AD-A125 418 STANDARD ENGINEERING INSTALLATION PACKAGE FOR DUAL 1/1
FREQUENCY SIGNALING UNIT (DFSU)(U) ARMY
COMMUNICATIONS-ELECTRONICS ENGINEERING INSTALLATION
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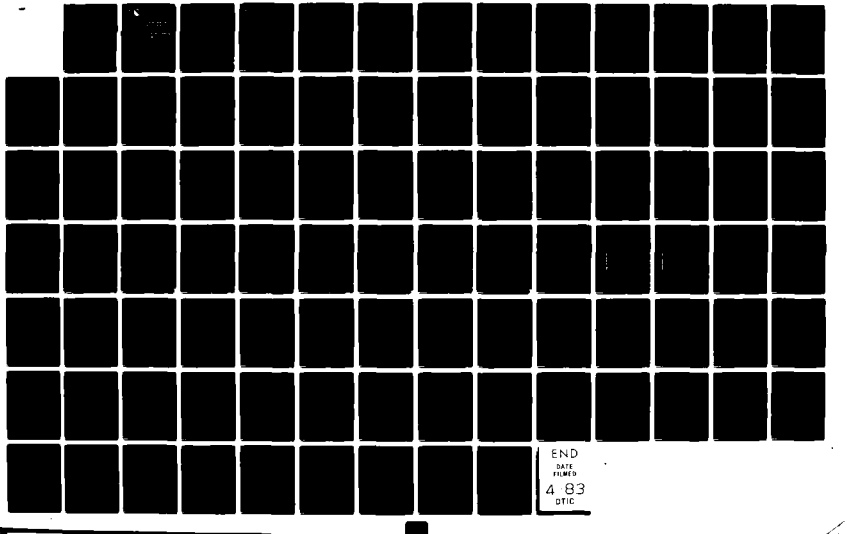

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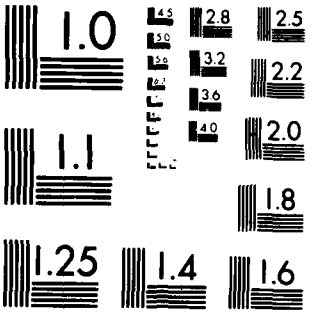

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STANDARD ENGINEERING INSTALLATION PACKAGE

DUAL FREQUENCY SIGNALING UNIT (DFSU)

15 MARCH 1982

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US ARMY COMMUNICATIONS-ELECTRONICS
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CERTIFICATION

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Department of the Army
Headquarters, US Army Communications-Electronics
Engineering Installation Agency
Fort Huachuca, Arizona 85613

STANDARD ENGINEERING INSTALLATION PACKAGE FOR DUAL FREQUENCY SIGNALING UNIT (DFSU)

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SECTION 1. GENERAL

1.1 BACKGROUND. The U.S. Army Communications-Electronics Installation Agency is responsible for engineering and installation of the Dual Frequency Signaling Unit (DFSU) communications-electronics (C-E) equipment at new and existing U.S. Army facilities worldwide. This Standard Engineering Installation Package (SEIP) will provide engineering and installation data, site survey criteria, quality assurance provisions, and test plan guidance in preparing an Engineering Installation Package (EIP) for installation of the DFSU.

1.2 GENERAL SYSTEM DESCRIPTION.

1.2.1 The purpose of the DFSU is to provide enhanced in-band supervisory signaling capability over voice frequency (VF) communication circuits. The existing (conventional) in-band signaling equipment utilizes a single frequency (SF) technique whereby a 2600 Hertz (Hz) tone is placed on the circuit to indicate the idle state (on-hook) and the tone is removed from the circuit to indicate the busy state (off-hook). Signaling states are conveyed via E (receive) and M (transmit) leads to the telephone equipment terminating the circuit.

1.2.2 The DFSU operates in much the same way as SF units except that whenever the 2600 Hz tone is removed from the circuit a 2800 Hz tone is applied for a short period (175 milliseconds maximum). The 2800 Hz tone burst serves as a confirmation tone in that the receiving signaling unit will only transition from on-hook to off-hook if the loss of the 2600 Hz tone is followed by the 2800 Hz tone. This prevents false on-hook to off-hook transitions from occurring due to a break in the communications circuit.

1.2.3 In addition to the confirmation tone feature, the DFSU has alarm and out-of-service (OS) features. These features enable the DFSU to exchange special control signals with Automatic Voice Network (AUTOVON) system equipment and to communicate circuit status from one end of the circuit to another. The DFSU has an alarm lead and an out-of-service lead for interface with the AUTOVON System Equipment.

1.2.4 The DFSU has a switch selectable option which enables it to operate as an SF unit. When set for SF operation the DFSU is fully compatible with conventional SF units currently deployed throughout the Defense Communication System (DCS).

1.2.5 Table 1-1 lists capabilities and limitations.

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TABLE 1-1. DFSU Capabilities and Limitations

VF INPUT/OUTPUT

Impedance - Nominal 600 Ohm balanced to ground	
Return Loss - 26 db minimum	
Longitudinal Balance - 40 db minimum	
Maximum Signal Level - +12 dbm	
Insertion Loss -	
Transmit ± .25 db (nonadjustable)	
Receive ± .25 db (front panel adjustable up to ± 4 db)	
Envelope delay -	10 microseconds maximum 1000 to 2600 Hz
	20 microseconds maximum 500 to 2800 Hz
Crosstalk, Transmit - to Receive	At least 60 db down
Harmonic Distortion -	40 db below any signal input from 300 to 3400 Hz at 0dbm0 input level
Noise	17 dbrnC0 maximum
Phase Jitter	.1 degree peak to peak max
Operating Levels (Strap Options)	
Transmit	-16, -4, -2, 0, and +4 dbr
Receive	-8, -2, +4, 0, and + 7 dbr

SIGNALING TONE TRANSMIT LEVELS

Low Level	-20 dbm0 ± 1.5 db
High Level	-8 dbm0 ± 1.5 db

(NOTE: 2800 Hz tone transmitted at high level only)

TABLE 1-1. (continued)

SIGNALING TONE FREQUENCY ACCURACY ± 5 Hz

SIGNALING TONE RECEIVE THRESHOLDS (Levels required to cause E lead change)

Single Frequency Mode -	-29 dbm0 ± 1 db on-hook to off-hook transition -26 dbm0 ± 1 db off-hook to on-hook transition	
Dual Frequency Mode -		
E off-hook and M off-hook or within 1/2 second of having been off-hook	-16 dbm0 ± 1 db	High Guard
Conditions other than the above	-29 dbm0 ± 1 db	Low Guard
Signal Leak	Signaling tones appearing on the receive line are attenuated to at least -50 dbm0 at the receive drop	

DIAL PULSE OPERATION

Dial Pulse Rates	Will operate over any dial pulse rate from 8 pps to 12 pps with percent break limits from 42% to 72%.
Dial Pulse (Bias)	
Correction	By strap option dial pulses within the above limits are correctable to within ± 4% of any of the following percent breaks: 43, 49, 51, 53, 55, 57, 59, and 71%

TABLE 1-1. (continued)

	(Strap option also available for no correction)
	NOTE: 57% is the normal option used.
MINIMUM DETECTABLE PULSE WIDTH	
Normal Mode	23 milliseconds
Noise Rejection Mode (NRM)	40 milliseconds
(NOTE: NRM is only used when operating in the SF mode. It must not be used on dial pulse circuits)	
CONTROL LEAD CHARACTERISTICS	
E lead (DFSU output)	Dry contact form C Relay mounted on the DFSU mounting shelf. Relay is driven by a solid state switch within the DFSU. This switch provides a ground to negative potentials when off-hook and an open when on-hook.
M lead (DFSU input)	
Input Impedance	190 KOhms approx.
Input Sensitivity	Off-hook input more negative than -12 VDC. On-hook-input open, ground, or more positive than -12 VDC.
Alarm Lead (DFSU Output)	
DFSU in six position	Non alarm state - open

TABLE 1-1. (continued)

shelf	Alarm state - low impedance ground to negative voltages (less than .1V drop with 50 milliamp current). Open to positive voltages. Capable of sinking 300 milliamps.
DFSU in single position	Dry contact form C relay shelf
Out-of-Service Lead (DFSU input)	
Input Impedance	90 KOhm approx
Input Sensitivity	With an input voltage between -22 and -37 VDC the DFSU will be kept in the not out-of-service state. Any other input voltage, an open, or a ground will put the DFSU into the out-of-service state.

1.3 OPERATING INSTRUCTIONS. Operation of the DFSU is automatically controlled by the signals interfacing with it. When the appropriated straps are made for the operating configuration desired the unit is simply inserted into the mounting shelf. When -50 VDC power is applied the DFSU automatically resets itself to the operating condition.

1.3.1 The DFSU has two controls, the front mounted receive level adjustment (REC LEV) and the SF/DF mode switch mounted on the left side cover.

a. REC LEV Adjust: This screwdriver adjustment allows the gain from the receive line to the receive drop to be varied by approximately plus or minus 4db. In normal operation it is set for zero loss.

b. SF/DF Mode Switch: This is a flush mounted slide switch. It can be easily actuated by a thin pointed object such as a small screwdriver or a pencil point. When the switch is in the front position, the unit operates in the DF mode and when it is in the rear position, the unit operates in the SF mode. Note that to access the switch the DFSU must be unseated and pulled partially out from the mounting shelf. This action serves to remove power from the DFSU while changing modes. The DFSU will not react properly if a mode change is attempted without removing power.

1.3.2 The DFSU front panel has the following LED indicators:

(See figure 1-1).

PWR	When lit indicates that power is applied to the DFSU.
FIL	When lit indicates that the notch rejection filter is inserted in receive path.
E	When lit indicates that the E lead is in the off-hook condition.
M	When lit indicates that the M lead is in the off-hook condition.
LA	When lit indicates that the DFSU is in the Local Alarm State. (Functions in DF mode only.)
RA	When lit indicates that the DFSU is in the Remote Alarm State. (Functions in the DF mode only.)
LOS	When lit indicates that the DFSU is in the Local Out-of-Service State. (Functions in the DF mode only.)
ROS	When lit indicates that the DFSU is in the Remote Out-of-Service State. (Functions in the DF mode only.)

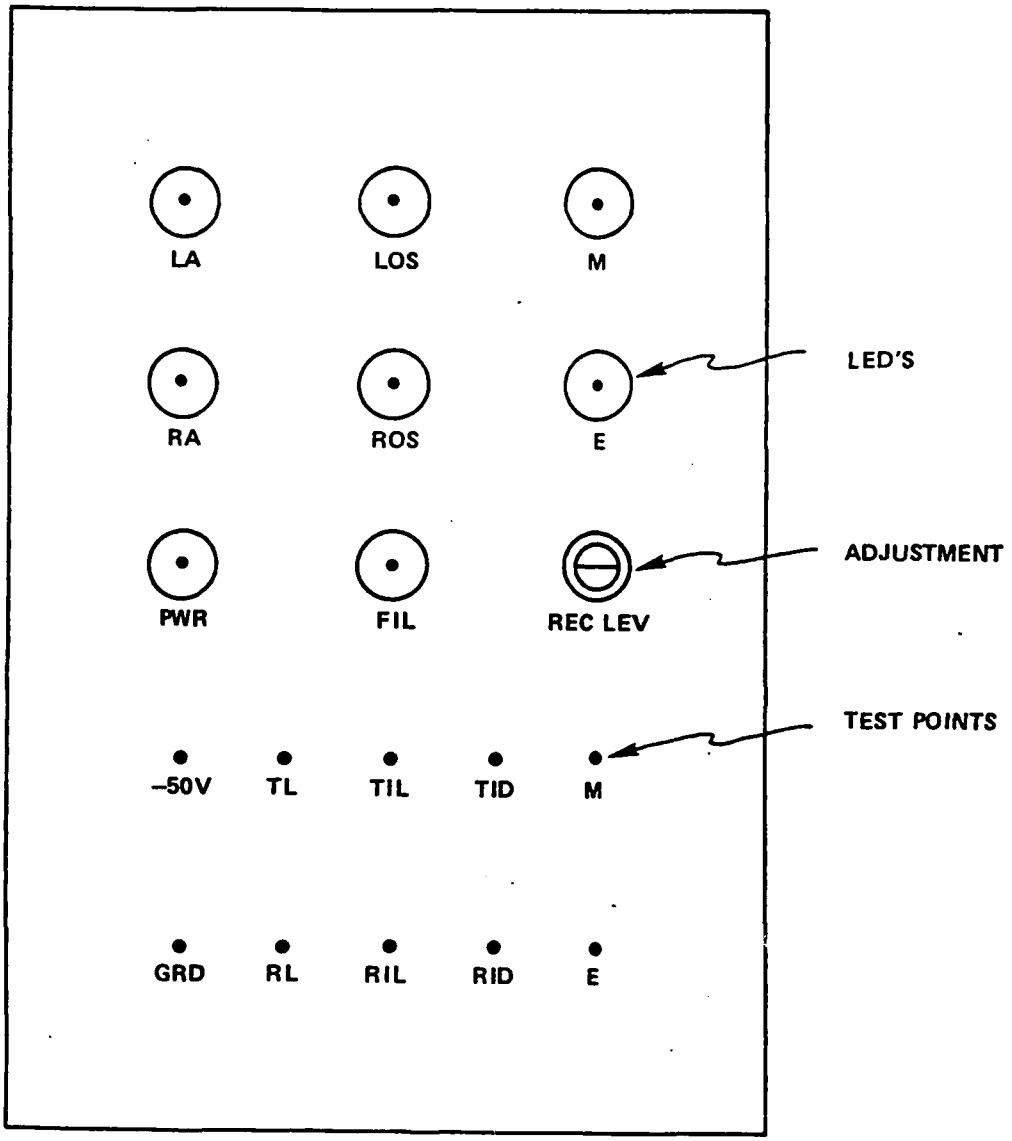


Figure 1-1. DFSU Front Panel Controls and Indicators.

1.3.3 The DFSU has the following front panel monitoring points: (NOTE: These monitor points are tied directly to the corresponding input/output connector pins. There is no internal buffering circuitry.)

-50V	Monitor point to enable front panel measurement of the -50V input power
GRD	Signal ground
TL-RL	Transmit line tip and ring
TIL-RIL	Receive line tip and ring
TID-RID	Receive drop tip and ring
M	M Lead
E	E Lead

1.3.4 There are two 1/4 A MDL 3AG fuses installed in the DFSU. They are mounted on the analog circuit board.

1.4 FUNCTIONAL OPERATION.

1.4.1 (See Figure 1-2).

a. The DFSU is a microprocessor based device. The microprocessor senses and analyzes inputs and controls outputs. A 2000 x 8 bit Read Only Memory (ROM) contains the operating program. A 32 x 8 Random Access Memory (RAM) is used as a scratch pad memory.

b. Signals enter the transmit drop input and interface with the transmit cut circuit and the signal tone circuit. The transmit cut circuit block signals from the drop from appearing in the transmit line under certain circumstances. The signal tone circuits place the 2600 Hz and 2800 Hz signaling tones on the transmit line.

c. Receive signals enter the receive line input and interface with the notch filter circuit, the signal tone energy circuit, the noise energy circuit, and the threshold circuits. The notch filter when inserted in the receive path block signals in the 2500 Hz to 2900 Hz band from the receive drop. The other circuits serve to detect the signaling tones and discriminate between valid and false tones.

d. The E lead provides receive signaling supervision to the terminating telephone equipment. A ground represents off-hook and an open on-hook. The E lead relay provides the capability to change the E lead conditions by varying the connections to the relay contacts.

