

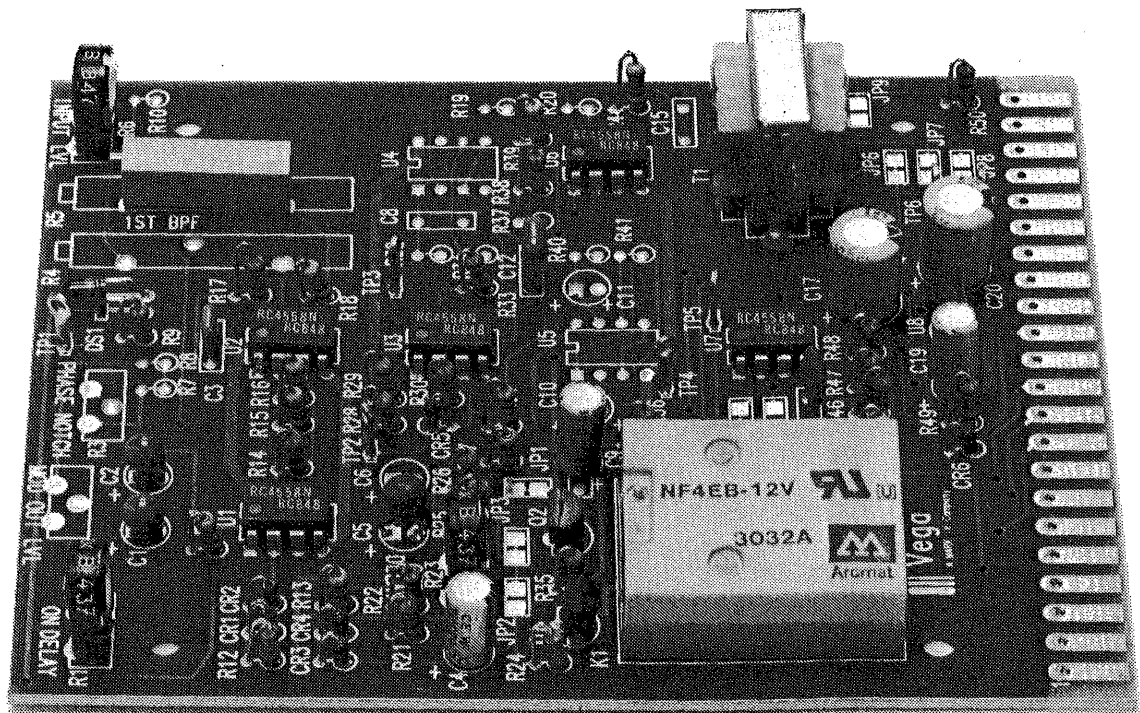


a MARK IV company

Vega D-342C and D-343C

Single-Frequency Tone Decoder Cards

Instruction Manual



Models D-342C and D-343C

General

The Vega Models D-342C and D-343C are very versatile, wide-frequency-range, single-frequency decoder cards which provide a reliable and convenient method of detecting tones in the audio-frequency range.

The D-342C detection frequency is adjustable from 1050 to 3000 Hz (300 to 1050 Hz on special order). The D-343C detection frequency is adjustable from 300 to 4000 Hz. The on-delay is adjustable from 50 milliseconds to over 1 second. The off-delay is adjustable from 50 ms to over 3 s (up to 30 s on special order and at higher cost).

Other features include transformer isolated 600- Ω or 10-k Ω input impedance, independent operation or 1-of-N interlock operation (requires external diodes), 4-pole/double-throw 2-A contact relay or up to 100 mA open-collector output, and response during (or after) tone detection.

The two models differ in that the D-342C is equipped with an audio output driver with a notch filter and an additional input bandpass filter.

General Operation

All tone-signaling applications involving decoders fall into one of two categories—namely, single or simultaneous signaling. In single-tone signaling, the desired tone frequency is never on simultaneously with voice or other tones. A typical application is burst-tone control of a radio repeater where tone precedes the voice; that is, tone and voice are not on at the same time. The single-signal condition is also satisfied in an alarm application where the transmission channel is inactive until a single alarm tone appears. Sequential tones are also an example of single signal since only one tone is on at any one time. The D-343C is designed for single-signal decoding, and critical adjustment of tone levels is not required due to the wide dynamic range of the limiter. The D-343C may also be used in certain simultaneous-signal applications such as tone during voice. However, unless the tone frequency is notched out of the voice channel at the source or the decoder is adjusted for a long on-delay, falsing may occur.

