

# GBPPR 'Zine



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***"During the 2000 Republican convention in Philadelphia the [bomb] squad there recorded forty-eight 'hoax' devices. These had been placed by activists attempting to disrupt the proceedings. The devices look like bombs, were placed where bombs would have been placed, and had to be treated as such. Sometimes when one was opened up, a note that said 'Boom!' would be found"***

— Excerpt from *Bomb Squad: A Year Inside the Nation's Most Exclusive Police Unit* by Richard Esposito and Ted Gerstein. These are the kinds of childish activities Eric Corley defended in the pages of *\$2600 Magazine* in order to rile up his little kiddy following.

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# 10A Remote Switching System Maintenance / #1A ESS

## Software Description

BELL SYSTEM PRACTICES  
AT&T Co SPCS

SECTION 231-045-420  
Issue 1, November 1981

### 10A REMOTE SWITCHING SYSTEM MAINTENANCE SOFTWARE DESCRIPTION 2-WIRE NO. 1/1A ELECTRONIC SWITCHING SYSTEM

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**NOTICE**

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**1. GENERAL**

**INTRODUCTION**

- 1.01 The 10A Remote Switching System (RSS) maintenance software performs the maintenance function necessary to maintain a 10A RSS under control of a host No. 1/1A Electronic Switching System (ESS).
- 1.02 When this section is reissued, the reason for reissue will be given in this paragraph.
- 1.03 Part 12 of this section provides a defined list of the abbreviations and acronyms used herein.

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**PURPOSE OF THE RSS MAINTENANCE SOFTWARE**

1.04 The RSS maintenance software provides a No. 1/1A ESS Central Office (CO) with the capability to maintain the remote terminal (RT). This RT may be used as a CO replacement vehicle for a small community dial office or as a pair gain system to reduce the number of subscription pairs in the loop plant. Most of the maintenance functions for RSS lines are performed by the host ESS office.

**SCOPE OF SECTION**

1.05 This section provides an introduction to the RSS maintenance software operating in a No. 1/1A ESS. Information unique to a specific system is based on the 1E7 (No. 1 ESS) and 1AE7 (No. 1A ESS) versions of the generic program.

**2. PIDENT DESCRIBED IN SECTION**

2.01 Table A provides a pident-to-program number cross reference for the RSS pidents described in this document. Table A is not an exhaustive list of all RSS pidents, rather only those pidents which form the maintenance core of the RSS maintenance software are listed.

**3. FUNCTIONAL DESCRIPTION**

**GENERAL**

- 3.01 The RSS software provides a means of controlling a remotely located switching network. This system takes advantage of existing equipment and control capacity in an ESS to provide a more cost effective switching entity for central offices than provided by conventional stand-alone switches. While software controlling the RSS resides in the host ESS, the remote terminal, with its associated firmware, functions as an autonomous peripheral. A major advantage of this arrangement is that the complex tasks of call processing, using existing software facilities and features, are performed in the host ESS. RSS also furnishes a means of providing ESS services to customers served by electromechanical offices. As shown in Fig. 1, RSS consists of a host ESS office, a remote terminal, and interconnecting voice and data links. Note that a particular ESS may host one or more RSS.
- 3.02 The data links are used for communication between the ESS central control (CC) via the

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**TABLE A**  
**RSS MAINTENANCE PIDENTS**

PIDENT	TITLE	NO. 1 PR	NO. 1A PR
RSBC	RSS Broadcast Messages	1A620	6A620
RTTI	RSS TTY Interface Program	1A620	6A620
RDOC	RSS Circuit Disposition	1A626	6A626
RSAS	RSS Alarm Summary Report Program	1A659	6A659
RPIN	RSS Physical Initialization Program	1A662	6A662
RTTR	RSS TOUCH-TONE Receiver Diagnostic Program	1A837	6A837
<b>LINE MAINTENANCE</b>			
RLTD	RSS Local Test Desk	1A625	6A625
RLIT	RSS Line Insulation Test	1A628	6A628
<b>CHANNEL MAINTENANCE</b>			
CHDL	RSS Channel Maintenance Data Link Interface Program	1A603	6A603
CHNC	RSS Channel Control Program	1A603	6A603
CHND	RSS Channel Diagnostic Program	1A604	6A604
CHCS	Change State of RSS CREN Program	1A632	6A632
CHLS	RSS Channel List Program	1A632	6A632

peripheral unit controller and the microprocessor in the RT. Information such as line origination, acknowledgment, and status (RT and ESS), and network orders (ESS to RT) is passed via the data link.

4 or greater initialization, (b) problems in the RSS cause it to request an initialization, (c) whenever it is necessary to manually force an initialization, or (d) when the RSS recovers from a stand-alone state (cut off from host communication). Such an initialization is performed by pident RPIN.

#### 4. RSS PHYSICAL INITIALIZATION PROGRAM (RPIN)

##### GENERAL

4.01 It is necessary to initialize an RSS any time (a) the No. 1/1A ESS (host) performs a phase

4.02 The RSS initialization is a complex and intricate function that affects many areas of RSS

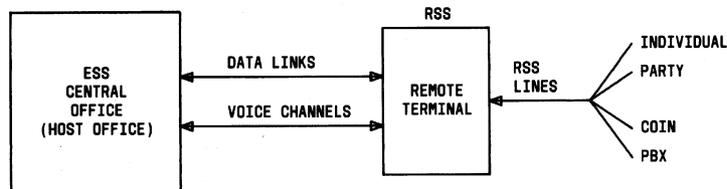


Fig. 1—RSS Block Diagram

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activity. The function directly interfaces with the ESS audits, RSS message routing, data link recovery function, and ROB activation. It directly affects these and many other areas of RSS.

**4.03** The RSS initialization function can be broken down into three separate yet interrelated functions. These functions are:

- Host initiated phases
- Remote initiated phases
- Stand-alone recovery.

#### HOST INITIATED PHASES

**4.04** Host initiated phases are RSS initializations that are caused by fault recovery actions taken by the ESS machine. They can occur automatically when the host executes phase 4 and 5 initialization, or manually by depressing the appropriate buttons at the master control center (MCC). Any host initialization which is greater than a phase 3 forces all RSSs attached to that host to execute an equivalent initialization action. An initialization of one or more RSS is requested during the host phase but performed outside of the host phase. This allows the signal processor (SP) time to start running (if it is an SP office) and the data links to be up and operational. These are necessary conditions for host-RSS communication.

**4.05** Initializations are forced on RSSs for only the more serious fault recovery actions. When the host initiates a phase 4 or phase 5 initialization, the RSSs that are attached to it must perform a transient clear initialization (Fig. 2). When the host initiates a phase 6 or phase 7 which represents stable clear actions (Fig. 3), the RSSs attached to it must also perform stable clear actions.

**4.06** When the host executes a phase that affects the RSSs attached to it, certain functions must be performed on the host's RSS software data base and related hardware before these RSSs can be initialized. These functions include the following:

- (1) Complete initialization of RSS call store in the host for each RSS to be initialized.
- (2) Each Primary Route table corresponding to an RSS to be initialized must have selected entries inhibited.

- (3) The RSS control words must be set up indicating the type of initialization and the RSSs to be initialized.

- (4) If recent change has been zeroed, it must be indicated in the first RSS control word.

- (5) The data links for each RSS must be initialized.

- (6) The isolate call processing bit must be set.

- (7) The RSS physical initialization routine must be activated.

**4.07** Audits 5P and 49 perform functions 1, 2, 4, and 6 above when they run inside the host phase. These audits initialize the host RSS call store data bases commensurate to the phase in progress.

**4.08** The data link recovery routines perform functions 3, 5, and 7. The RSS data links are initialized inside a host phase but the data link recovery actions do not reset the duplex link failure bit (which gets set when the data links drop off) until it receives a link restore from the peripheral unit controller (PUC). This message is received outside the host phase, and the RSS initialization cannot take place until after the duplex link failure bit has been cleared. The RSS initialization function uses the duplex link failure bit as an indication to abort an RSS initialization in progress when the data links drop off. Therefore it becomes necessary to perform each RSS initialization as the link restore is received for the data links of a particular RSS. Upon receiving the link restore, the data link recovery routines determine if the host has taken a phase in the last 60 seconds. If it has not it is assumed the RSS has already dropped into stand-alone and stand-alone recovery action must be initiated. If it has performed a phase within the last 60 seconds, then the appropriate bits in the RSS control words are set and the RSS physical initialization function is activated.

#### REMOTE INITIATED PHASES

**4.09** Remote initiated phases are those fault recovery actions which originate in the RSS. These initializations can be initiated in three different ways:

- (1) The RSS finds internal problems and requests initialization.

- (2) The reset button on the back of the RSS frame is depressed.

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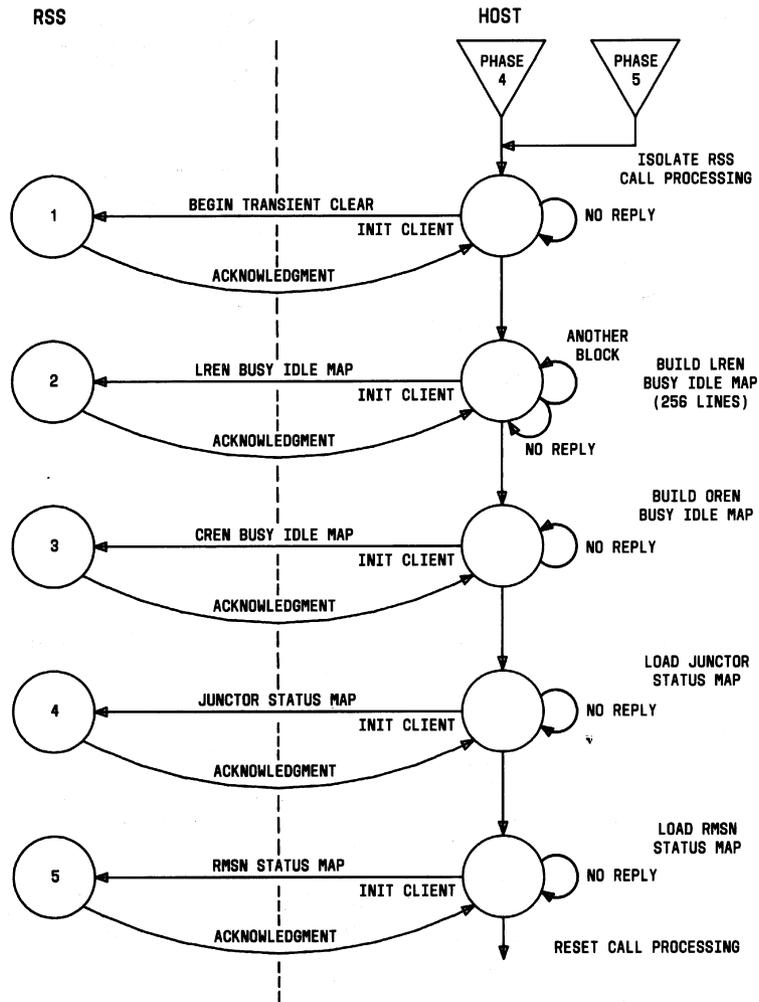


Fig. 2—Host Initiated Transient Clear

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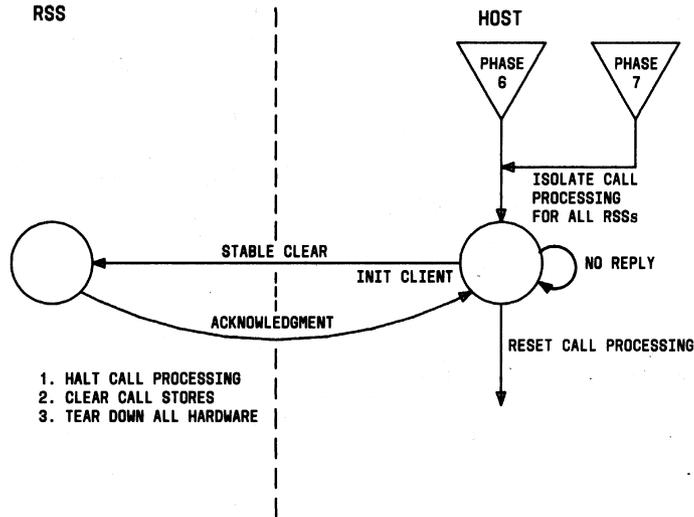


Fig. 3—Host Initiated Stable Clear

(3) An initialization TTY message is typed in at the host's maintenance TTY.

4.10 The first action can cause level 1 through 5 initializations, the second action causes a level 6 initialization, and the last action can cause level 1 through 6 initializations. The host only responds to the more serious initializations (4 through 6). An RSS level 4 initialization is a transient clear (Fig. 4) while levels 5 and 6 are stable clears (Fig. 5). When the RSS initiates a certain level of initialization, it sends a message to the host requesting to begin a phase. If the host is already initializing another RSS, it ignores the request; if not, it isolates call processing, prepares to receive data for initialization, and sends an acknowledgment to the RSS. When the RSS receives this acknowledgment, it will either send an LREN busy idle status map (for transient clear initialization) or an indication to begin stable clear. If the acknowledgment fails, the RSS will wait for a predetermined amount of time and resend the message. Functions 1, 2, 3, 6, and 7 (paragraph 4.06) which were once performed by audit 49, audit 5P, and the data link fault recovery routines must now be

performed by the RSS physical initialization function.

#### STAND-ALONE RECOVERY

4.11 RSS stand-alone recovery (Fig. 6) is necessary any time communication between the RSS and the ESS has been interrupted for a predetermined amount of time causing the RSS to fall into a stand-alone mode. When the RSS is in this stand-alone state, it can only complete intra-RSS calls. Since communication between the ESS (host) and the RSS has been interrupted, no inter-RSS calls can be made. When the RSS falls into a stand-alone mode, it performs a transient clear and forces on-hooks on all the RSS channels. The RSS will remain in stand alone until it receives a stand-alone inquiry message from the host.

#### 5. RSS REMOTE TERMINAL CIRCUIT DISPOSITION PROGRAM (RDOC)

##### GENERAL

5.01 The RDOC pident is responsible for removing peripheral circuits from service and also re-

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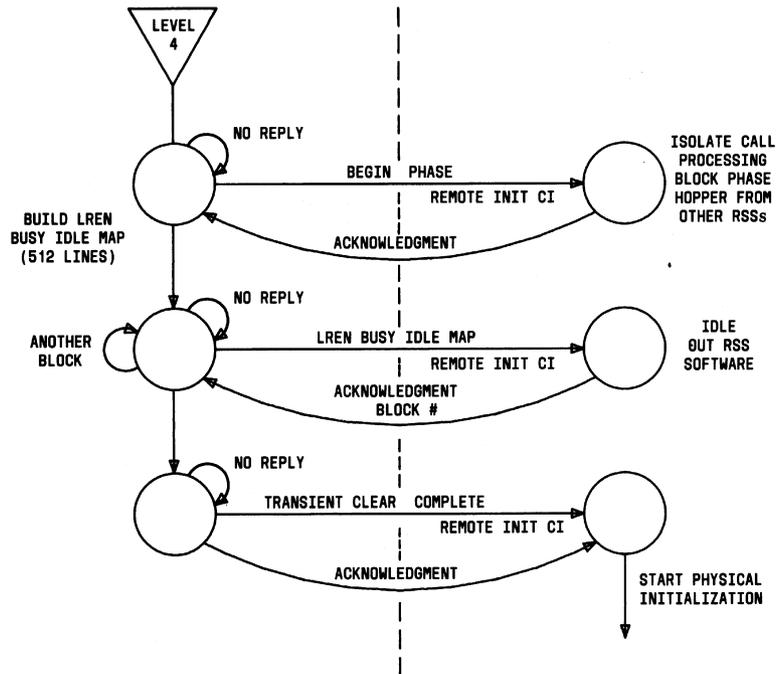


Fig. 4—Remote Level 4 Initialization (Transient Clear)

storing peripheral circuits to service. The removal from service requests may come from the RSS remote terminal (error analysis, quick check, the operating system, or the maintenance panel) or from a manual request via the TTY. The restoral to service requests are generated only from the maintenance panel or the TTY. Another function of RDOC is to provide the capability of printing the out-of-service lists of the various peripheral circuits upon request.

**5.02** The circuit disposition programs reside in both the host No. 1/1A ESS and the RSS remote terminal. The reason for this is the call processing programs must be blocked from selecting out-of-service equipment for use. For universal service circuits (USCs) and metallic access buses, the RSS remote terminal maintains the busy/idle and out-of-service states. For all other peripheral circuits, such as A links, channels, junctors, lines, receiver off-hook

(ROH) tone circuits, and the maintenance test circuits, the busy/idle and out-of-service states are maintained in the No. 1/1A ESS. The RDOC pident is responsible for all of these circuits except for channels that are controlled by the channel maintenance programs.

**5.03** Removal from service requests may be denied for two reasons. First of all, for each type of peripheral circuit except for lines, there exists an out-of-service threshold limit which prevents automatic removal requests by error analysis or quick check from removing more than a given number of circuits from service of any one type. The second reason is the particular circuit may remain busy. There is the capability of camping on a busy circuit so when the circuit is idled, it may be removed from service. However, a circuit may only be camped on for a maximum of 5 minutes at any one time.



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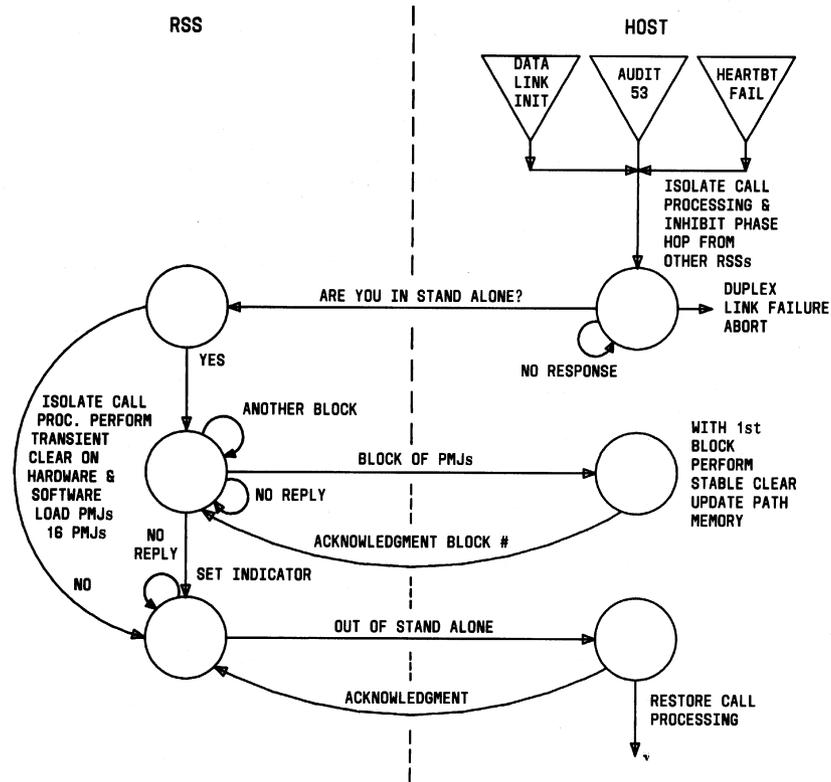


Fig. 6—RSS Stand-alone Recovery

**5.06** The way a circuit is marked as being out of service depends upon the type of circuit. A links removed from service are kept on a list that allows up to 32 entries per module. Also, the busy/idle bit for the A link is set to busy which prevents call processing from selecting that A link for use. Junctors have their own path memory word that is set to out of service, and like A links, the associated busy/idle bit is set to busy. The ROH tone circuits have their own path memory word that is set to out of service, and the ROH tone circuit is also removed from the idle linked list. Universal service circuits and metallic access buses are treated the same in the

RSS remote terminal. The busy/idle bits are set to busy as are the associated maintenance (out of service) bits. Lines have their own path memory word that is placed in the high and wet state with the ignore bit set. A data link message is also sent to the RSS remote terminal which informs the RSS to mark the path memory word to the ignore state and to turn off battery feed for the line. The maintenance test circuits (automatic line insulation test, miniresponder, remote line test, line test access bus, and the channel test access bus) simply have out-of-service bits that are set to indicate the circuit is out of service.

