to supersede, cancel and/or declare obsolete any part, part numbers, kits or publication that may be referenced in this manual without prior notice.

WARNING

Use only genuine BEECHCRAFT or BEECHCRAFT approved parts obtained from BEECHCRAFT approved sources, in connection with the maintenance and repair of Beech airplanes.

Genuine BEECHCRAFT parts are produced and inspected under rigorous procedures to insure airworthiness and suitability for use in Beech airplane applications. Parts purchased from sources other than BEECHCRAFT, even though outwardly identical in appearance, may not have had the required tests and inspections performed, may be different in fabrication techniques and materials, and may be dangerous when installed in an airplane.

Salvaged airplane parts, reworked parts obtained from non-BEECHCRAFT approved sources, or parts, components or structural assemblies, the service history of which is unknown or cannot be authenticated, may have been subjected to unacceptable stresses or temperatures or have other hidden damage, not discernible through routine visual or usual nondestructive testing techniques. This may render the part, component or structural assembly, even though originally manufactured by BEECHCRAFT, unsuitable and unsafe for airplane use.

BEECHCRAFT expressly disclaims any responsibility for malfunctions,

failures, damage or injury caused by use of non-BEECHCRAFT approved parts.

CORRESPONDENCE (Effectivity: All)

If a question should arise concerning the care of your airplane, it is important to include the airplane serial number in any correspondence. The serial number appears on the model designation placard (see Chapter 11-00-00 in the Beechcraft Starship 1 Maintenance Manual for placard location).

ASSIGNMENT OF SUBJECT MATERIAL (Effectivity: All)

The content of this publication is organized at four levels. The four levels are:

GROUP - Identified by different colored divider tabs. These are the primary divisions of the manual that enable broad separation of of content. Typical of this division is the separation between Airframe Systems and the Power Plant.

SYSTEM/CHAPTER - The various groups are broken down into major systems such as Environmental Systems, Electrical Power, Landing Gear, etc. The systems are arranged more or less alphabetically rather than by precedence or importance. They are assigned a number, which becomes the first element of the standardized numbering system. Thus, the element *"39"* of the number **39**-60-00 refers to the chapter "ELECTRIC/ELECTRONIC PANELS & MULTIPURPOSE PARTS". Everything concerning electric & electronic panels and parts will be covered in this chapter.

SUB-SYSTEM/SECTION - The major systems/chapters of an airplane are broken down into subsystems. These sub-systems are identified by the second element of the standard numbering system. The element *"60"* of the number 39-**60**-00 concerns itself with printed circuit card assemblies.

UNIT/SUBJECT - The individual units within a subsystem/section may be identified by the third element of the standard numbering system. The element *"00"* of the number 39-60-**00** is a subject designator. This element is assigned at the option of the manufacturer and may or may not be used.

APPLICATION (Effectivity: All)

Any publication conforming to the GAMA or ATA format will use the same basic numbering system. Thus, whether the manual be a BEECHCRAFT Starship 1 Printed Circuit Board Manual or a BEECHCRAFT Starship 1 Wiring Diagram Manual, the person wishing information concerning electric/electronic panels & multipurpose parts would refer to System/Chapter Tab "39-ELECTRIC, PANELS, PARTS & INSTRUMENTS". The table of contents in the front of this chapter will provide a list of sub-systems covered in this chapter. For example, the Electrical Panels and Multipurpose Parts chapter with a full index would contain:

39-00	General
39-10	Instrument & Control Panels
39-20	Electrical & Electronic Equipment Racks
39-30	Electrical & Electronic Junction Boxes
39-40	Multipurpose Electrical & Electronic Parts
39-50	Integrated Circuits
39-60	Printed Circuit Card Assemblies

The material is arranged within the chapter in ascending numerical sequence. The Chapter-Section-Subject number and page number are found at the lower outside corner of each page.

LIST OF EFFECTIVE REVISIONS (Effectivity: All)

The List of Effective Revisions following the title page of the manual lists the revisions currently effective for the manual.

RECORD OF REVISIONS PAGE (Effectivity: All)

A Log of Revisions page is provided in the front of the manual following the List of Effective Revisions page. After insertion of revision pages, in the manual, enter the revision number, date inserted, and initials on this page.

LIST OF EFFECTIVE PAGES (Effectivity: All)

The list of effective pages following each Chapter-Divider-Tab lists the issue date of each page that is effective for that chapter.

AEROFICHE (Effectivity: All)

The General Aviation Manufacturers Association (GAMA) has developed a specification for microfiche reproduction of aircraft publications for use by all GAMA members. Consult the current issue of the Publication Price List for an enumeration of the maintenance information available in Aerofiche form which may be ordered from Beech Aircraft Corporation.

REVISED TEXT (Effectivity: All)

That portion of text which has been revised by the addition or deletion of, or a change in, information is denoted by a solid revision bar along the outside margin of a column.

REVISED ILLUSTRATIONS (Effectivity: All)

That portion of an illustration which has been revised is denoted by the following symbol:

SYSTEM/CHAPTER INDEX GUIDE (Effectivity: All)

The following system/Chapter, Sub-System Section Index Guide is prepared in accordance with both GAMA Specification No. 2 and ATA Specification No. 100 for use with maintenance manuals, parts catalogs and wiring diagram manuals. Only chapters 20 and 39 are applicable to this printed circuit board manual.

20 - STANDARD PRACTICES-AIRFRAME

LIST OF PAGE EFFECTIVITY

CHAPTER-SECTION-SUBJECT	*PAGE*	*DATE*
20-Effectivity	1	Feb 25/94
20-Contents	1	Feb 25/94
20-00-00	1	Feb 25/94
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CHAPTER 20 - STANDARD PRACTICES-AIRFRAME

TABLE OF CONTENTS

SUBJECT *PAGE*

20-00-00

ELECTROSTATIC DISCHARGE SENSITIVITY - DESCRIPTION AND OPERATION (Effectivity: All)

Some types of electronic components are easily damaged by electrostatic discharge (ESD), and require special handling and storage procedures. ESD is a release of stored electrostatic charge which has been generated by actions such as contact, rubbing, or separating of materials. A charge of this type can damage electrical and electronic equipment installed in the airplane. In some instances, the damage may not be immediate, but progressive. Components and items of equipment that can be damaged by electrostatic discharge are considered to be electrostatic discharge sensitive (ESDS). Electronic components that are considered to be electrostatic discharge sensitive include CMOS integrated circuits, transistors and diodes, monolithic and hybrid microelectronics, MOS capacitors, thin film resistors, and piezoelectric crystals. Any circuit or piece of equipment, that contains ESDS components, is subject to ESD damage if certain handling precautions are not observed.

Personnel who remove, inspect, test or install instruments and equipment that contain ESDS components must be aware of the possibility of ESD damage, and should handle ESDS components in accordance with procedures covered in this chapter. Proper procedures and policies for the handling of ESDS components and equipment should be adhered to for the following reasons:

- Control of ESD damage, from time of component manufacture to time of actual installation, must be verifiable and must be maintained by use of established industry standards.
- Established policy dictates that all personnel follow certain procedures to prevent damage to ESDS components and equipment.
- Personnel in areas of interacting responsibility must be aware of their obligation to maintain a proper ESD-controlled environments.

Chart 1 lists several materials and the associated electrostatic charge polarity and magnitude for each. Materials at the top of the list are capable of producing the greatest amount of positive electrostatic charge, while materials at the bottom of the list are capable of producing a similar negative electrostatic charge. Items of dissimilar polarity provide the greatest potential for electrostatic discharge. Numeric values have not been assigned to the listed materials, as static charge levels are not constant, and will vary with ambient conditions. A greater possibility of ESD exists when the positions of listed items in Chart 1 are farther apart. For example, an individual using his/her hands to pick up a PVC pipe has more potential for producing ESD than does an aluminum part contacting a steel part.

Chart 2 identifies some typical electrostatic charge levels and the actions that can produce the electrostatic charge.

CHART 1
ELECTROSTATIC CHARGE LEVELS
(Effectivity: All)

MATERIALS	CHARGE (Relative Magnitude and Polarity)
Air	Positive
Human Hands	Positive
Asbestos	Positive
Rabbit Fur	Positive
Glass	Positive
Mica	Positive
Human Hair	Positive
Nylon	Positive
Wool	Positive
Fur	Positive
Lead	Positive
Silk	Positive
Aluminum	Positive
Paper	Positive
Cotton	--Neutral--
Steel	Negative
Wood	Negative
Amber	Negative
Sealing Wax	Negative
Hard Rubber	Negative
Nickle, Copper	Negative
Brass, Silver	Negative
Gold, Platinum	Negative
Sulfur	Negative
Acetate, Rayon	Negative
Polyester	Negative
Celluloid	Negative
Orlon	Negative
Saran	Negative
Polyurethane	Negative
Polyethylene	Negative
Polypropylene	Negative
Pvc (Vinyl)	Negative
Kel-f (CTFE)	Negative
Silicon	Negative
Teflon	Negative

ELECTROSTATIC DISCHARGE SENSITIVITY - MAINTENANCE PRACTICES (Effectivity: All)

REMOVAL/INSTALLATION OF ESDS EQUIPMENT (Effectivity: All)

Observe the following procedures when removing or installing ESDS equipment at the airplane:

CAUTION

Tools with plastic or insulated handles should not be used around ESDS devices. These tools can carry a static charge which does not readily discharge during the grounding process. Insulated tools should be used only during power-on testing of aircraft systems to prevent electrical shock to maintenance personnel performing the tests.

Some circuit board assemblies may be protected by plastic covers. These covers can store an electrostatic charge. Use a static control workstation to neutralize any electrostatic charge on the covers before touching a printed circuit board. Store the covers a safe distance from the work area.

a. When using test equipment, discharge all test leads to ground prior to connection to the ESDS circuit under test.

b. Use a portable static control workstation when removing ESDS circuit boards from card cages and enclosures at the airplane.

c. Place removed ESDS equipment on the workstation static dissipative work surface before opening the static shielding container holding the replacement ESDS equipment.

d. Just prior to engaging a cable connector with its mating receptacle, touch the connector shell to the receptacle shell to neutralize any electrostatic charge on the connector or the installer's body.

e. Maintain protective coverings on stored ESDS equipment.

HANDLING OF ESDS COMPONENTS AND EQUIPMENT (Effectivity: All)

All personnel that handle ESDS components and equipment should receive instruction in the proper handling of such items. Observe the following handling rules to prevent damage to ESDS components and equipment:

a. Keep ESDS components and equipment inside ESD protective packaging until opened at a static control workstation.

CHART 2
TYPICAL ELECTROSTATIC VOLTAGES (Effectivity: All)

This data based on an ambient relative humidity of 15 to 36 percent.

Action of person	Most Common Reading (Volts)	Highest Reading (Volts)
1. Walking across carpet	12,000	39,000
2. Walking across vinyl tile floor	4,000	13,000
3. Seated in polyurethane foam chair	1,800	18,000
4. Picking up polly bag	1,500	20,000
5. Inserting paperwork into vinyl envelopes	800	7,000

b. Before unsealing ESD protective packs, place the packs on the work surface of a static control workstation.

c. Do not use pressure air nozzles to remove dust from ESDS printed circuit boards. Rapid movement of air, combined with airborne dust particles, can create an electrostatic charge that will destroy ESDS components.

d. Always wear a grounding wrist strap when opening any ESD protective package.

e. Avoid touching circuit components or connector pins when handling ESDS components or equipment.

f. Never place any ESDS component, before or after assembly, on a non-conductive surface or in a container not specifically designed for storage of ESDS devices.

g. Protect ESDS components and equipment with protective containers, conductive caps, and/or pin shorting devices.

h. Store and transport ESDS components and equipment in ESD protective containers. Seal all protective containers with an ESD warning label prior to shipment.

i. Place all loose ESDS components and equipment into ESD protective containers BEFORE removing a grounding wrist strap.

j. Keep the workstation free of any material not required to accomplish the assigned task.

k. Follow established ESD protection rules and procedures.

l. Always use a static control workstation, either permanent or portable, when removing ESDS components and equipment from protective packaging.

m. Use only grounded, electrically isolated, and temperature controlled soldering irons that have been rated for use with ESDS components and equipment. Use only hand tools that have conductive or static dissipative handles or grips. Test equipment, such as scopes and meters, must be rated for use around ESDS components and equipment.

n. Avoid exposing ESDS components and equipment to large electromagnetic or electrostatic fields such as transformers or transmitting antennas.

CONTROLLING STATIC CHARGE BUILDUP (Effectivity: All)

Four basic techniques are employed in ESD control. These are:

a. Minimize The Charge Buildup - Minimize electrostatic charge buildup by using conductive or static dissipative flooring and static-dissipative work surfaces. Wear leather shoes, cotton socks, and a grounding ankle strap to dissipate body charge buildup. Wear cotton clothing instead of wool or synthetics. Use an ionized air blower to dissipate charges from nonconductive items.

b. Drain Off The Charge To Ground - The human body is a good electrical conductor and for that reason electrostatic charges on the body can be dissipated by skin contact with a grounding device such as a wrist or ankle strap. Always wear a grounding wrist strap when opening ESD containers or handling exposed ESDS components and equipment.

c. Neutralize The Charge - Non-conductors, such as polystyrene coffee cups, plastic bags, and some clothing develop electrostatic charges that cannot be neutralized by grounding. Ionized air flow will neutralize

an electrostatic charge on a non-conductor as long as the ionized air blower puts out both positive and negative ions.

d. Minimize The Effects Of Electrostatic Fields - The immediate environment surrounding ESDS components and equipment must be free of electrostatic fields or must have suitable static shielding to minimize induced effects from electrostatic fields.

PERMANENT STATIC CONTROL WORKSTATION (Effectivity: All) (Figure 1)

A static control workstation provides for static-free handling of ESDS components and equipment by diverting, to ground, electrostatic charges on conductive objects.

A permanent static control workstation consists of the following items:

CAUTION

Never wear a grounding wrist strap over clothing. The strap must be in contact with the wearer's skin to adequately dissipate any electrostatic charge. Under certain conditions, personnel using a grounding wrist strap may need to use a lotion-type skin moisture enhancer to provide a low-resistance connection between the wrist and the wrist strap.

a. Grounding Wrist Strap - Each person that handles ESDS components and equipment must wear a grounding wrist strap to dissipate bodily electrostatic charges. The wrist strap must fit snugly against the skin and should release quickly in case of an emergency. The wrist strap incorporates a 1 megohm current-limiting resistor, in series with the ground cord, to protect the wearer from electrical shock hazards.

b. Static-Dissipative Work Surface - Conductive mats, on the work bench surface, are designed to remove electrostatic charges from conductive items placed on the mat.

c. Conductive Flooring - Conductive flooring is used when additional control of ESD is required. To maintain total control over ESD, use conductive chairs, a grounding heel strap, and conductive shoes. Conductive flooring in ESD control areas must be free of all wax or other non-conductive coatings.

d. Hard Ground Connection - Grounding of the static control workstation is accomplished through one or more copper ground rods driven into moist earth to a depth sufficient to provide a low resistance path from the workstation to ground. All workstation connections to ground are made through a one megohm resistor to protect workstation personnel from electrical shock hazards by limiting current flow to ground.

NOTE

Some building grounds need to be checked to ensure that there is no current looping from other nearby grounds.

Ensure that the source of current is external and not static.

e. Ionized Air Blower - The ionized air blower provides a constant flow of positive and negative ions over the workstation surface to neutralize electrostatic charges on non-conductive materials in the air flow path. The use of an ionized air blower, in combination with a static control workstation, provides additional protection for ESDS components and equipment. Since it is not always possible to eliminate all static charge accumulators (styrofoam, plastic, etc.) from a work area, the ionized air blower is used to provide additional protection by flooding the work area with balanced negative/positive ionized air. Static charge accumulators should always be kept away from static-free areas, but inadvertent static is hard to control, especially when developed by such common items as clothing, footwear, combs, and pens. An ionized air blower will help control some of this inadvertent buildup.

f. Static Dissipative Seating - Chairs used at ESD protected workstations must be conductive, and if padded, must be covered with static dissipative material.

g. Conductive Containers - ESDS devices must be transported in approved containers to prevent ESD damage. These special containers are made of metal or special conductive plastic. Before static-sensitive components and equipment are removed from a static control workstation, they must be packaged in containers that provide at least as much protection as that provided by the workstation. Conductive boxes, kitting trays, and similar types of approved containers provide complete ESD protection to ESDS components and equipment while in transit.

h. Grounding Heel Strap - A grounding heel strap can provide additional ESD protection. The heel strap

makes contact with the wearer's skin at the ankle, and extends to the bottom of footwear to make contact with a conductive mat or conductive flooring. The grounding heel strap can be used in combination with a grounding wrist strap to provide maximum ESD protection.

i. Antistatic/Conductive Clothing - Many types of clothing generate electrostatic charges. To remove some of this buildup, workstation personnel should wear outer garments that help dissipate electrostatic charges. Cotton ranks among the best fabrics for antistatic protection. Do not wear synthetic or wool fabrics around ESDS devices, as these fabrics retain electrostatic charges.

PORTABLE STATIC CONTROL WORKSTATION (Effectivity: All) (Figure 2)

A portable static control workstation provides for static-free handling of ESDS components and equipment during maintenance operations at the airplane. The typical portable workstation is available as a field service kit that is used to dissipate electrostatic charges before the charges can damage ESDS components and equipment.

A typical portable static control workstation consists of the following items:

a. Grounding Wrist Strap - Each person that handles ESDS components and equipment must wear a grounding wrist strap to dissipate bodily electrostatic charges. The wrist strap must fit snugly against the skin and should release quickly in case of emergency. The wrist strap incorporates a 1 megohm current-limiting resistor, in series with the ground cord, to protect the wearer from electrical shock hazards.

b. Static-Dissipative Work Surface - A conductive mat is an integral part of the portable workstation, and is designed to remove electrostatic charges from conductive items when those items contact the mat.

c. Hard Ground Connection - Ground the portable workstation to the airframe or to a common ground as shown in Figure 2. All portable workstation connections to ground are made through 1 megohm current-limiting resistors to protect maintenance personnel from electrical shock hazards.

HUMIDITY AND DUST EFFECTS ON ESDS COMPONENTS AND EQUIPMENT (Effectivity: All)

Humidity is a factor in the control of ESD. The lower the humidity, the greater the chance of damage to ESDS components and equipment. Humidity, at the workstation, should be maintained between 30 and 65 percent.

Repair of ESDS circuit boards, including replacement of ESDS components, should be performed in a dust-free environment.

PACKAGING OF ESDS COMPONENTS AND EQUIPMENT (Effectivity: All)

All ESDS components and equipment require special ESD protective packaging. Seal all ESDS packages with an appropriate cautionary label as shown in Figures 3 through 5.

CAUTION

Do not use clips or staples when sealing any ESDS package.

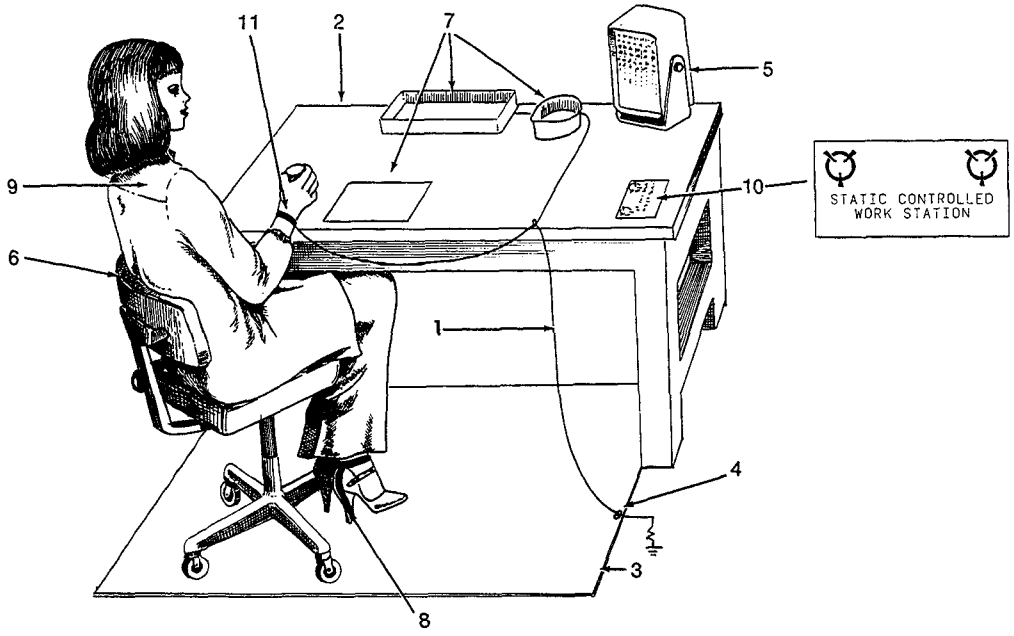
Do not use carbon-filled, conductive bags.

Remove ESDS components and equipment from protective, static-shielded containers ONLY at a static control workstation after attaching a grounding wrist strap and verifying that ESD producing items are not on the static dissipative work surface.

ESD protective packaging requirements, unless otherwise defined by specification, shall conform to the following:

- Class 1 - Package in multi-layer conductive type bags consisting of an inner and outer layer of antistatic (surface resistivity of 10^9 to 10^{14} ohms per square inch) or static dissipative (surface resistivity of 10^5 to 10^9 ohms per square inch) material with a middle layer of conductive material (surface resistivity of 10^5 ohms or less).

- Class 2 - Package in a static dissipative material possessing a surface resistivity of 10^5 to 10^9 ohms per square inch. Materials specified for Class 1 may also be used.



* 1. GROUND CORD ASSEMBLY

* 2. STATIC DISSIPATIVE MAT OR WORK BENCH SURFACE

3. STATIC DISSIPATIVE/CONDUCTIVE FLOOR OR MAT

* 4. GROUND CONNECTION

* 5. IONIZED AIR BLOWER

6. STATIC CONTROLLED CHAIR

* 7. CONDUCTIVE CONTAINERS AND CONDUCTIVE BAGS

8. HEEL GROUNDING STRAP

9. ANTISTATIC/CONDUCTIVE CLOTHING OR OUTER GARMENT

*10. SIGN - ESD CONTROLLED WORK STATION

*11. SNUG-TO-SKIN PERSONNEL WRIST STRAP TO GROUND

NOTE

ITEMS MARKED WITH AN (*) ARE REQUIRED FOR A STATIC CONTROLLED WORK STATION. ALL OTHER ITEMS ARE OPTIONAL, BUT PROVIDE ADDED PROTECTION OR ENHANCE WORKER MOBILITY.

NOTE

KEEP STATIC GENERATORS, SUCH AS PLASTIC CUPS, CIGARETTE WRAPPERS, SURPLUS CLOTHING, HANDBAGS, LUNCH CONTAINERS, PLASTIC BAGS, FOAM PACKING, READING MATERIAL, ETC. AWAY FROM STATIC CONTROL WORK STATIONS.

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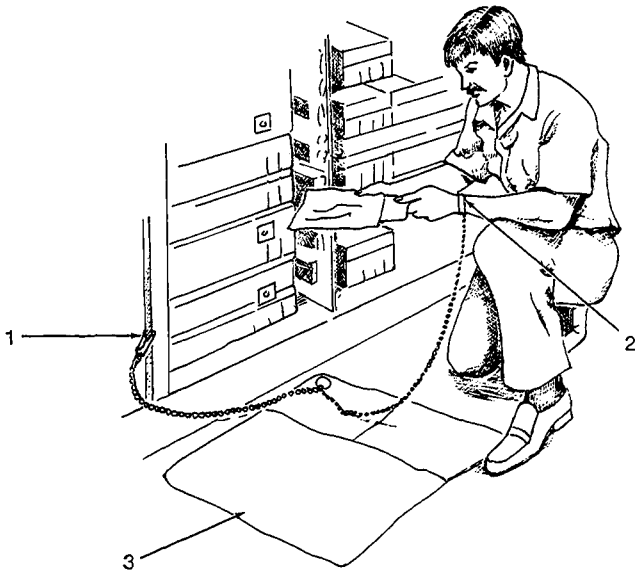
Permanent Static Control Workstation (Effectivity: All)
Figure 1



1. ALLIGATOR CLIP TO RELIABLE GROUND CONNECTION
2. SNUG-TO-SKIN PERSONNEL WRIST STRAP
3. STATIC DISSIPATIVE WORK SURFACE

APC14189

Portable Static Control Workstation (Effectivity: All)
Figure 2

• Class 3 - Package in an antistatic material possessing a surface resistivity of 10^9 to 10^{14} ohms per square inch.

Place all ESDS devices in approved static shielding containers before packing in shipper's normal exterior containers. Use antistatic cushioning or fill materials. Do not use static generating materials, such as polyethylene, styrofoam, or paper.

Antistatic packaging is generally pink or blue in color. The material differs from common plastic in that an antistatic compound is incorporated into the material during the manufacturing process. This type of packaging DOES NOT provide static shielding, and is generally used to package instruction sheets, data sheets, and other non-ESDS materials prior to introduction into a static-free environment. All non-ESDS items, that are to enter an ESD workstation, require repackaging in antistatic materials.

Conductive static shielding packaging differs from antistatic packaging, in that it has the ability to shield devices, contained within, from external static charges. Conductive static shielding packaging is available in the form of bags and rigid containers.

MARKING OF ESDS COMPONENTS AND EQUIPMENT (Effectivity: All)

All ESDS components and equipment should be marked appropriately with an ESDS symbol as shown in Figure 4.

NOTE

ESDS symbols are yellow on a black background or black on a yellow background.

Mark unit containers with the ESDS caution label on the outside of the package. Mark exterior containers with an ESD caution label as shown in Figure 5. Apply marks directly to each ESDS printed circuit board, assembly cover, equipment enclosure, or access door that would expose ESDS devices, if removed. Mark appropriately using decal transfer, stencil, silk screen, or any other method that meets permanency and legibility requirements.

Display ESDS symbols in a prominent package location to alert all personnel to the presence of ESDS devices and equipment. The ESDS symbol should be at least 1/4" in diameter. ESDS symbols that are attached to circuit boards should contrast with the circuit board base color. Enclosures that contain ESDS circuit boards should be identified by bright orange paint on the outer face of the enclosure.

STORAGE AND TRANSIT OF ESDS COMPONENTS AND EQUIPMENT (Effectivity: All)

CAUTION

NEVER use ordinary plastic containers or packing materials when transporting ESDS components or equipment.

When preparing ESDS devices for shipment, ensure that all assemblies and equipment have been protected against ESD through appropriate handling at static controlled workstations.