Simultaneous signal involves the simultaneous transmission of both the desired operating tone frequency and other signals such as voice. The simultaneous transmission of two or more tones such as alarm and control tones is another example.

The D-342C decoder, which includes a second bandpass filter as a prefilter, is recommended for simultaneous-signal applications; it may be used for all single-signal applications. The D-342C also includes an audio output driver with a notch filter to remove the tone frequency from voice audio or another tone(s).

Both models include inputs for latch from tone-burst detection and reset from carrier-operated-relay (COR) dropout.

Input/output connections for interlock (1-of-N) operation of multiple cards has also been provided. The internal off-delay timer can be used to perform the repeater dropout delay function.

Installation

Install the unit with the connector kit provided in a rack panel such as the Vega 211 Series or use the mounting holes in the card for installation. Avoid mounting the decoder in high temperature or strong magnetic or RF areas. The decoder input transformer is not designed for conducting DC current. If the input line carries DC voltage, open JP6 and install a 2.2- μ F capacitor (rated for the input voltage involved) in the holes provided for C18. If the input must carry DC current, install an external 600:600 Ω isolation transformer rated for the DC current involved. Refer to the schematic for input/output connection details.

Input/Output Functional Descriptions

Contacts U,17 (interlock in) and P,13 (interlock out) are used with external diodes to provide 1-of-N operation in multiple-card applications. Solder-bridge JP1 must be opened in this mode. Contact P,13 may be used to operate the relay independent of decoder operation, by external grounding. Contact P,13 may also be used for an open-collector logic output when JP4 and JP5 are open.

Contact U,17 is normally grounded by JP1, but, when JP1 is open, may be routed through the decoder's own relay contacts to ground to provide a latch upon decode that is resettable only externally by use of the INHIBIT INPUT contact S,15.

The INHIBIT INPUT contact S,15 is normally open or near ground potential. When raised above 7 volts momentarily, a latched relay is reset. Continuous inhibit input holds the decoder output in the off state regardless of tone input.

Contacts X,20 and Y,21 (D-342C only) provide notched audio output. These outputs are a push-pull pair and may be used individually as unbalanced outputs or together with an external transformer for a balanced output into a 600- Ω line.

Solder-Bridge Options

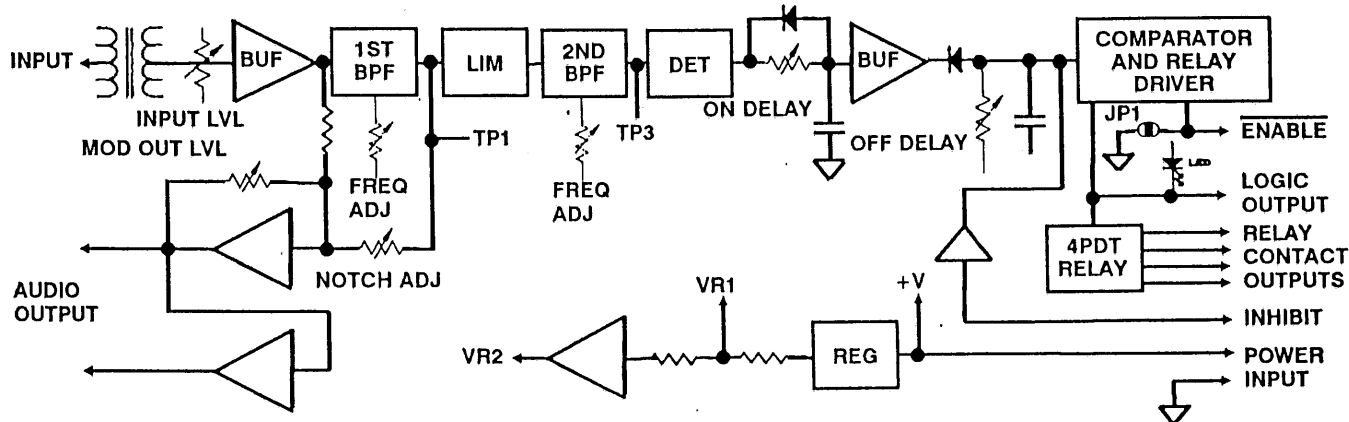
Several field-programmable options are available by closing solder-bridges with a small soldering iron or opening the factory installed traces across the solder-bridge pads with a small knife.