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#### LOCAL TEST DESK INTERFACE

**5.07** The RDOC and RSS local test desk (RLTD) may request control of a line at the same time or while either client has control of a line. Since the local test desk has a higher priority than circuit disposition, the following procedures have been provided. For both single line and line board removals, if the local test desk has control of the line, the line will not be removed from service. For a single line removal, if the line is being camped on by circuit disposition and the local test desk requests control of the line, the camp-on bit for the line is cleared to prevent the idle report from entering circuit disposition. When the 5-minute timer expires, a line removal stopped busy message is printed. For line board removal, if a line is being tested by the local test desk, the line busy counter is incremented to prevent the board removal completion message from being sent to the RSS remote terminal and the camp-on bit for the line is not set to prevent the idle report from entering circuit disposition. If the line should be removed from service, the request will have to be repeated at a later time.

#### 6. RSS ALARM SUMMARY REPORT PROGRAM (RSAS)

**6.01** Pident RSAS provides the alarms summary report of RSS scan points by sending a copy (current or initialized) of its host remote miscellaneous scanner number-map to each equipped RSS. When the RSS receives the map, it assumes the new map is the correct one. Then the two maps are compared (the new with the old) and the difference is sent to the host as an alarm report message at the TTY.

#### 7. RSS TTY INTERFACE PROGRAM (RTTI)

**7.01** This pident consists primarily of the programs necessary to interface the No. 1/1A ESS host TTY programs with the 10A RSS remote terminal over the connecting data link. Three major components of code are included and are described in the following paragraphs.

**7.02** The first component takes the TTY input data and does any necessary preprocessing (primarily encodes strings of ASCII characters). Then it forms the data link header and the message header, and loads the message onto the data link for final processing at the RSS remote terminal.

**7.03** The second component takes the data transmitted over the data link from the RSS remote

terminal to the host and places it into temporary ESS memory. This transfer involves a small amount of data manipulation before program control is passed to the proper output program.

**7.04** The third component of this pident performs any additional data formatting required for the TTY output message and executes the print macro. This component also is the interface between pident RTTI and the TTY output programs.

#### 8. RSS BROADCAST MESSAGES PROGRAM (RSBC)

**8.01** The function of pident RSBC is to transmit a requested message to all assigned RSSs.

**8.02** The following is a list of the messages that can be sent to the RSSs.

- (a) RSBCLL—This entry requests line load control messages to be broadcast.
- (b) RSBCCCT—This entry requests cutover control messages to be broadcast.
- (c) RSBCTM—This entry requests a time of day message to be broadcast.

#### 9. RSS LINE MAINTENANCE

##### REMOTE LINE INSULATION TEST (RLIT)

**9.01** The purpose of pident RLIT is to interface between pident ALIT and the remote terminals. Since the remote terminals have their own ALIT circuits (Automatic Line Insulation Test), the ALIT pident does not do the actual testing but instead controls the testing through pident RLIT. All RT lines are tested through RLIT.

**9.02** While ALIT processes the input message, the control action parameter is examined to determine if the test is for RSS or the host.

**9.03** An additional check is necessary for those cases where the specified input is a directory number (DN). Since the input message associated with DNs was not modified, a check for RSS is made after the DN translation (TRDWBM).

**9.04** Translation TRRIAC is the RSS information translation. It provides information such as: class of service, plug up, or service observed. Transla-

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tion TRDWBM gives DN information for the line remote equipment number (LREN). These two are needed in order to determine the DN of the LREN so the DN can be printed when an LREN fails a given test.

**9.05** The following types of lines are not tested:

- Centrex attendant console
- Plug up
- Ground start.

In addition if the request is to perform a sequential test, the following types of lines are not tested:

- Service observed
- Service order
- PBX multiple hunt
- Unassigned or inactive.

**9.06** For lines found to be testable, a data link message is generated and two 16-bit words are loaded into a remote order buffer (ROB) for execution at the RSS. An external channel data link message, subroutine CHDLMG, from pident CHDL is used to generate the data link orders and utilize the macros to hunt a ROB and activate ROB (AROB). Upon completion of the test at the RSS, it returns a 16-bit data link message.

**9.07** After the RSS has completed the test and returned the data link message to the interface package, the RLIT program will analyze the data and return to ALIT (host).

**9.08** During sequential testing a message is only outputted when the line fails a test. However if a test for a single LREN or DN is processed, the result of that test, pass or fail, will be outputted.

### RSS LOCAL TEST DESK (RLTD)

**9.09** Pident RLTD provides the state control for establishing various connections between the Remote Telemetry System (RTS) trunk from the local test desk to the remote line test (RLT) circuit in the 10A RSS (see Fig. 7 through 11). Once the connections are established, the two systems interact to perform the local test desk functions on remote lines.

**9.10** Remote line testing requires five stable states.

- (1) STATE 0—Idle no connections.
- (2) STATE 1—RLT connection.
  - (a) LTD trunk to any channel (channel A) between RSS and host ESS. (ESS connection.)
  - (b) Channel A to RLT circuit connection then REN to metallic access bus followed by metallic access bus to RLT circuit connection. (RSS connection.)
- (3) STATE 2—Line Ferrod Test State (Fig. 10).
  - (a) The initial RLT connection is retained.
  - (b) Customer dial pulse receiver (CDPR) to another RSS to host channel (channel B) connection with CDPR in the idle state. (ESS connection.)
  - (c) Channel B to REN (RSS connection) with REN in transfer supervision state to CDPR. Scans for origination at 400-ms rate.
- (4) STATE 3—TOUCH-TONE Service Equipment Test State (Fig. 11)
  - (a) LTD trunk to Channel A disconnect.
  - (b) LTD trunk, to port 0 of the station ringer TOUCH-TONE service equipment test circuit.
  - (c) PORT 1 of the station ringer TOUCH-TONE service equipment test circuit to another channel (channel B) for ESS connection.
  - (d) Disconnect channel A from RLT (RSS connection).
  - (e) Channel B to REN (RSS connection).
  - (f) RLT to REN—transfer to low power state.
- (5) STATE 4—Failure Tone State. LTD trunk to tone circuit (ESS connection).

**9.11** The following paragraphs describe the state transitions which occur with a specified stimulus.

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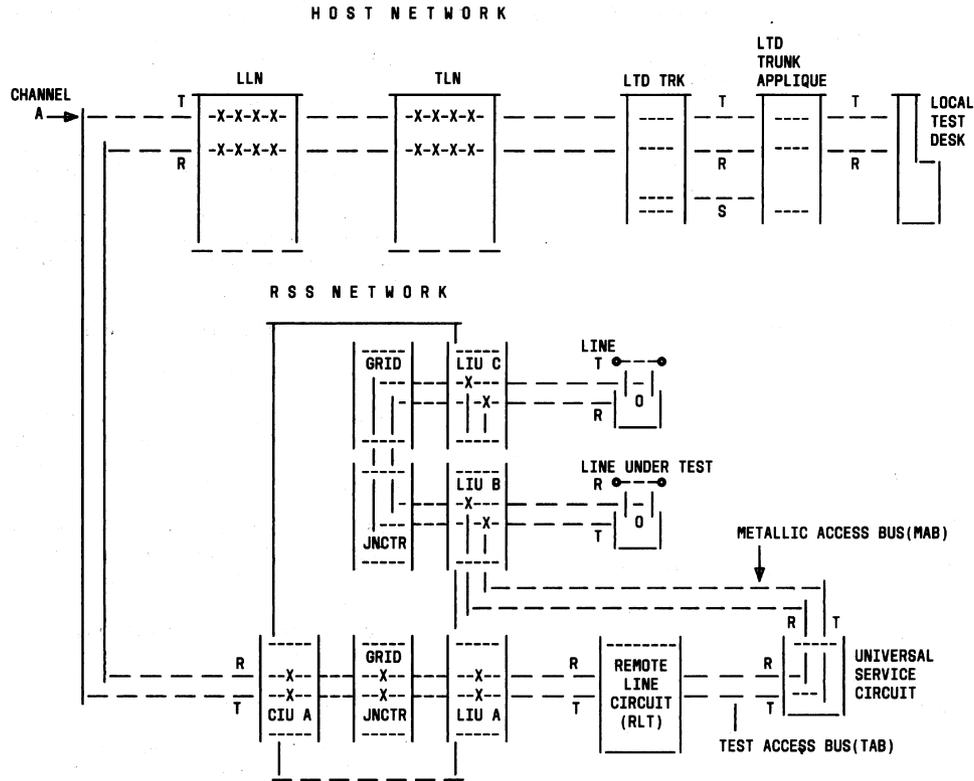


Fig. 7—Local Test Desk Intra-RSS Monitor Connection

**9.12** Idle to RLT occurs when the KP key is restored at the LTD. This is an origination. The craftsman first operates the KP key, then keys in the directory number to be tested and releases the KP key. At this point STATE 1 is established and testing can begin. The KP is restored without correct number of digits keyed; then the local test desk task is terminated.

**9.13** The RLT to line ferrod test (LFT) occurs when the 3WO key is operated while in the RLT state. Once the 3WO key is operated, an origination is applied on the line under test by the RLT circuit. A 400-ms repetitive scan is performed on the line fer-

rod's supervised CDPR scan point until the CDPR supervisory scan point saturates. If the CDPR scan point saturates, dial tone is connected to the line and back to the LTD. At this point the tester can use the talk key to listen for dial tone. Releasing the 3WO key terminates the test, dial tone is removed from the trunk, and the ferrod is removed from the line. When dial tone is not returned to the tester, the line ferrod test has detected that the line cannot originate. In order to repeat the test, operate the 3WO key again.

**9.14** The RLT to TOUCH-TONE service equipment test (TTT) occurs when the TT key is operated while in the RLT state. Operating the TT key allows

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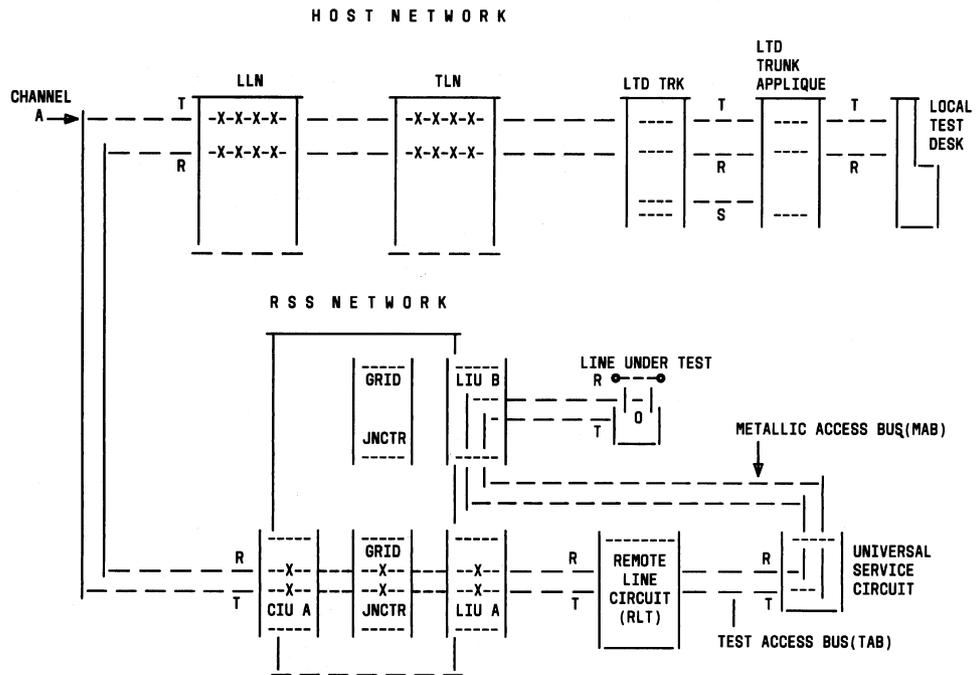


Fig. 8—Local Test Desk Origination Connection

the craftsperson at the LTD and another person or craft at the station test to perform the TTT.

**9.15** The LFT to RLT occurs when the 3WO key is released while in the LFT state. After performing origination testing, the craftsperson must return to the RLT state by restoring the 3WO key.

**9.16** The TTT to RLT occurs when the TT key is restored while in the TTT state. After perform-

ing the TTT, the craftsperson can return to the RLT state by restoring the 3WO key.

**9.17** Any state to failure tone state will occur if any failure occurs (POB or ROB failures, network blockages) while in any state or while executing a state transition, connections are torn down, and the appropriate failure is returned to the craftsperson.

**9.18** The following are the different types of failures and the corresponding tones.

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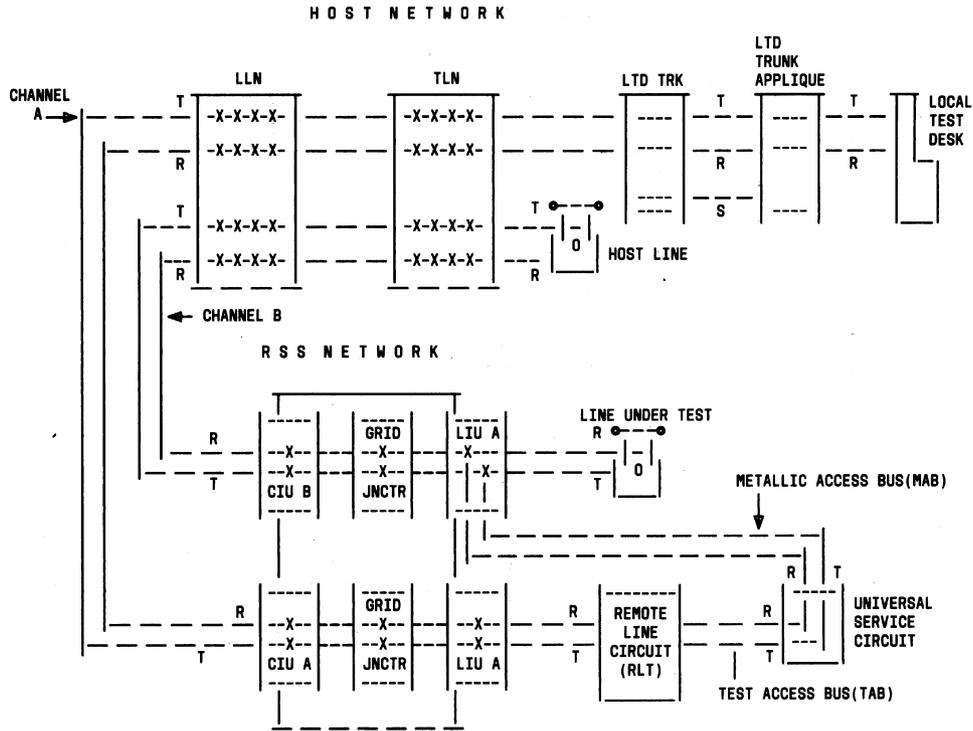


Fig. 9—Local Test Desk Host-to-RSS Monitor Connection

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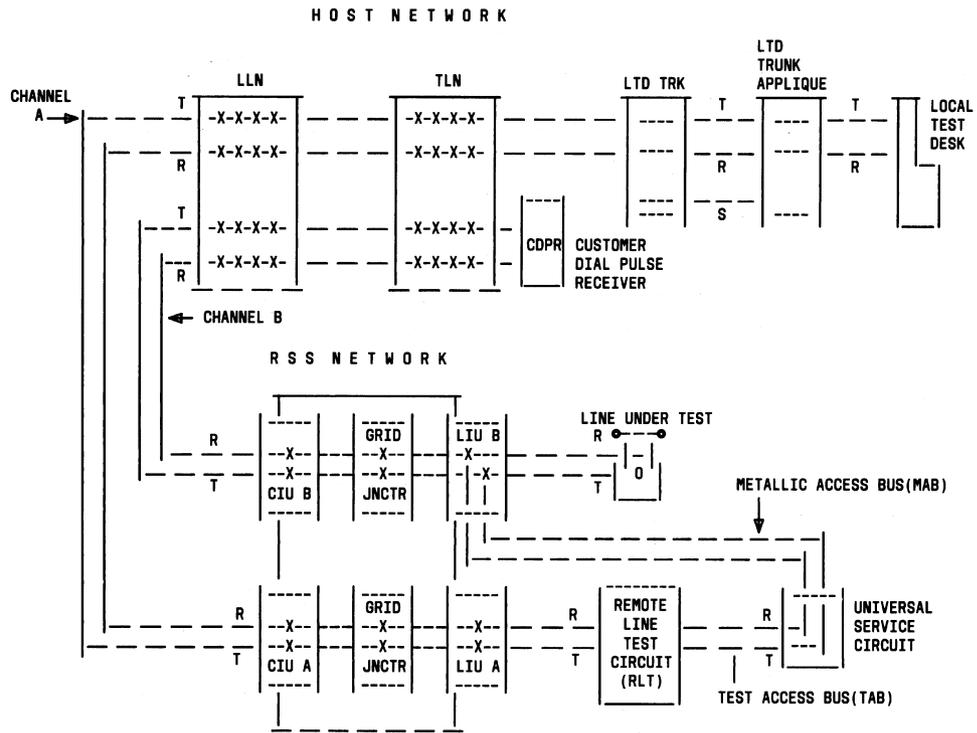


Fig. 10—Line Ferrod Test Connection

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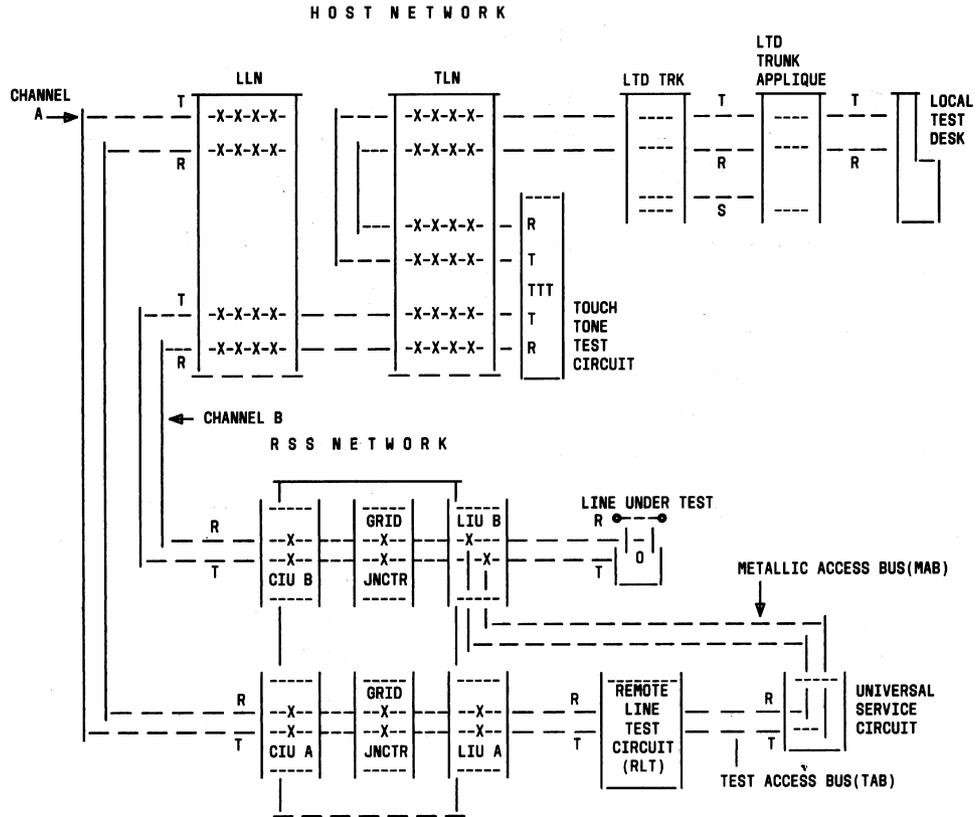


Fig. 11 — TOUCH-TONE Service Equipment Test Connection

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TYPE OF FAILURE	TYPE OF TONE
CIN Blockage	60 IPM Low Tone
POB Failure	120 IPM Low Tone
ROB Failure	120 IPM Low Tone
Test Access (Busy)	60 IPM Low Tone

**9.19** Failure tone to idle occurs when software failure action is taken. This action is handled in pident LTDK.

### 10. RSS CHANNEL MAINTENANCE

#### RSS CHANNEL CONTROL PROGRAM (CHNC)

**10.01** Pident CHNC is the library for subroutines used by various RSS pidents.

#### RSS CHANNEL DIAGNOSTIC PROGRAM (CHND)

**10.02** Pident CHND handles channel diagnostics for the RSS. The diagnostic program attempts to (1) verify that a unit is free of faults, and (2) identify the faulty replacement entity (ie, circuit packs) of a faulty unit. The diagnostic procedure is accomplished by applying inputs to a unit, observing the output from the unit, comparing the unit's output with known correct outputs, and associating the failure pattern with faulty circuit pack(s). Also included in the RSS channel diagnostic pident CHND is a diagnostic program for testing the RSS loop-around trunk circuitry.

