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TECHNICAL MANUAL

OPERATION AND MAINTENANCE

WITH ASSEMBLY PARTS LIST

DISPLAY-MONITORING GROUP OD-88(V)/G

(AUTOVON CENTRALIZED ALARM SYSTEM)

Atlantic Research Corporation

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FOREWORD

PURPOSE OF MANUAL.

This technical manual contains the procedures, diagrams, technical data, and descriptive material required to aid responsible personnel in the operation and maintenance of Display-Monitoring Group OD-88(V)/G (AUTOVON Centralized Alarm System). The AUTOVON Centralized Alarm .System (ACAS) is a display and monitoring facility used to monitor the status of overseas AUTOVON Switches in the Defense Communication System. It is a divided facility consisting of a Master Station operating in conjunction with several associated Remote Stations. The information presented in this manual is to be used by operation and maintenance personnel assigned to all stations in performing both internal and inter-station maintenance functions. This information is intended to familiarize these personnel with the equipment and to facilitate rapid assessment of trouble conditions and rectification by simple replacement of a faulty module or printed circuit board.

SCOPE OF MANUAL.

The manual is divided into six chapters. A brief description of the contents of each chapter is as follows:

a. Chapter 1, General Description, contains general information to aid operation and maintenance personnel in understanding the ACAS and its relationship to the AUTOVON. This information includes a system description, a general description of the ACAS equipment, and pertinent technical characteristics.

b. Chapter 2, Operation, describes the features and indications provided by the ACAS in each of its operating modes, and presents the various available strapping options.

c. Chapter 3, Theory of Operation, presents general and detailed functional descriptions of the ACAS on system, station, subassembly, and module/printed circuit board levels.

d. Chapter 4, Maintenance, provides troubleshooting, testing, and adjustment data and other maintenance aids necessary for corrective maintenance of the ACAS to the module/printed circuit board level.

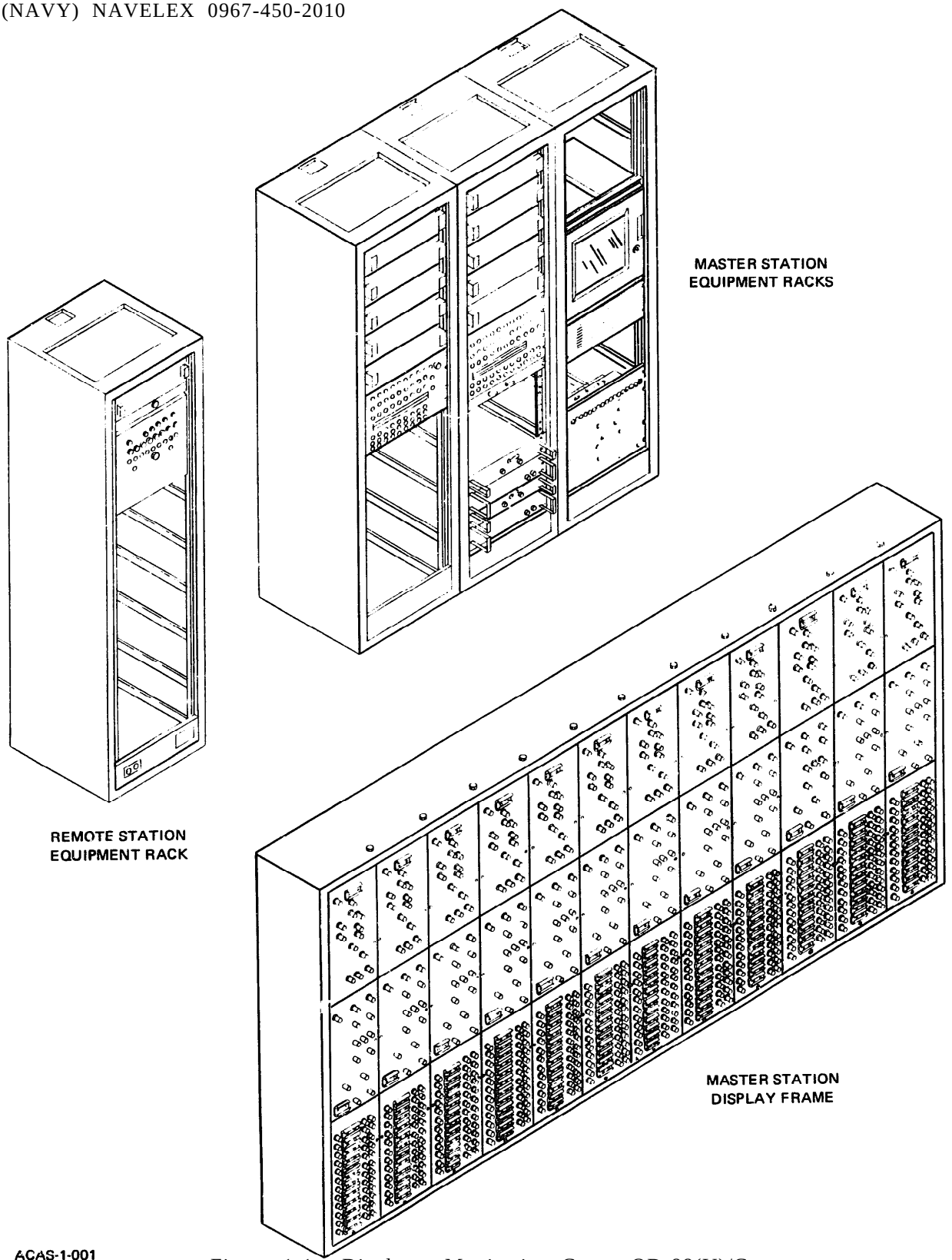
e. Chapter 5, Assembly Parts List, provides illustrated breakdowns and identification of the replaceable elements comprising the ACAS.

f. Chapter 6, Circuit Diagrams, contains the functional block, schematic, and cabling diagrams and wire lists necessary to support ACAS personnel in the performance of their maintenance tasks.

RELATED PUBLICATIONS.

The following technical manual is used in conjunction with this operation and maintenance manual.

Technical Manual	Publication Number
Preventive Maintenance Work Cards, Display-Monitoring Group OD-88(V)/G (AUTOVON Centralized Alarm System)	(USAF) T.O. 31W2-2G-216WC-1 (ARMY) TM 11-5805-636-14-2 (NAVY) NAVELEX 0967-450-2020



ACAS-1-001

Figure 1-1. Display - Monitoring Group OD-88(V)/G

CHAPTER 1

GENERAL DESCRIPTION

1-1. INTRODUCTION.

1-2. This chapter presents a general description of Display-Monitoring Group OD-88(V)/G to aid operation and maintenance personnel in understanding the purpose and use of this equipment as a display and monitoring facility in the Defense Communication System (DCS). Figure 1-1 shows the various equipment comprising Display-Monitoring Group OD-88(V)/G. The Display-Monitoring Group is an integral part of the overseas Automatic Voice Network (AUTOVON) and serves as the AUTOVON Centralized Alarm System (ACAS).

1-3. ACAS MISSION.

1-4. The ACAS is a communications network management and control facility in the overseas AUTOVON. Network management and control consists of the rapid modification of the normal operating characteristics of AUTOVON, as network conditions change, to maximize service by making the best use of available equipment and facilities. To aid in achieving these ends, the ACAS provides near-real-time equipment status indications for remote AUTOVON Switches through the use of status display panels and recorders located at the network management centers for overseas AUTOVON. These status indications provide network control personnel with up-to-date information on traffic conditions and equipment availability throughout the network. By analyzing this status information, network control personnel are able to determine the most effective course of action to be taken when traffic overload, equipment out-of-service, or other abnormal conditions exist anywhere in the network. All status indications are constantly updated by the ACAS as network conditions change, and may be permanently recorded at the discretion of the responsible personnel.

1-5. The responsibility for network management and control in the overseas AUTOVON is delegated to the Defense Communications Agency (DCA) areas in which the AUTOVON Switches are located. Management and control functions are exercised by personnel and facilities based at the Area Communications Operations Center (ACOC) for the cognizant DCA area. In the overseas AUTOVON, network control is exercised from the ACOCs for DCA-Europe and DCA-Pacific located at Stuttgart, West Germany and Kunia, Hawaii, respec - tively. Each ACOC monitors the AUTOVON Switches deployed within its particular theater of operation using the status information provided by the ACAS.

1-6. Figure 1-2 shows the relationship of the ACAS to a typical AUTOVON Switch and the ACOC which utilizes the AUTOVON Switch status information. The ACAS is a divided facility consisting of several Remote Stations operating into a Master Station and associated display and recording equipment. Each Remote Station is located, with the AUTOVON Switch, at an AUTOVON Communications Center site. The Master Station and display and' recording equipment are located at the ACOC.

1-7. The Remote Station consists of terminal equipment which receives traffic data and status signals from the AUTOVON Switch and encodes these signals into a format and level suitable for radio transmission to the Master Station. Data transmission is effected by an external communications link with transmission circuits in the Station Technical Control (STC) facility at the AUTOVON Communications Center, and receiver facilities at the ACOC. When the coded transmission is received at the ACOC, the coded data inputs are applied to a decoder subassembly in the Master Station terminal equipment. This equipment consists of a number of identical decoder subassemblies; one decoder for each Remote Station associated with the Master Station. Upon receipt of the coded data inputs from the Remote Station, the decoder subassembly converts these inputs into drive signals which are simultaneously applied to the ACAS display and recording equipment.

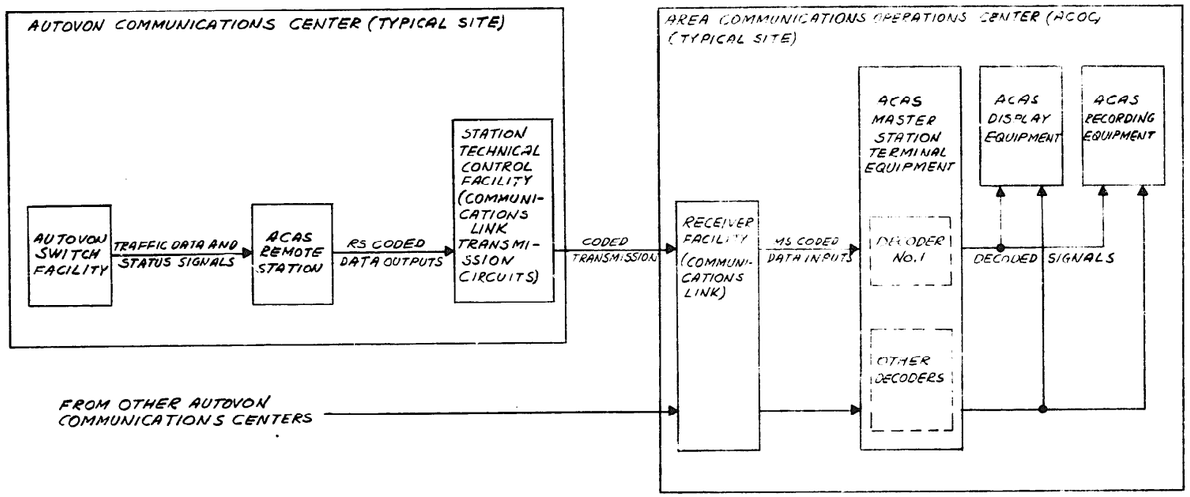


Figure 1-2. ACAS/AUTOVON Inter-facility Block Diagram

The visual displays and recorded indications at the Master Station represent a nearly instantaneous, constantly updated reflection of the status of the AUTOVON Switches being monitored.

1-8. SITE DEPLOYMENT.

1-9. The geographic deployment of ACAS Master and Remote Station sites is shown in figure 1-3. From an equipment configuration standpoint, there are two separate ACAS configurations, one serving the DCA-Europe area and the other serving the DCA-Pacific area. The European AC-AS Master Station is located at Stuttgart, West Germany and monitors associated Remote Stations. In the Pacific, the Master Station at Kunia, Hawaii monitors associated Remote Stations. The specific locations of all ACAS sites in overseas AUTOVON are given in table 1-1. An additional ACAS configuration consisting of a combined Remote/Master Station is provided for training purposes at Sheppard Air Force Base, Texas.

1-10. DESCRIPTION OF ASSOCIATED FACILITIES.

1-11. The ACAS Remote and Master Stations interface with external facilities at the AUTOVON Communications Center and ACOC, respectively. A Remote Station receives data inputs from the AUTOVON Switch facility and transmits data via the communications link transmission circuits in the STC facility. At the receiving end of the data transmission channel, the communications link receiver facility applies the coded transmission to the Master Station terminal equipment. The AUTOVON Switch and communications link facilities are described in the following paragraphs.

1-12. AUTOVON SWITCH FACILITY. Each overseas AUTOVON Switch facility consists of a high-speed, four -wire telephone switching system which uses nonblocking switching matrices, controlled by electronic common control equipment, and capable of switching voice, data, and teletypewriter circuits. Status monitoring leads are extended from critical points within the various AUTOVON Switch equipment groups to the facility intermediate distributing frame (IDF). These leads consist of wire pairs, each of which carries a particular bit of status information in the form of an open- or short-circuit condition. These status leads are extended to the ACAS Remote Station facility,

1-13. COMMUNICATIONS FACILITIES. The communications link between the ACAS Master Station at the ACOC site and the ACAS Remote Stations at the AUTOVON sites is provided by unclassified teletypewriter critical control circuits These circuits use carrier frequencies in the 300-Hz to 3400-Hz band, with frequency shift keying operatin!: at speeds between 50 and 150 baud. They are capable of half-duplex, full-duplex, polar, or neutral operation and have provisions for adjusting the bias of received signals. At ihe AUTOVON site, the STC teletypewriter transmission circuits receive high level coded signals from the ACAS Remote Station in either polar or neutral form, depending upon the input requirements of the particular transmission; circuit. These signals are transmitted to the corresponding receiver circuits at the ACOC site where they are applied to the appropriate ACAS Master Station terminal equipment as a low level serial message.

1-14. DESCRIPTION OF ACAS EQUIPMENT.

1-15. The basic function of the ACAS is to gather status information from remote AUTOVON Switches and present this status information at a central point in the form of visual displays and permanently recorded indications. The ACAS is composed of five basic equipment groups: Remote Station equipment (Coder Group OX-23/G), Master Station terminal equipment, signal data recorder equipment, recorder selector panel, and data display equipment. With the exception of the Remote Station equipment, all equipment is located at the Master Station facility.

1-16. The ACAS equipment groups and their major components are listed in table 1-2. This list and the equipment description presented in the following paragraphs reflect the equipment complement and configuration at a typical Remote Station and at the DCA-Europe Master Station. The DCA-Pacific Master Station is functionally the same, but has fewer associated Remote Stations. Consequently, the DCA/ Pacific site utilizes fewer subassemblies and associated display sectors. The ACAS Air Training Command facility in the Zone of Interior (ZI) is a combined Remote/Master Station equipped with one complete Remote Station, one Master Station decoder subassembly

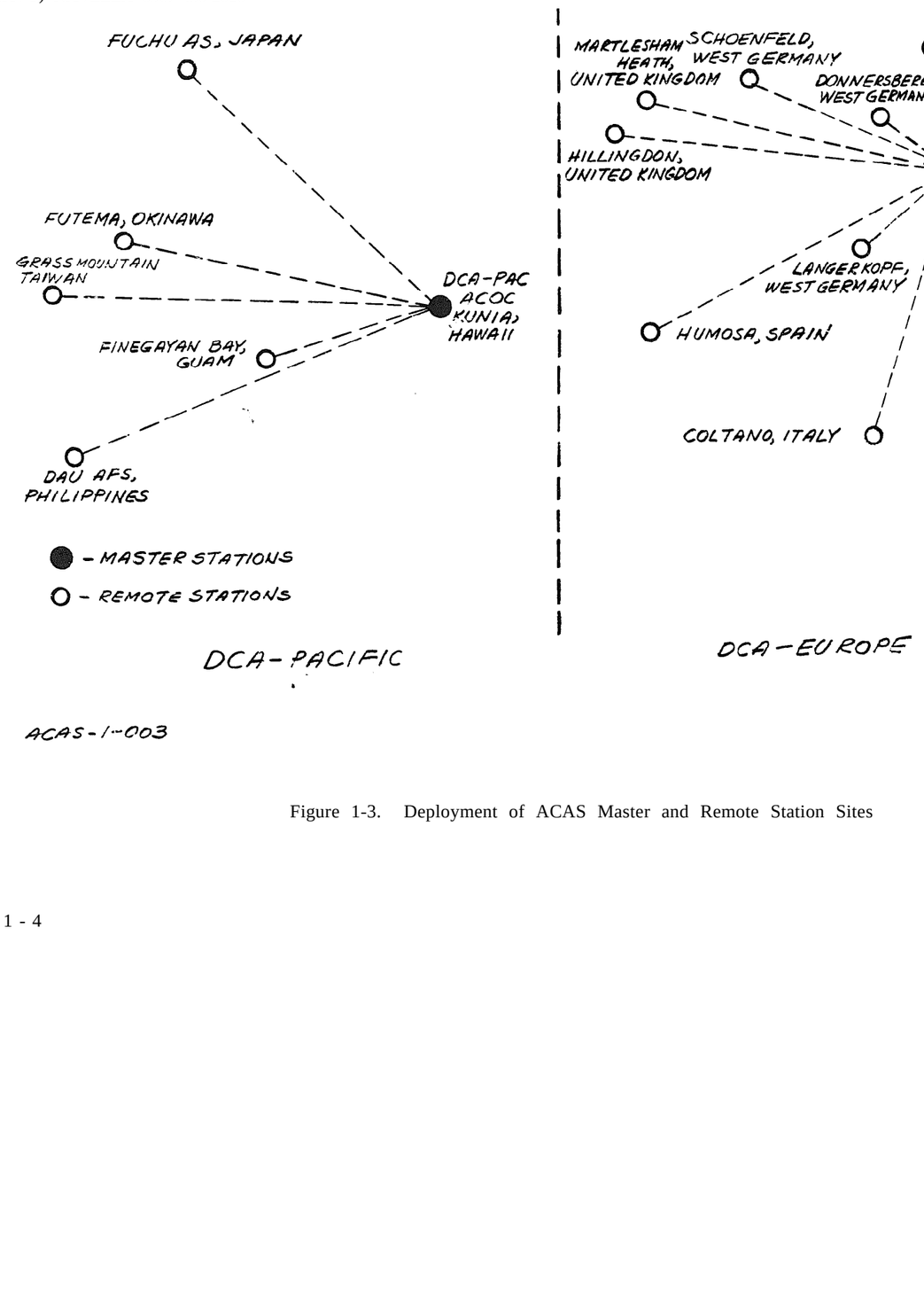


Figure 1-3. Deployment of ACAS Master and Remote Station Sites

Table 1-1. ACAS Site Locations

SITE DESIGNATION	SITE LOCATION	FACILITY TYPE
01	Martlesham Heath, United Kingdom	Remote Station
02	Hillingdon, United Kingdom	Remote Station
03	Schoenfeld, West Germany	Remote Station
04	Langerkopf, West Germany	Remote Station
05	Feldberg, West Germany	Remote Station
06	Donnersbarg, West Germany	Remote Station
07	Coltano, Italy	Remote Station
08	Naples, Italy	Remote Station
09	Humosa, Spain	Remote Station
10	Athens, Greece	Remote Station
11	Fuchu AS, Japan	Remote Station
12	Grass Mountain, Taiwan	Remote Station
13	Futema, Okinawa	Remote Station
14	Dau AFS, Philippine Islands	Remote Station
15	Finegayan Bay, Guam	Remote Station
16	Stuttgart, West Germany	Master Station
17	Kunia, Hawaii U.S. A.	Master Station
18	Sheppard AFB, Texas	Composite Remote alid Master Stations

Table 1-2. ACAS Equipment List

OFFICIAL NOMENCLATURE	COMMON NAME	QTY	REF DES	REMARKS
Coder Group OX-23/G	Remote Station equipment (RSE)			
Remote Station Coder Group Encoder Subassembly TFA-42029735	RSE encoder subassembly	1	**A1**	
Printed Circuit Board BG-103	Bit generator circuit board	1	**A1A1**	
Printed Circuit Board PB-320	Power buffer circuit board	1	A1A2	
Printed Circuit Board NI-133	Non-locking input circuit board	7	A1A3 thru A1A9	
Printed Circuit Board IS-191	Input switch circuit board	4	A1A10 thru A1A13	
Printed Circuit Board LU-192	Line usage circuit board	8	A1A14 thru A1A21	
Front -Bottom Panel T-31425735	Mode selector panel	**1**		
Remote Station Coder Group Power Supply Subassembly TFA-42020735	RSE power supply subassembly	**1**	A2	
Component SheIf TDA-42045735	Component shelf	**1**	A2A1	
Power Supply, 130 Volts at 0.1 Amp (LCS-A-150)	RSE +130 volt dc power supply module	**1**	A2A1A1	

Table 1-2. ACAS Equipment List (Cont)

OFFICIAL NOMENCLATURE	COMMON NAME	QTY	REF DES	REMARKS
Dual Power Supply, 60 Volts at 0.2 Amp (LCD-2-44)	RSE ±60 volt dc power supply module	1	A2A1A2	
Power Supply, 12 volts at 1.9 Amps (LCS-A-12)	RSE alarm power supply module	1	A2A1A3	
Dual Power Supply, 12 volts at 0.4 Amp (LXD-3-152)	RSE ±12 volt dc power supply module	1	A2A1A4	
Power Supply, 3.6 Volts at 10 Amps (LM-CC-3-P6)	RSE +3.6 volt dc power supply module	1	A2A1A5	
Card File TP-DA-31419000	Card file	1	A2A2	
Printed Circuit Board CR-51	Neutral coupling repeater circuit board	1	A2A2A1	
Printed Circuit Board CR-52	Polar coupling repeater circuit board	1	A2A2A2	
Printed Circuit Board ACR-2	Automatic current regulator circuit board	1	A2A2A3	
Printed Circuit Board LA-196	RSE local alarm circuit board	1	A2A2A4	
Front Panel T-42042735	RSE alarm and control panel	1		

Table 1-2. ACAS Equipment List (Cont)

OFFICIAL NOMENCLATURE	COMMON NAME	QTY	REF DES	REMARKS
Master Station Terminal Equipment (Rack No. 1)	Master Station terminal equipment (MSTE)			
Decoder Group OX-22/G (TFA-42046731)	MSTE decoder subassembly	5	1A1 thru 1A5	**Printed circuit board complements are identical for each Decoder Group OX-22/G; printed circuit board reference designations are prefixed with 1A1 through 1A5, as applicable. If more or fewer decoder groups are used in Rack No. 1, the reference designators will increase or decrease accordingly.**
Printed Circuit Board LA-296	MSTE local alarm circuit board	1	A1	
Printed Circuit Board BA-201	Bit analyzer circuit board	1	A2	
Printed Circuit Board SD-231	Shift detector circuit board	1	A3	
Printed Circuit Board PB-320	Power buffer circuit board	1	A4	
Printed Circuit Board EO-230	Eight -output circuit board	10	A5 thru A14	
Printed Circuit Board DD-295	Display driver circuit board	8	A15 thru A22	
Master Station Decoder Group Control and Local Display Assembly TFA-42053731	MSTE control and local display panel	1	1A6	

Tablet 1-2. ACAS Equipment List (Cont)

OFFICIAL NOMENCLATURE	COMMON NAME	QTY	REF DES	REMARKS
Master Station Terminal Equipment (Rack No. 2)	Master Station terminal equipment (MSTE)			
Decoder Group OX-22/G (TFA-42046731)	MSTE decoder subassembly	5	2A1 thru 2A5	Decoder Group OX-22/G subassemblies in rack No. 2 are identical to Decoder Group OX-22/G subassemblies in rack No. 1; printed circuit board reference designations are prefixed with 2A1 through 2A5, as applicable. If more or fewer decoder groups are used in rack No. 2, the reference designators will increase or decrease accordingly.
Master Station Decoder Group Power Distribution Assembly TFA-42049731	MSTE power distribution panel	1	2A6	
Master Station Decoder Group Modular Power Supply TFA-42050731	MSTE +3.6 volt dc power supply subassembly	2	2A7 and 2A9	
Master Station Decoder Group Modular Power Supply TFA-42056731	MSTE dual 12 volt dc power supply subassembly	2	2A8 and 2A10	
Signal Data Recorder Group (Rack No. 3)	Signal data recorder equipment			
Signal Data Twin Flush Recorder Assembly (40-channel) TFA-42024732	40-channel signal data recorder	1	3Al	Kunia and Sheppard AFB sites are equipped with Signal Data Flush Recorder Assembly (20 channel) TFA-42025732.

Table 1-2. ACAS Equipment List (Cont)

OFFICIAL NOMENCLATURE	COMMON NAME	QTY	REF DES	REMARKS
Recorder Group Control TFA-42019733	Recorder selector panel	1	3A2	This panel is located with the signal data recorder equipment in rack No. 3.
Power Supply Assembly TFA-42021734	Display/recorder +24 volt dc power supply subassembly	1	3A3	This power supply also provides indicator lamp operating voltages for the data display and MSTE groups.
Data Display Group	Data display equipment			
Master Station Display Assembly TFA-50124734-2	Display frame	1		Kunia and Sheppard AFB sites are equipped with Master Station Display Assemblies TFA-50124734-l and TFA-42036734, respectively.
Data Display Group Panel Assembly TSA-42031734	Display sector panel	10	A1 thru A10	Kunia site is equipped with five display sector panels; Sheppard AFB site is equipped with one display sector panel.

and one data display sector. This installation is used for training network control personnel and ACAS Remote and Master Station Operation and Maintenance personnel.

1-17. The ACAS equipment groups are described in the following paragraphs. Differences between the Stuttgart, Kunia, and Sheppard AFB sites are noted where applicable.

1-18. REMOTE STATION EQUIPMENT (CODER GROUP OX-23/G). The Remote Station equipment (Coder Group OX-23/G), shown in figure 1-4, senses the condition of equipment status indications from the AUTOVON Switch and codes these indications into a serial message for transmission over an external communications link to the Master Station. The Remote Station equipment (RSE) is composed of an encoder subassembly and a power supply subassembly mounted in a standard 19-inch equipment rack. The encoder subassembly (figures 1-5 and 1-6) is a card file with a small control panel and contains a total of 21 printed circuit logic cards of five different types. The power supply subassembly (figures 1-7, 1-8, and 1-9) contains five power supply modules mounted in a component shelf, a card file with four printed circuit boards, and a control panel.

1-19. Status indicator signal inputs from the AUTOVON Switch are terminated on two wire-wrap terminal blocks mounted on the rear of the encoder subassembly. These inputs consist of 244 wire pairs, eat h of which presents a specific bit of status information in the form of an open or shorted condition. An open circuit indicates a normal operating condition, and a short circuit represents an overload or fault condition. The input signal conditions are sensed and converted into logic levels by the input switch and line usage logic circuits of the encoder subassembly. The remaining logic circuits in the subassembly form an encoder which receives the logic signals from the input switch and line usage circuits in parallel, and converts them into a low level serial data stream in a format suitable for transmission over the external communications link. This data stream is applied through an interconnecting cable to the power supply subassembly where it is converted into a high level loop voltage output capable of driving the external communications equipment. The coupling repeater and automatic current regulator circuit boards in the power supply

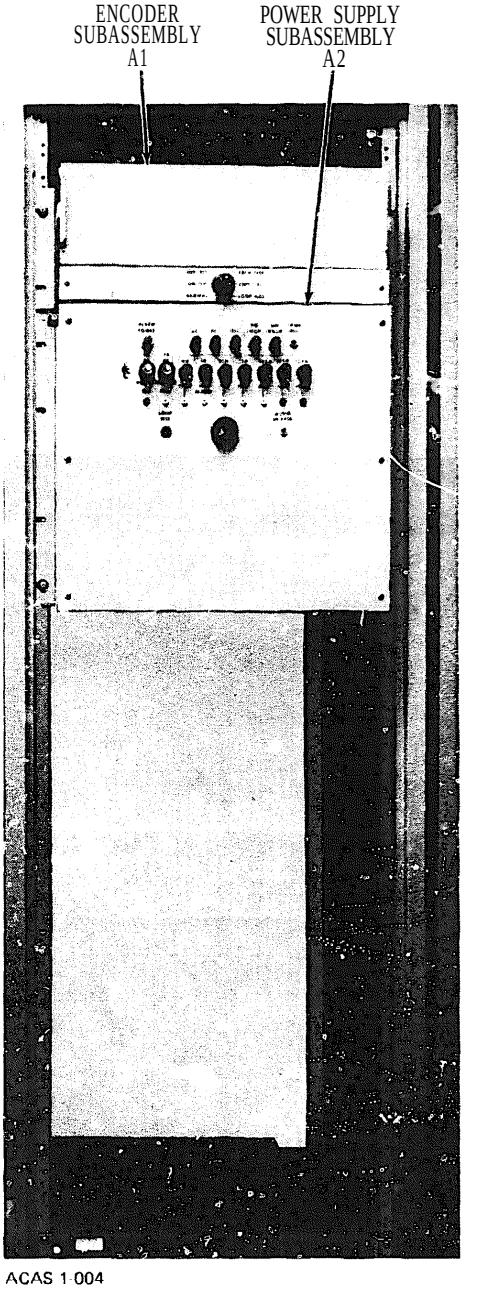


Figure 1-4. Remote Station Equipment (Coder Group OX-23/G)

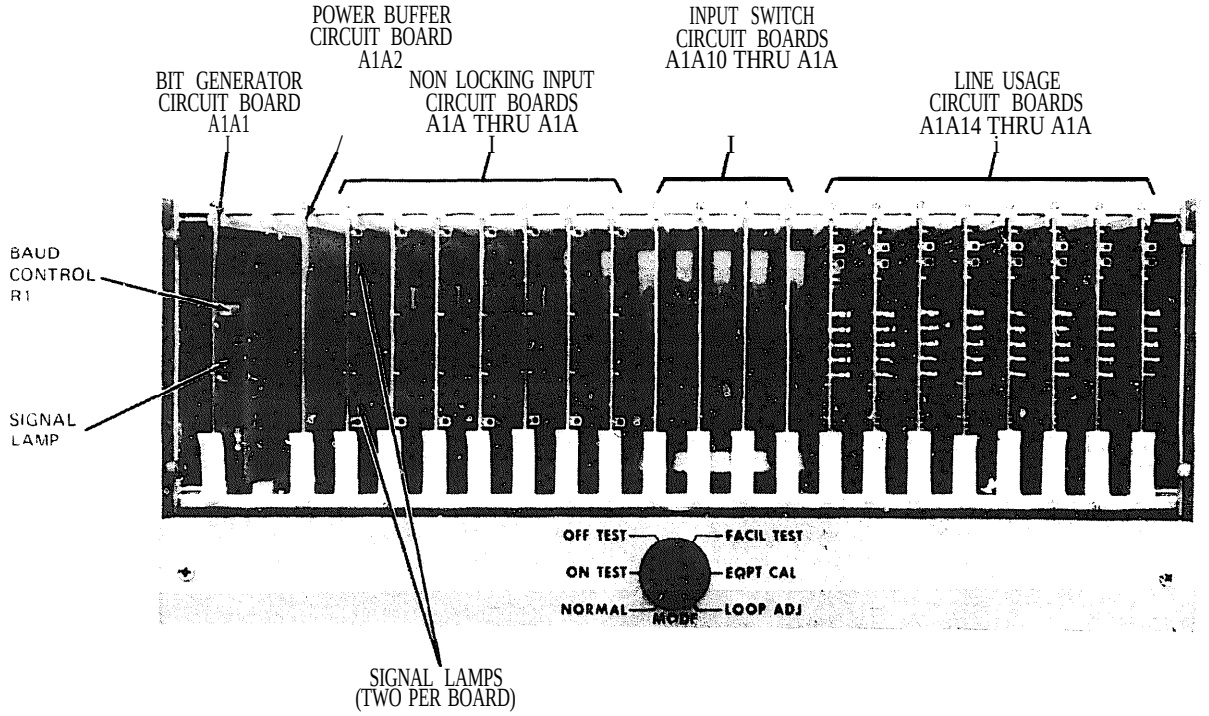


Figure 1-5. RSE Encoder Subassembly, Front View

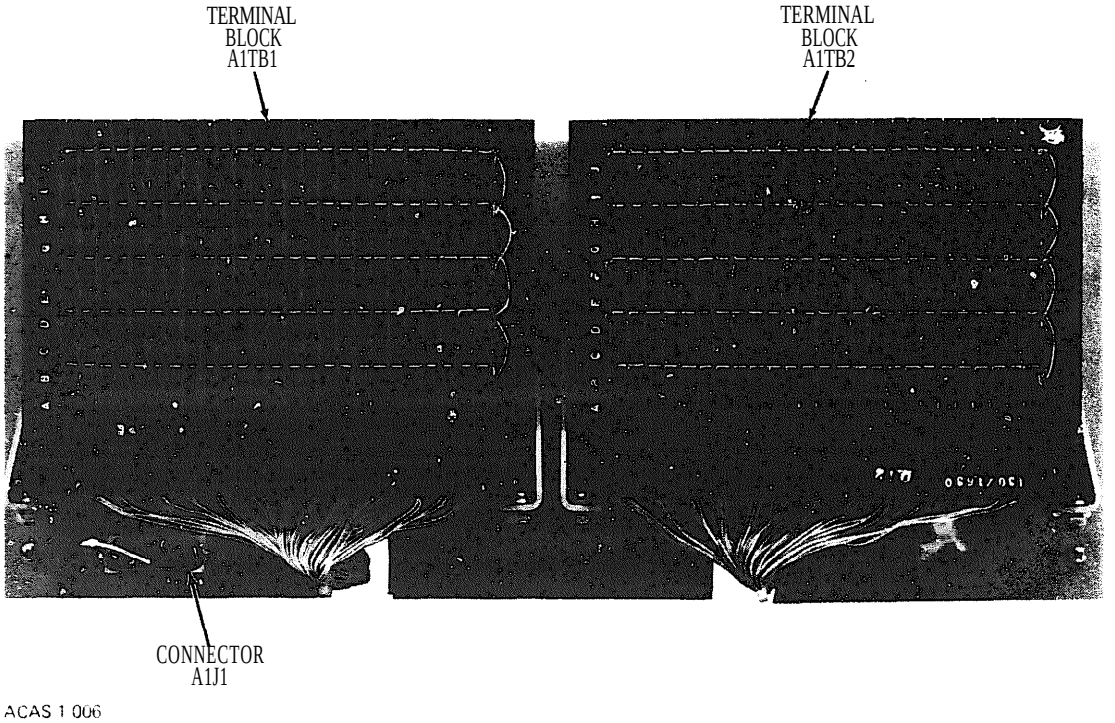


Figure 1-6. RSE Encoder Subassembly, Rear View

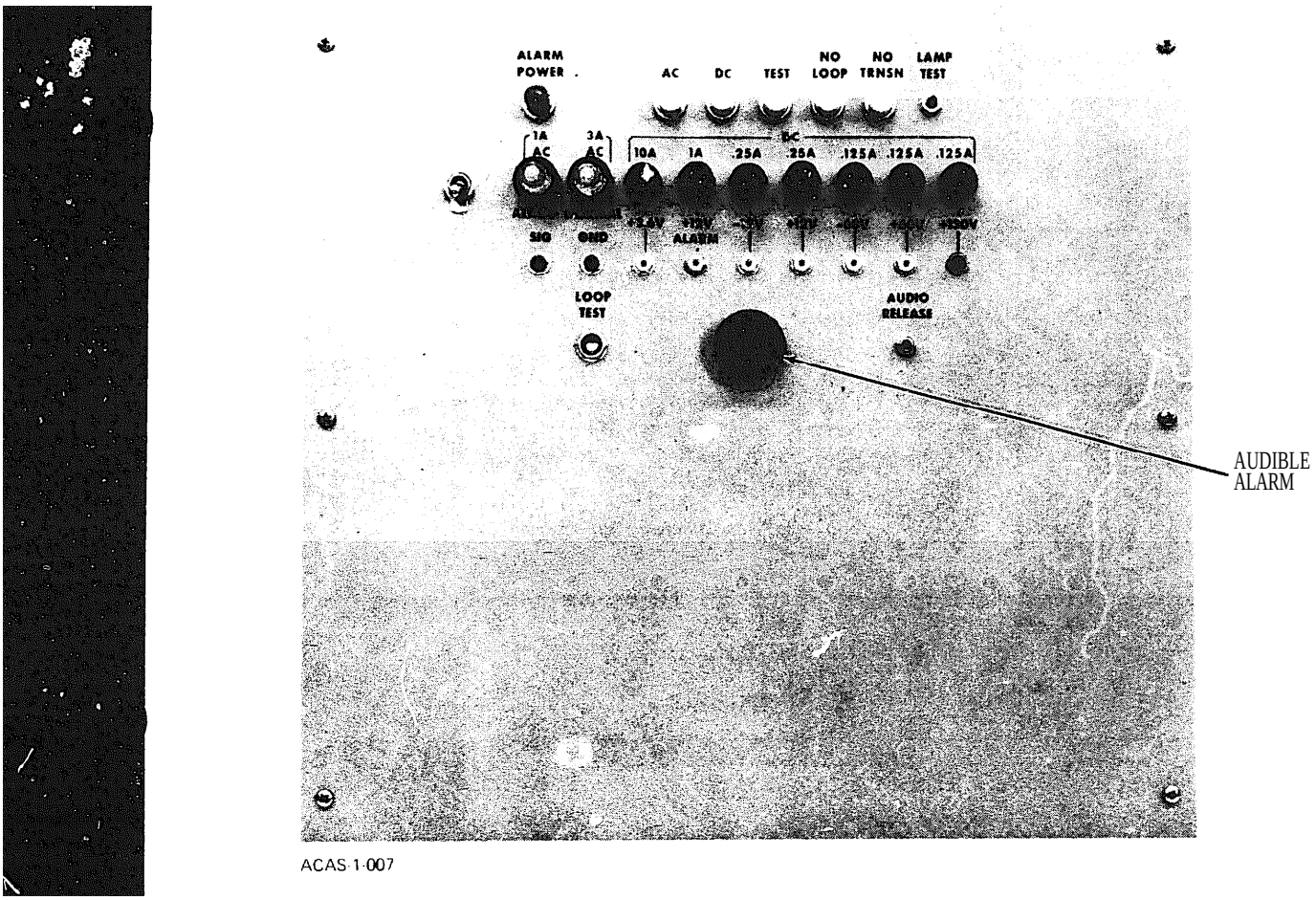


Figure 1-7. RSE Power Supply Subassembly, Front View

subassembly form a modulator which performs the low level to high level conversion. The high level loop output may be either a polar or neutral voltage, depending upon the input requirements of the external communications equipment. A switch on the rear panel of the power supply subassembly permits selection of either a polar or neutral output. Power for the high level polar and neutral outputs is obtained from ±60 volt dc and +130 volt dc power modules, respectively. These modules are located in the component shelf of the power supply subassembly. Rear panel switches permit the use of external loop power supplies when necessary. A barrier strip terminal board on the rear of the power supply subassembly is used to interface the high levelserial data output with the external communications equipment. The power supply subassembly also contains the following components :

a. The +3.6 volt, +12 volt, and ±12 volt dc power supply modules which provide operating power for the encoder subassembly logic and alarm circuits.

b. Local alarm circuit board which controls audible and visual alarms related to dc voltage failures and loss of signal.

C. Terminal board for extending local alarms to remote locations.

d. An ac input power connector.

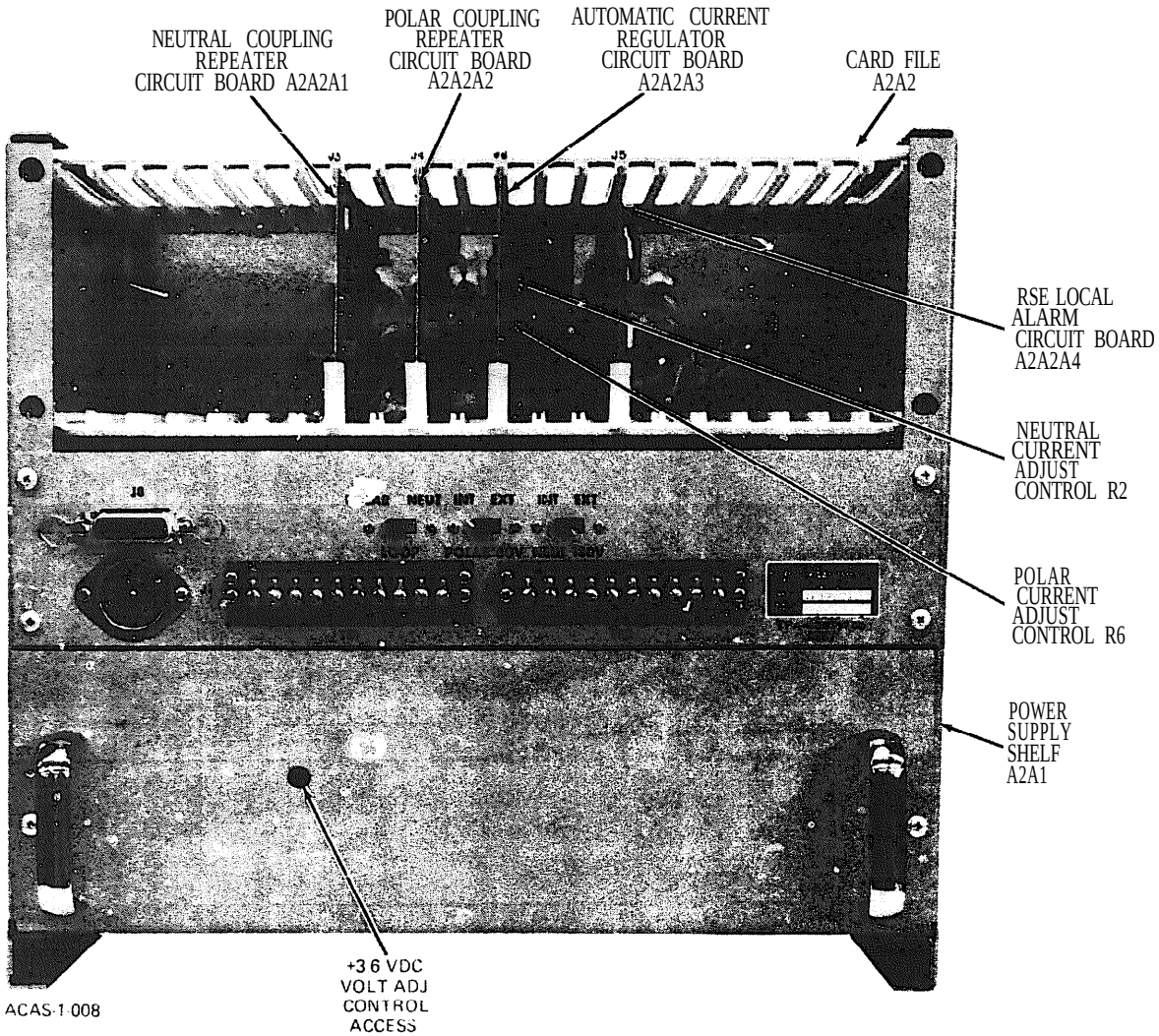


Figure 1-8. RSE Power Supply Subassembly, Rear View

e. Alarm lamps to indicate abnormal conditions of signal inputs and operating voltages.

f. An audible alarm which responds to any alarm signal.

q. Audible alarm release control.

h. Lamp test control.

i. Test points for monitoring signal inputs and power supply voltages.

j. Protective fuses for the dc power distribution lines.

1-20. Data encoding and transmission are the normal functions performed by the RSE. In addition, the RSE can be operated in several special modes to facilitate testing and adjustment of the RSE, the Master Station, and the external communications facility. A switch on the front panel of the encoder subassembly is used to place the RSE in any of its operating modes.

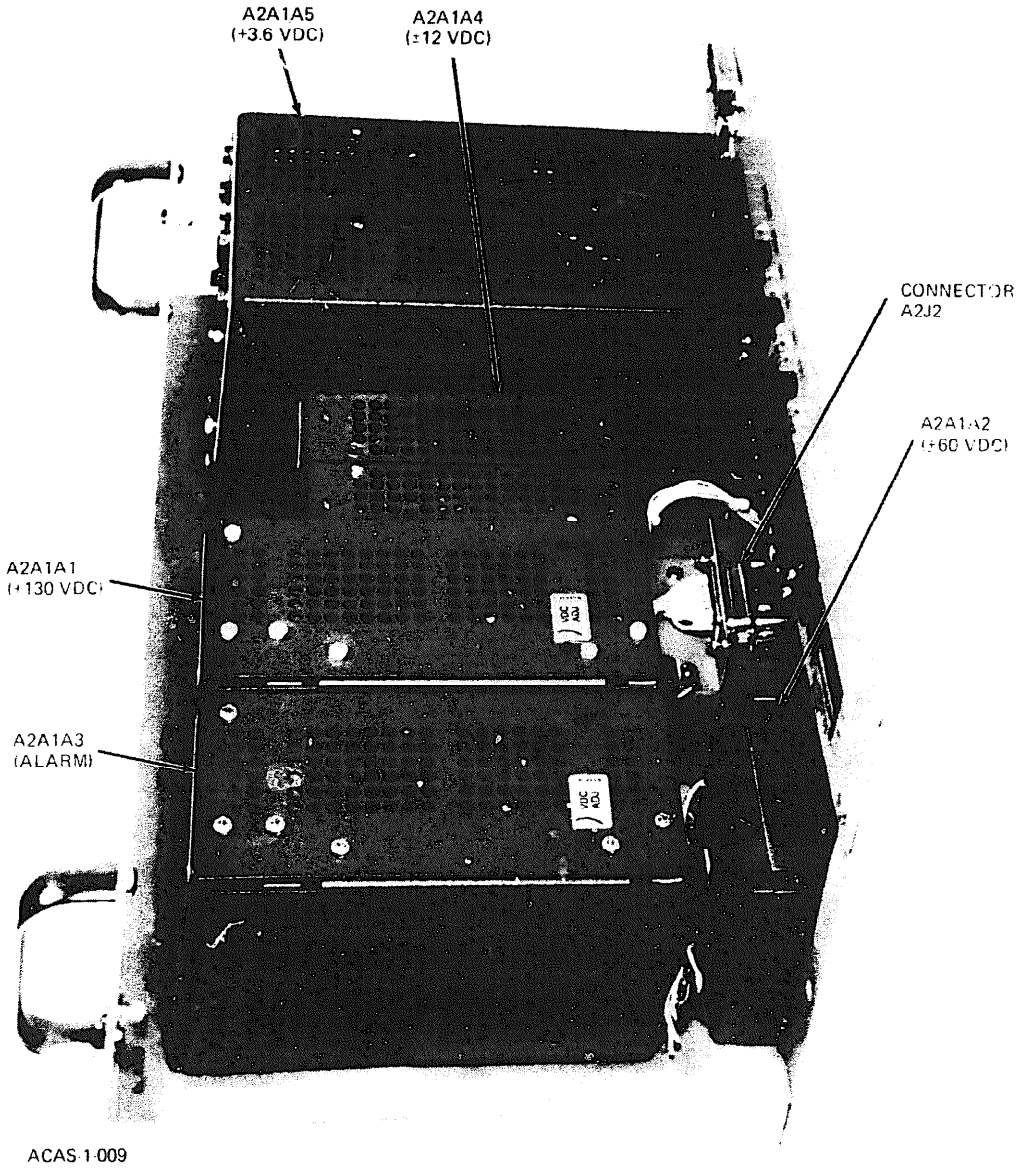


Figure 1-9. RSE Power Supply Subassembly Component Shelf, Power Supply Modules

1-21. MASTER STATION TERMINAL EQUIPMENT. The Master Station terminal equipment (MSTE) receives the serial messages transmitted from the Remote Stations over the communications link and decodes these messages into display signals that represent the AUTOVON Switch status input conditions sensed by the Remote Stations. These display signals drive the data display equipment and the signal data recorder. The MSTE occupies two standard 19-inch equipment racks shown in figure 1-10 and is composed of the following major subassemblies: decoder subassembly (Decoder Group OX-22/G), control and local display panel, power distribution panel, two +3.6 volt dc power supply subassemblies, and two dual 12 volt dc power supply subassemblies. There are identical decoder subassemblies, one for each Remote Station. Subassemblies are installed in each MSTE rack. Operational

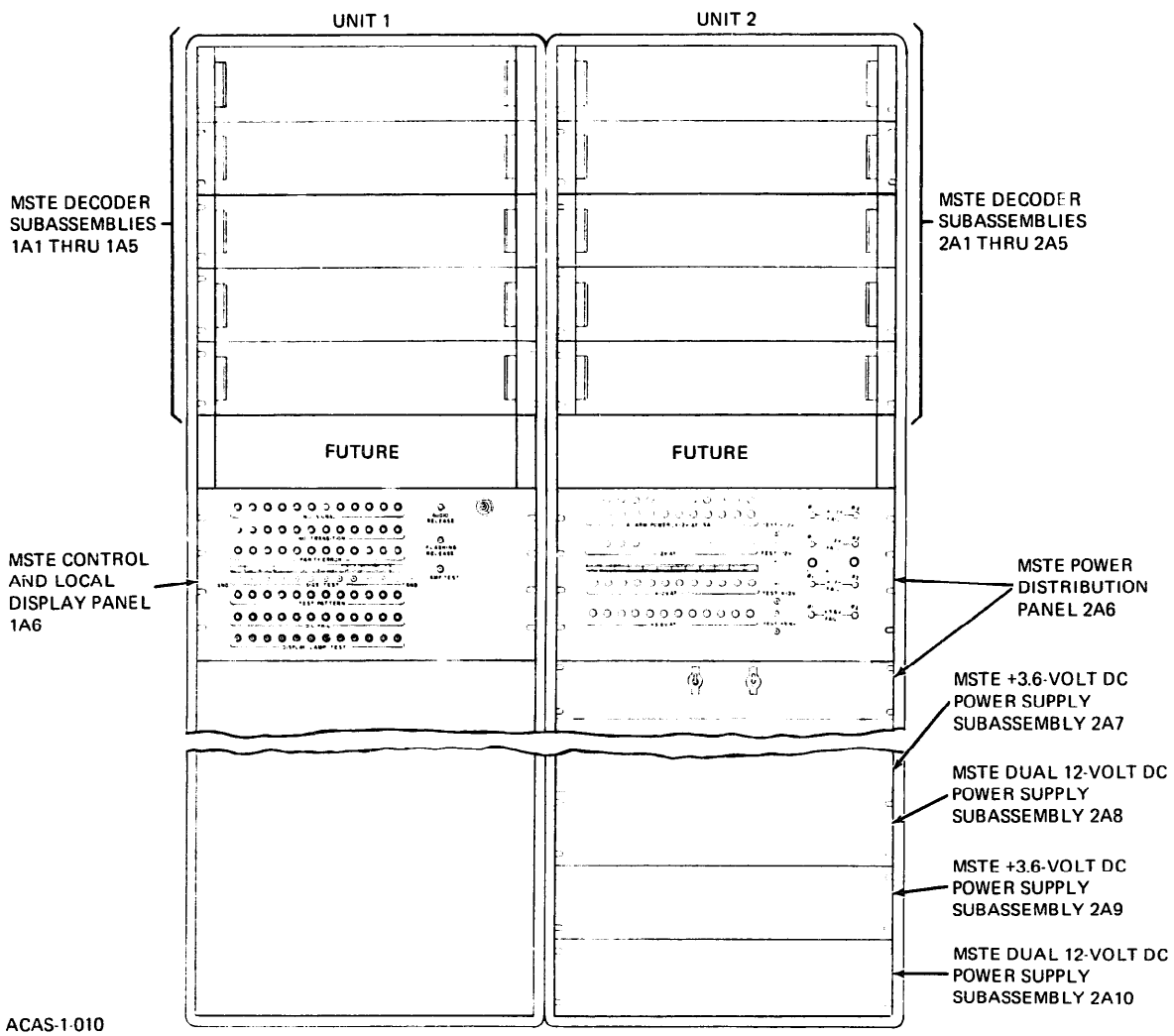


Figure 1-10. Master Station Terminal Equipment Racks

racks are cabled for known requirements plus two spares to prevent blank sectors in the display.

1-22. MSTE Decoder Subassemblies. Each MSTE decoder subassembly (figures 1-11 and 1-12) consists of a card file containing 22 printed circuit logic boards of six different types. All but one of these boards comprise the logic circuits which decode the serial message from the Remote Station into parallel output signals capable of driving the data display lamps and the signal data recorder. The remaining board contains a local alarm circuit which monitors the input signals and the Master Station operating voltages for alarm conditions, and provides drive signals for the alarm lamps and audible alarm in the control and local display panel.

1-23. MSTE Control and Local Display Panel. The control and local display panel is shown in figures 1-13 and 1-14. Status signal inputs received from the Remote Station are terminated on wire-wrap terminal blocks mounted at the rear of the control and local display panel. These signals are distributed through an interconnecting cable to the appropriate decoder subassemblies. The input signals are also extended to front panel test points to facilitate testing. Alarm lamps located on the front panel indicate abnormal conditions of signal inputs and operating voltages for each decoder subassembly. Operating power for the alarm

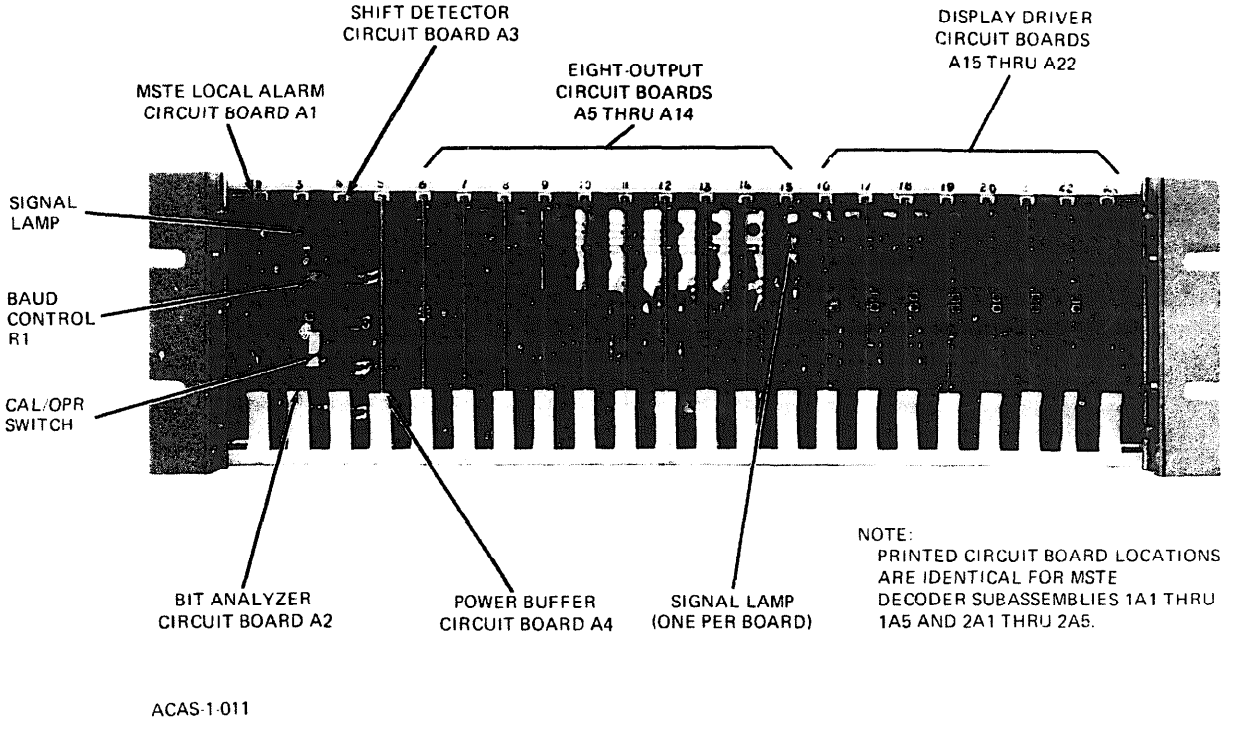


Figure 1-11. Typical MSTE Decoder Subassembly (Decoder Group OX-22/G), Front View

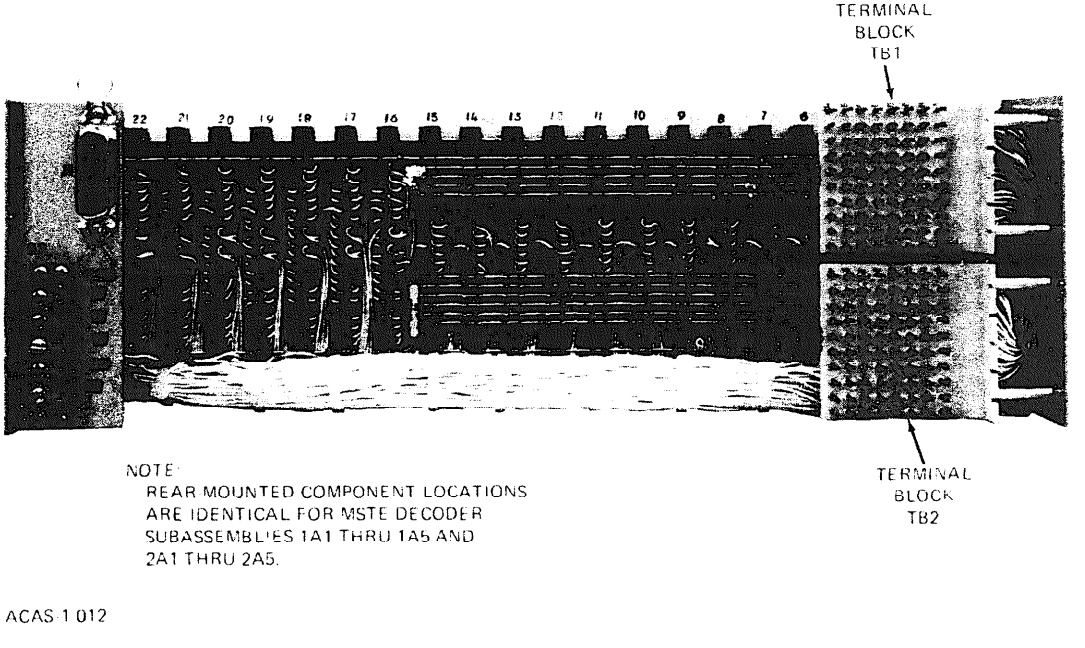


Figure 1-12. Typical MSTE Decoder Subassembly (Decoder Group OX-22/G), Rear View

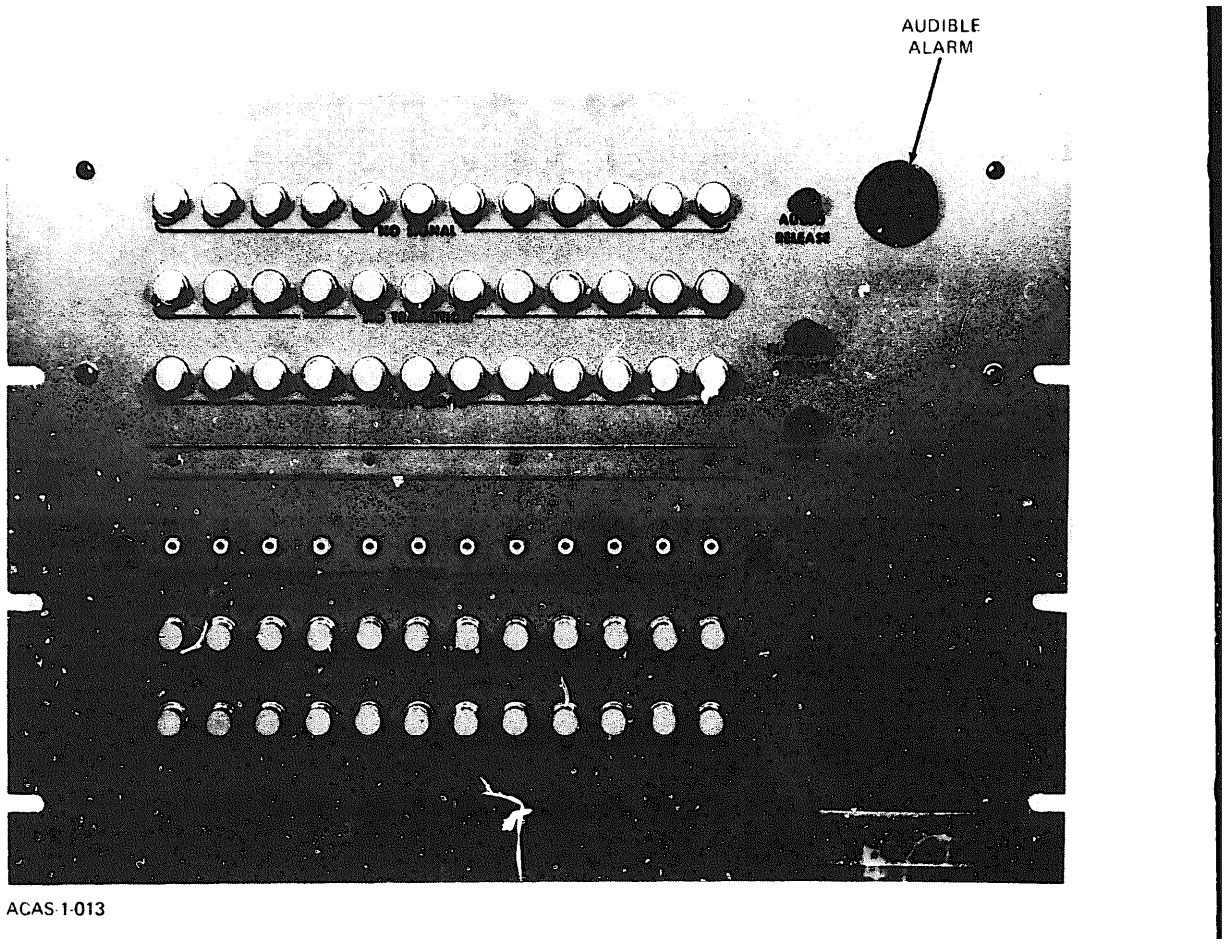


Figure 1-13. MSTE Control and Local Display Panel, Front View

lamps is provided by the +24 volt dc power supply located in the signal data recorder equipment rack. The control and local display panel is also equipped with an audible alarm which responds to any strapped alarm signal, an audible alarm release control, a flashing release control common to all decoder subassemblies, one control for testing the panel alarm lamps, and one lamp test control for each display sector in the data display equipment.

1-24. MSTE Power Distribution Panel. The power distribution panel (figures 1-15 and 1-16), channels the dc power outputs of the MSTE power supply subassemblies into the decoder subassemblies. Input and output power connections are made at barrier strip terminal boards mounted on the rear of the power distribution panel. Each power distribution line is protected from overload by a fuse which is accessible from the front of the panel. The power distribution panel is also equipped with test points for checking each voltage, failure indicator lamps for each power supply, and a control for testing the indicator lamps. A small control panel (figures 1-17 and 1-18) is located below the main distribution panel. The ac line voltage is connected at the rear of this control panel and distributed to the MSTE power supply subassemblies via a barrier strip terminal block. Switches for applying the ac input power are located on the front of the control panel.

1-25. MSTE +3.6 Volt DC Power Supply Subassemblies. The MSTE +3.6 volt dc power supply subassemblies (figures 1-19 and 1-20) provide dc operating voltages for the printed logic circuits in the decoder subassemblies.

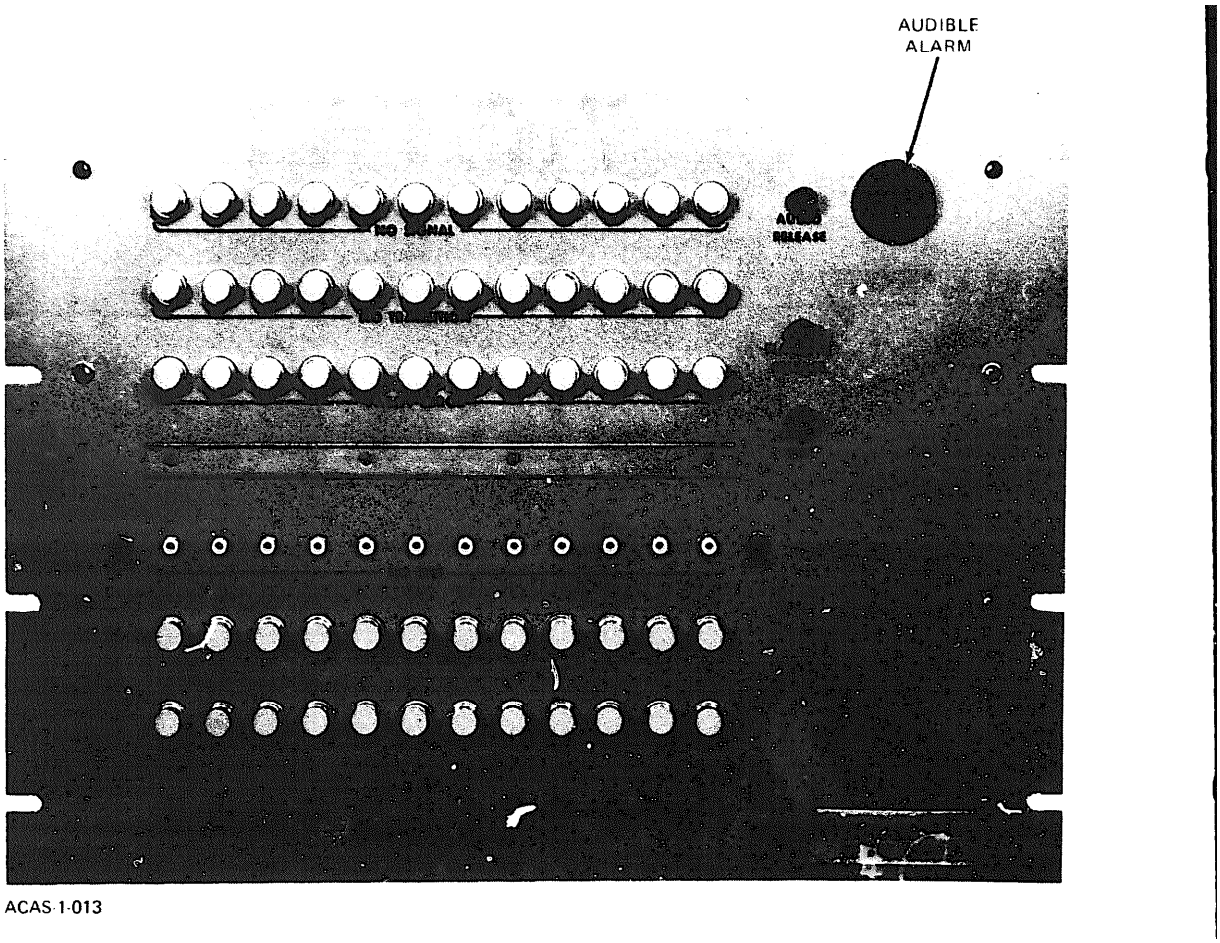


Figure 1-13. MSTE Control and Local Display Panel, Front View

lamps is provided by the +24 volt dc power supply located in the signal data recorder equipment rack. The control and local display panel is also equipped with an audible alarm which responds to any strapped alarm signal, an audible alarm release control, a flashing release control common to all decoder subassemblies, one control for testing the panel alarm lamps, and one lamp test control for each display sector in the data display equipment.

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1-25. MSTE +3.6 Volt DC Power Supply Subassemblies. The MSTE +3.6 volt dc' power supply subassemblies [figures 1-19 and 1-20) provide dc operating voltages for the printed logic circuits in the decoder subassemblies.

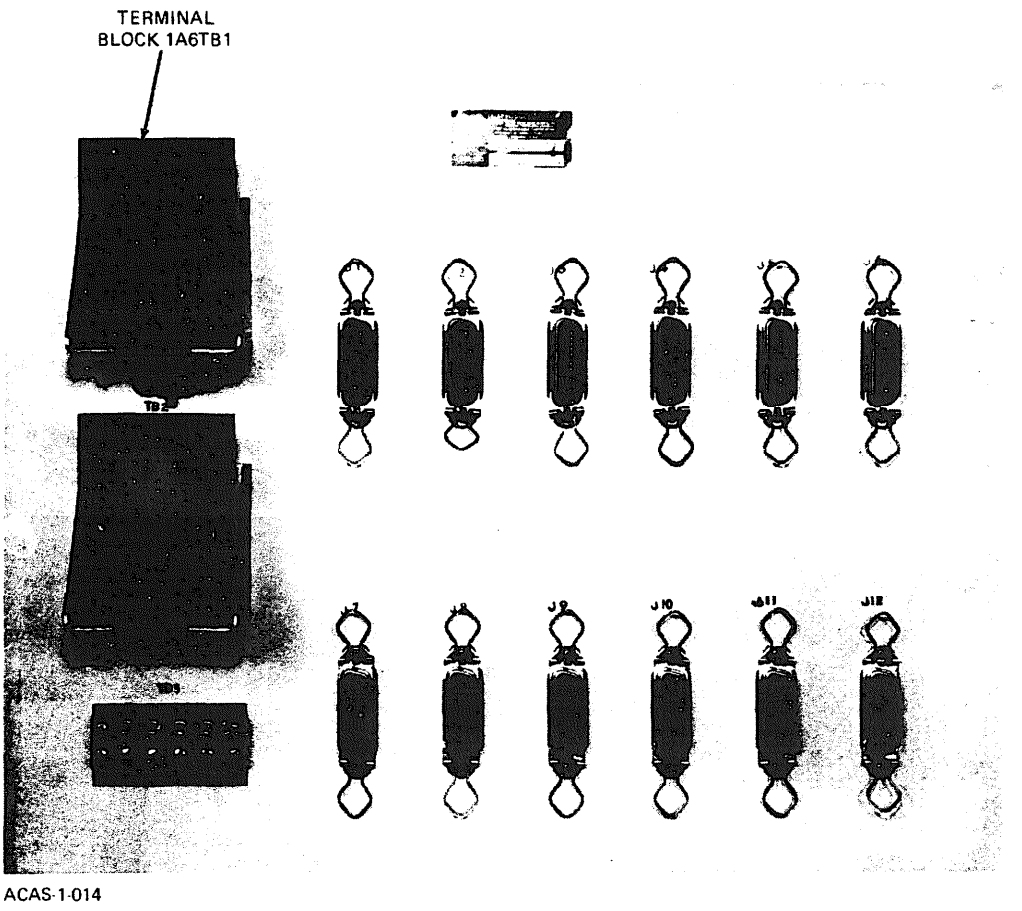


Figure 1-14. MSTE Control and Local Display Panel, Rear View

The outputs of the two power supply subassemblies are connected in parallel for load-sharing purposes. Each subassembly is capable of handling the full load. The front panel of each power supply subassembly is equipped with a power turn-on switch, a power indicator lamp, and an output voltage adjustment control.

1-26. MSTE Dual 12 Volt DC Power Supply Subassemblies. The MSTE dual 12 volt dc power supply subassemblies (figures 1-21 and 1-22) provide dc operating voltages for the oscillators and alarm circuits in the decoder subassemblies. The outputs of the two power supply subassemblies are connected in parallel for load-sharing purposes. Each subassembly is capable of handling the full load.

1-27. Each dual 12 volt dc power supply subassembly contains one ±12 volt dc power module and one +12 volt dc power module. The ±12 volt dc power module provides a dual output (+12 volts and -12 volts) to operate the stable oscillators in the decoder subassemblies. The +12 volt dc power module supplies the operating voltage for the failure detection circuits in the decoder subassemblies. Each module has an internal fuse for overload protection. A power indicating fuse for each module is located on the front panel of the power supply subassembly.

1-28. SIGNAL DATA RECORDER EQUIPMENT. The signal data recorder equipment consists of a 40-channel signal data recorder and a +24 volt dc power supply mounted in the standard 19-inch equipment rack shown in figure 1-23. The signal data recorder (figures 1-24 and 1-25) is composed of two 20-channel event chart recorder assemblies, each

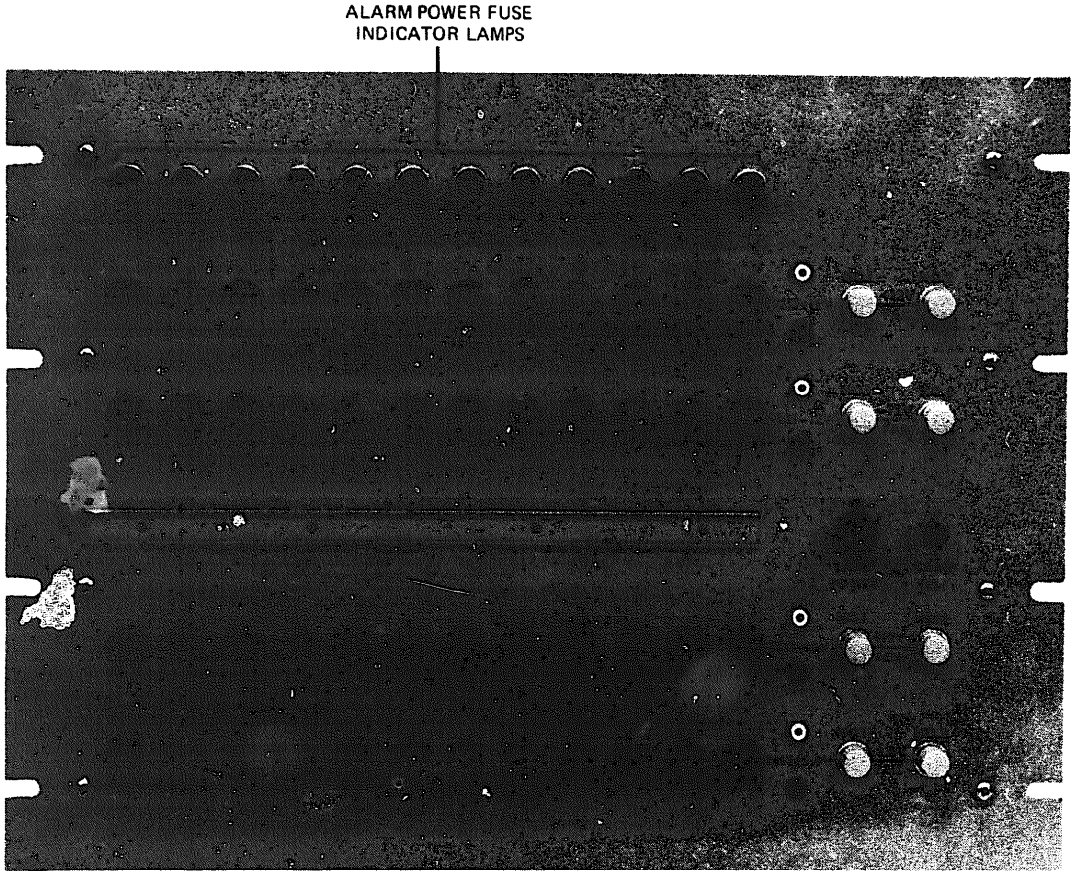
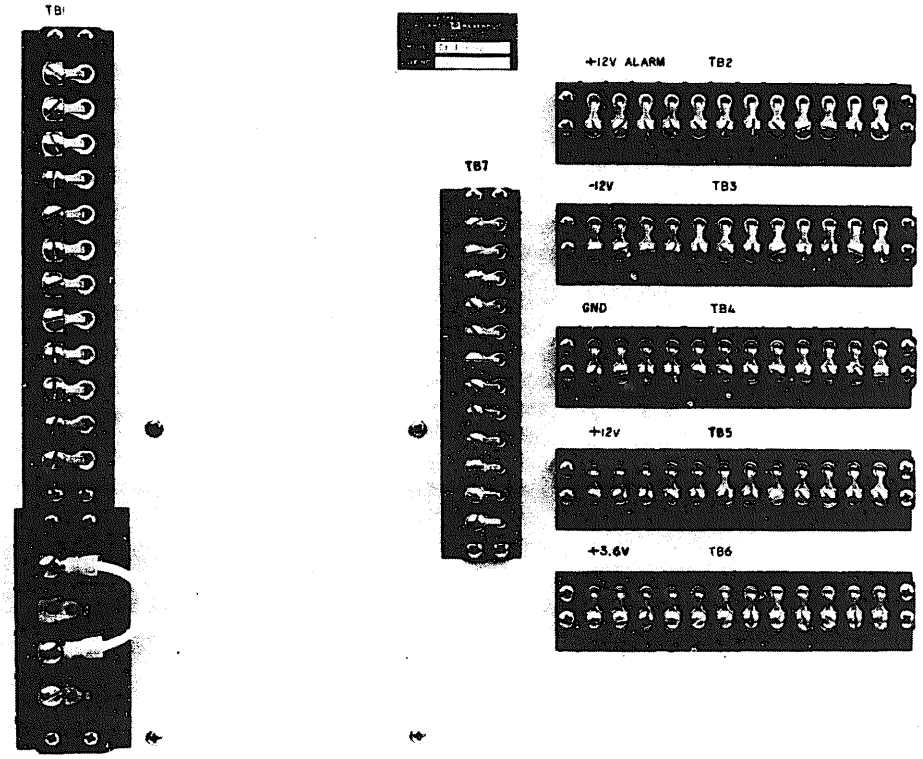


Figure 1-15. MSTE Power Distribution Panel, Front View

containing 20 individually controlled thermal writing elements. At the Kunia and Sheppard AFB sites, only one 20-channel event chart recorder assembly is provided. The +24 volt dc power supply (figures 1-26 and 1-27) provides dc operating power for the recorder, and for the display indicator lamps in the data display group.

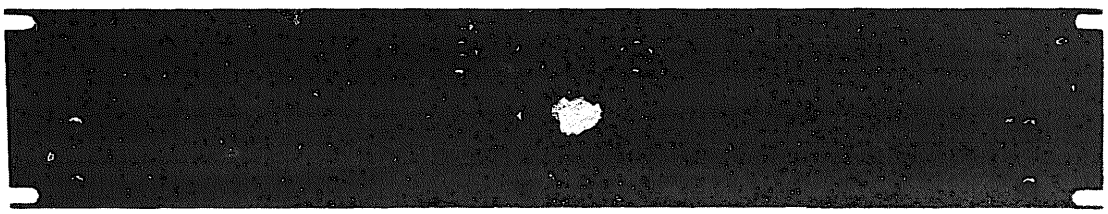
1-29. The recorder is used to graphically record the conditions on critical status reporting lines. Status signals from the MSTE drive the recorder writing elements. The status signal input lines are connected to terminal strips at the rear of each 20-channel event chart recorder assembly. Each writing element deflects laterally on the chart paper when its particular status signal input reflects an abnormal condition. Using the recorded indications, network control personnel are able to monitor the status of critical reporting lines over a specific period of time. The lines normally selected for recorder monitoring are those that reflect overload conditions. Selection of status reporting lines for recorder monitoring is accomplished by patching at the recorder selector panel.

1-30. RECORDER SELECTOR PANEL. The recorder selector panel is located in the signal data recorder equipment rack shown in figure 1-21. The recorder selector panel (figures 1-28 and 1-29) provides a means for patching selected status display signals into specific channels of the signal data recorder. Input lines from the MSTE decoder subassemblies and output lines to the recorder are wired to connectors mounted on the rear of the panel.



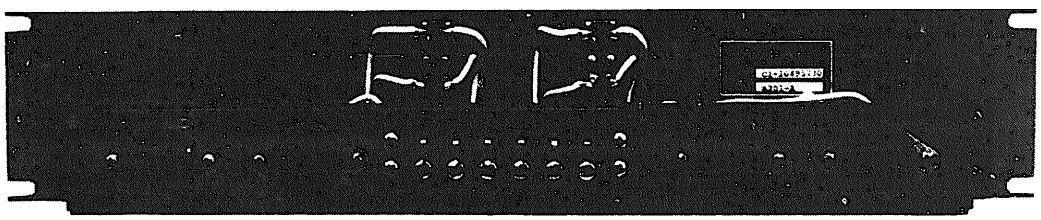
ACAS-1-016

Figure 1-16. MSTE Power Distribution Panel, Rear View



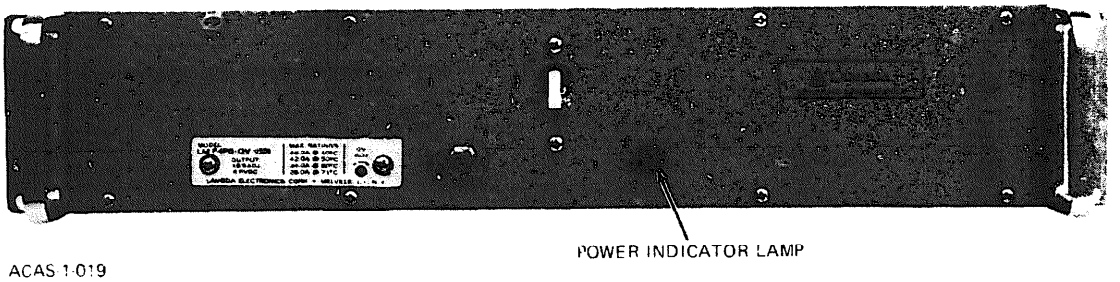
ACAS-1-017

Figure 1-17. MSTE AC Power Control Panel, Front View



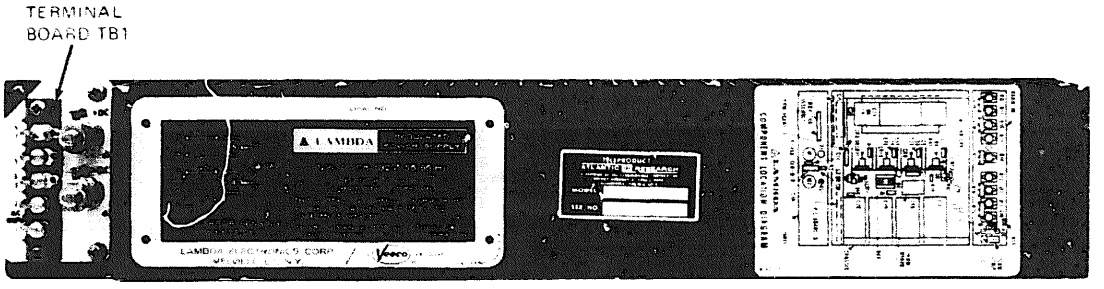
ACAS-1-018

Figure 1-18. MSTE AC Power Control Panel, Rear View



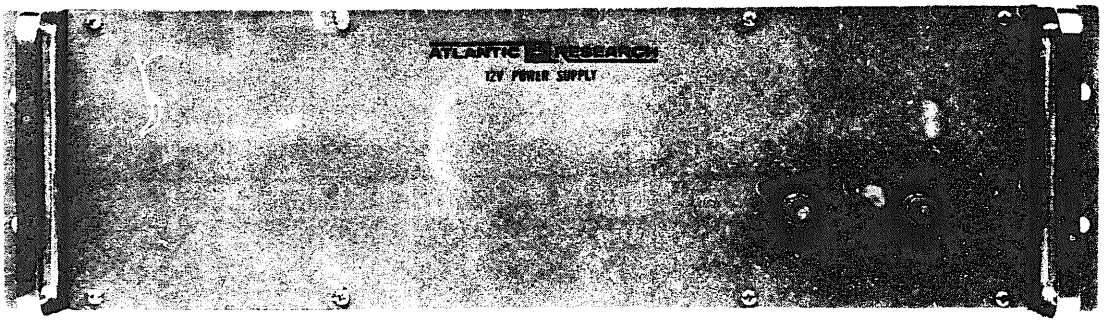
ACAS 1-019

Figure 1-19. MSTE +3.6 Volt DC Power Supply Subassembly, Front View



ACAS 1-020

Figure 1-20. MSTE +3.6 Volt DC Power Supply Subassembly, Rear View



ACAS 1-021

Figure 1-21. MSTE Dual 12-Volt DC Power Supply Subassembly, Front View

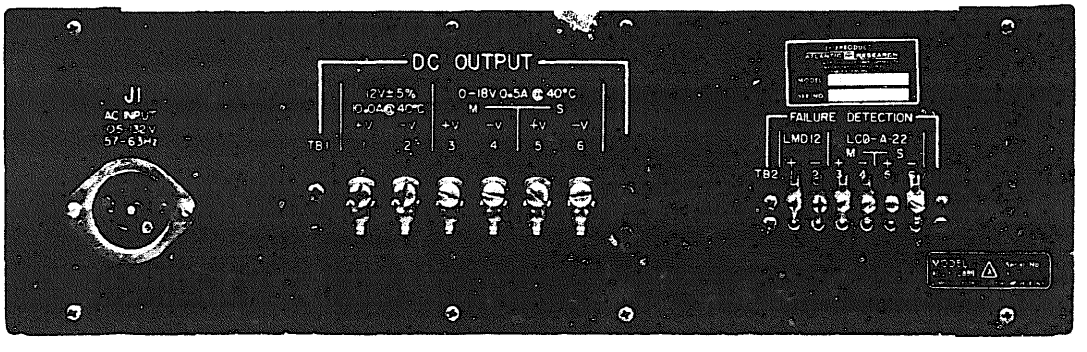


Figure 1-22. MSTE Dual 12-Volt DC Power Supply Subassembly, Rear Vice

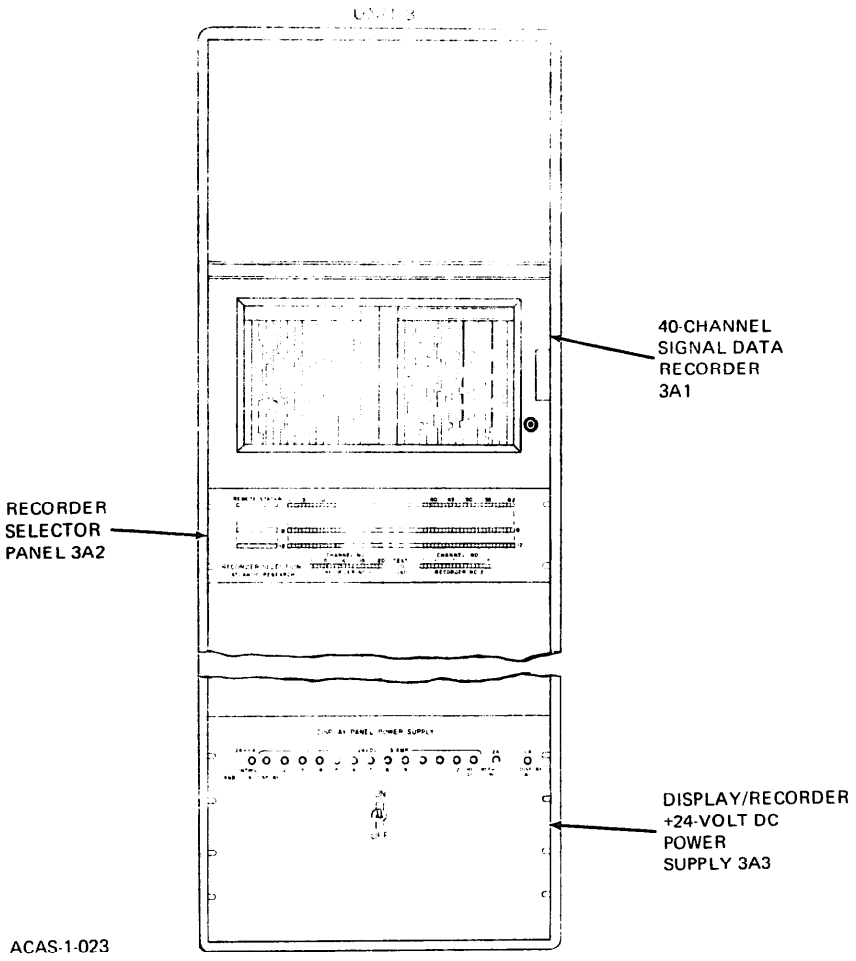


Figure 1-23. Signal Data Recorder Equipment Rack

These inputs and outputs can be cross-connected using the patch jacks on the front of the panel.

1-31. DATA DISPLAY EQUIPMENT. The data display equipment consists of a multiple-sector display frame suspended from the ceiling. The display frame (figures 1-30 and 1-31) contains ten display sector panels. Each display sector panel (figure 1-32) has an arrangement of lamps which depict the status information reported by a particular Remote Station. When an abnormal condition exists on a particular status reporting line, a drive signal from the MSTE decoder subassembly lights the corresponding lamp on the display sector panel.

1-32. TECHNICAL CHARACTERISTICS.