ESDS packages, which have been properly enclosed in protective packages, require proper storage and transfer in conductive static-dissipative, or static-free containers. Shipping information and other instructions, accompanying ESD-protected packages, shall be contained in anti-static materials. ESDS components, that are received in damaged or opened packing containers, are not acceptable, and should be returned for replacement.

CAUTION

THIS EQUIPMENT CONTAINS DEVICES SENSITIVE TO DAMAGE BY ELECTROSTATIC DISCHARGE (ESD). USE ESD PRECAUTIONARY PROCEDURES WHEN TOUCHING, REMOVING, OR INSERTING PARTS OR ASSEMBLIES.

CAUTION

ELECTROSTATIC DISCHARGE SENSITIVE ELECTRONIC DEVICES. SPECIAL HANDLING REQUIRED.

CAUTION

SENSITIVE ELECTRONIC DEVICES.
SPECIAL HANDLING REQUIRED.
DO NOT OPEN EXCEPT AT AN APPROVED WORK STATION.

(PREFERRED)

ATTENTION

CONTENTS
STATIC SENSITIVE

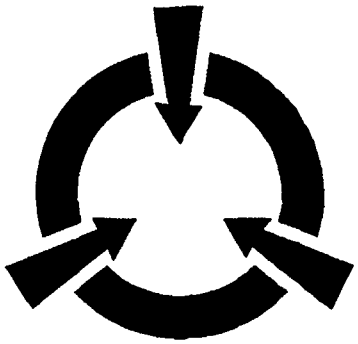
HANDLING
PRECAUTIONS REQUIRED

CONTENTS _____
_____
_____

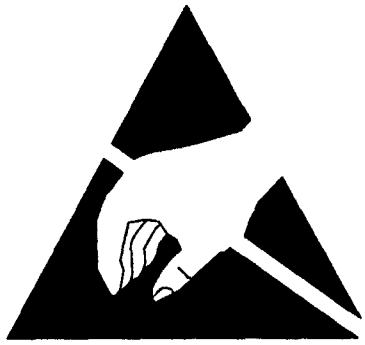
(ACCEPTABLE)

C94NC20B0200

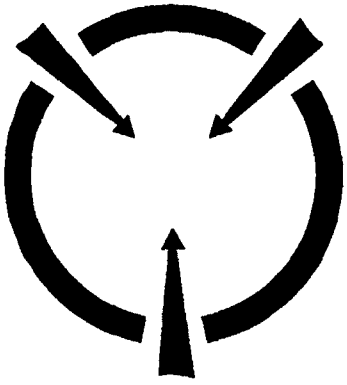
ESD Sensitive Placards (Effectivity: All)
Figure 3



MIL-STD-1285 ESD SYMBOL



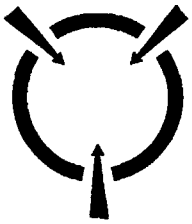
RS-471 ESD SYMBOL



MIL-STD-129H ESD SYMBOL

AP0141933 C

ESD Symbols (Effectivity: All)
Figure 4



ATTENTION
CONTENTS
STATIC SENSITIVE

HANDLING
PRECAUTIONS REQUIRED

CAUTION

SENSITIVE ELECTRONIC DEVICES
DO NOT SHIP OR STORE NEAR STRONG
ELECTROSTATIC,ELECTROMAGNETIC,
MAGNETIC, OR RADIOACTIVE FIELDS.

C94NC20B0201 C

ESD Sensitive Container Labels (Effectivity: All)
Figure 5

39 - ELECTRICAL PANELS & MULTIPURPOSE PARTS

LIST OF PAGE EFFECTIVITY

39 - ELECTRICAL PANELS & MULTIPURPOSE PARTS

LIST OF PAGE EFFECTIVITY (Continued)

39 - ELECTRICAL PANELS & MULTIPURPOSE PARTS

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Beechcraft
STARSHIP 1
PRINTED CIRCUIT BOARD MANUAL

CHAPTER 39 - ELECTRICAL PANELS & MULTIPURPOSE PARTS

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INTRODUCTION

This chapter provides information on the operation and the repair of most of the Printed Circuit Boards (PCBs) in the Starship 1 aircraft.

PCBs that are not field repairable will have a schematic and description and operation in their respective sections while those that are field repairable will also include troubleshooting procedures.

All of the PCBs are Electrostatic Discharge (ESD) sensitive. Personnel handling these PCBs should be aware of the following CAUTION:

CAUTION

Anytime maintenance is performed on or around printed circuit boards, it is essential that all Electrostatic Discharge (ESD) precautions are strictly observed. Refer to Chapter 20-00-00 for detailed information on the handling of ESD sensitive equipment.

The following tables provide Nomenclature To Part Number and Part Number to Nomenclature cross referencing.

NOMENCLATURE TO PART NUMBER LISTING

NOMENCLATURE	PART NUMBER	CHAPTER
Annunciator Control (A135)	122-364180-1	39-60-01
Annunciator Fault Detector (A137)	122-364139-5	39-60-02
Annunciator Test & Fire Extinguisher (A130)	122-364038-5	39-60-03
Battery Monitor (A125)	122-364182-7	39-60-04
Flap & FWD Wing Controller & Annunciator (A144)	122-364166-19	39-60-05
Flap & FWD Wing Monitor & Monitor Test (A180, A181)	122-364168-17	39-60-06
Landing Gear Control (A142)	122-364028-27	39-60-07
Landing Gear Indicator (A161)	122-364028-21	39-60-08
Lighting Control (A163)	122-364176-1	39-60-09
Logic Relay (A134, A182, A211)	122-364156-1	39-60-10
N_1 Speed & Ice Vane (A133)	122-364054-13	39-60-11
Power Distribution Control (A126)	122-364173-21	39-60-12
Windshield Deice & External Power (A127)	122-364030-5	39-60-13
Surface Deice System (A215)	122-364208-19	39-60-14
Standby Trim Assembly	122-340169-1	39-60-15
Electric Pitch Trim	122-340179-5	39-60-16
Electric Trim	122-340188-7,-9	39-60-17

PART NUMBER TO NOMENCLATURE LISTING

PART NUMBER	NOMENCLATURE	CHAPTER
122-340169-1	Standby Trim Assembly	39-60-15
122-340179-5	Electric Pitch Trim	39-60-16
122-340188-7,-9	Electric Trim	39-60-17
122-364028-21	Landing Gear Indicator (A161)	39-60-08
122-364028-27	Landing Gear Control (A142)	39-60-07
122-364030-5	Windshield Deice & External Power (A127)	39-60-13
122-364038-5	Annunciator Test & Fire Extinguisher (A130)	39-60-03
122-364054-13	N_1 Speed & Ice Vane (A133)	39-60-11
122-364139-5	Annunciator Fault Detector (A137)	39-60-02
122-364156-1	Logic Relay (A134, A182, A211)	39-60-10
122-364166-19	Flap & FWD Wing Controller & Annunciator (A144)	39-60-05
122-364168-17	Flap & FWD Wing Monitor & Monitor Test (A180, A181)	39-60-06
122-364173-21	Power Distribution Control (A126)	39-60-12
122-364176-1	Lighting Control (A163)	39-60-09
122-364180-1	Annunciator Control (A135)	39-60-01
122-364182-7	Battery Monitor (A125)	39-60-04
122-364208-19	Surface Deice System (A215)	39-60-14

ANNUNCIATOR CONTROL PCB (A135), P/N 122-364180-1, - DESCRIPTION AND OPERATION (Effectivity: All) (Figure 1)

This chapter describes the Annunciator Control Printed Circuit Board (PCB) installed in the circuit card box assembly. The annunciator control PCB reference designator corresponds with the reference designator used in the BEECHCRAFT Starship 1 Wiring Diagram Manual and the Avionics Wiring Diagrams.

CAUTION

Anytime maintenance is performed on or around printed circuit boards, it is essential that all Electrostatic Discharge (ESD) precautions be strictly observed. Refer to Chapter 20-00-00 for detailed information on the handling of ESD sensitive equipment.

The annunciator control PCB consists of four circuits which function independently of each other. The four circuits are described in the text that follows.

MASTER WARNING CIRCUIT (Effectivity: All)

The master warning circuit consists of Q1, Q2, U1, U2 and their associated circuitry. When this circuit receives a +28 vdc pulse (red trigger) on pin 12, it outputs a cycling +28 vdc pulse (Master Warning Lt signal) on pin 2. This signal is applied to the master warning lamps in the cockpit. The master warning lamps are tied to pin 20 of the Ambient Light Circuit. This allows the intensity of the master warning lamps to be varied by the ambient light sensor in the cockpit. The master warning circuit also receives a momentary +28 vdc (Master Warn Lt Reset) signal which resets the circuit and turns the master warning lamps off.

MASTER CAUTION CIRCUIT (Effectivity: All)

The master caution circuit consists of Q7, Q8, R28 and R29. The collectors of Q7 (pin 4) and Q8 (pin 7) are tied back to pins 47 and 37 respectively. This allows the intensity of the master caution lamps to be automatically varied by the ambient light sensor in the cockpit. Input to the master caution circuit is on pins 3 and 6. This input comes from the Data Acquisition Unit (DAU). When the DAU receives a discrete requiring an Engine Instrument, Crew Alerting System (EICAS) yellow caution message, it sends cycling grounds (Master Caution Sig A and Master Caution Sig B) to the Annunciator Control PCB on pins 3 and 6. This condition is reset by the DAU which removes the input on pins 3 and 6.

DOOR-UNLOCKED CIRCUIT (Effectivity: All)

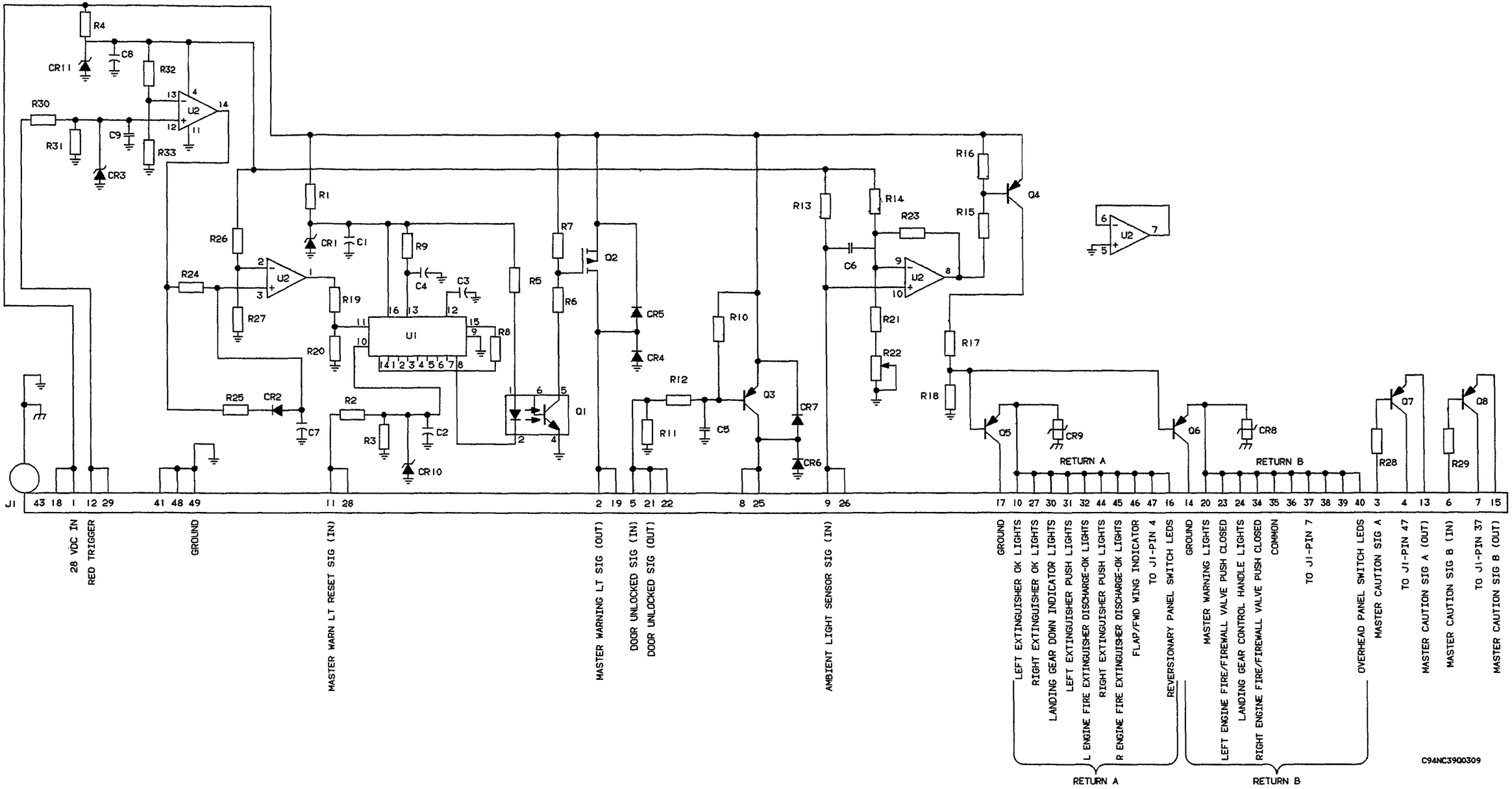
The door-unlocked circuit consists of Q3 and its associated circuitry. Since the dimming of the door-unlocked annunciator is not desired, this circuit is currently not used. Input to this circuit is +28 vdc from the cabin door switches on pin 5, which is jumpered to pin 21. Since the output is on pin 21, this circuit is effectively bypassed. The output is +28 vdc which is applied to the Annunciator Fault Detection PCB (A137) to illuminate the annunciator in the cockpit.

AMBIENT LIGHT SENSOR CIRCUIT (Effectivity: All)

The ambient light sensor circuit consists of Q4, Q5, Q6, U2 and their associated circuitry. The input to this circuit is from the ambient light sensor in the cockpit. This input signal is applied to pin 9 of the ambient light sensor circuit (dark > 900k ohms and light < 700k ohms). The ambient light sensor circuit adjusts all lights that are grounded at Return A and Return B in relation to the strength of the input signal. All warning annunciators, master warning and caution lights, and some of the lighted switches on the instrument panel are controlled by the ambient light sensor circuit with the exception of the door-unlocked annunciator.

ANNUNCIATOR CONTROL PCB (A135), TESTING AND TROUBLESHOOTING (Effectivity: All)

Testing and troubleshooting of the annunciator control PCB is not authorized. All repair of this PCB must be performed at the BEECHCRAFT factory.



Annunciator Control PCB Schematic Diagram,
P/N 122-364180-1 (Effectivity: All)
Figure 1

ANNUNCIATOR FAULT DETECTOR PCB (A137), P/N 122-364139-5, - DESCRIPTION AND OPERATION (Effectivity: All) (Figure 1)

This chapter describes the Annunciator Fault Detector Printed Circuit Board (PCB) installed in the circuit card box assembly. The annunciator fault detector reference designator corresponds with the reference designator used in the BEECHCRAFT Starship 1 Wiring Diagram Manual and the Avionics Wiring Diagrams.

CAUTION

Anytime maintenance is performed on or around printed circuit boards, it is essential that all Electrostatic Discharge (ESD) precautions be strictly observed. Refer to Chapter 20-00-00 for detailed information on the handling of ESD sensitive equipment.

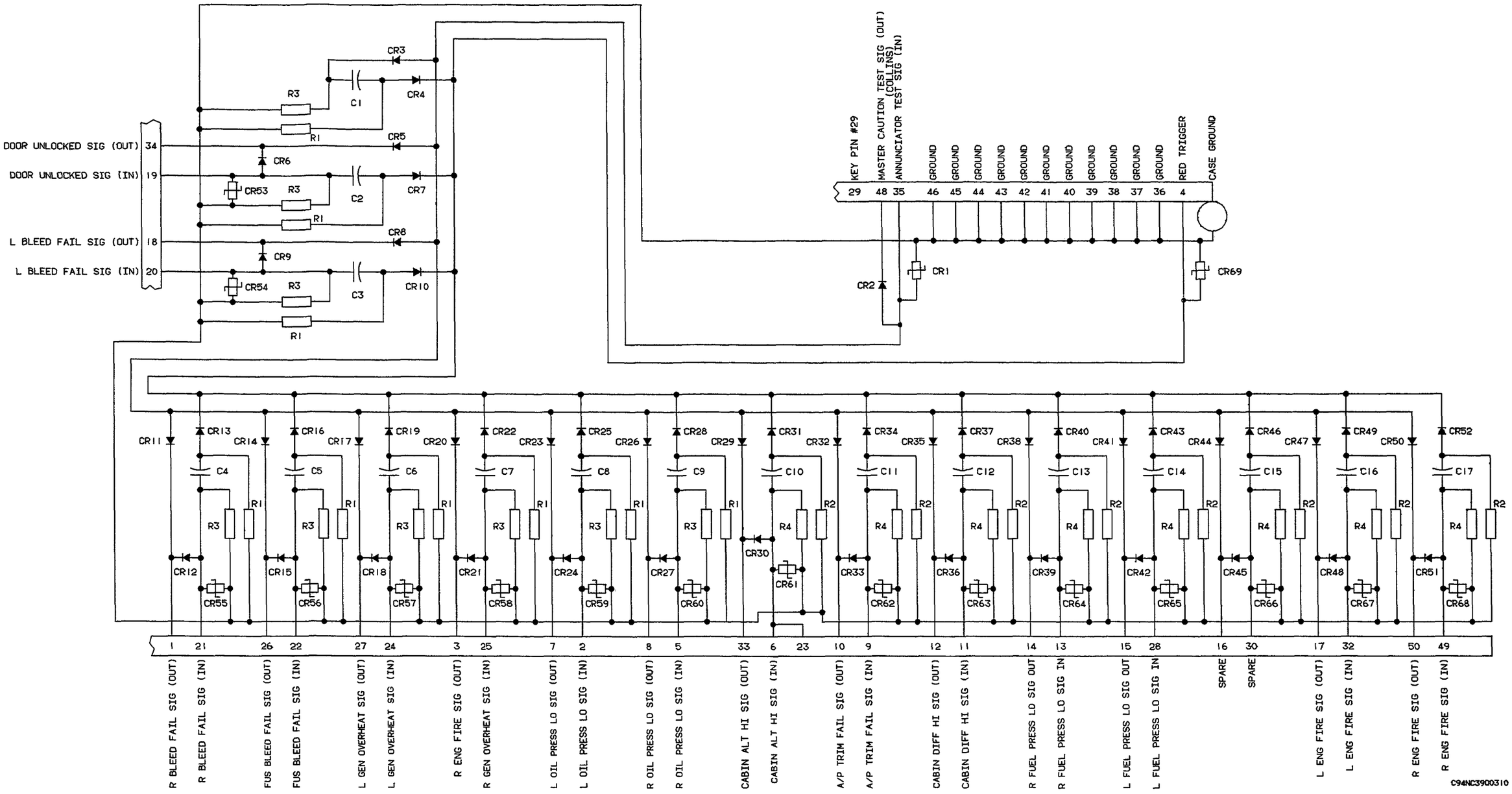
The annunciator fault detection PCB consists of 16 identical fault detection circuits, a red trigger output, an annunciator test signal input and a master caution test signal output.

The annunciator fault detection PCB receives 28 vdc fault signals from various airplane systems that have detected a fault. In return, the annunciator fault detection PCB sends a signal to the warning annunciator panel to illuminate the appropriate annunciator. The annunciator will remain illuminated until the 28 vdc fault signal is removed from the annunciator fault detection PCB. The annunciator fault detection PCB also sends a +28 vdc (red trigger) pulse to the annunciator control PCB (A135) master warning timer circuit for each fault signal that it receives. This causes both master warning lamps in the cockpit to illuminate and flash until reset.

A test switch (placarded ANNUN) on the pilot's outboard subpanel is used to test the warning annunciators and master warning lamps. When the switch is activated, 28 vdc is applied to pin 35 on the annunciator fault detection PCB. This causes all output signals to be tripped on the annunciator fault detection PCB and all annunciators to be illuminated on the annunciator panel in the cockpit. A "red trigger" is also generated and sent to the annunciator control PCB (A135) causing the master warning lamps to illuminate and flash.

ANNUNCIATOR FAULT DETECTOR PCB (A137), TESTING AND TROUBLESHOOTING, (Effectivity: All)

Testing and troubleshooting of the annunciator fault detector PCB is not authorized. All repair of this PCB must be performed at the BEECHCRAFT factory.



Annunciator Fault Detector PCB Schematic Diagram, P/N 122-364139-5 (Effectivity: All)
Figure 1

ANNUNCIATOR TEST AND FIRE EXTINGUISHER PCB (A130), P/N 122-364038-5, - DESCRIPTION AND OPERATION (Effectivity: All) (Figure 1)

This chapter describes the Annunciator Test and Fire Extinguisher Printed Circuit Board (PCB) installed in the circuit card box assembly. The annunciator test and fire extinguisher PCB reference designator corresponds with the reference designator used in the BEECHCRAFT Starship 1 Wiring Diagram Manual and the Avionics Wiring Diagrams.

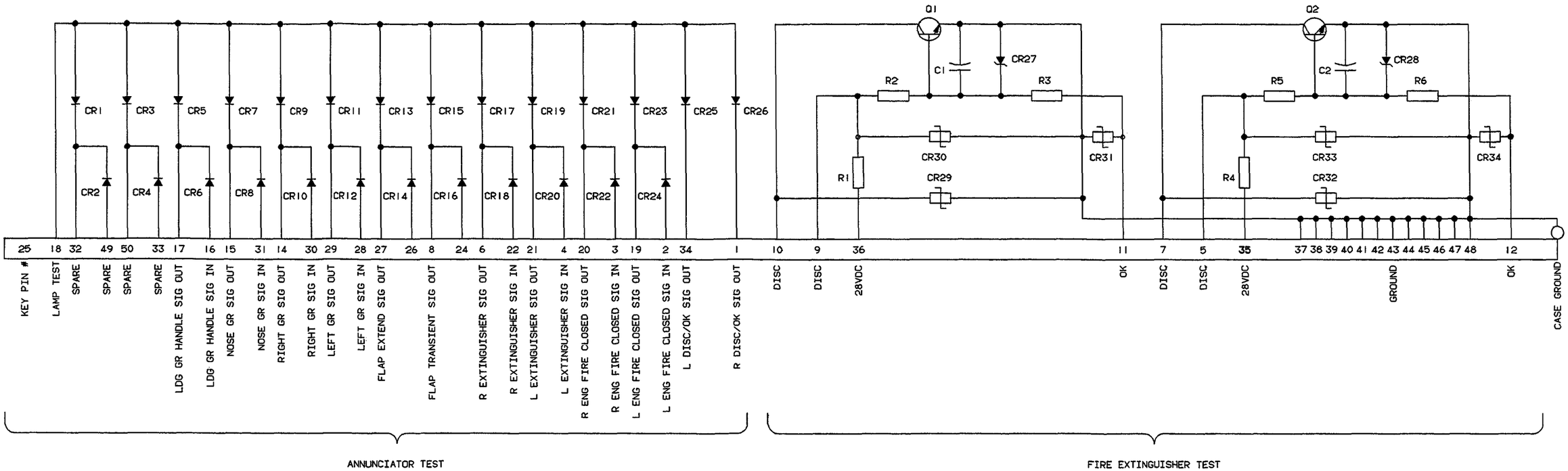
CAUTION

Anytime maintenance is performed on or around printed circuit boards, it is essential that all Electrostatic Discharge (ESD) precautions be strictly observed. Refer to Chapter 20-00-00 for detailed information on the handling of ESD sensitive equipment.

The annunciator test and fire extinguisher PCB consists of an annunciator test circuit and a left and right fire extinguisher test circuit. These circuits allow the testing of the annunciators and the fire extinguishing system without a failure present or actually discharging the fire extinguishing system.

ANNUNCIATOR TEST AND FIRE EXTINGUISHER PCB (A130), TESTING AND TROUBLESHOOTING (Effectivity: All)

Testing and troubleshooting of the annunciator test and fire extinguisher PCB is not authorized. All repair of this PCB must be performed at the BEECHCRAFT factory.



C94NC39Q0311

Annunciator Test and Fire Extinguisher PCB Schematic Diagram, PCB 122-364038-5 (Effectivity: All) Figure 1

BATTERY MONITOR PCB (A125), P/N 122-364182-7, - DESCRIPTION AND OPERATION (Effectivity: All) (Figures 1 and 2)

This chapter describes the Battery Monitor Printed Circuit Board (PCB) installed in the circuit card box assembly. The battery monitor PCB (A125) reference designator corresponds with the reference designator used in the BEECHCRAFT Starship 1 Wiring Diagram Manual and the Avionics Wiring Diagrams.

CAUTION

Anytime maintenance is performed on or around printed circuit boards, it is essential that all Electrostatic Discharge (ESD) precautions be strictly observed. Refer to Chapter 20-00-00 for detailed information on the handling of ESD sensitive equipment.

The battery monitor PCB monitors the battery charge rate. The BATT CHG RATE warning annunciator is illuminated by a signal from the battery monitor PCB when an abnormal battery charge rate is detected. Once the annunciator is illuminated, it can only be reset by turning the battery switch OFF or by pressing the BATTERY MONITOR TEST SWITCH.

When the battery switch is placed in the ON position, the battery monitor PCB performs a self-test. After a two-second time delay, which begins when the battery switch is placed in the ON position, the BATT CHG RATE annunciator illuminates for two seconds, then extinguishes. The BATT CHG RATE annunciator will remain OFF if the PCB is functioning normally. The initial two-second delay and the two-second annunciator illumination should be equivalent. If they are not equivalent, it is an indication of a fault in the PCB.

The battery monitor PCB receives 28 vdc input power on pin 17. This power is filtered and then divided by FL1, Q1, and U23. The output of this power conditioning circuit is 28 vdc, 15 vdc, and -15 vdc for use on the PCB.

When 28 vdc is applied to pin 17, U18 sends a power-on clear signal to U14 to reset the PCB. At the same time, the power-on clear signal sets U16 which allows the PCB self-test to begin. U5 applies clock pulses to binary counter U21. The output of U21 pin 9 is applied through U19 to U14 which applies clock pulses to binary counter U20. The output at U20 pin 14 will set U17 and enable the output to the annunciator. When U20 pin 15 goes high, U16 will be reset and U15 will enable U14 to reset the PCB ending the PCB self-test.