**10.03** The loop-around trunk configuration consists of two trunk circuits, both of which are either SD-1A166-D2 or SD-1A166-05, wired back-to-back via the miscellaneous distribution frame (MDF). The purpose of the loop-around feature is to allow existing trunk maintenance software to treat a line (CLEN) as if it were a trunk.

#### RSS CHANNEL MAINTENANCE LINK INTERFACE PROGRAM (CHDL)

**10.04** The purpose of pident CHDL is to provide host ESS-to-RSS communication for the host line and channel maintenance software. Resource contentions permitting, this routine transmits orders from the host to the RT and returns to the client with the response, if any, from the RSS. CHDL keeps track of the hardware states of the necessary test circuits at the RT and the client need not know their present hardware or software state.

#### RSS CHANNEL LIST PROGRAM (CHLS)

##### A. General

**10.05** The CHLS program is a collection of maintenance subroutines that interface with various RSS channel lists. The interfaces include the channel maintenance list (CML) and the channel maintenance list for audits (CMLA) administration. CHLS also includes routines which administer the channel maintenance usage counts, interface with remote terminal error analysis for channels, and performs channel automatic progression testing.

##### B. CML Administration

**10.06** The channel maintenance list is a special camp-on list for system requested diagnosis of suspected channels. Channels are placed on the CML by call processing programs when they suspect a channel is not properly passing supervision; by the POB failure action program (NMFL) when a channel is implicated in a hardware failure; by the remote terminal error analysis programs; and by the CMLA processing program when a channel has been involved in an audit failure. The CML processing program gets a periodic entry to monitor the channels on the list. When one is found to have become traffic idle, it is seized for diagnosis. If the channel fails two successive diagnostics, it is removed from service (or, if the AML has been reached, the channel is restored to service and a minor alarm). The routines that interface with the CML are the following:

- (a) CHPCML—Puts XCREN on CML and starts CML processing
- (b) CHNCML—Processes the XCRENs on the CML
- (c) CHCMLC—Searches for and removes an XCREN on the CML, or only searches and indicates if found.

##### C. CMLA Administration

**10.07** When an RSS channel is involved in an audit failure (has invalid path memory, inconsistent LEN and CREN states, etc), the current hardware state of the channel is unknown. Also, the audit failure may be an indirect symptom of a hardware problem since failure legs tend to be less well debugged than the successive legs. The CMLA is the

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resting place for channels that have failed an audit but have not been idled. The CMLA processing routines cause the channels on the CMLA to be blind-idled, and then places them on the CML for diagnosis. The following routines interface with the CMLA:

- (a) CHCMLA—Processes the XCRENs on the CMLA by blind idling them at the remote end and afterwards attempts to put the XCRENs on the CML via CHPCML.
- (b) CHRCLA—Removes first XCREN from CMLA and decrements the CMLA counter. Checks are made on the XCREN that is removed, and on the one that replaces it as first XCREN on the CMLA. If the check fails, the head cell and counter are zeroed.
- (c) CHPLST—Puts an XCREN on the CMLA, increments the CLMA counter and sets the main program flag assigned to CMLA processing.
- (d) CHLLST—Searches for but does not remove XCREN from CMLA. This routine also audits the CMLA and clears the head cell and counter if any discrepancies are found.
- (e) CHRLST—Searches for and removes the specified XCREN from the CMLA if found.
- (f) CHLIST—See PR-1A632 for list of functions (administers the CLN-LIST-AAA. input message).

#### D. Maintenance Usage Count Administration

##### Increment TUC and Decrement MUC

**10.08** A client enters routine CHITUC to increment the traffic usage counter (TUC) by 1 and decrement the maintenance usage counter (MUC) by 1 when an RSS channel goes from locked-out to active. The RSS group head cell contains the TUC and MUC counters. If the channel goes idle routine RTCKIL in program RTAD will decrement the TUC by 1. The number of idle channels plus TUC plus MUC should equal the number of RSS channels in the RSS group.

##### Increment MUC and Decrement TUC

**10.09** Routine HIMUC is entered to increment the MUC by 1 and decrement the TUC by 1 when

an RSS channel goes from active to locked-out. When an RSS channel is removed from the idle link list, the TUC is incremented by 1. When an RSS channel is restored to the idle link list, the TUC is decremented by 1. The total number of channels in an RSS group is equal to the number of idle channels plus TUC plus MUC.

#### Check Automatic Maintenance Limit (AML)

**10.10** Routine CHTOAD determines if the specified RSS group (determined from inputted XCREN) is at or exceeding the AML. Routine CHTOAD also will transfer to the client's return address plus 1 if the AML is not exceeded or transfer to the client's return address plus 0 if the AML is reached or exceeded.

#### E. Remote Terminal Channel Error Analysis Interface

**10.11** When the RSS error analysis routine reaches the error limit for an RSS channel, the error analysis routine sends a data link message to pident RDOC, which in turn enters CHNLMF. If the channel is idle, routine CHNLMF will either lock-out the channel or put it on the CML to be diagnosed.

#### F. Channel Automatic Progression Testing (APT)

**10.12** Channel automatic progression testing begins at 1:00 am on Monday morning. Starting with the first assigned channel in the smallest assigned RSS group member number, APT will diagnose idle RSS channels until 5:00 am. If testing has not completed, it will resume at 1:00 am the next morning and terminate at 5:00 am unless testing has completed earlier. This continues each morning at 1:00 am until the last assigned XCREN in the largest assigned RSS group member number has been diagnosed. When the last channel has been diagnosed, automatic progression testing terminates until the following Monday morning. If a channel fails two consecutive tests, it will be locked out unless the AML for that RSS group would be exceeded. Otherwise, it remains in service.

#### CHANNEL STATE OF RSS CREN PROGRAM (CHCS)

**10.13** Pident CHCS provides routines necessary in administering the software change in state of a CREN circuit. There are three main routines in CHCS that are used to change the state of a CREN (CHOFFL, CHCAMP, and CHREST/CHCRES).

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**Note:** Some clients do not call these routines directly. Instead the associated routines in pident TNCS are called (TNOFFL, TNCAMP, and TNREST).

**10.14** Before changing the state of a CREN, it must be off all lists or it must be in the process of being restored after being traffic busy. The program unit Dispose of Maintenance Busy CRENS (routine CHREST) is used to dispose of a maintenance busy CREN (locked-out, put on CML, made active, or high and wet).

**10.15** Routine CHOFFL has been provided to remove the CREN from any specified states. The routine may also be used to only determine the current software state of a CREN circuit without removing it from any list. If the CREN is traffic busy, it cannot be removed from any maintenance state that it is currently in. A separate return (client return address plus 1) is given to the client if the CREN is found to be traffic busy.

**10.16** If the CREN is in an invalid state (eg, PMR code indicates idle, but not on idle list), the client is notified by another return (client return address plus 0) and/or a bit in the output set up by the routine.

**10.17** If the CREN is in a valid condition and the client requested only the state of the CREN, the state of the CREN is put in the Y-register and G6state, and a return is made to the client at their return address plus 2.

**10.18** If the client requested that the CREN be removed from specified states and the CREN is in one of the states specified on input, then CREN is removed from the state that it is in and the PMR word is zeroed. The original maintenance state of the CREN is preserved by setting the remote maintenance busy bit if the CREN was locked out.

**10.19** If the CREN was not originally locked out, the PMR word is set to indicate that it is off all lists. A return address is made to the client return address plus 2 with the state of the CREN in the Y-register and G6state. Several error conditions can occur which will prevent routine CHOFFL from performing its requested task. Those error conditions are listed in the functional description for program unit CHOFFL.

**10.20** After the CREN has been removed from all states or found to be traffic busy by routine

CHOFFL or is known to be traffic busy, it may be camped on for the desired maintenance state. Routine CHCAMP has been provided to perform this function. The routine is supplied the requested state in the form of a camp-on code and the origin or source of the request in the form of a source code. The routine determines the actions necessary in performing the camp-on. This may include setting the remote maintenance busy bit and entering the appropriate information in the R1CAMP list.

**10.21** After the CREN has been camped on, it may be put in the desired state immediately if the CREN was not found to be traffic busy by calling routine CHREST. If the CREN is traffic busy, no action can be taken on the CREN until it is no longer traffic busy. When a traffic busy CREN has been camped on to go to a maintenance state, CHCRES is entered via routine RTCKIL in pident RTAD, when the CREN is restored after disconnect on the call. Routine CHREST disposes of the CREN according to information, if any, contained in the camp-on list (R1CAMP), CML, and the remote maintenance busy bit.

**10.22** The maintenance usage and traffic usage counters are incremented or decremented according to the original and final state of the CREN. If the CREN was camped on with information in the R1CAMP list, an output message is printed if the source is other than G6NPRT (no-print). This message is printed when the state of an RSS channel is changed. The message can occur in response to a T-CLN message, actions taken at a TLTP/STTP/MTTP, a system requested diagnostic, or a Centralized Automatic Reporting on Trunks (CAROT) or Remote Office Test Line (ROTL) system test set remote request.

**10.23** After the CREN has been put into the requested state by CHREST, a return is made to the client.

### 11. RSS TOUCH-TONE (SERVICE EQUIPMENT) RECEIVER DIAGNOSTIC PROGRAM (RTTR)

**11.01** Pident RTTR provides the diagnostic program with phase two of the RSS tone/TOUCH-TONE service equipment board diagnostic. This diagnostic consists of two phases: Phase one diagnoses all of the circuit packs except the TOUCH-TONE service equipment receiver circuit (tone sources and network) and runs the diagnostic in the RSS remote terminal, while phase two diagnoses the TOUCH-TONE service equipment receiver circuit

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and is controlled by the host programs of MAC II. A path is set up between a TOUCH-TONE service equipment receiver test set in the host and the TOUCH-TONE service equipment receiver under test in the remote terminal. A sequence of test tones are sent by the test set and collected by the host for analysis. The process is repeated until a failure is encountered or until all tests have been run. A TTY message detailing the results of the diagnostic is printed and the test is terminated.

### 12. ABBREVIATIONS AND ACRONYMS

12.01 The following abbreviations and acronyms apply to this section.

ALIT	Automatic Line Insulation Test
AML	Automatic Maintenance Limit
APT	Automatic Progression Testing
CC	Central Control
CDPR	Customer Dial Pulse Receiver
CML	Channel Maintenance List
CMLA	Channel Maintenance List Audit
CO	Central Office
CREN	Channel Remote Equipment Number
DN	Directory Number
ESS	Electronic Switching System
LFT	Line Ferrod Test
LREN	Line Remote Equipment Number
MTTP	Manual Trunk Test Panel
MUC	Maintenance Usage Counter
POB	Peripheral Order Buffer
POTS	Plain Old Telephone Service
PUC	Peripheral Unit controller
RTL	RSS Local Test Desk

RLT	Remote Line Test
ROB	Remote Order Buffer
ROH	Receiver Off-hook
RSS	Remote Switching System
RT	Remote Terminal
RTS	Remote Telemetry System
SP	Signal Processor
STTP	Supplementary Trunk Test Panel
TLTP	Trunk and Line Test Panel
TTT	TOUCH-TONE Service Equipment Test
TUC	Traffic Usage Counter
USC	Universal Service Circuit

### 13. REFERENCES

#### BELL SYSTEM PRACTICES

13.01 Consult the following references for further information.

- (a) Section 231-037-022—No. 10A Remote Switching System Interface Description and Maintenance Consideration—2-Wire No. 1/1A Electronic Switching System
- (b) Section 231-045-153—Operation with Remote Switching System Feature—2-Wire No. 1/1A Electronic Switching System
- (c) Section 231-045-235—Trunk and Line Test—Software Subsystem Description (SSD)—2-Wire No. 1/1A Electronic Switching System
- (d) Section 231-048-346—Recent Change Implementation Procedures for Remote Switching System (RRS)—2-Wire No. 1/1A Electronic Switching System
- (e) Section 231-049-310—Remote Switching System Remote Terminal Maintenance from Host—2-Wire No. 1/1A Electronic Switching Systems
- (f) Section 231-053-000—RSS Interface (TOP) Maintenance From Host—No. 1/1A Electronic Switching System.

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**OTHER**

- (a) RSS PIDENTs (See Table A)
- (b) IM-6A001 TTY Input Message Manual
- (c) IM-1A001 TTY Input Message Manual (No. 1 ESS)
- (d) OM-6A001 TTY Output Message Manual
- (e) OM1-1A001 TTY Output MESSage Manual (No. 1 ESS).

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21 Pages

# Teletypewriter Facility Loop Tests / #1 ESS

BELL SYSTEM PRACTICES  
AT&T Co Standard

SECTION 231-003-501  
Issue 6, September 1980

## TELETYPEWRITER FACILITY

### LOOP TESTS

#### NO. 1 ELECTRONIC SWITCHING SYSTEM

	CONTENTS	PAGE	
1. GENERAL		1	Since this is a general revision, arrows ordinarily used to indicate changes have been omitted.
2. APPARATUS		3	This reissue does not affect the equipment test list (ETL).
3. PREPARATIONS		3	1.03 The TTY communicates with the ESS through TR units (SD-1A121-01, SD-1A121-02, SD-1A147-01, or SD-1A147-02.) A loop jack (Fig. 1) per channel is provided for connecting test apparatus.
4. METHOD		4	1.04 The 35-type TTYs are designed to print correctly with 38 percent bias and 35 percent end distortion. The TR units accommodate 45 percent bias and 45 percent end distortion.
1. GENERAL			1.05 Normal TTY and loop routine maintenance would be adequate for the ESS TTY loops under normal power conditions; however, when the TTYs are switched to emergency ac power supply, significant impairment can occur. A frequency shift of 2 Hz can cause as much as 26.6 percent distortion; therefore, the loop <i>must</i> be maintained within tolerances to assure trouble free operation under emergency conditions.
1.01	This section describes test procedures to maintain the teletypewriter (TTY) loops used in the 2-wire No. 1 Electronic Switching System (ESS), 4-wire No. 1 ESS, and No. 1 ESS Arranged with Data Features (ADF). The TTY loops covered are those loops that communicate with the ESS programs and that are used for the administration of the system.		1.06 <b>Lettered Steps:</b> A letter a, b, c, etc, added to a step number in Part 4 of this section, indicates an action which may or may not be required depending on local conditions. The condition under which a lettered step or a series of lettered steps should be made is given in the ACTION column, and all steps governed by the same condition are designated by the same letter within a test. Where a condition does not apply, all steps designated by that letter should be omitted.
1.02	This section is reissued to:		1.07 The following abbreviations are used in this section:
(a)	Add the J79911NA (911NA) data set in Paragraph 2.01.		ADF Arranged with Data Features
(b)	Change the member number for the remote maintenance teletypewriter from 08 to 12 as required for CTX-8 and later generics. This number is used in TTY-DGN and TTY-MAINT messages.		
(c)	Change the MCC-BEGIN-4. message to RT-MSG-REM.		
(d)	Change Steps 10 and 12 to show that they apply when testing maintenance TTYs or maintenance monitor loop TTYs associated with SD-1A121-01 or SD-1A121-02 TR units. This change affects almost all of the optional condition letters that follow the step numbers.		

**NOTICE**

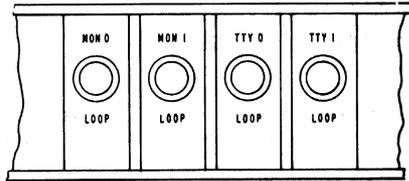
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SD-1A121-01

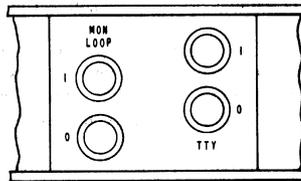
LEGEND:



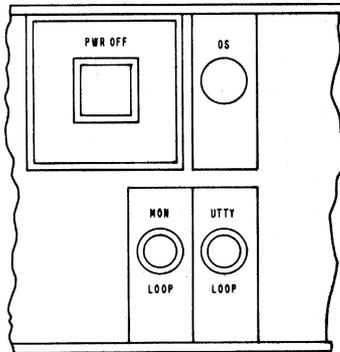
LAMP



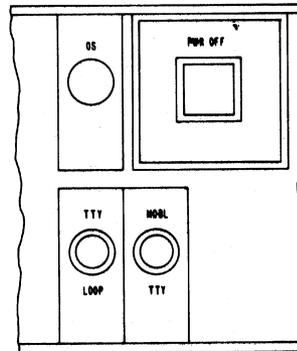
LAMP/KEY



SD-1A121-02



SD-1A147-01



SD-1A147-02

Fig. 1—Teletypewriter Transmit-Receive Unit Loop Jacks

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DTS	Data Set	generator and a distortion measuring set. (Calibration of the test set may be found in Section 103-813-100 and 103-813-110, respectively.
ESS	Electronic Switching System	
Hz	Hertz	<b>2.02</b> Patching cord 2P4C, P2B cord, 6 feet long, equipped with two 310 plugs.
MCC	Master Control Center	
TR	Transmit Receive	<b>2.03</b> Patching cord 2P30B, P2CP cord, 6 feet long, equipped with one 347B plug and one 310 plug.
TTY	Teletypewriter	

**2. APPARATUS**

- 2.01** J79911A (911A) or J79911NA (911NA) data set (DTS) which contains a test sentence
- 2.04** Five patching cords 1W13A, 3 feet long, each equipped with two 360A tools and two KS-6278 connecting clips.

