The Tellun Corporation

TLN-866 Gate Processor

User Guide, Rev. 1.0

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1. Introduction

The TLN-866 Gate Processor is a gate delay, a pulse stretcher, and a gate generator. Any signal that momentarily exceeds +1.5V can be used to "arm" the processor and create a GATE signal at the output. This output GATE is held for the HOLD time but doesn't appear at the output until the DELAY time has passed. HOLD and DELAY times can be from 5 milliseconds to 10 seconds (or longer if you wish). A handy pushbutton on the front panel addresses the need for a manual GATE signal in your synthesizer. A bicolour LED is used to indicate the processor's status: RED when the processor is armed and GREEN when the output goes high.

Description of panel controls:

- HOLD control: sets the length of time the output signal is held high after the input has gone low, from 5 milliseconds to 10 seconds (or longer).
- DELAY control: sets the delay time before the output signal goes high from 5 milliseconds to 10 seconds (or longer).
- IN jack: any signal that exceeds +1.5V can be used to arm the processor.
- OUT jack: the held and delayed gate signal.
- GATE pushbutton: manually arms the processor.
- LED: bicolour LED is RED when the processor is armed and GREEN when the output goes high.

2. Circuit Description

The core of the circuit comprises two lag circuits in series. The first lag circuit (U2, VR1, D3, and C14) sets the HOLD time for the gate. When a gate signal is applied to U2a via R18, C14 discharges quickly through D3 and stays low as long as the gate remains high. This results in a low state from U2b. When the gate goes low, C14 charges via VR1 (the HOLD time). When the voltage on C14 goes above +10V, comparator U2b switches state from low to high. Thus the output from U2b is an inverted gate that follows the input gate but has a variable HOLD time. This signal feeds the second lag circuit (U3, VR2, D6, and C15) which sets the DELAY time for the gate. This lag circuit charges C15 quickly through D6 when U3a goes high. This results in a high state from U3b. When U3a goes low, C15 discharges via VR2 (the DELAY time). When the voltage on C15 goes below +1.5V, comparator U3b changes state from high to low. Transistor Q3 inverts the U3b signal so that we get a positive going gate signal at the output jack J2.

Because the two lag circuits are in series, the DELAY time must always be less than the HOLD time when using very short pulses to trigger the circuit, otherwise there will be no gate signal at the output. As designed, the DELAY time will always be slightly less than the HOLD time when both the panel controls are set to similar positions (subject to the +/-20% tolerances of the potentiometers VR1/VR2 and electrolytic caps C14/C15).

The rest of the circuitry is simply support for the two lag circuits.

The signal applied at input jack J1 is fed to a comparator (U1a) so that any signal that exceeds +1.5V can be used to trigger the circuit. Pressing the GATE pushbutton charges C12 via R8 to provide a manual gate signal. The signals at the output from comparator U1a and the GATE pushbutton are wire-OR'd together via D1/D2/R7 so that both can be used at the same time. This combined input gate is then inverted by Q1 and fed to U4 (because U4 wants to see a negative going trigger).

U4 is a 7555 timer configured as a monostable with a 5 millisecond pulse width. The lag circuits work best when gate signals are at least 5 milliseconds long. U4 stretches any transient to at least a 5 millisecond width. This allows the TLN-866 to work properly with very short trigger signals (even those that are less than 1 millisecond). If the input gate signal is longer than 5 milliseconds, U4 has no effect. The output from U4 feeds the HOLD lag circuit described above.

C13, R22, R23, and Q2 form a reset circuit. Whenever a new gate signal is applied at the input jack J1 (or via the GATE pushbutton), Q2 pulls pin 6 of U2 down just long enough to force a high signal from U2b that will reset the DELAY lag circuit. Without this reset capability, you'd have to wait for the hold or delay time to pass before rearming the circuit which can be quite annoying when using long hold or delay times.

U1b is the LED driver. It takes two signals from the HOLD and DELAY lag circuits and adds them together to form a ternary logic signal (low, zero, and high). When the HOLD circuit is armed, U1b puts out a low signal and lights the red half of the bicolour LED. When the output gate signal goes high, U1b switches from low to high and lights the green half of the bicolour LED. When both the input gate and output gate are low, U1b outputs a zero signal which turns both LEDs off.