U2 and its associated components amplify the battery shunt input and output it on pins 13(+) and 25(-). This output drives the airplane battery ammeter.

U6 and U20 monitor the amplified shunt voltage from U1 to see if the battery charge current is greater than 12 amps for 15 minutes. If it is, U20 sets U17 which enables the annunciator output.

The remaining components, U3, U18, U22, U7 thru U13, and U17, determine if the battery charge current is greater than 5 amps and continually increasing. If the increase rate is greater than 9.72 ma in a 35 second-time frame, the BATT CHG RATE annunciator is illuminated.

BATTERY MONITOR PCB (A125), TESTING AND TROUBLESHOOTING (Effectivity: All)

Testing and troubleshooting of the battery monitor PCB includes verification of board failure and troubleshooting to the circuit level.

Whenever a given pin number is followed by a polarity, ie. 47(+) or 47(-), it indicates that that polarity be applied to this pin. If no polarity is indicated, either polarity may be applied to that pin.

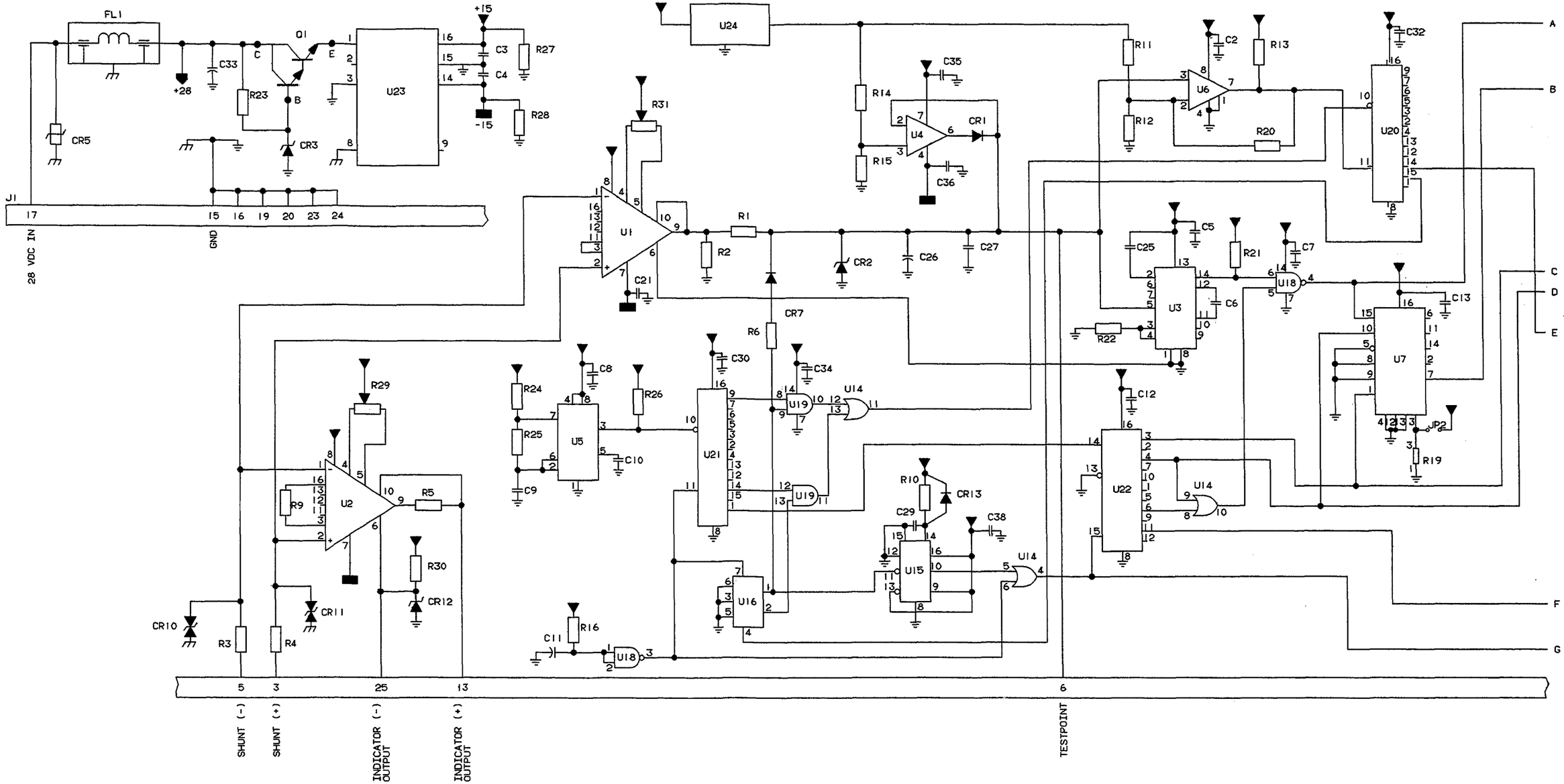
CAUTION

Anytime maintenance is performed on or around printed circuit boards, it is essential that all Electrostatic Discharge (ESD) precautions be strictly observed. Refer to Chapter 20-00-00 for detailed information on the handling of ESD sensitive equipment.

Prior to troubleshooting, perform the indicator offset null alignment procedure followed by the self-test procedure.

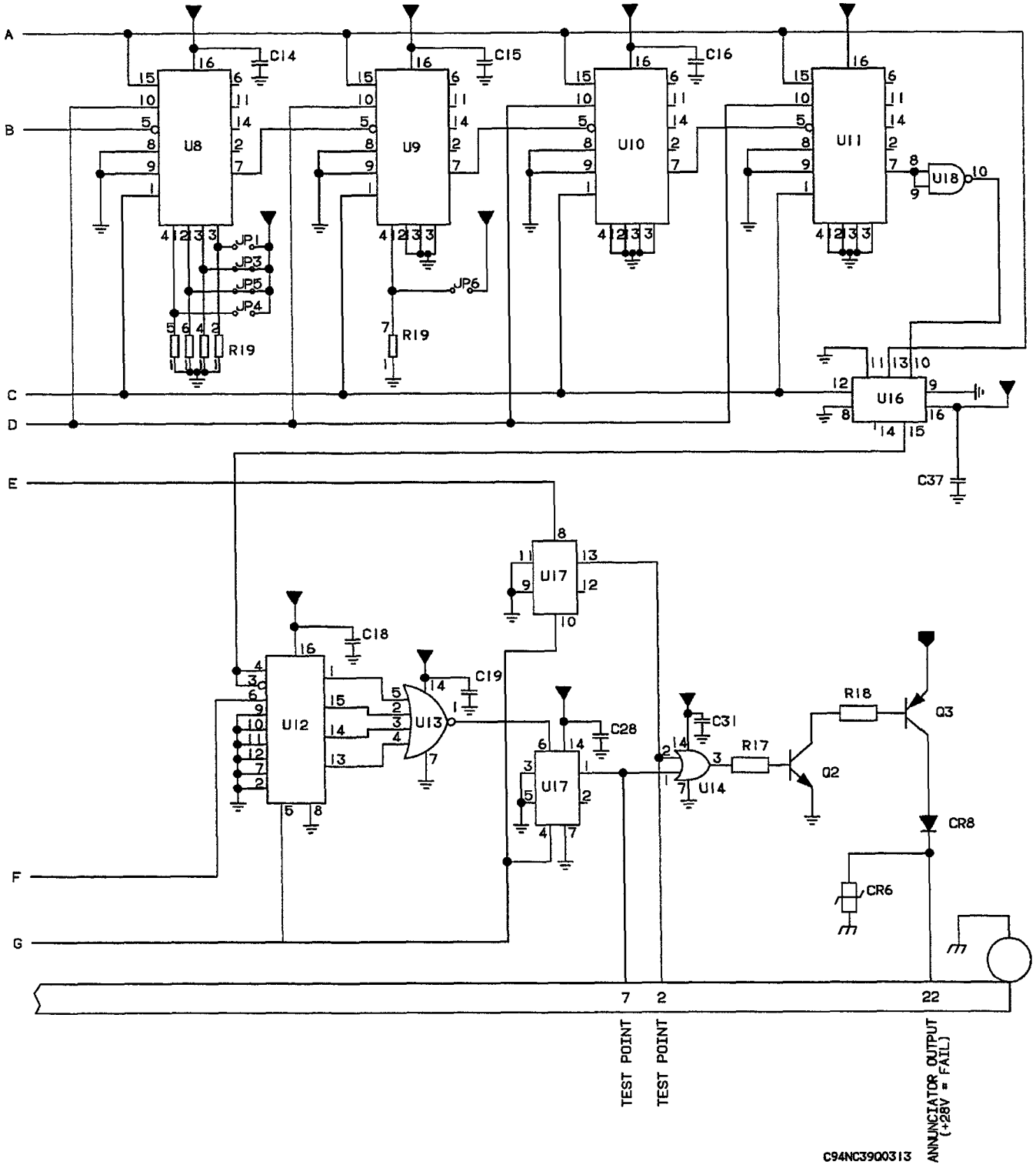
ALIGNMENT PROCEDURE (Effectivity: All) (Figure 3)

a. Connect a 28 vdc power supply between pins 17(+) and 24(-).



C94NC3900312

**Battery Monitor PCB Schematic Diagram,
P/N 122-364182-7 (Effectivity: All) (Sheet 1 of 2)
Figure 1**



Battery Monitor PCB Schematic Diagram,
P/N 122-364182-7 (Effectivity: All) (Sheet 2 of 2)
Figure 1

b. Connect a jumper between pins 3(+) and 5(-).

c. Connect a digital multimeter between pins 13(+) and 25(-).

d. Connect a #327 test lamp (DS1) between pin 22 and ground.

e. Apply 28 vdc to pin 17.

f. Adjust R29 until the digital multimeter reads 0 ±.25 mvdc. If 0 ±.25 mvdc can not be achieved, perform troubleshooting procedures.

NOTE

Tolerance on the 2 mvdc in the following step may be ±.1 mvdc as long as the output voltage on pin 6 is EXACTLY 1000 times the applied voltage at pins 3 and 5.

g. Remove the jumper from between pins 3(+) and 5(-) and connect a 0-150 mvdc power supply. Adjust the power supply for 2 ±0 mvdc.

h. Connect the digital multimeter between pins 6(+) and ground.

i. Adjust R31 until the digital multimeter reads 2 ±0 vdc (1000 times the applied voltage). If R31 can not be adjusted so the output on pin 6 is 1000 times the applied input voltage, perform troubleshooting procedures.

j. Remove power.

k. Perform the Self-Test to determine if the alignment procedure has corrected the original problem.

SELF-TEST PROCEDURE (Effectivity: All) (Figure 3)

Self-test consists of measuring the time between the application of power to pin 17 and when the test lamp (DS1) connected to pin 22 illuminates and the length of time that the lamp remains illuminated. These two time frames MUST be 2 seconds each. Since the time frames to be measured are sequential, the self-test will be performed twice to allow accurate measurements to be taken.

a. Connect a 28 vdc power supply between pins 17(+) and 24(-).

b. Connect a test lamp between pin 22 and ground.

c. Apply power to pin 17 and measure the time between power application and the time that the lamp illuminates. Record time as T1.

d. Remove power from pin 17.

e. Apply power to pin 17 and measure the time that DS1 is illuminated. Record time as T2.

f. Self-test passes if: T1 = T2 and T2 = 2 seconds

g. If self-test fails, perform troubleshooting procedures.

TROUBLESHOOTING (Effectivity: All) (Figures 1 and 4)

a. Connect a 28 vdc power supply between pins 17(+) and 24(-).

b. Connect a 0-150 mvdc power supply between pins 3(+) and 5(-).

c. Apply 28 vdc to pin 17.

d. Measure between the output of FL1 and ground for 28 vdc. If voltage is incorrect, a fault is indicated in FL1, Q1, U23 or their associated circuitry.

e. Measure between U23-16 and ground for 15 vdc. If voltage is incorrect, a fault is indicated in Q1, U23 or their associated circuitry.

f. Measure between U23-14 and ground for -15 vdc. If voltage is incorrect, a fault is indicated in Q1 or its associated circuitry.

g. Apply 3 ±.2 mvdc between pin 3(+) and pin 5(-).

h. Measure between pins 13(+) and 25(-) for 7.5 ±0.5 mvdc. If voltage is incorrect, a fault is indicated in U2 or its associated circuitry.

i. Measure between pin 6(+) and ground for 3 ±0.2 vdc. If voltage is incorrect, a fault is indicated in U1, U3, U4, U6 or their associated circuitry.

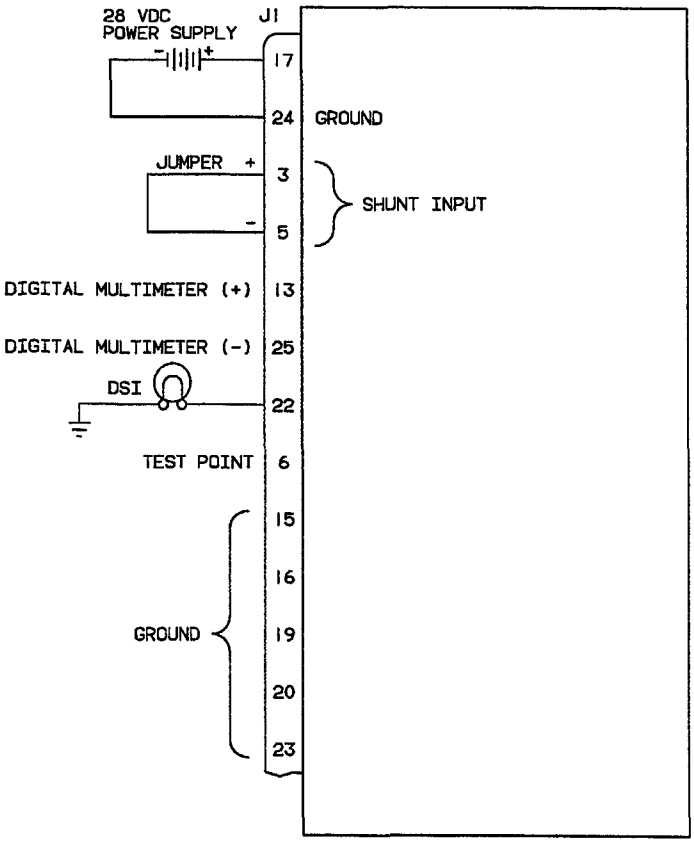
j. Between 12 and 18 minutes after the 3 mvdc signal on pins 3 and 5 is applied, the voltage on pin 22 should change from 0.5 ±0.5 vdc to 27 ±1 vdc and the voltage on pin 2 should change from 0.5 ±0.5 vdc to 14 ±1 vdc.

1. If the voltage on pin 22 is incorrect, a fault is indicated in Q2, Q3, U14, U17 or their associated circuitry.

2. If the voltage on pin 2 is incorrect, a fault is indicated in U6, U20, U17, U24 or their associated circuitry.

NOTE

The following step requires the use of a programmable power supply.



C94NC39Q0314

Alignment Test Setup (Effectivity: All)
Figure 2

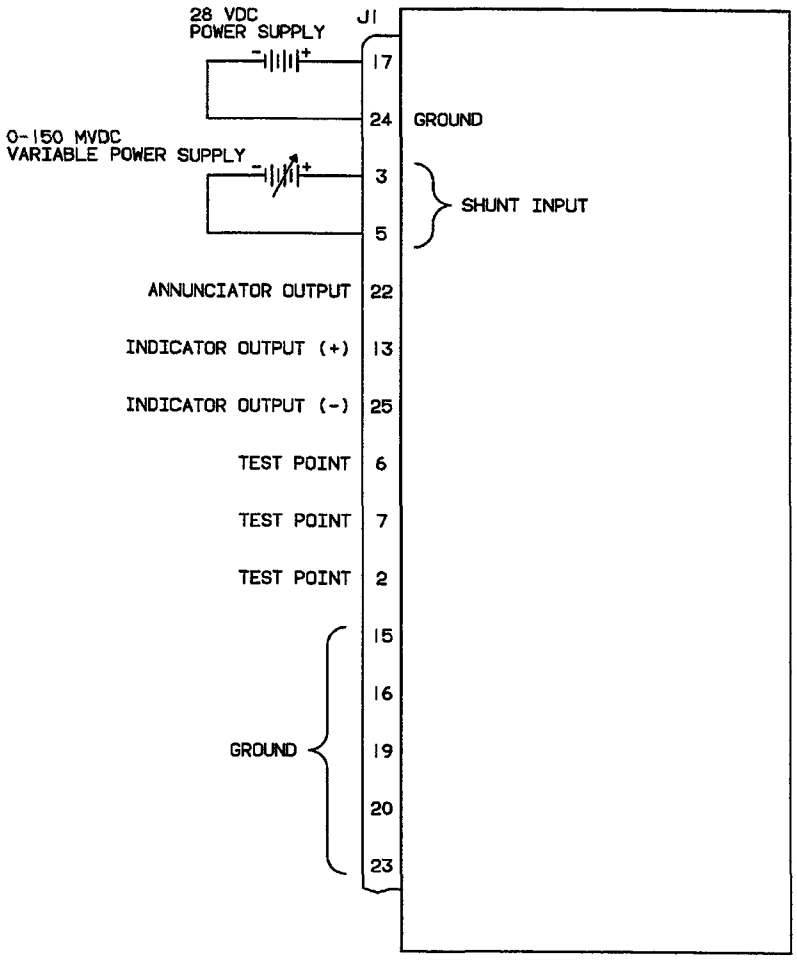
k. Apply 1.5 ±0.5 mvdc, which constantly increases in magnitude at a rate of 0.2 mvdc/hour, between pin 3(+) and pin 5(-).

l. Within 9 minutes of 1.5 mvdc being applied to pins 3 and 5, the voltage on pin 22 should change from 0.5 ±0.5 vdc to 27 ±1 vdc and the voltage on pin 7 should change from 0.5 ±0.5 vdc to 14 ±1 vdc.

1. If the voltage on pin 22 is incorrect, a fault is indicated in Q2, Q3, U14, U17 or their associated circuitry.

2. If the voltage on pin 7 is incorrect, a fault is indicated in U3, U7 thru U13, U16, U18 or their associated circuitry.

m. This completes testing and troubleshooting. Secure power and disconnect PCB.



C94NC3900316

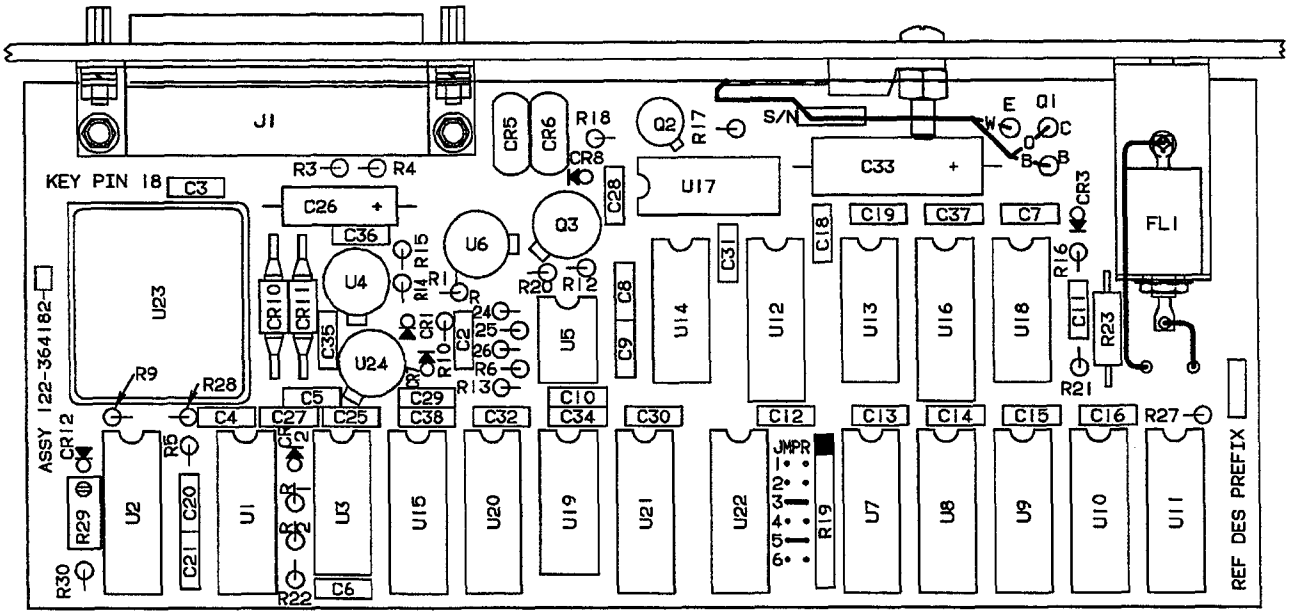
Battery Monitor PCB Initial Test Setup,
P/N 122-364182-7 (Effectivity: All)
Figure 3

BATTERY MONITOR PCB PARTS LIST
(Effectivity: All)

COMPONENT	PART NO.
R1-R2	RCR07G103JS
R3-R4	RCR07G101JS
R5	RCR07G102JS
R6	RCR07G103JS
R7-R8	NOT USED
R9	RN55C2672F
R10	RCR07G103JS
R11	RN55C1002F
R12	RN55C3091F
R13	RCR07G103JS
R14	RN55C1002F
R15	RN55C1101F
R16	RN55C2003F
R17	RCR07G393JS
R18	RCR07G202JS
R19	MSP08A01-103J
R20	RCR07G514JS
R21	RCR07G512JS
R22	RN55C1432F
R23	RCR20G152JS
R24-R25	RN55C8451F
R26	RCR07G103JS
R27-R28	RN60D1001F
R29	RJR24FW103P
R30	RCR07G102JS
R31	RJR24FW103P
C1	NOT USED
C2	CKR05BX104KR
C3-C4	CKR06BX105KR
C5	CKR05BX104KR
C6	ECR102GG
C7-C8	CKR05BX104KR
C9	ECR104BF
C10	CKR05BX103KR
C11	CKR06BX105KR
C12	CKR05BX104KR
C13-C16	CKR05BX104KR
C17	NOT USED
C18-C19	CKR05BX104KR
C20	NOT USED
C21	CKR05BX104KR
C22-C24	NOT USED
C25	CKR05BX103KR
C26	CSR13E156KM
C27	CKR05BX103KR

BATTERY MONITOR PCB PARTS LIST
(Effectivity: All) *(Continued)*

COMPONENT	PART NO.
C28	CKR05BX104KR
C29	CKR05BX103KR
C30-C32	CKR05BX104KR
C33	CSR13G106KM
C34-C38	CKR05BX104KR
CR1	1N4005
CR2	1N4741A
CR3	1N4747A
CR4	NOT USED
CR5	V47ZA7
CR6	V47ZA1
CR7	1N4005
CR8	1N4007
CR9	NOT USED
CR10	UDZ5807
CR11	UDZ5807
CR12	1N4738A
CR13	1N914
Q1	2N6045
Q2	2N2222A
Q3	2N2905A
U1-U2	AD524SD
U3	AD537SD
U4	LM741AH or JM38510/ 10101BGC
U5	LM555J
U6	LM111H
U7-U11	MC14516BAL
U12	MC14035BAL
U13	MC14002BCL
U14	MC14071BCL
U15	MC14538BAL
U16	MC14027BAL
U17	MC14013BAL or MC14013BCL
U18	MC14011BCL
U19	MC14081BCL
U20-U21	MC14040BAL
U22	MC14017BAL or MC14017BCL
U23	HCHR 015-220
U24	AD581SH
FL1	5JX2732
J1	DBM25PD



C94NC39Q0316

Battery Monitor PCB Component Location
(Effectivity: All)
Figure 4

FLAP AND FORWARD WING CONTROLLER AND ANNUNCIATOR PCB (A144), P/N 122-364166-19, - DESCRIPTION AND OPERATION (Effectivity: All) (Figure 1)

This chapter describes the Flap and Forward or Wing Controller and Annunciator or Printed Circuit Board (PCB) installed in the circuit card box assembly. The flap and forward wing monitor and annunciator PCB reference designator corresponds with the reference designator used in the BEECHCRAFT Starship 1 Wiring Diagram Manual and the Avionics Wiring Diagrams.

CAUTION

Anytime maintenance is performed on or around printed circuit boards, it is essential that all Electrostatic Discharge (ESD) precautions be strictly observed. Refer to Chapter 20-00-00 for detailed information on the handling of ESD sensitive equipment.

This PCB coordinates and synchronizes the movement of the flap/forward wing systems and illuminates the respective flap/forward indicator on the pilot's inboard subpanel their current position.

When the flaps and forward wings are synchronized within 2% of each other, the PCB will enable the flaps and forward wing. This includes unlocking the hydraulic lock on the forward wing, enabling the flap/forward wing go-signals, and sending the fwd wing a speed signal.