Balanced 10 k Ω Line Input: JP7, JP8, and JP9 open, JP6 closed (as shipped)

600- Ω Input Impedance: Close JP9

DC Voltage on Line: Open JP6 and install a nonpolar 2.2- μ F capacitor in the holes provided for C16

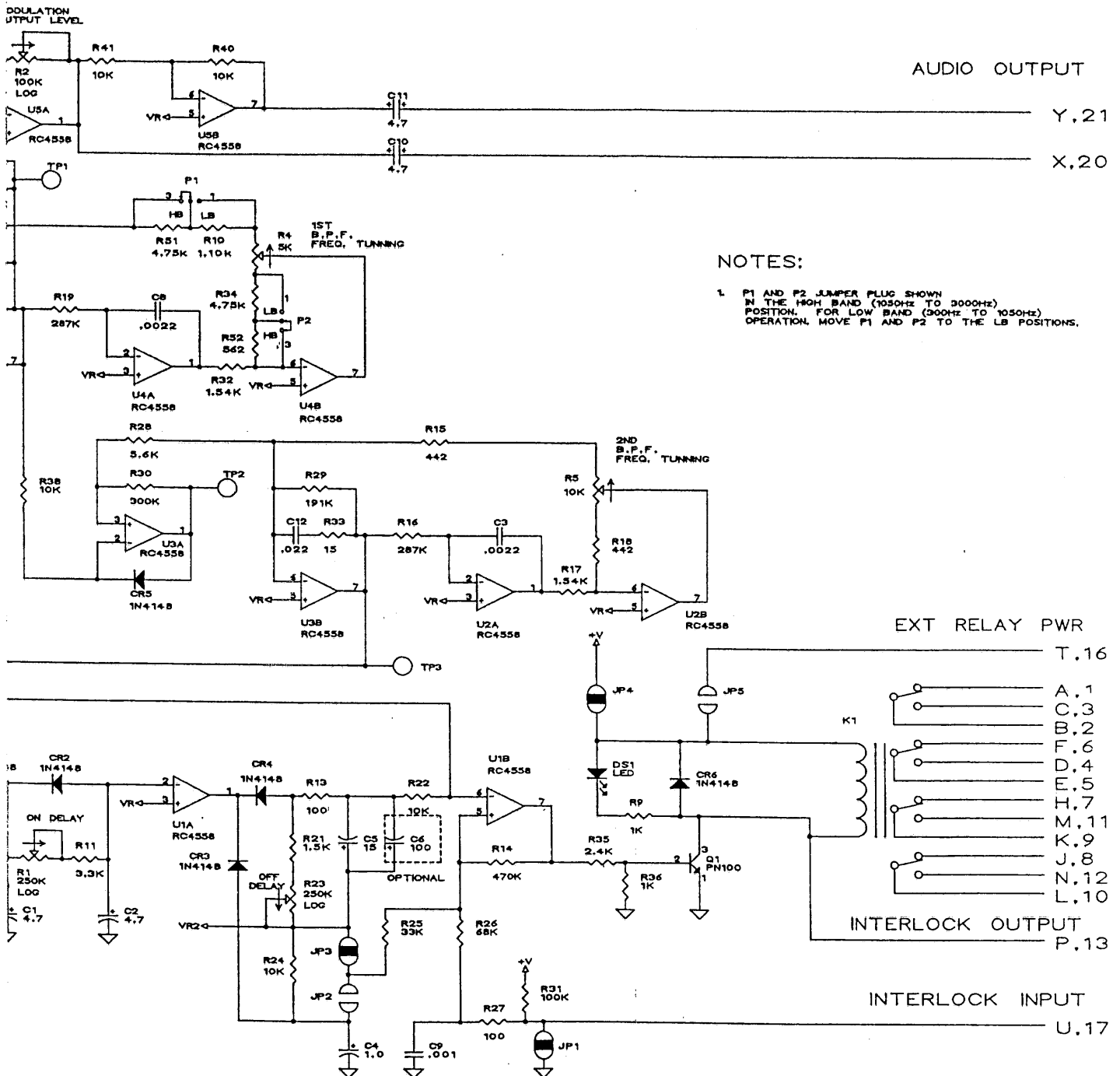
One Side of Input Signal Path Grounded (Input to Z,22 or W,19 or Both): Close JP7 and JP8, open JP6



Model D-342C single-tone decoder includes audio output driver with notch filter and additional input bandpass filter.