3. Construction Tips

This circuit relies on an electrolytic cap being charged through a potentiometer to set both the hold and delay times. Because both of these components are typically +/-20% accurate, you are really at their mercy in terms of getting accurate and repeatable results. I measured several Bourns 91A1DB28D25 1M pots and found the maximum resistance varied from 790K to 850K. But even with these values I can still get a hold time of 10 seconds and a delay time of 9 seconds. If possible, try to pick the pot with the larger value for the HOLD pot so that you can avoid having delay times that are always longer than the hold times when the two controls are set to similar positions.

Use log pots for VR1 and VR2 to get more resolution with short hold and delay times. If you use the Bourns 91A1DB28D25 pots with the Alco PKES60 knobs, you might want to trim 1/8" off the end of the pot shafts to get the knobs to sit closer to the panel. I did not do this for the TLN-866 seen in the website pictures.

The Lumex bicolour LED is difficult to buy in small quantities. I bought some from Synthesis Technologies and they came with red and black wires already attached. The schematic shows which wire connects to R16 and which connects to ground so that the red LED is lit when the HOLD circuit is armed and the green LED is lit when the gate output goes high. Reverse these two wires if you want the opposite colour scheme.

You don't need to use 1% resistors for this circuit, 5% will work fine. I used 1% because I have lots on hand.

4. Modifications

If you have panel space available, you can put two caps in parallel for C14 and C15 and use a RANGE switch to select which of the caps are connected into the circuit. For example, the range switch could select a 10uF cap for C14 (the HOLD lag circuit) in one position, and a 1uF cap for C14 in the other position. This would provide much more resolution when setting hold times less than 1 second. Similarly, for C15, the range switch would select between 4.7uF and 0.47uF caps (for the DELAY lag circuit) to increase the resolution when setting delay times less than 1 second. To get longer hold and delay times, you can use larger caps for C14 and C15. But you may experience problems at certain settings due to the longer times needed to reset the two lag circuits. To remedy this you have to increase the width of the reset circuit (by increasing C13) and also increase the minimum gate signal width generated by U4 (by increasing R11).

There may be circumstances where it is desirable to disable the reset circuitry altogether (although I haven't found any yet). To do this, simply add a switch between C13 and pin 3 of U4. When C13 is not connected to U4, the reset circuit will have no effect.

5. Building the Gate Processor with MUUBs

This circuit really pushes the limits of what you can build with MUUBs. In fact, if I hadn't specifically tried to build this circuit using MUUBs, I probably would have designed it quite differently.

Be sure to check out the construction pictures on the website. Most of what I try to describe below can best be understood just by looking at the pictures.

You'll need one MUUB-4 and one MUUB-2 to build one instance of the TLN-866. I built two TLN-866s as independent circuits mounted to Stooge modular brackets and a Stooge compatible 1U wide panel (a prototype panel made from plexiglass). Described below are details for building a single TLN-866. You'll need to duplicate this effort to build a dual version like mine. There is an additional bit of jiggery-pokery needed to get two instances to mount on the Stooge bracket: you have to mount one MUUB-2 on top of another MUUB-2 using spacers. Not too difficult, but keep that in mind as you connect wires between the MUUB boards because at some point the whole contraption will wind up looking like one of those 3D chessboards from Star Trek. Make sure your wires will reach between Queen's level 3 and King's level 1.

Prepare your panel and Stooge brackets before you do any soldering. Get all the mechanical issues dealt with first. You'll need two of the Stooge "2 jack modular bracket" and one of the Stooge "flat plate modular bracket". If you use the same panel layout as my dual TLN-866, note that the pots are 1/8" closer to the middle of the panel than the jacks. When you attach the jack brackets to the panel (at the HOLD B pot and the IN B jack), they will not be in the same plane. This is easy to remedy by simply inserting an extra nut between the flat plate bracket and the jack bracket that attaches to the IN B jack.

