ZETRON

Model 19 Simplexor Instruction Manual

Part No. 025-9179K

Please check for change information at the end of this manual.

Contents

TRADEMARKS

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FEDERAL COMMUNICATIONS COMMISSION (FCC) REGULATIONS

This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area, if not installed and used in accordance with the instruction manual, is likely to cause harmful interference in which case the user will be required to correct the interference at his or her own expense.

Changes or modifications not expressly approved by the manager of Zetron's compliance department can void the FCC authorization to operate this equipment.

Repair work on this device must be done by Zetron, Inc. or a Zetron authorized repair station.

INTRODUCTION

By definition, simplex radio systems have limited range depending on the power of the radios being used and the terrain in which they are used. To extend the range beyond that of the radio, a device is required that can receive and record audio, key the transmitter, and play the audio back out. A Zetron Model 19 Simplexor fits this bill. Because the channel is simplex (transmit and receive frequencies are identical), all "repeating" is done on the same channel and transmission is not concurrent with reception. A duplexor is not required. You can think of the Model 19 as a user who is simply listening to what you say and then "passing the word" along to another user.

The Model 19 has been proven useful in a number of applications beyond that of basic simplex repeating. To address these requirements as effectively as possible, two additional configurations of the Model 19 were created. The three available forms are: the Basic version, the Announcement version, and the Selective Repeat version.

The Basic version addresses the need to extend simplex communications as touched on above. The unit records a received signal and retransmits it when recording is complete.

The Model 19 Announcement version offers several additional capabilities beyond the basic simplex repeater function. The most distinguishing feature of this version is its ability to replay messages either twice or continuously. Applications for this version include highway advisory radio, emergency warning systems, and performance enhancement when used in noisy environments.

The Model 19 Selective Repeat version is another variation of the of the Basic version simplex repeater. This option offers all of the functionality of the Basic version *and* the Announcement version with the addition of selective call and tone+voice paging repeat capability. Selective calling is used in situations such as centrally dispatching to individual fire departments with emergency information. Tone+voice allows the combining of a separate page and a separate voice message into a single transmission.

How to Use This Manual

This manual covers all three versions of the Model 19. Items that do not apply to all of the versions are labeled with an explanation of where they do apply. Please refer to these notes when installing and configuring the unit.

SPECIFICATIONS

General

Power	11-16 VDC, 150 mA
Temperature	0 to 65 degrees Celsius
Size	5.5" W x 6.25" D x 1.4" H
Weight	1.0 pound

Radio Interface

PTT	FET pull to ground
COR	External detect with polarity selection
TX Audio	-40 to +6 dBm, Hi/Lo selector, 1 kΩ output
RX Audio	-40 to +10 dBm, Hi/Lo selector, 50 kΩ input, 25 mV to 6 Vp-p

Announcement and Selective Repeat versions only

Busy	External transmit channel receiver busy detector. Polarity selectable

Selective Repeat version only

Decode Input	External Pager or Tone Decoder Input. Polarity selectable
Decode Reset Output	FET pull to ground used to reset external decoder
Indicators	Carrier, Transmit, Power, Test

OPERATION

Normal Operation

During normal operation, the Model 19 Simplexor waits for carrier to be detected. When carrier is detected, the Model 19 begins electronically recording the receive audio. When carrier drops, the Model 19 waits for the carrier hold time to expire. When the hold time expires, the Model 19 keys the transmitter and plays the recorded audio. If one side of the conversation lasts more than 40 seconds, the Model 19 will stop recording and will wait until carrier drops before playing the audio back.

To operate the Model 19, the user simply keys the radio and begins speaking. When PTT is released, the recorded voice is replayed. Then a long pause will be heard while the responding voice is recorded.

Announcement Version

The Announcement version of the Model 19, by default, operates in exactly the same manner as the Basic version. The additional capabilities beyond the basic simplex repeat function are selected at the time of installation by setting option switches to configure the unit. The switch settings are discussed in detail in "Option Switch", starting on page 13, however, their effect on operation is discussed here.

In some circumstances, as in noisy environments or when reaching the service area limit of the system, the receiving party may have difficulty hearing the message being received. If this is a common occurrence, it may be desirable to select message repeat. When set, the recorded message is played back twice. This allows a second opportunity to hear the information. The Model 19 places an adjustable gap between the first and second

play back. By default the unit will unkey and watch for a received signal during the wait between messages. This allows the users to control whether the message is repeated or not. If carrier is seen, a new message will be recorded rather than replaying the previous message a second time. If desired, the unit can be set to remain keyed during the replay gap, forcing the unit to always replay the message twice.

The Model 19 can be set to continuously replay a recorded message. This is useful for applications such as emergency warning systems or highway advisory announcements. The gap placed between the end of continuously repeated message and its restart is settable from either of two ranges. The gap ranges from 0 to approximately 10 seconds in the short range, or 0 to about 10 minutes in the long range.