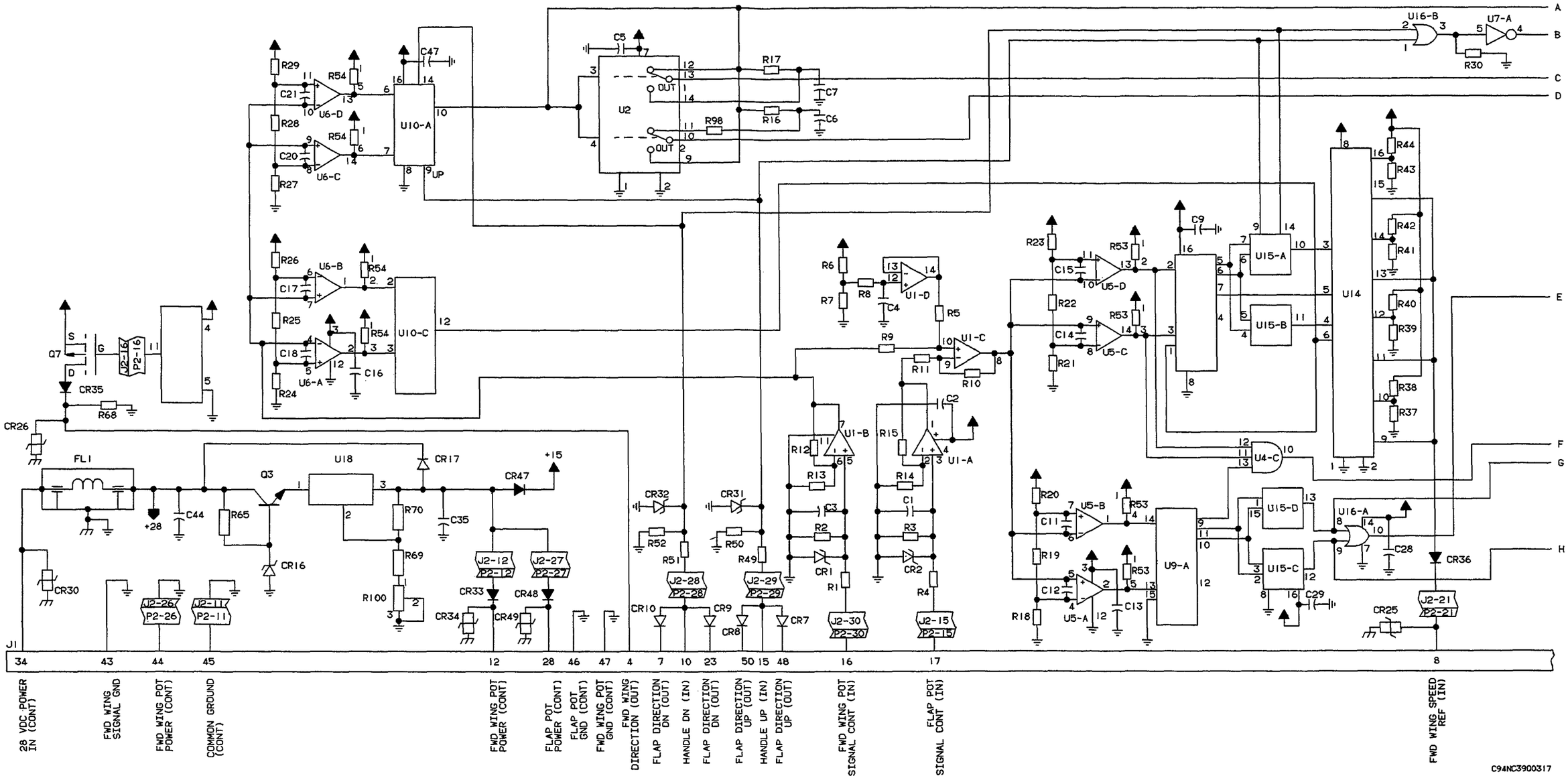
When the flap/forward wing are synchronized within 2% to 4% of each other, the PCB will increase or decrease the speed signal sent to the forward wing to allow synchronization to be attained. If the flap and forward wing are more than 4% out of synchronization, the PCB will remove the go signal to the leading unit until synchronization is attained.

Whenever the travel limit is reached on the flap or forward wing units, the go signal is removed by the PCB. In the case of the forward wing, the hydraulic lock will be energized when the go signal is removed. If either a flap or forward wing monitor status input indicates a monitor failure, the go signal to both units is removed and the hydraulic lock is energized on the forward wing.

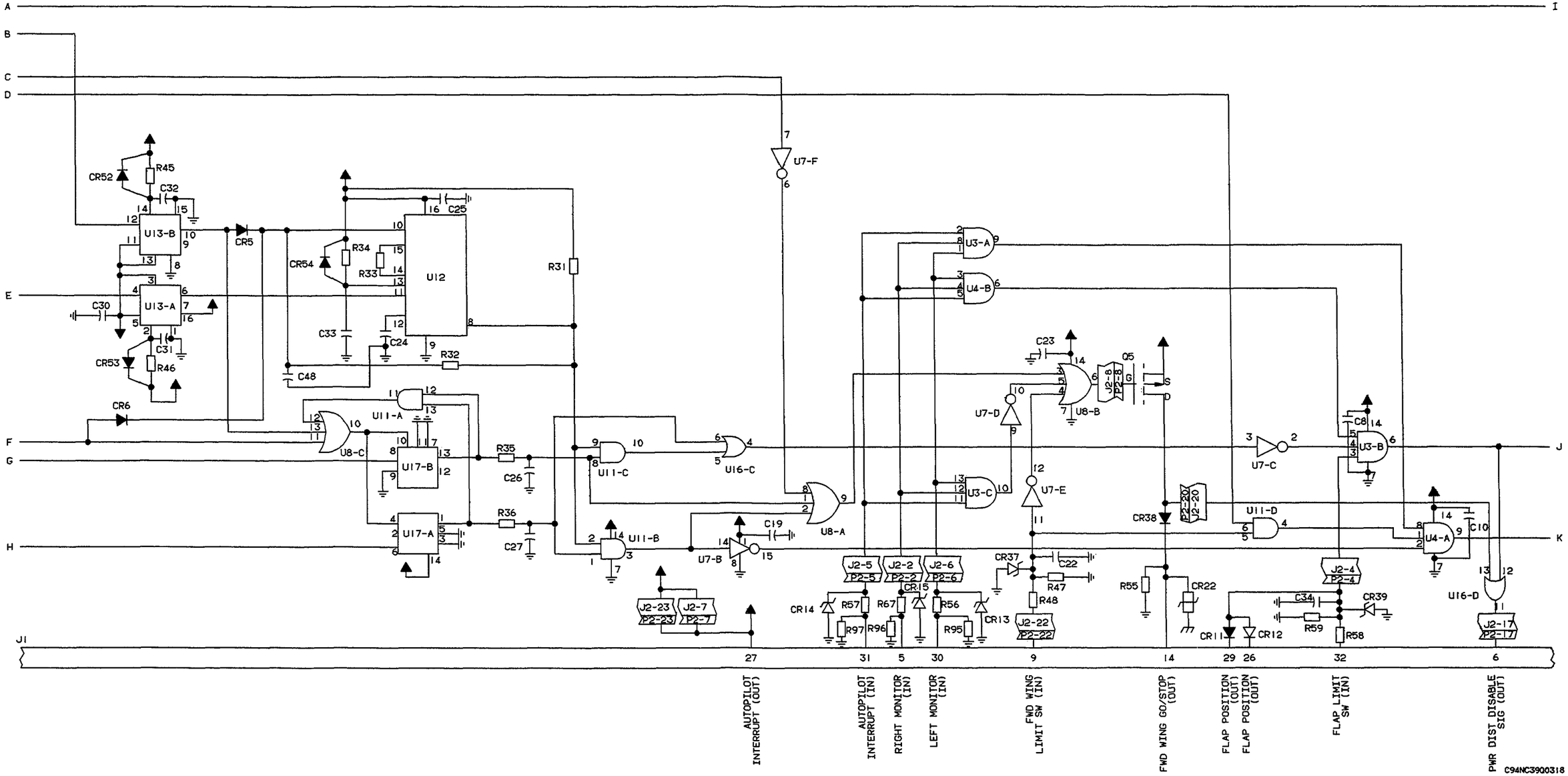
The annunciation section of the PCB monitors the position of the flaps and the forward wing. When the flaps and forward wing are fully extended, the flap/forward wing-extend signal goes high and the flap/forward wing-transit signal goes low. If the flaps and forward wing are fully retracted, both annunciation outputs are low. If both the flaps and forward wing are not fully extended or fully retracted, then the flap/forward wing transit signal is high and the flap/forward wing extend signal is low.

FLAP AND FORWARD WING CONTROLLER AND ANNUNCIATOR PCB (A144) TESTING AND TROUBLESHOOTING (Effectivity: All)

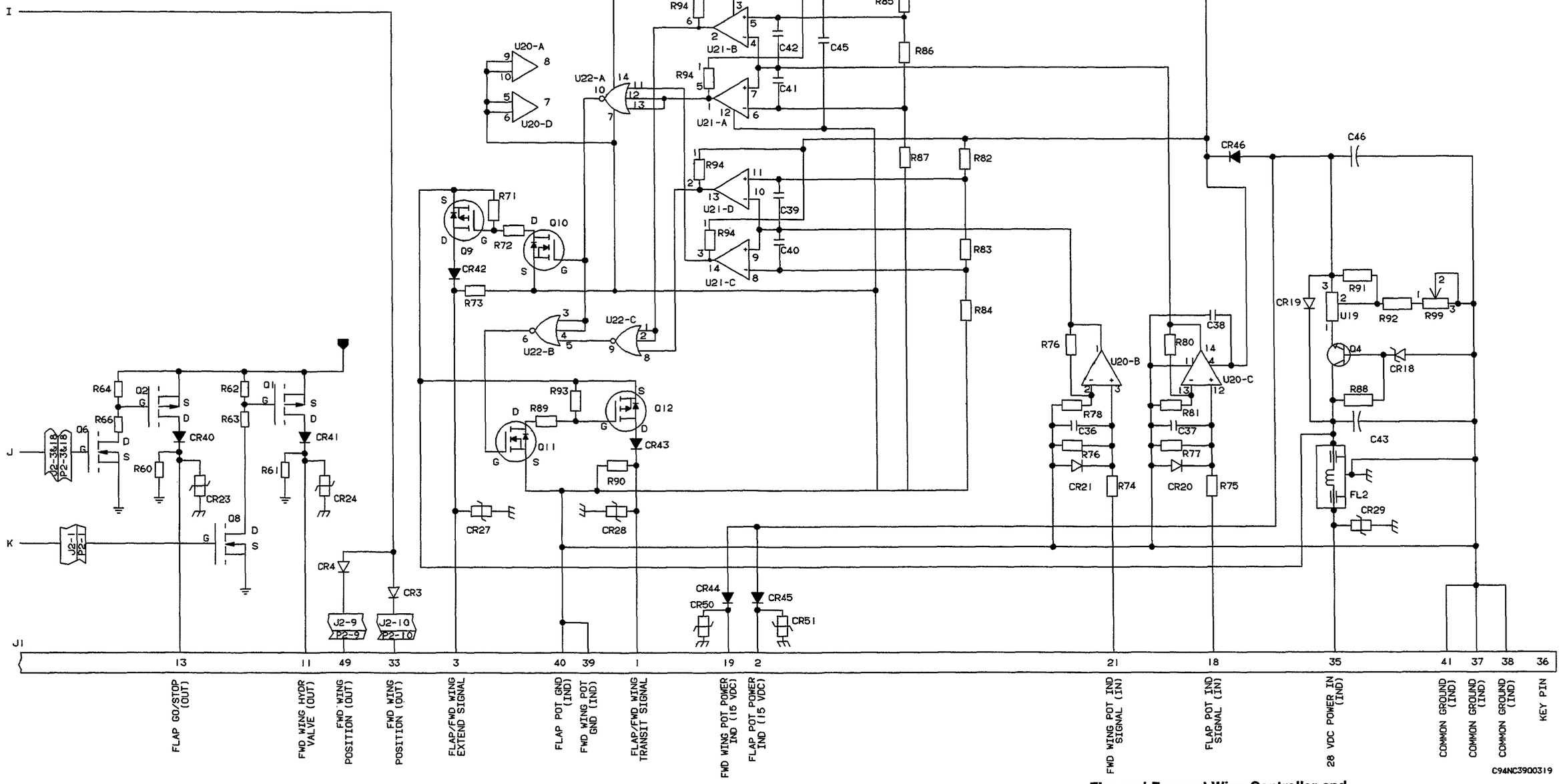
Testing and troubleshooting of the Flap and Forward Wing Controller and Annunciator PCB is not authorized. All repair of this PCB must be performed at the BEECHCRAFT factory.



Flap and Forward Wing Controller and Annunciator PCB Schematic Diagram, P/N 122-364166-19 (Effectivity: All) (Sheet 1 of 3) Figure 1



Flap and Forward Wing Controller and Annunciator PCB Schematic Diagram, P/N 122-364166-19 (Effectivity: All) (Sheet 2 of 3) Figure 1



Flap and Forward Wing Controller and Annunciator PCB Schematic Diagram
P/N 122-364166-19 (Effectivity: All)
(Sheet 3 of 3)
Figure 1

FLAP AND FWD WING MONITOR AND MONITOR TEST PCB (A180, A181), P/N 122-364168-17, - DESCRIPTION AND OPERATION (Effectivity: All) (Figure 1)

This chapter describes the Flap and FWD Wing Monitor and Monitor Test Printed Circuit Board (PCB) installed in the circuit card box assembly. The Flap and FWD Wing Monitor and Monitor Test PCB reference designator corresponds with the reference designator used in the BEECHCRAFT Starship 1 Wiring Diagram Manual and the Avionics Wiring Diagrams.

CAUTION

Anytime maintenance is performed on or around printed circuit boards, it is essential that all Electrostatic Discharge (ESD) precautions be strictly observed. Refer to Chapter 20-00-00 for detailed information on the handling of ESD sensitive equipment.

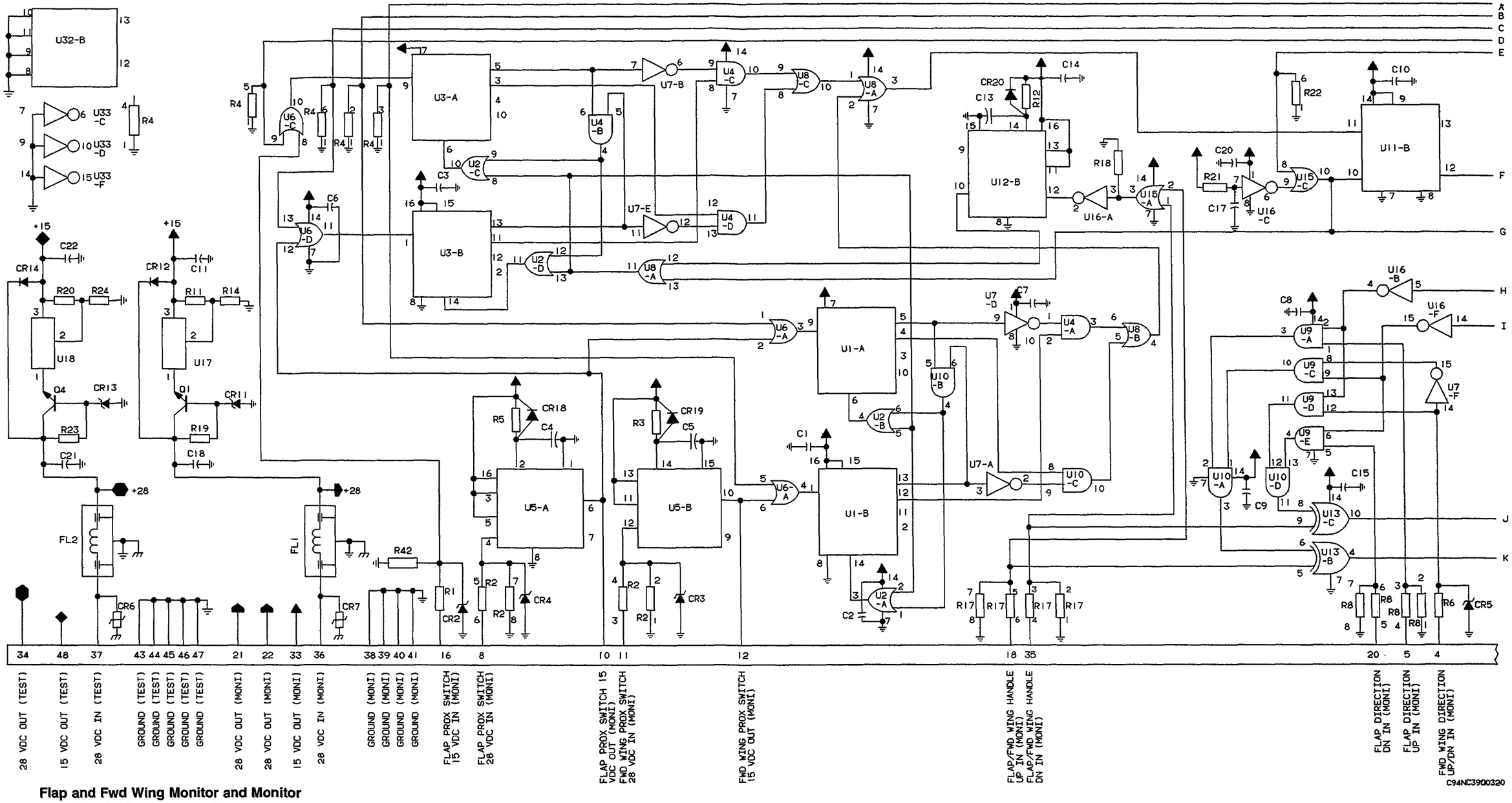
The Flap and FWD Wing Monitor and Monitor Test PCB monitors the position of the flaps and forward wing, their direction of travel, and the position of the flap handle. If the flap and forward wing position, direction of travel, and flap handle do not agree, the logic on the PCB will deenergize the flap monitor relay. When the flap monitor relay is deenergized, the flaps and forward wings will remain in their current position and the autopilot will be disengaged.

The PCB also contains a self-test section located on the daughter board. The self-test function only works when the input on pins 14 and 49 is 0 volts. This occurs when the flaps and forward wing are fully extended or retracted.

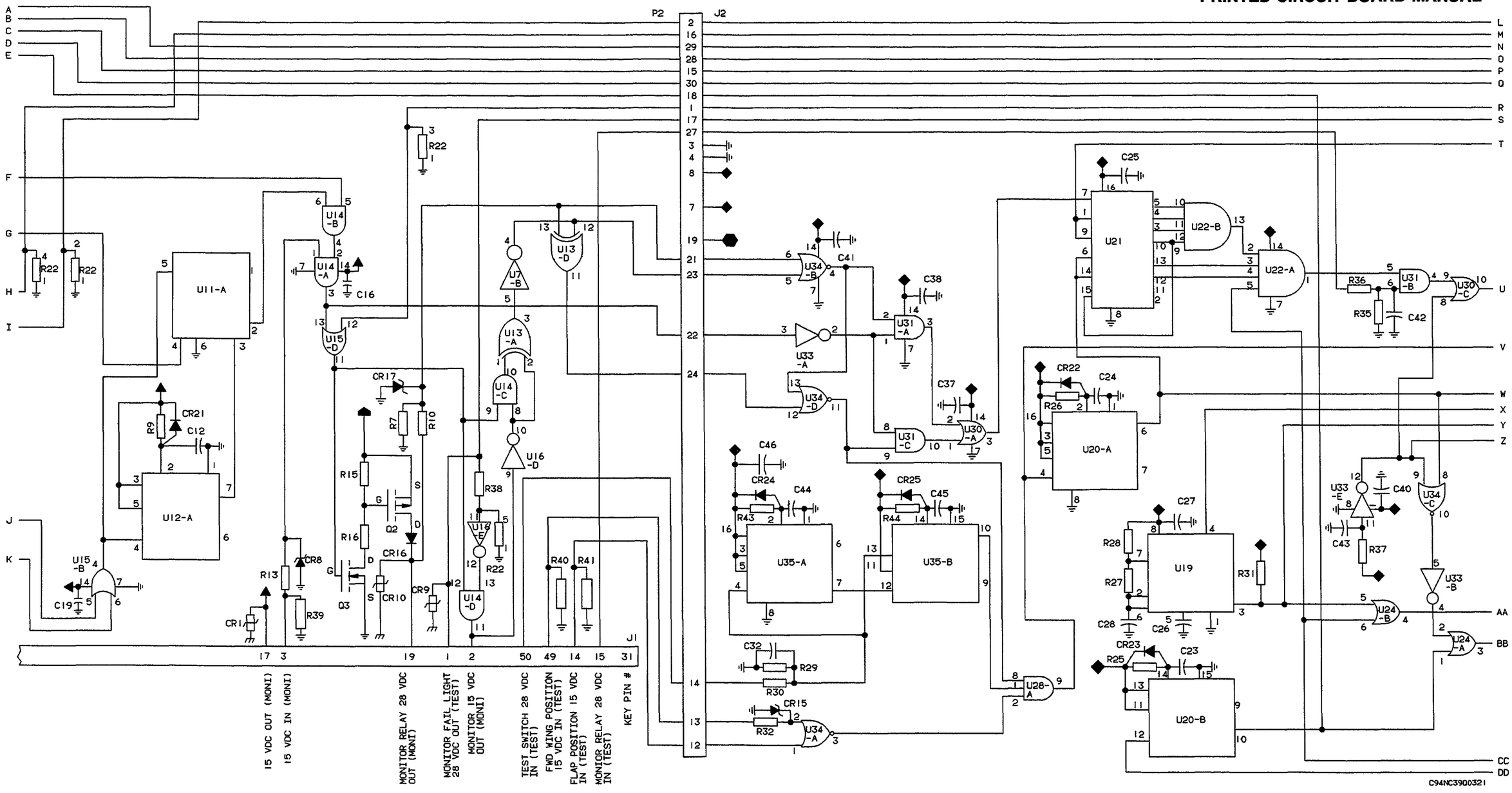
Self-test is initiated by applying 28 vdc to pin 50. Self-test checks internal circuits, the monitor fault output, and the monitor relay output. If any of these events fail, the self-test fails.

FLAP AND FWD WING MONITOR AND MONITOR TEST PCB (A180, A181), TESTING AND TROUBLESHOOTING (Effectivity: All)

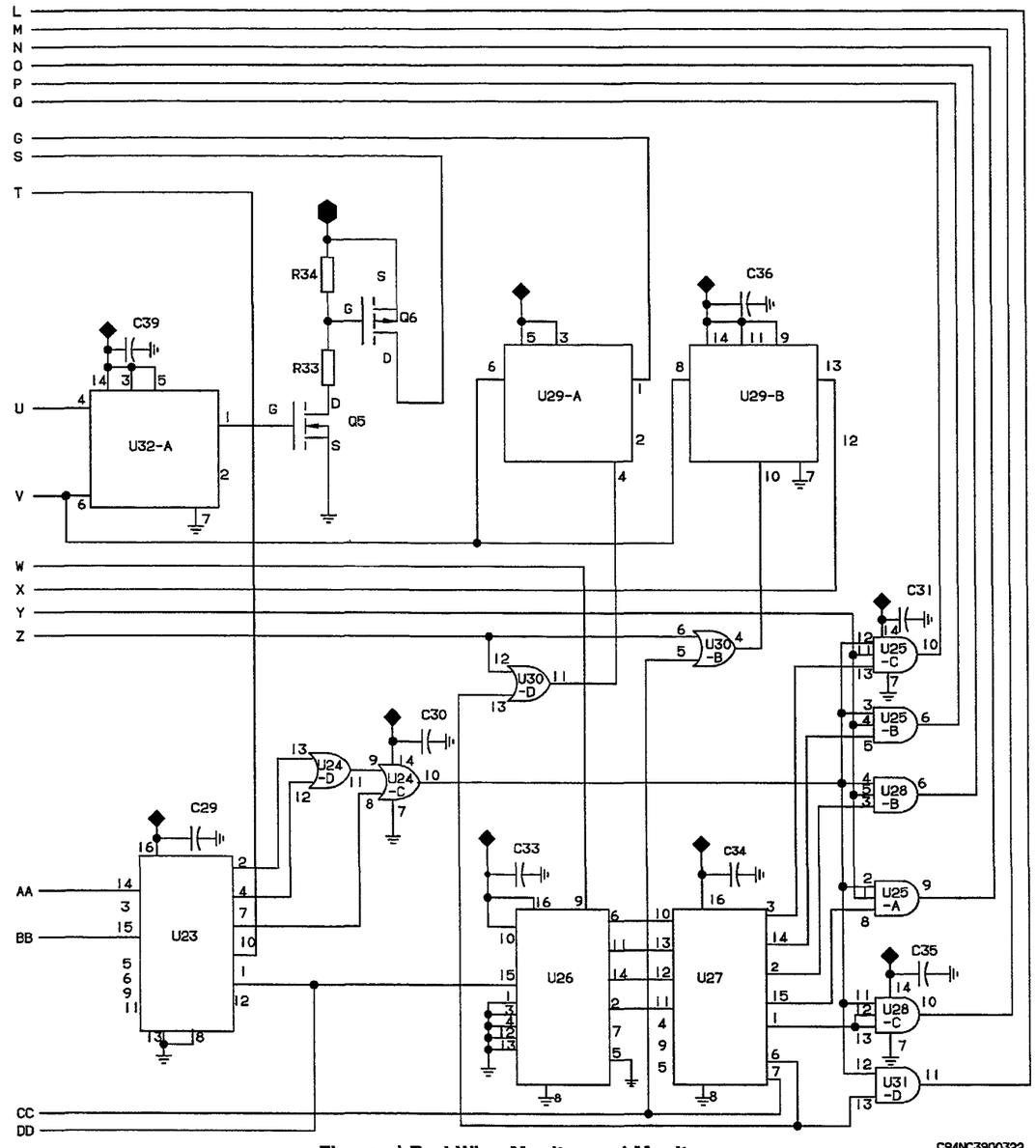
Testing and troubleshooting of the Flap and FWD Monitor and Monitor Test PCB is not authorized. All repair of this PCB must be performed at the BEECHCRAFT factory.



Flap and Fwd Wing Monitor and Monitor Test PCB Schematic Diagram, P/N 122-364168-17 (Effectivity: All) (Sheet 1 of 3)
Figure 1



Flap and Fwd Wing Monitor and Monitor Test PCB Schematic Diagram, P/N 122-364168-17 (Effectivity: All) (Sheet 2 of 3)
Figure 1



Flap and Fwd Wing Monitor and Monitor Test PCB Schematic Diagram, P/N 122-364168-17 (Effectivity: All) (Sheet 3 of 3)
Figure 1

LANDING GEAR CONTROL PCB (A142), P/N 122-364028-27, - DESCRIPTION AND OPERATION (Effectivity: All) (Figure 1)

This chapter describes the Landing Gear Control Printed Circuit Board (PCB) installed in the circuit card box assembly. The landing gear control PCB reference designator corresponds with the reference designator used in the BEECHCRAFT Starship 1 Wiring Diagram Manual and the Avionics Wiring Diagrams.

