GBPPR 'Zine

Issue #106 / The Monthly Journal of the American Hacker / February 2013

"Neither a borrower nor a lender be,
Do not forget: Stay out of debt;
Think twice, and take this good advice from me,
Guard that old solvency.
There's just one other thing you ought to do,
To thine own self be true."

––– Shakespeare's *Hamlet* as performed by the castaways on *Gilligan's Island*.

Funny, isn't it? Seven people trapped on a deserted island have more economic sense than the entire Obama administration...

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Single Digit Dialing Feature / #1A ESS

FEATURE DOCUMENT

SINGLE DIGIT DIALING FEATURE

2-WIRE NO. 1 AND NO. 1A ELECTRONIC SWITCHING SYSTEMS

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Single Digit Dialing Feature / #1A ESS

SECTION 231-090-400

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FEATURE DEFINITION AND DESCRIPTION

1. DEFINITION/INTRODUCTION

DEFINITION

1.01 The ***single digit dialing*** feature permits business customer station users to reach any of a preselected group of stations or other internal facilities by dialing single digit codes.

1.02 The ***digit timing code conflict*** feature provides the ability to use conflicting, variable-length codes in a business customer group dialing plan to reach similar or different facilities.

1.03 The ***override attendant access restriction*** (OAR) option permits a business customer station user or attendant to use single digit codes to complete an intragroup call regardless of the originator's class of service.

INTRODUCTION

1.04 Single digit dialing can be used for special hotel/motel services such as room service, lounge, laundry, etc.

1.05 Digit timing code conflict can be used with the flexible numbering of stations feature in a hotel/motel environment to permit mixing of 2-, 3-, and 4-digit station codes with the same first and second digits to associate room extension numbers and room numbers; e.g., room 10 extension 10, room 100 extension 100, room 1000 extension 1000. Also, the code conflict feature may be used to assign 1-, 2-, and 3-digit access codes with the same first, second, etc., digits or assign access codes and extension numbers with the same first, second, etc., digits; e.g., digit 4 to reach single digit extension, digits 40 to reach dial dictation equipment, or digits 4000 for customer extension.

1.06 The override access code (OAR) option is used to allow the attendant or a station to complete a call to extensions accessed by single digit codes from which they would normally be restricted because of the method used to access those single digit codes in the ESS. (See 3.02.) Without OAR, the attendant and fully restricted stations would be denied access to single digit codes used for extensions such as lounge, valet, etc., in a hotel/motel environment or any other business customer extension which the customer desired to reach using single digit codes.

2. USER PERSPECTIVE

CUSTOMER

Single Digit Dialing

2.01 When a customer with the single digit dialing feature dials a single digit code and no code conflict exists and the called station is idle, audible ringing tone is heard immediately. If a code conflict exists and the customer dials the # (number) digit after the single digit code as ***an end of dialing*** digit, audible ringing tone is heard immediately. (The # digit can be used only by customers equipped with TOUCH-TONE® calling.) If the # digit is not dialed, a 4- to 6-second delay occurs between the dialing of the single digit code and the receipt of audible ringing tone. When the called party answers, audible ringing tone is silenced and the two parties may converse. If the called station is busy, busy tone is heard instead of audible ringing tone.

Digit Timing Code Conflict

2.02 When a customer dials an access code or a station code for which a code conflict exists and then dials the # digit as an end-of-dial indication, either audible ringing tone or second dial tone is heard immediately. (The # digit can be used only by customers equipped for TOUCH-TONE calling.) If the # digit is not dialed after the code digits, a 4- to 6-second delay occurs between the dialing of the code digits and the receipt of the second dial tone or audible ringing tone. If a busy station or an all-circuits-busy condition is encountered, busy tone or overflow tone is heard instead of audible ringing tone or second dial tone, respectively.

Override Attendant Access Restriction (OAR)

2.03 The business customer attendant or a fully restricted station dials a single digit code to reach an intragroup business customer station. The call is completed as described in 2.01.

SECTION 231-090-400

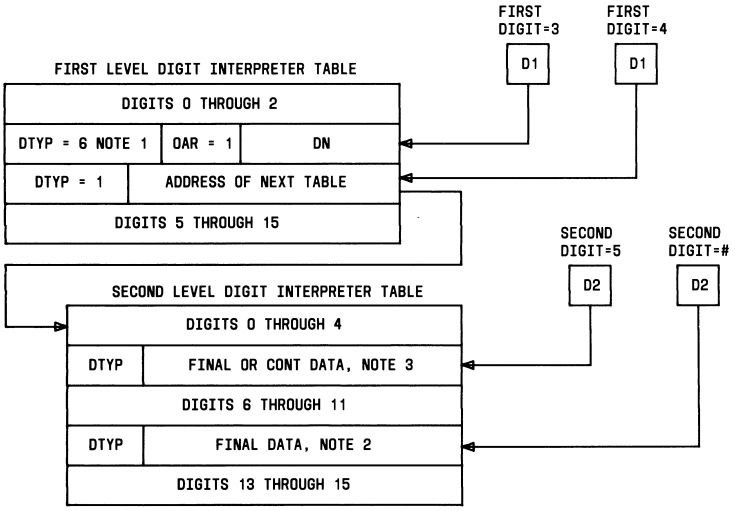
3. SYSTEM PERSPECTIVE

SOFTWARE DATA STRUCTURES

3.01 Figure 1 illustrates the translation required for the single digit dialing and code conflict features.

3.02 The single digit dialing feature uses a DTYP 6 word in the centrex digit interpreter tables to reach business customer stations on intracentrex calls that would usually be reached by dialing normal length station codes. If no code conflict exists, the final data DTYP 6 is shown in the first level digit interpreter table. (See Fig. 1.) If a code conflict exists, a DTYP 1 entry is used in the first level digit interpreter table to indicate timing for the next digit; the DTYP 6 entry is used in slot 12 of the second level digit interpreter table. The directory number (DN) in the DTYP 6 word may be any internal business customer group station. The OAR item in the DTYP 6 word must equal 1 to permit the business customer attendant(s) and fully restricted stations to terminate to internal stations using single digit dialing. The OAR item must equal 0 when the DTYP 6 word is used to terminate to the business customer attendant using a single digit code (normally 0).

3.03 The DTYP 1 word in the digit 4 slot in Fig. 1 is used to resolve a code conflict condition and indicates that 4- to 6-second critical timing is to be performed before collection of the next digit. If another digit is collected before the 4- to 6-second time-out, the digit interpreter program obtains the address of the next level digit



NOTES:
1. THE DTYP = 6 FINAL DATA IS FOUND IN FIRST LEVEL DIGIT INTERPRETER TABLE WHEN NO CODE CONFLICT EXISTS FOR SINGLE DIGIT CODES
2. THIS ENTRY MAY ONLY BE FINAL DATA (DTYP = 0-6). A DTYP = 1 OR DTYP = 7 MAY NOT BE USED
3. THIS ENTRY MAY BE FINAL DATA (DTYP = 0-6), OR DTYP = 1, OR CONTINUATION DATA (DTYP = 7)

Fig. 1—Centrex Digit Interpreter Table for Single Digit Dialing and Code Conflict Features—Typical

interpreter table from the DTYP 1 word, indexes into the next level digit interpreter table using the second digit dialed (digit 5 in Fig. 1), and proceeds in accordance with the data found in the digit 5 slot of the second level digit interpreter table. The next digit may be any digit 0 through 9, *, or #. Digit # (12) is used as the standard end-of-dialing digit. If digit # (12) or any other digit is not dialed in 4 to 6 seconds, time-out occurs and the address is obtained from the digit interpreter table from the data type entry for the last digit collected (e.g., digit 4 in the first level digit interpreter table in Fig. 1). The next digit indexes the next level digit interpreter table to slot 12. Any data type entry 0 through 7 may be used in digit slots 0 through 11. Only final data types 0 and 2 through 6 may be used in the digit 12 slot.

3.04 A change has been made to utilize the digit 12 (#) word in the centrex digit interpreter tables. For the digit timing code conflict feature, the # word in the tables can contain only final data as shown in Fig. 1.

FEATURE OPERATION

3.05 When a digit is collected on a call originated by a member of a centrex group, the centrex digit interpreter routines are used to analyze the digit. This routine uses data type (DTYP) information in the centrex digit interpreter tables to identify the type of call and routing for a particular dialed digit.

3.06 When a DTYP 1 entry is found in the centrex digit interpreter table for a dialed digit, the digit code conflict feature is indicated. The DTYP 1 entry indicates that 4- to 6-second timing should be performed for the next digit.

3.07 When a DTYP 6 entry is found in the centrex digit interpreter table for a dialed digit, it indicates that a line is being accessed using fewer digits than would normally be used to reach that line.

3.08 If a DTYP 7 entry is found in the centrex digit interpreter table for a dialed digit, normally 16- to 20-second interdigital timing is indicated for the next digit. In this case, the system expects to enter at least one additional digit before final routing data is found.

3.09 If DTYP 0, 2, 3, 4, 5, or 6 entries are found in the digit interpreter tables for a dialed digit, final data is indicated and the call is routed according to the type of data specified in the DTYP word.

3.10 When a DTYP 1 entry is found in the centrex digit interpreter table for a dialed digit and dial tone is not removed before a subsequent digit is collected, the digit is immediately interpreted through the centrex digit interpreter table. If dial tone is removed before the digit is collected, 4- to 6-second timing is started for the subsequent digit. This is accomplished by placing the originating register (OR) linked to the call on a 2-way timing list.

3.11 When the OR is on the timing list, one of two things can occur: another digit can be collected, or time-out can occur before another digit is collected. If another digit is collected, the OR is removed from the timing list and normal digit interpretation continues. If time-out occurs before another digit is collected, an end-of-dialing digit (digit 12) is generated by the ESS, stored in the OR, the digit counter is incremented, and the OR is removed from the timing list.

3.12 The end-of-dialing digit (#) may also be dialed from the originating station; it is collected and interpreted in the same way as any other digit. The end-of-dialing digit is used as an index in the centrex digit interpreter tables and selects the twelfth word in a digit interpreter table where final data (DTYP) exists (e.g., DTYP 2 extensions, DTYP 5 special services, DTYP 6 directory number). The call is then routed according to the final data obtained.

3.13 Calls originated over incoming tie trunks with dial pulse (DP) or dial pulse/TOUCH-TONE (DP/TT) pulsing are handled in the same way as lines. The incoming digits are collected and analyzed through the centrex digit interpreter tables; the incoming register (IR) linked to the call is placed on a 4- to 6-second timing list if required.

3.14 A different procedure is followed when centrex-originated calls are incoming over tie trunks with multifrequency (MF) pulsing. In this case, the IR is not put on a timing list. The digit analysis program for trunks (1) waits for a digit to be received or (2) waits for the start signal (indicating the last digit has been outpulsed) to be

received. If the start signal is obtained, the address of the location where processing is to continue is stored in the IR. If a digit is collected, centrex digit interpretation is continued. If the start signal is received, it is treated in the same manner as a time-out. Digit 12 is generated by the system and stored in the IR. The digit counter is then incremented, and the centrex digit interpretation routine is continued.

FEATURE ATTRIBUTES

4. APPLICABILITY

4.01 The single digit dialing feature is provided on a per customer group basis unless a centrex complex arrangement is involved. If a centrex complex is involved, access is limited to stations belonging to the centrex group (common block and digit interpreter tables) where single digit dialing is specified.

4.02 Single digit dialing feature access from the trunks may be restricted by normal trunk restriction techniques.

5. LIMITATIONS AND RESTRICTIONS

5.01 The use of the single digit dialing feature is limited to the number of digits available (0 through 9, *, #). Several of these codes are normally taken for standard use (e.g., 0 to reach attendant, 8 to reach toll terminal or CCSA, and 9 for local calls or local and toll calls).

5.02 The digit timing feature cannot be used to time out to another digit timing entry or to subsequent dial access codes of two or more digits. The feature may time out only to final routing data.

5.03 The single digit dialing feature cannot be used on an incoming foreign exchange line.

6. COMPATIBILITY AND INTERACTIONS

6.01 DTYP 1 and DTYP 6 centrex digit interpreter table entries cannot be assigned to slots in the first and second level digit interpreter tables for which timing for unprefixed speed calling is required. For example, if slot 2 in the first level digit interpreter table is used for speed calling, it cannot also be assigned to digit timing or single digit dialing or vice versa.

