

Vega[®] a MARK IV company
Signaling Products

Instruction Manual

098-0279C

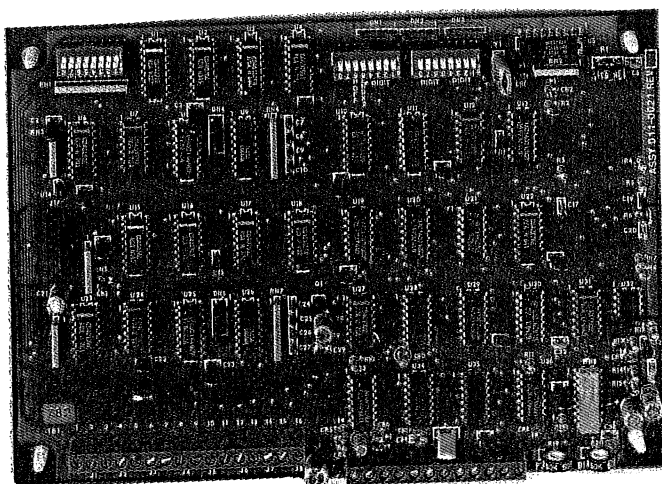
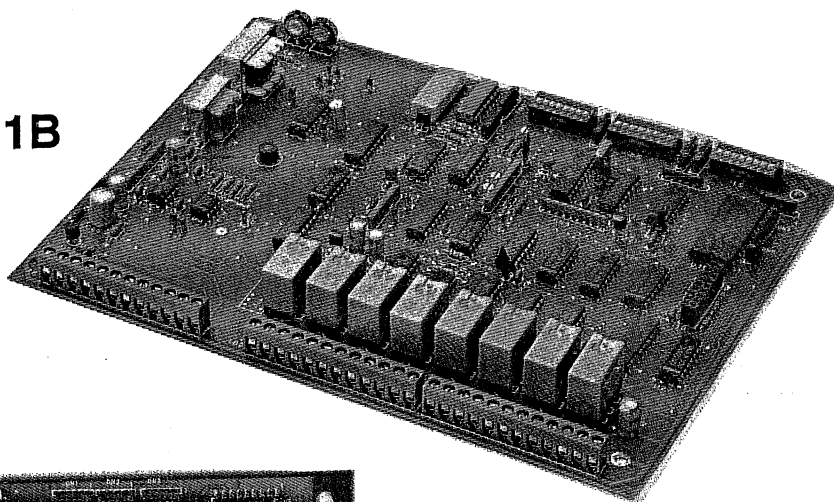
780 Series DTMF Control and Status-Monitoring System

Model DCU-781B DTMF Control Unit (Decoder)

Model DAU-782 DTMF Alarm Unit (Encoder)

Model DRU-783B Remote System (Encoder/Decoder)

DCU-781B



DAU-782

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Introduction

The Vega 780 Series DTMF control and status-reporting system provides remote control and/or remote alarms over any voice-grade transmission medium, such as a radio link, leased line, or microwave, by decoding or encoding DTMF messages.

DTMF control messages may be generated by a DTMF keypad or by a Model I-733 DTMF modem used in conjunction with a personal computer.

The Model DCU-781B DTMF control unit (decoder) provides remote control of up to eight outputs (eight 1-of-N, eight momentary, eight accumulator or ON only with a master reset, or four ON/OFF). DTMF answerback regeneration verifies all received messages.

The Model DAU-782 DTMF alarm unit provides eight inputs for remote alarm or status change. The DTMF alarm/status messages generated by the DAU-782 encoder may be decoded and displayed by a computer equipped with a Model I-733 DTMF modem.

The Model DRU-783B remote system combines the DCU-781B decoder with the DAU-782 encoder to provide remote control of eight outputs, verification that commands have been received and have activated a function, indication of the ON/OFF status of the eight controlled outputs, and interrogation of eight alarm/status inputs by decoding incoming DTMF commands and generating outgoing DTMF messages. The system can also automatically report alarm inputs.

The Model P-780 case is an optional metal enclosure for the DCU-781B, DAU-782, or DRU-783B.

DCU-781B—General

The Vega Model DCU-781B DTMF control unit (decoder) provides up to eight outputs—either open collector or optional plug-in SPDT relays. This unit may be DIP-switch programmed for either a three- or four-digit address. Digits "1" through "8" determine the selected output.

Upon decode of a valid DTMF message, the command is executed and an answerback message is generated. This message is actually a repeat of the DTMF message received and is provided as a verification that the command was received.

The eight outputs are DIP-switch programmable for 1-of-N interlock, momentary, set/reset paired interlock, or "accumulator" (ON-only) modes of operation. In any mode, the address followed by "0" resets all outputs. The first four and the last four outputs are separately programmable for ON/OFF paired interlock or "accumulator" (ON-only) modes. However, the 1-of-N and momentary modes must be 1-of-8.

A push-to-talk (PTT) output is provided to key a transmitter. A carrier-operated-relay input is provided to prevent accidental simultaneous transmission on

a shared radio channel. The DCU-781B will also operate over a two-wire or four-wire voice-grade 600-ohm line. The radio channel or voice-grade line need not be dedicated and may be used for voice communications and multiple 780 Series installations. System failure is possible, however, should inadvertent simultaneous transmission occur either on a radio channel or on a wire line.

Provision has been made for an optional rechargeable battery to retain output status (memory only) during power failures. However, relays and LEDs are not energized by the back-up battery connected to these terminals.

Provision has also been made to operate multiple DCU-781B decoders in a single 1-of-N mode, when more than eight outputs are required.

The DIP-switch-programmable station address may be either three or four digits long. Any of the 16 DTMF characters may be used. Control digits "1" through "8" are then added after the address to control the associated output (one through eight). Control digit "0" resets all outputs to the "OFF" position. This results in a total message length of either four (three address plus one control) or five (four address plus one control) digits.