CAUTION

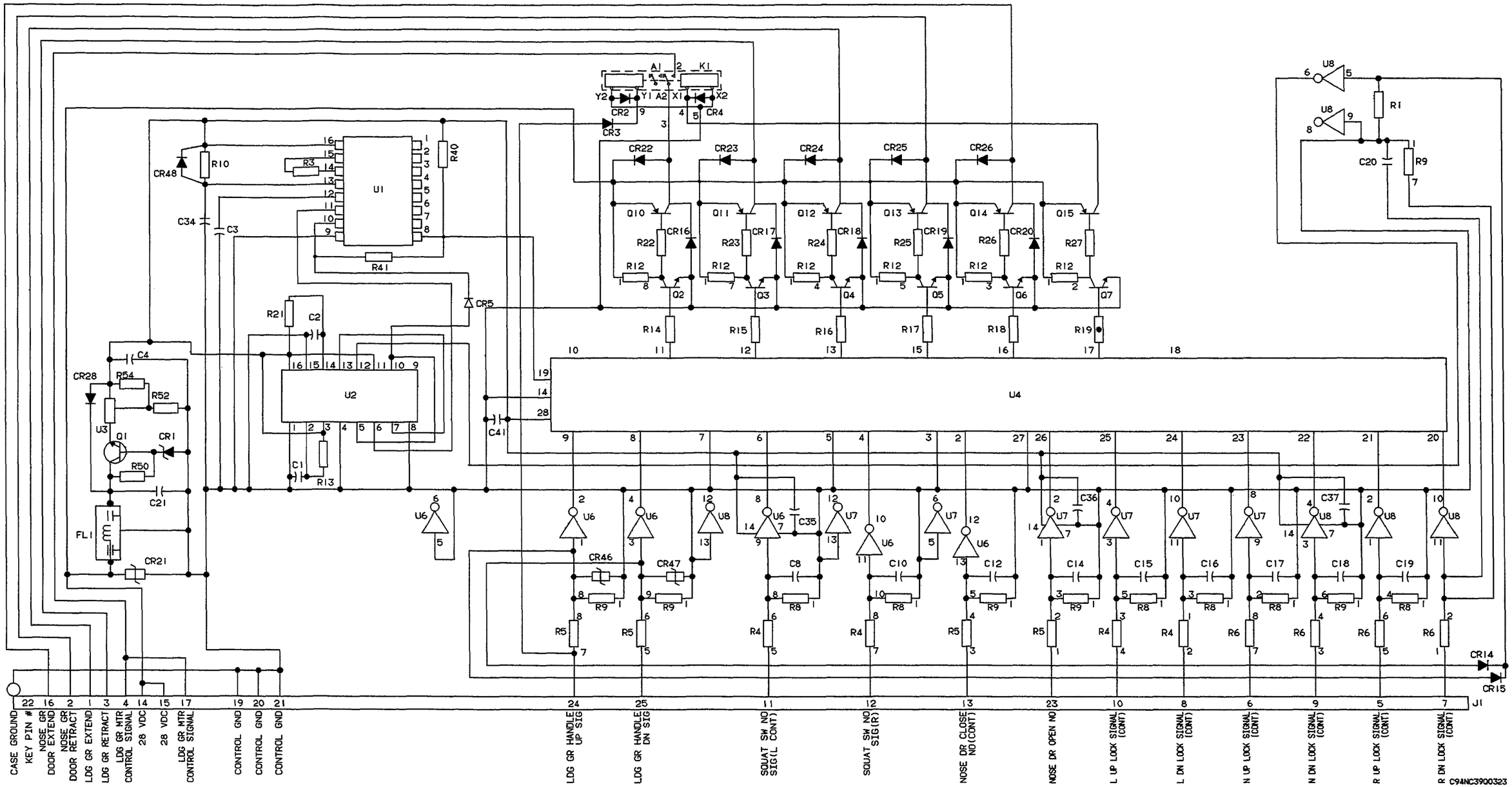
Anytime maintenance is performed on or around printed circuit boards, it is essential that all Electrostatic Discharge (ESD) precautions be strictly observed. Refer to Chapter 20-00-00 for detailed information on the handling of ESD sensitive equipment.

The landing gear control PCB consists of input conditioning circuits (U6, U7, U8), output circuits (Q2 thru Q7 and Q10 thru Q15), timing circuits (U1 and U2), power conditioning (Q1 and FL1) and the programmable logic array (U4).

Normal landing gear transition takes between 6 and 8 seconds. The timing circuits on the PCB are preset for 17 seconds. If the landing gear does not complete transitioning in the 17-second time frame, the outputs from the PCB are disabled. The 17-second time frame begins when the landing gear handle is placed in either the up or down position.

LANDING GEAR CONTROL PCB (A142), TESTING AND TROUBLESHOOTING (Effectivity: All)

Testing and troubleshooting of the landing gear control PCB is not authorized. All repair of this PCB must be performed at the BEECHCRAFT factory.



Landing Gear Control PCB Schematic Diagram, P/N 122-364028-27 (Effectivity: All)
Figure 1

LANDING GEAR INDICATOR PCB (A161), P/N 122-364028-21, - DESCRIPTION AND OPERATION (Effectivity: All) (Figure 1)

This chapter describes the Landing Gear Indicator Printed Circuit Board (PCB) installed in the circuit card box assembly. The PCB reference designator corresponds with the reference designator used in the BEECHCRAFT Starship 1 Wiring Diagram Manual and the Avionics Wiring Diagrams.

CAUTION

Anytime maintenance is performed on or around printed circuit boards, it is essential that all Electrostatic Discharge (ESD) precautions be strictly observed. Refer to Chapter 20-00-00 for detailed information on the handling of ESD sensitive equipment.

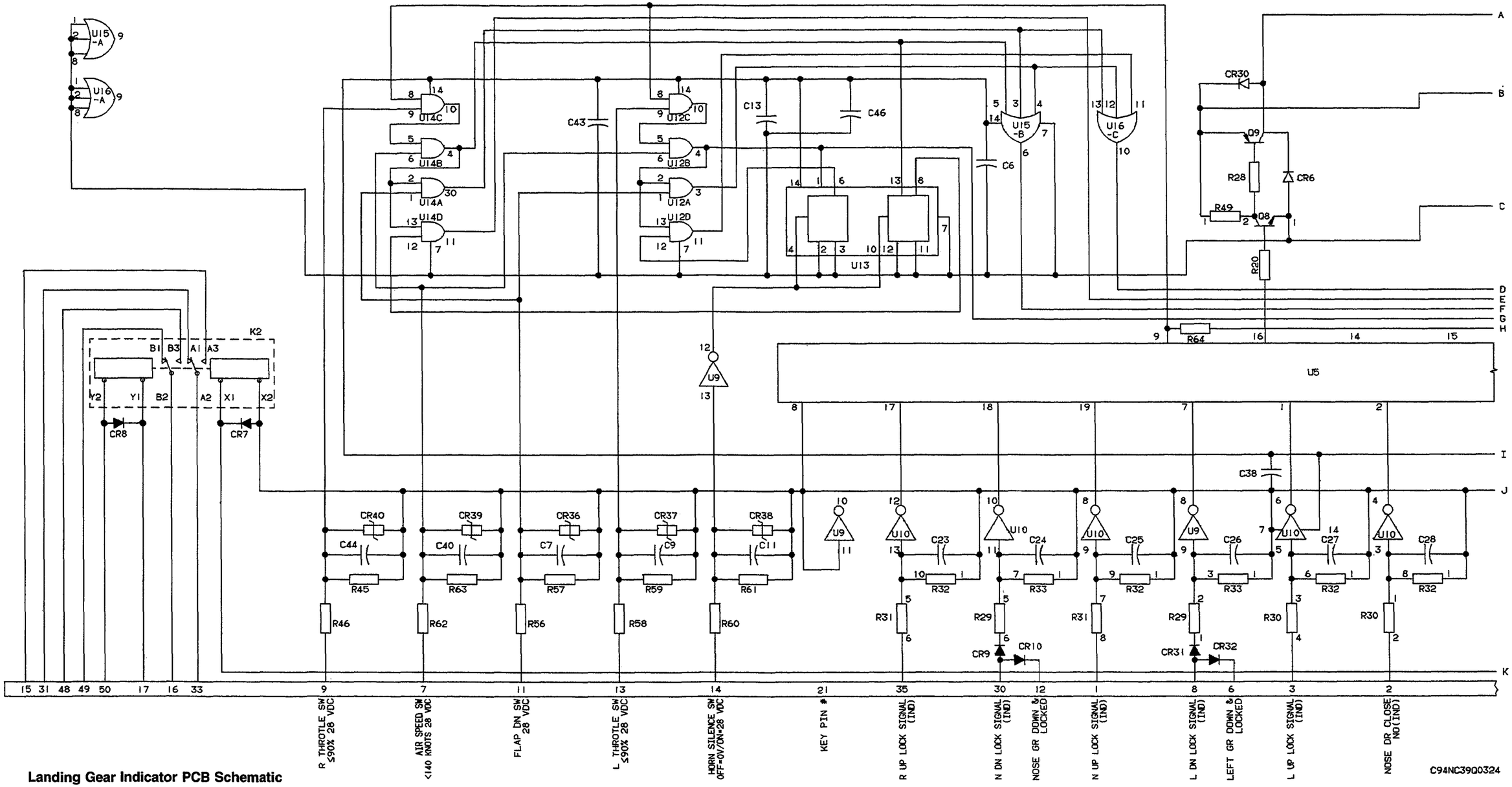
The landing gear indicator PCB is part of the landing gear warning system used to warn the pilot that the landing gear is not down and locked.

When the flaps and forward wings are retracted, airspeed is below 140 knots, and either power lever is retarded below 90% N_1, the warning horn will sound and the landing gear handle in-transit lights will illuminate. The warning horn can be silenced, but the landing gear in-transit lights cannot be extinguished. The landing gear warning system will be rearmed by advancing power so that N_1 is greater than 90%.

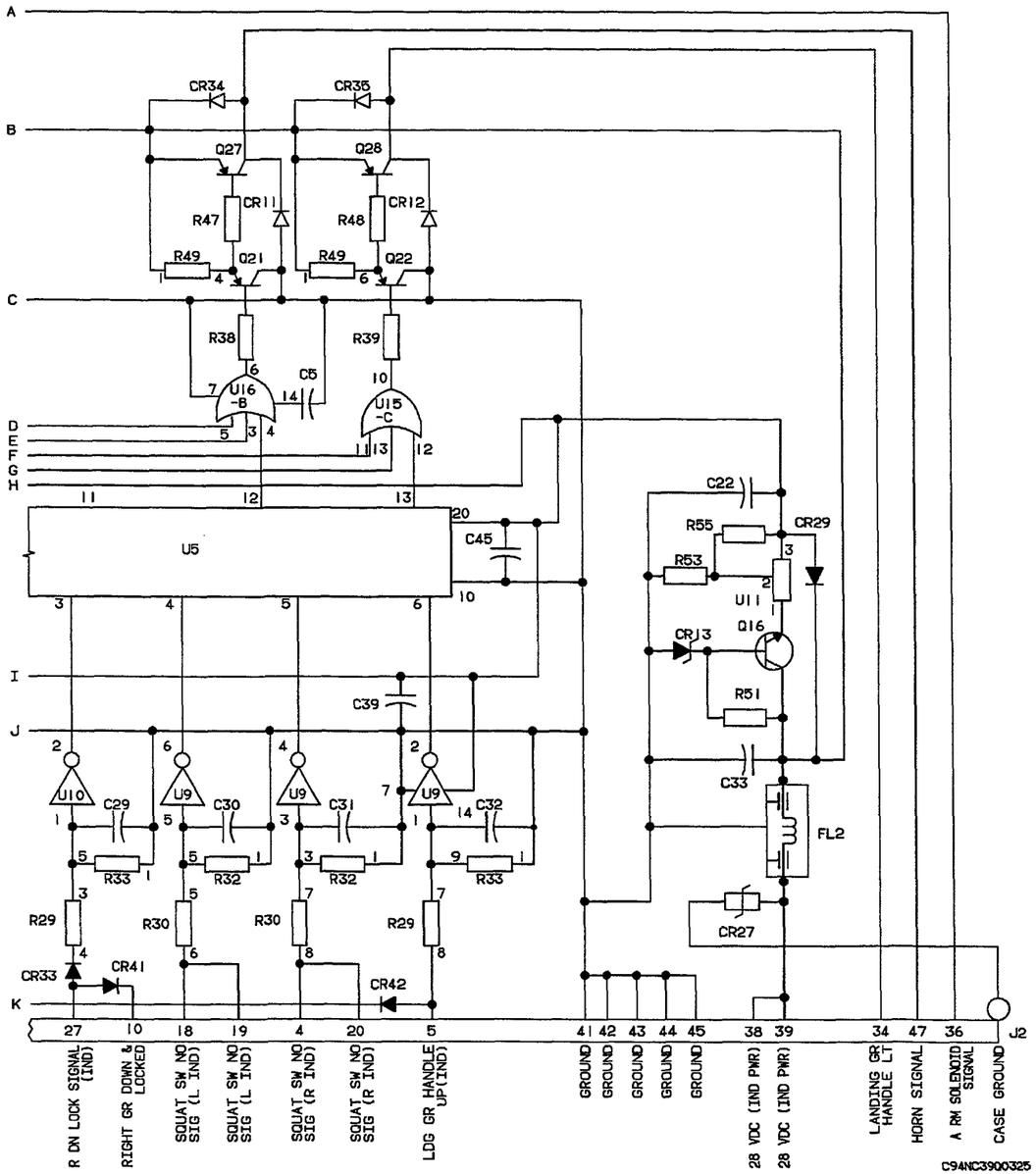
When the flaps and forward wings are extended, airspeed is below 140 knots and either power lever is retarded below 90% N_1, the warning horn and the landing gear handle in-transit lights will be activated and neither can be silenced.

LANDING GEAR INDICATOR PCB (A161), TESTING AND TROUBLESHOOTING (Effectivity: All)

Testing and troubleshooting of the landing gear control PCB is not authorized. All repair of this PCB must be performed at the BEECHCRAFT factory.



Landing Gear Indicator PCB Schematic Diagram, P/N 122-364028-21
(Effectivity: All)
(Sheet 1 of 2)
Figure 1



Landing Gear Indicator PCB Schematic Diagram
P/N 122-364028-21, (Effectivity: All), (Sheet 2 of 2)
Figure 1

LIGHTING CONTROL PCB (A163), P/N 122-364176-1, - DESCRIPTION AND OPERATION (Effectivity: All) (Figure 1)

This chapter describes the Lighting Control Printed Circuit Board (PCB) installed in the circuit card box assembly. The lighting control PCB reference designator corresponds with the reference designator used in the BEECHCRAFT Starship 1 Wiring Diagram Manual and the Avionics Wiring Diagrams.

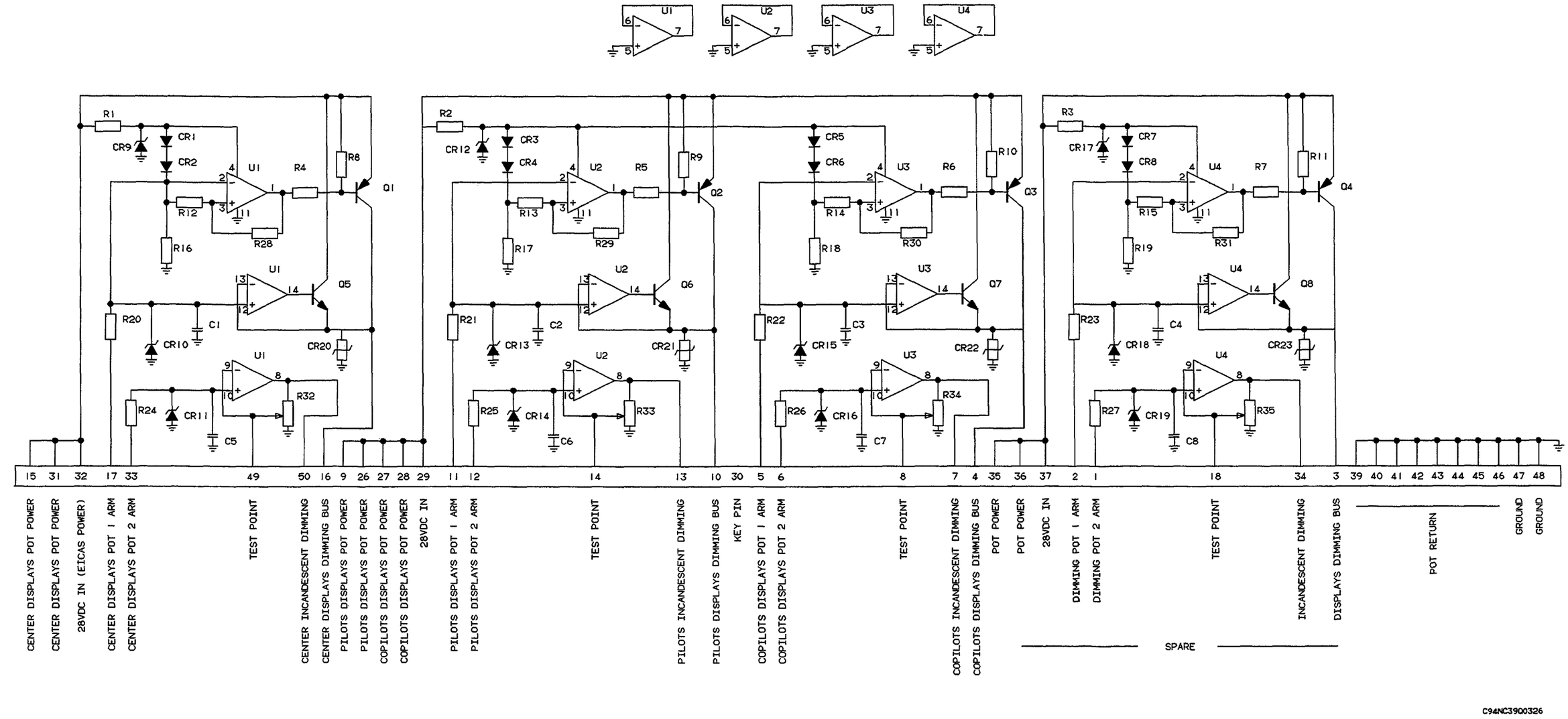
CAUTION

Anytime maintenance is performed on or around printed circuit boards, it is essential that all Electrostatic Discharge (ESD) precautions be strictly observed. Refer to Chapter 20-00-00 for detailed information on the handling of ESD sensitive equipment.

The lighting control PCB consists of four circuits which are nearly identical. These circuits are used to control the dimming of the CRT displays in the Starship. Inputs to this PCB are on pins 17 and 33, 11 and 12, 5 and 6, and 1 and 2. Outputs from this board are from pins 16 and 50, 10 and 13, 4 and 7, and 3 and 34.

LIGHTING CONTROL PCB (A163), TESTING AND TROUBLESHOOTING (Effectivity: All)

Testing and troubleshooting of the lighting control PCB is not authorized. All repair of this PCB must be performed at the BEECHCRAFT factory.



Lighting Control PCB Schematic Diagram
P/N 122-364176-1 (Effectivity: All)
Figure 1

LOGIC RELAY PCB (A134, A182, A211), P/N 122-364156-1, - DESCRIPTION AND OPERATION (Effectivity: All) (Figure 1)

This chapter describes the Logic Relay Printed Circuit Board (PCB) installed in the circuit card box assembly. The logic relay PCB reference designator corresponds with the reference designator used in the BEECHCRAFT Starship 1 Wiring Diagram Manual and the Avionics Wiring Diagrams.

CAUTION

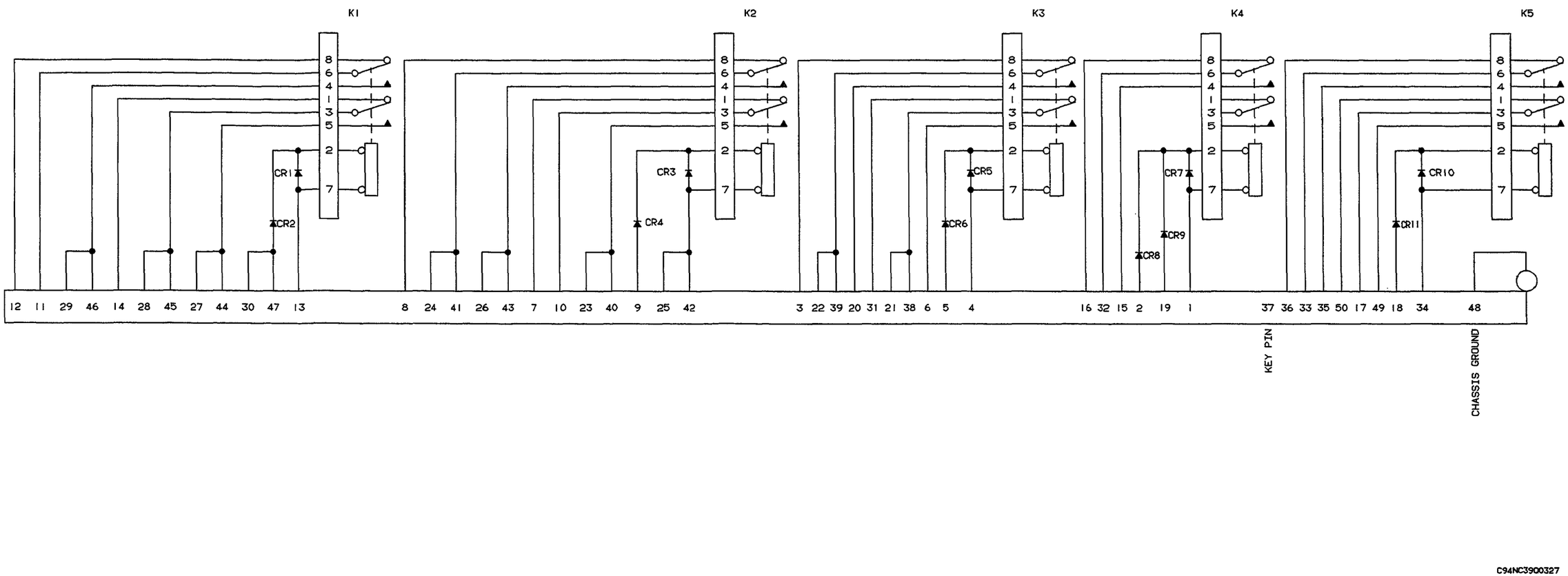
Anytime maintenance is performed on or around printed circuit boards, it is essential that all Electrostatic Discharge (ESD) precautions be strictly observed. Refer to Chapter 20-00-00 for detailed information on the handling of ESD sensitive equipment.

The logic relay PCB consists of five relays, 11 diodes, and a multilayer printed circuit board.

Each relay is independent of the others. Input signals are applied to the various pins of the relays. When a relay is energized, the input signal is either provided or removed from the output.

LOGIC RELAY PCB (A134, A182, A211), TESTING AND TROUBLESHOOTING (Effectivity: All)

Testing and troubleshooting of the logic relay PCB is not authorized. All repair of this PCB must be performed at the BEECHCRAFT factory.



Logic Relay PCB Schematic Diagram
P/N 122-364156-1 (Effectivity: All)
Figure 1

N_1 SPEED AND ICE VANE PCB (A133), P/N 122-364054-13, - DESCRIPTION AND OPERATION (Effectivity: All) (Figure 1)

This chapter describes the N_1 Speed and Ice Vane printed circuit board (PCB) installed in the circuit card box assembly. The PCB reference designator corresponds with the designator used in the BEECHCRAFT Starship 1 Wiring Diagram Manual and the avionics wiring diagrams.

CAUTION

Anytime maintenance is performed on or around printed circuit boards, it is essential that all Electrostatic Discharge (ESD) precautions be strictly observed. Refer to Chapter 20-00-00 for detailed information on the handling of ESD sensitive equipment.

The N_1 speed control module consists of three sections. The frequency to voltage conversion section, the comparator section, and the logic section.

The frequency to voltage conversion section consists of U1, U2, and their associated circuitry. This section converts the frequency input from the left and right N_1 tach generators into a usable voltage. This voltage is then applied to the comparator section.

The comparator section consists of U3 and its associated circuitry. This section compares the left and right N_1 voltage to predetermined levels. The predetermined levels are set by the adjustment of R16, R20, and R24. When the N_1 voltage exceeds the predetermined levels, the comparator output changes from a low (zero volts) to a high (28 volts). These outputs are then applied to the logic section.

The logic section consists of U4, Q1, Q2, Q3, Q4, Q5, and their associated circuitry. The logic section monitors the output of the comparator and provides the following signals:

When the left and right N1 are greater than 90%, the OUTPUT SIGNAL TO PRESSURIZATION SYSTEM (pin 6) changes from an open to a ground.

When the COOL COMMAND SIGNAL IN (pin 13) is high and the right N_1 is less than 62%, the N_1 LOW SIGNAL OUT (pin 19) will be high.

When the COOL COMMAND SIGNAL IN (pin 13) is high and the right N_1 is greater than 62%, the output power is turned on to the air conditioner COMPRESSOR CLUTCH (pin 17) and the CONDENSER BLOWER RELAY (pin 4) after a 10 second delay.

When the right N_1 is greater than 62%, the transistor switch (Q4) is biased on for the FLT HR METER (pin 24).

Table 1 shows the frequency to voltage relationship between N_1 percent, N_1 RPM, Tach Generator, and the Converted Voltage.

TABLE 1
N_1 FREQUENCY TO VOLTAGE CONVERSION

N_1%	N_1 RPM	TACH GEN HZ	CONVERTED VOLTAGE
62	2604	43.4	3.61
80	3360	56.0	4.66
90	3780	63.0	5.24
100	4200	70.0	58.82

N_1 SPEED AND ICE VANE PCB (A133), TESTING AND TROUBLESHOOTING (Effectivity: All)

Testing and troubleshooting of the printed circuit boards includes verification of board failure and troubleshooting to the circuit level.

CAUTION

Anytime maintenance is performed on or around printed circuit boards, it is essential that all Electrostatic Discharge (ESD) precautions be strictly observed. Refer to Chapter 20-00-00 for detailed information on the handling of ESD sensitive equipment.

Troubleshooting the N_1 Speed & Ice Vane PCB consists of applying a variable frequency input to pins 11 and 12 and monitoring the output pins. During this process R16, R20, and R24 settings will be verified and adjusted if necessary. The tolerance on 0 vdc is plus or minus 0.5 vdc. The tolerance on 28 vdc is plus or minus 2 vdc.

TEST SETUP (Effectivity: All)

a. Connect pin 22 to ground.

b. Connect a 10K ohm, 1/4 watt resistor between pin 4 and ground.

c. Connect pin 1 and pin 24 to a 28 vdc supply.

d. Connect signal generator to pin 12.