**3. PREPARATION**

STEP	ACTION	VERIFICATION
1	Place 911A DTS near TR unit of loop to be tested.	
2	At DTS— Insert 8-11 matrix card J79911BF L1.	
3	Set following switches:  On Test Sentence Generator—	

SWITCH	SET TO FUNCTION
AUTO-MAN-STEP	AUTO
BAUD	110
BIAS	SWC
CODE	8/11 M
DIST 1%	0
DIST 5%	0
REPEAT	OFF
RY or U	OFF
OUTPUT	REL

On Distortion Measuring Set—

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STEP	ACTION	VERIFICATION																
	<table border="0" style="width: 100%;"> <thead> <tr> <th style="text-align: left; width: 30%;">SWITCH</th> <th style="text-align: left;">SET TO FUNCTION</th> </tr> </thead> <tbody> <tr> <td>BAUD</td> <td>110</td> </tr> <tr> <td>CODE</td> <td>8/11</td> </tr> <tr> <td>FILTER</td> <td>OUT</td> </tr> <tr> <td>PARITY</td> <td>OFF</td> </tr> <tr> <td>PIP-PK</td> <td>PK</td> </tr> <tr> <td>POLARITY</td> <td>—</td> </tr> <tr> <td>INPUT</td> <td>NORM 20</td> </tr> </tbody> </table>	SWITCH	SET TO FUNCTION	BAUD	110	CODE	8/11	FILTER	OUT	PARITY	OFF	PIP-PK	PK	POLARITY	—	INPUT	NORM 20	
SWITCH	SET TO FUNCTION																	
BAUD	110																	
CODE	8/11																	
FILTER	OUT																	
PARITY	OFF																	
PIP-PK	PK																	
POLARITY	—																	
INPUT	NORM 20																	

- 4 Connect ac power and turn DTS on.
- 5 Momentarily operate RESET keys on both test sentence generator and distortion measuring set.

**4. METHOD**

STEP	ACTION	VERIFICATION
6a	If testing first (local) maintenance TTY or first (local) maintenance monitor loop TTY— Notify attendant at second maintenance TTY that maintenance messages are to be transferred.  <i>Note:</i> Second maintenance TTY could be located at the Switching Control Center (SCC).	
7a	At local maintenance TTY— Type input message TTY-DGN-12.  <i>Note:</i> Do not proceed unless ATP appears.	Following output message printed: DR02 RAW TTY 08 PH1 ATP
8a	Type input message RT-MSGs-REM.	Maintenance messages transferred to second maintenance TTY. AR02 output message printed.
9a	Contact attendant at second maintenance TTY and verify that second TTY is functioning.	
10b	If testing first maintenance TTY or first maintenance monitor loop TTY that is associated with a SD1A121-01 or SD-IA121-02 TR unit—	

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STEP	ACTION	VERIFICATION
	At second maintenance TTY— Type input message TTY-MAINT-00 S. to suspend local TTY.	
11b	At master control center (MCC) AMA-TTY frame control panel— Operate TTY CONTROL OFF-0 key.	OS-0, OFF NOR, and POWER OFF lamps lighted.  <i>Note:</i> POWER OFF and OFF NOR lamps also reflect the condition of the AMA portion of this frame. For example, if power is off in one AMA part, the POWER OFF and OFF NOR lamps will be lighted.
12c	If testing second maintenance TTY or second maintenance monitor loop TTY— Notify attendant at second maintenance TTY that loop tests are to be performed.	
13c	At local maintenance TTY— Type input message TTY-MAINT-08 S. to suspend second TTY.	
14c	At MCC AMA-TTY frame control panel— Operate TTY CONTROL OFF-1 key.	OS-1, OFF NOR, and POWER OFF lamps lighted. (See Note after Step 11b).
15d	If testing TTY or monitor loop TTY associated with SD-1A147-01, -02— Notify appropriate attendant that loop tests are to be performed.	
16d	At local maintenance TTY— Type input message TTY-MAINT-aa S. (aa = member number) to suspend loop to be tested.	
17d	At TR unit (SD-1A147-01, -02)— Operate PWR OFF key.	PWR OFF lamp lighted.
18	At TR unit under test— Remove A-45 circuit pack (bipolar flip-flop) from its location (Table A).	
19	At TR unit under test— Strap pins 27 and 11 on circuit pack connector of A140 to ground (Table A).	
20e	If TR unit is SD-1A147-02— Strap as shown in Table B.	
	<i>Note:</i> If TR unit is equipped with option S and two or more TTYs, all 5 ports will repeat the QUICK BROWN FOX message generated by the 911A test set.	

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**TABLE A**  
**CIRCUIT PACK LOCATIONS FOR**  
**LOOP SIGNALER AND BIPOLAR FLIP-FLOP**

CIRCUIT	LOCATION OF A-140 CIRCUIT PACK	LOCATION OF A-45 CIRCUIT PACK	LOCATION OF A-976 CIRCUIT PACK
SD-1A121-01 Circuit 0 – Local Maintenance TTY	110-20	134-18	–
SD-1A121-01 Circuit 0 – Local Maintenance Monitor TTY	106-14	134-18	–
SD-1A121-01 Circuit 1 – Second Maintenance TTY	108-30	134-38	–
SD-1A121-01 Circuit 1 – Second Maintenance Monitor TTY	106-16	134-38	–
SD-1A121-02 Circuit 0 – Local Maintenance TTY	110-14	134-18	–
SD-1A121-02 Circuit 0 – Local Maintenance Monitor TTY	110-24	134-18	–
SD-1A121-02 Circuit 1 – Second Maintenance TTY	110-36	134-38	–
SD-1A121-01 Circuit 1 – Second Maintenance Monitor TTY	110-26	134-38	–
SD-1A147-01 Universal TTY Circuit	038	222	–
SD-1A147-01 Universal TTY Monitor Circuit	036	222	–
SD-1A147-02 Universal Input/Output Circuit	–	2-31	0-32
	–	2-31	0-30

**Table A—CIRCUIT PACK LOCATIONS FOR LOOP SIGNALER AND BIPOLAR FLIP-FLOP**



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STEP	ACTION	VERIFICATION
24	Using 2P4C patching cord, patch OUTPUT REL jack of test sentence generator to TTY jack on TR unit (Fig. 1).	
25f	If channel being tested is equipped with 105A data sets— At office data set mounting panel— Operate R relay.	
26	At TTY under test— Verify that QUICK BROWN FOX message is being received.	
27	At DTS— Turn DIST 5% switch one step at a time to increase distortion, allowing at least two lines of print between each increase until copy garbles.	Final error-free setting of DIST 5% switch indicates amount of distortion on loop signal that TTY machine will tolerate.
28	Record setting of DIST 5% switch.	
29	Remove patch between test sentence generator and TR unit.	
30g	If TTY being tested is receive-only or receive-only typing reperforator set— Omit Steps 31 through 38f.	
31	Using 2P30B patching cord, insert 347B plug in CUR IN jack of distortion measuring set and 310 plug in TTY test jack on TR unit.	
32f	If channel being tested is equipped with 105A data sets— At TR unit— Block operated MT(1) relay (for second maintenance TTY) or M relay (other than maintenance TTY)	
33f	Using 1W13A patching cord, connect MT1-3B relay to MT1-3 relay (second maintenance TTY) or M3B relay to M3 relay (other than maintenance TTY).	
34	At distortion measuring set— Momentarily operate RESET switch.	Nixie tubes indicate 0.
35	At TTY being tested— Have at least two lines typed (QUICK BROWN FOX, RUs, etc).	At distortion measuring set— Nixie tubes indicate peak distortion.
36	Record reading on nixie tubes.	

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STEP	ACTION	VERIFICATION
37	Remove patch between distortion measuring set and TR unit.	
38f	If channel being tested is equipped with 105A data sets— Release operated relay MT(1) and remove connection made in Step 33f.	
39h	If reading in Step 28 is less than 35 percent or reading in Step 36 is greater than 18 percent— Request that TTY maintenance force locate and correct trouble.	
40a	If testing local maintenance TTY is local maintenance monitor loop TTY— At MCC AMA-TTY frame control panel— Operate TTY CONTROL OFF-0 key.	OFF NOR, OS-0, and POWER OFF lamps lighted. (See Note after Step 11b.)
41c	If testing second maintenance TTY or second maintenance monitor loop TTY— At MCC AMA-TTY frame control panel— Operate TTY CONTROL OFF-1 key.	OFF NOR, OS-1, and POWER OFF lamps lighted. (See Note after Step 11b.)
42d	If testing TTY or monitor loop TTY associated with SD-1A147-01, -02— At TR unit— Operate PWR OFF key.	PWR OFF lamp lighted.
43	At TR unit — Remove temporary straps and replace A-45 (bipolar flip-flop) circuit pack. (See Table A.)	
44a	If testing local maintenance TTY or local maintenance monitor loop TTY— At MCC AMA-TTY frame control panel— Operate TTY CONTROL NOR key.	POWER OFF, OFF NOR, and OS-0 lamps extinguished. (See Note after Step 11b.)
45a	At second maintenance TTY— Type input message TTY-MAINT-00 R. to restore local TTY.	
46a	At local maintenance TTY— Type input message TTY-DGN-a bb. (See input message manual.)	DR01 message printed. (See output message manual.)
47a	At second maintenance TTY— Type input message RT-MSG-REM. to return maintenance messages to local maintenance TTY.	AR02 message printed. (See output message manual.)

Page 9

# Teletypewriter Facility Loop Tests / #1 ESS

## SECTION 231-003-501

STEP	ACTION	VERIFICATION
48c	If testing second maintenance TTY or second maintenance monitor loop TTY— At MCC AMA-TTY frame control panel— Operate TTY CONTROL NOR key.	POWER OFF, OFF NOR, and OS-1 lamps extinguished. (See Note after Step 11b.)
49c	At local maintenance TTY— Type input message TTY-MAINT-12 R. to restore TTY to service.	
50c	Type input message TTY-DGN-a bb. (See input message manual.)	DR01 message printed. (See output message manual.)
51d	If testing TTY or monitor loop TTY associated with SD-1A147-01, -02— At TR unit— Release PWR OFF key.	PWR OFF lamp extinguished.
52	At local maintenance TTY— Type input message TTY-MAINT-aa R. (aa = member number) to restore the TTY under test.	
53d	Type input message TTY-DGN-a bb. (See input message manual.)	DR01 message printed. (See output message manual.)

# 100 Watt RF Power Amplifier for 2 GHz

## Overview

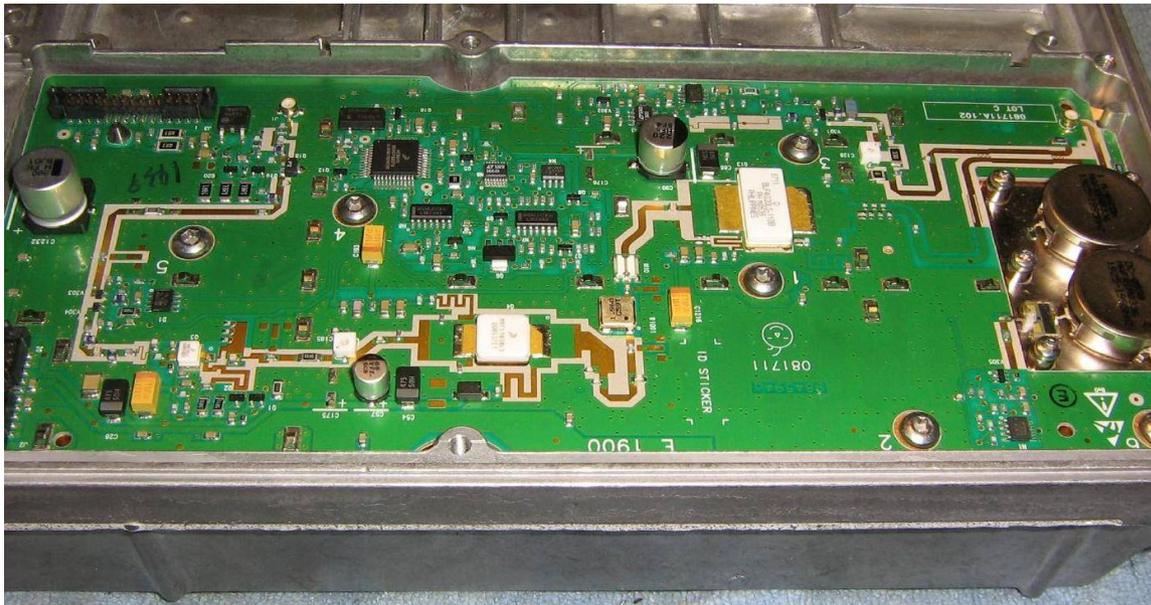
Old cellular phone base station modules operating in the 1.9 GHz band are starting to show up at ham fests. These devices are ripe for experimental applications of high-power (+100 watts) microwave energy in the 2 GHz band. With a fairly reduced output power (10 watts or so), the stock power amplifier modules will cover the 2.3 GHz and 2.4 GHz amateur radio bands. All that they require is some minor tweaking and a decent +28 VDC power supply.

The RF power amplifier section of the cellular phone base station module which will be covered here is based around a Philips BLF4G20LS-110B LDMOS RF power transistor. This LDMOS RF power transistor will do an easy 100 watts at frequencies from 1.8–2.0 GHz. The BLF4G20LS-110B does require a clean +28 volt power supply and will draw at least 10 amps when run near its maximum output power. Since the BLF4G20LS-110B has around 13 dB of in-band gain, to reach the 100 watt (+50 dBm) limit will require around 5 watts (+37 dBm) of RF drive power. Because of the nature of the narrowband impedance matching sections in the stock amplifier's pre-driver circuits, we will be driving the BLF4G20LS-110B externally.

The stock base station amplifier module has a very nice 1.9 GHz-band isolator (M/A-Com MAFRIN0336) on the RF output. We'll be keeping this isolator, as they protect the amplifier in case of a high SWR situation, but when run out-of-band, they loose isolation and are not as effective. They can even increase the insertion loss, further reducing the output RF power.

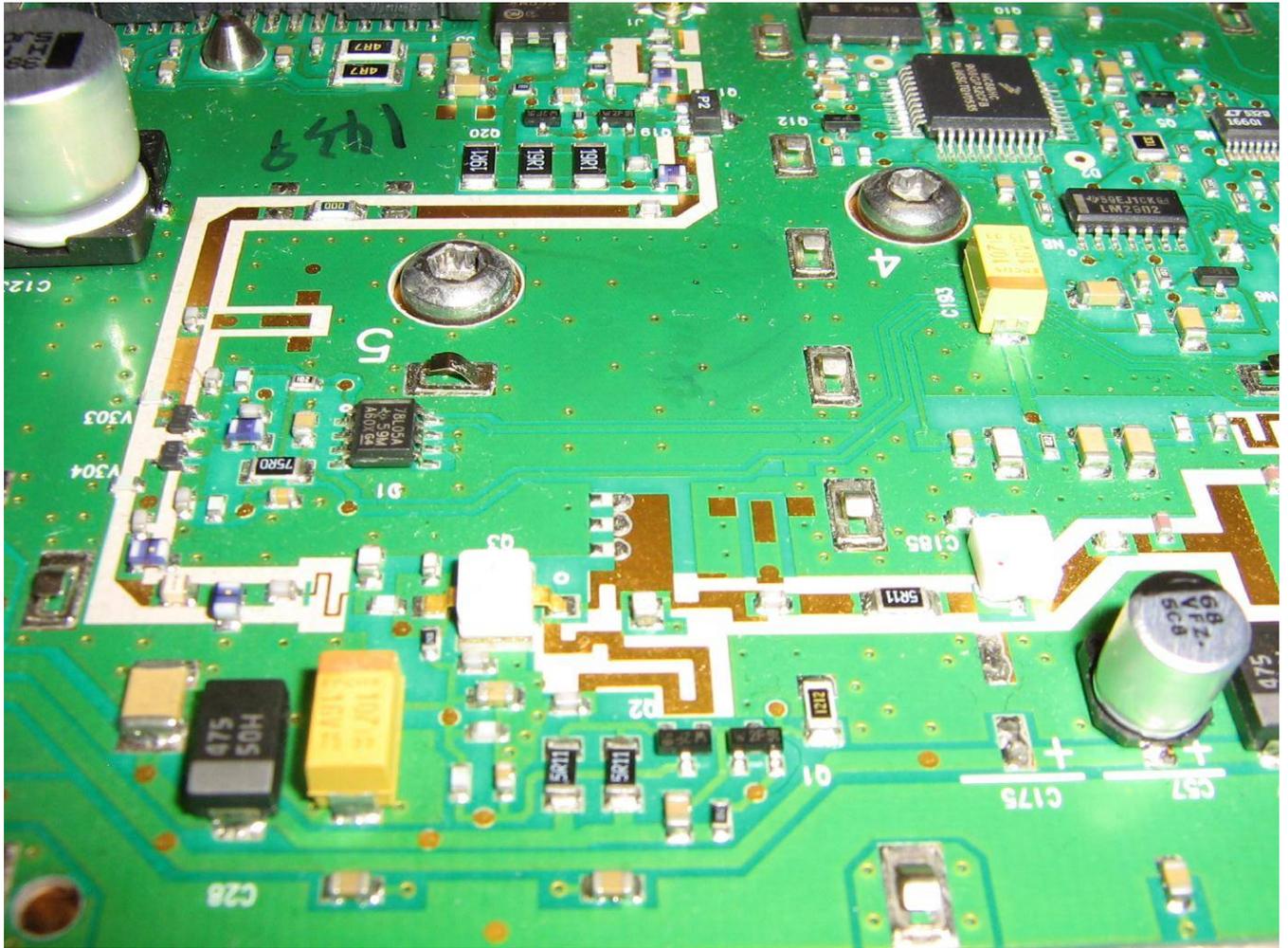
This is all still very experimental right now, but should be a good starting point.

## Pictures & Construction Notes



Stock RF power amplifier section of a 1.9 GHz cellular phone base station module. FCC ID: L7KTSPB-01.

