

**METALLIC FACILITY TERMINAL
RINGDOWN SIGNALING UNITS (J99343EA, EB, EC)**

SD-1C359-()

INSTALLATION AND TESTING

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1. GENERAL

1.01 The Metallic Facility Terminal (MFT) is a standard grouping of modular equipment which includes transmission and/or signaling functions required with metallic (wire) facilities. This section describes the installation and testing for the J99343EA, EB, and EC ringdown signaling units.

1.02 When this section is reissued, the reason(s) for reissue will be given in this paragraph.

1.03 A description of the J99343EA, EB, and EC ringdown signaling units may be found in Section 332-911-104.

2. CHARACTERISTICS OF THE J99343EA, EB, AND EC RINGDOWN SIGNALING UNITS

A. General

2.01 The ringdown signaling units are used as a conversion interface between dc signaling (E&M, SG, or loop) and 20-Hz ringing.

B. Code Select Ringdown Signaling Unit (CSR) — J99343EA

2.02 The CSR is used for multipoint private line service with ringdown signaling. It can be used with SG lead operation around bridges or with E&M lead signaling at the end of a carrier leg of a multipoint circuit. The CSR is essentially a bi-directional dc to 20-Hz converter. In one direction it detects 17- to 35-Hz ringing signal and converts it to dc (E&M or SG). In the other direction it receives dc signaling (E&M or SG) and converts it to one or more ringing bursts.

2.03 The CSR is capable of converting single-ended or looped SG or E&M inputs to 20-Hz ringing. The dc signaling mode is selected by setting nine screw switches as indicated in Table A.

2.04 Three ringing modes are available with the CSR.

- **Code Select Ringing:** There are 15 code select screw switches (numbered 1-15) on the CSR, one corresponding to each usable code. When a code is assigned to a station, the unit rings that station for 2 seconds when the number of input pulses equals the code. The interval between successive pulses must not exceed 2 seconds. For group mode operation, a station can have more than one code assigned to it. The additional assigned code(s) is shared by other stations, and all stations

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with a given code are rung when the number of input pulses equals the group code. Codes are selected by turning the switches up (out).

- **No Code:** The no-code option allows a dc input (SG or E&M) to trigger one 2-second ring toward the station. The timing circuits in the decoding circuit require a minimum delay of 4 seconds between dc inputs to generate another 20-Hz ring.
- **Repeat Input Timing:** With the repeat input timing mode selected, the CSR will generate 20-Hz rings that follow the timing of the dc input pulses. However, if the dc input pulse exceeds 2 seconds in length, the output ring is limited to 2 seconds.

The ringing mode desired is selected by setting screw switches as shown in Table B.

2.05 The CSR must be used with one of the MFT transmission units to obtain signaling access to the circuit. Most transmission units have a reversing switch (marked NOR/RV). When the switch is in the NOR position, the CSR ringing detector is connected to the B side of the transmission unit. The simplex shorting (SX SH) switch in the transmission unit should be in the NOR position.

Note: The ringing detector circuit is designed to detect ringing between tip and ground or ring and ground, and will not function with ungrounded ringers.

C. Ringdown Converter Signaling Unit (RCSU) — J99343EB

2.06 The RCSU is used in special service applications which require E&M or SG to 20-Hz conversion without code selection. The RCSU is capable of performing the following signaling conversion.

- SG to 20 Hz
- Loop SG to 20 Hz
- E&M to 20 Hz
- Loop E&M to 20 Hz
- E&M to SG
- Loop E&M to Loop SG

- Loop E&M to SG
- E&M to Loop SG.

2.07 The signal conversion mode is selected by setting 16 screw switches as shown in Table C.

2.08 The RCSU must be used with a companion MFT transmission unit for obtaining signaling access to the circuit. Most transmission units have a reversing switch marked NOR/RV. When in the NOR position, the ringing detector is connected to the B side of the transmission unit. It is connected to the A side when set in the RV position. The SX SH switch in the transmission unit should be in the NOR position.

Note: The ringing detector circuit is designed to detect ringing between tip and ground or ring and ground, and will not function with ungrounded ringers. Selection from non-specified screw switch settings to obtain a permanent ground on one side of the circuit will cause noise and interference problems because of circuit unbalance.

D. Private Line Automatic Ringdown Signaling Unit (PLAR) — J99343EC

2.09 The PLAR incorporates the necessary circuitry to permit ringing, ring trip, audible ringing, and detection of loop opens and closures, and also supplies talk battery for both ends of two-point automatic ringdown circuits.