The unit can be used in shared frequency applications where the unit may be transmitting on a different channel than it is receiving. Such might be the case if a central office periodically sends announcements out to a dispatch group. A BUSY input is available for such uses. This is connected to the transmit channel's carrier detect circuitry. The unit will then monitor the busy line, waiting until the channel is free before keying the transmitter. The polarity of the BUSY line is switch selectable.

If enabled, the Model 19 can accept a second message during the time the unit is waiting for BUSY to indicate channel available. This will occur if a received signal is seen before the transmit channel becomes free. Recording time must still be available for this to happen and only one additional message may be recorded. Subsequent messages will overwrite a previously recorded second message. During playback the messages are played consecutively.

An option switch along with additional interface connections provides a means of selecting and configuring these options.

The selectable features of the Model 19 Announcement version include:

- Play recorded message once, twice or continuously.
- Adjustable gap between message replays (Range: 0 to 10 seconds or 0 to 10 minutes for continuous replay).
- A BUSY input to determine channel activity in shared TX or cross-frequency applications.
- Selectable BUSY input polarity.
- COR priority mode. During TX channel busy, a second message may be recorded before playback if COR appears before TX.
- Repeat message override using COR and/or front panel button. Override allows re-recording of continuous announcement messages and controlling when send-twice messages are actually required.

Selective Repeat Version

The Model 19 Selective Repeat version is another variation of the Basic version simplex repeater. This option offers all of the functionality of the Basic version *and* the Announcement version with the addition of selective call and tone+voice page repeat capability. Selective calling is used in situations such as a central dispatch facility contacting individual fire departments with emergency information. All of the fire departments use the same radio channel and central dispatch contacts the desired Model 19 Selective Repeat version with a page or through tone encoding.

Tone + voice page repeating is often used in conjunction with selective calling. This function allows a two part message to be repeated as a single outgoing message.

These extended functions utilize one additional input and one output on the connector block of the Model 19. Three option switches enable and configure the options.

The Selective Repeat version includes:

- External decode input enable
- Decode input polarity
- Page + message enable

Test Mode

Pressing the test button on the front of the Model 19 causes the TEST LED to light. The transmitter will remain keyed for as long as the button is depressed. During the test mode, the Model 19 generates a 1 kHz test tone for transmit audio level adjustment.

Note

The Announcement and Selective Repeat versions perform an additional test when the button is released.

When the button is released, the unit executes the Repeat Delay Test. This is an aid for adjusting the gap between message repeats. The TEST LED briefly extinguishes when the TEST button is released. After a half second, the LED again illuminates and remains on as a visual indication of the inter-message gap. Use this test repeatedly as necessary while adjusting the gap timing (R45). More information on this adjustment is found on page 15.

INSTALLATION

Caution!

This equipment generates, uses, and can radiate radio frequency energy. If not installed and used in accordance with the instruction manual, it may cause interference to radio communications. Installation of the Model 19 should only be attempted by qualified radio service personnel.

General

Connections to the transmitter, receiver, and power are grouped on a detachable terminal strip on the rear of the unit for ease of installation. The Model 19 includes an installation test mode to aid in installation. Adjustments may be made on the back of the Model 19.

Equipment

Required equipment includes:

1. A communications service monitor
2. A handheld or mobile radio with DTMF encode capability
3. A VOM (volt-ohm-meter)

An oscilloscope is highly recommended, but not absolutely required.

Installation Procedure

1. **POWER SUPPLY**: Locate the +12 volt DC power supply for the radio receiver and transmitter. With a VOM, measure the DC voltage. It should be between 10.5 V and 15.0 V. Connect the power supply ground lead to J1-pin 2, and the positive supply lead to J1-pin 1.

2. **GROUND CONNECTION**: Connect a chassis ground wire from J1-pin 2 to the chassis ground of the transmitter/receiver.
3. **TRANSMITTER PTT**: Connect a wire from J1-pin 7 (PTT) to the PTT input of the transmitter. Note that this output is a FET pull down to ground.
4. **TRANSMITTER AUDIO OUTPUT**: Connect a wire from J1-pin 5 to the microphone input of the transmitter. Shielded cable must be used for this connection; connect the shield braid to J1-pin 4. This output has an impedance of 1 kΩ. If the microphone input has a significantly higher impedance, you may need to put a resistor in series with the audio line to get a proper match. If so, put the resistor on the radio end of the wire.
5. **RECEIVER AUDIO INPUT**: Connect J1-pin 3 to either the Discriminator output of the radio or the Speaker HI output of the radio. Shielded cable must also be used for this connection; The shield braid is connected to J1-pin 2. If the Discriminator output is used, place JP5 in the B position. If the Speaker audio is used, place JP5 in the A position. This is a high impedance input, 50 kΩ.
6. **CARRIER DETECT INPUT**: Connect a wire from J1-pin 9 to the carrier detect or tone decode output of the radio. This input is a voltage comparator so the threshold level may be set, if required, using R1 (COR LVL). The polarity of the carrier input may also be set by rotating the two jumpers that make up JP1.
7. **BUSY INPUT:** This function is available only on the Announcement and Selective Repeat versions of the Model 19. This pin should be left unconnected on the Basic version.