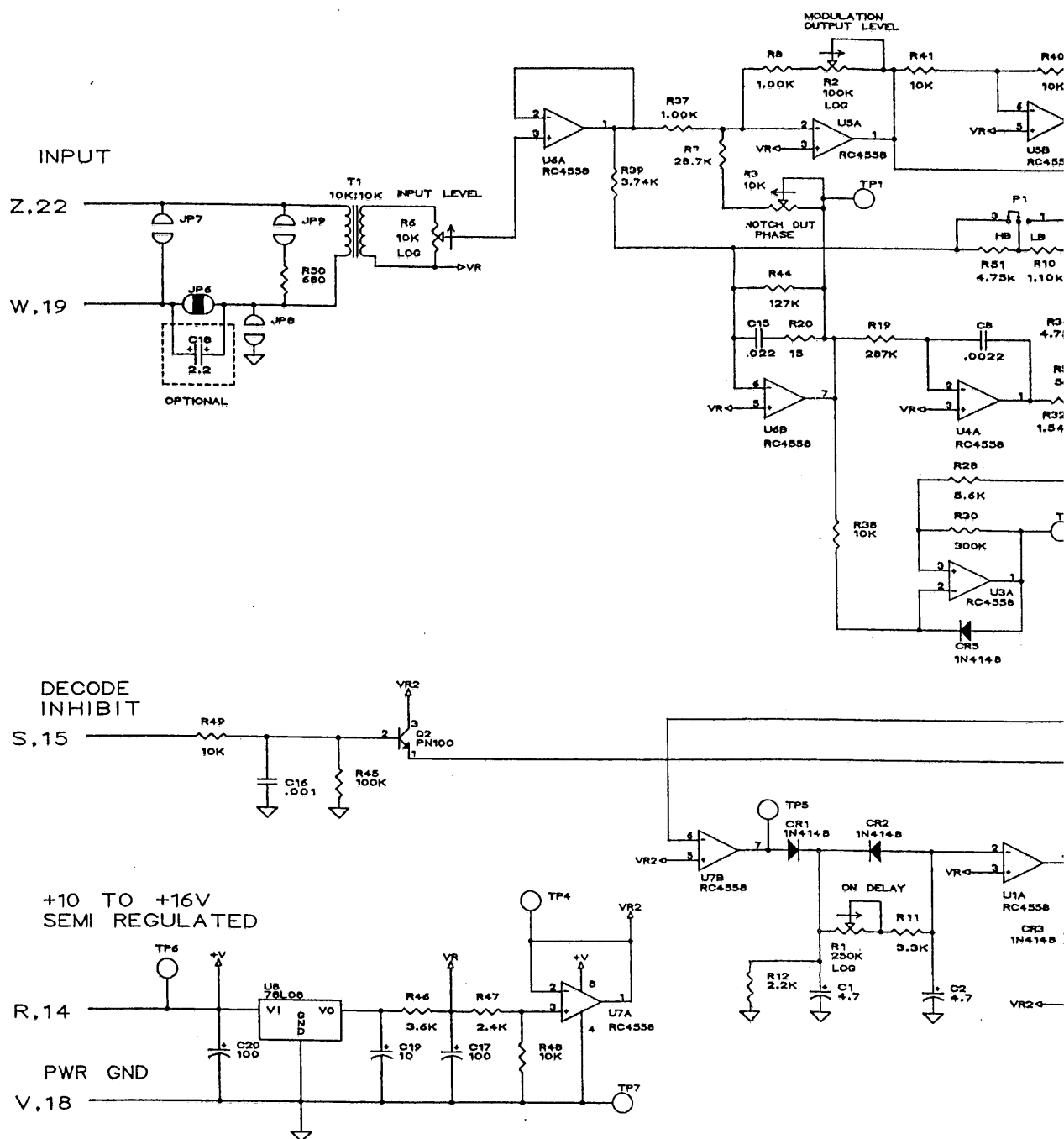
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A	BB-220	RELEASE TO PRODUCTION	9/26/88	MARK
B	BB-072	CHANGED THE VALUE OF R4, 10, AND 34	5/5/89	MARK
C	BB-074	ADDED P1, 2, R3132 WITH NEW VALUES	5/11/89	RLG