6.02 When tie trunks use the digit timing feature, the collect digits and save access code (SAC) information must be compatible between the far-end office and the ESS. For example, the collect digits information for tie trunks must be specified as variable if a 2-digit time-out code and a 3-digit (no time-out) code can be received over the same trunks. For further details, refer to reference A(4) in Part 19.

7. COST FACTORS

MEMORY—NO. 1 ESS

A. Fixed

7.01 The following memory is required whether or not the feature is active.

- ***Generic (program store):*** The single digit dialing feature requires an increase of 200 to 250 words of generic program store.

B. Conditional

7.02 Not applicable.

C. Variable

7.03 The following memory is required when the feature is activated on a per customer group basis.

- ***Translation (program store):***

  (a) One 15-word digit interpreter table is required for each single digit code assigned. For example, if five single digit codes are required, five extra digit interpreter tables must be added since all codes use # to get final data (1#, 2#, 3#, 4#, 5#). In some cases, if digit interpreter tables already exist, the single digit dialing feature may be implemented without building new digit interpreter tables.

  (b) When variable digit extensions are to be provided, additional PS words are required to build the appropriate level centrex digit interpreter tables. For example, one word is required in the first level digit interpreter table for extensions 4000 through 4999. For variable digit extensions 4000 through 4999 and 400

through 499, one word in the first level digit interpreter table plus one 15-word second level, ten 15-word third level, and one hundred 15-word fourth level tables are required.

MEMORY—NO. 1A ESS

A. Fixed

7.04 The following memory is required whether or not the feature is active.

- ***Generic (program store):*** The single digit dialing feature requires an increase of 250 to 312 words of generic program store.

B. Conditional

7.05 Not applicable.

C. Variable

7.06 The following memory is required when the feature is activated on a per customer group basis.

- ***Translation (unduplicated call store/file store):***

(a) One 15-word digit interpreter table is required for each single digit code assigned. For example, if five single digit dialing codes are required, five extra digit interpreter tables must be added since all codes use # to get final data (1#, 2#, 3#, 4#, 5#). In some cases, if digit interpreter tables already exist, the single digit dialing feature may be implemented without building new digit interpreter tables.

(b) When variable digit extensions are to be provided, additional CS/FS words are required to build the appropriate level centrex digit interpreter tables. For example, one word is required in the first level digit interpreter table for extensions 4000 through 4999. For variable digit extensions 4000 through 4999 and 400 through 499, one word in the first level digit interpreter table plus one 15-word second level, ten 15-word third level, and one hundred 15-word fourth level tables are required.

PROCESSOR TIME

7.07 The digit timing feature in a No. 1 ESS, when used by a station, adds 300 cycles in terms of real-time cost. This is opposed to the situation where a digit is dialed and final data is returned immediately. When # end-of-dialing digit is used with digit timing, 50 or more cycles are added to the real-time cost.

7.08 The digit timing feature in a No. 1A ESS, when used by a station, adds 600 cycles in terms of real-time cost. This is opposed to the situation where a digit is dialed and final data is returned immediately. When # end-of-dialing digit is used with digit timing, 100 more cycles are added to the real-time cost.

7.09 The cycle time for the No. 1 ESS is 5.5 microseconds. The cycle time for the No. 1A ESS is 0.7 microsecond.

8. AVAILABILITY

8.01 The single digit dialing and digit timing code conflict feature and the override attendant access option are available with the CTX-7, Issue 1, generic program in the No. 1 ESS and the 1A1 generic program in the No. 1A ESS.

CONSIDERATIONS FOR INCORPORATION OF FEATURE INTO SYSTEM

9. PLANNING

9.01 Not applicable.

10. HARDWARE

10.01 Not applicable.

11. DETERMINATION OF QUANTITIES

11.01 The holding time of the ORs and the IRs is increased 4 to 5 seconds when digit timing is used. IRs are a special use of ORs; both are specified by set card NOR.

11.02 For detailed information concerning call store for determination of the number of ORs required, refer to references B(5), B(6), D(2), and D(3) in Part 19.

12. ASSIGNMENTS AND RECORDS

ASSIGNMENT RECOMMENDATIONS AND GUIDELINES

12.01 Digits that require digit timing to resolve code conflict (DTYP 1) or that are used for single digit dialing (DTYP 6) and digits used for unprefixed speed calling cannot be assigned to the same digit in the centrex digit interpreter tables. If they are assigned to the same digit, the data type entries take precedence over speed calling. [See reference A(5) in Part 19.]

INPUT AND RECORD KEEPING

A. Translation Forms

12.02 The ESS translation form 1109 provides a record of digits requiring digit timing and those that are used for single digit dialing.

B. Recent Change Messages

12.03 Recent change message formats affected by the single digit dialing feature are as follows:

RC MESSAGES	FUNCTIONS
RC:CTXDI	Builds centrex interpreter entries by using key words ATTN and TIME. Refer to Sections 231-118-331 and 231-318-309 for the entire message format.
RC:DITABS	Builds and links digit interpreter table using key words DGS and OAR. Refer to Sections 231-118-331 and 231-318-309 for the entire message format.

UNIFORM SERVICE ORDER CODES

12.04 The uniform service order code for single digit dialing is EES.

13. NEW INSTALLATION AND GROWTH

13.01 The procedures for adding, deleting, or changing the digit timing and single digit dialing feature for business customer groups are shown in Fig. 2 and Fig. 3.

14. TESTING

14.01 The VFY-XDGNT input messages in references C(1) and C(2) in Part 19 can be used to verify digit timing and single digit dialing translation. The system response to this message should be TR18.

14.02 Test calls should be made to verify that the digit timing and single digit dialing features operate correctly and to verify changes and deletions.

15. MEASUREMENTS

15.01 Not applicable.

16. CHARGING

16.01 Not applicable.

SUPPLEMENTARY INFORMATION

17. GLOSSARY

17.01 Not applicable.

18. REASONS FOR REISSUE

18.01 Not applicable.

19. REFERENCES

A. Bell System Practices

(1) Section 231-118-331—Centrex-CO Recent Change Procedures RC:CTXCB, RC:CTXDI, RC:CTXEXR, RC:DITABS, RC:FLXDG, RC:FLXRD, and RC:FLXRS (CTX-6 through CTX-8, Issue 3, Generic Programs)—2-Wire No. 1 Electronic Switching System

(2) Section 231-318-309—Centrex-CO Recent Change Formats RC:CTXCB, RC:CTXDI, RC:CTXEXR, RC:DITABS, RC:FLXDG, and RC:FLXRS (1A2W<G1>1 Generic Program)—2-Wire No. 1A Electronic Switching System (when published)

(3) Section 966-102-100—Centrex-CO and PBX-CO Service General Description (changes planned)

(4) Section 231-090-256—Feature Document—Tie Trunk Switching Tandem, Non-Tandem and

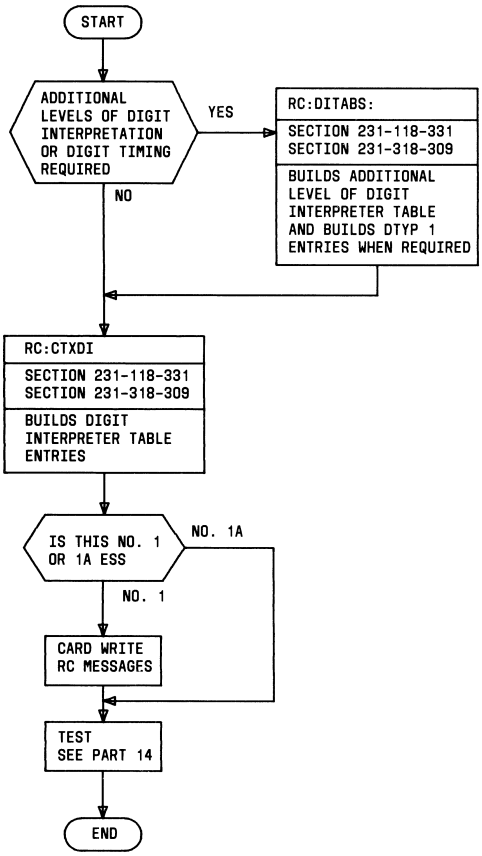


Fig. 2—Procedure for Adding Digit Timing and Single Digit Timing Features

Foreign Exchange Access—2-Wire No. 1 and 1A Electronic Switching Systems (when published)

(5) Section 231-090-401—Feature Document—Speed Calling Feature—2 Wire No. 1 and No. 1A Electronic Switching Systems (when published).

B. Traffic Facilities Practices

(1) Division D, Section 10j—Dial Facilities—No. 1 Electronic Switching System—Centrex

(2) Division D, Section 11h—Dial Facilities—No. 1A Electronic Switching System—Centrex

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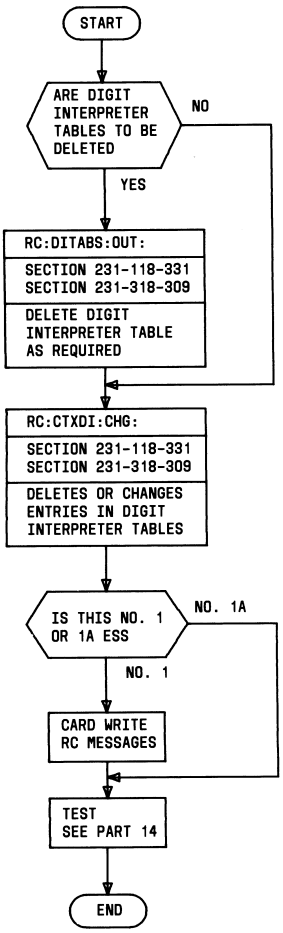

Fig. 3—Changing or Deleting Digit Timing and Single Digit Dialing Features

(3) Division D, Section 10a(5)—Dial Facilities—No. 1 Electronic Switching System—Service Features

(4) Division D, Section 11a(5)—Dial Facilities—No. 1A Electronic Switching System—Service Features (when published)

(5) Division D, Section 10h—Dial Facilities—No. 1 Electronic Switching System—Call Stores

(6) Division D, Section 11f(5)—Dial Facilities—No. 1A Electronic Switching System—Duplicated Call Stores (when published).

C. TTY Input and Output Manuals (TMs and OMs)

(1) Input Message Manual IM-1A001—No. 1 Electronic Switching System

(2) Input Message Manual IM-6A001—No. 1A Electronic Switching System

(3) Output Message Manual OM-1A001—No. 1 Electronic Switching System

(4) Output Message Manual OM-6A001—No. 1A Electronic Switching System.

D. Other References

(1) Translation Guide TG-1A

(2) Office Parameter Specification PA-591001—No. 1 Electronic Switching System

(3) Office Parameter Specification PA-6A1001—No. 1A Electronic Switching System

(4) Translation Output Configuration PA-591003—No. 1 Electronic Switching System

(5) Translation Output Configuration PA-6A002—No. 1A Electronic Switching System.

Dial Call Waiting Feature / #1A ESS

FEATURE DOCUMENT

DIAL CALL WAITING FEATURE

2-WIRE NO. 1 AND NO. 1A ELECTRONIC SWITCHING SYSTEMS

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SECTION 231-090-370

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INTRODUCTION

1. GENERAL INFORMATION

SCOPE

1.01 This document describes the Dial Call Waiting (DCW) feature when used with the No. 1/1A Electronic Switching Systems (ESSs). Coverage is also included for the silence, tone, and audible ringing (STAR) option, and the distinctive burst of call waiting tone patterns.

REASONS FOR REISSUE

1.02 This document is reissued for the following reasons:

(a) To provide coverage for the STAR option

(b) To provide coverage for the distinctive burst of call waiting tone patterns.

Since this reissue is a general revision involving conversion to the standard 18-part format, no revision arrows have been used to denote significant changes.

FEATURE AVAILABILITY

1.03 The DCW feature is available with all active No. 1 and No. 1A generic programs. The STAR option is initially available with the 1E(B4)5/1E5/1AE(C4,B4)3/1AE5 generic programs. Both the DCW feature and STAR option are located in the base generic program.

1.04 The distinctive burst of call waiting tone is initially available with the 1E6/1AE6 generic programs. It requires the optionally loadable Distinctive Ringing/Distinctive Call Waiting Tone (DRNG/DCWT) feature group.

2. DEFINITION/BACKGROUND

DEFINITION

2.01 The ***Dial Call Waiting (DCW) feature*** provides a capability whereby originating centrex stations can invoke call waiting service on selected intragroup calls by dialing a DCW access code followed by the extension number of the station to be call waited. The called party may elect to answer the call by flashing the switchhook or by hanging up and being rung back.