If a channel busy signal is required, connect a wire from J1-pin 6 to the squelch or channel-in-use signal from the receiver section of the transmit radio. This input includes a 10 kΩ pull up to +5 volts. The polarity of this signal is selected with option switches explained in "Option Switch" starting on page 13.

8. **EXTERNAL DECODE:** This function is available only on the Selective Repeat version of the Model 19. J1-pin 8 and J1-pin 10 should remain unconnected for the Basic and Announcement versions.

   Connect a wire from J1-pin 8 to the decode output of the external decoding device. This input includes a 10 kΩ pull up to +5 volts. The polarity of this signal is selected with option switches explained in "Option Switch" starting on page 13.

9. **DECODE RESET:** If the external decode device requires a reset following a decode, connect a wire from J1-pin 10 to the reset input of the external decoder. This line is an open drain FET output that is clamped with a 20-volt Zener diode. When the line is active, the output will be pulled to ground.

INITIAL TURN-ON AND ADJUSTMENTS

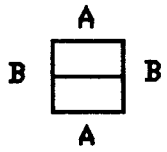
Before turning on the unit for the first time or adjusting the unit, check that the jumpers are set as follows: JP1 set to A, JP2 to B, JP3 to B, JP4 to B. Put the pot R1 (COR LVL) in the middle of its range.

1. **POWER UP:** Verify that the positive power supply is connected to pin 1 of J1 and the ground lead is connected to pin 2 of J1. Apply power to the unit.

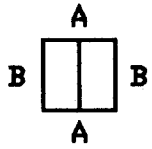
2. **SET RECEIVE LEVEL:** If you have not already done so, set JP2 to the B position. Supply a full quieting signal to the receiver, modulated by a 1-kHz tone at 60% of full channel deviation (typically 3.5-kHz deviation). Place an oscilloscope probe on U1-pin 1, and adjust R3 (RX AUD) for a 1 Vp-p signal (that is 0.354 Vrms if you are using the VAC scale on a VOM). If the receive level will not go high enough, move JP2 to the A position and readjust the level.

3. **CARRIER ADJUST:** Supply and remove carrier while measuring the voltage on J1-pin 9 to verify that the carrier detect polarity, JP5, is set correctly. If the voltage drops to zero when the receiver unsquelches (Active Low), then set JP1 to position 'A'. If the voltage rises to some positive value when the receiver unsquelches (Active High), then set JP1 to position B. JP1 is set by rotating both jumpers 90 degrees left or right as shown:

JP1 in A Position (active low)



JP1 in B Position (active high)



If the carrier LED does not light when carrier is present, adjust R1 (COR LVL) on the PC board inside the unit until it does. Remove the carrier and verify that the carrier LED goes out.

4. **LOW-PASS FILTER:** The Model 19 has an optional low-pass filter on the transmit audio line that can be enabled or disabled using jumper JP3. To enable the low-pass filter, put JP3 in position B. This will produce a much cleaner output signal to the transmitter, however, it may cause some signaling tones to be attenuated much more than when the filter is disabled with JP3 in position A. The B position for JP3 is recommended for the best quality of voice audio through the Model 19.

5. **SET THE TRANSMIT AUDIO GAIN:** Set the service monitor to receive on the transmitter's output frequency. Press the TEST button on the front of the Model 19, it should key the transmitter and generate a 1-kHz test tone. Adjust R4 (TX AUD) until the service monitor shows 70% of full channel deviation (typically 3.5-kHz deviation). If the deviation will not go high enough, move JP4 to the A position, and readjust the level.

6. **AUDIO TEST:** Once all of the preceding adjustments have been made, use a portable or mobile to key up and speak a test message for a few seconds. After you unkey, the Model 19 should key up and transmit the same message over again. Verify that the repeated audio is clean, clear, and transmitted at the proper level.

7. **COR HOLD:** If you want to lengthen the period between the mobile unkeying and the Model 19 keying up to repeat the message, use R2 (COR HOLD) on the back of the unit to set the delay.

This completes the initial turn-on and adjustments.

Jumpers

JP1 COR POLARITY	Sets the polarity for an active carrier detect at J1-pin 9. The A position is active low, and the B position is active high.
JP2 RX AUDIO GAIN	Sets the gain of the RX audio input stage. The A position is high gain, and should be used with low level input signals. The B position is low gain, and should be used with high level input signals.
JP3 LOW-PASS FILTER	Position A disables the low-pass filter on the TX audio. Position B enables the low-pass filter on the TX audio. The default position is B.
JP4 TX AUDIO GAIN	Sets the gain of the last TX audio stage. Position A gives a high level output, and position B gives a low level output.
JP5 DE-EMPHASIS	Sets the amount of high frequency roll-off the RX audio gets. If the RX audio is taken from the discriminator, use position B. If the RX audio is taken from the speaker (or some other "processed" audio source) in the receiver, use position A.