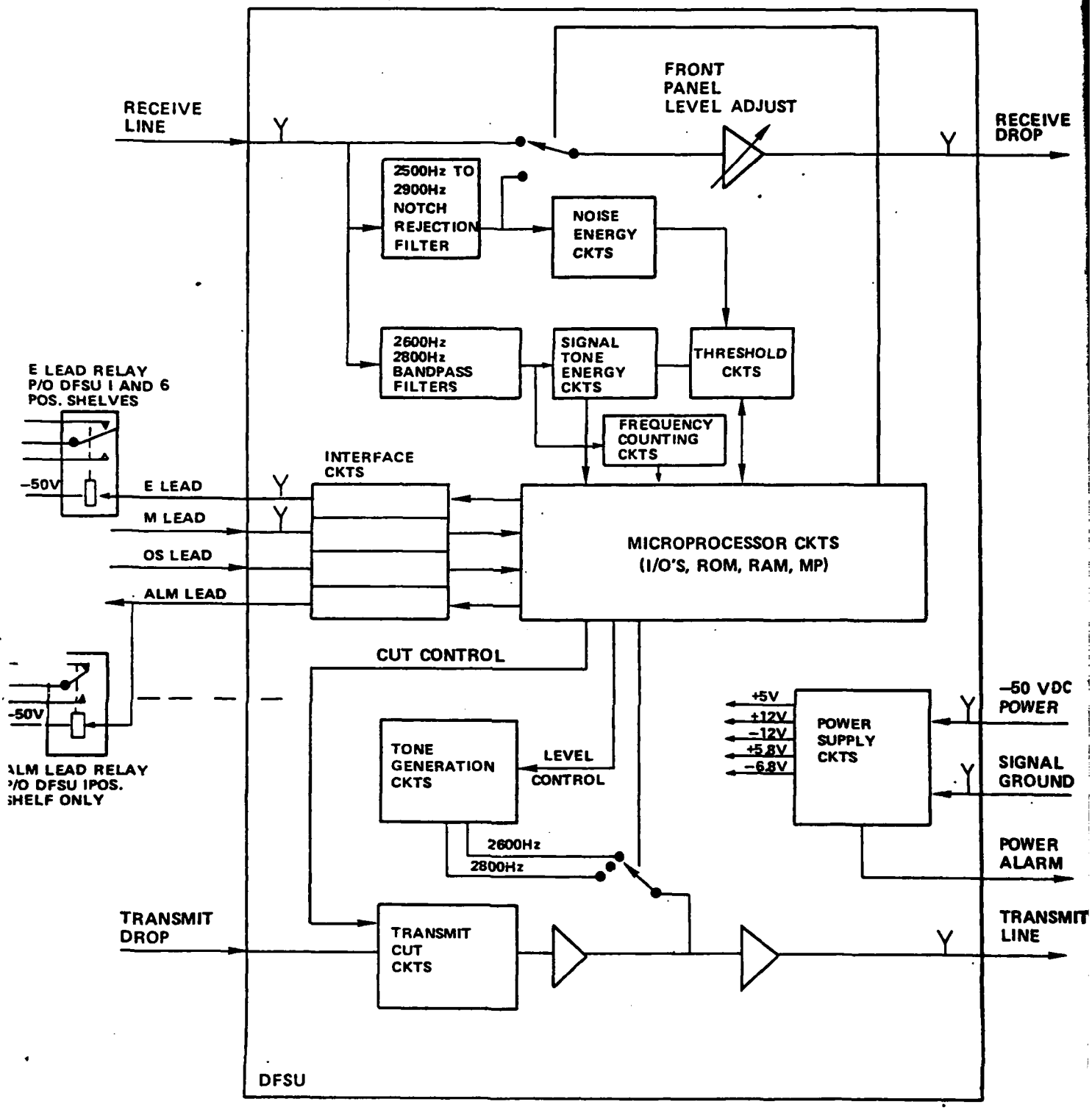


Figure 1-2. DFSU Block Diagram

Y FRONT PANEL TEST POINT

e. The M lead provides the DFSU with transmit signaling supervision from the terminating telephone equipment. Normally -50 VDC represents off-hook and a ground on-hook.

f. The alarm (ALM) lead provides the terminating telephone equipment with an indication that the DFSU is in one of several alarm states. A ground indicates alarm, an open no alarm.

g. The Out-of-Service (OS) lead provides the DFSU with a control signal from the terminating telephone equipment indicating whether or not to put the circuit in a local out-of-sevice condition. A voltage on the lead between -22 and -37 VDC indicates normal circuit operation; any excursion outside these limits indicates a local out-of-service condition.

1.4.2 Df transmit operation.

a. Transmit Cut. Under normal operating conditions (non alarm, non out-of-service) the transmit cut is inserted in the transmit circuit as follows:

(1) E lead steady on-hook, M lead transitions to on-hook. Transmit cut is applied approximately 6 milliseconds (ms) after the M lead transition to on-hook and is maintained continuously as long as E and M are on-hook.

(2) E lead steady on-hook, M lead transition to off-hook. Transmit cut is removed approximately 180 ms after the M lead transition.

(3) E lead steady off-hook, M lead transitions to on-hook. Transmit cut is applied approximately 6 ms after the M lead transition, maintained for 500 ms and then removed.

(4) E lead steady off-hook, M lead transitions to off-hook. Transmit cut is applied approximately 6 ms after the M lead transition, maintained for 174 ms and then removed.

(5) M lead steady on-hook, E lead transitions to on-hook. Transmit cut is applied approximately 28 ms after the 2600 Hz tone appears on the receive line and is maintained as long as E and M lead are on-hook.

(6) M lead steady on-hook, E lead transitions to off-hook. Transmit cut is removed 500 ms after the 2600 Hz tone ceases to appear on the receive line.

(7) M lead steady off-hook. When the M lead is steady off-hook the E lead has no effect on transmit cut. Transmit cut stays removed as

long as M is off-hook regardless of the E lead state or E lead transitions.

b. Transmit Signaling Tones. Transmit signaling tones are placed on the transmit line in response to the condition of the M lead as follows:

(1) M lead steady on-hook. 2600 Hz tone transmitted continuously at -20 dbm0.

(2) M lead transitions to off-hook. 2600 Hz tone is removed and 2800 Hz tone at -8dbm0 is applied within 6 ms of the M lead transistion. The 2800 Hz tone is applied for 175ms or until the M lead returns to on-hook whichever comes sooner. (During dial pulsing what results is alternate pulses of 2600 Hz and 2800 Hz tone.)

(3) M lead transitions to on-hook. 2600 Hz tone at -8dbm0 is transmitted for 500 ms or until the M lead transition to off-hook whichever comes sooner. If the M lead stays on-hook for more than 500 ms the tone level is reduced to -20 dbm0 and kept at that level.

1.4.3 Df receive operation.

a. Tone Detection. Signaling tones are detected in two ways, by frequency counting and by level. The frequency counting detection criteria for the 2600 Hz tone is that it be between 2580 and 2640 Hz. The criteria for the 2800 Hz tone is that it be between 2770 and 2840 Hz. There are two level detection states; they are called high guard and low guard.

(1) High Guard. The DFSU is in the high guard detection state when the E lead is off-hook and the M lead is either off-hook or within 500 ms of having been off-hook. In the high guard state the detection threshold is -16 dbm0. When the DFSU is in the high guard state and a 2600 Hz signaling tone is received continuously for 6 seconds at a level lower than the high guard thresnold but higher than the low guard threshold (-29 dbm0), i.e. between -16 dbm0 and -29 dbm0, the unit will consider this a valid tone and go into the on-hook condition.

(2) Low Guard. The DFSU is in the low guard state whenever the conditions for high guard are not met. In the low guard state the detection threshold is -29 dbm0.

b. Off-Hook Confirmation. When in the idle state, E and M on-hook, the DFSU will recognize an on-hook transition only if at least 23 ms of continuous 2800 Hz tone is detected within 100 ms after the loss of 2600 Hz tone. Thus the 2800 Hz tone provides off-hook confirmation. When not in the idle state the loss of 2600 Hz is sufficient to cause an on-hook to off-hook E lead transition; the 2800 Hz tone need not be detected.

c. Voice Guard. The purpose of voice guard is to prevent an off-hook to on-hook transition to occur due to detection of 2600 Hz components of speech or data signals. Voice guard is enabled whenever the E lead is off-hook and disabled 100 ms after the E lead transition from off-hook to on-hook. The voice guard circuitry compares the level of energy within the signaling tone band to the level of energy outside the band (600 Hz to 2500 Hz and 2900 Hz to 3600 Hz). The energy within the signal tone band must exceed the energy outside the band for the tone to be considered valid. In addition the frequency of the energy in the tone band must be within the frequency counting criteria stated earlier. Below are typical values of 2600 Hz tone level required to cause an on-hook transition with the corresponding out of band signal energy present.

Level of Energy Outside the Tone Band	Level of 2600 Hx Tone Required to Cause On-Hook Transition
-36 dbm0	-16 dbm0
-30	-14
-25	-13
-20	-10
-15	- 7

Note that only 2600 Hz tone plays a part in voice guard. 2800 Hz tone is not considered since it is only associated with on-hook to off-hook transitions and voice guard is only concerned with off-hook to on-hook transitions.

d. Dial Pulse Correction (Bias Correction). The DFSU has the capability to correct received dial pulse signals to strap selectable percent breaks. The DFSU actually measures the incoming dial pulse rate and then regenerates dial pulses in accordance with the selected percent break. Thus it will lengthen or shorten the received break pulse depending on the length of the pulse and the measured dial pulse rate. The DFSU will not alter the dial pulse rate itself. Dial pulse correction can be applied over the pulse rate range of 8 to 12 pps and the percent break limits of 42% to 72%. When incoming pulse are outside these limits the DFSU passes the pulses without correction. Dial pulse correction is enabled by a strapping option. The DFSU can also operate in a no correction mode.

e. Transition Delays. When operating in the dial pulse correction mode there is a 105 ms delay between the time the signaling tone at the receive line input changes state and the time the E lead changes state. When operating in the no-correction mode the delay is 35 ms.

f. Minimum Pulse Widths. The DFSU will not react to on-hook or off-hook pulses of less than 23 ms duration. That is, any pulse of incoming signaling tone or break in incoming signaling tone must exceed 23 ms to be recognized as a valid supervisory signal.

g. Notch Rejection Filter. The notch rejection filter is placed in the receive path whenever valid 2600 Hz tone or 2800 Hz tone is detected. The filter attenuates frequencies in the 2500 to 2900 Hz band. Signals at 2600 Hz and 2800 Hz are attenuated to at least -50 dbm0 at the receive drop. The filter is inserted within approximately 10 ms of appearance of the tone. The filter will only be inserted if the received tone meets the threshold and frequency criteria for a valid signal. If voice guard is enabled it must also meet the voice guard criteria. However the received signal does not have to meet the minimum pulse width requirements. As a special condition the filter will not be inserted if 2800 Hz tone is detected during the busy state (E and M off-hook) and the DFSU has been in the busy state for at least 500 ms. The notch filter will be inserted when the 2800 Hz tone is detected in the first 500 ms of the busy period. This permits communications terminal equipment, such as data modems and facsimiles, using the 2800 Hz portion of the spectrum to communicate through the DFSU without having their signals distorted by notch filter insertion.

1.4.4 The DFSU will go into an alarm conditon under certain circumstances. When this happens the alarm lead to the terminating telephone equipment is grounded. The AUTOVON system equipment uses this ground to prohibit selection of that particular circuit. (Use of the alarm lead in telephone systems other than AUTOVON will depend on the particular design of that system.) When an alarm condition occurs various functions of the DFSU are put under specific control. Table 1-2 provides details as to what happens.

a. Local Alarm (LA) and Remote Alarm (RA). The DFSU can go into a LA or a RA condition. The LA condition occurs when the local DFSU detects an alarm causing abnormality. The RA condition occurs when the remote DFSU detects the abnormality and transmits the LA message to the local DFSU. Upon receipt of this message the local DFSU goes into the RA state.

b. LA Message. The LA message is a continuous repetition of the following pattern: 400 ms of 2600 Hz tone at -20 dbm0 followed by 400 ms of no transmission. Note the LA message is transmitted by the DFSU in the LA state and received by the unit in the RA state.

c. Alarm Conditions. The DFSU goes into the LA state under the following circumstances:

(1) When in the idle state (E and M on-hook) 2600 Hz tone drops out for 800 ms or longer without the detection of 2800 Hz tone within 100 ms after the dropout. Basically this is the loss of 2600 Hz tone without off-hook confirmation by the appearance of 2800 Hz tone.

(2) When having been in the busy state (E and M off-hook) for at least 500 ms the M lead is returned to on-hook but the E lead remains off-hook for 60 seconds or longer. This is the condition of failing to receive an on-hook after the completion of a call.

TABLE 1-2. STATUS OF DFSU FUNCTIONS UNDER ALARM AND OUT-OF-SERVICE CONDITIONS

DFSU FUNCTION	LOCAL ALARM (LA)	REMOTE ALARM (RA)	LOCAL OUT-OF-SERVICE (LOS)	REMOTE OUT-OF-SERVICE (ROS)
Message Transmission	LA message sent Continuously at	Sends 2600 Hz tone at -20 dbm0	Sends ROS message once at -8 dbm0	No constraints, tone sent as dictated by M lead
E Lead	Forced on-hook	Forced on-hook	No constraints imposed	Forced on-hook
M Lead	Control function	Control function	Control function disabled	No constraints imposed
Alarm Lead	Grounded	Grounded	Open	Grounded
OS Lead	Control function disabled	Control function disabled		Control function disabled
Transmit Cut	Imposed	Imposed	*See below	Applied and removed in accordance with M lead states
Notch Rejection Filter	Inserted in receive path	Inserted in receive path	No constraints on operation	Removed from receive path
LA Condition	-----	Inhibited	Inhibited	Inhibited
LOS Condition	Inhibited	Inhibited	-----	Inhibited
RA Condition	Inhibited	-----	Inhibited	Inhibited
ROS Condition	Receipt of ROS message causes DFSU state to change from LA to ROS	Receipt of ROS message causes DFSU state to change from RA to ROS	Receipt of ROS message caused DFSU state to change from LOS to ROS	-----
Front Panel Indicator Lit	LA	RA	LOS	ROS

*with E on hook Cut controlled by M: M off-hook cut out, M on-hook cut applied. With E off-hook cut continuously out.

(3) When the Signal to Noise Mode (S/N) is strapped and the DFSU is in the idle state an LA condition will occur when the ratio of the signaling tone energy to energy outside the signaling tone band (noise) degrades below a certain limit. Typical signal and noise values causing the LA condition are listed below.

2600 Hz Tone Level	Noise Level Required to Cause LA
-28 dbm0	-33 dbm0
-26	-30
-24	-27
-22	-24
-20	-22
-18	-20
-16	-18

As can be seen extremely high noise levels would be required to cause an LA condition. The S/N mode is generally not used.

d. Clearing of Alarm Conditions. An LA condition caused by other than S/N will clear automatically upon detection of 200 ms of continuous 2600 Hz tone. An LA condition caused by S/N will clear as soon as the S/N ration increases to a value above that required to cause the LA condition. An LA caused by S/N will also clear if the M lead transitions to off-hook. An RA condition clears automatically upon detection of 600 ms of continuous 2600 Hz tone.

1.4.5 DF Out-of-Service (OS) Operation. When used in the AUTOVON system the DFSU provides the capability to take an AUTOVON circuit out-of-service at both ends by placing a control signal on the OS lead of the DFSU. Any voltage applied to the OS lead outsite of the range of -22 to -37 VDC will cause the DFSU to go into a local out-of-service (LOS) state. When this happens the DFSU transmits a LOS message to the remote DFSU which in turn causes the remote DFSU transmits a LOS message to the remote DFSU which in turn causes the remote DFSU to go into a remote out-of-service (ROS) condition. Table 1-1 provides details as to what happens to the various functions of the DFSU when the LOS and ROS conditions occur. Note that under ROS conditions the alarm lead is grounded even though this is not an alarm condition. The grounding inhibits selection of the circuit by the telephone terminal equipment.

a. LOS Message. The LOS message is a one time transmission of the following pattern: 200 ms of 2600 Hz tone followed by 300 ms of no transmission

followed by 100 ms of 2800 Hz tone. The tones are transmitted at the high level, -8 dbm0. After completion of the message transmission all transmission ceases until the OS lead is returned to the normal state (-22 to -37 VDC).

b. Restoration from LOS and ROS. The LOS state will clear immediately upon transition of the voltage on the OS lead to the -22 to -37 VDC voltage range. The ROS state will clear upon detection of 2600 Hz tone for more than 280 ms.