Once you get the three bracket parts bolted together (use ¼" #6 screws) and attached to the panel, you should have enough space to mount two MUUB-4s and one MUUB-2 to the bracket using ¼" spacers and ½" #6 screws. Make sure you leave enough space for the Switchcraft 112A jacks so that they don't interfere with the lower MUUB-4 board. If you are building a dual version, you'll also need additional spacers to mount a second MUUB-2 board on top of the first MUUB-2 board. I used 3/8" spacers and 1" #6 screws but you may be able to get by with a ¼" spacer. If you used an extra nut between the flat plate and the lower jack bracket, you'll need a 3/8" spacer to mount the right side of the lower MUUB-4 board to the bracket (because the extra nut is 1/8" thick) and a ¾" #6 screw. I recommend getting some ¼" and 3/8" spacers, a wide selection of #6 screws in different lengths (from ¼" to 1"), and some extra #6 nuts.

Before beginning the soldering, note the following labeling conventions used in this document for diodes, pots, and transistors.

1. Diodes: banded end is cathode, other end is anode.
2. Pots: when viewing the back of the pot (the shaft facing away from you) with the leads facing down, the pins are (left to right): 3, 2, 1.
3. Transistors: when viewing the front of the transistor (the flat side facing you) with the leads facing down, the pins are (left to right): 3 (collector), 2 (base), 1 (emitter).

5.1. Building Board #1 (MUUB-2)

Let's get the worst part of the way first. The 7555 timer is a pain because it doesn't have any place to go on a MUUB board. Fortunately, there is a bit of extra space in the lower left corner that we can use. Study the schematic and the pictures on the website to see how I squeezed U4, C9, C10, C11, and R9 into that small square of 25 holes. I used a socket for U4. Bend the leads of the components on the underside of the PCB to connect everything up. You shouldn't need to use any extra wires. In the first two pictures, everything is hooked up except the +15V power line (to pins 4/8), although there is a wire connecting pins 4 and 8 together. A wire will be hooked up between the +15V line and pin 4 later.

Use the following table to place components from the TLN-866 schematic onto board #1. For short jumpers, use a scrap resistor lead. For longer jumpers, use a piece of #22 wire. Watch out for the peculiar placement of R5 and D1. These components have one lead in one component and the other lead in another component. Also, pins 1 and 2 of Q1 are soldered to the MUUB-2 but pin 3 floats above the PCB. One end of R10 connects to pin 3 of Q1 and a wire will also connect to this junction later on. Check the website pictures.

Schematic	*MUUB-2 Location (board #1)*
R1-10K	CB2 top and middle holes (R1 must stand upright)
R2-100K	RB6
R3-1M	RB12
R4-100K	RB11
R5-10K	one lead in left hole of RB9, other lead in ground hole next to TB1
R6-1K	RB14
R7-4K7	RB2
R8-1K	TB2 middle and bottom holes (R8 must stand upright)
R9-10K	one lead in V+, other lead connects to pin 3 of Q1
R10-47K	RB1
R12-200K	RA11
R13-200K	RA1
R14-100K	RA5
R15-100K	RA9
R16-1K2	RA14
R17-100K	RA13
C1-100N	C3 (bypass cap for U1)
C2-100N	C4 (bypass cap for U1)
C12-100N	JB3
D1-1N4148	cathode (band) in right hole of RB4, anode in right hole of JB9
D2-1N4148	RB3, cathode (band) to the right
Q1-BC549	pin 1 (emitter) in left hole of JB1 (ground), pin 2 (base) in right hole of JB2, pin 3 connects to R9
jumper	JB2
jumper	JB6
jumper	RB5
jumper	TB1, top and middle holes
jumper	CA2, middle and bottom holes
jumper	CA1, middle and bottom holes
jumper	TA2, top and middle holes
jumper	TA2, middle to ground hole (at immediate left)

Two additional wires are required on this board.