Option Switch

The Announcement and Selective Repeat versions of the Model 19 include an option switch to select and configure the various features available on these models.

The option switch (SW1) contains eight individual switches. Of these switches, the first five are used to select particular options common to both the Announcement version and the Selective Repeat version. The remaining three switches apply to only the Selective Repeat version, see Table 1.

Table 1. Option Switch

Version	SW#	Function
Announcement and Selective Repeat Versions	1	Busy Input Polarity
	2	Single Play/ Repeat or Short/ Long Delay
	3	Continuous Message Replay
	4	COR Priority Enable
	5	Repeat Over-ride Control
Selective Repeat Version Only	6	External Decode Enable
	7	Decode Input Polarity
	8	Page+Message Enable

The switches are read at power up and at the end of the button tests. This means that the switches may be changed while the unit is in operation and will have no effect on the unit's behavior until the power is cycled or the TEST button pressed and released.

The following describes the first five switches on the option switch (SW1).

Switch-1 **Busy Input Polarity**-If the switch is OFF, BUSY is active low. When ON, BUSY is active high. Note that the BUSY line is internally pulled up. If the BUSY line is left unconnected and the switch left in the OFF position, the unit will not see a busy condition.

Switch-2 **Single Play/ Repeat** or **Short/Long Delay**-Please note that this switch's function changes based on the setting of Switch-3. When Switch-3 is OFF and Switch-2 is OFF, the recorded message is played back once. If Switch-2 is set to ON, the recorded message will be sent twice.

Switch-3 **Continuous Message Replay**-When this switch is OFF, the recorded message will be sent once or twice depending upon the setting of Switch-2 described above. If this switch is set to ON, the recorded message will be continuously sent. The unit allows a delay before restarting the message. This delay is settable from about 0 – 10 seconds if Switch-2 is OFF. If both switch-2 and switch-3 are ON, the delay will be 60 times greater (i.e., about 0 – 10 minutes). The time is adjusted using the R45 repeat delay adjustment potentiometer and the test button "Repeat Delay Test".

Switch-4 **COR Priority Enable**-When this switch is ON, the Model 19 will watch COR while waiting for BUSY to become inactive. If COR becomes active during this time, the unit will allow recording of a second message. If this switch is OFF, the unit will record only a single message. The unit will then wait for BUSY to become inactive before sending the recorded message.

With this switch ON, the unit will send the first and last message received, disregarding any messages in between.

Switch-5 **Repeat Over-ride Control**-This switch applies only when the unit is set to replay a recorded message either twice or continuously. When this switch is OFF, the unit will drop PTT and watch COR during the repeat delay. If COR is seen during this time, a new message may be recorded. The new message will then be replayed according to the settings of Switch-2 and Switch-3. When this switch is ON, the TEST button must be pressed to interrupt the repeated message. The button press will only be acknowledged during the repeat delay.

The following describes the remaining three switches, which apply to only the Selective Repeat version.

Switch-6 **External Decode Enable**-When this switch is ON, the external decode line must become active at some point while a message is being recorded. The received message will be ignored otherwise.

Switch-7 **Decode Input Polarity**-When this switch is OFF, the Decode Input is active high. If this switch is ON, the Decode Input is active low.

Switch-8 **Page+Message Enable**-When ON, this switch enables the two-part message record mode. This is useful, for example, in fire department situations where pager tones are to be recorded followed by a voice message. When enabled, the Model 19 will record the first half of the message. The unit will watch COR while waiting for up to 10 seconds for the second half of the message to be recorded. When recording is complete or

the time lapses, the entire message is sent out as a continuous message. If the second half of the message is not recorded within the fixed 10-second time, the first half will be sent.

Potentiometers

R1 COR LVL — Sets the voltage threshold for the carrier detect input.

R2 COR HOLD — Sets the delay time between the carrier detect input going inactive and the Model 19 keying up to repeat what it just recorded.

R3 RX AUD — Sets the RX audio level into the Model 19. The range over which this pot adjusts the level is controlled by JP2.

R4 TX AUD — Sets the TX audio level out of the Model 19. The range over which this pot adjusts the level is controlled by JP4.

R45 REPEAT DELAY — This pot sets the gap between message repeats. The range over which this pot adjusts is controlled by the option switch (SW1-2 and SW1-3). See page 14.

Patch Notes

The Model 19 begins recording when a valid COR is seen, and transmits after COR drops. For this reason, it is important that you find a COR signal that does not give spurious pulses when the radio changes state from transmit to receive.

RADIO CONNECTIONS

Motorola Radio

Model 19 Basic Version

These instructions are for connecting a basic Model 19 to a Radius M200 or GM300 Series mobile radio using cable 709-7199.

