Based on information from:

https://github.com/TomVickers/Arduino2keypad // Replace Vista 20P with arduino

https://github.com/Dilbert66/esphome-vistaECP // Replace 6160 KP with ESPHome esp8266

GOAL:

Allow ECPbus devices to be used in Home Assistant

Honeywell control panel speaks to various equipment including:

RF receiver - Address 00?

Keypad AUI - Addresses 01, 02, 05, 06

LRR - long range radio (cellular radio) - Address 03

4286 Voice Module - Address 04

Zone expander - Addresses 07-11 for zones 09-48 (8 zones per address)

Relay module - Addresses 12-15

Keypad Fixed LCD - Addresses 16-23

Keypad Alphanumeric - Addresses 16-23

Keypad voice enabled - Addresses 16-23

HARDWARE:

ECP keypad such as Honeywell 6150 or 6160

ESP8266 module or similar (ESP32, ESP-01, ESP-12E, etc)

12Vdc Power Supply

DC 3.3V MP1584EN DC-DC Mini Step Down Buck Converter Power Supply Module Diy Electronic on AliExpress

Octocouplers and resistors

DEVICE SPECIFICS:
1) 6150 keypad
    a) Binary inputs
        i) 0-9,* , #, 1+*, *+#, 3+#, A, B, C, D
    b) Binary outputs
        i) ARMED light - red   (B7b7, B8b2)
        ii) READY light - green   (B7b4)
        iii) LCD - backlight   (B12b7, B45b7)
        iv) LCD - ALARM   (B8b1)
        v) LCD - FIRE   (B7b5)
        vi) LCD - AWAY   (B8b2)
        vii) LCD - BYPASS   (B8b4)
        viii) LCD - STAY   (B7b7)
        ix) LCD - CHECK   (B7b1)
        x) LCD - INSTANT   (B8b7)
        xi) LCD - NIGHT   (B6b4)
        xii) LCD - "AC"/ "NO AC" (B8b3)
        xiii) LCD - PHONE   (B45b5)
        xiv) LCD - TEST   (B45b4)
        xv) LCD - NOT READY   (B7b4)
        xvi) LCD - CHIME   (B8b5)
        xvii) LCD - BAT   (B7b6)
        xviii) LCD - CANCELED   (B6b5)
    c) Variable output
        i) Seven segment display "2188"
            (1) "88" as set by Byte 5

(2) "2" toggled by B45b1

(3) "1" toggled by B45b0

  ii) Tone

     (1) 000 - No tone

     (2) 001 - chime once

     (3) 010 - chime twice

     (4) 011 - chime three times

     (5) 100 - fast repeating tone (used when arm/disarm delay timeout is nearing completion)

     (6) 101 - slow repeating tone (used for arm/disarm delay timeout)

     (7) 110 - same as 101

     (8) 111 - continuous loud tone (alarm triggered)

2) 6160V keypad

  a) Binary inputs

    i) 0-9, *, #, *1+*, *+#, 3+#*, A, B, C, D

  b) Analog input

    i) microphone

  c) Binary outputs

    i) ARMED light - red

    ii) READY light - green

    iii) MESSAGE light (standalone use only)

  d) Variable output

    i) 2 line, 16 character alphanumeric display

    ii) Tone

      (1) 000 - No tone

      (2) 001 - chime once

      (3) 010 - chime twice

      (4) 011 - chime three times

      (5) 100 - fast repeating tone (used when arm/disarm delay timeout is nearing completion)

      (6) 101 - slow repeating tone (used for arm/disarm delay timeout)

      (7) 110 - same as 101

      (8) 111 - continuous loud tone (alarm triggered)

  e) Voice output

    i) Would benefit to monitor its communication with Vista alarm panel

3) 4219 Zone Expander

  a) Reed switch acting as tamper detection

  b) DIP switch selectable address 0-15

    i) Jumper available to disable reed switch tamper reporting

  c) Terminals for 8 zones

    i) 4 common posts

    ii) Looking for 1kohm end-of-line resistance

  d) Does NOT respond to F6 message requests

    i) Would benefit to monitor its communication with Vista alarm panel

COMMUNICATION:

1. General

  a. 4800 baud serial

  b. 8E2 bidirectional except for polling process

  c. LSB first

  d. Signals and voltages inverted

  e. Alarm initiated sequences

2. Polling - Who wants to talk?

a. Alarm sends volts 13ms low, 9 bits high, 1ms low, 9 bits high, 1ms low, 9 bits high, 1ms low, high
b. During this, bus devices respond as follows