The first runs from the V+ holes to U4 pin 4. You can make this connection on the top or bottom of the board (I did it on top, look for the red wire in the website pictures for board #1). R9 is already in the V+ holes, run a short wire from another one of the V+ holes over to the hole to the left of U4 pin 4. Leave a long enough piece of wire exposed so you can bend it on the underside of the PCB to touch pin 4 of U4 when it's soldered in place.

The second wire runs from the junction of R9 and Q1 (pin 3) to pin 2 of U4. This wire will have to start on the top of the board (at R9/Q1) and end on the bottom side of the board (at U4). Look for the orange wire in the website pictures for board #1.

5.2. Building Board #2 (MUUB-4)

This board has an additional bit of circuitry to construct in the lower left corner. Study the schematic and the pictures on the website to see how I fit C13, R22, R23, D5, and Q2 into that small square of 25 holes. Bend the leads of the components on the underside of the PCB to connect everything up. You will need one small wire to jumper Q2 pin 3 to the right hole of JD4. This is the small orange wire in the website pictures that loops over D5. Q2 pin 1 (emitter) goes into the left hole of JD5. The anode (non-banded end) of D5 goes into the left hole of JD4. One end of R22 goes into the left hole of JD7.

Use the following table to place components from the TLN-866 schematic onto board #2. For short jumpers, use a scrap resistor lead. For longer jumpers, use a piece of #22 wire. Watch out for the peculiar placement of Q5. It may look like there's a jumper in RA13, but that's actually pin 3 of Q3 going into the right hole of RA13 (nothing connects to the left hole of RA13). Pins 1 and 2 of Q5 go into the middle and lower holes of CA4, respectively. Check the website pictures.

Schematic	*MUUB-4 Location (board #2)*
R18-100K	RC1
R19-91K	RC11
R20-100K	RC9
R21-1K	JD8 (R21 must stand upright)
R24-100K	RD11
R25-200K	RD1
R26-10K	RD15
R27-100	JA8 (R27 must stand upright)
R28-100K	RA11
R29-10K	RA1
R30-47K	RA14
R31-1K	TA2 (top and middle holes, R31 must stand upright)
C3-100N	C5 (bypass cap for U2)
C4-100N	C6 (bypass cap for U2)
C5-100N	C3 (bypass cap for U3)
C6-100N	C4 (bypass cap for U3)
C14-10MF	RD8, negative pin to the left
C15-4.7MF	RA8, negative pin to the left
D3-1N4148	RC14, cathode (band) to the right
D4-1N4148	RD14, cathode (band) to the left
D6-1N4148	RB14, cathode (band) to the left
D7-1N4148	RA15, cathode (band) to the left
Q3-BC549	pin 1 (emitter) in middle hole of CA4 (ground), pin 2 (base) in bottom hole of CA4, pin 3 connects to right hole of RA13
jumper	JA1
jumper	RA5
jumper	CA2, middle and bottom holes
jumper	CA1, middle and bottom holes
jumper	TA1, top and middle holes
jumper	RB5
jumper	RB9
jumper	CB2, top and middle holes
jumper	RC13

jumper	CC1, middle and bottom holes
jumper	TC1, middle and bottom holes
jumper	TC2, middle to ground hole (at immediate left)
jumper	JD1
jumper	RD4
jumper	RD5
jumper	CD1, top and middle holes
jumper	CD2, top and middle holes
jumper	TD2, middle and lower holes
jumper	JD9 (right hole) to JB5 (right hole)
jumper	JB9 (right hole) to JA5 (right hole)
jumper	JC9 (right hole) to JD5 (right hole)

One additional wire is required on this board. This wire runs from C13 to JC1 (right hole). To connect to C13, insert the wire into the hole immediately to the left of the top pin of C13. Leave a long enough piece of wire exposed so you can bend it on the underside of the PCB to touch the top pin of C13 when it's soldered in place. Later, you will have to attach another wire from board #1 to this same pin on C13.