Zetron Signal Name	Pin	Wire	Radio Connection / Signal Name
+12 Volts DC in	1	Red	JAUX Pin 13, Switched A+
GND	2	Black	JAUX Pin 7, Ground
DISC	3	White	JAUX Pin 11, Disc. Audio
GND	4	Shield	Not Connected
TX AUD	5	Blue	JAUX Pin 2, Mic. Audio
BUSY	6	(none)	(not used)
PTT	7	Orange	JAUX Pin 3, Microphone PTT
DECODE	8	Brown	JAUX Pin 14, External Alarm (Not used by M19)
COR	9	Yellow	JAUX Pin 8, CSQ Detect
ACK	10	Green	JAUX Pin 5, Flat Tx Audio (Not used by M19)
		jumper	JAUX Pin 15, Internal Speaker (+)
			JAUX Pin 16, External Speaker (+)

Radio Notes

1. Set the jumpers inside the GM300 radios as follows:
   JU551 = Position A, Flat, Unmuted Discriminator Audio
   JU651 = Position A, TX Audio Gain selection
   JU701 = Position B, Flat, TX Audio Limiter Bypass (16 channel radios only)

2. Using the RSS software, program the accessory connector as shown in Figure 1:

ACCESSORY CONNECTOR CONFIG

INT Accessory: None EXT Accessory: General I/O Custom: Y

PIN#	DESCRIPTION	DATA DIR	DEBOUNCE	ACT LEVEL
4	NULL 2	Output	No	High
6	NULL 1	Input	No	Low
8	PL/DPL + CSQ	Output	No	Low
9	NULL 1	Input	No	High
12	NULL 1	Input	No	Low
14	External Alarm	Output	No	Low

Figure 1. Accessory Connector Programming for Model 19 Basic Version

PLEASE NOTE: The accessory connector programming shown in Figure 1 only applies to the Radius M200 and GM300 (16-channel) radios. It mimics the non-programmable pinout of other models of Radius radios.

Model 19 Notes

1. Connect the cable to P1 on the rear of the Model 19.
2. Set jumper JP1 to the "A" position to select an active low polarity for the COR input. Set the pot R1 to its midpoint.
3. Refer to the Installation section on page 8 for initial tests and adjustments.

Model 19 Selective Repeat

The following instructions are for connecting a Model 19 equipped with either the Continuous Announcement (950-9826) or the Selective Repeat (950-9240) option to a Radius M200 or GM300 Series mobile radio using cable 709-7199.

Zetron Signal Name	Pin	Wire	Radio Connection / Signal Name
+12 Volts DC in	1	Red	JAUX Pin 13, Switched A+
GND	2	Black	JAUX Pin 7, Ground
DISC	3	White	JAUX Pin 11, Disc. Audio
GND	4	Shield	Not Connected
TX AUD	5	Blue	JAUX Pin 2, Mic. Audio
BUSY	6	(not used)	
PTT	7	Orange	JAUX Pin 3, Microphone PTT
DECODE	8	Brown	JAUX Pin 14, PL/DPL Detect
COR	9	Yellow	JAUX Pin 8, CSQ Detect
ACK	10	Green	JAUX Pin 5, Flat Tx Audio (Not used by M19)
		jumper	JAUX Pin 15, Internal Speaker (+)
			JAUX Pin 16, External Speaker (+)

Radio Notes

1. Set the jumpers inside the GM300 radios as follows:
   JU551 = Position A, Flat, Unmuted Discriminator Audio
   JU651 = Position A, TX Audio Gain selection
   JU701 = Position B, Flat, TX Audio Limiter Bypass (16 channel radios only)

Using the RSS software, program the radio's accessory connector as shown in Figure 2:

```
                    ACCESSORY CONNECTOR CONFIG
INT Accessory: None          EXT Accessory: General I/O        Custom:  Y

PIN#    DESCRIPTION      DATA DIR        DEBOUNCE    ACT LEVEL
 4      NULL 2           Output          No          High
 6      NULL 1           Input           No          Low
 8      CSQ DETECT       Output          No          Low
 9      NULL 1           Input           No          High
12      NULL 1           Input           No          Low
14      PL/DPL + CSQ     Output          No          Low
```

Figure 2. Accessory Connector Programming for Model 19 Selective Repeat Version

PLEASE NOTE: The accessory connector programming shown in Figure 2 only applies to the Radius M200 and GM300 (16-channel) radios. It mimics the non-programmable pinout of other models of Radius radios.

3. Program a signaling system into the radio. An example is provided in Figure 3:

```
CHANGE/VIEW:SIG:SIGNAL

System ..............01
Type ................QCII

ID ..................330.5  349.0
Signaling Squelch ....N                 PTT Sidetone .............N
Call Format ..........A-B                PTT Short Sidetone .......N
Call Type ............Call Alert/Voice  Pretime (s) ..............0.5
Alert Tone Reset .....Automatic

PL/DPL Required ......Y

Horn/Lights ..........Permanent          Acknowledge ..............N
Horn/Lights ..........0.0
```

Figure 3. Selective Signaling Programming Example

Model 19 Notes

1. Connect the cable to P1 on the rear of the Model 19.
2. Set SW1 switches 6 and 7 "ON", all other switches should be "OFF".
   Set jumpers as follows:
   JP1 to position "A" (selects active low polarity for COR)
   JP5 to position "B" (selects Discriminator audio)
3. Refer to the Installation section on page 8 for initial tests and adjustments.