1-33. The pertinent technical characteristics of the ACAS are listed below.

a. Total input signals . . . . 244 wire pairs (from AUTOVON Switch)

b. Input signal levels. . . . . open and short

c. Output loop current . . . level (to communications link) 60 ma neutral or 20 ma polar (selectable)

d. Signaling rate. . . . . 75 ± 10 baud

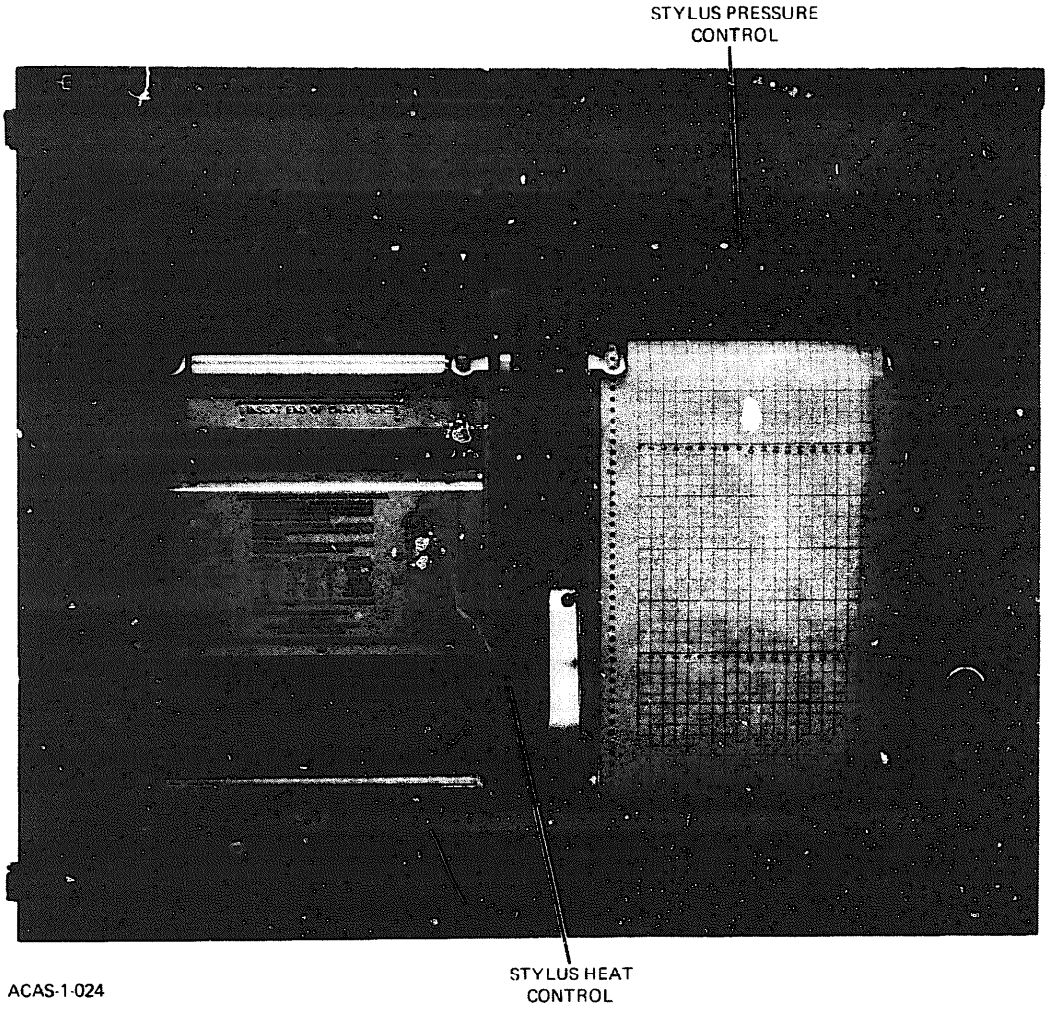


Figure 1-24. 40-Channel Signal Data Recorder, Front View

e. Total distortion . . . less than 1% (mark and space), 0% (transition)

f. Recorder capacity:

DCA/Europe . . . . . 40 channels

DCA/Pacific . . . . . 20 channels

ATC facility . . . . . 20 channels

g. Dimensions (height x width x depth) and weights :

RSE encoder. . . . subassembly	7 x 9 x 12 inches, 20 pounds
RSE power . . . . . supply sub-assembly	15-3/4 x 19 x 12 inches, 45 pounds
MSTE decoder. . . . subassembly	5-1/4 x 19 x 12 inches, 15 pounds
MSTE control . . . . and local display panel	14 x 19 x 4 inches, 8 pounds
MSTE power . . . . . distribution panel	14 x 19 x 4 inches, 8 pounds

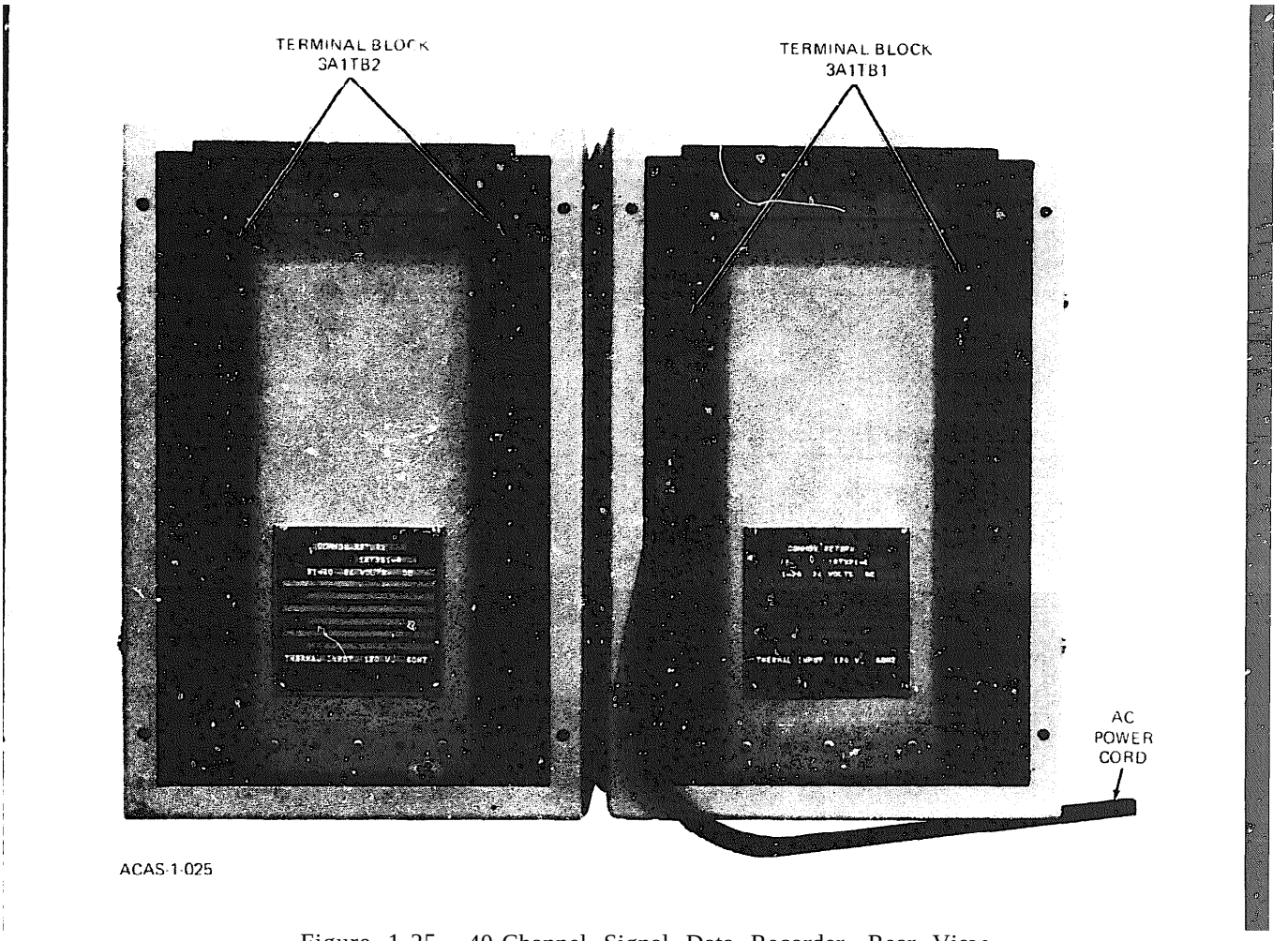


Figure 1-25. 40-Channel Signal Data Recorder, Rear View

MSTE ac power control panel	4 x 19 x 4 inches, 3 pounds
MSTE +3.6 volt dc power supply subassembly	3-1/2 x 19 x 16-1/2 inches, 55 pounds
MSTE ±12 volt dc power supply subassembly	5-1/4 x 19 x 12-1/2 inches, 55 pounds
40-channel signal data recorder	19-1/4 x 19 x 12-3/4 inches, 70 pounds
Recorder selector panel	7 x 19 x 5 inches, 6 pounds
Display frame	38 x 76 x 7 inches, 170 pounds

h. AC input power requirements:

RSE	120 volts, 1.75 amps, single phase, 50/60 Hz
MSTE	120 volts, single phase, 50/60 Hz
Recorder	120 volts, 0.6 amp, single phase, 50/60 Hz
Display frame	120 volts, 8.4 amps, single phase, 50/60 Hz

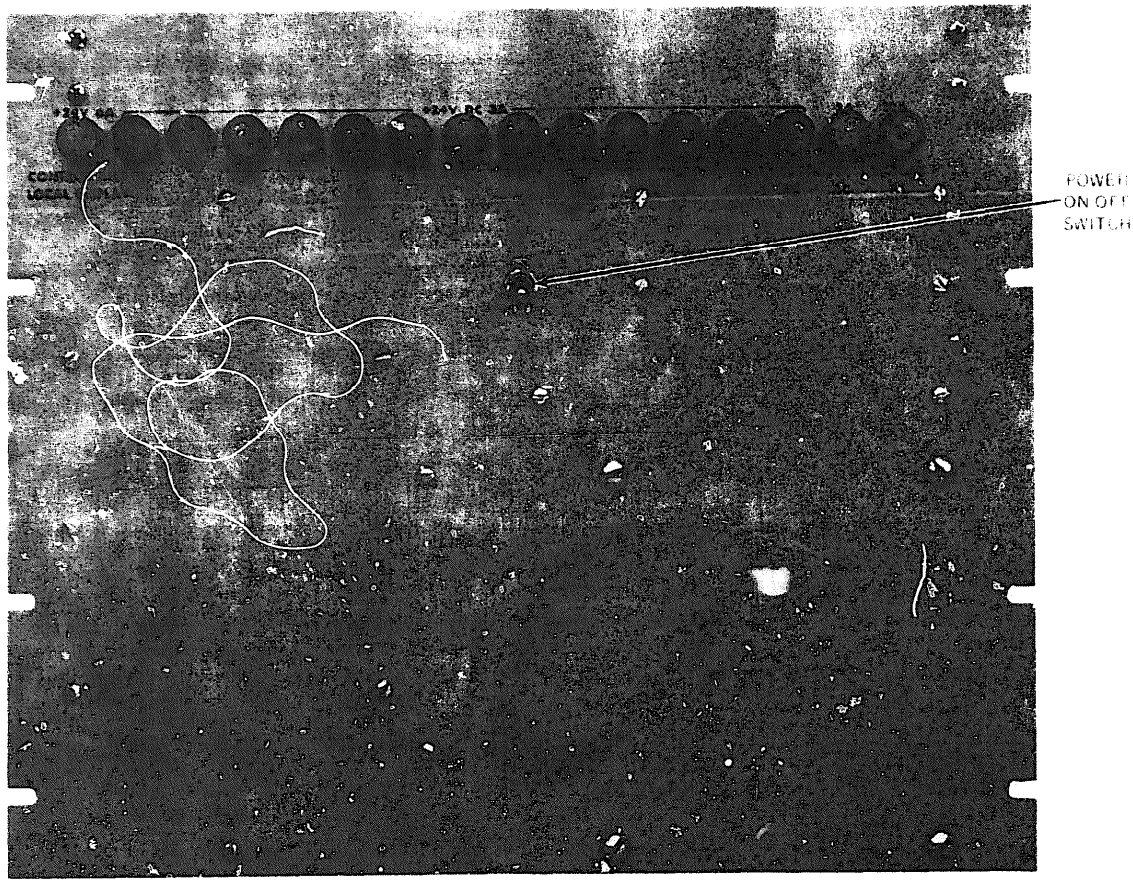
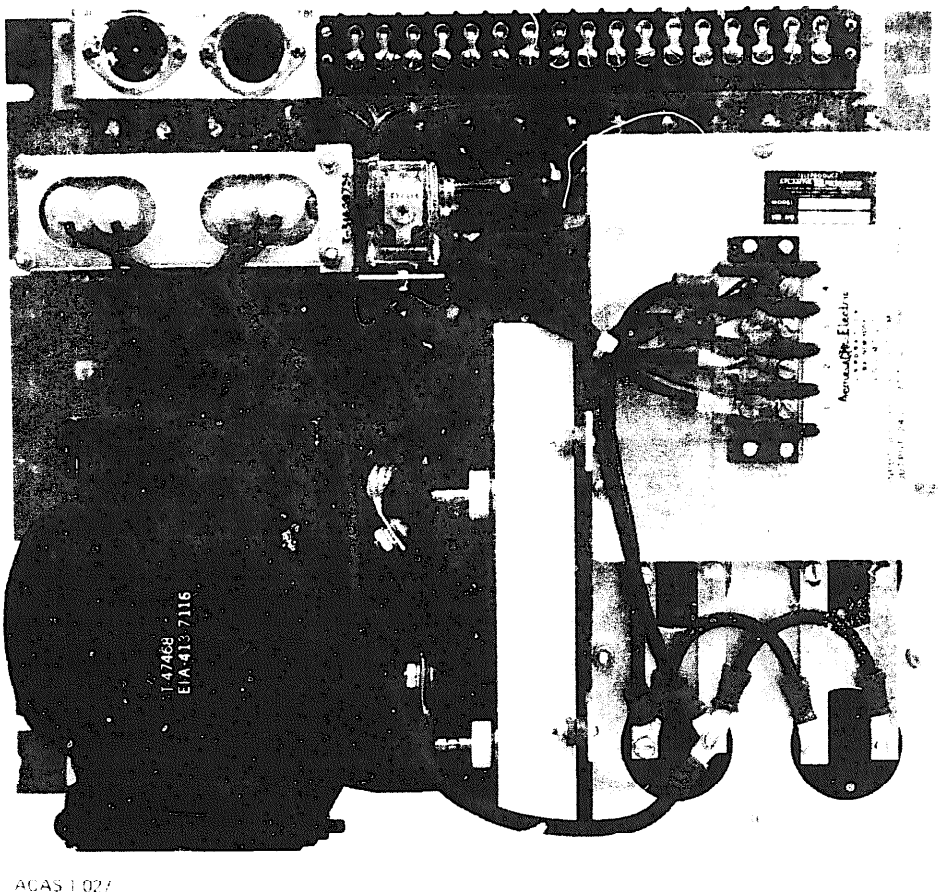


Figure 1-26. Display/Recorder +24 Volt DC Power Supply Subassembly, Front View

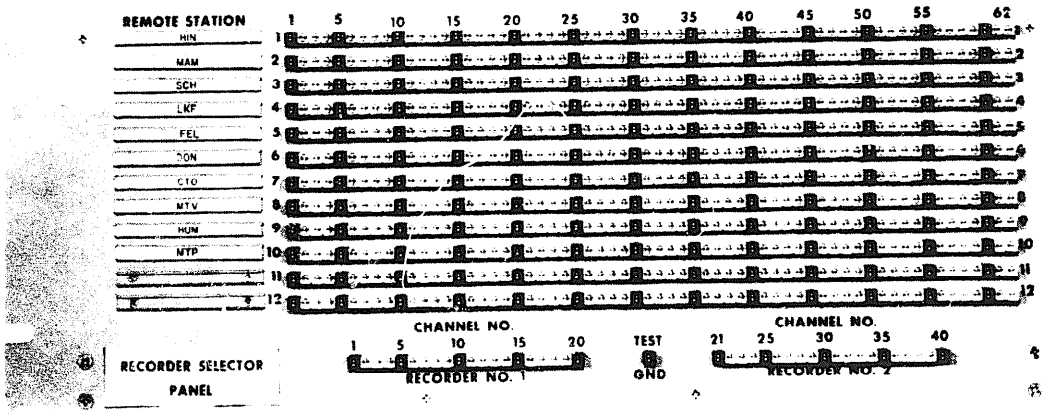
i. DC power requirements:

RSE logic	3.6 volts at 10 amps, +12 volts at 1.9 amps, ±12 volts at 0.4 amp
RSE polar loop	±60 volts at 0.2 amp
RSE neutral	+130 volts at 0.1 amp
MSTE logic	+3.6 volts at 45 amps, ±12 volts at 0.4 amp, +12 volts at 6 amps
Display lamps and recorder	+24 volts at 50 amps



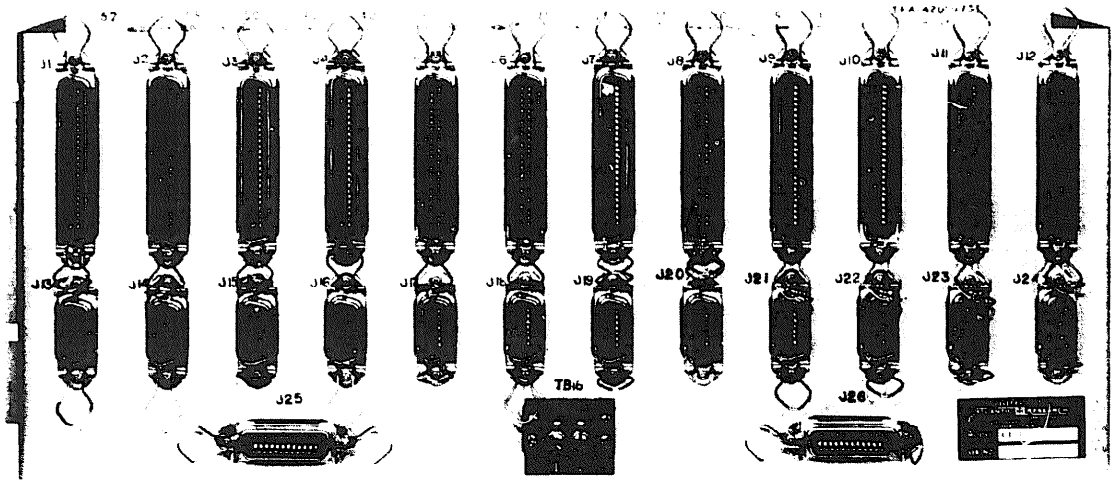
ACAS 1 027

Figure 1-27. Display/Recorder +24 Volt DC Power Supply Subassembly, Rear View



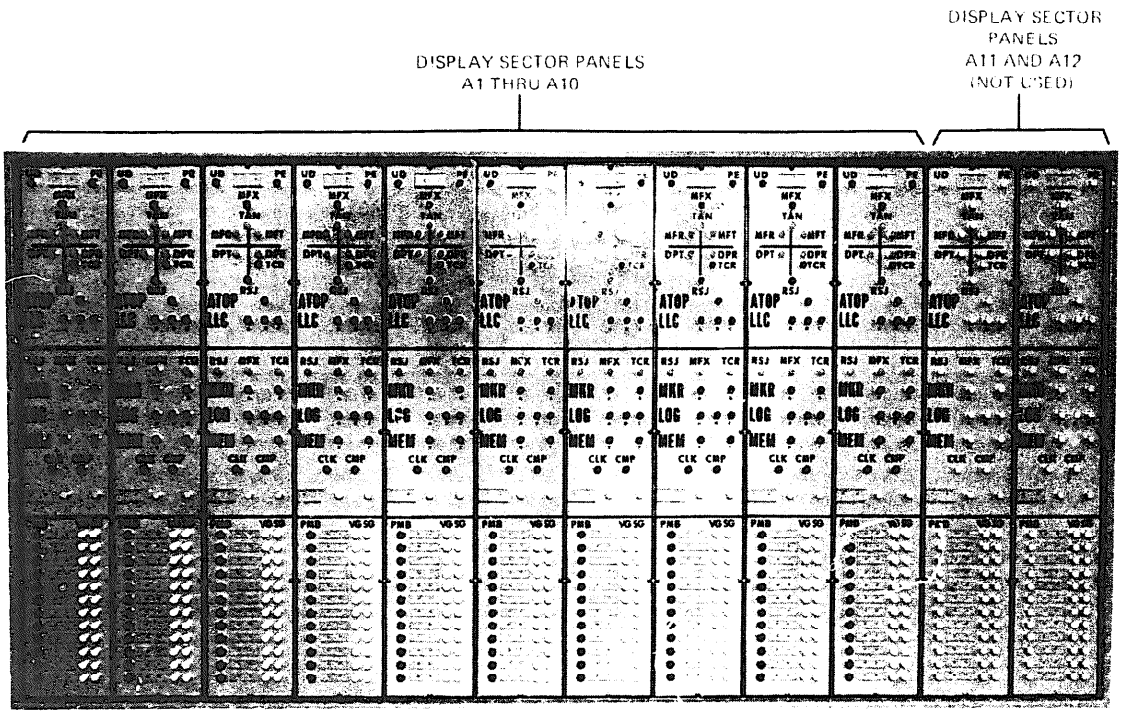
ACAS 1 028

Figure 1-28. Recorder Selector Panel, Front View



ACAS 1 029

Figure 1-29. Recorder Selector Panel, Rear View



ACAS 1 030

Figure 1-30. Display Frame, Front View

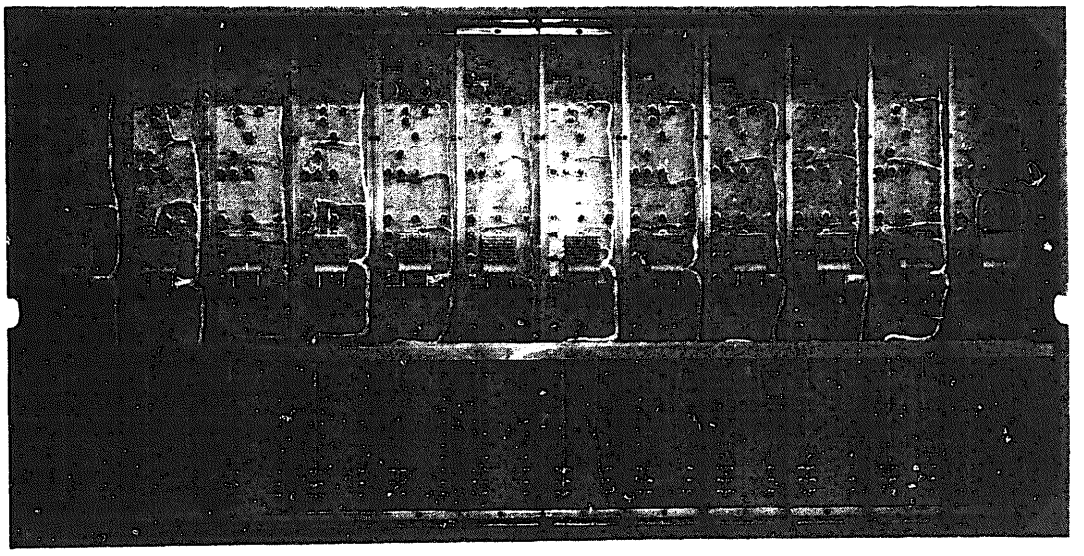


Figure 1-31. Display Frame, Rear View

Figure 1-32. Display Sector Panel

CHAPTER 2

OPERATION

2-1. INTRODUCTION.

2-2. This chapter provides information pertinent to ACAS equipment operation, including descriptions of system fault indications, modes of operation, and strapping options. System fault indication data, with references to the appropriate troubleshooting charts in Chapter 4 (Maintenance), is provided in paragraph 2-3. The ACAS modes of operation, including the indications (visual and audible) that result from each operating mode, are covered in paragraphs 2-5 through 2-11. These indications include the Remote Station input data displays contained on the Master Station display sector panels; data error, power supply error, and operating mode indications on both the MSTE control and local display panel 1A6 and RSE power supply subassembly A2 front panel; data (signal) status indicators located on the various circuit boards of the Remote and Master Station equipment. ACAS strapping options are described in paragraph 2-12; procedures for making strapping changes are contained in Chapter 4. Operating instructions such as equipment turn-on and shutdown procedures are not presented in this chapter. The ACAS is a continuously operating system which is shut down only when it is necessary to perform off -line maintenance; therefore equipment shutdown and turn-on procedures are included in Chapter 4.

NOTE

In addition to the various displays mentioned above, a chart recorder and associated patch panel are provided to maintain a permanent record of up to 40 selected status signals.

2-3. SYSTEM FAULT INDICATIONS.

2-4. There are two types of fault (alarm) indications associated with the ACAS equipment, data (logic) faults and power faults. If a power fault (ac, dc or open loop) is indicated during any of the ACAS operating modes, refer to the appropriate troubleshooting table in Chapter 4 for corrective action. However, if a data fault (parity error, unreliable data, no signal and/or no transition) is indicated, it must first be ascertained whether this is an abnormal indication for the mode in use. (Refer to paragraphs 2-5 through 2-11.) If the particular fault indication is abnormal, refer to the appropriate troubleshooting table for corrective action.

2-5. NORMAL ACAS INDICATIONS.

2-6. NORMAL OPERATING MODE. When ACAS is in the normal operating mode (MODE switch set to NORMAL), various indications are provided on the Master Station display panels to indicate the status of the AUTOVON Switch data inputs. Table 2-1 lists the AUTOVON Switch status signal input pairs, associated ACAS Remote Station input circuit boards receiving this data, and the corresponding lamps on the display panel associated with each set of inputs. In addition to the display lamps, the Remote and Master Station circuit board lamps are in the following conditions.

a. Signal lamp flashes on Remote Station bit generator circuit board A1A1 (figure 1-5).

b. Remote Station non-&king input circuit boards A1A through AlA signal lamps (figure 1-5) sequence top to bottom and left to right. On non-locking input circuit board A1A4, only top lamp lights in sequence.

c. Signal lamp flashes on Master Station bit analyzer circuit board A2 (figure 1-11).

d. Master Station eight-output circuit board A5 through A14 signal lamps (figure 1-11) sequence.

2-7. ON-TEST MODE. In the ON-TEST mode (MODE switchset to ON TEST), short-circuit conditions are simulated at the input circuit boards and the following indications can be observed.

Table 2-1. ACAS Inputs and Associated Displays

AUTOVON SWITCH PAIRS	ACAS INPUT CIRCUIT BOARD	DISPLAY LAMPS
A1TB1 TERMINALS:		
A1-B1 Thru A24-B24	Line usage A1A14	MFX (red)
C1-D1 Thru C24-D24	Line usage A1A15	TAN
E1-F1 Thru E24-F24	Line usage A1A16	MFR
G1-H1 Thru G24-H24	Line usage A1A17	MFT
I1-J1 Thru I24-J24	Line usage A1A18	DPT
A1TB2 TERMINALS:		
A1-B1 Thru A24-B24	Line usage A1A19	DPR
C1-D1 Thru C24-D24	Line usage A1A20	TCR (red)
E1-F1 Thru E24-F24	Line usage A1A21	RSJ (red)
G1-H1	Input switch A1A10	ATOP
G2-H2	Input switch A1A10	LLC-A
G3-H3	Input switch A1A10	LLC-B
G4-H4	Input switch A1A10	LLC-C
G5-H5	Input switch A1A10	RSJ (amber)
G6-H6	Input switch A1A10	MFX (amber)
G7-H7	Input switch A1A10	TCR (amber)
G8-H8	Input switch A1A10	MKR-A
G9-H9	Input switch A1A10	MKR-B
G10-H10	Input switch A1A10	LOG-A
G11-H11	Input switch A1A10	LOG-B
G12-H12	Input switch A1A10	LOG-C
G13-H13	Input switch A1A10	MEM-X
G14-H14	Input switch A1A10	MEM-Y
G15-H15	Input switch A1A10	CLK

Table 2-1. ACAS Inputs and Associated Displays (Cont)

AUTOVON SWITCH PAIRS	ACAS INPUT CIRCUIT BOARD	DISPLAY LAMPS
A1TB2 TERMINALS:		
G16-H16	Input switch A1A10	CMP
G17-H17	Input switch A1A11	PMB-1
G18-H18	Input switch A1A11	VG-1
G19-H19	Input switch A1A11	SG-1
G20-H20	Input switch A1A11	PMB-2
G21-H21	Input switch A1A11	VG-2
G22-H22	Input switch A1A11	SG-2
G23-H23	Input switch A1A11	PMB-3
G24-H24	Input switch A1A11	VG-3
G25-H25	Input switch A1A11	SG-3
G26-H26	Input switch A1A11	PMB-4
I1-J1	Input switch A1A11	VG-4
I2-J2	Input switch A1A11	SG-4
I3-J3	Input switch A1A12	PMB-5
I4-J4	Input switch A1A12	VG-5
I5-J5	Input switch A1A12	SG-5
I6-J6	Input switch A1A12	PMB-6
I7-J7	Input switch A1A12	VG-6
I8-J8	Input switch A1A12	SG-6
I9-J9	Input switch A1A12	PMB-7
I10-J10	Input switch A1A12	VG-7
I11-J11	Input switch A1A12	SG-7
I12-J12	Input switch A1A12	PMB-8
I13-J13	Input switch A1A12	VG-8

Table 2-1. ACAS Inputs and Associated Displays (Cont)

AUTOVON SWITCH PAIRS	ACAS INPUT CIRCUIT BOARD	DISPLAY LAMPS
A1TB2 TERMINALS:		
I14-J14	Input switch A1A12	SG-8
I15-J15	Input switch A1A13	PMB-9
I16-J16	Input switch A1A13	VG-9
I17-J17	Input switch A1A13	SG-9
I18-J18	Input switch A1A13	PMB-10
I19-J19	Input switch A1A13	VG-10
I20-J20	Input switch A1A13	SG-10
I21-J21	Input switch A1A13	PMB-11
I22-J22	Input switch A1A13	VG-11
I23-J23	Input switch A1A13	SG-11
I24-J24	Input switch A1A13	PMB-12
I25-J25	Input switch A1A13	VG-12
I26-J26	Input switch A1A13	SG-12

a. On RSE power supply subassembly A2 panel (figure 1-7), the TEST lamp lights.

b. On MSTE control and local display panel 1A6 (figure 1-13), associated TEST PATTERN lamp lights.

c. On the Master Station display sector panel (figure 1-30), all lamps light except PE.

d. At the Remote Station, the circuit board lamps are in the following conditions:

1. Bit generator circuit board AlAl lamp is flashing.

2. Non-locking input circuit board AlA through A1A9 lamps sequence, top to bottom and left to right. On board A1A4, only bottom lamp lights in sequence.

e. At the Master Station, bit analyzer circuit board A2 lamp is flashing and the eight-output circuit board A5 through A14 lamps sequence.

2-8. OFF-TEST MODE. In the OFF-TEST mode (MODE switch set to OFF TEST), open-circuit conditions are simulated at the input circuit boards and the following indications can be observed.

a. On RSE power supply subassembly A2 panel, the TEST lamp lights.

b. On the MSTE control and local display panel 1A6, associated TEST PATTERN lamp lights.

c. On the Master Station display sector panel, all lamps are off except UD.

d. At the Remote Station, the circuit board lamps are in the following conditions:

1. Bit generator circuit board AlAl lamp is flashing.

2. Non-locking input circuit board AlA through AlA lamps sequence, top to bottom and left to right. On board A1A4, only bottom lamp lights in sequence.

3. At the Master Station, bit analyzer circuit board A2 lamp is flashing and the eight-output circuit board A5 through A14 lamps sequence.

2-9. LOOP ADJUST MODE. In the loop adjust mode (MODE switch set to LOOP ADJ), a constant mark is generated to adjust loop current in the polar/neutral current regulator circuits. The following indications can be observed.

a. On RSE power supply subassembly A2 panel, the TEST and NO TRNSN lamps light, and the audible alarm sounds if no-transition alarm is strapped for audible.

b. On MSTE control and local display panel 1A6, the associated NO TRANSITION lamp lights, and the audible alarm sounds if no-transition alarm is strapped for audible.

c. On the Master Station display sector panel, the UD lamp is lighted (other lamps, including PE lamp, may also be lighted).

d. At the Remote Station, the signal lamp on the bit generator will be off if strapped for EIA and on if strapped for MIL. All non-locking input circuit board lamps are off.

e. At the Master Station, the bit analyzer and eight-output circuit board lamps are off.

2-10. EQUIPMENT CALIBRATION MODE. In the equipment calibration mode (MODE switch set to EQPT CAL), continuous mark-space reversals are generated to calibrate the baud-rate oscillators on the bit generator and bit analyzer circuit boards. The following indications can be observed.

a. On RSE power supply subassembly A2 panel, the TEST lamp lights.

b. On MSTE control and local display panel 1A6, associated TEST PATTERN and PARITY ERROR lamps light.

c. On the Master Station display sector panel, UD and PE lamps light, and other display lamps may light.

d. At the Remote Station, the bit generator lamp flashes and the non-locking input circuit lamps do not sequence.

e. At the Master Station, the bit analyzer lamp flashes and the eight-output circuit lamps do not sequence.

2-11. FACILITIES TEST MODE. In the facilities test mode (MODE switch set to FACIL TEST), two characters are generated, each one containing alternate mark and space information bits, and each character's information bits reversed from each other. The following indications can be observed:

a. On RSE power supply subassembly A2 panel, the TEST lamp lights.

b. On MSTE control and local display panel 1A6, associated TEST PATTERN lamp lights.

c. On the Master Station display sector panel, the UD lamp is lighted (other lamps, including PE lamp, may also be lighted).

d. At the Remote Station, the bit generator lamp flashes and the two lamps on non-locking input circuit board AlA light sequentially.

e. At the Master Station, the bit analyzer lamp flashes and the eight-output circuit board lamps are off.

2-12. STRAP OPTIONS.

2-13. Table 2-2 provides a list of all programmable straps contained on the Remote and Master Station circuit boards with the appropriate option selected in the present ACAS equipment configuration.

2-14. OPERATING INSTRUCTIONS.

2-15. There are no operating instructions applicable to ACAS. The ACAS operating controls and indicators are used to perform maintenance functions. Refer to Chapter 4 for maintenance procedures.

Table 2-2. ACAS Strapping Options

CIRCUIT BOARDS	STRAP OPTION	ACAS SELECTION
	REMOTE STATION EQUIPMENT	
Bit generator A1A1	Level - 5, 7, 8	8
	Clock - Int, Ext Pos, Ext Neg	Int
	Data - Closure at Input = mark, space	mark
	Start - Ext, Automatic	Automatic
	Stop (8 level only) - 1 element, 2 elements	2 elements
	Parity - Odd, Even	Odd
	Output Sense - EIA, MIL	EIA (neutral) MIL (polar)
Line usage A1A14-A21	Count Strap Field - 1 to 32	Optional
Coupling repeaters A2A2A1 and A2A2A2	LHDX, RHDX	RHDX
Local alarm A2A2A4	Audible Alarms [A(in), G(out)] :	
	Strap 1 - Open Loop	Optional
	Strap 2 - DC Failure	Optional
	Strap 3 - No Transition	Optional
	Strap 4 - AC Failure	Optional
	MASTER STATION TERMINAL EQUIPMENT	
Bit analyzer A2	Level - 5, 7, 8	8
	Clock - Int, Ext	Int
	Input Polarity - Mark Pos, Mark Neg	Mark Pos
	Idle Sense - Space, Mark No trans	No trans
	Voltage - ±12V, -24V	±12V
Shift detector A3	Character Recognizer	See figure 3-23
Display driver A15-A22	Indicator Status (8 each module F(Flashing), N(Norma1)	Optional
Local alarm A1	Audible Alarms [A(in), G(out)] :	
	Strap 1 - No Transition	Optional
	Strap 2 - DC Failure	Optional
	Strap 3 - AC Failure	Optional
	Strap 4 - Open Loop	Optional

CHAPTER 3

THEORY OF OPERATION

3-1. INTRODUCTION.

3-2. This chapter provides theory of operation for the ACAS. Included is a general block diagram description of the system, which is followed by individual functional descriptions of the ACAS Remote and Master Stations. In addition, functional descriptions are provided for the individual circuit boards and modules contained in the Remote and Master Stations, as well as the power supply subassembly in the display section. Appropriate figure references are provided throughout the text to identify the simplified logic and block diagrams at each level of discussion. The system description is based upon the DCA-Europe configuration where ten Remote Stations operate in conjunction with the Master Station at Stuttgart, West Germany.

3-3. ACAS FUNCTIONAL DESCRIPTION.

3-4. ACAS provides equipment status indications of remote AUTOVON Switches through the use of lamp display panels and chart recorders. (Figure FO-1 is the overall block diagram of the system.) Each ACAS Remote Station is capable of sensing the condition of up to 244 wire pairs from the AUTOVON Switch, either for open or short circuit conditions. After sensing, the input signals are encoded into ten 11-bit data characters. These 10 characters each consist of a start bit (space), six data or information bits, a securit: bit (always a mark for a data character), a parity bit (odd parity) and two stop bits (marks). A start-of-message (SOM) character (also eleven bits, with the security bit always a space) is generated and precedes the data characters in the message as it is transmitted to the Master Station. Refer to figure 3-1 for an example of the timing of a complete 11 character message cycle. In addition to normal data transmission, the MODE switch on the Remote Station encoder (figure 1-5) selects various test modes which simulate data for system checkout and adjustment. Examples of the characters generated in each of the ACAS modes are shown in figures 3-2 and 3-3. The encoded messages from the Remote Stations are then fed via a communications link to the Master Station terminal equipment as either high-level neutral or polar signals.

3-5. As shown in figure FO-1, each Remote Station operates in conjunction with a separate Master Station decoder. Each decoder receives the encoded serial data characters from its associated Remote Station and checks them for proper parity. After the start, parity, and stop bits have been processed, the start-of-message (SOM) character is decoded, as determined by a preprogrammed (via strapping) module, and the remaining 10 information characters of the message are converted from serial-to-parallel format. The parallel outputs from the decoders are then applied to the display panel and recorder equipment. In both the Remote and Master Stations, audible and/or visual alarms are provided to detect equipment status and operating modes.

3-6. The decoded output signals from the Master Station terminal equipment represent AUTOVON system equipment status. These status indications are displayed visually on the display panel, providing operating personnel with test data and real-time indication of AUTOVON Switch status. The display frame contains 12 display sectors (10 operational, two spares for expansion), each depicting the status of a particular Remote Station and associated master decoder. Up to 40 of these equipment status signals (20 at Kunia) can be monitored simultaneously by a signal data (chart) recorder. Selection of signals for recorder monitoring is accomplished by patching at a recorder selector panel.

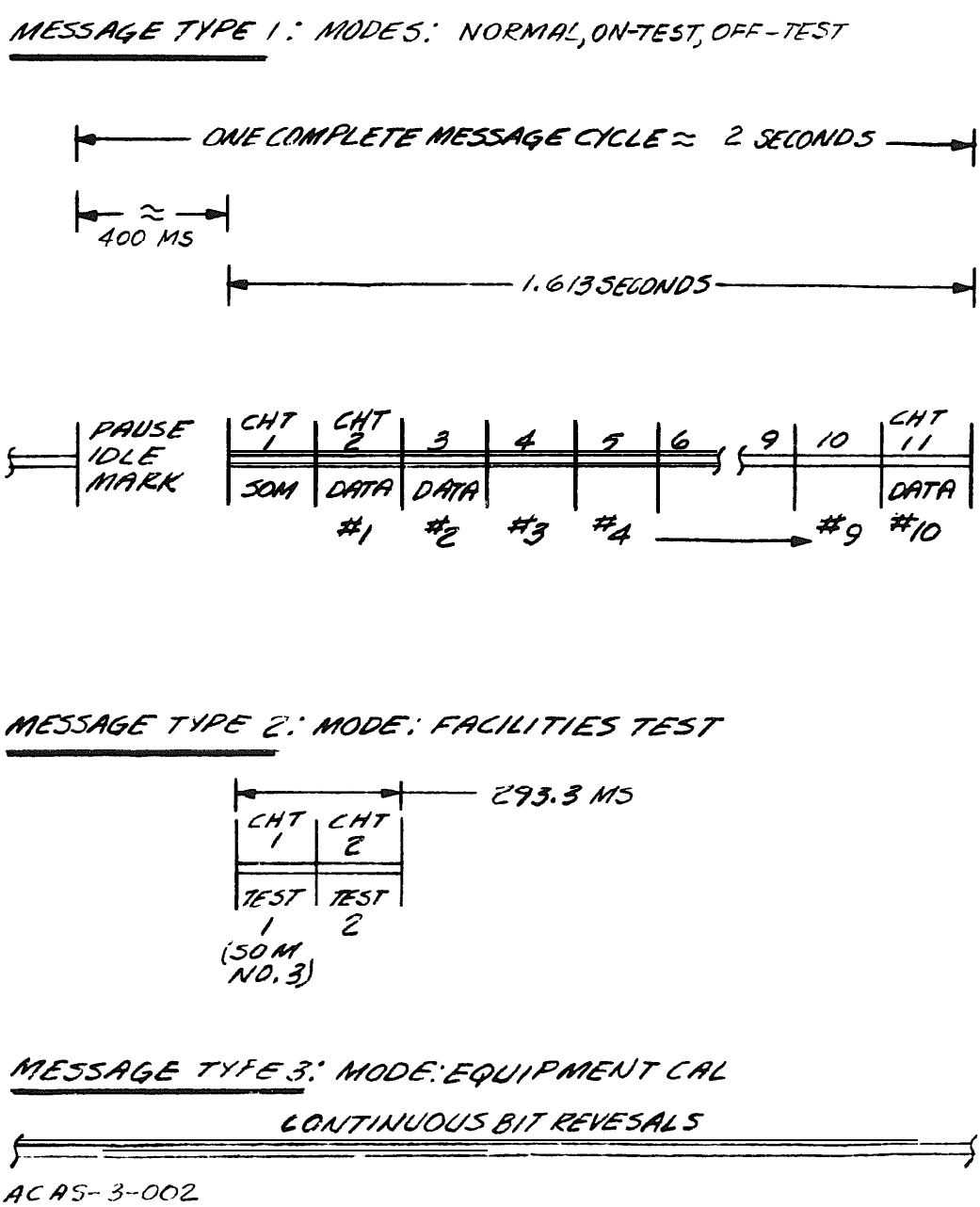


Figure 3-1. Message Formats and Timing

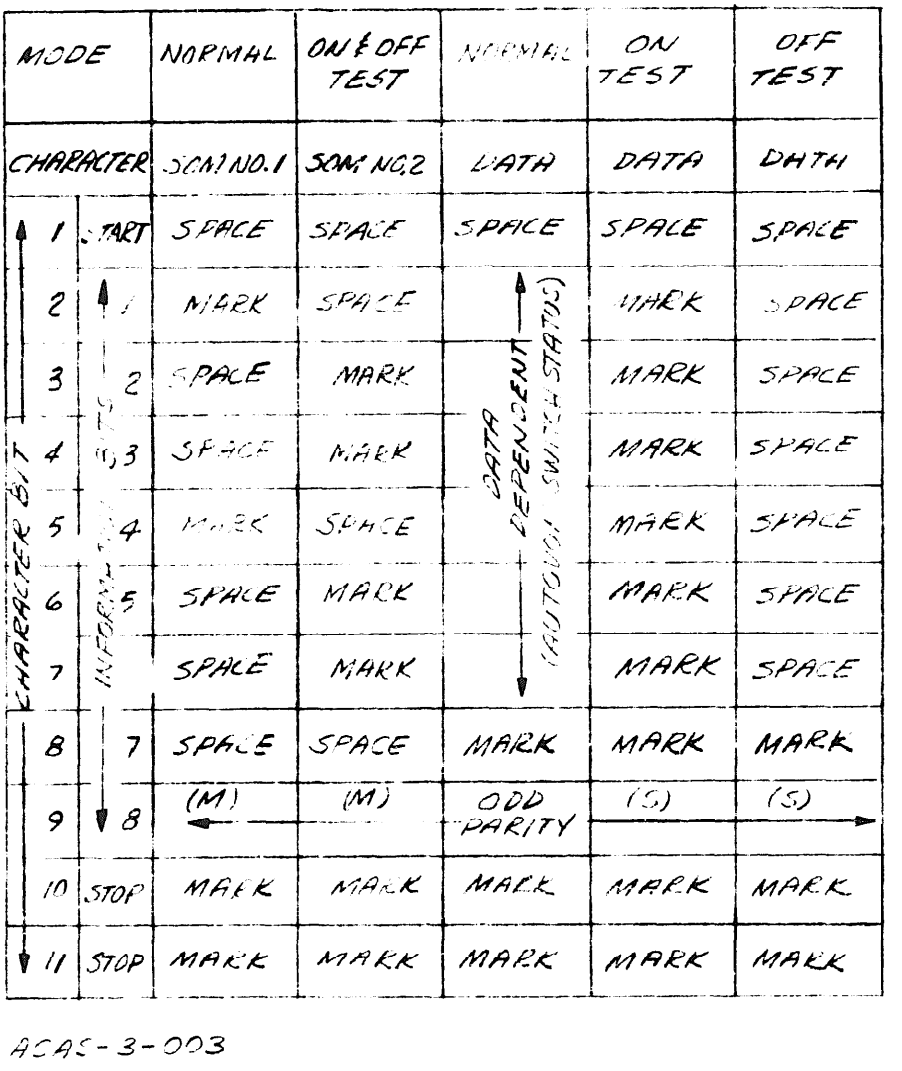


Figure 3-2. Character Bit Assignments, Message Type No. 1

3-7. REMOTE STATION FUNCTIONAL DESCRIPTION.

3-8. GENERAL. The following paragraphs provide a functional description of an ACAS Remote Station. (Refer to figure FO-2.) The functions performed by the Remote Stations include: data gathering, character and message encoding, data transmission, monitoring and alarms, power distribution, and test modes. Except for the test mode (paragraph 3-18), all references and signal routings pertain to normal operation (as selected by MODE switch S1). In the test mode discussion, each switch position is described together with its associated test message and method of generation. References to various circuit and display group lamps are not provided in this discussion, but are covered in detail in Chapter 2 of this manual. To aid in understanding the functional description, refer to the Remote Station detailed circuit theory (paragraph 3-33) and the schematic and logic diagrams following Chapter 6.

3-9. DATA GATHERING. Data gathering in the Remote Station is provided by two different input circuit boards. (See figure FO-2.) The eight line usage circuits (A1A14 through A1A21) each receive up to 24 parallel inputs from the AUTOVON Switch and by use of an internal code strap field, determine whether

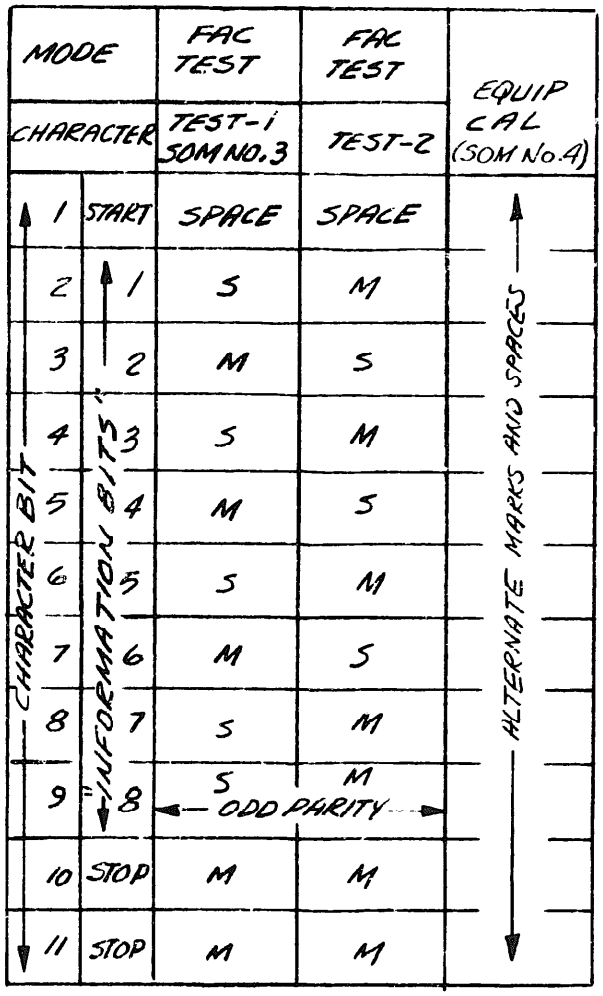


Figure 3-3. Character Bit Assignments, Message Type No. 2

the number of input lines in a short circuit condition equals this preprogrammed strap count. The line usage outputs, which indicate AUTOVON Switch status (approximately 0 volts when equaling or exceeding strap count), are applied as parallel inputs to encoder non-locking input circuit board A1A5.

3-10. Data gathering in each Remote Station is also provided by four input switch circuit boards, A1A10 through A1A13. The parallel inputs to these modules (from the AUTOVON Switch) represent specific maintenance and traffic status indications. In the present ACAS configuration, A1A10 receives 16 inputs, while A1A11 through A1A1 receive 12 each. The 52 outputs from the input switch circuit boards, which represent their associated input conditions (positive output represents open; ground represents closure), are applied in parallel to encoder non-locking input circuits A1A through A1A9.

3-11. DATA CHARACTER AND MESSAGE ENCODING. Character and message encoding in the Remote Station is accomplished by non-locking input circuit boards AlA through AlA and bit generator circuit board AlAl. The bit generator is the master logic encoder in the Remote Station and provides all basic timing required for character and message encoding. Since more than four non-locking input circuit boards are used, power buffer circuit AlA is included to provide appropriate fan-out capabilities.

3-12. Each non-locking input circuit board is divided into two identical character encoders, each encoding one 7-bit character. The circuits receive 12 parallel data bit inputs (two sets of 6 each) from the line usage and input switch circuit boards, as well as the basic bit clock and sequence gates from the bit generator. (Two exceptions exist in non-locking input circuits A1A and A1A4, which are internally preprogrammed, via connector wiring, to generate the facilities test characters and the normal and test on, test off SOM characters, respectively.) Each non-locking input circuit (except A1A3 and A1A4) then encodes the applied input data into two 7-bit serial characters. The seventh bit is preprogrammed, via connector wiring, as a mark for data characters, and as a space for SOM characters. The initial character advance signal for the SOM is supplied to A1A by the bit generator. All other character advance signals are internally generated by the non-locking input circuits to advance from the first to second character of each circuit and from the second character of each circuit to the first character of the subsequent circuit. In addition, an end-of-scan (EOS) signal is supplied back to the bit generator to reset its sequence counter. The encoded outputs from the non-locking input circuit boards, which represent part of the SOM character (seven bits) and part of 10 data characters (seven bits each), are then applied to bit generator A1A1.

3-13. After receiving part of the SOM and data character inputs from the non-locking

input circuit boards, the bit generator further encodes the input information to provide a complete 11 bits per character and 11 characters per message format. For normal operation for the SOM character, this includes inserting a space for bit 1 (start bit), inserting the 7-bit SOM from non-locking input circuit A1A4, generating an odd parity bit (mark) for bit 9, and inserting stop bits (both marks) for bits 10 and 11. For the 10 data characters, a space is inserted for bit 1 (start bit), followed by the 'I-bit data character (character bit 8 is always a mark for data) from the non-locking input circuits. This is then followed by the parity bit (generated for odd parity) and two marks for stop-bits 10 and 11. (Refer to figures 3-1 through 3-3 for the message format under the character column labeled SOM No. 1 and Data.) The serial data message from bit generator A1A1 is then applied (in polar form) to the polar and neutral coupling repeaters.

3-14. DATA TRANSMISSION. The polar serial data message from the bit generator is applied to power supply subassembly A2, where it is converted to a high level loop output capable of driving the external communications equipment. The POLAR/NEUT switch on the power supply subassembly is used to select either polar or neutral loop outputs, depending upon the input requirement of the external communications equipment at the particular remote site.

3-15. For polar loop output, the serial data message is applied to polar coupling repeater A2A2A2 which, in conjunction with *60 volt power supply A2A1A2, performs the low-level to high-level conversion. For neutral loop output, neutral coupling repeater A2A2A1, in conjunction with ±130 volt power supply A2A1A1, performs the low-level to high-level conversion. Automatic current regulator A2A2A3 regulates the polar or neutral loop current outputs to 20 or 60 milliamperes, respectively.

3-16. MONITORING AND ALARMS. The monitoring alarms provide indications of the failure of any Remote Station operating voltage, loss of loop current, keying failure (no transitions in output signal), and loss of ac or dc power. Strapping options (on local alarm circuit board A2A2A4) allow the selection of visual alarms only (lighting of lamps on remote station power supply subassembly A2), or, for some alarms, both visual and audible alarm indications. If audible strapping is selected, the AUDIO RELEASE switch on assembly A2 silences the audio alarm, but the appropriate alarm lamp remains on. A new failure again supplies an audible, as well as visual, alarm. In addition to failures, assembly A2 indicates when the Remote Station is in any mode other than NORMAL, by the lighting of the TEST lamp.

3-17. POWER DISTRIBUTION. Remote Station power supply subassembly A2 contains the power supply modules for the encoder subassembly logic circuits, protective fuses for the dc power supply outputs, ac input power connections and fuse and test points for monitoring the power supply voltages.

3-18. TEST AND CALIBRATION MODES. The MODE switch on the Remote Station encoder subassembly (figure 1-5) selects the operating mode for the entire ACAS. Included are NORMAL operation (described previously), ON TEST, OFF TEST, FACIL TEST, EQPT CAL and LOOP ADJ. The following paragraphs describe each of the test modes, equipment calibration mode and loop adjust mode in further detail. The primary difference between these and the normal operating mode is that data is simulated in the line usage and input switch circuits (for on test and off test only) and routed differently through the encoder (non-locking input and bit generator) circuits. The interconnection of encoder circuit boards for each setting of the MODE switch is shown on the Remote Station functional block diagram (figure FO-4).

3-19. On Test Mode. In the ON TEST mode, MODE switch S1 applies a positive voltage (nominally 3.6 volts DC) to the ON TEST inputs of the line usage circuits and to the Test In and Input Enable inputs of the input switch circuits. This simulates shorted AUTOVON Switch signals and results in all positive outputs from the line usage and input switch modules. All other functions are identical, except that a test start of message (test SOM) is generated in the bottom half of non-locking input circuit A1A4, rather than the top half of non-locking input circuit AlA which is for normal SOM. This results in a message containing the Test SOM, followed by 10 data characters each containing all marks (six) as information bits, as shown in figure 3-2. In addition, a ground is applied to the local alarm circuits which causes a TEST lamp to light. (This lamp will also light for all test, calibrate and adjustment modes.)

3-20. Off Test Mode. In the OFF TEST mode, a positive voltage (nominally 3.6 volts dc) is applied to the Off Test inputs of the line usage circuits and to the Input Enable inputs of the input switch circuits. A ground signal is applied to the Test In inputs of the input switch modules. The same test SOM is generated as in the ON TEST mode but this time the six data character information bits are all spaces, as shown in figure 3-2.

3-21. Facilities Test Mode. In the FACIL TEST mode, the character counter advance signal from bit generator AlAl is routed through the S1D contacts of the MODE switch to facilities test non-locking input circuit A1A3. In addition, a ground is applied to the bit generator via the SIF contacts of the MODE switch which disables the 400-ms pause normally occurring between messages. The transition monitor output of the bit generator determines the end of the second character of the facilities test (from A1A3) and is applied, after delay, through the power buffer A1A and the MODE switch S1G contacts to the bit generator external start input, to repeat the two character transmission. This results in a message containing two 11-bit characters with a format as shown in figures 3-1 (message type 2) and 3-3 (test 1 character and test 2 character of facility test). Note that the primary difference between the test 1 and test 2 characters is that bit 2 of test 1 starts with a space while bit 2 of test 2 starts with a mark, and from bit 2 through bit 8, each bit is reversed from the one preceding it.

3-22. Equipment Calibration Mode. In the EQPT CAL mode, a ground is applied to the CAL input of bit generator circuit AlAP. This causes the bit generator to produce a message containing continuous bit reversals. (Refer to figures 3-1 and 3-3.) This message continues as long as the MODE switch is in the EQPT CAL position and is used in conjunction with an internal potentiometer to adjust the bit generator baud rate.

3-23. Loop Adjust Mode. In the LOOP ADJ mode, a ground is applied through the S1F switch contacts to the GND= MARK OUT terminal (pin 4) of the bit generator. This causes a constant mark signal to be fed from the SIG OUT terminal (pin 3) of the bit generator to the bipolar and neutral coupling repeaters. Subsequently, this signal is used in adjustment of the loop current in the 20 ma and 60 ma regulators on the automatic current regulator circuit board.

3-24. MASTER STATION FUNCTIONAL DESCRIPTION.

3-25. GENERAL. The following paragraphs provide a functional description of the ACAS Master Station terminal equipment and display equipment. Figure FO-20 is a functional block diagram of the Master Station terminal equipment (MSTE). Since one master decoder is required for each Remote Station and all decoders are identical, only one will be covered. The following Master Station functions are included: data reception, SOM and data character decoding, output displays, monitoring and alarms, and power distribution. Specific references to various module and display group lamps are not provided as these are discussed in detail in Chapter 2 of this manual. To aid in understanding the functional description, refer to the Master Station detailed circuit theory (paragraph 3-69) and the schematic and logic diagrams contained in Chapter 6.

3-26. DATA RECEPTION. The 11-character serial data message from the Remote Station is applied to bit analyzer circuit board A2, of the Master Station terminal equipment. (See figure FO-20.) The bit analyzer is the master decoding element in ACAS Master Stations. Its first function after receiving the serial data message is to synchronize its self-contained oscillator with the incoming mark-to-space transition of the start element. This results in a positive-to-negative-going bit clock supplied to the shift detector, where it is used as the master timing element for the serial-to-parallel converter. The bit analyzer also generates an end-of-character signal at the initiation of the stop element of each character and an SOM strobe pulse during the last half of the last bit in each character. The bit analyzer then applies part of the serial data message, which consists of the 7-bit SOM and ten 'I-bit data characters, to shift detector 1A1A3 for SOM decoding and serial-to-parallel conversion of the data bits. In addition, parity and no-transition detectors are provided in the bit analyzer module. If the received data message contains even parity (parity error or equipment calibration mode), the PARITY ERROR lamp on the front panel will light. When this happens, an update inhibit signal is generated in local alarm circuit Al which subsequently inhibits display of erroneous data.

Furthermore, if the serial data message Contains no transition (either all marks or all spaces) for approximately 1.2 seconds or longer, the NO TRANS lamp will light, indicating that communications have been interrupted.

3-27. SOM AND DATA CHARACTER DECODING. Data character decoding in each Master Station decoder is accomplished by shift detector circuit board A3 and 10 eight-output circuit boards 1A1A5 through 1A1A14. The shift detector 1A1A3 decodes the four 7-bit SOM characters (by a preprogrammed strap field) as well as converting the ten 6-bit data characters from serial-to-parallel (6-bit) format. These parallel data bits are then applied to the 10 eight-output modules where each module decodes one 6-bit character of the complete message.

3-28. Most timing signals for the decoding functions are generated in the bit analyzer circuit 1A1A2. These include the bit clock which provides the basic timing for the serial-to-parallel conversion of the data bits, the SOM strobe which permits the SOM decode outputs only upon completion of the SOM character, and the end-of -character signal which sequences the 10 characters through the eight-output circuits. A fourth basic timing function is generated in power buffer circuit board 1A1A4, which effectively ORs the normal SOM and test NO. 1 SOM from the shift detector to provide a scan start pulse (ground level), when operating in either of these two modes. This pulse initiates decoding of the first data character (character 2) in eight-output circuit board 1A1A5, while all subsequent characters are initiated by the end-of-character pulse from the preceding eight-output circuit. Normal decoding is not utilized in test SOM No. 2 (facilities test) and test SOM No. 3 (equipment calibration) as the latter is used to adjust the baud rate oscillator in the bit generator and analyzer modules and the former (SOM No. 2, test No. 1 only) is used in checking the communication link between the Remote and Master Stations. In addition, all decoded SOM characters are applied to local alarm circuit board 1A1A1, which subsequently causes various lamps on the display panel to light.

NOTE

Power buffer A4 is necessary between various Remote Station circuit boards and the eight-output circuit board data bus to provide the required fan-out capabilities.

3-29. Each eight-output circuit board receives all 10 data characters of six parallel bits each. The end-of-character shift clock from the bit analyzer (via the power buffer) is used to sequence the characters through the eight-output circuits while the scan start pulse and end-of-character signals from each eight-output circuit enable the circuit to decode the proper message character. The 6-bit decoded parallel output from each eight-output circuit is then applied to the display and recorder selector panels, via display drivers 1A1A15 through 1A1A22.

3-30. OUTPUT DISPLAYS. The decoded output signals from the Master Station terminal equipment represent AUTOVON equip: ment status. All of these output signals are displayed visually on the display sector panels, providing the operating personnel with a constant real-time indication of both equipment usage and availability. In addition to these real-time displays, up to 40 status signals can be patched through recorder selector panel 3A2 to 40-channel (20-channel at Kunia) signal data recorder 3A1, providing a permanent record of AUTOVON Switch status.

3-31. MONITORING AND ALARMS. As described in paragraph 3-16, both visual and audible indications are provided in ACAS. The Master Station control and local display panel, 1A6, receives all inputs from the Remote Stations and distributes them to the appropriate subassemblies. Both Remote and Master Station failures light appropriate lamps, as do the loss of operating voltages, loss of signal, and parity error.

3-32. POWER DISTRIBUTION. Master Station power distribution panel 2A6 received input power to the station, and distributes dc power from the power supply assemblies. All input and output lines are fused, and all dc voltages are available at front panel test point connectors for monitoring.

3-33. FUNCTIONAL DESCRIPTION OF REMOTE STATION CIRCUITS.

3-34. The following paragraphs provide a detailed functional description of the circuits in the Remote Station encoder subassembly and power supply subassembly. Functional block diagrams are provided to support this description. For further details, refer to the individual circuit schematic diagrams contained in Chapter 6.

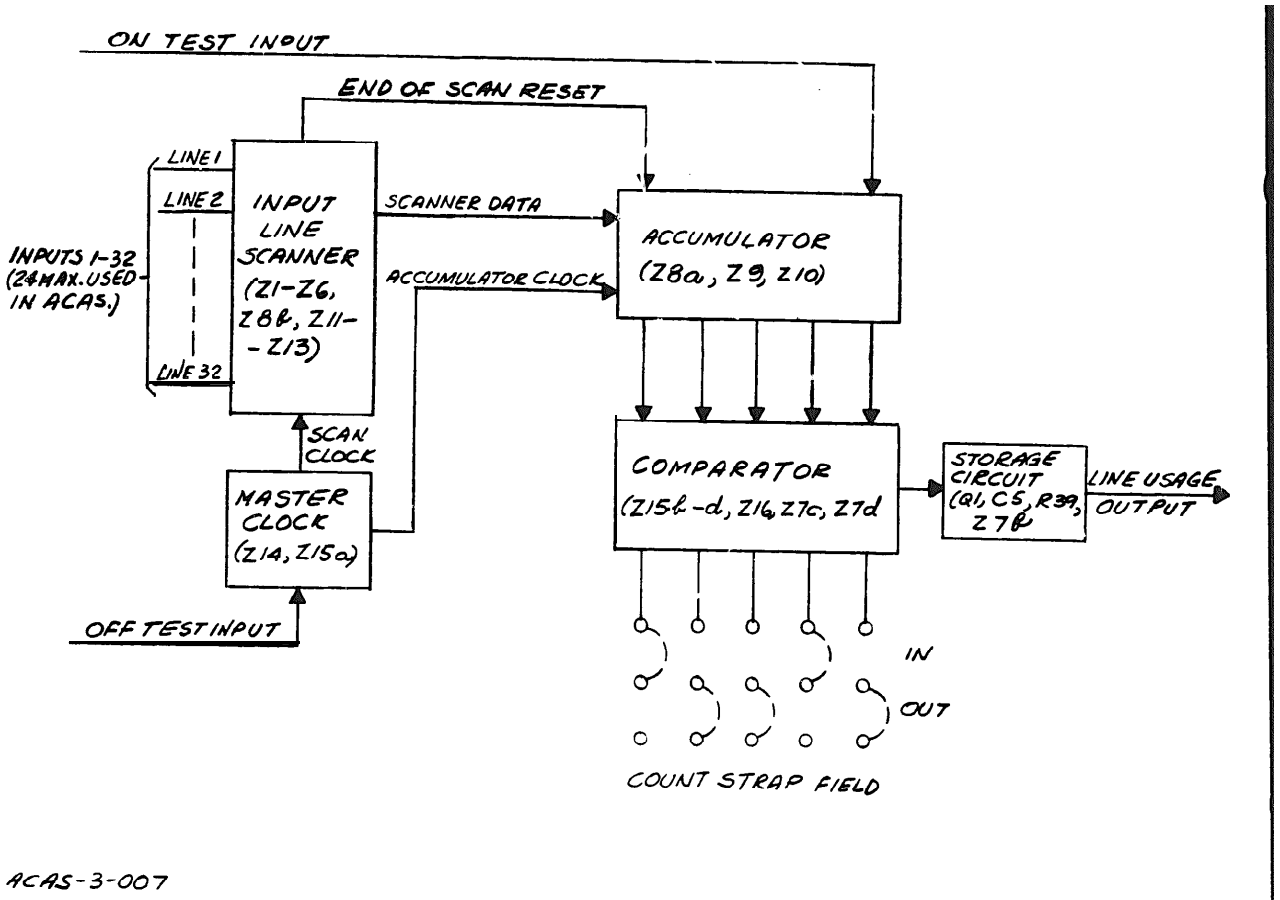


Figure 3-4. Line Usage Circuit, Block Diagram

3-35. REMOTE STATION ENCODER SUB-ASSEMBLY A1. The detailed functional description of the Remote Station encoder subassembly A1 is presented in signal flow sequence as follows: line usage circuit boards A1A1 through A1A21; input switch circuit boards A1A10 through A1A13; non-locking input circuit boards A1A3 through A1A9; bit generator circuit board A1A1; and power buffer circuit board A1A2.

3-36. Line Usage Circuit Boards A1A14-A1A21. The line usage circuit boards (figure 3-4) consist basically of an input line scanner, master clock, accumulator, comparator, count strap field, storage section and test functions. Since all line usage circuits are identical except for possible variations in the programmed count strap field, only one circuit will be discussed in detail.

3-37. The master clock (oscillator), which consists of Z14 and capacitors C2, C3, and C4, provides the basic 100-kHz (nominal) clock pulses for use by the input line scanner. In addition, an inverted clock is applied to the accumulator (via Z15a) when the off-test input is held at ground level.

3-38. The input line scanner, which consists of a scanning section (Z1 through Z6, excluding the Z4a and Z4b outputs) and a counter (Z11 through Z13 and Z8b), continuously scans the 32 input lines, (although ACAS uses only up to a minimum of 24 inputs, all lines are scanned) using one scan clock cycle per line (approximately 10 microseconds). The scan data

output represents the condition of the input line being scanned at any given moment, with ground representing "line in use" and +E representing "line not in use." When the scanner goes from input line 32 to input line 1, the counter provides an end-of-scan reset to the accumulator counter.

3-39. The accumulator is a counter (Z8a, Z9 and Z10) which is incremented by the negative transition of the accumulator clock when the scanned data is at ground. This counter is reset to zero by the end-of-scan reset pulse and counts the number of input lines in the in-use condition during the scan cycle. The binary output of the accumulator is then applied to a comparator (Z15b, c, d, Z16, Z7c and Z7d) which compares this binary number with the setting of the count strap field program. The count strap field consists of five straps with each strap representing a binary count and two selectable positions (IN and OUT). The program consists of the sum of the straps in theIN position. When the count in the accumulator and the count strap field are identical, a positive voltage is applied to the storage circuit.

3-40. The storage circuit (Q1, C5, R39 and Z7b) is basically a charging circuit which stores the positive input voltage for approximately 400 usec, or two scan cycles. This assures that as long as the number of input lines is equal to or greater than the programmed number in the count strap field, the line usage output will be activated. However, if the number of input lines is reduced to less than the programmed number, the output will deactivate within 400 usec.

3-41. Built-in test functions are provided to check module operation. When a positive level (nominally 3.6 volts dc) is applied to the on-test input, the accumulator counter increments continuously as a function of the accumulator clock. This results in the accumulator reaching a count comparable to the count strap program once every scan cycle. When a +3.6 volt level is applied to the off-test input, the accumulator clock is inhibited. This prevents the accumulator from incrementing and reaching the setting of the count strap field program. A further test would be to set the count strap field to all zeroes and verify that the end-of-scan reset pulse resets the accumulator counter to zero. Thus ON TEST checks the master clock, accumulator, comparator

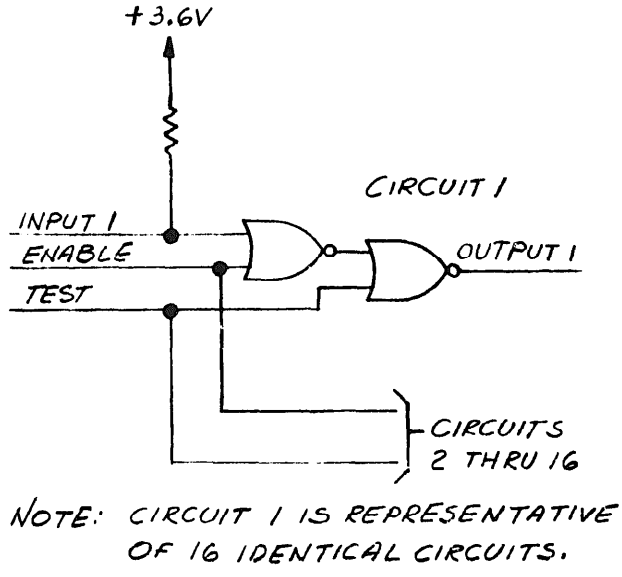


Figure 3-5. Input Switch Circuit, Simplified Logic Diagram

and storage circuits while OFF TEST checks the scanner counter, end-of-scan reset and storage circuit.

3-42. Input Switch Circuit Boards A1A10-A1A13. The input switch circuit boards provide buffering for the non-locking input circuits, as well as a means of testing simulated data in the encoder. Figure 3-5 is a simplified logic diagram showing the first of 16 identical stages located on the input switch circuit board. It should be noted that only board A1A10 utilizes all 16 inputs and outputs, whereas boards A1A11 through A1A13 utilize 12 each.

3-43. The enable input is common to the input of the first NOR gate of all 16 circuits and is at ground in normal operation. Similarly, the test input is common to the input of the second NOR gate, which is also at ground during normal operation. Therefore, during normal operation, the output of the first NOR gate is input 1 inverted and the final output of the second NOR gate is the inverted input 1 inverted, or input 1.

3-44. When a system test is to be performed a positive level is applied to the enable input. This causes the output of the first NOR gate to go to ground so that the output of the second

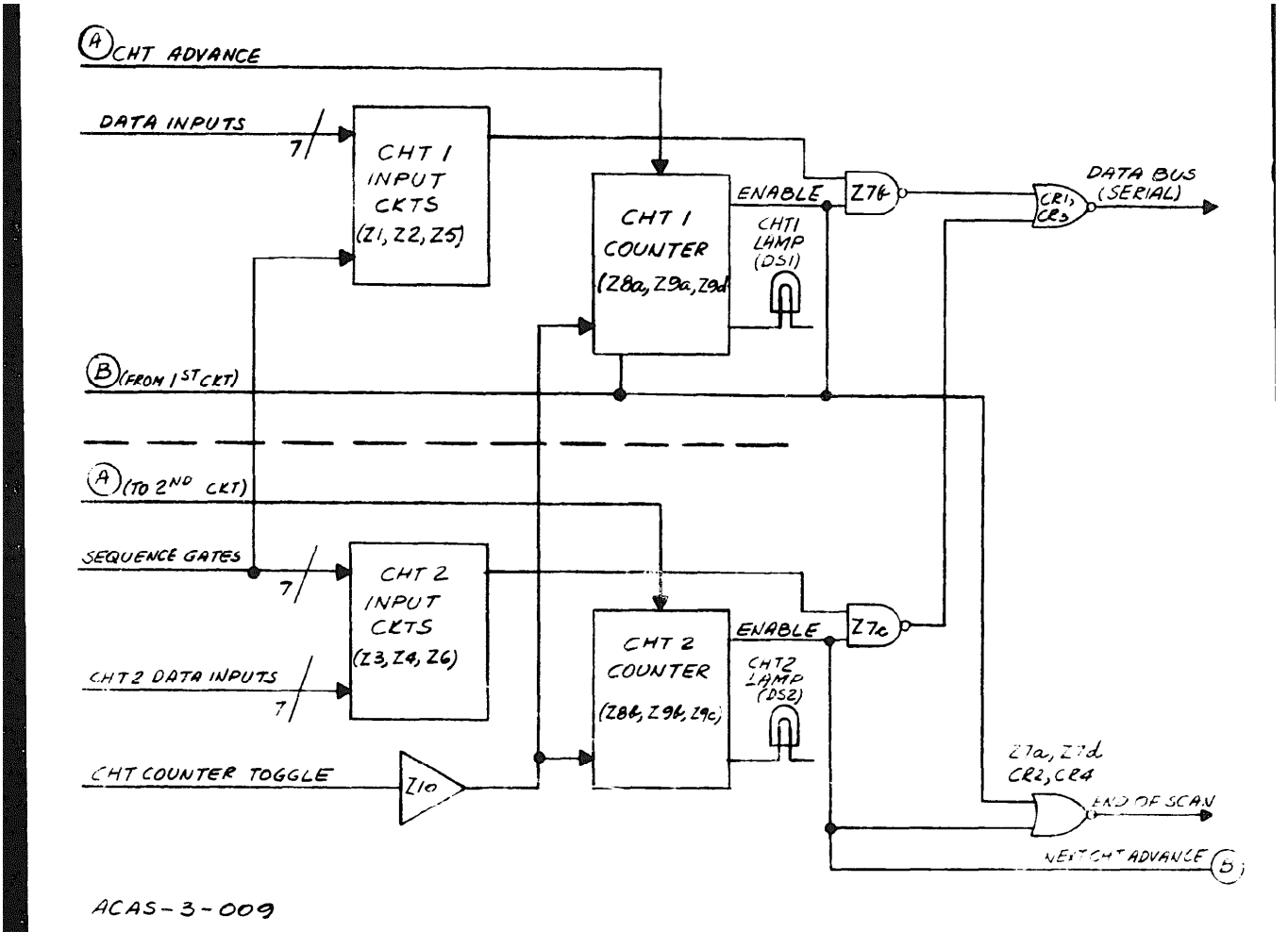


Figure 3-6. Non-Locking Input Circuit, Block Diagram

NOR gate becomes a function of the signal in the lest lead. If the test lead is at ground (off test), the output is a position voltage and if the test lead is a positive voltage (on test), the output is at ground. The 16 data (or test outputs) are the uncommitted collector type for use in driving the non-lockin? input modules.

3-35. Non-Locking Input Circuit Boards A1A3-A1A9. The non-lockin;: input circuit boards (figure 3-6) consist basically of two 8-bit character encoders, although the ACAS configuration utilizes 7-bit character encoding. Boards A1A3 and A1A4 provide 7-bit character encoding of the facilities test and start-of-message (SOM) characters, where encoding is accomplished by preprogramming the card file wiring. For all circuit boards, bit 7 is preprogrammed as a space for SOM characters and as a mark for all others. Circuit boards A1A5 through A1A9, however, encode the first 6 hits of the data characters from the line usage (A1A14-A1A21) and input switch (A1A10-A1A13) circuits by determining whether an input is present or absent at the instant that it is scanned. The scan, or sequence gate, inputs are supplied by hit generator circuit A1A1. Each character has an associated lamp on the circuit board which lights to indicate when that particular character is being scanned. The non-locking input boards provide parallel-to-serial conversion of input data for application to the hit generator data bus.

3-46. The circuit board contains two separate and identical sets of logic, each set of which encodes a single character. A dotted line on the block diagram divides tile circuit board into its

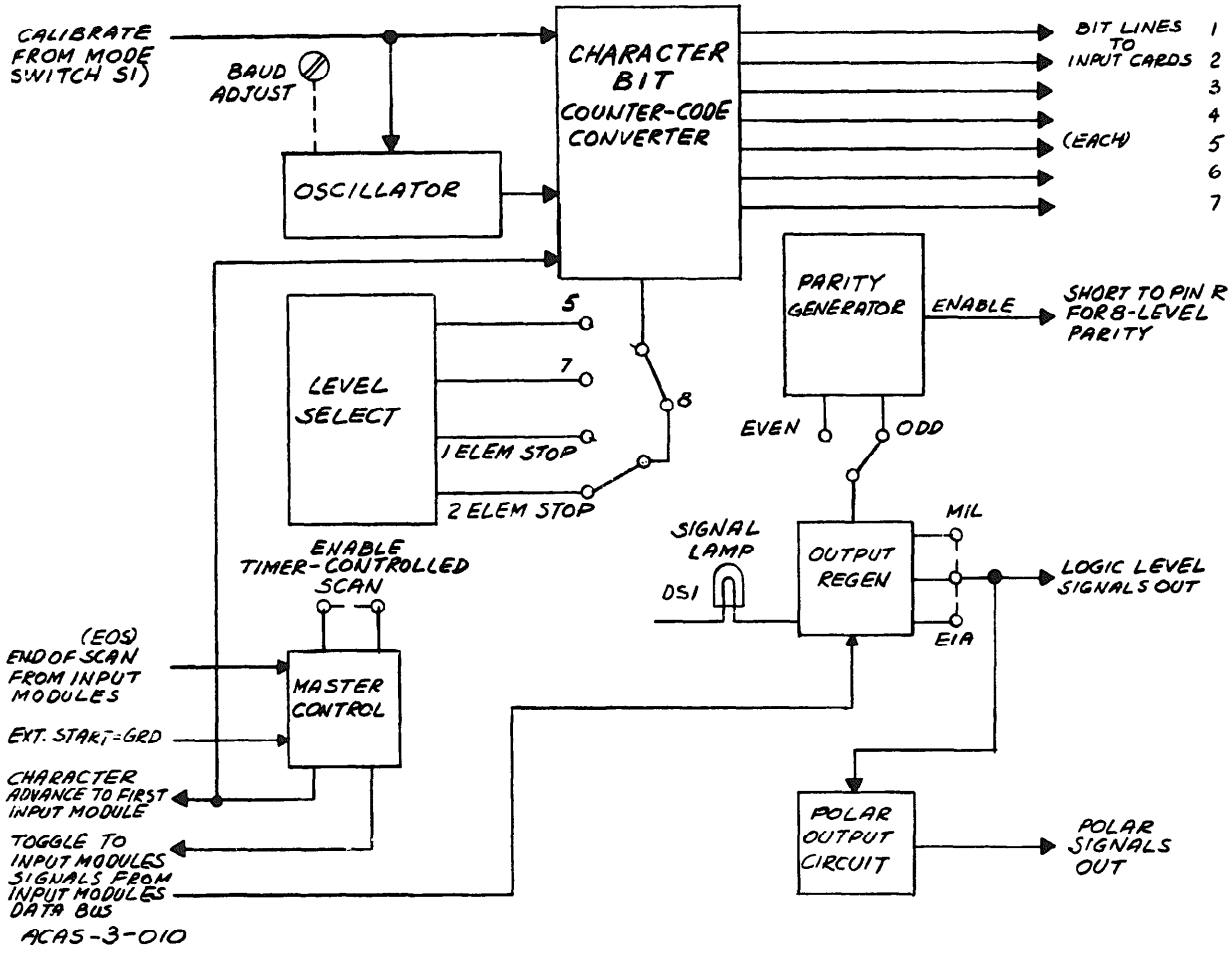


Figure 3-7. Bit Generator Circuit, Block Diagram

converter which determines the baud rate of the output signals.

3-53. The character bit counter/code converter generates seven sequentially enabled pulses to sample the data in the non-locking input circuits via the bit lines. Before being applied to the input circuits, they are applied to a data bus, via power buffer circuit A1A2. In addition, the parity generator (strapped for odd parity) receives an enable from the character bit counter/code converter, before applying parity to the output regenerator.

3-54. The output regenerator receives the data bits from the non-locking input circuits and regeneratively retimes the signals for transmission. This regenerative function eliminates the possibility of narrow pulses appearing at the output which could cause adjacent channel interface. Complementary outputs are provided with a strap option, which selects ground level for a mark (EIA strap position for neutral operation), or a positive level for a mark (MIL strap position for polar operation). In addition, a signal light is provided which indicates a space when lighted.

3-55. The polar output circuit is a transistorized output keyer which generates a positive and a negative g-volt (nominal) signal.

3-56. Power Buffer Circuit Board A1A2. The power buffer circuit (figure 3-8) contains 16 separate circuits which provide general buffering and amplification of digital logic signals. These 16 include 12 non-inverting circuits with high fan-out capability (Z1 through Z6), 2 low-power non-inverting circuits (Z7), and 2 dual input low-power gates with either inverting or

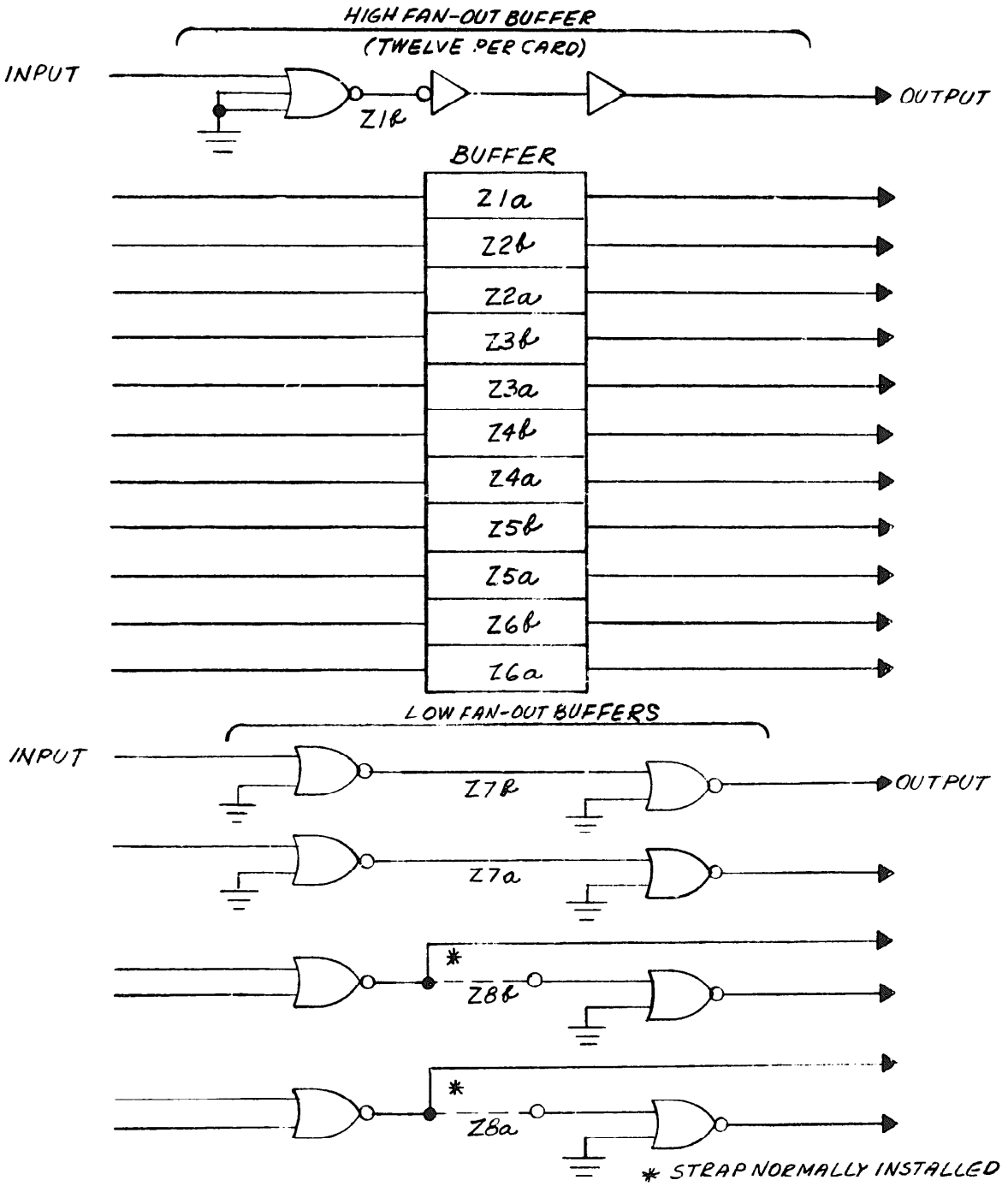


Figure 3-8. Power Buffer Circuits, Simplified Logic Diagram

two identical sections with each section showing an input circuit (parallel-to-serial converter) and a character counter (shift register element). Since both are identical, only the character 1 circuit will be discussed in detail with appropriate references to the interface signals between them.

3-47. The input circuit (Z1, Z2 and Z5) performs input data buffering, serial sequence sating for assigning each one of seven time slots to each data input signal, and an OR function for combining all sequential outputs onto a common lead. The character counter (Z8a, Z9a and Z9d), when toggled by the character clock from the bit generator, effectively gates (Z7b) the associated serial output onto an external data bus. The output of Z7b is then ORed (CR1, CR3) with the output of Z7c (character 2 serial output) to provide a serial data bus output containing the contents of two data characters.

3-48. Each character counter clement requires a character advance input (A) to permit it to be set by the toggle and provides a character advance output (B) to provide a set condition to the subsequent (A) input in the chain. Referring to figure 3-6, @ is the character counter advance of character 1, an output from character counter 1 is internally jumpered via card file wiring to the input of character counter 2 (pins N and 12 respectively) to provide the character advance for the second character in all modules except A1A4. In AlAd, either character 1 or character 2 is selected (NORMAL SOM or TEST SOM) via contacts SID of MODE switch S1. The (B) output from character counter 2 is applied to the (A) input of the next stage for all circuit boards except A1A and A1A4. In addition, an end of scan (EOS) signal is fed back to the bit generator circuit board A1A1 to reset its sequence gate (scan) counter.

3-49. Bit Generator Circuit Board A1A1. The bit generator (figure 3-7) is the master logic element in the Remote Station encoding system. (Since the bit generator has multiple capabilities, only those functions and associated strap positions used in the ACAS equipment will be described.) The primary function of the circuit is to interrogate the non-locking input circuits and generate a multiple character message containing start, data, security, parity and stop bits, as well as providing the basic timing to control encoder operation: while the message is being transmitted. Transmissions are programmed internally to generate a message automatically after a pause idle mark of approximately 400 milliseconds. However, an external signal may be utilized to initiate transmission. This method of operation is used in the Facilities Test mode, as follows. Character 1 of the message is initially generated when the MOUE switch is set to FACIL TEST. Character 2 is generated by the character advance signal applied to character counter 2 at the completion of character 1. Character 1 is then regenerated by means of the external start signal, and the process is repeated. In addition, an external ground supplied by the MODE switch via SIF will automatically place the Remote Station in the calibration mode.

3-50. The bit generator is made up of two printed circuit boards (board A and board B connected to board A), and consists basically of a master control, level select circuit, oscillator, character bit counter/code converter, parity generator, output regenerator, and polar output circuit. The master control generates the character advance signal to the first non-locking input circuit and a toggle pulse to each non-locking input circuit character bit counter. Characters from each input circuit are transmitted serially when the character advance signal (obtained from the bit generator for the first character or from the preceding character for each remaining character) and the. toggle pulse are coincident. At the end of transmission, an end-of-scan (EOS) signal from the non-locking input circuit is received by the master control to terminate transmission. The master control also initiates transmission either internally by means of an automatic pause timfIr, or externally as for the facilities test (see paragraph 3-49).

3-51. The level select circuit permits strap selection for 5-level, 7-level, or 8-level signals; ACAS utilizes an 8-level configuration. The block diagram shows that for 8-level, either 1 or 2 stop elements may be selected, a 2-level strap element is used for ACAS.

3-52. In the ACAS configuration, the oscillator is controlled internally to provide the basic clock pulses for the system. In the equipment calibration mode, the frequency may be adjusted by a circuit board mounted potentiometer (R1). The clock pulse output from the oscillator is applied to the character bit counter/code

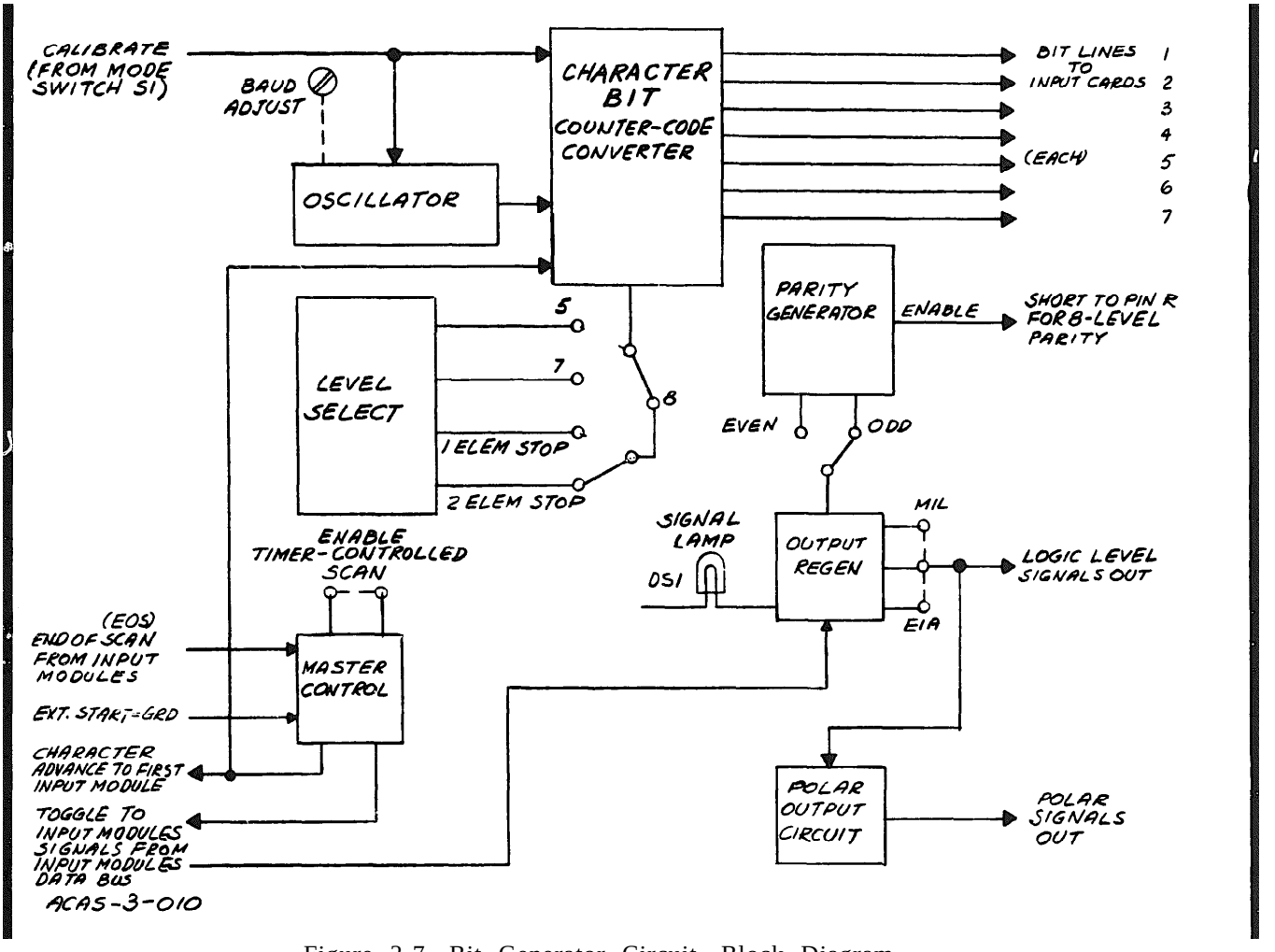


Figure 3-7. Bit Generator Circuit, Block Diagram

converter which determines the baud rate of the output signals.

3-53. The character bit counter/code converter generates seven sequentially enabled pulses to sample the data in the non-locking input circuits via the bit lines. Before being applied to the input circuits, they are applied to a data bus, via power buffer circuit A1A2. In addition, the parity generator (strapped for odd parity) receives an enable from the character bit counter/code converter, before applying parity to the output regenerator.

3-54. The output regenerator receives the data bits from the non-locking input circuits and regeneratively retimes the signals for transmission. This regenerative function eliminates the possibility of narrow pulses appearing at the output which could cause adjacent channel interface. Complementary outputs are provided with a strap option, which selects ground level for a mark (EIA strap position for neutral operation), or a positive level for a mark (MIL strap position for polar operation). In addition, a signal light is provided which indicates a space when lighted.

3-55. The polar output circuit is a transistorized output keyer which generates a positive and a negative g-volt (nominal) signal.

3-56. Bower Buffer Circuit Board A1A2. The power buffer circuit (figure 3-8) contains 16 separate circuits which provide general buffering and amplification of digital logic signals. These 16 include 12 non-inverting circuits with high fan-out capability (Z1 through Z6), 2 low-power non-inverting circuits (Z7), and 2 dual input low-power gates with either inverting or

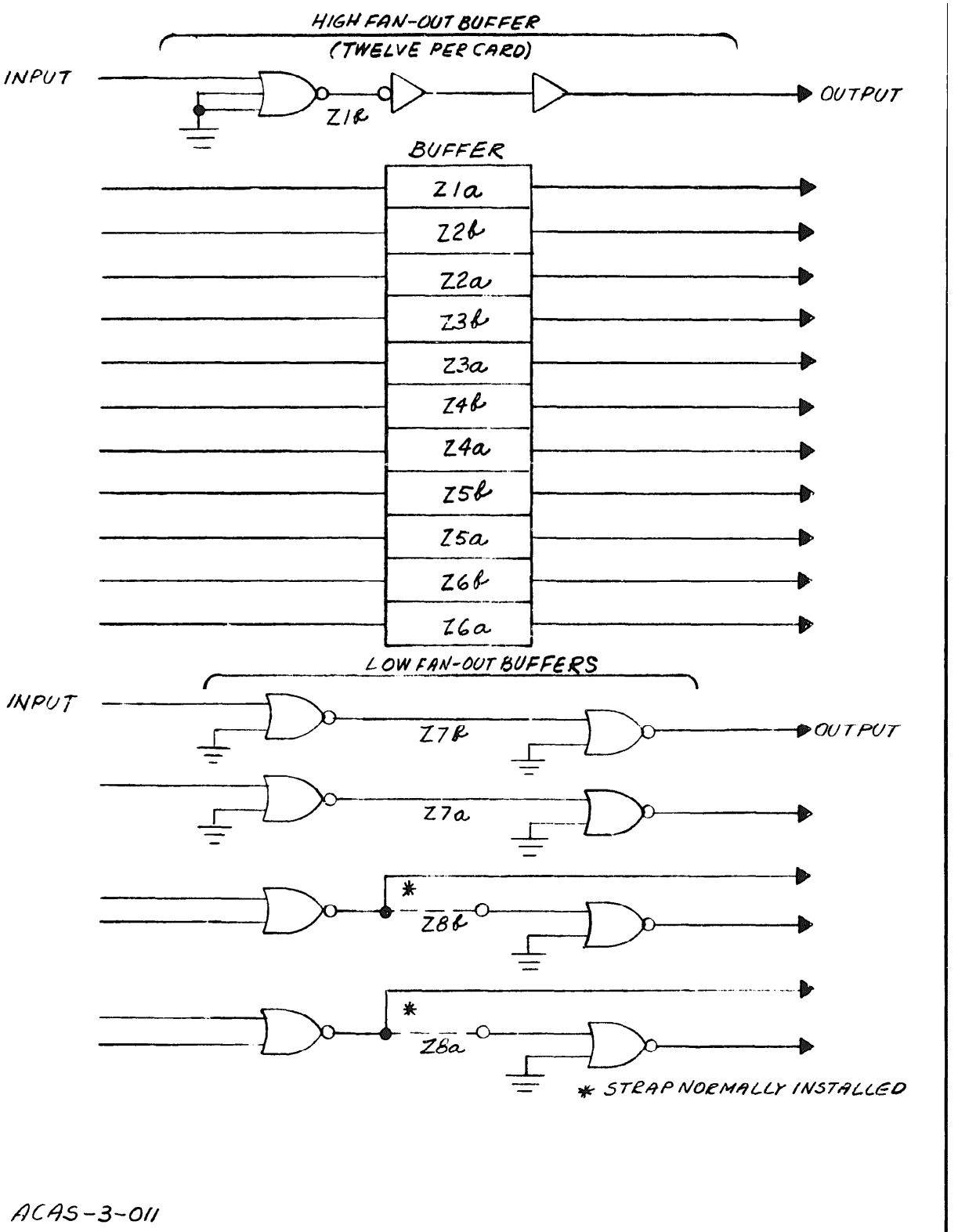


Figure 3-8. Power Buffer Circuits, Simplified Logic Diagram

non-inverting outputs (28). Note that in the ACAS equipment, the straps in low -power gates Z8a and Z8b are as shown in figure 3-8.

3-57. As noted in 3-56, the power buffer is used in logic circuits requiring high fan-out capabilities. In the Remote Station encoder, its major application is to provide power buffering of the seven character bit lines between the bit generator circuit AlAl and the data bus applied to non-locking input circuits AlA through A1A9.

3-58. REMOTE STATION POWER SUPPLY SUBASSEMBLY A2. The following paragraphs provide the functional description of power supply subassembly A2 and the circuit boards and modules contained within the subassembly.

3-59. All interconnections between these circuit boards and modules are shown in the overall power supply subassembly schematic diagram, figure FO-10. Input ac power is applied to connector J1, through indicating fuses F1 and F2, and then to the inputs of the various power supply modules. The outputs of these modules are made available at two terminal boards, TB1 and TB2, and connector J8 for distribution within the remote station.

3-60. Neutral Coupling Repeater Circuit Board A2A2A1. Neutral coupling repeater A2A2A1 (figure 3-9) converts the serial data message from bit generator A1A1A1 into a high-level neutral format suitable for transmission. The input message to the assembly is EIA format, When positive, input transistor Q13 conducts, applying a O-volt input to the internal half-duplex control circuit. Logic circuitry in the half-duplex control circuit allows the EIA input signal to pass from the input circuit to the isolation output circuit. The positive voltage at the inGut (a space) turns Q10 on and Q9 off, providing a ground path for the high-frequency square wave from power supply flip-flop Q11-Q12. A mark signal from the half-duplex control circuit turns Q10 off; Q9 turns first on and then off, allowing the square wave to pass to the output circuit. This output provides a steady positive voltage during a mark. This voltage is applied to Q8, the dry keyer, which is on for a mark and off for a space.

3-61. Polar Coupling Repeater Circuit Board A2A2A2. Polar coupling repeater A2A2A2 (figure 3-10) converts the serial data message from bit generator A1A1A1 into a high-level polar format suitable for transmission. The input message to the assembly is MIL format. When positive, input transistor Q14 conducts, presenting a 0-volt input to the internal half-duplex control circuit. The logic circuitry in the half-duplex control circuit allows the input signal to pass from the input circuit to the output circuit. A positive voltage (a mark) from the half-duplex control circuit turns off Q10 and Q11 in the output circuit, isolating the negative battery from the output. Transistors Q8 and Q9 (Darlington connection) conduct, allowing the positive battery in the output, producing the positive loop current. A space signal (negative) turns on Q10 and Q11, coupling the negative battery into the output. Negative loop current then flows, and Q8 and Q9 turn off to isolate the positive battery from the output.

3-62. Automatic Current Regulator Circuit Board A2A2A3. Automatic current regulator A2A2A3 (figure 3-11) consists of two independent regulator circuits. One is adjusted to 20 ma to provide polar loop current, the other to 60 ma to provide neutral loop current. (Since both halves of the regulator are identical, only one is discussed.) Transistors Q3 and Q4 form a Darlington-connected series regulator to keep the current flow constant. Current adjust potentiometer R2 adjusts the current level, providing a constant voltage input to Q3. This constant voltage is obtained by operating transistor Q1 in its Zener range, applying a constant voltage to the base of Q2 and across potentiometer R2. Steering diodes allow either positive or negative current to flow through the regulator.

3-63. RSE Local Alarm Circuit Board A2A2A4. Local alarm A2A2A4 (figure 3-12) provides the operating personnel with indications of failures in the Remote Station equipment. The outputs of the Remote Station power supplies are applied to logic circuitry in A2A2A4 to enable the DC alarm lamp if a failure of any one of the dc power supplies should occur (+3.6V, +12V, +60V, +130V, -60V, or -12V). In addition, a failure of all power supplies simultaneously enables the ac alarm lamp.

3-64. If the data message stops (no loop current, that is no marks and no spaces or 0 volts at the sensing point), the NO LOOP alarm lamp is enabled. If the data message is present,

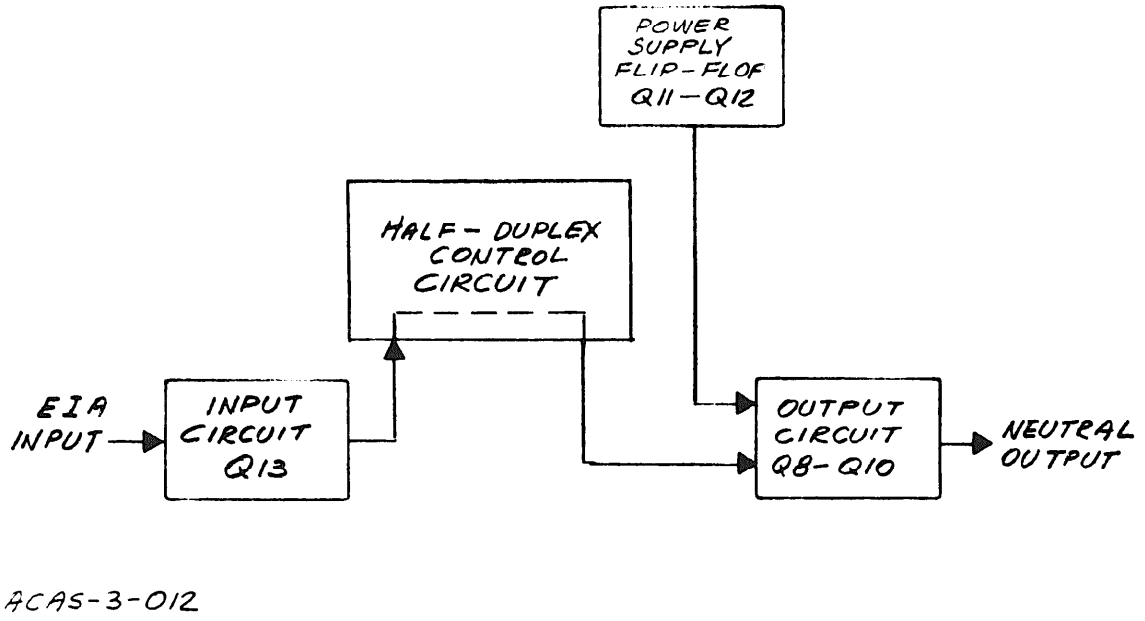


Figure 3-9. Neutral Coupling Repeater Circuit Board A2A2A1, Functional Block Diagram

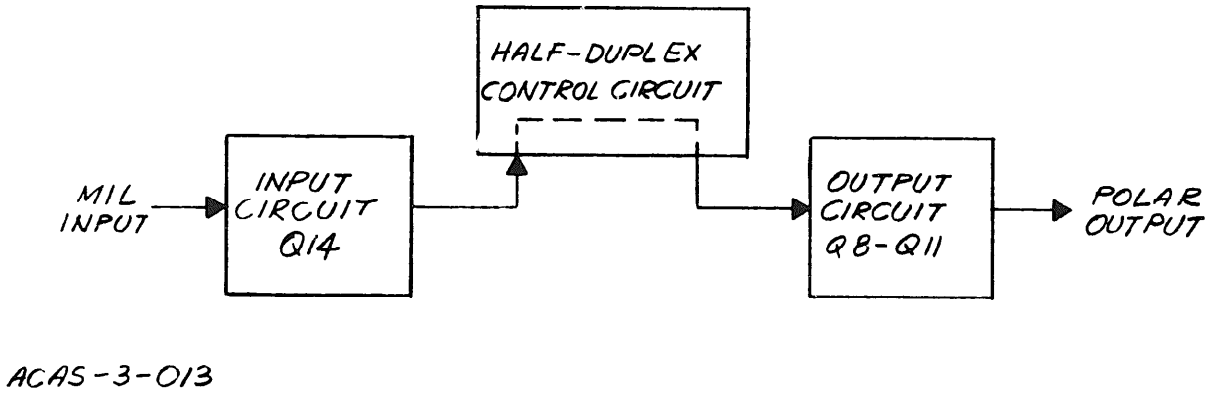


Figure 3-10. Polar Coupling Repeater Circuit Board A2A2A2, Functional Block Diagram

but consists of a steady mark or a steady signal (that is, constant positive or negative voltage) the NO TRNSN lamp is enabled. When the MODE switch is in any position other than NORMAL, the TEST lamp is enabled. If the applicable audible strapping is selected, any dc, ac, no transition, or open loop alarm will cause the audible alarm to sound until silenced by the AUDIO RELEASE switch on the front of the Remote Station power supply subassembly. If silenced, the associated alarm lamp continues to light. Any new alarm condition will again cause an audible alarm to sound.