BACKGROUND

2.02 The silence, tone, or audible ringing (STAR) option, provides a choice of termination to which the calling party is terminated during dial call waiting. The two choices available are:

(a) Music, announcement or special tone (music source must be supplied by the customer).

(b) Audible ringing.

2.03 When DCW is invoked on a busy station, both the calling party and called party are alerted by specific signals and/or tones as outlined below.

2.04 Prior to generic programs 1E5/1AE5, audible ringing is the only tone to which the calling party can be terminated during DCW. Effective with 1E5/1AE5, the STAR option may be used. If music, announcement, or special tone is used, and all routes to this source are busy, the system defaults to audible ringing.

2.05 Prior to generic programs 1E6/1AE6, the called party is alerted to DCW by a 440-Hz call waiting tone which is repeated 10 seconds later if the called party has not answered. Effective with 1E6/1AE6, only one burst of call waiting tone is applied. If the customer also has the DRNG/DCWT feature, this tone is a distinctive pattern based upon the class assigned to the call source. For class, call source, and tone pattern applicable to the Dial Call Waiting feature, see reference A(14) in Part 18.

DESCRIPTION

3. USER OPERATION

CUSTOMER

3.01 To invoke DCW, the station user dials the assigned DCW access code and the extension number of the desired station. If the station is idle, the call is completed normally. If the station is busy, call waiting is invoked and both the calling party and called party are alerted by specific signals and/or tones as discussed in paragraphs 2.02 through 2.05. Further progress on the call is determined

by the supervisory inputs occurring on the call by the calling and/or called party. If call waiting is not allowed (e.g., the station is already call waited), busy tone is returned to the calling party.

3.02 To answer an incoming call waiting call, the called station party flashes the switchhook or abandons the original connection. In the latter case, the called station is immediately rung. If the called station party flashes, the original call is effectively placed on hold and a talking connection is established with the third party. From this point, the call waited station party may alternate between parties by switchhook flashes. If the call waited station party abandons either call, the called station is rerung and upon answer is connected to the held party. If the held party disconnects, the conference connection is disconnected and a simple 2-party connection between the call waited party and held party is established.

TELEPHONE COMPANY

3.03 Not applicable.

4. SYSTEM OPERATION

HARDWARE

4.01 The DCW feature requires the use of a 3-port conference circuit SD-1A284 and tone or recorded announcement circuit SD-1A218. The 3-port conference circuit is used to connect three parties associated with a DCW call through the network. The burst of call waiting tone is provided via a SD-1A218 tone circuit connected to a 440-Hz tone source. The incoming party to a call waited station may receive: (1) Music/other tone or announcement or (2) Audible ringing via a standard SD-1A218 circuit. If music is chosen with the STAR option, a music on queue circuit SD-1A432 is also required to interface with the customer's music source.

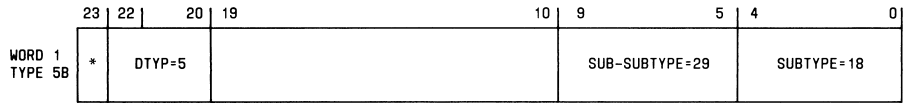
OFFICE DATA STRUCTURES

A. Translations

4.02 Centrex digit interpreter table entry data type 5, subtype 18, sub-subtype 29 is used to provide an access code for the Dial Call Waiting feature. (See Fig. 1.)

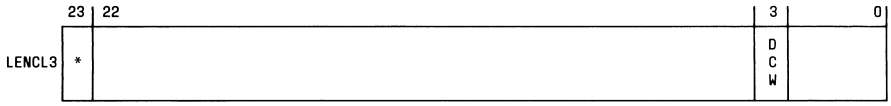
4.03 The standard LEN translator is used to allow the Dial Call Waiting feature. When the DCW item of LENCL3 word is set to 1, dial call waiting is provided for a customer line. (See Fig. 2.)

4.04 To implement the STAR option, the CXOO item of word 0, in the centrex supplementary data auxiliary block is set to 1. (See Fig. 3.) When the CXOO item is set to 1, optional word O containing the call waiting attendant tone (CWAT) and call waiting nonattendant tone (CWNT) options can be provided by setting the appropriate item to 1. If either CWAT or CWNT is set to 1, a route index (RI) for "tone" (special tone, music, or recorded announcement) is specified in optional word O to provide access to the associated trunk group for the "tone" selected by the customer. Failure to find a path through the network to that "tone" or a busy circuit associated with that "tone" causes a default to audible ringing. Audible ringing is also provided when neither the CWAT or CWNT items are set to 1. Since only one RI for tone can be specified per centrex group, only one selection for "tone" can be provided per group, therefore, another translation word is necessary to allow for expansion of the route index. (See Fig. 4.)



* BIT 23 DOES NOT EXIST IN THE TRANSLATION WORD FOR NO. 1 ESS.
IT IS EQUAL TO 0 IN THE NO. 1A ESS

Fig. 1—Centrex Digit Interpreter Table Word



* BIT 23 DOES NOT EXIST IN THE TRANSLATION WORD FOR NO. 1 ESS.
IT IS EQUAL TO 0 IN THE NO. 1A ESS
DCW - DIAL CALL WAITING

Fig. 2—Line Equipment Number Class 3 Word (LENCL3)

B. Parameters/Call Store

4.05 A 3-port conference register is required for each DCW activation. Parameter word I4CF, located in the I4REGS table, contains the quantity and call store address of 3-port conference registers. (See Fig. 5.) The quantity of 3-port conference registers in the office is defined by set card NCF.

4.06 DCW calls that provide audible ringing or one of the choices of termination available with the STAR option to the calling party requires conference assistance registers for the duration of the alerting signal and/or tone. The quantity of conference assistance registers in the office is defined by set card NAC.

4.07 Parameter word B6PORT contains the address of 3-port traffic registers for collecting traffic counts for features that use 3-port conference circuits. (See Fig. 6.)

FEATURE OPERATION

4.08 The DCW feature is initiated when the calling party dials the access code assigned to the feature. The access code is collected and interpreted through the digit interpreter tables resulting in a data type 5, subtype 18, sub-subtype 29 entry.

4.09 The system checks the LEN translations of the originating party for availability of the feature. If the feature is not allowed, busy tone is returned to the calling party. If the feature is allowed, the extension number is collected and interpreted with call forwarding, series completion, and multiline hunting features being inhibited. With these features inhibited, ringing is applied to the called station if the station is idle. If the called station is busy, call waiting treatment is given as outlined below.

4.10 A trace function is performed to determine the status of the line, the network path involved, and the identity of any call register associated with the call. For the call waiting function to be successful, the line to be call waited must be in a stable, valid connected path. All cases that do not meet this criteria cause busy tone to be returned to the originating party.

4.11 The system seizes and initializes a conference register and seizes a 3-port conference circuit. (Refer to Fig. 7 for a typical dial call waiting setup.)

4.12 The original party talking to the call waited station is first connected to one of the ports of the 3-port conference circuit. The call waited line is then connected to a 440-Hz call waiting tone circuit, and a path is reserved for the call waited line to another port of the 3-port conference circuit. When the call waiting tone circuit is released, the reserved path from the call waited station is connected to the 3-port conference circuit. At this time the call waited station and the original party are connected via the 3-port conference circuit.

4.13 While the call waited station is connected to the 440-Hz call waiting tone, the originating line is reserved to the third port of the 3-port conference circuit and connected to audible ringing or other tone. (See paragraph 2.02 for the two choices available with the STAR option.) No ringing or tone register is seized at this time.

4.14 If the call waited station flashes, the originating line connection to audible ringing or other tone is taken down, and the reserved

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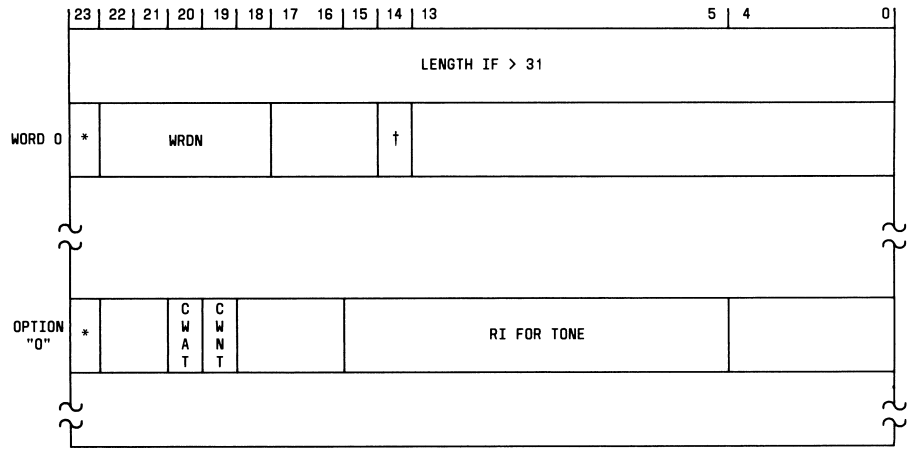


* BIT 23 DOES NOT EXIST IN THE TRANSLATION WORD FOR NO. 1 ESS. IT IS EQUAL TO 0 IN THE NO. 1A ESS

† CX00 - SET TO ONE TO INDICATE OPTIONAL WORD 0 REQUIRED

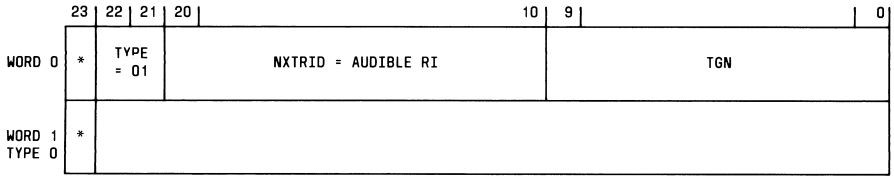
CWAT – CALL WAITING ATTENDANT TONE OPTION INDICATOR
= 1 IF TONE (OR MUSIC OR ANNOUNCEMENT) IS PROVIDED TO ATTENDANT LINES INVOKING DIAL CALL WAITING, WHICH ORIGINATE A CALL TO A BUSY STATION IN THE SAME CENTREX GROUP.
= 0 IF AUDIBLE RINGING IS PROVIDED.

CWNT – CALL WAITING NONATTENDANT TONE OPTION INDICATOR
= 1 IF TONE (OR MUSIC OR ANNOUNCEMENT) IS PROVIDED TO NONATTENDANT LINES INVOKING DIAL CALL WAITING WHICH ORIGINATE OR TRANSFER A CALL TO A BUSY STATION IN THE SAME CENTREX GROUP.
= 0 IF AUDIBLE RINGING IS PROVIDED.

RI – ROUTE INDEX FOR TONE
ROUTE INDEX ASSOCIATED WITH A TRUNK GROUP TO PROVIDE TONE (OR MUSIC OR ANNOUNCEMENT) OPTIONS. MUST BE PROVIDED IF CWAT OR CWNT = 1.

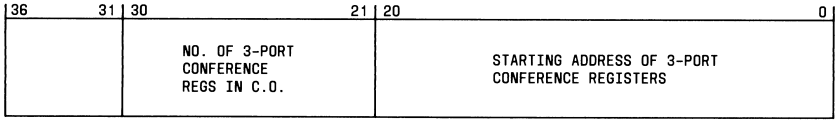
Fig. 3—Centrex Supplementary Data Auxiliary Block

path to the third port of the 3-port conference circuit is set up. The party to whom the call waited party was originally talking is split off (effectively put on hold). When the call waited party disconnects from the talking party, a ringing register is seized and ringing is connected to the call waiting station. When the call waiting party answers the call, the connection is dropped off the 3-port conference circuit, and the call waited line is put in a talking path through the network with the party who was previously on hold. The 3-port conference circuit, conference register, ringing circuit, and ringing register are idled at this time. Further progress on the call is determined by the supervisory inputs occurring on the call. The action to be performed is then determined by the type of input and the current configuration of the call.