2.10 When an off-hook is detected from either station by the PLAR, ringing is transmitted via the MFT transmission unit toward the called station. The ringing interval is 2.5 seconds on and 2.5 seconds off.

2.11 When the PLAR is used with 2-2 type repeaters, the audible ringback tone is internally generated. The NOR/DIS switch on the transmission unit should be operated in the DIS position to allow the PLAR to open the voice path during the audible ringing interval. Audible ringback tone levels are prescription set to give a -21 dBm level at the station side of the transmission unit. Table D lists the screw settings for -6 to -26.5 dBm levels. This range of levels is required to allow for cable loss on two-repeater circuits, and the ringback levels are adjusted to a -21 dBm level on the station side of each repeater.

2.12 Screws A through D adjust ringback tone levels for the A side of the transmission unit, and screws E through H adjust levels on the B side with the transmission unit RV/T and RV switches in the NOR position.

2.13 On circuits with single 2-2 type repeaters, the ringback tone levels should be set to -21 dBm on each side of the repeater. For circuits using tandem 2-2 type repeaters, the A-side level should be set to -21 dBm and the B-side level must be determined by the following formula:

B-Side Ringing Level = -21 dBm + Cable Loss-Gain of Distant Repeater.

2.14 The ringback tone function for 2-wire transmission units and 2-4 type repeaters is provided by ringing voltage feed-through in the transmission unit which is of sufficient magnitude to provide audible tone to the calling station. All screw switches (A through H) on the PLAR should be down for best results.

2.15 Audible ringback tone is not furnished on circuits using 4-4 type repeaters since audible frequencies cannot be passed via the signaling leads.

2.16 The PLAR is capable of ring tripping either station during the ringing or silent interval when the called station goes off-hook. After ringing is tripped, talk battery is supplied to both stations. After the call is completed, both stations must hang up before the PLAR will reset to permit another ring. The ringing and ringing trip ranges of the PLAR are given in Tables E and F, respectively.

2.17 The PLAR has a resistance lamp in both the A side and B side of the unit. Simplex inductors on the A side of the transmission unit should be shorted. The B-side inductors should be normal.

3. MAINTENANCE AND TESTS

A. Maintenance

3.01 Maintenance of the MFT ringdown signaling units as for all MFT plug-in units, which are found defective, is by substitution. If the appropriate signaling function is not detected during end-to-end test of the service, the signaling unit should be removed and replaced with a spare unit. If on subsequent tests the service is operating correctly, the defective unit should be returned to the nearest Western Electric Service Center for repair.

B. Tests

3.02 If replacement of the signaling unit does not correct the signaling problem, further tests as described in the following paragraphs may be used to sectionalize the trouble.

3.03 Sectionalization of circuit troubles requires the use of the J99343TB test extender (Section 332-910-102). Signaling units are not compatible with the test extender. Therefore, they must be tested through their associated transmission unit which is plugged into the test extender.

3.04 The test extender which is designed to allow adjustment and testing of MFT transmission units, provide jack access to the AS1, AS2, and the A and B or SX signaling leads which pass through the transmission unit (TU). Loop opens and closures or pulses of the signaling units may be checked with the appropriate test equipment using test jacks provided by the test extender.

Caution: Working circuits should be turned down before removing a transmission unit for tests to prevent service interruptions.

3.05 The leads required for any dc conversion option of the CSR are shown in Fig. 1. Tables G and H list the electrical state of the various leads for both idle and busy conditions for each mode.

3.06 Figure 2 shows the leads required for each dc signaling mode of the RCSU. Note that some leads are not available to the test extender and must be tested at the frame. Tables I and J give the electrical states of the leads for busy and idle conditions of the RCSU.

3.07 The PLAR is tested using the A/B, SX/SX1 jacks of the test extender. Ringing may be checked as shown in the figure associated with Table D.

3.08 If the MFT transmission unit is suspected of causing a malfunction, the following sections should be consulted for test procedures:

- 2-2 Wire Terminal Repeaters — 332-912-214
- 2-2 Wire Intermediate Repeaters — 332-912-215
- 4-2 or 2-4 Wire Intermediate Repeaters — 332-912-22

SECTION 332-911-204

- 4-4 Wire Repeaters — 332-912-234
- 2-4 Wire Terminal Repeaters — 332-912-235.