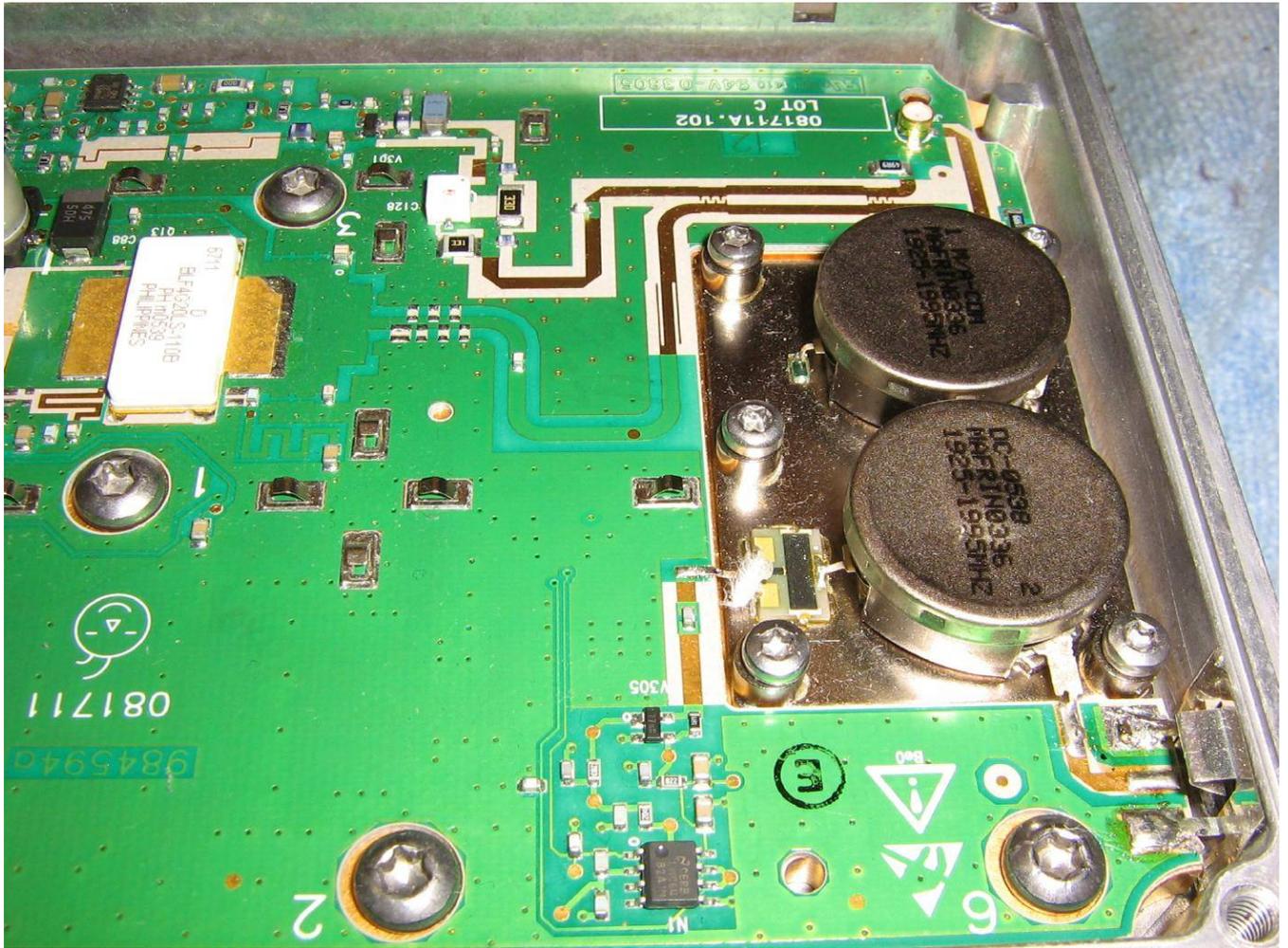
The RF input circuitry is on the left-side, RF output is on the right. The silver circular part is the output RF isolator.



Close up of the RF input circuitry.

The smaller white transistor on the left is a MRF281Z, which feeds a MRF1903LS.

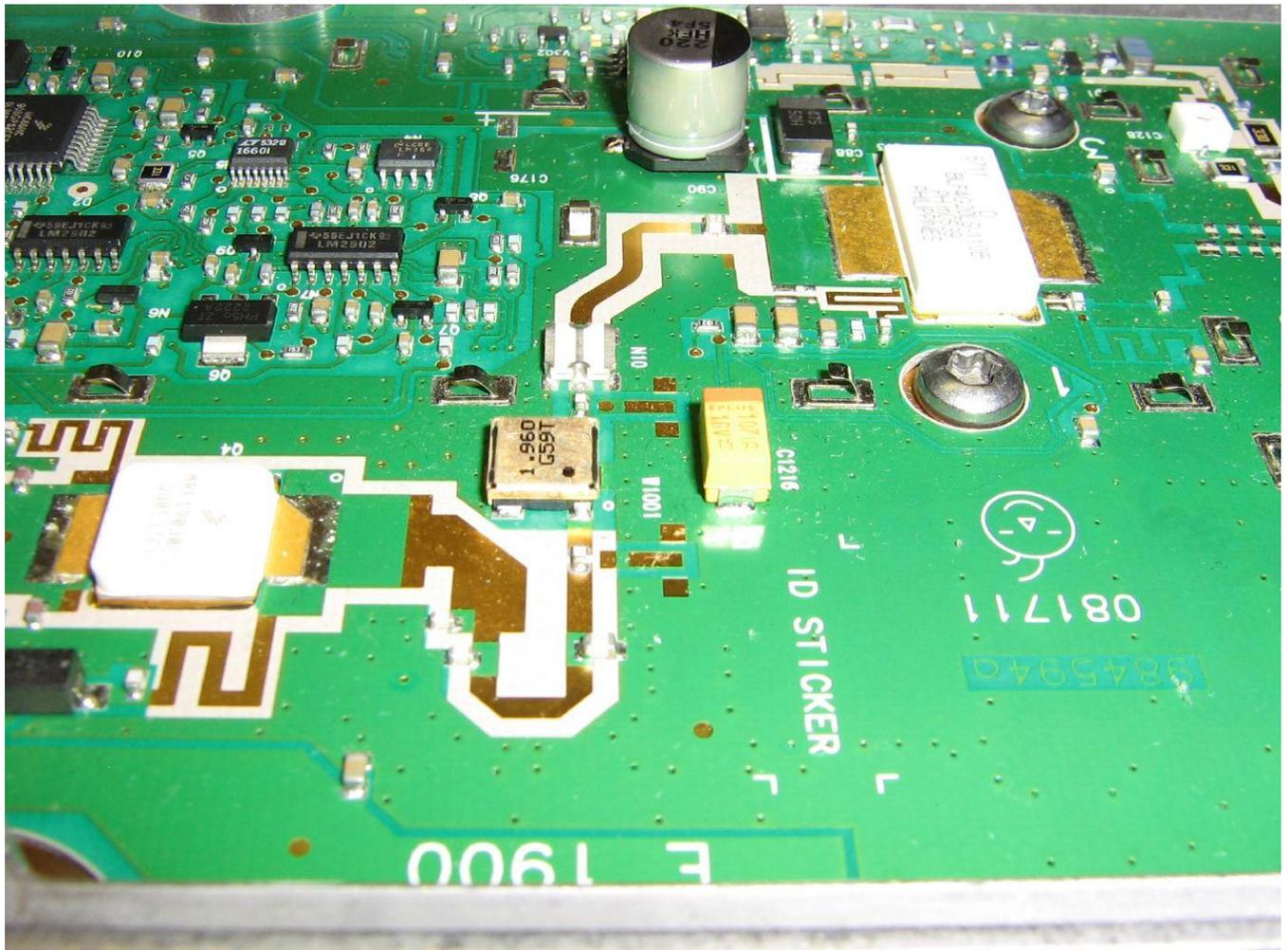
We won't be using the pre-amplifier transistors in this amplifier, but they may be documented in an upcoming project.



Close up of the RF output circuitry and isolator.

The SMA RF output connector is on the lower-right.

The top PC board traces form a directional coupler to monitor the BLF4G20LS-110B's RF output.



Input circuitry and impedance matching section for the Philips BLF4G20LS-110B. The MRF19030LS is on the lower-left. The silver box in the middle is a 1.96 GHz bandpass filter.



The front-panel to the rack-mounting system we'll be using for this amplifier.

The panel was salvaged from an old rack-mounted power supply and some of the holes were filled with Bondo. A fresh coat of paint, labels, and clear coat help to finish it off.

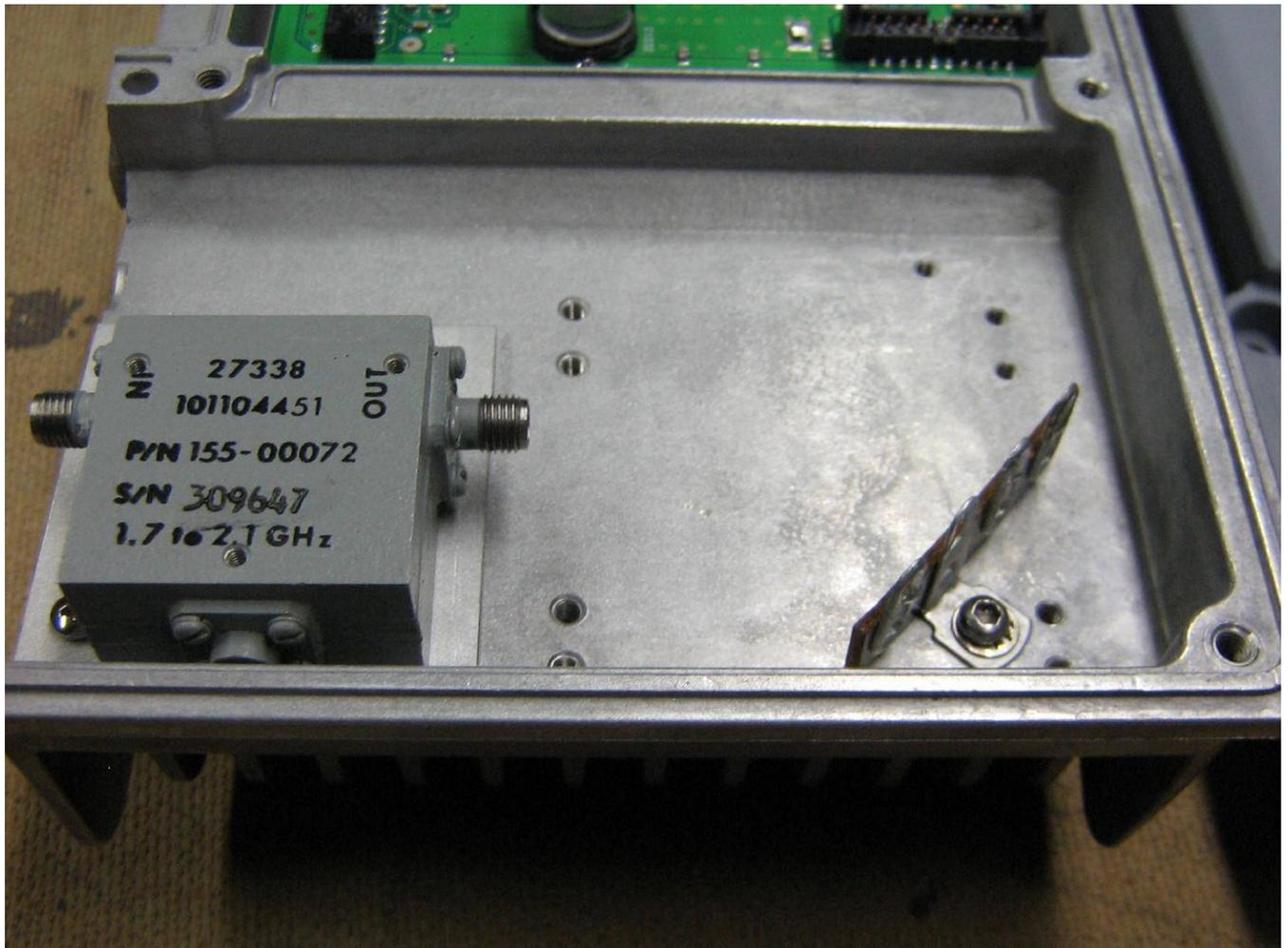
The RF output will be via a panel-mounted female N connector.

The +28 VDC input will be protected with a 15 amp fuse.



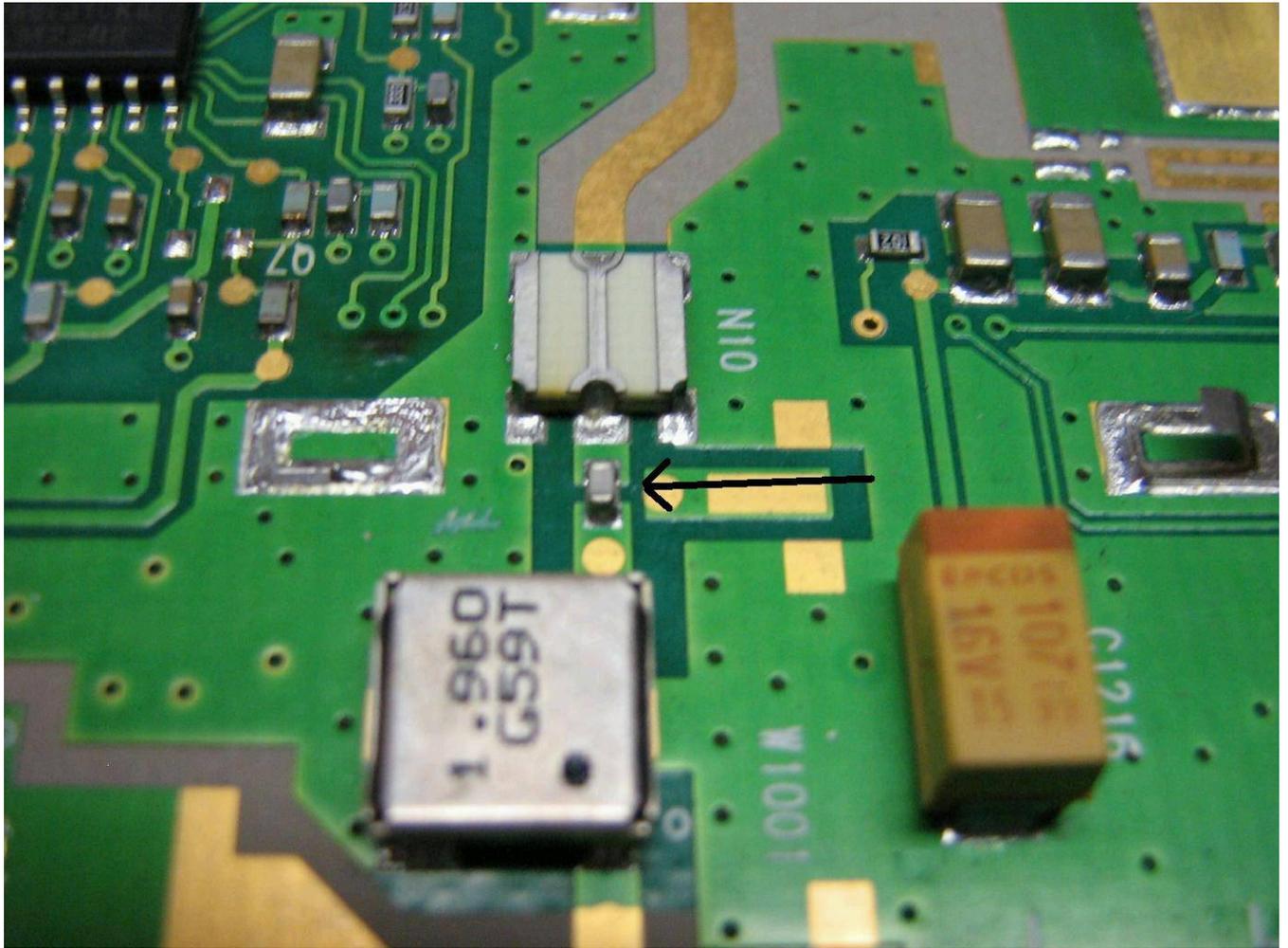
Modifying and cutting down the module's original aluminum case so it can be mounted to the front-panel.

The amplifier case will be attached to the front-panel with four 1/4-inch bolts and hardware protruding through its cover.



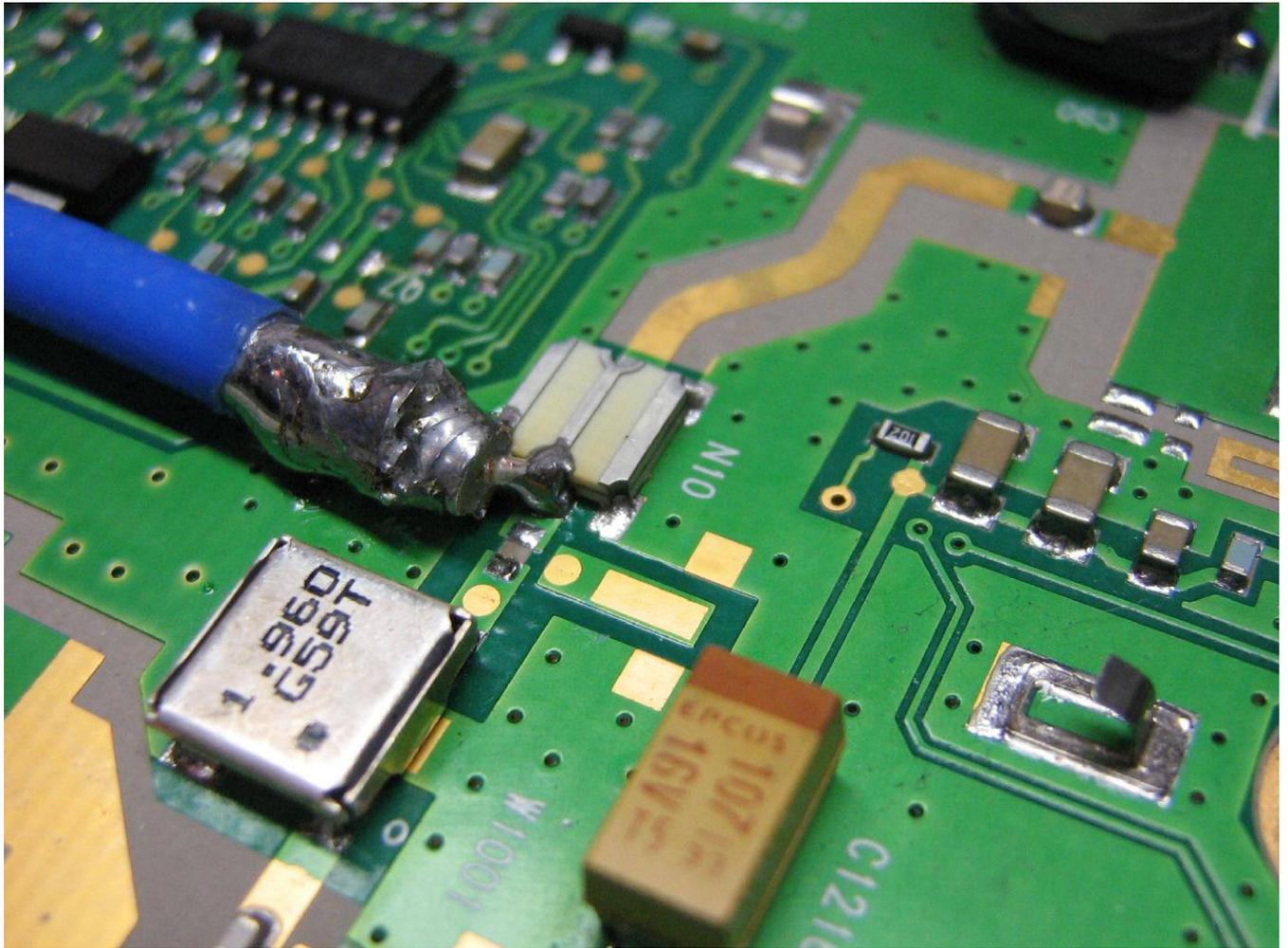
A salvaged 1.9 GHz-band isolator was added to the input of BLF4G20LS-110B. This is to help solve any stability problems, but may restrict the amplifier's overall frequency range. This input isolator is optional.