Yellow Line - from Alarm Panel / ESP	Green Line - Response from devices
12V - Signal Low - Normal State	0V - Signal High - Standby - Normal State
0V - Signal High - 13ms - prep polling	0V - Signal High - Prep to answer polling calls
12V - Signal Low - polling start bit	12V - Signal Low - IF addr < 8 has update
12V - Signal Low - poll 1 bit 1	0V - Signal High
12V - Signal Low - poll 1 bit 2	12V - Signal Low - IF AUIkp addr 1 has update
12V - Signal Low - poll 1 bit 3	12V - Signal Low - IF AUIkp addr 2 has update
12V - Signal Low - poll 1 bit 4	12V - Signal Low - IF LRR addr 3 has update
12V - Signal Low - poll 1 bit 5	12V - Signal Low - IF 4286 module addr 4 has update
12V - Signal Low - poll 1 bit 6	12V - Signal Low - IF AUIkp addr 5 has update
12V - Signal Low - poll 1 bit 7	12V - Signal Low - IF AUIkp addr 6 has update
12V - Signal Low - poll 1 bit 8	12V - Signal Low - IF expander addr 7 has update
0V - Extended stop bit - 1ms	0V - Signal High
12V - Signal Low - polling start bit	12V - Signal Low - IF addr < 16 has update
12V - Signal Low - poll 2 bit 1	12V - Signal Low - IF expander addr 8 has update
12V - Signal Low - poll 2 bit 2	12V - Signal Low - IF expander addr 9 has update
12V - Signal Low - poll 2 bit 3	12V - Signal Low - IF expander addr 10 has update
12V - Signal Low - poll 2 bit 4	12V - Signal Low - IF expander addr 11 has update
12V - Signal Low - poll 2 bit 5	12V - Signal Low - IF relay addr 12 has update
12V - Signal Low - poll 2 bit 6	12V - Signal Low - IF relay addr 13 has update
12V - Signal Low - poll 2 bit 7	12V - Signal Low - IF relay addr 14 has update
12V - Signal Low - poll 2 bit 8	12V - Signal Low - IF relay addr 15 has update
0V - Extended stop bit - 1ms	0V - Signal High
12V - Signal Low - polling start bit	12V - Signal Low - IF addr < 24 has update
12V - Signal Low - poll 3 bit 1	12V - Signal Low - IF kp addr 16 has update
12V - Signal Low - poll 3 bit 2	12V - Signal Low - IF kp addr 17 has update
12V - Signal Low - poll 3 bit 3	12V - Signal Low - IF kp addr 18 has update
12V - Signal Low - poll 3 bit 4	12V - Signal Low - IF kp addr 19 has update
12V - Signal Low - poll 3 bit 5	12V - Signal Low - IF kp addr 20 has update

12V - Signal Low - poll 3 bit 6	12V - Signal Low - IF kp addr 21 has update
12V - Signal Low - poll 3 bit 7	12V - Signal Low - IF kp addr 22 has update
12V - Signal Low - poll 3 bit 8	12V - Signal Low - IF kp addr 23 has update
0V - Extended stop bit - 1ms	0V - Signal High
12V - Signal Low - Normal State	0V - Signal High - Standby - Normal State

Possibly extended to addr 28 for RF receiver?

3. F6 Message - Polling Response - Keypads
   a. Alarm initiates communication
      i. Signal high (0V) for 4ms
      ii. Send 0xF6
      iii. Send (hex)addr (i.e. 0x10 for addr 16)
   b. Keypad responds in one of following formats:
      i. Keypress response follows format:
         1. Byte 0
            a. Bit 0&1, increment with each message from keypad
            b. Bits 2-5, Keypad address
            c. Bits 6&7, zeros
         2. Byte 1
            a. Number of bytes to follow (N)
         3. Byte 2 through (N-1)
            a. Key presses (values):
               i. 0-9 are 0x00-0x09
               ii. * is 0x0A
               iii. # is 0x0B
               iv. 1+* is 0x0C
               v. *+# is 0x0D
               vi. 3+# is 0x0E
               vii. Function keys 0x1C-0x1F
         4. Byte N (last byte)
            a. Checksum byte
      ii. First message after keypad powerup follows format:
         1. Byte 0
            a. Bits 0-3, Keypad address
            b. Bits 4-7, unknown
         2. Byte 1
            a. 0x87
         3. Bytes 2-7
            a. 6150 keypad: 0x00, 0x10, 0x04, 0x04, 0x04, 0x00
            b. 6160V keypad: 0x00, 0x00, 0x04, 0x04, 0x04, 0x00
         4. Byte 8 (last byte)
            a. Checksum byte
   c. Alarm acknowledges
      i. Signal high (0V) for 4ms
      ii. Send first byte received from device
4. F2 Message - Unknown purpose
   a. See referenced projects for more information
   b. Starts with 0xF2, ends with checksum
   c. Hopefully not necessary for this project