TESTING AND TROUBLESHOOTING (Effectivity: All)

a. Apply 28 vdc power to the PCB.

b. Adjust the signal generator for a sine wave output with a frequency less than 40 Hz and an amplitude of 3.5 - 21 V_{p-p} or 1.2-7.4 VRMS.

c. While monitoring the voltage on pin 25, slowly increase the frequency on the signal generator until the voltage transitions from 0 to 28 vdc. The frequency displayed on the signal generator should be 44 ±1 Hz. If the frequency is incorrect, adjust R24 and repeat this step. If 44 ±1 Hz can not be obtained, a fault is indicated in Q4 and its associated circuitry.

d. Measure pin 4 for 0 vdc. If voltage is incorrect, a fault is indicated in Q3 and its associated circuitry.

e. Measure pin 6 for a resistance greater than 10k ohms. If resistance is less than 10k ohms, a fault is indicated in Q5 and its associated circuitry.

f. While monitoring the voltage on pin 8, slowly increase the frequency on the signal generator until the voltage transitions from 0 to 28 vdc. The frequency displayed on the signal generator should be 63 ±1 Hz. If the frequency is incorrect, adjust R20 and repeat this step. If frequency can not be obtained, a fault is indicated in U3B and its associated circuitry.

g. Measure the voltage on pin 4 for 0 vdc. If the voltage is incorrect, a fault is indicated in Q3 and its associated circuitry.

h. Measure pin 6 for a resistance greater than 10k ohms. If the resistance is incorrect, a fault is indicated in Q5 and its associated circuitry.

i. While monitoring the voltage on pin 10, slowly decrease the frequency on the signal generator until the voltage transitions from 28 to 0 vdc. The frequency displayed on the signal generator should be 42 ±1 Hz. If the frequency is incorrect, a fault is indicated in U3C or its associated circuitry.

j. Connect the signal generator to pins 11 and 12.

k. Slowly increase the frequency on the signal generator until the resistance between pin 6 and ground transitions from 10k ohms to less than 100 ohms. The frequency displayed on the signal generator should be 63 ±1 Hz. If the frequency is incorrect, adjust R16 and repeat this step. If the frequency can not be obtained, a fault is indicated in U1, U3A, U4A, Q5 and their associated circuitry.

l. Apply 28 vdc to pin 13.

m. While monitoring the voltage on pin 19, slowly decrease the frequency on the signal generator until the voltage transitions from 0 vdc to 28 vdc. The frequency displayed on the signal generator should be 42 ±1 Hz. If the frequency is incorrect, a fault is indicated in U3D, U4D, or their associated circuitry.

NOTE

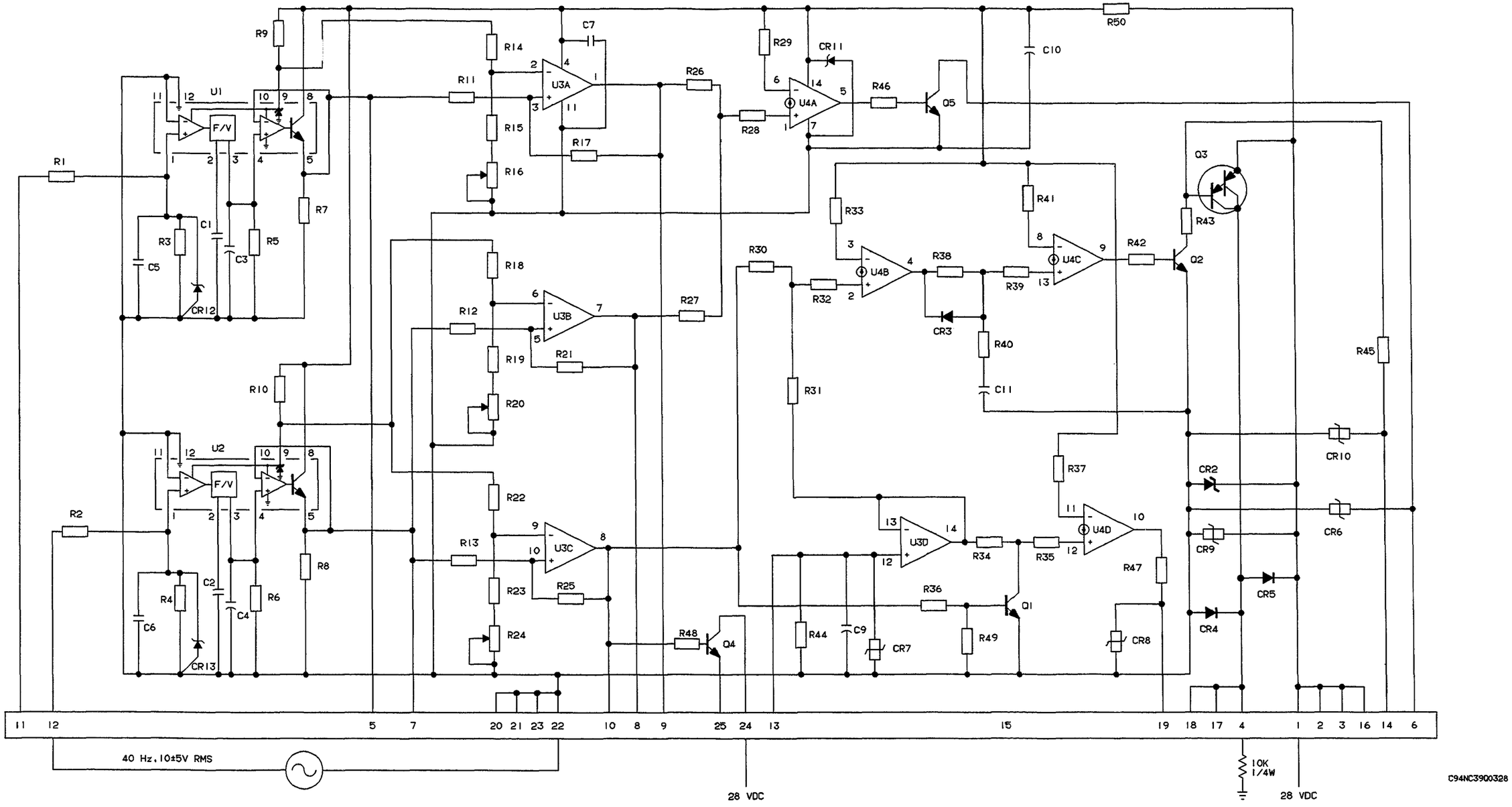
The next step will require a time measurement.

n. While monitoring the voltage on pin 19, slowly increase the frequency on the signal generator until the voltage transitions from 28 vdc to 0 vdc. Approximately 5 to 15 seconds after the transition, the voltage on pin 4 should change from 0 vdc to 28 vdc. The frequency displayed on the signal generator should be 44 ±1 Hz. If the frequency is incorrect a fault is indicated in U2, U3C, U3D, U4D, or their associated circuitry.

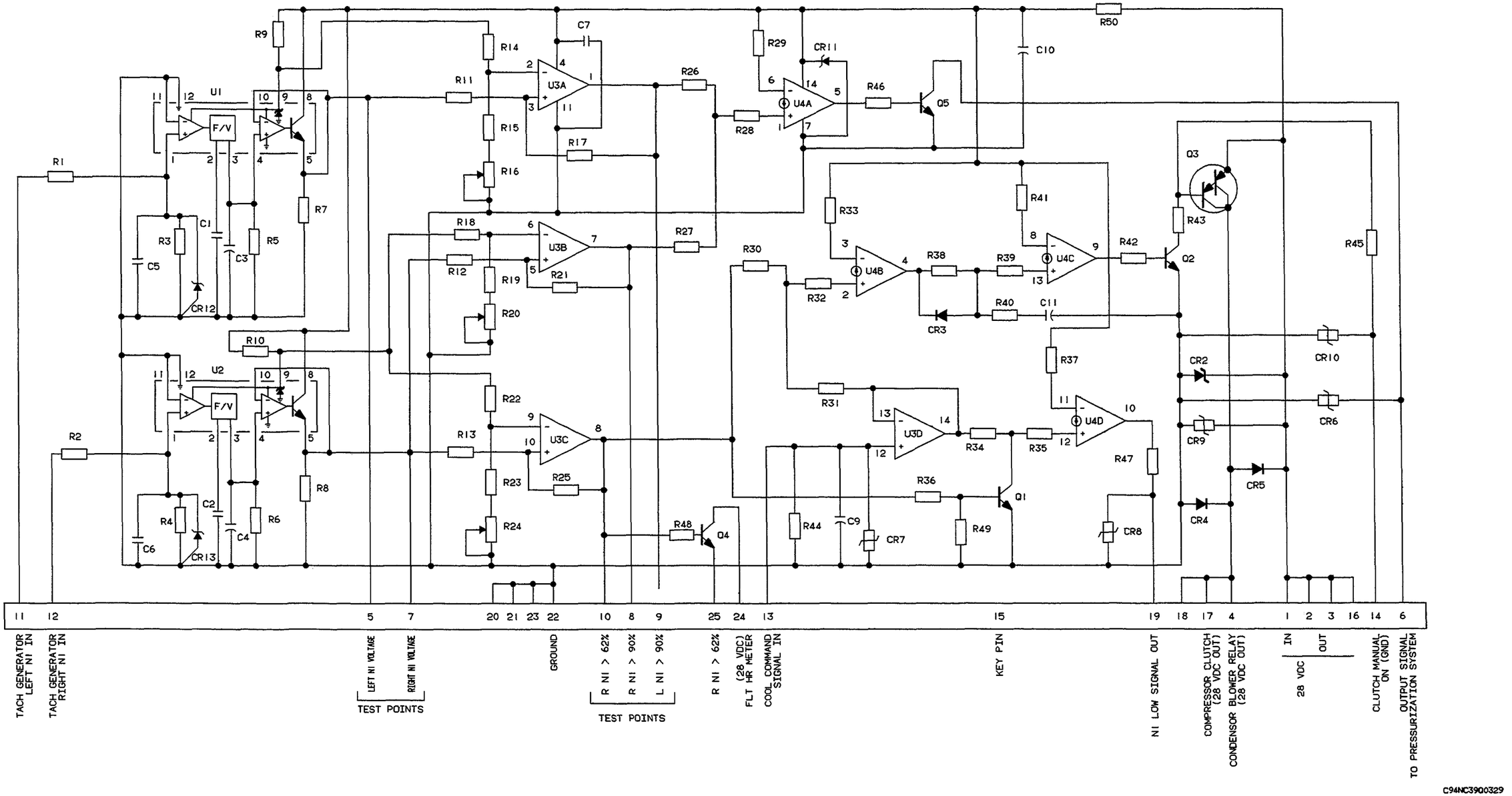
o. If the voltage on pin 4 does not transition, a fault is indicated in Q3 or its associated circuitry.

p. Remove the 28 vdc input on pin 13 and observe that the voltage on pin 4 transitions from 28 vdc to 0 vdc. If the transition does not occur, a fault is indicated in Q3 and its associated circuitry.

q. This completes testing and troubleshooting. Secure power and disconnect PCB.



Test Setup (Effectivity: All)
Figure 1



C94NC39Q0329

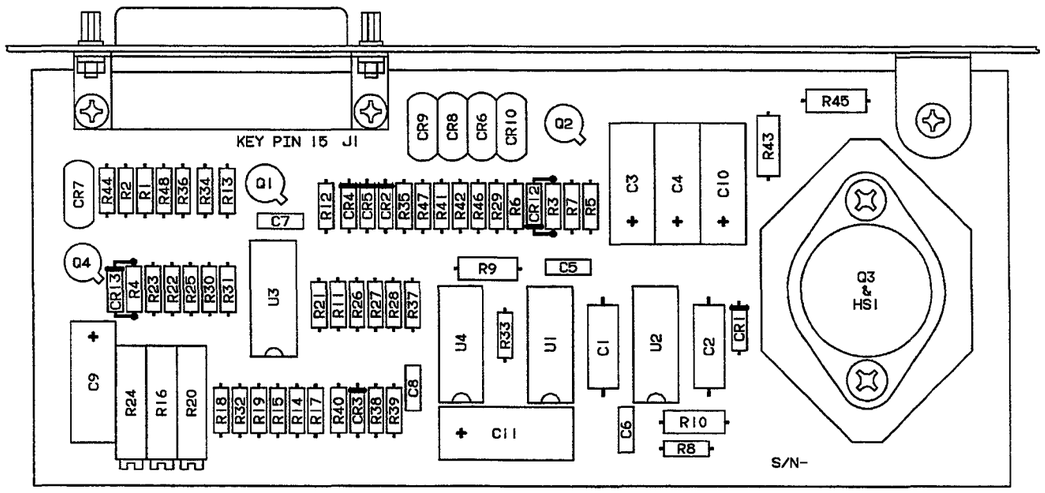
N_1 Speed and Ice Vane PCB Schematic Diagram,
P/N 122-364054-13 (Effectivity: All)
Figure 2

N_1 SPEED AND ICE VANE PCB PARTS LIST (Effectivity: All)

COMPONENT	PART NO.
R1-R2	RNC55H1002FS
R3-R4	RNC55H1001FS
R5-R6	RNC55H1103FS
R7-R8	RNC55H1003FS
R9-R10	RNC60H2001FS
R11-R13	RNC55H1002FS
R14	RNC55H3012FS
R15	RNC55H4022FS
R16	8487-50K
R17	RNC55H1004FS
R18	RNC55H3012FS
R19	RNC55H4022FS
R20	8487-50K
R21	RNC55H1004FS
R22	RNC55H4752FS
R23	RNC55H2262FS
R24	8487-50K
R25	RNC55H1004FS
R26-R28	RNC55H3652FS
R29	RNC55H7502FS
R30-R32	RNC55H3652FS
R33	RNC55H7502FS
R34-R35	RNC55H3652FS
R36	RNC55H8251FS
R37	RNC55H1823FS
R38	RNC55H3093FS
R39	RNC55H3833FS
R40	RNC55H1001FS
R41	RNC55H1004FS

N_1 SPEED AND ICE VANE PCB PARTS LIST (Effectivity: All) *(Continued)*

COMPONENT	PART NO.
R42	RNC55H8251FS
R43	RNC60H3651FS
R44	RNC55H1002FS
R45	RNC60H3651FS
R46	RNC55H1002FS
R47	SOLID WIRE
R48	RNC55H8251FS
R49	RNC55H1001FS
R50	RN60D39R2F
C1-C2	192P1049R8
C3-C4	CSR13G106KR or M39003/01-2854
C5-C7	CKR05BX104KR
C9-C10	CSR13G106KR or M39003/01-2854
C11	M39003/01-2312 or CSR13F476KM
CR1	1N4005
CR2	1N972B
CR3-CR5	1N4005
CR6-CR10	V47ZA1
CR11	1N53638
CR12-CR13	1N4007
Q1-Q2	2N2222A
Q3	MJ11013
Q4-Q5	2N2222A
U1-U2	LM2917N
U3	LM124AJ
U4	LM2900N



C94NC39Q0330

N_1 Speed and Ice Vane PCB Component Location
(Effectivity: All)
Figure 3

POWER DISTRIBUTION CONTROL PCB (A126), P/N 122-364173-21, - DESCRIPTION AND OPERATION (Effectivity: All) (Figure 1)

This chapter describes the Power Distribution Control printed circuit board (PCB) installed in the circuit card box assembly. The PCB reference designator corresponds with the designator used in the BEECHCRAFT Starship 1 Wiring Diagram Manual and the avionics wiring diagrams.

CAUTION

Anytime maintenance is performed on or around printed circuit boards, it is essential that all Electrostatic Discharge (ESD) precautions be strictly observed. Refer to Chapter 20-00-00 for detailed information on the handling of ESD sensitive equipment.

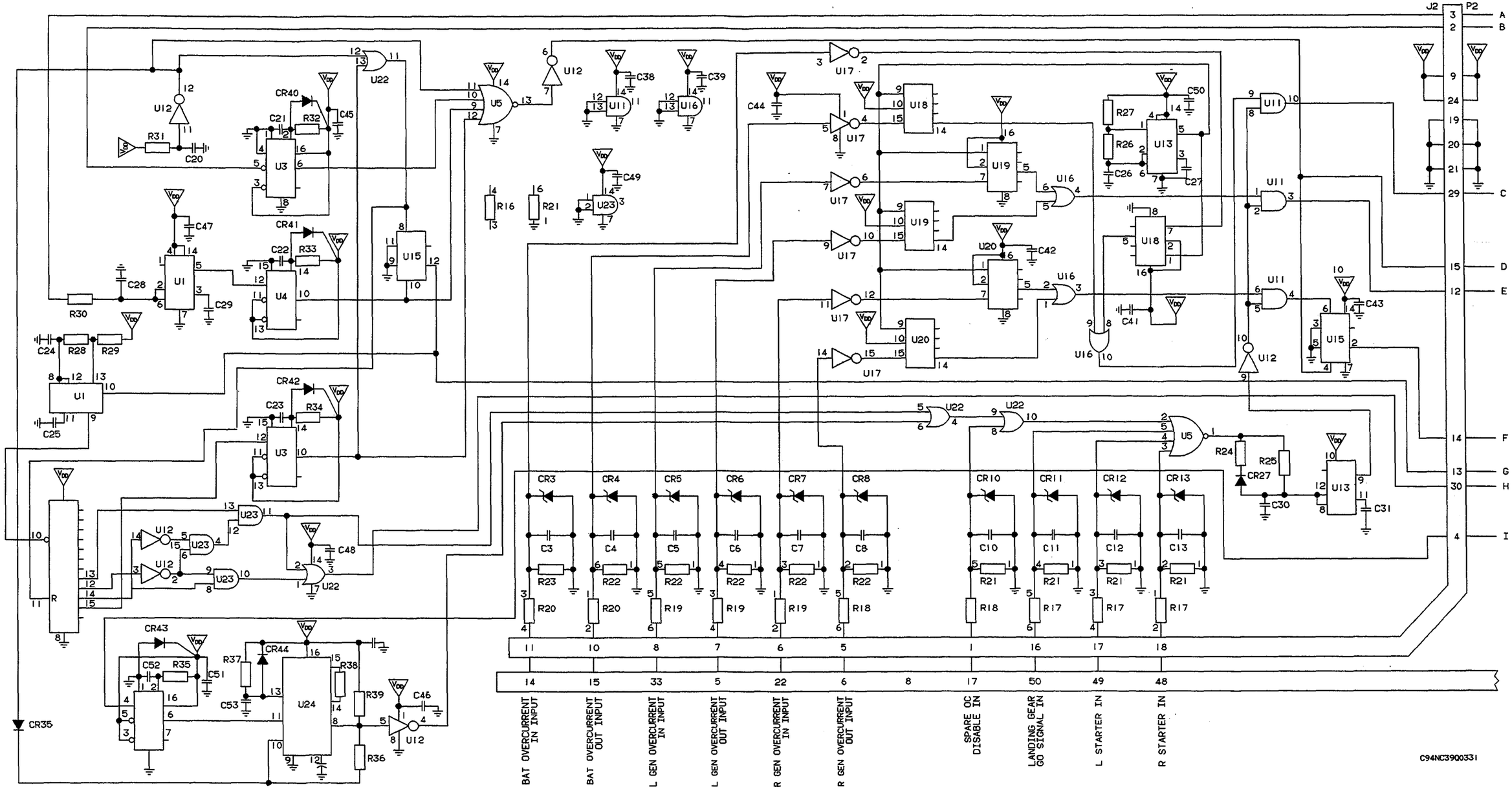
The power distribution control PCB receives 28 vdc from the triple-fed bus. All three power-relay-panel current sensors and bus-tie relays are monitored and controlled by the power distribution control PCB. When a current sensor senses an overcurrent of 325 amperes or more on a bus, the power distribution control PCB will open the appropriate bus-tie relay isolating the overcurrent on the affected bus. Due to the high amount of current required to operate the landing gear and start the engines, signals are sent to the power distribution control PCB, allowing it to disregard overcurrent signals from the current sensors and keep the bus- tie relays closed.

The PCB will close the battery bus-tie relay if the battery switch is in the ON position and no overcurrent is on the center bus. It will also automatically close both generator bus-tie relays if at least one starter/generator is operating with the line contactor relay closed and the generator bus tie switch in the NORM position.

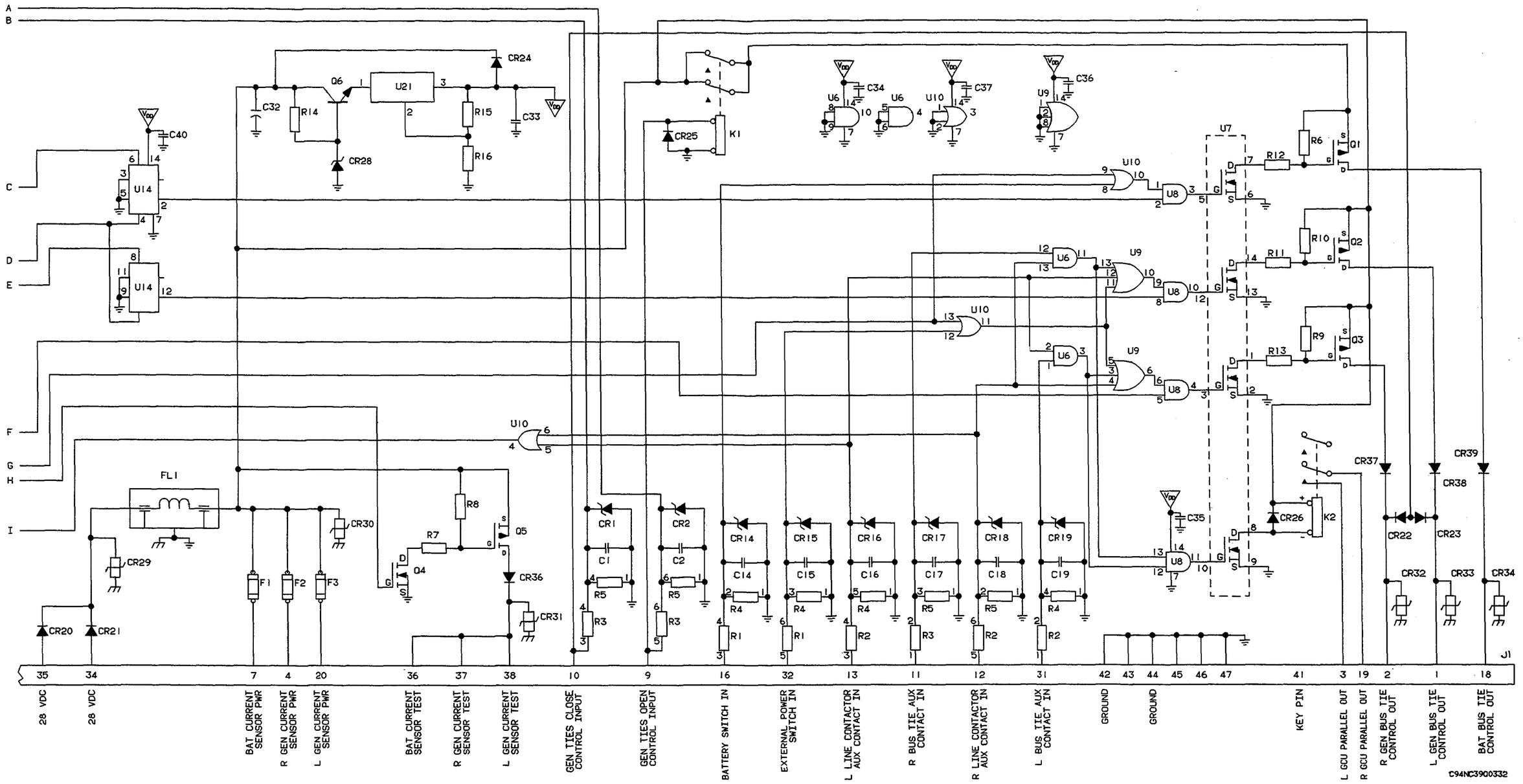
The PCB provides an interconnect for the generator control units (GCU) during starter/generator parallel operation. It uses an internal relay to connect the two GCU paralleling channels when the line contactor and bus-tie relays are closed in both generator power relay panels. This feature ensures that load sharing is possible only when both generators are on-line with their bus-tie relays closed.

POWER DISTRIBUTION CONTROL PCB (A126), TESTING AND TROUBLESHOOTING (Effectivity: All)

Testing and troubleshooting of the power distribution control PCB is not authorized. All repair of this PCB must be performed at the BEECHCRAFT factory.



Power Distribution Control PCB Schematic Diagram, P/N 122-364173-21 (Effectivity: All) (Sheet 1 of 2)
Figure 1



Power Distribution Control PCB Schematic Diagram, P/N 122-364173-21 (Effectivity: All) (Sheet 2 of 2)
Figure 1

WINDSHIELD DEICE & EXTERNAL POWER PCB (A127), P/N 122-364030-5, - DESCRIPTION AND OPERATION (Effectivity: All) (Figure 1)

This chapter describes the Windshield Deice & External Power printed circuit board (PCB) installed in the circuit card box assembly. The PCB reference designator corresponds with the designator used in the BEECHCRAFT Starship 1 Wiring Diagram Manual and the avionics wiring diagrams.

CAUTION

Anytime maintenance is performed on or around printed circuit boards, it is essential that all Electrostatic Discharge (ESD) precautions be strictly observed. Refer to Chapter 20-00-00 for detailed information on the handling of ESD sensitive equipment.

The windshield deice & external power PCB consists of four circuits. Three of the circuits are identical and are used for windshield deice. The remaining circuit is used to monitor external power.

The windshield deice circuits are provided for the pilots windshield deice, the copilot's windshield deice, and the pilot's redundant deice.

Each of these deice circuits receives 28 vdc power and a temperature-sense signal from the windshield. The temperature-sense signal maintains the windshield glass temperature between 88 and 110 degrees. The output from these three circuits is 28 vdc to the main, copilots, and redundant relays.

The external power circuit enables the application of external power. This circuit monitors the applied external power to see that the polarity is not reversed and that the applied voltage is between 25 and 32 volts. When these conditions are met along with the battery switch being on and the external power switch in the EXT PWR position, the external power circuit will output 28 vdc to close the external power relay. This circuit also outputs 28 vdc to the Data Acquisition Unit to enable the EXT PWR CONN status message to be displayed on the EICAS display.

WINDSHIELD DEICE & EXTERNAL POWER PCB (A127) TESTING AND TROUBLESHOOTING (Effectivity: All)

Testing and troubleshooting of this PCB includes verification of board failure and troubleshooting to the circuit.

The resistors shown in the test setup (XR1, XR2, and XR3) are 500 ohm, 10 turn potentiometers.

CAUTION

Anytime maintenance is performed on or around printed circuit boards, it is essential that all Electrostatic Discharge (ESD) precautions be strictly observed. Refer to Chapter 20-00-00 for detailed information on the handling of ESD sensitive equipment.

TEST SETUP (Effectivity: All)

a. Connect the PCB as shown in Figure 1.

b. Set XR1, XR2, and XR3 full counterclockwise.