1.4.6 Operation in the SF Mode. In the SF mode the DFSU operates virtually the same as conventional SF signaling units. In some aspects the DFSU performs the same way in the SF mode as in the DF mode. Below is a description of SF operation; where it is the same as DF operation the reader is referred to the appropriate paragraph. The only difference between SF and DF transmit operation is that there is no transmission of 2800 Hz tone.

a. Tone Detection. Tone detection is based on tone signal level and frequency. In the SF mode the DFSU operates in the low guard state only. Detection thresholds are as follows:

On-hook to off-hook transition - -29 dbm0 $\pm$ db

Off-hook to on-hook transition - -26 dbm0 $\pm$ 1 db

Frequency counting detection criteria is 2580 to 2640 Hz.

b. Off-hook Confirmation. There is no off-hook confirmation in the SF mode.

c. Voice Guard. Voice Guard Voice Operation is the same as in the DF mode except that the relative levels of tone energy and out of band energy are somewhat different. Below are typical values of 2600 Hz tone level required to cause an on-hook transition with the corresponding out-of-band signal energy present.

Level of Energy Outside the Tone Band	Level of 2600 Hz Tone Required to Cause On-hook Transition
-36 dbm0	-24 dbm0
-30	-21
-25	-17
-20	-13
-15	- 9

d. Dial Pulse Correction (Bias Correction). Dial pulse correction is the same as in the DF mode.

e. Transition Delays. Transition delays are the same as in the DF mode.

f. Minimum Pulse Width. Minimum pulse width is the same as in the DF mode except for the noise rejection mode (NRM) strapping option. NRM is applicable to SF operation only and when it is employed the minimum pulse width changed from 23 ms to 40 ms. NRM should not be used on dial pulse circuits.

g. Notch Rejection Filter. Notch rejection filter operation is the same as in the DF mode except that under no circumstances will 2800 Hz tones cause the filter to be inserted.

h. Alarm and Out-of-Service Operation. All of the alarm and out-of-service functions of the DFSU are inhibited in the SF mode. In the SF mode the DFSU will not transmit or respond to LA and LOS messages nor will it respond to OS lead signals. The alarm lead is held continuously open.

1.5 LIST OF APPLICABLE DOCUMENTS.

a. Government documents

Manuals

Standards

MIL-STD-188-124	Ground, Bonding and Shielding for Common Long Haul/Tactical Communications Systems

Regulations

(C) AR 530-4	Control of Compromising Emanations (U)

Circulars

(C) DCAC 370-160-3	Site Survey Data Book for Communications Facilities (U)
CCR 702-1-2	USACC Quality Assurance Program for Engineering, Installation and Acceptance of Communications Electronics Equipment and Systems
CCCR 702-1	USACEEIA Quality Assurance and Testing Programs
CCCR 702-2	Preparation of Documentation for Test and Evaluation of Communications-Electronics Material

CCCR 702-3	Role of the Test Director
CCCR 702-4	Quality Assurance During Onsite Installation
CCCR 702-6	Quality Assurance Reports
CCCR 702-7	Quality Assurance Corrective Action
CCC-TED-79-TP-065, October 1979	USACEEIA, Test and Evaluation Directorate, Modular AUTODIN Terminal Equipment (MATE) Onsite Test Plan

Pamphlets

CCCP 105 Series	Communications-Electronics Standard Installation Practices
USACEI-Bn Pamphlet 105-3	USACEI Bn, Communications-Electronics Installation Planning and Implementation Guide
Air Force Technical Order, T.O. 31-10 Series	Standard Installation Practices

b. Non-Government documents.

NFPA 70	National Electrical Code

1.6 COMMENTS ON PUBLICATIONS.

a. Users of this publication are invited to submit recommendations for its improvement. Comments should be keyed to the drawing, page, paragraph, and line of the text for which the change is recommended. For convenience, a mailing card is bound with this SEIP. Comments should be sent directly to the Commander, HQ USACEEIA, ATTN: CCC-CED-STD, Fort Huachuca, Arizona 85613.

b. Request for USACEEIA regulations and forms should be addressed to the Commander, HQ USACEEIA, ATTN: CCC-DRM-P-R, Fort Huachuca, Arizona 85613.

SECTION 2. SITE SURVEY DATA AND CHECKLIST

2.1 GENERAL. The site survey is conducted by the detail engineer, site personnel, and/or by a USACEEIA designee before any attempt to reconfigure an existing facility or to install a new facility. The information collected during the survey is necessary to accomplish preliminary engineering, and to determine the related support requirements. The survey information will provide base line data which defines the existing facility and its capabilities. An analysis of the base line data will be used to determine the approach in the design of an engineering installation package for a particular site.

2.2 SITE SURVEY CRITERIA. The site survey should be conducted in accordance with guidelines and criteria set forth in Defense Communications Agency (DCA) Circular 370-160-3, Site Survey Data `ook for Communications Facilities. The Project Coordination will be developed as Section 2 of the Engineering Installation Package (EIP).

2.2.1 Site Survey Checklist. The Sample Site Survey Checklist, Figure 2-1, should be used.

2.2.2 Use of Site Survey Checklist. The checklist, when completed, will aid in preparing an official site survey report with equipment layout drawings. The following items, as applicable, are to be included with the site survey checklist.

2.2.2.1 Floor plan of the equipment room showing actual dimensions.

2.2.2.2 Single-line drawings of existing electrical distribution system(s) and power supply(s). If possible, show required changes or additions to meet the new requirements.

2.2.2.3 The existing environmental equipment capabilities (i.e., heater BTU, air conditioner CFM) and changes or additions needed to meet new requirements.

2.2.2.4 Copy of DA Form 2701, Job Order Request (repairs and utilities) or Military Construction, Army (MCA) project(s) previously submitted, if any.

2.2.2.5 Comments on anticipated difficulties or hinderances to the flow of materials, work, or personnel in the operations area.

2.2.2.6 Host country requirements or restrictions, if applicable.

2.2.2.7 U.S. Army Security Agency comments, if any.

2.2.2.8 Validation of Plant-in-Place Records.

2.2.2.9 Memorandum of Understanding between the Operation and Maintenance (O&M) activity, District Engineer, and District Space Coordinator.

2.3 EQUIPMENT CHARACTERISTICS. The physical and electrical characteristics of the applicable equipment are listed in Table 2-1. This table should be used to determine the site's physical size, AC power requirements, and floor loading criteria.

TABLE 2-1. EQUIPMENT CHARACTERISTICS

	POWER	DIMENTIONS (INCHES)	STORAGE CONDITION	OPERATING CONDITIONS	WEIGHT (lbs)
DISU	-50 VDD + 6 VDD @ 150 ma/unit	5 1/4H, 3W, 6 1/2D	-55°C to +70°C up to 100% HUM Alt to 40K FT	-0°C to +46°C up to 80% HUM Alt to 7500 FT	3
SHELF (SIX POS)	------	5 1/4H, 19W, 17 1/2D	------	------	10
SHELF (SINGLE)	------	5 1/2H, 3 1/2W, 17 1/2D	------	------	3

SITE SURVEY CHECKLIST

FOR

_____

_____

_____

_____

DATE: _____

PROJECT NUMBER: _____

SITE LOCATION: _____

CITY: _____ COUNTRY: _____

INSTALLATION: _____

_____

BUILDING: _____ ROOM: _____

PROJECT ENGINEER: _____

_____

_____

CLASSIFICATION: _____

Figure 2-1. Sample Site Survey Checklist (sheet 1 of 11).

PROJECT OR TASK NO: _____

1. PURPOSE OF SITE SURVEY: _____

_____

_____

_____

_____

2. PERSONNEL CONTACTED OR PRESENT DURING SURVEY:

Name, Grade, and Title	Organization	Phone No.
a.		
b.		
c.		
d.		
e.		
f.		
g.		
h.		

3. EQUIPMENT TO BE INSTALLED:

a. Contractor furnished and installed.

b. GFE, Government installed.

c. GFE, contractor installed.

d. Equipment description chart.

Figure 2-1. Sample Site Survey Checklist (sheet 2 of 11).

PROJECT OF TASK NO: _____

Nomenclature	Weight	Dimensions	Ambient operating ranges	Heat dissipation	Access clearance requirements

4. DOCUMENTATION:

a. Documentation of the status of the physical plant should be completed by requisition and review of the appropriate as-built drawings. The list of as-built drawings obtained is as follows:

Drawing number	Title	Revision date	Source

b. Drawings not available during the site survey should be requested by the local military authorities through the most expeditious channels. Once obtained, the drawings should be immediately forwarded to responsible area electronics engineering installation agency.

Figure 2-1. Sample Site Survey Checklist (sheet 3 of 11).

PROJECT OR TASK NO: _____

c. If as-built drawings of the physical plant are not available, lack sufficient details, or are otherwise inadequate, provide a dimensioned sketch of the floor plan including location, dimensions, and identity of each equipment. (Please attach sketch.)

d. Additional general information, which bears on the engineering of the facility, is as follows:

_____

_____

_____

_____

_____

_____

_____

5. ROOM CONFIGURATION (to be supported by scaled drawings):

a. Room numbers: _____

b. Floor:

(1) Material: _____

(2) Condition: _____

(3) Loading capacity: _____

(4) Obstructions (Pipes, pillars, etc): _____

_____

_____

_____

_____

Figure 2-1. Sample Site Survey Checklist (sheet 4 of 11).

PROJECT OR TASK NO: _____

(5) Space available under raised flooring, if installed:

_____

c. Walls:

(1) Material: _____

(2) Condition: _____

(3) Load bearing: _____

(4) Obstructions: _____

(5) Height: _____

(6) Possible removal: _____

_____

d. Doors:

(1) Number of outer doors: _____

(2) Number of inner doors: _____

(3) Material: _____

(4) Condition: _____

(5) Dimensions: _____

(6) Openings: IN: _____ _____ OUT: _____

e. Windows:

(1) Quantity on outer walls: _____

(2) Dimensions: _____

(3) Type (double hung, projected, etc.): _____

_____

Figure 2-1. Sample Site Survey Checklist (sheet 5 of 11).

PROJECT OR TASK NO: _____

(4) Height above floor: _____

(5) Number of windows: Barred _____ Opaques _____

f. Ceiling:

(1) Material: _____

(2) Condition: _____

(3) Height (suspended or other): _____

(4) Obstructions (pipes, pillars, etc): _____

_____

_____

(5) Space available for ducting if a drop ceiling is installed:

_____

_____

g. Lighting (if wiring is to be removed, check here _____:

(1) Type: Incandescent: _____ Flourescent _____

(2) Type of fixtures: _____

(3) Number of fixtures: _____

(4) Size of lamps in watts: _____

(5) Height above floor: _____

(6) All power cable for lights in fettous conduit:

Yes _____ No _____

(7) Foot candle rating: _____

(8) Total power loading: _____

Figure 2-1. Sample Site Survey Checklist (sheet 6 of 11).

PROJECT OR TASK NO: _____

h. Convenience outlets (if wiring is to be removed, check here ___:

(1) Type: _____ Number: _____

(2) Voltage: _____ Phase: _____

Frequency: _____ Ampere rating: _____

(3) Number of wires: _____

(4) Protective ground to ac outlets: Yes _____ No _____

(5) All power cable in fettous conduit: Yes _____ No _____

i. Environmental systems:

(1) Type of heating: _____

Btu/hr capacity: _____

(2) Type of air conditioning: _____

Btu/hr capacity: _____

(3) Maximum number of personnel who normally occupy area: _____

(4) Humidity controlled: Yes _____ No _____

(5) Heat dissipation capacity of existing equipment: _____
_____Btu/hr

(6) Surplus air-conditioning capacity available for this installation: _____

(7) Feasibility of expansion (if necessary): _____

(8) Monitoring equipment: _____

Figure 2-1. Sample Site Survey Checklist (sheet 7 of 11)

PROJECT OR TASK NO: _____

6. POWER AVAILABILITY:

a. Primary power supplied by commercial means: Yes ___ No _____

b. Power specifications:

(1) Present available capacity: _____kW

(2) Voltage: _____volts

(3) Frequency: _____Hz

(4) Phase: _____0

(5) Size of feeder lines: _____AWG

(6) Monitoring equipment (if any): _____

c. Means of providing emergency power:

(1) Manual start, automatic start, or no-break _____

(2) Manual or automatic switching unit:

(3) Emergency power available: _____kW

(4) Generator specifications:

Number	Rating (kW)	Frequency (Hz)	Nomenclature	Capacity (kW)

d. Space available for additional generators: Yes _____ No _____

Figure 2-1. Sample Site Survey Checklist (sheet 8 of 11).

PROJECT OR TASK NO: _____

e. Uninterrupted power requirements: Yes _____ No _____

(1) Voltage: _____

(2) Current: _____

(3) Solid state system: Yes _____ No _____

Life after power failure: _____

Type of battery: _____

f. Presently programmed power upgrade (give details): _____

_____

g. Technical load:

(1) Present critical technical load: _____ kW

(2) Present noncritical technical load: _____ kW

(3) Present nontechnical load: _____ kW

7. EXISTING POWER CONFIGURATION:

a. Main power panel:

(1) Location: _____

(2) Rating: _____ kVA

(3) Voltage: _____ Volts

(4) Phase: _____ 0

(5) Frequency: _____ Hz

(6) Number of spare circuit breakers: _____

(7) RED/BLACK TEMPEST: _____

b. Additional power panels should also be reported here using the same reporting format given in a above. (Please attach sheet.)

Figure 2-1. Sample Site Survey Checklist (sheet 9 of 11).

PROJECT OR TASK NO: _____

c. All power panels have ac protective ground wire installed:

Yes _____ No _____

d. All ac power lines contained in conduit: Yes _____ No _____

e. All ac juntion boxes used: Yes _____ No _____

(1) If yes, what type: _____

(2) Pre-punched knockouts: Yes _____ No _____

(3) Ferrous box and cover: Yes _____ No _____

f. Power isolation transformer available: Yes _____ No _____

(1) If yes, what type: _____

(2) Rating: _____

(3) Primary voltage: ___ volts Secondary voltage: _____ volts

(4) Number of phases: _____ 0

8. STATION GROUND:

a. Signal ground installed: Yes _____ No _____

(1) Type (water pipe, rod, etc.): _____

(2) Resistance of true earth ground: _____ ohms

(3) Date measured: _____

(4) Method used: _____

(5) RED/BLACK ground distribution boxes available for installation: Yes _____ No _____

b. Protective ac ground installed: Yes _____ No _____

(1) All equipment grounded to ac protective ground by separate wires: Yes _____ No _____

Figure 2-1. Sample Site Survey Checklist (sheet 10 of 11).

PROJECT OR TASK NO: _____

(2) Ferrous shields tied to ac protective ground bus:

Yes _____ No _____

9. UTILITIES AVAILABLE (water and gas):

a. Size and capacity of each: _____

b. Supplier: _____

c. Available capacity: _____

10. PRESENTLY INSTALLED EQUIPMENT (List type and quantity of installed equipment that will be associated with or used for this installation.):

Item No.	Room location	Nomenclature	Qty. in operation	Qty. reserved

11. MISCELLANEOUS:

_____
Site Survey Team Chief

Figure 2-1. Sample Site Survey Checklist (sheet 11 of 11).

SECTION 3. INSTALLATION SPECIFICATIONS AND INSTRUCTIONS

3.1 GENERAL. The installation specifications and instructions outlined in this section are standardized engineering guidance for use by responsible activities during the initial engineering and installation of the DFSU. The installations will be performed in compliance with the listed installation specifications. Installation supervisors and the quality assurance representative must become thoroughly familiar with the installation effort and inspect all work.

3.2 DOCUMENTATION AND APPLICABLE DIRECTORIES. All changes or alterations to engineering drawings shall be marked in red for additions, yellow for deletions, and notes in blue; submitted to Commander, US Army Communications-Electronics Engineering Installation Agency, ATTN: CCC-CED-STD, Fort Huachuca, Arizona 85613, for coordination and incorporation of applicable changes. Installer personnel must be familiar with, and will be guided by MIL-STD-188-124, (C) AR 530-4, TO 31-10 Series, CCCP 105 Series, USACEI BN PAM 105-3 and NFPA 70.

3.3 INSTALLATION DETAIL. The following steps provide typical procedures and sequence of events for installation of the DFSU.

3.3.1 Order of Installation. The DFSU should be installed in sequence of events to assure compliance with the installation drawings. Minor changes to the sequence of installation procedures may be made in consideration of available manpower, material, equipment, and facilities. The following sequence is suggested:

3.3.2 Inventory. Inventory material and equipment and establish storage control procedures. Coordinate secure storage requirement during nonworking hours with the O&M command.