Lightning Protection (All Models)

Line inputs and outputs are diode-protected from line transients up to certain limitations. Protection from lightning-induced high voltage and current has not been provided. Vega does not provide repair under warranty for damage obviously caused by high voltages.

If the line is leased from a telephone company, lightning protection is usually provided at the line entrance to the building. (Verify with your telephone company.) If this protection is not provided, or if the system is to be used on a private, customer-owned line, it is recommended that a North Supply part # S-561034 or equal lightning-protection device be installed and properly grounded at the entrance to the building. It is also recommended that gas-discharge units such as North Supply part # S-568015 or MOV devices such as GE part # V100ZA15 be installed directly at the line terminals of all 780 Series models.

DCU-781B Installation and Setup

Refer to the DCU-781B schematic, PC-board silk screen, and the Installation and Setup Chart located in this manual and on the label on the inside of the P-780 cover. DIP-switch program the station address, output interlock, wrong-digit operation, and answerback ON/OFF.

As shipped, the DCU-781B is programmed for radio or four-wire-line operation with answerback. (J9 and J10 should be open, and J1 closed.) For two-wire line operation, close J9 and J10 and open J1.

For radio operation, receiver audio is connected to TB1-1,2 and transmit audio is obtained from TB1-3,4. If the radio speaker output and the microphone input are used, attenuator pads should be installed to reduce the maximum input to about 0 dBm and maximum output to about -15 dBm. TB1-7 connects to the radio PTT circuit and TB1-5 connects to the radio carrier-operated relay (COR) output. Carrier detection grounds TB1-5 and "holds off" answerback until the channel is clear.

As shipped, the DCU-781B DTMF inputs are programmed for -20 to +10 dBm, 1/3 to 10 digits per second, 50% duty factor. For -40 to -10 dBm input, close J2. For 11 to 22 digits per second (50% duty factor), close J4. For DTMF with a fixed 15-ms interdigit time, close J3 and J4.

Factory programming is for open-collector output operation. When the optional SPDT relays are used, remove the jumper wires from the relay sockets, close J5, and plug in the relays. If a mixture of open-collector and relay outputs are used and the external circuits operate from a higher supply voltage than the DCU-781B, J5 must be open and individual diodes must be reverse-connected across all relay coils.

Adjust R28 for the desired answerback level (usually 0 dBm on a 600-ohm line and about at voice peak level into a radio transmitter. Answerback digit rate is factory adjusted to 10 digits per second. Adjust R1 for a different digit rate. Adjust the interdigit timer to minimum if only 10 digits-per-second automatic encoding is used and to maximum if manual keypad encoding is always or sometimes used.

DAU-782 – General

The DAU-782 is a DTMF alarm/status-change reporting device. The report is a four-digit DTMF message which may be transmitted via any voice-grade transmission medium such as a microwave circuit, radio links, leased line, or audio pair.

A radio channel may be used both for voice communications and for alarm reporting from one or more locations. The DAU-782 provides push-to-talk (PTT) output to operate the transmitter, and a carrier-operated relay (COR) input to "hold off" alarm messages until the channel is clear. Use of voice or multiple DAU-782 units on a single 600-ohm line requires external sensing of line activity to hold off alarms until the line is clear.

DIP-switch programming of the first three DTMF digits (address) is provided. The fourth digit always corresponds to the number of the activated input.

Each alarm may be programmed to be sent once or twice. The input is then disabled and will not be sent again until the alarm input is removed and reapplied.

An inhibit/trigger-status input is provided. This can be used for time-clock or special-circumstances reporting of all alarms present. A trigger from this input

causes the alarm messages to be sent only once, regardless of the send-twice programming.

Reapplication of power after a loss automatically causes all alarms present to be reported.

DAU-782 Installation and Setup

Refer to the DAU-782 schematic, PC-board silk screen, and the Installation and Setup Chart or the label located inside the P-780 cover. Program the three-digit DTMF address of the four-digit message. Select an "odd" number for the third digit. NOTE: An "even" number in the third-digit position will cause the third digit plus one to be generated. For example, if the programmed address is "1-2-4-X", then the message "1-2-5-X" will be sent.