332-910-102 MFT Test Extender Description and Operation

332-910-180 General Application Information for MFT

4. REFERENCES

4.01 The following references contain additional information which may be helpful.

CD-1C359-01 Common Systems — Metallic Facility Terminal Circuit

SD-1C485-02 Common Systems Test Extender for Use With Metallic Facility Terminal

REFERENCE **TITLE**

332-910-100 General Description of MFT

SD-1C359-01 Metallic Facility Terminal Circuit.

TABLE A

DC SIGNALING OPTIONS J99343EA

| OPTION | S20 | S21 | S25 | S26 | S27 | S28 | S29 | S31 | S32 |
|----------|------|------|------|------|------|------|------|------|------|
| SG | UP | DOWN | UP | DOWN | UP | UP | UP | UP | DOWN |
| LOOP SG | UP | DOWN | UP | UP | UP | UP | DOWN | DOWN | DOWN |
| E&M | DOWN | UP | DOWN | UP | DOWN | UP | UP | DOWN | UP |
| LOOP E&M | DOWN | UP | DOWN | UP | UP | DOWN | UP | DOWN | UP |

TABLE B

RINGING OPTIONS J99343EA

| OPTION | S16 | S17 | S18 | S19 | S22 | S23 | S24 | S30 |
|------------------------|------|------|------|------|------|------|------|------|
| CODE SELECT | UP | DOWN | UP | UP | UP | UP | DOWN | DOWN |
| NO CODE | UP | DOWN | UP | DOWN | UP | DOWN | UP | DOWN |
| REPEAT INPUT TIMING | DOWN | UP | DOWN | UP | DOWN | DOWN | UP | DOWN |

TABLE C
SIGNALING CONVERSION OPTIONS FOR J99343EB

| MODE | SCREW SWITCH | | | | | | | | | | | | | | | |
|--------------------|--------------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|
| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 |
| SG - 20HZ | DOWN | DOWN | DOWN | DOWN | UP | UP | UP | UP | DOWN | UP | UP | DOWN | UP | UP | UP | DOWN |
| Loop SG - 20 HZ | DOWN | DOWN | DOWN | DOWN | UP | UP | UP | DOWN | UP | DOWN | UP | DOWN | UP | UP | UP | DOWN |
| E&M - 20HZ | DOWN | DOWN | DOWN | DOWN | UP | UP | UP | DOWN | UP | UP | DOWN | UP | UP | DOWN | DOWN | UP |
| Loop E&M - 20HZ | DOWN | DOWN | DOWN | DOWN | UP | UP | UP | DOWN | UP | UP | DOWN | UP | DOWN | UP | DOWN | UP |
| SG - E&M | UP | UP | UP | UP | UP | DOWN | DOWN | DOWN | UP | UP | DOWN | UP | UP | DOWN | DOWN | UP |
| Loop SG - Loop E&M | UP | UP | UP | UP | DOWN | UP | DOWN | DOWN | UP | UP | DOWN | UP | DOWN | UP | DOWN | UP |
| Loop SG - E&M | UP | UP | UP | UP | DOWN | UP | DOWN | DOWN | UP | UP | DOWN | UP | UP | DOWN | DOWN | UP |
| SG - Loop E&M | UP | UP | UP | UP | UP | DOWN | DOWN | DOWN | UP | UP | DOWN | UP | DOWN | UP | DOWN | UP |

TABLE D
SCREW SWITCH SETTING FOR OUTPUT AUDIBLE RINGING TONE
LEVEL OF RINGING TONE IN DBM (J99343 EC)

| SCREW SWITCH DESIGNATION | 6 | 10 | 13 | 15 | 17.5 | 18 | 20 | 21 | 22 | 23 | 23.5 | 24 | 25 | 25.5 | 26 | 26.5 |
|--------------------------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|
| | A | DOWN | UP | DOWN |
| B | DOWN | DOWN | UP | UP |
| C | DOWN | DOWN | DOWN | DOWN | UP | UP | UP | UP | DOWN | DOWN | DOWN | DOWN | UP | UP | UP | UP |
| D | DOWN | UP |
| E | DOWN | UP |
| F | DOWN | DOWN | UP | UP |
| G | DOWN | DOWN | DOWN | DOWN | UP | UP | UP | UP | DOWN | DOWN | DOWN | DOWN | UP | UP | UP | UP |
| H | DOWN | UP |

The levels shown in Table D are those obtained when the circuit is configured as shown.