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Normal Decode: JP3 closed, JP2 open (as shipped)

Respond after Tone: JP3 open, JP2 closed. Relay is off at idle and during tone decode. When tone ends, relay is on for the duration of the "off-delay" adjustment

Normal Relay Power: JP4 closed, JP5 open (as shipped)

External Relay Power: JP4 open, JP5 closed. Power to operate relay comes from contact T₁₆

Defeat Relay and LED: Open JP4 and JP5. Active-low, open-collector output is at P₁₃. (40 V maximum, 150 mA maximum, external relay must have transient-suppressor diode)

Factory Setup and Adjustments

The decoders are shipped tuned to 2175 Hz with normal solder-bridge programming per the schematic. The D-342C has been adjusted for 50-ms on and off delays. The D-343C has been adjusted for 100-ms on delay and 1-s off delay.

On special order and at extra cost, the factory will tune the units to any frequency, adjust on and off delay (off delays up to 30 s), and program to any operating mode within the capabilities of the design.

Model D-342C Only Adjustments

The audio-output section of the D-342C is equipped with a very narrow-band notch filter to remove the tone signal from the voice audio. Adjustments should be made with the actual tone signal to be used applied to the D-342C input. If a test tone is used instead of the actual tone signal, the test tone must be within 1/4 Hz of the tone-signal frequency, and the harmonic content (THD) must be less than 0.5% for optimum notch adjustment.

With the tone signal connected to the D-342C input terminals and with power applied, adjust R4 (first bandpass filter) for maximum output at TP₁, using an AC meter with an internal DC blocking capacitor. Adjust R6 (INPUT LVL) for 0.3 V_{rms} at TP₁. Connect a sensitive AC meter (or scope) to Y₂₁ and V₁₈ (GND) and adjust R2 (MOD OUT LVL) to maximum. NOTE: A battery-operated meter may be connected to Y₂₁ and X₂₀ for 6 dB greater sensitivity.

Alternately adjust R3 (PHASE NOTCH) and R4 (first bandpass filter) for minimum on the meter.

Switch the meter sensitivity for a midscale reading or maximum sensitivity, whichever comes first, and again alternately adjust R3 and R4 for the minimum meter reading. Recheck the level at TP₁ and readjust R6 (INPUT LVL) for 0.3 V_{rms} if necessary.

Recheck the level at Y₂₁. If the notch has been properly adjusted, the level at Y₂₁ is 5 mV_{rms} or less (-44 dBm) in the absence of hum, noise, and tone-signal harmonic content.

Adjust R5 (second bandpass filter) for maximum reading at TP₃ (about 1.7 V_{rms}). If the maximum reading is significantly lower than 1.7 V_{rms}, you are tuned to a harmonic of the input

signal. Adjust the control counter-clockwise for another maximum reading.

With typical voice signals connected to the D-342C input (or a test tone at the voice level and at a frequency at least 200 Hz from the notch) and Y₂₁ (or the output line if a transformer is used) connected to the radio modulation input, adjust R2 (MOD OUT LVL) for the desired output or transmitter deviation. If a mic input on the transmitter is used, it may be necessary to reduce the gain of the D-342C for easy adjustment of the modulation level. If this is required, use the X₂₀ output and replace R40 (10 kΩ) with a 1-kΩ resistor. This reduces the X₂₀ output by 20 dB and allows the MOD OUT LVL control R2 to be advanced to an area of easy adjustment.

If a high-impedance input on the radio is used, use shielded cable.

Adjustments

Model D-343C Only

With the tone signal (or a test tone at the tone-signal frequency and at the expected level) applied to the D-343C input, adjust R6 (INPUT LVL) for 0.3 V_{rms} at TP₁. Connect the meter to TP₃ and adjust R5 (second bandpass filter) for a maximum meter reading. If the meter reading is significantly lower than 1.7 V_{rms}, the filter has been tuned to a harmonic instead of to the fundamental frequency. Continue adjustment until a maximum of about 1.7 V_{rms} is found.