5.3. Power Considerations

There are several ways to power the MUUB boards. Each board can have it's own MTA-156 connector, two ferrite beads, and two electrolytic caps. Or you can skimp (as I did) and use the MTA-156, ferrite beads, and caps only on the MUUB-4 board and run three power lines (+/-15V and ground) over to the MUUB-2 board. If you go this route, make sure you tap the +/-15V lines on the MUUB-4 after the ferrite beads (where they connect to the two 10uF caps). I recommend using the V+ and V- pads, the holes are too small for #18 wire, but you should be able to fit #22 wire in them. On the MUUB-2, connect these +/-15V lines to the (unused) right holes for L1 and L2. There are lots of unused ground connections on the MUUB boards (e.g. the square holes for JA1-8, JB1-8, JC1-8, JD1-8). Pick ones that are close to the power supply connection points and run a ground wire between the two MUUB boards.

If you're building a dual TLN-866, you'll need to supply power to both circuits. A simple way to do this is to use a pass-thru MTA-156 connector. This connector can be installed on an existing MOTM power cable to provide two outlets from one cable.

Future versions of the MUUB boards will have larger holes specifically for chaining power supply connections between boards.

Once you've gotten the power situation figured out, solder in the MTA-156, ferrite beads L1/L2, and the electrolytic caps C7/C8.

5.4. Board to Board Wiring

There are three wires that need to be hooked up between the two MUUB boards. The lengths of these wires will depend on where the boards are mounted to the bracket. Also, keep in mind that the MUUB-2 board may be mounted in a different plane than the

MUUB-4 board. The lengths given below are the ones I used to build the dual gate processor. The first number is for the B channel (mounted first), the second number is for the A channel.

Board #1 Location (MUUB-2)	*Board #2 Location (MUUB-4)*	*Length (inches)*
U4 pin 3 (underside of PCB)	C13 top pin (topside of PCB)	3 (B) and 3 (A)
JA1 (right hole)	CD3 (top hole)	2.5 (B) and 4 (A)
JA5 (right hole)	CA3 (bottom hole)	4 (B) and 5 (A)

The wire that connects U4 pin 3 on board #1 to C13 on board #2 connects to C13 using the hole second to the left of the top pin of C13. There should already be a wire in the first hole to the left of the top pin of C13. U4 pin 3 needs to connect to this same point. Leave a long enough piece of wire exposed so you can bend it on the underside of the PCB to touch the top pin of C13 when it's soldered in place (or to the wire that already connects to the top pin of C13).

5.5. Panel Wiring

The panel pots require only two wires. Solder pins 3 and 2 together on the pots, and run a single wire from pins 3/2 and another wire from pin 1 to the MUUBs. It doesn't matter which wire goes into which hole for the panel pots or the pushbutton switch. You don't need to use coaxial cable for any of these connections; twisted pair is fine. The lengths given below are the ones I used to build the dual gate processor. The first number is for the B channel (mounted first), the second number is for the A channel.

Panel Item	*PCB connection*	*Length (inches)*
LED	board #1, black wire in JA9 left hole, red wire in JA9 right hole	4 (B) and 4 (A) (twisted pair)
GATE pushbutton	board #1, one pushbutton connection goes in RB13 right hole, the other pushbutton connection goes into JB4 right hole (see notes below)	5 (B) and 5 (A) (twisted pair)
J1 (input jack)	board #1 JB5, jack ground goes in left hole, jack signal goes in right hole (see notes below)	5 (B) and 5 (A) (twisted pair)
J2 (output jack)	board #2, jack signal connects to Q3 pin 3 (exposed lead), jack ground connects to nearest ground (see notes below)	7.5 (B) and 3 (A) (twisted pair)
HOLD pot	board #2, CC3 lower hole and CC4 lower hole	5 (B) and 7.5 (A) (twisted pair)
DELAY pot	board #2, CB3 upper hole and CB4 upper hole	4 (B) and 5.5 (A) (twisted pair)

The input jack J1 should have the switched lug (the middle lug) connected to the ground lug (use a scrap resistor lead). The circuit works better this way than if the input is simply left floating when nothing is plugged into J1 and you want to use the pushbutton to generate a manual gate.