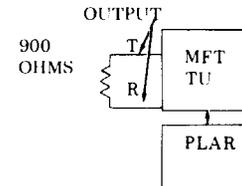


TABLE E

RINGING RANGE OF PLAR (J99343EC)

| MIDPOINT CAPACITOR | NUMBER OF RINGERS AND LOOP RESISTANCE* IN OHMS FOR 50V RMS ACROSS RINGER | | | | |
|-----------------------|---|------|------|------|-----|
| | 1 | 2 | 3 | 4 | 5 |
| 2.64 μ F | 5900 | 2740 | 1690 | 1170 | 840 |
| 1.62 μ F | 5960 | 2800 | 1720 | 1190 | 860 |
| 1.06 μ F | 5980 | 2800 | 1720 | 1200 | 866 |
| 0.60 μ F | 5990 | 2810 | 1720 | 1200 | 872 |

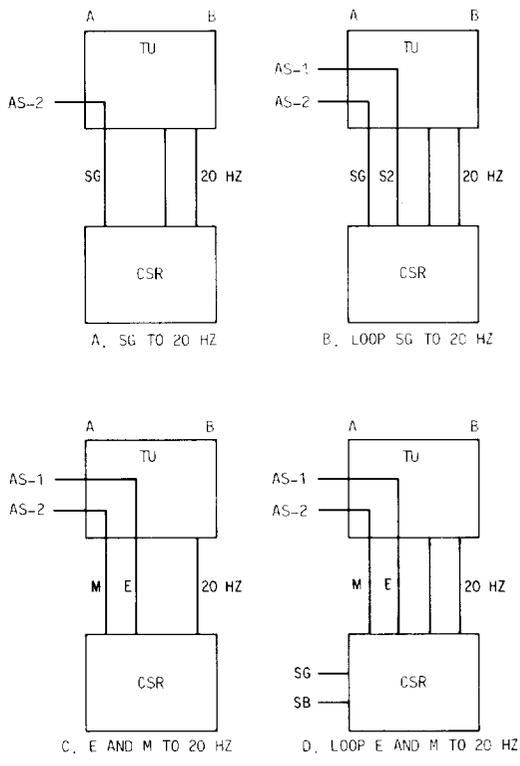
*Total permissible external resistance as measured from terminals 16 and 17 or 6 and 9 on PLAR.

TABLE F

RINGING TRIP RANGE IN OHMS*
OF PLAR (J99343EC)

| BATTERY VOLTAGE | SILENT INTERNAL | RINGING INTERVAL |
|--------------------|--------------------|---------------------|
| 37.0 | | 3300 |
| 42.5 | 2211 | 3852 |
| 45.0 | 2368 | 4100 |
| 48.0 | 2555 | 4400 |
| 52.0 | 2805 | 4800 |
| 67.5 | 3774 | |
| 72.0 | 4055 | |
| 78.0 | 4430 | |

*Total permissible external resistance as measured from terminals 16 and 17 or 6 and 9 on PLAR.



NOTE:
THE LEAD DESIGNATIONS SHOWN BETWEEN THE
TU AND CSR REPRESENT THE FUNCTIONAL NAME
OF THE AS-1 AND AS-2 LEADS.

Fig. 1—CSR Lead Designations

TABLE G

ELECTRICAL STATE OF CSR SIGNALING LEADS FOR VARIOUS OPERATING
MODES AND CIRCUIT CONDITIONS

CALL FROM A SIDE TO B SIDE

| MODE | CALL STATUS | INPUT | OUTPUT (20HZ-RMS) |
|---------------|----------------|--|----------------------------|
| SG-20HZ | IDLE BUSY | SG:0 SG:≈ -48VDC | AB OR SX:0 AB OR SX:86V |
| LOOP SG-20HZ | IDLE BUSY | SG:0 S2:0 SG:≈ -48VDC S2:GND | AB OR SX:0 AB OR SX:86V |
| E&M-20HZ | IDLE BUSY | E:GND E:≈ -48VDC | AB OR SX:0 AB OR |
| LOOP E&M-20HZ | IDLE BUSY | E:GND E:GND E:≈ -48VDC SG:GND | AB OR SX:0 AB OR SX:86V |

Note: To determine the difference between a ground and zero volts, connect a voltmeter between pins 18 (chassis ground) and the terminal being tested. If the reading is zero, connect an ohmmeter between the same two points. If the reading is zero, ground is on the terminal being tested and, if an open is indicated, the terminal is at zero voltage.