TESTING AND TROUBLESHOOTING (Effectivity: All)

a. Close S1 and apply 28 vdc power to the PCB. If DS1 illuminates, a fault is indicated in Q1, Q2, U1 or their associated circuitry.

b. Decrease XR1 (CCW) until DS1 illuminates. If DS1 does not illuminate, a fault is indicated in Q1, Q2, U1 or their associated circuitry.

c. Open S1 and S8. Measure the resistance between TP1 and TP2 for 339 ±3 ohms. If resistance is incorrect, a fault is indicated in Q1, Q2, U1 or their associated circuitry.

d. Close S1 and S8.

e. Increase the XR1 (CW) until DS1 extinguishes. If DS1 does not extinguish, a fault is indicated in Q1, Q2, U1 or their associated circuitry.

f. Open S1 and S8. Measure the resistance between TP1 and TP2 for 346 ±4 ohms. If resistance is incorrect, a fault is indicated in Q1, Q2, U1 or their associated circuitry.

g. Close S2 and apply 28 vdc power to the PCB. If DS2 illuminates, a fault is indicated in Q3, Q4, U2 or their associated circuitry.

h. Decrease XR2 (CCW) until DS2 illuminates. If DS2 does not illuminate, a fault is indicated in Q3, Q4, U2 or their associated circuitry.

i. Open S2 and S9. Measure the resistance between TP3 and TP4 for 339 ±3 ohms. If resistance is incorrect, a fault is indicated in Q3, Q4, U2 or their associated circuitry.

j. Close S2 and S9.

k. Increase the XR2 (CW) until DS2 extinguishes. If DS2 does not extinguish, a fault is indicated in Q3, Q4, U2 or their associated circuitry.

l. Open S2 and S9. Measure the resistance between TP3 and TP4 for 346 ±4 ohms. If resistance is incorrect, a fault is indicated in Q3, Q4, U2 or their associated circuitry.

m. Close S3 and apply 28 vdc power to the PCB. If DS3 illuminates, a fault is indicated in Q5, Q6, U3 or their associated circuitry.

n. Decrease XR3 (CCW) until DS3 illuminates. If DS3 does not illuminate, a fault is indicated in Q5, Q6, U3 or their associated circuitry.

o. Open S3 and S10. Measure the resistance between TP5 and TP6 for 339 ±3 ohms. If resistance is incorrect, a fault is indicated in Q5, Q6, U3 or their associated circuitry.

p. Close S3 and S10.

q. Increase the XR3 (CW) until DS3 extinguishes. If DS3 does not extinguish, a fault is indicated in Q5, Q6, U3 or their associated circuitry.

r. Open S3 and S10. Measure the resistance between TP5 and TP6 for 346 ±4 ohms. If resistance is incorrect, a fault is indicated in Q5, Q6, U3 or their associated circuitry.

s. Close S4. Neither DS4 nor DS5 illuminate. If DS4 illuminates, a fault is indicated in Q8 or its associated circuitry. If DS5 illuminates, a fault is indicated in Q10 or its associated circuitry.

t. Close S5. DS4 illuminates. If DS4 does not illuminate, a fault is indicated in Q7, Q8, or their associated circuitry.

u. Open S5. DS4 extinguishes. If DS4 does not extinguish, a fault is indicated in Q7, Q8, or their associated circuitry.

v. Press S6. DS4 illuminates. If DS4 does not illuminate, a fault is indicated in Q7, Q8, or their associated circuitry.

w. Release S6.

x. Adjust PS1 for an output of +28 vdc.

y. Close S4. DS4 and DS5 do not illuminate. If DS4 illuminates, a fault is indicated in Q7, Q8, or their associated circuitry. If DS5 illuminates, a fault is indicated in U4, U5, Q9, Q10, or their associated circuitry.

z. Adjust PS2 for an output of +28 vdc.

aa. Close S7. DS5 illuminates. If DS5 does not illuminate, a fault is indicated in U4, U5, Q9, Q10, or their associated circuitry.

ab. Increase the output of PS2 to +32 vdc. DS5 extinguishes. If DS5 does not extinguish, a fault is indicated in U4, U5, Q9, Q10, or their associated circuitry.

ac. Adjust PS2 for an output of +28vdc.

ad. This completes testing and troubleshooting. Secure power and disconnect PCB.

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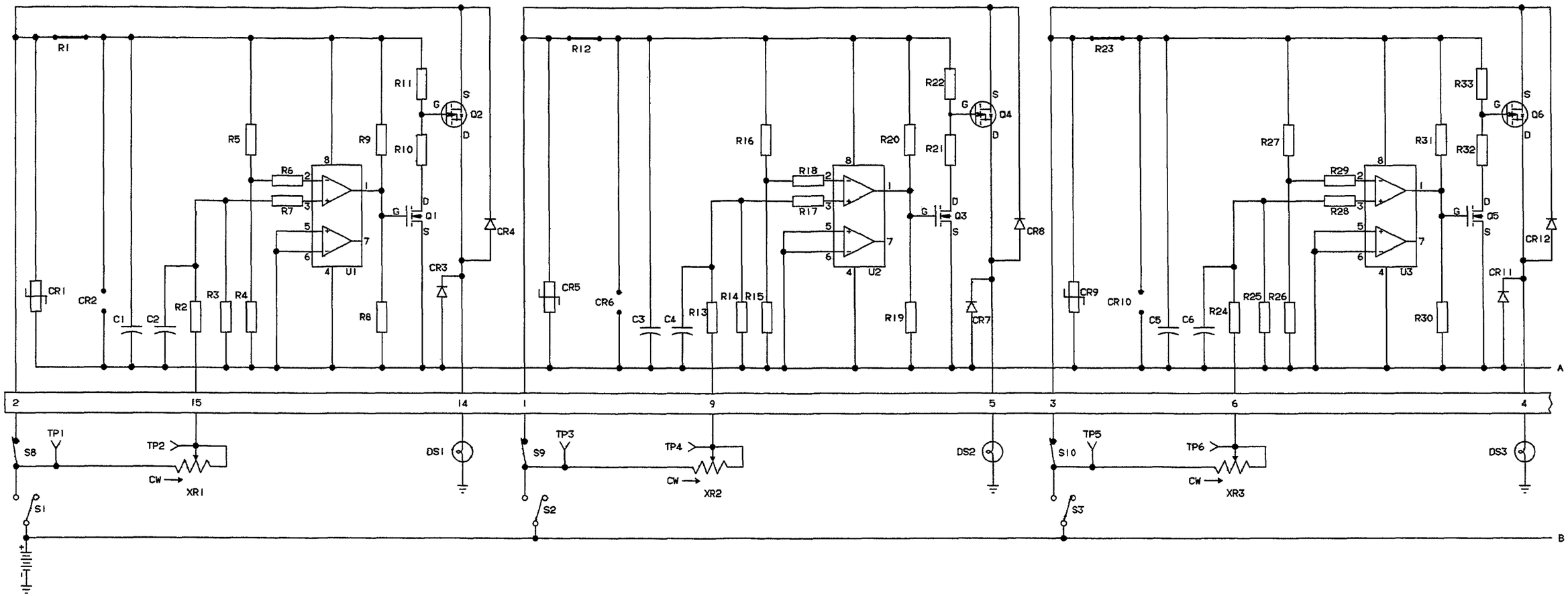
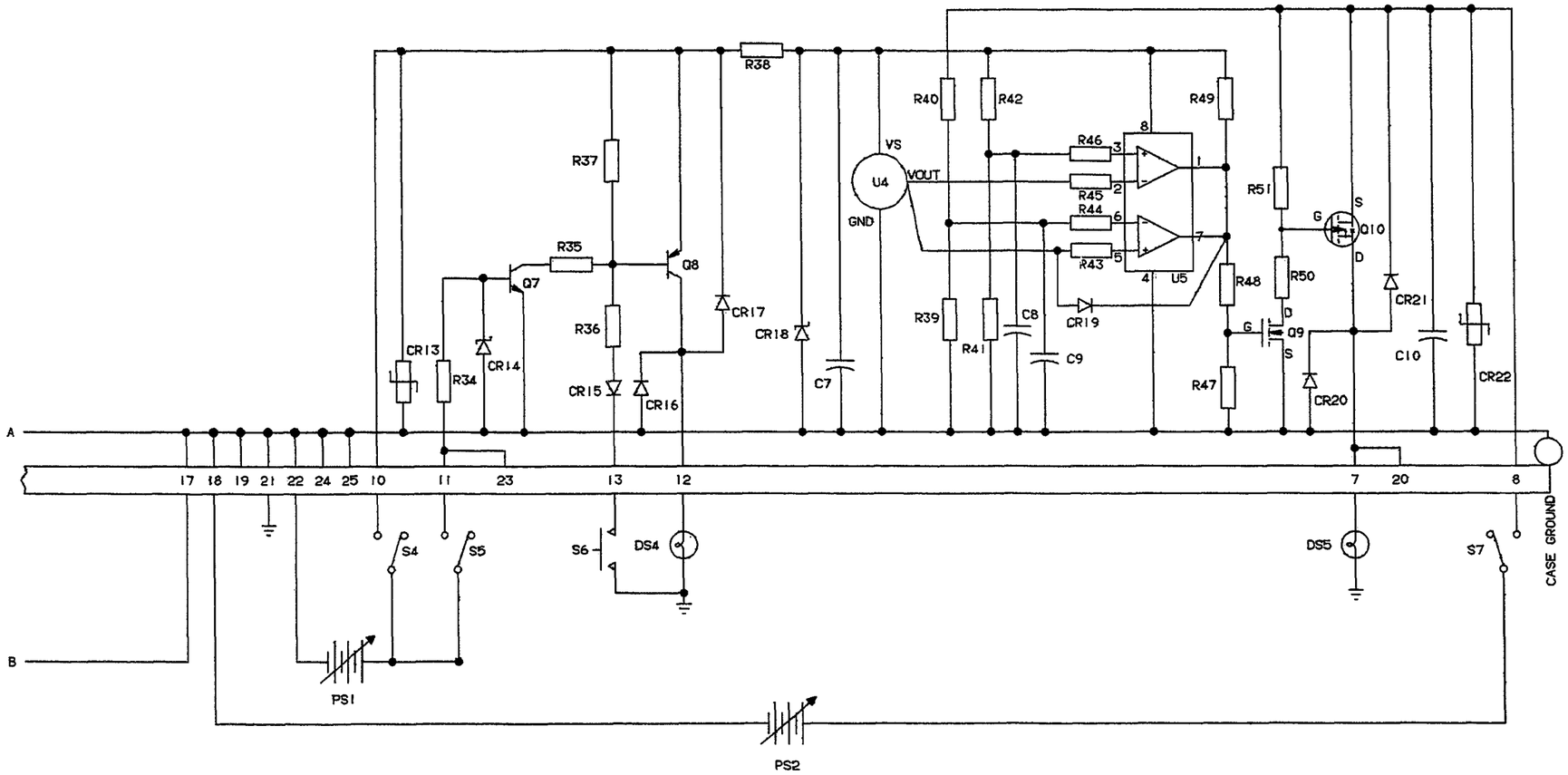


D94NC3900333

**Windshield Deice & External Power PCB
Test Setup and Schematic Diagram,
P/N 122-364030-5 (Effectivity: All)
(Sheet 1 of 2)
Figure 1**



C94NC3900334

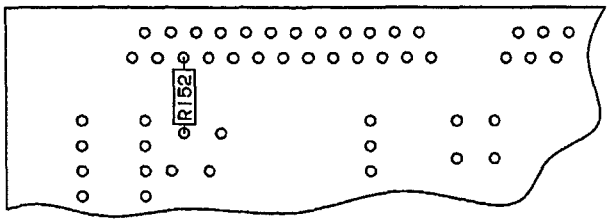
**Windshield Deice & External Power PCB
Test Setup and Schematic Diagram,
P/N 122-364030-5 (Effectivity: All)
(Sheet 2 of 2)
Figure 1**

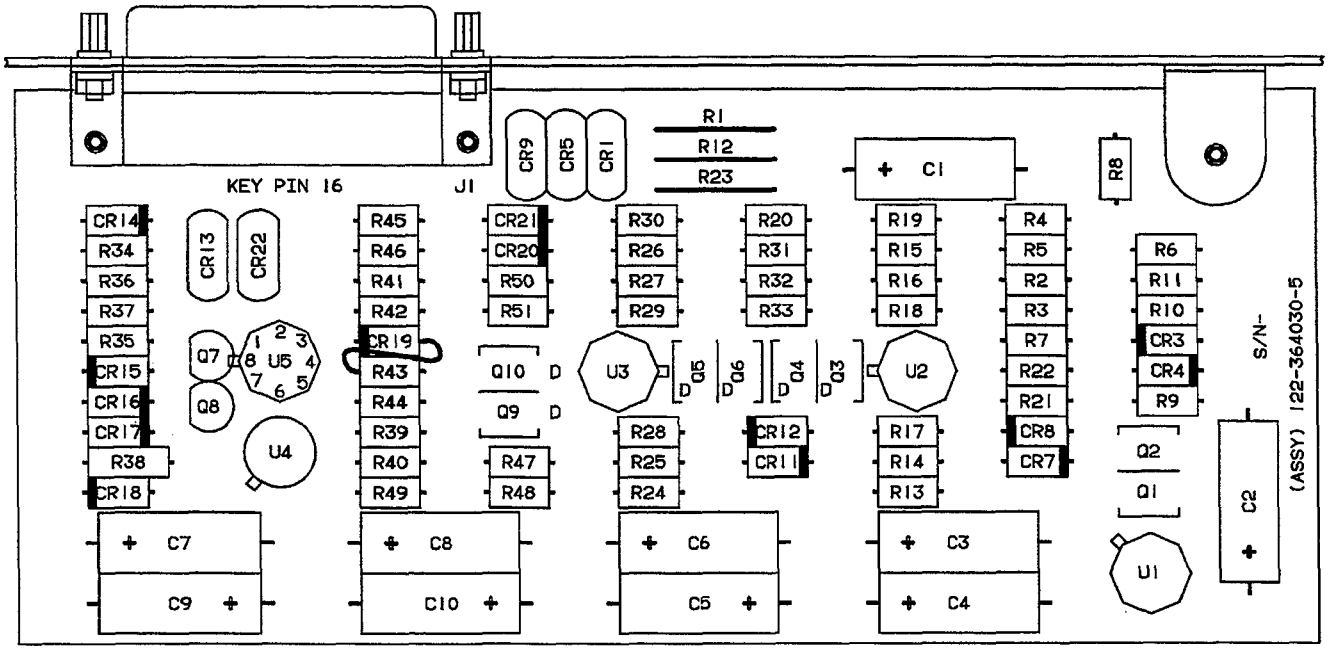
WINDSHIELD DEICE & EXTERNAL POWER PCB PARTS LIST (Effectivity: All)

COMPONENT	PART NO.
R1	22 AWG JUMPER
R2	RN55C2151F
R3	RN55C2491F
R4-R8	RN55C1002F
R9-R10	RN55C3002F or RNC55H3002FS
R11	RN55C1002F
R12	22 AWG JUMPER
R13	RN55C2151F
R14	RN55C2491F
R15-R19	RN55C1002F
R20-R21	RN55C3002F or RNC55H3002FS
R22	RN55C1002F
R23	22 AWG JUMPER
R24	RN55C2151F
R25	RN55C2491F
R26-R30	RN55C1002F
R31-R32	RN55C3002F or RNC55H3002FS
R33	RN55C1002F
R34	RN55C2212F
R35-R36	RN55C1002F
R37	RN55C2212F
R38	RN60C1800F
R39	RN55C1002F
R40	RN55C2212F
R41-R47	RN55C1002F
R48	RN55C2212F
R49	RN55C1002F
R50	RN55C3002F or RNC55H3002FS
R51	RN55C1002F

WINDSHIELD DEICE & EXTERNAL POWER PCB PARTS LIST (Effectivity: All) *(Continued)*

COMPONENT	PART NO.
R152	RN55C1002F
C1-C10	CSR13G106KR or M39003/01-2854
CR1	V47ZA1
CR2	NOT USED
CR3-CR4	1N4005
CR5	V47ZA1
CR6	NOT USED
CR7-CR8	1N4005
CR9	V47ZA1
CR10	NOT USED
CR11-CR12	1N4005
CR13	V47ZA1
CR14	1N5938A
CR15	1N4007
CR16-CR17	1N4005
CR18	1N5935A
CR19-CR21	1N4005
CR22	V47ZA1
Q1	IRFD113
Q2	IRFD9120
Q3	IRFD113
Q4	IRFD9120
Q5	IRFD113
Q6	IRFD9120
Q7	2N5822
Q8	2N5823
Q9	IRFD113
Q10	IRFD9120
U1-U3	LM193AH
U4	AD581SH
U5	LM193AH





C94NC39Q0335

Windshield Deice & External Power PCB
Component Location (Effectivity: All)
Figure 2

SURFACE DEICE SYSTEM PCB (A215), P/N 122-364208-19, - DESCRIPTION AND OPERATION (Effectivity: All) (Figure 1)

This chapter describes the Surface Deice System Printed Circuit Board (PCB) installed in the circuit card box assembly. The PCB reference designator corresponds with the reference designator used in the BEECHCRAFT Starship 1 Wiring Diagram Manual and the Avionics Wiring Diagrams.

CAUTION

Anytime maintenance is performed on or around printed circuit boards, it is essential that all Electrostatic Discharge (ESD) precautions be strictly observed. Refer to Chapter 20-00-00 for detailed information on the handling of ESD sensitive equipment.

The surface deice system PCB assembly consists of four PCB's. The PCB assembly provides main and standby deice system control for the forward and main wings. Main and standby are identical circuits. In the event that the main circuit fails the standby circuit will take control. The operational sequence of the deice boots are:

Left/right forward wing,

left/right main wing outboard,

left/right main wing inboard.

The PCB assembly has three modes of operation, test (main/standby), manual, and automatic.

The test mode consists of separate tests for the main and standby systems. When the main/standby test switch is activated the deice boots are cycled. During the cycling sequence the boot pressure, inflation time, and deflation time are monitored. If a failure is detected, the main/standby deice fail indicator is illuminated.

In the manual mode, a single deice cycle is performed.

In the automatic mode, the deice sequence is initiated by the detection of current in the deice heater circuit. The deice sequence is continued until current in the deice heater circuit decreases which indicates that the icing condition no longer exists.

SURFACE DEICE SYSTEM PCB (A215) TESTING AND TROUBLESHOOTING (Effectivity: All)

Testing and troubleshooting of the surface deice system PCB is not authorized. All repair of this PCB must be performed at the BEECHCRAFT factory.

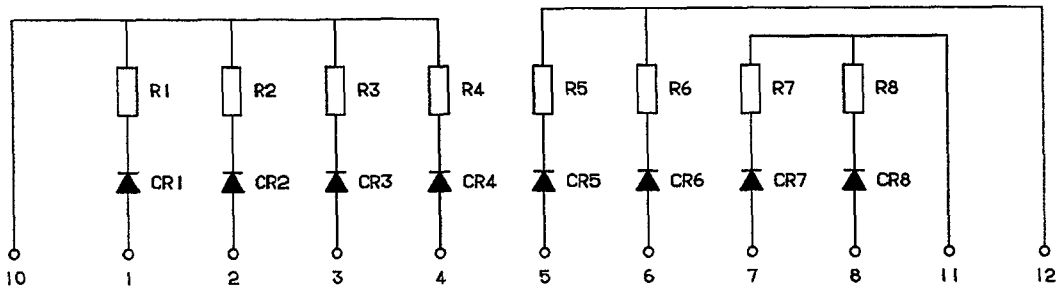
Due to the complexity of the surface deice system the schematic has been omitted.

STANDBY TRIM PCB, P/N 122-340169-1, - DESCRIPTION AND OPERATION (Effectivity: All) (Figure 1)

This chapter describes the Standby Trim Printed Circuit Board (PCB). The standby trim PCB reference designator corresponds with the reference designator used in the BEECHCRAFT Starship 1 Wiring Diagram Manual and the Avionics Wiring Diagrams.

CAUTION

Anytime maintenance is performed on or around printed circuit boards, it is essential that all Electrostatic Discharge (ESD) precautions be strictly observed. Refer to Chapter 20-00-00 for detailed information on the handling of ESD sensitive equipment.



C94NC39Q0336

Standby Trim PCB Schematic Diagram, P/N 122-340169-1 (Effectivity: All) Figure 1

STANDBY TRIM PCB, TESTING AND TROUBLESHOOTING (Effectivity: All)

Testing and troubleshooting of the standby trim PCB includes verification of board failure and troubleshooting to the circuit level. In some instances, repair of the printed circuit board may not be cost effective and return of the printed circuit board to BEECHCRAFT may be recommended. In other instances, detailed troubleshooting may be presented.

CAUTION

Anytime maintenance is performed on or around printed circuit boards, it is essential that all Electrostatic Discharge (ESD) precautions be strictly observed. Refer to Chapter 20-00-00 for detailed information on the handling of ESD sensitive equipment.

TEST SETUP (Effectivity: All)

No special setup is required.

TESTING AND TROUBLESHOOTING (Effectivity: All)

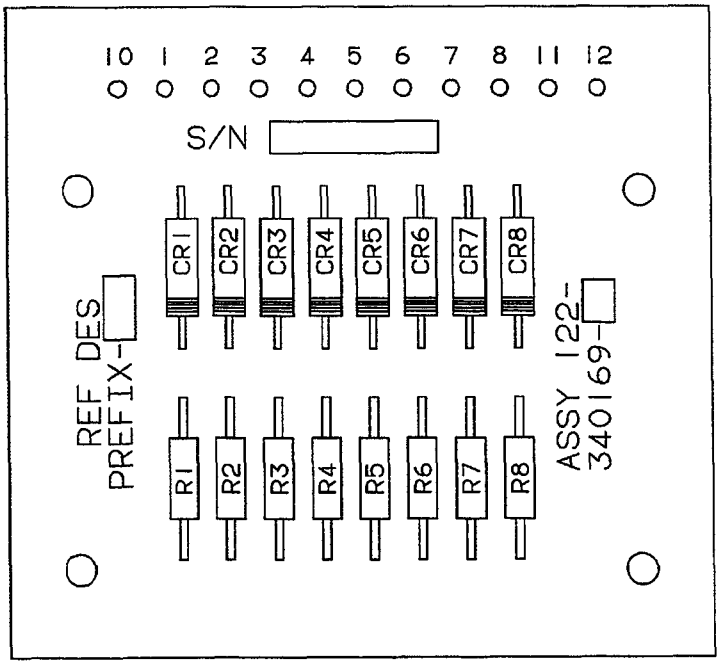
No special troubleshooting is required for the Standby Trim PCB.

Each resistor should be tested for a value of 10K ohms plus or minus the tolerance indicated on the resistor.

Each diode should be tested for shorts and opens using standard troubleshooting procedures.

STANDBY TRIM PCB PARTS LIST (Effectivity: All)

COMPONENT	PART NO.
R1-R8	RCR07G103JS
CR1-CR8	1N4007



Standby Trim PCB Component Location
(Effectivity: All)
Figure 2

ELECTRIC PITCH TRIM PCB, P/N 122-340179-5, - DESCRIPTION AND OPERATION (Effectivity: All) (Figure 1)

This chapter describes the Electric Pitch Trim Printed Circuit Board (PCB) installed in the circuit card box assembly. The logic relay PCB reference designator corresponds with the reference designator used in the BEECHCRAFT Starship 1 Wiring Diagram Manual and the Avionics Wiring Diagrams.

CAUTION

Anytime maintenance is performed on or around printed circuit boards, it is essential that all Electrostatic Discharge (ESD) precautions be strictly observed. Refer to Chapter 20-00-00 for detailed information on the handling of ESD sensitive equipment.

The electric pitch trim PCB controls the application of power to the pitch trim actuators and provides several annunciator outputs.

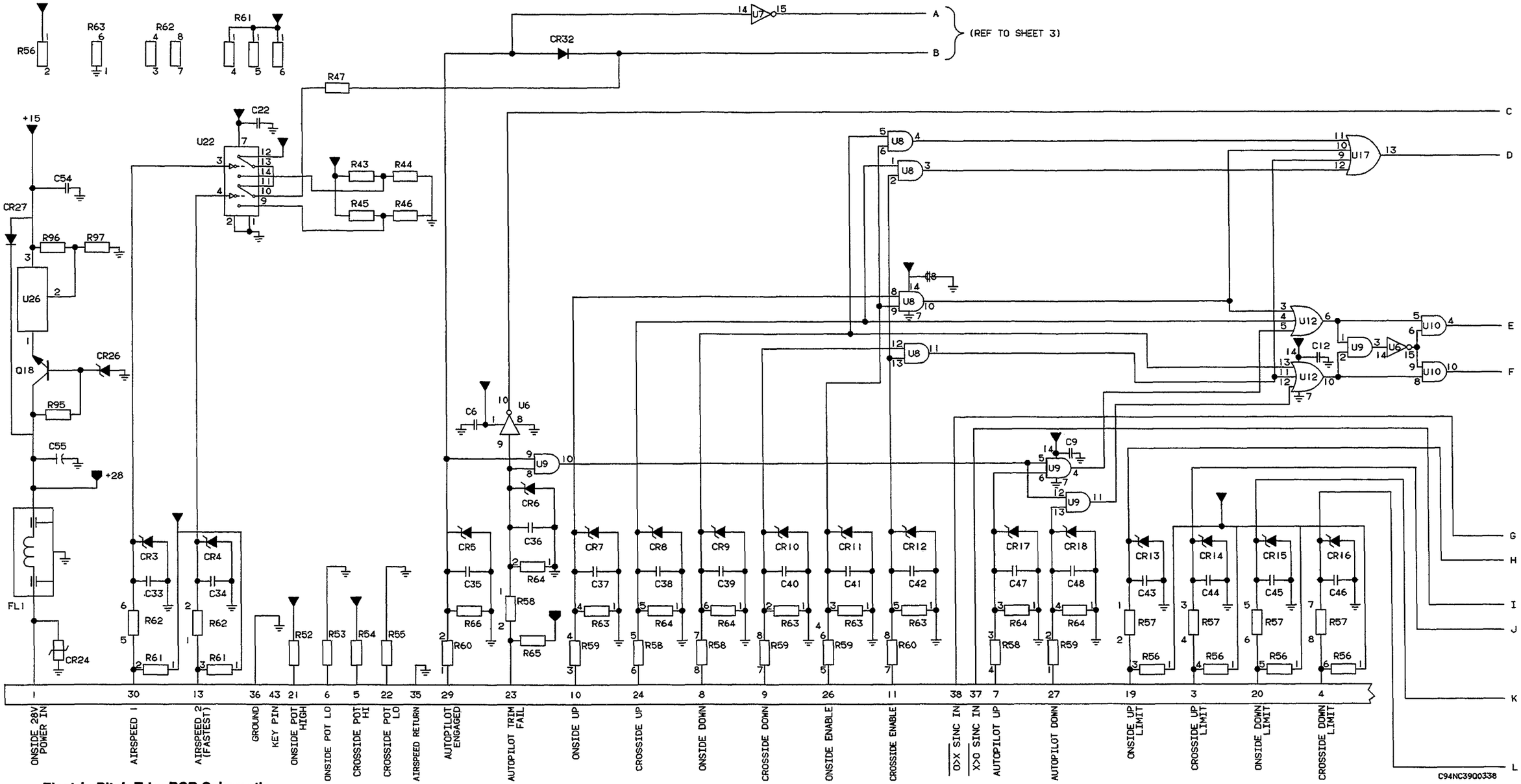
Two PCB's are required to control the trim axis. The logic interconnects between the two PCB's monitor and control the I/O's in a manner which insures synchronized trim operation.