3.3.3 Layout. Lay out the equipment floor plan and establish reference working lines and location points.

3.3.4 Physical Installation. The DFSU is mounted in either a six position shelf or a single position shelf. The six position shelf mounts in a standard 19 inch rack. The single position shelf can also be mounted in a standard 19 inch rack, but mounting will depend upon the type of installation and will be specified by the O&M Command.

3.3.5 Electrical Connections. Electrical connections are made to 45 x 45 mil wire wrap pins located on the rear of the mounting shelves. There are two vertical rows of 22 pins per each DFSU. On the shelf, the left hand row is marked A thru Z with A being the top pin and Z being the bottom pin; the right hand row is not marked. (NOTE: Ignore the

pin numbers marked on the connectors themselves. They may or may not correspond to pin numbers on the shelf.) All connections are made to these rows of pins except for the E lead on the six position shelf and E and Alarm leads on the single position shelf. These connections are made to a shelf mounted relay card. Table 3-1 provides the electrical connections.

3.3.6 Strapping Options. The DFSU has several strapping options. The strapping posts are located on either the digital circuit board (left hand board when viewing from the front) or the analog board (right hand board). Fig 3-1 and 3-2 show locations of the strapping posts. The strapping options are as follows:

Digital Board -	Bias Correction
	Percentage of Bias Connection
	Mode of Operation - DFSU or SFSU
	Noise Rejection Mode (NRM)
Analog Board -	Transmit Transmission Level Point (TLP)
	Receive TLP - Signaling Tone
	Receive TLP - Noise
	Out-of-Service (OS) Mode
	Signal to Noise (S/N)

3.3.7 Bias Correction. Bias correction alters the received dial pulses as required to provide a uniform percent break when they appear on the E lead. Four straps must be made to implement bias correction.

a. Bias Correction/No Bias Correction. If bias correction is required strap ST302 to ST303. If bias correction is not required strap ST302 to ST301.

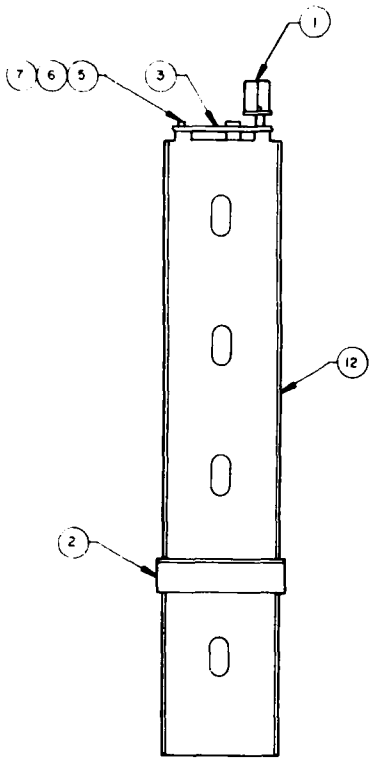
b. Percentage Bias Correction. Three straps must be made to select the desired percent break in the corrected dial pulses. Normally 57% break is used. The strapping is provided below.

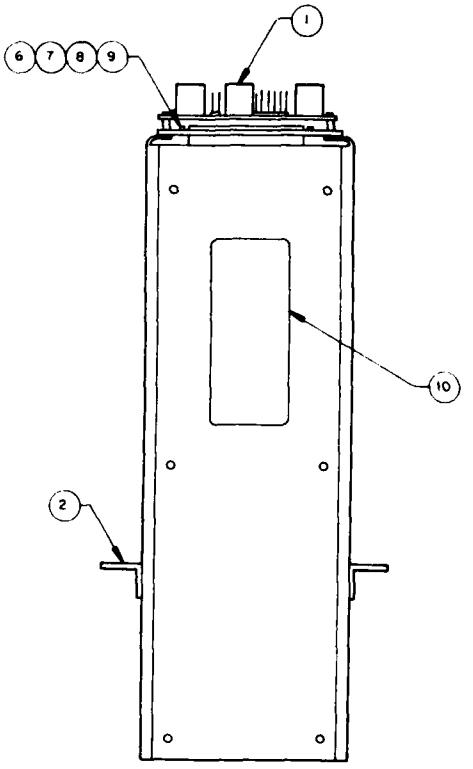
SECTION 4. ENGINEERING INSTALLATION DRAWINGS

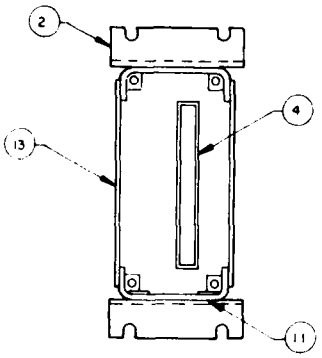
4.1 GENERAL. The engineering installation drawings provided in this section depict typical floor plans, equipment placement, conduit runs, and electrical interface/interconnections.

4.2 MODIFICATION OF INSTALLATION DRAWINGS. The engineering drawings may be modified during and after installation of a project to reflect adaptation to local physical and environmental conditions. Copies of modified drawings should be retained on site and changes, corrections, and deletions forwarded to the Cdr. US Army Communications-Electronics Engineering Installation Agency, CCC-CED-STD, Fort Huachuca, Arizona 85613.

4.2.1 USACEEIA drawings. The engineering installation drawings, STD-TC-0068 (2 sheets) and STD-TC-0069 (2 sheets) are 11-1/2 by 16 inches, foldout type, and are not to scale format. The scale referenced on these drawings refer to D size drawings only.







CONNECTOR PINS			FUNCTIONS
N/C	A	-	T DROP
	B	-	R DROP
	C	-	T LINE
	D	-	R LINE
	E	-	TI DROP
	F	-	RI DROP
	H	-	TI LINE
	J	-	RI LINE
	K	-	E
	L	-	M
	M	-	ALM LEAD
	N	-	OS LEAD
	P	-	N/C
	R	-	N/C
	S	-	N/C
	T	-	N/C
	U	-	SHLD GND
	V	-	-50V
	W	-	SIG GND
	X	-	N/C
	Y	-	N/C
N/C	Z	-	PWR ALM

N/C NO CONNECTION

TABLE 1
REAR VIEW

REVISION				
		DESCRIPTION	DATE	APPROVED

FUNCTIONS
DROP
DROP
LINE
LINE
DROP
DROP
LINE
LINE
LEAD
LEAD
C
C
C
C
GND
GND
ALM
ON

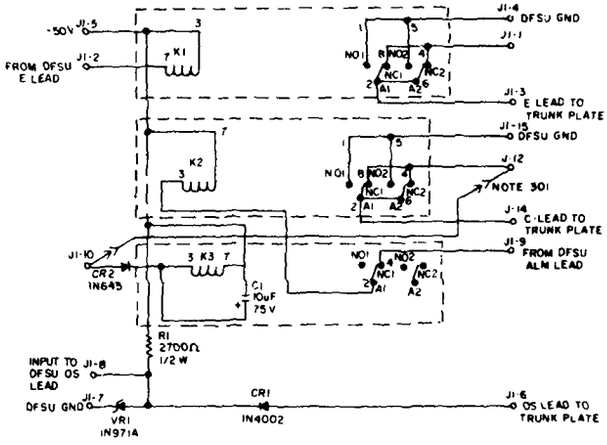
ITEM NO	SML	DESCRIPTION	PART NO / NSN	UI	QTY
13		PANEL, SIDE		EA	
12		PANEL, TOP		EA	
11		PANEL, BOTTOM		EA	
10		PLATE, IDENT, METAL FOIL, ADHESIVE BACK		EA	
9		NUT, HEX, MACH SCREW, MS35649/244		EA	
8		SCREW, MACH PH SLOT, MS35233/18		EA	
7		WASHER, FLAT, NAS620-4LC		EA	
6		WASHER, LOCK SPR HEL, MS35338/135		EA	
5		SCREW, MACH, PH SLOT, 440 X 312		EA	
4		CONN CARDEDGE, WIRE WRAP, SCD 406 CBSD1		EA	
3		PANEL, CONNECTOR		EA	
2		BRACKET MOUNTING		EA	
1		ALARM INTERFACE ASSY, 8123900		EA	

PARTS LIST

DENT NO	U S ARMY COMMUNICATIONS-ELECTRONICS ENGINEERING INSTALLATION AGENCY
STD-TC-0068	DFSU AUTOVON INTERFACE SINGLE SHELF ASSEMBLY
SIZE D	FSCM NO 50470
DRAWING NO	
SCALE	SHEET OF

NEXT ASSEMBLY	USED ON
DWG INDEX NO	

2



WIRING DIAGRAM
SINGLE SHELF

REVISION			
	DESCRIPTION	DATE	APPROVED

J1-4 DFSU GND

J1-1

J1-3 E LEAD TO TRUNK PLATE

J1-15 DFSU GND

J1-12

NOTE 301

J1-14 C LEAD TO TRUNK PLATE

J1-9 FROM DFSU ALM LEAD

J1-6 OS LEAD TO TRUNK PLATE

NOTE:

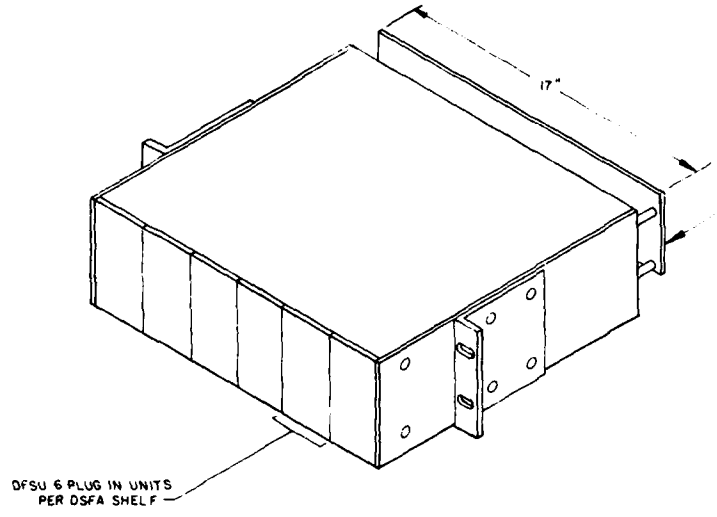
301 FOR PBX INSTALLATIONS WHICH REQUIRE A 150MS DELAY, FOR THE SWITCH TRAIN TO RELEASE AFTER THE SUBSCRIBER GOES ON HOOK, PROVIDE A STRAP BETWEEN J1-10 AND J1-12 IF A DELAY OF LONGER THAN 150MS IS REQUIRED, ADD 5uF OF CAPACITANCE TO C1 FOR EACH 50MS OF ADDITIONAL DELAY REQUIRED

302 SEE SHEET 2 OF STD-TD-0069 FOR EXTERNAL WIRING.

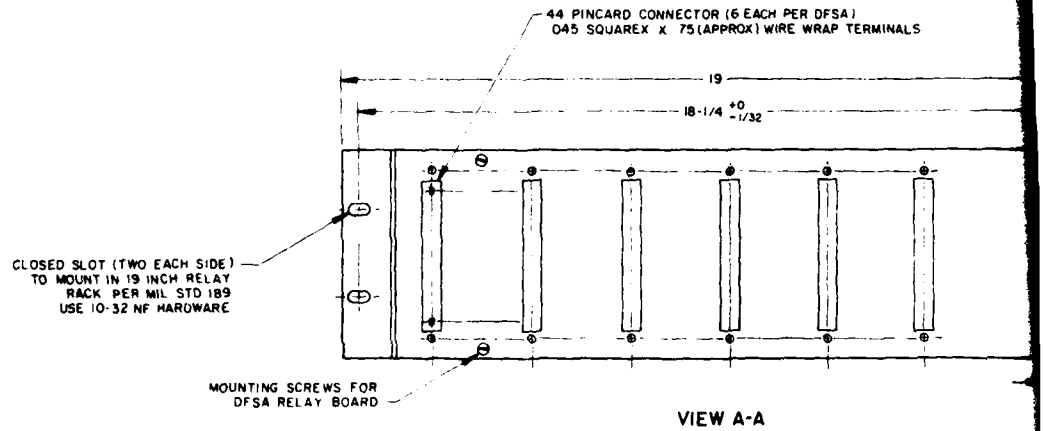
IDENT NO STD-TC-0068			
SHEET 2 OF 2			
DRAWN BY DRAWING	DATE 23 JUN 82	SIZE D	FSCM NO 50470
APPROVED BY		SCALE NONE	SHEET OF