A solder terminal strip was added on the lower-right for centralizing the DC input power connections.



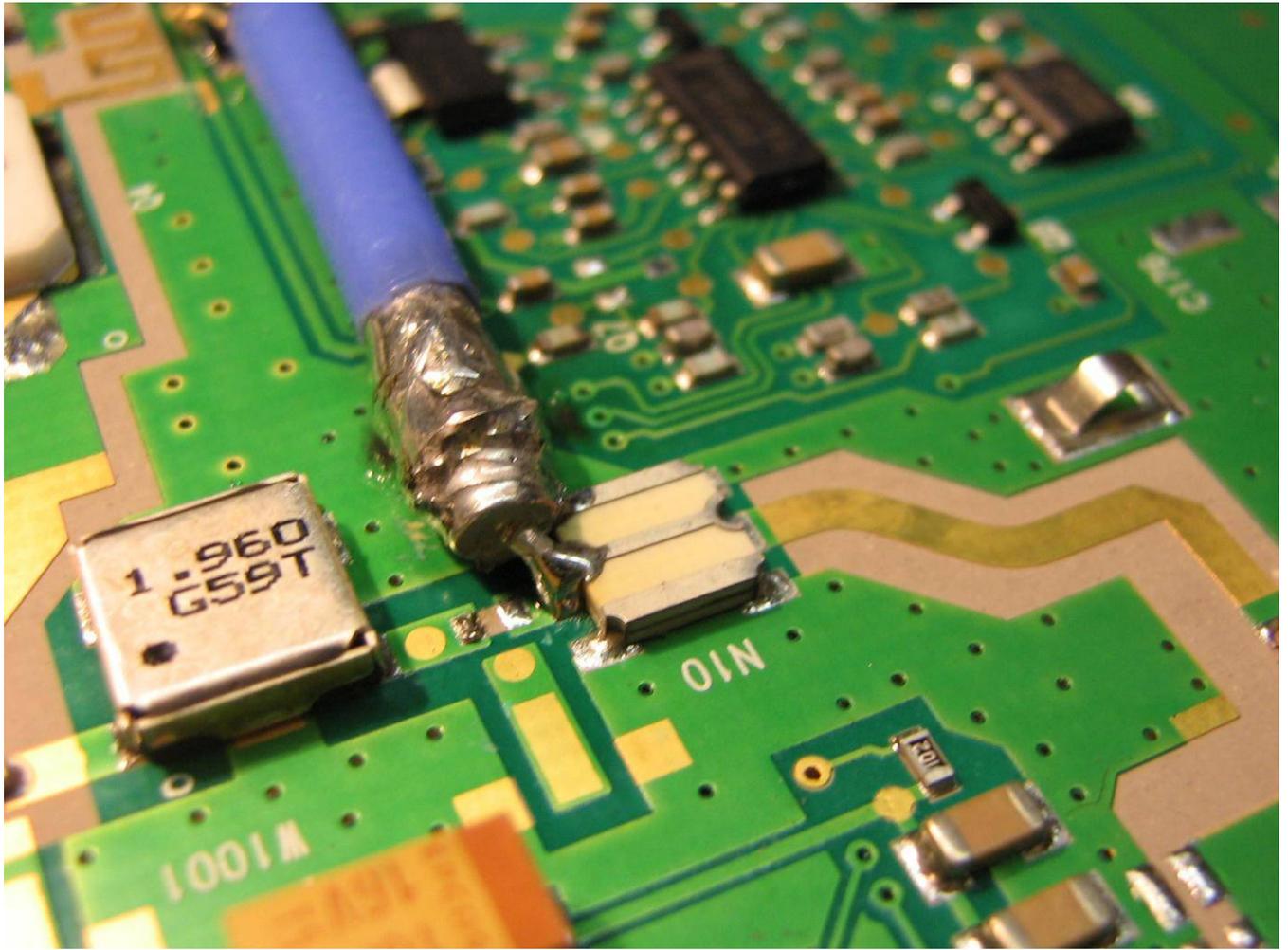
Arrow points to a series capacitor which will need to be removed to isolate the input to the BLF4G20LS-110B.

This is first of several modifications which will need to be done in order to use the amplifier.



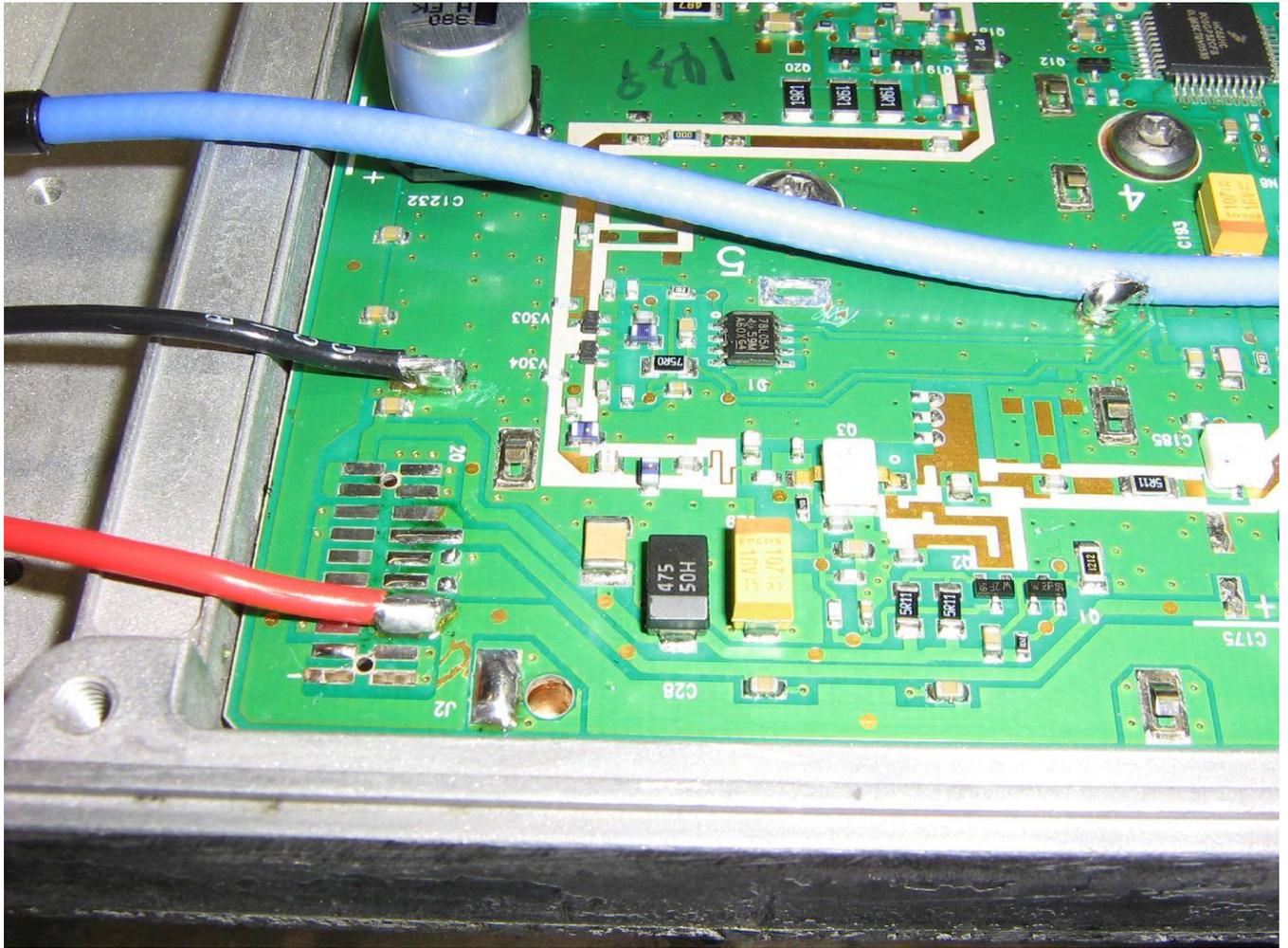
After that capacitor is removed, solder a piece of 50 ohm coax for the RF input to the BLF4G20LS-110B.

Solder the center of the coax to the surface-mount jumper device labeled "N10" on the PC board. Scrape away some of the amplifier PC board's top coating and solder the shield of the coax to the ground plane.



Alternate view.

Try to use Teflon dielectric coax to avoid any melting and to ease soldering.

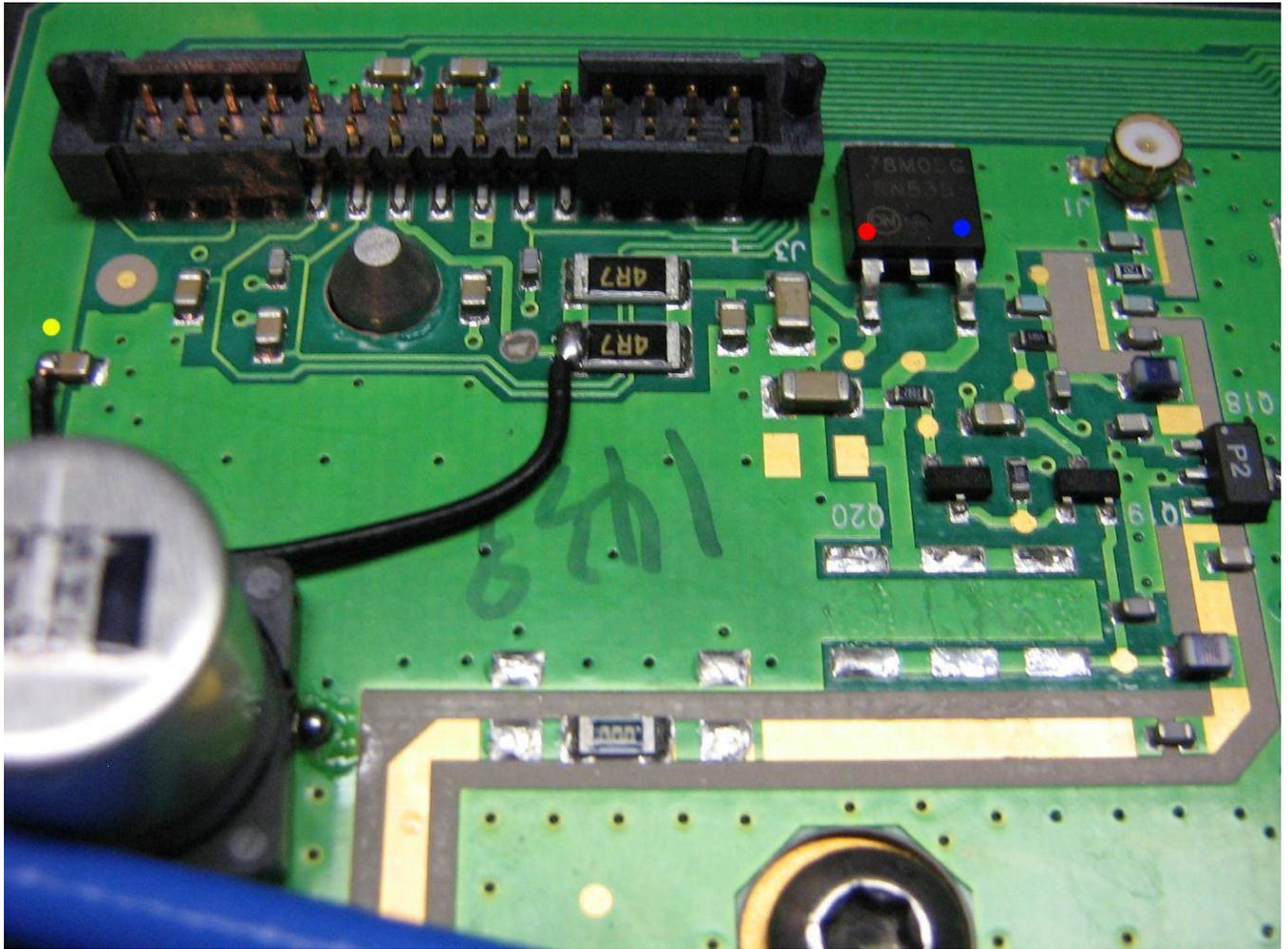


+28 VDC power input connections.

The **BLACK** wire is **NEGATIVE**.

The **RED** wire is **POSITIVE**.

Unsolder the amplifier's original power input terminal strip and solder the power connection wires like so. The negative wire is actually going to an unused solder pad on the amplifier's ground plane.



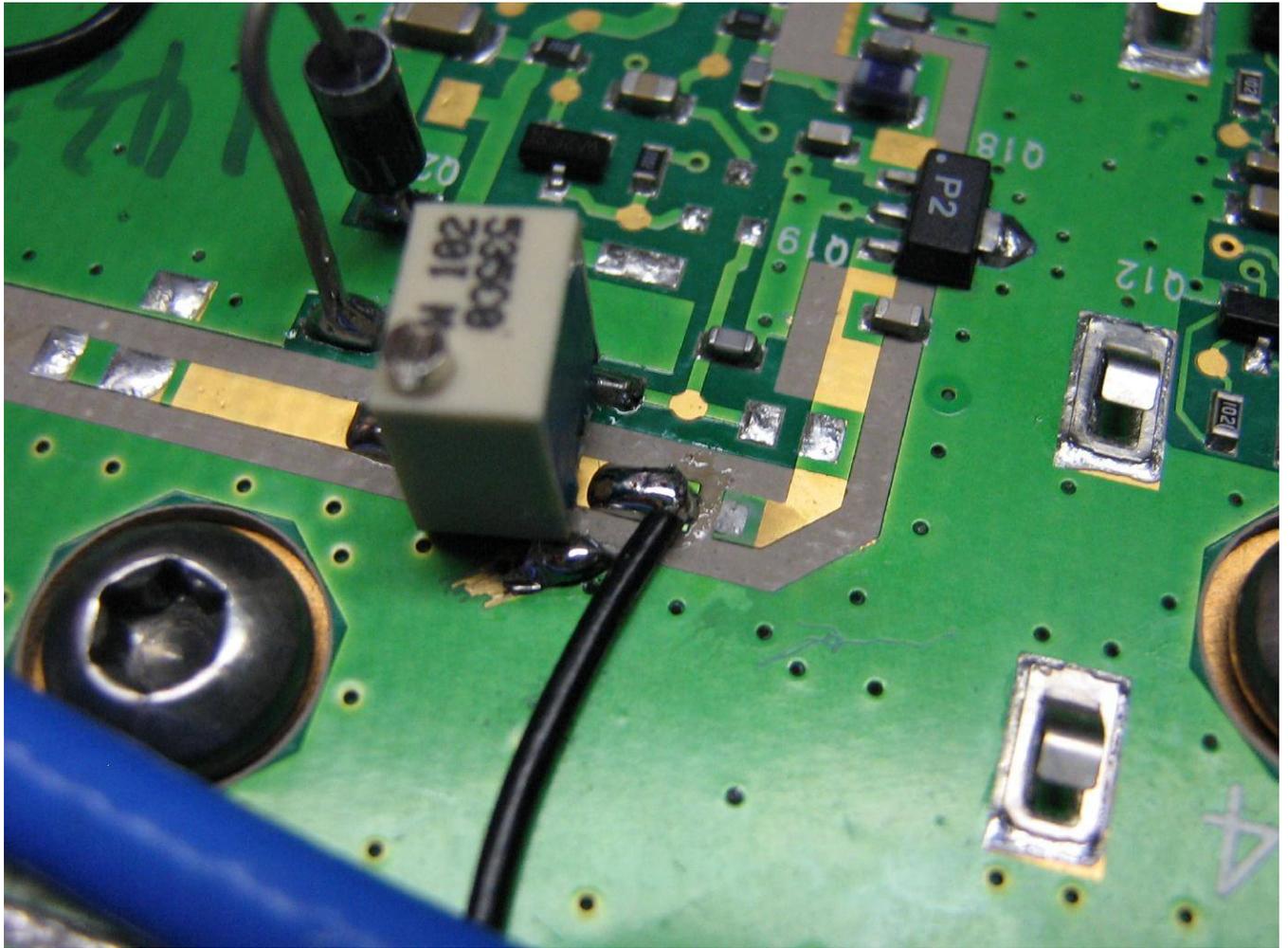
The BLF4G20LS-110B requires an approximate 3.2 VDC bias voltage on its gate for proper class-AB operation.

To generate this voltage, we'll isolate and use a 78M05 voltage regulator on the amplifier circuit board.

In the above picture, the **YELLOW** dot is the +28 VDC input for the 78M05. The **RED** dot is the input pin for the 78M05 and the **BLUE** dot is the 78M05's output.

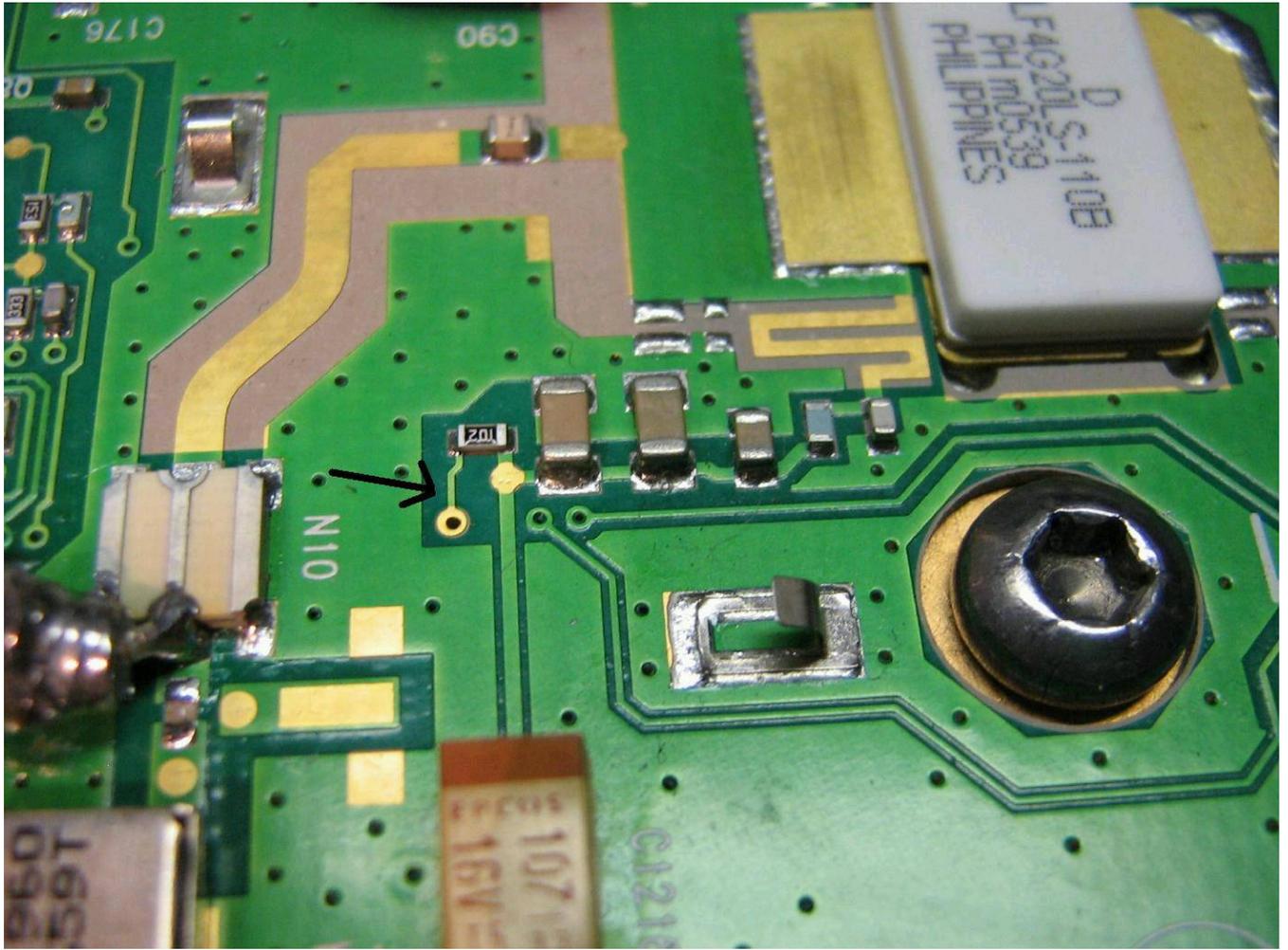
Note that you'll need to follow the traces on the output of the 78M05 and remove three series resistors, as shown above.