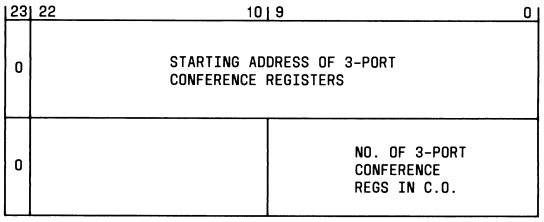


* BIT 23 DOES NOT EXIST IN THE TRANSLATION WORD FOR NO. 1 ESS. IT IS EQUAL TO 0 IN THE NO. 1A ESS

Fig. 4—Route Index Expansion Table



NO. 1 ESS (PROGRAM STORE)



NO. 1A ESS (UNDUPLICATED CALL STORE, FILE STORE)

Fig. 5—Parameter Word I4CF (I4REGS Table) 3-Port Conference Registers

CHARACTERISTICS

5. FEATURE ASSIGNMENT

5.01 The DCW feature and STAR option are provided on a per centrex group basis.

6. LIMITATIONS

OPERATIONAL

6.01 Dial call waiting service is provided only if the called station is in a valid, stable talking state.

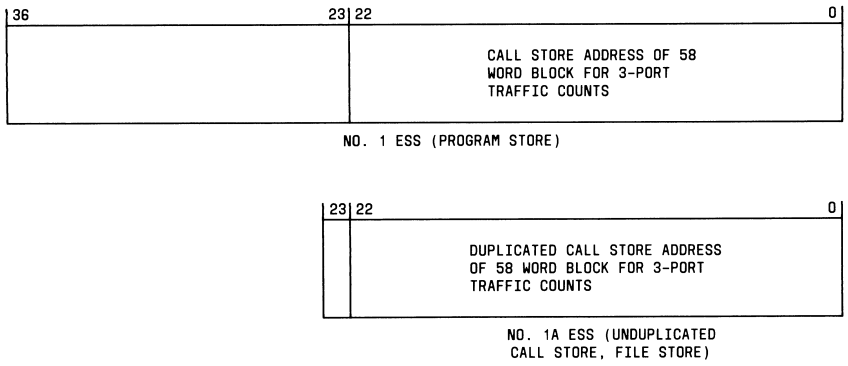


Fig. 6—Parameter Word B6PORT, 3-Port Traffic Counts

ASSIGNMENT

6.02 Not applicable.

7. INTERACTIONS

STATIC

7.01 Not applicable.

DYNAMIC

7.02 The Call Forwarding, Call Forwarding Busy Line, Call Transfer, Series Completion, and Multiline Hunt features are inhibited when the DCW feature is invoked.

7.03 Stations with both Dial Call Waiting (DCW) and Call Hold (CHD) features will have a slight modification in the operation of the DCW feature, since the switchhook flash of a station with CHD is always interpreted as a request for dial tone. Thus, when a station user with call waiting flashes, dial tone is returned and the station user dials the call hold access code which causes the present call to be placed on hold. The call waited call is then automatically connected to the call waited party.

7.04 The burst of call waiting tone that alerts a busy station user to call waiting is inhibited during certain service operations that are provided with the Interface With Voice Storage System (VSS) feature (1E6/1AE6 and later). For specific interactions between DCW and VSS, refer to A(15) in Part 18.

8. RESTRICTION CAPABILITY

8.01 Not applicable.

INCORPORATION INTO SYSTEM

9. INSTALLATION/ADDITION/DELETION

9.01 Figure 8 illustrates the procedures for assigning the DCW feature and STAR option to a centrex group.

9.02 Set cards applicable to the DCW feature are:

(a) NAC—Number of conference assistance registers

(b) NCF—Number of 3-port conference registers.

10. HARDWARE REQUIREMENTS

Note: This part contains cost factors and determination of quantities. Central Office Equipment Engineering System (COEES) Planning and Mechanized Ordering Modules are the recommended procedures for developing these requirements. However, for planning

Dial Call Waiting Feature / #1A ESS

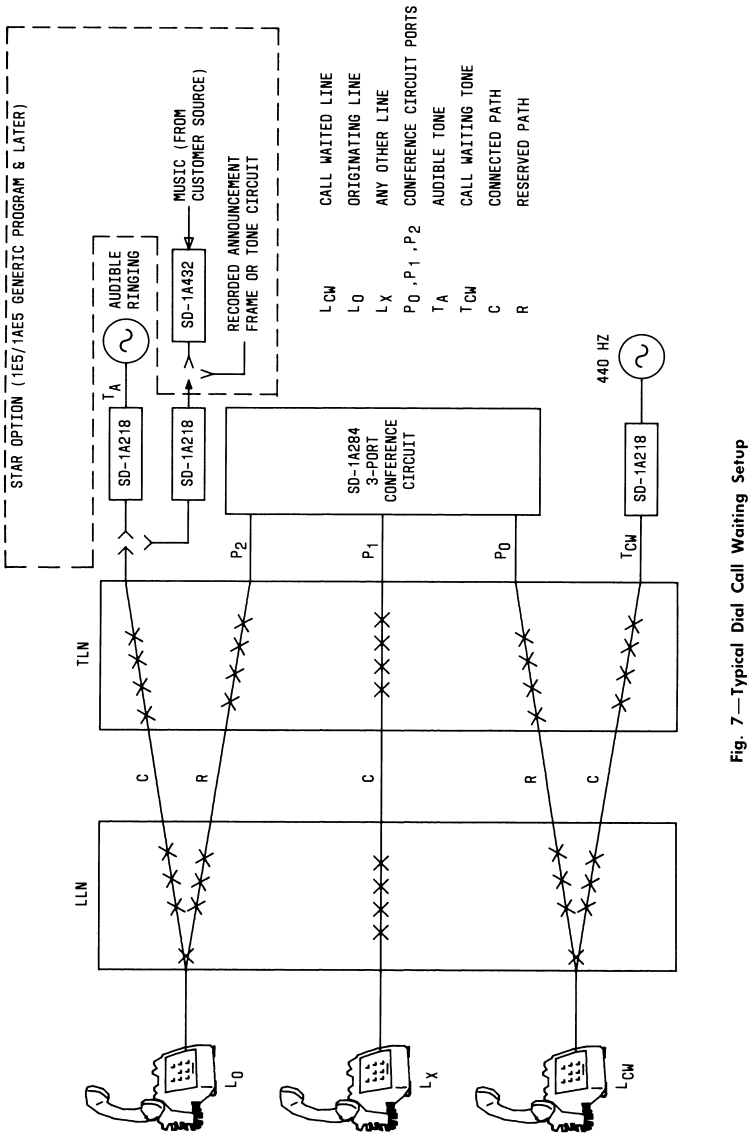


Fig. 7—Typical Dial Call Waiting Setup

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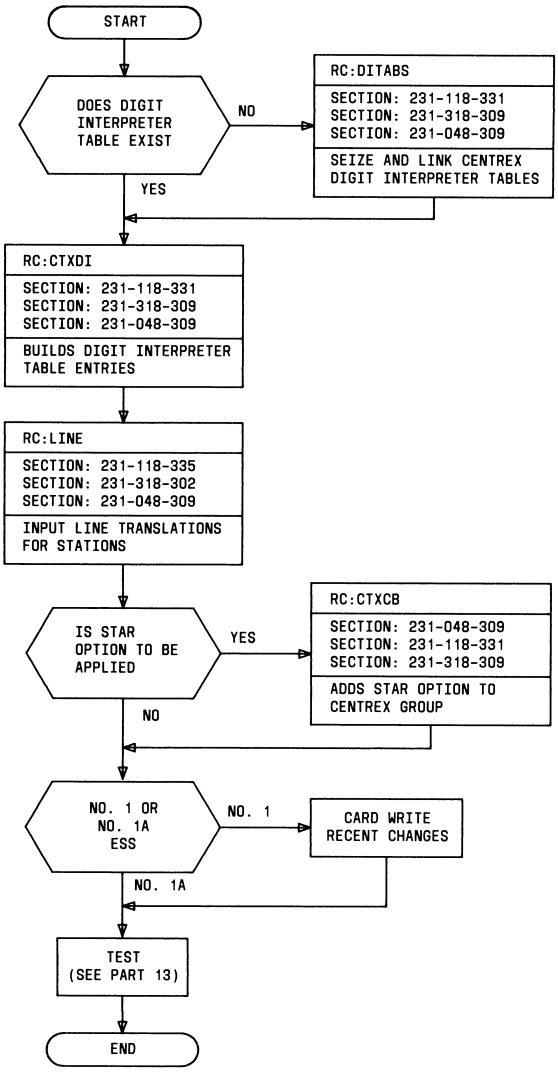


Fig. 8—Procedure for Assigning the Dial Call Waiting Feature

Page 10

purposes or if COEES is not available, the following guidelines may be used.

10.01 Three-port conference circuits require three master scan points, nine signal distributor points, and three network appearances (one per port). For SD-1A284-01 (J1A033JG), the order code is 04370. For the miniature version, SD-1A284-05 (J1A088JG), the order code is 04302.

10.02 A 3-port conference circuit SD-1A284 is required as long as three parties are associated with the call waiting call. Three-port conference circuits are engineered on a one-to-one basis with 3-port conference registers.

10.03 The tone or recorded announcement circuit requires one master scan point, two signal distributor points and one network appearance. For SD-1A218-01 (J1A032DC), the order code is 07870. For the miniature version, SD-1A218-05 (J1A084DC), the order code is 07800.

10.04 A tone or recorded announcement circuit SD-1A218 connected to a 440-Hz tone source SD-81652-01 is required each time the call waited station receives the burst of call waiting tone. The average holding time for this circuit is 0.5 seconds. This circuit is also required to interface the calling party to the appropriate termination during call waiting.

10.05 The music on queue circuit SD-1A432-01, has no master scan point, signal distributor point, network appearance or order code. If used, J1A033GR is required for the first group of 22 trunks; J1A033GU is required for the second and third group of 22 trunks for a maximum of 66 trunks.

11. SOFTWARE REQUIREMENTS

Note: This part contains cost factors and determination of quantities. Central Office Equipment Engineering System (COEES) Planning and Mechanized Ordering Modules are the recommended procedures for developing these requirements. However, for planning purposes or if COEES is not available, the following guidelines may be used.

MEMORY

A. No. 1 ESS

Fixed

11.01 The following memory is required whether or not the DCW feature and STAR option are used:

- ***Base generic program (program store):***

  (a) 1E4 and earlier—approximately 1020 words

  (b) 1E(B4)5/1E5 and later—approximately 1270 words.

Note: Only approximately 20 words are unique to the DCW feature. The remainder are shared with the CWT and CWO features.

- ***Fixed parameters (program store):*** 2 words (shared with other features).

Conditional

11.02 The following memory is required only when the feature is activated:

- ***Call Store:***

  (a) A 34-word 3-port conference register is required on a one-to-one basis with a 3-port conference circuit. The quantity of 3-port conference registers in the office is defined by set card NCF.

  (b) A 6-word conference assistance register is required during the period of time a call is waiting to be acknowledged by the called station. The quantity of conference assistance registers in the office is defined by set card NAC.

See references C(2) and C(4) in Part 18 for set card engineering.

Variable

11.03 The following memory is required when the DCW feature and the STAR option are applied:

- ***Translations (Program store):***

  (a) One word is required in the existing centrex digit interpreter tables. This word is required for final data type word 05B.

  (b) One item (DCW) is required in LENCL3 word of the centrex multiline hunt group auxiliary block or centrex line auxiliary block.

  (c) For the STAR option, one word (option O), is required in the centrex supplementary data auxiliary block. Two words are required if this translator does not exist for this customer. Option O may be shared with the CWT and CWO features.

  (d) When the recorded Centrex/ESSX-1 requires music, announcement, or special tone with the STAR option, a 2-word route index expansion table is required.

B. No. 1A ESS

Fixed

11.04 The following memory is required whether or not the DCW feature and STAR option are used:

- ***Base generic program (program store, file store):***

  (a) 1AE4 and earlier—approximately 1275 words

  (b) 1AE(C4,B4)3/1AE5 and later—approximately 1625 words.

Note: Only approximately 25 words are unique to the DCW feature. The remainder are shared with the CWT and CWO features.

- ***Fixed parameters (unduplicated call store, file store):*** 4 words (shared with other features).

Conditional

11.05 The following memory is required only when the feature is activated:

- ***Duplicated call store:*** Same as No. 1 ESS call store in paragraph 11.02 above. See references C(3) and C(5) in Part 18 for set card engineering.

Variable

11.06 Variable costs are identical to paragraph 11.03 above; translations are in unduplicated call store/file store.

REAL TIME IMPACT

11.07 The processor time required for a DCW call is approximately 100 cycles (No. 1 ESS) and 200 cycles (No. 1A ESS) in addition to the real time required to establish a call waiting call.