The gate pushbutton connects to the right hole of RB13 on board #1 and the right hole of JB4 on board #1. Note that nothing is connected to JB4, we're only using this as an anchor point for the wire. This wire must connect to the junction between D2 and C12, which are in RB3 and JB3, respectively. This junction is directly above the right hole of JB4. Leave a long enough piece of wire exposed so you can bend it on the underside of the PCB to touch the right hole of JB3 when it's soldered in place.

The output jack signal must be connected to Q3 pin 3 (on board #2). This wire should be exposed and thus easy to solder onto (near the right hole of RA13). The nearest ground connection for the output jack is the unused ground hole immediately to the left of the centre pin of TA2.

6. Testing

Below are some simple test procedures you can use to get acquainted with the TLN-866.

6.1. Manual Gate Test

Create a simple patch on your synthesizer with an oscillator (MOTM 300 or 310) feeding into a VCA (MOTM 110 or 190) and an envelope generator (MOTM 800) controlling the VCA level. Set the EG ADR times to 0 (minimum) and the sustain level to 10 (maximum). Patch the output from the TLN-866 to the GATE input of the EG.

Turn the DELAY and HOLD times to 0 (minimum). Press and hold the GATE pushbutton. The LED should be green and you should hear sound from your oscillator through the VCA. Release the GATE pushbutton. The LED should go off and the sound should stop. If the patch is set up correctly, you should hear sound whenever the LED is green. If not, figure out why not and get it working before continuing.

Turn the HOLD time to 5. Press and release the GATE pushbutton. The LED should stay lit for a couple of seconds after you've released the pushbutton. Turn the HOLD time to 10 (maximum). Press and release the GATE pushbutton, the LED should stay lit for nearly 10 seconds. Try different settings for the HOLD time.

Turn the HOLD time to 0 (minimum) and turn the DELAY time to 5. Press and hold the GATE pushbutton. The LED should be red as soon as you press the pushbutton then switch to green a second or two later. Release the GATE pushbutton and the LED should immediately go off. Turn the DELAY control to 10 (maximum). Press and hold the GATE pushbutton. The LED should be red as soon as you press the pushbutton then switch to green after nearly 10 seconds. Release the GATE pushbutton and the LED should immediately go off. Try different settings for the DELAY time.

Turn the HOLD time to 6 and the DELAY time to 5. Very briefly press and then release the GATE pushbutton (just a fraction of a second). The LED should be red for a second or two then switch to green for a second or two. Lower the HOLD time to 5.5 and briefly press and then release the GATE pushbutton again. The DELAY time shouldn't change but the HOLD time should be shorter. Continue lowering the HOLD time while initiating brief presses of the GATE pushbutton. When the HOLD time is around 5 (roughly the same value as the DELAY time), the LED should not go green anymore. Try holding the GATE pushbutton for half a second or more before releasing it. The LED should start to turn green again as the GATE pushbutton is held for a longer time. Try different settings for the HOLD and DELAY times and the length of time the GATE pushbutton is held.

What you should have discovered: the DELAY time is initiated the moment the GATE goes high. The HOLD time is initiated the moment the GATE goes low.

6.2. Periodic Gate Test

Create two copies of the simple patch from the Manual Gate Test (you can share the oscillator, but you'll need two VCAs and two EGs). Pan the first VCA output to the left speaker and pan the second VCA output to the right speaker. Patch the output from a variable pulse width LFO (MOTM 320) to the GATE input of both EGs. Set the LFO frequency to 1 Hz with a fairly narrow pulse width (use 2 on the MOTM 320). What you should hear is a short note from both VCAs every second. It should not be so short that it just sounds like a click; it should be a very short staccato note with an identifiable pitch. When you've got that working, take the LFO output that feeds the second VCA and patch it to the TLN-866 input. Patch the output from the TLN-866 to the GATE input of the second EG.

Turn the DELAY and HOLD times to 0 (minimum). You should still hear a short burst of sound every second from both speakers at the same time. The LED will turn green briefly on each burst of sound.

Gradually increase the HOLD time. The LED will turn green for a longer period and the sound burst should last longer on the right speaker as the HOLD time is increased. Eventually, the sound on the right speaker will be continuous. Lower the HOLD time to 4.