3-65. RSE +3.6 Volt DC Power Supply Module A2A1A5. Power supply module A2A1A5 (figure 3-13) provides a regulated +3.6 volt output for the logic elements in the various Remote Station modules.

3-66. Single phase input power is applied to transformer T1 through overheating protection thermostat S1. Full-wave rectifier CR8-CR10 supplies +10.7 volts, which is regulated by series regulator Q8 to provide the +3.6 volt regulated output. Half -wave rectifier CR7 and Zener regulator CR6 provide the

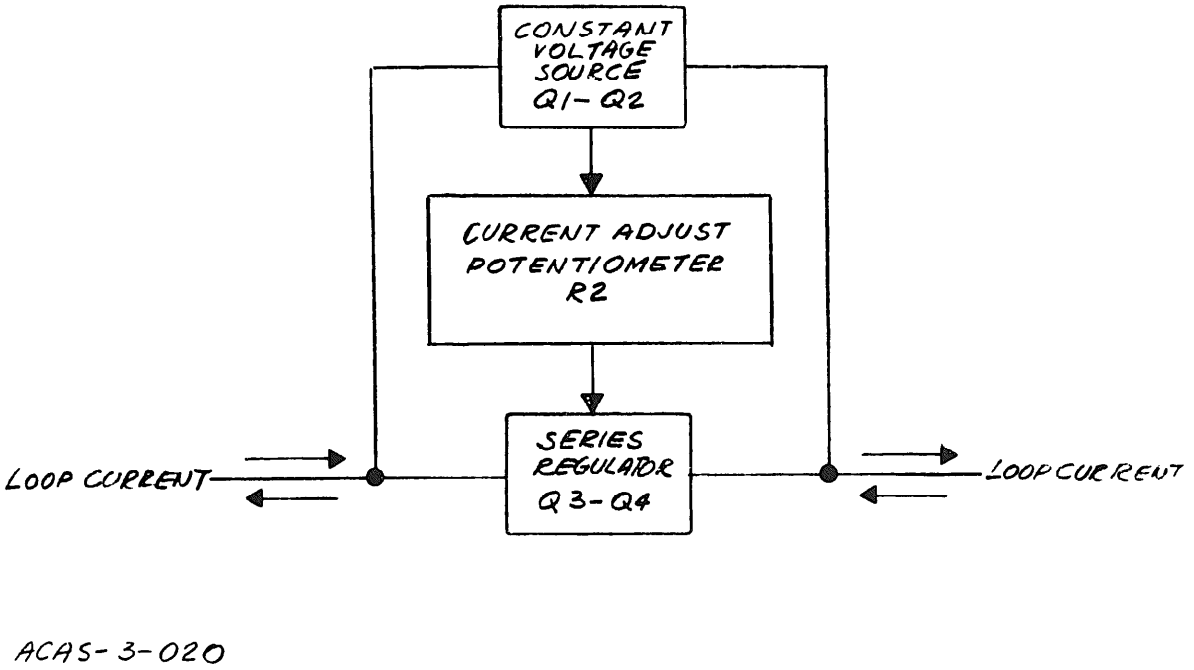


Figure 3-11. Automatic Current Regulator Circuit Board A2A2A3, Functional Block Diagram

+9.1 volt bias supply voltage for current limit amplifier Q3 and error amplifier Q1-Q2. The regulated temperature compensated reference voltage for error amplifier Q1-Q2 is obtained from Zener regulator CR1. The error amplifier compares the reference voltage with a sample of the output voltage from voltage sensing network R1-R3. As the output voltage of the power supply varies, the output of the error amplifier varies, causing the amplifier error signal from drivers Q5-Q6 to control series regulators Q8-Q10, maintaining the output voltage at the proper level.

3-67. Current limit amplifier Q3 samples the voltage across current sensing resistor R25A and compares it with the preset voltage across R17-R18. When the voltage drop across the load current resistor increases, Q3 conducts, decreasing the current through the drivers. This results in an increase of the voltage across the series regulator and a decrease of the output voltage. The current limit value is determined by the setting of potentiometer R17.

3-68, Overvoltage protection is supplied by the overvoltage protector circuit OV-1. When the power supply output voltage increases above the preset overvoltage limit (set for nominally 5.6 volts) the SCR in the protection circuit turns on, causing the power supply output voltage to drop.

3-69. RSE ±12 Volt DC Power Supply Module A2A1A4. Power supply module A2A1A4 (figure 3-14) provides regulated ±12 volt outputs for the logic elements in the various Remote Station modules. Since the positive (+12 volt) and negative (-12 volt) supplies are similar, the following discussion applies to both.

3-70. Single-phase input power is applied to transformer T1. Full-wave rectifier CR1-CR4 provides +31 volts, which is regulated by series regulator Q1 to provide the +12 volt regulated output. Constant voltage operation is determined by changes in the load sensed by voltage sensing network R4, R6, R8. This causes a change to one input of IC1.

3-71. Integrated circuit IC1 acts as a combination current and voltage comparator, increasing or decreasing the current into the base of Q1 as required to produce a corresponding decrease or increase of the voltage across Q1. This provides the regulated output voltage from the power supply. The output current is

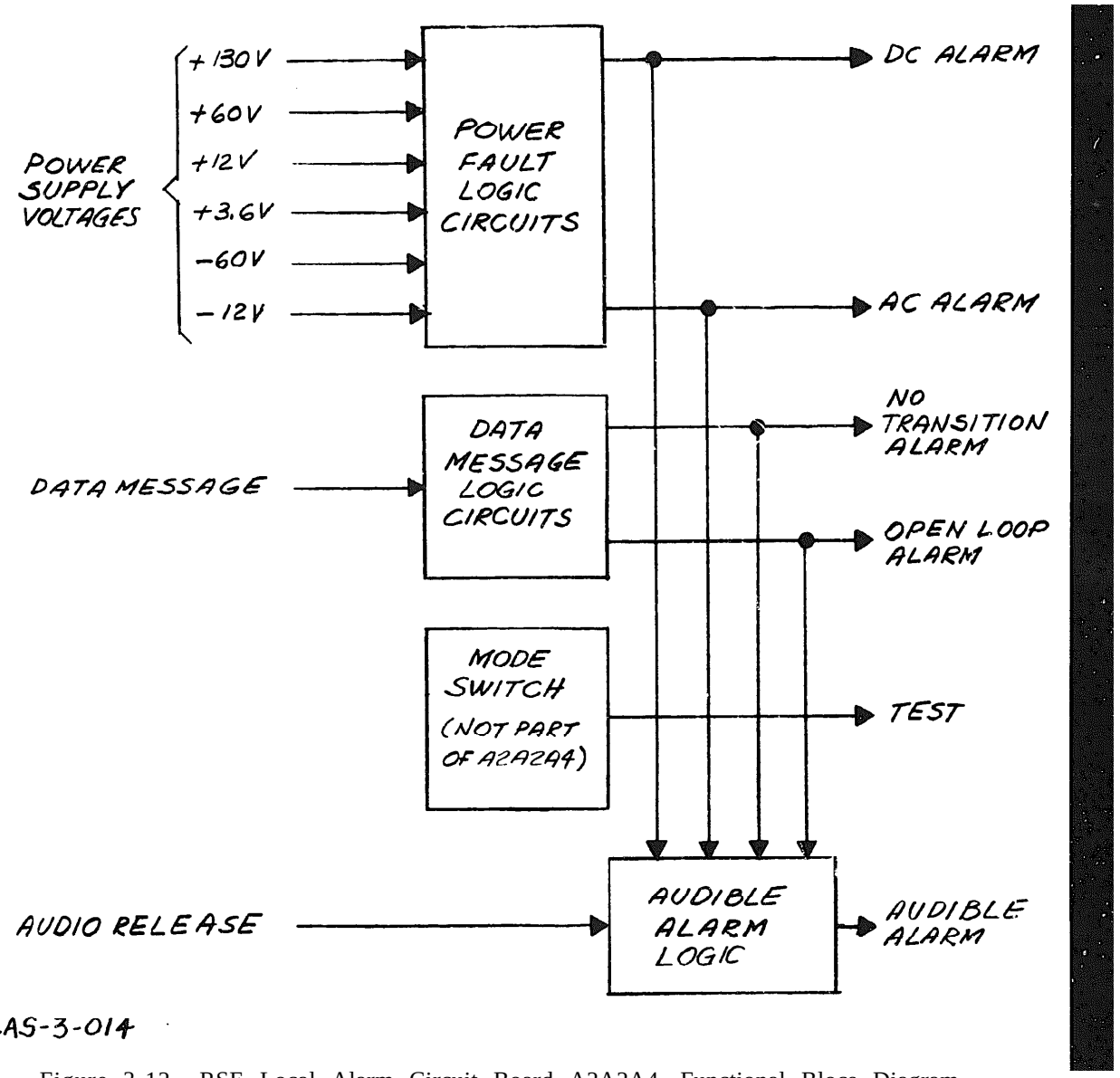


Figure 3-12. RSE Local Alarm Circuit Board A2A2A4, Functional Blocs Diagram

sampled across current sensing resistor R1. When the voltage drop across R1 increases to the preset reference, IC1 decreases the current into the base of Q1, decreasing the output voltage and limiting the current. The output voltage is adjusted by R6.

3-72. RSE +12 Volt DC Power Supply Module A2A1A3. Power supply module A2A1A3 (figure 3-15) provides +12 volts for the alarm circuits in the Remote Station.

3-73. Single-phase input power is applied to transformer T1. Full-wave rectifier CR2-CR4 provides the positive voltage for series regulator Q2, while half-wave rectifier CR1 provides the voltage for integrated circuit IC1. IC1 acts as a combination voltage and current comparator, varying the base current of Q2 as required to keep the output voltage constant. The output current is sensed across current sensing resistor R22, the output voltage is sampled across voltage sensing network

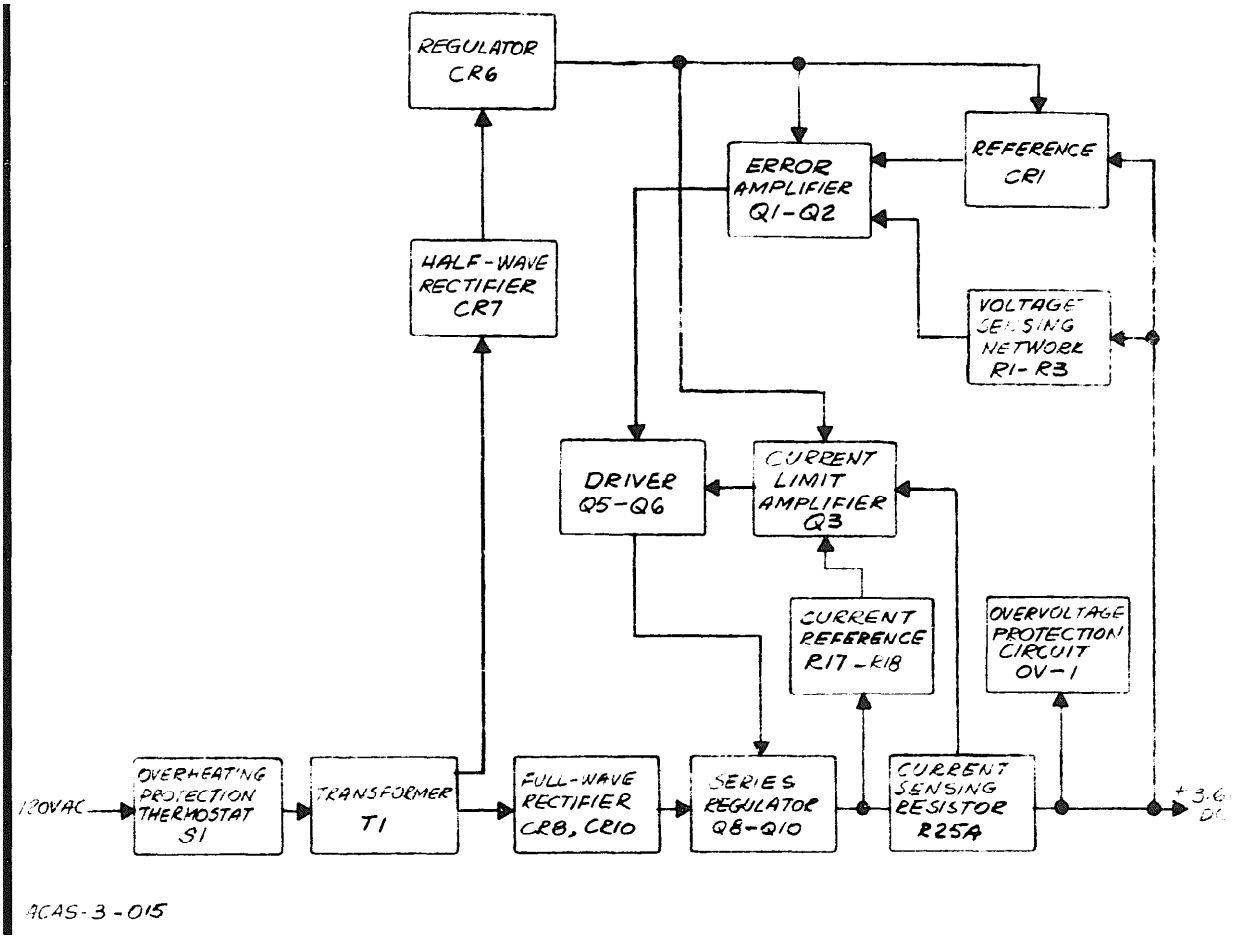


Figure 3-13. RSE +3.6 Volt Dc Power Supply Module A2A1A5, Functional Block Diagram

R8 and R20. The regulated output is adjusted by potentiometer R8.

3-74. Changes in the output voltage (sensed by R8, R20) change one input to IC1. The other input to IC1 is a fixed reference voltage. The comparator in IC1 compares the output voltage changes with the reference voltage resulting in an error signal which is amplified by drivers Q1-Q3 and applied to series regulator Q2. When load current increases above the rated current value, IC1 causes the output voltage to decrease, limiting the output current.

3-75, RSE ±60 Volt Dc Power Supply Module A2A1A2. Power supply module A2A1A2 (figure 3-16) provides both +60 volts for the polar loop transmission circuits in the Remote Station.

3-76. Single-phase input power is applied to transformer T1. Full-wave rectifier CR2-CR4 provides +71 volts, which is regulated by series regulator Q2 to provide the regulated output voltage. Half-wave rectifier CR1 provides -7.4 volts for integrated circuits. IC1. IC1 acts as a combination voltage and current comparator, varying the base current of Q2 as required to keep the output voltage constant. The output current is sensing resistor R'?, the output voltage is sampled across voltage sensing network R8. The regulated output is adjusted by potentiometer R8,

3-77. Changes in the output voltage (sensed by R8) change one input to IC1. The comparator in IC1 compares the voltage changes with the reference voltage, resulting in an error signal which is amplified by driver Q1 and applied to series regulator Q2. When load

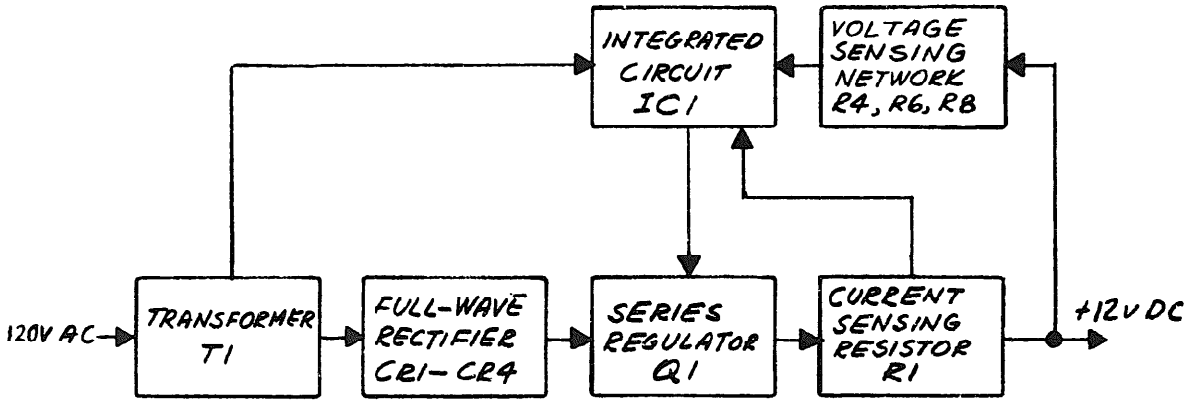


Figure 3-14. RSE ±12 Volt Dc Power Supply Module A2A1A4, Functional Block Diagram

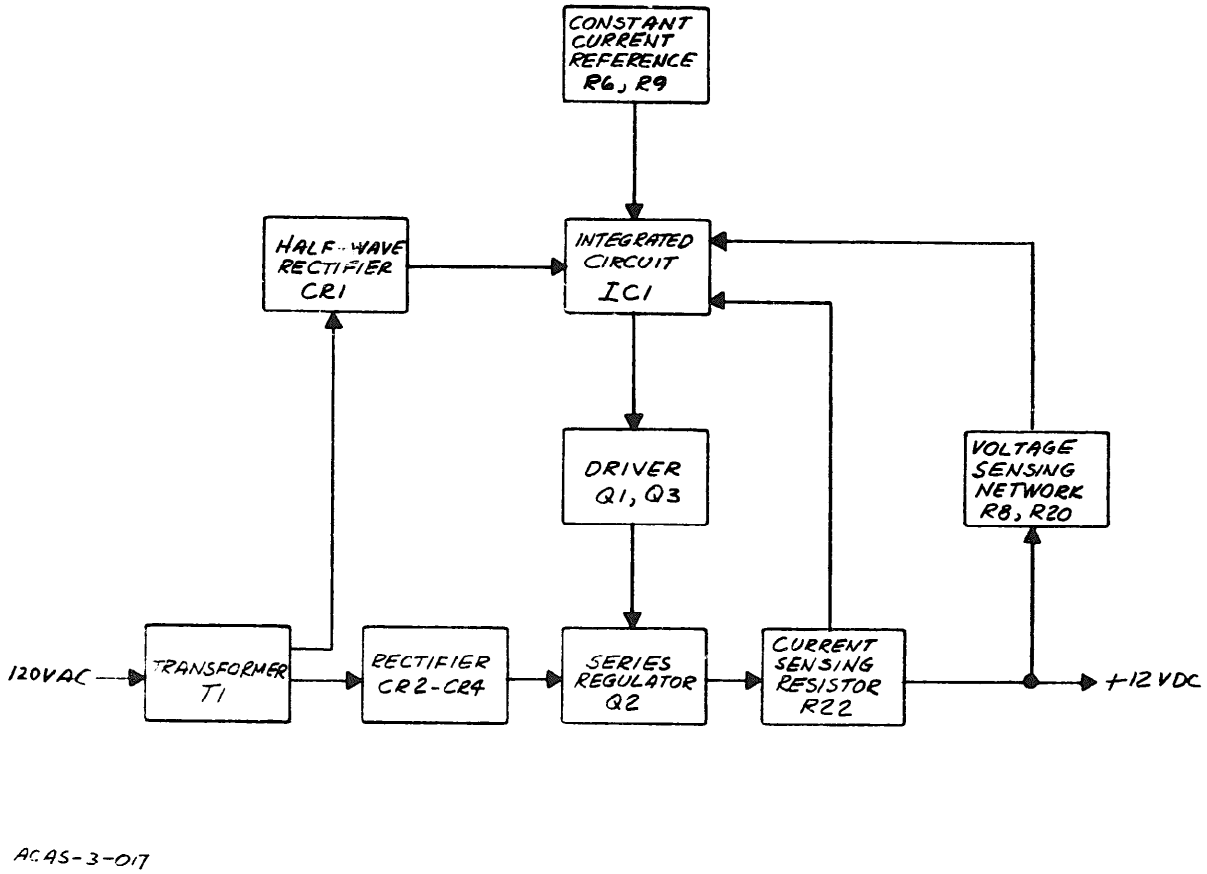


Figure 3-15. RSE +12 Volt DC Power Supply Module A2A1A3, Functional Block Diagram

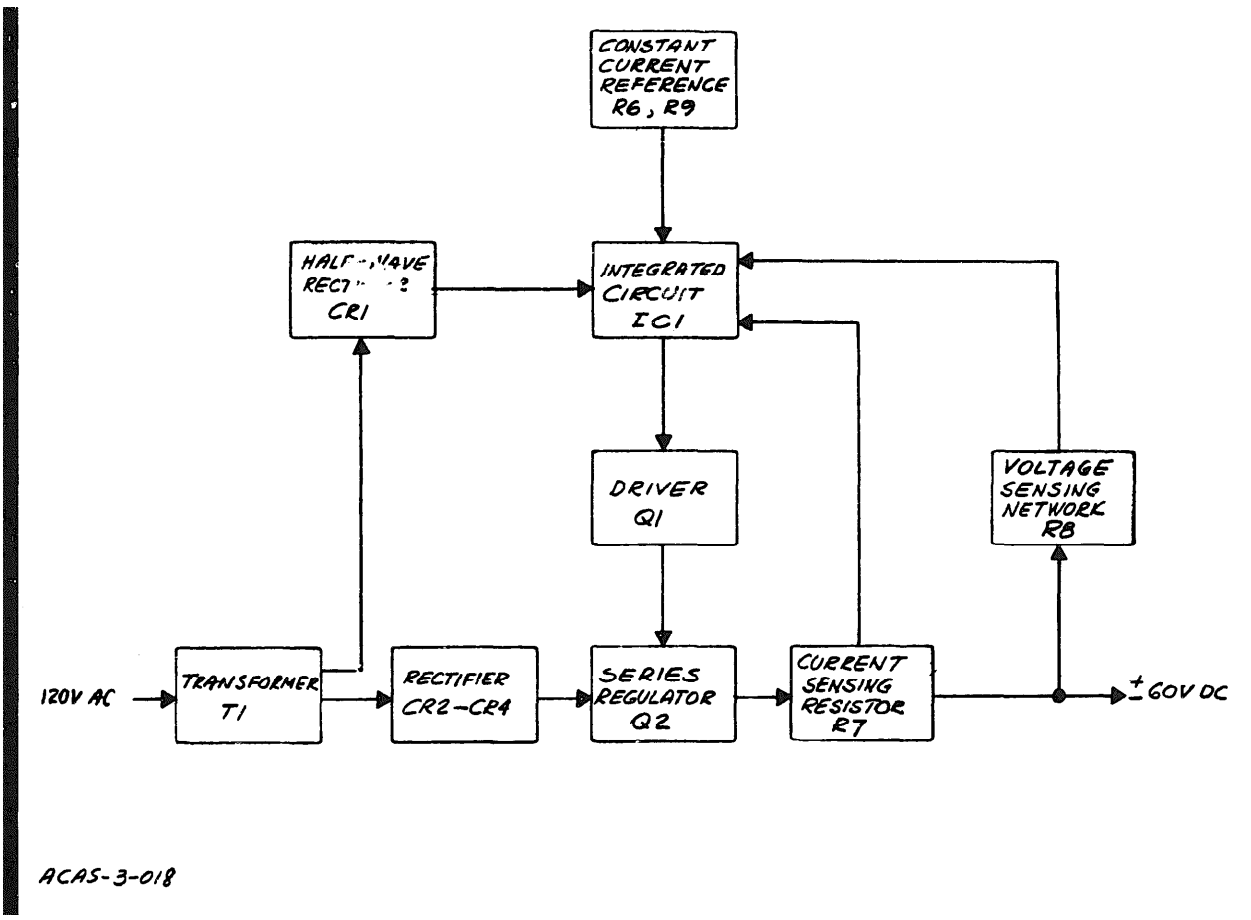


Figure 3-16. RSE ±60 Volt Dc Power Supply Module A2A1A2, Functional Block Diagram

current increases above the rated current value, IC1 causes the output voltage to decrease, limiting the output current.

3-78. RSE +130 Volt DC Power Supply Module A2A1A1. Power supply module A2A1A1 (figure 3-17) provides +130 volts for the neutral loop transmission circuits in the Remote Station.

3-79. Single-phase input power is applied to transformer T1. Full-wave rectifier CR2-CR4 provides the positive voltage for series regulator Q2, while half-wave rectifier CR1 provides the voltage for integrated circuit IC1. IC1 acts as a combination voltage and current comparator, varying the base current of series regulator Q2 as required to keep the output voltage constant. The output voltage is sampled across voltage sensing network R8 and R20, the output current is sensed across current sensing resistor R22. The regulated power supply output is adjusted by potentiometer R8.

3-80. Changes in the output voltage change one of the inputs to IC1. The other input to IC1 is a fixed reference voltage. The comparator circuit in IC1 compares these two inputs and develops an error signal output. The error signal is amplified by driver Q1 and applied to series regulator Q2. When load current increases beyond the rated current value of the supply, IC1 causes the output voltage to decrease, limiting the output current.

3-81. FUNCTIONAL DESCRIPTION OF MASTER STATION TERMINAL EQUIPMENT CIRCUITS.

3-82. The following paragraphs provide a detailed functional description of the circuits in the Master Station terminal equipment. Functional block diagrams are provided to support this description. For further details, refer to the individual circuit schematic diagrams contained in Chapter 6.

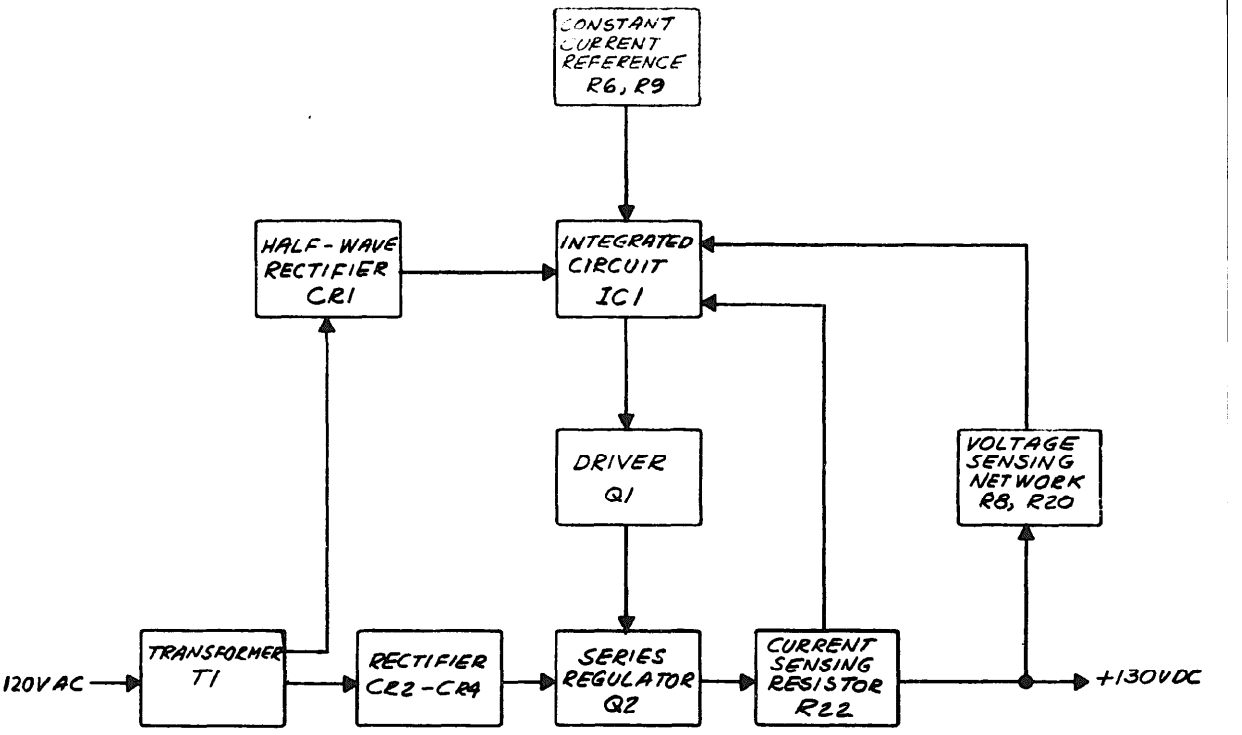


Figure 3-17. RSE +130 Volt Dc Power Supply Module A2A1A1, Functional Block Diagram

3-83. MSTE DECODER SUBASSEMBLY. The detailed functional descriptions presented in the following paragraphs are applicable for each decoder subassembly at the Master Station, since all decoder subassemblies are identical. Reference descriptions used in these descriptions are those which are applicable to the circuits in decoder subassembly 1A1. The detailed functional descriptions are presented in signal flow sequence as follows: bit analyzer circuit board 1A1A2; shift detector circuit board 1A1A3; power buffer circuit board 1A1A4; eight-output circuit boards 1A1A5 through 1A1A14; and display driver circuit boards 1A1A15 through A1A22.

3-84. Bit Analyzer Circuit Board 1A1A2. The bit analyzer circuit board (figure 3-18) is the master logic element in the blaster Station decoding system. The primary function of the bit analyzer is to receive the serial data message from the Remote Station and synchronize with it. This is accomplished by a self-contained oscillator which is synchronized with each character of the incoming signal on each mark-to-space transition of the start element. In the process of synchronizing with the incoming signal, the bit analyzer generates a bit clock for serial-to-parallel conversion of the data bits in shift detector circuit 1A1A3, an end-of-character (EOC) pulse which is used as the basic shift clock by the eight-output decoder circuits, and a strobe pulse used in decoding the start-of-message (SOM) characters in the shift detector. In addition, the bit analyzer monitors the incoming data signal for wrong (even) parity and no transition of the mark-space pattern (i.e., steady mark or steady space signal).

3-85. The bit analyzer consists basically of an input circuit, idle/open line timer, oscillator, false start detector, character control circuit, counter, and level selector. The data message signal from the remote station is applied to the input circuit which is normally strapped for

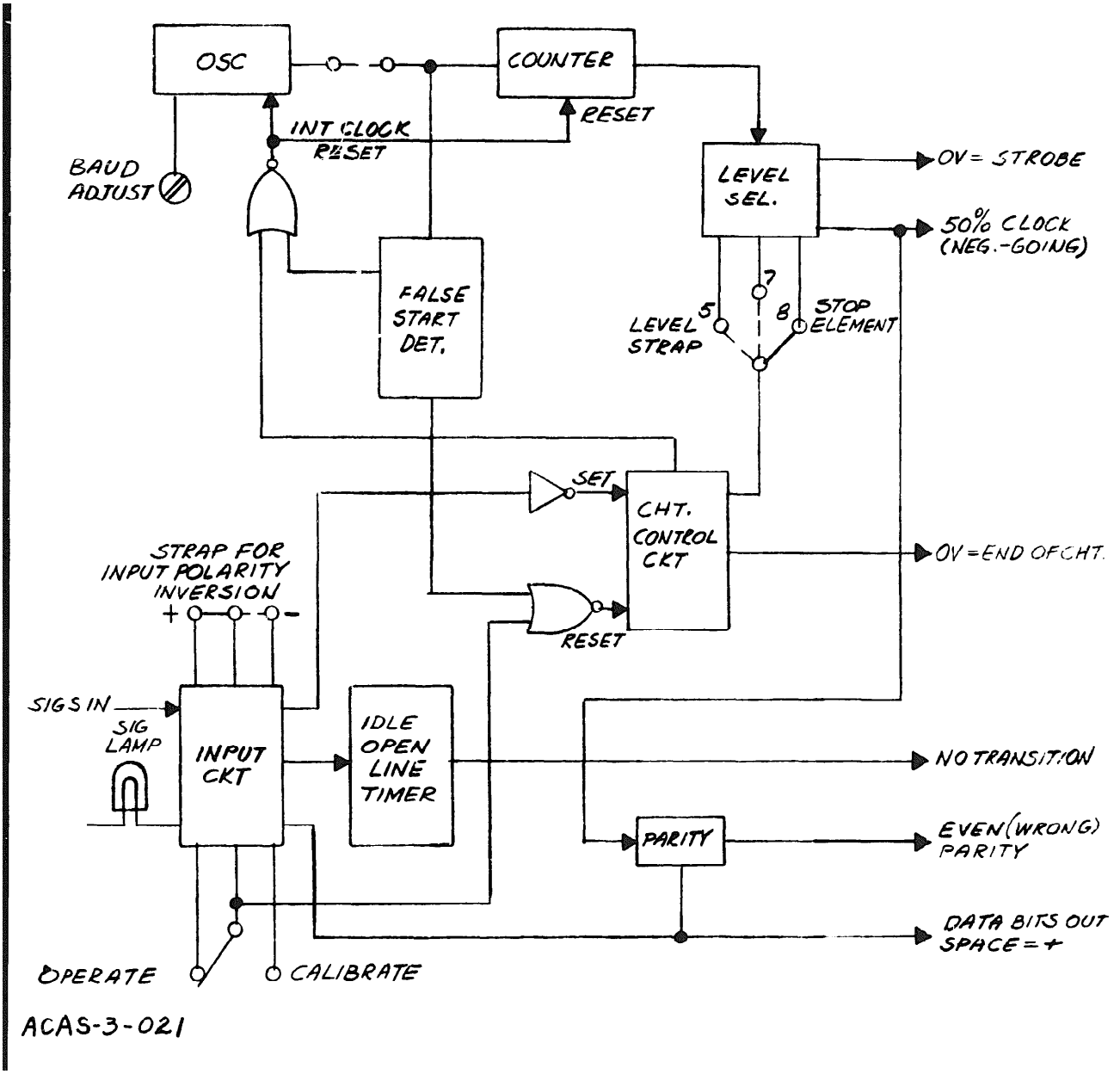


Figure 3-18. Bit Analyzer Circuit Board 1A1A2, Functional Block Diagram

positive (+) polarity. The signal lamp (lights for space) is functionally connected to the input circuit as well as the decoder operate-calibrate switch which permits adjustment of the baud rate oscillator when in the calibrate position. The input circuit also provides the data bit output (space is positive) to the shift detector as well as coupling the input information to the idle/open line timer. This circuit is internally timed such that if there is no transition of the input signal within 1.2 seconds, a ground will be applied to the local alarm MSTE circuit board 1A1A1. This in turn applies an enable to the NO TRANS lamp on the display panel and generates an update inhibit signal for eight-output circuits.

3-86. The input circuit also supplies a set and reset signal to the character control circuit which controls the oscillator and initiates a reset signal to the counter. The character control circuit is reset if the input circuit

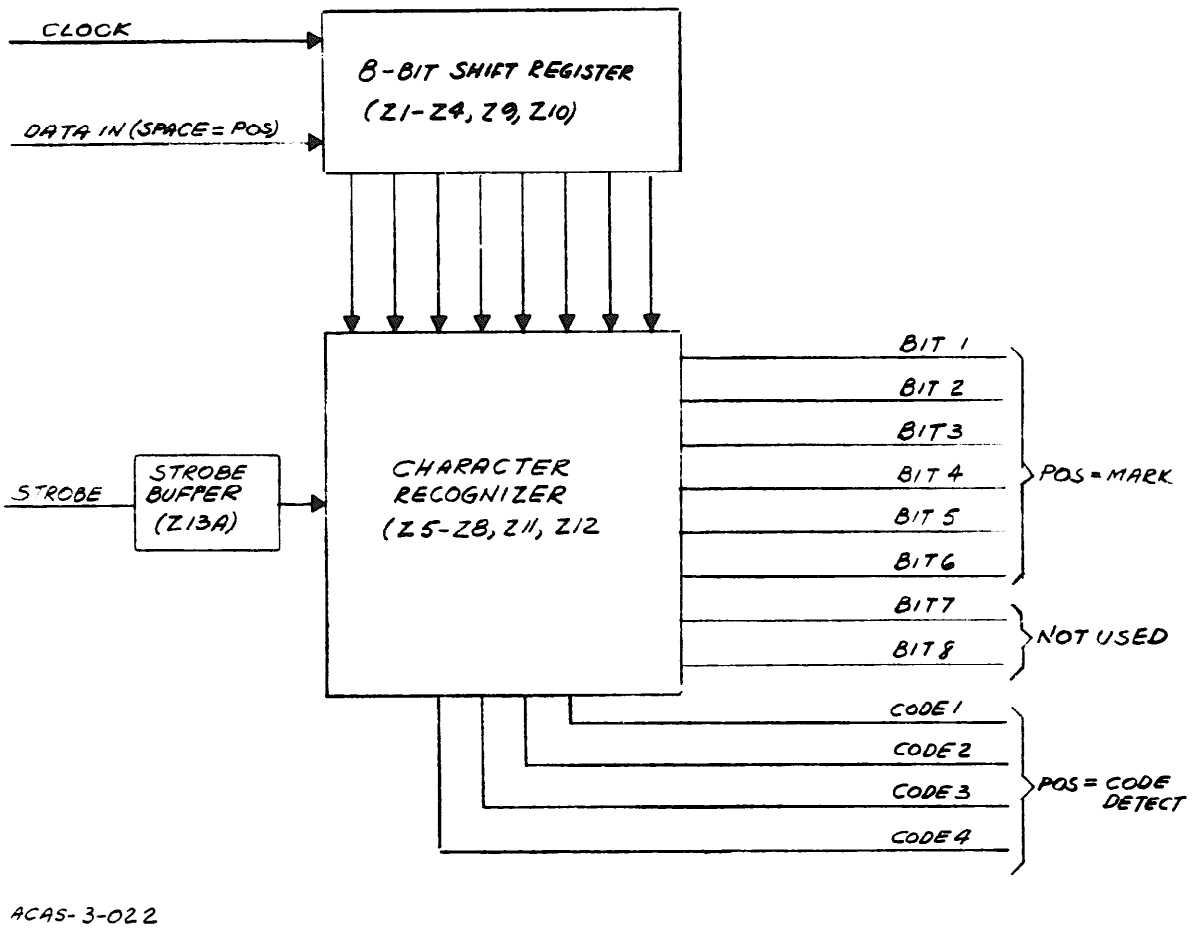


Figure 3-19. Shift Detector Circuit Board 1A1A3, Functional Block Diagram

determines that the incoming data signal has returned to a mark during the time that the false start detector determines that the signal is in the first 50 percent of the start element. The counter then begins counting each data bit as determined by the clock, which has been synchronized by the transition of the input start element. The counter output is then applied to the level selector (strapped for 8-level) which detects the presence of the last information bit and resets the character control circuit, thereby indicating the end of the received character and generating the end-of-character (EOC) pulse. The level selector also generates strobe pulse and bit clock.

3-87. Shift Detector Circuit Board 1A1A3. The shift detector circuit board (figure 3-19) consists basically of an 8-bit shift register, character recognizer, and strobe buffer. This circuit receives a serial data signal from bit analyzer circuit board 1A1A2, recognizes (or decodes) up to four preselected 8-bit (including parity bit) code patterns, and provides a parallel output of six information bits when strobed at the end of each character. (Although eight parallel outputs are available from the shift register, only six are connected in the ACAS configuration.) A serial data output is provided for use when shift detector circuit boards are connected in cascade, but this output also is not used in the ACAS configuration.

3-88. The shift register, which consists of Z1 through Z4, Z9a, Z9b, and Z10, is triggered at the negative-going 50-percent points of the bit clock pulses received from the bit analyzer circuit. Since the shift detector

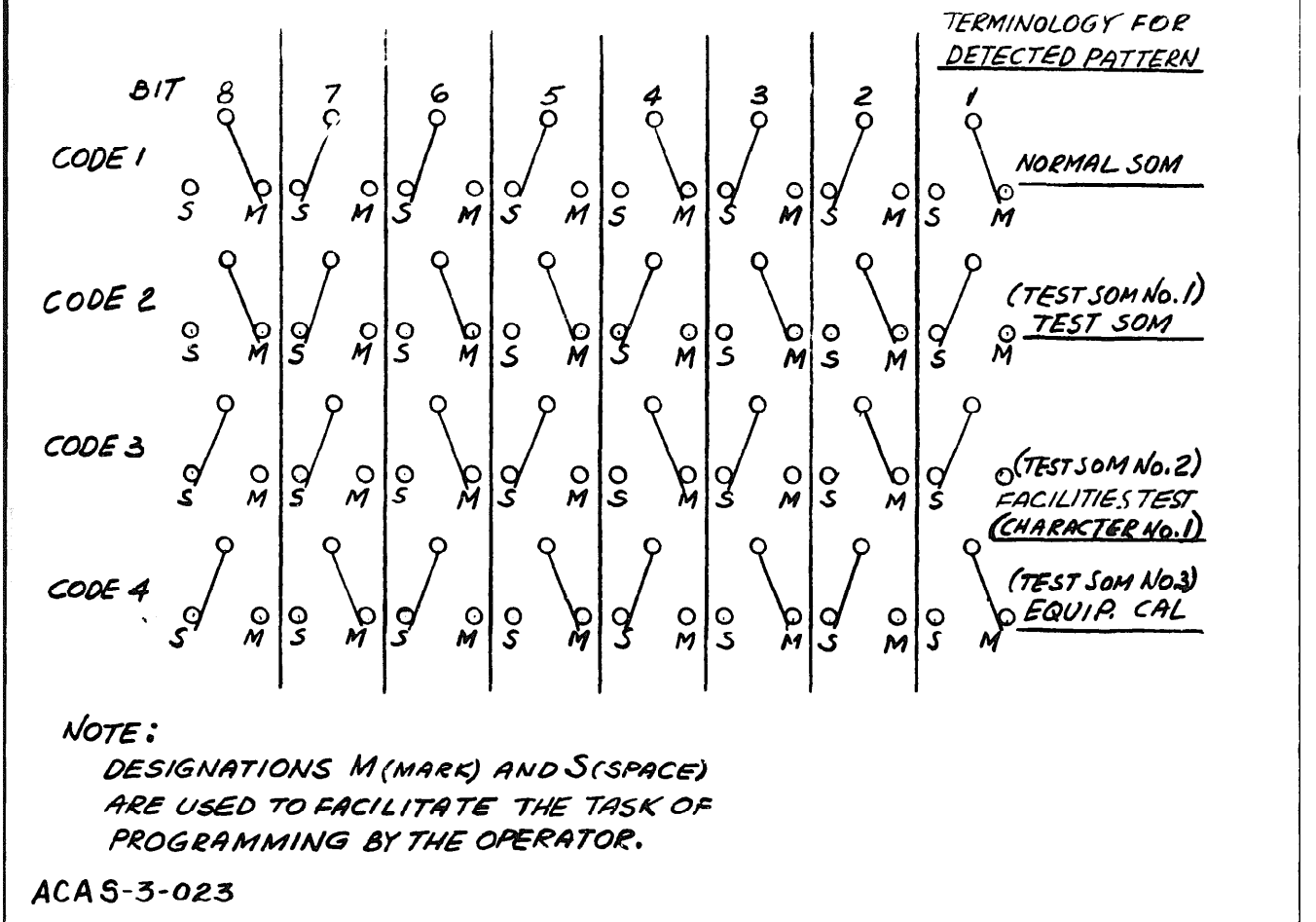


Figure 3-20. Shift Detector Circuit Board 1A1A3, Pin Strap Positions

circuit serves the dual purpose of providing a parallel output of the information (data) at the end of each character, as well as decoding the SOM codes, each function will be described separately. The 8-stage shift register receives its data input at the bit clock rate. One output each from seven of the shift detector stages (corresponding to bits 1-7) is applied to the programmed card (via strap field) as inputs to the character recognizer, and the first six parallel outputs are fed to the eight-output circuit boards, via power buffer 1A1A4.

3-89. The character recognizer, which consists of Z5 through Z8, Z11 and Z12, is programmed to provide a positive output when the desired mark-space pattern for seven assigned bits is decoded. Four code detector outputs are provided for the detection of four different 8-bit codes which are manually programmed on the card. (Refer to figure 3-20 for the strap positions corresponding to the normal SOM, test SOM No. 1, test SOM No. 2, and test SOM No. 3 characters.) All code outputs are connected to a common strobe input (from the bit analyzer) to permit the output code to be sampled only after completion of an entire character. The normal and test No. 1 SOM decoded outputs are then applied to the first eight-output circuit (via the power buffer) as the scan start pulse. In addition, all decoded outputs are applied to local alarm circuit A1.

3-90. Power Buffer Circuit Board 1A1A4. The power buffer circuit board used in the MSTE decoder subassembly is identical to that used in the RSE encoder subassembly. (Refer

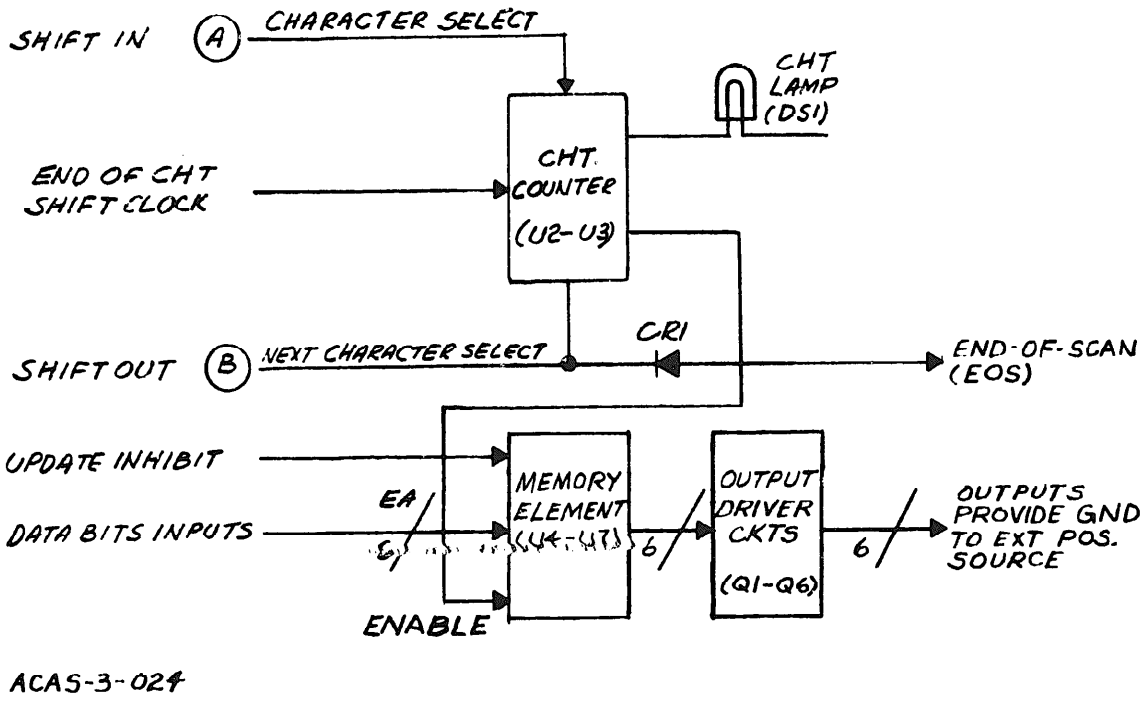


Figure 3-21. Eight-Output Circuit Board 1A1A4, Functional Block Diagram

to paragraph 3-56.) In the MSTE decoder subassembly, power buffering is provided for the six data bits and for timing and control signals on the busses between the bit analyzer and shift detector circuits and the eight-output circuits.

3-91. Eight-Output Circuit Boards 1A1A5 through 1A1A14. The eight-output circuit board (figure 3-21) consists basically of a character counter, output memory and output driver circuits. Each of the 10 identical modules decodes one 6-bit data character, which is received in parallel from shift detector circuit 1A1A3, via the power buffer. As each circuit is decoding its associated character, a lamp located on the circuit board lights to indicate which character in the line is being scanned. All decoder timing functions are provided by bit analyzer 1A1A2 except scan start (or shift in), which is generated in shift detector circuit 1A1A3 and applied to the shift-in input (pin 4) of the first eight-output circuit board, 1A1A5.

3-92. The two major functions of each eight-output circuit are the character counter (U2 and U3) which permits multiple circuits to be sequentially decoded for receipt of multiple character messages, and the memory elements (U4 through U7) which update the data as each new character is received. The end-of-character shift clock from bit analyzer 1A1A2 is used to sequence the characters through each circuit while the shift in (A) character select) and shift out (B) (next character select) from each circuit enable the circuit to decode the proper message character. In addition, an end-of-scan (EOS) output is provided to the local alarm circuit which generates the update inhibit signal to permit storage of the decoded character until the next scan cycle. The (A) input to the first eight-output circuit in the line, 1A1A5, is received from the shift detector (via the power buffer) and all others are received from the (B) output of the previous stage.

3-93. The memory element receives an enable signal from the character counter, the six data bits from the shift detector, and an update inhibit signal from the local alarm circuit. In order to update memory and decode the data bit inputs, the enable from the character counter must be present and the update inhibit must not be present. The decoded outputs from the memory element are applied, in parallel, to

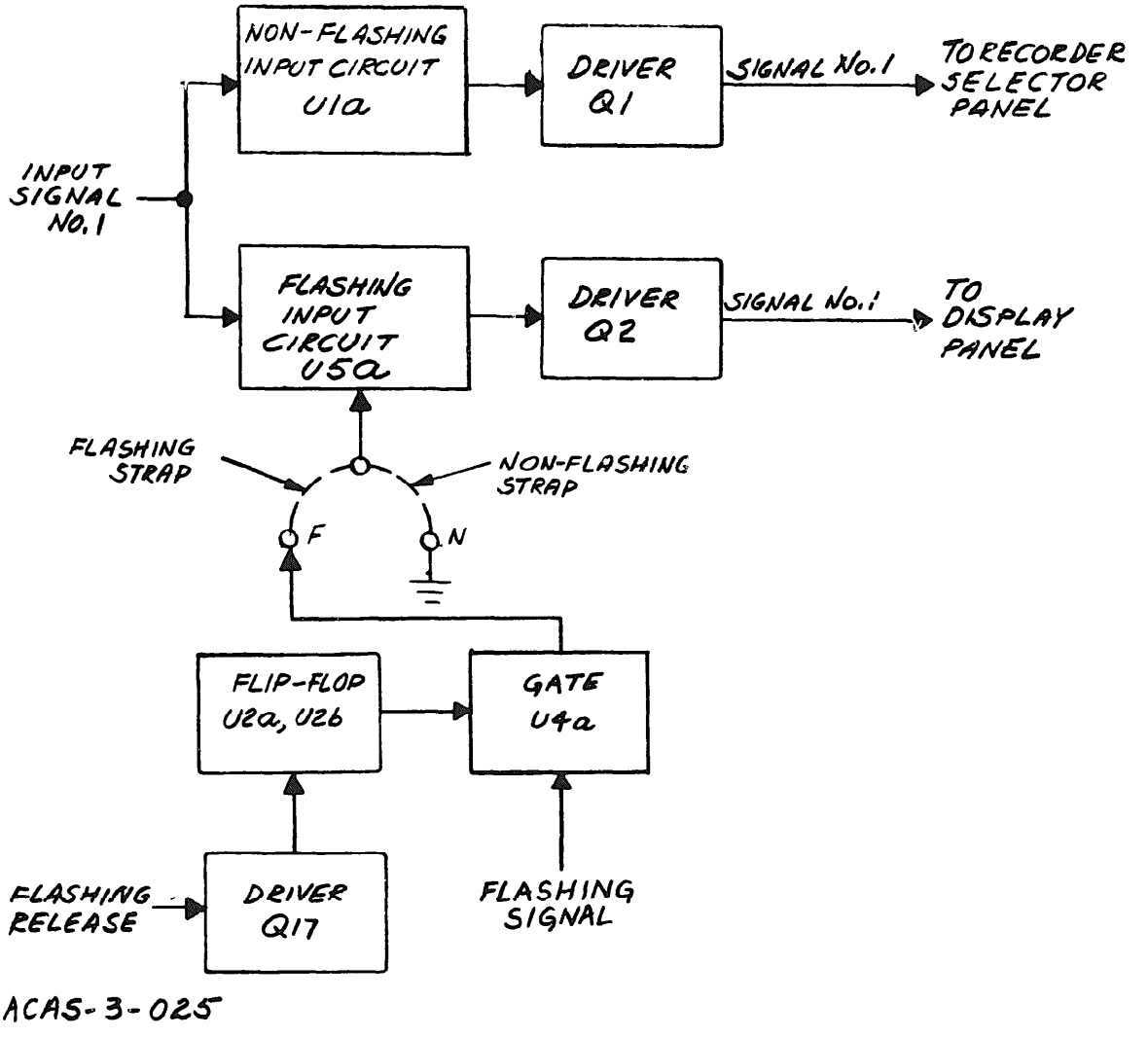


Figure 3-22. Display Driver Circuit Boards 1A1A15 Through 1A1A22, Typical Circuit, Functional Block Diagram

the output driver circuits (Q1 through Q6). The 6-bit parallel outputs from the output driver circuits are then applied to the display and recorder selector panels, via the associated display driver.

3-94. Display Driver Circuit Boards 1A1A15 Through 1A1A22. The display drivers (figure 3-22) accept the status signals from the eight-output boards and distribute them to drive both the lamps of the display panel and the channels of the recorder (via the patch connectors on the recorder selector panel). Each display driver has eight inputs (display driver 1A1A uses only the first six) each of which goes through identical circuitry. For this reason figure 3-22, the functional block diagram, shows only one signal path.

3-95. Input signal No. 1 (a typical status signal) is applied to both the flashing and non-flashing input circuits. The output of the non-flashing input circuits is applied, through a driver, to the recorder selector panel for a recorded record of that status signal (if selected on panel). The output of the flashing input circuit is applied, through a driver, directly to one of the status indicator lamps on the display panel. If strapped for flashing, the output of the flip-flop will cause the driver

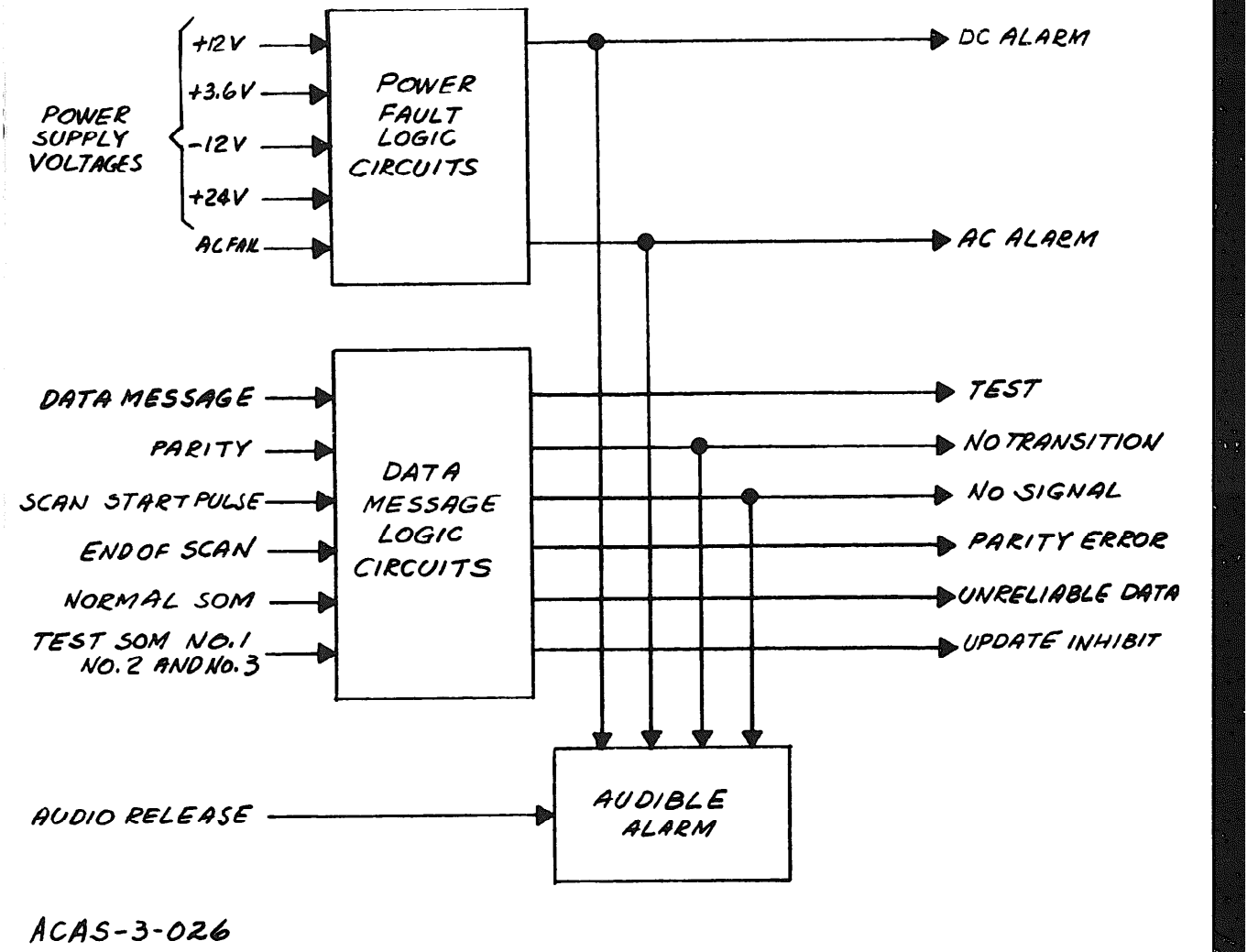


Figure 3-23. MSTE Local Alarm Circuit Board 1A1A1, Functional Block Diagram

input to alternately go on and off, causing the associated display panel lamp to flash at approximately 30 times per minute. Pressing the FLASHING RELEASE pushbutton on the control and local display panel will disable the flip-flop and stop the lamp from flashing. If strapped for non-flashing, the appropriate lamp will light, but not flash.

3-96. MSTE Local Alarm Circuit Board 1A1A1. The Master Station local alarm circuit board (figure 3-23) functions in the same manner as the Remote Station local alarm (paragraph 3-16), however it monitors additional signals that are unique to the Master Station, namely parity error and unreliable data. In addition to alarms, it generates the update inhibit signal to power buffer circuit board A4 from the end of scan, start of scan (for a short message, i.e., less than characters) and parity signals. The same four alarms as described in the Remote Station local alarm can be strapped for audible operation (AC FAIL, DC FAIL, NO SIGNAL (open loop), and NO TRANSITION). The alarm lamps are contained on the control and local display panel, however PARITY ERROR is repeated on the display panel as PE. The unreliable data signal is displayed on the display panel as UD, and is activated whenever any other alarm is activated.

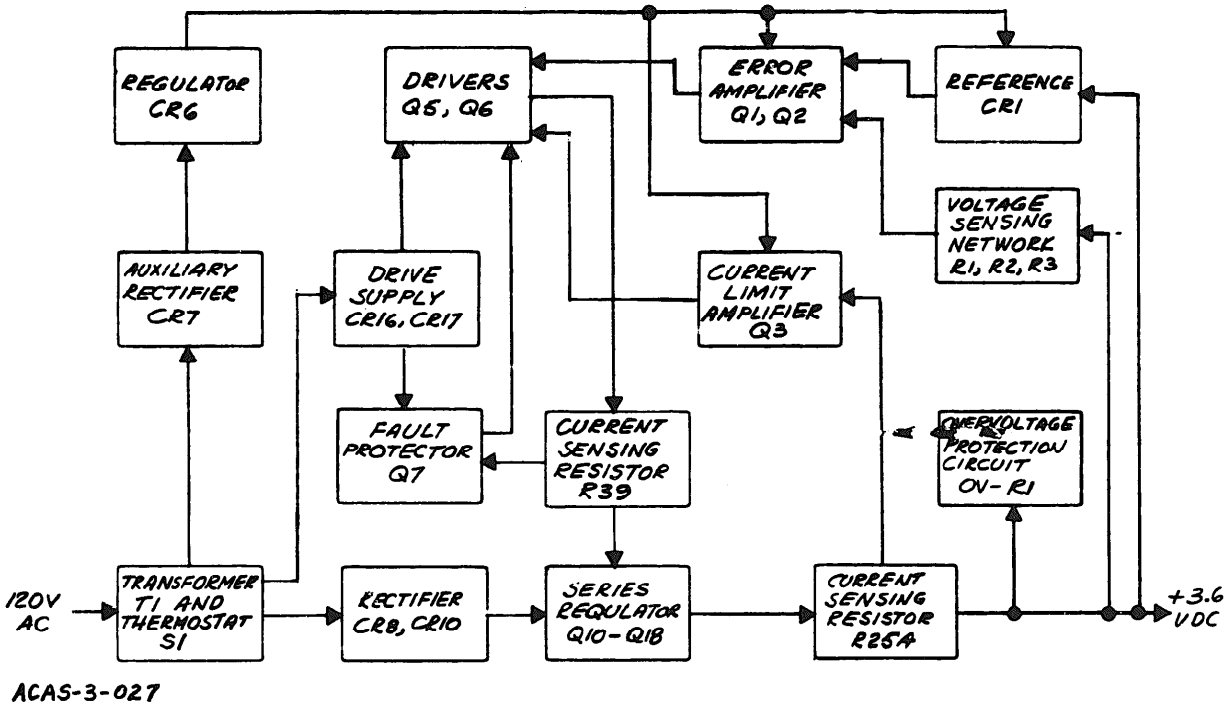


Figure 3-24. MSTE +3.6 Volt Dc Power Supply Subassemblies 2A7 and 2A9, Functional Block Diagram

3-97. MSTE POWER DISTRIBUTION PANEL 2A6. The Master Station power distribution panel distributes the dc power outputs of the Master Station power supplies to the appropriate circuitry. Each distribution line is fused, each power supply output is available at a test point, and each output is connected to an alarm lamp. (Refer to the power distribution panel schematic diagram in Chapter 6.) There are two of each type of power supply in the Master Station, each one capable of carrying the current load by itself. Each pair of identical supplies is connected in parallel across TB1. The output of each supply is connected directly across one of the eight relays (K1 through K8) in the power distribution panel. In the event of a failure of any power supply, the associated relay will de-energize, lighting the appropriate power supply FAIL lamp. In the energized position (on) of the relays, the LAMP TEST pushbutton applies a ground to all FAIL lamps on the front panel for lamp checkout.

3-98. MSTE +3.6 VOLT DC POWER SUPPLY SUBASSEMBLIES 2A7 AND 2A9. The two +3.6 volt power supplies (figure 3-24) provide dc operating voltages for the decoder logic circuits.

NOTE

These subassemblies supply the logic voltage of 3.6 volts at the decoder subassembly. To overcome the loss in the changeover diodes used in paralleling these supplies (at 2A6), and to overcome other line drops, these supplies are actually rated at 4.5 volts dc and are adjusted to supply this voltage at 2A7TB1 and 2A9TB1 between terminals 6 (+) and 4 (-).

3-99. Single-phase 115-volt power is applied to transformer T1 through the thermostat protection circuit. Rectifier CR8-CR10 provides the dc output regulated by series regulators Q10-Q18 to become the +4.5 volt regulated power supply output. Rectifier CR7 and regulator CR6 provide the dc bias voltage for the error amplifier, current limit amplifier, and voltage reference circuits. The

drive supply, CR16-17, provides voltage for drivers Q5 and Q6.

3-100. Changes in the output voltage are sensed by voltage sensing network R1, R2, R3. Error amplifier Q1-Q2 compares these changes with the reference voltage from CR1. The resulting error signal is amplified by drivers Q5, Q6 and applied to series regulators Q10-Q18.

3-101. Load current is sensed across current sensing resistor R25A. When the load current increases, the voltage drop across R25A increases. When the current exceeds the rating of the unit, current limit amplifier Q3 con-&acts, decreasing the current through drivers Q5, Q6 and reducing the output voltage, thus limiting the output current.

3-102. When the power supply output voltage exceeds the overvoltage limit (nominally +5.2 volts dc) set by OV-R1, the overvoltage protection circuit causes the output to decrease. The overvoltage circuit continues to limit the output until the circuit breaker shuts off the supply l

3-103. MSTE DUAL 12-VOLT DC POWER SUPPLY SUBASSEMBLIES 2A8 AND 2A10. The dual 12-volt dc power supply assemblies (figure 3-25) contain one ±12 volt power supply and one +12 volt power supply, which supply operating voltage to the decoder assemblies and the alarm circuits.

3-104. The ac input to each supply is protected with fuses installed in indicating Iuse holders on front panel to indicate failure of either logic or alarm power. The alarm power supply receives 115-volt input power to transformer T1, which is protected by thermostat S1. The rectified output from rectifier CR8-CR11 is regulated by series regulator Q8 and applied as the +12 volt alarm output. Variations in output voltage are sensed by voltage sensing network R2-R3. This variation is compared with the reference voltage from CR1 by error amplifier Q1-Q2 and applied as the error signal to driver Q5. The output of Q5 is applied to series regulator Q8 to regulate the output voltage. If the load current exceeds the power supply rating, the voltage drop increases across current sensing resistor R14. This increase is applied through current limit amplifier Q3 to driver Q5, limiting the output current of the power supply. The logic power supply contains an integrated circuit that functions as a combined current limiter and voltage regulator. Any increase in output voltage (sensed by R8) causes IC1 to reduce the output voltage. Increases in load current (sensed across current sensing resistor R7) also cause the integrated circuit to decrease the voltage output to keep the load current at a safe value. Each supply is equipped with an overvoltage protector (OV-2) which causes the output voltage to decrease to 0 volts whenever the power supply voltage exceeds the overvoltage limit set by OV-2.

3-105. FUNCTIONAL DESCRIPTION OF RECORDER SELECTOR PANEL 3A2.

3-106. The recorder selector panel receives the 62 status signals from the output driver circuits. Each of these signals (up to 40) can be patched to the chart recorder, to provide a permanent record as required. The lower portion of the panel contains 40 jacks (1 through 40), the upper portion contains 62 jacks (1 through 62) for each of the 12 display sectors. Patch cords are connected between these upper and lower jacks to accomplish the patching. Table 3-1 lists the correlation between display lamp and recorder selector panel jack.

3-107. FUNCTIONAL DESCRIPTION OF 40-CHANNEL SIGNAL DATA RECORDER 3A1.

3-108. The 40-channel recorder is actually two identical 20-channel recorders mounted in a common chassis, with completely independent drive motors and controls. It contains thermal pens to indicate the status of each channel on a rotating paper chart. When any status signal output is present, the appropriate pen deflects 1/10 inch to the right.

3-109. FUNCTIONAL DESCRIPTION OF DATA DISPLAY GROUP.

3-110. DATA DISPLAYS. The data display contains 12 identical sectors (10 operational, 2 for expansion), one for each Remote Station. Each sector consists of three sections (from top to bottom): the switch cluster display, the out-of-service display, and the trunk status display.

3-111. DISPLAY POWER SUPPLY. Power for the display section lamps, the recorder stylus coils, and the indicator lamps on

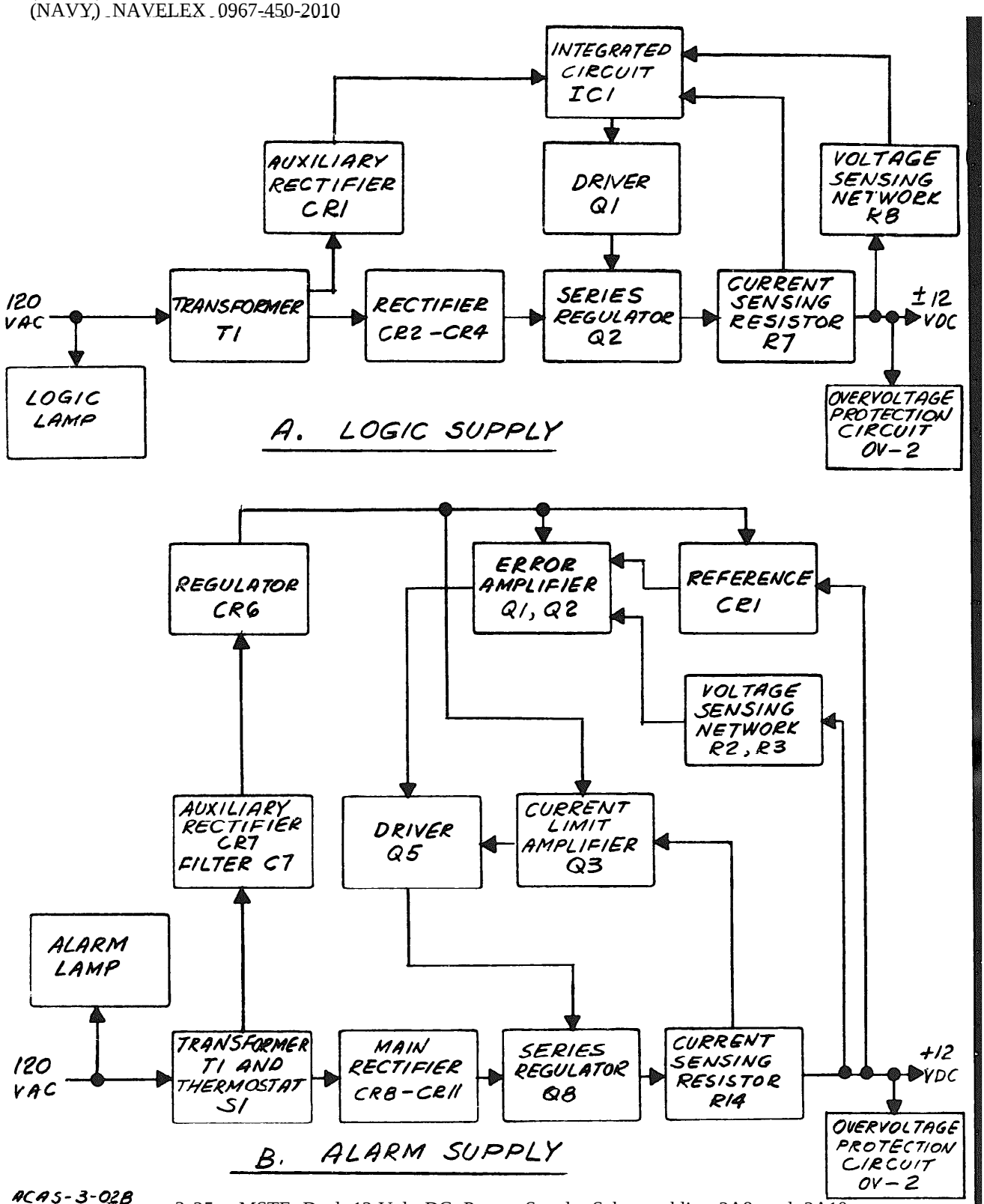


Figure 3-25. MSTE Dual 12-Volt DC Power Supply Subassemblies 2A8 and 2A10, Functional Block Diagram

subassembly 1A6 is obtained from the display/ recorder +24 volt dc power supply (figure 3-26). The 120-volt input power is applied through a fuse to transformer T1. The output of the transformer is rectified by CR1, CR2 and applied through separate fuses to a sector of the display panel. The 120 volts to transformer T1 is also applied through a separate fuse to the recorder. Relays across both the recorder ac power and the recorder dc power de-energize in the event of a failure of either line, lighting the appropriate alarm lamp.

Table 3-1. Recorder Selector Panel Jack/Display Lamp Correlation

JACK NO.	DISPLAY LAMP	JACK NO.	DISPLAY LAMP	JACK NO.	DISPLAY LAMP
1	MFX - Red	22	MEM-Y	43	PMB-7
2	TAN	23	CLK	44	VG-7
3	MFR	24	CMP	45	SG-7
4	MFT	25	PMB-1	46	PMB-8
5	DPT	26	VG-1	47	VG-8
6	DPR	27	SG-1	48	SG-8
7	TCR - Red	28	PMB-2	49	PMB-9
8	RSJ - Red	29	VG-2	50	VG-9
9	ATOP	30	SG-2	51	SG-9
10	LLC-A	31	PMB-3	52	PMB-10
11	LLC-B	32	VG-3	53	VG-10
12	LLC-C	33	SG-3	54	SG-10
13	RSJ - Amber	34	PMB-4	55	PMB-11
14	MFX - Amber	35	VG-4	56	VG-11
15	TCR - Amber	36	SG-4	57	SG-11
16	MKR-A	37	PMB-5	58	PMB-12
17	MKR-B	38	VG-5	59	VG-12
18	LOG-A	39	SG-5	60	SG-12
19	LOG-B	40	PMB-6	61	UD
20	LOG-C	41	VG-6		
21	MEM-X	42	SG-6		

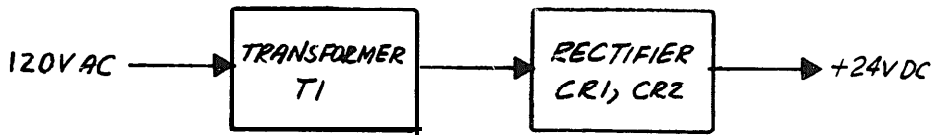


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Figure 3-26. Display/Recorder +24 Volt Dc Power Supply, Functional Block Diagram

CHAPTER 4

MAINTENANCE

4-1. INTRODUCTION.

4-2. This chapter contains the information necessary to perform corrective maintenance of the ACAS equipment. The approach to ACAS corrective maintenance is based upon the concept of rapid restoral of malfunctioning equipment to normal operation by simple replacement of a faulty module, circuit board, or subassembly. This objective is achieved by utilizing efficient performance assessment and fault isolation techniques in conjunction with the information presented in this chapter. This information trouble analysis guides, testing and troubleshooting procedures for fault isolation, adjustment and replacement procedures for correcting the fault, and other supporting data such as equipment shutdown and restart procedures and strapping procedures.

4-3. MAINTENANCE TEST EQUIPMENT.

4-4. Maintenance and testing of the ACAS equipment is accomplished with the use of standard test equipment. Table 4-1 lists the required test equipment, their model or part numbers, and pertinent operating characteristics. Substitute test equipment may be used only if the recommended equipment is not available and if the substitute equipment has approximately the same operating characteristics.

4-5. TROUBLE ANALYSIS.

4-6. The isolation of any trouble condition is accomplished by performing a logical analysis of the trouble symptoms and utilizing the various maintenance aids provided. Trouble analysis is based on the following logical steps :

a. SYMPTOM RECOGNITION. This is the first step in the troubleshooting procedure and is based on a complete knowledge and understanding of equipment operating characteristics in all modes (normal and test). Not all equipment troubles are the direct result of component failure. Therefore, a trouble in an equipment is not always easy to recognize since all conditions of less than peak performance are not always apparent. This type of equipment trouble is usually discovered while accomplishing preventive maintenance procedures. (Refer to the associated Preventive Maintenance Work Card set.) It is important that the not-so-apparent troubles, as well as the apparent troubles, be recognized.

b. SYMPTOM ELABORATION. After an equipment trouble has been recognized, all the available maintenance aids designed into the equipment should be used to further elaborate on the original trouble symptom. Use of the MODE switch, alarm lamps, and other built-in indicating or testing aids provides better identification of the original trouble symptom.

c. LISTING PROBABLE FAULTY FUNCTION. The next step in logical troubleshooting is to formulate a number of logical choices as to the cause and likely location (module or circuit board) of the trouble. The logical choices are mental decisions which are based on knowledge of the equipment operation, a full identification of the trouble symptom, and information contained in this manual. The overall functional description in Chapter 3 and its associated block diagrams should be referred to when selecting possible faulty functional modules or circuit boards.

d. LOCALIZING THE FAULTY MODULE OR CIRCUIT BOARD. For the greatest efficiency in localizing trouble, the modules or circuit boards which have been selected by the logical choice method should be replaced in an order that will require the least time. This requires a mental selection to determine which to try first. The selection should be based on the validity of the logical choice and the difficulties in making the replacement. If the replacement does not prove that module or

Table 4-1. Maintenance Test Equipment

ITEM	MODEL OR PART NUMBER	OPERATING CHARACTERISTICS
Multimeter	AN/PSM-6	Voltage ranges: 0.5, 2.5, 10, 50, 250, 500, 1000 Vdc and Vac Current ranges: 0.5, 2.5, 10, 50 250, 500, 1000 ma Resistance ranges: 1K, 10K, 100K 1 meg, 10 meg Sensitivity: 1000 ohms/Vdc, 1000 and 2000 ohms/Vdc Accuracy: ±4 percent
Oscilloscope	Tektronix Model 535A	Frequency range: dc to 15 mHz Sweep speed: 0.1 usec/cm min, 5 sec/cm max. (±3 percent), 12 sec/cm uncalibrated Rise time: 0.023 usec
Electronic counter	Hewlett-Packard Model 523B	Frequency range: 0.001 Hz to 1.100 mHz Operating time intervals: 3 usec to 27.8 hours
Printed circuit board extender assembly	Atlantic Research Part No. TP-AD-40952472	
Stopwatch		

circuit board to be at fault, the next selection should be tested, and so on until the fault is located. As aids in this process, the manual contains a functional description with supporting logic and block diagrams and other descriptive material for the Remote and Master Station equipment (Chapter 3), and descriptions of the abnormal indications to be observed in each of the ACAS operating modes (Chapter 2). In addition, Chapter 6 presents servicing block diagrams, wiring and cabling diagrams, and individual circuit schematic and logic diagrams to facilitate circuit and signal tracing. The applicable parts location figures are presented in Chapter 1 of the manual. The various maintenance aids presented in the following paragraphs of this chapter will aid in the selection of probable faulty modules or circuit boards based upon the symptoms observed.

4-7. PERFORMANCE TEST.

4-8. One method of uncovering trouble symptoms when a malfunction is suspected is to perform an end-to-end system performance test involving the Master Station and

associated Remote Stations. Perform this test as follows:

a. Establish voice communications between Master Station and Remote Station to be tested.

b. At Remote Station, set MODE switch on RSE encoder subassembly A1 (figure 1-5) to ON TEST, OFF TEST, LOOP ADJ, and NORMAL positions in succession. At each switch position, observe lamp indications at Remote Station, Master Station terminal equipment, and display sector associated with Remote Station under test. Normal indications for each switch position are given in table 4-2. These indications are observed on the following panels:

1. For Remote Station, RSE power supply subassembly A2 (figure 1-7).

2. Fo:r Master Station terminal equipment, MSTE control and local display panel 1A6 (figure 1-13).

3. For display sector, the appropriate display sector panel (figures 1-30 and 1-32).

c. In the event that any abnormal indications are observed, refer to paragraph 4-15 for the appropriate troubleshooting procedure.

d. Repeat steps a, b, and c with each Remote Station as required.

4-9. TROUBLESHOOTING PROCEDURES.

4-10. The procedures for troubleshooting the ACAS equipment are based upon two types of fault indications: alarm lamp indications denoting power supply failures or open fuses, and data and display lamp indications of data message signal irregularities. Paragraphs 4-11 and 4-12 contains the procedures to be followed to isolate the cause of power supply failure indications at the Remote and Master Stations, respectively. Troubleshooting procedures for data message signal failures utilizing the system performance test and other maintenance aids are presented in paragraph 4-15.

4-11. REMOTE STATION POWER SUPPLY FAILURES. Loss of power to Remote Station equipment can be caused by an open fuse or

Table 4-2. System Performance Test, Normal Indications

MODE SWITCH SETTING	NORMAL INDICATIONS		
	RSE	MSTE	DISPLAY SECTOR
ON TEST	TEST lamp lights	TEST PATTERN lamp lights	All lamps light, except PE lamp.
OFF TEST	Same as ON TEST mode	Same as ON TEST mode	All lamps extinguished, except UD lamp.
LOOP ADJ	TEST and NO TRNSN lamps light	NO TRANSITION lamp lights	*UD lamp lights
NORMAL	All lamps extinguished, except ALARM POWER	All lamps extinguished	Lamp display returns to normal (UD and PE lamps extinguished).

*In Loop Adj mode the PARITY ERROR lamp on MSTE and the PE lamp, or other lamps, on the display sector may also light.

failure of a dc power supply or the ac input power source. In the event of a power supply failure other than the alarm power supply, an alarm lamp lights on RSE power supply subassembly A2 (figure 1-7), and an audible alarm sounds (if strapped). Proceed as follows :

a. Depress AUDIO RELEASE pushbutton to silence audible alarm, if required.

b. Refer to table 4-3 for interpretation of the alarm indication.

C. Check fuses associated with the suspetted faulty power supply (table 4-4). Replace any open fuse,

d. Using multimeter, measure output voltage of suspected power supply at test points listed in table 4-5.

e. If faulty power supply is indicated, loosen two screws securing power supply shelf A2A1 at rear of RSE power supply subassembly A2 (figure 1-8).

Table 4-3. RSE Power Supply Subassembly A2, Alarm Lamp Indications

ALARM LAMP	REF DES	PROBABLE CAUSE OF ALARM INDICATION
ALARM POWER (normally lighted)	DS1	Extinguishes if power supply module A2A1A3 defective or if the associated ac or dc fuse opens (indicating fuseholder will light if ac fuse opens). Audible alarm not operative.
AC	DS2	Loss of ac input power or associated fuse open (indicating fuseholder will light if fuse opens).
DC	DS3	Power supply module A2A1A1, A2A1A2, A2A1A4, or A2A1A5 defective or associated fuse opens.
NO LOOP	DS5	Loss of loop current. If DC ALARM is also lighted, probable cause is power supply module A2A1A1 or A2A1A2 (for neutral or polar mode operation, respectively); otherwise refer to table 4-11.
NO TRNSN	DS6	Loop output signal consists of steady mark or steady space for longer than 400 msec (nominal). If DC lamp is also lighted, probable cause is power supply module A2A1A2, A2A1A4, or A2A1A5; otherwise, refer to table 4-11.
TEST	DS4	Lights to indicate when system is in any mode other than normal (not a failure indication). Audible alarm not used with this lamp.

Table 4-4. RSE Power Supply Subassembly A2, Fuse Complement

FUSE	REF DES	FUNCTION
AC ALARM (self -indicating)	F1	Protects ac input line to alarm power supply.
AC NORMAL (self-indicating)	F2	Protects ac input line to other dc power supplies.
DC fuses:		
+3.6V, 10A	F9	Protects output of +3.6 Vdc power supply A2A1A5.
+12V ALARM, 1A	F6	Protects output of +12 Vdc alarm power supply A2A1A3.
-12V, .25A	F8	Protects negative output of ±12 Vdc power supply A2A1A4.
+12V, .25A	F7	Protects positive output of ±12 Vdc power supply A2A1A4.
-60V, .125A	F5	Protects negative output of ±60 Vdc power supply A2A1A2.
+60V, .125A	F4	Protects positive output of ±60 Vdc power supply A2A1A2.
+130V, .125A	F3	Protects output of +130 Vdc power supply A2A1A1.

f. Withdraw power supply shelf to gain access to power supply modules (figure 1-9).

g. If voltage measured in step d is out of tolerance, adjust VDC ADJ control on the faulty module to obtain proper output. For module A2A1A5 (+3.6 volt dc), adjustment is made through access hole at the rear of the shelf. If measured voltage is 0, checkinternal fuse and replace if open. If these procedures fail to correct the trouble, replace the faulty power supply module in accordance with paragraph 4-38.

4-12. MASTER STATION POWER SUPPLY FAILURES, Loss of power to Master Station equipment can be caused by an open fuse or failure of a dc power supply or the ac input power source. Power supply failure or open fuse indications for Master Station terminal equipment appear on the MSTE power distribution panel and the control and local display panel (paragraph 4-13). Display/recorder power supply failure indications appears on the front panel of the display/recorder +24 volt dc power supply (paragraph 4-14), and on the control and local display panel (audible alarm).

Table 4-5. RSE Power Supply Subassembly A2, Test Points

TEST POINT	REF DES	FUNCTION
SIG	TP1	Provides connection point for observing serial data message output waveform, or for measuring loop current (proportional voltage).
GND	TP6	Provides common ground connection for output waveform and power supply voltage measurements.
+3.6V	TP9	Provides connection point for measuring output voltage of +3.6 Vdc power supply A2A1A5 (4.0 ±0.2 Vdc).
+12V ALARM	TP5	Provides connection point for measuring output voltage of +12 Vdc alarm power supply A2A1A3 (+12.0 ±1.0 Vdc).
-12V	TP8	Provides connection point for measuring negative output voltage of ±12 Vdc power supply A2A1A4 (-12 ±1.0 Vdc).
+12V	TP7	Provides connection point for measuring positive output voltage of *12 Vdc power supply A2A1A4 (+12 ±1.0 Vdc).
-60V	TP4	Provides connection point for measuring negative output voltage of &60 Vdc power supply A2A1A2 (-60 ±1.5 Vdc).
+60V	TP3	Provides connection point for measuring positive output voltage of +60 Vdc power supply A2A1A2 (±60 ±1.5 Vdc).
+130V	TP2	Provides connection point for measuring output voltage of +130 Vdc power supply A2A1A1 (+130 ±3.0 Vdc).
LOOP TEST	J7	Provides connection point for measuring loop current, distortion, etc. (Requires use of 1/4-inch telephone plug with positive tip.)

4-13. MSTE Power Supplies. MSTE power supply failures are indicated in two distinct ways. A single supply failure will produce an audible alarm (if so strapped) and will cause the appropriate FAIL lamp on the MSTE power distribution panel 2A6 (figure 1-15) to light. Refer to table 4-6 for interpretation of the alarm indication. Failure of both parallel-connected power supplies, or opening of one of the individual distribution fuses listed in able 4-8 will produce an audible alarm (if so strapped) and will cause a DC FAIL lamp on

the MSTE control and local display panel 1A6 (figure 1-13 and table 4-7) to light. In the event of a power supply failure, proceed as follows:

a. Audible alarm will sound for any dc or ac power failure (except for loss of all ac power to MSTE power distribution panel 2A6). Depress AUDIO RELEASE pushbutton to silence alarm, and note which lamps are lighted on 1A6 and 2A6.

NOTE

In the event of the opening of one of the +12V ALARM POWER fuses (F1-F10) on 1A6, the audible alarm will continue to sound (i. e., AUDIO RELEASE has no effect) until fuse is replaced.

b. If a FAIL lamp alarm on 2A6 is lighted and no DC FAIL lamps on 1A6 are lighted, refer to table 4-6 for probable cause. (A single power supply failure will not affect continued operation of the MSTE.)

c. If a DC FAIL lamp is lighted on 1A6 and no FAIL lamps on 2A6 are lighted, check appropriate fuse from table 4-8.

d. If all DC FAIL lamps (DS37-DS46) on 1A6 are lighted and both FAIL lamps for any MSTE parallel-connected power supply on 2A6 are lighted, check for ac input power failure.

e. If all four FAIL lamps for the power supply are lighted on 2A6, check for ac input power failure on the appropriate line,

Table 4-6. MSTE Power Distribution Panel 2A6, Alarm Lamp Indications

ALARM LAMP	REF DES	PROBABLE CAUSE OF ALARM INDICATION
ALARM POWER +12V FAIL NO. 1	DS1	Defective +12 Vdc alarm module in dual power supply 2A8.
ALARM POWER +12V FAIL NO. 2	DS2	Defective +12 Vdc alarm module in dual power supply 2A10.
-12V FAIL NO. 1	DS3	Defective ±12 Vdc module in dual power supply 2A8.
-12V FAIL NO. 2	DS4	Defective ±12 Vdc module in dual power supply 2A10.
+12V FAIL NO. 1	DS5	Defective ±12 Vdc module in dual power supply 2A8.
+12V FAIL NO. 2	DS6	Defective ±12 Vdc module in dual power supply 2A10.
+3.6V FAIL NO. 1	DS7	Defective +3.6 Vdc power supply 2A7.
+3.6V FAIL NO. 2	DS8	Defective +3.6 Vdc power supply 2A9.
Fuse indicator lamps (12 provided, 10 used)	DS9 - DS20	An extinguished lamp indicates that +12V alarm fuse in associated decoder power distribution line is open,

Table 4-7. MSTE Control and Local Display Panel 1A6, Alarm Lamp Indications

ALARM LAMP	REF DES	PROBABLE CAUSE OF ALARM INDICATION
NO SIGNAL	DS1 - DS10	Loss of input signal (0 volts) to decoder subassemblies 1A1 - 1A5 and 2A1 - 2A5, respectively.
	DS11 - DS12	Not used.
NO TRANSITION	DS13 - DS22	Input signal to decoder subassemblies 1A1 - 1A5 and 2A1 - 2A5, respectively, consists of a steady mark or a steady space for longer than 1.2 seconds (nominal). If associated DC FAIL lamp is also lighted, dc fuse F13 - F22 (-12V) or F37 - F46 (+3.6V), asapplicable, has opened; otherwise see table 4-11.
	DS23 - DS24	Not used.
PARITY ERROR	DS25 - DS34	Input signal to decoder subassemblies 1A1 - 1A5 and 2A1 - 2A5, respectively, contains even parity in one or more character intervals, If associated DC FAIL lamp is also lighted, dc fuse F12 - F22 (-12V), F25 - F34 (+12V), or F37 - F46 (+3.6V) as applicable, has opened; otherwise see table 4-11.
	DS35 - DS36	Not used.
TEST PATTERN	DS37 - DS46	Lights to indicate when Remote Station associated with decoder subassemblies 1A1 - 1A5 and 2A1 - 2A5, respectively, is operating in ON TEST, OFF TEST, FACIL. TEST or EQPT CAL modes (not a failure indication),
	DS47 - DS48	Not used.
DC FAIL	DS49 - DS58	DC fuse for -12V, +12V, or +3.6V associated with decoder subassemblies 1A1 - 1A5 and 2A1 - 2A5, respectively, on control and local display panel has opened.

Table 4-7. MSTE Control and Local Display Panel 1A6, Alarm Lamp Indications (Cont)

ALARM LAMP	REF DES	PROBABLE CAUSE OF ALARM INDICATION
		NOTE If audible alarm sounds but no alarm lamps are lighted, an ac or dc fuse has opened, or power failure has occurred in display/ recorder power supply, 3A3.
	DS59 - DS60	Not used,

Table 4-8. MSTE Power Distribution Panel 2A6, Fuse Complement

FUSE	REF DES	FUNCTION
ALARM POWER +12V AT .5A (12 provided, 10 used)	F1 - F10	Protect +12 Vdc alarm power distribution lines to decoder subassemblies 1A1 - 1A5 and 2A1 - 2A5, respectively.
	F11 and F12	Not used.
-12V AT .125A (12 provided, 10 used)	F13 - F22	Protect -12 Vdc power distribution lines to decoder subassemblies 1A1 - 1A5 and 2A1 - 2A5, respectively.
	F23 and F24	Not used.
+12V AT .125A (12 provided, 10 used)	F25 - F34	Protect +12 Vdc power distribution lines to decoder subassemblies 1A1 - 1A5 and 2A1 - 2A5, respectively.
	F35 and F36	Not used.
+3.6V AT 5A (12 provided, 10 used)	F37 - F46	Protect +3.6 Vdc power distribution lines to decoder subassemblies 1A1 - 1A5 and 2A1 - 2A5, respectively.
	F47 and F48	Not used,
LAMP POWER - 1A	F49	Protects +24 Vdc power distribution lines to MSTE panel lamps.

f. Table 4-9 lists the test points at which the output voltage of any suspected power supply may be measured.

NOTE

The voltage at these test points is the parallel-output of the redundant supply pairs. Failure of only one supply will not affect the measured voltage level.

g. If ac input power is proper and if a fuse has not opened or, in the case of power supply 2A7 or 2A9, a circuit breaker has not tripped, replace the power supply module in accordance with paragraph 4-38.

4-14. Display/Recorder Power Supply. The display/recorder +24 volt dc power supply 3A3 is located in Master Station equipment rack No. 3 (figure 1-23). Loss of +24 volt dc power to a specific area of the Master Station equipment is probably caused by an open fuse in the distribution line to that area, or in the ac input power line to the display recorder. All distribution fuses are located on the front panel of power supply 3A3 (figure 1-26). These fuses are of the self-indicating type (an internal lamp lights when the fuse is open). The power supply fuses and their functions are listed in table 4-10. Opening of any fuse (ac or dc), other than individual display sector fuses (F4 - F13), will be accompanied by an audible alarm (if strapped for audible operation). When the audible alarm sounds, depress AUDIO RELEASE pushbutton on 1A6 to silence alarm and observe front panel of 3A3 to determine if any indicating fuseholders are lighted. Replace applicable fuse. If audible alarm sounds and there are no alarm lamps lighted on subassemblies 1A6, 2A6 and 3A3, check ac input power to display/recorder (at J1, figure 1-27). If present, check for presence of +24 volts at terminal 14 of TB1, on 3A3. If voltage is zero, replace power supply 3A3.

4-15. DATA MESSAGE SIGNAL FAILURES. The procedures to be followed in troubleshooting the system to isolate data message signal failures are given in the following paragraphs.

Table 4-9. MSTE Power Distribution Panel 2A6, Test Points

TEST POINT	REF DES	FUNCTION
TEST +12V ALARM POWER (white and black)	TP1 and TP2	Provide positive (white) and ground (black) connection points for measuring parallel +12 Vdc alarm outputs of power supplies 2A8 and 2A10 (+12 ±1.0 Vdc).
TEST -12V (white and black)	TP3 and TP4	Provide negative (white) and ground (black) connection points for measuring parallel -12 Vdc outputs of power supplies 2A8 and 2A10 (-12 ±1.0 Vdc).
TEST +12V (white and black)	TP5 and TP6	Provide positive (white) and ground (black) connection points for measuring parallel +12 Vdc outputs of power supplies 2A8 and 2A10 (+12 ±1.0 Vdc).
TEST +3.6V (white and black)	TP7 and TP8	Provide positive (white) and ground (black) connection points for measuring parallel +3.6 Vdc outputs of power supplies 2A7 and 2A9 (+4.0 ±0.2 Vdc).

Table 4-10. Display/Recorder +24 Volt DC Power Supply 3A3, Fuse Complement

FUSE	REF DES	FUNCTION
DISPLAY AC - 10A	F1	Protects ac input line to +24 Vdc power supply 3A3.
RECORDER AC - 2A	F2	Protects ac input line to signal data recorder 3A1.
RECORDER DC - 3A	F3	Protects +24 Vdc power line to signal data recorder 3A1.
+24V DC 3A - 1 through 10	F4 - F13	Protect +24 Vdc power lines to lamps on display sector panels A1 through A10, respectively.
+24V DC 3A - 11 and 12	F14 and F15	Not used.
+24V 6A - CONTROL AND LOCAL DISPLAY	F16	Protects +24 Vdc power lines to lamps on MSTE control and local display panel 1A6.

4-16. System Troubleshooting Chart. In the event of any data message signal failure, an abnormal indication will be observed on a data or display lamp at the Master Station. This may occur during normal operation, or during testing (paragraph 4-7). When an abnormal indication is obtained, locate the observed symptom in table 4-11 and follow the fault isolation procedures given in that table to locate the probable faulty circuit board(s). Additional troubleshooting aids to support these fault isolation procedures are given in the following paragraphs.

4-17. Lamp Tests. Whenever an unlighted data or display lamp is observed as an abnormal symptom indication, the possibility of a burned-out lamp must be considered. To check for possible lamp failures, proceed as follows:

a. For Remote Station lamps, depress LAMP TEST pushbutton on RSE power supply subassembly A2 (figure 1-7). All front panel lamps should light.

b. For MSTE lamps, depress LAMP TEST pushbutton on MSTE control and local display panel 1A6 (figure 1-13). All lamps on the panel should light.

C. For display sector lamps, depress DISPLAY LAMP TEST pushbutton (located on control and local display panel.) associated with a particular display sector panel. All lamps on that panel should light.