Using a Generic Radio Cable

To connect the Model 19 to a radio using the generic radio cable (Part No. 709-7179), refer to the following cable diagram.

Zetron End Function	Pin	Color	Radio End (MT-16P) Connection / Notes
+12 Volts DC in	1	Red	Supply between +11 - 16 VDC
GND	2	Black	DC Ground
DISC	3	White	Discriminator Audio
GND	4	Shld	Ground
TXAUD	5	Blue	Microphone Audio
BUSY	6	---	
PTT	7	Orange	Microphone PTT
DECODE	8	Brown	No Connection
COR	9	Yellow	Carrier Squelch
ACK	10	Green	No Connection

REPAIR

In Case of Difficulty

In case of installation difficulty, call Zetron Model 19 Applications Department at (425) 820-6363. Please have the serial number of the unit and/or the Zetron order number. If the call is made from the installation site by the installer or radio technician, the problem can usually be solved over the phone.

If a problem develops after a unit has been in service for some time, call the Zetron Model 19 Service Department at (425) 820-6363. If the call is made from the installation site by a radio technician, the problem can usually be solved over the phone.

The parts lists and schematics for the Model 19 are included in this document to aid installation or repair of the unit.

Model 19 Top Level Parts List

REFERENCE: 901-9240J

ITEM	QTY	ZETRON P/N	DESCRIPTION	REFERENCE
1.	4	220-0108	440 X 1/4 PAN PHILLIPS	PCB
2.	4	220-0199	632 X 1/4 BLK PAN PHILLIPS	CASE
3.	1	265-0001	TY-WRAP	(NOTE 3)
4.	1	265-0003	STRAIN RELIEF	(NOTE 3)
5.	1	401-0201	10 PIN X .156 HOUSING	(NOTE 2)
6.	10	402-0012	CONN PINS TIN/PHOSPHORIDON	(NOTE 2)
7.	1	415-9084	FCC LABEL, PART 15	BOTTOM CENTER
8.	1	415-9523	TOP COVER	
9.	1	415-9524-3	BOTTOM CASE, FINISHED	(NOTE 1)
10.	4	431-0006	RUBBER FEET	(NOTE 1)
11.	1	702-9589	REV PCB ASSEMBLY	

NOTES: Notes are for production use only.

Model 19 Simplexor (702-9383D)

Parts List

LEGEND
#=NOT INSTALLED
^=INSTALLED ON HIGHER ASSY
+=OPTION (INSTALLED PER CUSTOMER ORDER)