Gradually increase the DELAY time. The LED will turn red briefly before it turns green and the onset of the sound burst should be delayed on the right speaker as the DELAY time is increased. At around 4, the right speaker should sound like an echo of the left speaker. As the DELAY time is increased above the HOLD time, the sound in the right speaker will stop entirely. Tweak the HOLD and DELAY times so that the delayed gate is an exact echo in both delay and duration. Ping pong level 1.

Increase the pulse width of the LFO to 50%. Notice the effect it has on the sound on the left and right speakers. Tweak the HOLD and DELAY times so that the sound is heard for ½ second from the left speaker and then ½ second from the right speaker (with no silence in between). The LED should also be red for ½ second and then green for ½ second. Ping pong level 2.

Briefly press the GATE pushbutton the instant the LED first turns green. Notice that the LED immediately turns red again (and the sound stops from the right speaker). That's the reset circuit in action.

6.3. Random Gate Test

Create the simple patch from the Manual Gate Test with the TLN-866 output going to the EG gate input. Patch a slow random voltage source to the TLN-866 input jack (e.g. the SLOW output from MOTM-101, or even the D output from an MOTM-380 will work). You will get better results if you patch a voltage attenuator/amplifier (e.g. Oakley Multimix or MOTM-830) between the random source and the TLN-866.

Set the HOLD time to 5 and the DELAY time to 2. You should be hearing bursts of sound from the VCA as the random source causes random gates to be generated by the TLN-866. Adjust the level of the random source with the attenuator/amplifier and the DELAY time (between 0 and 3) to change the density of the random gates. Lower the HOLD time to affect the width of the random gates. Adjust the ADR times on the EG to soften the edges of the EG controlling the VCA.

TLN-866 Parts List

This bill of materials (BOM) is for building one instance of the TLN-866. If you are building a dual version, you must double all of these parts (except for the panel and brackets).

Resistors (31)

Quantity	*Description*	*Part No.*	*Notes*
1	100	R27	5% or better, Mouser #291-100
4	1K	R6, R8, R21, R31	5% or better, Mouser #291-1K
1	1.2 K	R16	5% or better, Mouser #291-1.2K
1	4.7 K	R7	5% or better, Mouser #291-4.7K
5	10 K	R1, R5, R9, R26, R29	5% or better, Mouser #291-10K
1	39 K	R11	5% or better, Mouser #291-39K
3	47 K	R10, R23, R30	5% or better, Mouser #291-47K
1	91 K	R19	5% or better, Mouser #291-91K
9	100 K	R2, R4, R14, R15, R17, R18, R20, R24, R28	5% or better, Mouser #291-100K
3	200 K	R12, R13, R25	5% or better, Mouser #291-200K
2	1 M	R3, R22	5% or better, Mouser #291-1M

Capacitors (15)

Quantity	*Description*	*Part No.*	*Notes*
1	10 nF poly	C13	Mouser #581-10NJ63
1	10 nF ceramic	C11	Mouser #147-71-103
9	100N ceramic	C1 – C6, C9, C10, C12	Mouser #147-72-104 Mouser #581-SA105E104M
1	4.7 uF low ESR elec.	C15	Mouser #140-ESRL50V4.7
1	10 uF low ESR elec.	C14	Mouser #140-ESRL50V10
2	10 uF 35V elec.	C7 – C8	Mouser #140-XRL35V10

Semiconductors (15)

Quantity	*Description*	*Part No.*	*Notes*
3	TL072 dual op amp	U1 – U3	Allied #735-2727 Mouser #595-TL072CP Digikey #296-1775-5-ND
1	7555 timer	U4	Digikey #ICMAX7555IPA-ND
7	1N4148 diode (can substitute 1N914)	D1 – D7	Allied #263-1538 Mouser #512-1N4148 Digkey #1N4148FS-ND
3	BC549B transistor (NPN)	Q1 – Q3	Mouser #512-BC549B (can substitute BC550)
1	bicolour LED	LED1	Lumex #SSI-LXH387HGW, Mouser & Digikey lists these but minimum order is 100

Potentiometers & Trimmers (2)