1

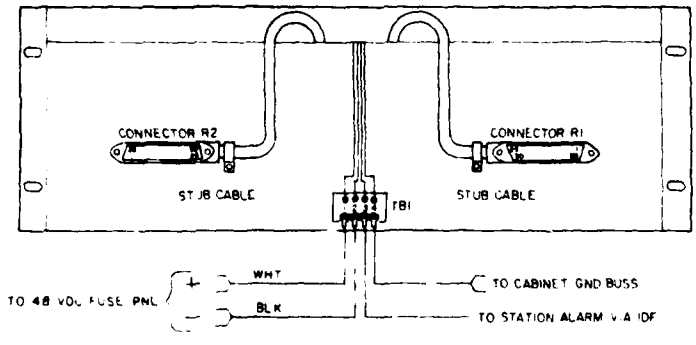
2



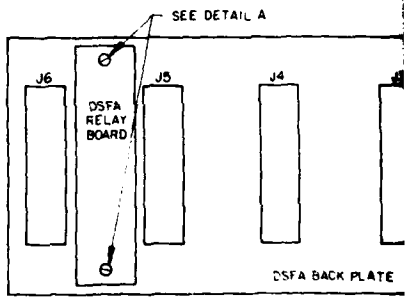
FRONT VIEW



VIEW A-A

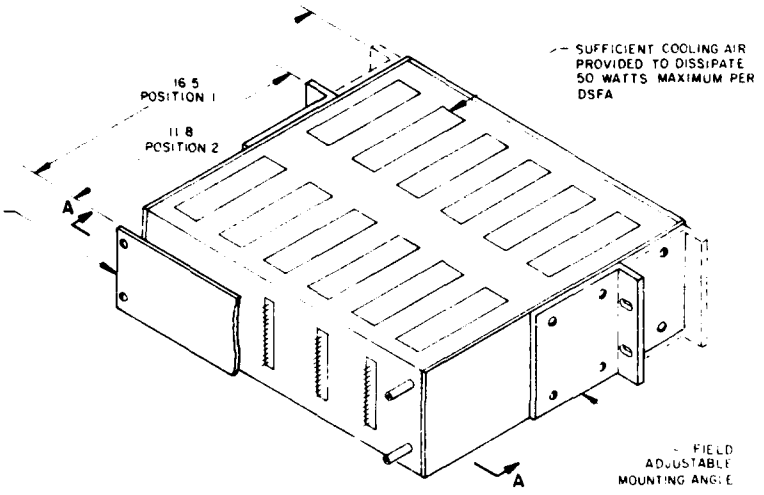


DFSU SHELF
NSN 5805-L8822163101



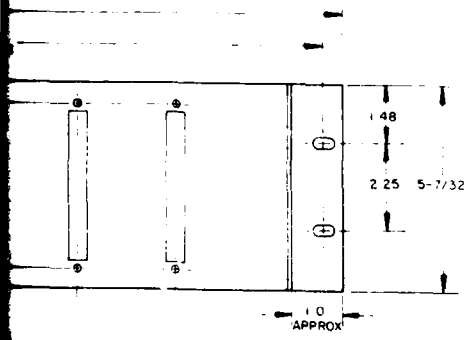
DSFA

REVISION			
SYM	DESCRIPTION	DATE	APPROVED

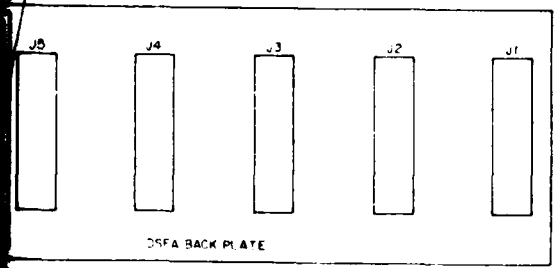


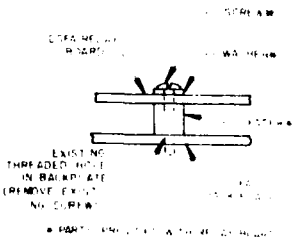
REAR VIEW

PER DSFA
WIRE WRAP TERMINALS



SEE DETAIL A





DETAIL A

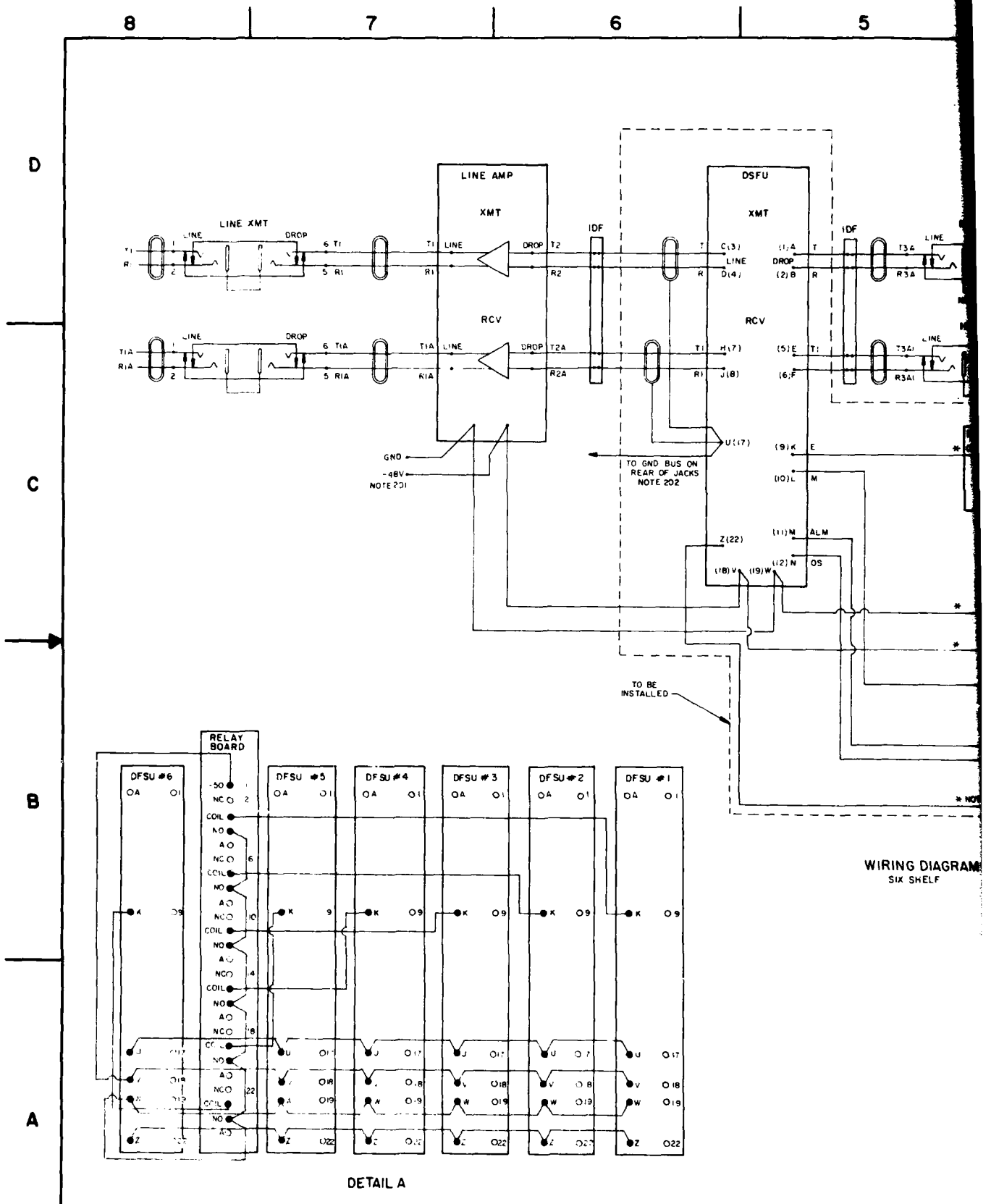
DSFA RELAY BOARD
MECHANICAL MOUNTING

SYM	DESCRIPTION	PART NO / NSN	UI	QTY
	PARTS LIST			

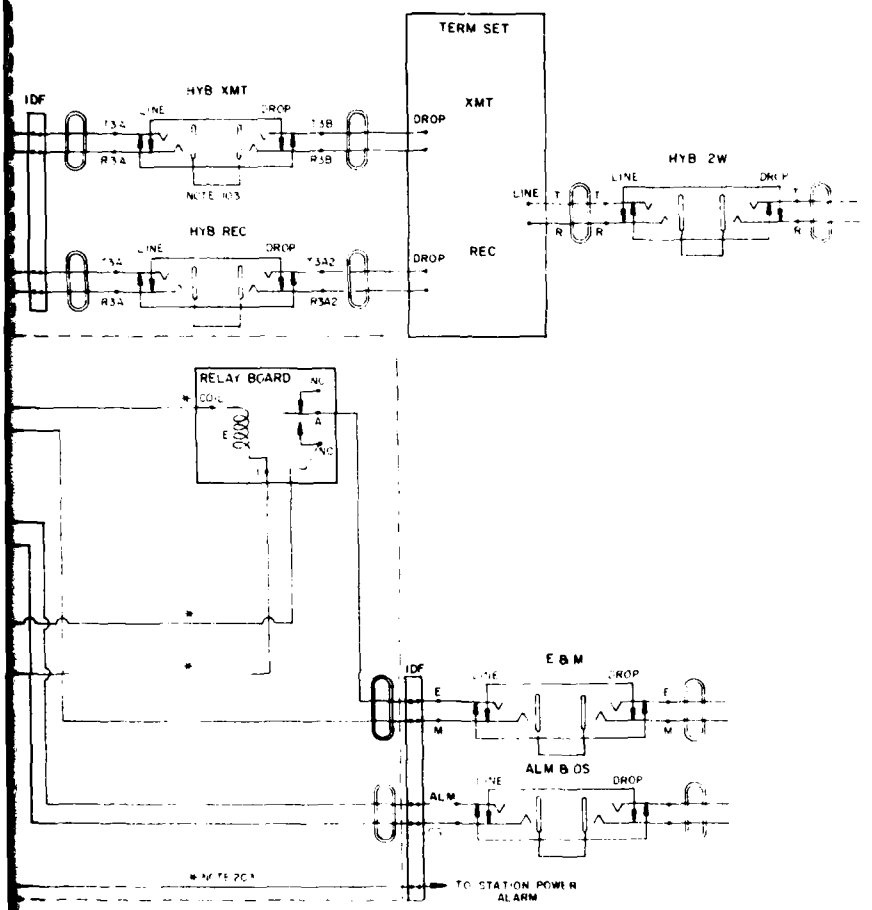
STD-TC-0069	U S ARMY COMMUNICATIONS-ELECTRONICS ENGINEERING INSTALLATION AGENCY
H GILES 15 JUN 82 L CRAWFORD 21 JUN 82	DSFU AUTOVON INTERFACE ASSEMBLY SIX POSITION SHELF
NEXT ASSEMBLY / USED ON	SIZE D / FSCM NO 50470 / DRAWING NO
DWG INDEX NO	SUPERCEDED STD / SCALE NONE / SHEET OF

1

2


8
7
6
5
D
C
B
A
LINE AMP
XMT
RCV
LINE XMT
DSFU
XMT
RCV
IDF
LINE
DROP
6 T1
5 R1
6 T1A
5 R1A
T1
R1
T1A
R1A
T2
R2
T2A
R2A
C(3)
D(4)
H(7)
J(8)
U(17)
Z(22)
(1)A
(2)B
(5)E
(6)F
(9)K
(10)L
(11)M
(12)N
(18)V
(19)W
T34
R34
T34A
R34A
ALM
OS
E
M
GND
-48V
NOTE 201
TO GND BUS ON REAR OF JACKS NOTE 202
TO BE INSTALLED
RELAY BOARD
DFSU #6
DFSU #5
DFSU #4
DFSU #3
DFSU #2
DFSU #1
-50
NC
NO
COIL
AO
WIRING DIAGRAM
SIX SHELF
DETAIL A

REVISION				
ZONE	REV	DESCRIPTION	DATE	APPROVED



WIRING DIAGRAM
SIX SHELF

NOTES.

201 THE POWER AND GROUND FOR EACH LINE AMP AND SIGNALING UNIT IS PRESENTLY RUN TO THE SIGNALING UNIT AND THEN MULTIPLIED TO THE CORRESPONDING LINE AMP. WHEN INSTALLING THE DFSU RUN THE POWER & GND TO THE LINE AMP FIRST AND THEN MULTIPLE TO PIN 1 OF EACH RELAY BOARD

202 TERMINATE ALL SHIELD DRAIN LEADS AT JACK STRIP END ONLY

203 PREWIRE DFSU SHELF & RELAY BOARD TO DFSU SHELF IAW DETAIL A ONE RELAY BOARD IS REQUIRED FOR EVERY SIX DFSU'S

204 ELECTRICAL PIN CONNECTION DESIGNATIONS
ELECTRICAL CONNECTIONS ARE MADE TO 45 X 45 MIL WIRE WRAP PINS. THERE ARE TWO VERTICAL ROWS OF 22 PINS. LEFT HAND ROW IS MARKED A THRU Z. RIGHT HAND IS MARKED 1 THRU 22. TERMINAL DESIGNATIONS IN PARENTHESES ARE FOR RIGHT HAND ROW. EITHER SIDE MAY BE USED

IDENT NO	SIZE	FSCM NO	DRAWING NO
STD-TC-0069	D	50470	
SHEET 1 OF			
DRAWN BY CRAWFORD DATE JUN 82			
APPROVED BY	SCALE NONE	1"	SHEET OF

2

SECTION 5. BILL OF MATERIALS

5.1 GENERAL. A master bill of materials (BOM) is provided as a guide in ordering the material to accomplish installation of the DFSU. Items are identified by systems material list (SML) number and/or national stock number (NSN). When both of these numbers are not available, the manufacturer's part number and item description are provided. The areas in which the installations are made can be of various types of construction. Project engineers for each engineering installation package (EIP) must site adapt each DFSU installation using the requisite listed in the master BOM.

9595k/255K

TELECOMMUNICATIONS DEVELOPMENT PROJECT — BILL OF MATERIALS

For use of this form, see AR 105-22; the proponent agency is the United States Army Communications Command

LOCATION: SEIP 017, DUAL FREQUENCY SIGNALLING UNIT (DFSU)

UNIT IDENT CODE:

TELER NUMBER:

DATE:

PAGE NO: 1

NO OF PAGES: 2

ITEM NO	STOCK NUMBER	NOMENCLATURE	UNIT	TOTAL REQ FOR PROJECT	AVAILABLE IN COMMAND	REQUIRED
1	NCL 5805-010359107 SML 30968D	SIGNALING UNIT, DUAL FREQUENCY, F/U/W 490L OVERSEAS AUTOVON SYSTEM	EA	6		
2	NCL 5805-010404276 SML 30966B	SHELF, ELECT EQUIP; MTG 6EA DFSU	EA	1		
3	5305-002061288 SML 09122Q	SCREW MACH PH 6-32 X 1/2 IN LG	EA	1		
4	5305-009897434 SML 00337G	SCREW MACH PH 10-32 X 1/2 IN LG	EA	4		
5	5310-001670834 SML 00488D	WASHER FLAT RD #10	EA	4		
6	5310-001348977 SML 08985K	WASHER LOCK SPLIT #6	EA	1		
7	6145-008455206 SML 15966E	CABLE SP PUR EL 2C 20GA, SHIELDED, W/DRAIN WIRE	FT	15		
8	5940-002314430 SML 06255M	TERMINAL LUG, 16/22 AWG, FORK, CRIMP STYLE (F/U/W NO. 6 SCREW)	EA	1		
9	6145-005481050 SML 11511E	WIRE EL INSL SOLID COND, 22 AWG, BLK	FT	10		
10	5935-010067775 SML 20628D	KIT, CONNECTOR/PLUG FEMALE. U/W KEY TELE	EA	2		
11	6145-009266444 SML 05796J	CABLE, 25 PR, 24 AWG, TEL	FT	2	RUNS	

9595k/255K

TELECOMMUNICATIONS DEVELOP[illegible]T PROJECT — BILL OF MATERIALS

For use of this form, see AR 105-22; the proponent agency is the United States Army Communications Command.

LOCATION	UNIT IDENT CODE		
SEIP 017, DUAL FREQUENCY SIGNALLING UNIT (DFSU)			
TELER NUMBER	DATE	PAGE NO 2	NO OF PAGES 2

ITEM NO	STOCK NUMBER	NOMENCLATURE	UNIT	TOTAL REQ FOR PROJECT	AVAILABLE IN COMMAND	REQUIRED
12	6145-00-643-0647 SML 21877W	WIRE, ELEC INSU STR COND, 500 FT TO REEL, 20 AMG, WHT	RL	1		
*13	NONE	ALARM INTERFACE ASSEMBLY	EA	1		
*14	5805-0736358	MOUNTING COMPONENT, DIAL FREQUENCY SIGNALING UNIT; ALUMINUM BOX 5.9 IN WIDE BY 5.12 IN HIGH BY 13 IN DEEP DESIGNED TO MOUNT ONE DUAL FREQUENCY SIGNALING UNIT	EA	1		
*15	5805-0120853	RACK, WESCOM MOUNTING BARS 19"	EA	2		

*NOTE: ITEMS 13, 14, AND 15 ARE FOR SINGLE POSITION SHELF ONLY.

DA FORM 1 APR 78 3071-R

EDITION OF 1 AUG 72 IS OBSOLETE.

SECTION 6. QUALITY ASSURANCE PLAN

6.1 GENERAL. This Quality Assurance (QA) program is for the SEIP 017 DFSU as defined in the preceeding sections of the SEIP. The following sections define this plan in detail and have been developed in accordance with the provisions and criteria of US Army Communications Command (USACC) Regulation 702-1-2. This plan, along with sections 7 and 8, outlines procedures to provide assurance that the specified equipment and facilities have been installed in accordance with the installation requirements and criteria of this SEIP, are tested, and are acceptable for turnover to and use by the operating agency.

6.2 REFERENCES. The following references apply to this QA program.

a. USACC Regulation 702-1-2, USACC Quality Assurance Program for Engineering, Installation and Acceptance of Communications-Electronics Equipemnt and Systems, 23 February 1979.

b. US Army Communications-Electronics Engineering Installation Agency (USACEEIA) Regulation 702-1, Quality Assurance and Testing Program, 17 January 1980.

c. USACEEIA Regulation 702-2, Preparation of Documentation for TEst and Evaluation of Communications-Electronics Material, 1 July 1979.

d. USACEEIA Regulation 702-3, Role of the Test Director, 16 January 1980.

e. USACEEIA Regulation 702-4, Quality Assurance During Onsite Installation, 11 March 1980.

f. USACEEIA Regulation 702-6, Quality Assurance Reports, 17 January 1980.

g. US Air Force Technical Order (AFTO) Series 31-10-2 through 31-10-29, Standard Installation Practices.

h. US Army Communications-Electronics Installation Battalion (USACEI Bn) Pamphlet 105-3, USACEI Bn, Communications-Electronics Installation Planning and Implementation Guide, 1 February 1980.

6.3 QUALITY ASSURANCE PROGRAM. The QA program defined herein consists of a planned and systematic approach for assessing the quality control(QC) during the installation and the QA during the acceptance testing of project implementation and correcting discrepancies, or shortcomings revealed through inspection and test efforts. The QA and QC planning will begin at the earliest stages of project implementation and end after all possible corrective action efforts are completed and the project is released to the operating or user agency. QA and QC functions are to be performed by personnel operating independently from those charged with the engineering of the installation or involved in the process of installing the subsystems. Under this plan, the QA and acceptance testing effort will be accomplished by the test agency (USACEEIA-TED-TRSS) and the installation QC effort by the installation agency (USACEI Bn) or by the contractor as appropriate.