11.08 The cycle time for No. 1 ESS is 5.5 μsec and for No. 1A ESS is 0.7 μsec.

12. DATA ASSIGNMENTS AND RECORDS

TRANSLATION FORMS

12.01 ESS translation forms referenced in C(1), in Part 18, requiring completion are as follows:

(a) ESS 1101—Directory Number Record: This form provides the DCW indicator on a per line basis.

(b) ESS 1107—Centrex Group Supplementary Information Record: This form is used for recording the translation data for the STAR option.

(c) ESS 1109—Centrex Group Record: This form contains data defining the service requirements of the centrex group.

(d) ESS 1303—Trunk and Service Circuit Route Index Record: This form is used to record the RI information when either the CWNT or CWAT choices are selected.

RECENT CHANGES

12.02 Recent change (RC) message formats required to implement the DCW feature and STAR option are as outlined below:

RC MESSAGE	FUNCTION
RC:LINE	Builds LEN translation entries for the DCW feature by utilizing keyword CWC. See A(1), A(3), or A(5) in Part 18 for details.
RC:CTXCB	Adds STAR option to a centrex group by utilizing keywords CWNT or CWAT. See A(2), A(4), or A(6) in Part 18 for details.

13. TESTING

13.01 The DCW feature and STAR option can be tested by first verifying the translations and then by making test calls. The translations are verified using the input and output (I/O) messages shown below. For a detailed description of I/O messages, refer to teletypewriter I/O manuals in Part 18B.

13.02 Use VFY-XDGNT input message to verify the centrex digit interpreter table entry for DCW. The system response is a TR18 output message.

13.03 Use VFY-LEN input message to verify the DCW item assignment in the LENCL3 translation word. The system response is a TR03 output message.

13.04 When the STAR option is applied, verification can be accomplished by using VFY-CSTG-35 input message. The system response is a TR17 output message followed by a TR46 output message.

13.05 Perform test calls from various stations within the centrex group to verify that the DCW feature and STAR option (if applied) are properly assigned and functioning properly.

14. OTHER PLANNING TOPICS

14.01 Not applicable.

ADMINISTRATION

15. MEASUREMENTS

15.01 The following total office counts—traffic measurement code (TMC) 05 are available on the H-, C-, DA-15, and S-traffic measurement schedules. The S-schedules are available only with 1E5/1AE5 and later generic programs. The equipment group or office count numbers (EGO) are as follows:

EGO	DESCRIPTION
111	***Conference Assistance Register Usage***—Measures conference assistance register usage.
332	***Conference Assistance Registers (6-Word Path Memory Annex) Peg Count***—A count of the number of attempts to seize an idle conference register (1E4/1AE4 and later).
333	***Conference Assistance Registers (6-Word Path Memory Annex) Overflow***—Counts the number of failures to find an idle conference register (1E5/1AE5 and later).
334	***3-Port Conference Register Overflow***—Counts the number of failures to find an idle conference register (1E5/1AE5 and later).
387	***Call Waiting Centrex Peg Count***—Counts the number of times the call waiting feature is activated on a centrex line, i.e., a centrex line with call waiting in a talking state received a second call and was given call waiting tone (1E4/1AE4 and later).

15.02 The following measurements (TMC 111) define a set of peg and usage counts for the use of 3-port conference circuits by the Dial Call Waiting feature. These counts are available with 1E5/1AE5 and later generic programs on the H-, C-, DA-15, and S-traffic schedules.

EGO	DESCRIPTION
010	***Centrex-Call Waiting Peg Count***—Counts the number of times a 3-port conference circuit is seized to give a centrex line dial call waiting.
011	***Centrex-Call Waiting Usage***—Measures usage on conference registers in use for call waiting. Provided on a 100-second scan basis.
170	***Selected Centrex-Call Waiting Peg Count***—Counts the number of times a 3-port conference circuit is seized to give a centrex line dial call waiting on selected centrex group(s) only.
171	***Selected Centrex-Call Waiting Usage***—Measures usage on conference registers in use for call waiting on selected centrex group(s) only. Provided on a 100-second scan basis.

16. CHARGING

AUTOMATIC MESSAGE ACCOUNTING

16.01 Not applicable.

UNIFORM SERVICE ORDER CODES

16.02 Uniform service order codes (USOCs) applicable to the Dial Call Waiting feature and STAR option are as shown in Table A.

SUPPLEMENTARY INFORMATION

17. GLOSSARY

17.01 Not applicable.

18. REFERENCES

18.01 The following documentation contains information pertaining to or affected by the DCW feature and STAR option.

A. Bell System Practices

(1) Section 231-118-335—Line RC Procedures for LINE, TWOPTY, MPTY, SCLIST, MLHG, ACT and CFV (CTX-7 through 1E5 Generic Programs)—2-Wire No. 1 Electronic Switching System

(2) Section 231-118-331—Centrex-CO RC Procedures for CTXCB, CTXEXR, CXDICH, DITABS, DLG, FLXDG, FLXRD, and FLXRS (CTX-6 through 1E5 Generic Programs)—2-Wire No. 1 Electronic Switching System

(3) Section 231-318-302—Line RC Procedures for LINE, TWOPTY, MPTY, SCLIST, and

TABLE A

UNIFORM SERVICE ORDER CODES

USOC	APPLICABILITY
E6C	Dial Call Waiting
RA2	Recorded Announcement Option — Per Group of 22 R.A. Ports
RPC	Recorded Announcement Option — Per Each Port Connecting Circuit
MUS	Music Option — Per Group of 22 Music Ports
MUP	Music Option — Per Each Port Connecting Circuit
(U)	Channel Connecting Serving Central Office and Music Source on Customer Premises.

CFV (Through 1AE5 Generic Program)—2-Wire No. 1A Electronic Switching System

(4) Section 231-318-309—Centrex-CO RC Procedures CTXCB, CTXDI, CTXEXR, CXDICH, DITABS, DLG, FLXDG, FLXRD, and FLXRS (Through 1AE5 Generic Program)—2-Wire No. 1A Electronic Switching System

(5) Section 231-048-312—Line RC Formats for LINE, TWOPTY, MPTY, SCLIST, MLHG, ACT, CFV, and VSS (1E6 and 1AE6 Generic Programs)—2-Wire No. 1 and No. 1A Electronic Switching Systems

(6) Section 231-048-309—Centrex-CO and ESSX-1 RC Formats for CTXCB, CTXDI, CTXEXR, CXDICH, DITABS, DLG, FLXDG, FLXRD and FLXRS (1E6 and 1AE6 Generic Programs)

(7) Section 231-060-210—Service Circuits—Network Switching Engineering—No. 1 and No. 1A Electronic Switching Systems

(8) Section 231-061-450—Program Stores—Network Switching Engineering—No. 1 Electronic Switching System

(9) Section 231-061-460—Call Stores—Network Switching Engineering—No. 1 Electronic Switching System

(10) Section 231-062-460—Processor Community Engineering—Program Stores—Network Switching Engineering—No. 1A Electronic Switching System

(11) Section 231-062-465—Processor Community Engineering—Duplicated Call Store—Network Switching Engineering—No. 1A Electronic Switching System

(12) Section 231-062-470—Processor Community Engineering—Unduplicated Call Store—Network Switching Engineering—No. 1A Electronic Switching System

(13) Section 231-062-475—Processor Community Engineering—File Stores—Network Switching Engineering—No. 1A Electronic Switching System

(14) Section 231-090-158—Feature Document—Distinctive Ringing/Distinctive Call Waiting Tone Feature—2-Wire No. 1 and No. 1A Electronic Switching Systems

(15) Section 231-090-151—Feature Document—Interface With Voice Storage System Feature—2-Wire No. 1 and No. 1A Electronic Switching Systems.

B. Teletypewriter Input and Output Manuals

(1) Input Message Manual IM-1A001—2-Wire No. 1 Electronic Switching System

(2) Output Message Manual OM-1A001—2-Wire No. 1 Electronic Switching System

(3) Input Message Manual IM-6A001—2-Wire No. 1A Electronic Switching System

(4) Output Message Manual OM-6A001—2-Wire No. 1A Electronic Switching System.

C. Other References

(1) Translation Guide TG-1A—No. 1 and No. 1A Electronic Switching Systems—2-Wire

(2) Office Parameter Specification PA-591001—No. 1 Electronic Switching System—2-Wire

(3) Office Parameter Specification PA-6A001—No. 1A Electronic Switching System—2-Wire

(4) Parameter Guide PG-1—No. 1 Electronic Switching System—2-Wire

(5) Parameter Guide PG-1A—No. 1A Electronic Switching System—2-Wire

(6) Translation Output Configuration PA-591003—No. 1 Electronic Switching System—2-Wire

(7) Translation Output Configuration PA-6A002—No. 1A Electronic Switching System—2-Wire.

GBPPR JAMCAT

Overview

This is a simple add−on jammer adapter for any amateur or two−way radio transceiver with an external microphone (PTT) and earphone/speaker connection. The jammer will key (transmit) the radio on upon the detection of any "activity" on the particular frequency the receiver is tuned to.

This is the perfect type of jamming system to interfere with those pesky security guards, restaurant drive−throughs, corrupt police, or even LoJack and cellular/pager−type "quick bursting" radio transmission systems.

The construction of the circuit is quite simple. Two LM358 dual op−amps are used to amplify and clip any audio signal coming from the jamming transceiver's earphone or speaker output. This audio signal is what is used to trigger the transmitter portion of the transceiver.

The circuit assumes that any "noise" coming from the earphone or speaker output is the transceiver receiving a valid transmission, so be sure your radio's squelch setting is tight or none of this will work properly and you'll just be stuck jamming random signals!

The op−amps are configured to amplify and rectify any incoming audio signal. This amplification and diode hard−limiting eventually turns the incoming audio signal into a square wave.

This square wave is further rectified to generate a positive pulse which is used to trigger a 555 timer in a monostable configuration with an adjustable delay time. The output of the 555 timer toggles a relay which controls the PTT switch on the jamming transceiver causing it to transmit.

The 1 megaohm **Delay Time** potentiometer can be adjusted to increase/decrease the length of the 555 timer's "jamming" time. Note that too low of a jamming delay time can result in "relay chatter," so set the delay time for a few seconds or longer.

The internal noise generator, which is optional, is just a standard 1N5235 6.8 volt Zener diode with a small reverse current and a 2N3904 transistor buffer. The National LM386 audio amplifier acts as a natural band−pass filter and small−signal amplifier. The noise jamming signal is then mixed with the PTT control line / microphone input to modulate the transmitter's RF output with a little bit of random noise. This will help in masking the jamming transmission, making it look like just random "noise" to an outside observer. With the noise generator disabled, the jamming signal will be an unmodulated RF carrier.

The only real "bug" in the circuit is the PTT control. Some transceivers like to be keyed with a PTT−to−ground circuit, while some require a little bit of resistance to ground. You may have to experiment with the 1 kohm resistor value, or check the radio's manual for the proper PTT control circuit.

It's also possible to replace the PTT control relay with a single transistor (2N3904, etc.), but the hardware relay will allow for more external control options when adapting to other gear.

Operation

1. Tune your transceiver to the desired frequency to jam. Remember, you want to jam the *receiver* of the target, so take this into account when a repeater system is being used. Optionally, connect the transceiver to an external high−power RF power amplifier (or antenna system) to increase the effectiveness of the jamming.