5. F7 Message - Keypad updates - 48 bytes
    a. Byte 00 - 0xF7
    b. Byte 01 - Bitmask of keypads to receive message. LSB for addr 0, MSB for addr 7. 0xFF for all)
    c. Byte 02 - Bitmask of keypads to receive message. LSB for addr 8, MSB for addr 15. 0xFF for all)
    d. Byte 03 - Bitmask of keypads to receive message. LSB for kp addr 16, MSB for kp addr 23. 0xFF for all keypads)
    e. Byte 04 - Bitmask of keypads to receive message. LSB for kp addr 24, MSB for kp addr 31. 0xFF for all keypads)
    f. Byte 05 - Zone (possibly zone number to display on 6150 kp?)
    g. Byte 06 - Bitmask
        i. Bits 0-2 - keypad tones
            1. 000 - No tone
            2. 001 - chime once (6160Vkp vocalize "Disarmed Ready to Arm")
            3. 010 - chime twice
            4. 011 - chime three times
            5. 100 - fast repeating tone (used when arm/disarm delay timeout is nearing completion)
            6. 101 - slow repeating tone (used for arm/disarm delay timeout)
            7. 110 - same as 101
            8. 111 - continuous loud tone (alarm triggered)
        ii. Bit 3 -
        iii. Bit 4 - Binary toggle - LCD "NIGHT"
        iv. Bit 5 - Binary toggle - LCD "CANCELED"
        v. Bit 6 - must be 0 or else incompat. conn. Error + BEEPING
        vi. Bit 7 -
    h. Byte 07 - Bitmask
        i. Bit 0 - Binary toggle - Repeated 3 beeps for fire alarm
        ii. Bit 1 - Binary toggle - LCD "CHECK"
        iii. Bit 2 - Binary toggle - Hide ones zone digit
        iv. Bit 3 - Binary toggle - Hide tens zone digit
        v. Bit 4 - Binary toggle - (1) GREEN READY LED or (0) LCD " NOT READY"
        vi. Bit 5 - Binary toggle - LCD "FIRE"
        vii. Bit 6 - Binary toggle - LCD "BAT"
        viii. Bit 7 - Binary toggle - LCD "STAY" + RED ARMED LED
    i. Byte 08 - Bitmask
        i. Bit 0 - Binary toggle - Repeating dual tone sound
        ii. Bit 1 - Binary toggle - LCD "ALARM"
        iii. Bit 2 - Binary toggle - LCD "AWAY" + RED ARMED LED
        iv. Bit 3 - Binary toggle - LCD "AC"(1) / "NO AC"(0)
        v. Bit 4 - Binary toggle - LCD "BYPASS"
        vi. Bit 5 - Binary toggle - LCD "CHIME"
        vii. Bit 6 - Binary toggle -
        viii. Bit 7 - Binary toggle - LCD "INSTANT"
    j. Byte 09 - Programming mode enabled if bit 0 set. 0x00
    k. Byte 10 - Prompt position. Used for programming. 0x00
    l. Byte 11 -
    m. Byte 12 - First char of line1 LCD ascii text. MSB set to 1 turns on backlight
    n. Byte 13-27 - Remaining 15 chars of line 1 LCD ascii text
    o. Byte 28-43 - 16 chars of line2 LCD ascii text
    p. Byte 44 - Message checksum
    q. Byte 45 - Bitmask
        i. Bit 0 - Binary toggle - LCD "1" in 2188 seven segment display
        ii. Bit 1 - Binary toggle - LCD "2" in 2188 seven segment display

      iii.   Bit 2 - Binary toggle -

      iv.   Bit 3 - Binary toggle -

      v.   Bit 4 - Binary toggle - LCD "TEST"

      vi.   Bit 5 - Binary toggle - LCD "PHONE" and blinks green LED

      vii.   Bit 6 - Binary toggle -

      viii.   Bit 7 - Binary toggle - Backlight

    r.   Byte 46-47 pad bytes 0x00

6. **F8 Message - Unknown purpose**
   a. See referenced projects for more information
   b. Starts with 0xF8, ends with checksum
   c. Hopefully not necessary for this project
7. **F9 Message - Long Range Radio Message**
   a. See referenced projects for more information
   b. Starts with 0xF9, ends with checksum
   c. Hopefully not necessary for this project

VOCALIZATIONS

- 6160 Will say "Disarmed, Ready to Arm" <u>once</u> when tone=1(byte06) IF B8b3=1(AC on) and RED ARMED light recently off
- One byte or more should be available to send voice descriptors. Byte 11 or 45+? Or not part of F7? 😳

ALPHA VOCABULARY LIST (For Entering Zone Descriptors)