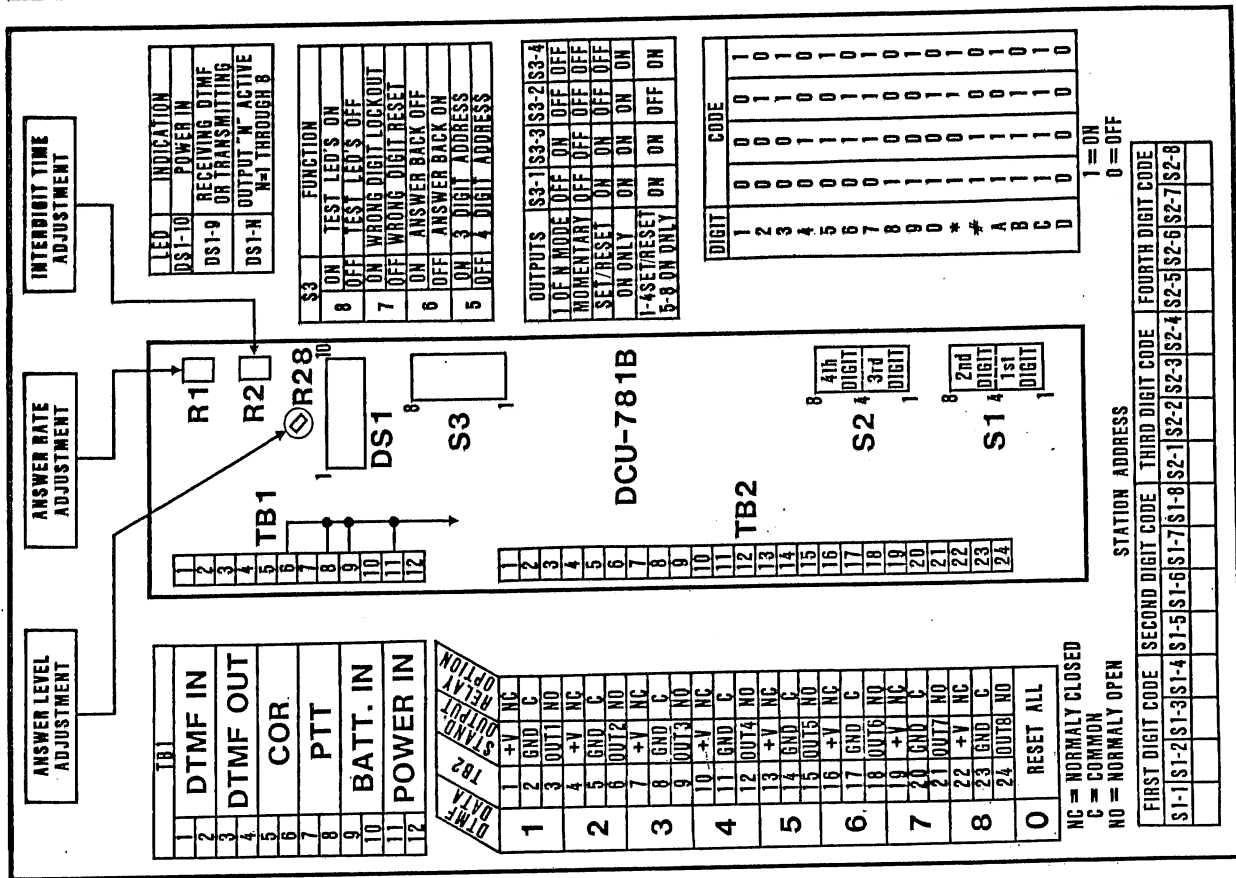
As shipped, a ground applied at a trigger input will generate an alarm message. To generate an alarm when a ground is removed, open the S1 switch associated with that input. For example, when S1-1 is open ("OFF"), an alarm will occur on input one when ground is removed. If alarm generation is desired upon application (or removal) of a voltage (10 to 28 V_{dc} grounded supply), open J9 through J16 and close J1 through J8. For operation with optically isolated inputs, open J1 through J16. Apply (or remove) the 10 to 28 volt supply to (or from) the two terminals associated with each input (observe polarity). The associated S1 switch should be closed ("ON") to sense the presence of current and open ("OFF") to sense the absence of current.

For radio operation, transmit audio is obtained from TB2-9. If the transmit audio is applied to the radio microphone input, an attenuator pad should be used to limit the maximum applied audio to about -15 dBm. Radio PTT is obtained from TB2-7. Connect the receiver COR to TB2-11. The COR connection inhibits alarm reporting while the receiver is active. This allows the radio channel to be used for voice communications and/or multiple DAU-782 units without the danger of losing messages.

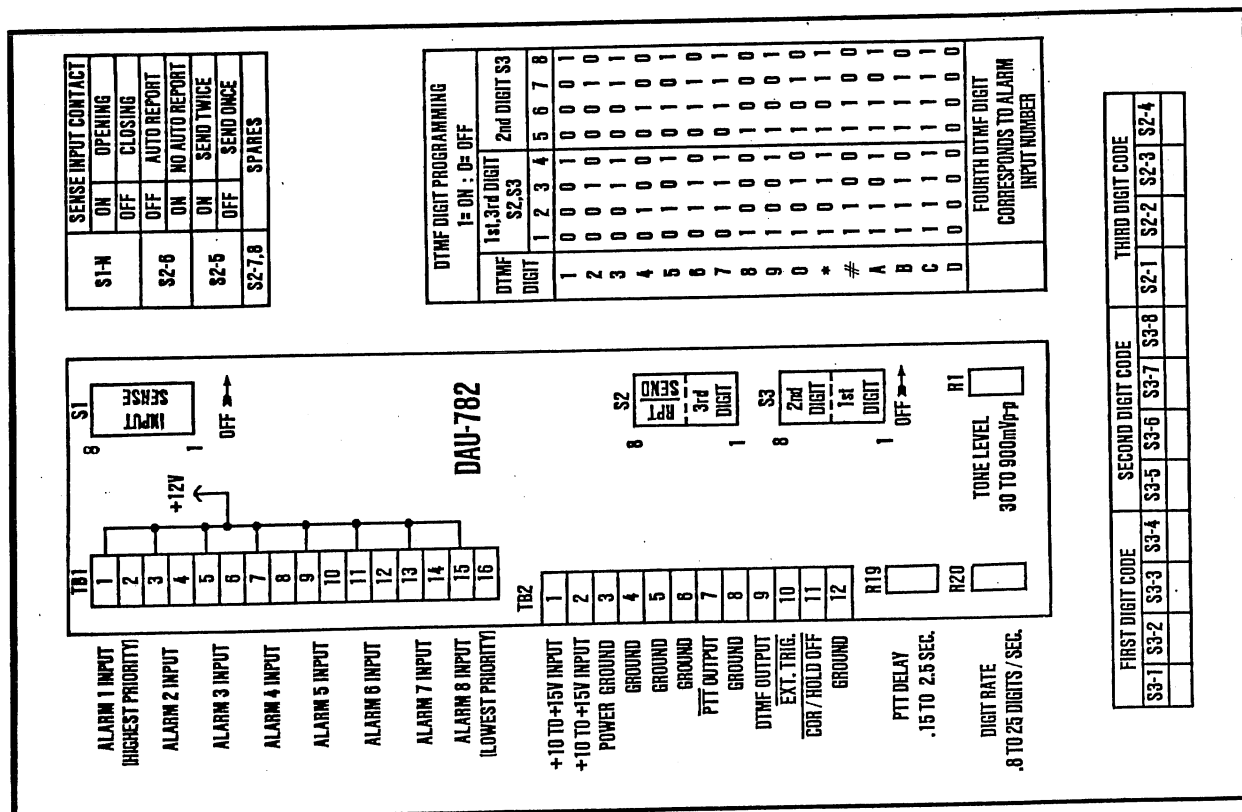
For 600-ohm voice-grade line operation, connect TB2-8,9 to an external terminated 600-to-600-ohm isolation transformer. Use of voice or multiple DAU-782s on a single line is not recommended without external traffic-sensing equipment because the possibility exists that an alarm message will not be decoded in the presence of voice. If alarms are received from two DAU-782s simultaneously, then neither message will be decoded. For applications utilizing voice and/or multiple alarm panels on a single line, contact the factory.