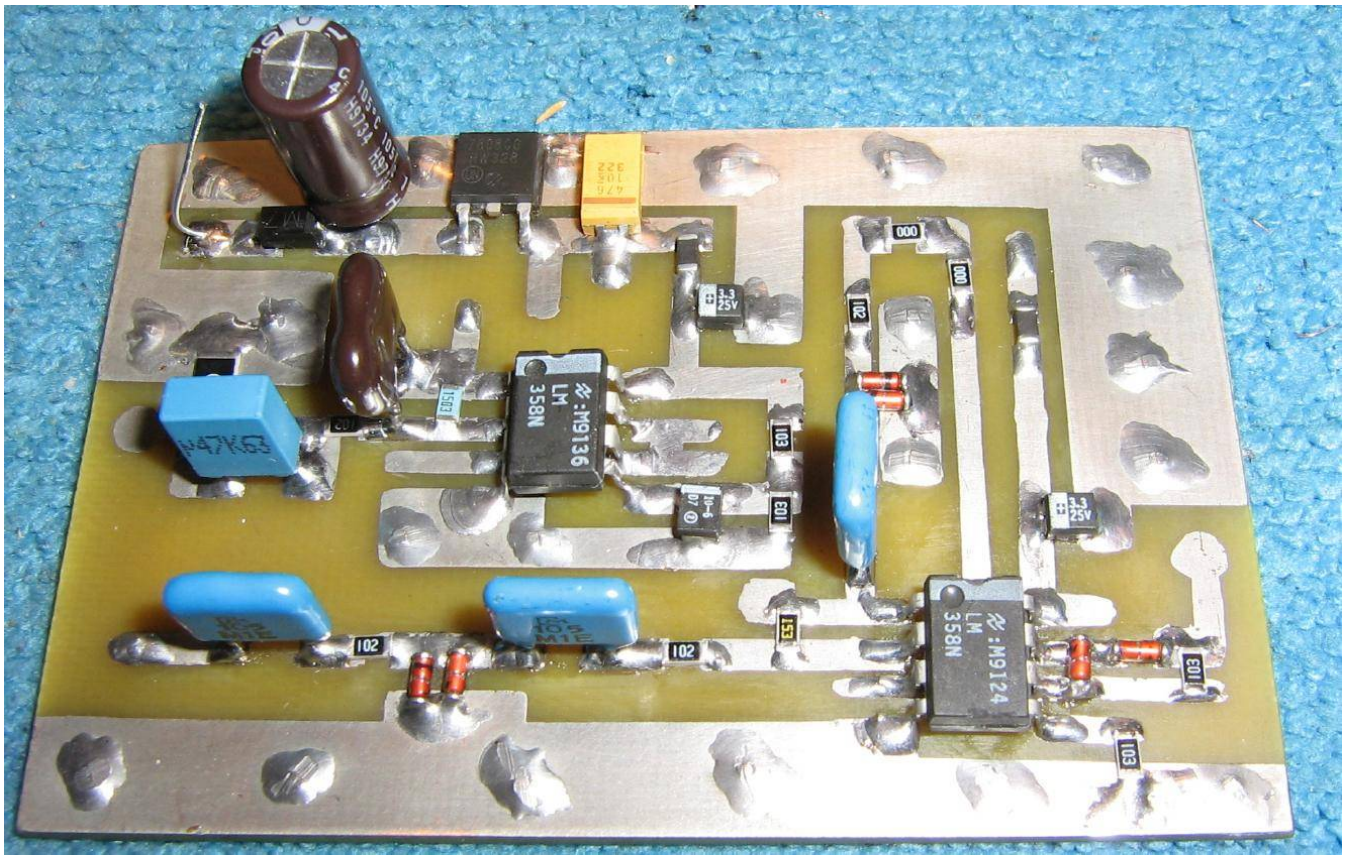
2. Connect the transceiver's earphone/speaker output jack to the GBPPR JAMCAT's **Audio Input**. This will usually be via a 1/8" mono jack. Use as low a volume as possible. Also watch out for "speaker pops" when your radio unkeys. Test ahead of time, if you can.

3. Connect the transceiver's microphone/PTT jack to the GBPPR JAMCAT's **PTT Control** input. This will usually be via a 3/32" mono jack.

4. Adjust the squelch on the transceiver to the desired setting. "Tight" squelches are best, that is, squelches which require a strong received signal before they "open." This helps in eliminating the receiving of random RF interference or noise, and prevents any unnecessary jamming transmissions which could potentially reveal your jamming location.

5. Select either the internal noise modulation or use an external line−level modulation source, such as tones, speech, music, etc.

Pictures & Construction Notes

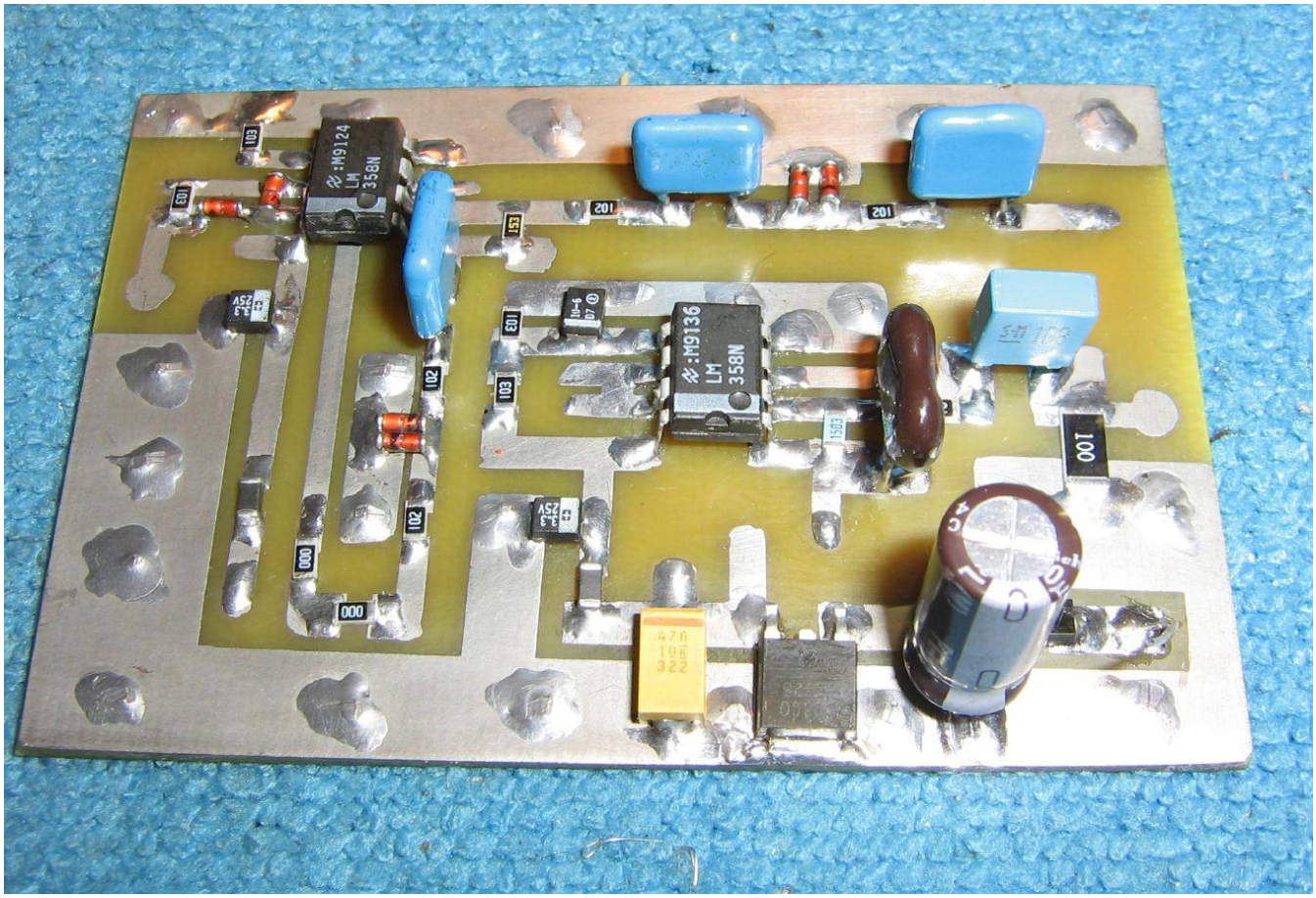


GBPPR JAMCAT Audio Amplifier and Limiter circuit board.

Two LM358 op−amps are used to amplify and limit the input audio signal.

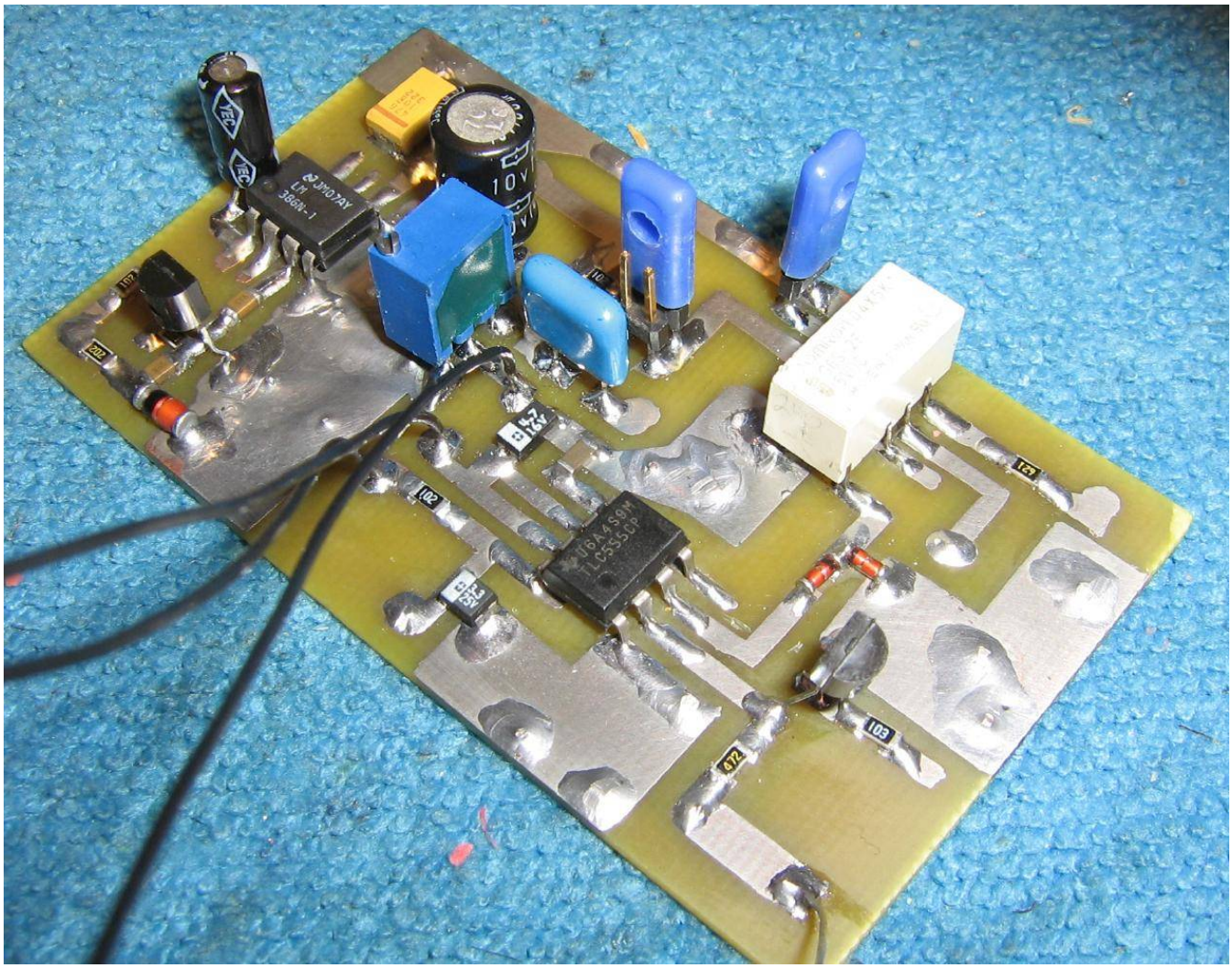
The blue, rounded capacitors are non−polarized 1 µF.

A 1 watt, 10 ohm resistor on the **Audio Input** acts as a load for the transceiver's speaker output.



GBPPR JAMCAT Audio Amplifier and Limiter circuit board, alternate overview.

A 78M08 +8 VDC voltage regulator is along the bottom.