#	Word	#	Word	#	Word	#	Word	#	Word
000	(Word Space)	057	DOOR •		– L –		– R –		– V –
	– A –	059	DOWN	106	LAUNDRY •	155	RADIO	209	VALVE
001	AIR	060	DOWNSTAIRS	107	LEFT	156	REAR	210	VAULT
002	ALARM •	061	DRAWER	108	LEVEL	157	RECREATION	212	VOLTAGE
004	ALLEY	062	DRIVEWAY	109	LIBRARY •	159	REFRIGERATION		– W –
005	AMBUSH	064	DUCT	110	LIGHT	160	RF	213	WALL
006	AREA		– E –	111	LINE	161	RIGHT	214	WAREHOUSE
007	APARTMENT	065	EAST	113	LIVING •	162	ROOM •	216	WEST
009	ATTIC •	066	ELECTRIC	114	LOADING	163	ROOF	217	WINDOW •
010	AUDIO	067	EMERGENCY •	115	LOCK		– S –	219	WING
	– B –	068	ENTRY	116	LOOP	164	SAFE	220	WIRELESS
012	BABY •	069	EQUIPMENT	117	LOW	165	SCREEN		– X –
013	BACK •	071	EXIT •	118	LOWER	166	SENSOR	222	XMITTER
014	BAR	072	EXTERIOR		– M –	167	SERVICE		– Y –
016	BASEMENT •		– F –	119	MACHINE	168	SHED •	223	YARD
017	BATHROOM •	073	FACTORY	121	MAIDS	169	SHOCK		– Z –
018	BED	075	FAMILY	122	MAIN •	170	SHOP •	224	ZONE (No.)
019	BEDROOM •	076	FATHERS	123	MASTER •	171	SHORT	225	ZONE •
020	BELL	077	FENCE	125	MEDICAL •	173	SIDE •	226	0
021	BLOWER	079	FIRE •	126	MEDICINE	174	SKYLIGHT	227	1
022	BOILER	080	FLOOR •	128	MONEY	175	SLIDING •	228	1ST •
023	BOTTOM	081	FLOW	129	MONITOR	176	SMOKE •	229	2
025	BREAK	082	FOIL	130	MOTHERS	178	SONS	230	2ND •
026	BUILDING	083	FOYER	131	MOTION •	179	SOUTH	231	3
	– C –	084	FREEZER	132	MOTOR	180	SPRINKLER	232	3RD •
028	CABINET	085	FRONT •		– N –	182	STATION	233	4
029	CALL		– G –	134	NORTH	184	STORE	234	4TH
030	CAMERA	089	GARAGE •	135	NURSERY	185	STORAGE •	235	5
031	CAR	090	GAS		– O –	186	STORY	236	5TH
033	CASH	091	GATE	136	OFFICE •	190	SUPERVISED •	237	6
034	CCTV	092	GLASS	138	OPEN •	191	SUPERVISION	238	6TH
035	CEILING	093	GUEST	139	OPENING	192	SWIMMING	239	7
036	CELLAR	094	GUN	140	OUTSIDE	193	SWITCH	240	7TH
037	CENTRAL		– H –	142	OVERHEAD		– T –	241	8
038	CIRCUIT	095	HALL •		– P –	194	TAMPER	242	8TH
040	CLOSED •	096	HEAT	143	PAINTING	196	TELCO	243	9
046	COMPUTER	098	HOLDUP	144	PANIC •	197	TELEPHONE	244	9TH
047	CONTACT	099	HOUSE •	145	PASSIVE	199	TEMPERATURE		
	– D –	100	INFRARED	146	PATIO •	200	THERMOSTAT	245	Custom Word #1
048	DAUGHTERS	101	INSIDE •	147	PERIMETER	201	TOOL	246	Custom Word #2
049	DELAYED	102	INTERIOR	148	PHONE	202	TRANSMITTER	247	Custom Word #3
050	DEN •	103	INTRUSION	150	POINT		– U –	248	Custom Word #4
051	DESK		– J –	151	POLICE •	205	UP	249	Custom Word #5
052	DETECTOR •	104	JEWELRY	152	POOL •	206	UPPER	250	Custom Word #6
053	DINING •		– K –	153	POWER	207	UPSTAIRS •	251	Custom Word #7
054	DISCRIMINATOR	105	KITCHEN			208	UTILITY •	252	Custom Word #8
055	DISPLAY							253	Custom Word #9
								254	Custom Word #10

Note: Bulleted (•) words in **boldface type** are those that are also available for use by the 4286 Phone Module. If using a Phone module, and words other than these are selected for Alpha descriptors, the module will not provide annunciation of those words. *Italicized* words followed by an asterisk indicate those words supported by the 6160V/6150V Voice Keypads