Solder a jumper wire from the **YELLOW** dot (+28 VDC) to the two parallel 4.7 ohm resistors on the input of the 78M05.



After removing several unnecessary components on the output of the 78M05 voltage regulator to isolate the solder pads, you'll need to add a series 1N4001 diode and a surface-mount multiterm 1 kohm potentiometer. The series diode is optional, but helps to protect the BLF4G20LS-110B from exceeding its maximum gate voltage.

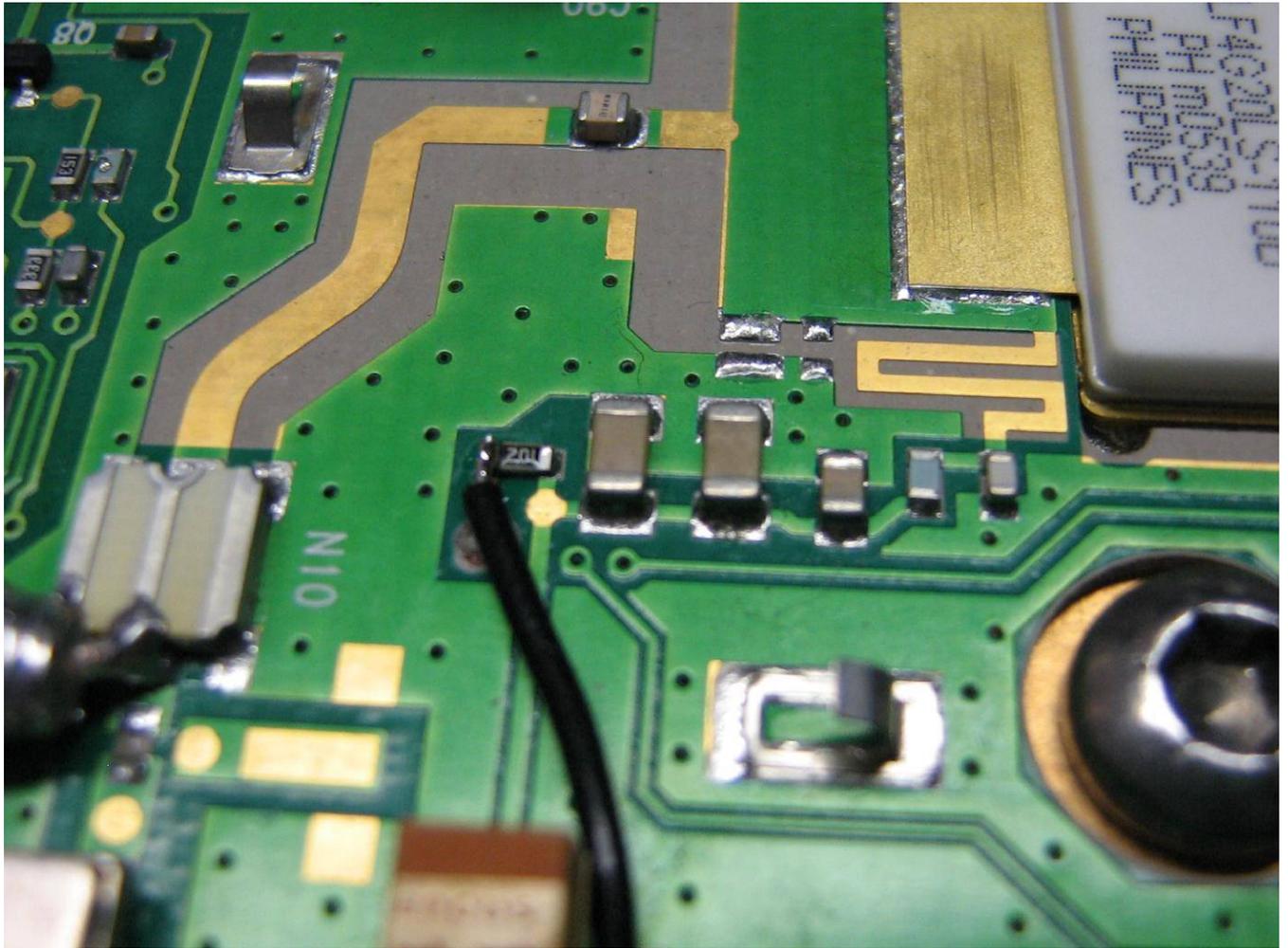
One side of the 1 kohm potentiometer will go to the +5 VDC and the other to ground. The wiper output will go to the gate bias circuitry near the BLF4G20LS-110B.



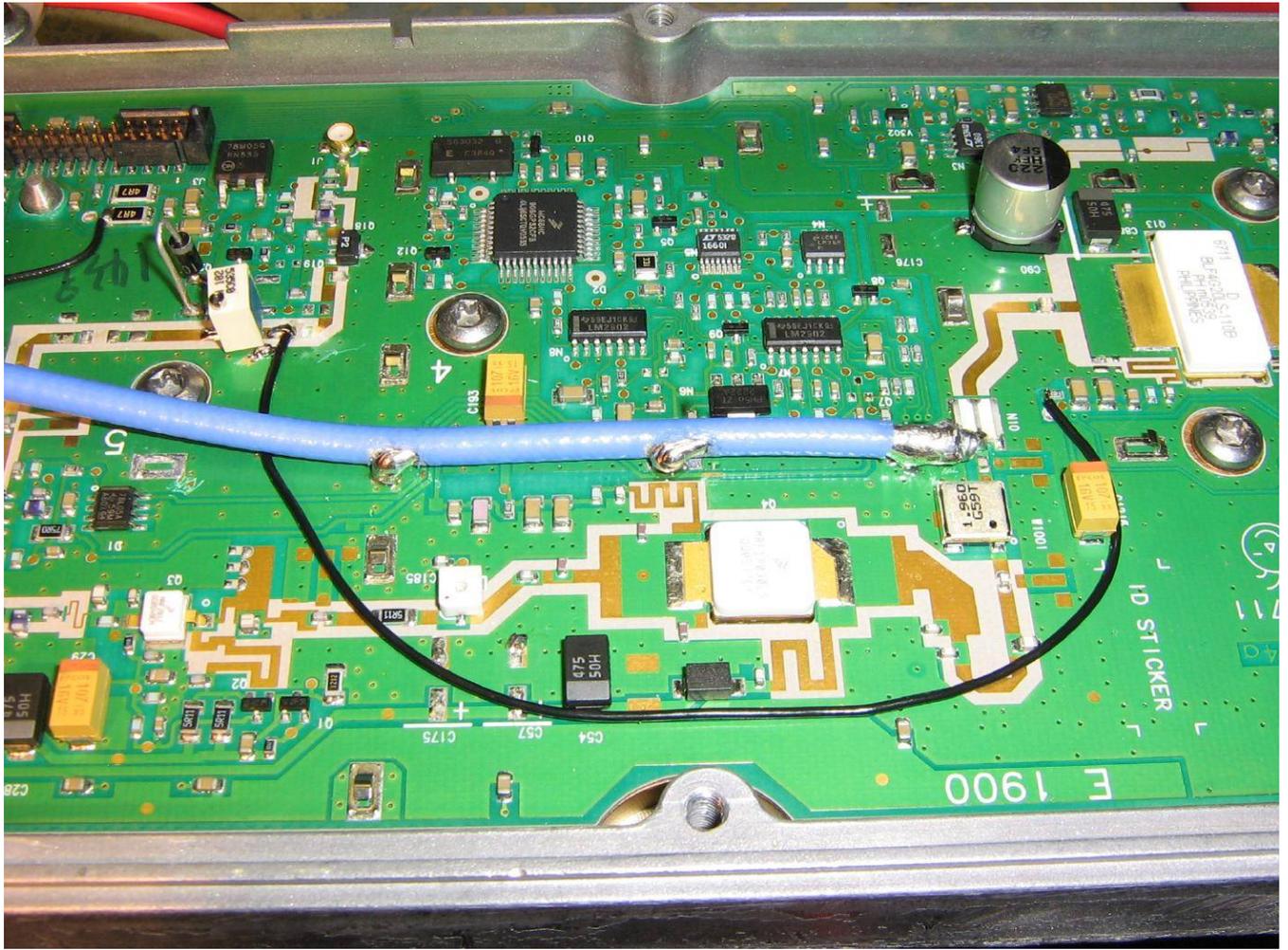
BLF4G20LS-110B gate bias components.

You'll need to cut the trace where the arrow is pointing to isolate it from that feed-through via.

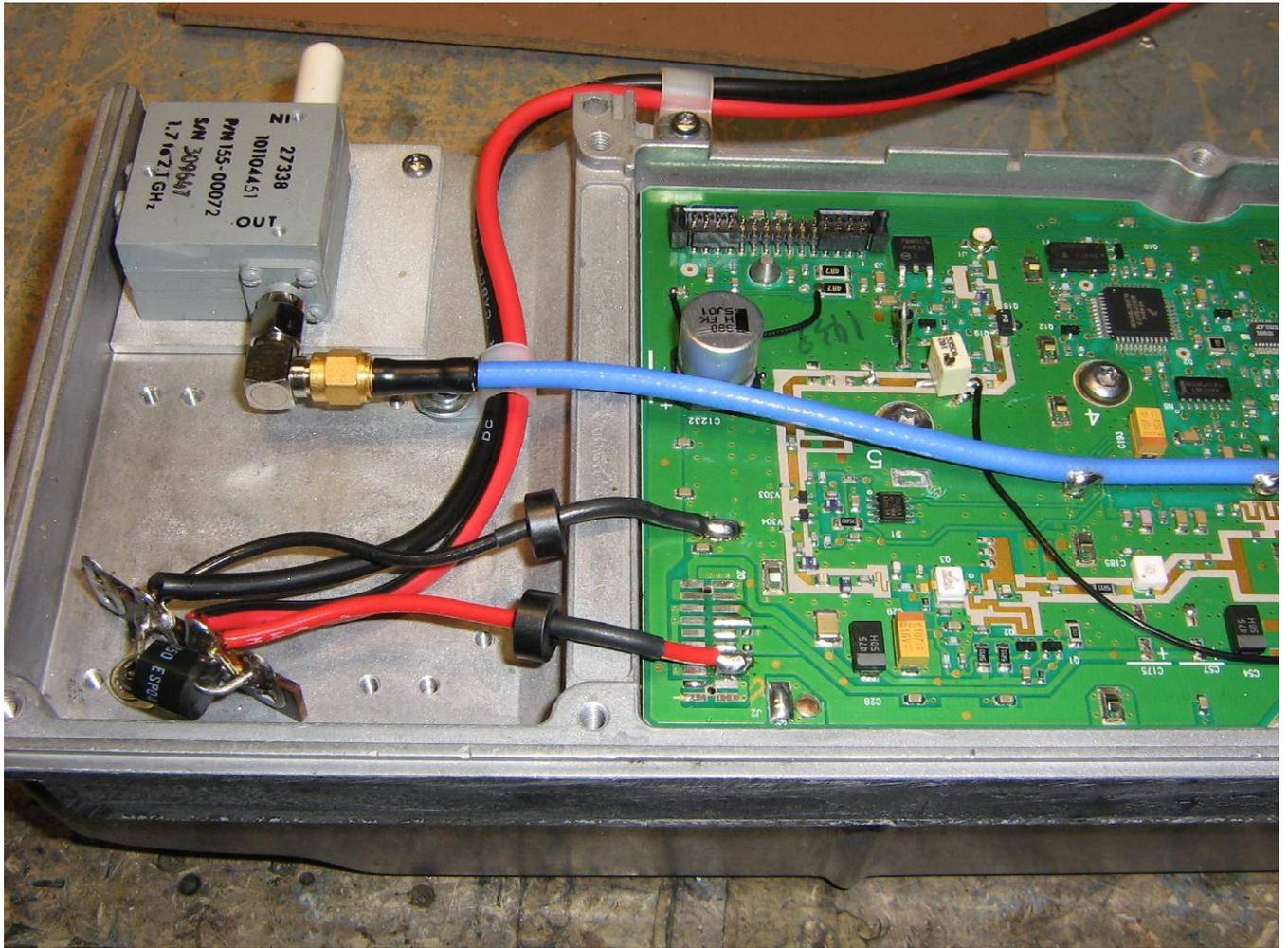
We'll be isolating this bias line and adding our own gate bias voltage.



Solder a wire from the wiper of the 1 kohm potentiometer on the output of the 78M05 to the 1 kohm resistor in the BLF4G20LS-110B gate bias input, as shown above.



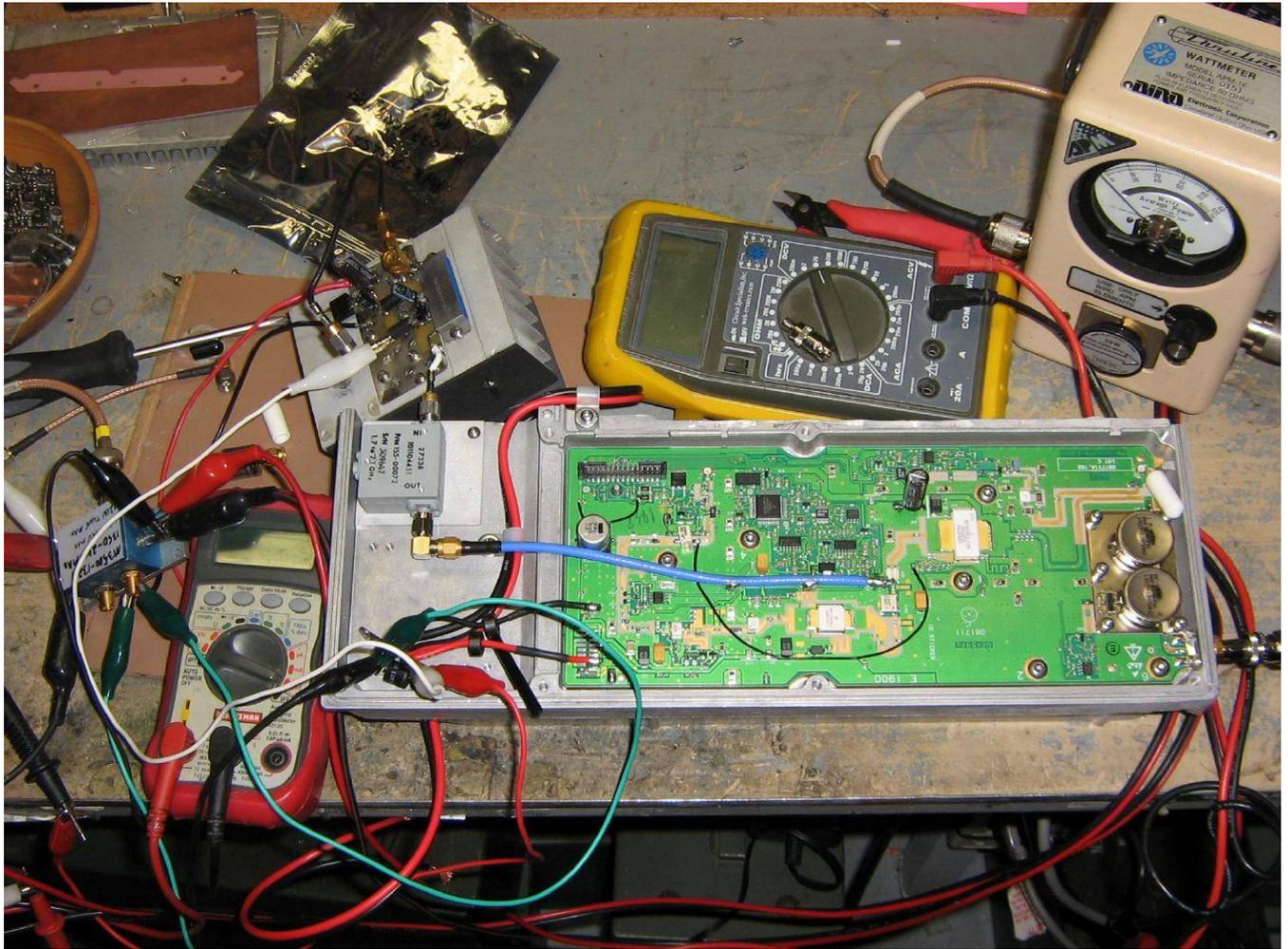
Overview of the modifications performed so far.



Finishing and connecting the DC power input connections and RF input.

Optional ferrite beads were slipped over the DC power wires.

There is also an optional DC polarity protection diode on the solder terminal strip.