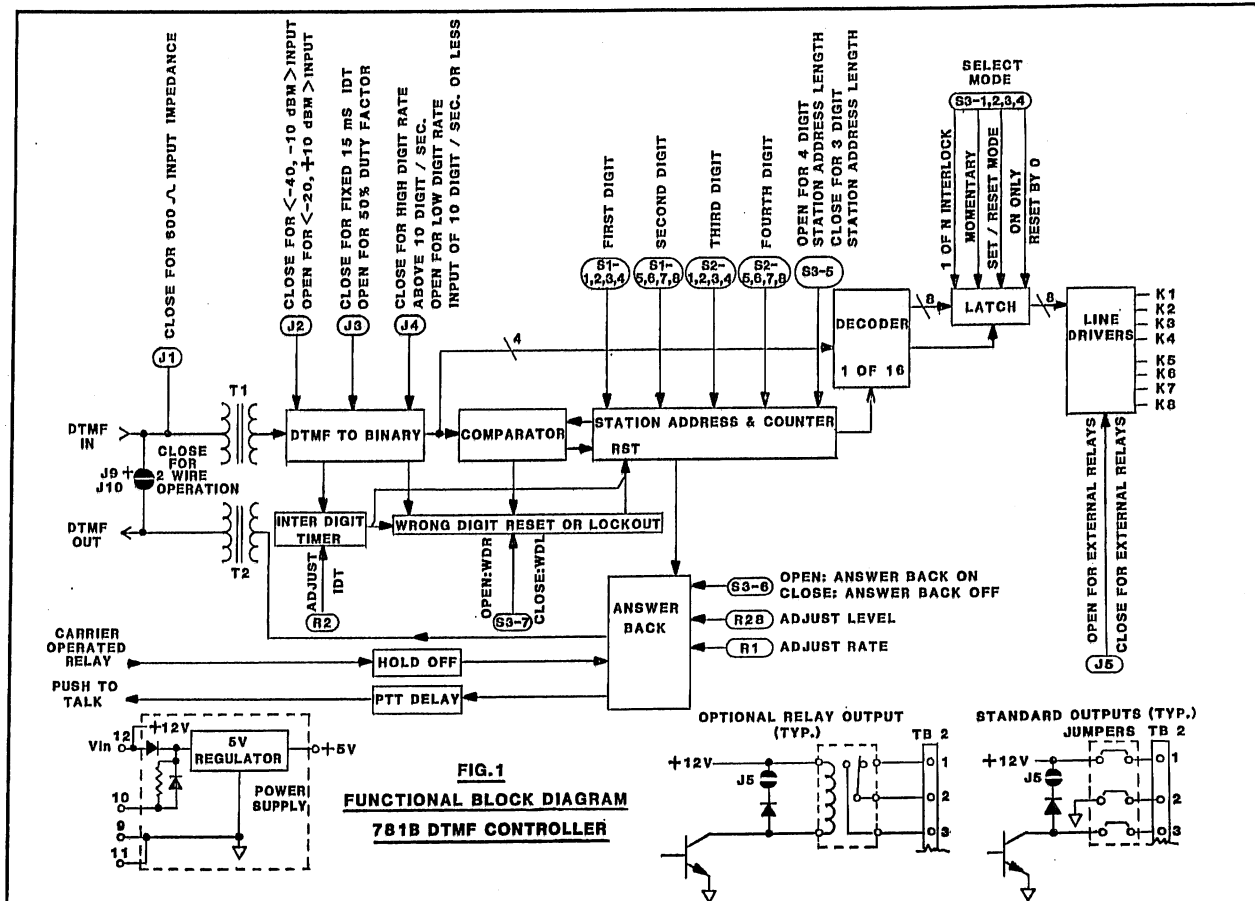
"PTT delay" for the radio transmitter is factory adjusted to 250 ms. For longer or shorter times, adjust R19.

Factory programming is for a 10-digit-per-second message rate and for the message to be sent twice. For a faster or slower rate, adjust R20. For a send-once message, open S2-5.