6.2.1 Test Agency. As the manager of the QA program and acceptance testing efforts for the SEIP 017 DFSU, USACEEIA TED-RESS will commence project/QA test planning concurrent with engineering. The Test Director is responsible for final QA inspections and acceptance test in accordance with the management provisions of USACEEIA Regulation 702-3 and this document. QA inspectiona by the QA/Test Director will be performed to assess the affectiveness of the QC effort by th USACEI Bn and contractor, initiating corrective actions as appropriate, and determining the extent to which the installation effort adheres to the system requirements. Before recommending system acceptance to the operating command, system acceptance testing will be conducted by the QA/Test Director using a Government prepared test plan to assure that the facility complies with all technical requirements and is suitable for the intended application. To assure that the QA test efforts are fuly integrated, the following actions shall be accomplished:

a. The QA/Test Director will assure that the QA concepts and requirements identified herein are implemented and will be responsible for the overall management and control of the facility.

b. The QA/Test Director will perform a final QA inspection of the facility. This inspection will consist of thorough visual and mechanical observations of the installed material, QC records, and onsite inspection to evaluate the quality of work performed and its acceptability.

c. The Test Director will conduct subsystem acceptance tests to include end-to-end tests, where applicable, to determine the acceptability of the subsystem installation. The Test Director may re-set to verify that corrective action efforts have been implemented and will preclude recurrence. If these items cannot be resolved by onsite personnel, the Test Director will take either of the following actions as appropriate:

(1) Reject the installation and terminate testing until the matter is corrected or reso;ved or;

(2) Attempt to complete the acceptance tests noting the descrepancies, deficiencies, or shortcomings, as exceptions on the Technical Acceptance Recommendation (TAR), HQ CEEIA CCC-TED-QA Form 98-R.

d. In case of installation rejection, the Test Director will provide immediate message notification citing major exceptions and deficiencies and pertinent recommendations for resolving problems, if appropriate. For the normal case of acceptance test completion, the Test Director will provide message notification to test completion within one week of the TAR completion. Include identification of exceptions that will prevent full facility operation (e.g. missing equipment). The message will be addressed to CDRUSACEEIA FT HUACHUCA AZ//CCC-OPS-O/CCC-TED-TRSS// and CDRUSACSA FT HUACHUCA AZ //CCM-TT-(H)-TC//.

e. The Test Director will record and analyze test results, determine accpatability of the installation, record the data and finding on the TAR, coordinate the data with the designated participants, prepare a final test report, make distribution in accordance with guidance, direction and format of USACEEIA Regulation 702-2, and after necessary coordination, the QA/Test Director will recommend the project for acceptance or rejection to the operating command. Project tasking documents must be consulted for

modification of the distribution requirements. The acceptance test report will note outstanding installation and operational exceptions and recommend corrective actions to be taken by the responsible agency. The report will document project completion. Correction of the exceptions will be documented by correspondence or supplemental test reports as determined by the Test Director.

f. The Test Director will assure the site security requirements have been satisfied and will monitor the implementation of required EW and ECCM techniques, where applicable.

6.3.2 Installation Agency. In accordance with the provisions and authority of USACEEIA Regulation 702-4, the USACEI Bn will establish and maintain a QC system. The QC system will assure that all inspections are conducted in accordance with the published procedures and that the results of the QC inspections and follow-up actions are recorded. The records are to be made available for review and evaluation by the QA/Test Director. Pre-acceptance tests in installation checkouts are to be satisfactorily completed and necessary corrections made prior to submitting a Statement of Readiness (SOR), in accordance with USACEEIA Regulation 702-3 to Commander, USACEEIA, Fort Huachuca, AZ, ATTN: CCC-TED-TRSS. The installation activities QC system must meet all of the procedures contained in the USACEI Bn Pamphlet 105-3. The USACEI Bn will designate a QC representative (QCR) who will assure the following actions are expeditiously performed:

a. Assure that QC procedures are effectively applied on this installation and establish the reporting requirements consistent with this project, and all policies. Assure that the corrective actions related to the installation are completed at the earliest possible point in the installation effort.

b. Assure the availability of test equipment for pre-acceptance testing and checkout. The communications operating command is to supply test equipment for maintaining communications equipment common to operations and maintenance functions.

c. Assure that pre-acceptance testing is accomplished and any corrective action is completed prior to acceptance testing.

d. Advise the QA/Test Director of the completed installation prior to or upon completion.

e. Assure that adequate personnel remain on call to assist in the QA inspection and acceptance test.

f. Assure that the QC inspection records and installation documentation are provided to the QA/Test Director. When the onsite effort is completed the QC documentation will be placed in the project files and maintained for 1 year.

6.3.3 Operating Agency. The operating agency will designate a representative early in the project but no later than the start of installation. This representative will assure that the following actions are taken and expeditiously completed:

a. Provide administrative and typing support.

b. Serve as interface between the installation, QA and test personnel and the operating agency.

c. Assist inresolution of descrepancies, deficiencies, and shortcomings.

d. Provide O&M personnel to assist on an as-required basis.

e. Provide test equipment as required to support the shakedown and acceptance tests.

f. Provide a representative to witness the acceptance test and sign the TAR.

6.4 QUALITY ASSURANCE DOCUMENTATION

6.4.1 The QC/QA ckecklists, Figures 6-2 and 6-3, will be used as general guides and final inspection records. These ckecklists are not restrictive, and the QA/Test Director and QCR may delete non-applicable items or investigate other areas as appropriate.

6.4.2 Figure 6-1, Cognizant Agency, Command, and Facility Points of Contact. This document shall be completed prior to beginning of formal inspection and shall become part of the permanent records.

6.4.3 Figure 6-2, Quality Control Inspection Ckecklist. The QC checklist is designed as a guide to the QC inspectors. The ckecklist provides means whereby QCRs have their attentionn focused on the C-E equipment elements and functions inherent in the system facilities. The checklist may be revised to satisfy the QC inspection requirements for a specific function whenever that becomes necessary as a result of abnormal functions. A revision is considered to be any change to an inspection requirement or precedure through additions, deletions or modifications. Revisions to this checklist may be authorized by the onsite QA/Test Director and QCR. All revisions will be documented and presented to the Test Director.

6.4.4 Figure 6-3, Quality Assurance Programs Checklist. This document will be completed by the QA/Test Director.

6.5 SPECIAL CONSIDERATIONS

6.5.1 Interruptions. QA inspections and test may be interrupted at any point if disrupted by an equipment or system malfunction. They may also be interrupted at a compatible breaking point to permit scheduled duty breaks. Any inspectior that is interrupted because of equipment malfunction shall be restarted at a point determined appropriate by the Test Director.

6.5.2 Substitutions. Spare equipment may be substituted for malfunctioning equipment with the approval of the Test Director. Any equipment which has been replaced will be repaired and retested. During acceptance tests, no piece of equipment, including cables, conduit, etc., may be changed or adjusted without the approval of the Test Director.

6.5.3 Corrections or Modifications of Documentation. Site plans, specifications, SEIPs, drawings, etc., are to be acquired by QA, QC and test personnel prior to commencement of the specified work effort. At this time, the Test Director will have identified the applicable and non-applicable items on HQ CEEIA Form CCC-TED-QA 112-R and will delete and mark "non-applicable" (N/A) thosae items inappropriate for his QA inspections. These documents shall be used as master documents to mark,record and identify discrepancies. Any discrepancies noted shall be recorded using yellow markings to record deletions of equipment or cables or changes in schematic diagrams. All additions shall be noted with red markings. Notes to the draftsman will be in blue. Site documentation will be marked in the same manner. A complete set of marked drawings will be left onsite for and maintained by the operating agency. A second set of marked drawings will be delivered to USACEEIA-CED by the installaing agency. USACEEIA-CED will assure that a finalized set of as-built drawings are returned to the site.

COGNIZANT AGENCY, COMMAND, AND
FACILITY QA POINTS OF CONTACT
(CCCR 702-2)

	Individual POC	Bldg. No.	Rm. No.	Phone No.	Name of Agency
Installation:					
Team Leader					
Assistant Team Leader					
Quality Control					
Quality Assurance Agency:					
Representative					
Testing Activity					
Operating Agency:					
Representative					
Site Commander					

HQ CEEIA CCC-TED-QA FM 113-R
1 JAN 79

Figure 6-1. Cognizant Agency, Command, and Facility QA Points of Contact.

QUALITY CHECKLIST - INSTALLATION (CCCH 702-2)		DATE (Day, Month, Year)		
SITE	LOCATION			
PROJECT NAME	TASK NO.			
REFERENCES FOLLOW MAIN AND SUB PARAGRAPHS		YES	NO	NA
A. Drawings and Specifications (AFTO 31-10-3, -9, -27, -29, USACEEIA PAM 105-10):				
1. Is the EIP complete and available?				
2. Are floor plans available?				
3. Are equipment location drawings available?				
4. Are face layout drawings of equipment in bays available?				
5. Are drawings for the MDF/CDF/IDF/CCFB block assignments available?				
6. Is stenciling of terminal blocks shown on drawings?				
7. Are pin connections on terminal blocks shown on drawings?				
8. Are drawings of AC/DC power distribution equipment available?				
9. Are wire sizes and circuit breaker capacity shown on drawings?				
10. Are schematic diagrams of typical circuits to be installed included in drawings?				
11. Are drawings of site grounding systems available?				
12. Do specifications contain a list of reference material required by installers?				
13. Are drawings showing the arrangement of cable racks, ducts, and trenches available?				

HQ CEEIA CCC-TED-QA FM 112-R
Rev (6 JAN 79) Previous edition 1 JAN 79 is obsolete.

Figure 6-2. Quality Checklist-Installation (1 of 11)

QUALITY CHECKLIST - INSTALLATION (CCCR 702-2)	YES	NO	NA
14. Do specifications contain the cable running list for power distribution?			
15. Do specifications contain the cable running list for signal cabling?			
16. Do specifications contain the cable running list for RF cabling?			
17. Do specifications contain the cable running list for optical cabling?			
18. Do specifications contain detailed information on grounding/bonding/ shielding?			
19. Do specifications contain details on all special instructions for installers?			
20. Do the drawings reference all applicable items to the BOM?			
B. Tools and Equipment (AFTO 31-10-29):			
1. Is equipment damaged or unserviceable?			
2. Are all installation materials on hand and serviceable?			
3. Are all special tools necessary for completion of the job on hand?			
4. Will all test equipment needed for test and checkout be available?			
5. Is the BOM equipment available at the facility?			
6. Is the C-E equipment BOM available at the facility?			
7. Has the C-E equipment been inventoried and are discrepancies reported (2-13)?			
C. General Safety Practice (AFTO 31-10-all):			
1. Are goggles worn when drilling and grinding?			

2

Figure 6-2. Quality Checklist-Installation (2 of 11)

QUALITY CHECKLIST - INSTALLATION (CCCR 702-2)	YES	NO	NA
2. Are all sharp edges properly disposed of?			
3. Are hand tools properly used?			
4. Are electric tools properly grounded?			
5. Are rubber gloves used when working near electrical hazards?			
6. Is first-aid equipment on site?			
7. Are emergency numbers posted conspicuously?			
8. Are safety practices observed during the installation?			
D. Floor Plan Layout (AFTO 31-10-9):			
1. Are equipment layout plans in accordance with drawings?			
2. Was the layout plan completed before equipment was moved into area?			
3. Are reference lines still visible/useable (2-11)?			
E. Erecting and Mounting (AFTO 31-10-29):			
1. Is equipment laid out in accordance with floor plan drawing (2-10)?			
2. Are equipment bays level and plumbed within tolerances (2-42)?			
3. Has proper spacing been provided between equipment racks (2-36)?			
4. Are base angles of frames secured to floor in the proper location (2-48)?			
5. Are all cabinets flush mounted and plumbed (2-36)?			
6. Has the finish of equipment/cabinets/racks been touched up (3-2a)?			

3

Figure 6-2. Quality Checklist-Installation (3 of 11)

QUALITY CHECKLIST - INSTALLATION (CCCR 702-2)	YES	NO	NA
7. Are bolts and screws free from stripped threads and defaced heads (3-3f)?			
8. Are sufficient clearances provided between apparatus for heat dissipation (3-11)?			
9. Are terminal blocks aligned on MDF/CDF/IDF (3-23)?			
10. Has equipment been installed in cabinets or racks in accordance with face layouts?			
11. Are all nuts and bolts securely tightened (3-3h)?			
12. Are exposed or cut ends of metal filed smooth and painted?			
13. Are the correct lock and flat washers used (3-3a, e, and f)?			
F. Cable Racks (AFTO 31-10-6):			
1. Location of cable racks:			
a. Are racks located in accordance with the cable plan drawing (3-17)?			
b. Does the height of racks conform to the drawing (3-13)?			
c. Are racks located so that clearances for installation and maintenance of equipment are unencumbered (3-14)?			
d. Are racks located so cables are not subject to damage, exposure, or other detrimental conditions (3-36a)?			
2. Assembly of cable racks:			
a. Are long sections of racks used where possible (3-3b)?			
b. Have clamping details been altered other than where necessary to avoid interference?			

4

Figure 6-2. Quality Checklist-Installation (4 of 11)

QUALITY CHECKLIST - INSTALLATION (CCCR 702-2)	YES	NO	NA
c. Are open ends of racks properly closed (3-34)?			
d. Are vertical racks properly terminated on floors (3-36a)?			
3. Support of cable racks:			
a. Are racks properly supported and fastened (3-36b)?			
b. Are racks installed so that no excessive load or binding is imposed on the equipment (3-36e)?			
c. Are horizontal racks supported on 5' centers but not exceeding 6' (1-16)?			
d. Has support been provided within 3' of free end of rack (1-16)?			
e. Are racks braced to prevent sway (2-50)?			
f. Are racks level (3-33)?			
G. Running Cable (AFTC 31-10-13):			
1. Are cable runs made in accordance with cable running list (1-34)?			
2. Are cables twisted or crossed on cable rack (1-43)?			
3. Do cables at turns or bends conform to the bending radius and maintain their position (1-42)?			
4. Is protection provided where cable sheaths contact rough or sharp edges or metal (1-53)?			
5. Are cables, which are turned off over the side of cable racks, formed with the minimum allowable radius (1-42)?			
6. Are cables turned off rack horizontally and then up/down (1-42)?			
7. Do cables to the MDF/CDF/IDF enter on the vertical side (3-56)?			

5

Figure 6-2 Quality Checklist-Installation (5 of 11)

QUALITY CHECKLIST - INSTALLATION (CCCR 702-2)	YES	NO	NA
8. Are cables serving the horizontal side of a frame secured to the transverse arms near the vertical upright (3-58)?			
9. Are cable tags properly prepared and in accordance with the cable running list (1-26)?			
10. Are cable tags secured at each end of the cable run (2-3)?			
11. Have cable tags been removed upon completion of verification and termination excluding coaxial cables (1-32)?			
12. Are cable butts located as near as practicable to the point where the first conductors turn out (4-8)?			
13. Are cable butts properly treated (4-9)?			
14. Is the cable pile-up exceeded (1-18)?			
15. Are the conductors damaged at the cable butt (4-9)?			
16. Are the AC/DC power cables separated for signal cables (1-49)?			
17. Are the correct color conductors used for power runs(AFTO 31-10-2,3-100)?			
H. Securing Cable (AFTO 31-10-2, -13)?			
1. Is the starting stitch properly made and placed (3-22)?			
2. Is the required Kansas City City Stitch properly made (3-26)?			
3. Are first and succeeding layers properly secured (3-28)?			
4. Are cables secured at every other cable rack cross strap on horizontal runs (3-21)?			

6

Figrue 6-2. Quality Checklist-Installation (6 of 11)

QUALITY CHECKLIST - INSTALLATION (CCCR 702-2)	YES	NO	NA
5. Are cables secured at every cable rack cross strap on vertical runs (3-53)?			
6. When cable butt is between securing devices, are cables secured together with the appropriate stitch (3-54)?			
7. Are lock stitches properly made and spaced (3-32)?			
8. Are splices in twine properly made (3-32)?			
9. Are cables protected where twine is apt to cut or damage cable (3-3)?			
10. Is the correct amount of cable secured under one stitch (3-16)?			
I. Sewed Forms (AFTO 31-10-2):			
1. Is proper size twine used for the diameter of the form (3-25)?			
2. Are the proper stitches used and spaced (3-26, 3-30)?			
3. Are wires formed correctly (3-49)?			
4. Are the skinners the correct length (2-26)?			
5. When ty-wraps are used, are the correct size and spacing maintained (3-42)?			
6. Are spare wires treated correctly for the form (3-51)?			
J. Butting and Stripping (AFTO 31-10-13):			
1. Are the proper tools used (4-9, 4-15, 4-24)?			
2. Are the cable butts properly dressed (4-32, 4-34)?			
3. Is the proper distance maintained from the cable to the fanning strip (4-8)?			
4. Is the cable butt adequately supported (3-54)?			