4-18. Circuit Board Fault Localization Aids. In many cases table 4-11 lists several possible causes of an abnormal indication. The data message observed at the appropriate SIG TEST jacks (with an oscilloscope) on MSTE control and local display panel 1A6 (figure 1-13) or at the SIG jack on RSE power supply subassembly A2 (figure 1-7) for the ON TEST and OFF TEST modes will enable the isolation of the malfunction to a Remote or Master Station circuit board, or to the communication link interconnecting the two stations. In the ON TEST and OFF TEST modes, the data messages observed leaving the RSE should appear as shown in figure 4-1. The corresponding data messages entering the MSTE should appear as shown in figure 4-2. If the data message observed at the MSTE is correct for each mode, the trouble is in the MSTE circuit boards specified in table 4-11. If the data message observed at the MSTE is incorrect, but is proper at the RSE, the trouble is external to the ACAS equipment and Station Technical Control (STC) personnel should be informed. If. however? the data

Table 4-11. System Troubleshooting Chart (Data Message Signal Failures)

SYMPTOM	PROBABLE CAUSE	REMEDY
Sector display lamp (figure 1-32) either stays lighted in OFF TEST mode or does not light in ON TEST mode.	RSE line usage, input switch, or non-locking input circuit board; MSTE eight-output or display driver circuit board.	a. Isolate trouble to either RSE or MSTE by observing data message at SIG TEST jack, as described in paragraph 4-18. b. Refer to table 4-12 to localize fault to particular RSE or MSTE circuit boards associated with sector display lamp showing abnormal symptom. c. Remove front panel from RSE or MSTE encoder or decoder, as applicable. Observe circuit board lamps on boards associated with symptom as determined in b above. d. Compare lamp indications on those boards to the normal indications described in table 4-13. If abnormal indication is observed, replace circuit board indicated as cause of trouble in table 4-13. e. If abnormal indication is not observed, replace the possible faulty circuit boards determined in step b above, as a possible cause of trouble, one at a time, until original symptom no longer appears.
NO TRANSITION lamp at MSTE control and local display panel 1A6 (figure 1-13) lights in NORMAL, ON TEST, or OFF TEST modes.	MSTE bit analyzer or RSE bit generator circuit board.	a. If NO TRNSN lamp on associated RSE power supply subassembly A2 (figure 1-7) also lights, replace bit generator circuit board or coupling repeater. b. If NO TRNSN lamp does not light, replace bit analyzer circuit board.

Table 4-11. System Troubleshooting Chart (Data Message Signal Failures) (Cont)

SYMPTOM	PROBABLE CAUSE	REMEDY
NO LOOP lamp on RSE and UD lamp on display panel and NO TRANSITION lamp at MSTE control and local display panel light in NORMAL, ON TEST, or OFF TEST inodes.	Automatic current regulator, neutral coupling repeater, or polar coupling repeater circuit board.	a. If associated RSE is in polar transmission mode, replace polar coupling repeater and automatic current regulator circuit boards (figure 1-8) one at a time until symptom no longer exists. b. If associated RSE is in neutral transmission mode, replace neutral coupling repeater and automatic current regulator circuit boards one at a time until symptom no longer exists.
NO TRANSITION lamp at MSTE control and local display panel does not light when Remote Station is in LOOP ADJ mode.	MSTE local alarm circuit board.	Replace MSTE local alarm circuit board (figure 1-11).
NO TRNSN lamp at RSE does not light when station is in LOOP ADJ mode.	RSE local alarm circuit board.	Replace RSE local alarm circuit board (figure 1-8).
TEST PATTERN lamp does not light at MSTE when RSE is in any test mode.	MSTE shift detector circuit board or RSE non-locking input circuit board A1A4.	Replace shift detector circuit board (figure l-l 1). If symptom persists, replace non-locking input circuit board (figure 1-5).
A series of sector display lamps (10) do not light in ON TEST mode.	MSTE power buffer circuit board.	Replace power buffer circuit board (figure 1-11).
A series of sector display lamps (6) do not light in ON TEST mode.	MSTE eight-output circuit board.	Replace eight-output circuit board associated with sector display lamp showing symptom (refer to table 4-12).
In flashing configuration, display sector lamp lights, but does not flash in ON TEST mode.	MSTE display driver circuit board.	Replace display driver circuit board (figure 1-11) associated with display lamp showing symptom. (Refer to table 4-11.)

Table 4-11. System Troubleshooting Chart (Data Message Signal Failures) (Cant)

SYMPTOM	PROBABLE CAUSE	REMEDY
Display sector lamp flashes, but does not stag flashing when FLASHING RELEASE pushbutton on control and local display panel (figure 1-13) is depressed.	MSTE display driver circuit board.	Replace display driver circuit board associated with display lamp showing symptom, (Refer to table 4-12.)

message signal leaving the RSE is incorrect, the trouble is in the specified RSE circuit boards. Table 4-12 lists those circuit boards in both the Master and Remote Stations associated with each display sector lamp. Utilization of table 4-12 and the observed signal waveforms will, in most cases, enable isolation to a defective circuit board.

4-19. Another aid to faulty circuit board localization is the built-in lamps on many of the circuit boards. These are listed in table 4-13. To observe these lamps, remove the front cover from the RSE encoder or MSTE decoder subassemblies.

4-20. RECORDER FAILURES. The symptoms, probable causes, and remedies of common recorder failures are given in table 4-14.

4-21. ADJUSTMENT PROCEDURES.

4-22. ACAS adjustment procedures include data speed (baud rate) adjustments at the Remote and Master Stations, loop current adjustments at the Remote Stations, and recorder stylus temperature and pressure adjustments at the Master Station. These procedures are presented in the following paragraphs.

4-23. DATA SPEED. This adjustment procedure synchronizes the baud rate of the Remote Station encoder bit generator with the associated Master Station decoder bit analyzer at 75 bauds. Adjust the baud rate as follows:

a. Establish voice communications between Master Station and Remote Station with which adjustment is to be performed.

b. At Remote Station, remove front cover of RSE encoder subassembly to gain access to bit generator circuit board A1A1 (figure 1-5).

c. At Master Station, remove front cover of MSTE decoder subassembly circuit board A2 associated with Remote Station (figure 1-11), to gain access to bit analyzer.

d. At Remote Station, set MODE switch on RSE encoder subassembly A1 (figure 1-5) to EQPT CAL position. TEST lamp on RSE power supply subassembly A2 (figure 1-7) lights. At MSTE control and local display panel 1A6 (figure 1-13), TEST PATTERN lamp associated with Remote Station lights. At display sector panel (figure 1-32) associated with Remote Station, UD and PE lamps light. Set CAL/OPR slide switch on bit analyzer circuit board to CAL position.

e. At RSE power supply subassembly front panel, connect electronic counter at SIG and GND test points.

f. At Remote Station, adjust baud control potentiometer R1 on board A1A1 for a period measurement of 26.67 ±0.27 milliseconds on electronic counter,

g. At Master Station, adjust baud potentiometer R1 on board A2 until lamp on board A2 goes from full brilliance to minimum brilliance and back to full brilliance in 10 seconds or more. (Use a stopwatch for timing.)

h. Return CAL/OPR slide switch to OPR position.

i. Replace front covers on RSE encoder and MSTE decoder subassemblies.

Table 4-11. System Troubleshooting Chart (Data Message Signal Failures) (Cont)

SYMPTOM	PROBABLE CAUSE	REMEDY
NO LOOP lamp on RSE and UD lamp on display panel and NO TRANSITION lamp at MSTE control and local display panel light in NORMAL, ON TEST, or OFF TEST inodes.	Automatic current regulator, neutral coupling repeater, or polar coupling repeater circuit board.	a. If associated RSE is in polar transmission mode, replace polar coupling repeater and automatic current regulator circuit boards (figure 1-8) one at a time until symptom no longer exists. b. If associated RSE is in neutral transmission mode, replace neutral coupling repeater and automatic current regulator circuit boards one at a time until symptom no longer exists.
NO TRANSITION lamp at MSTE control and local display panel does not light when Remote Station is in LOOP ADJ mode.	MSTE local alarm circuit board.	Replace MSTE local alarm circuit board (figure 1-11).
NO TRNSN lamp at RSE does not light when station is in LOOP ADJ mode.	RSE local alarm circuit board.	Replace RSE local alarm circuit board (figure 1-8).
TEST PATTERN lamp does not light at MSTE when RSE is in any test mode.	MSTE shift detector circuit board or RSE non-locking input circuit board A1A4.	Replace shift detector circuit board (figure 1-11). If symptom persists, replace non-locking input circuit board (figure 1-5).
A series of sector display lamps (10) do not light in ON TEST mode.	MSTE power buffer circuit board.	Replace power buffer circuit board (figure 1-11).
A series of sector display lamps (6) do not light in ON TEST mode.	MSTE eight-output circuit board.	Replace eight-output circuit board associated with sector display lamp showing symptom (refer to table 4-12).
In flashing configuration, display sector lamp lights, but does not flash in ON TEST mode.	MSTE display driver circuit board.	Replace display driver circuit board (figure 1-11) associated with display lamp showing symptom. (Refer to table 4-11.)

Table 4-11. System Troubleshooting Chart (Data Message Signal Failures) (Cont)

SYMPTOM	PROBABLE CAUSE	REMEDY
Display sector lamp flashes, but does not stag flashing when FLASHING RELEASE pushbutton on control and local display panel (figure 1-13) is depressed.	MSTE display driver circuit board.	Replace display driver circuit board associated with display lamp showing symptom. (Refer to table 4-12.)

message signal leaving the RSE is incorrect, the trouble is in the specified RSE circuit boards. Table 4-12 lists those circuit boards in both the Master and Remote Stations associated with each display sector lamp. Utilization of table 4-12 and the observed signal waveforms will, in most cases, enable isolation to a defective circuit board.

4-19. Another aid to faulty circuit board localization is the built-in lamps on many of the circuit boards. These are listed in table 4-13. To observe these lamps, remove the front cover from the RSE encoder or MSTE decoder subassemblies.

4-20. RECORDER FAILURES. The symptoms, probable causes, and remedies of common recorder failures are given in table 4-14.

4-21. ADJUSTMENT PROCEDURES.

4-22. ACAS adjustment procedures include data speed (baud rate) adjustments at the Remote and Master Stations, loop current adjustments at the Remote Stations, and recorder stylus temperature and pressure adjustments at the Master Station. These procedures are presented in the following paragraphs.

4-23. DATA SPEED. This adjustment procedure synchronizes the baud rate of the Remote Station encoder bit generator with the associated Master Station decoder bit analyzer at 75 bauds. Adjust the baud rate as follows:

a. Establish voice communications between Master Station and Remote Station with which adjustment is to be performed.

b. At Remote Station, remove front cover of RSE encoder subassembly to gain access to bit generator circuit board A1A1 (figure 1-5).

c. At Master Station, remove front cover of MSTE decoder subassembly circuit board A2 associated with Remote Station (figure 1-11), to gain access to bit analyzer.

d. At Remote Station, set MODE switch on RSE encoder subassembly A1 (figure 1-5) to EQPT CAL position. TEST lamp on RSE power supply subassembly A2 (figure 1-7) lights. At MSTE control and local display panel 1A6 (figure 1-13), TEST PATTERN lamp associated with Remote Station lights. At display sector panel (figure 1-32) associated with Remote Station, UD and PE lamps light. Set CAL/OPR slide switch on bit analyzer circuit board to CAL position.

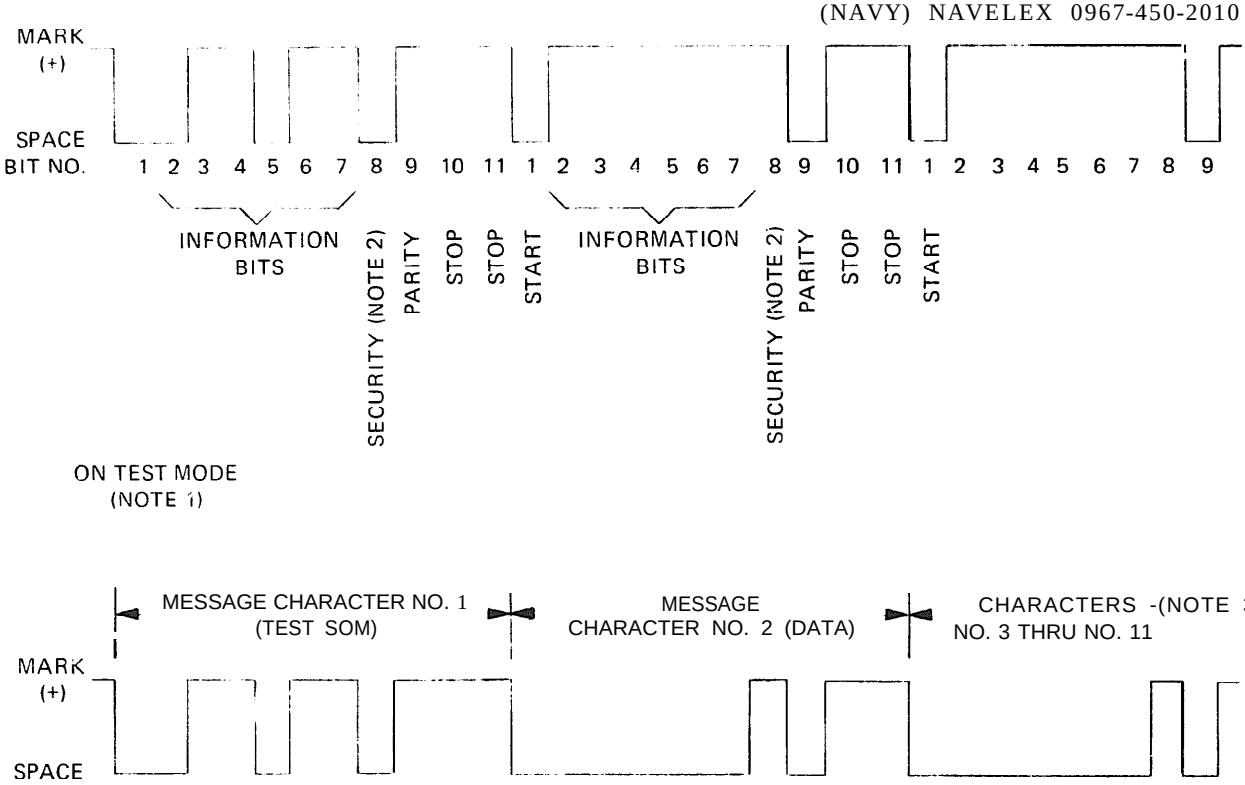
e. At RSE power supply subassembly front panel, connect electronic counter at SIG and GND test points.

f. At Remote Station, adjust baud control potentiometer R1 on board AlAl for a period measurement of 26.67 ±0.27 milliseconds on electronic counter,

g. At Master Station, adjust baud potentiometer R1 on board A2 until lamp on board A2 goes from full brilliance to minimum brilliance and back to full brilliance in 10 seconds or more. (Use a stopwatch for timing.)

h. Return CAL/OPR slide switch to OPR position.

i. Replace front covers on RSE encoder and MSTE decoder subassemblies.



NOTES:

1. OSCILLOSCOPE VERTICAL INPUTS CONNECTED TO SIG AND GND JACKS ON SUBASSEMBLY A2, TIME BASE SET TO 50 MS/DIV, AND EXTERNAL TRIGGER CONNECTED TO TEST POINT TP4 (YELLOW) OF CIRCUIT BOARD A1A4 (ACCESSIBLE FROM FRONT OF ENCODER SUBASSEMBLY Al, COVER REMOVED).

2. SECURITY BIT (NO. 8) IS ALWAYS A SPACE FOR SOM CHARACTERS AND ALWAYS A MARK FOR DATA CHARACTERS.

3. CHARACTERS NO. 2 THRU NO. 11 HAVE IDENTICAL FORMATS. EACH CHARACTER (INCLUDING SOM CHARACTER NO. 1) MAY BE OBSERVED INDIVIDUALLY BY TRIGGERING OSCILLOSCOPE FROM CIRCUIT BOARD TEST POINTS LISTED BELOW AND SETTING TIME BASE TO MS/DIV. ON ALL BOARDS, TP3 IS ORANGE, TP4 IS YELLOW.

CHARACTER NO.	BOARD	TEST POINT
1 (SOM)	A1A4	TP4
2	A1A5	TP3
3	A1A5	TP4
4	A1A6	TP3
5	A1A6	TP4
6	A1A7	TP3
7	A1A7	TP4
8	A1A8	TP3
9	A1A8	TP4
10	A1A9	TP3
11	A1A9	TP4

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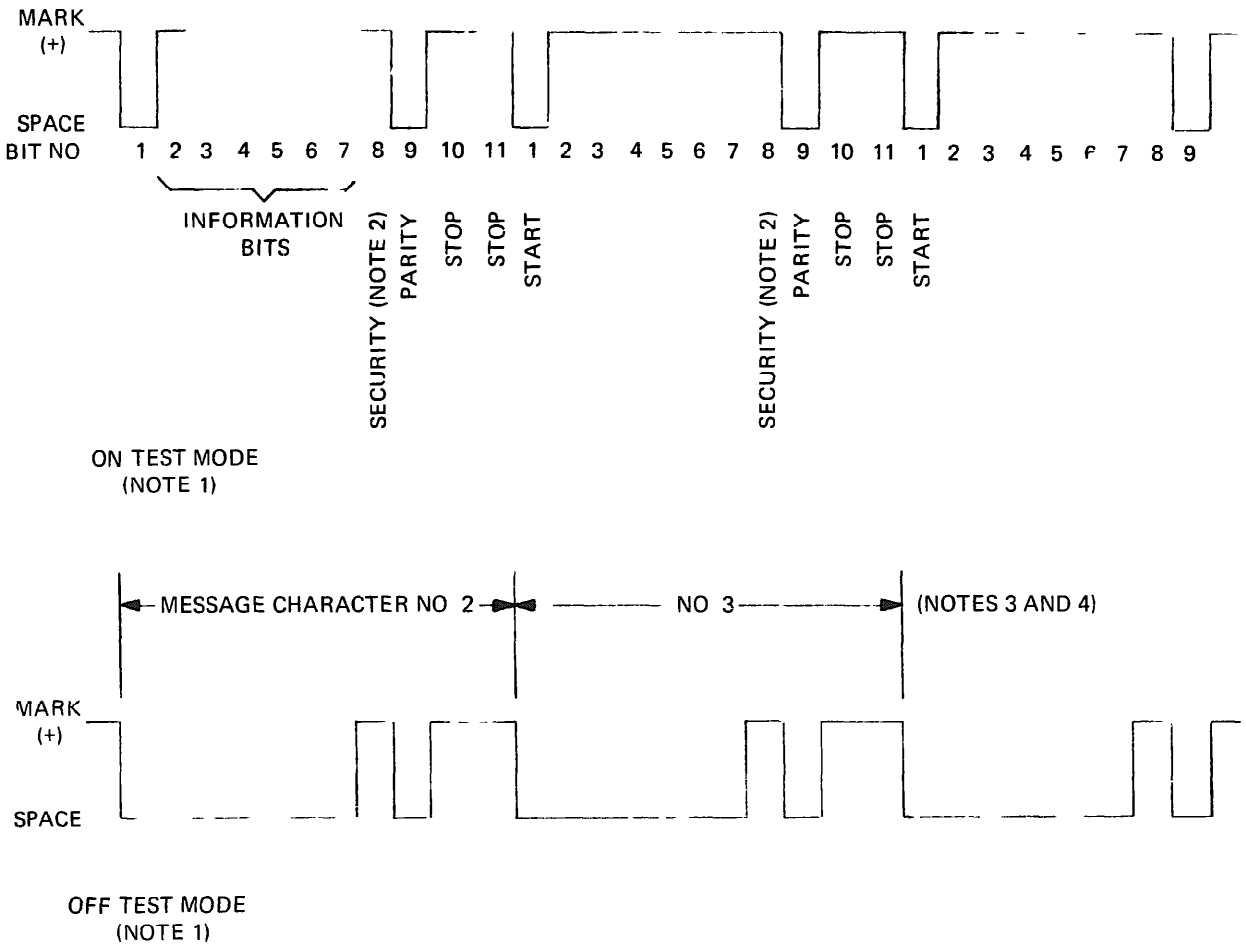
Figure 4-1. Test Message Waveforms (Remote Station)



NOTES

1 OSCILLOSCOPE VERTICAL INPUTS CONNECTED TO SIG TEST AND GND JACKS ON PANEL 1A6 TIME BASE SET TO 50 MS/DIV AND EXTERNAL TRIGGER CONNECTED TO TEST POINT TP1 OF CIRCUIT BOARD A5 (ACCESSIBLE FROM FRONT OF DECODER SUBASSEMBLY COVER REMOVED)

2 SECURITY BIT (NO 8) IS ALWAYS A SPACE FOR SOM CHARACTERS AND ALWAYS A MARK FOR DATA CHARACTERS

3 SOM CHARACTER NOT OBSERVED IN THIS PROCEDURE

4 DATA CHARACTERS NO 1 THRU NO 10 (MESSAGE CHARACTERS NO 2 THRU NO 11) HAVE IDENTICAL FORMATS EACH CHARACTER MAY BE OBSERVED INDIVIDUALLY BY TRIGGERING OSCILLOSCOPE FROM TEST POINT TP1 OF BOARD A5 THRU A 4 RESPECTIVELY AND SETTING TIME BASE TO 20 MS/DIV

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Figure 4-2 Test Message Waveforms (Master Station)

Table 4-12. Display Sector Lamps and Associated Remote and Master Station Circuit Boards

DISPLAY SECTOR LAMP	RSE ENCODER CIRCUIT BOARDS		MSTE DECODER CIRCUIT BOARD	
	LINE USAGE OR INPUT SWITCH	NON-LOCKING INPUT CIRCUIT	EIGHT-OUTPUT CIRCUIT	DISPLAY DRIVER
MFX-Red	A1A14	A1A5	A5	A15
TAN	A1A15	A1A5	A5	A15
MFR	A1A16	A1A5	A5	A15
MFT	A1A17	A1A5	A5	A15
DPT	A1A18	A1A5	A5	A15
DPR	A1A19	A1A5	A5	A15
TCR-Red	A1A20	A1A5	A6	A16
RSJ-Red	A1A21	A1A5	A6	A16
ATOP	A1A10	A1A5	A6	A16
LLC-A	A1A10	A1A5	A6	A16
LLC-B	A1A10	A1A5	A6	A16
LLC-C	A1A10	A1A5	A6	A16
RSJ-Amber	A1A10	A1A5	A7	A16
MFX-Amber	A1A10	A1A5	A7	A16
TCR-Amber	A1A10	A1A6	A7	A17
MKR-A	A1A10	A1A6	A7	A17
MKR-B	A1A10	A1A6	A7	A17
LOG-A	A1A10	A1A6	A7	A17
LOG-B	A1A10	A1A6	A8	A17
LOG-C	A1A10	A1A6	A8	A17
MEM-X	A1A10	A1A6	A8	A17
MEM-7	A1A10	A1A6	A8	A17
CLK	A1A10	A1A6	A8	A18
CMP	A1A10	A1A6	A8	A18

Table 4-12. Display Sector Lamps and Associated Remote and Master Station Circuit Boards (Cont)

DISPLAY SECTOR LAMP	RSE ENCODER CIRCUIT BOARDS		MSTE DECODER CIRCUIT BOARD	
	LINE USAGE OR INPUT SWITCH	NON-LOCKING INPUT CIRCUIT	EIGHT-OUTPUT CIRCUIT	DISPLAY DRIVER
PMB-1	A1A11	A1A7	A9	A18
VG-1	A1A11	A1A7	A9	A18
SG-1	A1A11	A1A7	A9	A18
PMB-2	A1A11	A1A7	A9	A18
VG-2	A1A11	A1A7	A9	A18
SG-2	A1A11	A1A7	A9	A18
PMB-3	A1A11	A1A7	A10	A19
VG-3	A1A11	A1A7	A10	A19
SG-3	A1A11	A1A7	A10	A19
PMB-4	A1A11	A1A7	A10	A19
VG-4	A1A11	A1A7	A10	A19
SG-4	A1A11	A1A7	A10	A19
PMB-5	A1A12	A1A8	A11	A19
VG-5	A1A12	A1A8	A11	A19
SG-5	A1A12	A1A8	A11	A20
PMB-6	A1A12	A1A8	A11	A20
VG-6	A1A12	A1A8	A11	A20
SG-6	A1A12	A1A8	A11	A20
PMB-7	A1A12	A1A8	A12	A20
VG-7	A1A12	A1A8	A12	A20
SG-7	A1A12	A1A8	A12	A20
PMB-8	A1A12	A1A8	A12	A20
VG-8	A1A12	A1A8	A12	A21

Table 4-12. Display Sector Lamps and Associated Remote and Master Station Circuit Boards (Cont)

DISPLAY SECTOR LAMP	RSE ENCODER CIRCUIT BOARDS		MSTE DECODER CIRCUIT BOARD	
	LINE USAGE OR INPUT SWITCH	NON-LOCKING INPUT CIRCUIT	EIGHT-OUTPUT CIRCUIT	DISPLAY DRIVER
SG-8	A1A12	A1A8	A12	A21
PMB-9	A1A13	A1A8	A13	A21
VG-9	A1A13	A1A9	A13	A21
SG-9	A1A13	A1A9	A13	A21
PMB-10	A1A13	A1A9	A13	A21
VG-10	A1A13	A1A9	A13	A21
SG-10	A1A13	A1A9	A13	A21
PMB-11	A1A13	A1A9	A14	A22
VG-11	A1A13	A1A9	A14	A22
SG-11	A1A13	A1A9	A14	A22
PMB-12	A1A13	A1A9	A14	A22
VG-12	A1A13	A1A9	A14	A22
SG-12	A1A13	A1A9	A14	A22

Table 4-13. Interpretation of Circuit Board Lamp Indications (RSE Encoder and MSTE Decoder)

CIRCUIT BOARD	NORMAL INDICATION		PROBABLE CAUSE OF ABNORMAL INDICATION
	ON TEST MODE	OFF TEST MODE	
RSE bit generator AlAl (figure 1-5)	Lamp flashing	Lamp flashing	Circuit board AlAl defective.
RSE non-locking input circuit AlA (figure 1-5)	Bottom lamp lights in sequence	Same as ON TEST mode	Circuit board AlA defective,
RSE non-locking input circuits AlAS through AlA (figure 1-5)	Lamps sequence from top to bottom and left to right	Same as ON TEST mode	If last sequencing lamp is top lamp, that circuit board is defective: if last sequencing lamp is bottom lamp, the

Table 4-13. Interpretation of Circuit Board Lamp Indications (RSE Encoder and MSTE Decoder) (Cont)

CIRCUIT BOARD	NORMAL INDICATION		PROBABLE CAUSE OF ABNORMAL INDICATION
	ON TEST MODE	OFF TEST MODE	
RSE non-locking input circuits A1A5 through A1A9 (figure 1-5) (Cont)			following circuit board is defective.
MSTE bit analyzer A2 (figure 1-11)	Lamp flashing	Lamp flashing	Circuit board A2 defective.
MSTE eight-output circuits A5 through A14 (figure 1-11)	All lamps sequencing from left to right	Same as ON TEST	Circuit board on which lamp does not light is defective.

Table 4-14. Signal Data Recorder 3A1, Troubleshooting Chart

SYMPTOM	PROBABLE CAUSE	REMEDY
Recorder stylus does not deflect on all channels	Recorder	Repair or replace recorder as required.
Recorder stylus for one channel does not deflect	MSTE display driver or recorder	Connect patch cord between TEST GND jack on recorder selector panel (3A2) and suspected channel. If stylus deflects, replace display driver circuit board (figure 1-11) associated with channel showing symptom. (Refer to tables 3-1 and 4-12.) If symptom still exists, repair or replace recorder as required.
Recorder traces are too light or too heavy	Recorder stylus	Adjust stylus temperature and pressure in accordance with paragraphs 4-25 and 4-26, respectively.

j. At Remote Station, set MODE switch to NORMAL position.

k. Disconnect electronic counter from test points.

4-24. LOOP CURRENT. To adjust the loop current at the Remote Station, proceed as follows.

a. Establish voice communications between Master Station and Remote Station with which adjustment is to be performed.

b. At rear of RSE power supply subassembly A2 (figure 1-8), remove cover from card file A2A2 to gain access to automatic current regulator circuit board A2A2A3.

c. Set MODE switch on RSE encoder subassembly Al front panel (figure 1-5) to LOOP ADJ position.

d. Connect multimeter at SIG and GND test points on RSE power supply subassembly A2 front panel (figure 1-7). (Connect the positive lead to SIG test point.)

e. On automatic current regulator circuit board A2A2A3, make one of the following adjustments as applicable :

1. If RSE is in polar loop transmission mode (LOOP switch A2S5, figure 1-8, set to POLAR position), adjust potentiometer R6 on board A2A2A3 until multimeter indicates -1.2 volts dc (proportional to 20 milliamperes loop current).

2. If RSE is in neutral loop transmission mode (LOOP switch set to NEUTRAL position), adjust potentiometer R2 on board A2A2A3 until multimeter indicates +3.6 volts dc (proportional to 60 milliamperes loop current).

f. Replace dust cover on card file A2A2.

g, Disconnect multimeter from test points.

h. Set MODE switch to NORMAL position.

4-25. RECORDER STYLUS TEMPERATURE. The density of the chart recorder trace is dependent upon stylus temperature. If required, adjust recorder stylus temperature as follows:

WARNING

Avoid direct contact with heated styluses, Contact with styluses when recorder is operating could result in injury through burns.

a. Open front cover of recorder (figure 1-24).

b. Using a screwdriver, rotate slotted potentiometer shaft that projects through hole in the lower right side of chart drive mounting plate. To obtain a lighter trace, rotate shaft counterclockwise. To obtain a darker trace, rotate shaft clockwise.

c. Close front cover of recorder.

4-26. RECORDER STYLUS PRESSURE. The line width of the chart recorder trace is dependent upon stylus pressure. If required, adjust recorder stylus pressure as follows:

WARNING

Avoid direct contact with heated styluses. Contact with styluses when recorder is operating could result in injury through burns.

Open front cover of recorder (figure 1-22).

b. Turn stylus temperature slotted shaft (refer to paragraph 4-25) fully counterclockwise.

c0 Loosen lockscrew in the center of stylus pressure adjustment (3/8-inch hex nut, located slightly above and behind the scaleplate).

d. Adjust 3/8-inch hex nut until all styluses are producing fine lines on the chart paper and are properly recording all lateral movement. When desired pressure adjustment is obtained, tighten lockscrew.

e. If pressure adjustment is required on an individual stylus, bend that stylus tip with needle -nose pliers.

f. Close front cover of recorder.

4-27. SHUTDOWN PROCEDURES.

4-28. The ACAS is a continuously operating system which is shut down only when it is necessary to perform off-line maintenance, such as Certain replacement and repair procedures and changing of strapping options. The shutdown procedures for the Remote and Master Stations are presented in paragraphs 4-29 and 4-30, respectively.

4-29. REMOTE STATION SHUTDOWN. To shut down the Remote Station equipment, proceed as follows:

a. Set ac power switch on RSE power supply subassembly A2 (figure 1-7) to OFF position.

b. Set Remote Station ac input circuit breaker on external ac power panel to OFF position.

4-30. MASTER STATION SHUTDOWN. To shut down the Master Station equipment, proceed as follows:

a. Turn off recorder (refer to instruction plate mounted behind chart paper),

b. Set power switch on display/recorder +24 volt dc power supply 3A3 (figure 1-26) to OFF position.

c. Set AC-1 and AC-2 switches on ac control panel (figure 1-17) to OFF position.

d. Set Master Station ac input circuit breakers on external ac power panel to OFF position.

4-31. RESTART PROCEDURES.

4-32. The procedures for restarting the Remote and Master Station equipment following a shutdown for off-line maintenance are presented in paragraphs 4-33 and 4-34, respectively,

4-33. REMOTE STATION RESTART. The procedure for restarting the Remote Station equipment is to follow the reverse order of shutdown (paragraph 4-29). Set all applicable switches to ON position.

4-34. MASTER STATION RESTART. The procedure for restarting the Master Station equipment is to follow the reverse order of shutdown (paragraph 4-30). Set all applicable switches to ON position.

4-35. REPLACEMENT PROCEDURES.

4-36. After a fault has been located to a defective unit, that unit must be removed, and a known-good unit substituted for it. Care should be taken that the unit to be inserted is identical to the unit removed.

4-37. PRINTED CIRCUIT BOARD REPLACEMENT. When replacing one of the printed circuit boards in the Remote or Master Station, first remove the dust cover, pull down card ejector, and gently pull the circuit board from its card file slot position. Carefully insert the replacement circuit board into the connecter, making sure that all pins are properly aligned, and firmly push the board into the frame until seated. Replace dust cover.

4-38. POWER SUPPLY MODULE REPLACEMENT. When replacing a power supply module, first be sure all power is removed from equipment (use shutdown procedure) then tag all wires to the module terminals so as to insure their replacement on the corresponding terminals of the replacement module. Remove all wires to the module, remove the module, and install the replacement module, using the same hardware that secured the removed module. Connect all tagged wires to the appropriate terminals and remove tags. Use restart procedure for reapplying power.

4-39. SUBASSEMBLY REPLACEMENT. The ACAS subassemblies are those units which are mounted in the 19-inch equipment racks. These units include the RSE encoder and power supply subassemblies, MSTE decoder subassemblies, MSTE control and power distribution panels, MSTE and recorder/display power supply subassemblies, recorder, and recorder selector panel. When removing a subassembly, be sure all power is removed from equipment (use shutdown procedure) then disconnect all cables and wiring from the main connectors and terminal blocks. (Refer to the applicable cabling diagram and cable lists in Chapter 6.) Tag individual wires for identification. Remove hardware securing the subassembly to the vertical mounting angles of the equipment rack. (Refer to the applicable rack assembly figures in Chapter 5.) Place the new subassembly in position on the rack, and secure with the same

hardware used with the replaced subassembly. Connect cables and wires to the new subassembly, and remove the identification tags from the wires. Use restart procedure for reapplying power.

4-40. STRAPPING PROCEDURES.

4-41. There are several strapping options available to ACAS operating personnel. These options are described in Chapter 2 of this manual. Each option, the printed circuit board(s) affected, and the applicable parts location figures and schematic diagrams are listed in table 4-15. To change a strap position, remove printed circuit board (paragraph 4-37), locate the desired link utilizing the appropriate schematic diagram, shift the strap as required, and replace printed circuit board.

Table 4-15. Printed Circuit Board Strapping Data

STRAPPING OPTION	PRINTED CIRCUIT BOARD	PARTS LOCATION FIGURE	SCHEMATIC DIAGRAM
Count strap field (threshold setting)	RSE line usage circuit boards A1A14-A1A21	1-5	FO-3
Audible alarm (Remote Station)	RSE local alarm circuit board A2A2A4	1-8	FO-11
Audible alarm (Master Station)	MSTE local alarm circuit board A1	1-11	FO-22
Flashing sector displays (see note)	MSTE display driver circuit boards A15-A22	1-11	FO-21

NOTE

The normal strapping configuration for flash/steady sector displays is shown in table 4-16. Refer to table 4-12 to identify display driver circuit board associated with each display lamp.

Table 4-16. Display Sector Lamp Flash/Steady Strapping (Normal Configuration)

DISPLAY LAMP	FLASHING	STEADY	DISPLAY LAMP	FLASHING	STEADY
UD	X		DPT		X
PE		X	DPR		X
MFX-Red	X		TCR-Red	X	
TAN		X	RSJ-Red	X	
MFR		X	ATOP		X
MFT		X	LLC-A		X

Table 4-16. Display Sector Lamp Flash/Steady Strapping (Normal Configuration) (Cont)

DISPLAY LAMP	FLASHING	STEADY
LLC-B		X
LLC-C		X
RSJ-Amber		X
MFX-Amber		X
TCR-Amber		X
MKR-A	X	
MKR-B	X	
LOG-A	X	
LOG-B	X	
LOG-C	X	
MEM-X	X	
MEM-Y	X	
CLK	X	
CMP	X	
PMB		X
VG		X
SG		X

CHAPTER 5

ASSEMBLY PARTS LIST

5-1. INTRODUCTION.

5-2. The assembly parts list presented in this chapter lists and illustrates detail parts for the ACAS equipment manufactured by Atlantic Research Corporation, Alexandria, Virginia 22314. An explanation of the assembly parts list and the type of information it contains is given in the following paragraphs.

5-3. ASSEMBLY PARTS LIST.

5-4. The assembly parts list is separated into figures by main groups or assemblies and keyed to associated illustrations by figure and index numbers. The groups are systematically broken down into assemblies and detail parts, which fall into the following categories: Those which have been procured as spares, and those which are subject to frequent removal ant' replacement. The relation of each part to its next higher assembly (NHA) or main group is shown either by indention or by figure cross-reference notes.

5-5. INDENTION. Parts listed in the group assembly parts list are indented to indicate item relationship or NHA. The nomenclature of each assembly is followed in the list (except for attaching parts) by the nomenclature of its component indented one column to the right. This indention indicates the relationship of the component to the assembly. To determine the next higher assembly of a part or assembly, note the column in which the first word of the nomenclature appears. The first item directly above, which appears one column to the left (except for attaching parts), is the NHA.

5-6. CROSS-REFERENCES. The notation "(See figure ____ for detail breakdown)" following the description of a part number indicates that further breakdown of the part will be shown on the figure noted.

5-7. The notation "(See figure for NHA)" following the description of a part number indicates that the correct assembly relationship of the part will be shown on the figure and index number noted.

5-8. UNITS PER ASSEMBLY. The quantity shown in this column represents the units required for one next higher assembly, subassembly, or sub-subassembly. The abbreviation "REF" (reference) indicates that this item has been previously listed under its next higher assembly. The "SEE FIGURE" notation in the description of the item will indicate the figure and index number at which the units per assembly can be determined.

5-9. MANUFACTURER'S CODE. Part numbers other than those of the prime contractor are designated by manufacturer's code symbols in parentheses following the description of the part. These codes are in accordance with the Federal Supply Code for Manufacturer's Cataloging Handbook H4-1 or H4-2 and amendments thereto. The complete manufacturer's name and address is written in the description column of the Group Assembly Parts List when no manufacturer's code is listed in H4-1 or H4-2. See Manufacturer's Code List paragraph 5-28, to determine manufacturer's name and address.

5-10. USABLE ON CODE. The absence of a usable on code symbol in the Usable on Code column of the Assembly Parts List indicates that the part is used on all articles covered by this manual. The following usable on codes are used in the Assembly Parts List.

Code	Definition
A	Equipment used only at Stuttgart Master Station (i.e., Master Station Display Assembly, part No. TFA-50124734-2 and 40-Channel Twin Flush Recorder Assembly, part No. TFA-42024732)

Code	Definition
B	Equipment used only at Kunia Master Station (i.e., Master Station Display Assembly, part No. TFA-50124734-1 and 20-Channel Twin Flush Recorder Assembly, part No. TFA-42025732)

5-11. NUMERICAL INDEX.

5-12. The numerical index consists of a complete listing, in numerical sequence, of all part numbers. The figure and index numbers are given for the first occurrence only of Government Standard parts. For nonstandard parts, all figures and index numbers are listed.

5-13. SOURCE CODE DEFINITIONS.

5-14. "P" Series - Parts Procured And Under Inventory Stock Control. The source codes in the "P" series are described below.

a. Code "P" identifies parts which may be requisitioned and installed by any level of maintenance consistent with the activity's authorized scope of maintenance. Code "P" is applied to parts on which usage is anticipated or known. Restricted (emergency) service manufacture of code "P" items is considered practical but may be accomplished only after confirmation of nonavailability from supply sources.

b. Code "PD" identifies parts which may be requisitioned and installed by AF activities authorized depot-level maintenance only. Code "PD" is applied to parts on which usage is anticipated or known. Restricted (emergency) service manufacture of code "PD" parts is considered practical but may be accomplished only after confirmation of nonavailability from supply sources.

c. Code "P1" identifies parts which may be requisitioned and installed by any maintenance level consistent with the activity's authorized scope of maintenance. Code "PI" is applied to parts on which usage is anticipated or known, and which service manufacture is considered impractical.

d. Code "P1D" identifies parts which may be requisitioned and installed by AF activities authorized depot-level maintenance only. Code "P1D" is applied to parts on which usace is anticipated or known, and which service manufacture is considered impractical.

e. Code P2" identifies insurance-type spare parts which can be installed by any AF activity consistent with the activity's authorized scope of maintenance. This code is applied to such parts as are basically structural items of very limited usage, require special tools, templates, and/or jigs, and are very difficult, impractical, or uneconomical to manufacture by AF activities. These items are not subject to periodic replacement or wearout but may require infrequent replacement as a result of accidents or other unexpected occurrences. Delayed procurement items are included under this code.

f. Code "P2D" identifies insurance-type parts which may be installed by AF activities which are authorized depot-level maintenance only. This code is applied to parts as described under code "P2" and to delayed procurement items.

5-15. "M" Series - Manufacture, Parts Not Procured. The source codes in the "M" series are described below.

a. Code "M" identifies parts, the manufacture and installation of which are within the capabilities of field maintenance activities and to which all of the following conditions apply:

1. Procurement is not justified because of low usage or peculiar storage and installation factors. Needs are to be met by local manufacture only as required.

2. Their manufacture does not require tools, equipment, or skills not normally authorized at field maintenance level.

3. Does not require test equipment not normally authorized at field maintenance level.

4. Does not require material not normally available in AF inventory.

b. Code "Ml" identifies parts which can be manufactured at activities authorized depot-level maintenance facilities and to which all of the following conditions apply:

1. Procurement is not justified because of low usage or peculiar storage and installation factors. The needs of base activities are to be

met by requisitioning from the geographical AMA, SSM AMA, or IM AMA.

2. Their manufacture is beyond capabilities of field maintenance activities as outlined above.

3. Their manufacture does not require tools or equipment not normally authorized at all AMA's.

5-16. "A" Series - Assemble, Assembly Not Procured. The source codes in the "A" series are described below.

a. Code "A" identifies items capable of being assembled at any level of maintenance and is applied to assemblies of two or more parts, the majorit,' of which are purchased and/or service manufactured.

b. Code "A1" identifies assemblies which can be assembled at AF activities authorized depot-level maintenance only and is applied to assemblies described under "A" code.

5-17. "X" Series - Parts Considered Impractical for Service Manufacture. The source codes in the "X" series are described below.

a. Code 'X" is applied to main structural members or similar parts, which, if required, would suggest extensive repair. The need for a part or parts coded "X" (wing spars, center section structure, etc.) should normally result in a recommendation to retire the article from service.

b. Code 'X1" identifies parts applicable at any level of maintenance consistent with the activity's authorized scope of maintenance and for which it is more feasible to obtain the next higher assembly; for example, an integral detail part such as welded segment inseparable from its assembly; a part machined in a matched set; or a part of any assembly which, if required, would suggest extensive reconditioning of such assembly. In some cases, code "X1" may be used to indicate an integral detail part of an assembly which has no anticipated usage and as an assembly was source-coded "M" or "M1".

c. Code "X1D" identifies parts which are described under the "X1" code but which are applicable to AF activities authorized depot-level maintenance only.

d. Code "X2" identifies parts which are applicable to any level of maintenance consistent with the activity's authorized scope of maintenance, for which there is no anticipated usage, and which are impractical for service manufacture. This type of item will not be stocked. Such parts shall be obtained from reclamation or, if not available from this source, requisitioned through normal supply channels together with supporting justification for one-time procurement and immediate use. Repeated requests shall justify a change to a code "P1" or "P2", as applicable, if considered economical to procure and store such parts.

e, Code "X2D" identifies parts which are described under the "X2" code but which are applicable to AF activities authorized depot-level maintenance only. Repeated requests for such parts shall justify a change to a "P1D" or "P2D" code, as applicable, if considered economical and feasible to procure and stock such parts.

5-18. Code "U" - Parts Not Procured, Manufactured, or Stocked. Code "U" is applied to installation drawings, diagrams instruction sheets, field-service drawing numbers, and parts not otherwise of supply significance, including obsolete parts, which cannot be procured or service manufactured.

5-19. Codes For Parts Kits. Codes for parts kits are described below.

a. Code "C" - Cure-Dated Parts Kit. Code "C" is applied to kits containing parts that have a specific period of time (cure-date) to remain in storage without affecting their serviceability and are subject to deterioration due to aging or exposure. The cure-date for the kit is established on the shortest life item within the kit. C-Kit contains parts required for maintenance and overhaul and will be used in conjunction with Overhaul (Code "D") Repair Kits and/or Minor or Field (Code "F") Repair Kits, as applicable.

1. Code "KC" - Component of C Kit. Code "KC" is applied to items which are components of a C-Kit.

b. Code "F" - Minor or Field Parts Kit. Code 'IF" is applied to kits which are available to all maintenance activities authorized to perform base level repair of the end item,

including overhaul activities in support of field activities. These kits do not contain cure-dated parts.

1. Code “KF” - Component of F-Kit, Code “KF” is applied to items which are components of an F-Kit.

c. Code “3)” - Major Overhaul Parts Kit. Code "D" is applied to kits which are available only to those activities authorized to perform depot level repair. These kits do not contain cure-dated parts.

1. Code “KD” - Component of D-Kit. Code “KD” is applied to items which are components of a D-Kit.

2. Code “KB” - Component of both F-Kit and D-Kit. Code "KB" is applied to items which are components of both an F-Kit and a D-Kit.

d. Items which are source-coded "KC," “KD,” “KF,” or "KB," and for which the application of such items is peculiar to repair kits, will not be stocked separately and will not be assigned any additional source codes.

e. Items which are source-coded "KC," "KD," "KF," or “KB,” and for which the application of such items is common to repair kits and to other repair or overhaul applications, will be stocked separately in the appropriate commodity class if followed by the letter “P”. However, Military and Industry Standard Items and Bulk Materials which have multi-purpose application (repair kits as well as other repair and overhaul purposes) will be stocked separately but will not be assigned source codes.

5-20. MAINTENANCE REPAIR LEVEL CODES. Maintenance repair level codes used in this Illustrated Parts Breakdown are shown in the Numerical Index in the column entitled “REPAIR CODE”. Maintenance repair level codes identify the reparable or nonreparable character of the equipment and parts and identify the depth of repair and the level of maintenance at which repair will be accomplished.

5-21. Code "S" - No Repair. Code "S" identifies items which are nonreparable and have no reclamation value. When these items fail, they will be disposed of at user level as condemned material.

5-22. Code "BP " No Repair; Recondition. Code *‘B-m& assemblies or parts that will be reconditioned at the user level by adjusting, cleaning, soldering broken connection, etc. If these items cannot be returned to serviceable condition by such means, they will be disposed of at user level as condemned material, No repair parts or tools are specially procured for maintenance of these items,

5-23. Code "F" - Repair at Field Level. Code "F" identifies which will be repaired by the field level maintenance activities. Normal servicing will be done by organizational level maintenance. Selected parts, tools, and technical order data are procured and provided to applicable field level maintenance activities for repair of these items, No SRA is established for these items, If the condition of these items is such that they cannot be returned to serviceable condition by the field maintenance activity with authorized parts aad tools, they will be disposed of as condemned material, If repair of "F" coded items cannot be accomplished due to unavailability of authorized parts, tools, or other capability, the applicable SSM/IM will be so advised with request for disposition instructions. "F" coded Hi-Valu or Critical Items, regardless of condition, will be turned in to supply for disposition instructions from the applicable SSM/IM.

5-24. Code "D" - Limited Field Repair: Depot Overhaul. Code “D” identifies item; on which a limited degree of repair can be accomplished by field level maintenance activities. Normal servicing will be done at organizational level. SRA is established for overhaul of these items. A range of repair parts, tools, and technical order data consistent with the capability of repair is procured and provided to applicable field maintenance activities. Because of the design characteristics and complexity of repair, the degree of repair which is authorized on these items at field maintenance level is necessarily determined by the degree of technical skills required and the cost of special tools, special test equipment, spare parts, and the predicted frequency of failure generation. If these items cannot be returned to serviceable condition with authorized Tarts and tools, they will be returned to supply for shipment to the designated SRA.

5-25. Code “DM” - Limitad Field Repair; Mobile Depot Overhaul. Code "DM" identifies items to which all the conditions of code “D” apply, except that repair beyond field capability will be done by the mobile depot activity (MDA). If the MDA cannot repair these items, they will determine whether these items should be condemned or sent to the SRA.

5-26. Code “L” - Depot Level Maintenance Only. Code “L” identifies items that will be repaired only at designated SRA. Repair parts and tools for repair are procured and provided only to these authorized activities. Required functional checkout and bench check equipment may be provided to applicable organizational and field level maintenance activities for accomplishing external adjustment or calibration and for verifying serviceability of these items. If they are found unserviceable, they will be turned in to supply for shipment to the SRA.

5-27. Code “LM” - Depot Level Maintenance Only; Mobile Depot Activity Code "LM" identifies items to which ali conditions of code "L" apply except that repair will be accomplished by MDA. If MDA cannot repair these items, they will determine whether these items should be condemned or sent to the SRA.

5-28. MANUFACTURER’S CODE LIST.

5-29. The manufacturer’s code is used as an element in item identification to designate manufacturer or distributor.

CODE	MANUFACTURER
00159	ACME Electric Corp. 40 Water Street Cuba, N.Y. 14727
02660	Amphenol Corp. 2801 So. 25th Ave. Broadview, Ill. 60153
03330	Productive Equipment Corp. 2924 W. Lake St. Chicago, Illinois 60612
04713	MotorolaSemiconductor Products, Inc. 5005 East McDowell Road Phoenix, Ariz. 85008
05820	Wakefield Engineering, Inc. 139 Foundry Street Wakefield, Mass. 01880
06383	Panduit Corp. 17301 Ridgeland St. Tinley Park, Ill. 60477
11897	Plastiguide Mfg. Corp. Santa Monica, Calif.
17117	Electronic Molding Corp. 40 Church Street Pawtucket, R.I.
17597	Cook Electric Co. Data-Stor Division 6401 Oakton Street Morton Grove, Ill. 60053
31356	J-B-T Instruments, Inc. 424 Chapel St. P.O. Box 1818 New Haven, Corm. 06508
37942	Mallory PR and Company, Inc. 3029 East Washington St. Indianapolis, Ind. 46206
44655	OHMITE Mfg. Corp. 3601 W. Howard St, Skokie, Ill. 60076
70674	ADC Products, Inc. 6405 Cambridge Pt. Minneapolis, Minn. 55426
71279	Cambridge Thermionic Corp. 445 Concord Ave. Cambridge, Mass. 02138
71400	Bussmann Mfg. Division of McGraw - Edison Co. 2536 W. University St. St. Louis, MO. 63017
71785	Cinch Mfg. Co. and Howard B. Jones Division 1026 S. Homan Ave. Chic ago, Illinois 60624
72264	Esterline Angus Instrument Co. P.O. Box 24000 Indianapolis, Ind. 46224
72619	Dialight Corp. 60 Stewart Ave. Brooklyn, N.Y. 11237

CODE	MANUFACTURER
73445	Amperex Electronic Corp. 230 Duffy Ave. Hicksville, L.I., N.Y. 11801
74545	Harvey Hubbell, Inc. State St. & Bostwick Ave. Bridgeport, Conn. 06602
75915	LITTELFUSE, Inc. 800 E. Northwest Hwy. Des Plaines, Ill. 60016
77342	American Machine & Foundry Co. Potter & Brumfield 64 Division Road East Princeton, Ind. 47570
78553	Tinnerman Products Inc. 8700 Brook Park Rd. Cleveland, Ohio 44129
79727	Continental-Wirt Electric Philadelphia, Pa.
80103	Lambda Electronics Corp. 515 Broad Hollow Road Huntington, N. Y. 11749
81073	Grayhill, Inc. 561 Hillgrove Ave. La Grange, Ill. 60525
82389	Switchcraft, Inc. 5527 N. Elston Ave. Chicago, Ill. 60630
83330	Herman H. Smith, Inc. 812 Snediker Ave. Brooklyn, N.Y. 11207
91886	Malco Mfg. Co., Inc. 4025 W. Lake Chicago, Ill. 60624
94144	Raytheon Company Components Division Industrial Components Operation 465 Centre St. Quincy, Ma. 02189
94222	South Chester Corp. Chester, Pa.
95146	Alto Electronics Products, Inc. 3 Wolcott Ave. Lawrence, Mass. 01843
95335	Atlantic Research Corp. Shirley Highway & Edsall Rd. Alexandria, Virginia 22314
99515	Marshall Industries Capacitor Division 1960 Walker Avenue Monrovia, Calif. 91016

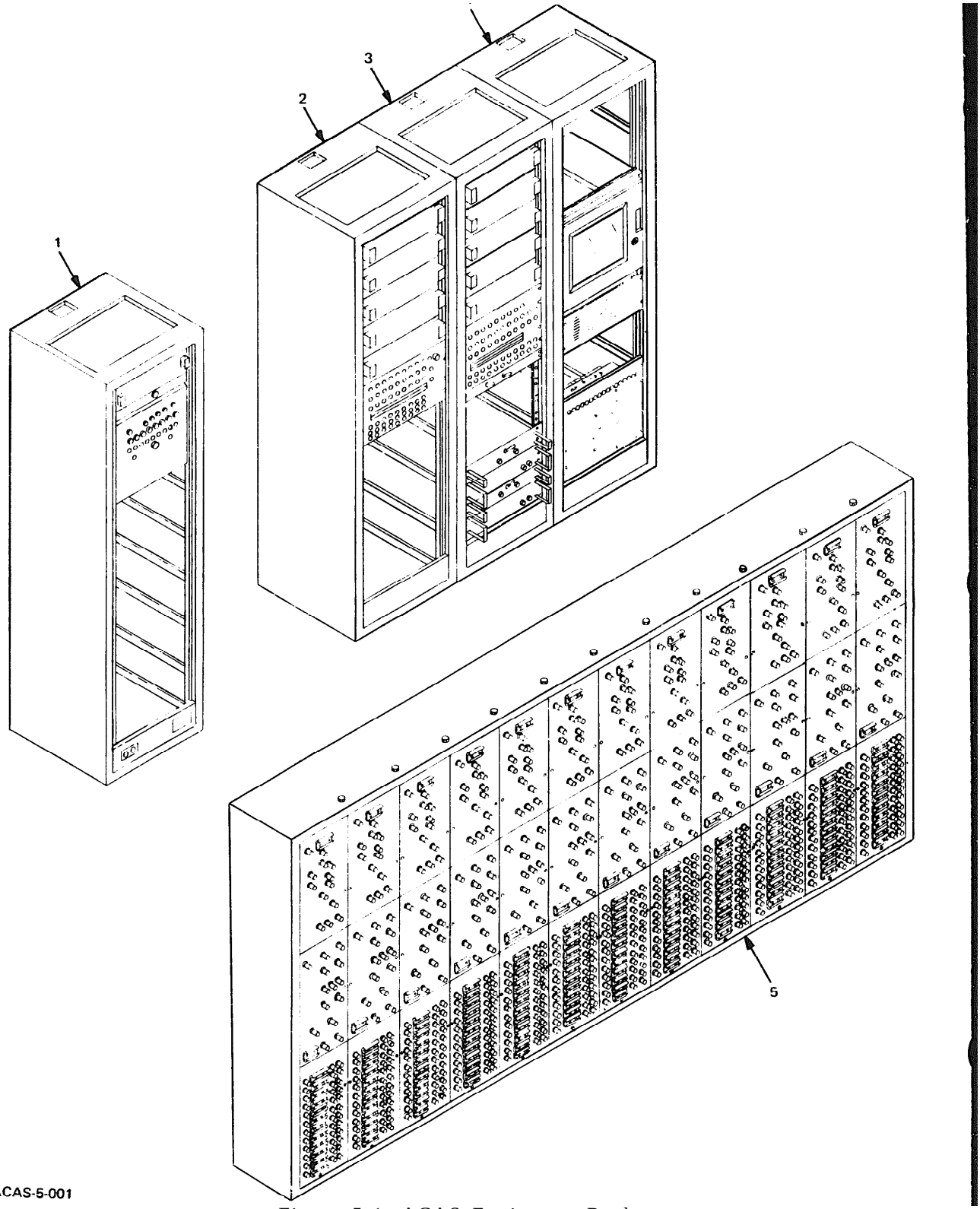

Figure 5-1. ACAS Equipment Racks

FIGURE ANDINDEX NUMBER	PARTNUMBER	DESCRIPTION 1 2 3 4 5 6 7	UNITS PER ASSY	USABLE ON CODE
5-1-		ACAS EQUIPMENT RACKS		
-1	NO NUMBER	EQUIPMENTRACK, ... OX-23/G, CODERGROUP (SEE FIGURE 5-2 FOR DETAIL BREAKDOWN)	1	
-2	NO NUMBER	TERMINALEQUIPMENT . . . . . (RACK NO. 1), MASTER STATION (SEE FIGURE 5-5 FOR DETAIL BREAKDOWN)	1	
-3	NO NUMBER	TERMINAL EQUIPMENT . . . . . (RACK NO. 2), MASTER STATION (SEE FIGURE 5-8 FOR DETAIL BREAKDOWN)	1	
-4	NO NUMBER	RECORDER GROUP . . . . . (RACK NO. 3) (SEE FIGURE 5-10 FORDETAIL BREAKDOWN)	1	
-5	TFA-50124734-1	DISPLAYASSEMBLY, ... MASTER STATION (USED AT KUNIA) (SEE FIGURE 5-14 FOR DETAIL BREAKDOWN)	1	A
	TFA-50124734-2	. . DISPLAYASSEMBLY MASTER STATION (USED AT STUTTGART) (SEE FIGURE 5-14 FOR DETAIL BREAKDOWN)	1	B

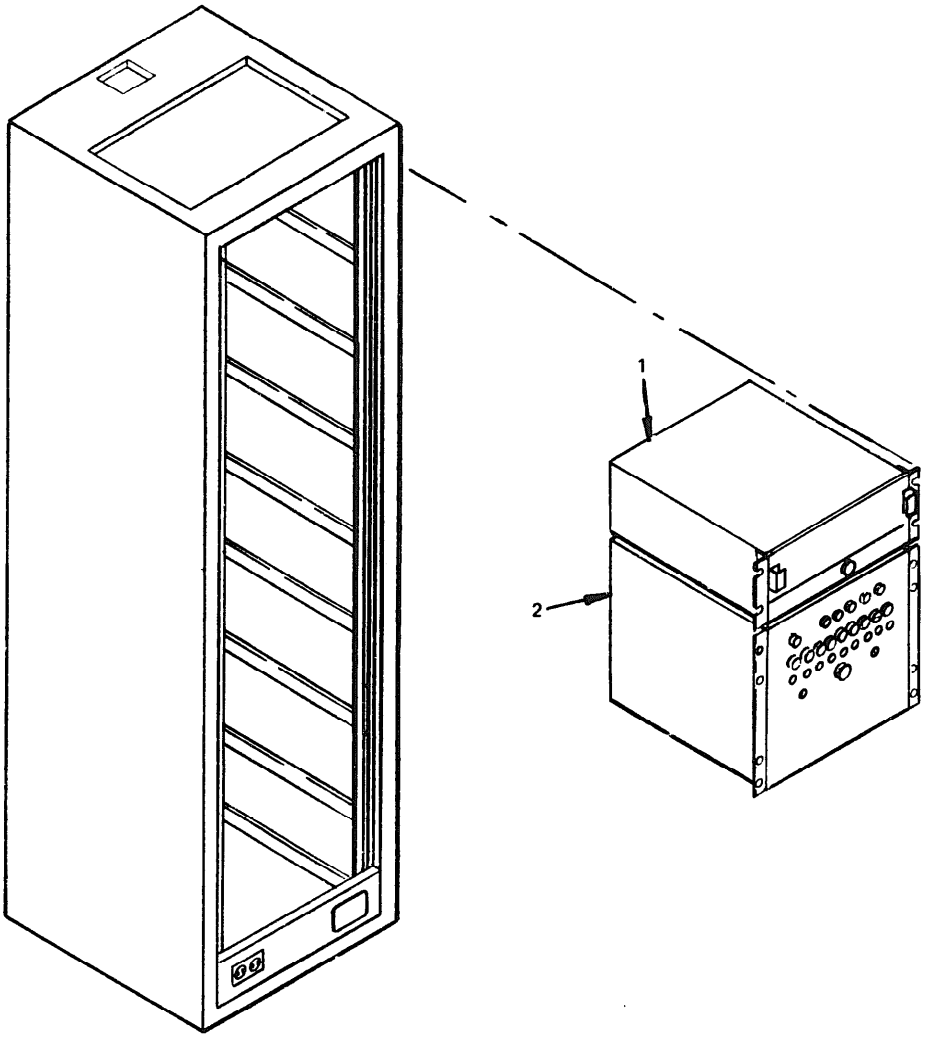

Figure 5-2. Coder Group OX-23/G, Equipment Rack

FIGURE AND INDEX NUMBER	PART NUMBER	1 2 3 4 5 6 7 DESCRIPTION	UNITS PER ASSY	USABLE ON CODE
5-2-	NO NUMBER	EQUIPMENT RACK, ... OX-23/G, CODER GROUP (SEE FIGURE 5-1-1 FOR NHA)	REF	
-1	TFA-42029735	. ENCODER SUBASSEMBLY, ... CODER GROUP-REMOTE STATION (SEE FIGURE 5-3 FOR DETAIL BREAKDOWN)	1	
-2	TFA-42020735	. POWER SUPPLY SUBASSEMBLY, . . CODER GROUP-REMOTE STATroN (SEE FIGURE 5-4 FOR DE TAIL BREAKDOWN)	1	

FIGURE AND INDEX NUMBER	PART NUMBER	DESCRIPTION 1 2 3 4 5 6 7	UNITS PER ASSY	USABLE ON CODE
5-3-	TFA-42029735	ENCODER ASSEMBLY, CODER . . . . . GROUP-REMOTE STATION (SEE FIGURE 5-2-1 FOR NHA)	REF	
-1	T-31447735	. PLATE, IDENTIFICATION	1	
-2	70-3-2G	. KNOB, DIAL SKIRT, ... ROUND (94144)	1	
-3	T-71814735-2	. ANGLE, SUPPORT CHASSIS . . . . . (ATTACHING PARTS)	1	
-4	COML	. SCREW, MACH, PNH, NO. 8-32 . . . UNC-2A X 0.56L CRES	2	
-5	T-21814735-1	. ANGLE, SUPPORT CHASSIS . . . . . (ATTACHING PARTS)	1	
-6	COML	. SCREW, MACHINE, PNH, NO. . . . . 8-32 UNC-2A X 0.56L, CRES	2	
-7	T-31425735	. PANEL, FRONT-BOTTOM . . . . . (ATTACHING PARTS)	1	
-8	COML	. SCREW, MACH, PNH, NO. 6-32 . . . UNC-2A X 0.38L, CRES	2	
-9	TDA-31427735	. SWITCH, ROTARY	1	
	TDA-42034730	. PANEL, FRONT	1	
-10	5678-09	. . CLIP, FUSE (91400) . . . . . (ATTACHING PARTS)	4	
-11	COML	. . RIVET, SOLID, UNIV HD, ... 0.093 DIA X 0.16L, AA1100	2	
-12	COML	. . WASHER, FLAT, 0.093 ID, ... CRES	2	
-13	TDA-42034739-2	PANEL	1	
-14	TDA-21813735	: CLIP, MOUNTING. . . . . (ATTACHING PARTS)	2	
-15	COML	. SCREW, MACH, PNH, NO. 6-32 . . . UNC-2A X 0.44L, CRES	2	
-16	COML	. WASHER, LOCK-SPRING, ... NO. 6 CRES	2	
-17	COML	. WASHER, FLAT, NO. 6 CRES	2	
-18	COML	. NUT, PLAIN, HEX., NO. 6-32 . . . UNC-2B, CRES	2	
-19	130-1630	. BLOCK, LINE TERMINAL (17597) . . (ATTACHING PARTS)	2	
-20	COML	. SCREW, MACH, PNH, NO. 8-32 . . . UNC-2A X 0.44L, CRES	4	
-21	COML	. WASHER, LOCK-SPRING, ... NO. 8, CRES	4	
-22	COML	. WASHER, FLAT, NO. 8 CRES	4	
-23	COML	. NUT, PLAIN, HEX., NO. 8-32 . . . . UNC-2B, CRES	4	

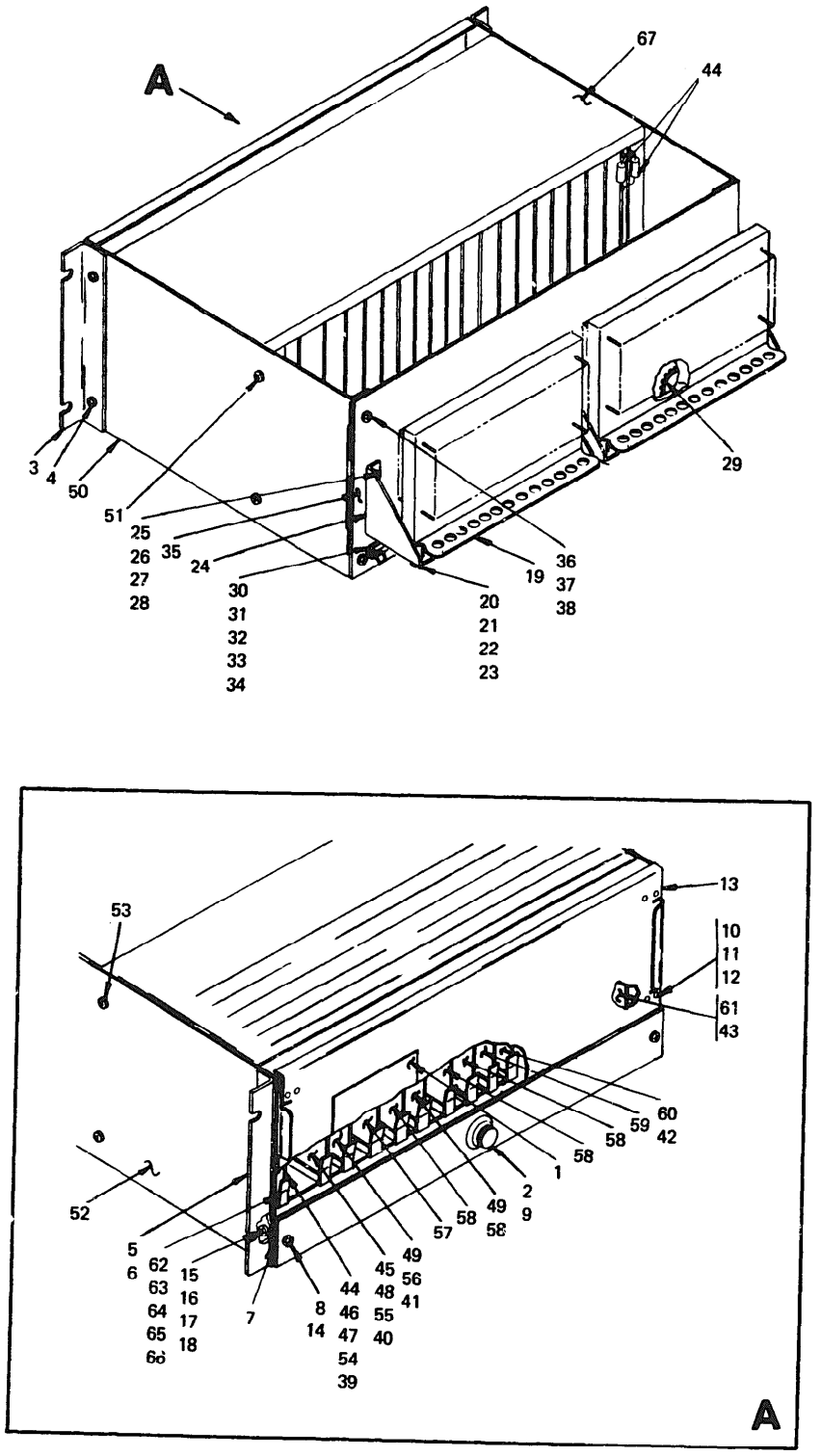

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Figure 5-3. Remote Station Coder Group Encoder Assembly

FIGURE AND INDEX NUMBER &	PART NUMBER	1 2 3 4 5 6 7 DESCRIPTION	UNITS PER ASSY	USABLE ON CODE
5-3-24	T-21825735	SUPPORT, LINE TERMINAL BLOCK	4	
		(ATTACHING PARTS)		
-25	COML	SCREW, MACH, PNH, NO. 8-32 . . . UNC-2A X 0.44L, CRES	2	
-26	COML	WASHER, LOCK-SPRING, ... NO. 8, CRES	2	
-27	COML	WASHER, FLAT, NO, 8 CRES. . . .	2	
-28	COML	NUT, PLAIN, HEX., NO. 8-32 . . . . UNC-2B, CRES	2	
-29	122-37-3000	GROMMET, CATERPILLAR, NYLON	AR	
-30	57-40240	CONNECTOR, ELECTRIC, ... RECTANGULAR (02660)	1	
		(ATTACHING PARTS)		
-31	COML	SCREW, MACH, PNH, NO. 2-56 . . . UNC-2A X 0.38L, CRES	2	
-32	COML	WASHER, LOCK-SPRING, NO. 2 CRES	2	
-33	COML	WASHER, FLAT, NO. 2, CRES. . .	2	
-34	COML	NUT, PLAIN, HEX., NO. 2-56 . . . UNC-2B, CRES	2	
-35	T-31426735	COVER, REAR	1	
		(ATTACHING PARTS)		
-36	COML	SCREW, MACH, PNH, NO. 6-32 . . UNC-2A X 0.44L, CRES	4	
-37	COML	WASHER, LOCK-SPRING, NO. 6, CRES	4	
-38	COML	WASHER, FLAT, NO. 6, CRES	4	
-39	TP-FA-41781669	PRINTED CIRCUIT BOARD ASSEMBLY, BG-103	1	
-40	TP-AD-41465591	PRINTED CIRCUIT BOARD ASSEMBLY, PB-320	1	
-41	TP-AD-41764667	PRINTED CIRCUIT BOARD ASSEMBLY, N1-133	7	
-42	TP-AD-41963709	PRINTED CIRCUIT BOARD ASSEMBLY, 1S-191	4	
-43	TP-AD-41966710	PRINTED CIRCUIT BOARD ASSEMBLY, LU-192	8	
-44	M1-205E	CAPACITOR, 2 UF, 100V, ... ±10% (99515)	2	
-45	RC20GF102K	RESISTOR, 1K OHMS, 1/2W,. . . . ±10%	1	
-46	1N914	DIODE, SILICON	1	
-47	C426AR/G8	CAPACITOR, 8 UF, 4V . . . . . (73445)	1	
-48	TYPE 33 MM	CAPACITOR, 0.1 UF (73445)	1	

FIGURE AND INDEX NUMBER	PART NUMBER	DESCRIPTION 1 2 3 4 5 6 7	UNITS PER ASSY	USABLE ON CODE
5-3-49	RC20GF472K	RESISTOR, 4.7K OHMS, 1/2W, ±10%	8	
-50	TDA-42027735-1	PLATE, SIDE (ATTACHING PARTS)	1	
-51	COML	SCREW, MACH, PNH, NO. 8 - 3 2 UNC-2A X 0.44L, CRES	2	
-52	TDA-42027735-2	PLATE, SIDE (ATTACHING PARTS)	1	
-53	COML	SCREW, MACHINE, PNH, NO. 8-32 UNC-2A X 0.44L, CRES	2	
-54	TP-AD-41285544-9	CONNECTOR, PRINTED CIRCUIT	1	
-55	TP-AD-41285544-10	CONNECTOR, PRINTED CIRCUIT	1	
-56	TP-AD-41285544-11	CONNECTOR, PRINTED CIRCUIT	1	
-57	TP-AD-41285544-12	CONNECTOR, PRINTED CIRCUIT	1	
-58	TP-AD-41285544-13	CONNECTOR, PRINTED CIRCUIT	4	
-59	TP-AD-41285544-14	CONNECTOR, PRINTED CIRCUIT	1	
-60	TP-AD-41285544-15	CONNECTOR, PRINTED CIRCUIT	4	
-61	TP-AD-41285544-16	CONNECTOR, PRINTED CIRCUIT	8	
-62	C52693-017-24	FASTENER, SPEED CLIP (78553) (ATTACHING PARTS)	40	
-63	COML	SCREW, MACH, PHN, NO. 4-400UNC-2A X 0.50L, CRES	4	
-64	COML	WASHER, LOCK-SPRING, NO. 4, CRES	4	
-65	COML	WASHER, FLAT, NO. 4, CRES	4	
-66	COML	NUT, PLAIN, HEX., NO. 4-400UNC-2B, CRES	4	
-67	TP-DA-31419000	CARD FILE	1	

FIGURE AND INDEX NUMBER	PART NUMBER	DESCRIPTION 1 2 3 4 5 6 7	UNITS PER ASSY	USABLE ON CODE
5-4-	TFA-42020735	POWER SUPPLY ASSEMBLY, ... CODER GROUP - REMOTE STATION (SEE FIGURE 5-2-2 FOR NHA)	REF	
-1	TDA-42035735	. COVER . . . . . (ATTACHING PARTS)	2	
-2	COML	. SCREW, MACH, PNH, NO. 6-32 UNC-2A X 0.25L, CRES	6	
-3	T-31432735	. ANGLE, SUPPORT, CHASSIS (ATTACHING PARTS)	2	
-4	COML	. SCREW, MACH, PNH, ... NO. 8-32 UNC-2A X 0.44L, CRES	4	
-5	382	. LAMP, INCANDESCENT, ... T-1-3/4 (72619)	6	
-6	183-9830-1472-604	. HOLDER, LAMP, GREEN LENS . . . (72619)	1	
-7	183-9830-1473-604	. HOLDER, LAMP, AMBER LENS . . . (72619)	5	
-8	30-1	. SWITCH, PUSHBUTTON, ... SUBMINIATURE (81073)	2	
-9	AGC 1/8	. FUSE, GLASS CASE, 0.125A . . . . . (71400)	3	
-10	AGC 1/4	. FUSE, GLASS CASE, 0.25A . . . . . (71400)	2	
-11	AGC 1	. FUSE, GLASS CASE, 1A . . . . . (71400)	2	
-12	AGC 10	. FUSE, GLASS CASE, 10A. . . . . (71400)	1	
-13	AGC 3	. FUSE, GLASS CASE, 3A . . . . . (71400)	1	
-14	HKP	. FUSEHOLDER, NONINDICATING . . . (71400)	7	
-15	HKL	. FUSEHOLDER, INDICATING . . . . . (71400)	2	
-16	508	. NAMEPLATE, ON-OFF (83330)	1	
-17	ST50K	. SWITCH, TOGGLE, DPST, ... 20A (31356)	1	
-18	4242-127-2	. JACK, TIP, LOW VOLTAGE, ... RED (17117)	1	
-19	4242-127-9	. JACK, TIP, LOW VOLTAGE, ... WHITE (17117)	6	
-20	4242-127-0	. JACK, TIP, LOW VOLTAGE, BLACK (17117)	1	
-21	4242-127-5	. JACK, TIP, LOW VOLTAGE; . . . . . GREEN (17117)	1	
-22	N-112A	. JACK, TELEPHONE (82389)	1	
-23	SC628	. AUDIBLE SIGNAL DEVICES . . . . . (37942)	1	

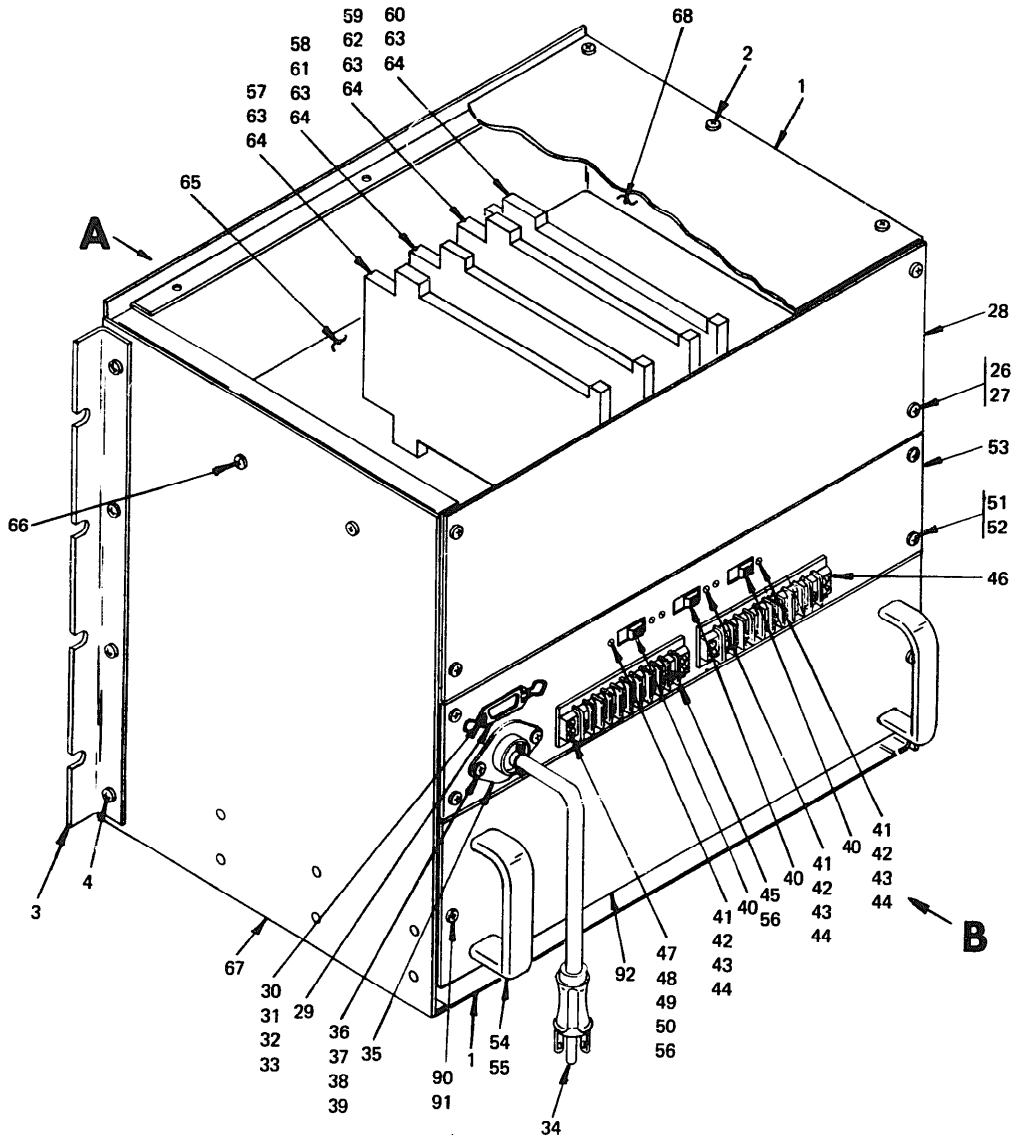

Figure 5-4. Remote Station Coder Group Power Supply Assembly (Sheet 1 of 2)

FIGURE AND INDEX NUMBER	PART NUMBER	DESCRIPTION 1 2 3 4 5 6 7	UNITS PER ASSY	USABLE ON CODE
5-4 -24	T-42042735	PANEL, FRONT . . . . . (ATTACHING PARTS)	1	
-25	COML	SCREW, MACH, PNH, NO. 8-32 UNC-2A X 0.62L, CRES	6	
	TDA-42026735	PANEL, REAR, UPPER	1	
-26	82-19-220-16	. FASTENER, 1/4 TURN . . . . . (94222)	4	
-27	82-32-101-17	. RETAINER (94222)	4	
-28	TDA-42026735-2	PANEL	1	
-29	57-40240	CONNECTOR, ELECTRIC, ... RECTANGULAR (02660) (ATTACHING PARTS)	1	
-30	COML	SCREW, MACH, PNH, ... NO. 2-56 UNC-2A X 0.38L, CRES	2	
-31	COML	WASHER, LOCK-SPRING, ... NO. 2, CRES	2	
-32	COML	WASHER, FLAT, NO. 2, CRES	2	
-33	COML	NUT, PLAIN, HEX., NO. 2-56 . . . . UNC-2B, CRES	2	
-34	TDA-31430730	POWERCORD	1	
-35	7486-G	CONNECTOR, CHASSIS, ... MOUNT, PLUG (74545) (ATTACHING PARTS)	1	
-36	COML	SCREW, MACH, PNH, NO. 6-32 . . . UNC-2A X 0.44L, CRES	2	
-37	COML	WASHER, LOCK-SPRING, ... NO. 6, CRES	2	
-38	COML	WASHER, FLAT, NO. 6, CRES . .	2	
-39	COML	NUT, PLAIN, HEX., NO. 6-32 . . . . UNC-2B, CRES	2	
-40	GF-326	SWITCH, SLIDE, DPST (79727) . . . . (ATTACHING PARTS)	3	
-41	COML	SCREW, MACH, PNH, NO. 2-56 a.. UNC-2A X 0.31L, CRES	6	
-42	COML	WASHER, LOCK-SPRING, ... NO. 2, CRES	6	
-43	COML	WASHER, FLAT, NO. 2, CRES . . .	6	
-44	COML	NUT, PLAIN, HEX., NO. 2-56 . . . . UNC-2B, CRES	6	
-45	363-12-10-010	MARKER STRIP, TERMINAL . . . . .. BOARD (71785)	2	
-46	353-18-10-001	TERMINAL BOARD, MOLDED, ... BARRIER, SCREW TYPE (71785) (ATTACHING PARTS)	2	
-47	COML	SCREW, MACH, PNH, NO. 6-32 . . .. UNC-2A X 0.81L, CRES	4	

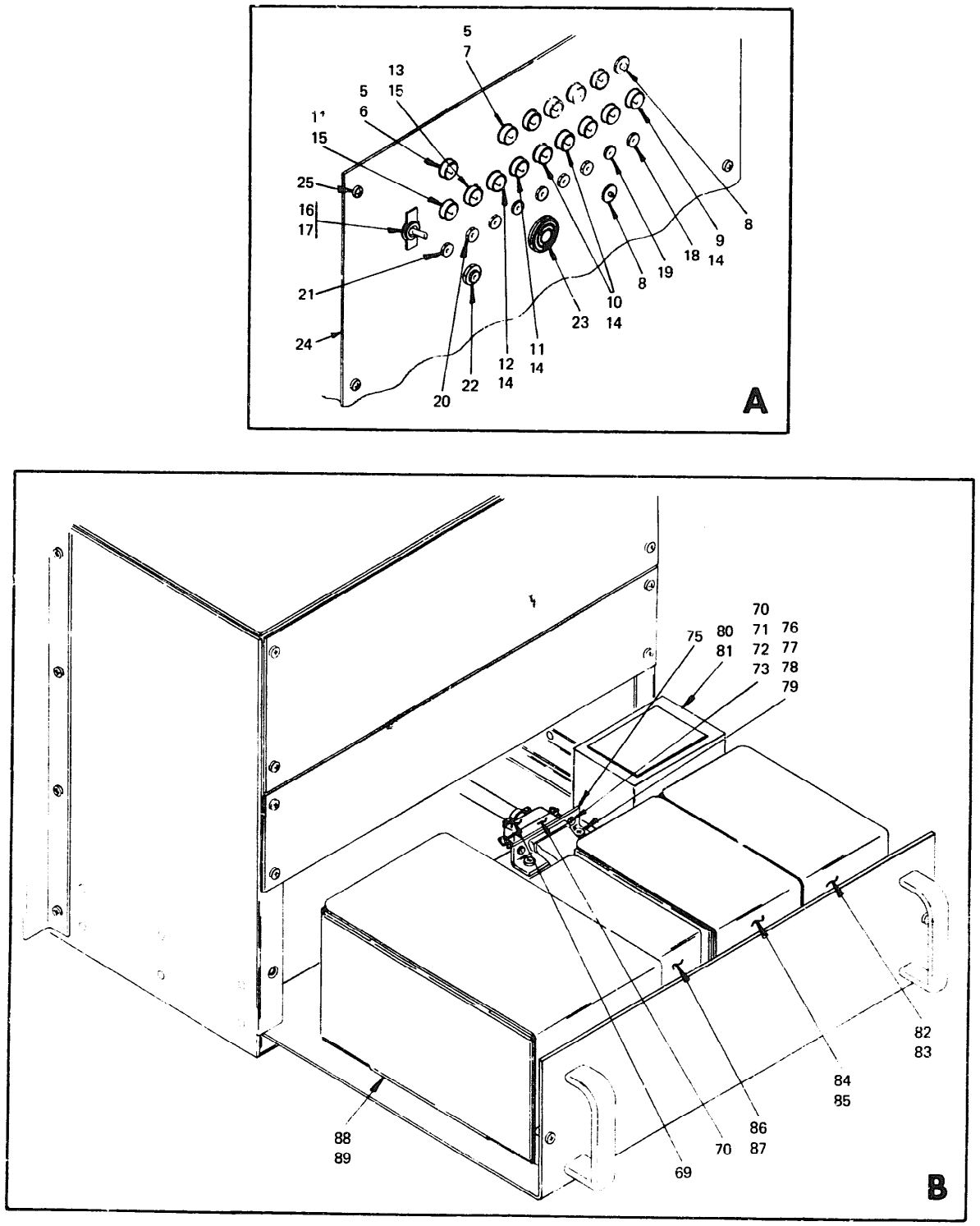

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Figure 5-4. Remote Station Coder Group Power Supply Assembly (Sheet 2 of 2)

FIGURE AND INDEX NUMBER	PART NUMBER	DESCRIPTION 1 2 3 4 5 6 7	UNITS PER ASSY	USABLE ON CODE
5-4 -3	COML	WASHER, LOCK-SPRING, NO. 6, CRES	4	
-49	COML	WASHER, FLAT, NO. 6, CRES	4	
-50	COML	NUT, PLAIN, HEX. NO. 6-32 . . . . . UNC-2B, CRES	4	
	TDA-42044735	PANEL, REAR, CENTER	1	
-51	82-19-220-16	. FASTENER, 1/4 TURN . . . . . (94232)	4	
-52	82-32-101-17	RETAINER (94222)	4	
-53	TDA-42044735-2	. PANEL	1	
-54	2111-1-02	HANDLE, OVAL {71279) (ATTACHING PARTS)	2	
-55	COML	SCREW, MACH, PNH, NO. 10-32 . . UNC-2A X 0.56L, CRES	2	
-56	RS2B	RESISTOR, 60 OHMS, 3W . . . . . (91637)	1	
-57	TP-AD-41488569	PRINTED CIRCUIT BOARD . . . . . ASSEMBLY, CR-51	1	
-58	TP-AD-41492603	PRINTED CIRCUIT BOARD . . . . . ASSEMBLY, CR-52	1	
-59	TP-AD-41647640	PRINTED CIRCUIT BOARD . . . . . ASSEMBLY, ACR-2	1	
-60	TP-AD-41969711	PRINTED CIRCUIT BOARD . . . . . ASSEMBLY, LA-196	1	
-61	32142	CAPACITOR, 0.27 UF, 200V (12673)	1	
-62	RS10	RESISTOR, 200 OHMS, 10W . . . . . (91637)	1	
-63	C52693-017-24	FASTENER, SPEED CLIP . . . . . (78553)	8	
-64	TP-AD-41285544-2	CONNECTOR, PRINTED CIRCUIT	4	
-65	TPA-DA-31419000	CARD FILE . . . . . (ATTACHING PARTS)	1	
-66	COML	SCREW, MACH, PNH, NO. 8-32 UNC-2A X 0.62L, CRES	4	
-67	TDA-42055735-1	PLATE, SIDE, LH	1	
-68	TDA-42055735-2	PLATE, SIDE, RH	1	
-69	57-30240	CONNECTOR, ELECTRIC, ... RECTANGULAR (02660)	1	
-70	57-40240	CONNECTOR, ELECTRIC, ... RECTANGULAR (02660) (ATTACHING PARTS)	1	
-71	COML	SCREW, MACH, PNH, NO. 2-56 . . . UNC-2A X 0.38L, CRES	2	
-72	COML	WASHER, LOCK-SPRING, ... NO. 2, CRES	2	
-73	COML	WASHER, FLAT, NO. 2, CRES . . .	2	
-74	COML	NUT, PLAIN, HEX., NO. 2-56 . . . . UNC-2B, CRES	2	

FIGURE AND INDEX NUMBER	PART NUMBER	1 2 3 4 5 6 7 DESCRIPTION	UNITS PER ASSY	USABLE ON CODE
5-4-75	T-21817735	. BRACKET, MOUNTING, CONNECTOR (ATTACHING PARTS)	1	
-76	COML	. SCREW, MACH, PNH, NO. 6-32 . . . UNC-2A X 0.50L, CRES	2	
-77	COML	. WASHER, LOCK-SPRING, ... NO. 6, CRES	2	
-78	COML	. WASHER, FLAT, NO. 6, CRES	2	
-79	COML	. NUT, PLAIN, HEX., NO. 6-32 . . . . UNC-2B, CRES	2	
-80	LCD-2-44	. POWER SUPPLY, DUAL, ... 60V AT 0.2A (80103) (ATTACHING PARTS)	1	
-81	COML	. SCREW, MACH, PNH, NO. 8-32 UNC-2A X 0.51L, CRES	4	
-82	LCS-A-12	. POWER SUPPLY, 12V AT 1.9A (80103) (ATTACHINGPARTS)	1	
-83	COML	. SCREW, MACH, PNH, NO. 8-32 . . . UNC-2A X 0.51L, CRES	4	
-84	LCS-A-150	. POWERSUPPLY, 130V AT 0.1A . . . (80103) (ATTACHING PARTS)	1	
-85	COML	. SCREW, MACH, PNH, NO. 6-32 . . . UNC-2A X 0.25L, CRES	4	
-86	LXD-3-152	. POWER SUPPLY, DUAL 12V AT 0.4A (80103) (ATTACHING PARTS)	1	
-87	COML	. SCREW, MACH, PNH, NO. 8-32 . . . UNC-0.51L, CRES	4	
-88	LMCC-3-P-6-LM-OV-1	. POWERSUPPLY, 3.6V AT 10A (80103) (ATTACHING PARTS)	1	
'-89	COML	. SCREW, MACH, PNH, NO. 6-32 . . . UNC-2A X 0.25L, CRES	4	
	TDA-42045735	. SHELF, COMPONENT	1	
-90	82-19-220-16	. . FASTENER, 1/4 TURN . . . . . (94222)	2	
-91	82-32-101-17	. RETAINER (94222	2	
-92	TDA-42045735-2	. : SHELF	1	

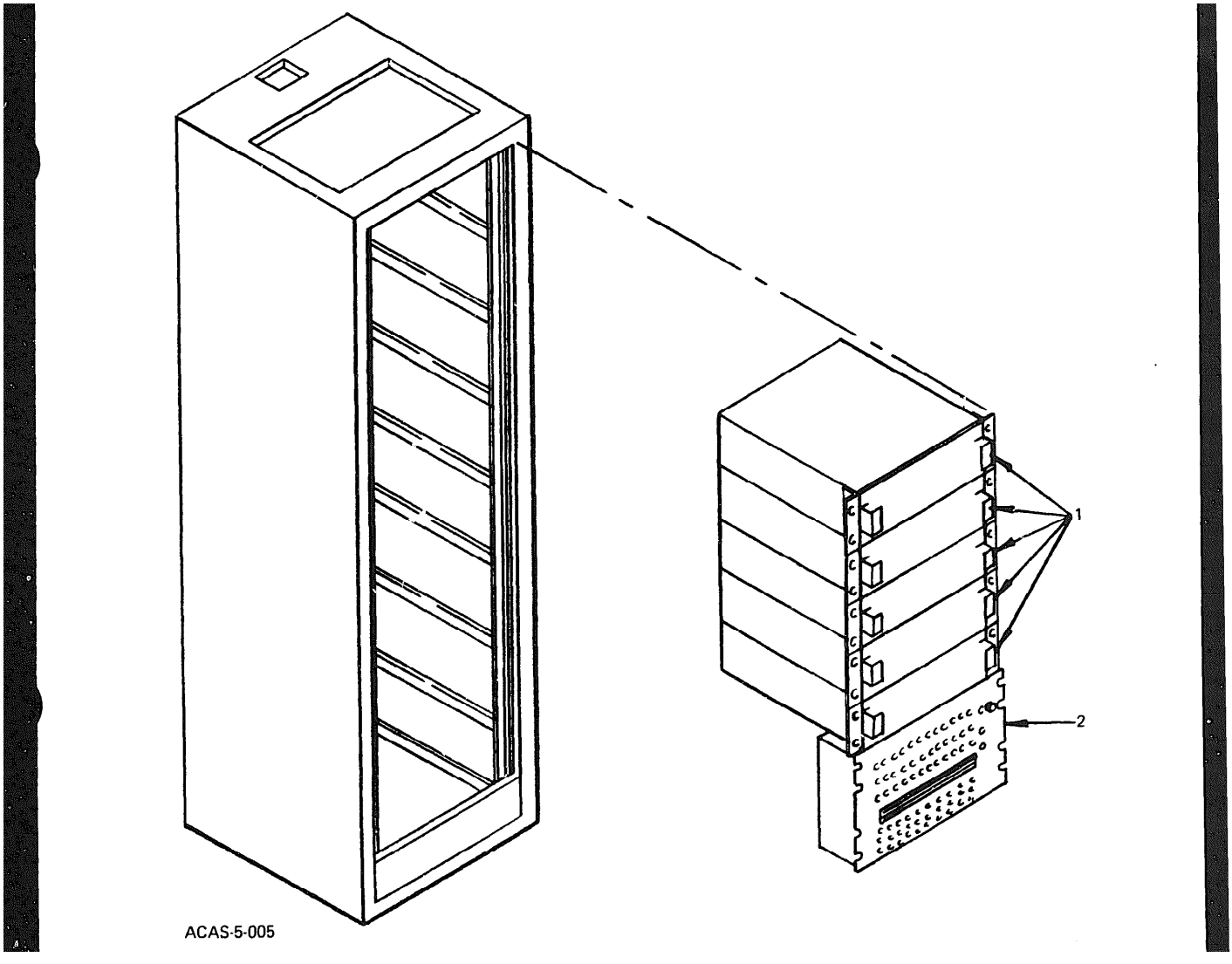


Figure 5-5. Master Station Terminal Equipment (Rack No. 1)

FIGURE AND INDEX NUMBER	PART NUMBER	DESCRIPTION 1 2 3 4 5 6 7	UN-ITS PER ASSY	USABLE ON CODE
5-5-	NO NUMBER	TERMINAL EQUIPMENT . . . . . (RACK NO. 1), MASTER STATION (SEE FIGURE 5-1-2 FOR NHA)	REF	
-1	TFA-42046731	. DECODER GROUP OX-22/G . . . . . MASTER STATION (SEE FIGURE 5-6 FOR DETAIL BREAKDOWN)	5	
-2	TFA-42053731	. CONTROL AND LOCAL . . . . . DISPLAY ASSEMBLY? DECODER GROUP-MASTER STATION (SEE FIGURE 5-7 FOR DETAIL BREAKDOWN)	1	