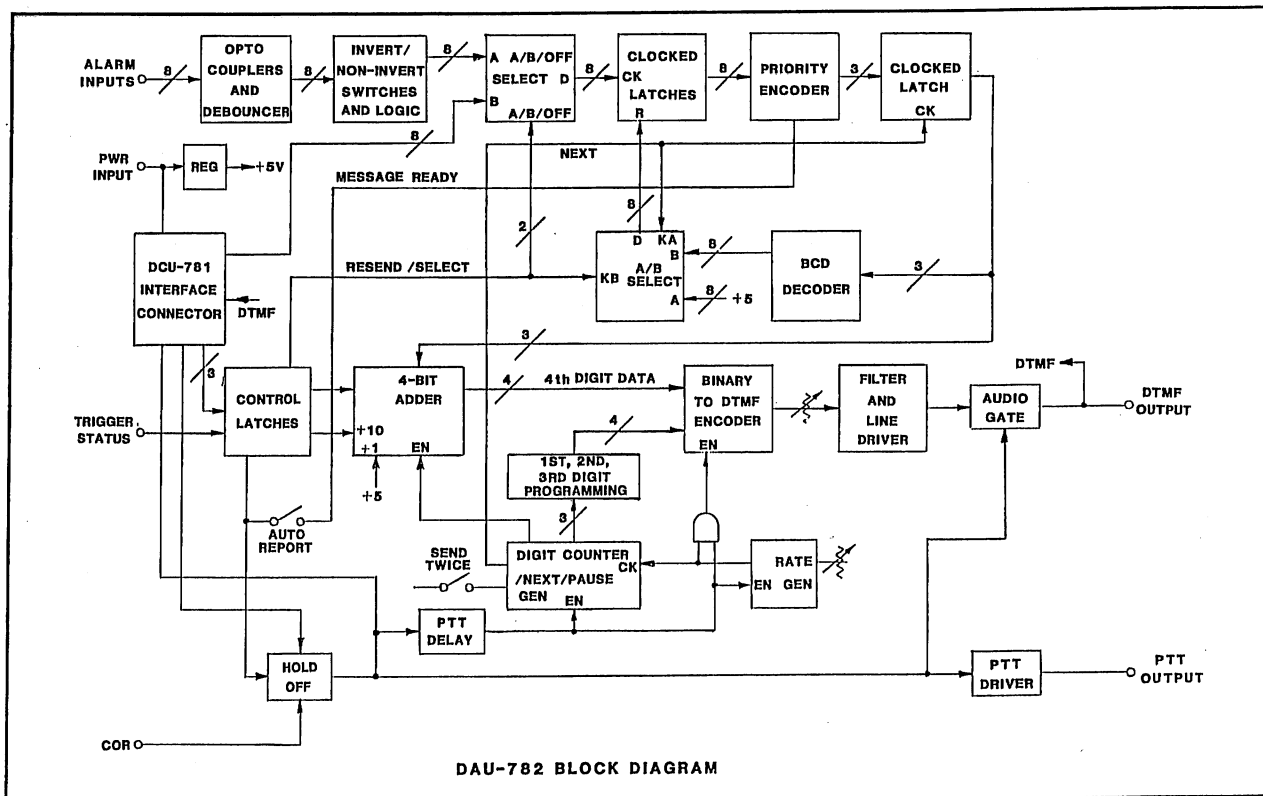


DCU-781B installation and setup chart.





Functional block diagram of Model DCU-781B DTMF controller (decoder).



Block diagram of Model DAU-782 DTMF alarm unit (encoder).

Adjust R1 for the desired DTMF output level (usually 0 dBm on a 600-ohm line or about peak voice level into a radio).

DRU-783B – General

The DRU-783B is a DTMF remote unit which provides the features of both the DCU-781B and the DAU-782 plus additional features. Upon DTMF command (last digit "9") the DRU-783B will read the status of all DCU-781B controlled outputs. Upon reception of the last digit "*", the DRU-783B will read out all active DAU-782 inputs. If the third digit of the four-digit DAU-782 message is programmed to be an "even" number, this third digit remains "even" when the DCU-781B control outputs are reporting. However, the third digit ("even") will change to an "odd" number (the programmed "even" number plus one) when the DAU-782 inputs are reporting. This condition allows separate decoding of the two types of readouts when the prefixes would otherwise be the same.

The answerback message of the DRU-783B gives more positive verification than the DCU-781B that the incoming command has taken place. The DCU-781B answers back with the same valid DTMF message as was decoded as a command message. The DRU-783B answerback is triggered by the change of state of one of the latches which controls one of the DCU-781B outputs. If a command is received to set one of the output latches and that latch is already set, the fourth digit of the answerback will be "0". This indicates that no change of state has occurred. A fourth-digit "0" is also generated from a "RESET ALL" command ("0") and from the following conditions:

- A "READ OUTPUTS" command ("9") when no active outputs are present.
- A "READ INPUTS" command ("*") when no alarms are present.
- An invalid-digit command ("#", "A", "B", "C", "D").

The DRU-783B has automatic hold-off whenever external DTMF is present. This allows multiple DRU-783B units to be used in the auto-report mode on a single 600-ohm line with no voice present. When voice is present and multiple DRU-783B units are used on a single 600-ohm line, the interrogate mode only is recommended because simultaneous DTMF reporting cannot be decoded and voice plus DTMF may not be decoded.

The DRU-783B is field programmable to report alarms automatically and upon command, as well as upon command only. An alarm message from one DRU-783B location may be sent as a command to another DRU-783B at a different location to perform an automatic action without the involvement of a central control point. For example, a water-tank overflow alarm could be sent to another location to turn off a pump.

DRU-783B Installation and Setup

Installation and setup is the same as outlined in the DCU-781B and DAU-782 instructions, with the following exceptions:

To access the DCU-781B terminals and programming switches, remove two screws and raise the DAU-782 PC board on its hinges. Care should be exercised to align the connectors when the DAU-782 PC board is lowered back to the operating position.

The only connections to the DAU-782 PC-board terminals are to the alarm inputs and to the "TRIGGER STATUS/INHIBIT" input, if used. Input and output audio, power, PTT, and COR (if used) are all connected to the DCU-781B PC-board terminals.

Disable the DCU-781B answerback by closing S3-6. Answerback is generated by the DAU-782 PC board.

If a voice-grade 600-ohm line is to be used and the line is also used to carry voice traffic, disable the automatic reporting feature by closing S2-6 on the DAU-782 PC board and obtain alarms by interrogation. If this is not done, alarms may not be properly decoded. Additionally, the DTMF tones may cause interference with the voice communications. Alternatively, an external voice sensor may be used to delay alarm transmission until the line is clear of voice traffic. Please contact the factory for advice should this situation occur.

When programming the DTMF message, choose an "even" number for the third digit. A "READ LATCHES" (controlled outputs) interrogation (last digit "9") will then cause the actual programmed message to be generated. However, a "READ OPTOS" (alarm inputs) interrogation (last digit "*") will generate the programmed third digit plus one. This allows messages that would otherwise be copies of one another to be decoded separately.

Technical Assistance

Vega products are engineered to meet your requirements of performance, reliability, and compatibility. Technical assistance is offered by correspondence or telephone, should it be required, to assure your satisfaction.

Warranty

Vega signaling products are guaranteed to be free from defects in material and workmanship for a period of three years from the date of shipment. Warranty is for factory repair or replacement only.