Inputs to the PCB are from:

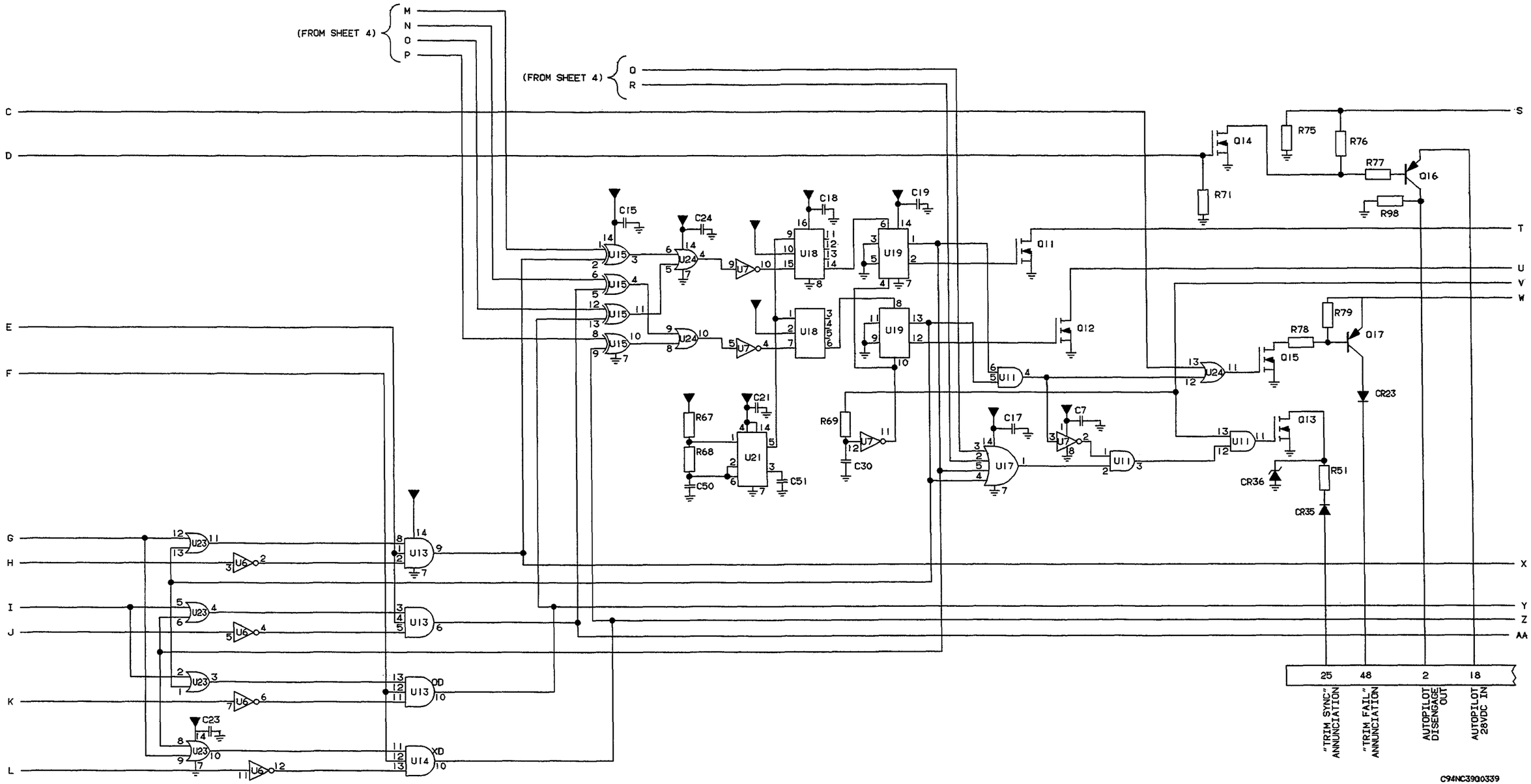
Autopilot,
air data computer,
trim actuator position potentiometers,
trim limit switches,
thumbwheel trim disconnect,
trim up/down thumbwheel switch.

ELECTRIC PITCH TRIM PCB TESTING AND TROUBLESHOOTING (Effectivity: All)

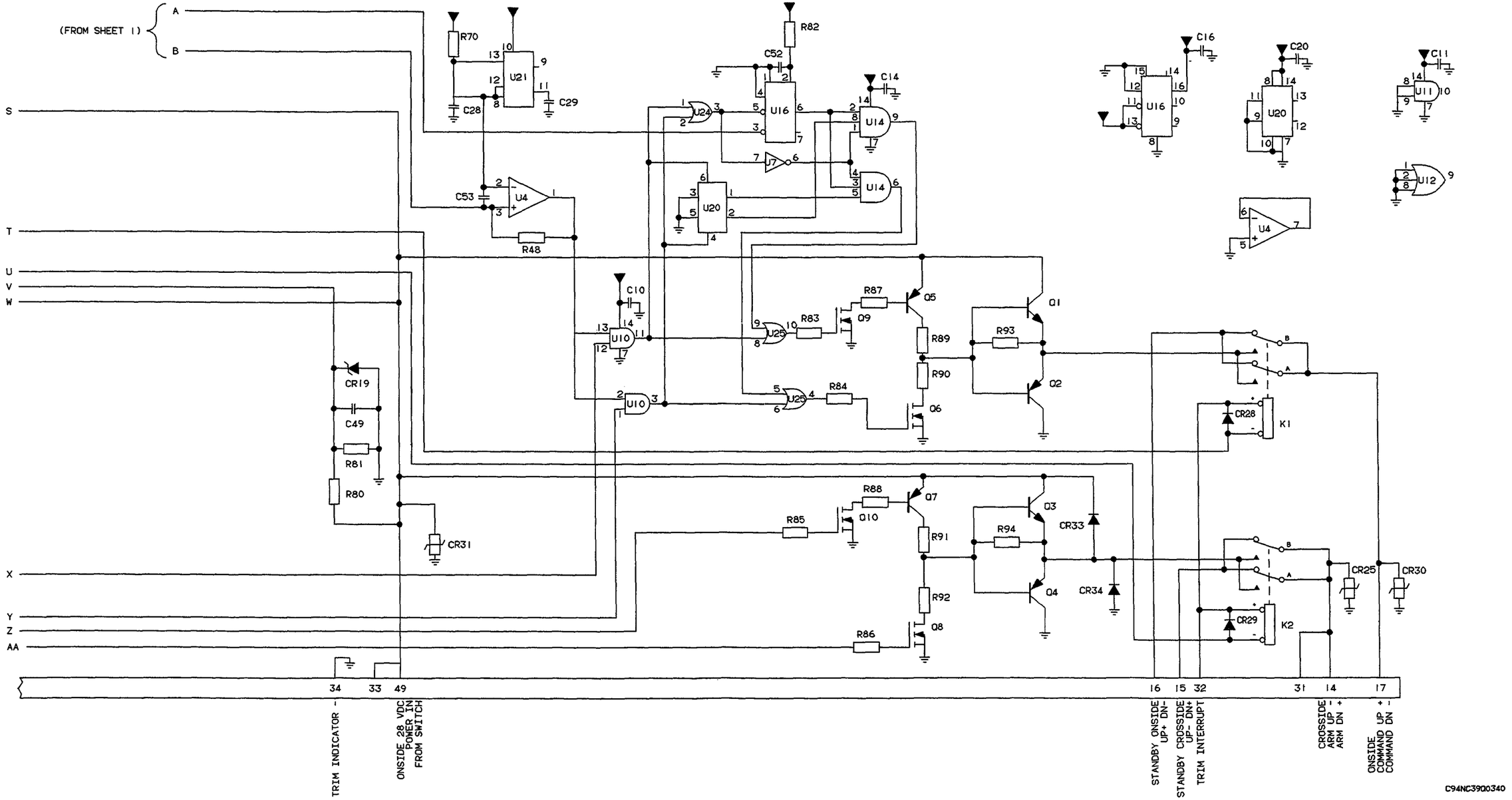
Testing and troubleshooting of the electric pitch trim PCB is not authorized. All repair of this PCB must be performed at the BEECHCRAFT factory.



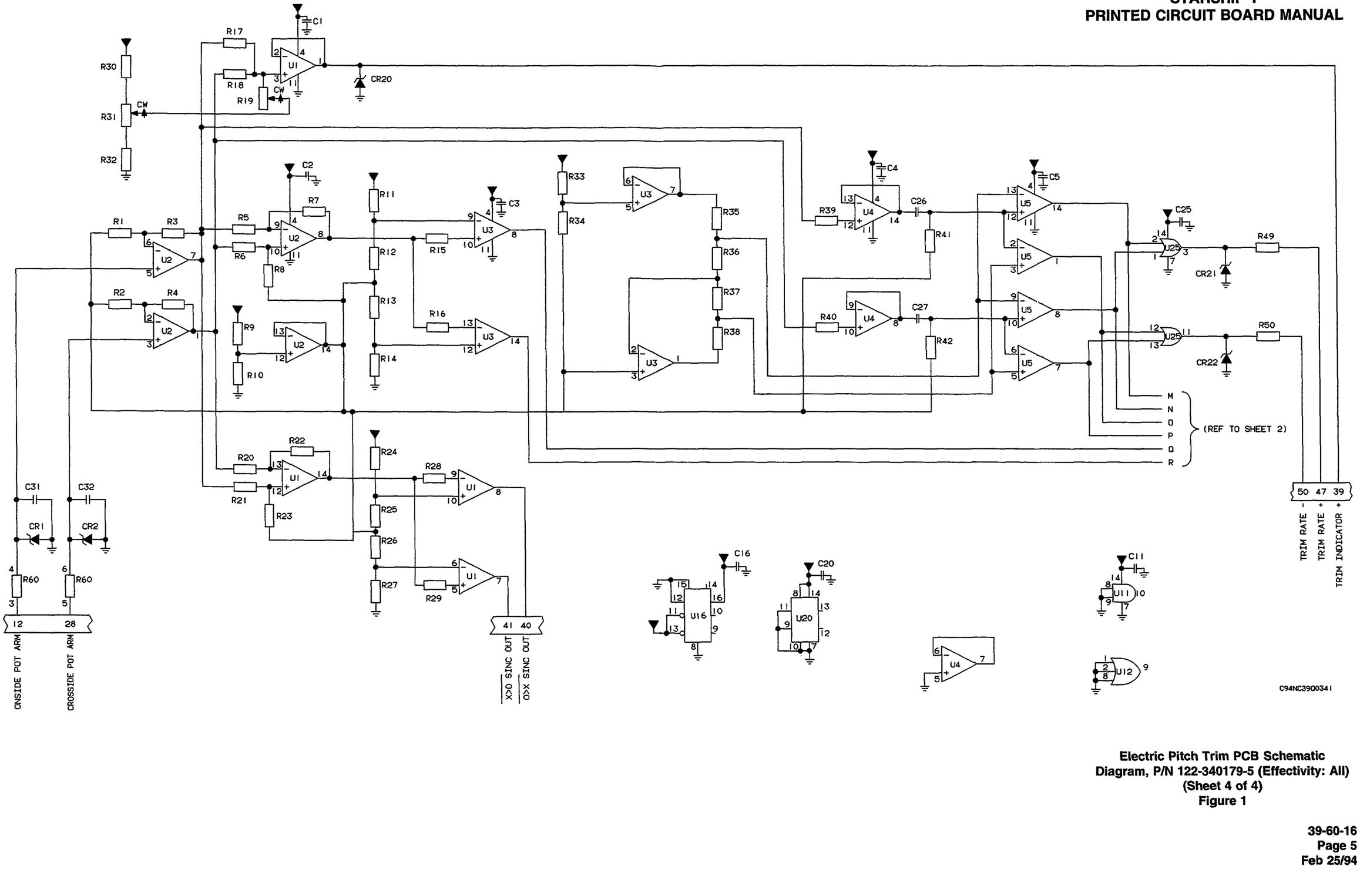
Electric Pitch Trim PCB Schematic Diagram, P/N 122-340179-5 (Effectivity: All) (Sheet 1 of 4) Figure 1



Electric Pitch Trim PCB Schematic Diagram, P/N 122-340179-5 (Effectivity: All) (Sheet 2 of 4)
Figure 1



Electric Pitch Trim PCB Schematic Diagram, P/N 122-340179-5 (Effectivity: All) (Sheet 3 of 4)
Figure 1



Electric Pitch Trim PCB Schematic Diagram, P/N 122-340179-5 (Effectivity: All) (Sheet 4 of 4)
Figure 1

ELECTRIC TRIM PCB, P/N 122-360188-7, -9, - DESCRIPTION AND OPERATION (Effectivity: All) (Figure 1)

This chapter describes the Electric Trim Printed Circuit Board (PCB) installed in the circuit card box assembly. The electric trim PCB reference designator corresponds with the reference designator used in the BEECHCRAFT Starship 1 Wiring Diagram Manual and the Avionics Wiring Diagrams.

CAUTION

Anytime maintenance is performed on or around printed circuit boards, it is essential that all Electrostatic Discharge (ESD) precautions be strictly observed. Refer to Chapter 20-00-00 for detailed information on the handling of ESD sensitive equipment.

The electric trim PCB controls application of power to the roll or yaw trim actuators and provides annunciator output.

Two PCB's are required to control each trim axis. Logic interconnects between the two PCB's monitor and control the I/O's to insure synchronized trim operation.

Inputs to the PCB are from:

Autopilot,

trim actuator position potentiometers,

trim actuator limit switches,

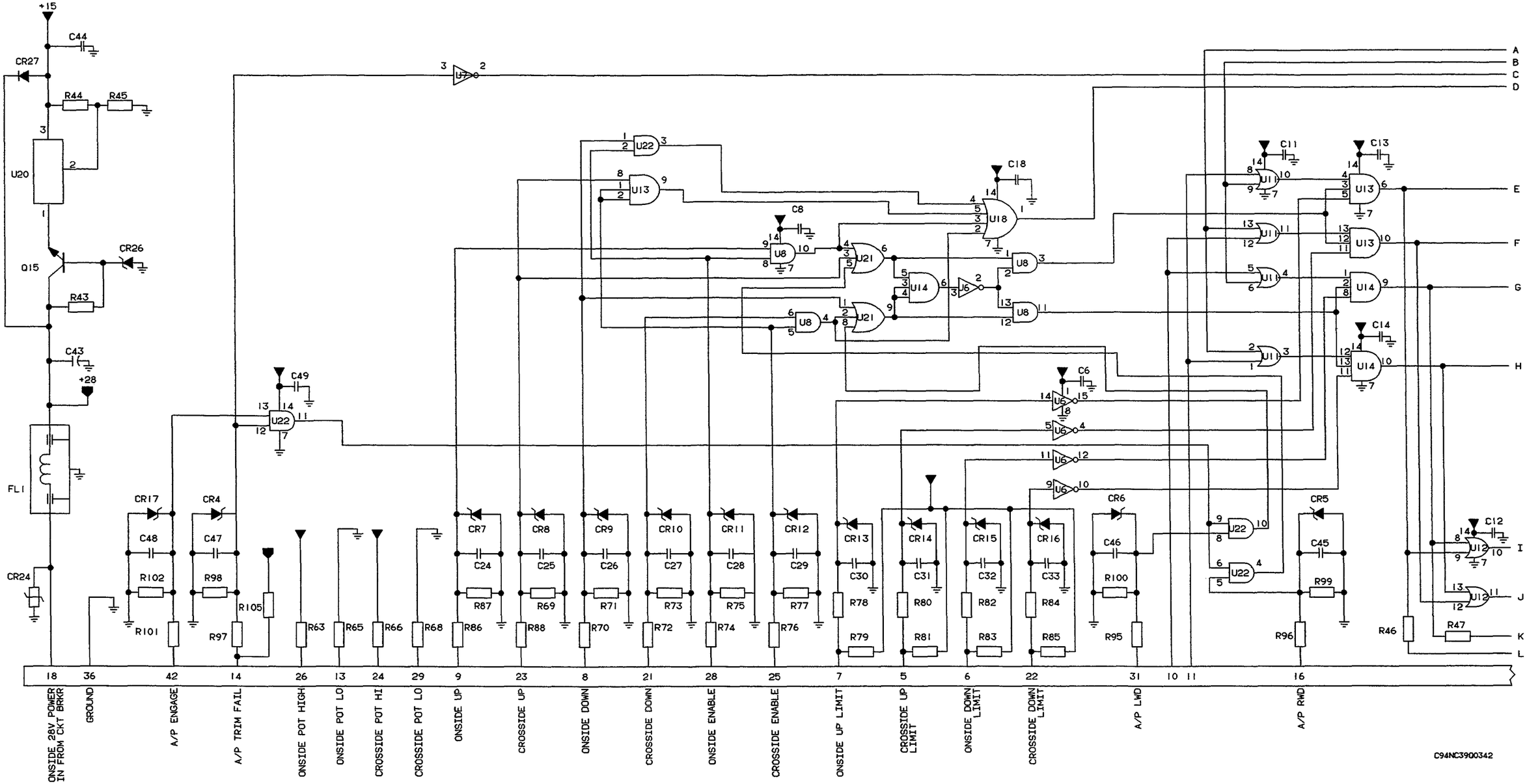
thumbwheel trim disconnect,

roll or yaw thumbwheel switch,

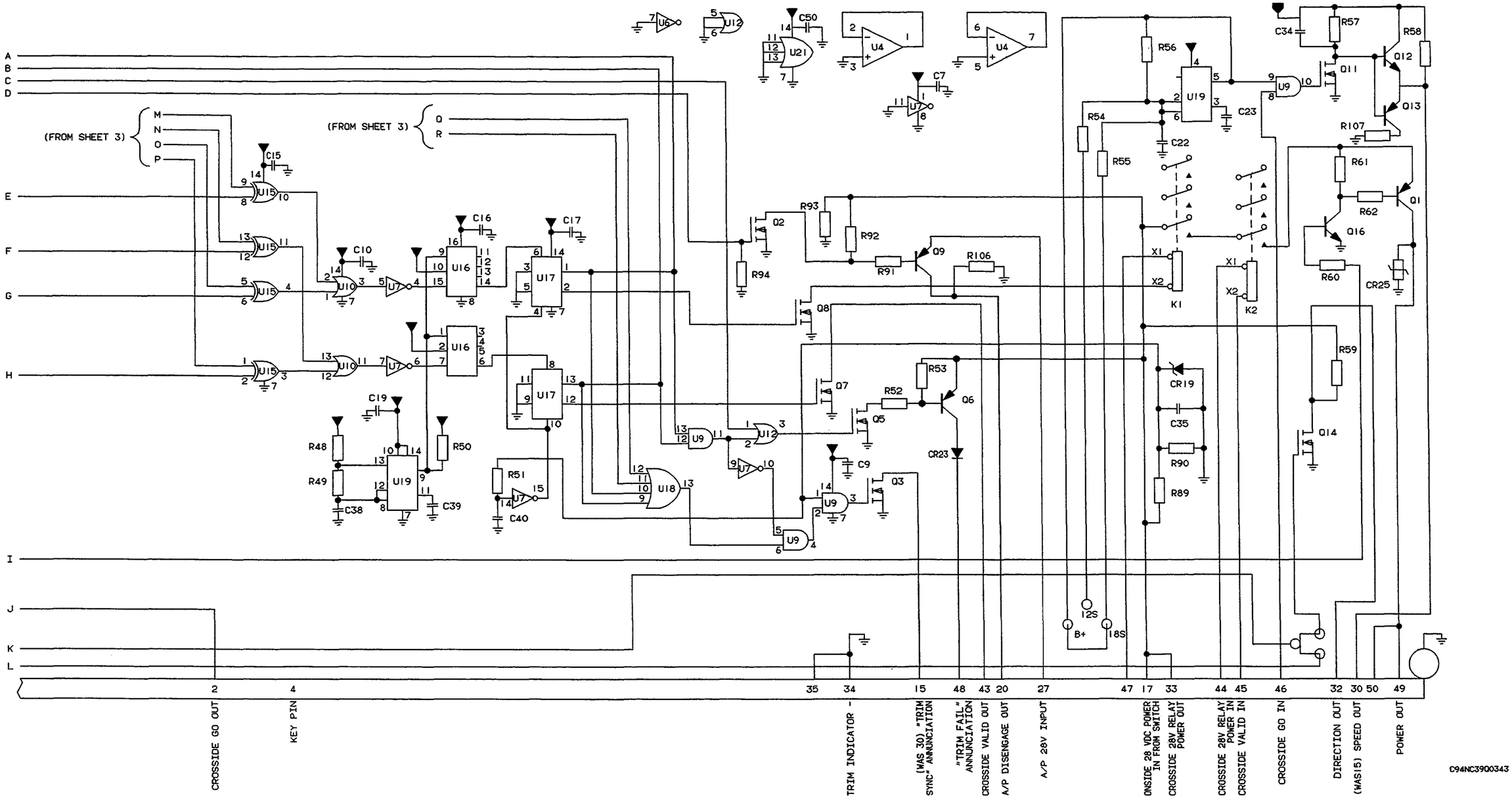
logic inputs for the crosside trim PCB.

ELECTRIC TRIM PCB TESTING AND TROUBLESHOOTING (Effectivity: All)

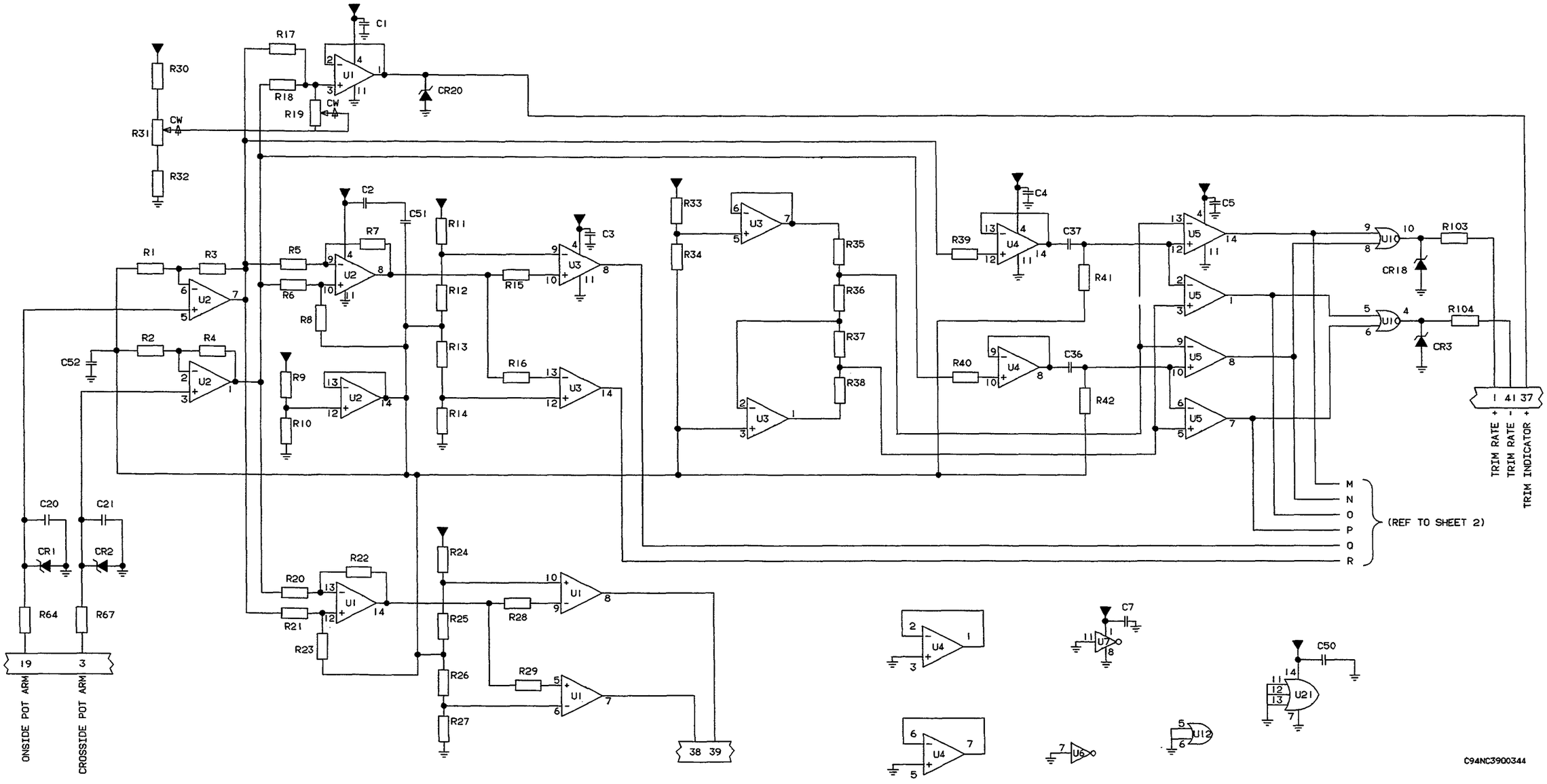
Testing and troubleshooting of the electric trim PCB is not authorized. All repair of this PCB must be performed at the BEECHCRAFT factory.



**Electric Trim PCB Schematic Diagram,
P/N 122-360188-7, -9, (Effectivity: All)
(Sheet 1 of 3)
Figure 1**



**Electric Trim PCB Schematic Diagram,
P/N 122-360188-7, -9, (Effectivity: All)
(Sheet 2 of 3)
Figure 2**



Electric Trim PCB Schematic Diagram,
P/N 122-360188-7, -9, (Effectivity: All)
(Sheet 3 of 3)
Figure 3