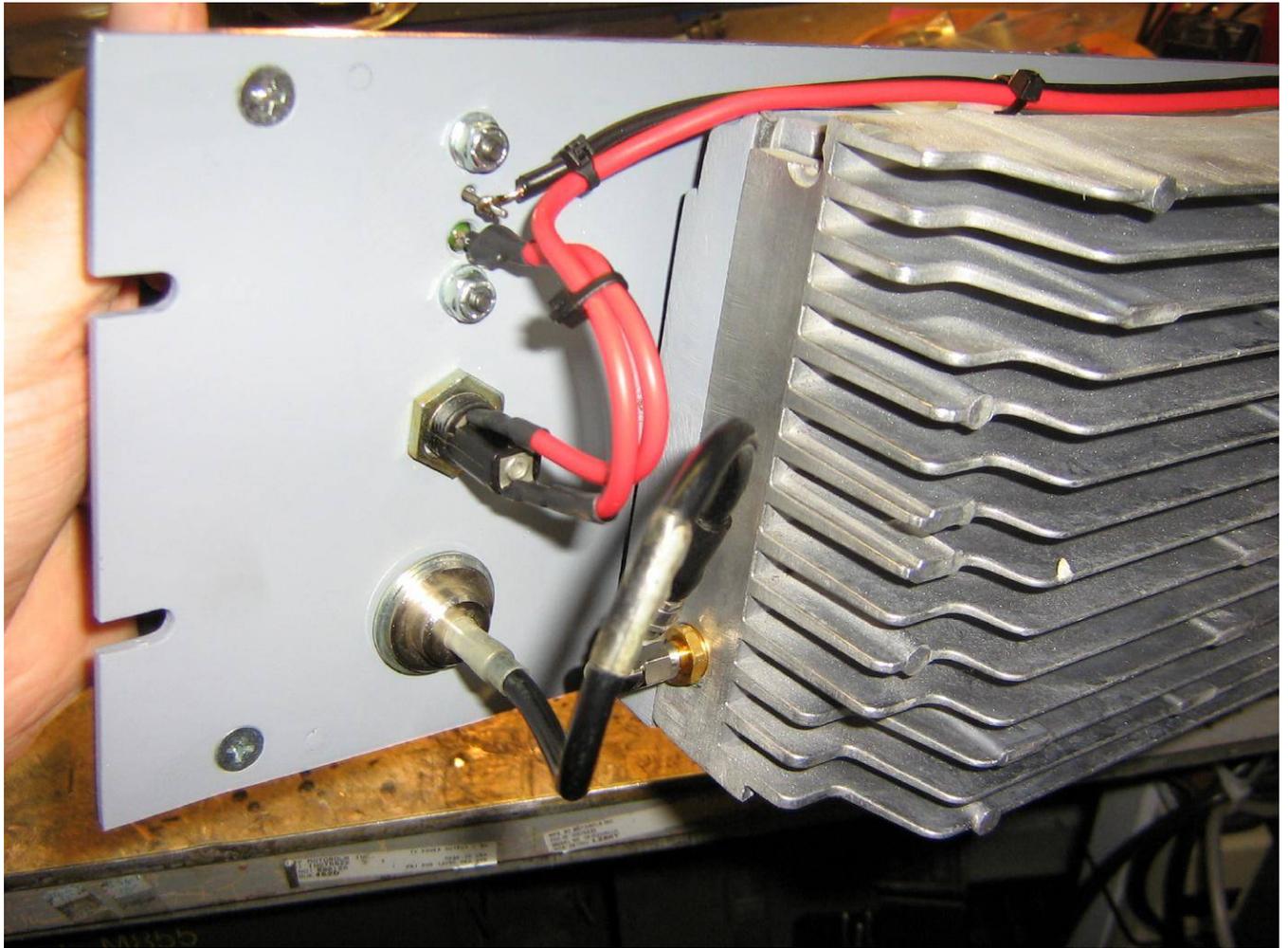


Setting the quiescent drain current on the BLF4G20LS-110B.

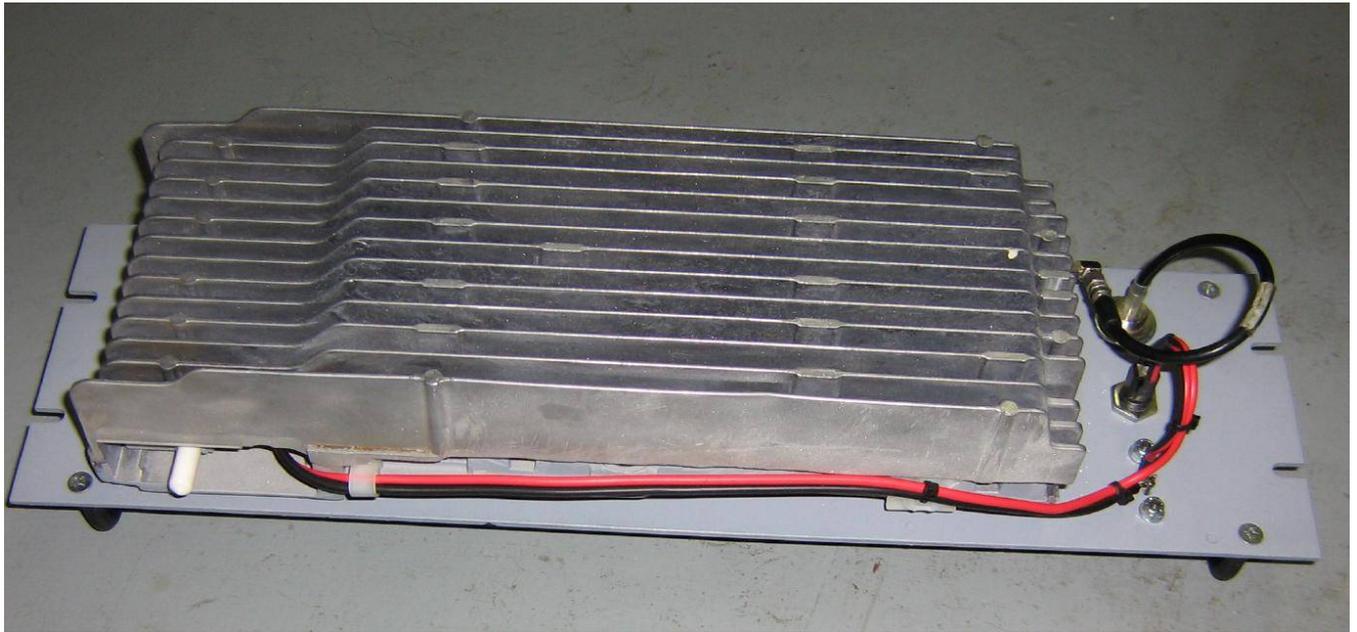
Connect good 50 ohm loads to the input and output of the amplifier and apply a clean source of +28 VDC power through an accurate current meter.

Slowly adjust the 1k ohm gate bias potentiometer until the amplifier is drawing around 650 mA of current with **NO** RF power applied. This should be equal to around 3.2 volts DC on the BLF4G20LS-110B's gate.

Let everything "warm up" for a bit and see if the quiescent drain current varies at all over time. It should be fairly stable when set.



Rear view of the front-panel showing the DC input wiring and fuse, and the panel-mounted N connector for the RF output.



Rear view of the amplifier showing the DC power and RF connections.

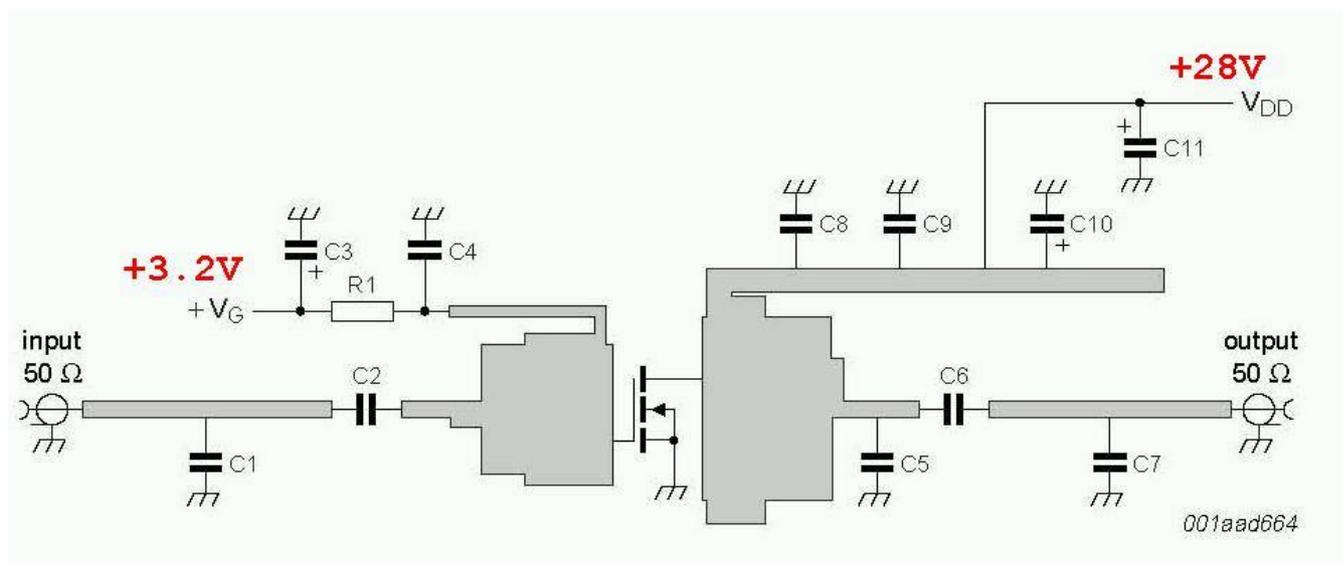
The white cap protects the SMA connector on the input RF isolator.



Finished amplifier front-panel overview.

5 watts in gives around 100 watts output at 2 GHz. I'll keep fiddling with it to try and get more RF power out at 2.3–2.4 GHz.

## BLF4G20LS-110B Application Note Schematic



**Table 8:** List of components (see [Figure 10](#)).

Component	Description	Value	Dimensions	Catalogue number
C1	multilayer ceramic chip capacitor	[1] 0.1 pF		
C2, C4, C8	multilayer ceramic chip capacitor	[1] 11 pF		
C3, C10	tantalum capacitor	10 $\mu$ F		
C5	multilayer ceramic chip capacitor	[1] 0.5 pF		
C6	multilayer ceramic chip capacitor	[1] 8.2 pF		
C7	multilayer ceramic chip capacitor	[1] 0.2 pF		
C9	multilayer ceramic chip capacitor	1 $\mu$ F		1812X7R105KL2AB
C11	Philips electrolytic capacitor	220 $\mu$ F; 35 V		
R1	Philips chip resistor	5.6 $\Omega$	0603	
W1	hand made wire		5 mm	

[1] American Technical Ceramics type 100B or capacitor of same quality.

# ***Nortel DMS-100 Position Name Table (POSNAME)***

## **Table Name**

Position Name Table

## **Functional Description of Table POSNAME**

Table POSNAME lists the position names assigned to the switch. The switch has a number of pseudo-fixed position names. Table POSNAME allows the operating company to assign additional position names, if required.

The pseudo-fixed position names are as follows:

- **AMAFAIL** This position name is required in a local, toll, or combined local/toll switch that has the parameter AMA\_FAILURE\_FREE\_CALL set to "N" in the OFCENG table. This position name should specify the office route to which all AMA (Automatic Message Accounting) calls are routed during AMA failure when AMA calls are not routed free-of-charge.
- **CAMA** This position name is required in a toll or combined local/toll switch arranged for CAMA (Centralized Automatic Message Accounting) operation and is the position to which ANIFAIL or ONI (Operator Number Identification) calls on a Super-CAMA or AMR-5 (Adaptive Multi-Rate) trunk group are routed.
- **TOPS** This position name is required in a toll or combined local/toll switch arranged for TOPS (Traffic Operator Position System) operation and is the position to which ANIFAIL or ONI calls on an incoming or two-way TOPS trunk group are routed. This position name is required in a toll or combined local/toll switch which tandem 0+ or 0- calls to a TOPS switch by means of a trunk group with trunk group type ZI.
- **TSPS** This position name is required in a toll or combined local/toll switch which tandem 0+ or 0- calls to a switch arranged for TSPS (Traffic Services Position System) by means of a trunk group with trunk group type ZI.
- **AMRX** This position name is required in a local switch arranged for AMR-5 type signaling and is the position to which a 0- call from a line is routed.
- **AOSS** This position name is required in a toll or combined local/toll switch arranged for AOSS (Auxiliary Operator Services System) operation and is the position to which 411, 555-1212, intercept, and 131-types of calls route from dedicated AOSS trunk groups.

The operating company can use pseudo-fixed position names CTOP, RTE1, RTE2, RTE3, or RTE4, and can specify additional position names, if required. When a position name is not required, the default value is NONE.

## **Requirements**

The following requirements are for the POSNAME table:

1. In a local or combined local/toll switch arranged for 0+ or 0- dialing, the position to which 0- calls are to be routed is specified in Line Attribute table.
2. When a code or block of codes for class-of-service screening have to route to a position, the position name is specified in the class-of-service screening tables CLSVSCRC or CLSVSCR.
3. When a code or block of codes routes directly from a standard pretranslator table to a position, the position name is specified in the standard pretranslator table STDPRT.
4. When a seizure (no digits) occurs on an incoming CAMA call, the position to which the call is routed is defined in the Super-CAMA trunk group data.

5. When a PBX is arranged for 0+ or 0- dialing, the position to which a 0- call is routed is specified in the two-way PBX DID/DOD or digital trunk group data.
6. Translation from the position table route directly to the CLLI table or via the office route table when prefixing or deletion of digits is required.
7. Each of the position names are assigned a value (0-15) in the POSNAME table.
8. Position "NONE" is assigned the value of 0.

## **Datafill**

The following table describes datafill for table POSNAME:

*Table POSNAME Field Descriptions*

<b>Field</b>	<b>Subfield</b>	<b>Entry</b>	<b>Explanation and Action</b>
VALUE		0-32,767	<i>Value</i> Enter the numeric value assigned to the position name.
SYMBOL		NONE or alphanumeric vector of up to 32 characters	<i>Name</i> Enter NONE if value is equal to 0; otherwise, enter the name of the position.

-End-

## **Datafill Example**

The following example MAP display shows sample datafill for table POSNAME.

It shows input data for position names NONE and CAMA, which are assigned values of 0 and 1, respectively.

<b>VALUE</b>	<b>SYMBOL</b>
0	NONE
1	CAMA

**Bonus**

# HELLCAT ON A HOT TIN ROOF

We've come up with a new base loaded mobile CB antenna.

It's wild. And it's a beauty. So we call it the Hellcat. And there should be one up on your roof.

That's easy, because the new Hellcat has a brand new kind of mount. It's called the "Claw" because that's how it works. You can put it in any hole,  $\frac{3}{8}$ " to  $\frac{3}{4}$ " even if the hole isn't so round. And the only way the antenna with the Claw will come off is if you loosen the three little screws that operate it.

Once you've got it up there, you'll be glad to know it has a new etched-copper loading coil that's photographically (not printed) etched for the most powerful signal under the sun.

This new coil also makes it possible for us to make this the sleekest, lowest-profile beauty you've ever seen. It hugs that roofline so close it almost looks like part of the car. (And we've got color caps to identify your club.)

Topping off the new Hellcat is a 17-7 PH stainless steel whip that's so strong it'll take anything you throw at it.

What you'd expect to pay for this is a fortune. What you do pay for it is not. It's just what you're used to paying.

So get down to the best distributor under the sun. The man that carries the Hy-Gain Hellcat.

The sooner you get a Hellcat on your roof, the sooner you can raise it.



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**Hy-Gain**

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FOR THE STRONGEST SIGNAL UNDER THE SUN!

## End of Issue #69



Any Questions?

### **Editorial and Rants**

*First, they lower school standards for non-Whites. Now, police entrance exams...*

*And I'll bet you thought those "Police Academy" movies were fake!*

### **U.S. Justice Department Suing New Jersey Over Police Promotion Test**

January 7, 2010 – From: [www.pressofatlanticcity.com](http://www.pressofatlanticcity.com)

TRENTON -- The U.S. Department of Justice is suing New Jersey over the state's use of a written exam to promote police sergeants, saying it discriminates against blacks and Hispanics.

Most law enforcement agencies across the state use the exam.

The lawsuit stems from an investigation into test results from 2000 to 2008 in which white officers did considerably better than their black and Hispanic counterparts.

The lawsuit seeks to stop the state from continuing to use the exam and asks the court to order New Jersey to offer relief to officers "harmed" by the exam by offering promotions, back pay and retroactive seniority.



Look at this advertisement on Haaretz.com for Meir Panim, a New York City–based kike charity.

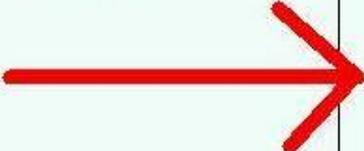
From: [www.haaretz.com/hasen/spages/1142115.html](http://www.haaretz.com/hasen/spages/1142115.html)

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Comments: 249

Last update - 23:13 12/01/2010  
**Netanyahu: Turkey drift toward Iran is worrying**  
By [Barak Ravid](#), Haaretz Correspondent, Haaretz Service

Here is the stock image they used, which has the following description:



*"A Palestinian girl cries during the funeral of a relative that was killed in an Israeli air strike in Beit Lahiya, northern Gaza Strip, Sunday, Jan. 4, 2009. Israeli ground troops and tanks cut swaths through the Gaza Strip early Sunday, cutting the coastal territory into two and surrounding its biggest city as the new phase of a devastating offensive against Hamas gained momentum. Photo by Fady Adwan/propaimages"*

---



***"I'm not a puppet!"***

***"It says that right here ... on my teleprompter!"***

No more shopping at Lowe's.

# familytrees

**Start a holiday tradition** with a beautiful pre-lit tree from Lowe's. All are pre-strung with hundreds of lights – just add your own ornaments and celebrate! After the holidays, they fold away to store compactly, waiting for more merry engagements year after year.



**A. 7.5' Madison Fir Pre-Lit Tree**

Tap your toe on the light switch to illuminate 550 Sure-Lit™ clear lights that stay lit even if one bulb burns out. Hinged trunk unfolds into a glorious 50"Dia. tree with 1,037 tips and 4-legged no-tip base. #d7999 **\$98.00**

**B. 7' Dakota Pine Pre-Lit Tree**

Year after year, you'll be glad you chose this beautiful tree, with 1,002 tips and 500 multicolored lights. Sets up in minutes, stores in neat-to-no space, thanks to easy 3-pc. design. Steel base. 54"Dia.  
7' Tree with Multicolor Lights. #175127 **\$76.00**  
7' Tree with Clear Lights. #175100 **\$76.00**

**C. 7.5' Madison Fir Green Tree with 550 Multicolor Lights**

Illuminate 550 Sure-Lit™ multicolored lights with touch of your toe. They stay lit even if one bulb out. Hinged trunk unfolds into a glorious 50"D tree with 1,037 tips and 4-legged no-tip base. #e6917 **\$98.00**

6

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Looks like a public relations firm connected the corrupt Obama administration is sending fake letters of support to various newspapers around the U.S. All the pro-Obama letters appear to use the name "Ellie Light" and they make the false claim of living in the general area. One appeared on the *Green Bay Press-Gazette's* website on January 13. They caught it (shocking) and issued this statement:

From: [www.greenbaypressgazette.com](http://www.greenbaypressgazette.com)

January 25, 2010

To our readers: About that letter from Ellie Light

A woman named Ellie Light (if that is her real name) recently duped dozens of newspapers around the country, including some here in Wisconsin, into printing her letter praising President Barack Obama as if she were a local resident.

The letter appeared in three Gannett Wisconsin Media newspapers, including the *Door County Advocate*. As a result, it also appeared on the *Green Bay Press-Gazette's* website.

Since the *Cleveland Plain Dealer* broke the story Friday, Light's bogus letter has been found in more than 60 papers and counting. The editors of the GWM papers exercised due diligence to one degree or another, in most cases calling the phone number provided by the writer to confirm she was the author. However, she responded with false information and a series of different hometowns. Because the *Press-Gazette's* search engine is linked to the other Gannett Wisconsin Media newspaper websites, when it calls up content that appeared in other GWM papers, our logo appears on the top of the page.

Therefore, a search for Ellie Light would have provided links to the letter under our banner, even though the *Press-Gazette* did not print it and our editors did not post it directly to our website. People intent on duping us are using more sophisticated methods all of the time. We catch many mass-mailed form letters, but this person managed to get past editors with a simple misstatement of fact. Like many newspapers, the *Press-Gazette* already requires writers to provide a street address and phone number (not for publication) for verification purposes.

We still believe in the inherent honesty of many letter writers, but this case will find us reviewing the incident to determine whether additional safeguards are necessary.

We apologize that this letter appeared on our website.



**Photo of "Ellie Light"**