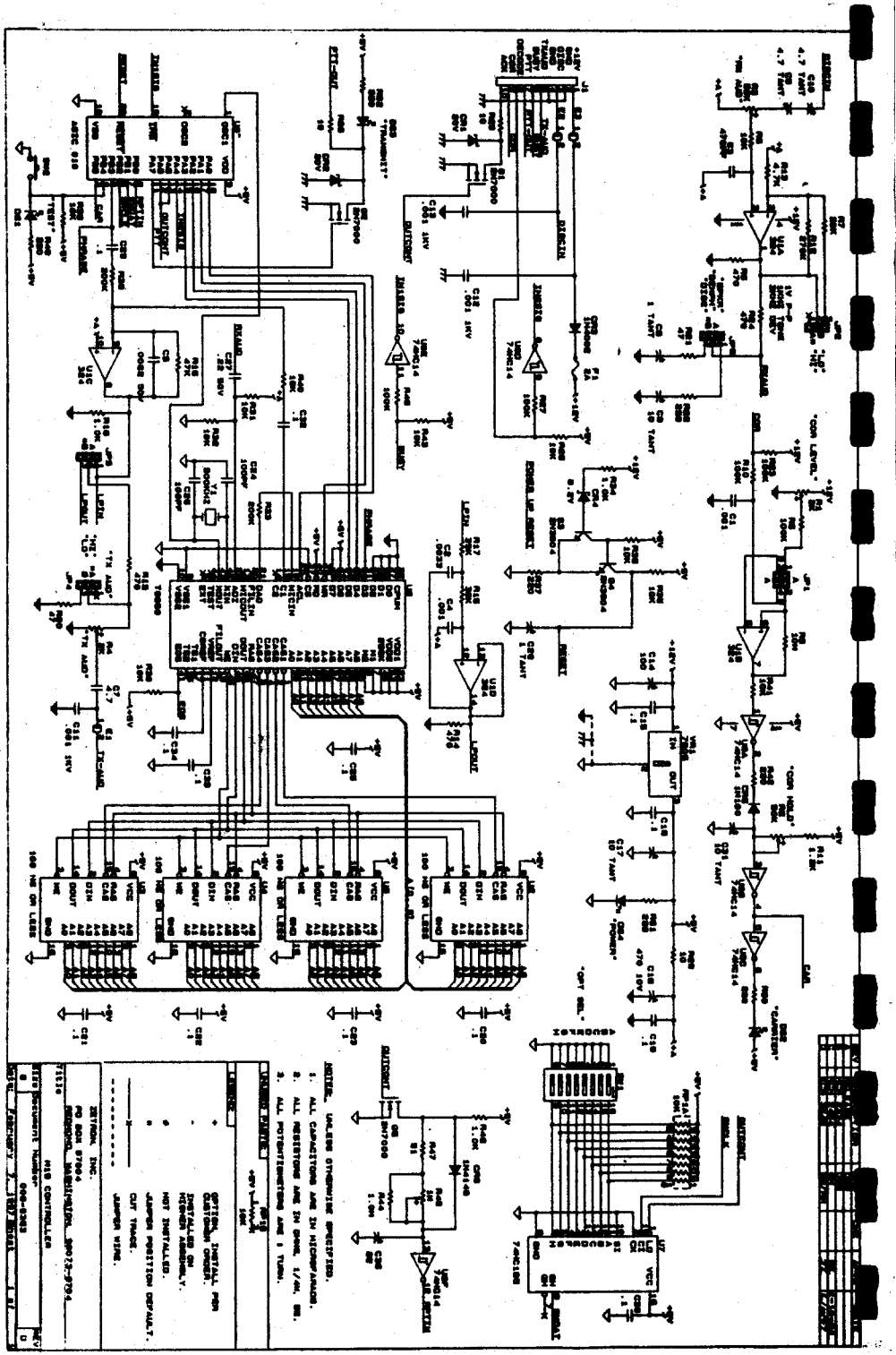
ITEM	QTY	COMPONENT REFERENCE	PART NO.	DESCRIPTION	MANUFACTURE P/N
1	3	R25,R28,R29	101-0025	RESISTOR, 10 OHM, 1/4W, 5%, CARBON FILM	10
2	1	R47	101-0042	RESISTOR, 51 OHM, 1/4W, 5%, CARBON FILM	51
3	2	R20,R21	101-0047	RESISTOR, 47 OHM, 1/4W, 5%, CARBON FILM	47
4	6	R22,R37,R49,R50,R51,R52	101-0057	RESISTOR, 220 OHM, 1/4W, 5%, CARBON FILM	220
5	5	R6,R14,R19,R24,R42	101-0065	RESISTOR, 470 OHM, 1/4W, 5%, CARBON FILM	470
6	4	R11,R18,R34,R48	101-0073	RESISTOR, 1.0K OHM, 1/4W, 5%, CARBON FILM	1.0K
7	1	R13	101-0089	RESISTOR, 4.7K OHM, 1/4W, 5%, CARBON FILM	4.7K
8	10	R8,R26,R30,R31,R32,R35, R36,R38,R41,R43	101-0097	RESISTOR, 10K OHM, 1/4W, 5%, CARBON FILM	10K
9	1	R40	101-0103	RESISTOR, 18K OHM, 1/4W, 5%, CARBON FILM	18K
10	1	R7	101-0104	RESISTOR, 20K OHM, 1/4W, 5%, CARBON FILM	20K
11	2	R17,R15	101-0111	RESISTOR, 39K OHM, 1/4W, 5%, CARBON FILM	39K
12	1	R16	101-0113	RESISTOR, 47K OHM, 1/4W, 5%, CARBON FILM	47K
13	5	R5,R10,R23,R27,R46	101-0121	RESISTOR, 100K OHM, 1/4W, 5%, CARBON FILM	100K
14	2	R33,R39	101-0128	RESISTOR, 200K OHM, 1/4W, 5%, CARBON FILM	200K
15	1	R12	101-0131	RESISTOR, 270K OHM, 1/4W, 5%, CARBON FILM	270K
16	1	R44	101-0145	RESISTOR, 1.0M OHM, 1/4W, 5%, CARBON FILM	1.0M
17	1	R9	101-0160	RESISTOR, 10M OHM, 1/4W, 5%, CARBON FILM	10M
18	1	R4	107-0003	POT, 2K OHM, 1 TURN, R/A	2K
19	1	R45	107-0008	POT, 1M OHM, 1 TURN	1M
20	2	R2,R3	107-0015	POT, 50K OHM, 1 TURN, R/A	50K
21	1	R1	107-0202	POT, 2K OHM, 1 TURN	2K
22	1	RP1	119-0006	R-NETWORK, 10K OHM x 9, BUSSED, 10-PIN SIP	10K
23	3	C11,C12,C13	150-0098	CAPACITOR, 1000pF, 1KV, 10%, CERAMIC DISC, Y5P	.001 1KV
24	2	C24,C26	151-0010	CAPACITOR, 100pF, 100V, 10%, CERAMIC NPO	100pF
25	1	C1	151-0020	CAPACITOR, .001MF, 100V, 10%, CERAMIC X7R	.001
26	1	C3	151-0047	CAPACITOR, 470pF, 100V, 10%, CERAMIC NPO	470pF
27	1	C2	151-0081	CAPACITOR, .0033UF, 100V, 5%, CERAMIC NPO	.0033
28	10	C15,C16,C19,C20,C21,C22, C23,C25,C29,C30	151-0180	CAPACITOR, .1UF, 50V, 20%, CERAMIC Z5U	.1
29	3	C32,C33,C34	152-0012	CAPACITOR, .1uF, 50V, 5%, POLYESTER	.1
30	1	C7	152-0040	CAPACITOR, 4.7uF, 50V, 20%, NON-POLAR ELECTROLYTIC, AX	4.7
31	1	C27	152-0080	CAPACITOR, .22uF, 50V, 5%, POLYESTER	.22 50V
32	1	C4	152-0089	CAPACITOR, .008uF, 50V, 5%, POLYESTER	.008
33	1	C5	152-0092	CAPACITOR, .0022uF, 50V, 5%, POLYESTER	.0022 50V
34	2	C28,C8	154-0025	CAPACITOR, 1uF, 35V, 10%, TANTALUM	1 TANT
35	2	C10,C6	154-0050	CAPACITOR, 4.7uF, 16V, 10%, TANTALUM	4.7 TANT
36	3	C9,C17,C31	154-0160	CAPACITOR, 10uF, 16V, 10%, TANTALUM	10 TANT
37	1	C35	155-0055	CAPACITOR, 22uF, 35V, 20%, AXIAL, ALUMINUM ELECTROLYTI	22
38	1	C14	155-0077	CAPACITOR, 100uF, 25V, 20%, RADIAL, ALUMINUM ELECTROLY	100
39	1	C18	155-0083	CAPACITOR, 470uF, 10V, RADIAL, ALUMINUM ELECTROLYTIC	470 10V
40	3	E1,E2,E3	305-0001	BEAD, 3B FERRITE, W/LEADS	
41	3	DS1,DS2,DS3	311-0011	LED, RED, FLUSH	
42	1	DS4	311-0012	LED, GREEN, FLUSH	
43	1	U1	316-0324	IC, OP-AMP, BIPOLAR, 358 EQUIVALENT, QUAD	324
44	1	VR1	316-7805	REGULATOR, +5V, 1.5A	7805
45	4	U2,U3,U4,U5	321-0256	IC, DRAM, 256K x 1	UPD41256C10
46	0	U8^	321-6807	IC, 8 BIT CMOS OTP UP, 20 PIN DIP (68HC705)	ASIC 010
47	1	U6	323-6668	VOICE REC/PLAY LSI	T6668
48	1	U7	324-4165	IC, SIP-INPUT, SERIAL OUTPUT 8-BIT SR, HC	74HC165
49	1	U9	324-7414	IC, HEX SCHMIDT, MOTOROLA THRESHOLDS	74HC14
50	2	Q3,Q4	340-3904	XSTR, NPN, 40V/200MA, TO92	2N3904
51	3	Q1,Q2,Q5	340-7000	XSTR, MOSFET, N-CHANNEL, 60V/ 0.2A, 5 OHMS, TO-92	2N7000
52	1	CR3	342-0001	DIODE, SILICON, 1A, 100V, DO-41	1N4002
53	2	CR6,CR5	342-3008	DIODE, SILICON, 100V, 250MW	1N4148
54	1	CR4	343-3300	DIODE, ZENER, 8.2V, 1W, 5%	8.2V
55	2	CR1,CR2	343-3310	DIODE, ZENER, 20V, 1W, 5%	20V