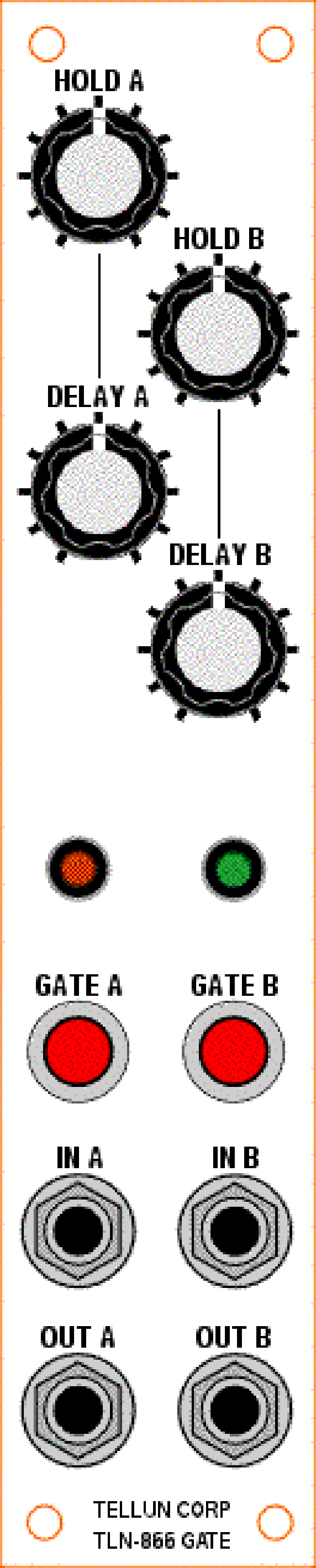
Quantity	*Description*	*Part No.*	*Notes*
2	1M log pot	VR1 – VR2	Bourns #91A1DB28D25, Mouser lists these but minimum order is 500

Miscellaneous

Quantity	*Description*	*Part No.*	*Notes*
2	phone jack Switchcraft 112A	J1 – J2	Allied #932-9391 Mouser #502-112A
4	8 pin DIP socket		for U1 – U4
2	axial ferrite bead	L1, L2	Active #MURJP2141 Mouser #623-2743002112
1	pushbutton, E-Switch RP3502MA-RED	SW1	Digikey # EG1938-ND Mouser # 612-RP3502MA-RED
1	MTA-156 4 pin header	JP1	Mouser #571-6404454 Digikey #A1973-ND

Hardware

Quantity	*Description*	*Notes*
2	knob ALCO PKES60B1/4	Mouser #506-PKES60B1/4 (not the same size as MOTM knobs, this is the smaller knob found on Encore's UEG and Frequency Shifter, Radio Shack has a knob that looks almost identical to this)
1	TLN-866 panel	front panel
1	MUUB-4	printed circuit board
1	MUUB-2	printed circuit board
2	2 jack modular bracket	Stooge bracket
1	flat plate modular bracket	Stooge bracket
	#6-32 screws (1/4", ½", ¾", 1") spacers (1/4", 3/8") #6-32 nuts #6-32 lock washers	Mouser part numbers: 534-405, 534-407 (spacers) 5721-632-1/4, 5721-632-1/2, 5721-632-3/4 (screws) 5721-632 (nuts), 5721-LWI-6 (lockwashers) (for mounting main circuit boards to Stooge bracket)
	pot nut	Mouser #534-1456 (for mounting Stooge bracket to front panel)
1	MTA-156 power cable	Mouser #571-6404264 (connector) Mouser #571-6405514 (dust cover)
1	MTA-156 4 pin pass-thru	Mouser #571-6405994 (connector) Mouser #571-6406434 (dust cover) (optional, for supplying power to two TLN-866s using one power cable)
4	#8-32 black screw	(for mounting module to cabinet)
	cable ties	
	hookup wire	
	solder	both organic and no clean


HOLD A
HOLD B
DELAY A
DELAY B
GATE A
GATE B
IN A
IN B
OUT A
OUT B
TELLUN CORP
TLN-866 GATE