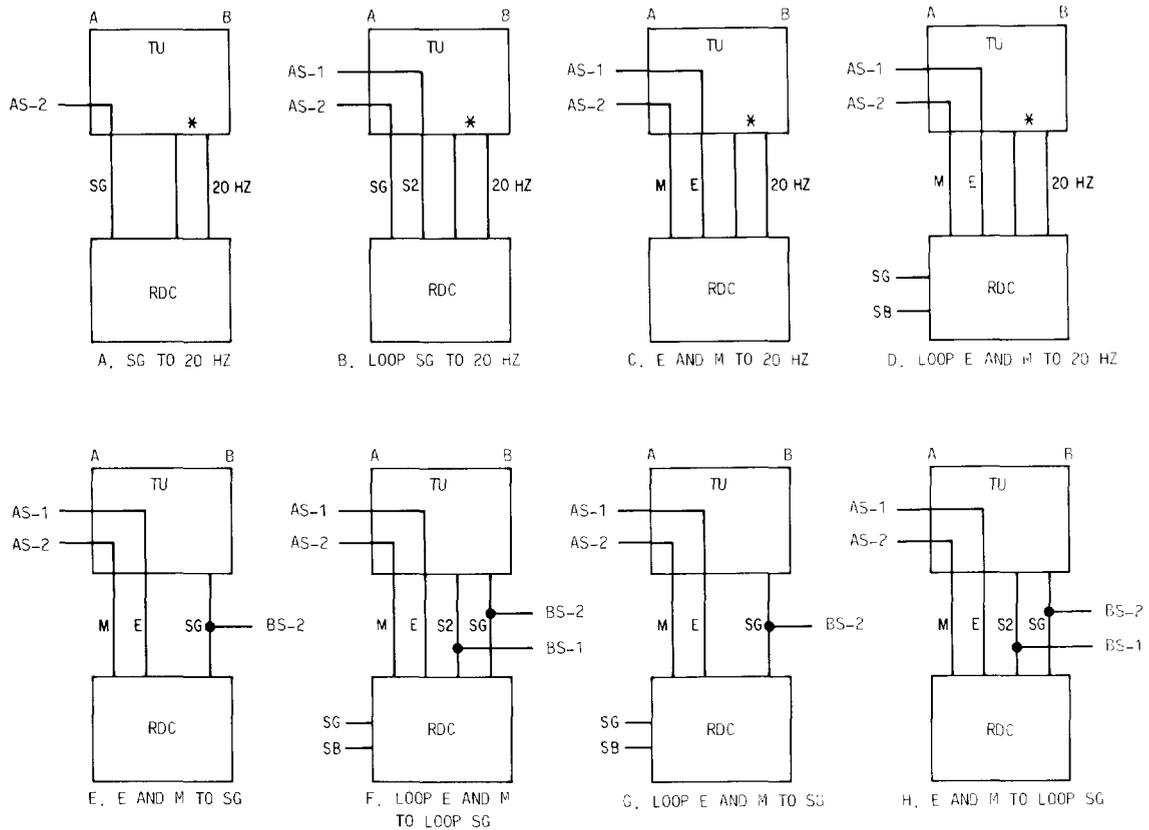
TABLE H

ELECTRICAL STATE OF CSR SIGNALING LEADS FOR VARIOUS OPERATING
MODES AND CIRCUIT CONDITIONS

CALL FROM B SIDE TO A SIDE

| MODE | CALL STATUS | INPUT (20HZ-RMS) | OUTPUT |
|---------------|----------------|--------------------------------|---------------------------------------|
| 20HZ-SG | IDLE BUSY | AB OR SX:0 AB OR SX:MIN 50V | SG:0 SG:≈ -48VDC |
| 20HZ-LOOP SG | IDLE BUSY | AB OR SX:0 AB OR SX:MIN 50V | SG:0 S2:0 SG:≈ -48VDC SG:GND |
| 20HZ-E&M | IDLE BUSY | AB OR SX:0 AB OR SX:MIN 50V | M:≈ -48VDC M:0 |
| 20HZ-LOOP E&M | IDLE BUSY | AB OR SX:0 AB OR SX:MIN 50V | M: SB: SHORT M:0 SB:≈ -48VDC |

Note: To determine the difference between a ground and zero volts, connect a voltmeter between pin 18 (chassis ground) and the terminal being tested. If the reading is zero, connect an ohmmeter between the same two points. If the reading is zero, ground is on the terminal being tested and, if an open is indicated, the terminal is at zero voltage.