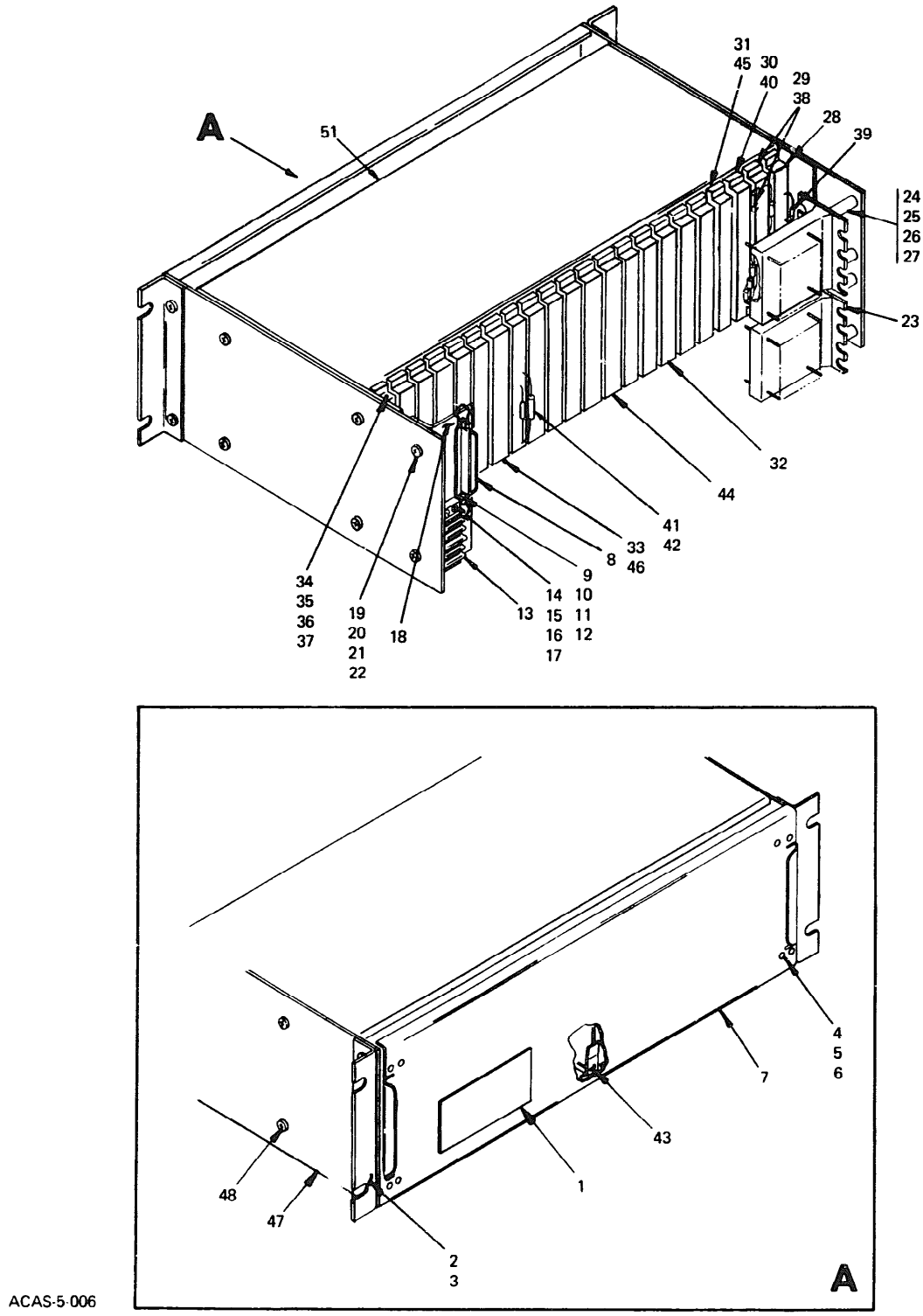


Figure 5-6. Master Station Decoder Group OX-22G

FIGURE AND INDEX NUMBER	PART NUMBER	1 2 3 4 5 6 7 DESCRIPTION	UNITS PER ASSY	USABLE ON CODE
5-6-	TFA-42046731	DECODER GROUP OX-22/G MASTER STATION (SEE FIGURES 5-5-1 AND 5-8-1 FOR NHA)	REF	
-1	T-31448731	PLATE IDENTIFICATION	1	
-2	T-21822731	ANGLE, SUPPORT, CHASSIS (ATTACHINGPARTS)	2	
-3	COML	SCREW, MACH, PNH, NO. 6-32 . . . UNC-2A X 0.38L, CRES	2	
	TDA-42034730	P A N E L , F R O N T	1	
-4	5678-09	CLIP, FUSE (91400) . . . . . (ATTACHING PARTS)	4	
-5	COML	RIVET, SOLID, UNIV HD, ... 0.093 DIA X 0.16L, AA1100	2	
-6	COML	WASHER, FLAT, 0.093 ID, CRES	2	
-7	TDA-42034730-2	PANEL	1	
-8	57-40240	CONNECTORS ELECTRIC, ... RECTANGULAR (02660) (ATTACHING PARTS)	1	
-9	COML	SCREW, MACH, PNH, NO. 2-56 . . . UNC-2A X 0.38L, CRES	2	
-10	COML	WASHER, LOCK-SPRING, ... NO. 2, CRES	2	
-11	COML	WASHER, FLAT, NO. 2, CRES	2	
-12	COML	NUT, PLAIN, HEX., NO. 2-56 . . . . UNC-2B, CRES	2	
-13	353-18-05-001	TERMINAL BOARD, ... MOLDED (71785) (ATTACHINGPARTS)	1	
-14	COML	. SCREW, MACH, PNH, NO. 5-40 . . . UNC-2A X 0.56L, CRES	4	
-15	COML	. WASHER, LOCK-SPRING, ... NO. 5, CRES	4	
-16	COML	WASHER, FLAT, NO. 5, CRES	4	
-17	COML	NUT, PLAIN, HEX., NO. 5-40 . . . . UNC-2A X CRES	4	
-18	T-31439731	. BRACKET, ANGLE . . . . . (ATTACHING PARTS)	1	
-19	COML	. SCREW, MACH, PNH, NO. 8-32 . . . UNC-2A X 0.44L, CRES	2	
-20	COML	. WASHER, LOCK-SPRING, ... NO. 8, CRES	2	
-21	COML	WASHER, FLAT, NO. 8, CRES	2	
-22	COML	: NUT, PLAIN, HEX., NO. 8-32 . . . . UNC-2B, CRES	2	

FIGURE AND INDEX NUMBER	PART NUMBER	DESCRIPTION 1 2 3 4 5 6 7	UNITS PER ASSY	USABLE ON CODE
5-6-23	PJ-608	. TERMINAL BLOCK (70674)	2	
		(ATTACHING PARTS)		
-24	COML	. SCREW, MACH, PNH, NO. 8-32 . . .	2	
		UNC-2A X 0.44L, CRES		
-25	COML	. WASHER, LOCK-SPRING, ...	2	
		NO. 8, CRES		
-26	COML	. WASHER, FLAT, NO. 8, CRES	2	
-27	8367	. SPACER, 0.25 O.D. X 1.00L	2	
-28	TP-AD-41972712	. PRINTED CIRCUIT BOARD	1	
		ASSEMBLY, LA-296		
-29	TP-AD-415016O5	. PRINTED CIRCUIT BOARD.	1	
		ASSEMBLY, BA-201		
-30	TP-AD-414686O4	. PRINTED CIRCUIT BOARD.	1	
		ASSEMBLY, SD-231		
-31	TP-AD-41465591	. PRINTED CIRCUIT BOARD	1	
		ASSEMBLY, PB-320		
-32	TP-AD-415026O6	. PRINTED CIRCUIT BOARD.	10	
		ASSEMBLY, EO-230		
-33	TP-AD-419757l3	. PRINTED CIRCUIT BOARD	8	
		ASSEMBLY, DD-295		
		(ATTACHING PARTS)		
-34	COML	. SCREW, MACH, PNH, NO. 4-40 . . .	4	
		UNC-2A X 0.50L, CRES		
-35	COML	. WASHER, LOCK-SPRING, ...	4	
		NO. 4, CRES		
-36	COML	WASHER, FLAT, NO. 4, CRES	4	
-37	COML	NUT, PLAIN, HEX., NO. 4-40	4	
		UNC-2B, CRES		
-38	M1-205E	. CAPACITOR, 2UF, 100V, ±10%. . . .	2	
		(99515)		
-39	1N914	. DIODE.	1	
-40		. RESISTOR, 620 OHMS,	4	
		1/2w, ±5%		
-41	1513	RESISTOR, 40 OHMS, 8W (44655). . .	1	
-42	1N5227A	DIODE, ZENER, 3.6V, 5%	1	
-43	C52693-017-024	. FASTENER, SPEED CLIP.	40	
		(78553)		
-44	TP-AD-41285544-5	CONNECTOR, PRINTED CIRCUIT . .	11	
-45	TP-AD-41285544-17	: CONNECTOR, PRINTED CIRCUIT . .	1	
-46	TP-AD-41285544-18	CONNECTOR, PRINTED CIRCUIT . .	10	
-47	T-42054731-2	PLATE, SIDE, LH.	1	
		(ATTACHING PARTS)		
-48	COML	. SCREW, MACH, PNH, NO. 8-32 . . .	4	
		UNC-2A X 0.44L, CRES		
-49	T42054731-1	. PLATE, SIDE, RH	1	
		(ATTACHING PARTS)		
-50	COML	. SCREW, MACH, PNH, NO. 8-32 . . .	4	
		UNC-2A X 0.44L, CRES		
-51	TP-DA-31419000	. CARD FILE	1	

FIGURE AND INDEX NUMBER	PART NUMBER	1 2 3 4 5 6 7 DESCRIPTION	UNITS PER ASSY	USABLE ON CODE
5-7-	TFA-42053731	CONTROL AND LOCAL DISPLAY . . . . ASSEMBLY, DECODER GROUP-MASTER STATION (SEE FIGURE 5-5-2 FOR NHA)	REF	
-1	T-31537731-1	. STRIP, DESIGNATION . . . . . (ATTACHING PARTS)	1	
-2	COML	. SCREW, MACH, FLH, 82° CSK NO. 2-56 UNC-2A X 0.31L, CRES	4	
-3	COML	. WASHER, LOCK-SPRING, NO. 2, CRES	4	
-4	COML	WASHER, FLAT, NO. 2, CRES....	4	
-5	COML	: NUT, PLAIN, HEX., NO. 2-56 . . . . UNC-2B, CRES	4	
-6	387	. LAMP, INCANDESCENT, T-1-3/4 . . (72619)	60	
-7	183-9830-1473-604	. HOLDER, LAMP, AMBERLENS . . . (72619)	60	
-8	MSP-105F/C-12BLK	. SWITCH, PUSHBUTTON, ... SPDT, BLK (95146)	15	
-9	SC628	. AUDIBLE SIGNAL DEVICE ..... (37942)	1	
-10	4242-127-0	. JACK, TIP, LOW VOLTAGE, ... BLACK (17117)	2	
-11	4242-127-9	. JACK, TIP, LOW VOLTAGE, ... WHITE (17117)	12	
-12	T-42051731	. PANEL, FRONT . . . . . (ATTACHING PARTS)	1	
-13	COML	. SCREW, MACH, PNH, NO. 8-32 . . . UNC-2A X 0.38L, CRES	8	
-14	PJ-610	. TERMINAL BLOCK (70674)..... (ATTACHINGPARTS)	2	
-15	COML	. NUT, PLAIN, HEX, NO. 8-32..... UNC-2B, CRES	2	
-16	COML	. WASHER, LOCK-SPRING, ... NO. 8, CRES	2	
-17	COML	. WASHER, FLAT, NO. 8, CRES....	2	
-18	T-31441731-1	. SUPPORT, TERMINAL BLOCK, LH (ATTACHINGPARTS)	2	
-19	COML	. SCREW, MACH, PNH, NO. 8-32 . . . UNC-2A X 0.44L, CRES	2	
-20	COML	. WASHER, LOCK-SPRING, ... NO. 8, CRES	2	
-21	COML	. WASHER, FLAT, NO. 8, CRES....	2	
-22	COML	. NUT, PLAIN, HEX., NO. 8-32 . . . . UNC-2B CRES	2	

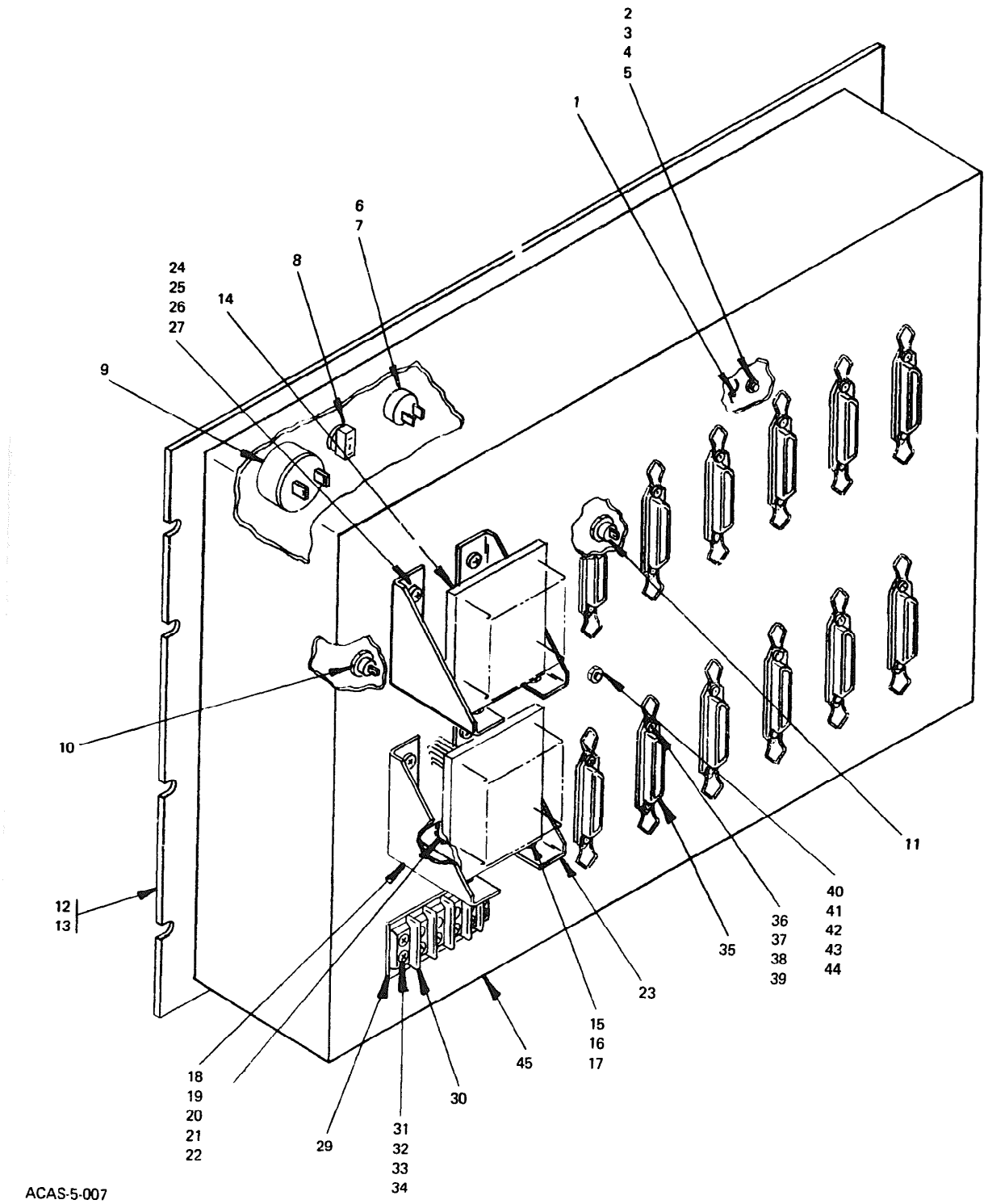


Figure 5-7. Master Station Decoder Group, Control and Local Display Assembly

FIGURE ANDINDEX NUMBER	PARTNUMBER	1 2 3 4 5 6 7 DESCRIPTION	UNITS PER ASSY	USABLE ON CODE
5-7-23	T-31441731-2	SUPPORT, TERMINAL . . . . . BLOCK, RH (ATTACHING PARTS)	2	
-24	COML	SCREW, MACH, PNH, NO. 8-32 . . . UNC-2A X 0.44L, CRES	2	
-25	COML	. WASHER, LOCK-SPRING, ... NO. 8, CRES	2	
-26	COML	WASHER, FLAT, NO. 8, CRES....	2	
-27	COML	NUT, PLAIN, HEX., NO. 8-32 . . . . UNC-2B, CRES	2	
-28	122-37-2000	. GROMMET, CATERPILLAR, NYLON (11897)	2	
-29	364-12-04-010	. MARKERSTRIP, TERMINAL BOARD (71785)	1	
-30	354-18-04-001	. TERMINAL BOARD, MOLDED . . . . (71785) (ATTACHING PARTS)	1	
-31	COML	. SCREW, MACH, PNH, NO. 8-32 . . . UNC-2A X 0.75L, CRES	4	
-32	COML	. WASHER, LOCK-SPRING, NO. 8, CRES	4	
-33	COML	WASHER, FLAT, NO. 8, CRES....	4	
-34	COML	NUT, PLAIN, HEX., NO. 8-32 . . . . UNC-2B, CRES	4	
-35	57-40240	. CONNECTOR, ELECTRIC,..... RECTANGULAR (02660) (ATTACHING PARTS)	12	
-36	COML	. SCREW, MACH, PNH, NO. 2-56 . . . UNC-2A X 0.38L, CRES	2	
-37	COML	. WASHER, LOCK-SPRING, ... NO. 2, CRES	2	
-38	COML	WASHER, FLAT, NO. 2, CRES....	2	
-39	COML	NUT, PLAIN, HEX., NO. 2-56 . . . . UNC-2B, CRES	2	
-40	TM3S8C	. MOUNT (06383). . . (ATTACHING PARTS)	7	
-41	COML	. SCREW, MACH, PNH, NO. 8-32 . . . UNC-2A X 0.44L, CRES	7	
-42	COML	. WASHER, LOCK-SPRING, ... NO. 8, CRES	7	
-43	COML	. WASHER, FLAT, NO. 8, CRES....	7	
-44	COML	. NUT, PLAIN, HEX., NO. 8-32 . . . . UNC-2B, CRES	7	
-45	TDA-42052731	. CHASSIS	1	

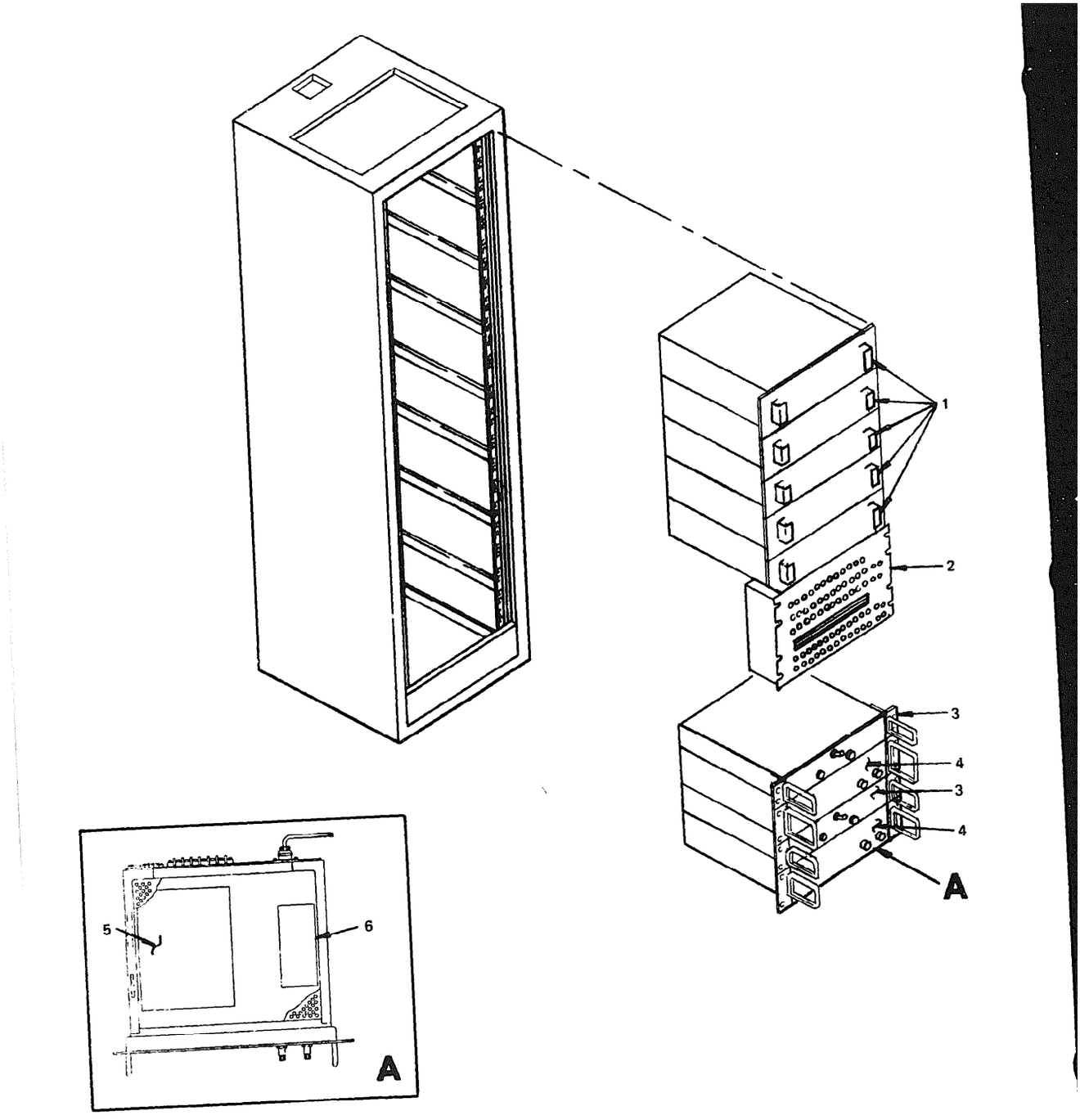


Figure 5-8. Master Station Terminal equipment (Rack No. 2)

FIGURE AND INDEX NUMBER	PART NUMBER	1 2 3 4 5 6 7 DESCRIPTION	UNITS PER ASSY	USABLE ON CODE
5-8-	NO NUMBER	TERMINAL EQUIPMENT . . . . . (RACK NO. 2), MASTER STATION (SEE FIGURE 5-1-3 FOR NHA)	REF	
-1	TFA-42046731	. DECODER GROUP, OX-22/G (SEE FIGURE 5-6 FOR DETAIL BREAKDOWN)	5	
-2	TFA-42049731	. POWER DISTRIBUTION . . . . . ASSEMBLY, MASTER STATION DECODER GROUP (SEE FIGURE 5-9 FOR DETAIL BREAKDOWN)	1	
-3	TFA-42050731	. MODULAR POWER SUPPLY, MASTER STATION DECODER GROUP (ALTERED FROM 80103 PART NO. LM-F-4-P-5)	2	
-4	TFA-42056731	, MODULAR POWER SUPPLY, MASTER STATION DECODER GROUP (ALTERED FROM 11746 PART NO, 10889)	2	
-5	LMD-12	. POWER SUPPLY, 12V AT 10A (80103)	1	
-6	LCD-A-22	. POWER, SUPPLY, ±12V . . . . . (0-18V) AT 0.5A (80103)	1	

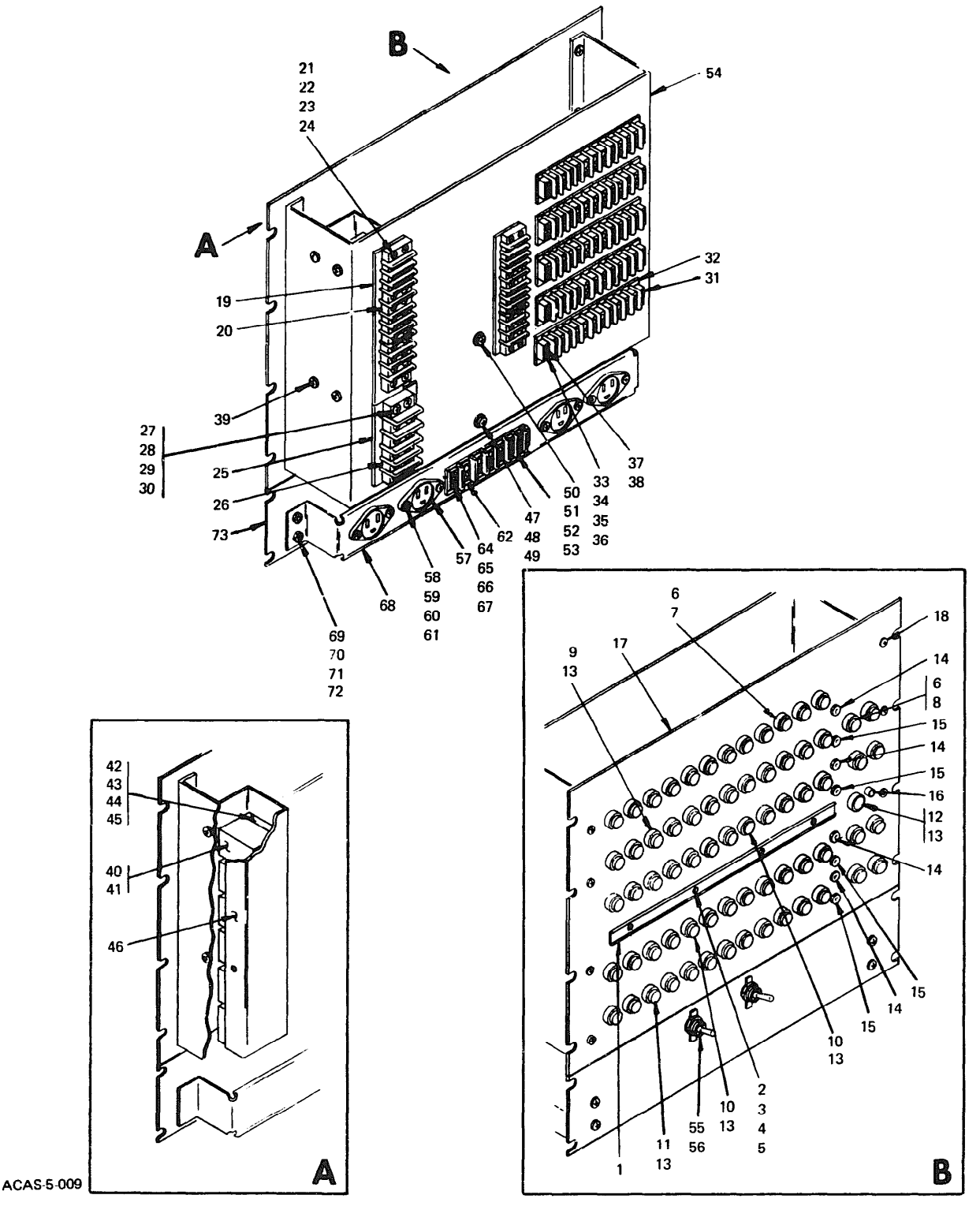


Figure 5-9. Master Station Decoder Group, Power Distribution Assembly

FIGURE AND INDEX NUMBER	PART NUMBER	DESCRIPTION 1 2 3 4 5 6 7	UNITS PER ASSY	USABLE ON CODE
		POWER DISTRIBUTION ASSEMBLY, . . DECODER GROUP-MASTER STATION (SEE FIGURE 5-8-2 FOR NHA)	REF	
-1	T-31437731-2	. STRIP, DESIGNATION . . . . . (ATTACHING PARTS)	1	
-2	COML	. SCREW, MACH, FLH, 82° CSK, . . . NO. 2-56 UNC-2A X 0.31L, CRES	4	
-3	COML	. WASHER, LOCK-SPRING, ... NO. 2, CRES	4	
-4	COML	WASHER, FLAT, NO. 2, CRES	4	
-5	COML	NUT, PLAIN, HEX, NO. 2-56 . . . . UNC-2B, CRES	4	
-6	382	. LAMP, INCANDESCENT, ... T-1-3/4 (72619)	20	
-7	183-9830-1472-604	. HOLDER, LAMP, GREEN . . . . . LENS (72619)	12	
-8	183-9830-1473-604	. HOLDER, LAMP, AMBER . . . . . LENS (72619)	8	
-9	AGC, .5A	. FUSE, GLASS CASE, 0.5A . . . . . (71400)	12	
-10	AGC, .125A	. FUSE, GLASS CASE, 0.125A . . . . . (71400)	24	
-11	AGC, 5A	. FUSE, GLASS CASE, 5A . . . . . (71400)	12	
-12	AGC, 1A	. FUSE, GLASS CASE, IA . . . . . (7 1400)	1	
-13	HKP	. FUSEHOLDER, NONINDICATING . . . (71400)	49	
-14	4242-127-0	. JACK, TIP, LOW VOLTAGE, ... BLACK (17117)	4	
-15	4242-127-9	. JACK, TIP, LOW VOLTAGE, ... WHITE (17117)	4	
-16	MSP-105F/C-12 BLK	. SWITCH, PUSHBUTTON, ... SPDT, BLACK (95146)	1	
-17	T-42047731	. PANEL, FRONT . . . . . (ATTACHING PARTS)	1	
-18	COML	. SCREW, MACH, PNH, NO. 8-32 . . . UNC-2A X 0.38L, CRES	8	
-19	365-12-12-010	. MARKER STRIP, TERMINAL . . . . . BOARD (71785)	1	
-20	355-18-12-001	. TERMINAL BOARD, MOLDED, ... BARRIER, SCREW TYPE (71785) (ATTACHING PARTS)	1	
-21	COML	. SCREW, MACH, PNH, NO. 10-32 . . UNC-2A X 0.75L, CRES	4	
-22	COML	. WASHER, LOCK-SPRING, . . . NO. 10, CRES	4	

FIGURE AND INDEX NUMBER	PART NUMBER	DESCRIPTION 1 2 3 4 5 6 7	UNITS PER ASSY	USABLE ON CODE
5-9-23	COML	. WASHER, FLAT, NO. 10, CRES . . .	4	
-24	COML	. NUT, PLAIN, HEX., NO. 10-32 . . . UNC-2B, CRES	4	
-25	366-12-03-010	. MARKER S RIP, TERMINAL . . . . . STRIP (71785)	1	
-26	356-18-04-001	, TERMINAL BOARD, MOLDED . . . . (71785) (ATTACHING PARTS)	1	
-27	COML	SCREW, MACH, PNH, NO. 6-32 . . . UNC-2A X 1.00L, CRES	4	
-28	COML	. WASHER, LOCK-SPRING, NO. 6, . . CRES	4	
-29	COML	WASHER, FLAT, NO. 6, CRES . . .	4	
-30	COML	NUT, PLAIN, HEX., NO. 6-32 . . . . UNC-2B, CRES	4	
-31	364-12-12-010	MARKER STRIP, TERMINAL BOARD (71785)	6	
-32	354-18-12-001	. TERMINAL BOARD, MOLDED . . . . (71785) (ATTACHING PARTS)	6	
-33	COML	. SCREW, MACH, PNH, NO. 8-32 . . . UNC-2A X 0.69L, CRES	4	
-34	COML	. WASHER, LOCK-SPRING, ... NO. 8, CRES	4	
-35	COML	. WASHER, FLAT, NO. 8, CRES.. . .	4	
-36	COML	. NUT, PLAIN, HEX., NO,. 8-32 . . . . UNC-2B, CRES	4	
-37	1N914	DIODE	2	
-38	NO. 863	TERMINAL STRIP, SOLDER.	1	
	TSA-42057731	. RELAY ASSEMBLY, DECODER. . . . GROUP-MASTER STATION (ATTACHING PARTS)	1	
-39	COML	SCREW, MACH, PNH, NO. 8-32 . . . UNC-2A X 0.38L, CRES	4	
-40	R10-E1-Z4-S30	RELAY, 4PDT, 3V (77342)	2	
-41	R10-E1-Z4-450	RELAY, 4PDT, 12V (77342)	6	
-42	33211	SOCKET, RELAY, NO. A10-2 . . . (77342) (ATTACHING PARTS)	8	
-43	COML	SCREW, MACH, HEX. HD, . . . NO. 4-40 UNC-2A X 0.38, CRES	8	
-44	COML	WASHER, FLAT, NO. 4, CRES . .	8	
-45	COML	NUT, PLAIN, HEX., NO. 4-40 . . UNC-2B, CRES	8	
-46	TDA-31440731	SUPPORT, RELAY	1	
-47	MR1210SLR	SEMICONDUCTOR (04713).	2	

FIGURE AND INDEX NUMBER	PART NUMBER	DESCRIPTION 1 2 3 4 5 6 7	UNITS PER ASSY	USABLE ON CODE
5-9 -48	1491	RECTIFIER LUG (83330) .	2	
-49	T-31438731	H E A T S I N K (0 5 8 2 0) .	1	
		(ATTACHING PARTS)		
-50	COML	SCREW, MACH, PNH, NO. 6-32 . . .. UNC-2A X 0.50L, CRES	4	
-51	COML	WASHER, LOCK-SPRING, ... NO. 6, CRES	4	
-52	COML	WASHER, FLAT, NO. 6, CRES	4	
-53	COML	NUT, PLAIN, HEX., NO. 6-32 , ... UNC-2B, CRES	4	
-54	TDA-42-48731-1	CHASSIS .	1	
	TSA-42064731	P A N E L S U B A S S E M B L Y, DECODER GROUP-MASTER STATION	1	
-55	ST50K	SWITCH, TOGGLE, DPST, 20A., (31356)	2	
-56	508	N A M E P L A T E, O N - O F F . . .. (83330)	2	
-57	160-2	RECEPTACLE, 2 POLE, ..., 15A, 125V (02660)	4	
		(ATTACHING PARTS)		
-58	COML	SCREW, MACH, PNH, ... NO. 6-32 UNC-2A X 0.44L, CRES	2	
-59	COML	WASHER, LOCK-SPRING, ... NO. 6, CRES	2	
-60	COML	WASHER, FLAT, NO. 6, ... CRES	2	
-61	COML	NUT, PLAIN, HEX., ... NO. 6-32 UNC-2B, CRES	2	
-62	365-12-06-010	MARKER STRIP, TERMINAL . . BOARD (71785)	1	
-63	355-18-06-001	TERMINAL BOARD (71785) . . . . . (ATTACHING PARTS)	1	
-64	COML	SCREW, MACH, PNH, ... NO. 8-32 UNC-2A X 0.75L, CRES	4	
-65	COML	WASHER, LOCK-SPRING, ... NO. 8, CRES	4	
-66	COML	-WASHER, FLAT, NO. 8, CRES. .	4	
-67	COML	NUT, PLAIN, HEX., ... NO. 8-32 UNC-2B, CRES	4	
-68	T-42062731	BRACKET . . . . . (ATTACHING PARTS)	1	
-69	COML	SCREW, MACH, PNH, ... NO. 8-32 UNC-2A X 0.50L, CRES	4	
-70	COML	WASHER, LOCK-SPRING, ... NO. 8, CRES	4	

FIGURE AND INDEX NUMBER	PART NUMBER	DESCRIPTION 1 2 3 4 5 6 7	UNITS PER ASSY	USABLE ON CODE
5-9-71	COML	WASHER, FLAT, ... NO. 8, CRES	4	
-72	COML	NUT, PLAIN, HEX., ... NO. 8-32 UNC-2B, CRES	4	
-73	T-42063731	PANEL	1	

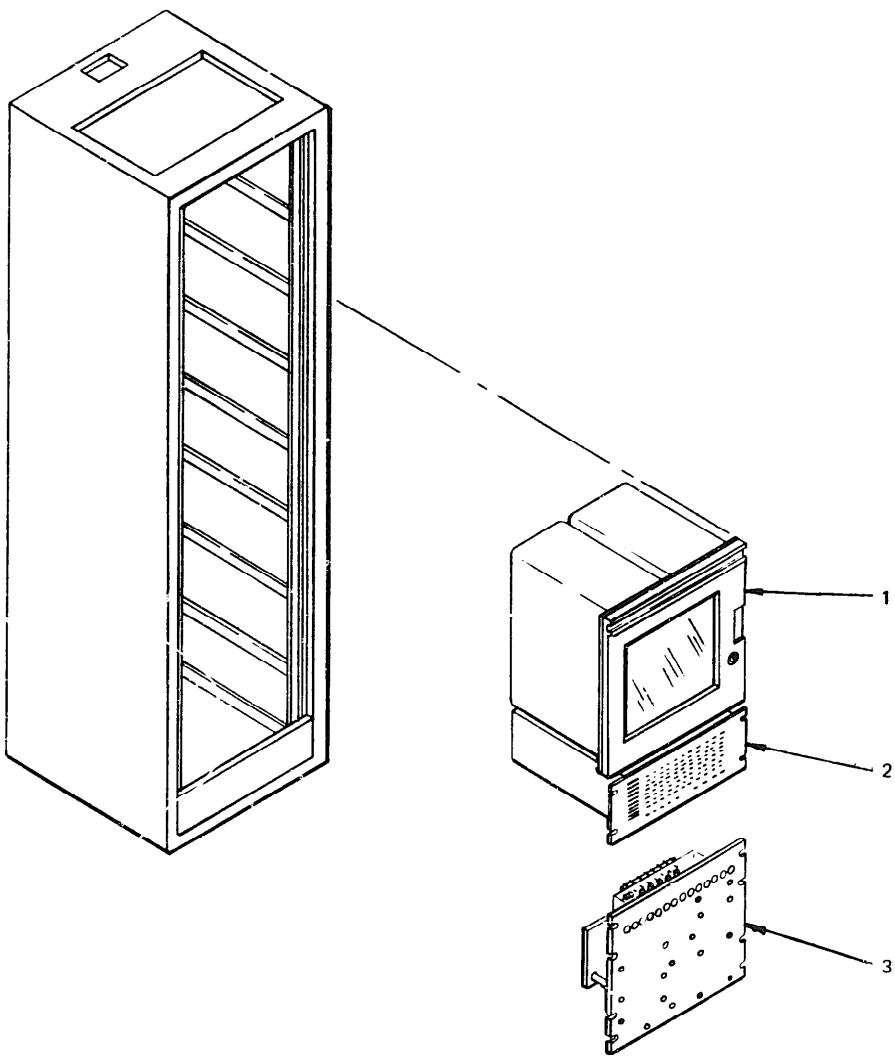


Figure 5-10. Signal Data Recorder Group (Rack No. 3)

FIGURE AND INDEX NUMBER	PART NUMBER	1 2 3 4 5 6 7 DESCRIPTION	UNITS PER ASSY	USABLE ON CODE
5-10-	NONUMBER	RECORDER GROUP (RACK N0. 3), SIGNAL DATA (SEE FIGURE 5-1-4 FOR NHA)	REF	
-1	TFA-42024732	. RECORDERASSEMBLY . . . . . (40 CHANNEL), TWIN FLUSH, sIGNALDATA (USED AT STUTTGART) (SEE FIGURE 5-11 FOR DETAIL BREAKDOWN)	1	A
	TFA-42025732	. RECORDER ASSEMBLY . . . . . (20 CHANNEL), TWIN FLUSH, SIGNAL DATA (USED AT KUNIA) (SEE FIGURE 5-11 FOR DETAIL BREAKDOWN)	1	B
-2	TFA-42019733	. RECORDER GROUP CONTROL (SEE FIGURE 5-12 FOR DETAIL BREAKDOWN)	1	
-3	TFA-42021734	. POWER SUPPLY ASSEMBLY (SEE . . FIGURE 5-13 FORDETAIL BREAKDOWN)	1	

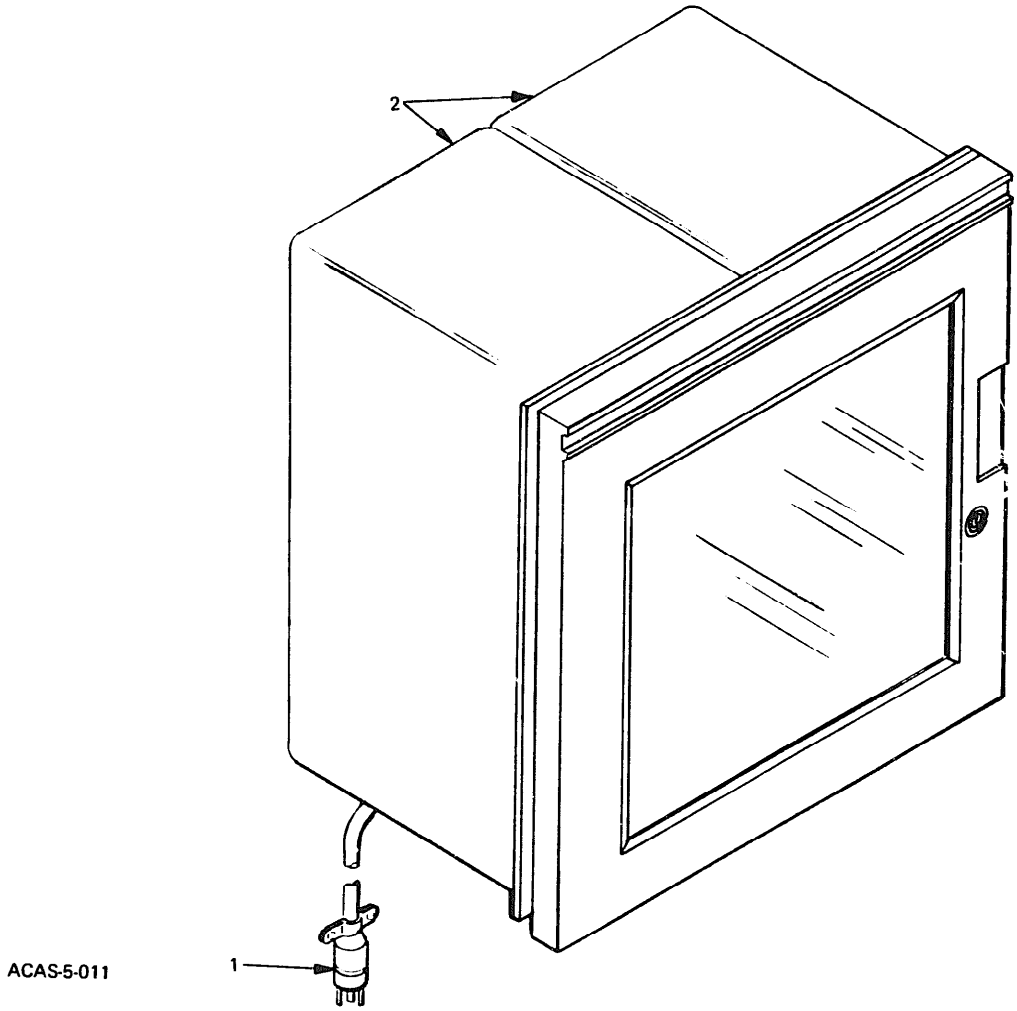
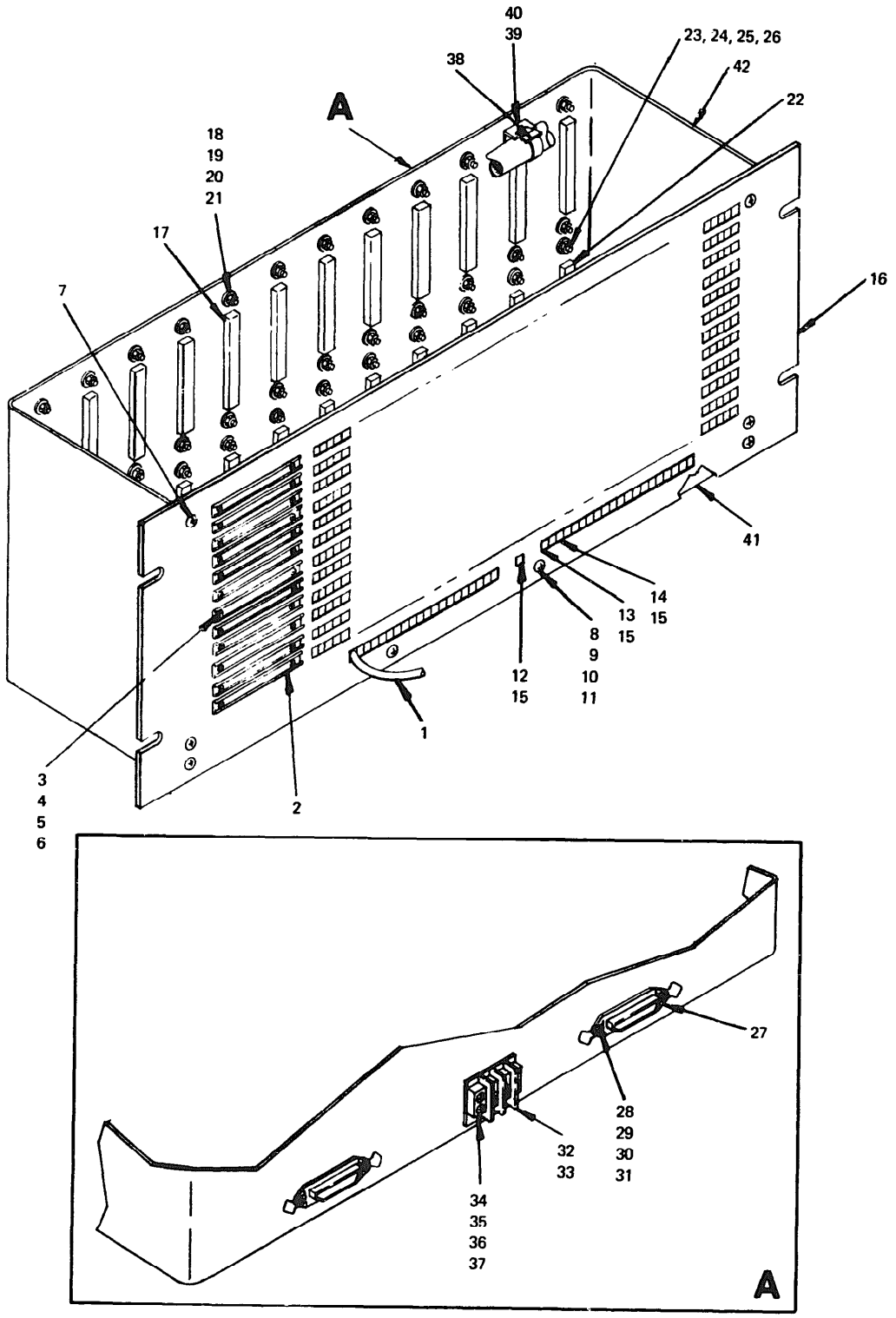


Figure 5-11. 40-Channel Signal Data Twin Flush Recorder Assembly

FIGURE AND INDEX NUMBER	PART NUMBER	DESCRIPTION 1 2 3 4 5 6 7	UNITS PER ASSY	USABLE ON CODE
5-11-	TFA-42024732	TWIN FLUSH RECORDER ASSEMBLY, 40 CHANNEL-SIGNAL DATA (USED AT STUTTGART) (SEE FIGURE 5-10-1 FOR NHA)	REF	A
	TFA-42025732	TWIN FLUSH RECORDER ASSEMBLY, 20 CHANNEL-SIGNAL DATA (USED AT KUNIA) (SEE FIGURE 5-10-1 FOR NHA)	REF	B
-1	TDA-31431732	POWER CORD	1	
-2	A620T	: RECORDER, INKLESS TWIN FLUSH (72264)	1	

FIGURE AND INDEX NUMBER	PART NUMBER	DESCRIPTION 1 2 3 4 5 6 7	UNITS PER ASSY	USABLE ON CODE
5-12-	TFA-42019733	CONTROL, RECORDERGROUP . . . . . (SEE FIGURE 5-10-2 FOR NHA)	REF	
-1	418-0096-165	CORD, PATCH (91886)	40	
-2	T-31422730-1	STRIP, DESIGNATION	12	
		(ATTACHING PARTS)		
-3	COML	. SCREW, MACH, FLH, 82° CSK,.... NO. 2-56 UNC-2A X 0.31L, CRES	2	
-4	COML	. WASHER, LOCK-SPRING, NO. 2, . . CRES	2	
-5	COML	. WASHER, FLAT, NO. 2, CRES	2	
-6	COML	. NUT, PLAIN, HEX. NO. 2-56 . . . . . UNC-2B, CRES	2	
	TSA-42018733	CONTROL, SUBASSEMBLY, ... RECORDERGROUP (ATTACHINGPARTS)	1	
-7	COML	. SCREW, MACH, FLH, 100° CSK, . . NO. 6-32 UNC-2A X 0.38L, CRES	4	
-8	COML	. SCREW, MACH, FLH, 100° CSK, . . NO. 6-32 UNC-2A X 0.62L, CRES	4	
-9	COML	. WASHER, LOCK-SPRING, NO. 6, . . CRES	4	
-10	COML	. WASHER, FLAT, NO. 6, CRES	4	
-11	COML	. NUT, PLAIN, HEX., NO. 6-32 . . . . UNC-2B, CRES	4	
-12	12-20000-BLK	INSULATOR, FEMALE, BLACK . (91886)	1	
-13	12-20000-GRN	INSULATOR, FEMALE, GREEN . (91886)	166	
-14	12-20000-WHT	INSULATOR, FEMALE, WHITE . (91886)	618	
-15	11-20005-115	WRAPOST, FEMALE (91886) . . .	785	
-16	TSA-42018733-2	PLATE, 0.125 STOCK	1	
-17	57-40590	CONNECTOR, ELECTRIC, ... RECTANGULAR (73445) (ATTACHINGPARTS)	12	
-18	COML	. SCREW, MACH, PNH, NO. 2-56 . . . UNC-2A X 0.38L, CRES	2	
-19	COML	. WASHER, LOCK-SPRING, NO. 2, . . CRES	2	
-20	COML	. WASHER, FLAT, NO. 2, CRES	2	
-21	COML	. NUT, PLAIN, HEX., NO. 2-56 . . . . UNC-2B, CRES	2	
-22	57-40140	. CONNECTOR ELECTRICAL, ... RECTANGULAR (73445) (ATTACHING PARTS)	12	
-23	COML	. SCREW, MACH, PNH, NO. 2-56 UNC-2A X 0.38L, CRES	2	
-24	COML	. WASHER, LOCK-SPRING, NO. 2, CRES	2	
-25	COML	. WASHER, FLAT, NO. 2, CRES	2	



ACAS-5-012

Figure 5-12. Recorder Group Control

FIGURE AND INDEX NUMBER	PART NUMBER	DESCRIPTION 1 2 3 4 5 6 7	UNITS PER ASSY	USABLE ON CODE
5-12-26	COML	NUT, PLAIN, HEX., NO. 2-56 UNC-2B, CRES	2	
-27	57-40240	CONNECTOR, ELECTRIC, RECTANGULAR (73445) (ATTACHINGPARTS)	2	
-2&	COML	SCREW, MACH, PNH, NO. 2-56 . . UNC-2A X 0.36L, CRES	2	
-29	COML	WASHER, LOCK-SPRING, NO. 2, . . CRES	2	
-30	COML	WASHER, FLAT, NO. 2, CRES	2	
-31	COML	NUT, PLAIN, HEX., NO. 2-56 . . . . UNC-2B, CRES	2	
-32	363-12-02-010	MARKER STRIP (71785)	1	
-33	353-18-02-001	TERMINAL BOARD, MOLDED, . . . BARRIER (71785) (ATTACHINGPARTS)	1	
-34	COML	SCREW, MACH, PNH, NO. 6-32 . . . UNC-2A X 0.62L, CRES	2	
-35	COML	WASHER, LOCK-SPRING, NO. 6, . . CRES	2	
-36	COML	WASHER, FLAT, NO. 6, CRES	2	
-37	COML	NUT, PLAIN, HEX. NO. 6-32 . . . . . UNC-2B, CRES	2	
-38	SST2	STRAP, CABLE, ADJUSTABLE . . . (06383)	7	
-39	TM2S6C	MOUNT, CABLE STRAP (06383) . . . (ATTACHING PARTS)	7	
-40	COML	SCREW, MACH, PNH, NO. 6-32 . . . UNC-2A X 0.38L, CRES	7	
-41	T-31421733	STIFFENER, ANGLE	1	
-42	TDA-42028733	BRACKET, SUPPORT, CONNECTOR-RECORDER GROUP	1	

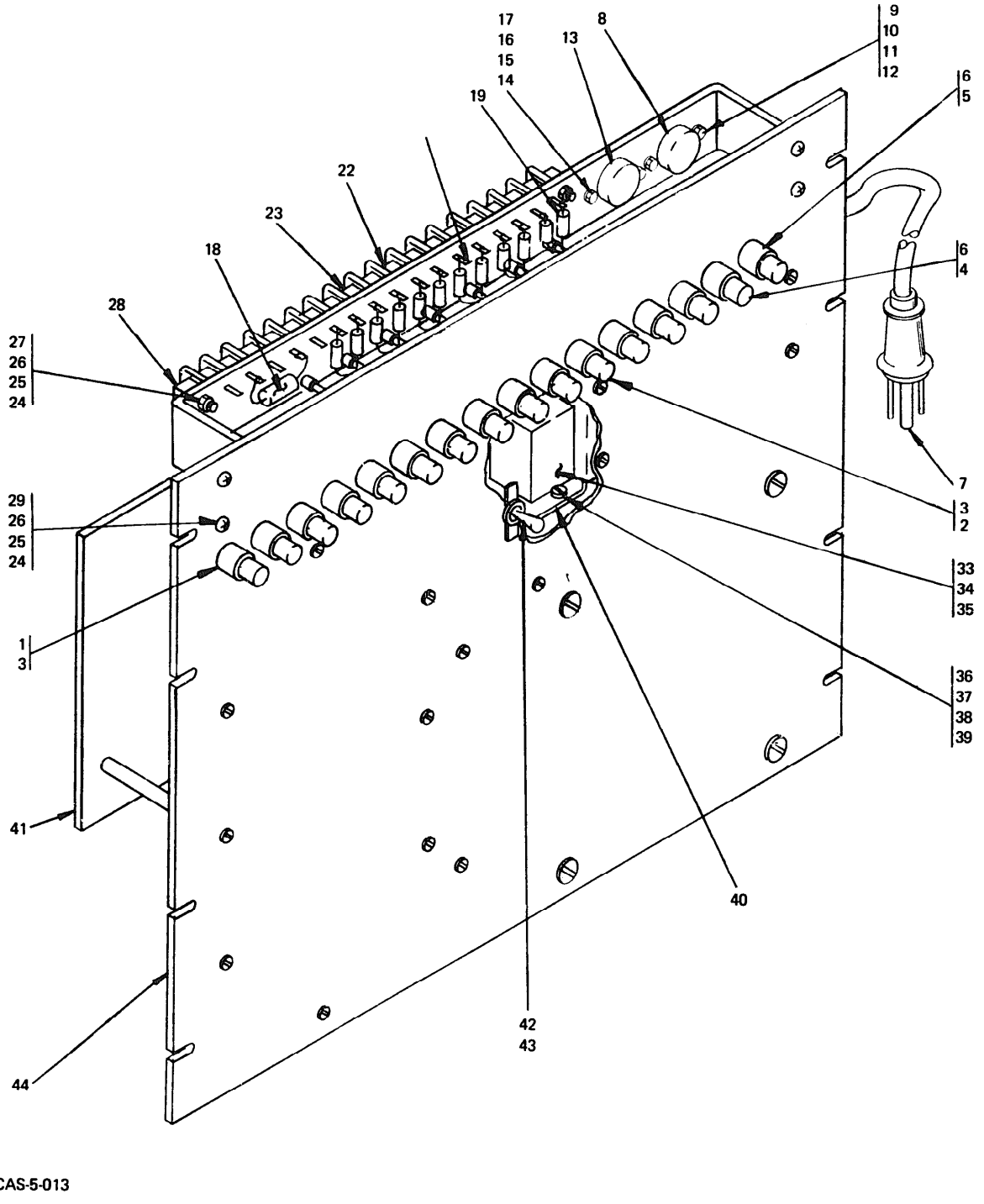


Figure 5-13. Data Display Group, Power Supply Assembly

FIGURE AND INDEX NUMBER	PART NUMBER	1 2 3 4 5 6 7 DESCRIPTION	UNITS PER ASSY	USABLE ON CODE
	TFA-42021734	POWER SUPPLY ASSEMBLY, DATA . . DISPLAY GROUP (SEE FIGURE 5-10-3 FOR NHA)	REF	
-1	MTH, 6A	FUSE, GLASS CASE, 6A (71400) . . .	1	
-2	AGC, 3A	FUSE, GLASS CASE, 3A (71400) . . .	13	
-3	HKR	. FUSEHOLDER, INDICATING . . . . . (71400)	14	
-4	AGC, 2A	FUSE, GLASS CASE, 2A (71400) . . .	1	
-5	GLH, l0A	FUSE, GLASS CASE, 10A (71400) . .	1	
-6	HKL	FUSEHOLDER, INDICATING . . . . . (71400)	2	
-7	TDA-31430730	POWER CORD	1	
-8	7486-G	CONNECTOR, CHASSIS MOUNT, . . . PLUG (74545) (ATTACHING PARTS)	1	
-9	COML	. SCREW, MACH, PNH, NO. 6-32 . . . UNC-2A X 0.75L, CRES	2	
-10	COML	. WASHER, LOCK-SPRING, NO. 6, . . CRES	2	
-11	COML	. WASHER, FLAT, NO. 6, CRES	2	
-12	COML	. NUT, PLAIN, HEX., NO. 6-32 . . . . UNC-2B, CRES	2	
-13	7487	CONNECTOR, CHASSIS MOUNT, . . . RECEPTACLE (74545) (ATTACHING PARTS)	1	
-14	COML	. SCREW, MACH, PNH, NO. 6-32 . . . UNC-2A X 0.75L, CRES	2	
-15	COML	. WASHER, LOCK-SPRING, NO. 6, . . CRES	2	
-16	COML	. WASHER, FIAT, NO. 6, CRES	2	
-17	COML	. NUT, PLAIN, HEX., NO. 6-32 . . . . UNC-2B, CRES	2	
-18	1719	. RESISTOR, 75 OHM 12W (44655)	1	
-19	30946	. RESISTOR, 360 OHM, 2W, ±5% .	13	
-20	3650-2	TERMINAL, INSULATED (71279) . . . (ATTACHING PARTS)	7	
-21	COML	. SCREW, MACH, FLH, 100°, ... NO. 6-32 UNC-2A X 0.31L, CRES	1	
-22	365-12-17-010	. TERMINAL BOARD, MARKER . . . . STRIP (71785)	1	
-23	355-18-17-001	. TERMINAL BOARD, MOLDED, ... BARRIER, SCREW TYPE (71785) (ATTACHING PARTS)	1	
-24	COML	. SCREW, MACH, PNH, NO. 6-32 . . . . UNC-2A X 0.81L, CRES	4	
-25	COML	. WASHER, LOCK-SPRING, NO. 6, . . CRES	4	
-26	COML	. WASHER, FLAT, NO. 6, CRES	4	
-27	COML	. NUT, PLAIN, HEX., NO. 6-32 . . . . UNC-2B, CRES	4	

FIGURE AND INDEX NUMBER	PART NUMBER	DESCRIPTION 1 2 3 4 5 6 7	UNITS PER ASSY	USABLE ON CODE
5-13-28	T-31429734	BRACKET, MOUNTING, ... CONNECTOR (ATTACHING PARTS	1	
-29	COML	SCREW, MACH, PNH, NO. 8-32 . . . UNC-2A X 0.56L, CRES	4	
-30	COML	WASHER, LOCK-SPRING, NO. 8, . . CRES	4	
-31	COML	WASHER, FLAT, NO. 8, CRES	4	
-32	COML	NUT, PLAIN, HEX., NO. 8-32 . . . . UNC-2B, CRES	4	
-33	TYPE KRP-5A	RELAY, SPDT 120VAC (77342) . .	1	
-34	TYPE KRP-5D	RELAY, SPDT, 24VDC (77342)	1	
-35	77M1P8	SOCKET, OCTAL (02660) (ATTACHING PARTS)	2	
-36	COML	SCREWMACH, PNH, NO. 6-32 . . . UNC-2A X 0.44L, CRES	2	
-37	COML	WASHER, LOCK-SPRING, NO. 6, . . CRES	2	
-38	COML	WASHER, FLAT, NO. 6, CRES	2	
-39	COML	NUT, PLAIN, HEX., NO. 6-32 UNC-2B, CRES	2	
-40	T-31449734	BRACKET, RELAY	1	
-41	T-42032734	REGULATED DC POWER SUPPLY . . (ALTERED FROM 00159 PART NO. PS-1-47127)	1	
-42	508	NAMEPLATE, ON-OFF (03330)	1	
-43	ST50K	SWITCH, TOGGLE, DPST, 20A . . . . (31356)	1	
-44	T-42033734	PANEL, F R O N T	1	

FIGURE AND INDEX NUMBER	PART NUMBER	DESCRIPTION 1 2 3 4 5 6 7	UNITS PER ASSY	USABLE ON CODE
5-14-	TFA-50124734-2	DISPLAYASSEMBLY, MASTER . . . . . sTATroN (USED AT STUTTGART) (SEE FIGURE 5-1-5 FOR NHA)	REF	A
	TFA-50124734-l	DISPLAYASSEMBLY, MASTER . . . . . STATION (USED AT KUNIA) (SEE FIGURE 5-1-5 FOR NHA)	REF	B
-1	T-31435734-1	. COVER REAR (A T T A C H I N G P A R T S)	2	
-2	COML	. SCREW, MACH, PNH, NO.8-32 . . . UNC-2A X 0.44L, CRES	4	
-3	T-31435734-2	. C O V E R , R E A R	4	A
	T-31435734-1	. COVER, REAR (A T T A C H I N G P A R T S)	2	B
-4	COML	. SCREW, MACH, PNH, NO. 8-32 . . . UNC-2A X 0.44L, CRES	4	
-5	T-31434734	. C O V E R , C A B L E . . . . . (ATTACHING PARTS)	2	
-6	COML	. SCREW, MACH, PNH, NO. 8-32 . . . UNC-2A X 0.38L, CRES	10	
-7	T-21821734	. BRACE . . . . . (ATTACHINGPARTS)	1	B
-8	COML	. SCREW, CAP., HEX. HD, ... NO. 1/2-13 UNC-2A X 1.00L, CRES	2	B
-9	COML	. WASHER, LOCK-SPRING,.... . . . . NO. 1/2, CRES	2	B
-10	COML	. WASHER, FLAT, NO. 1/2, CRES	2	B
-11	TSA-42037734-2	CHANNEL, SUPPORT	2	A
	TSA-42037734-1	CHANNEL, SUPPORT (A T T A C H I N G P A R T S)	2	B
-12	COML	. NUT, PLAIN, HEX., NO. 3/8-16 . . UNC-2B, CRES	2	
-13	COME	. WASHER, LOCK-SPRING,..... NO. 3/8, CRES	2	
-14	COML	WASHER, FLAT, NO. 3/8, CRES . .	2	
-15	TDA-42039734	CHANNEL, ADJUSTABLE (ATTACHING PARTS)	2	
-16	COML	. SCREW, CAP, HEX. HD, ... NO. 3/8-16 UNC-2A X 1.13L, CRES	2	
-17	COML	. WASHER, LOCK-SPRING, ... NO. 3/8, CRES	2	
-18	COML	WASHER, FLAT, NO. 3/8, CRES . .	2	
-19	T-21816734	SPACER, BUSHING	1	

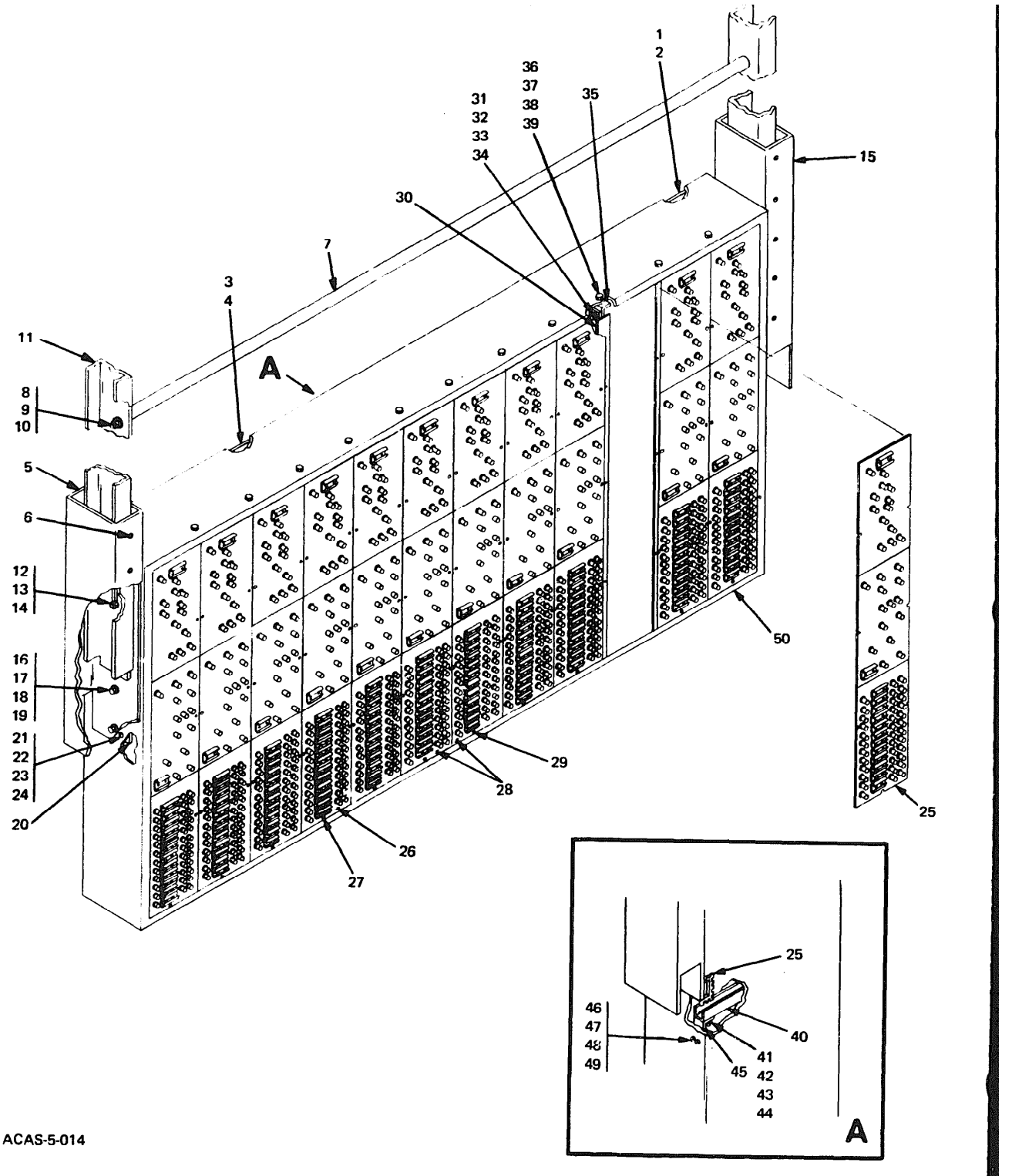


Figure 5-14. Master Station Display Assembly

FIGURE AND INDEX NUMBER	PART NUMBER	1 2 3 4 5 6 7 DESCRIPTION	UNITS PER ASSY	USABLE ON CODE
5-14-20	T-21820734	PLATE, PIVOT	2	
		(ATTACHING PARTS)		
-21	COML	SCREW, MACH, FLH, NO. 10-32 . . UNC-2A X 0.56L, CRES	4	
-22	COML	WASHER, LOCK-SPRING, NO. 10, . . CRES	4	
-23	COML	WASHER, FLAT, NO. 10, CRES . . .	4	
-24	COML	NUT, PLAIN, HEX., NO. 10-32 . . . UNC-2B, CRES	4	
-25	122-37-2000	GROMMET, CATERPILLAR, ... NYLON (11897)	1	
-26	TSA-42031734-1	PANEL ASSEMBLY, DATA DISPLAY GROUP (SEE FIGURE 5-15 FOR DETAIL BREAKDOWN)	10	A
	TSA-42031734-1	PANEL ASSEMBLY, DATA DISPLAY GROUP (SEE FIGURE 5-15 FOR DETAIL BREAKDOWN) (ATTACHING PARTS)	6	B
-27	COML	SCREW, MACH, PNH, NO. 8-32 . . . UNC-2A X 0.44L, CRES	8	
-28	TSA-42031734-2	PANEL ASSEMBLY, DATA DISPLAY GROUP (SEE FIGURE 5-15 FOR DETAIL BREAKDOWN)	2	A
	TSA-42031734-2	PANEL, ASSEMBLY, DATA . . . . . DISPLAY GROUP (SEE FIGURE 5-15 FOR DETAIL BREAKDOWN) (ATTACHING PARTS)	3	B
-29	COML	SCREW, MACH, PNH, NO. 8-32 . . . UNC-2A X 0.44L, CRES	8	
-30	TDA-42043734-2	BRACKET, MOUNTING, PANEL . . .	11	A
	TDA-42043734-1	BRACKET, MOUNTING, PANEL . . . (ATTACHING PARTS)	7	B
-31	COML	SCREW, MACH, PNH, NO. 8-32 . . . UNC-2A X 0.56L, CRES	2	
-32	COML	WASHER, LOCK-SPRING, NO. 8, . . CRES	2	
-33	COML	WASHER, FLAT, NO. 8, CRES	2	
-34	COML	NUT, PLAIN, HEX., NO. 8-32 . . . UNC-2B, CRES	2	
-35	T-21818734-2	. CLIP, MOUNTING, TEE	22	B
	T-21818734-1	. CLIP, MOUNTING, TEE . . . . . (ATTACHING PARTS)	14	A
-36	COML	. SCREW, MACH, PNH, NO. 8-32 . . . UNC-2A X 0.56L, CRES	1	
-37	COML	. WASHER, LOCK-SPRING, NO. 8, . . CRES	1	
-38	COML	. WASHER, FLAT, NO. 8, CRES	1	
-39	COML	. NUT, PLAIN, HEX., NO. 8-32 . . . . UNC-2B, CRES	1	

FIGURE AND INDEX NUMBER	PART NUMBER	1 2 3 4 5 6 7 DESCRIPTION	UNITS PER ASSY	USABLE ON CODE
5-14-40	T-31436734-2	TROUGH, CABLE	1	A
	T-31436734-1	TROUGH, CABLE . . . . . (ATTACHING PARTS)	1	B
-41	COML	SCREW, MACH, PNH, NO. 8-32 . . . UNC-2A X 0.56L, CRES	1	
-42	COML	WASHER, LOCK-SPRING, NO. 8, . . CRES	2	
-43	COML	WASHER, FLAT, NO. 8, CRES	2	
-44	COML	NUT, PLAIN, HEX., NO. 8-32 . . . UNC-2B, CRES	2	
-45	T-21819734	CLIP, MOUNTING, TROUGH . . . . . (ATTACHING PARTS)	2	
-46	COML	SCREW, MACH, PNH, NO. 8-32 . . . UNC-2A X 0.56L, CRES	1	
-47	COML	WASHER, LOCK-SPRING, NO. 8, . . CRES	1	
-48	COML	WASHER, FLAT, NO. 8, CRES	1	
-49	COML	NUT, PLAIN, HEX. , NO. 8-32 . . . . UNC-2B, CRES	1	
-50	TDA-50125734-2	FRAME, DISPLAY	1	A
	TDA-50125734-1	FRAME, DISPLAY	1	B
5-15-	TSA-42031734-2	PANEL ASSEMBLY, DATA. . . . . DISPLAY GROUP (SEE FIGURE 5-14-28 FOR NHA)	REF	A
	TSA-42031734-1	PANEL ASSEMBLY, DATA . . . . . DISPLAY GROUP (SEE FIGURE 5-14-26 FOR NHA)	REF	B
-1	T-31422730-3	. STRIP, DESIGNATION . . . . . (ATTACHING PARTS)	2	
-2	COML	. SCREW, MACH, FLH, ... 82° CSX, NO. 2-56 UNC-2A X 0.31L, CRES	2	
-3	COML	. WASHER, LOCK-SPRING, ... NO. 2, CRES	2	
-4	COML	WASHER, FLAT, NO. 2, CRES	2	
-5	COML	: NUT, PLAIN, HEX., ... NO. 2-56 UNC-2B, CRES	2	
-6	T-31422730-2	STRIP, DESIGNATION . . . . . (ATTACHING PARTS)	12	
-7	COML	SCREW, MACH, FLH, ... 82° CSX, NO. 2-56 UNC-2A X 0.31L, CRES	2	
-8	COML	WASHER, LOCK-SPRING, ... NO. 2, CRES	2	
-9	COML	WASHER, FLAT, NO. 2, CRES . . .	2	

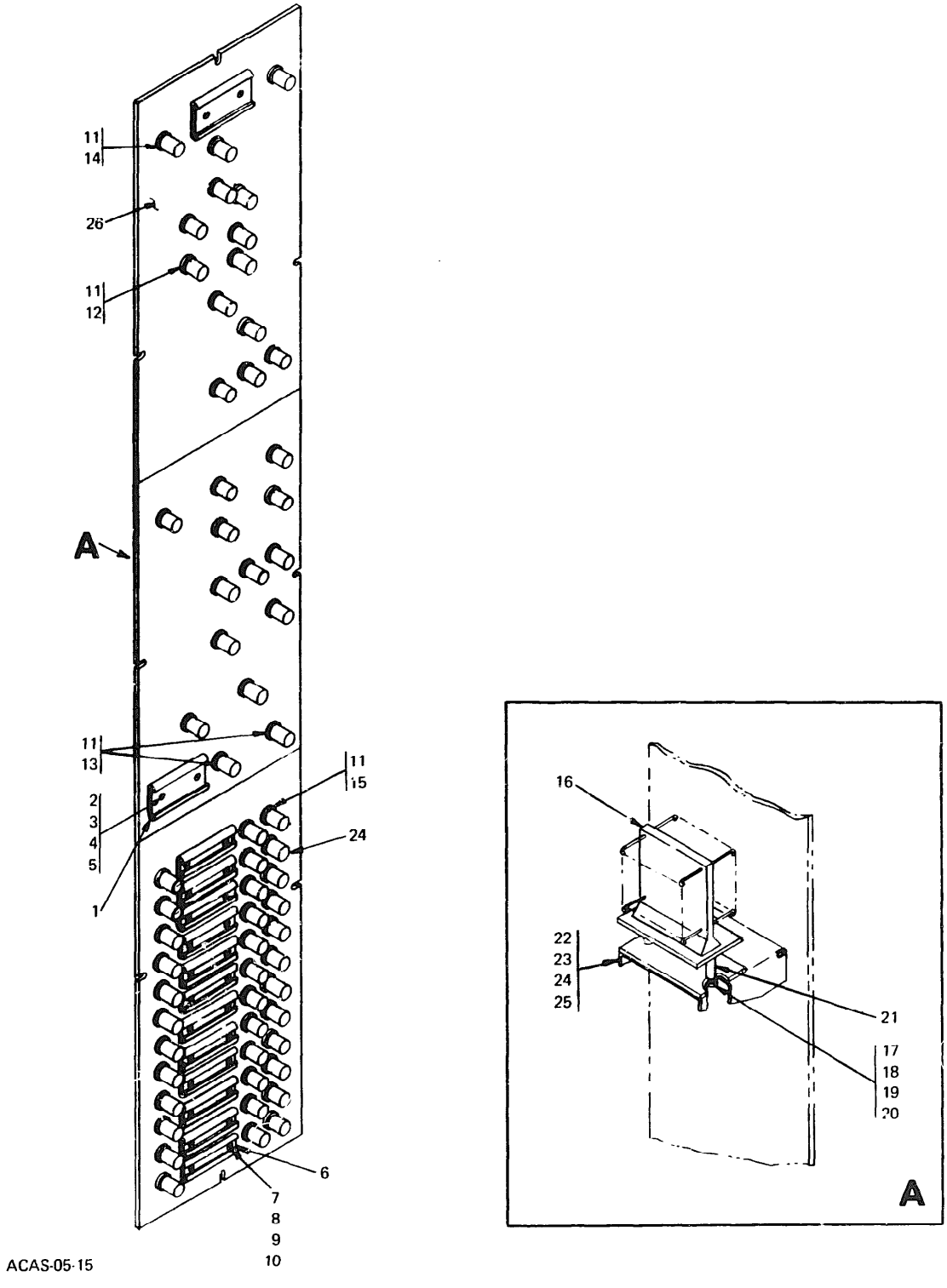


Figure 5-15. Data Display Group, Panel Assembly

FIGURE AND INDEX NUMBER	PART NUMBER	DESCRIPTION 1 2 3 4 5 6 7	UNITS PER ASSY	USABLE ON CODE
5-15 -10	COML	. NUT, PLAIN, HEX., ... NO. 2-56 UNC-2B, CRES	2	
-11	387	. LAMP, INCANDESCENT, ... T-1-3/4 (72619)	64	
-12	183-9830-1473-604	. HOLDER, LAMP, AMBER . . . . . LENS (72619)	8	A
-13	T-21812734	. HOLDER, LAMP, BLACK . . . . . LENS (72619)	64	A
	T-21812734	. HOLDER, LAMP, BLACK . . . . . LENS (72619)	2	B
-14	183-9830-1471-604	. HOLDER, LAMP, RED . . . . . LENS (72619)	30	A
-15	183-9830-1475-604	. HOLDER, LAMP, WHITE. . . . . LENS (72619)	24	A
-16	PJ-608	. BLOCK, TERMINAL (70674) . . . . . (ATTACHING PARTS)	1	
-17	COML	. SCREW, MACH, PNH, ... NO. 8-32 UNC-2A X 0.44L, CRES	2	
-18	COML	. WASHER, LOCK-SPRING, ... NO. 8, CRES	2	
-19	COML	WASHER, FLAT, NO. 8, CRES	2	
-20	COML	. NUT, PLAIN, HEX., ... NO. 8-32 UNC-2B, CRES	2	
-21	8367	SPACE; 0.25 OD X 1.00L	2	
-22	T-31423734	. SUPPORT, TERMINAL BLOCK (ATTACHING PARTS)	1	
-23	COML	. NUT, PLAIN, HEX. NO. 8-32 . . . . . UNC-2B, CRES	2	
-24	COML	. WASHER, LOCK-SPRING, ... NO. 8, CRES	2	
-25	COML	. WASHER, FLAT, NO. 8, CRES	2	
-26	T-42030734	. PANEL, FRONT.	1	

NUMERICAL INDEX

PART NUMBER	FIGURE & INDEX NUMBER	SOURCE CODE	REPAIR CODE
AGC, .125A	5-9-10	P1	S
AGC, .5A	5-9-9	P1	S
AGC 1	5-4-12	P1	S
AGC 10	5-4-13	P1	S
AGC 1/4	5-4-11	P1	S
AGC 1/8	5-4-10	P1	S
AGC, 1A	5-9-12	P1	S
AGC, 2A	5-13-4	P1	S
AGC 3	5-4-14	P1	S
AGC, 3A	5-13-2	P1	S
AGC, 5A	5-9-11	P1	s
A620T	5-11-2	A	F
C426AR/G8	5-3-47	P1	S
C52693-017-024	5-6-43	P1	S
C52693-017-24	5-3-62	P1	S
	5-4-69	P1	s
GF-324	5-4-41	P1	Y
GF-326	5-4-46	P1	S
GLH, 10A	5-13-5	P1	S
HKL	5-4-16	P1	S
	5-13-6	P1	S
HKP	5-4-15	P1	S
	5-9-13	P1	S
HKR	5-13-3	P1	S
LCD-2-44	5-4-86	P1	B
LCS-A-12	5-4-88	P1	B
LCS-A-150	5-4-90	P1	B
LMCC-3-P-6-LM-OV-1	5-4-94	P1	B
LXD-3-152	5-4-92	P1	B
MR1210SLR	5-9-47	P1	S
MSP-105F/C-12BLK	5-7-8	P1	S
	5-9-16	P1	S
MTH, 6A	5-13-1	P1	S
M1-205E	5-3-44	P1	S
	5-6-38	P1	S
N-112A	5-4-23	P1	S
NO. 863	5-9-38		
NUT NO. 10-32	5-9-24	P1	S
	5-14-24	P1	S
NUT NO. 2-56	5-3-34	P1	S
	5-4-34		
	5-4-45		
	5-4-50		
	5-4-80		
	5-6-11		
	5-7-5		
	5-7-39		
	5-9-5		
	5-12-6		
	5-12-21		
	5-12-26		
	5-12-31		
	5-15-5		
	5-15-10		
NUT NO. 3/8-16	5-14-12	P1	S
NUT NO. 4-40	5-3-66	P1	S
	5-6-37		
	5-9-45		
NUT NO. 5-40	5-6-17	P1	S
NUT NO. 6-32	5-3-18	P1	S
	5-4-40		
	5-4-56		
	5-4-85		
	5-9-30		
	5-9-53		
	5-9-61		
	5-12-11		
	5-12-37		
	5-13-17		
	5-13-27		
	5-13-39		
NUT NO. 8-32	5-3 -23	P1	S
	5-3-28		
	5-6-22		
	5-7-15		
	5-7-22		
	5-7-27		
	5-7-34		
	5-7-44		
	5-9-36		
	5-9-67		
	5-9-72		
	5-13-32		
	5-14-34		
	5-14-39		
	5-14-44		
	5-14-49		
	5-15-20		
	5-15-23		
PJ-608	5-6-23	P1	S
	5-15-16		
PJ-610	5-7-14	P1	S
RESISTOR	5-3-45	P1	S

NUMERICAL INDEX (Cont)

PART NUMBER	FIGURE & INDEX NUMBER	SOURCE CODE	REPAIR CODE
RESISTOR	5-3-49	P1	S
RESISTOR	5-6-40	P1	S
RIVET SOLID .093 X 0.16	5-3-11 5-6-5		
RS10	5-4-68	P1	S
RS2B	5-4-62	P1	S
R10-E1-Z4-S30	5-9-40	P1	S
R10-E1-Z4-450	5-9-41	P1	S
SCREW NO. 1/2-13 x 1.00	5-14-8	P1	S
SCREW NO. 10-32 X 0.56	5-4-61 5-14-21	P1	S
SCREW NO. 2-56 x 0.31	5-4-42 5-4-47	P1	S
SCREW NO. 2-56 X 0.31 82° CSK	5-7-2 5-9-2 5-12-3 5-15-2 5-15-7	P1	S
SCREW NO. 2-56 X 0.38	5-3-31 5-4-31 5-4-77 5-6-9 5-7-36 5-9-43 5-12-18 5-12-23 5-12-28	P1	S
SCREW NO. 3/8-16 x 1.13	5-14-16	P1	S
SCREW NO. 4-46 X 0.50	5-3-63 5-6-34	P1	S
SCREW NO. 5-40 X 0.56	5-6-14	P1	S
SCREW NO. 6-32 X 0.25	5-4-2 5-4-91 5-4-95	P1	S
SCREW NO. 6-32 X 0.31 100° CSK	5-13-21	P1	S
SCREW NO. 6-32 X 0.38	5-3-8 5-6-3 5-12-40	P1	S
SCREW NO. 6-32 X 0.38 100° CSK	5-12-7	P1	S
SCREW NO. 6-32 X 0.44	5-3-15 5-3-36 5-4-37	P1	S
	5-9-58 5-13-36		
SCREW NO. 6-32 X 0.50	5-4-82 5-9-50	P1	S
SCREW NO. 6-32 X 0.62	5-12-34	P1	S
SCREW NO. 6-32 X 0.62 100° CSK	5-12-8	P1	S
SCREW NO. 6-32 X 0.75	5-13-9	P1	S
SCREW NO. 6-32 X 0.81	5-4-53 13-24	P1	S
SCREW NO. 6-32 X 1.00	5-9-27	P1	S
SCREW NO. 8-32 X 0.38	5-7-13 5-9-18 5-9-39 5-14-6	P1	S
SCREW NO. 8-32 X 0.44	5-3-20 5-3-25 5-3-51 5-3-53 5-4-4 5-6-19 5-6-24 5-6-48 5-6-50 5-7-19 5-7-24 5-7-41 5-14-2 5-14-4 5-14-27 5-14-29 5-15-17	P1	S
SCREW NO. 8-32 x 0.50	5-9-69	P1	S
SCREW NO. 8-32 x 0.51	5-4-87 5-4-89 5-4-93	P1	S
SCREW NO. 8-32 X 0.56	5-3-4 5-3-6 5-13-29 5-14-31 5-14-36 5-14-41 5-14-46	P1	S

NUMERICAL INDEX (Cant)

PART NUMBER	FIGURE & INDEX NUMBER	SOURCE CODE	REPAIR CODE
SCREW NO. 8-32 X 0.62	5-3-26 5-4-72	P1	S
SCREW NO. 8-32 X 0.69	5-9-33	P1	S
SCREW NO. 8-32 x 0.75	5-7-31 5-9-21 5-9-64	P1	S
SC628	5-4-24 5-7-9	P1	S
SST2	5-12-38	X2	S
ST50X	5-4-18 5-9-55 5-13-43	P1	S
T-21812734	5-15-13	X2	S
T-21814735-1	5-3-5	X2	S
T-21816734	5-14-19	X2	S
T-21817735	5-4-81	X2	S
T-21818734-1	5-14-35	X2	S
T-21818734-2	5-14-35	X2	S
T-21819734	5-14-45	X2	S
T-21820734	5-14-20	X2	X
T-21821734	5-14-7	X2	S
T-21822731	5-6-2	X2	S
T-21825735	5-3-24	X2	S
T-31421733	5-12-41	X2	S
T-31422730-1	5-12-2	U	S
T-31422730-2	5-15-6	U	S
T-31422730-3	5-15-1	U	S
T-31423734	5-15-22	X2	S
T-31425735	5-3-7	X2	S
T-31426735	5-3-35	X2	S
T-31429734	5-13-28	X2	S
T-31432735	5-4-3	X2	S
T-31434734	5-14-5	X2	S
T-31435734-1	5-14-1	X2	S
T-31435734-2	5-14-3	X2	S
T-31436734-1	5-14-40	X2	S
T-31436734-2	5-14-40	X2	S
T-31437731-1	5-7-1	X2	S
T-31437731-2	5-9-1	X2	S
T-31438731	5-9-49	X2	S
T-31439731	5-6-18	X2	S
T-31441731-1	5-7-18	X2	S
T-31441731-2	5-7-23	X2	S
T-31447735	5-3-1	X2	S
T-314487341	5-6-1	X2	S
T-31449734	5-13-40	X2	S
T-42039734	5-15-26	X2	S
T-42032734	5-13-41	X2	F
T-42033734	5-13-44	X2	S
T-42042735	5-4-25	X2	S
T-42047731	5-9-17	X2	F
T-42051731	5-7-12	X2	F
T-42054731-1	5-6-49	X2	S
T-42054731-2	5-6-47	X2	S
T-42062731	5-9-68	X2	S
T-42063731	5-9-73	X2	S
T-71814735-2	5-3-3	X2	S
TDA-21813735	5-3-14	X2	S
TDA-31427735	5-3-9	P1	S
TDA-31430730	5-4-35 5-13-7	X2	S
TDA-31431732	5-11-1	X2	S
TDA-31440731	5-9-46	X2	S
TDA-42026735	5-4-26	X2	S
TDA-42026735-2	5-4-29	X2	S
TDA-42027735-1	5-3 -50	X2	S
TDA-42027735-2	5-3-52	X2	S
TDA-42028733	5-12-42	X2	S
TDA-42034730	5-3-9 5-6-3	X2	S
TDA-42034730-2	5-3-13 5-6-7	X2	S
TDA-42035735	5-4-1	X2	S
TDA-42039734	5-14-15	X2	S
TDA-42043734-1	5-14-30	X2	S
TDA-42044735	5-4-56	X2	S
TDA-42044735-2	5-4-59	X2	S
TDA-42045735	5-4-95	X2	S
TDA-42045735-2	5-4-98	X2	S
TDA-42048731-1	5-9-54	X2	S
TDA-42052731	5-7-45	X2	S
TDA-42055735-1	5-4-73	X2	S
TDA-42055735-2	5-4-74	X2	S
TDA-50125734-1	5-14-50	X2	S
TDA-50125734-2	5-14-50	X2	S
TFA-42019733	5-10-2	X2	S
TFA-42020735	5-12- 5-2 -2	X2	S
TFA-42021734	5-4- 5-10-3	X2	
TFA-42024732	5-13- 5-10-1 5-11-	X2	F

NUMERICAL INDEX (Cont)

PART NUMBER	FIGURE & INDEX NUMBER	SOURCE CODE	REPAIR CODE
TFA-42025732	5-10-1	X2	F
	5-11-		
TFA-42029735	5-2-1	X2	F
	5-3-		
TFA-42046731	5-5-1	X2	F
	5-6-		
	5-8-1		
TFA-42049731	5-8-2	X2	F
	5-9-		
TFA-42050731	5-8-3	X2	F
TFA-42053731	5-5-2	X2	F
	5-7-		
TFA-42056731	5-5-4	X2	F
TFA-50124734-2	5-1-5	X2	F
	5-14-		
TFA-50124734-2	5-1-5	X2	F
	5-14-		
TM2S6C	5-12-39	X2	S
TM3S8C	5-7-40	P1	S
TP-AD-41285544-10	5-3-55	P1	S
TP-AD-41285544-11	5-3-56	P1	S
TP-AD-41285544-12	5-3-57	P1	S
TP-AD-41285544-13	5-3-58	P1	S
TP-AD-41285544-14	5-3-59	P1	S
TP-AD-41285544-15	5-3-60	P1	S
TP-AD-41285544-16	5-3-61	P1	S
TP-AD-41285544-18	5-6-46	P1	S
TP-AD-41285544-2	5-4-70	P1	S
TP-AD-41285544-5	5-6-44	X2	F
TP-AD-41285544-9	5-3-54	P1	S
TP-AD-41465591	5-6-31	P1	B
TP-AD-41468604	5-6-30	P1	B
TP-AD-41488569	5-4-63	P1	B
TP-AD-41492603	5-4-64	P1	B
TP-AD-41501605	5-6-29	P1	B
TP-AD-41502606	5-6-32	P1	B
TP-AD-41647640	5-4-65	P1	B
TP-AD-41685544-17	5-6-45	P1	B
TP-AD-41763701	5-3-42	P1	B
TP-AD-41764667	5-3-41	P1	B
TP-AD-41765591	5-3-40	P1	B
TP-AD-41766710	5-3-43	P1	B
TP-AD-41969711	5-4-66	P1	B
TP-AD-41972712	5-6-28	P1	B
TP-AD-41975713	5-6-33	P1	B
TP-AD-31419000	5-3-67	X2	F
	5-4-71		
	5-6-51		
TP-FA-41781669	5-3-39	P1	B
TSA-42018733	5-12-6	X2	S
TSA-42018733-2	5-12-16	X2	F
TSA-42031734-1	5-5-15	X2	F
	5-14-26		
	5-15-		
TSA-42031734-2	5-5-15	X2	F
	5-14-28		
TSA-42037734-1	5-14-11	X2	S
TSA-42037734-2	5-14-11	X2	S
TSA-42057731	5-9-38	P1	S
TSA-42064731	5-9-54	X2	S
TYPE KRP-5A	5-13-33	P1	B
TYPE KRP-5D	5-13-34	P1	B
TYPE 33 MM	5-3-48	P1	S
WASHER FL NO. 1/2	5-14-10	P1	S
WASHER FL NO. 10	5-9-23	P1	S
	5-14-23		
WASHER FL NO. 2	5-3-33	P1	S
	5-4-33		
	5-4-44		
	5-4-49		
	5-4-79		
	5-6-10		
	5-7-4		
	5-7-38		
	5-9-4		
	5-12-5		
	5-12-20		
	5-12-25		
	5-12-30		
	5-15-4		
	5-15-9		
WASHER FL NO. 3/8	5-14-4	P1	S
	5-14-8		
WASHER FL NO. 4	5-3-65	P1	S
	5-6-36		
	5-9-44		
WASHER FL NO. 5	5-6-16	P1	S
WASHER FL NO. 6	5-3-17	P1	S
	5-3-38		
	5-4-39		
	5-4-55		
	5-4-84		

NUMERICAL INDEX (Cont)

PART NUMBER	FIGURE & INDEX NUMBER	SOURCE CODE	REPAIR CODE
WASHER FL NO. 6 (cant)	5-9-29		
	5-9-52		
	5-9-60		
	5-12-19		
	5-12-36		
	5-13-16		
	5-13-26		
	5-13-38		
WASHER FL NO. 8	5-3-22	P1	S
	5-3-27		
	5-6-21		
	5-6-26		
	5-7-17		
	5-7-21		
	5-7-26		
	5-7-33		
	5-7-43		
	5-9-35		
	5-9-66		
	5-9-71		
	5-13-31		
	5-14-33		
	5-14-38		
	5-14-43		
	5-14-48		
	5-15-18		
	5-15-25		
WASHER FL 0.093	5-3-12	P1	S
	5-6-6		
WASHER LOCK NO. 1/2	5-14-9	P1	S
WASHER LOCK NO. 10	5-9-22	P1	S
	5-14-22		
WASHER LOCK NO. 2	5-3-32	P1	S
	5-4-32		
	5-4-43		
	5-4-48		
	5-4-78		
	5-6-9		
	5-7-3		
	5-7-37		
	5-9-3		
	5-12-4		
	5-12-19		
	5-12-24		
	5-12-29		
	5-15-3		
	5-15-8		
WASHER LOCK NO. 3/8	5-14-13	P1	S
	5-14-17		
WASHER LOCK NO. 4	5-3-64	P1	S
	5-6-35		
WASHER LOCK NO. 5	5-6-15	P1	S
WASHER LOCK NO. 6	5-3-16	P1	S
	5-3-37		
	5-4-38		
	5-4-54		
	5-4-83		
	5-9-28		
	5-9-51		
	5-9-59		
	5-12-9		
	5-12-35		
	5-13-15		
	5-13-25		
	5-13-37		
WASHER LOCK NO. 8	5-3-21	P1	S
	5-3-26		
	5-6-20		
	5-6-25		
	5-7-16		
	5-7-20		
	5-7-25		
	5-7-32		
	5-7-42		
	5-9-34		
	5-9-65		
	5-9-70		
	5-13-30		
	5-14-32		
	5-14-37		
	5-14-41		
	5-14-47		
	5-15-19		
	5-15-24		
1N5227A	5-6-42	P1	S
1N914	5-6-39	P1	S
	5-9-37		
	5-3 -46		
11-20005-115	5-12-15	P1	S
12-20000-BLK	5-12-12	P1	S
12-20000-GRN	5-12-13	P1	S
12-20000-WHT	5-12-14	P1	S

NUMERICAL INDEX (Cont)

PART NUMBER	FIGURE & INDEX NUMBER	SOURCE CODE	REPAIR CODE
122-37-2000	5-7-28		
	5-14-25		
122-37-3000	5-3-29	P1	S
130-1630	5-3-19	P1	S
1491	5-9-48	X2	S
1513	5-6-41	X2	S
160-2	5-9-57	X2	S
1719	5-13-18	X2	S
183-3830-1471-604	5-15 -14	P1	S
183-9830-1472-604	5-4-6	P1	S
	5-9-7		
183-9830-1473-604	5-4-7	P1	S
	5-7-7		
	5-9-8		
	5-15 -12		
183-9830-1475-604	5-15-15	P1	S
2111-1-02	5-4-60	P1	S
30-1	5-4-8	P1	S
30946	5-13-19	P1	S
32142	5-4-67	P1	S
33211	5-9-42	P1	S
353-18-02-001	5-12-33	P1	S
353-18-05-001	5-6-13	P1	S
353-18-10-001	5-4-52	P1	S
354-18-04-001	5-7-30		
355-18-06-001	5-9-63		
355-18-12-001	5-9-20	P1	S
	5-9-32		
355-18-17-001	5-13-23	P1	S
356-18-04-001	5-9-26	P1	S
363-12-02-010	5-12 -32	P1	S
363-12-10-010	5-4-51	P1	S
364-12-04-010	5-7-29	P1	
364-12-12-010	5-9-31	P1	S
365-12-06-010	5-9-62	P1	
365-12 -12 -010	5-9-19	P1	S
365-12-17-010	5-13-22	P1	S
3650-2	5-13-20	P1	S
366-12-03-013	5-9-25	P1	S
382	5-4-5	P1	S
	5-9-6		
387	5-7-6	P1	S
	5-15-11		
418-0096-165	5-21-1	P1	S
4242-127-0	5-4-21	P1	S
	5-7-10		
	5-9-14		
4242-127-2	5-4-19	P1	S
4242-127-5	5-4-22	P1	S
4242-127-9	5-4-20	P1	S
	5-9-15		
508	5-4-17	P1	S
	5-9-56		
	5-13-42		
5678-09	5-3-10	P1	S
	5-6-4		
57-30240	5-4-75	P1	S
57-40140	5-12-22	P1	S
57-40240	5-3-30	P1	S
	5-4-30		
	5-4-76		
	5-6-8		
	5-7-35		
	5-12-27		
57-40500	5-12-17	P1	S
7-3-2G	5-3-2	P1	S
7468-G	5-4-36	P1	S
	5-13-8		
77M1P8	5-13-35	P1	S
82-19-220-16	5-4-27	P1	S
	5-4-57		
	5-4-96		
82-32-101-17	5-4-28	P1	S
	5-4-58		
	5-4-97		
8367	5-6-27	P1	S
	5-15-21		

CHAPTER 6

CIRCUIT DIAGRAMS

6-1. INTRODUCTION.

6-2. This chapter contains the circuit diagrams required to support ACAS Remote Station and Master Station maintenance personnel in the performance of troubleshooting, testing, and maintenance procedures. The types of diagrams provided are wire and cable lists, functional block diagrams, schematic diagrams, and cabling diagrams. The order of presentation of the diagrams, their relationship to each other, and their contents are described in the following paragraphs.

6-3. ARRANGEMENT OF DIAGRAMS.

6-4. The circuit diagrams are arranged in the following order:

a. Remote Station wire lists

b. Master Station wire lists

c. Master Station cable lists (there are no cable lists for the Remote Station)

d. ACAS overall block diagram

e. Remote Station simplified block diagram

f. Master Station simplified block diagram

g. Remote Station functional block diagram

h. Remote Station schematic diagrams

i. Master Station functional block diagram

j. Master Station schematic diagrams

k. Remote Station cabling diagram

1. Master Station cabling diagram

6-5. WIRE LISTS. The wire lists show point-to-point wiring connections between printed circuit boards, power supply modules, and panel-mounted components within a major subassembly. These lists give the location of origin and destination points for the internal subassembly wiring and identify components such as resistors, capacitors, and diodes which may be connected in the signal path. The function of the signal carried by each wire is also identified.