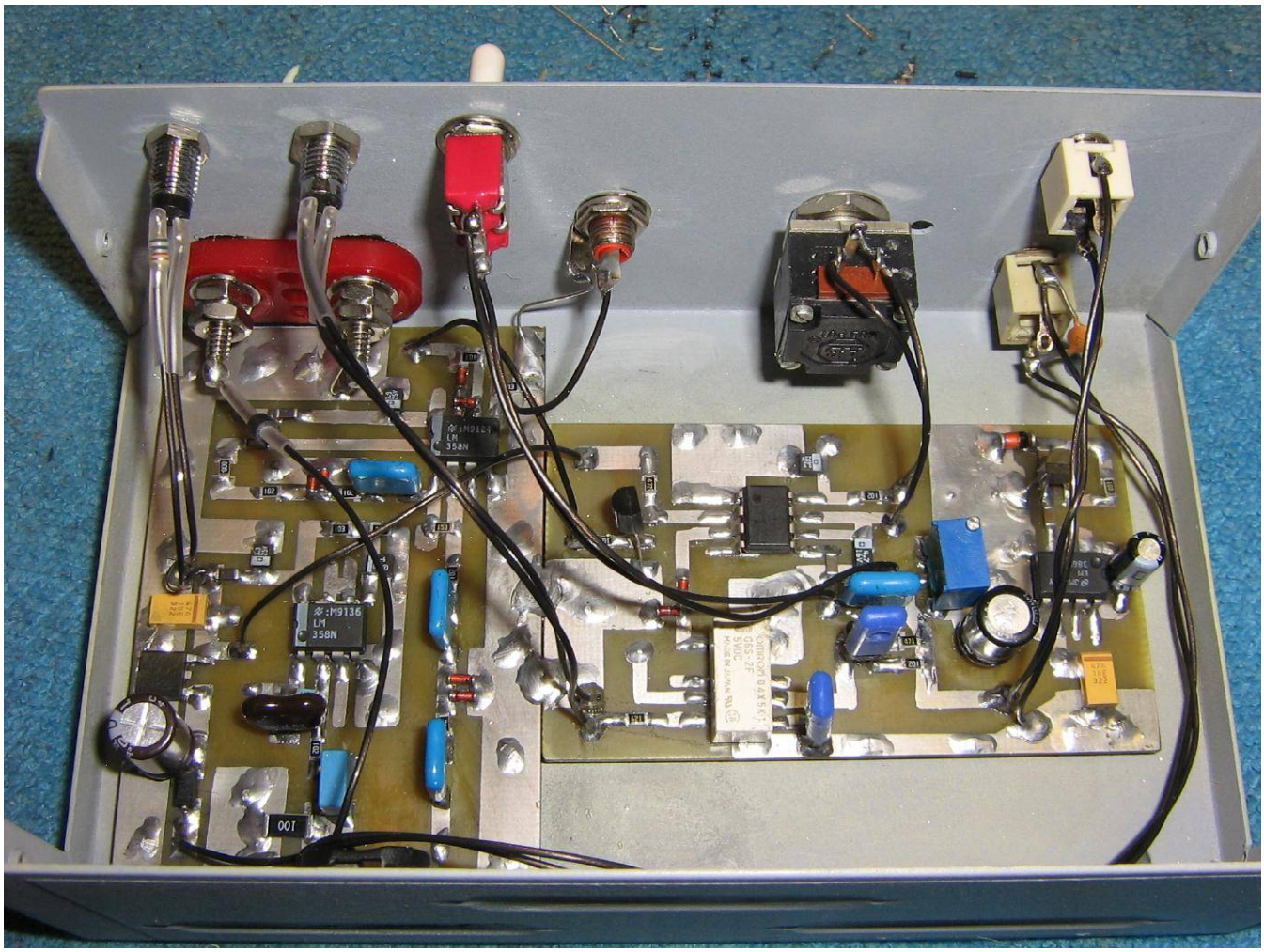
GBPPR JAMCAT Timer and Relay circuit board.

The DPDT relay is the white rectangle device.

The LM386–based noise generator circuit is along the top of the circuit board. The 1N5235 Zener is the orange/black device.

The blue thing with the screw top is the 500 ohm **Noise Amplitude** potentiometer.

DIP headers where used for experimenting with different PTT control options and are not necessary in the final circuit.



Completed circuit, internal overview.

Mounting the circuit board in an old printer switch case.

+12 VDC power input is via the banana jacks on the upper–left. A power–indicating red LED and the green **TX Enable** LED are above it.

The **Audio Input** and **PTT Control** inputs are along the upper–right.

Front−panel overview of the GBPPR JAMCAT.

The green **TX Enable** and red **Power** LEDs are panel−mounted on the top−right.

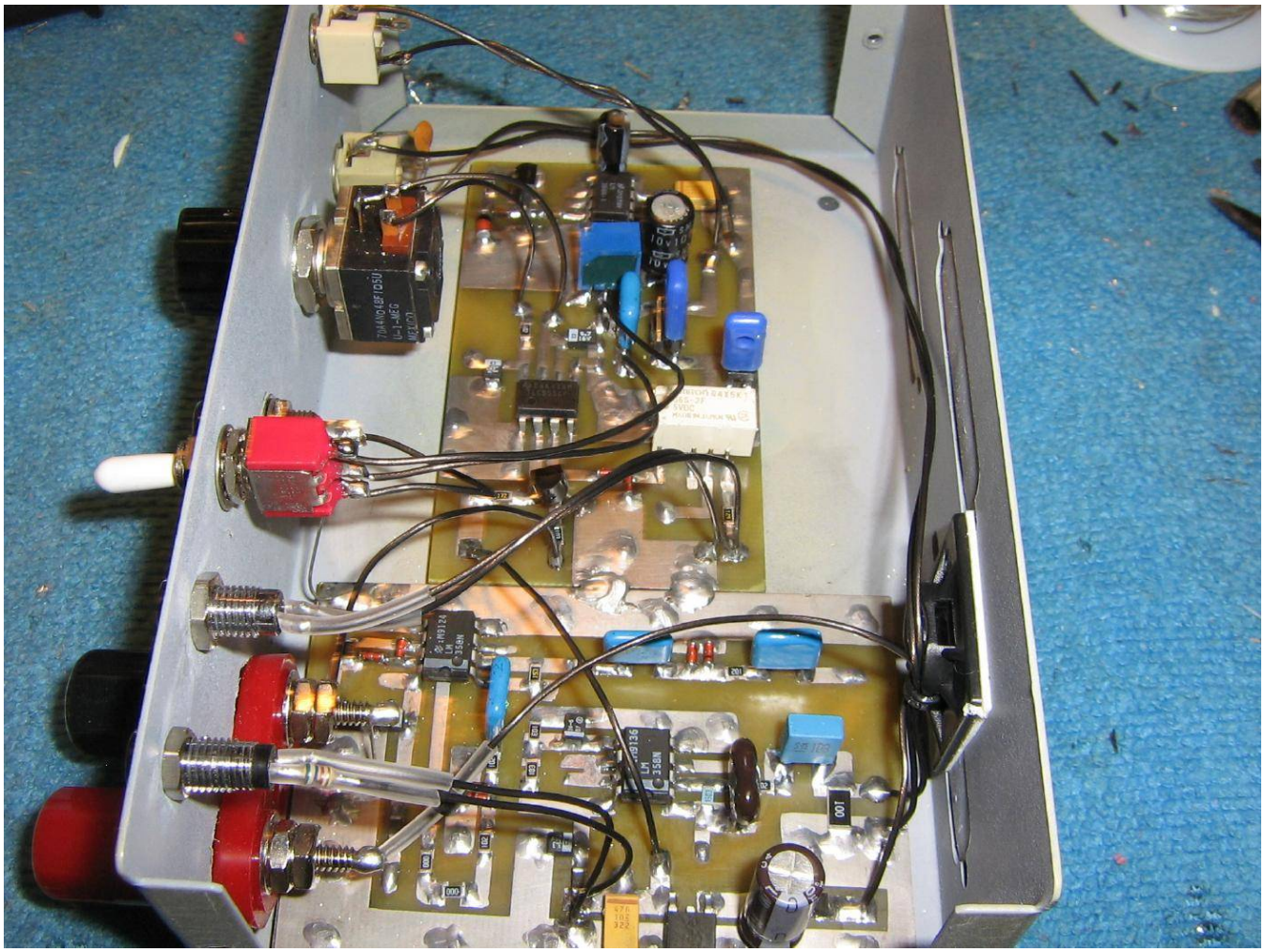
The banana jacks below the LEDs are for the +12 VDC power input. There is no power switch for this device and the current draw is around 80 mA when activated.

The internal/external **Modulation Select** switch is to the left of the LEDs. This selects between the internal noise generator or the option of using an external modulation source via the panel−mounted RCA phono jack.

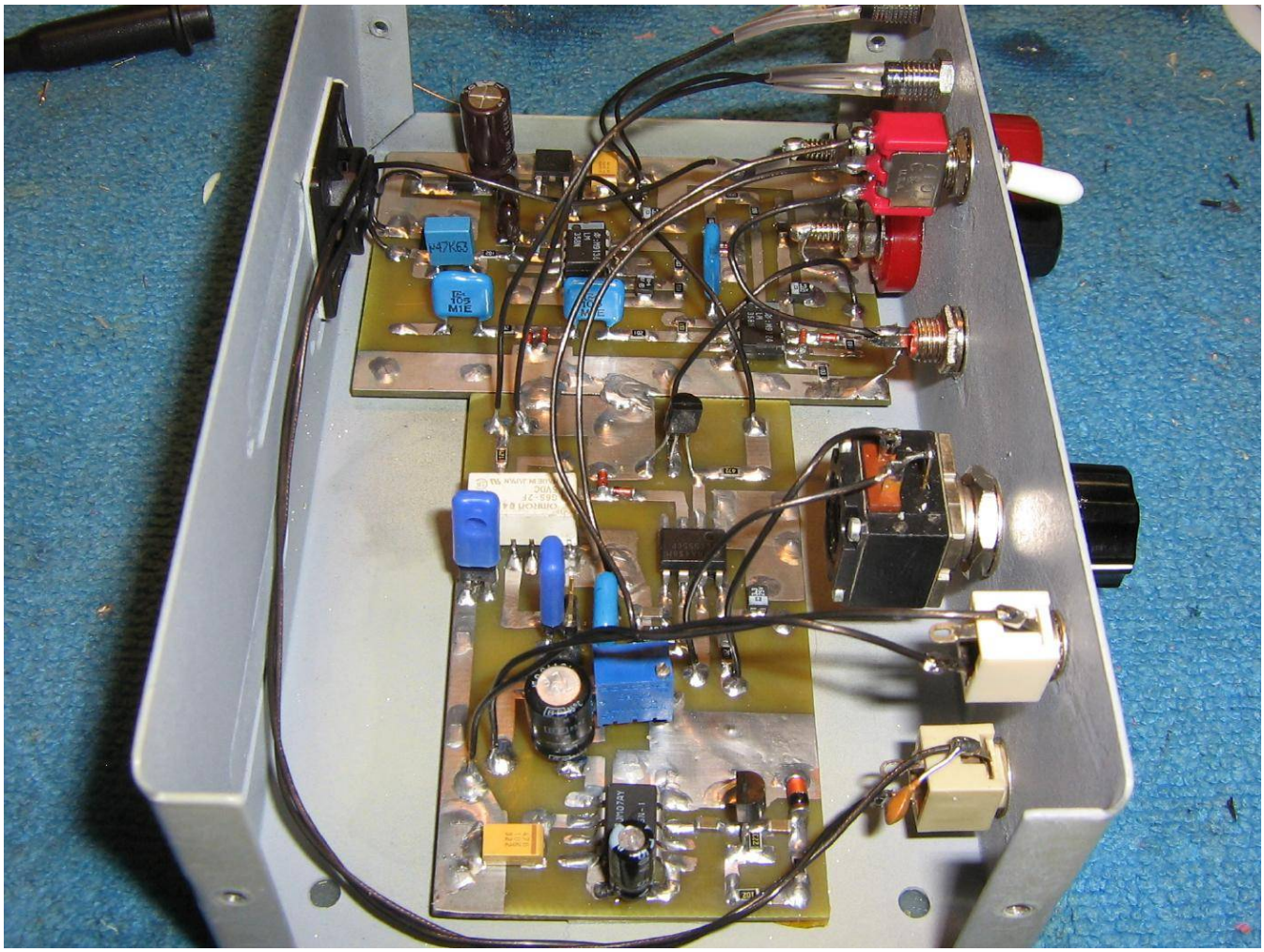
The 1 megaohm transmit **Delay Time** potentiometer is in the center.

The 1/8" mono jack for the low−impedance **Audio Input** is on the lower−left.

The 3/32" mono jack for the **PTT Control** is on the upper−left.