NOTE:

THE LEAD DESIGNATIONS SHOWN BETWEEN THE TU AND RDC REPRESENT THE FUNCTIONAL NAME OF THE AS-1, AS-2, BS-1, AND BS-2 LEADS.

* - IN THE NORMAL MODE, 20 HZ RINGING IS APPLIED TO THE B-SIDE OF THE TU; IT IS APPLIED TO THE A-SIDE IN THE REVERSE MODE.

Fig. 2—RCSU Lead Designations

TABLE I

ELECTRICAL STATE OF RINGDOWN CONVERTER SIGNALING LEADS FOR
VARIOUS OPERATING MODES AND CIRCUIT CONDITIONS

CALL FROM A SIDE TO B SIDE

| MODE | CALL STATUS | INPUT | INPUT |
|----------------------|--------------|---|--------------------------------------|
| SG-20HZ | IDLE BUSY | SG:0 SG:≈ -48VDC | AB OR SX:0 AB OR SX:86V RMS |
| LOOP SG-20HZ | IDLE BUSY | SG:0 S2:0 SG:≈ -48VDC S2:GND | AB OR SX:0 AB OR SX:86V RMS |
| E&M-20HZ | IDLE BUSY | E:GND E:≈ -48VDC | AB OR SX:0 AB OR SX:86V RMS |
| LOOP E&M-20HZ | IDLE BUSY | E:GND SG:GND E:≈ -VDC SG:GND | AB OR SX:0 AB OR SX:86V RMS |
| E&M-SG | IDLE BUSY | E:GND E:≈ -48VDC | SG:0 SG:≈ -\$*VDC |
| LOOP E&M- LOOP SG | IDLE BUSY | E:GND SG:GND E:≈ -48VDC SG:GND | SG:0 S2:0 SG:≈ 48VDC S2:GND |
| LOOP E&M-SG | IDLE BUSY | E:GND SG:GND E:≈ -48VDC SG:GND | SG:0 SG:≈ -48VDC |
| E&M-LOOP SG | IDLE BUSY | E:GND E:≈ -48VDC | SG:0 S2:0 SG:≈ -48VDC |

Note: To determine the difference between a ground and zero volts, connect a voltmeter between pins 18 (chassis ground) and the terminal being tested. If the reading is zero, connect an ohmmeter between the same two points. If the reading is zero, ground is on the terminal being tested and, if an open is indicated, the terminal is at zero voltage.

TABLE J

ELECTRICAL STATE OF RINGDOWN CONVERTER SIGNALING LEADS FOR
VARUOUS OPERATING MODES AND CIRCUIT CONDITIONS

CALL FROM B SIDE TO A SIDE

| MODE | CALL STATUS | INPUT | OUTPUT |
|---------------------|----------------------|---------------------------------------|---|
| 20HZ-SG | IDLE BUSY | AB OR SX:0 AB OR SX:MIN 50V RMS | SG:0 SG:≈ -48VDC |
| 20HZ-LOOP SG | IDLE BUSY | AB OR SX:0 AB OR SX:MIN 50V RMS | SG:0 S2:0 SG:≈ -48VDC S2:GND |
| 20HZ-E&M | IDLE BUSY | AB OR SX:0 AB OR SX:MIN 50V RMS | M:≈ -48VDC M:0 |
| 20HZ-LOOP E&M | IDLE BUSY | AB OR SX:0 AB OR SX:MIN 50V RMS | M: SHORT SB: SHORT M:0 SB:≈ -48VDC |
| SG-E&M | IDLE BUSY | SG:0 SG:≈ -48VDC | M:≈ -48VDC M:0 |
| LOOP SG LOOP E&M | IDLE S2:0 BUSY | SG:0 SG:≈ -48VDC S2:GND | M: SHORT SB: SHORT M:0 SB:≈ -48VDC |
| SG-LOOP E&M | IDLE BUSY | SG:0 SG:≈ -48VDC | M: SHORT SB: SHORT M:0 SB:≈ -48VDC |
| LOOP SG-E&M | IDLE BUSY | SG:0 S2:0 SG:≈ -48VDC S2:GND | M:≈ -48VDC M:0 |

Note: To determine the difference between a ground and zero volts, connect a voltmeter between pins 18 (chassis ground) and the terminal being tested. If the reading is zero, connect an ohmmeter between the same two points. If the reading is zero, ground is on the terminal being tested and, if an open is indicated, the terminal is at zero voltage.