Model 19 Simplexor (702-9383D)

Parts List (Continued)

ITEM	QTY	COMPONENT REFERENCE	PART NO.	DESCRIPTION	MANUFACTURE P/N
56	1	SW1	371-0010	DIP SW, 8 POS, TOP ACTUATED	
57	1	SW2	371-0024	SPST PA PWB MNT MOM PB	
58	1	Y1	376-0500	RESONATOR, CERAMIC, 5000KHZ, CL=30pF, OFFSET LEADS	5000KHZ
59	1	J1	401-0202	10 PIN X .156 R/A CONN	
60	4	JP2,JP3,JP4,JP5	403-0003	3 OF 401-0052	
61	1	JP1	403-0202	4 OF 401-0052 [2X2]	
62	1	F1	416-1202	FUSE AGC 2A FAST-BLOW	2A
63	6	JCP1 (2 IN POS A) JCP2,4 (POS A) JCP3,5 (POS B)	402-3040	MINI JUMPER	
64	2	XU1,9	407-0014	SKT, 14 PIN DIP	
65	5	XU2-5,7	407-0016	SKT, 16 PIN DIP	
66	1	XU8	407-0020	SKT, 20 PIN DIP	
67	1	PCB	410-9383C	PCB, M19 CONTROLLER	
68	2	XF1	416-3040	FUSE CLIP	
69	4	XDS1-4	417-0010	LED MOUNT PA	

NOTES: Notes are for production use only.



MODEL 19 SIMPLEXOR SILKSCREEN (702-9383D)