7

Figure 6-2. Quality Checklist-Installation (7 of 11)

QUALITY CHECKLIST - INSTALLATION (CCCR 702-2)	YES	NO	NA
5. Are the conductors damaged at the cable butt (4-9)?			
K. Fanned and Formed Conductors (AFTO 31-10-2):			
1. Are cables fanned and connected to the correct side of the terminal blocks (2-7)?			
2. Are the conductors in the fanned form twisted and bunched (2-14)?			
3. Are fanned forms straight and taut from the cable butt to the fanning strip (2-23)?			
4. Is the length of the skinners correct (2-26)?			
5. Has the correct color code been followed (2-28)?			
6. Are spare/unused/unequipped conductors disposed of properly (2-31)?			
7. Are the shields properly disposed of (3-79)?			
L. Stenciling (AFTO 31-10-27):			
1. Is equipment correctly identified and stenciled in accordance with floor plan drawings (1-24)?			
2. Are designations located correctly (2-16)?			
3. Are correct size designations used on particular types of apparatus or equipment (2-16)?			
4. Are the correct abbreviations used (3-3, 3-5)?			
M. Strapping (AFTO 31-10-16):			
1. Are the straps properly placed (1-15)?			
2. Is the correct type of strap wire used (1-17)?			
3. Does the insulation extend to the terminal (2-9)?			
4. Do the straps interfere with the operation of the equipment?			

8

Figure 6-2 Quality Checklist-Installation (8 of 11)

QUALITY CHECKLIST - INSTALLATION (CCCR 702-2)	YES	NO	NA
5. Do the straps make maximum contact with the terminals (2-6)?			
6. Do wrapped straps conform to the criteria of wrapped conductors (AFTO 31-10-1, 2-111)?			
7. Do straps obscure equipment designations (2-52f)?			
N. Terminating and Soldering Conductors (AFTO 31-10-7):			
1. Are the soldering clamp and solder bag used when connecting conductors (2-45a)?			
2. Is the proper soldering iron used (2-5)?			
3. Is all soldering done with the correct rosin core solder (2-22)?			
4. Is the conductor connected to the terminal correctly (2-34, 2-38)?			
5. Do skinners on terminals, both wrapped and soldered, exceed 1/16"(2-34)?			
6. Is the insulation burnt, frayed, or otherwise damaged (2-34)?			
7. Have all unsightly flux and excess globules of solder been removed?			
8. Are the conductors given a continuity test after termination?			
9. Are wrapped connections applied only to suitable terminals (2-113)?			
10. Are mechanical connections making good contact, secure, and under no local stress (2-81)?			
11. Do pressure connections provide a good electrical connection (2-86)?			

9

Figure 6-2. Quality Checklist-Installation (9 of 11)

QUALITY CHECKLIST - INSTALLATION (CCCR 702-2)	YES	NO	NA
12. Are the required number of turns in contact with the terminal in accordance with the gauge of wire used (2-120)?			
13. Are the conductors dressed on the terminal block after termination?			
14. Are wrapped connectors soldered where necessary (2-131f)?			
15. Do the wrap connections appear uniform with no open spirals, overwraps, or shiners exceeding 1/16" (2-131)?			
O. Cross Connections (AFTO 31-10-11):			
1. Are jumpers routed at the MDF/CDF/IDF correctly (2-6)?			
2. Is there sufficient slack remaining after termination (2-32)?			
3. Are conductors twisted between fanning strip and terminal (2-34)?			
4. Does the pair twist remain in conductors beyong the rear of the fanning strip (2-34)?			
5. Are jumpers properly dressed (2-54)?			
6. Are jumpers made in accordance with the cable running list?			
7. Is the correct gauge wire used?			
8. CCP's (USACEEIA PAM 105-10):			
a. Are sufficient jacks/plugs available for use with the CCP's (3-1)?			
b. Are jumpers made with 26 AWG wire only (3-1a)?			
c. Are modular tools available (3-2)?			

10

Figure 6-2. Quality Checklist-Installation (10 of 11)

QUALITY CHECKLIST - INSTALLATION (CCCR 702-2)	YES	NO	NA
P. Equipment and Signal Grounds (AFTO 31-10-24, MIL-STD-188-24, TM 11-487-4):			
1. Are equipment and signal grounds installed in accordance with applicable drawings?			
2. Are the correct color coded cables used?			
3. Are grounds/bonds/shields protected from external corrosion?			
4. Are the correct screw/washer/nut combinations used on ground junctions?			
5. Are equipment/signal/protective grounds connected at the station ground box only?			
6. Are the signal grounds and signal buss insulated?			
Q. Conduit (AFTO 31-10-12):			
1. Are burrs removed from conduit after cutting (2-40)?			
2. Is the bending radius exceeded (2-55)?			
3. Are there more than 360 degrees of total bends in a single conduit run(2-46)?			
4. Does the number of conductors in a conduit exceed the established criteria (2-16)?			
5. Are conduits supported at intervals not exceeding 6' and within 3' of the end or outlet box (2-58)?			
6. Are flexible conduits terminated correctly (2-98)?			
7. Are all connections tight and secure?			
8. Are secure conduit runs correctly marked?			
R. Metal Ducts (AFTO 31-10-12):			
1. Are the ducting/raceways supported and anchored adequately (2-97, 3-10)?			

11

Figure 6-2. Quality Checklist-Installation (11 of 11)

QUALITY ASSURANCE/MIL-Q-9858A/ MIL-I-45208 PROGRAM CHECKLIST (CCCR 702-2)			DATE (Day, Month, Year)
SITE/LOCATION		PROJECT NAME	QUALITY ASSURANCE REPRESENTATIVE (QAR)
____QA	___MIL-Q-9858A	____MIL-I-45208	TASK NO.

	YES	NO	NA
1. Is the on-site inspection/quality program available for review?			
2. Does the inspection system/quality program address the pertinent requirements which will assure that all conditions are complied with?			
3. Are quality personnel and their responsibilities identified?			
4. Are detailed work instructions provided and complied with?			
5. Do records provide useful information, data, and indicate follow-up action?			
6. Are provisions made for prompt corrective actions when deficiencies occur?			
7. Are procedures provided and complied with for prevention and correction of defects?			
8. Are pertinent documents and drawings available?			
9. Are procedures provided and complied with for updating and controlling documents and drawings?			
10. Are procedures provided and complied with for storage of material prior to installation.			
11. Are in-process and final test and inspection procedures available and used?			
12. Is inspection system being complied with in all phases?			

HQ CFEIA CCC-TED-QA FM 111-R
(Rev 1 Jan 79) Previous edition 6 DEC 78 is obsolete.

Figure 6-3. Quality Assurance Program Checklist (1 of 2)

QUALITY ASSURANCE/MIL-Q-9858A/MIL-I-45208 PROCRAM CHECKLIST (CCCR 702-2)			
	YES	NO	NA
13. Are procedures provided for control of subcontractor's work?			
14. Are procedures provided for calibration and controlling of test equipment?			
15. Are procedures provided for handling, inspection, and test of furnished material?			

NOTE: IF THE "NO" COLUMN IS CHECKED, EXPLAIN HERE, AND CONTINUE ON REVERSE SIDE IF NEEDED.

Figure 6-3. Quality Assurance Program Checklist (2 of 2)

SECTION 7. ACCEPTANCE TEST PLAN AND PROCEDURES

7.1 PURPOSE. This test plan specifies the test procedures necessary to determine acceptable performance of the Dual Frequency Signaling Unit (DFSU) as specified in SEIP 017.

7.1.2 Equipment Involved. The equipment to be tested is as follows: CAR-TED Ind. Dual Frequency Signaling Unit.

7.1.3 Tests.

a. Pre-acceptance tests will be prepared as a dry run to assure the equipment/system is operational and ready for the final acceptance test. This testing is also known as "Shakedown testing". The required test procedures are attached to this Section as annexes.

b. Final acceptance tests will be performed inaccordance with the test procedures attached to this Section as annexes. The pre-acceptance tests and final acceptance tests are the same.

7.1.4 Amendments. This plan may be amended by the US Army Communications-Electronics Engineering Installation Agency-Test and Evaluation Directorate (USACEEIA-TED) or designated personnel where necessary to meet local requirements or contingencies. Prior approval must be obtained from the TED before implementing any changes.

7.2 RESPONSIBILITIES.

7.2.1 General. The work specified in the engineering package is a Headquarters, USACEEIA effort. All QA test efforts will be under the management of USACEEIA-TED.

7.2.2 Installation of Equipment and Pre-Acceptance Testing.

7.2.2.1 USACEI-Bn has the responsibility to install the equipment in accordance with this engineering package, to insure that all corrections are complete and correct, and to identify modules and/or components of the complete installed communications subsystem.

7.2.2.2 USACEI-Bn has the responsibility to perform equipment pre-acceptance testing to include identification of defective modules and/or components of the complete installation.

7.2.3 Acceptance Testing. USACEEIA-TED will conduct the final acceptance testing in accordance with Section 7 of this SEIP and associated annexes.

7.3 TEST OBJECTIVES AND TEST REQUIREMENTS.

7.3.1 Shakedown testing (pre-acceptance testing) will insure that the installed equipment is, in fact, capable of operation and that all signal level and alarm adjustments are properly set and functioning.

7.3.2 Acceptance Test requirements for individual equipment components and equipment systems are contained in the annexes to this Section and are based on DCA/USACC/MFG documents. Final acceptance tests will assure the technical operational, and interface requirements were acheived and the equipment or system is suitable for operation.

7.4 TEST DOCUMENTS.

7.4.1 A QA/test report will be prepared in accordance with USACEEIA Reg 702-2. A copy of the Technical Acceptance Recommendation (TAR) will be attached. Recommendations, is any, will be attached to the test report for future resolution by the appropriate agency. A copy of all test data sheets; HQ USACEEIA CCC-TED-QA FM 113-R, Cognizant Agency, Command, and Facility QA Points of Contact; and HQ USACEEIA CCC-TED-QA FM 111-R, Quality Assurance/MIL-Q-9858A/MIL-I-45208 Program Checklist will be maintained in the HQ USACEEIA CCC-TRSS files for at least one year after completion of the test.

7.5 TEST PERSONNEL. The acceptance test effort will be conducted by a Test Director appointed by USACEEIA-TED. The installation agency will provide one or more test personnel as required, to support the Test Director and to make minor corrections and adjustments.

7.6 TEST EQUIPMENT. The test equipment and spares required to conduct applicable tests are listed below (where necessary, substitution can be made for equivalent equipment):

a. Audio Oscillator, Hewlett Packard 200 CD

b. AC Voltmeter, Hewlett Packard 400 EL

c. Variable Attenuator, Hewlett Packard 350D

d. Electonic Counter, Hewlett Packard 522D

e. DC Power Supply, Hewlett Packard 6274D

f. Oscilloscope, Tektronix 310

g. Multimeter, AN/PSM-6

h. Signaling Test Set, Lenkurt 26600

i. Amplifier, Hewlett Packard 465A (required for +7, -16 dbr operation only).

ANNEX 7A

LINE CONDITIONING EQUIPMENT TESTS

1. PURPOSE. The purpose of the tests are to insure that all equipment is interconnected correctly and that it will operate when connected in a circuit configuration.

2. TEST EQUIPMENT REQUIRED.

a. Multimeter, AN/PSM-6

b. Audio Oscillator, Hewlett Packard 200CD

c. AC Voltmeter (DB Meter)

d. Frequency Counter, Electronic, Hewlett Packard 522D

e. Oscilloscope/Dual-Trace, Tektronix 310

3. REQUIREMENT.

a. To insure that the installed equipment is properly operating.

b. Preliminary check on all wiring and cross-connects.

c. Individual module inspection, alignment and operation.

d. Back-to-back test on each circuit configuration.

4. PROCEDURE.

4.1 Dual Frequency Signaling Unit, 2600/2800 Hz (TA-988/F).

4.1.1 The DFSU has several strapping options. The strapping posts are located on either the digital circuit board (left hand board when viewing from the front) or the analog board (right hand board). Strapping should be in accordance with the SEIP and/or site requirements. Table 7A-1 identifies connector pin functions and strapping post locations are shown in Figures 3-1 and 3-2.

4.1.1.1 Strapping Options.

Digital Board - Bias Correction
Percentage of Bias Correction
Mode of Operation - DFSU or SFSU
Noise Rejection Mode (NRM)

Analog Board - Transmit Transmission Level Point (TLP)
Receive TLP - Signaling unit
Receive TLP - Noise
Out-of-Service (OS) Mode
Signal to Noise (S/N)

4.1.1.2 Strapping Instructions.

a. Bias Correction: Bias correction alters the received dial pulses as required to provide a uniform percent break when they appear on the E lead. Four straps must be made to implement bias correction. If bias correction is required, strap ST-302 to ST-303. If bias correction is not required, strap ST-302 to ST-301. Three straps must be made to select the desired percent break in the corrected dial pulses. Normally, 57 percent break is used. The strapping for percent of break are as follows:

57 percent	ST-308 to ST-307	ST-311 to ST-310	ST-314 to ST-313
43 percent	ST-308 to ST-307	ST-311 to ST-312	ST-314 to ST-315
49 percent	ST-308 to ST-307	ST-311 to ST-310	ST-314 to ST-315
51 percent	ST-308 to ST-309	ST-311 to ST-312	ST-314 to ST-313
51 percent	ST-308 to ST-307	ST-311 to ST-312	ST-314 to ST-313
55 percent	ST-308 to ST-309	ST-311 to ST-310	ST-314 to ST-313
59 percent	ST-308 to ST-309	ST-311 to ST-312	ST-314 to ST-315
71 percent	ST-308 to ST-309	ST-311 to ST-310	ST-314 to ST-315

b. Mode of Operation: There are strapping posts for making mode selection, i.e., SF or DF. These strapping posts are normally connecterd to the mode selection switch mounted on the left side cover of the SFSF, therefore, no straps are installed. If a situation should arise where the switch leads must be disconnected from the posts, the following straps will provide the desired mode of operation.

DF ST-305 to ST-304
SF ST-305 to ST-306

c. Noise Rejection Mode (NRM): The NRM strap connects a strapping post to a test connector pin. A short length of insulated wire ir required. The connection is made between ST-303 and test connector pin 5 (see Figure 3-1). NOTE: Do not implement NRM if the DFSU is to be used in the Dual Frequency (DF) mode or on dial pulse circuits in the Signal Frequency (SF) mode.

d. Transmit TLP. This strap is required to insure that transmitted signaling tones are transmitted at the correct level. The options are as follows:

TLP	STRAP
-16 db	ST-8 to ST-7
-4 db	ST-8 to ST-6
-2 db	ST-8 to ST-5
0 db	ST-8 to ST-5
+4 db	ST-8 to ST-3

e. Receive TLP - Noise. This strap is required to insure that the DFSU will properly measure noise (VF energy outside the 2500 to 2900 Hz baud) for operation of the voice guard circuitry. The options are as follows:

TLP	STRAP
+7 db	ST-22 to ST-21
+4 db	ST-22 to ST-38
0 db	ST-22 to ST-37
-2 db	ST-22 to ST-36
-8 db	ST-22 to ST-35

f. Strapping for Increased Sensitivity. If the DFSU is to operate over circuits that might sometimes experience severe loss (e.g., 6 db or more), the receive sensitivity of the unit can be increased by strapping for a receive TLP that is lower than the operating TLP. For example, if the operating TLP is 0 db, strap the DFSU for -8 db receive TLP (both tone and noise); if the operating TLP is+7 db, strap for 0 db. This will provide 8 db more sensitivity in the frist case and 7 db more in the second. This strapping will have no noticeable effect on other performance characteristics.

g. Out-of-Service (OS) Mode. To enable operation of the OS lead, strap ST-19 to ST-20. To disable operation of this lead, leave out the strap.

h. Signal-to-Noise (SN) Mode. The S/N mode enables the DFSU to enter an alarm condition in the idle state (E and M leads on-hook), if the ratio of the received 2600 Hz tone energy to the other energy in the circuits does not exceed a certain amount. Normally, this mode is not used. To enable S/N, strap ST-41 to ST-42. To disable it, leave the strap out.