6-6. CABLE LISTS. The cable lists provided for the Master Station equipment show point-to-point wiring connections through inter-rack cables and wiring harnesses. These lists identify or describe each cable and wiring harness, specify the origin and destination points of individual wires, and identify signals carried by each wire. The cable lists are provided in support of the Master Station cabling diagram presented at the rear of this manual.

6-7. FUNCTIONAL BLOCK DIAGRAMS. Two functional block diagrams are provided: one for the Remote Station and one for the Master Station terminal equipment. These diagrams show the interconnection of circuits with respect to major signal flow. Each functional block diagram is followed by schematic diagrams for the individual circuits.

6-8. SCHEMATIC DIAGRAMS. A schematic diagram is provided for each printed circuit board and power supply module used in the Remote Station equipment and Master Station terminal equipment. These diagrams are arranged in the order of functional signal flow and illustrate the circuit details shown on the associated functional block diagram. Circuit details are shown either in logic or electrical schematic form. The schematic diagrams also identify the origin of all input signals, the destination of output signals, and the function of each signal. Specific point-to-point connections of input and output signals are given in the subassembly wire lists previously described.

6-9. CABLING DIAGRAMS. The cabling diagrams illustrate the inter-rack cables and wiring harnesses and show the physical

location of their connection points. For the Master Station cabling diagram, specific point-to-point connections of individual wires are given in the associated cable lists previously described. The cabling diagrams also show all interface connections to other facilities via the station intermediate distributing frames (IDF).

6-10. ABBREVIATIONS.

6-11. All abbreviations used on the circuit diagrams are standard abbreviations.

6-12. SPECIAL SYMBOLS.

6-13. Special symbols are defined on the partitular circuit diagrams on which they appear.

FROM		CABLE/WIRES	TO		FUNCTION
LOCATION	TERMINAL		LOCATION	TERMINAL	
		NOTE ALL REFERENCE DESIGNATIONS ARE PREFIXED BY Al.			
		POWER INPUTS			
J1	11-14		J2	22	+3.6V (4 WIRES)
	8			1	+12V
	7			2	-12V
	1-4			A	GND (4 WIRES)
		POWER BUSSING			
J2	A		53-522	A/1	GND
J2	Z/22		53-522	Z/22	+3.6V
		SIGNAL BUSSING			
J63	B		J7	2	CHARACTER ADVANCE
J7	B		J8	2	CHARACTERADVANCE
J8	B		J9	2	CHARACTER ADVANCE
J9	B		J10	2	CHARACTERADVANCE
J2	C		J4-J10	C/3	END OF SCAN
J11	C/3		J12-J14	C/3	TEST IN
J2	D		J4-J10	D/4	DATA BUS
J15	D/4		J16-J22	D/4	OFF TEST INPUT
J6	M/11		J7-J10	M/11	INPUT 7
J2	P		J4-J10	P/13	CHARACTERCLOCK
J2	S		J3	15	BIT 7
J3	S		J4-J10	S/15	BIT 7
J2	T		J3	16	BIT 6
J3	T		J4-J10	T/16	BIT 6
J2	U		J3	17	BIT 5
J3	U		J4-J10	U/17	BIT 5
J2	V		J3	18	BIT 4
J3	V		J4-J10	V/18	BIT 4
J2	W		J3	19	BIT 3
J3	W		J4-J10	W/19	BIT 3
J2	X		J3	20	BIT 2
J3	X		J4-J10	X/20	BIT 2
J2	Y		J3	21	BIT 1
J3	Y		J4-J10	Y/21	BIT 1
J11	X/20		J12-J14	X/20	INPUT ENABLE
J15	Y/21		J16-J22	Y/21	ON TEST INPUT
J4	12		J4	N	CHARACTER ADVANCE
J6	12		J6	N	CHARACTER ADVANCE
J7	12		J7	N	CHARACTER ADVANCE
J8	12		J8	N	CHARACTER ADVANCE

Figure 6-1. RSE Encoder Subassembly A1, Wire List (Sheet 1 of 10)

FROM			TO		
LOCATION	TERMINAL	CABLE/WIRES	LOCATION	TERMINAL	FUNCTION
		SIGNAL BUSSING (Cork)			
J9	12		J9	N	CHARACTER ADVANCE
J10	12		J10	N	CHARACTER ADVANCE
		SIGNAL GROUND BUSSING			
TB1	B1		TB1	B2-B26	
	D1			D2-D26	
	F1			F2-F26	
	H1			H2-H26	
	J1			J2-J26	
	B26			D26/F26/ H26/J26	
TB2	B1		TB2	B2-B26	
	D1			D2-D26	
	F1			F2-F26	
	H1			H2-H26	
	J1			J2-J26	
	B26			D26/F26/ H26/J26	
		INTERCONNECT WIRING			
J2	1	(VIA 2UF CAP. C4)	J2	A	GND
	2	(VIA 2UF CAP. C3)	J2	A	GND
	11	(VIA 1N914 DIODE)	J2	C	(ANODE CONNECTED AT J2-11)
	7	(VIA 1K, 1/2W, ±10%) RES)	J3	3	TRANSMISSION MONITOR
J3	4	(VIA 8UF CAP. C2)	J3	1	40V, + CONNECTED AT 53-4
	4		J3	3	
J2	L		J2	R	PARITY
	M	(VIA 0.1 UF CAP. C1)	J2	A	CAL
J3	2		J3	F	
J4	6		J4	1	FAC TEST #1 - GND
	8			6	FAC TEST #1 - GND
	10			8	FAC TEST #1 - GND
	E			A	FAC TEST #2 - GND
	H			E	FAC TEST #2 - GND
	K			II	FAC TEST #2 - GND
	M			Ii	FAC TEST #2 - GND
	2	(VIA 4.7K, 1/2W, ±10% RES)		22	+3.6V
J5	5		J5	1	NORMAL SOM - GND
	8			5	NORMAL SOM - GND
	2	(VIA 4.7K, 1/2W, ±10% RES)		22	-3.6V

Figure 6-1. RSE Encoder Subassembly A1, Wire List (Sheet 2 of 10)

FROM		CABLE/WIRES	TO		FUNCTION
LOCATION	TERMINAL		LOCATION	TERMINAL	
		INTERCONNECT WIRING (Cont)			
J5	12	(VIA 4.7K, 1/2W, ±10% RES)	J5	Z	+3.6V
	F			A	TEST SOM - GND
	H			F	TEST SOM - GND
	K			H	TEST SOM - GND
	L			K	TEST SOM - GND
J6	2	(VIA 4.7K, 1/2W, ±10% RES R5)	J6	22	+3.6V
	11			1	INPUT 7 - GND
J7	2	(VIA 4.7K, 1/2W, ±10% RES R6)	J7	22	+3.6V
J8	2	(VIA 4.7K, 1/2W, ±10% RES R7)	J8	22	+3.6V
J9	2	(VIA 4.7K, 1/2W, ±10% RES R8)	J9	22	+3.6V
J10	2	(VIA 4.7K, 1/2W, ±10% RES R9)	J10	22	+3.6V

				CHAR.	BIT	NAME
J6	5		J15	C	1	1	MFX
	6		J16	C	1	2	TAN
	7		J17	C	1	3	MFR
	8		J18	C	1	4	MFT
	9		J19	C	1	5	DPT
	10		J20	C	1	6	DPR
	E		J21	C	2	1	TCR
	F		J22	C	2	2	RSJ
	H		J11	D	2	3	ATOP
	J			E	2	4	LLC-A
	K			F	2	5	LLC-B
	L			H	2	6	LLC-C
J7	5			J	3	1	RSJ
	6			K	3	2	MFX
	7			L	3	3	TCR
	8			M	3	4	MKR-A
	9			N	3	5	MKR-B
	10			P	3	6	LOG-A
	E			R	4	1	LOG-B
	F			S	4	2	LOG-C
	H			T	4	3	MEM-X
	J			U	4	4	MEM-Y
	K			V	4	5	CLK
	L			W	4	6	CMP
J8	5		J12	D	5	1	PMB-1
	6			E	5	2	VG-1
	7			F	5	3	SG-1
	8			H	5	4	PMB-2

Figure 6-1. RSE Encoder Subassembly A1, Wire List (Sheet 3 of 10)

FROM		CABLE/WIRES	TO		FUNCTION		
LOCATION	TERMINAL		LOCATION	TERMINAL			
			INTERCONNECT WIRING (Cont)				
					CHAR.	BIT	NAME
J8	9		J12	J	5	5	VG-2
	10			K	5	6	SG-2
	E			L	6	1	PMB-3
	F			M	6	2	VG-3
	H			N	6	3	SG-3
	J			P	6	4	PMB-4
	K			R	6	5	VG-4
	L			S	6	6	SG-4
J9	5		J13	D	7	1	PMB-5
	6			E	7	2	VG-5
	7			F	7	3	SG-5
	8			H	7	4	PMB-6
	9			J	7	5	VG-6
	10			K	7	6	SG-6
	E			L	8	1	PMB-7
	F			M	8	2	VG-7
	H			N	8	3	SG-7
	J			P	8	4	PMB-8
	K			R	8	5	VG-8
	L			S	8	6	SG-8
J10	5		J14	D	9	1	PMB-9
	6			E	9	2	VG-9
	7			F	9	3	SG-9
	8			H	9	4	PMB-10
	9			J	9	5	VG-10
	10			K	9	6	SG-10
	E			L	10	1	PMB-11
	F			M	10	2	VG-11
	H			N	10	3	SG-11
	J			P	10	4	PMB-12
	K			R	10	5	VG-12
	L			S	10	6	SG-12
J14	C		J15	21	ON TEST INPUT		
			INPUT SIGNAL CONNECTIONS				
J2	3		J1	10	POLAR SIGS		
TB1	A1		J15	H	MFX-1		
	A2			7	MFX-2		
	A3			8	MFX-3		
	A4			J	MFX-4		
	A5			F	MFX-5		
	A6			6	MFX-6		
	A7			E	MFX-7		
	A8			5	MFX-8		
	A9			M	MFX-9		

Figure 6-1. RSE Encoder Subassembly A1, Wire List (Sheet 4 of 10)

FROM		CABLE/WIRES	TO		FUNCTION
LOCATION	TERMINAL		LOCATION	TERMINAL	
		INPUT SIGNAL CONNECTIONS (Cont)			
TB1	A10		J15	11	MFX-10
	A11			N	MFX-11
	A12			12	MFX-12
	A13			L	MFX-13
	A14			10	MFX-14
	A15			K	MFX-15
	A16			9	MFX-16
	A17			S	MFX-17
	A18			15	MFX-18
	A19			T	MFX-19
	A20			16	MFX-20
	A21			R	MFX-21
	A22			14	MFX-22
	A23			P	MFX-23
	A24			13	MFX-24
	C1		J16	H	TAN-1
	C2			7	TAN-2
	C3			8	TAN-3
	C4			J	TAN-4
	C5			F	TAN-5
	C6			6	TAN-6
	C7			E	TAN-7
	C8			5	TAN-8
	C9			M	TAN-9
	C10			11	TAN-10
	C11			N	TAN-11
	C12			12	TAN-12
	C13			L	TAN-13
	C14			10	TAN-14
	C15			K	TAN-15
	C16			9	TAN-16
	C17			S	TAN-17
	C18			15	TAN-18
	C19			T	TAN-19
	C20			16	TAN-20
	C21			R	TAN-21
	C22			14	TAN-22
	C23			P	TAN-23
	C24			13	TAN-24
	E1		J17	H	MFR-1
	E2			7	MFR-2
	E3			8	MFR-3
	E4			J	MFR-4
	E5			F	MFR-5
	E6			6	MFR-6
	E7			E	MFR-7

Figure 6-1. RSE Encoder Subassembly A1, Wire List (Sheet 5 of 10)

FROM		CABLE/WIRES	TO		FUNCTION
LOCATION	TERMINAL		LOCATION	TERMINAL	
		INPUT SIGNAL CONNECTIONS (Cont)			
TB1	E8		J17	5	MFR-8
	E9			M	MFR-9
	E10			11	MFR-10
	E11			N	MFR-11
	E12			12	MFR-12
	E13			L	MFR-13
	E14			10	MFR-14
	E15			K	MFR-15
	E16			9	MFR-16
	E17			S	MFR-17
	E18			15	MFR-18
	E19			T	MFR-19
	E20			16	MFR-20
	E21			R	MFR-21
	E22			14	MFR-22
	E23			P	MFR-23
	E24			13	MFR-24
	G1		J18	H	MFT-1
	G2			7	MFT-2
	G3			8	MFT-3
	G4			J	MFT-4
	G5			F	MFT-5
	G6			6	MFT-6
	G7			E	MFT-7
	G8			5	MFT-8
	G9			M	MFT-9
	G10			11	MFT-10
	G11			N	MFT-11
	G12			12	MFT-12
	G13			L	MFT-13
	G14			10	MFT-14
	G15			K	MFT-15
	G16			9	MFT-16
	G17			S	MFT-17
	G18			15	MFT-18
	G19			T	MFT-19
	G20			16	MFT-20
	G21			R	MFT-21
	G22			14	MFT-22
	G23			P	MFT-23
	G24			13	MFT-24
	I1		J19	H	DPT-1
	I2			7	DPT-2
	I3			8	DPT-3
	I4			J	DPT-4
	I5			F	DPT-5

Figure 6-1. RSE Encoder Subassembly A1, Wire List (Sheet 6 of 10)

FROM		CABLE/WIRES	TO		FUNCTION
LOCATION	TERMINAL		LOCATION	TERMINAL	
		INPUT SIGNAL CONNECTIONS (Cont)			
TB1	I6		J19	6	DPT-6
	I7			E	DPT-7
	I8			5	DPT-8
	I9			M	DPT-9
	I10			11	DPT-10
	I11			N	DPT-11
	I12			12	DPT-12
	I13			L	DPT-13
	I14			10	DPT-14
	I15			K	DPT-15
	I16			9	DPT-16
	I17			S	DPT-17
	I18			15	DPT-18
	I19			T	DPT-19
	I20			16	DPT-20
	I21			R	DPT-21
	I22			14	DPT-22
	I23			P	DPT-23
	I24			13	DPT-24
	J1		J2	A	SIGNAL GND
TB2	A1		J20	H	DPR-1
	A2			7	DPR-2
	A3			8	DPR-3
	A4			J	DPR-4
	A5			F	DPR-5
	A6			6	DPR-6
	A7			E	DPR-7
	A8			5	DPR-8
	A9			M	DPR-9
	A10			11	DPR-10
	A11			N	DPR-11
	A12			12	DPR-12
	A13			L	DPR-13
	A14			10	DPR-14
	A15			K	DPR-15
	A16			9	DPR-16
	A17			S	DPR-17
	A18			15	DPR-18
	A19			T	DPR-19
	A20			16	DPR-20
	A21			R	DPR-21
	A22			14	DPR-22
	A23			P	DPR-23
	A24			13	DPR-24
	C1		J21	H	TCR-1
	C2			7	TCR-2

Figure 6-1. RSE Encoder Subassembly A1, Wire List (Sheet 7 of 10)

FROM		CABLE/WIRES	TO		FUNCTION
LOCATION	TERMINAL		LOCATION	TERMINAL	
		INPUT SIGNAL CONNECTIONS (Cont)			
TB2	C3		J21	8	TCR-3
	C4			J	TCR-4
	C5			F	TCR-5
	C6			6	TCR-6
	C7			E	TCR-7
	C8			5	TCR-8
	C9			M	TCR-9
	C10			11	TCR-10
	C11			N	TCR-11
	C12			12	TCR-12
	C13			L	TCR-13
	C14			10	TCR-14
	C15			K	TCR-15
	C16			9	TCR-16
	C17			S	TCR-17
	C18			15	TCR-18
	C19			T	TCR-19
	C20			16	TCR-20
	C21			R	TCR-21
	C22			14	TCR-22
	C23			P	TCR-23
	C24			13	TCR-24
	E1		J22	H	RSJ-1
	E2			7	RSJ-2
	E3			8	RSJ-3
	E4			J	RSJ-4
	E5			F	RSJ-5
	E6			6	RSJ-6
	E7			E	RSJ-7
	E8			5	RSJ-8
	E9			M	RSJ-9
	E10			11	RSJ-10
	E11			N	RSJ-11
	E12			12	RSJ-12
	E13			L	RSJ-13
	E14			10	RSJ-14
	E15			K	RSJ-15
	E16			9	RSJ-16
	E17			S	RSJ-17
	E18			15	RSJ-18
	E19			T	RSJ-19
	E20			16	RSJ-20
	E21			R	RSJ-21
	E22			14	RSJ-22
	E23			P	RSJ-23
	E24			13	RSJ-24

Figure 6-1. RSE Encoder Subassembly A1, Wire List (Sheet 8 of 10)

FROM		CABLE/WIRES	TO		FUNCTION
LOCATION	TERMINAL		LOCATION	TERMINAL	
		INPUT SIGNAL CONNECTIONS (Cont)			
TB2	G1		J11	4	ATOP
	G2			5	LLC-A
	G3			6	LLC-B
	G4			7	LLC-C
	G5			8	RSJ
	G6			9	MFX
	G7			10	TCR
	G8			11	MKR-A
	G9			12	MKR-B
	G10			13	LOG-A
	G11			14	LOG-B
	G12			15	LOG-C
	G13			16	MEM-X
	G14			17	MEM-Y
	G15			18	CLK
	G16			19	CMP
	G17		J12	4	PMB-1
	G18			5	VG-1
	G19			6	SG-1
	G20			7	PMB-2
	G21			8	VG-2
	G22			9	SG-2
	G23			10	PMB-3
	G24			11	VG-3
	G25			12	SG-3
	G26			13	PMB-4
	I1			14	VG-4
	I2			15	SG-4
	I3		J13	4	PMB-5
	I4			5	VG-5
	I5			6	SG-5
	I6			7	PMB-6
	I7			8	VG-6
	I8			9	SG-6
	I9			10	PMB-7
	I10			11	VG-7
	I11			12	SG-7
	I12			13	PMB-8
	I13			14	VG-8
	I14			15	SG-8
	I15		J14	4	PMB-9
	I16			5	VG-9
	I17			6	SG-9
	I18			7	PMB-10
	I19			8	VG-10
	I20			9	SG-10

Figure 6-1. RSE Encoder Subassembly A1, Wire List (Sheet 9 of 10)

FROM		CABLE/WIRES	TO		FUNCTION
LOCATION	TERMINAL		LOCATION	TERMINAL	
		INPUT SIGNAL CONNECTIONS (Cont)			
TB2	I21		J14	10	PMB-11
	I22			11	VG-11
	I23			12	SG-11
	I24			13	PMB-12
	I25			14	VG-12
	I26			15	SG-12
	J1		J2	A	SIGNAL GND
		MODE SWITCH CONNECTIONS			
S1A	POS 1		S1B	POS 1	GND
S1B	POS 1		S1B	POS 3	GND
S1B	POS 1		S1C	POS 1	GND
S1C	[illegible]		S1C	POS 2	GND
S1C	POS 1		S1F	WIPER	GND
S1F	WIPER		S1H	POS 2	GND
S1H	POS 2			POS 3	GND
	POS 3			POS 4	GND
	POS 4			POS 5	GND
	POS 5			POS 6	GND
S1A	POS 2		S1A	POS 3	+3.6V
S1A	POS 2		S1B	POS 2	+3.6V
S1B	POS 2		S1C	POS 3	+3.6V
S1D	POS 2		S1D	POS 3	
S1F	POS 2		S1E	POS 3	
S1A	WIPER		J14	X	INPUT ENABLE
	POS 1		J2	A	GND
	POS 2		J2	Z	+3.6V
S1B	WIPER		J14	C/3	TEST IN
S1C	WIPER		J15	D/4	OFF TEST INPUT
S1D	WIPER		J2	B	CHARACTER ADVANCE
	POS 1		J5	2	CHARACTER ADVANCE
	POS 2		J5	12	CHARACTER ADVANCE
	POS 4		J4	2	CHARACTER ADVANCE
S1E	WIPER		J6	2	CHARACTER ADVANCE
	POS 1		J5	N	CHARACTER ADVANCE
	POS 2		J5	B	CHARACTER ADVANCE
S1F	POS 4		J2	J	DISABLE PAUSE
	POS 5			M	CAL
	POS 6			4	FORCE MARK
S1G	WIPER		J3	8	TRANS MONITOR
S1G	POS 4		J2	H	EXT START
S1H	WIPER		J1	5	TEST

Figure 6-1. RSE Encoder Subassembly A1, Wire List (Sheet 10 of 10)

FROM		CABLE/WIRES	TO		FUNCTION
LOCATION	TERMINAL		LOCATION	TERMINAL	
			NOTE		
			ALL REFERENCE DESIGNATIONS ARE PREFIXED BY A2.		
			COMPONENT SHELF WIRING (POWER SUPPLY MODULES)		
A1A5	2		A1A4	2	120 VAC - NEUT
A1A4	2		A1A1	2	120 VAC - NEUT
A1A1	2		A1A3	2	120 VAC - NEUT
A1A3	2		A1A2	2	120 VAC - NEUT
A1J2	22		A1A5	2	120 VAC - NEUT
	17		CHASSIS GND LUG		
	24		A1A3	1	120 VAC - FUSED
	20		A1A5	1	120 VAC - FUSED
A1A5	1		A1A4	1	120 VAC - FUSED
A1A4	1		A1A1	1	120 VAC - FUSED
A1A1	1		A1A2	1	120 VAC - FUSED
A1J2	1		A1A5	4	DC GND
	2			4	DC GND
	13			4	DC GND
	4		A1A1	6	+130V
	6		A1A2	6	+60V
	8		A1A3	12	-60V
	10		A1A3	6	+12V ALARM
	12		A1A4	7	+12V
	18		A1A4	5	-12V
	14		A1A5	6	+3.6V
	15			6	+3.6V
	16			6	+3.6V
A1A1	4		A1A3	4	DC GND
A1A2	4		A1A2	14	DC GND
A1A3	4		A1A2	4	DC GND
A1A4	6		A1A1	4	DC GND
A1A5	4		A1A4	6	DC GND
LM-OV	BLK		A1A5	4	
LM-OV	RED		A1A5	6	
			FRONT PANEL INTERCONNECT WIRING		
TP2	-		F3	SLEEVE	+130V
TP3	-		F4	SLEEVE	+60V
TP4	-		F5	SLEEVE	-60V
TP5	-		F6	SLEEVE	+12V ALARM
TP6	-		DS7	SLEEVE	GND
TP7	-		F7	SLEEVE	+12V
TP8	-		F8	SLEEVE	-12V
TP9	-		F9	SLEEVE	+3.6V

Figure 6-2. RSE Power Supply Subassembly A2, Wire List (Sheet 1 of 4)

FROM		CABLE/WIRES	TO		FUNCTION
LOCATION	TERMINAL		LOCATION	TERMINAL	
		FRONT PANEL INTERCONNECT WIRING (Cont)			
F6	SLEEVE		DS1	POS	+12V ALARM
F6	SLEEVE		DS3	TIP	+12V ALARM
DS2	TIP		DS3	TIP	+12V ALARM
DS2	TIP		DS7	TIP	+12V ALARM
DS4	TIP		DS3	TIP	+12V ALARM
DS4	TIP		DS5	TIP	+12V ALARM
DS5	TIP		DS6	TIP	+12V ALARM
S3	2		TP6	–	GND
DS7	SLEEVE		S4	2	GND
J7	SLEEVE		J7	SHUNT	LOOP TEST
F1	TIP		F2	TIP	120 VAC
TB2	10		TB1	5/7/9	GND
TB1	2	(VIA 60Ω, 3W, ±1% RES R1)	TB1	5	
	6		S2B	EXT	EXT -60V
	8		S2A	EXT	EXT +60V
	10		S1	EXT	EXT +130V
		CARD FILE INTERCONNECT WIRING			
A2J3	1		A2J4	1	
	1		A2J5	A/1	
	1		A2J6	1	
	4		A2J5	16	+130V
	9		A2J4	9	POLAR SIGS
	10			10	-12V
	12			12	+12V
A2J4	5		A2J5	X	-60V
	10			20	-12V
	12			18	+12V
	20			17	+60V
	3		A2J6	16	
A2J3	2		A2J6	4	
A2J5	Z		A2J5	22	+12V ALARM
A2J6	18	(VIA 0.27UF, 200V, ±5% CAP. C1)	A2J6	1	
A2J6	18	(VIA 200 , 10W RES R2)	A2J4	A	
		GENERAL WIRING			
P2	17		CHASSIS GND LUG		
	1		TB2	10	GND
	2			10	GND
	13			10	GND

Figure 6-2. RSE Power Supply Subassembly A2, Wire List (Sheet 2 of 4)

FROM		CABLE/WIRES	TO		FUNCTION
LOCATION	TERMINAL		LOCATION	TERMINAL	
		GENERAL WIRING (Cont)			
P2	4		S1	INT	+130V
	6		S2A	INT	+60V
	8		S2B	INT	-60V
	10		F6	TIP	+12V ALARM
	12		F7	TIP	+12V
	14		F9	TIP	+3.6V
	15		F9	TIP	+3.6V
	16		F9	TIP	+3.6V
	20		F2	SLEEVE	120 VAC - FUSED
	24		F1	SLEEVE	120 VAC - FUSED
J8	1		TB2	10	GND
	2			10	GND
	3			10	GND
	4			10	GND
	5		A2J5	11	TEST (TO MODE SW)
	7		F8	SLEEVE	-12V
	8		F7	SLEEVE	+12V
	10		A2J3	9	POLAR SIGS
	11		F9	SLEEVE	+3.6V
	12			SLEEVE	+3.6V
	13			SLEEVE	+3.6V
	14			SLEEVE	+3.6V
TB1	1		J7	SLEEVE	LOOP +
	2		A2J5	10	LOOP -
A2J5	10		TP1		SIGS
	19		TP9		+3.6V
TB2	1		A2J5	4	AC ALARM
	2			6	DC ALARM
	3			14	TEST ALARM
	4			13	OPEN LOOP ALARM
	5			2	NO TRANSITION ALARM
	6			7	LAMP TEST
	7			Y	AUDIO RELEASE
	8			21	AUDIBLE ALARM
	9			22	+12V ALARM
S5	COM		J7	TIP	LOOP SWITCH
	NEUT		A2J6	6	LOOP SWITCH
	POLAR		A2J4	A	LOOP SWITCH
S1	COM		F3	TIP	+130V
S2A	COM		F4	TIP	+60V
S2B	COM		F5	TIP	-60V
F3	SLEEVE		A2J3	4	+130V
F4	SLEEVE		A2J4	20	+60V
F5	SLEEVE		A2J4	5	-60V
F6	SLEEVE		A2J5	22	+12V ALARM
DS1	NEG		A2J5	21	AUDIBLE ALARM

Figure 6-2. RSE Power Supply Subassembly A2, Wire List (Sheet 3 of 4)

FROM		CABLE/WIRES	TO		FUNCTION
LOCATION	TERMINAL		LOCATION	TERMINAL	
		GENERAL WIRING (Cont)			
S3	1		A2J5	Y	AUDIO RELEASE
S4	1			7	LAMP TEST
DS2	SLEEVE			4	AC ALARM
DS3	SLEEVE			6	DC ALARM
DS4	SLEEVE			14	TEST ALARM
DS5	SLEEVE			13	OPEN LOOP ALARM
DS6	SLEEVE			2	NO TRANSITION ALARM
P2	18		F8	TIP	-12V
TP6	–		A2J5	A	GND
TB1	5		S3	2	GND
A2J5	18		TP7	–	+12V
A2J5	20		TP8	–	-12V
J1	WIDE		S6A	1	120 VAC - NEUT
J1	NARROW		S6B	1	120 VAC
S6A	2		P2	22	120 VAC - NEUT
S6B	2		F1	TIP	120 VAC

Figure 6-2. RSE Power Supply Subassembly A2, Wire List (Sheet 4 of 4)

FROM		CABLE/WIRES	TO		FUNCTION
LOCATION	TERMINAL		LOCATION	TERMINAL	
		NOTE ALL REFERENCE DESIGNATIONS ARE PREFIXED BY ONE OF THE FOLLOWING, AS APPLICABLE: 1A1, 1A2, 1A3, 1A4, 1A5, 2A1, 2A2, 2A3, 2A4, 2A5.			
		POWER INPUTS			
TB3	–		J2	A/1	GND
	–			Z/22	+12V ALARM
	–		J3	Z/22	+3.6V
	–			12	+12V
	–			C	-12V
		POWER BUSSING			
J16	22		J16	Z	+12V ALARM
J2	A/1		J3-J23	A/1	GND
J3	Z/22		J4-J15, J17-J23	Z/22	+3.6V
		SIGNAL BUSSING			
J6	B/2		J7-J15	B/2	UPDATE INHIBIT
	C/3			C/3	END OF SCAN
	D			4	SHIFT OUT
	E/5			E/5	SHIFT CLOCK
J5	R		J6-J15	R/14	BIT 1
	S			S/15	BIT 2
	T			T/16	BIT 3
	U			U/17	BIT 4
	V			V/18	BIT 5
	W			W/19	BIT 6
J16	H		J17-J23	H	FLASHING SIG
	11			11	DISPLAY LAMP TEST
	9			9	FLASH RELEASE
J6	M		J7-J15	M	DISPLAY INHIBIT
		INTERCONNECT WIRING			
J4	10	(VIA 620Ω, 1/2W RES)	J4	22	+3.6V
	11	(VIA 620Ω, 1/2W RES)		22	+3.6V
	12	(VIA 620Ω, 1/2W RES)		22	+3.6V
	13	(VIA 620Ω, 1/2W RES)		22	+3.6V

Figure 6-3. MSTE Decoder Subassembly 1A1 - 1A5, 2A1 - 2A5, Wire List (Sheet 1 of 7)

FROM		CABLE/WIRES	TO		FUNCTION
LOCATION	TERMINAL		LOCATION	TERMINAL	
		INTERCONNECT WIRING (Cont)			
J2	D		J4	10	NORMAL SOM
	E			11	TEST SOM NO. 1
	11			12	TEST SOM NO. 2
	9			13	TEST SOM NO. 3
	10		J16	H	FLASHING SIG
	F		J5	K	UPDATE INHIBIT
	H		J3	P	PARITY
	J		J6	3	END OF SCAN
	M		J16	N	PARITY ERR ALARM
	N		J3	2	SIGS
	P		J16	K	UNREL DATA ALARM
	V		J3	20	NO TRANSITION
	C			22	+3.6V
	Y			C	-12V
	L			12	+12V
	K		J5	11	SCAN START
J3	D		J4	5	SIGS
	18			7	BIT CLOCK
	Y			R	STROBE
	H		J5	J	END OF CHAR
J4	10			5	NORMAL SOM
	11			6	TEST SOM NO. 1
	14			14	BIT 1
	15			15	BIT 2
	16			16	BIT 3
	17			17	BIT 4
	V			18	BIT 5
	W			19	BIT 6
J5	7			L	SCAN START
	9		J6	5	SHIFT CLOCK
	10			2	UPDATE INHIBIT
	11			4	SCAN START
J6	M			A	DISPLAY INHIB GND
J2	4	(VIA 1N914 DIODE)	J2	12	(ANODE CONNECTED AT J2-4)
	12			22	+12V ALARM
J3	12	(VIA 2UF CAP. C1)	J3	1	GND (#32029)
	C	(VIA 2UF CAP. C2)	J3	1	GND (#32029)
J4	8		J4	1	GND
				CHAR.	BIT NAME
J6	13		J16	L	1 1 MFX
	12			J	1 2 TAN
	11			P	1 3 MFR

Figure 6-3. MSTE Decoder Subassembly 1A1 - 1A5, 2A1 - 2A5, Wire List (Sheet 2 of 7)

FROM		CABLE/WIRES	TO		FUNCTION		
LOCATION	TERMINAL		LOCATION	TERMINAL			
			INTERCONNECT WIRING (Cont)				
					CHAR.	BIT	NAME
J6	10		J16	S	1	4	MFT
	9			R	1	5	DPT
	8			M	1	6	DPR
J7	13		J17	K	2	1	TCR
	12			N	2	2	RSJ
	11			L	2	3	ATOP
	10			J	2	4	LLC-A
	9			P	2	5	LLC-B
	8			S	2	6	LLC-C
J8	13			R	3	1	RSJ
	12			M	3	2	MFX
	11		J18	K	3	3	TCR
	10			N	3	4	MKR-A
	9			L	3	5	MKR-B
	8			J	3	6	LOG-A
J9	13			P	4	1	LOG-B
	12			S	4	2	LOG-C
	11			R	4	3	MEM-X
	10			M	4	4	MEM-Y
	9		J19	K	4	5	CLK
	8			N	4	6	CMP
J10	13			L	5	1	PMB-1
	12			J	5	2	VG-1
	11			P	5	3	SG-1
	10			S	5	4	PMB-2
	9			R	5	5	VG-2
	8			M	5	6	SG-2
J11	13		J20	K	6	1	PMB-3
	12			N	6	2	VG-3
	11			L	6	3	SG-3
	10			J	6	4	PMB-4
	9			P	6	5	VG-4
	8			S	6	6	SG-4
J12	13			R	7	1	PMB-5
	12			M	7	2	VG-5
	11		J21	K	7	3	SG-5
	10			N	7	4	PMB-6
	9			L	7	5	VG-6
	8			J	7	6	SG-6
J13	13			P	8	1	PMB-7
	12			S	8	2	VG-7
	11			R	8	3	SG-7
	10			M	8	4	PMB-8
	9		J22	K	8	5	VG-8
	8			N	8	6	SG-8

Figure 6-3. MSTE Decoder Subassembly 1A1 - 1A5, 2A1 - 2A5, Wire List (Sheet 3 of 7)

FROM		CABLE/WIRES	TO		FUNCTION		
LOCATION	TERMINAJ		LOCATION	TERMINAL			
		INTERCONNECT WIRING (Cont)					
					CHAR.	BIT	NAME
J14	13		J22	L	9	1	PMB-9
	12			J	9	2	VG-9
	11			P	9	3	SG-9
	10			S	9	4	PMB-10
	9			R	9	5	VG-10
	8			M	9	6	SG-10
J15	13		J23	K	10	1	PMB-11
	12			N	10	2	VG-11
	11			L	10	3	SG-11
	10			J	10	4	PMB-12
	9			P	10	5	VG-12
	8			S	10	6	SG-12
J1	1		J2	8	TEST LAMP		
	2			3	NO TRANSITION LAMP		
	3			6	NO SIGNAL LAMP		
	4			7	PARITY ERROR LAMP		
	5			5	DC FAIL LAMP		
	6			2	LOCAL LAMP TEST		
	7			4	AUDIBLE ALARM		
	8			S	AUDIO RELEASE		
	9		J16	9	FLASH RELEASE		
	10			11	DISPLAY LAMP TEST		
	11		J2	X	AC FAIL INPUT		
	12			20	+24 VDC		
	13			N	INPUT SIGNAL		
	14			A/1	SIGNAL GND		
TB1	1A		J16	6	MFX		
	1B			7	TAN		
	1C			18	MFR		
	1D			19	MFT		
	1E			15	DPT		
	1F			16	DPR		
	1G			4	UD		
	1H			5	PE		
	2A		J17	4	TCR		
	2B			5	RSJ		
	2C			6	ATOP		
	2D			7	LLC-A		
	2E			18	LLC-B		
	2F			19	LLC-C		
	3A			15	RSJ		
	3B			16	MFX		
	3C		J18	4	TCR		
	3D			5	MKR-A		
	3E			6	MKR-B		

Figure 6-3, MSTE Decoder Subassembly 1A1 - 1A5, 2A1 - 2A5, Wire List (Sheet 4 of 7)

FROM		CABLE/WIRES	TO		FUNCTION
LOCATION	TERMINAL		LOCATION	TERMINAL	
			INTERCONNECT WIRING (Cont)		
TB1	3F		J18	7	LOG-A
	4A			18	LOG-B
	4B			19	LOG-C
	4C			15	MEM-X
	4D			16	MEM-Y
	4E		J19	4	CLK
	4F			5	CMP
	5A			6	PMB-1
	5B			7	VG-1
	5C			18	SG-1
	5D			19	PMB-2
	5E			15	VG-2
	5F			16	SG-2
	6A		J20	4	PMB-3
	6B			5	VG-3
	6C			6	SG-3
	6D			7	PMB-4
	6E			18	VG-4
	6F			19	SG-4
	7A			15	PMB-5
	7B			16	VG-5
	7C		J21	4	SG-5
	7D			5	PMB-6
	7E			6	VG-6
	7F			7	SG-6
	8A			18	PMB-7
	8B			19	VG-7
	8C			15	SG-7
	8D			16	PMB-8
	8E		J22	4	VG-8
	8F			5	SG-8
	9A			6	PMB-9
	9B			7	VG-9
	9C			18	SG-9
	9D			19	PMB-10
	9E			15	VG-10
	9F			16	SG-10
	10A		J23	4	PMB-11
	10B			5	VG-11
	10C			6	SG-11
	10D			7	PMB-12
	10E			18	VG-12
	10F			19	SG-12
TB2	1A		J16	E	MFX
	1B			F	TAN
	1C			21	MFR

Figure 6-3. MSTE Decoder Subassembly 1A1 - 1A5, 2A1 - 2A5, Wire List (Sheet 5 of 7)

FROM		CABLE/WIRES	TO		FUNCTION
LOCATION	TERMINAL		LOCATION	TERMINAL	
		INTERCONNECT WIRING (Cont)			
TB2	1D		J16	20	MFT
	1E			T	DPT
	1F			U	DPR
	1G			2	UD
	1H			3	PE
	2A		J17	2	TCR
	2B			3	RSJ
	2C			E	ATOP
	2D			F	LLC-A
	2E			21	LLC-B
	2F			20	LLC-C
	3A			T	RSJ
	3B			U	MFX
	3C		J18	2	TCR
	3D			3	MKR-A
	3E			E	MKR-B
	3F			F	LOG-A
	4A			21	LOG-B
	4B			20	LOG-C
	4C			T	MEM-X
	4D			U	MEM-Y
	4E		J19	2	CLK
	4F			3	CMP
	5A			E	PMB-1
	5B			F	VG-1
	5C			21	SG-1
	5D			20	PMB-2
	5E			T	VG-2
	5F			U	SG-2
	6A		J20	2	PMB-3
	6B			3	VG-3
	6C			E	SG-3
	6D			F	PMB-4
	6E			21	VG-4
	6F			20	SG-4
	7A			T	PMB-5
	7B			U	VG-5
	7C		J21	2	SG-5
	7D			3	PMB-6
	7E			E	VG-6
	7F			F	SG-6
	8A			21	PMB-7
	8B			20	VG-7
	8C			T	SG-7
	8D			U	PMB-8
	8E		J22	2	VG-8

Figure 6-3. MSTE Decoder Subassembly 1A1 - 1A5, 2A1 - 2A5, Wire List (Sheet 6 of 7)

FROM		CABLE/WIRES	TO		FUNCTION
LOCATION	TERMINAL		LOCATION	TERMINAL	
		INTERCONNECT WIRING (Cont)			
TB2	8F		J22	3	SG-8
	9A			E	PMB-9
	9B			F	VG-9
	9C			21	SG-9
	9D			20	PMB-10
	9E			T	VG-10
	9F			U	SG-10
	10A		J23	2	PMB-11
	10B			3	VG-11
	10C			E	SG-11
	10D			F	PMB-12
	10E			21	VG-12
	10F			20	SG-12
J16	1		J16	14	GND
	14	(VIA 1N5227A DIODE)	J16	22	(ANODE CONNECTED AT J16-14)
	12	(VIA 39Ω, 8W RES)	J16	22	
	12		J2	22	+12V ALARM

Figure 6-3. MSTE Decoder Subassembly 1A1 - 1A5, 2A1 - 2A5, Wire List (Sheet 7 of 7)

FROM		CABLE/WIRES	TO		FUNCTION
LOCATION	TERMINAL		LOCATION	TERMINAL	
			NOTE ALL REFERENCE DESIGNATIONS ARE PREFIXED BY 1A6.		
			FRONT PANEL BUSSING (STUTTGART SITE)		
DS1	TIP		DS2-DS12	TIP	+24V
DS13	TIP		DS14-DS24	TIP	NO TRANSITION
DS25	TIP		DS26-DS36	TIP	PARITY ERROR
DS37	TIP		DS38-DS48	TIP	TEST
DS49	TIP		DS50-DS60	TIP	DC FAIL
S1	COM		S2-S12	COM	DISPLAY LAMP TEST
S13	COM		S14, S15, TP1, TP14	COM	GND
S1	COM		TP1		GND
DS1	TIP		DS13, DS25, DS37, DS49	TIP	+24V
			FRONT PANEL BUSSING (KUNIA SITE)		
DS1	TIP		DS2-DS8	TIP	+24V
DS13	TIP		DS14-DS20	TIP	NO TRANSITION
DS25	TIP		DS26-DS32	TIP	PARITY ERROR
DS37	TIP		DS38-DS44	TIP	TEST
DS49	TIP		DS50-DS56	TIP	DC FAIL
S1	COM		S2-S8	COM	DISPLAY LAMP TEST
S13	COM		S14, S15, TP1	COM	GND
S1	COM		TP1		GND
DS1	TIP		DS13, DS25, DS37, DS49	TIP	+24V
			FRONT PANEL BUSSING (SHEPPARD SITE)		
S13	COM		S14, S15, TP1	COM	GND
S1	COM		TP1		GND
DS1	TIP		DS13, DS25, DS37, DS49	TIP	+24V
			TERMINAL BLOCK BUSSING (ALL SITES)		
TB2	3A		TB2	4A-10A	+24V
	3B			4B-10B	GND
	3C			4C-10C	AUD DRIVE
	3D			4D-10D	AUD RELEASE
	3E			4E-10E	LOCAL LAMP TEST
	3F			4F-10F	FLASH RELEASE
	3G			4G-10G	AC FAIL OUT
	3H			4H-10H	+12V ALARM

Figure 6-4. MSTE Control and Local Display Panel 1A6, Wire List (Sheet 1 of 8)

FROM		CABLE/WIRES	TO		FUNCTION
LOCATION	TERMINAL		LOCATION	TERMINAL	
		REAR PANEL WIRING (STUTTGART AND KUNIA SITES)			
J1	13		TB1	1A	NO. 1 SIG INPUT
	14			1B	NO. 1 SIG GND
	3			1C	NO. 1 NO SIG
	2			1D	NO. 1 NO TRANS
	4			1E	NO. 1 PAR. ERROR
	1			1F	NO. 1 TEST
	5			1G	NO. 1 DC FAIL
	10			1H	NO. 1 LAMP TEST
	12		TB2	4A	NO. 1 +24V
	7			4C	NO. 1 AUDIO DRIVE
	8			4D	NO. 1 AUDIO RLS
	6			4E	NO. 1 LOCAL LAMP TEST
	9			4F	NO. 1 FLASH RLS
	11			4G	NO. 1 AC FAIL
J2	13		TB1	2A	NO. 2 SIG INPUT
	14			2B	NO. 2 SIG GND
	3			2C	NO. 2 NO SIG
	2			2D	NO. 2 NO TRANS
	4			2E	NO. 2 PAR. ERROR
	1			2F	NO. 2 TEST
	5			2G	NO. 2 DC FAIL
	10			2H	NO. 2 LAMP TEST
	12		TB2	4A	NO. 2 +24V
	7			4C	NO. 2 AUDIO DRIVE
	8			4D	NO. 2 AUDIO RLS
	6			4E	NO. 2 LOCAL LAMP TEST
	9			4F	NO. 2 FLASH RLS
	11			4G	NO. 2 AC FAIL
J3	13		TB1	3A	NO. 3 SIG INPUT
	14			3B	NO. 3 SIG GND
	3			3C	NO. 3 NO SIG
	2			3D	NO. 3 NO TRANS
	4			3E	NO. 3 PAR. ERROR
	1			3F	NO. 3 TEST
	5			3G	NO. 3 DC FAIL
	10			3H	NO. 3 LAMP TEST
	12		TB2	5A	NO. 2 +24V
	7			5C	NO. 3 AUDIO DRIVE
	8			5D	NO. 3 AUDIO RLS
	6			5E	NO. 3 LOCAL LAMP TEST
	9			5F	NO. 3 FLASH RLS
	11			5G	NO. 3 AC FAIL

Figure 6-4. MSTE Control and Local Display Panel 1A6, Wire List (Sheet 2 of 8)

FROM		CABLE/WIRES	TO		FUNCTION
LOCATION	TERMINAL		LOCATION	TERMINAL	
		REAR PANEL WIRING (STUTTGART AND KUNIA SITES) (Cont)			
J4	13		TB1	4A	NO. 4 SIG INPUT
	14			4B	NO. 4 SIG GND
	3			4C	NO. 4 NO SIG
	2			4D	NO. 4 NO TRANS
	4			4E	NO. 4 PAR. ERROR
	1			4F	NO. 4 TEST
	5			4G	NO. 4 DC FAIL
	10			4H	NO. 4 LAMP TEST
	12		TB2	5A	NO. 4 +24V
	7			5C	NO. 4 AUDIO DRIVE
	8			5D	NO. 4 AUDIO RLS
	6			5E	NO. 4 LOCAL LAMP TEST
	9			5F	NO. 4 FLASH RLS
	11			5G	NO. 4 AC FAIL
J5	13		TB1	5A	NO. 5 SIG INPUT
	14			5B	NO. 5 SIG GND
	3			5C	NO. 5 NO SIG
	2			5D	NO. 5 NO TRANS
	4			5E	NO. 5 PAR. ERROR
	1			5F	NO. 5 TEST
	5			5G	NO. 5 DC FAIL
	10			5H	NO. 5 LAMP TEST
	12		TB2	6A	NO. 5 +24V
	7			6C	NO. 5 AUDIO DRIVE
	8			6D	NO. 5 AUDIO RLS
	6			6E	NO. 5 LOCAL LAMP TEST
	9			6F	NO. 5 FLASH RLS
	11			6G	NO. 5 AC FAIL
J6	13		TB1	6A	NO. 6 SIG INPUT
	14			6B	NO. 6 SIG GND
	3			6C	NO. 6 NO SIG
	2			6D	NO. 6 NO TRANS
	4			6E	NO. 6 PAR. ERROR
	1			6F	NO. 6 TEST
	5			6G	NO. 6 DC FAIL
	10			6H	NO. 6 LAMP TEST
	12		TB2	6A	NO. 6 +24V
	7			6C	NO. 6 AUDIO DRIVE
	8			6D	NO. 6 AUDIO RLS
	6			6E	NO. 6 LOCAL LAMP TEST
	9			6F	NO. 6 FLASH RLS
	11			6G	NO. 6 AC FAIL

Figure 6-4. MSTE Control and Local Display Panel 1A6, Wire List (Sheet 3 of 8)

FROM		CABLE/WIRES	TO		FUNCTION
LOCATION	TERMINAL		LOCATION	TERMINAL	
		REAR PANEL WIRING (STUTTGART AND KUNIA SITES) (Cont)			
J7	13		TB1	7A	NO. 7 SIG INPUT
	14			7B	NO. 7 SIG GND
	3			7C	NO. 7 NO SIG
	2			7D	NO. 7 NO TRANS
	4			7E	NO. 7 PAR. ERROR
	1			7F	NO. 7 TEST
	5			7G	NO. 7 DC FAIL
	10			7H	NO. 7 LAMP TEST
	12		TB2	7A	NO. 7 +24V
	7			7C	NO. 7 AUDIO DRIVE
	8			7D	NO. 7 AUDIO RLS
	6			7E	NO. 7 LOCAL LAMP TEST
	9			7F	NO. 7 FLASH RLS
	11			7G	NO. 7 AC FAIL
J8	13		TB1	8A	NO. 8 SIG INPUT
	14			8B	NO. 8 SIG GND
	3			8C	NO. 8 NO SIG
	2			8D	NO. 8 NO TRANS
	4			8E	NO. 8 PAR. ERROR
	1			8F	NO. 8 TEST
	5			8G	NO. 8 DC FAIL
	10			8H	NO. 8 LAMP TEST
	12		TB2	7A	NO. 8 +24V
	7			7C	NO. 8 AUDIO DRIVE
	8			7D	NO. 8 AUDIO RLS
	6			7E	NO. 8 LOCAL LAMP TEST
	9			7F	NO. 8 FLASH RLS
	11			7G	NO. 8 AC FAIL
TB3	1			10A	+24V
	2			10B	GND
	3			10G	AC FAIL
	4			10H	+12V ALARM
		REAR PANEL WIRING (STUTTGART SITE)			
J9	13		TB1	9A	NO. 9 SIG INPUT
	14			9B	NO. 9 SIG GND
	3			9C	NO. 9 NO SIG
	2			9D	NO. 9 NO TRANS
	4			9E	NO. 9 PAR. ERROR
	1			9F	NO. 9 TEST
	5			9G	NO. 9 DC FAIL
	10			9H	NO. 9 LAMP TEST
	12		TB2	8A	NO. 9 +24V

Figure 6-4. MSTE Control and Local Display Panel 1A6, Wire List (Sheet 4 of 8)

FROM		CABLE/WIRES	TO		FUNCTION
LOCATION	TERMINAL		LOCATION	TERMINAL	
		REAR PANEL WIRING (STUTTGART SITE) (Cont)			
J9	7		TB2	8C	NO. 9 AUDIO DRIVE
	8			8D	NO. 9 AUDIO RLS
	6			8E	NO. 9 LOCAL LAMP TEST
	9			8F	NO. 9 FLASH RLS
	11			8G	NO. 9 AC FAIL
J10	13		TB1	10A	NO. 10 SIG INPUT
	14			10B	NO. 10 SIG GND
	3			10C	NO. 10 NO SIG
	2			10D	NO. 10 NO TRANS
	4			10E	NO. 10 PAR. ERROR
	1			10F	NO. 10 TEST
	5			10G	NO. 10 DC FAIL
	10			10H	NO. 10 LAMP TEST
	12		TB2	8A	NO. 10 +24V
	7			8C	NO. 10 AUDIO DRIVE
	8			8D	NO. 10 AUDIO RLS
	6			8E	NO. 10 LOCAL LAMP TEST
	9			8F	NO. 10 FLASH RLS
	11			8G	NO. 10 AC FAIL
J11	13			1A	NO. 11 SIG INPUT
	14			1B	NO. 11 SIG GND
	3			1C	NO. 11 NO SIG
	2			1D	NO. 11 NO TRANS
	4			1E	NO. 11 PAR. ERROR
	1			1F	NO. 11 TEST
	5			1G	NO. 11 DC FAIL
	10			1H	NO. 11 LAMP TEST
	12			9A	NO. 11 +24V
	7			9C	NO. 11 AUDIO DRIVE
	8			9D	NO. 11 AUDIO RLS
	6			9E	NO. 11 LOCAL LAMP TEST
	9			9F	NO. 11 FLASH RLS
	11			9G	NO. 11 AC FAIL
J12	13			2A	NO. 12 SIG INPUT
	14			2B	NO. 12 SIG GND
	3			2C	NO. 12 NO SIG
	2			2D	NO. 12 NO TRANS
	4			2E	NO. 12 PAR. ERROR
	1			2F	NO. 12 TEST
	5			2G	NO. 12 DC FAIL
	10			2H	NO. 12 LAMP TEST
	12			9A	NO. 12 +24V
	7			9C	NO. 12 AUDIO DRIVE

Figure 6-4. MSTE Control and Local Display Panel 1A6, Wire List (Sheet 5 of 8)

FROM			TO		
LOCATION	TERMINAL	CABLE/WIRES	LOCATION	TERMINAL	FUNCTION
		REAR PANEL WIRING (STUTTGART SITE) (Cont)			
J12	8		TB2	9D	NO. 12 AUDIO RLS
	6			9E	NO. 12 LOCAL LAMP TEST
	9			9F	NO. 12 FLASH RLS
	11			9G	NO. 12 AC FAIL
		REAR PANEL WIRING (SHEPPARD SITE)			
J1	13		TB1	1A	NO. 1 SIG INPUT
	14			1B	NO. 1 SIG GND
	3			1C	NO. 1 NO SIG
	2			1D	NO. 1 NO TRANS
	4			1E	NO. 1 PAR. ERROR
	1			1F	NO. 1 TEST
	5			1G	NO. 1 DC FAIL
	10			1H	NO. 1 LAMP TEST
	12		TB2	4A	NO. 1 +24V
	7			4C	NO. 1 AUDIO DRIVE
	8			4D	NO. 1 AUDIO RLS
	6			4E	NO. 1 LOCAL LAMP TEST
	9			4F	NO. 1 FLASH RLS
	11			4G	NO. 1 AC FAIL
TB3	1			10A	+24V
	2			10B	GND
	3			10G	AC FAIL
	4			10H	+12V ALARM
		INTERCONNECT WIRING (ALL SITES)			
DS1	TIP		TB2	10A	+24V
TP1	–			10B	GND
DS61	NEG			10C	AUDIO DRIVE
S13				10D	AUDIO RLS
S15	–			10E	LOCAL LAMP TEST
S14	–			10F	FLASH RLS
DS61	+			10H	+12V ALARM
TP2	–		TB1	1A	NO. 1 SIG INPUT
DS1	SLEEVE			1C	NO. 1 NO SIG
DS13	SLEEVE			1D	NO. 1 NO TRANS
DS25	SLEEVE			1E	NO. 1 PARITY ERROR
DS37	SLEEVE			1F	NO. 1 TEST
DS49	SLEEVE			1G	NO. 1 DC FAIL
S1	–			1H	NO. 1 LAMP TEST

Figure 6-4. MSTE Control and Local Display Panel 1A6, Wire List (Sheet 6 of 8)

FROM		CABLE/WIRES	TO		FUNCTION
LOCATION	TERMINAL		LOCATION	TERMINAL	
		INTERCONNECT WIRING (STUTTGART AND KUNIA SITES)			
TP3	–		TB1	2A	NO. 2 SIG INPUT
DS2	SLEEVE			2C	NO. 2 NO SIG
DS14	SLEEVE			2D	NO. 2 NO TRANS
DS26	SLEEVE			2E	NO. 2 PARITY ERROR
DS38	SLEEVE			2F	NO. 2 TEST
DS50	SLEEVE			2G	NO. 2 DC FAIL
S2	–			2H	NO. 2 LAMP TEST
TP4	–			3A	NO. 3 SIG INPUT
DS3	SLEEVE			3C	NO. 3 NO SIG
DS15	SLEEVE			3D	NO. 3 NO TRANS
DS27	SLEEVE			3E	NO. 3 PARITY ERROR
DS39	SLEEVE			3F	NO. 3 TEST
DS51	SLEEVE			3G	NO. 3 DC FAIL
S3	–			3H	NO. 3 LAMP TEST
TP5	–			4A	NO. 4 SIG INPUT
DS4	SLEEVE			4C	NO. 4 NO SIG
DS16	SLEEVE			4D	NO. 4 NO TRANS
DS28	SLEEVE			4E	NO. 4 PARITY ERROR
DS40	SLEEVE			4F	NO. 4 TEST
DS52	SLEEVE			4G	NO. 4 DC FAIL
S4				4H	NO. 4 LAMP TEST
TP6				5A	NO. 5 SIG INPUT
DS5	SLEEVE			5C	NO. 5 NO SIG
DS17	SLEEVE			5D	NO. 5 NO TRANS
DS29	SLEEVE			5E	NO. 5 PARITY ERROR
DS41	SLEEVE			5F	NO. 5 TEST
DS53	SLEEVE			5G	NO. 5 DC FAIL
S5	–			5H	NO. 5 LAMP TEST
TP7	–			6A	NO. 6 SIG INPUT
DS6	SLEEVE			6C	NO. 6 NO SIG
DS18	SLEEVE			6D	NO. 6 NO TRANS
DS30	SLEEVE			6E	NO. 6 PARITY ERROR
DS42	SLEEVE			6F	NO. 6 TEST
DS54	SLEEVE			6G	NO. 6 DC FAIL
S6	–			6H	NO. 6 LAMP TEST
TP8	–			7A	NO. 7 SIG INPUT
DS7	SLEEVE			7C	NO. 7 NO SIG
DS19	SLEEVE			7D	NO. 7 NO TRANS
DS31	SLEEVE			7E	NO. 7 PARITY ERROR
DS43	SLEEVE			7F	NO. 7 TEST
DS55	SLEEVE			7G	NO. 7 DC FAIL
S7	–			7H	NO. 7 LAMP TEST
TP9	–			8A	NO. 8 SIG INPUT
DS8	SLEEVE			8C	NO. 8 NO SIG
DS20	SLEEVE			8D	NO. 8 NO TRANS

Figure 6-4. MSTE Control and Local Display Panel 1A6, Wire List (Sheet 7 of 8)

FROM		CABLE/WIRES	TO		FUNCTION
LOCATION	TERMINAL		LOCATION	TERMINAL	
		INTERCONNECT WIRING (STUTTGART AND KUNJA SITES) (Cont)			
DS32	SLEEVE		TB1	8E	NO. 8 PARITY ERROR
DS44	SLEEVE			8F	NO. 8 TEST
DS56	SLEEVE			8G	NO. 8 DC FAIL
S8	–			8H	NO. 8 LAMP TEST
		INTERCONNECT WIRING (STUTTGART SITE)			
TP10	–		TB1	9A	NO. 9 SIG INPUT
DS9	SLEEVE			9C	NO. 9 NO SIG
DS21	SLEEVE			9D	NO. 9 NO TRANS
DS33	SLEEVE			9E	NO. 9 PARITY ERROR
DS45	SLEEVE			9F	NO. 9 TEST
DS57	SLEEVE			9G	NO. 9 DC FAIL
S9	–			9H	NO. 9 LAMP TEST
TP11	–			10A	NO. 10 SIG INPUT
DS10	SLEEVE			10C	NO. 10 NO SIG
DS22	SLEEVE			10D	NO. 10 NO TRANS
DS34	SLEEVE			10E	NO. 10 PARITY ERROR
DS46	SLEEVE			10F	NO. 10 TEST
DS58	SLEEVE			10G	NO. 10 DC FAIL
S10	–			10H	NO. 10 LAMP TEST
TP12	–		TB2	1A	NO. 11 SIG INPUT
DS11	SLEEVE			1C	NO. 11 NO SIG
DS23	SLEEVE			1D	NO. 11 NO TRANS
DS35	SLEEVE			1E	NO. 11 PARITY ERROR
DS47	SLEEVE			1F	NO. 11 TEST
DS59	SLEEVE			1G	NO. 11 DC FAIL
S11	–			1H	NO. 11 LAMP TEST
TP13	–			2A	NO. 12 SIG INPUT
DS12	SLEEVE			2C	NO. 12 NO SIG
DS24	SLEEVE			2D	NO. 12 NO TRANS
DS36	SLEEVE			2E	NO. 12 PARITY ERROR
DS48	SLEEVE			2F	NO. 12 TEST
DS60	SLEEVE			2G	NO. 12 DC FAIL
S12	–			2H	NO. 12 LAMP TEST

Figure 6-4. MSTE Control and Local Display Panel 1A6, Wire List (Sheet 8 of 8)

FROM		CABLE/WIRES	TO		FUNCTION
LOCATION	TERMINAL		LOCATION	TERMINAL	
1A6J1	1	W1-1	1A1J1	1	TEST MODE LAMP
	2			2	NO TRANS LAMP
	3			3	NO SIGNAL LAMP
	4			4	PARITY ERROR LAMP
	5			5	DC FAIL LAMP
	6			6	LOCAL LAMP TEST
	7			7	AUDIBLE ALARM
	8			8	AUDIO RELEASE
	9			9	FLASH RELEASE
	10			10	DISPLAY LAMP TEST
	11			11	AC FAIL
	12			12	+24V
	13			13	INPUT SIG
	14			14	SIG GND
	–			15-24	(NOT USED)

NOTE

ORIGINS AND DESTINATIONS OF CABLES W1-2 THROUGH W1-12 ARE LISTED BELOW. POINT-TO-POINT WIRING CONNECTIONS THROUGH THESE CABLES ARE THE SAME AS FOR CABLE W1-1 ABOVE.

1A6J2	W1-2	1A2J1
1A6J3	W1-3	1A3J1
1A6J4	W1-4	1A4J1
1A6J5	W1-5	1A5J1
1A6J6	W1-6	2A1J1
1A6J7	W1-7	2A2J1
1A6J8	W1-8	2A3J1
1A6J9	W1-9	2A4J1
1A6J10	W1-10	2A5J1
1A6J11	W1-11	1A7J1
1A6J12	W1-12	2A11J1

Figure 6-5. Master Station Decoder, Cable List

FROM		CABLE/WIRES	TO		FUNCTION
LOCATION	TERMINAL		LOCATION	TERMINAL	
			DISPLAY SECTORS		
1A1TB1	1A	32-PAIR CABLE (GFE)	A1TB1	1A	MFX
	1B			1B	TAN
	1C			1C	MFR
	1D			1D	MFT
	1E			1E	DPT
	1F			1F	DPR
	1G			1G	UD
	1H			1H	PE
	2A			2A	TCR
	2B			2B	RSJ
	2C			2C	ATOP
	2D			2D	LLC-A
	2E			2E	LLC-B
	2F			2F	LLC-C
	3A			3A	RSJ
	3B			3B	MFX
	3C			3C	TCR
	3D			3D	MKR-A
	3E			3E	MKR-B
	3F			3F	LOG-A
	4A			4A	LOG-B
	4B			4B	LOG-C
	4C			4C	MEM-X
	4D			4D	MEM-Y
	4E			4E	CLK
	4F			4F	CMP
	5A			5A	PMB-1
	5B			5B	VG-1
	5C			5C	SG-1
	5D			5D	PMB-2
	5E			5E	VG-2
	5F			5F	SG-2
	6A			6A	PMB-3
	6B			6B	VG-3
	6C			6C	SG-3
	6D			6D	PMB-4
	6E			6E	VG-4
	6F			6F	SG-4
	7A			7A	PMB-5
	7B			7B	VG-5
	7C			7C	SG-5
	7D			7D	PMB-6
	7E			7E	VG-6
	7F			7F	SG-6

Figure 6-6. Master Station Decoder/Display Frame, Cable List (Sheet 1 of 3)

FROM		CABLE/WIRES	TO		FUNCTION
LOCATION	TERMINAL		LOCATION	TERMINAL	
			DISPLAY SECTORS		
1A1TB1	8A	32-PAIR CABLE (GFE)	A1TB1	8A	PMB-7
	8B			8B	VG-7
	8C			8C	SG-7
	8D			8D	PMB-8
	8E			8E	VG-8
	8F			8F	SG-8
	9A			9A	PMB-9
	9B			9B	VG-9
	9C			9C	SG-9
	9D			9D	PMB-10
	9E			9E	VG-10
	9F			9F	SG-10
	10A			10A	PMB-11
	10B			10B	VG-11
	10C			10C	SG-11
	10D			10D	PMB-12
	10E			10E	VG-12
	10F			10F	SG-12
		NOTE THE FOLLOWING DECODER SUB-ASSEMBLY 1A1 OUTPUT TERMINALS AND DISPLAY SECTOR PANEL A1 INPUT TERMINAL ARE NOT USED.			
1A1TB1	2G		A1TB1	2G	
	2H			2H	
	3G			3G	
	3H			3H	
	4G			4G	
	4H			4H	
	5G			5G	
	5H			5H	
	6G			6G	
	6H			6H	
	7G			7G	
	7H			7H	
	8G			8G	
	8H			8H	
	9G			9G	
	9H			9H	
	10G			10G	
	10H				

Figure 6-6. Master Station Decoder/Display Frame, Cable List (Sheet 2 of 3)

FROM			TO		
LOCATION	TERMINAL	CABLE/WIRES	LOCATION	TERMINAL	FUNCTION
		NOTE ORIGINS AND DESTINATIONS OF 32-PAIR CABLES FOR DISPLAY SECTORS A2 THROUGH A12 ARE LISTED BELOW. THESE CABLES ARE THE SAME AS FOR DISPLAY SECTOR A1 CABLE ABOVE.			
1A2TB1		32-PAIR CABLE (GFE)	A2TB1		
1A3TB1		32-PAIR CABLE (GFE)	A3TB1		
1A4TB1		32-PAIR CABLE (GFE)	A4TB1		
1A5TB1		32-PAIR CABLE (GFE)	A5TB1		
2A1TB1		32-PAIR CABLE (GFE)	A6TB1		
2A2TB1		32-PAIR CABLE (GFE)	A7TB1		
2A3TB1		32-PAIR CABLE (GFE)	A8TB1		
2A4TB1		32-PAIR CABLE (GFE)	A9TB1		
2A5TB1		32-PAIR CABLE (GFE)	A10TB1		
1A7TB1		32-PAIR CABLE (GFE)	A11TB1		
2A11TB1		32-PAIR CABLE (GFE)	A12TB1		

Figure 6-6. Master Station Decoder/Display Frame, Cable List (Sheet 3 of 3)

FROM			TO		
LOCATION	TERMINAL	CABLE/WIRES	LOCATION	TERMINAL	FUNCTION
		NOTE ORIGINS AND DESTINATIONS OF 32-PAIR CABLES FOR DISPLAY SECTORS A2 THROUGH A12 ARE LISTED BELOW. THESE CABLES ARE THE SAME AS FOR DISPLAY SECTOR A1 CABLE ABOVE.			
1A2TB1		32-PAIR CABLE (GFE)	A2TB1		
1A3TB1		32-PAIR CABLE (GFE)	A3TB1		
1A4TB1		32-PAIR CABLE (GFE)	A4TB1		
1A5TB1		32-PAIR CABLE (GFE)	A5TB1		
2A1TB1		32-PAIR CABLE (GFE)	A6TB1		
2A2TB1		32-PAIR CABLE (GFE)	A7TB1		
2A3TB1		32-PAIR CABLE (GFE)	A8TB1		
2A4TB1		32-PAIR CABLE (GFE)	A9TB1		
2A5TB1		32-PAIR CABLE (GFE)	A10TB1		
1A7TB1		32-PAIR CABLE (GFE)	A11TB1		
2A11TB1		32-PAIR CABLE (GFE)	A12TB1		

Figure 6-6. Master Station Decoder/Display Frame, Cable List (Sheet 3 of 3)

FROM		CABLE/WIRES	TO		FUNCTION
LOCATION	TERMINAL		LOCATION	TERMINAL	
1A1TB2	1A	CABLE D-1 (GFE)	3A2J1	1	MFX
	1B			2	TAN
	1C			3	MFR
	1D			4	MFT
	1E			5	DPT
	1F			6	DPR
	1G		3A2J13	11	UD
	1H		3A2J13	12	PE
	2A		3A2J1	7	TCR
	2B			8	RSJ
	2C			9	ATOP
	2D			10	LLC-A
	2E			11	LLC-B
	2F			12	LLC-C
	3A			13	RSJ
	3B			14	MFX
	3C			15	TCR
	3D			16	MKR-A
	3E			17	MKR-B
	3F			18	LOG-A
	4A			19	LOG-B
	4B			20	LOG-C
	4C			21	MEM-X
	4D			22	MEM-Y
	4E			23	CLK
	4F			24	CMP
	5A			25	PMB-1
	5B			26	VG-1
	5C			27	SG-1
	5D			28	PMB-2
	5E			29	VG-2
	5F			30	SG-2
	6A			31	PMB-3
	6B			32	VG-3
	6C			33	SG-3
	6D			34	PMB-4
	6E			35	VG-4
	6F			36	SG-4
	7A			37	PMB-5
	7B			38	VG-5
	7C			39	SG-5
	7D			40	PMB-6
	7E			41	VG-6
	7F			42	SG-6
	8A			43	PMB-7
	8B			44	VG-7
	8C			45	SG-7
	8D			46	PMB-8

Figure 6-7. Master Station Decoder/Recorder Selector Panel, Cable List (Sheet 1 of 3)

FROM		CABLE/WIRES	TO		FUNCTION
LOCATION	TERMINAL		LOCATION	TERMINAL	
1A1TB2	8E	CABLE D-1 (GFE)	3A2J1	47	VG-8
	8F			48	SG-8
	9A			49	PMB-9
	9B			50	VG-9
	9C		3A2J13	1	SG-9
	9D			2	PMB-10
	9E			3	VG-10
	9F			4	SG-10
	10A			5	PMB-11
	10B			6	VG-11
	10C			7	SG-11
	10D			8	PMB-12
	10E			9	VG-12
	10F			10	SG-12
CABLE GROUND WIRE		CABLE D-1 (GFE)	3A2J13	13	GND
		NOTE THE FOLLOWING DECODER SUB-ASSEMBLY 1A1 OUTPUT TERMINALS AND RECORDER SELECTOR PANEL 3A2 INPUT TERMINALS ARE NOT USED.			
1A1TB2	2G		3A2J13	14	
	2H				
	3G				
	3H				
	4G				
	4H				
	5G				
	5H				
	6G				
	6H				
	7G				
	7H				
	8G				
	8H				
	9G				
	9H				
	10G				
	10H				

Figure 6-7. Master Station Decoder/Recorder Selector Panel, Cable List (Sheet 2 of 3)

FROM		CABLE/WIRES	TO		FUNCTION
LOCATION	TERMINAL		LOCATION	TERMINAL	
		NOTE ORIGINS AND DESTINATIONS OF CABLES D-2 THROUGH D-12 ARE LISTED BELOW. POINT-TO-POINT WIRING CONNECTIONS THROUGH THESE CABLES ARE THE SAME AS FOR CABLE D-1 ABOVE.			
1A2TB2		CABLE D-2 (GFE)	3A2J2 3A2J14		
1A3TB2		CABLE D-3 (GFE)	3A2J3 3A2J15		
1A4TB2		CABLE D-4 (GFE)	3A2J4 3A2J16		
1A5TB2		CABLE D-5 (GFE)	3A2J5 3A2J17		
2A1TB2		CABLE D-6 (GFE)	3A2J6 3A2J18		
2A2TB2		CABLE D-7 (GFE)	3A2J7 3A2J19		
2A3TB2		CABLE D-8 (GFE)	3A2J8 3A2J20		
2A4TB2		CABLE D-9 (GFE)	3A2J9 3A2J21		
2A5TB2		CABLE D-10 (GFE)	3A2J10 3A2J22		
1A7TB2		CABLE D-11 (GFE)	3A2J11 3A2J23		
2A11TB2		CABLE D-12 (GFE)	3A2J12 3A2J24		

Figure 6-7. Master Station Decoder/Recorder Selector Panel, Cable List (Sheet 3 of 3)

FROM		CABLE/WIRES	TO		FUNCTION
LOCATION	TERMINAL		LOCATION	TERMINAL	
3A2J25	1	CABLE E-1 (GFE)	3A1TB1A	1	CHANNEL 1
	2			2	CHANNEL 2
	3			3	CHANNEL 3
	4			4	CHANNEL 4
	5			5	CHANNEL 5
	6			6	CHANNEL 6
	7			7	CHANNEL 7
	8			8	CHANNEL 8
	9			9	CHANNEL 9
	10			10	CHANNEL 10
	11		3A1TB1B	11	CHANNEL 11
	12			12	CHANNEL 12
	13			13	CHANNEL 13
	14			14	CHANNEL 14
	15			15	CHANNEL 15
	16			16	CHANNEL 16
	17			17	CHANNEL 17
	18			18	CHANNEL 18
	19			19	CHANNEL 19
	20			20	CHANNEL 20
	21				(NOT USED)
	22				(NOT USED)
	23				(NOT USED)
	24		3A1TB1A	C	+24V
		NOTE THE FOLLOWING CABLE/WIRING CONNECTIONS ARE APPLICABLE ONLY FOR SIGNAL DATA RECORDER WITH 40 CHANNELS.			
3A2J26	1	CABLE E-2 (GFE)	3A1TB2A	1	CHANNEL 21
	2			2	CHANNEL 22
	3			3	CHANNEL 23
	4			4	CHANNEL 24
	5			5	CHANNEL 25
	6			6	CHANNEL 26
	7			7	CHANNEL 27
	8			8	CHANNEL 28
	9			9	CHANNEL 29
	10			10	CHANNEL 30
	11		3A1TB2B	11	CHANNEL 31
	12			12	CHANNEL 32
	13			13	CHANNEL 33
	14			14	CHANNEL 34
	15			15	CHANNEL 35

Figure 6-8. Master Station Recorder Selector Panel/Recorder, Cable List (Sheet 1 of 2)

FROM		CABLE/WIRES	TO		FUNCTION
LOCATION	TERMINAL		LOCATION	TERMINAL	
3A2J26	16	CABLE E-2 (GFE)	3A1TB2B	16	CHANNEL 36
	17			17	CHANNEL 37
	18			18	CHANNEL 38
	19			19	CHANNEL 39
	20			20	CHANNEL 40
	21				(NOT USED)
	22				(NOT USED)
	23				(NOT USED)
	24		3A1TB1A	C	+24V

Figure 6-8. Master Station Recorder Selector Panel/Recorder, Cable List (Sheet 2 of 2)

FROM		CABLE/WIRES	TO		FUNCTION
LOCATION	TERMINAL		LOCATION	TERMINAL	
PRIM. POW. NO. 1	AC-1	NO. 12 GA (GFE)	2A6TB8	1	120 VAC-1
	ACC-1			2	120VAC COM-1
	GND-1			3	GND-1
PRIM. POW. NO. 2	GND-2			4	GND-2
	AC-2			5	120 VAC-2
	ACC-2			6	120 VAC COM-2
2A6J1	–	BELDEN NO. 17408S	2A7TB1	–	AC POWER
2A6J2	–	BELDEN NO. 17409SJO	2A8J1	–	AC POWER
2A6J3	–	BELDEN NO. 17408S	2A9TB1	–	AC POWER
2A6J4	–	BELDEN NO. 17409SJO	2A10J1	–	AC POWER
3A3J1	–	BELDEN NO. 17409SJO	3A3 PLUG STRIP	–	AC POWER
3A1 (HARD WIRED)		BELDEN NO. 18229SJO	3A3J2	–	AC POWER

Figure 6-9. Master Station Ac Power, Cable List

FROM		CABLE/WIRES	TO		FUNCTION
LOCATION	TERMINAL		LOCATION	TERMINAL	
2A7TB1	6	W4	2A6TB1	13	+3.6V (+) NO. 1
	4			14	+3.6V (-) NO. 1
2A8TB1	1			1	+12V ALARM (+) NO. 1
	2			2	+12V ALARM (-) NO. 1
	3			6	-12V (+) NO. 1
	4			5	-12V (-) NO. 1
	5			9	+12V (+) NO. 1
	6			10	+12V (-) NO. 1
2A8TB2	2		2A6TB7	7	+12V ALARM NO. 1
	4			9	-12V NO. 1
	6			11	+12V NO. 1
2A9TB1	6		2A6TB1	15	+3.6V (+) NO. 2
	4			16	+3.6V (-) NO. 2
2A10TB1	1			3	+12V ALARM (+) NO. 2
	2			4	+12V ALARM (-) NO. 2
	3			8	-12V (+) NO. 2
	4			7	-12V (-) NO. 2
	5			11	+12V (+) NO. 2
	6			2	+12V (-) NO. 2
2A10TB2	2		2A6TB7	8	+12V ALARM NO. 2
	4			10	-12V NO. 2
	6			12	+12V NO. 2
2A6TB2	1	W2-1	1A1TB3		ALARM +12V
2A6TB3	1				-12V
2A6TB4	1				GND
2A6TB5	1				+12V
2A6TB6	1				+3.6V
2A6TB2	2	W2-2	1A2TB3		ALARM +12V
2A6TB3	2				-12V
2A6TB4	2				GND
2A6TB5	2				+12V
2A6TB6	2				+3.6V
2A6TB2	3	W2-3	1A3TB3		ALARM +12V
2A6TB3	3				-12V
2A6TB4	3				GND
2A6TB5	3				+12V
2A6TB6	3				+3.6V
2A6TB2	4	W2-4	1A4TB3		ALARM +12V
2A6TB3	4				-12V
2A6TB4	4				GND
2A6TB5	4				+12V
2A6TB6	4				+3.6V
2A6TB2	5	W2-5	1A5TB3		ALARM +12V
2A6TB3	5				-12V
2A6TB4	5				GND
2A6TB5	5				+12V
2A6TB6	5				+3.6V

Figure 6-10. Master Station Dc Power, Cable List (Sheet 1 of 3)

FROM		CABLE/WIRES	TO		FUNCTION
LOCATION	TERMINAL		LOCATION	TERMINAL	
2A6TB2	6	W2-11	1A7TB3		ALARM +12V
2A6TB3	6				-12V
2A6TB4	6				GND
2A6TB5	6				+12V
2A6TB6	6				+3.6V
2A6TB2	7	W2-6	2A1TB3		ALARM +12V
2A6TB3	7				-12V
2A6TB4	7				GND
2A6TB5	7				+12V
2A6TB6	7				+3.6V
2A6TB2	8	W2-7	2A2TB3		ALARM +12V
2A6TB3	8				-12V
2A6TB4	8				GND
2A6TB5	8				+12V
2A6TB6	8				+3.6V
2A6TB2	9	W2-8	2A3TB3		ALARM +12V
2A6TB3	9				-12V
2A6TB4	9				GND
2A6TB5	9				+12V
2A6TB6	9				+3.6V
2A6TB2	10	W2-9	2A4TB3		ALARM +12V
2A6TB3	10				-12V
2A6TB4	10				GND
2A6TB5	10				+12V
2A6TB6	10				+3.6V
2A6TB2	11	W2-10	2A5TB3		ALARM +12V
2A6TB3	11				-12V
2A6TB4	11				GND
2A6TB5	11				+12V
2A6TB6	11				+3.6V
2A6TB2	12	W2-12	2A11TB3		ALARM +12V
2A6TB3	12				-12V
2A6TB4	12				GND
2A6TB5	12				+12V
2A6TB6	12				+3.6V
1A6TB3	2	W3	2A6TB7	2	GND
	3	W3		1	AC FAIL
	4	W3		7	+12V ALARM
3A3TB1	14	CABLE C (GFE)	1A6TB3	1	+24V
	13	CABLE B (GFE)	3A2TB16	1	+24V
	15	CABLE B (GFE)		2	GND
	15	CABLE A (GFE)	2A6TB7	2	GND
	15	CABLE A (GFE)		3	GND
	16	CABLE A (GFE)		4	GND
	16	CABLE A (GFE)		5	GND
	17	CABLE F (GFE)		1	AC FAIL

Figure 6-10. Master Station Dc Power, Cable List (Sheet 2 of 3)

FROM		CABLE/WIRES	TO		FUNCTION
LOCATION	TERMINAL		LOCATION	TERMINAL	
			DISPLAY SECTORS		
3A3TB1	1	NO. 12 GA (GFE)	A1TB1	10	+24V
	2		A2TB1	10	+24V
	3		A3TB1	10	+24V
	4		A4TB1	10	+24V
	5		A5TB1	10	+24V
	6		A6TB1	10	+24V
	7		A7TB1	10	+24V
	8		A8TB1	10	+24V
	9		A9TB1	10	+24V
	10		A10TB1	10	+24V
	11		A11TB1	10	+24V
	12		A12TB1	10	+24V

Figure 6-10. Master Station Dc Power, Cable List (Sheet 3 of 3)

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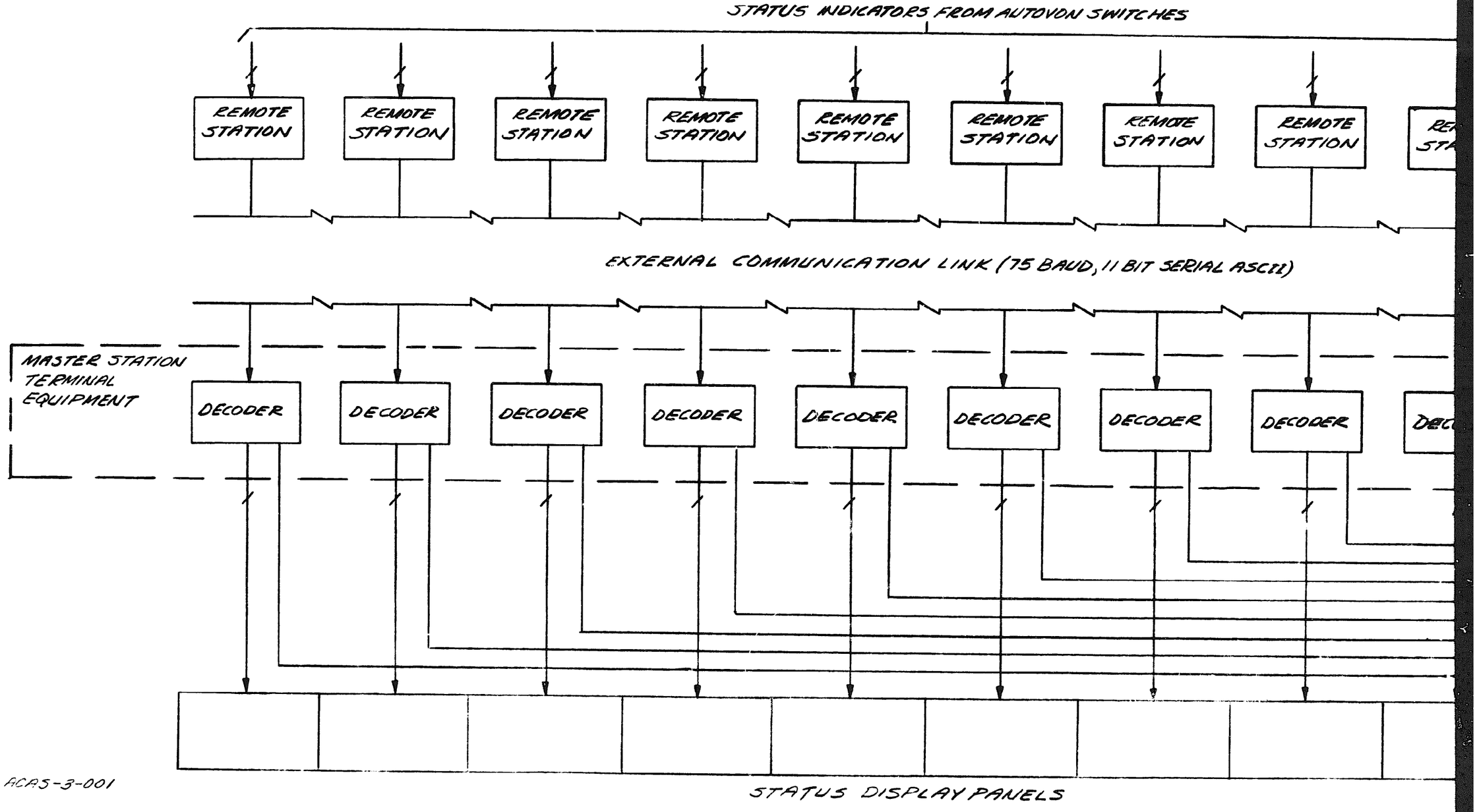
STATUS INDICATORS FROM AUTOVON SWITCHES
REMOTE STATION
REMOTE STATION
REMOTE STATION
REMOTE STATION
REMOTE STATION
REMOTE STATION
REMOTE STATION
REMOTE STATION
EXTERNAL COMMUNICATION LINK (75 BAUD, 11 BIT SERIAL ASCII)
MASTER STATION TERMINAL EQUIPMENT
DECODER
DECODER
DECODER
DECODER
DECODER
DECODER
DECODER
DECODER
STATUS DISPLAY PANELS

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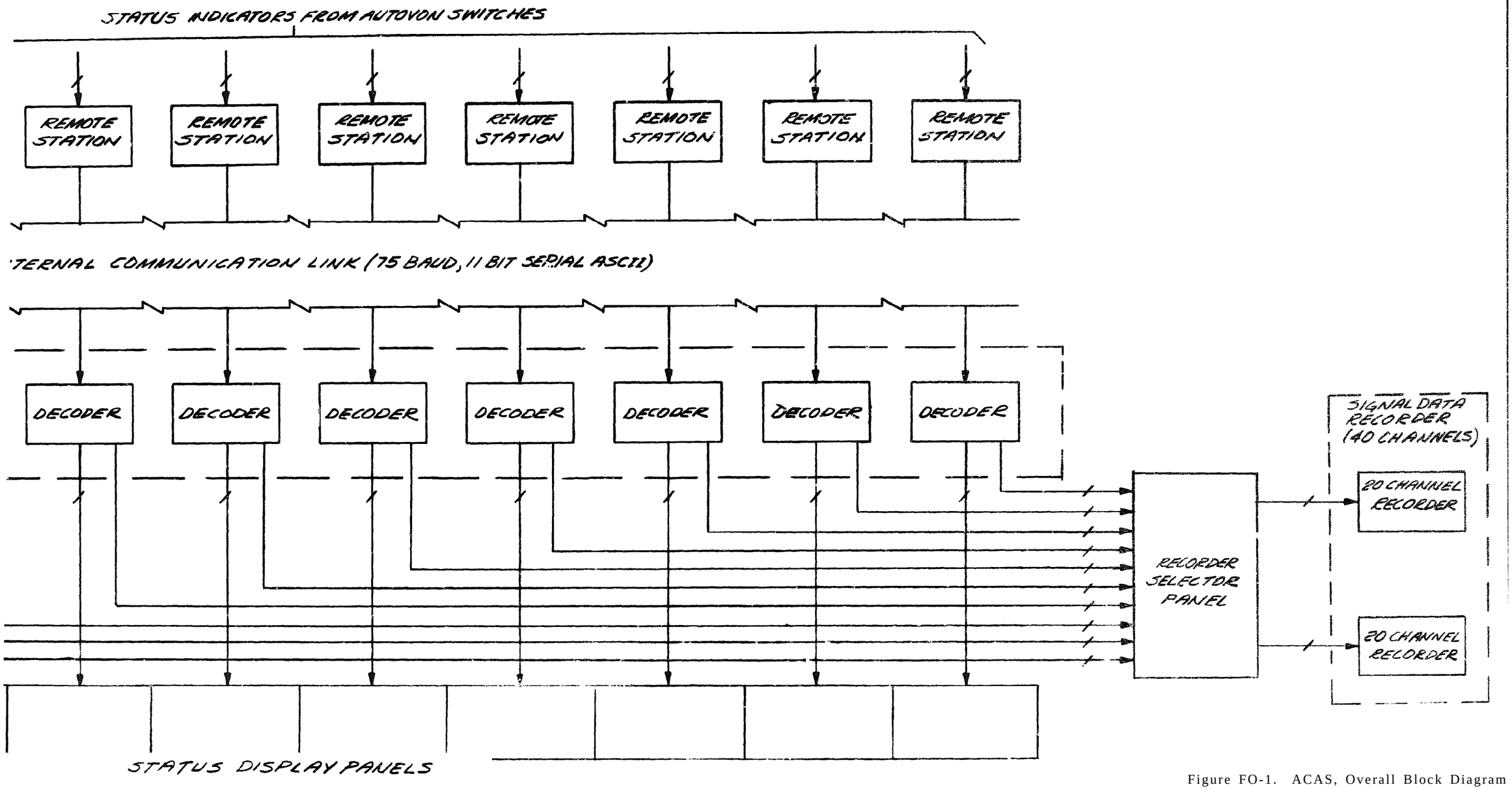


Figure FO-1. ACAS, Overall Block Diagram

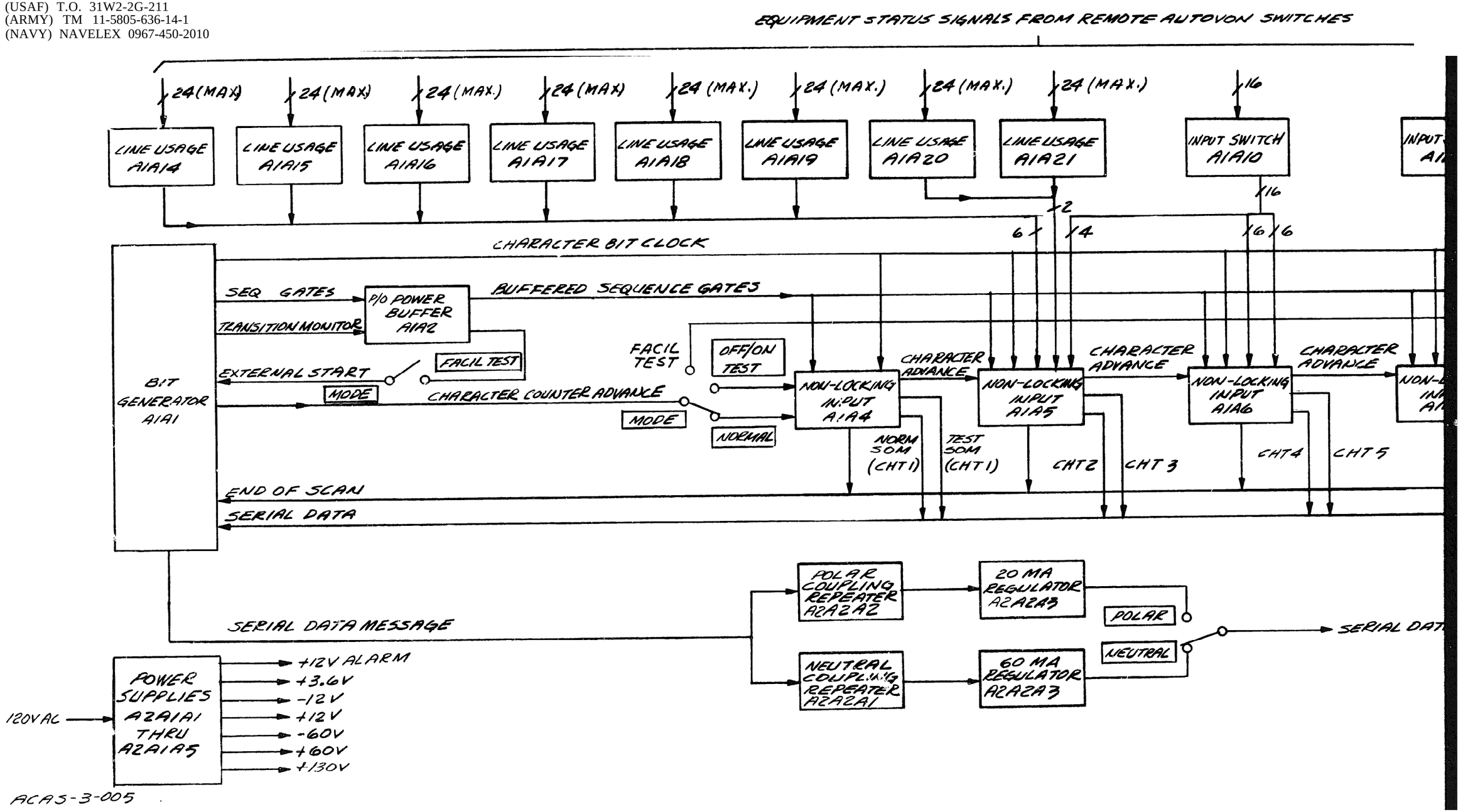


Figure FO-2. Remote Station Equipment Simplified Block Diagram.

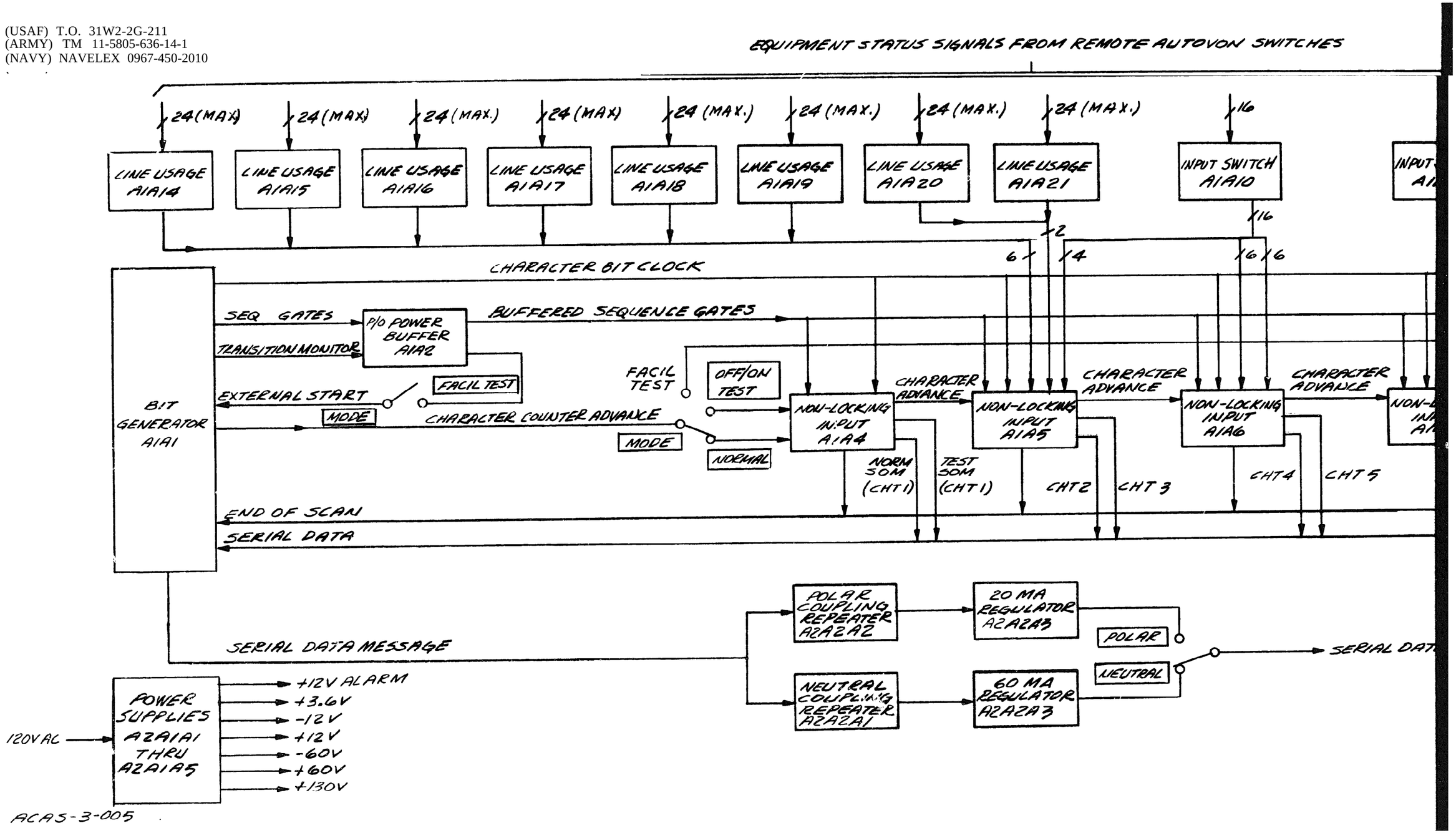


Figure FO-2. Remote Station Equipment Simplified Block Diagram.