Models D-342C and D-343C

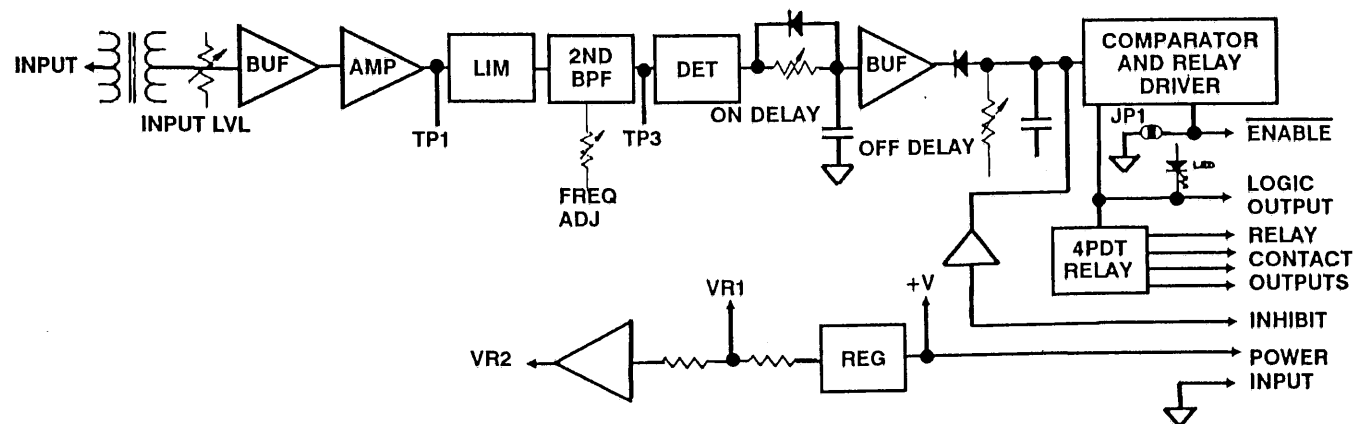
When all controls are properly adjusted, the decoder will operate with tone-signal level variations of up to ±20 dB in the absence of voice, noise, hum, or other signals.

Timing (Both Models)

Adjust R1 (ON DELAY) for the desired on delay. Typical on-delay adjustment range is from 50 ms to 1.2 s.

Adjust R23 (OFF DELAY) for the desired off delay. Typical off-delay adjustment range is from 50 ms to 3.6 s. If longer off delay is required, install a 100-μF, 6-V tantalum capacitor in the holes provided for C6. This provides a typical adjustment range of 200 ms to 30 s. Even longer off delay can be obtained by replacing C5 with another 100-μF tantalum capacitor. Up to 50 s off delay may be obtained in this manner. Note that the minimum typical on delay is increased to 85 ms with one 100-μF capacitor and 110 ms with two.

An LED has been provided to indicate when the relay is energized. This LED and a watch are normally used to set long off-delay times. Short delays are normally measured with a triggered oscilloscope.



Model D-343C single-tone decoder.