4.1.2 The receive level adjustment (REC LEV) allows gain adjustment of approximately 4 db. REC LEV is normally set for zero loss. The SF/DF mode switch allows the unit to operate as a Standard Single Frequency Signaling Unit or a Dual Frequency Signaling Unit. All test points (input and output) appear on front panel (Figure 1-1).

4.1.3 Transmit Frequency Response and Insertion Loss.

a. Terminaste the transmit (XMIT) line (TL-RL) on front panel with 600 ohms.

b. Connect audio oscillator to the XMIT drop (Pins A-B on the connector board) and adjust the oscillator for 1000 Hz at 0 dBm output.

c. Connect a DB meter to XMIT line on front panel and set meter to bridge position. A reading of 0 dBm $\pm$ 0.25 db should be obtained. Record results.

d. Adjust the oscillator for 300 Hz at 0 dBm. A reading of $\pm$ 0.5 dBm to 1000 Hz should be obtained. Record results.

e. Adjust the oscillator for 3400 Hz at 0 dBm. A reading of $\pm$ 0.5 dBr to 1000 Hz should be obtained. Record results.

4.1.4 Receive Frequency Response and Insertion Level.

a. Connect audio oscillator to the receive (RCV) line, (TIL-RIL) on front panel and adjust the oscillator for 1000 Hz at -13 dB output.

b. Connect a DB meter to RCV drop (TID-RID) on front panel and terminate in 600 ohms.

c. Adjust REC LEV screwdriver adjustment on front panel until a reading of -13 dB ± 0.25 dB is obtained. Record results.

d. Adjust oscillator for 300 Hz at -13 dB. A reading of -13 dB ± 0.5 dB should be obtained. Record results.

e. The operation level of the REC LEV control will be determined by the receive strapping options contained in the SEIP and site specifications.

4.1.5 "E" Lead Operation.

a. Connect audio oscillator to RCV line (TIL-RIL) on front panel and adjust the oscillator for 2600 Hz at -10 dB.

b. Connect a Volt Ohm Meter (VOM) to "E" lead relay contact terminals on the relay card.

c. Connect a dB meter to the RCV drop on front panel and terminate in 600 ohms.

d. The "E" lead relay should operate and a reading of less than -50 dBm0 should be obtained.

e. "E" lead LED on front panel should illuminate to indicate an off-hook condition.

f. The VOM should indicate 0 volts and 0 ohms (short).

g. Remove te 2600 Hz signal from the oscillator. The "E" lead relay should release and the VOM should indicate 0 volts and infinite ohms (open). The "E" lead LED should extinguish.

h. Shift the frequency of the oscillator from 2580 to 2640 Hz. The relay should remain closed over this range.

4.1.6 "M" Lead Operation.

a. Connect a dB meter and a frequency counter in parallel to the XMIT line (TL-RL) on front panel.

b. Connect a jumper lead between "M" lead input and ground. This represents "on-hook" condition.

c. Measure the output at the XMIT line, it should be 2600 Hz ± 5 Hz at -20 dBm0 ± 1.5 dB. Record results.

d. Connect -48 VDC to "M" lead input. This represents "off-hook" condition.

e. The 2600 Hz at the XMIT line should be lost at this point and a reading of 2800 Hz + 5 HZ at -8 dBmO ± 1.5 dB should be obtained. Record results. (During "Dial Pulsing", alternate pulses of 2600 Hz and 2800 Hz will be present.)

TABLE 7A-1 ELECTRICAL CONNECTIONS

Connector Pin		Function
Left Hand	Right Hand	
A	1	T Transmit Drop
B	2	R Transmit Drop
C	3	T Transmit Line
D	4	R Transmit Line

TABLE 7A-1 ELECTRICAL CONNECTIONS (Cont'd)

Connector Pin		Function
Left Hand	Right Hand	
E	5	T1 Receive Drop
F	6	R1 Receive Drop
H	7	T1 Receive Line
J	8	R1 Receive Line
K	9	*E (not for external connection, see below)
L	10	M
M	11	**Alarm Lead (see below)
N	12	Out-of-Service (OS) Lead
P	13	+5V (not used, do not connect)
R	14	No Connection
S	15	No Connection
T	16	No Connection
U	17	Shield Ground
V	18	-50V Supply
W	19	Signal Ground
X	20	No Connection
Y	21	No Connection
Z	22	Power Alarm (normally not connected)

* External E lead connection is made to appropriate pin on relay card.
** External alarm lead connection on single position shelf is made to appropriate pin on relay card.

SECTION 8. COMPLETION CERTIFICATION

8.1 GENERAL. The results of the QA inspections and acceptance tests specified in Sections 6 and 7 of this SEIP will be documented on site by the QA/Test Director using USACEEIA Form 98-R, TAR Figure 8-1. The purpose of the TAR is to record siginificant information to include the scope, results conclusions, remarks, exceptions, recommendations regarding technical acceptance, or rejection of the project. It does not constitute official acceptance of the project, but does certify that the major items installed and the documentation provided are as stated on the TAR. The TAR also provides participants the opportunity to indicate agreement or disagreement with the inspection and test assessments and for user consent to accept the installed equipment.

8.2 DISTRIBUTION. A copy of the TAR will be provided to the signaling participants and the operating agancy. The original copy will be maintained in the operating agency. The original copy will be maintained in the test agency project files and copies will be included in the test report.

8.3 WAIVERS. Waivers, to include command approvals for individual installations, will be recorded in the TAR with copies attached to clarify deviations from this EIP.

8.4 TAR PREPARATION INSTRUCTIONS.

8.4.1 General. Entries on the TAR are to be typed, whenever possible, to insure legibility and provide a quality product when reproduced. If a typewriter is not available, the forms may be completed by printing with black ink in block letters to insure legibility. Pages are to be sequentially numbered constituting the completed TAR. Additionally, each page will be idintified by the date and project/contract number in the appropriate blocks. The TAR will be completed according to the following block-by-block instructions.

a. Date: Enter the date, month, and year of completion for this action (e.g., 1/1/81 as the first day of the first month of 1981).

b. Project Contract Number: Enter the appropriate project or contract number. If this is a subproject or part of a subproject, provide all necessary information (i.e., IIP milestone number(s), subproject number(s), as well as subdivision(s) to same).

c. Title: Enter the project name or title.

d. Location: Enter the geographic location where the project was installed.

e. Facility: Enter the name of the facility and other pertinent identifying information.

f. Test Director: Enter the name, title, and grade of the QA/Test Director assigned to this project.

g. Operating Agency: Enter the name, office symbol, and complete mailing address of the organization having O&M responsibility for this project, system, or installed equipment.

h. Engineering Agency: Enter the name, office symbol, and complete mailing address of the organization having engineering responsibility.

i. Installation Agency: Enter the name, office symbol, and complete mailing address of the organizations having installation responsibility.

j. Testing Agency: Enter the name, office symbol, and complete mailing address of QA testing organization tasked for this project.

k. Project Description: Enter a brief and concise description of the project.

l. Major Equipment Installed/Relocated: List the major items of equipment installed or relocated in accordance with the project requirements. Enter the Bill of Materials (BOM) line item number, materiasl description, assigned part number or federal stock number, and the quantity of each major item. Componentsm assemblies, and subassemblies configured into a mojor item as listed in SB 700-200 or CCP 700-200 should also be recorded. Additional pages, numbered in sequence, may be added as required.

m. Project Documentation Provided: Enter the document identification (i.e., drawing number, tachnical manual number, etc.), title, and the quantity of each document provided to the operating unit as part of the project.

n. Exceptions:

(1) Upon completion of installation and testing any exceptionn to the project requirements which require corrective action will be listed. Include complete identification of each missing item. Exceptions to the specific requirements of the project must be supportable through the test results or other valid documentation, fully described, and precisely identified.

(2) The appropriate exception block must be anotated and seperate sheets should be used for each category of exception.

(3) The Test Director will also enter the agency responsible for correcting each exception, recognizing that he may not always be in a position to determine the final action agency.

(4) For facilities that are becoming patially operational, identify installation actions remaining for project completion. In this situation, the TAR will show the tests that have been completed and these will be identified as a partial completion record. A final TAR will be prepared after installation and testing of all remaining project equipment.

o. Remarks. The remarks section may be used to provide any additional information on or in support of a reccomendation, commendation, or criticism in relation to the project installation, engineering, or testing. Entries may include:

(1) Shortcomings which do not require corrective action (not considered an exception).

(2) Identification of support items that have not been accomplished and a description of any activity in progress by the operating agency to satisfy the requirement.

(3) A summary of test results noting the test agency and date(s) accomplished.

(4) A statement that the engineering agency will forward final "as built" drawings when completed.

(5) A statement to indicate that a list of excess material was provided the operating command for final disposition or to identify material that was excess to the project.

p. Certification. Enter the signatures and certification that the project was installed, tested, and accepted for operation with or without exceptions as applicable.

(1) Reference USACEEIA Regulation 702-2, paragraph p(2)a, the purpose of the TAR is to record significant project information ti include the scope, results, conclusions, remarks, exceptions, and recommendations regarding technical acceptance of the project but does not certify that the major items installed and the documentation provided are as stated on the TAR.

(2) Usa of this certification does not constitute acceptance for transfer of accountability.

(3) Operating agency's signature on the TAR indicates acceptance of the equipment/system installed for operation by them and does not prevent the O&M from obtaining relief to the exceptions noted on the TAR.

TECHNICAL ACCEPTANCE RECOMMENDATION (SUMMARY) (CCCS 702-2)		PAGE OF PAGES DATE (DAY, MO, YEAR)
PROJECT/CONTRACT NO.	TITLE	LOCATION
FACILITY		TEST DIRECTOR
OPERATING AGENCY		ENGINEERING AGENCY
INSTALLATION AGENCY		TESTING AGENCY
PROJECT DESCRIPTION		

This Technical Acceptance Recommendation is executed by the onsite representatives of the installation, test and operating agencies. It does not constitute official acceptance of the project but does certify that the MAJOR ITEMS INSTALLED AND DOCUMENTATION PROVIDED are as stated herein. This document further certifies that the project has been installed and performs satisfactorily in accordance with the requirements listed under REFERENCES except as noted under EXCEPTIONS and REMARKS. Upon execution of this TECHNICAL ACCEPTANCE RECOMMENDATION, USACFEIA considers this project complete except for such follow-on action as may be necessary to clear the EXCEPTIONS stated herein.

DD CFEIA CCC-702-QA FM 98-R
(Rev 1 Jan 79) Previous edition 27 Mar 78 is obsolete.

Figure 8-1. Technical Acceptance Recommendation (Summary) (1 of 6).

TECHNICAL ACCEPTANCE RECOMMENDATION (INSTALLED EQUIPMENT) (CCCR 702–2)		PAGE OF PAGES DATE (DAY, MO, YEAR)
PROJECT/CONTRACT NUMBER	TITLE	LOCATION
MAJOR EQUIPMENT INSTALLED/RELOCATED		

BOM ITEM NO.	DESCRIPTION	PART NUMBER/FSN	QUANTITY

Figure 8-1. Technical Acceptance Recommendation (Summary) (2 of 6).

TECHNICAL ACCEPTANCE RECOMMENDATION (DOCUMENTATION) (CCCR 702-1)		PAGE OF PAGES
		DATE (DAY, MO, YEAR)
PROJECT/CONTRACT NUMBER	TITLE	LOCATION
PROJECT DOCUMENTATION PROVIDED		
REFERENCE DOCUMENTATION	TITLE	NO. OF COPIES

Figure 8-1. Technical Acceptance Recommendation (Summary) (3 of 6).

TECHNICAL ACCEPTANCE RECOMMENDATION (EXCEPTIONS) (CCR 702-2)		PAGE OF PAGES DATE (DAY, MO, YEAR)
PROJECT/CONTRACT NUMBER	TITLE	LOCATION

EXCEPTIONS ENGINEERING INSTALLATION OTHER	SUGGESTED ACTION AGENCY

Figure 8-1. Technical Acceptance Recommendation (Summary) (4 of 6).

TECHNICAL ACCEPTANCE RECOMMENDATIONS (REMARKS) (CCCS 702-2)		PAGE OF PAGES
		DATE (DAY, MO, YEAR)
PROJECT/CONTRACT NUMBER	TITLE	LOCATION
REMARKS:		

Figure 8-1. Technical Acceptance Recommendation (Summary) (5 of 6).

TECHNICAL ACCEPTANCE RECOMMENDATION (CERTIFICATION)		PAGE OF PAGES DATE (DAY, MO, YEAR)
PROJECT/CONTRACT NUMBER	TITLE	LOCATION

CERTIFICATION

Acceptance tests and Quality Assurance Inspections are complete for equipment installed under this project.

WITHOUT EXCEPTIONS ☐ WITH NOTED EXCEPTIONS ☐

INSTALLATION AGENCY	SIGNATURE AND TITLE PRINTED
OPERATING AGENCY	SIGNATURE AND TITLE PRINTED
TEST AGENCY	SIGNATURE AND TITLE PRINTED

ACCEPTANCE

Equipment herein certified successfully installed and tested, is accepted.

OPERATING COMMAND	SIGNATURE TITLE

Figure 8-1. Technical Acceptance Recommendation (Summary) (6 of 6).

(CCC-CED)

FOR THE COMMANDER:

OFFICIAL:

R. K. BOWERS
Colonel, Signal Corps
Deputy Commander

Bruce C. McCain

BRUCE C. McCAIN
Major, Signal Corps
Executive Officer

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5 - USACEEIA Installation Detachment-Korea, ATTN: CCCK-IN, CCCK-CO, APO SF 96301
15 - USACEEIA-CONUS, ATTN: CCN-PRSO-S-TS (Tech Ref Cen), Fort Ritchie, MD 21719
10 - USACEEIA-EUR, APO New York 09056
10 - US Army Signal Corps and School, Fort Gordon, GA 31905
2 - US Army Materiel Development and Readiness Command, ATTN: CCCN-PI-P, Washington, DC 20315
5 - 5th Signal Command, APO New York 09056
5 - 7th Signal Command, Fort Ritchie, MD 21719
5 - US Army Communications Command, ATTN: CC-OPS-PP, Fort Huachuca, AZ 85613
2 - US Army Training and Doctrine Command, ATTN: ATCE, Fort Monroe, VA 23351
2 - US Army Forces Command, ATTN: AFCE, Fort McPherson, GA 30330
2 - Defense Communications Agency, Technical Library Center, Code 205, Washington, DC 20305
12 - Defense Documentation Center, Cameron Station, Alexandria, VA 22134
4 - 1st Signal Brigade USACC-Korea, APO San Francisco 96218
2 - USACC Agency-Japan, APO San Francisco 96343
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DEPARTMENT OF THE ARMY
US Army Communications-Electronics
Engineering Installation Agency
Fort Huachuca, Arizona 85613

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US ARMY COMMUNICATIONS-ELECTRONICS
ENGINEERING INSTALLATION AGENCY
ATTN: CCC-CED-S[illegible]
Fort Huachuca, Arizona 85613

This standard engineering installation package is based on the most current thinking at US Army Communications Command. Your experience and help can improve our responsiveness in this area. Please send us your comments. Thanks.

SEIP MGT Officer
AUTOVON 879-6719

Comments on SEIP ____ (please give number)

How can we contact you?

Rank Name Duty position Duty station AUTOVON number

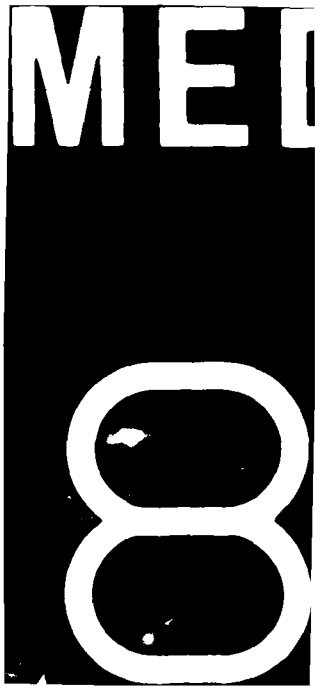
This standard engineering installation package is based on the most current thinking at US Army Communications Command. Your experience and help can improve our responsiveness in this area. Please send us your comments. Thanks.

SEIP MGT Officer
AUTOVON 879-6719

Comments on SEIP ____ (please give number)

How can we contact you?

Rank Name Duty position Duty station AUTOVON number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