TUS SIGNALS FROM REMOTE AUTOVON SWITCHES

24 (MAX.)
24 (MAX.)
16
12
12
12

VE USAGE
9IA20

LINE USAGE
AIA21

INPUT SWITCH
AIA10

INPUT SWITCH
AIA11

INPUT SWITCH
AIA12

INPUT SWITCH
AIA13

2
6 4
16 16
16 16
16 16
16 16

CHARACTER ADVANCE

NON-LOCKING INPUT AIA5

CHARACTER ADVANCE

NON-LOCKING INPUT AIA6

CHARACTER ADVANCE

NON-LOCKING INPUT AIA7

CHARACTER ADVANCE

NON-LOCKING INPUT AIA8

CHARACTER ADVANCE

NON-LOCKING INPUT AIA9

NON-LOCKING INPUT AIA3

M/S DATA (FACILITY TEST MODE ONLY)

RM
M
IT 1)

TEST SOM (CHT 1)

CHT 2

CHT 3

CHT 4

CHT 5

CHT 6

CHT 7

CHT 8

CHT 9

CHT 10

CHT 11

20 MA REGULATOR A2A2A3

POLAR

NEUTRAL

SERIAL DATA MESSAGE

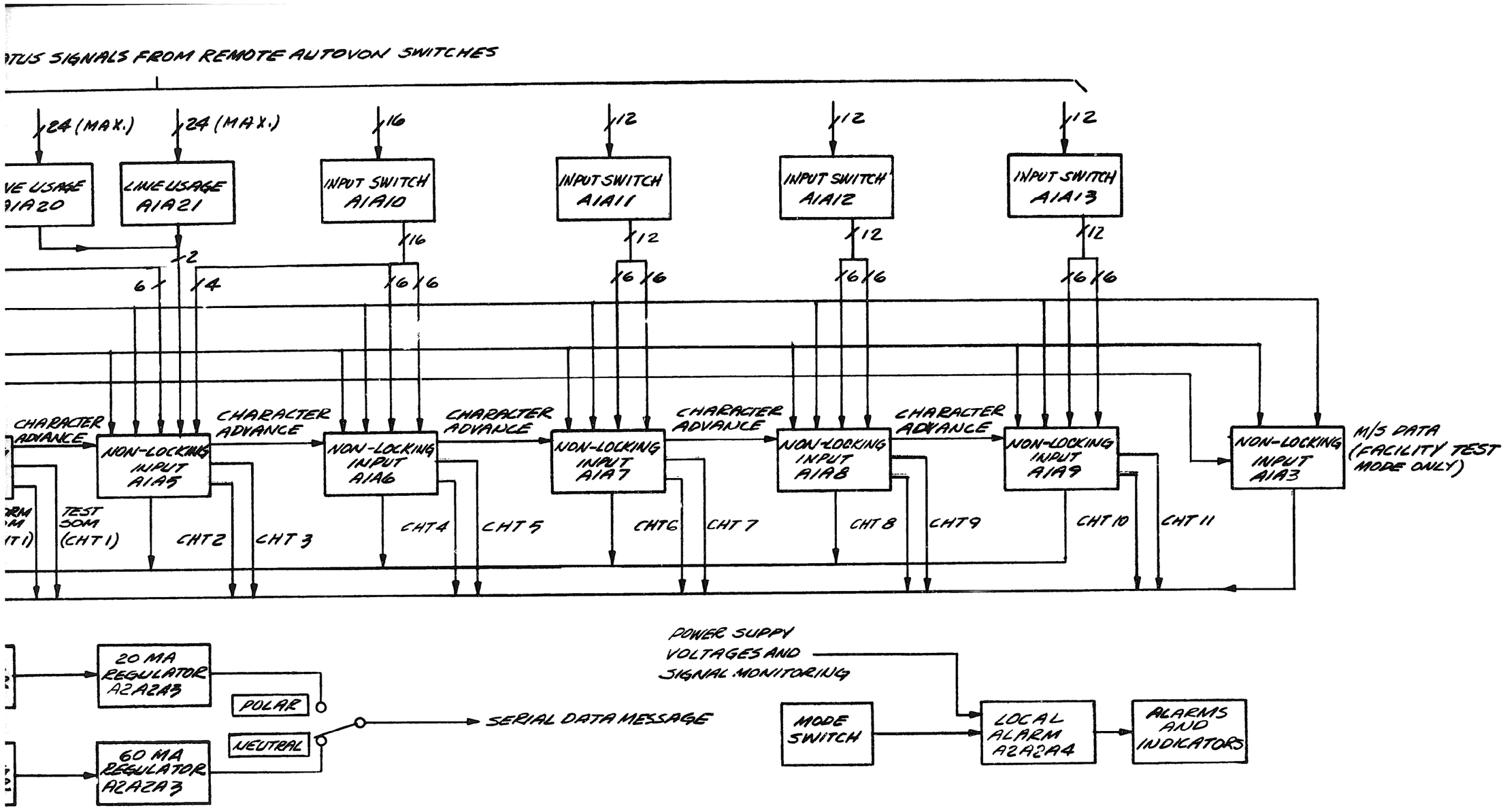
60 MA REGULATOR A2A2A3

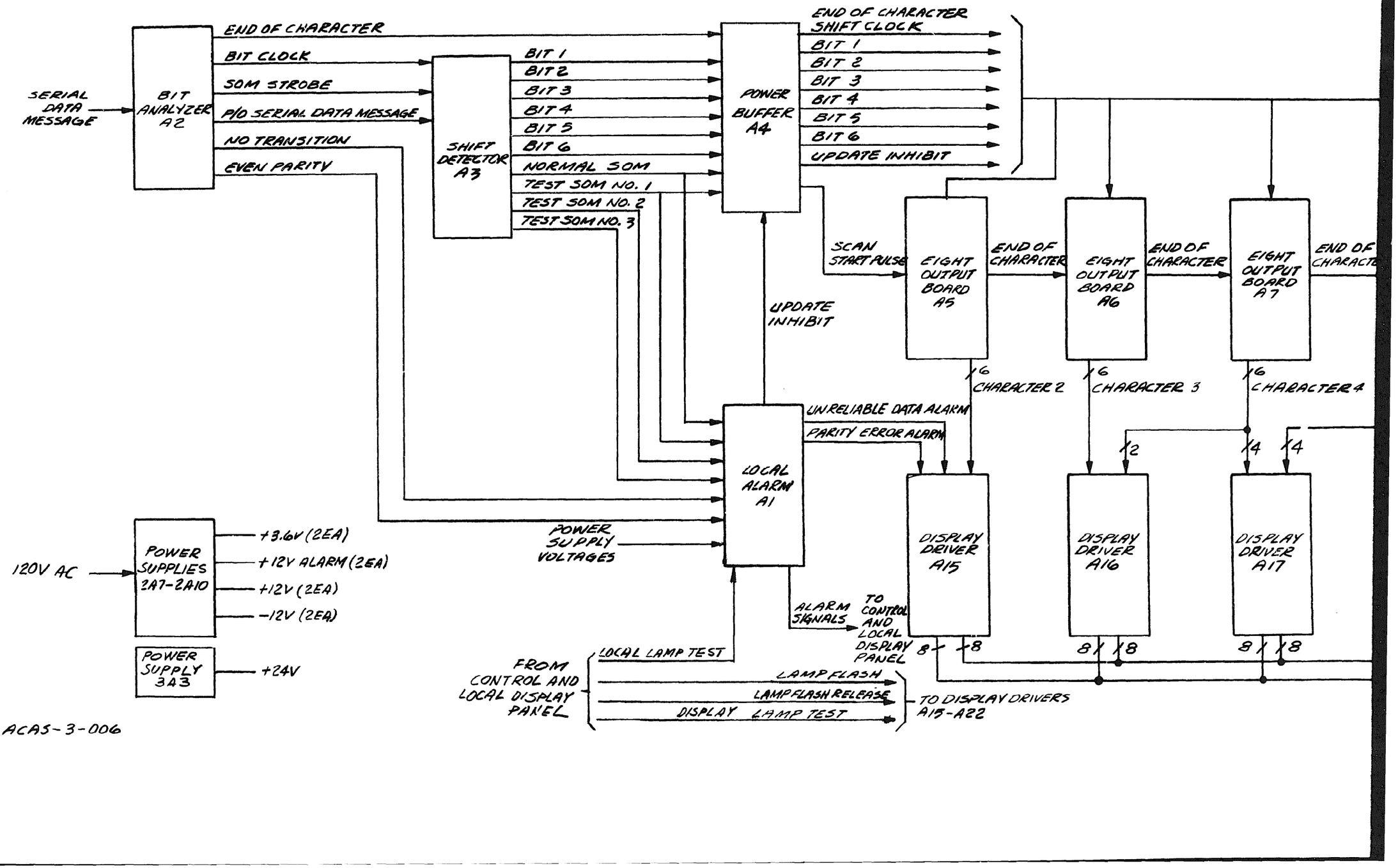
POWER SUPPY VOLTAGES AND SIGNAL MONITORING

MODE SWITCH

LOCAL ALARM A2A2A4

ALARMS AND INDICATORS


TUS SIGNALS FROM REMOTE AUTOVON SWITCHES
24 (MAX.)
24 (MAX.)
16
12
12
12
VE USAGE
A1A20
LINE USAGE
A1A21
INPUT SWITCH
A1A10
INPUT SWITCH
A1A11
INPUT SWITCH
A1A12
INPUT SWITCH
A1A13
2
6
4
16
6
CHARACTER ADVANCE
NON-LOCKING INPUT A1A5
NON-LOCKING INPUT A1A6
NON-LOCKING INPUT A1A7
NON-LOCKING INPUT A1A8
NON-LOCKING INPUT A1A9
NON-LOCKING INPUT A1A3
M/S DATA (FACILITY TEST MODE ONLY)
TEST SOM (CHT 1)
CHT 2
CHT 3
CHT 4
CHT 5
CHT 6
CHT 7
CHT 8
CHT 9
CHT 10
CHT 11
20 MA REGULATOR A2A2A3
60 MA REGULATOR A2A2A3
POLAR
NEUTRAL
SERIAL DATA MESSAGE
POWER SUPPY VOLTAGES AND SIGNAL MONITORING
MODE SWITCH
LOCAL ALARM A2A2A4
ALARMS AND INDICATORS


SERIAL DATA MESSAGE
BIT ANALYZER A2
END OF CHARACTER
BIT CLOCK
SOM STROBE
P/O SERIAL DATA MESSAGE
NO TRANSITION
EVEN PARITY
SHIFT DETECTOR A3
BIT 1
BIT 2
BIT 3
BIT 4
BIT 5
BIT 6
NORMAL SOM
TEST SOM NO. 1
TEST SOM NO. 2
TEST SOM NO. 3
POWER BUFFER A4
END OF CHARACTER SHIFT CLOCK
BIT 1
BIT 2
BIT 3
BIT 4
BIT 5
BIT 6
UPDATE INHIBIT
SCAN START PULSE
EIGHT OUTPUT BOARD A5
END OF CHARACTER
EIGHT OUTPUT BOARD A6
END OF CHARACTER
EIGHT OUTPUT BOARD A7
END OF CHARACTE
UPDATE INHIBIT
6 CHARACTER 2
6 CHARACTER 3
6 CHARACTER 4
UNRELIABLE DATA ALARM
PARITY ERROR ALARM
LOCAL ALARM A1
2
4
4
DISPLAY DRIVER A15
DISPLAY DRIVER A16
DISPLAY DRIVER A17
POWER SUPPLY VOLTAGES
ALARM SIGNALS
TO CONTROL AND LOCAL DISPLAY PANEL
8
8
8
8
8
8
LOCAL LAMP TEST
FROM CONTROL AND LOCAL DISPLAY PANEL
LAMP FLASH
LAMP FLASH RELEASE
DISPLAY LAMP TEST
TO DISPLAY DRIVERS A15-A22
120V AC
POWER SUPPLIES 2A7-2A10
+3.6V (2EA)
+12V ALARM (2EA)
+12V (2EA)
-12V (2EA)
POWER SUPPLY 3A3
+24V

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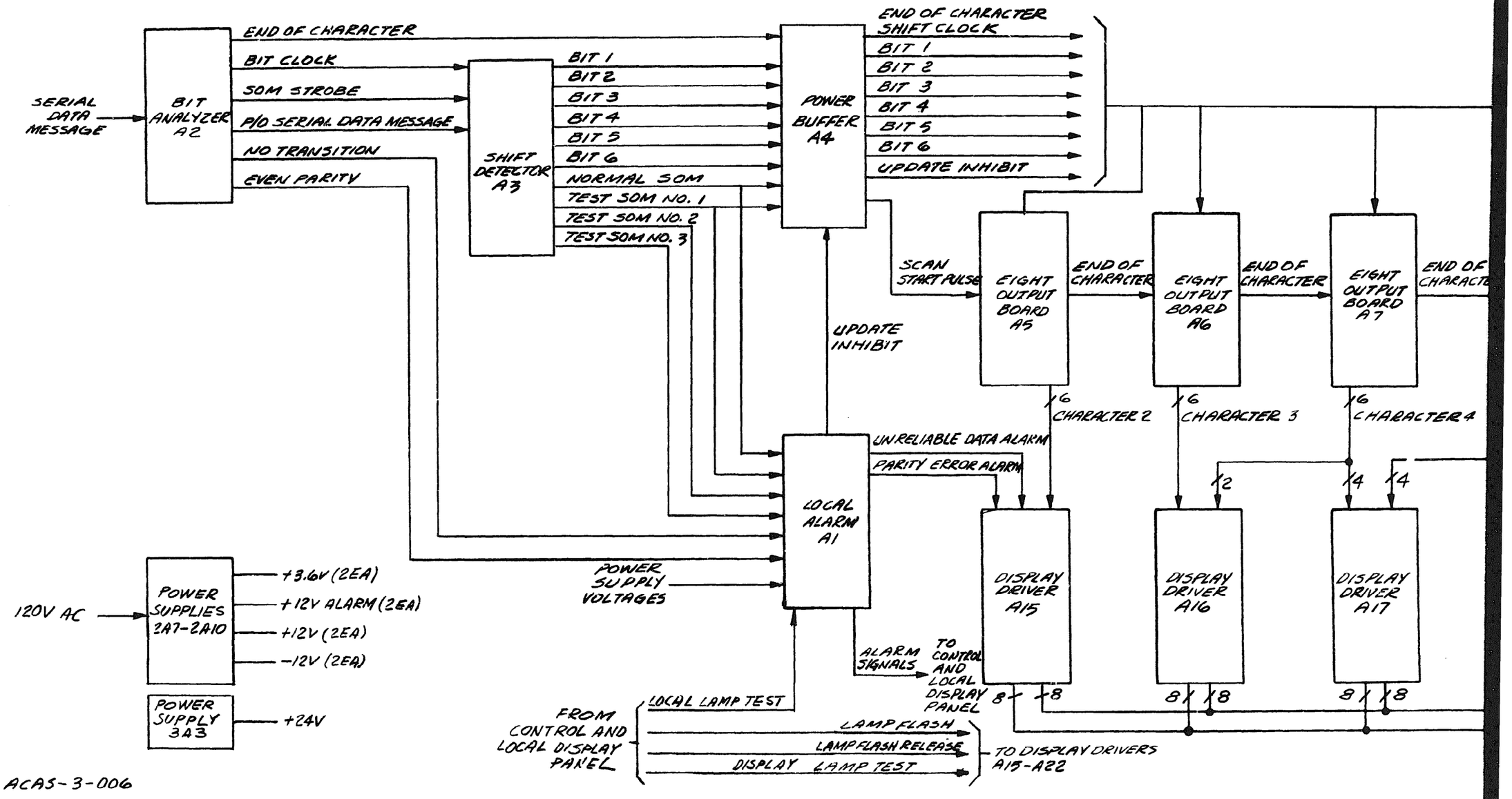

SERIAL DATA MESSAGE
BIT ANALYZER A2
END OF CHARACTER
BIT CLOCK
SOM STROBE
P/O SERIAL DATA MESSAGE
NO TRANSITION
EVEN PARITY
SHIFT DETECTOR A3
BIT 1
BIT 2
BIT 3
BIT 4
BIT 5
BIT 6
NORMAL SOM
TEST SOM NO. 1
TEST SOM NO. 2
TEST SOM NO. 3
POWER BUFFER A4
END OF CHARACTER SHIFT CLOCK
BIT 1
BIT 2
BIT 3
BIT 4
BIT 5
BIT 6
UPDATE INHIBIT
SCAN START PULSE
EIGHT OUTPUT BOARD A5
END OF CHARACTER
EIGHT OUTPUT BOARD A6
END OF CHARACTER
EIGHT OUTPUT BOARD A7
END OF CHARACTE
UPDATE INHIBIT
6 CHARACTER 2
6 CHARACTER 3
6 CHARACTER 4
UNRELIABLE DATA ALARM
PARITY ERROR ALARM
LOCAL ALARM A1
2
4
4
DISPLAY DRIVER A15
DISPLAY DRIVER A16
DISPLAY DRIVER A17
POWER SUPPLY VOLTAGES
ALARM SIGNALS
TO CONTROL AND LOCAL DISPLAY PANEL
8
8
8
8
8
8
LOCAL LAMP TEST
FROM CONTROL AND LOCAL DISPLAY PANEL
LAMP FLASH
LAMP FLASH RELEASE
DISPLAY LAMP TEST
TO DISPLAY DRIVERS A15-A22
120V AC
POWER SUPPLIES 2A7-2A10
+3.6V (2EA)
+12V ALARM (2EA)
+12V (2EA)
-12V (2EA)
POWER SUPPLY 343
+24V
ACAS-3-006

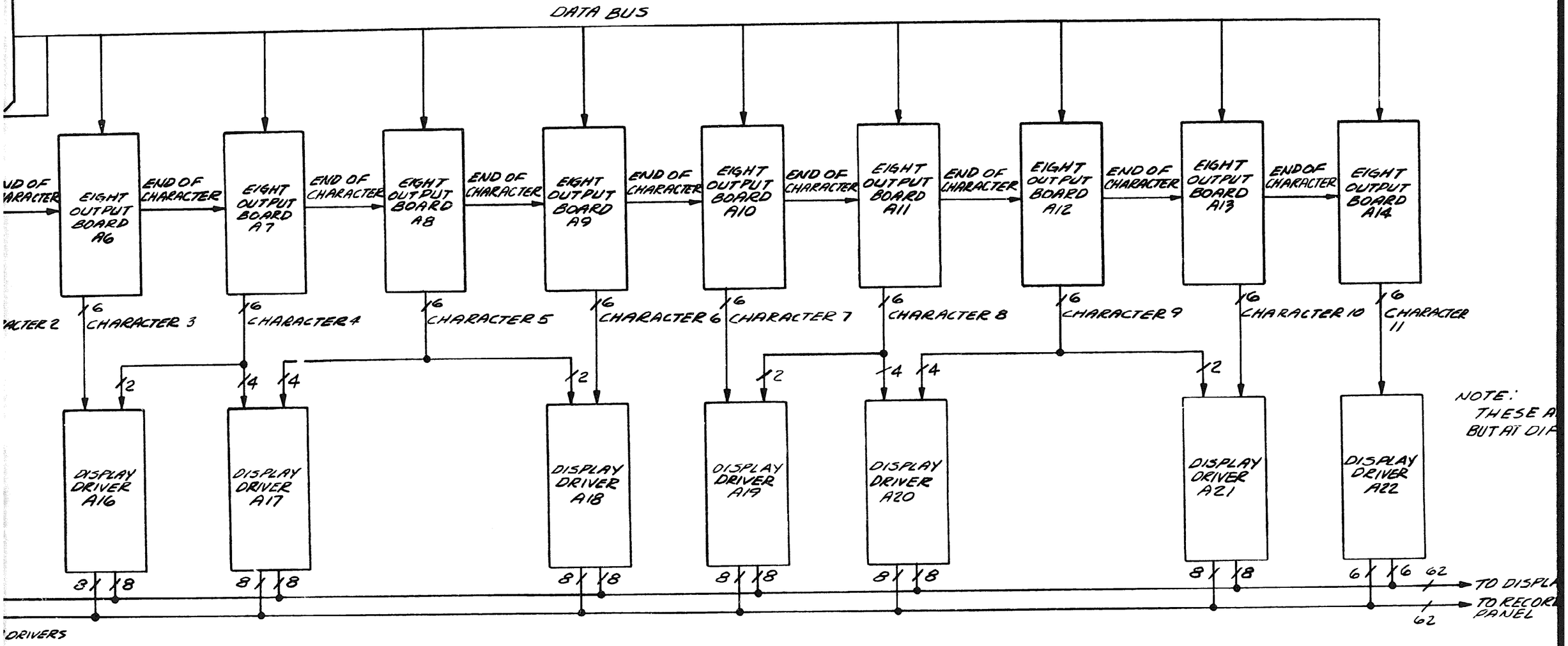

DATA BUS
END OF CHARACTER
EIGHT OUTPUT BOARD A6
EIGHT OUTPUT BOARD A7
EIGHT OUTPUT BOARD A8
EIGHT OUTPUT BOARD A9
EIGHT OUTPUT BOARD A10
EIGHT OUTPUT BOARD A11
EIGHT OUTPUT BOARD A12
EIGHT OUTPUT BOARD A13
EIGHT OUTPUT BOARD A14
CHARACTER 3
CHARACTER 4
CHARACTER 5
CHARACTER 6
CHARACTER 7
CHARACTER 8
CHARACTER 9
CHARACTER 10
CHARACTER 11
DISPLAY DRIVER A16
DISPLAY DRIVER A17
DISPLAY DRIVER A18
DISPLAY DRIVER A19
DISPLAY DRIVER A20
DISPLAY DRIVER A21
DISPLAY DRIVER A22
NOTE:
TO DISPL
TO RECOR
PANEL
DRIVERS

Figure FO

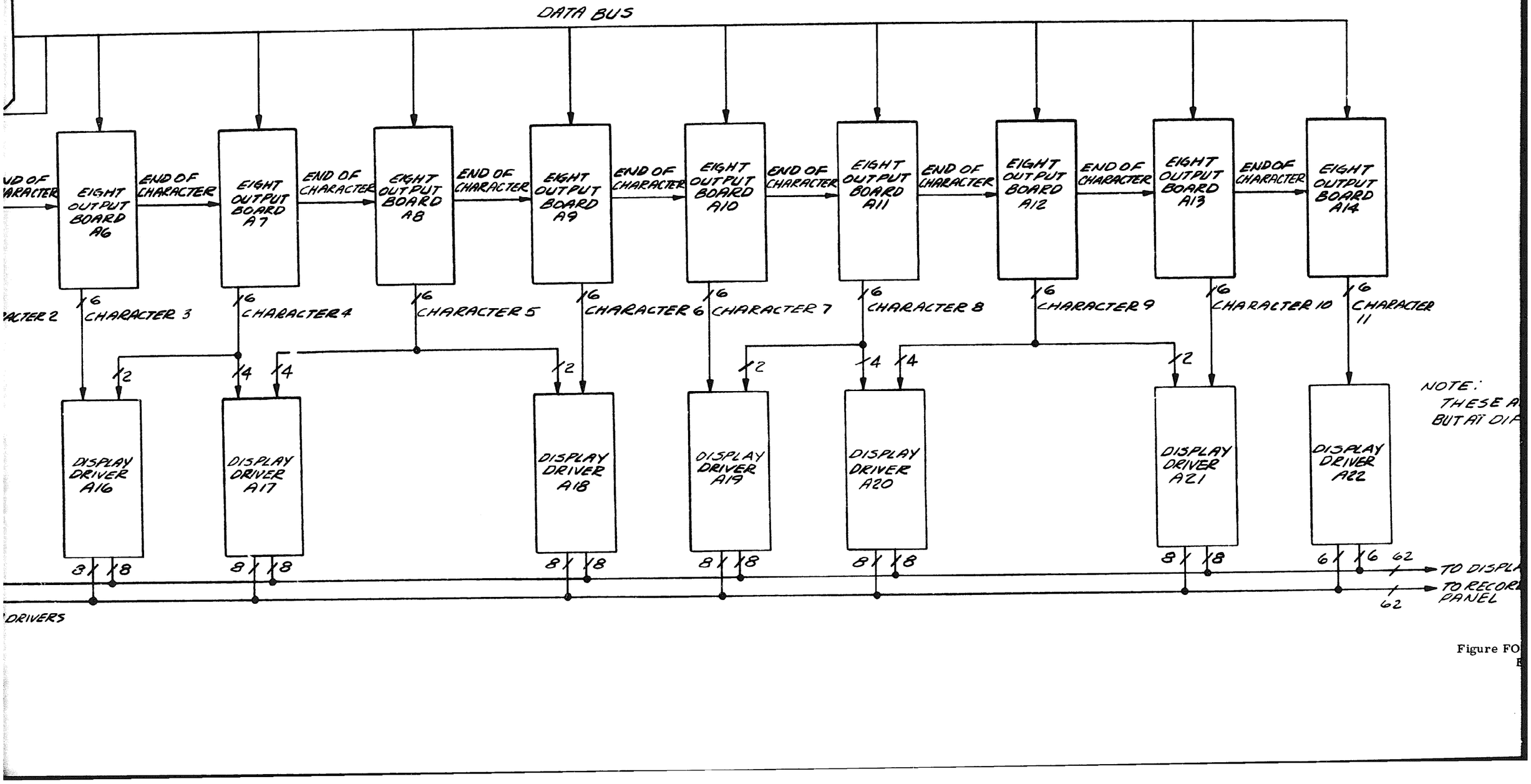

DATA BUS
END OF CHARACTER
EIGHT OUTPUT BOARD A6
EIGHT OUTPUT BOARD A7
EIGHT OUTPUT BOARD A8
EIGHT OUTPUT BOARD A9
EIGHT OUTPUT BOARD A10
EIGHT OUTPUT BOARD A11
EIGHT OUTPUT BOARD A12
EIGHT OUTPUT BOARD A13
EIGHT OUTPUT BOARD A14
CHARACTER 2
CHARACTER 3
CHARACTER 4
CHARACTER 5
CHARACTER 6
CHARACTER 7
CHARACTER 8
CHARACTER 9
CHARACTER 10
CHARACTER 11
DISPLAY DRIVER A16
DISPLAY DRIVER A17
DISPLAY DRIVER A18
DISPLAY DRIVER A19
DISPLAY DRIVER A20
DISPLAY DRIVER A21
DISPLAY DRIVER A22
NOTE:
TO DISPL
TO RECORD PANEL
DRIVERS

Figure FO

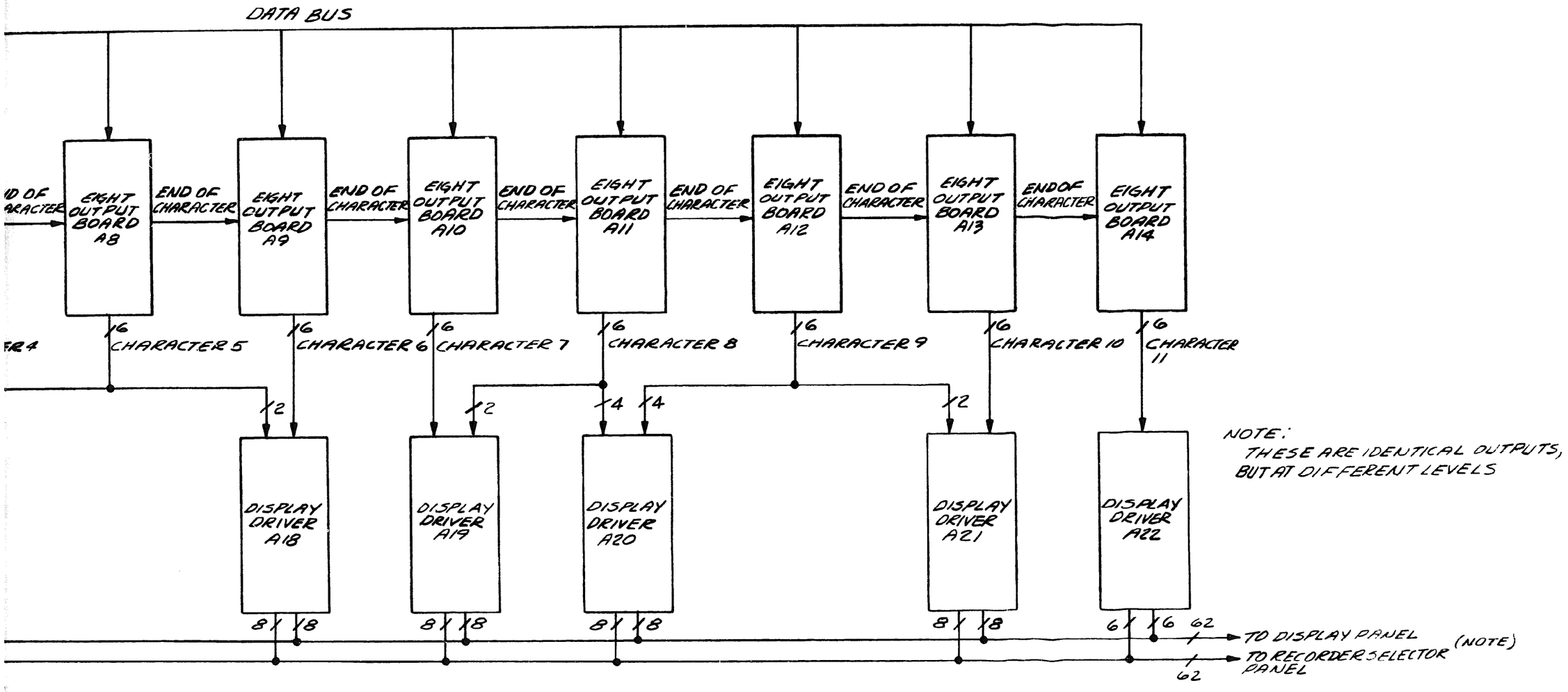
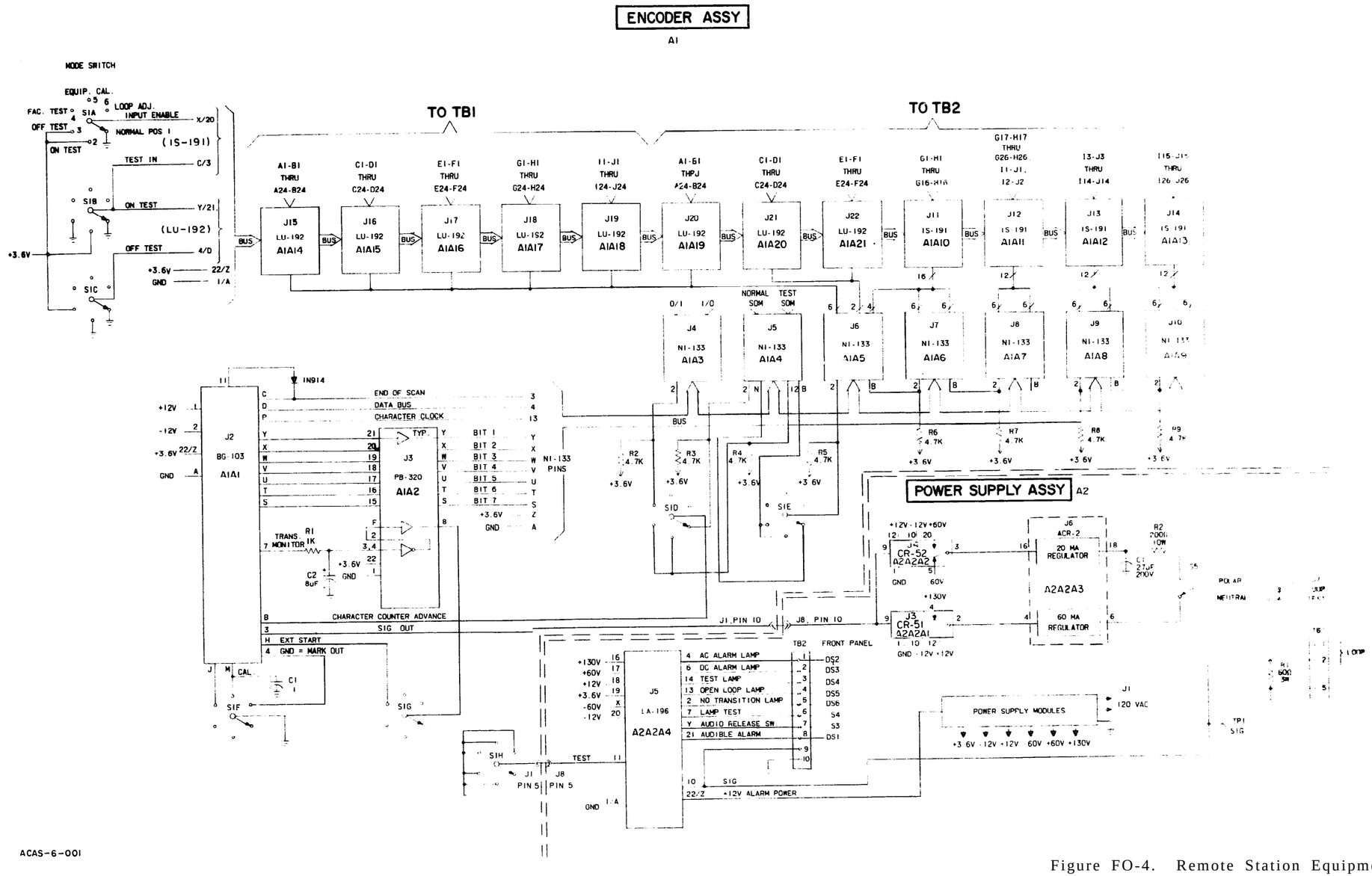
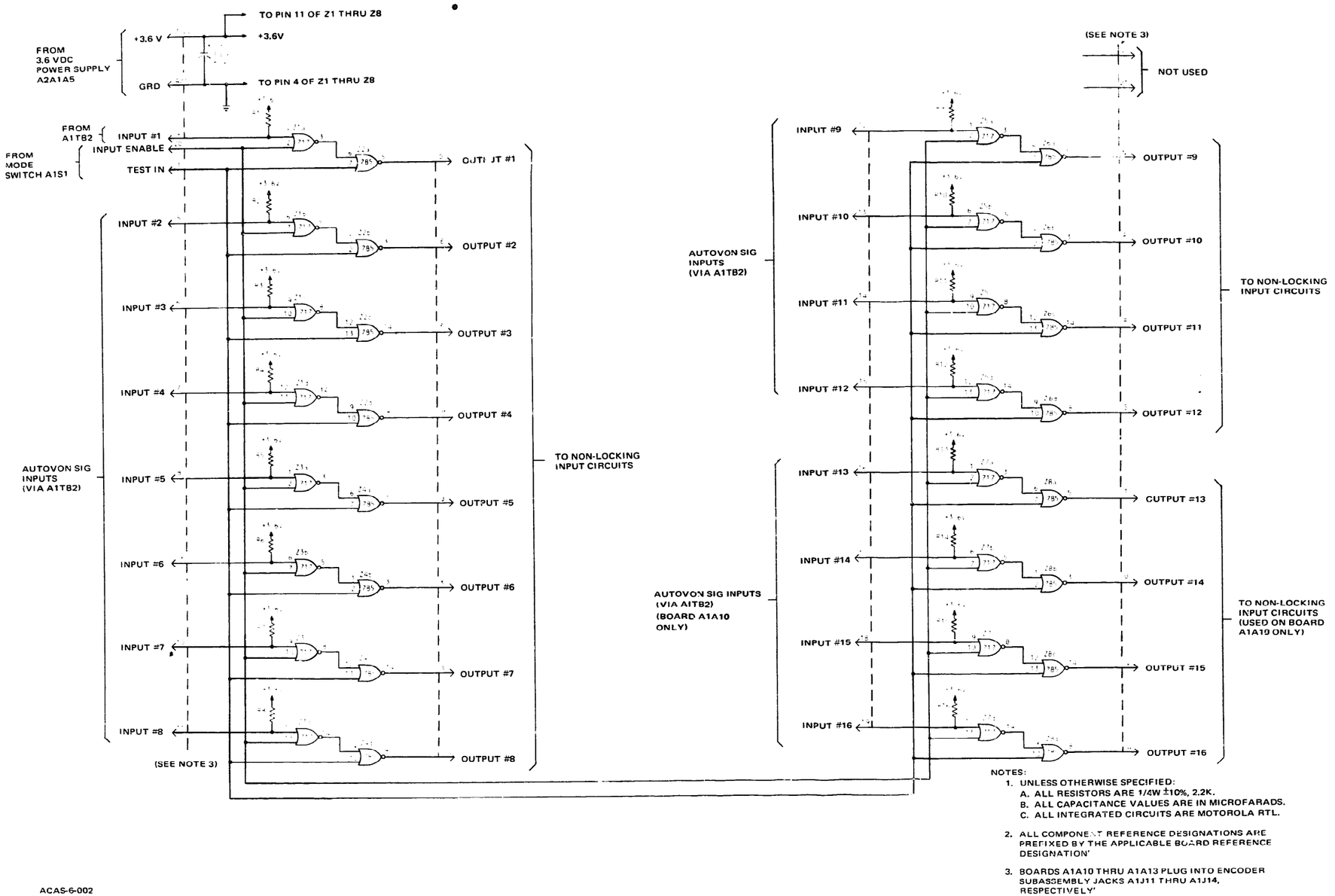


Figure FO-3. Master Station Terminal Equipment, Simplified Block Diagram



ACAS-6-001

Figure FO-4. Remote Station Equipment (RSE), Functional Block Diagram.



NOTES:

1. UNLESS OTHERWISE SPECIFIED:
   A. ALL RESISTORS ARE 1/4W ±10%, 2.2K.
   B. ALL CAPACITANCE VALUES ARE IN MICROFARADS.
   C. ALL INTEGRATED CIRCUITS ARE MOTOROLA RTL.
2. ALL COMPONENT REFERENCE DESIGNATIONS ARE PREFIXED BY THE APPLICABLE BOARD REFERENCE DESIGNATION'
3. BOARDS A1A10 THRU A1A13 PLUG INTO ENCODER SUBASSEMBLY JACKS A1J11 THRU A1J14, RESPECTIVELY'

ACAS-6-002

Figure FO-5. Input Switch Circuit Board (A1A10-A1A13), Schematic Diagram

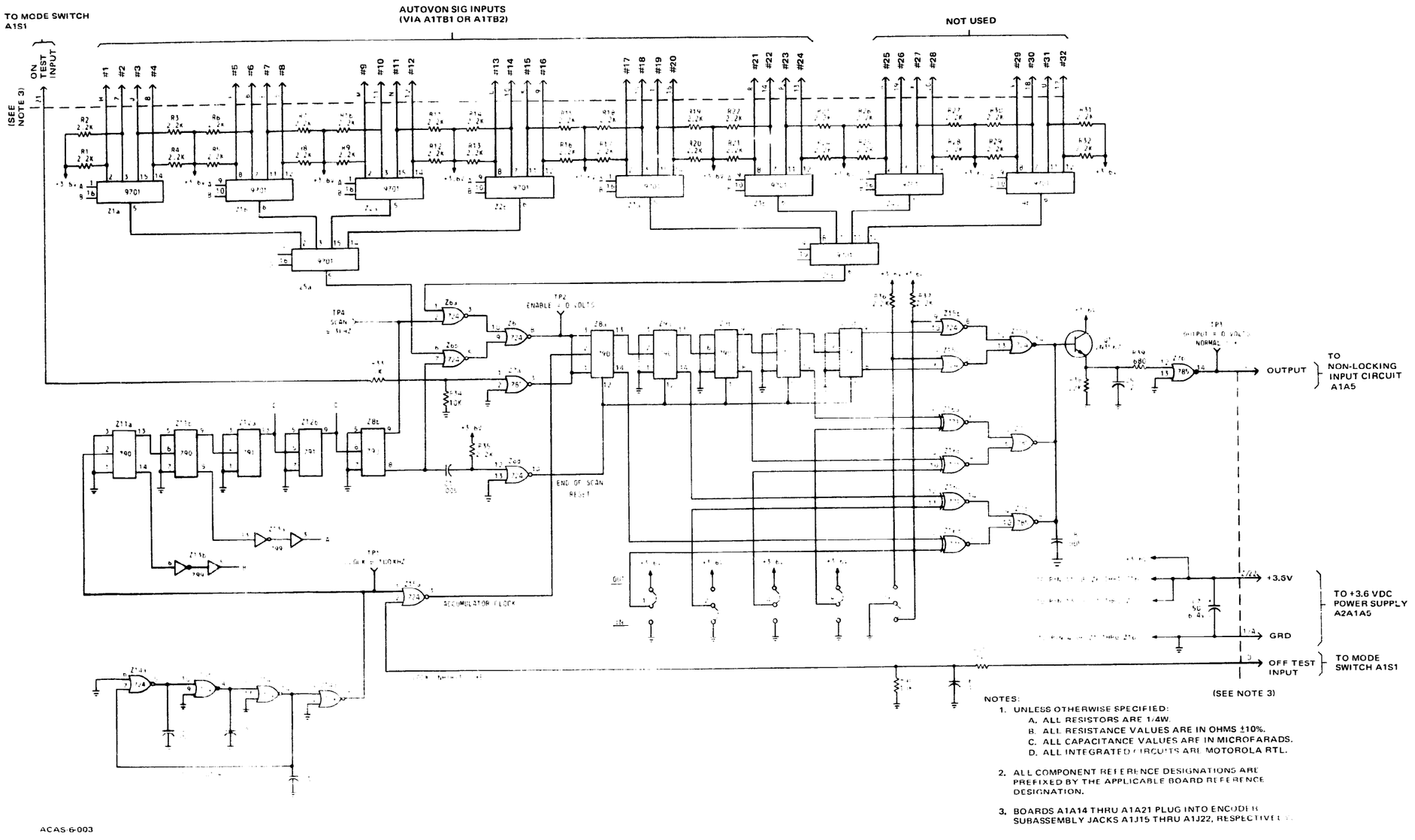
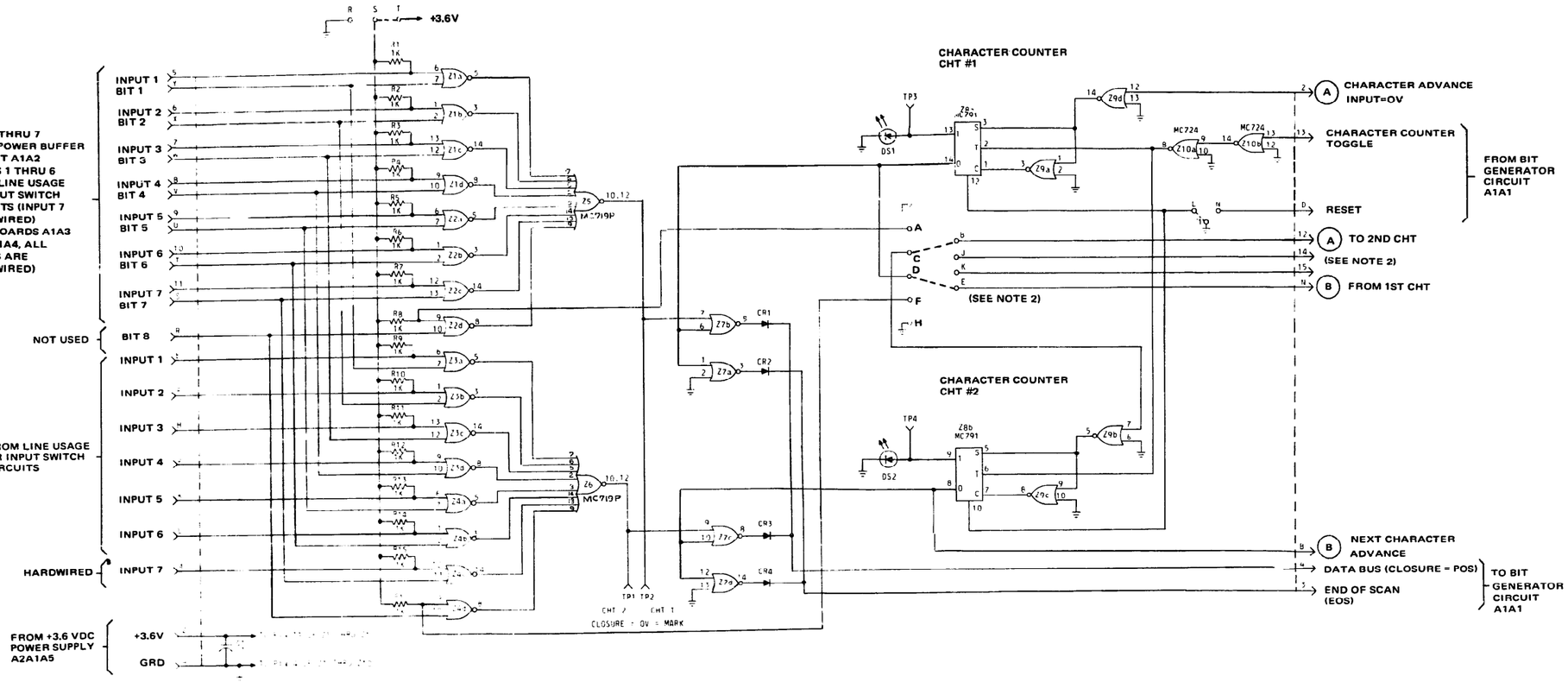


Figure FO-6. Line Usage Circuit Board (A1A14-A1A21), Schematic Diagram

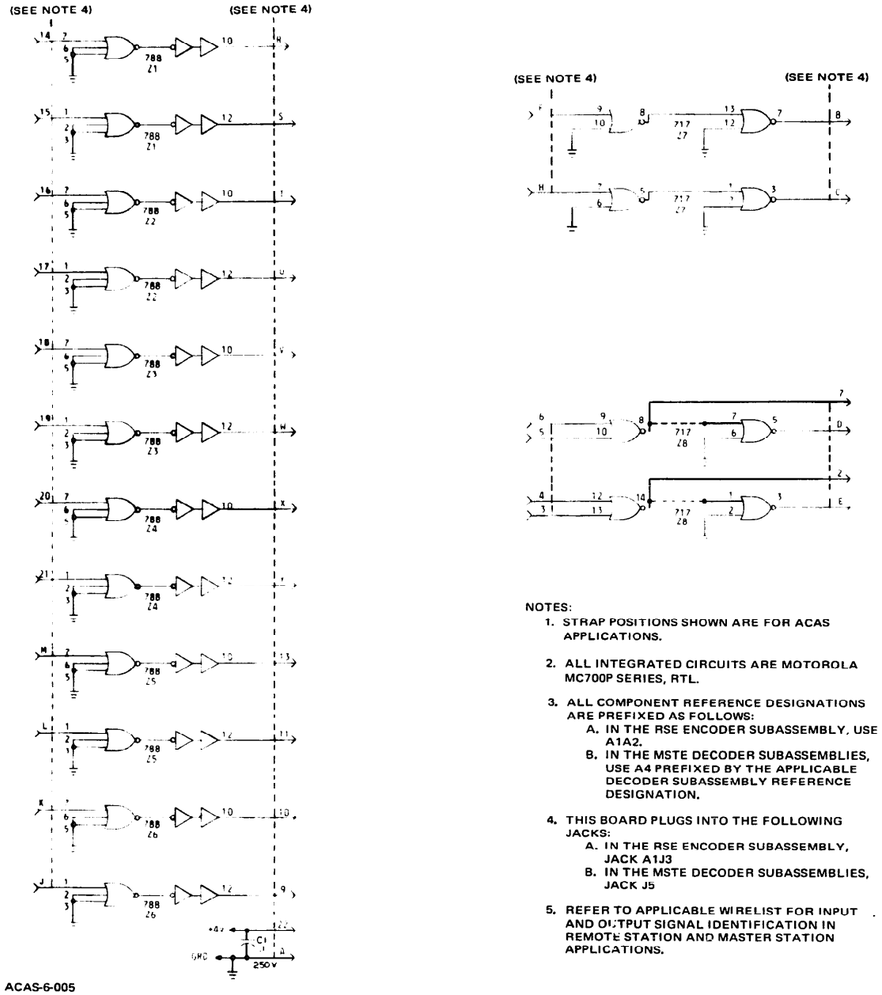


ACAS-6-004

NOTES:

1. UNLESS OTHERWISE SPECIFIED:
   A. ALL RESISTANCE VALUES ARE IN OHMS, 1/4W ±10%.
   B. ALL CAPACITANCE VALUES ARE IN MICROFARADS.
   C. ALL DIODES ARE 1N461.
   D. ALL INTEGRATED CIRCUITS ARE MOTOROLA MC717P, RTL.
2. STRAP POSITIONS SHOWN ARE FOR ACAS APPLICATIONS.
3. ALL COMPONENT REFERENCE DESIGNATIONS ARE PREFIXED BY THE APPLICABLE BOARD REFERENCE DESIGNATION.
4. BOARDS A1A3 THRU A1A9 PLUG INTO ENCODER SUBASSEMBLY JACKS A1J4 THRU A1J10, RESPECTIVELY.

Figure FO-7. Non-locking Input Circuit Board (A1A3-A1A9), Schematic Diagram

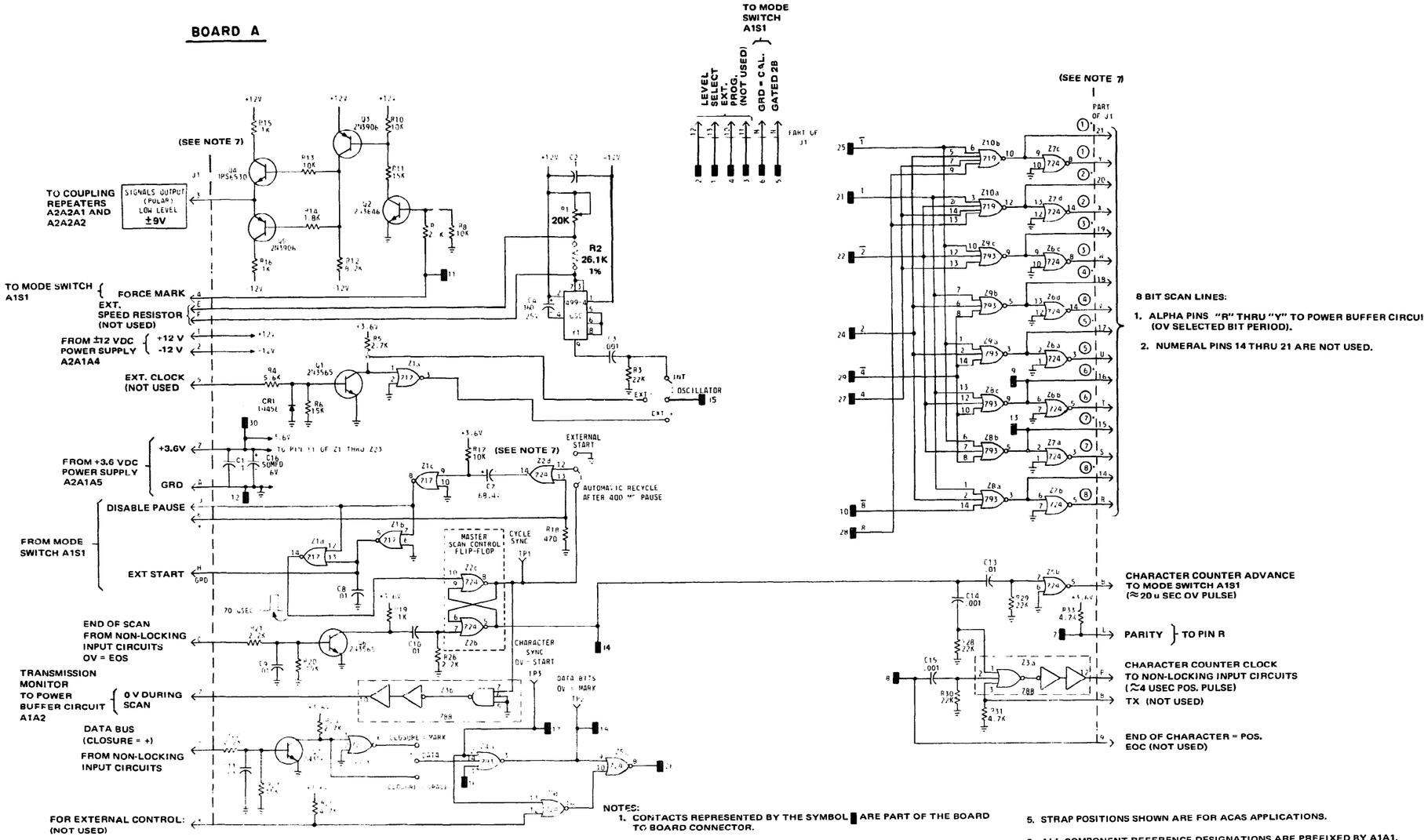


ACAS-6-005

NOTES:

1. STRAP POSITIONS SHOWN ARE FOR ACAS APPLICATIONS.
2. ALL INTEGRATED CIRCUITS ARE MOTOROLA MC700P SERIES, RTL.
3. ALL COMPONENT REFERENCE DESIGNATIONS ARE PREFIXED AS FOLLOWS:
   A. IN THE RSE ENCODER SUBASSEMBLY, USE A1A2.
   B. IN THE MSTE DECODER SUBASSEMBLIES, USE A4 PREFIXED BY THE APPLICABLE DECODER SUBASSEMBLY REFERENCE DESIGNATION.
4. THIS BOARD PLUGS INTO THE FOLLOWING JACKS:
   A. IN THE RSE ENCODER SUBASSEMBLY, JACK A1J3
   B. IN THE MSTE DECODER SUBASSEMBLIES, JACK J5
5. REFER TO APPLICABLE WIRELIST FOR INPUT AND OUTPUT SIGNAL IDENTIFICATION IN REMOTE STATION AND MASTER STATION APPLICATIONS.

Figure FO-8. Power Buffer Circuit Board, RSE or MSTE (A1A2 or A4), Schematic Diagram

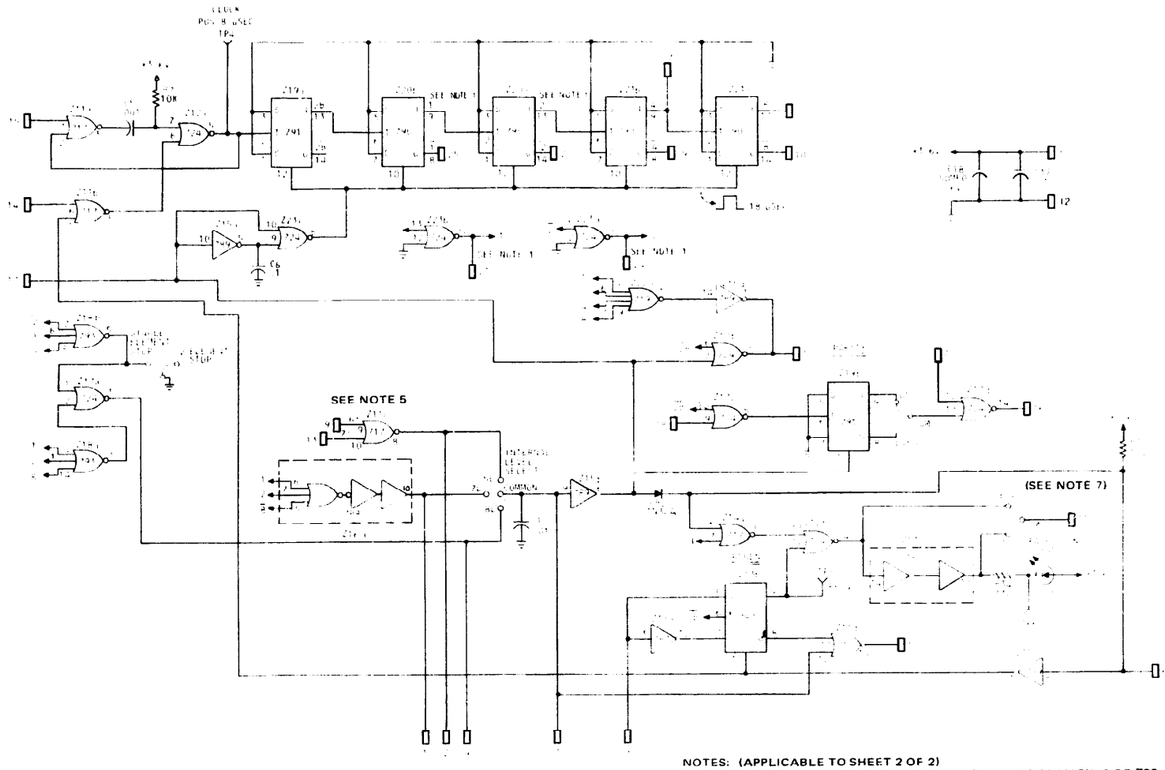


NOTES:
1. CONTACTS REPRESENTED BY THE SYMBOL ▌ ARE PART OF THE BOARD TO BOARD CONNECTOR.
2. COMPONENTS ARE NUMBERED CONSECUTIVELY WITH SHEET 2 OF 2.
3. ON Z6 AND Z7 OUTPUTS IN THE BCD-DECIMAL SECTION THE CIRCLED NUMBERS ARE BIT NUMBERS AND NOT I.C. PIN NUMBERS.
4. UNLESS OTHERWISE SPECIFIED:
   B. ALL CAPACITANCE VALUES ARE IN MICROFARADS.
   C. ALL INTEGRATED CIRCUITS ARE MOTOROLA RTL.
5. STRAP POSITIONS SHOWN ARE FOR ACAS APPLICATIONS.
6. ALL COMPONENT REFERENCE DESIGNATIONS ARE PREFIXED BY A1A1.
7. THIS BOARD PLUGS INTO ENCODER SUBASSEMBLY JACK A1J2.

ACAS-6-006①

Figure FO-9, Bit Generator Circuit Board (A1A1), Schematic Diagram (Sheet 1 of 2)

BOARD B

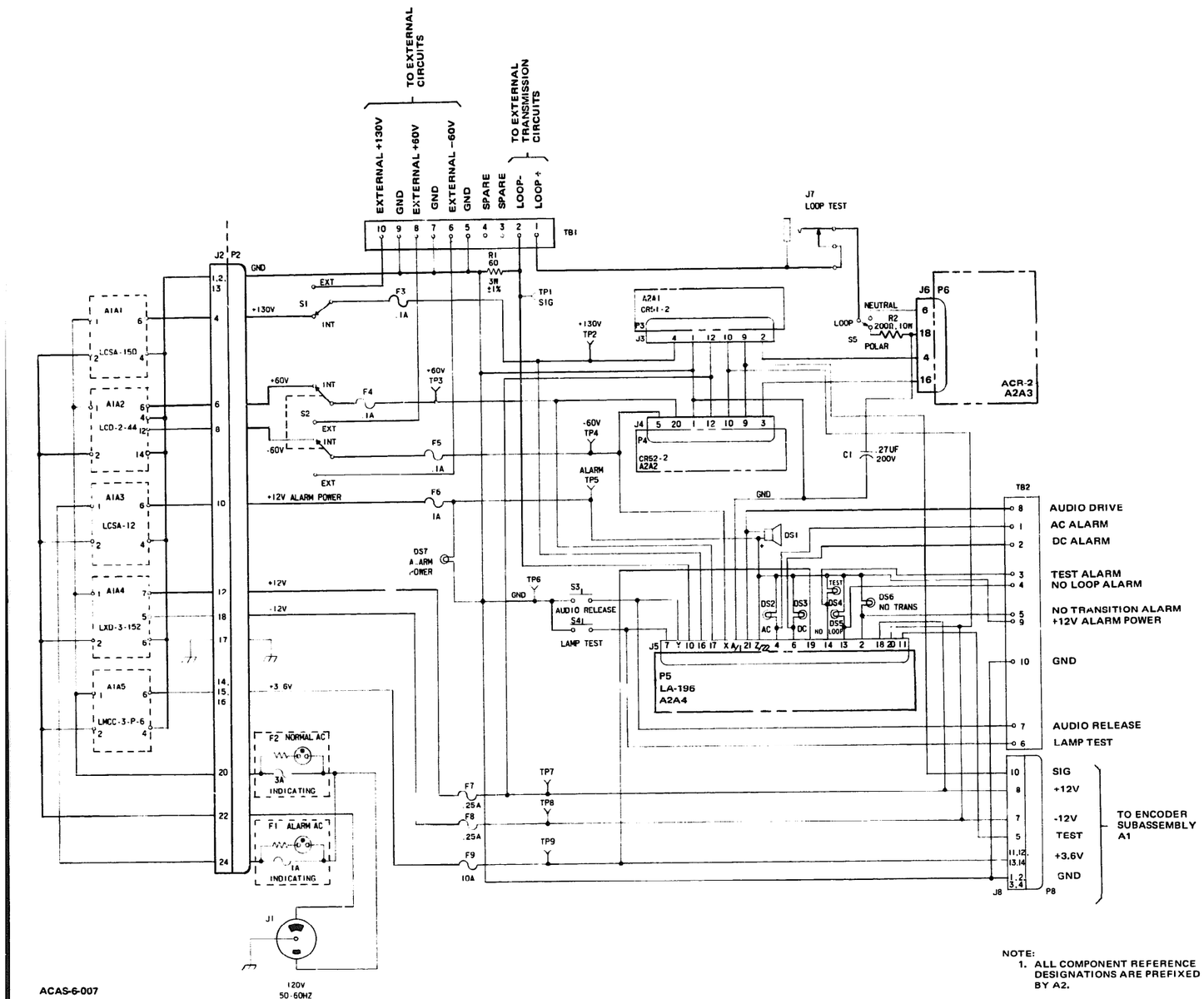


ACAS-6-006②

NOTES: (APPLICABLE TO SHEET 2 OF 2)

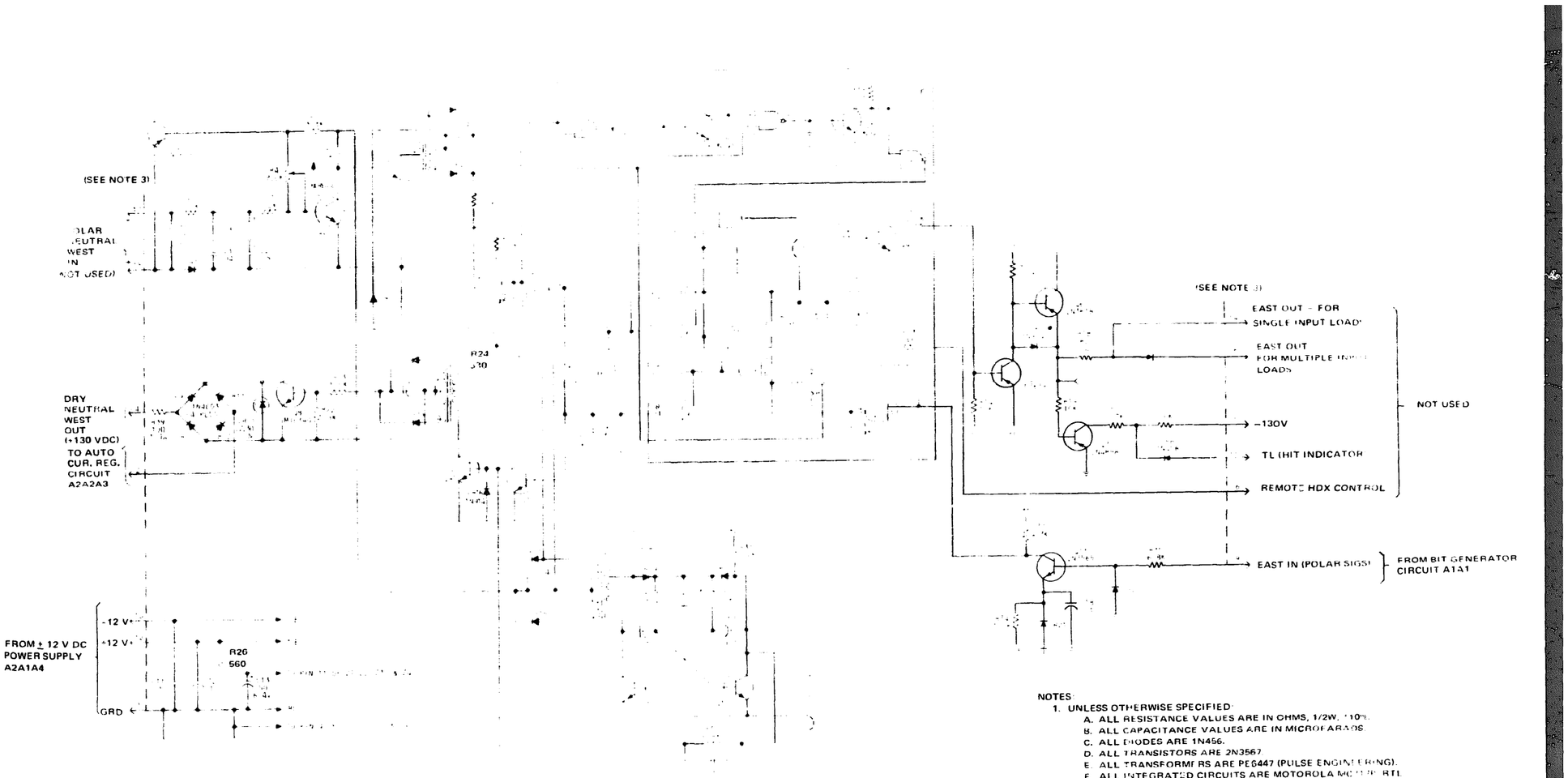
1. THE NON-BUFFERED 1, ON PIN 9 OF Z20, DRIVES ONLY PIN 2 OF Z20. THE NON-BUFFERED 2, ON PIN 13 of Z20, DRIVES ONLY PIN 6 of Z21. THE BUFFERED 1 AND 2, ON PINS 14 AND 3 RESPECTIVELY OF Z23, DRIVE THE REST OF THE 1 AND 2 INPUTS.
2. Z11 & Z19 THRU Z21, THE I.C. PIN NUMBER APPEARS BELOW THE SCHEMATIC LINE. THE DESIGNATION ABOVE THE LINE IS NOT A PIN NUMBER.
3. CONTACTS REPRESENTED BY THE SYMBOL ▯ ARE PART OF THE BOARD TO BOARD CONNECTOR, SHEET 1 OF 2 FOR RACK MOUNTED CONNECTOR CONTACTS.
4. COMPONENTS ARE NUMBERED CONSECUTIVELY WITH SHEET 1 OF 2.
5. 6* AND 7* APPEAR IN THE BCD TO DECIMAL SECTION OF SHEET 1.
6. STRAP POSITIONS SHOWN ARE FOR ACAS APPLICATIONS.
7. FOR NEUTRAL OPERATION, STRAP EIA (AS SHOWN); FOR POLAR OPERATION, STRAP MIL.

Figure FO-9. Bit Generator Circuit Board (A1A1), Schematic Diagram (Sheet 2 of 2)



NOTE:
1. ALL COMPONENT REFERENCE DESIGNATIONS ARE PREFIXED BY A2.

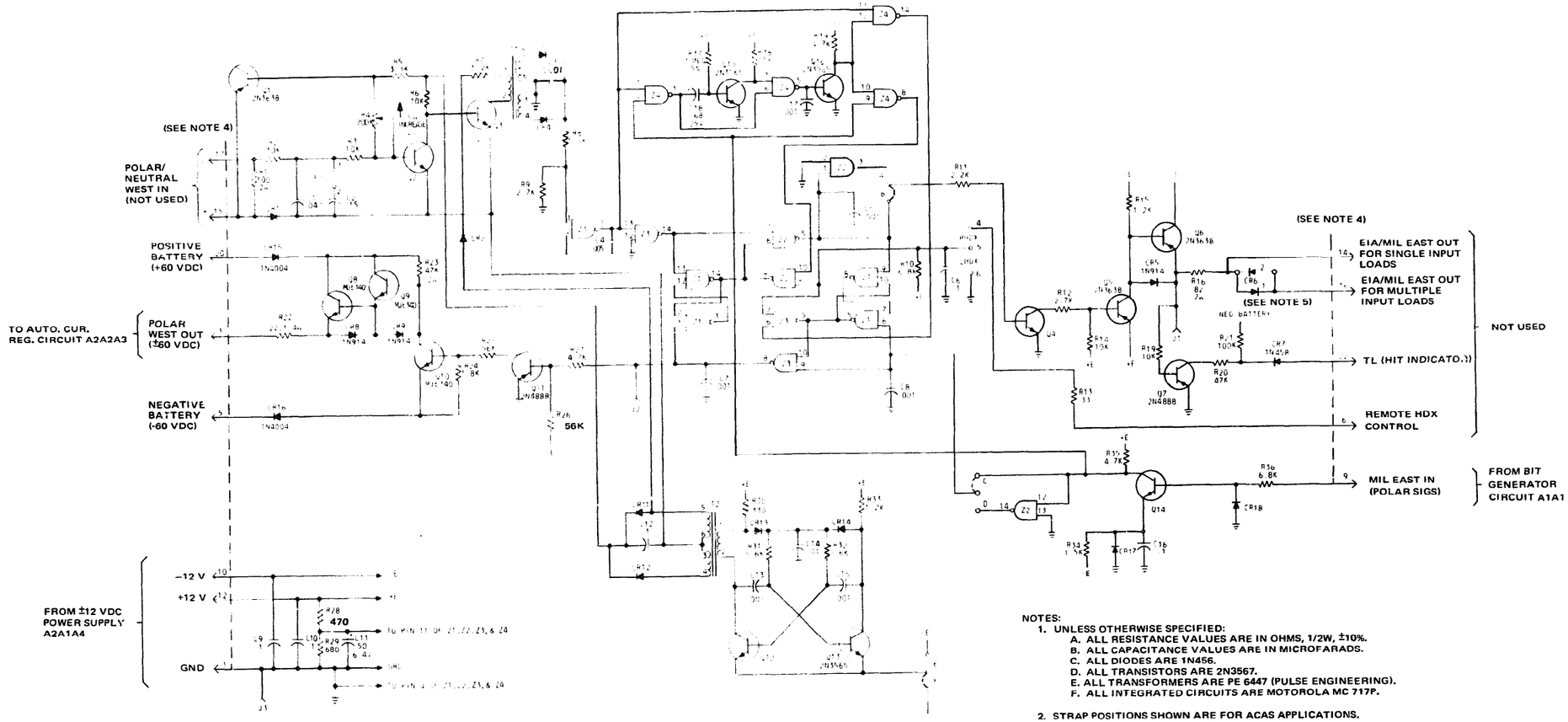
Figure FO-10. RSE Power Supply Subassembly (A2), Schematic Diagram



NOTES:
1. UNLESS OTHERWISE SPECIFIED:
   A. ALL RESISTANCE VALUES ARE IN OHMS, 1/2W, ±10%.
   B. ALL CAPACITANCE VALUES ARE IN MICROFARADS.
   C. ALL DIODES ARE 1N456.
   D. ALL TRANSISTORS ARE 2N3567.
   E. ALL TRANSFORMERS ARE PE6447 (PULSE ENGINEERING).
   F. ALL INTEGRATED CIRCUITS ARE MOTOROLA MC[illegible] RTL.
2. ALL COMPONENT REFERENCE DESIGNATIONS ARE PREFIXED BY #2A2A1.
3. [illegible] BOARD. PLUGS INTO JACK A2A2J3 OF THE POWER SUPPLY ASSEMBLY CARD FILE.
4. [illegible] PINS SHOWN ARE FOR A2A1 [illegible]

F i g u r e F O - 1 1

Schematic Diagram

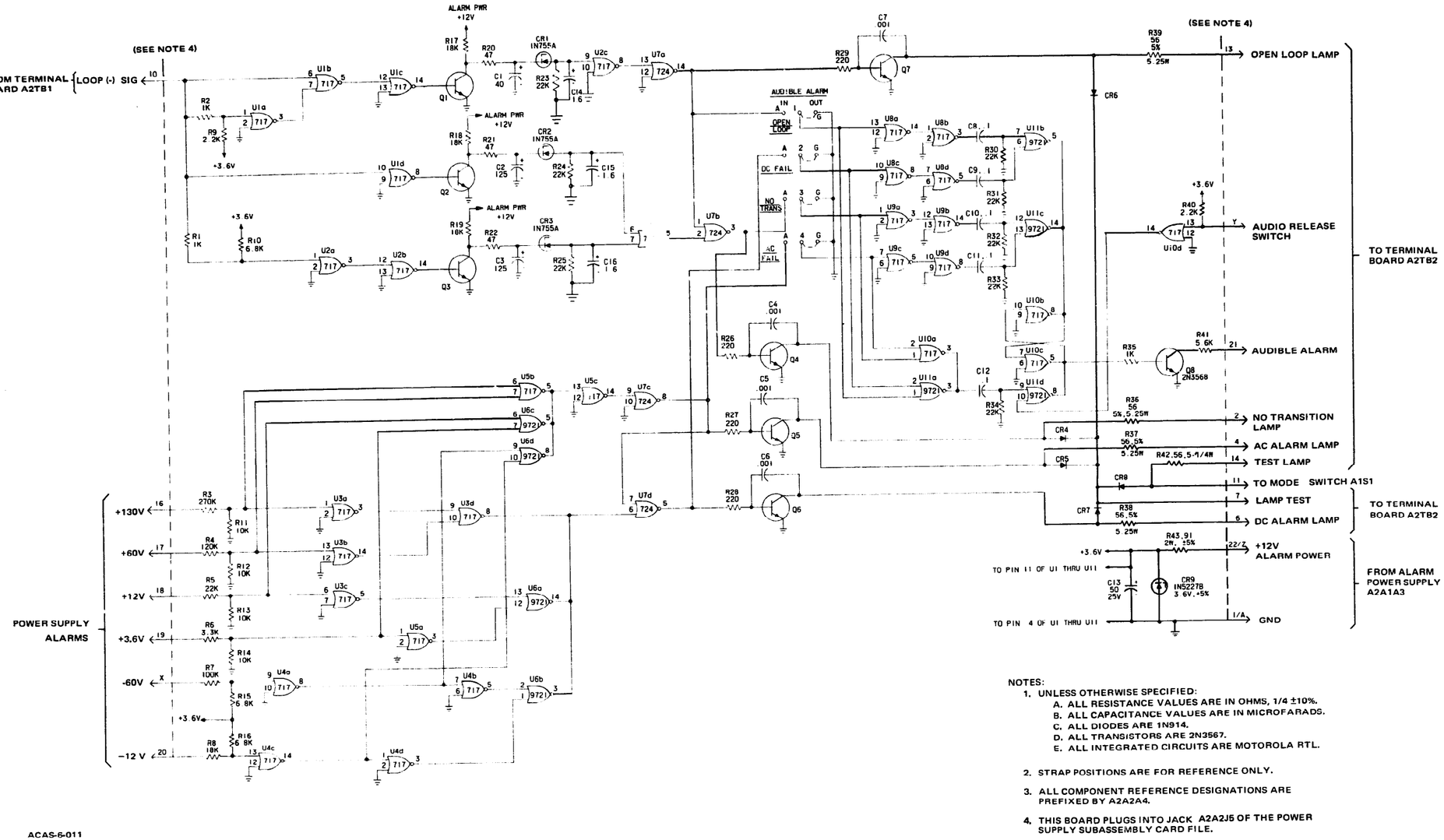


NOTES:

1. UNLESS OTHERWISE SPECIFIED:
   A. ALL RESISTANCE VALUES ARE IN OHMS, 1/2W, ±10%.
   B. ALL CAPACITANCE VALUES ARE IN MICROFARADS.
   C. ALL DIODES ARE 1N456.
   D. ALL TRANSISTORS ARE 2N3567.
   E. ALL TRANSFORMERS ARE PE 6447 (PULSE ENGINEERING).
   F. ALL INTEGRATED CIRCUITS ARE MOTOROLA MC 717P.
2. STRAP POSITIONS SHOWN ARE FOR ACAS APPLICATIONS.
3. ALL COMPONENT REFERENCE DESIGNATIONS ARE PREFIXED BY A2A2A2.
4. THIS BOARD PLUGS INTO JACK A2A2J4 OF THE POWER SUPPLY SUBASSEMBLY CARD FILE.

ACAS-6-009

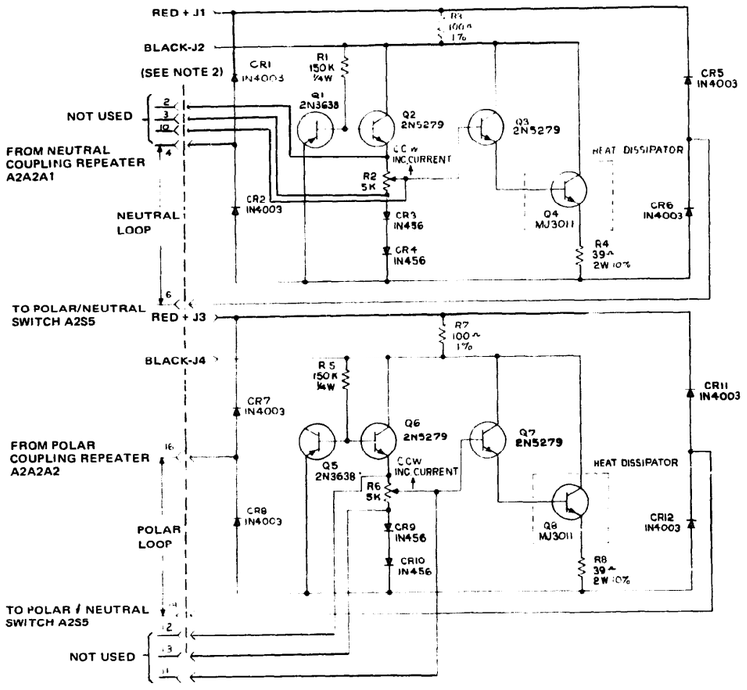
Figure FO-12. Polar Coupling Repeater Circuit Board (A2A2A2), Schematic Diagram



NOTES:

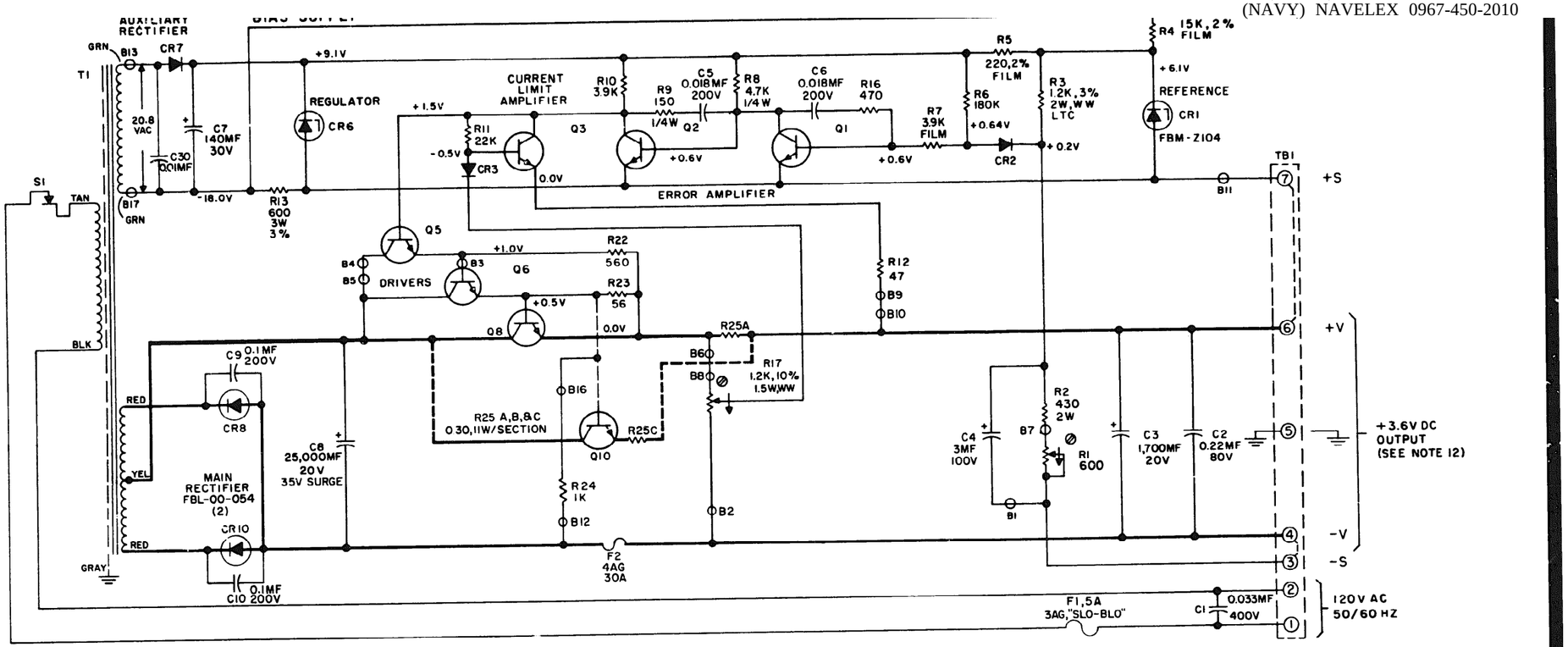
1. UNLESS OTHERWISE SPECIFIED:
   - A. ALL RESISTANCE VALUES ARE IN OHMS, 1/4 ±10%.
   - B. ALL CAPACITANCE VALUES ARE IN MICROFARADS.
   - C. ALL DIODES ARE 1N914.
   - D. ALL TRANSISTORS ARE 2N3567.
   - E. ALL INTEGRATED CIRCUITS ARE MOTOROLA RTL.
2. STRAP POSITIONS ARE FOR REFERENCE ONLY.
3. ALL COMPONENT REFERENCE DESIGNATIONS ARE PREFIXED BY A2A2A4.
4. THIS BOARD PLUGS INTO JACK A2A2J5 OF THE POWER SUPPLY SUBASSEMBLY CARD FILE.

Figure FO-14. RSE Local Alarm Circuit Board (A2A2A4), Schematic Diagram



NOTE:
1. ALL COMPONENT REFERENCE DESIGNATIONS ARE PREFIXED BY A2A2A3.
2. THIS BOARD PLUGS INTO JACK A2A2J6 OF THE POWER SUPPLY SUBASSEMBLY CARD FILE.

Figure FO-13. Automatic Current Regulator Circuit Board (A2A2A3), Schematic Diagram



NOTES

1. RESISTOR VALUES ARE IN OHMS.
2. RESISTOR WATTAGE 1/2 WATT; RESISTORS ABOVE 2 WATTS ARE WIREWOUND UNLESS OTHERWISE NOTED.
3. RESISTOR TOLERANCES: COMP. ±10%; WIREWOUND ±5%; FILM ±5%; UNLESS OTHERWISE NOTED.
4. CAPACITOR VALUES IN UF. TOLERANCES: ELECTROLYTIC -10%, +100%; MYLAR ±10%; UNLESS OTHERWISE NOTED.
5. SYMBOLS:
   - INDICATES CLOCKWISE ROTATION OF SHAFT.
   - INDICATES ADJUSTMENT OR CALIBRATION CONTROL.
   - INDICATES CONNECTION TO CHASSIS.
   - INDICATES ACTUAL UNIT MARKING
   - LAMBDA PT. #FBL-00-030; USE IN4002 DIODE FOR REPLACEMENT UNLESS OTHERWISE NOTED.
   - INDICATES TERMINAL ON PRINTED WIRING BOARD "B".
6. DESIGNATIONS ARE LAMBDA PART NUMBERS.
7. DERATE CURRENT 10% FOR 45-55Hz OR 360-440Hz.
8. CONDITIONS FOR CIRCUIT POINT MEASUREMENTS: INPUT: 115VAC, 60Hz, OUTPUT: NOM'L VDC NO LOAD. INDICATED VOLTAGES ARE TYPICAL VALUES AND ARE DC UNLESS OTHERWISE NOTED. DC MEASUREMENTS TAKEN WITH 20,000 OHMS/V VOLTMETER BETWEEN +S (TERM. 7) & INDICATED POINTS UNLESS NOTED.
9. COAT BOTH SIDES OF INSULATING WAFER WITH DOW CORNING NO. 340 SILICONE GREASE.
10. IF Q5 IS REPLACED, ALWAYS RETAIN RADIATOR AND INSTALL WITH NEW TRANSISTOR.
11. ALL COMPONENT REFERENCE DESIGNATIONS ARE PREFIXED BY A2A1A5.
12. VOLTAGE MEASURED AT OUTPUT TERMINALS IS +4.0 ± 0.2V DC.

REFERENCE DESIGNATIONS NOT USED	
Q4	C11
Q7	C12
	R14
	R15
	R19-21
CR4,5	CR9

DOTTED CONNECTIONS SHOWN ON TB1 INDICATE JUMPERS IN PLACE FOR LOCAL SENSING CONNECTION.

THIS SCHEMATIC APPLIES TO UNITS BEARING SERIAL NO. PREFIXES A,B

ACAS-6-012

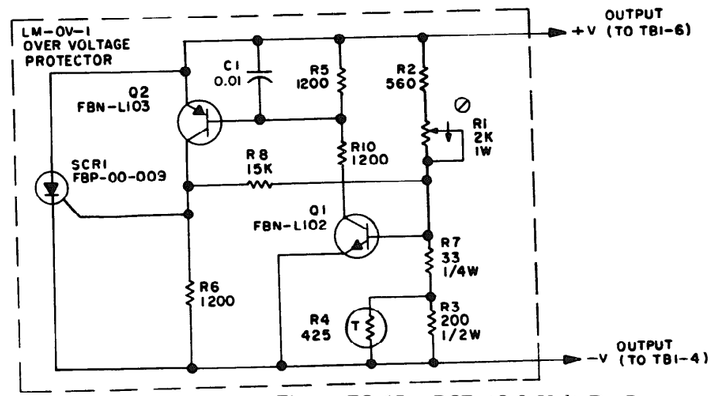
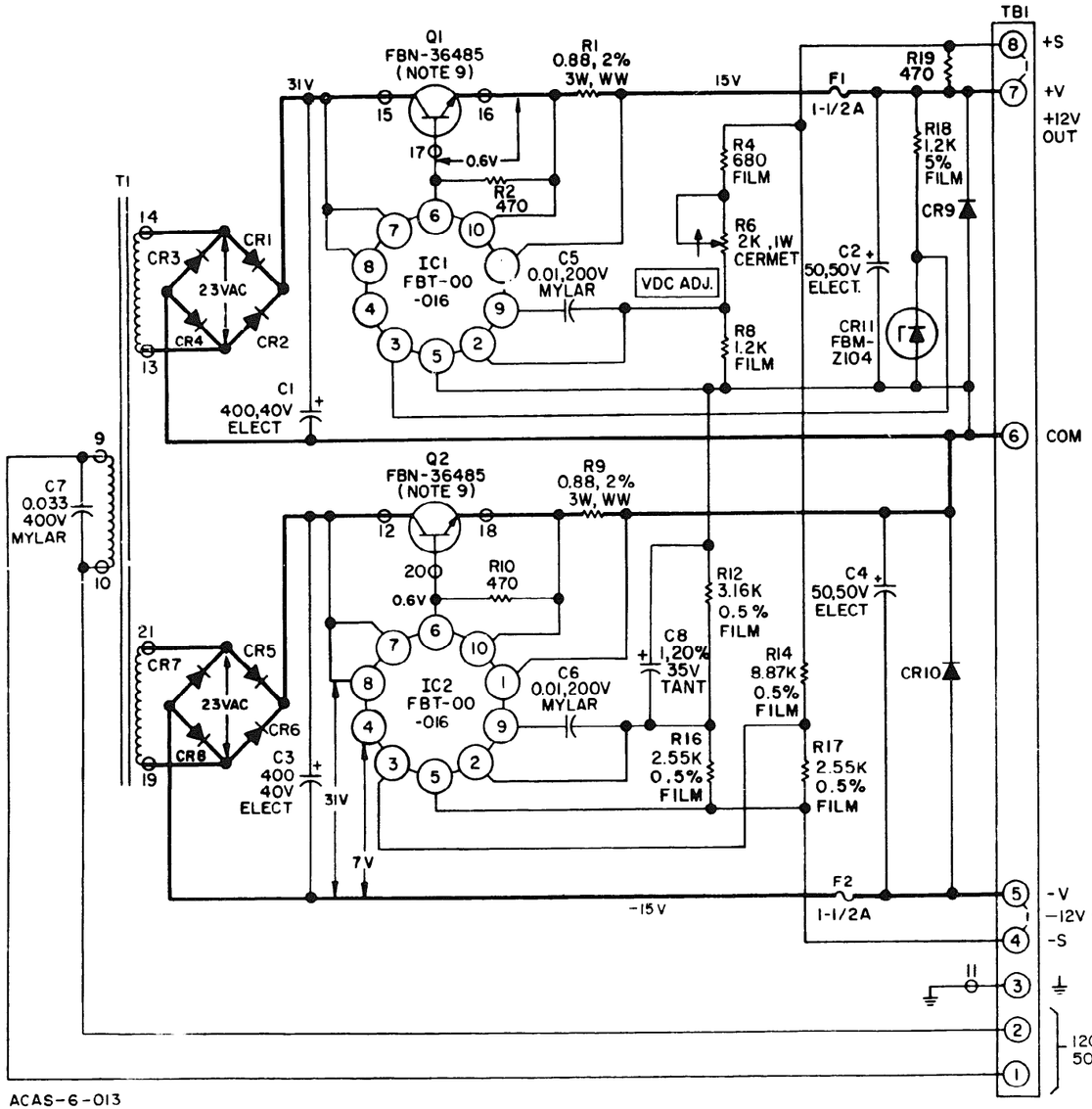


Figure FO-15. RSE +3.6 Volt Dc Power Supply Module (A2A1A5) Schematic Diagram



NOTES:

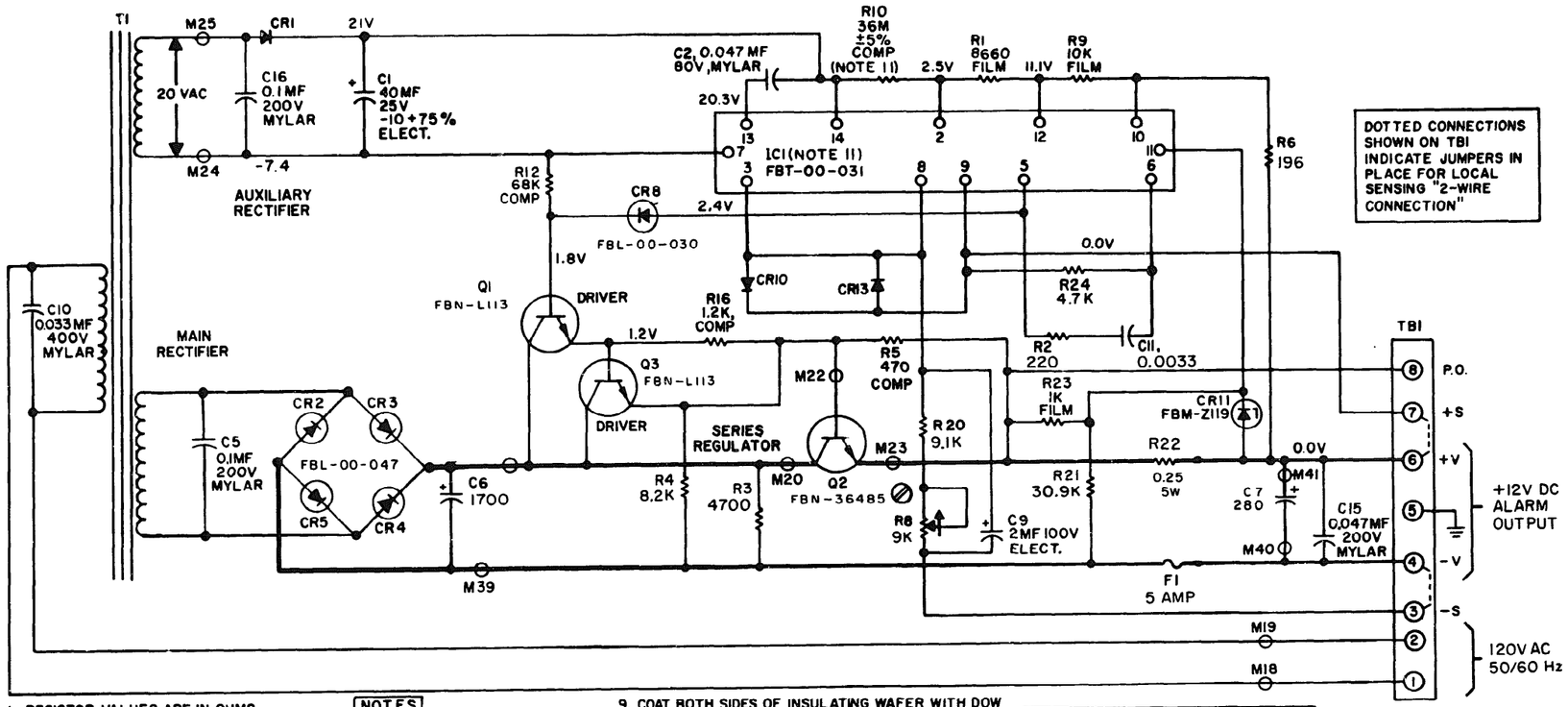
1. RESISTORS ARE COMP. 1/4W WITH VALUES IN OHMS, UNLESS OTHERWISE NOTED.
2. RESISTOR TOLERANCES: COMP. ± 10%, FILM ± 1%, WIREWOUND ±5%, UNLESS OTHERWISE NOTED.
3. CAPACITOR VALUES ARE IN MICROFARADS.
4. CAPACITOR VALUES IN uf, TOLERANCES: ELECTROLYTIC -10%; +100%; MYLAR ±10%; CERAMIC 10%; UNLESS OTHERWISE NOTED.
5. DESIGNATIONS ARE LAMBDA PART NUMBERS.
6. SYMBOLS:
   - ↑ INDICATES CLOCKWISE ROTATION OF SHAFT.
   - ⏚ INDICATES CONNECTION TO CHASSIS.
   - ▶| LAMBDA PART NO. FBL-00-030; USE IN4002 DIODE FOR REPLACEMENT UNLESS OTHERWISE NOTED.
   - ⊖ INDICATES TERMINAL ON PRINTED CIRCUIT BOARD.
   - ▭ INDICATES ACTUAL UNIT MARKING.
7. CONDITIONS FOR CIRCUIT POINT MEASUREMENTS: INPUT: 115 VAC, 60Hz, MAX. RATED VOLTAGE NO LOAD. INDICATED VOLTAGES ARE TYPICAL VALUES AND ARE D.C. UNLESS OTHERWISE NOTED, D.C. MEASUREMENTS TAKEN WITH 20,000 OHMS/V VOLTMETER BETWEEN COM. (TERM 6) AND INDICATED POINTS UNLESS OTHERWISE NOTED.
8. DERATE CURRENT 10% FOR 47-57 Hz INPUT, FOR 63-440 Hz INPUT CONSULT FACTORY.
9. COAT BOTH SIDES OF INSULATING WAFER WITH DOW CORNING NO. 340 SILICONE GREASE.
10. ALL COMPONENT REFERENCE DESIGNATIONS ARE PREFIXED BY A2A1A4.

DOTTED CONNECTIONS SHOWN ON TB1 INDICATE JUMPERS IN PLACE FOR LOCAL SENSING CONNECTION.

THIS SCHEMATIC APPLIES TO UNITS BEARING SERIAL NO. PREFIX A

ACAS-6-013

Figure FO-16. RSE ±12 Volt Dc Power Supply Module (A2A1A4), Schematic Diagram



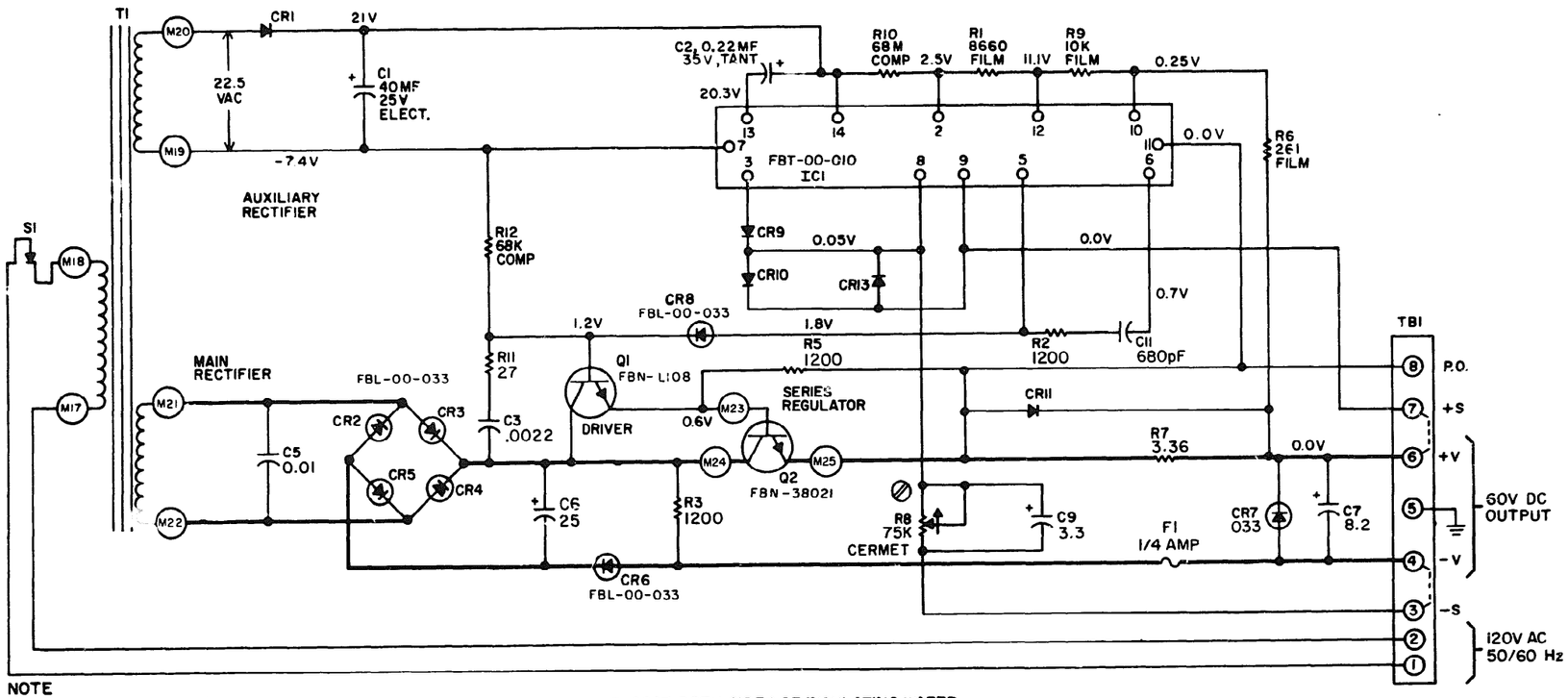
NOTES

1. RESISTOR VALUES ARE IN OHMS.
2. RESISTOR WATTAGE 1/4 WATT; RESISTORS ABOVE 2 WATTS ARE WIREWOUND UNLESS OTHERWISE NOTED
3. RESISTOR TOLERANCES: COMP. ±10%; WIREWOUND ±2% FILM ±1%; UNLESS OTHERWISE NOTED.
4. CAPACITOR VALUES IN μf TOLERANCES: ELECTROLYTIC -10%; +100%; MYLAR ±10%; CERAMIC 10%; UNLESS OTHERWISE NOTED.
5. SYMBOLS:
   - INDICATES CLOCKWISE ROTATION OF SHAFT.
   - INDICATES CONNECTION TO CHASSIS.
   - INDICATES ADJUSTMENT OR CALIBRATION CONTROL.
   - LAMBDA PT. # FBL-00-030; USE IN 4002 DIODE FOR REPLACEMENT UNLESS OTHERWISE NOTED.
   - INDICATES TERMINAL ON PRINTED WIRING BOARD.
6. DESIGNATION IS LAMBDA PART NUMBER.
7. DERATE CURRENT 10% FOR 47–57 Hz, FOR 360-440 Hz CONSULT FACTORY.
8. CONDITIONS FOR CIRCUIT POINT MEASUREMENTS: INPUT: 115 VAC, 60Hz; OUTPUT: NOMINAL V DC. INDICATED VOLTAGES ARE TYPICAL VALUES AND ARE DC UNLESS OTHERWISE NOTED. DC MEASUREMENTS TAKEN WITH 20,000 OHMS/V VOLTMETER BETWEEN +S (TERM. 7) & INDICATED POINTS UNLESS NOTED: +S AND +V SHORTED, -S AND -V SHORTED.
9. COAT BOTH SIDES OF INSULATING WAFER WITH DOW CORNING NO.340 SILICONE GREASE.
10. IF Q3 IS REPLACED RETAIN RADIATOR AND INSTALL WITH NEW TRANSISTOR.
11. ON UNITS WITH SERIAL NO. PREFIX A, R10 IS 68M ±10% AND IC1 IS FBT-00-010.
12. ALL COMPONENT REFERENCES ARE PREFIXED BY A2A1A3.