Models D-342C and D-343C

Models D-342C and D-343C Parts List

PART NO	DESCRIPTION	CKT SYM
011-0069	TOP ASSY 342C	C5
065-0404	PCB 342C/343C	C1
104-0763	CAP TANT 15UF 6V 10%	C2
104-0764	CAP TANT 4.7UF 10V	C9 *
110-1249	CAP CER .001MF 20% 1KV	C16
110-1270	CAP CER .022MF 10% 100V	C12
110-1345	CAP CER .0022MF 5% NPO	C15*
112-1606	CAP ELEC 10MF 25V	C3
112-1608	CAP ELEC 1.0MF 20% 25V	C8 *
112-1609	CAP ELEC 100MF 20% 25V	C19
112-1701	CAP ELEC 4.7UF 50V NP	C4
130-0532	RES VAR 10K VER MT LIN	C9 **
130-0657	RES VAR 10K MULTITURN	C17
130-0725	RES VAR 10K LOG PC HADJ	C20
130-0746	RES VAR 100K LOG H-ADJ	C10*
130-0747	RES VAR 250K LOG H-ADJ	C11*
130-0750	RES VAR 5K 20T H-ADJ	R3 *
134-0243	RES RN55D 127.K 1% 1/4W	R5
134-2903	RES RN55D 1.00K 1% 1/4W	R6
134-3027	RES RN55D 191K 1% 1/4W	R2 *
134-3037	RES RN55D 442 1% 1/4W	R1
134-3046	RES RN55D 28.7K 1% 1/4W	R23
134-3056	RES RN55D 1.54K 1% 1/4W	R4 *
134-3060	RES RN55D 3.74K 1% 1/4W	R44
134-3066	RES RN55D 287.K 1% 1/4W	R8 *
134-3071	RES RN55D 4.75K 1% 1/4W	R9 *
134-3072	RES RN55D 1.10K 1% 1/4W	R36*
136-0010	RES COMP 15 5% 1/4W	R37*
136-0020	RES COMP 100 5% 1/4W	R29
136-0030	RES COMP 680 5% 1/4W	R15
136-0032	RES COMP 1K 5% 1/4W	R18
136-0034	RES COMP 1.5K 5% 1/4W	R7 *
136-0036	RES COMP 2.2K 5% 1/4W	R17
136-0038	RES COMP 3.3K 5% 1/4W	R32*
136-0041	RES COMP 5.6K 5% 1/4W	R39
136-0044	RES COMP 10K 5% 1/4W	R16
136-0050	RES COMP 33K 5% 1/4W	R19*
136-0054	RES COMP 68K 5% 1/4W	R34*
136-0056	RES COMP 100K 5% 1/4W	R10*
136-0064	RES COMP 470K 5% 1/4W	R20*
136-1762	RES COMP 3.6K 5% 1/4W	R33
136-1766	RES COMP 2.4K 5% 1/4W	R13
136-1956	RES COMP 300K 5% 1/4W	R27
142-0001	XSTR NPN PN100 TO92 SW	R50
161-0426	DIODE 1N4148	R9 **
161-0544	DIODE LED RED T1	R36**
180-0324	RELAY 4PDT PCB 12V	R21
286-1768	PIN TEST POINT	R12
318-0246	XFORMER 10K CT-10K CT	R11
425-0105	IC OPAMP 4558 DUAL	R28
425-0168	IC REG-P 78L08 8V .1A	R22
*D-342C only		R24
**D-343C only		R38
		R40*
		R41*
		R48
		R49
		R25
		R26
		R31
		R45
		R14
		R46
		R35
		R47
		R30
		Q1
		Q2
		CR1
		CR2
		CR3
		CR4
		CR5
		CR6
		DS1
		K1
		TP1
		TP2
		TP3
		TP4
		TP5
		TP6
		TP7
		T1
		U1
		U2
		U3
		U4 *
		U5 *
		U6
		U7
		U8

Models D-342C and D-343C Specifications

Frequency Range

D-342C: 1050 to 3000 Hz (300-1050 Hz available on special order)

D-343C: 300 to 4000 Hz

Tone Input Sensitivity: 10 mV_{rms} to 5 V_{rms}

Frequency Stability: ±0.25%

Frequency Setability: ±0.2%

Supply Voltage: +10 to +16 V_{dc}

Supply Current: 18 mA idle, 85 mA maximum at 12 V_{dc} input

Input Impedance: 600 Ω or 10 kΩ, solder-jumper selectable, transformer isolated

Decode Bandwidth: 45 Hz ± 15 Hz

On Delay: 50 ms to 1 s, adjustable

Off Delay: 50 ms to 3 s, adjustable

Decode Output: 4PDT relay 2 A/24 V_{dc}, 1 A/115 V_{ac} contacts, or 40 V/150 mA open collector logic output, solder-jumper selectable

Operating Temperature: -30°C to +60°C

Size: 0.7 in (1.8 cm) H, 3.6 in (9.1 cm) W, 4.5 in (11.4 cm) D

Model D-342C Only Specifications

TX Output: To +10 dBm into a 600-Ω load, adjustable

Frequency Response: ±1.5 dB, 300 to 4000 Hz, except at the transmit notch frequency

TX Output Impedance: 10 to 100 Ω

Notch Depth: 45 dB minimum, 50 dB typical

Line To TX Output Gain: 4 to 44 dB, adjustable

Distortion: 2% THD maximum

Warranty

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

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.

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