Model DCU-781B Specifications:

Input Signal Format: Standard 2 of 7 or 2 of 8 DTMF digits

Tone Input Level: -40 to -10 dBm, or -20 to +10 dBm, jumper selectable

Input Impedance: 600 Ω or 10 k Ω , jumper selectable, transformer isolated

Signal Twist: ± 12 dB (minimum) level difference

S/N Tolerance: 7 dB at 10 digits/s, 50% duty factor

Frequency Acceptance: $\pm 1.5\%$ minimum

Input Dynamic Range: 30 dB minimum

Dialing Rate: 1/3 to 10 digits/s or 4 to 22 digits/s, jumper selectable

DTMF Duty factor (automatic dialing): 15 ms fixed interdigit time or 50% nominal duty factor, jumper selectable

Interdigit Time (manual dialing): 240 ms to 2.4 s, adjustable

Supply Voltage: +10 to +18 V_{dc} (no relays), +10 to +15 V_{dc} (with relays)

Supply Current: 40 mA (no relays). Add 33 mA per relay in the energized state (at 12 V_{dc} input)

Input Control COR: Active low, to hold off the answerback when the radio channel is active

Address Length: 3 or 4 digits, switch selectable

Invalid Digits Mode: Reset or lockout, switch selectable

Line Operation: 2-wire or 4-wire, jumper selectable

Operating Modes: 1 of N, set/reset, momentary, accumulator (ON only), all switch selectable

Output Control: 8 devices in 1 of N, momentary or accumulator mode; 4 devices in set/reset mode; or 2 devices in the set/reset mode with 4 devices in the accumulator mode

Outputs: Open collector, active low, 200 mA; optional SPDT relay, 2 A maximum

PTT ON Delay: 300 ms

PTT OFF Delay: 100 ms

LED Indicators: Power, transmit/receive DTMF and output state

Answerback Format: Standard 2 of 7 or 2 of 8 DTMF digits

Answerback Level: -13 to +12 dBm, factory set to 0 dBm

Answerback Rate: 4 to 20 digits/s, factory set to 10 digits/s

Answerback Duty Factor: 50%

Temperature Range: -30 to +70°C

Size: 1.6 in (4.1 cm) H, 6.4 in (16.3 cm) W, 8.9 in (22.4 cm) D

Model DAU-782 Specifications

Supply Voltage: +10 to +15 V, semiregulated

Supply Current: 12 mA idle, 18 mA maximum, at 12 V_{dc} supply

Alarm Inputs: Eight. Each individually DIP-switch programmable or jumper selectable for contact closure, contact opening, +10 to +20 V or -10 to -28 V application or +10 to +28 V or -10 to -28 V opening

Alarm Input Impedance: 25 k Ω , typical

Input Debounce Time: 25 ms, typical

Control Input Logic Level: 5 to 15 V_{dc}

DTMF Alarm Message: 4-digit length, 3-digit address, DIP-switch programmable. The last digit corresponds to the input number

DTMF Digit Rate: 4 to 20 digits/s, adjustable

DTMF Output Impedance: 100 k Ω typical, idle. 100 Ω maximum during the message

DTMF Output Level: -30 dBm to +6 dBm into a 600- Ω load, adjustable. -50 to -25 dBm into a 40- Ω load (dynamic microphone bridge), adjustable

PTT Output: 100 mA maximum sink current

PTT Delay: 150 ms to 2.5 s, adjustable

Size: 1.6 in (4.1 cm) H, 6.4 in (16.3 cm) W, 8.8 in (22.4 cm) D

DCU-781B Parts List

Part No.	Description	Ckt Sym		
031-0205	TEST SPEC DCU-781B		136-0049 RES COMP 27K 5% 1/4W	R29
065-0406	PCB DCU-781B		136-0053 RES COMP 56K 5% 1/4W	R33
071-0523	SCHEMATIC DCU-781B		136-0056 RES COMP 100K 5% 1/4W	R34
104-0761	CAP TANT 0.1UF 35V 10%	C11		R35
104-0763	CAP TANT 15UF 6V 10%	C6		R25
105-1099	CAP MYLAR .01MF 10% 100V	C10		R15
		C13		R20
		C31		R26
110-1340	CAP CER .1MF SMALL	C 9		R36
		C12		R37
		C14	136-0094 RES COMP 6.2K 5% 1/4W	R18
		C15	136-0294 RES COMP 510K 5% 1/4W	R16
		C17	136-1765 RES COMP 3K 5% 1/4W	R38
		C21	136-1965 RES COMP 11K 5% 1/4W	R32
		C22	138-0009 RNET ISO 8X1K DIP	RN1
		C26	138-0013 RNET ISO 4X22K SIP	RN6
		C30	138-0032 RNET CMN 5X22K SIP	RN2
		C32	138-0033 RNET ISO 5X22K SIP	RN4
		C33		RN7
		C34	138-0036 RNET ISO 5X220K SIP	RN3
		C35	140-0001 XSTR NPN MPS4124 TO92 GP	Q2
		C36	144-0001 XSTR NDMOS2N7000 TO92 SW	Q1
		C18		Q3
110-1389	CAP CER .001MF 10% X7R	C27	161-0366 DIODE 1N4003	CR 7
		C24		CR 8
112-1606	CAP ELEC 10MF 25V	C29	161-0426 DIODE 1N4148	CR 1
		C25		CR 2
112-1609	CAP ELEC 100MF 20% 25V	C28		CR 3
112-1663	CAP ELEC 4.7MF 10% RAD	C16		CR 4
112-1668	CAP ELEC 10MF 3SV 10% RD	C23		CR 5
		C37		CR 6
112-1671	CAP ELEC 22MF 16V 10%RD	C20	161-0576 LED BAR RED 10-ELEMENT	CR 9
130-0526	RES VAR 100K VER MT LIN	R2	162-0001 DNET CMNA QUAD DIODE SIP	CR10
130-0532	RES VAR 10K VER MT LIN	R1		CR11
130-0632	RES VAR 1K HOR MT	R28		CR12
136-0020	RES COMP 100 5% 1/4W	R22		CR13
136-0022	RES COMP 150 5% 1/4W	R27		DS1
136-0030	RES COMP 680 5% 1/4W	R 3		DN2
136-0032	RES COMP 1K 5% 1/4W	R11	162-0002 DNET CMNC 4XCR	DN3
		R12		DN4
136-0035	RES COMP 1.8K 5% 1/4W	R31	165-1212 XTAL HC-18 3.579545 MHZ	DN5
136-0041	RES COMP 5.6K 5% 1/4W	R30	286-1719 TERM STRIP12 PIN MINI	DN6
136-0044	RES COMP 10K 5% 1/4W	R4		DN7
		R17	286-1768 PIN TEST POINT	DN8
		R19		DN9
136-0048	RES COMP 22K 5% 1/4W	R5	286-1775 FEMALE HDR 9 PIN DUAL PCB	X1
		R6	286-1778 JUMPER .1 MALE GOLD	TB1
		R13	299-0315 SWITCH 8 POSITION DIP	TB2
		R14		TP1
		R21		TPGND
		R23	318-0243 XFORMER 600CT-600CT PCB	P1
				J
				S1
				S2
				S3
				T2