THIS SCHEMATIC APPLIES TO UNITS BEARING SERIAL NO PREFIXES A & B

ACAS-6-014

Figure FO-17. RSE Alarm Power Supply Module (A2A1A3), Schematic Diagram



NOTE

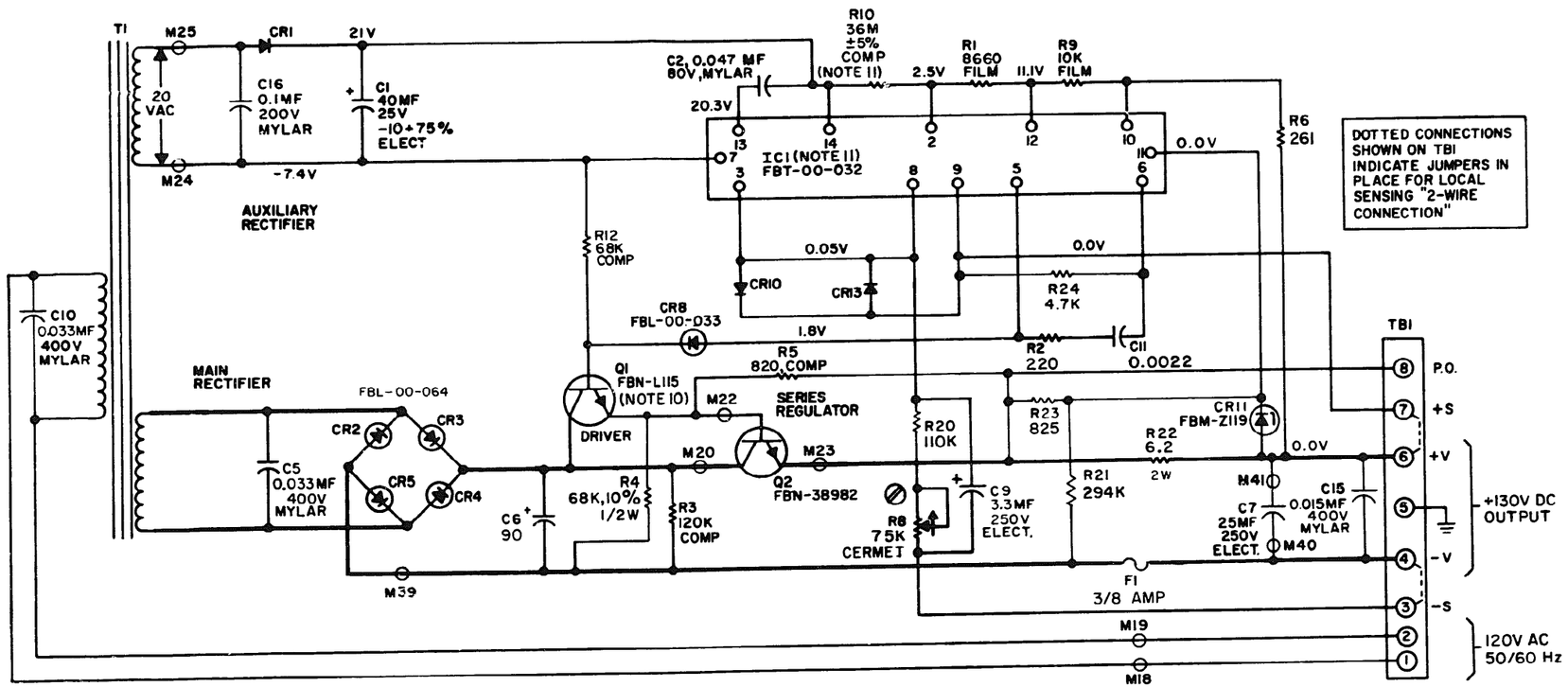
1. RESISTOR VALUES ARE IN OHMS.
2. RESISTOR WATTAGE 1/4 WATT; RESISTORS ABOVE 2 WATTS ARE WIREWOUND UNLESS OTHERWISE NOTED
3. RESISTOR TOLERANCES: COMP. ±10%; WIREWOUND ±2% FILM ±1%; UNLESS OTHERWISE NOTED.
4. CAPACITOR VALUES IN μf, TOLERANCES: ELECTROLYTIC -10%; +100%; MYLAR ±10%; CERAMIC 10%; UNLESS OTHERWISE NOTED.
5. SYMBOLS:
   - INDICATES CLOCKWISE ROTATION OF SHAFT.
   - INDICATES CONNECTION TO CHASSIS.
   - INDICATES ADJUSTMENT OR CALIBRATION CONTROL.
   - LAMBDA PT.#FBL-00-030; USE IN 4002 DIODE FOR REPLACEMENT UNLESS OTHERWISE NOTED.
   - INDICATES TERMINAL ON PRINTED WIRING BOARD.
6. DESIGNATION IS LAMBDA PART NUMBER.
7. DERATE CURRENT 10% FOR 47–57Hz, FOR 360-440Hz CONSULT FACTORY.
8. CONDITIONS FOR CIRCUIT POINT MEASUREMENTS: INPUT: 115 VAC, 60Hz; MAX. RATED VOLTAGE NO LOAD. INDICATED VOLTAGES ARE TYPICAL VALUES AND ARE DC UNLESS OTHERWISE NOTED. DC MEASUREMENTS TAKEN WITH 20,000 OHMS/V VOLTMETER BETWEEN +S (TERM. 7) & INDICATED POINTS UNLESS NOTED; +S AND +V SHORTED, -S AND -V SHORTED.
9. COAT BOTH SIDES OF INSULATING WAFER WITH DOW CORNING NO. 340 SILICONE GREASE.
10. ALL COMPONENT REFERENCE DESIGNATIONS ARE PREFIXED BY A2A1A2.

THIS SCHEMATIC APPLIES TO UNITS BEARING SERIAL NO PREFIX A

DOTTED CONNECTIONS SHOWN ON TB1 INDICATE JUMPERS IN PLACE FOR LOCAL SENSING "2-WIRE CONNECTION"

ACAS-6-015

Figure FO-18. RSE ±60 Volt Dc Power Supply Module (A2A1A2), Schematic Diagram



NOTE

1. RESISTOR VALUES ARE IN OHMS.
2. RESISTOR WATTAGE 1/4 WATT; RESISTORS ABOVE 2 WATTS ARE WIREWOUND UNLESS OTHERWISE NOTED
3. RESISTOR TOLERANCES: COMP. ±10%; WIREWOUND ±2% FILM ±1%; UNLESS OTHERWISE NOTED.
4. CAPACITOR VALUES IN uf TOLERANCES: ELECTROLYTIC -10%; +100%; MYLAR ±10%; CERAMIC 10%; UNLESS OTHERWISE NOTED.
5. SYMBOLS:
   - INDICATES CLOCKWISE ROTATION OF SHAFT.
   - INDICATES CONNECTION TO CHASSIS.
   - INDICATES ADJUSTMENT OR CALIBRATION CONTROL.
   - LAMBDA PT. # FBL-00-030; USE IN 4002 DIODE FOR REPLACEMENT UNLESS OTHERWISE NOTED.
   - INDICATES TERMINAL ON PRINTED WIRING BOARD.
6. DESIGNATION IS LAMBDA PART NUMBER.
7. DERATE 40°C CURRENT RATING 10% FOR 47-57 Hz INPUT
8. CONDITIONS FOR CIRCUIT POINT MEASUREMENTS: INPUT: 115 VAC, 60Hz; MAX. RATED VOLTAGE NO LOAD. INDICATED VOLTAGES ARE TYPICAL VALUES AND ARE DC UNLESS OTHERWISE NOTED. DC MEASUREMENTS TAKEN WITH 20,000 OHMS/V VOLTMETER BETWEEN +S (TERM. 7) & INDICATED POINTS UNLESS NOTED; +S AND +V SHORTED, -S AND -V SHORTED
9. COAT BOTH SIDES OF INSULATING WAFER WITH DOW CORNING NO. 340 SILICONE GREASE.
10. IF Q1 IS REPLACED, RETAIN RADIATOR AND INSTALL WITH NEW TRANSISTOR.
11. ON UNITS WITH SERIAL NO. PREFIX A, R10 IS 68M ±10% AND IC1 IS FBT-00-010.
12. ALL COMPONENT REFERENCE DESIGNATIONS ARE PREFIXED BY A2A1A1.

THIS SCHEMATIC APPLIES TO UNITS BEARING SERIAL NO. PREFIXES A & B

ACAS-6-016

Figure FO-19. RSE +130 Volt Dc Power Supply Module (A2A1A1), Schematic Diagram

DECODER ASSY

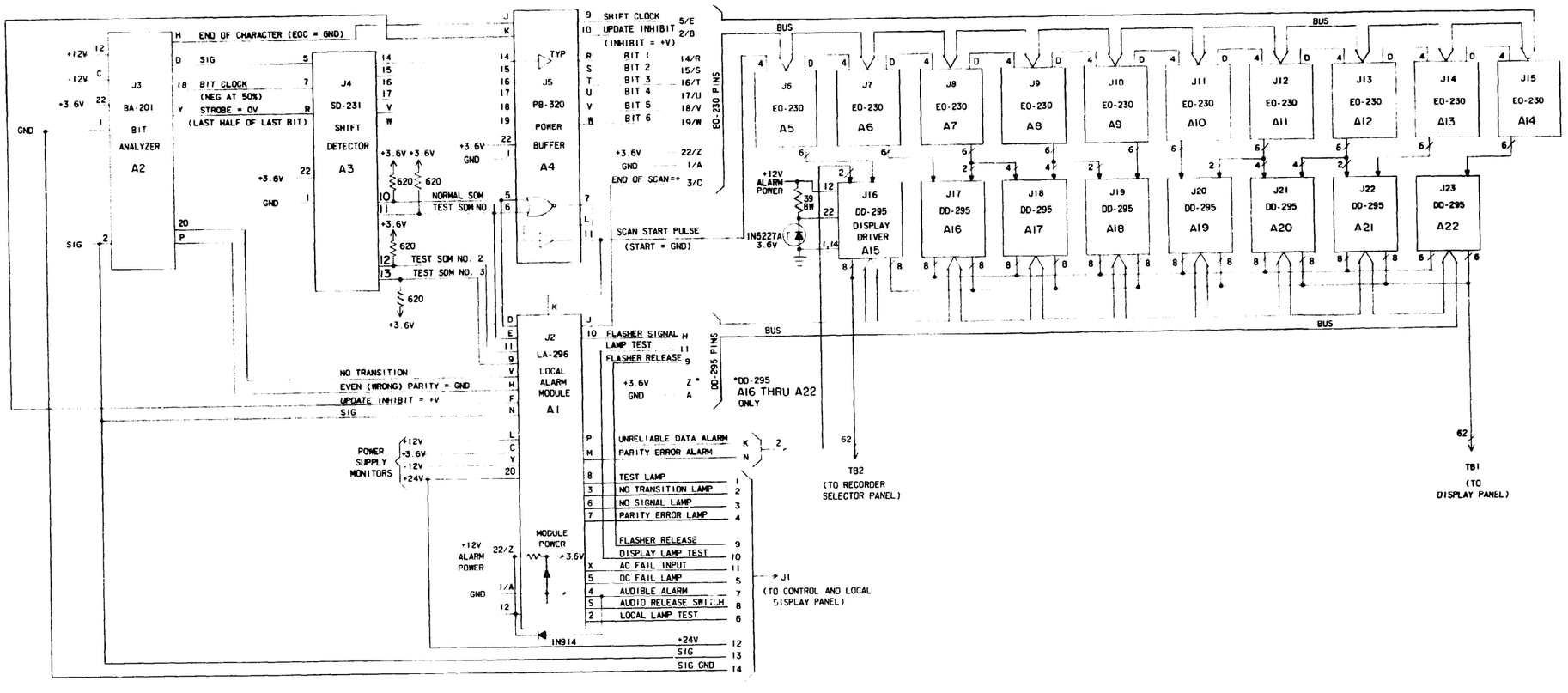
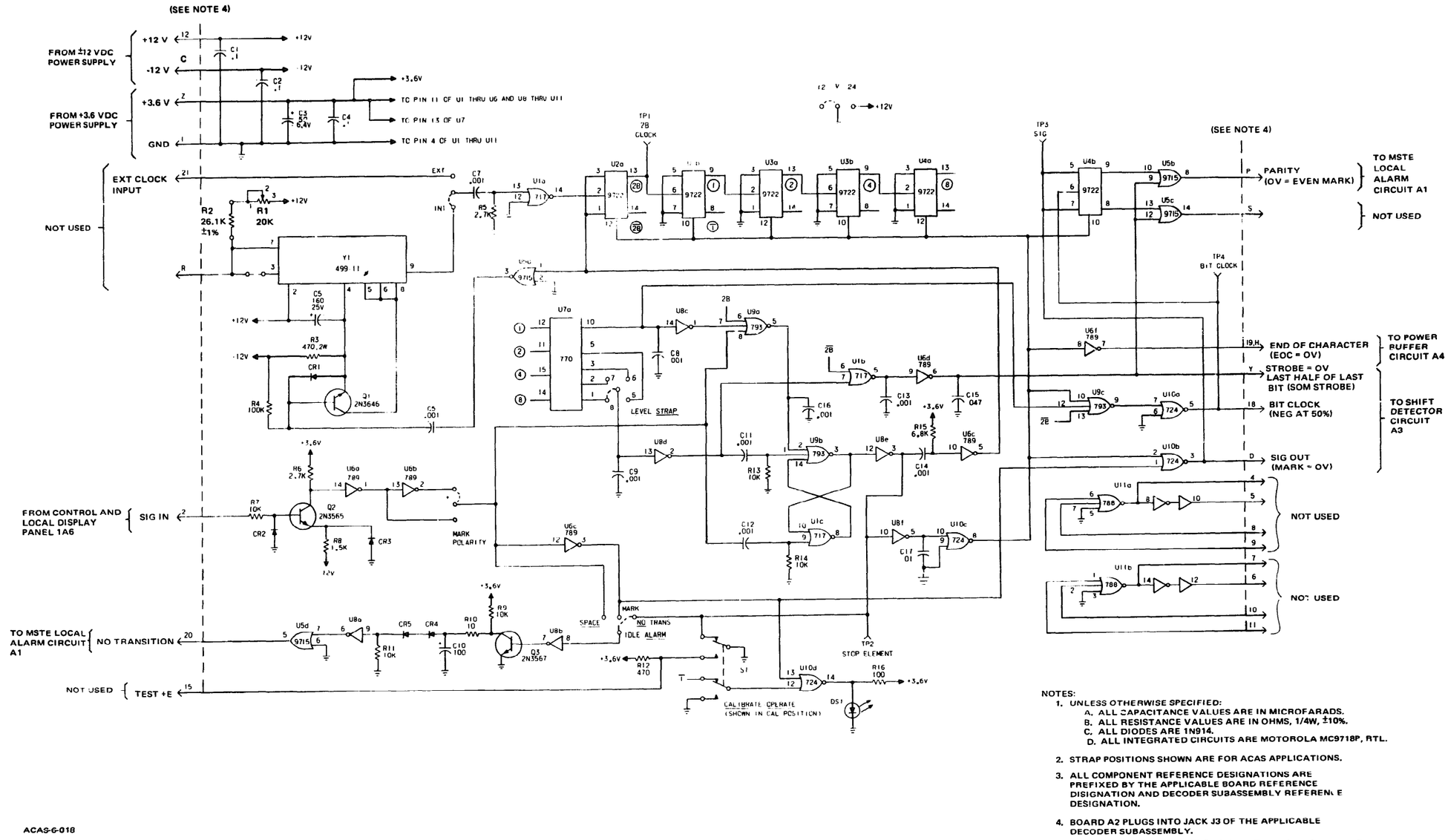


Figure FO-20. Master Station Terminal Equipment (MSTE), Functional Block Diagram



ACAS-6-018

NOTES:

1. UNLESS OTHERWISE SPECIFIED:
   A. ALL CAPACITANCE VALUES ARE IN MICROFARADS.
   B. ALL RESISTANCE VALUES ARE IN OHMS, 1/4W, ±10%.
   C. ALL DIODES ARE 1N914.
   D. ALL INTEGRATED CIRCUITS ARE MOTOROLA MC9718P, RTL.
2. STRAP POSITIONS SHOWN ARE FOR ACAS APPLICATIONS.
3. ALL COMPONENT REFERENCE DESIGNATIONS ARE PREFIXED BY THE APPLICABLE BOARD REFERENCE DISIGNATION AND DECODER SUBASSEMBLY REFERENCE DESIGNATION.
4. BOARD A2 PLUGS INTO JACK J3 OF THE APPLICABLE DECODER SUBASSEMBLY.

Figure FO-21. Bit Analyzer Circuit Board (A2), Schematic Diagram

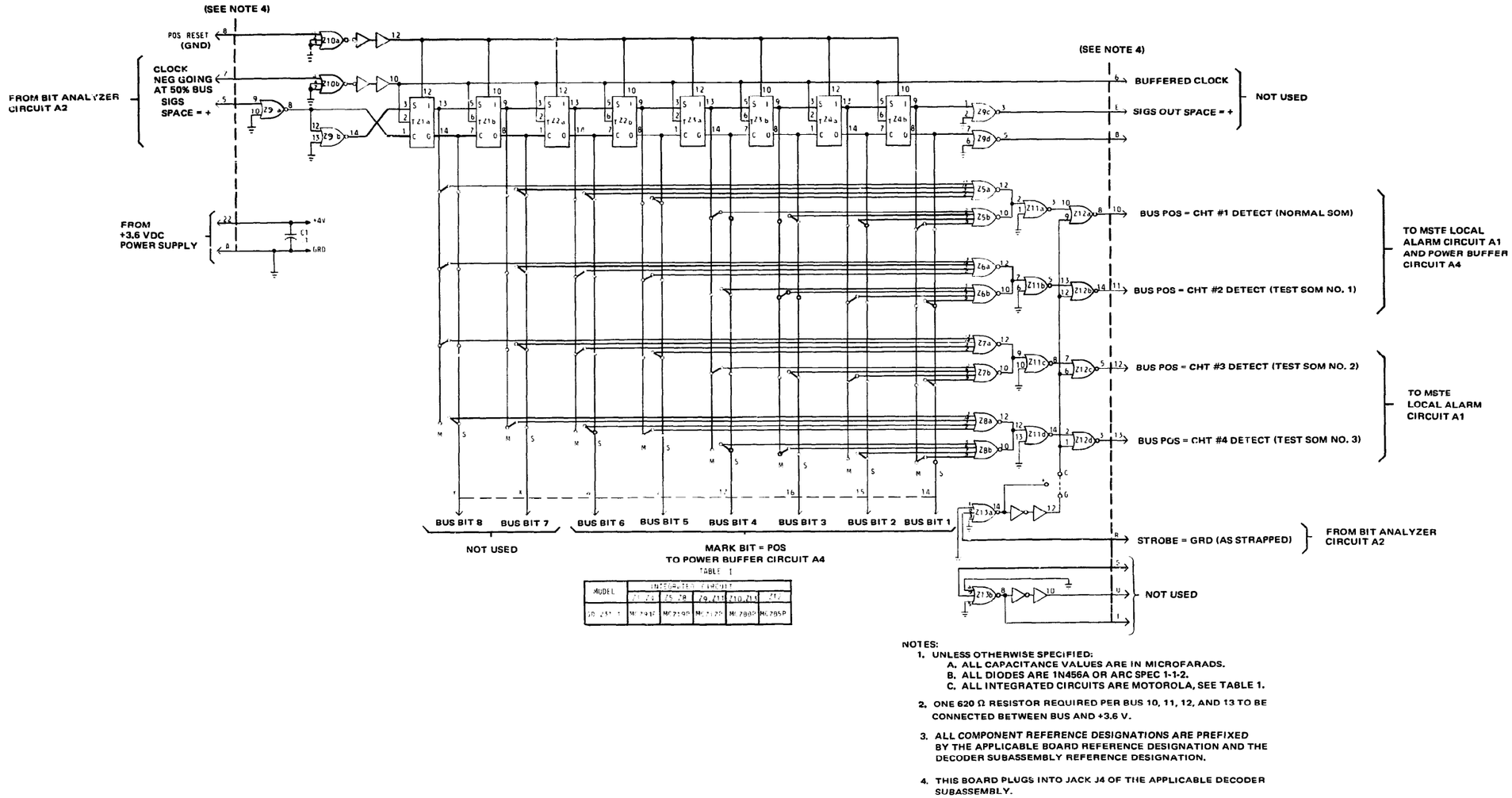


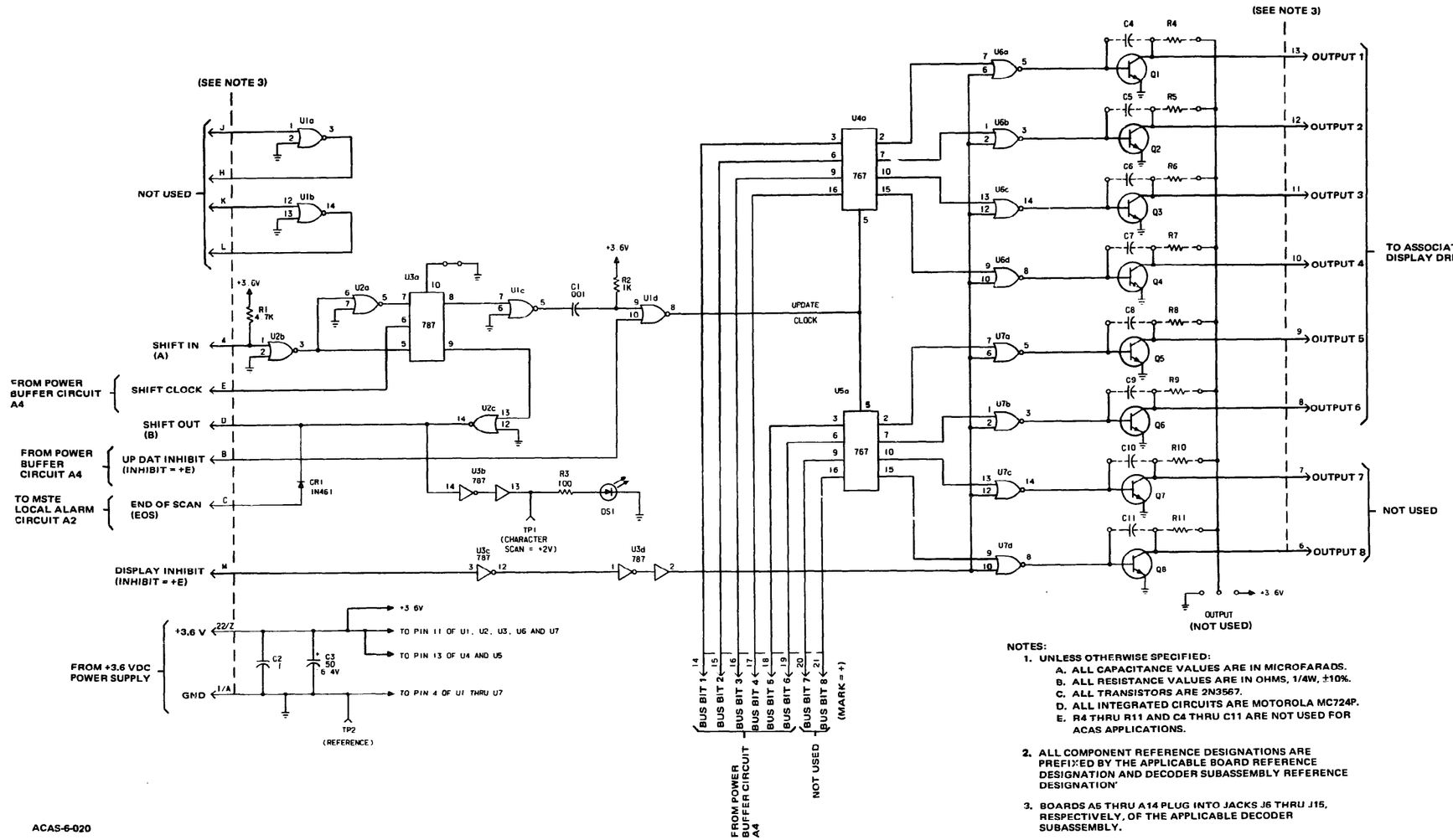
TABLE I

MODEL	INTEGRATED CIRCUIT			
	Z1, Z2	Z5, Z8	Z9, Z11	Z10, Z13
	MC7497	MC7495	MC7420	MC7885P

NOTES:
1. UNLESS OTHERWISE SPECIFIED:
   A. ALL CAPACITANCE VALUES ARE IN MICROFARADS.
   B. ALL DIODES ARE 1N456A OR ARC SPEC 1-1-2.
   C. ALL INTEGRATED CIRCUITS ARE MOTOROLA, SEE TABLE 1.
2. ONE 620 Ω RESISTOR REQUIRED PER BUS 10, 11, 12, AND 13 TO BE CONNECTED BETWEEN BUS AND +3.6 V.
3. ALL COMPONENT REFERENCE DESIGNATIONS ARE PREFIXED BY THE APPLICABLE BOARD REFERENCE DESIGNATION AND THE DECODER SUBASSEMBLY REFERENCE DESIGNATION.
4. THIS BOARD PLUGS INTO JACK J4 OF THE APPLICABLE DECODER SUBASSEMBLY.

ACAS-6-019

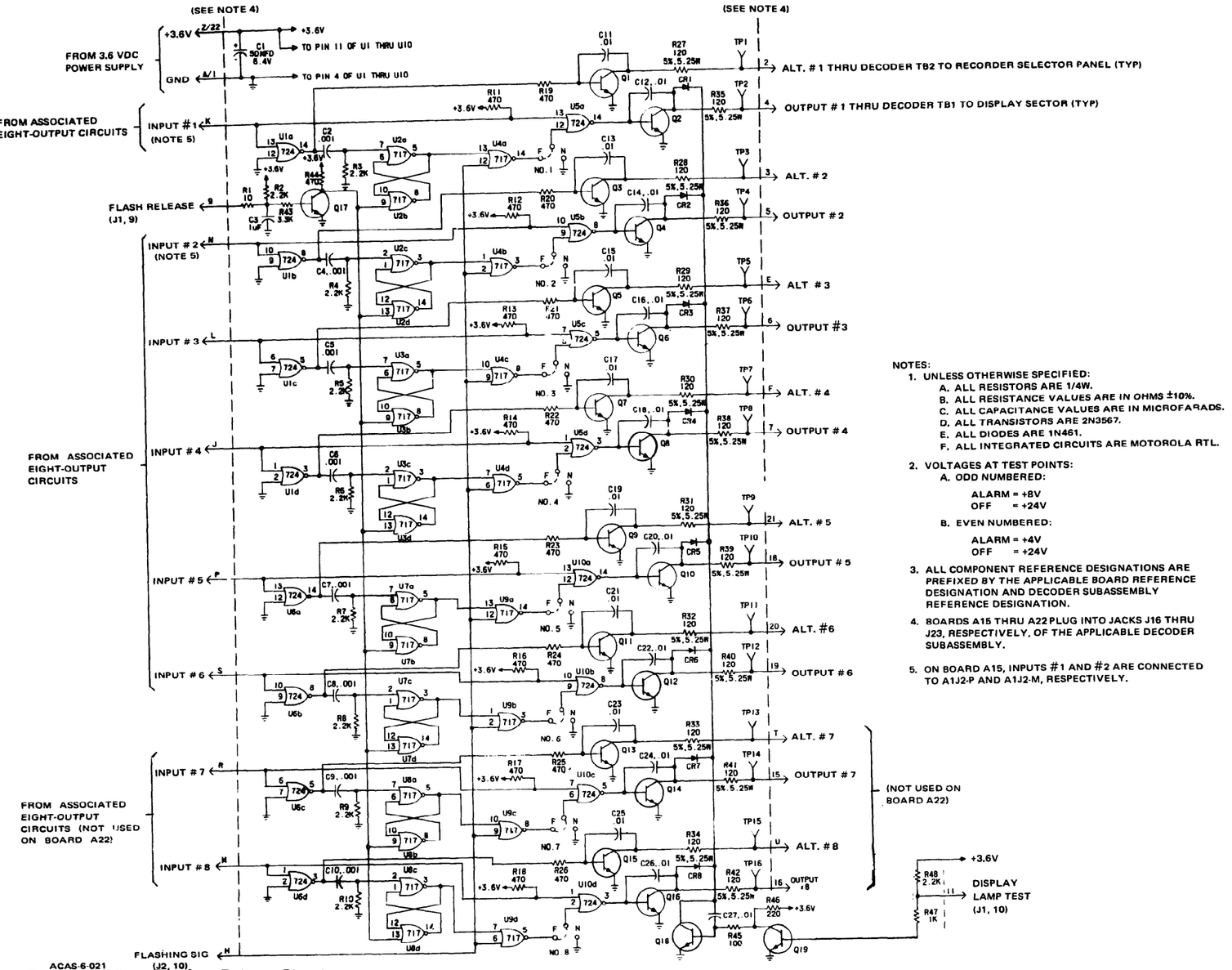
Figure FO-22. Shift Detector Circuit Board (A3), Schematic Diagram



NOTES:

1. UNLESS OTHERWISE SPECIFIED:
   - A. ALL CAPACITANCE VALUES ARE IN MICROFARADS.
   - B. ALL RESISTANCE VALUES ARE IN OHMS, 1/4W, ±10%.
   - C. ALL TRANSISTORS ARE 2N3567.
   - D. ALL INTEGRATED CIRCUITS ARE MOTOROLA MC724P.
   - E. R4 THRU R11 AND C4 THRU C11 ARE NOT USED FOR ACAS APPLICATIONS.
2. ALL COMPONENT REFERENCE DESIGNATIONS ARE PREFIXED BY THE APPLICABLE BOARD REFERENCE DESIGNATION AND DECODER SUBASSEMBLY REFERENCE DESIGNATION.
3. BOARDS A5 THRU A14 PLUG INTO JACKS J6 THRU J15, RESPECTIVELY, OF THE APPLICABLE DECODER SUBASSEMBLY.

Figure FO-23. Eight-Output Circuit Board (A5-A14), Schematic Diagram

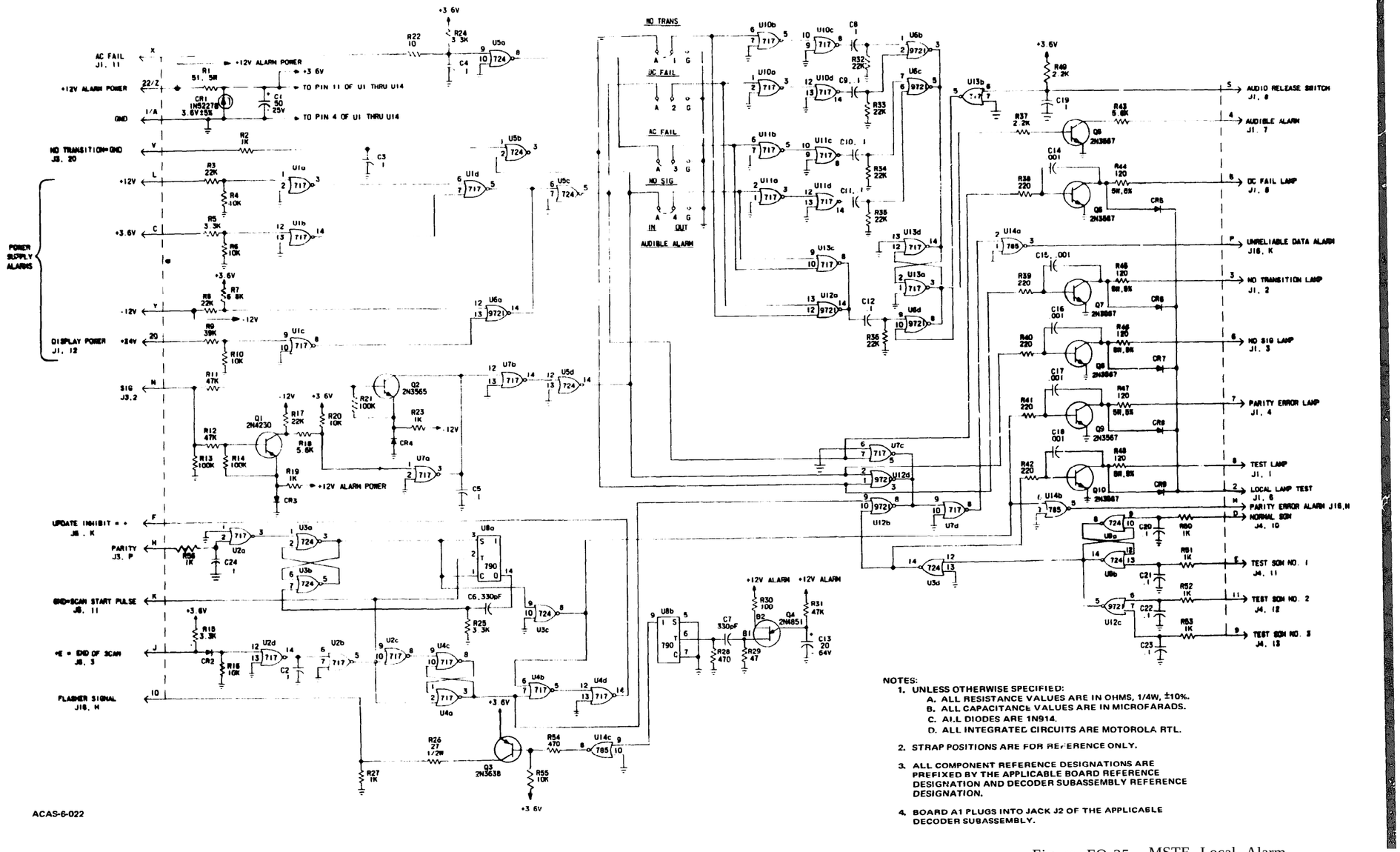


NOTES:

1. UNLESS OTHERWISE SPECIFIED:
   - A. ALL RESISTORS ARE 1/4W.
   - B. ALL RESISTANCE VALUES ARE IN OHMS ±10%.
   - C. ALL CAPACITANCE VALUES ARE IN MICROFARADS.
   - D. ALL TRANSISTORS ARE 2N3567.
   - E. ALL DIODES ARE 1N461.
   - F. ALL INTEGRATED CIRCUITS ARE MOTOROLA RTL.
2. VOLTAGES AT TEST POINTS:
   - A. ODD NUMBERED:
     - ALARM = +8V
     - OFF = +24V
   - B. EVEN NUMBERED:
     - ALARM = +4V
     - OFF = +24V
3. ALL COMPONENT REFERENCE DESIGNATIONS ARE PREFIXED BY THE APPLICABLE BOARD REFERENCE DESIGNATION AND DECODER SUBASSEMBLY REFERENCE DESIGNATION.
4. BOARDS A15 THRU A22 PLUG INTO JACKS J16 THRU J23, RESPECTIVELY, OF THE APPLICABLE DECODER SUBASSEMBLY.
5. ON BOARD A15, INPUTS #1 AND #2 ARE CONNECTED TO A1J2-P AND A1J2-M, RESPECTIVELY.

ACAS-6-021

Figure FO-24. Display Driver Circuit Board (A15-A22), Schematic Diagram

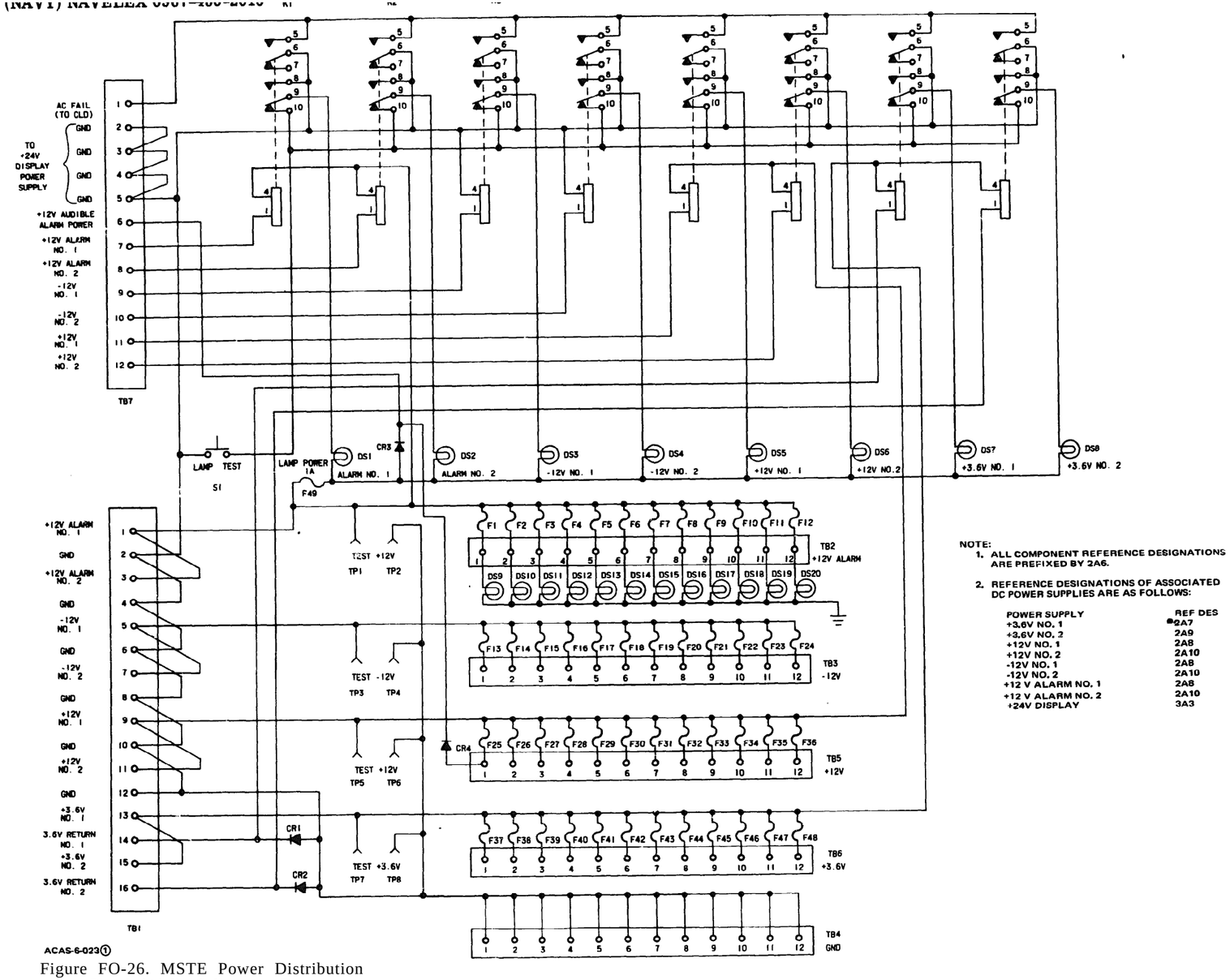


NOTES:

1. UNLESS OTHERWISE SPECIFIED:
   A. ALL RESISTANCE VALUES ARE IN OHMS, 1/4W, ±10%.
   B. ALL CAPACITANCE VALUES ARE IN MICROFARADS.
   C. ALL DIODES ARE 1N914.
   D. ALL INTEGRATED CIRCUITS ARE MOTOROLA RTL.
2. STRAP POSITIONS ARE FOR REFERENCE ONLY.
3. ALL COMPONENT REFERENCE DESIGNATIONS ARE PREFIXED BY THE APPLICABLE BOARD REFERENCE DESIGNATION AND DECODER SUBASSEMBLY REFERENCE DESIGNATION.
4. BOARD A1 PLUGS INTO JACK J2 OF THE APPLICABLE DECODER SUBASSEMBLY.

ACAS-6-022

Figure FO-25. MSTE Local Alarm Circuit Board (A1), Schematic Diagram



NOTE:
1. ALL COMPONENT REFERENCE DESIGNATIONS ARE PREFIXED BY 2A6.
2. REFERENCE DESIGNATIONS OF ASSOCIATED DC POWER SUPPLIES ARE AS FOLLOWS:

POWER SUPPLY	REF DES
+3.6V NO. 1	2A7
+3.6V NO. 2	2A9
+12V NO. 1	2A8
+12V NO. 2	2A10
-12V NO. 1	2A8
-12V NO. 2	2A10
+12 V ALARM NO. 1	2A8
+12 V ALARM NO. 2	2A10
+24V DISPLAY	3A3

Figure FO-26. MSTE Power Distribution Panel (2A6), Schematic Diagram (Sheet 1 of 2)

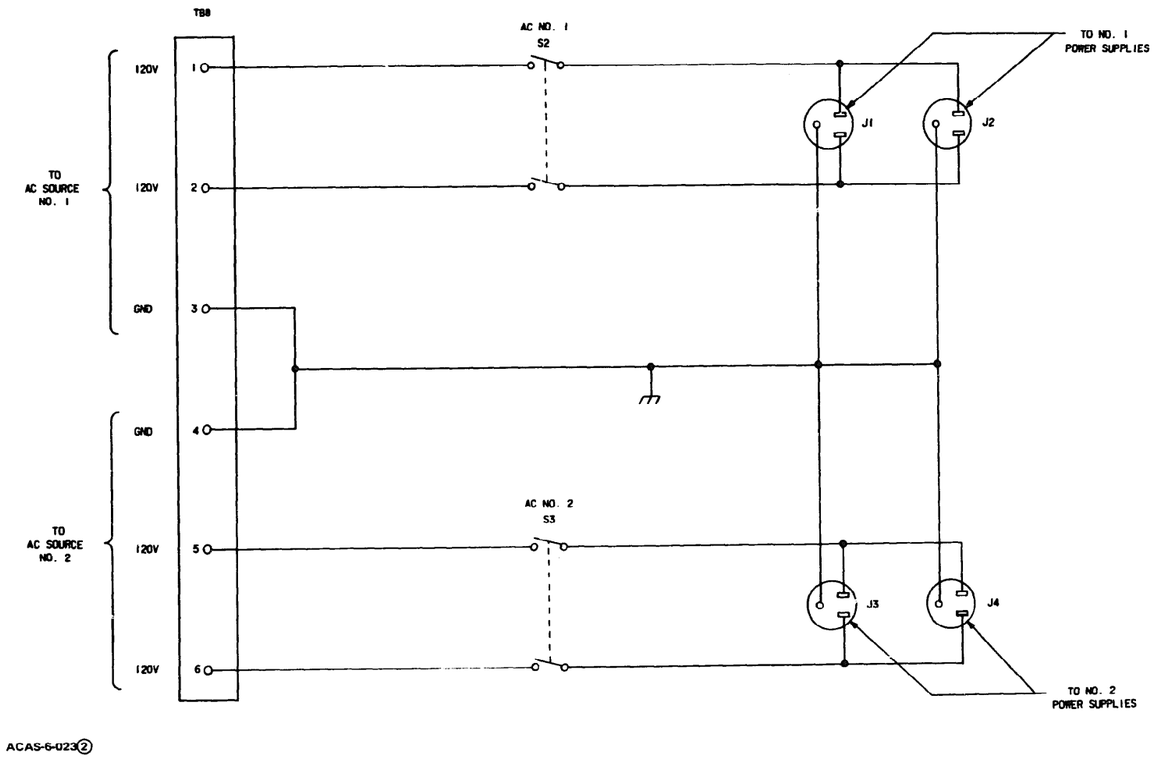
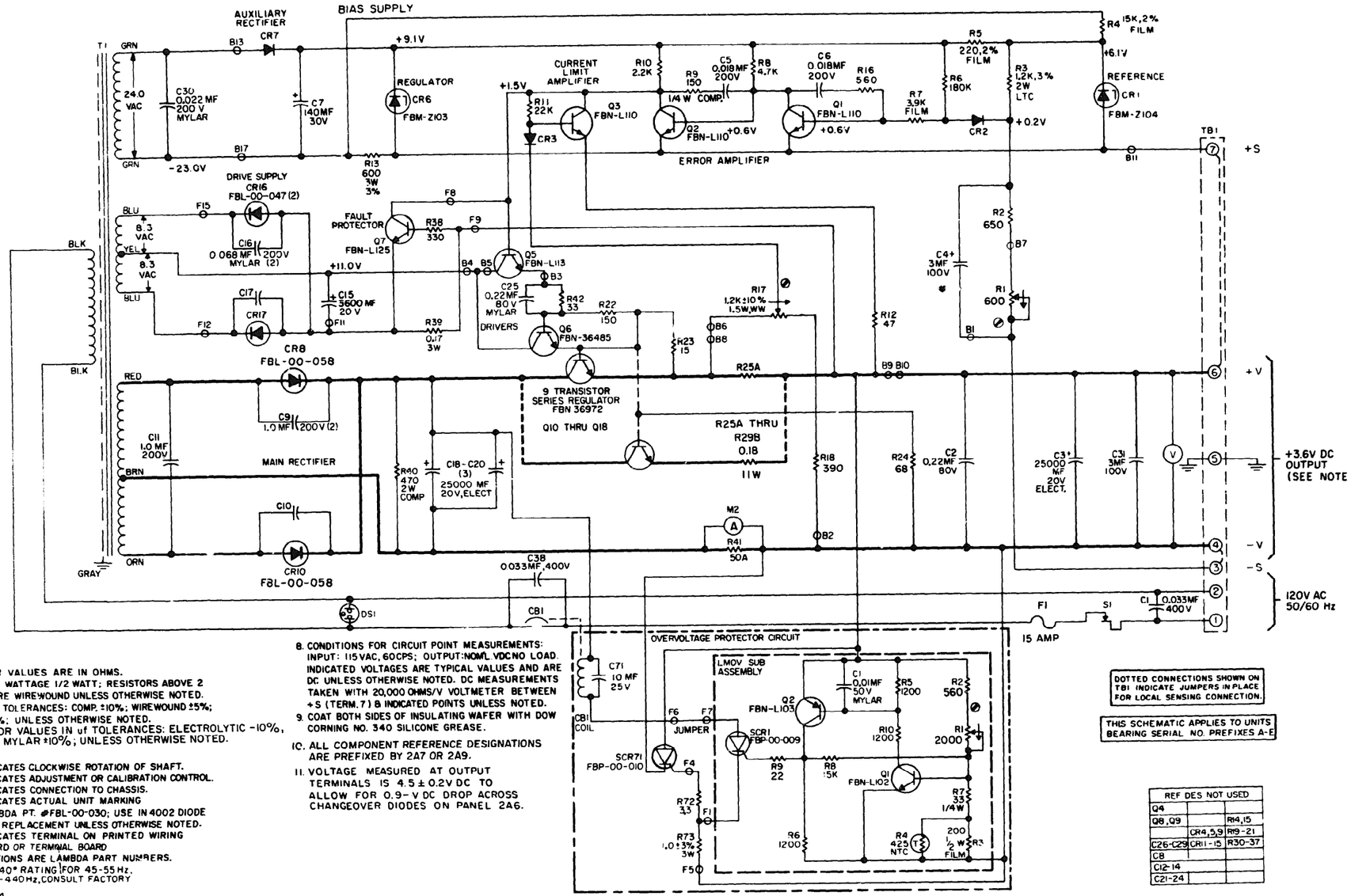


Figure FO-26. MSTE Power Distribution Panel (2A6), Schematic Diagram (Sheet 2 of 2)

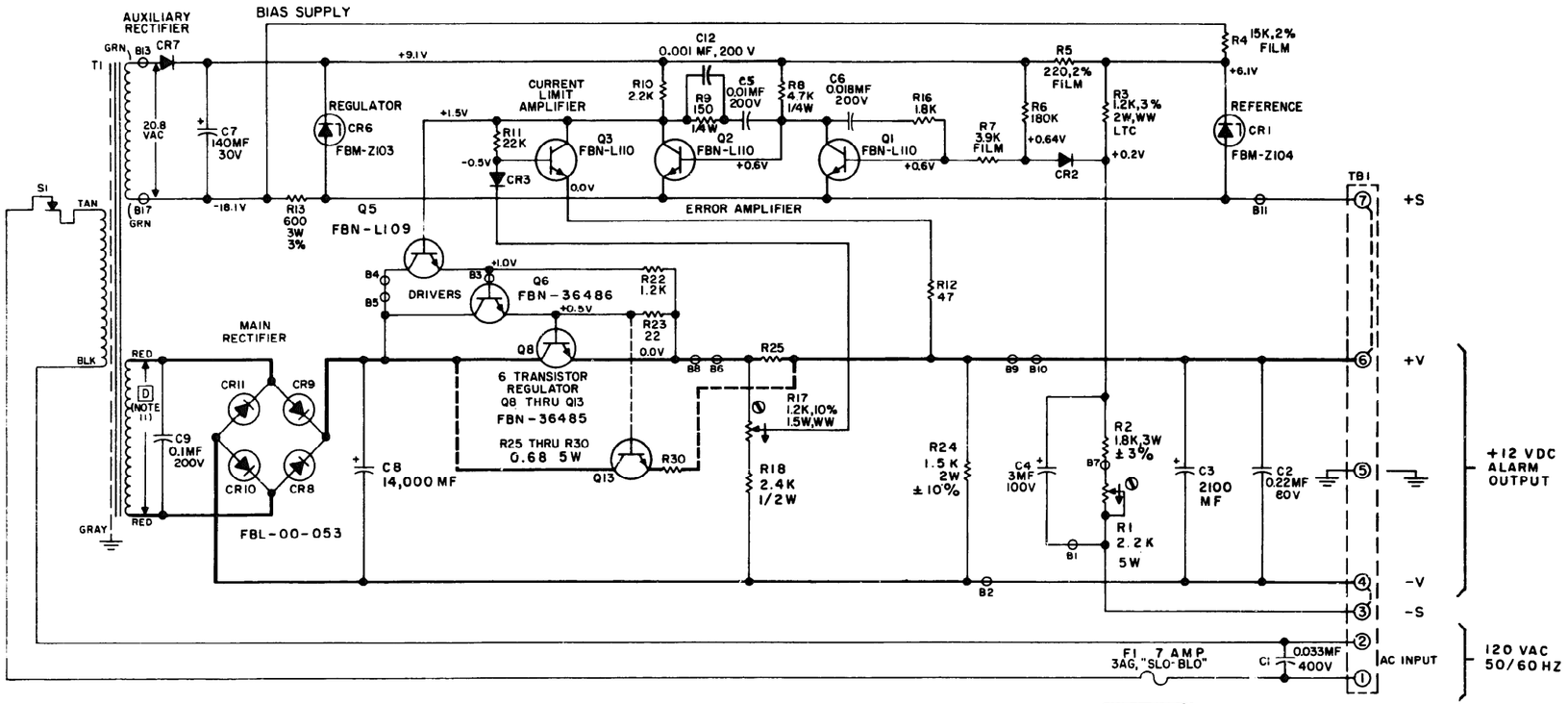


NOTES:

1. RESISTOR VALUES ARE IN OHMS.
2. RESISTOR WATTAGE 1/2 WATT; RESISTORS ABOVE 2 WATTS ARE WIREWOUND UNLESS OTHERWISE NOTED.
3. RESISTOR TOLERANCES: COMP. ±10%; WIREWOUND ±5%; FILM ±5%; UNLESS OTHERWISE NOTED.
4. CAPACITOR VALUES IN uf TOLERANCES: ELECTROLYTIC -10%, +100%; MYLAR ±10%; UNLESS OTHERWISE NOTED.
5. SYMBOLS
   - ↓ INDICATES CLOCKWISE ROTATION OF SHAFT.
   - ⊘ INDICATES ADJUSTMENT OR CALIBRATION CONTROL.
   - ⏚ INDICATES CONNECTION TO CHASSIS.
   - ▭ INDICATES ACTUAL UNIT MARKING
   - ⊣▶⊢ LAMBDA PT. #FBL-00-030; USE IN 4002 DIODE FOR REPLACEMENT UNLESS OTHERWISE NOTED.
   - ⊖ INDICATES TERMINAL ON PRINTED WIRING BOARD OR TERMINAL BOARD
6. DESIGNATIONS ARE LAMBDA PART NUMBERS.
7. DELETE 40° RATING FOR 45-55 Hz. FOR 360-440 Hz, CONSULT FACTORY
8. CONDITIONS FOR CIRCUIT POINT MEASUREMENTS: INPUT: 115 VAC, 60CPS; OUTPUT: NOML VDC NO LOAD. INDICATED VOLTAGES ARE TYPICAL VALUES AND ARE DC UNLESS OTHERWISE NOTED. DC MEASUREMENTS TAKEN WITH 20,000 OHMS/V VOLTMETER BETWEEN +S (TERM. 7) & INDICATED POINTS UNLESS NOTED.
9. COAT BOTH SIDES OF INSULATING WAFER WITH DOW CORNING NO. 340 SILICONE GREASE.
10. ALL COMPONENT REFERENCE DESIGNATIONS ARE PREFIXED BY 2A7 OR 2A9.
11. VOLTAGE MEASURED AT OUTPUT TERMINALS IS 4.5 ± 0.2V DC TO ALLOW FOR 0.9-V DC DROP ACROSS CHANGEOVER DIODES ON PANEL 2A6.

ACAS-6-024

Figure FO-27. MSTE +3.6-Volt Dc Power Supply Subassembly (2A7 or 2A9), Schematic Diagram



NOTES

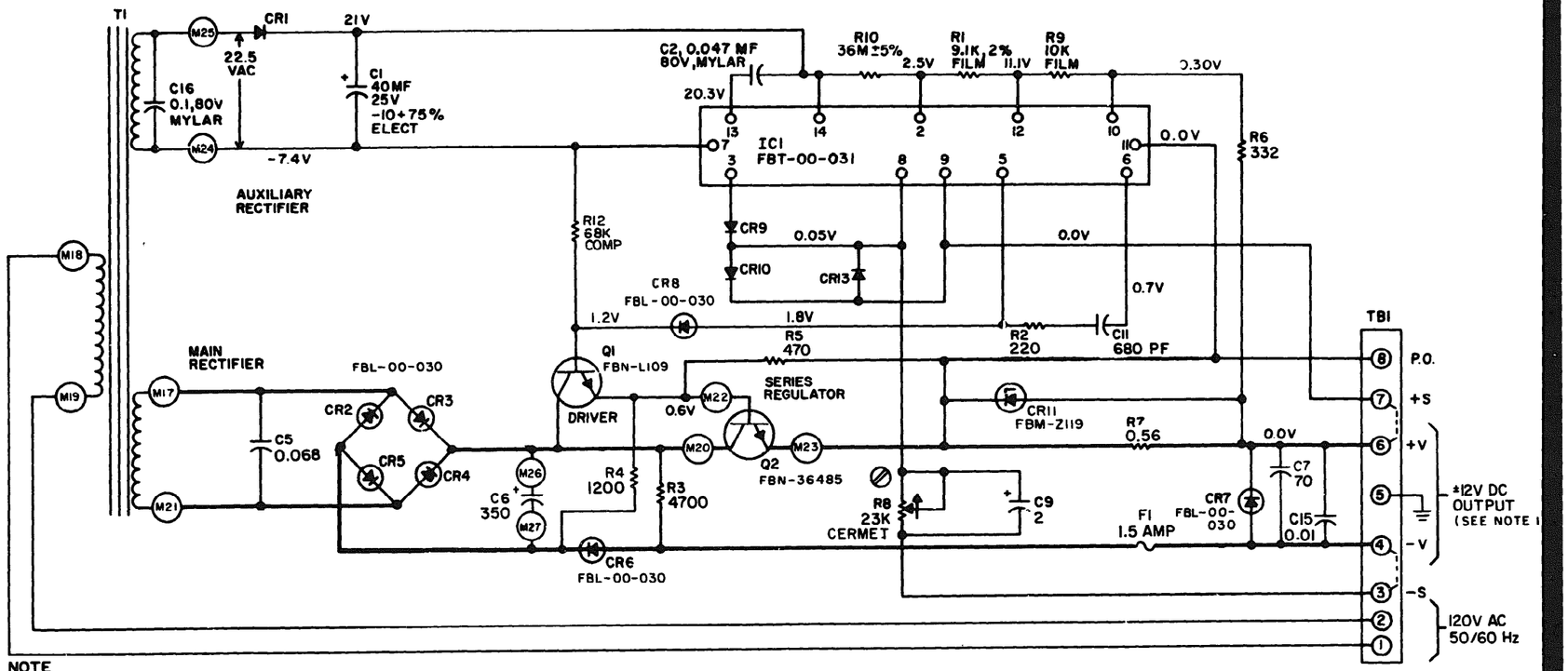
1. RESISTOR VALUES ARE IN OHMS.
2. RESISTOR WATTAGE 1/2 WATT; RESISTORS ABOVE 2 WATTS ARE WIREWOUND UNLESS OTHERWISE NOTED.
3. RESISTOR TOLERANCES: COMP. ±10%; WIREWOUND ±5%; FILM ±5%; UNLESS OTHERWISE NOTED.
4. CAPACITOR VALUES IN UF, TOLERANCES: ELECTROLYTIC −10%, +100%; MYLAR ±10%; UNLESS OTHERWISE NOTED.
5. SYMBOLS:
   - INDICATES CLOCKWISE ROTATION OF SHAFT.
   - INDICATES ADJUSTMENT OR CALIBRATION CONTROL.
   - INDICATES CONNECTION TO CHASSIS.
   - INDICATES ACTUAL UNIT MARKING.
   - LAMBDA PT. #FBL-00-030; USE IN 4002 DIODE FOR REPLACEMENT UNLESS OTHERWISE NOTED.
   - INDICATES TERMINAL ON PRINTED WIRING BOARD "B";

   ACAS-6-025-2
6. DESIGNATIONS ARE LAMBDA PART NUMBERS.
7. DELETE 40°C RATING FOR 45-55 CPS, FOR 360-440 CPS CONSULT FACTORY.
8. CONDITIONS FOR CIRCUIT POINT MEASUREMENTS: INPUT: 115VAC, 60 Hz OUTPUT: NOM'L VDC, NO LOAD INDICATED VOLTAGES ARE TYPICAL VALUES AND ARE DC UNLESS OTHERWISE NOTED. DC MEASUREMENTS TAKEN WITH 20,000 OHMS/V VOLTMETER BETWEEN +S (TERM. 7) 8 INDICATED POINTS UNLESS NOTED.
9. COAT BATH SIDES OF INSULATING WAFER WITH DOW CORNING NO. 340 SILICONE GREASE.
10. ALL COMPONENT REFERENCE DESIGNATIONS ARE PREFIXED BY 2A8A2 OR 2A10A2.

REFERENCE DESIGNATIONS NOT USED	
Q7	R14
Q4	R15
CR4	R19-R21
CR5	
C10,C11	

THIS SCHEMATIC APPLIES TO UNITS BEARING SERIAL NO. PREFIXES A-E

Figure FO-28. MSTE Dual 12-Volt DC Power Supply Subassembly (2A8 or 2A10), Schematic Diagram (Sheet 2 of 2)



NOTE

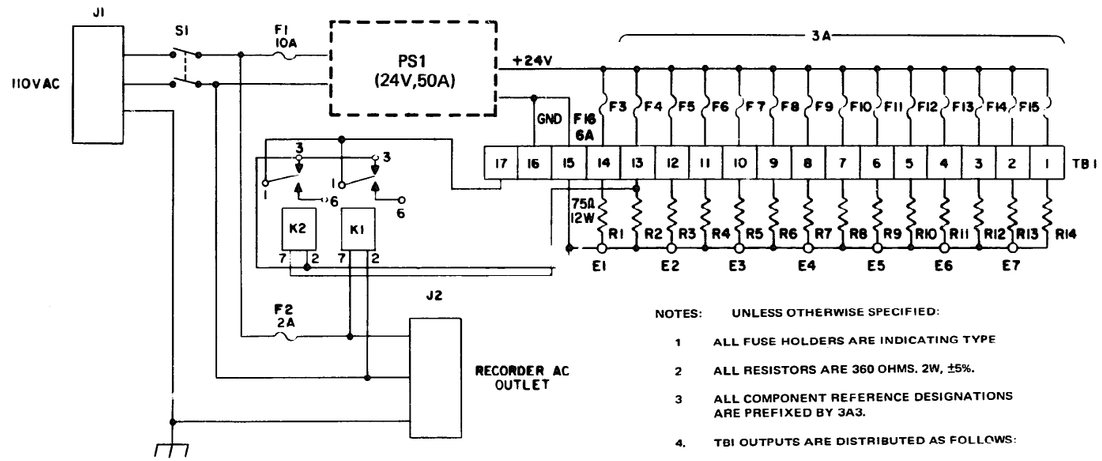
1. RESISTOR VALUES ARE IN OHMS.
2. RESISTOR WATTAGE 1/4 WATT; RESISTORS ABOVE 2 WATTS ARE WIREWOUND UNLESS OTHERWISE NOTED
3. RESISTOR TOLERANCES: COMP. ±10%; WIREWOUND ±2% FILM ±1%; UNLESS OTHERWISE NOTED.
4. CAPACITOR VALUES IN µf, TOLERANCES: ELECTROLYTIC -10%, +100%; MYLAR ±10%; CERAMIC 10%; UNLESS OTHERWISE NOTED.
5. SYMBOLS:
   - INDICATES CLOCKWISE ROTATION OF SHAFT.
   - INDICATES CONNECTION TO CHASSIS.
   - INDICATES ADJUSTMENT OR CALIBRATION CONTROL.
   - LAMBDA PT. # FBL-00-030; USE IN 4002 DIODE FOR REPLACEMENT UNLESS OTHERWISE NOTED.
   - INDICATES TERMINAL ON PRINTED WIRING BOARD.
6. DESIGNATION IS LAMBDA PART NUMBER.
7. DERATE 40°C CURRENT RATING 10% FOR 47-57 Hz INPUT
8. CONDITIONS FOR CIRCUIT POINT MEASUREMENTS: INPUT: 115 VAC, 60Hz; MAX. RATED VOLTAGE NO LOAD. INDICATED VOLTAGES ARE TYPICAL VALUES AND ARE DC UNLESS OTHERWISE NOTED. DC MEASUREMENTS TAKEN WITH 20,000 OHMS/V VOLTMETER BETWEEN +S (TERM. 7) & INDICATED POINTS UNLESS NOTED; +S AND +V SHORTED, -S AND -V SHORTED.
9. COAT BOTH SIDES OF INSULATING WAFER WITH DOW CORNING NO. 340 SILICONE GREASE.
10. ALL COMPONENT REFERENCE DESIGNATIONS ARE PREFIXED BY 2A8A1 OR 2A10A1.
11. OVERVOLTAGE PROTECTOR LM-OV-2 IS CONNECTED ACROSS OUTPUT TERMINALS TB1-4 AND TB1-6.

ACAS-6-025-1

THIS SCHEMATIC APPLIES TO UNITS BEARING SERIAL NO PREFIXES A, B & C

DOTTED CONNECTIONS SHOWN ON TB1 INDICATE JUMPERS IN PLACE FOR LOCAL SENSING "2-WIRE CONNECTION"

Figure FO-28. MSTE Dual 12-Volt DC Power Supply Subassembly (2A8 or 2A10), Schematic Diagram (Sheet 1 of 2)



NOTES: UNLESS OTHERWISE SPECIFIED:

1. ALL FUSE HOLDERS ARE INDICATING TYPE
2. ALL RESISTORS ARE 360 OHMS, 2W, ±5%.
3. ALL COMPONENT REFERENCE DESIGNATIONS ARE PREFIXED BY 3A3.
4. TB1 OUTPUTS ARE DISTRIBUTED AS FOLLOWS:

TB1-1 THRU TB1-12	DISPLAY SECTOR PANELS A1 THRU A12
TB1-13	RECORDER 3A1
TB1-14	MSTE CONTROL AND LOCAL DISPLAY PANEL 1A6
TB1-17	MSTE POWER DISTRIBUTION PANEL 2A6

Figure FO-29. Display/Recorder +24-Volt DC Power Supply Subassembly (3A3), Schematic Diagram

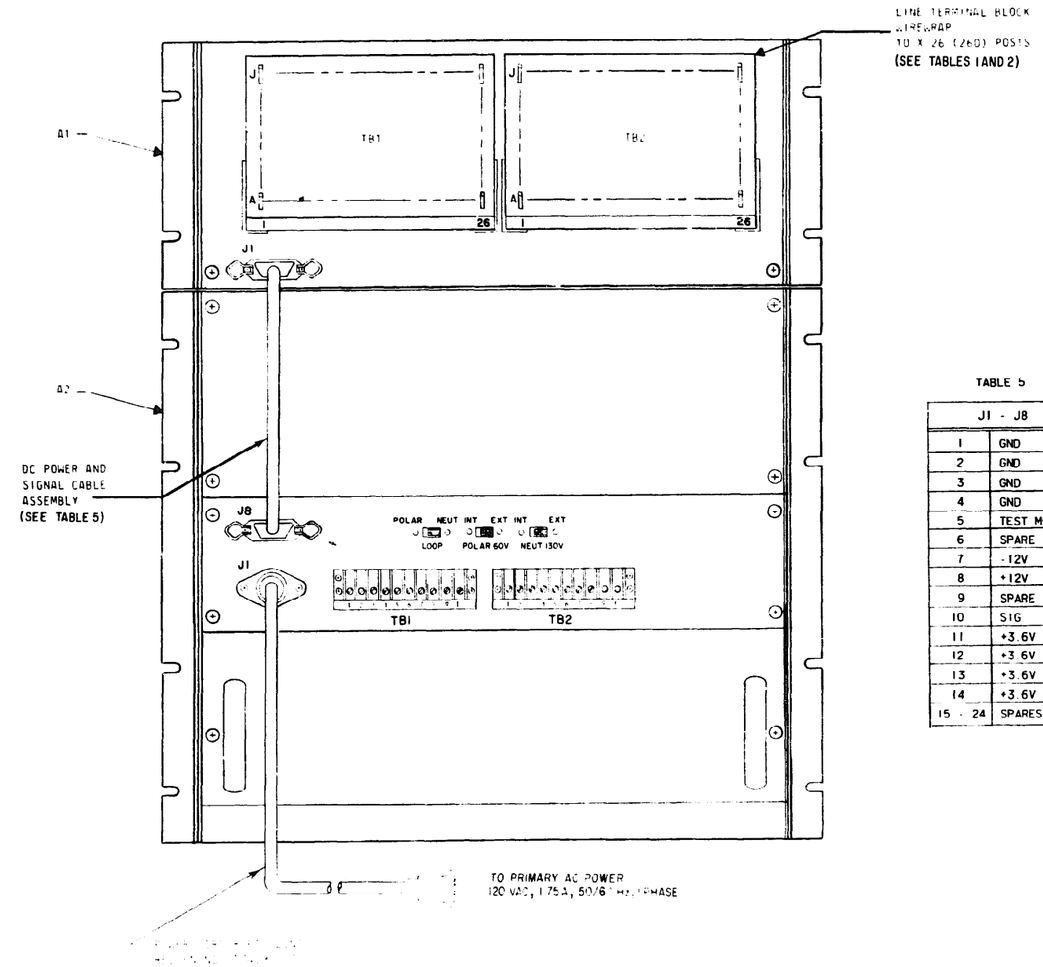


Figure FO-30. Remote Station Cabling Diagram

ENCODER A1 LEAD DESIGNATIONS (SEE NOTE 1)

TABLE 1

TB1	
TERMINAL	FUNCTION
A1-B1 THROUGH A24-B24	MFX INPUTS 1-24
C1-D1 THROUGH C24-D24	TAN INPUTS 1-24
E1-F1 THROUGH E24-F24	MFR INPUTS 1-24
G1-H1 THROUGH G24-H24	MFT INPUTS 1-24
I1-J1 THROUGH I24-J24	DPT INPUTS 1-24

ALL OTHER TERMINALS ARE SPARES (A25, A26, B25, B26, ETC.)

TABLE 2

TB2	
TERMINAL	FUNCTION
A1-B1 THROUGH A24-B24	DPR INPUTS 1-24
C1-D1 THROUGH C24-D24	TCR INPUTS 1-24
E1-F1 THROUGH E24-F24	RSJ INPUTS 1-24
G1-H1	ATOP
G2-H2	LLC-A
G3-H3	LLC-B
G4-H4	LLC-C
G5-H5	RSJ
G6-H6	MFX
G7-H7	TCR
G8-H8	MKR-A
G9-H9	MKR-B
G10-H10	LOG-A
G11-H11	LOG-B
G12-H12	LOG-C
G13-H13	MEM-X
G14-H14	MEM-Y
G15-H15	CLK
G16-H16	CMP
G17-H17	PMB-1
G18-H18	VG-1
G19-H19	SG-1
G20-H20	PMB-2
G21-H21	VG-2
G22-H22	SG-2
G23-H23	PMB-3
G24-H24	VG-3
G25-H25	SG-3
G26-H26	PMB-4
I1-J1	VG-4
I2-J2	SG-4
I3-J3	PMB-5
I4-J4	VG-5
I5-J5	SG-5
I6-J6	PMB-6
I7-J7	VG-6
I8-J8	SG-6
I9-J9	PMB-7
I10-J10	VG-7
I11-J11	SG-7
I12-J12	PMB-8
I13-J13	VG-8
I14-J14	SG-8
I15-J15	PMB-9
I16-J16	VG-9
I17-J17	SG-9
I18-J18	PMB-10
I19-J19	VG-10
I20-J20	SG-10
I21-J21	PMB-11
I22-J22	VG-11
I23-J23	SG-11
I24-J24	PMB-12
I25-J25	VG-12
I26-J26	SG-12

POWER SUPPLY A2 LEAD DESIGNATIONS (SEE NOTE 2)

TABLE 3

TB1	
TERMINAL	FUNCTION
1	LOOP +
2	LOOP -
3	SPARE
4	SPARE
5	GND
6	EXTERNAL -60V
7	GND
8	EXTERNAL +60V
9	GND
10	EXTERNAL +130V

TABLE 4

TB2	
TERMINAL	FUNCTION
1	AC ALARM LAMP
2	DC ALARM LAMP
3	TEST MODE LAMP
4	NO LOOP ALARM LAMP
5	NO TRANS ALARM LAMP
6	LAMP TEST
7	AUDIO RELEASE
8	AUDIBLE ALARM
9	+12V
10	GND

TABLE 5

J1 - J8	
1	GND
2	GND
3	GND
4	GND
5	TEST MODE
6	SPARE
7	-12V
8	+12V
9	SPARE
10	SIG
11	+3.6V
12	+3.6V
13	+3.6V
14	+3.6V
15 - 24	SPARES

NOTES

1. LEADS ON REMOTE STATION A1TB1 AND A1TB2 TERMINALS ARE RUN TO CORRESPONDING TERMINALS ON AUTOVON IDF, TB1 AND TB2, RESPECTIVELY (A1 TO A1, B1 TO B1, ETC.)
2. LOOP + AND - LEADS (TERMINALS A2TB1-1 AND A2TB1-2) ARE EXTENDED TO APPLICABLE DATA TRANSMISSION CIRCUITS VIA STATION TECHNICAL CONTROL IDF. OTHER TERMINALS ON A2TB1 AND AND A2TB2 TO BE USED FOR CONNECTION TO EXTERNAL POWER SUPPLIES AND REMOTE ALARM PANELS.

ENCODER A1 LEAD DESIGNATIONS (SEE NOTE 1)

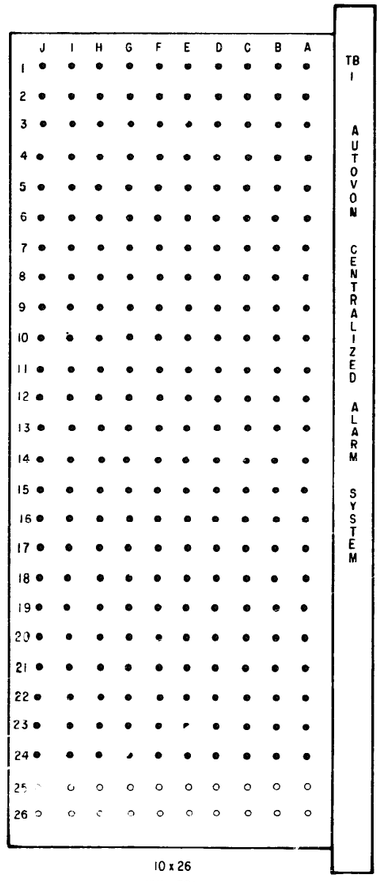
TABLE 1

TB1	
TERMINAL	FUNCTION
A1-B1 THROUGH A24-B24	MFX INPUTS 1-24
C1-D1 THROUGH C24-D24	TAN INPUTS 1-24
E1-F1 THROUGH E24-F24	MFR INPUTS 1-24
G1-H1 THROUGH G24-H24	MFT INPUTS 1-24
I1-J1 THROUGH I24-J24	DPT INPUTS 1-24

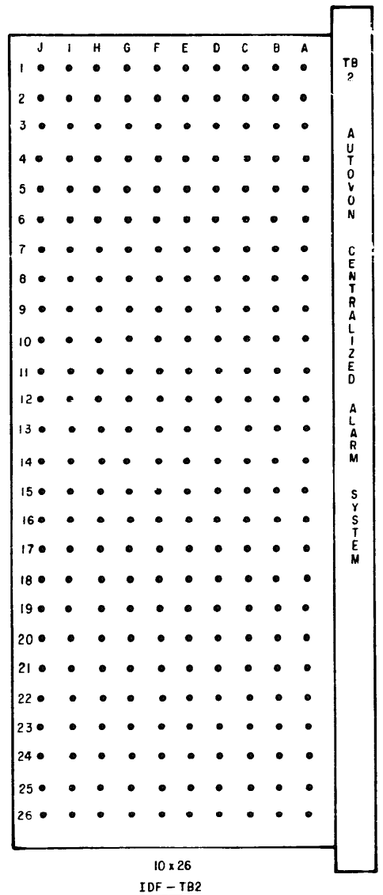
ALL OTHER TERMINALS ARE SPARES. (A25, A26, B25, B26, ETC.)

TABLE 2

TB2	
TERMINAL	FUNCTION
A1-B1 THROUGH A24-B24	DPR INPUTS 1-24
C1-D1 THROUGH C24-D24	TCR INPUTS 1-24
E1-F1 THROUGH E24-F24	RSJ INPUTS 1-24
G1-H1	ATOP
G2-H2	LLC-A
G3-H3	LLC-B
G4-H4	LLC-C
G5-H5	RSJ
G6-H6	MFX
G7-H7	TCR
G8-H8	MKR-A
G9-H9	MKR-B
G10-H10	LOG-A
G11-H11	LOG-B
G12-H12	LOG-C
G13-H13	MEM-X
G14-H14	MEM-Y
G15-H15	CLK
G16-H16	CMP
G17-H17	PMB-1
G18-H18	VG-1
G19-H19	SG-1
G20-H20	PMB-2
G21-H21	VG-2
G22-H22	SG-2
G23-H23	PMB-3
G24-H24	VG-3
G25-H25	SG-3
G26-H26	PMB-4
I1-J1	VG-4
I2-J2	SG-4
I3-J3	PMB-5
I4-J4	VG-5
I5-J5	SG-5
I6-J6	PMB-6
I7-J7	VG-6
I8-J8	SG-6
I9-J9	PMB-7
I10-J10	VG-7
I11-J11	SG-7
I12-J12	PMB-8
I13-J13	VG-8
I14-J14	SG-8
I15-J15	PMB-9
I16-J16	VG-9
I17-J17	SG-9
I18-J18	PMB-10
I19-J19	VG-10
I20-J20	SG-10
I21-J21	PMB-11
I22-J22	VG-11
I23-J23	SG-11
I24-J24	PMB-12
I25-J25	VG-12
I26-J26	SG-12



10 x 26
IDF – TB1



10 x 26
IDF – TB2

LEGEND
- ● – TERMINALS USED
- o – TERMINALS SPARE

POWER SUPPLY A2 LEAD DESIGNATIONS (SEE NOTE 2)

TABLE 3

TB1	
TERMINAL	FUNCTION
1	LOOP +
2	LOOP -
3	SPARE
4	SPARE
5	GND
6	EXTERNAL -60V
7	GND
8	EXTERNAL +60V
9	GND
10	EXTERNAL +130V

TABLE 4

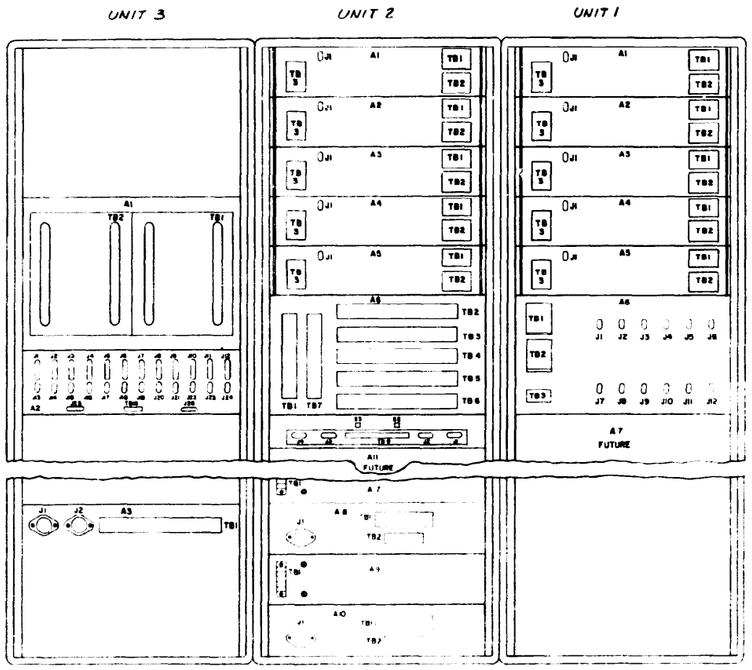
TB2	
TERMINAL	FUNCTION
1	AC ALARM LAMP
2	DC ALARM LAMP
3	TEST MODE LAMP
4	NO LOOP ALARM LAMP
5	NO TRANS ALARM LAMP
6	LAMP TEST
7	AUDIO RELEASE
8	AUDIBLE ALARM
9	+12V
10	GND

NOTES:

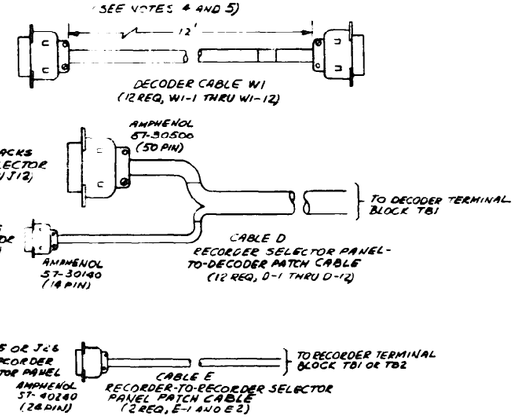
1 LEADS ON REMOTE STATION A1TB1 AND A1TB2 TERMINALS ARE RUN TO CORRESPONDING TERMINALS ON AUTOVON IDF, TB1 AND TB2, RESPECTIVELY (A1 TO A1, B1 TO B1, ETC.)

2 LOOP + AND - LEADS (TERMINALS A2TB1-1 AND A2TB1-2) ARE EXTENDED TO APPLICABLE DATA TRANSMISSION CIRCUITS VIA STATION TECHNICAL CONTROL IDF. OTHER TERMINALS ON A2TB1 AND AND A2TB2 TO BE USED FOR CONNECTION TO EXTERNAL POWER SUPPLIES AND REMOTE ALARM PANELS.

MASTER STATION EQUIPMENT CABINETS (REAR VIEW) TERMINAL BLOCK AND CONNECTOR LOCATIONS (SEE NOTES 1, 2 AND 3)

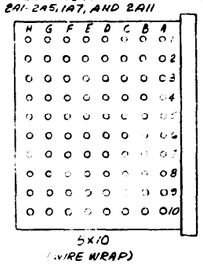


FABRICATED SIGNAL CABLES (SEE NOTES 4 AND 5)

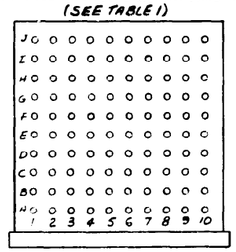


ACAS-6-028

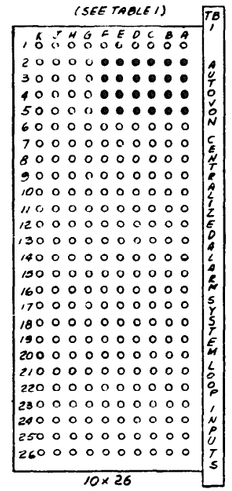
TERMINAL BLOCK PIN IDENTIFICATION FOR TB1 AND TB2
DECODER SUBASSEMBLIES 1A1-1A5, 2A1-2A5, 1A7, AND 2A11



TERMINAL BLOCK PIN IDENTIFICATION FOR TB1 AND TB2
CONTROL AND LOCAL DISPLAY PANEL 1A6
(SEE TABLE I)



TERMINAL BLOCK PIN IDENTIFICATION FOR TB1
IDF-1 (BLACK) CABINET 3F-VERTICAL
(SEE TABLE I)

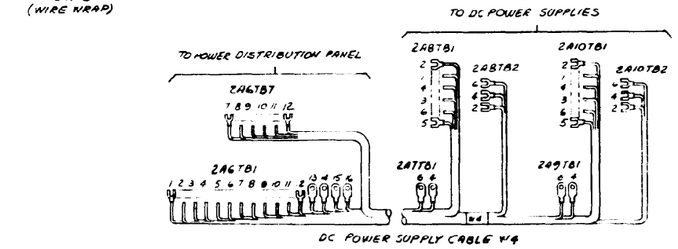


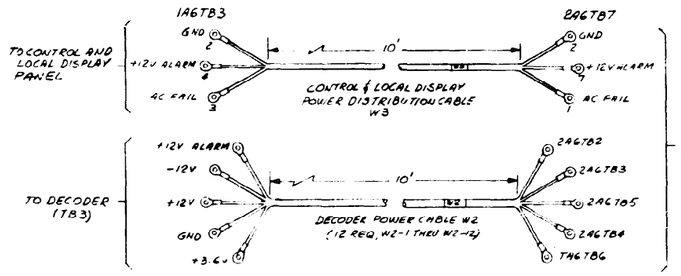
LEGEND
- ● TERMINALS USED
- o TERMINALS SPARE

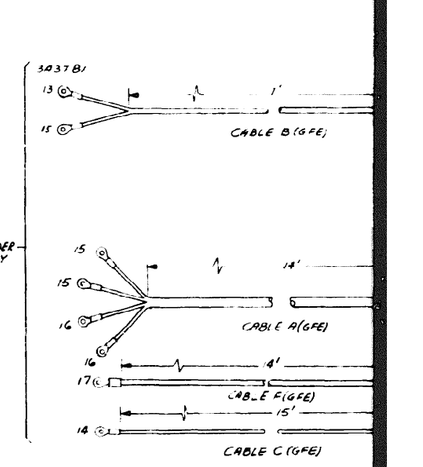
TABLE I
LOOP INPUT SIGNAL INTERFACE
IDF-TO-CONTROL AND LOCAL DISPLAY PANEL 1A6

IDF TERMINAL	1A6 INPUT TERMINAL	FUNCTION
A2	TB1 – 1A	NO.1 SIG INPUT
B2	1B	NO.1 SIG GND
C2	2A	NO.2 SIG INPUT
D2	2B	NO.2 SIG GND
E2	3A	NO.3 SIG INPUT
F2	3B	NO.3 SIG GND
A3	4A	NO.4 SIG INPUT
B3	4B	NO.4 SIG GND
C3	5A	NO.5 SIG INPUT
D3	5B	NO.5 SIG GND
E3	6A	NO.6 SIG INPUT
F3	6B	NO.6 SIG GND
A4	7A	NO.7 SIG INPUT
B4	7B	NO.7 SIG GND
C4	8A	NO.8 SIG INPUT
D4	8B	NO.8 SIG GND
E4	9A	NO.9 SIG INPUT
F4	9B	NO.9 SIG GND
A5	10A	NO.10 SIG INPUT
B5	10B	NO.10 SIG GND
C5	TB2 – 1A	NO.11 SIG INPUT
D5	1B	NO.11 SIG GND
E5	2A	NO.12 SIG INPUT
F5	2B	NO.12 SIG GND

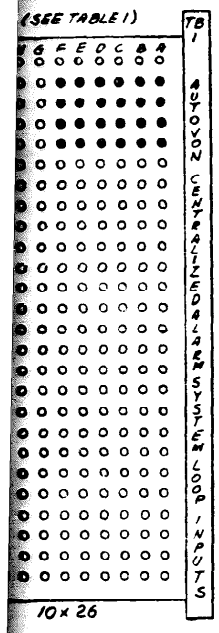
FABRICATED DC POWER CABLES (SEE NOTES 4 AND 6)







IDENTIFICATION FOR TB1
INET 3E-VERTICAL
(SEE TABLE I)



MINALS USED
MINALS SPARE

TABLE I
LOOP INPUT SIGNAL INTERFACE
IDF-TO-CONTROL AND LOCAL DISPLAY PANEL 1A6

IDF TERMINAL	1A6 INPUT TERMINAL	FUNCTION
A2	TB1 – 1A	NO.1 SIG INPUT
B2	1B	NO.1 SIG GND
C2	2A	NO.2 SIG INPUT
D2	2B	NO.2 SIG GND
E2	3A	NO.3 SIG INPUT
F2	3B	NO.3 SIG GND
A3	4A	NO.4 SIG INPUT
B3	4B	NO.4 SIG GND
C3	5A	NO.5 SIG INPUT
D3	5B	NO.5 SIG GND
E3	6A	NO.6 SIG INPUT
F3	6B	NO.6 SIG GND
A4	7A	NO.7 SIG INPUT
B4	7B	NO.7 SIG GND
C4	8A	NO.8 SIG INPUT
D4	8B	NO.8 SIG GND
E4	9A	NO.9 SIG INPUT
F4	9B	NO.9 SIG GND
A5	10A	NO.10 SIG INPUT
B5	10B	NO.10 SIG GND
C5	TB2 – 1A	NO.11 SIG INPUT
D5	1B	NO.11 SIG GND
E5	2A	NO.12 SIG INPUT
F5	2B	NO.12 SIG GND

NOTES:
1. THIS CABLING DIAGRAM AND ASSOCIATED CABLE LISTS DEPICT EQUIPMENT AND WIRING CONFIGURATION OF THE STUTTGART MASTER STATION.
2. DECODER POSITIONS 1A7 AND 2A11 ARE WIRED BUT NOT EQUIPPED.
3. FOR ADDITIONAL TERMINAL BLOCK AND CONNECTOR DETAILS, SEE PARTS LOCATION FIGURES IN CHAPTER 1.
4. CABLES DESIGNATED W1, W2, W3, OR W4 ARE SO MARKED. CABLES DESIGNATED A, B, C, D, OR E ARE NOT MARKED; DESIGNATIONS A THRU E ARE PROVIDED FOR REFERENCE ONLY.
5. POINT-TO-POINT CONNECTIONS FOR SIGNAL CABLES W1, D, AND E ARE SHOWN IN MASTER STATION DECODER, DECODER/RECORDER SELECTOR PANEL, AND RECORDER SELECTOR PANEL/ RECORDER CABLE LISTS, RESPECTIVELY.
6. POINT-TO-POINT CONNECTIONS FOR DC POWER CABLES ARE SHOWN IN MASTER STATION DC POWER CABLE LIST.

FABRICATED DC POWER CABLES (SEE NOTES 4 AND 6)

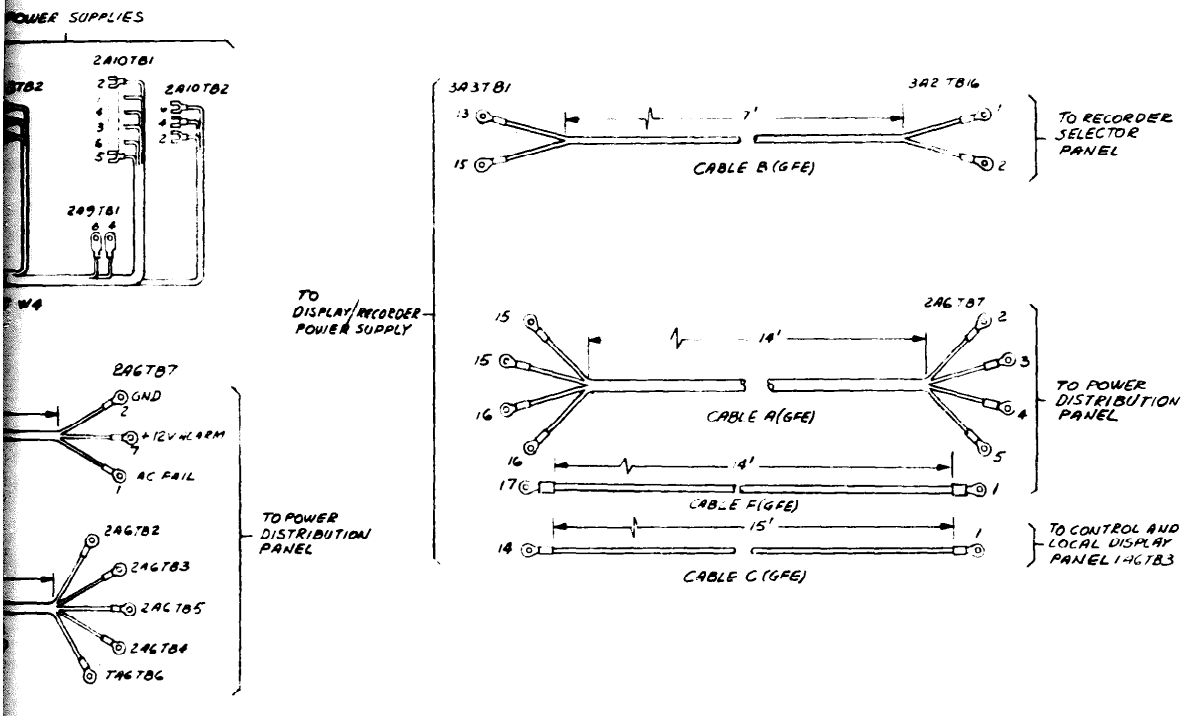


Figure FO-31. Master Station Cabling Diagram

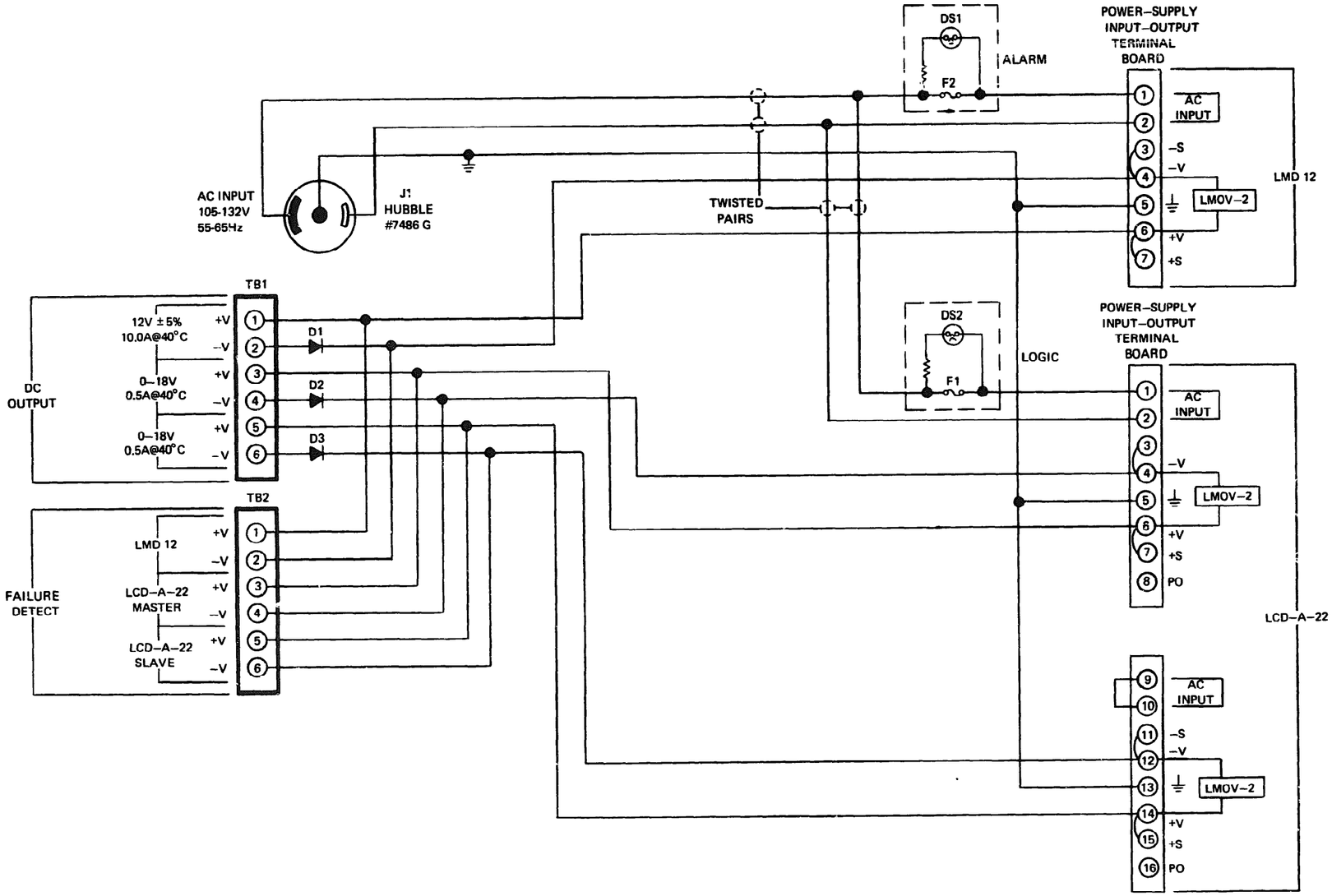


Figure FO-32. MSTE Dual 12-Volt DC Power Supply Subassembly (2A8 or 2A10), Interconnect Wiring Diagram

END

DATE

11-10-82

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