318-0246	XFORMER	10K CT-10K CT	T1		C16
395-0043	SOCKET	16 PIN DIP	K1		C18
			K2		C19
			K3		C22
			K4		C23
			K5		C29
			K6		C31
			K7		C36
			K8		C37
425-0132	IC CMOS	4017 CNTR-DCDR	U8	110-1320 CAP CER .001MF 20% 50V	C7
425-0157	IC CMOS	4001 QUAD 2NOR	U12		C8
425-0164	IC CMOS	4011 QUAD 2NAND	U22		C9
425-0166	IC REG-P	78L05 5V .1A	U28		C10
425-0171	IC CMOS	4081 QUAD 2AND	U15		C17
			U16		C24
425-0172	IC CMOS	4075 TRIP 3OR	U23		C25
425-0193	IC CMOS	4023 TRIP 3NAND	U13		C26
425-0202	IC OPAMP	5532 DUAL RL600	U19		C27
425-0206	IC CMOS	4584 HEX TRIG	U14		C34
			U20		C38
425-0214	IC CMOS	4514 LINE DCDR	U10	110-1340 CAP CER .1MF SMALL	C5
425-0221	IC CMOS	4071 QUAD 2OR	U6		C32
			U24		C41
			U25	110-1415 CAP CER 820PF X7R 10%	C20
425-0255	IC CMOS	4093 QUAD TRIG	U11	112-1609 CAP ELEC 100MF 20% 25V	C1
			U21	112-1646 CAP ELEC 1.0UF 25V MINI	C33
425-0272	INT CKT	XR-2242 TIMER	U18	112-1668 CAP ELEC 10MF 3SV 10% RD	C21
425-0274	INT CKT	CD4043B	U17		C28
			U27		C39
425-0295	INT CKT	MT8870 DTMF DCR	U7		C40
425-0296	IC CMOS	4063B MAG COMP	U9	130-0641 RES VAR 1K VER MT LIN	R1
425-0404	INT CKT	ULN2803A	U26	130-0672 RES VAR 250K VER MT LIN	R19
425-0411	IC	4538 DUAL MONO	U2		R20
425-0412	IC CMOS	40105 F1F0	U5	134-2961 RES RN55D 11.5K 1% 1/4W	R6
425-0414	INT CKT	TP53130 DTMF EN	U4	134-2962 RES RN55D 14.0K 1% 1/4W	R4
484-0112	INSULATOR	XTAL HC-18	X1	134-2963 RES RN55D 69.8K 1% 1/4W	R5
561-0628	SPACER	PC 6X3/8 SELF-TAP		136-0036 RES COMP 2.2K 5% 1/4W	R12
				136-0044 RES COMP 10K 5% 1/4W	R7
					R8
					R18
				136-0048 RES COMP 22K 5% 1/4W	R2
					R 3
					R11
					R17
				136-0056 RES COMP 100K 5% 1/4W	R14
					R16
				136-0060 RES COMP 220K 5% 1/4W	R15
				136-0061 RES COMP 270K 5% 1/4W	R13
				136-0063 RES COMP 390K 5% 1/4W	R21
				136-0094 RES COMP 6.2K 5% 1/4W	R10
				136-0281 RES COMP 43K 5% 1/4W	R9
				138-0013 RNET ISO 4X22K SIP	RN4
					RN7
				138-0015 RNET CMN 9X22K SIP	RN1
				138-0032 RNET CMN 5X22K SIP	RN3
					RN5

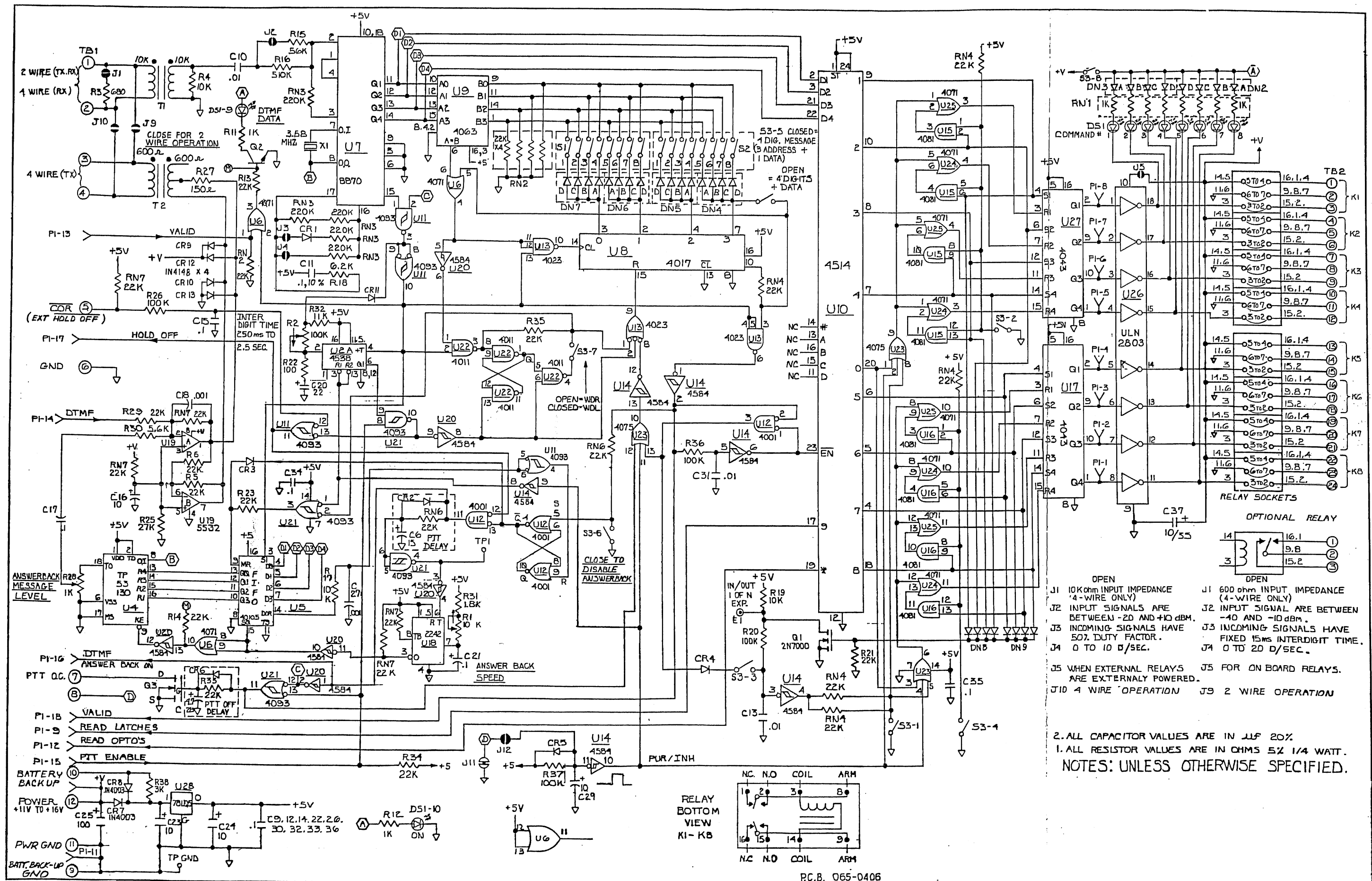
DAU-782 Parts List

Part No.	Description	Ckt Sym	
065-0355	PC BD STATUS MODULE		
104-0751	CAP TANT 2.2. MF 16V	C30	
105-1009	CAP MYLAR .022MF 10% 100V	C35	
105-1099	CAP MYLAR .01MF 10% 100V	C 2	
		C 3	
		C 4	
		C 6	
		C11	
		C12	
		C13	
		C14	
		C15	
			136-0056 RES COMP 100K 5% 1/4W
			136-0060 RES COMP 220K 5% 1/4W
			136-0061 RES COMP 270K 5% 1/4W
			136-0063 RES COMP 390K 5% 1/4W
			136-0094 RES COMP 6.2K 5% 1/4W
			136-0281 RES COMP 43K 5% 1/4W
			138-0013 RNET ISO 4X22K SIP
			138-0015 RNET CMN 9X22K SIP
			138-0032 RNET CMN 5X22K SIP

138-0047	RNET ISO 8X22K DIP	RN6	425-0421	4042B	QUAD D LATCH	U18
138-0048	RNET CMN 5X4.7K SIP	RN8	425-0422	4008B	FULL ADDER	U11
140-0001	XSTR NPN MPS4124 TO92 GP	RN2	425-0434	IC CMOS	4027 DUAL JKFF	U1
144-0001	XSTR NDMOS2N7000 TO92 SW	Q2				U2
161-0366	DIODE 1N4003	Q1				U15
161-0426	DIODE 1N4148	CR4				U16
		CR1	561-0628	SPACER PC 6X3/8	SELF-TAP	
		CR2				
		CR3				
		CR5				
		CR6				
		CR7				
		CR8				
		CR9				

DRU-783B Parts ListCkt
Sym

	Part No.	Description	
162-0001	DN1	011-0021 TOP ASSY DAU-782	
	DN2	011-0072 TOP ASSY DCU-781B	
	DN3	286-1806 CONN 9 PIN DUAL	
162-0003	DN4	518-0115 WASH LOCK 6 INT	
	DN5	518-0119 WASH LOCK#6 SPLIT	
165-1212	Y1	528-0022 SCREW PH 6-32 X 1/4	
286-1719	TB2	536-0041 NUT HEX 6-32	
286-1775	P1	538-0076 NUT KEP 6-32	
286-1794	TB1	561-0628 SPACER PC 6X3/8 SELF-TAP	
299-0315	S1	561-0638 HINGE MM 6-32X1/2 BRASS	
	S2	561-0640 STANDOFF HEX 6-32X1/2 AL	
	S3	561-0641 STANDOFF HEX 6-32X1L AL	
	U12	561-0642 STANDOFF MF 6-32X1/4 BRS	
425-0104	U32		
425-0105	U22		
425-0132	U34		
425-0157	U35		
425-0166	U14		
425-0171	U21		
	U30		
425-0172	U31		
425-0204	U28		
425-0206	U29		
	U33		
	U36		
425-0221	U13		
	U19		
	U20		
425-0249	U3		
425-0251	U4		
	U6		
	U17		
	U23		
425-0252	U10		
425-0253	U8		
	U25		
425-0255	U27		
425-0259	U7		
	U24		
425-0414	U5		
425-0420	U9		
	U26		





Vega

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