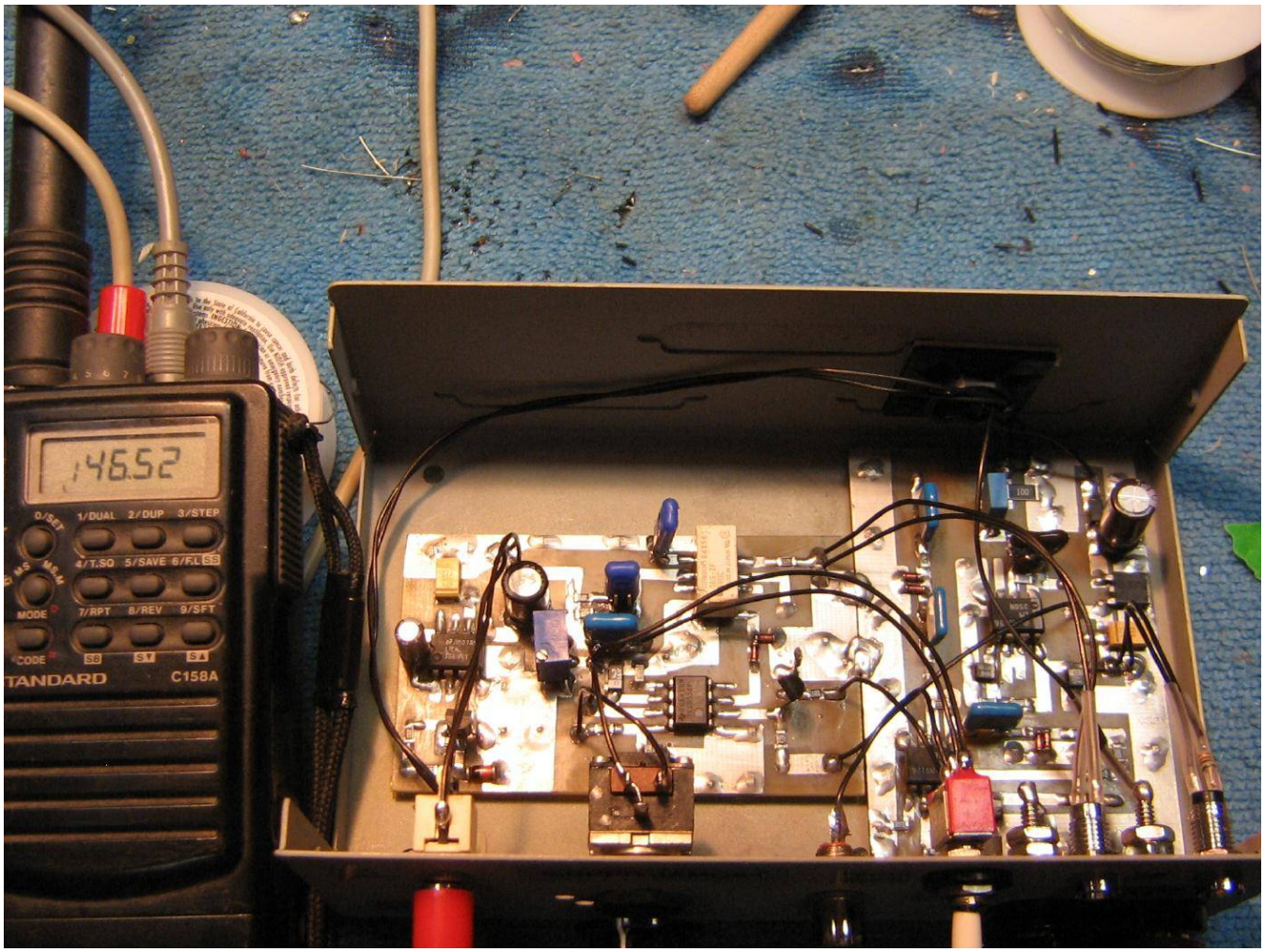
Internal overview.



Alternate internal overview.

The 1000 pF capacitor is directly connected to the **Audio Input** jack.

Keep the lines going to the **Delay Time** potentiometer as short as possible.



Example jammer setup using the PTT/microphone and earphone/speaker output jacks on a Standard C158A 2–meter amateur radio transceiver.

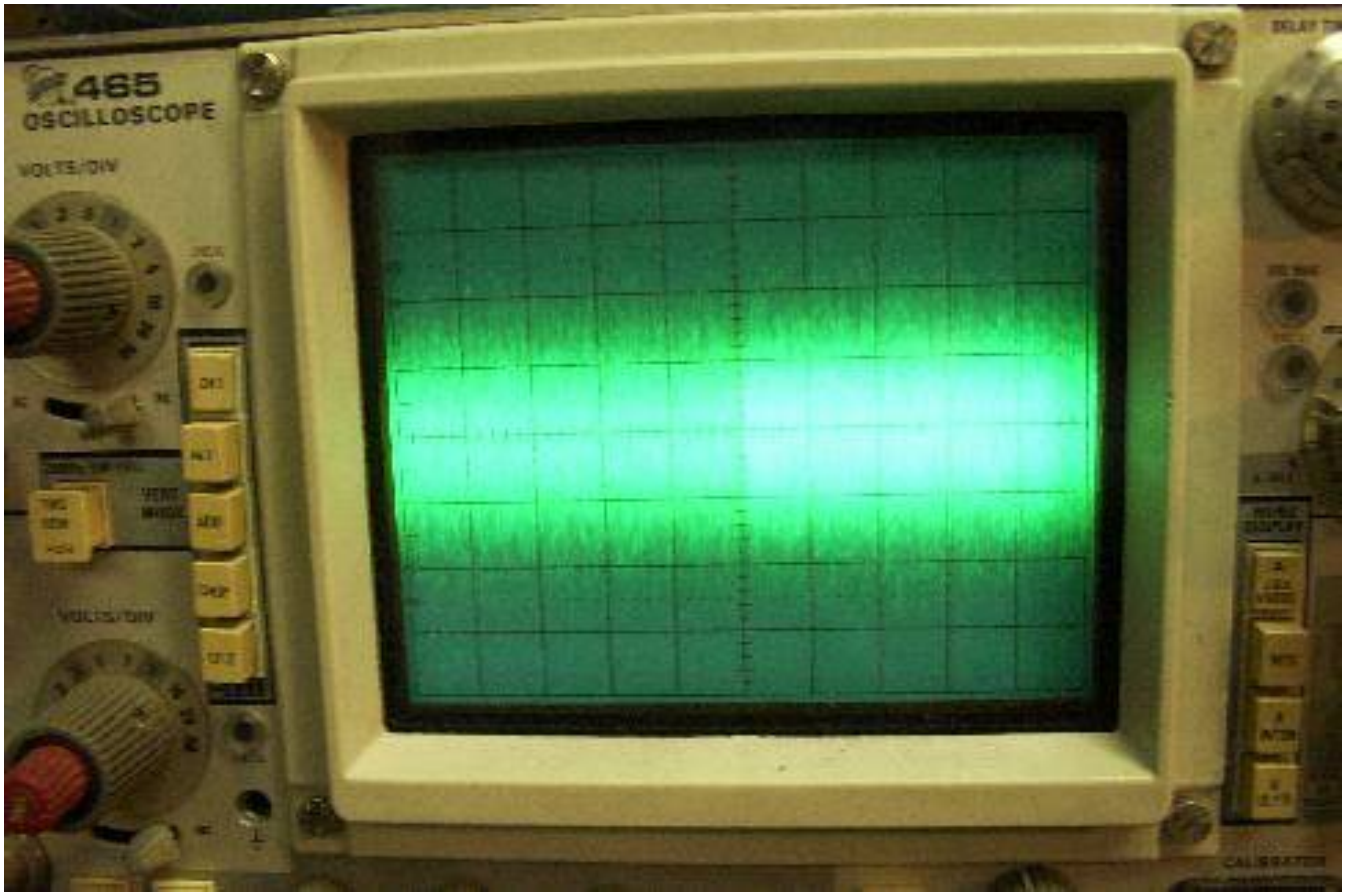
The Standard C158A's earphone/speaker output is connected to the JAMCAT's **Audio Input** jack (1/8").

The Standard C158A's PTT/microphone input is connected to the JAMCAT's **PTT Control** jack (3/32").

This example setup can only jam a single frequency, 146.52 MHz, in this case.

Any detected transmissions on that frequency will cause the C158A to transmit for approximately three seconds, which is controlled via the **Delay Time** potentiometer.

By using a separate frequency–agile receiver and transmitter, you can "listen" on one frequency and transmit on another!



Oscilloscope view of the internal noise generator's output signal.

The oscilloscope's settings are 0.5 V/division (Y) and 10 mS/division (X).

Tune for a noise signal about 1 volt peak−to−peak.

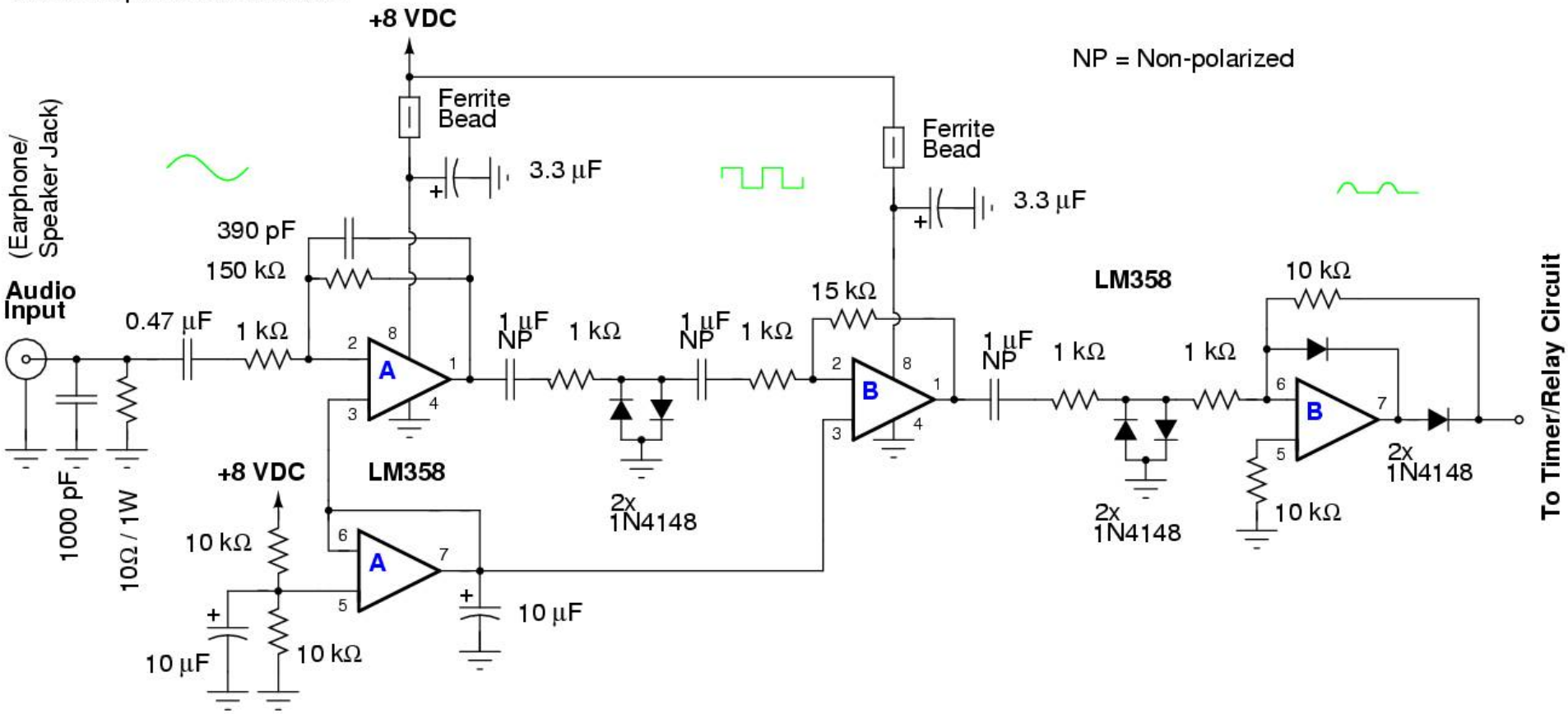
The noise signal's amplitude is adjustable via the 500 ohm **Noise Amplitude** potentiometer.

The noise generator circuit may break into oscillation or output a very low noise signal. If it does this, adjust the Zener bias resistor (2 kohm) up or down a few hundred ohms while observing the signal (disconnected from the LM386) on an oscilloscope for the maximum noise signal. The LM386 can also oscillate without a good ground and poor power supply bypassing.

Any Zener diode above or equal to 6.2 volts will work in the noise generator as these Zener diodes have an "avalanche" region which generates a tremendous amount of noise when properly biased.

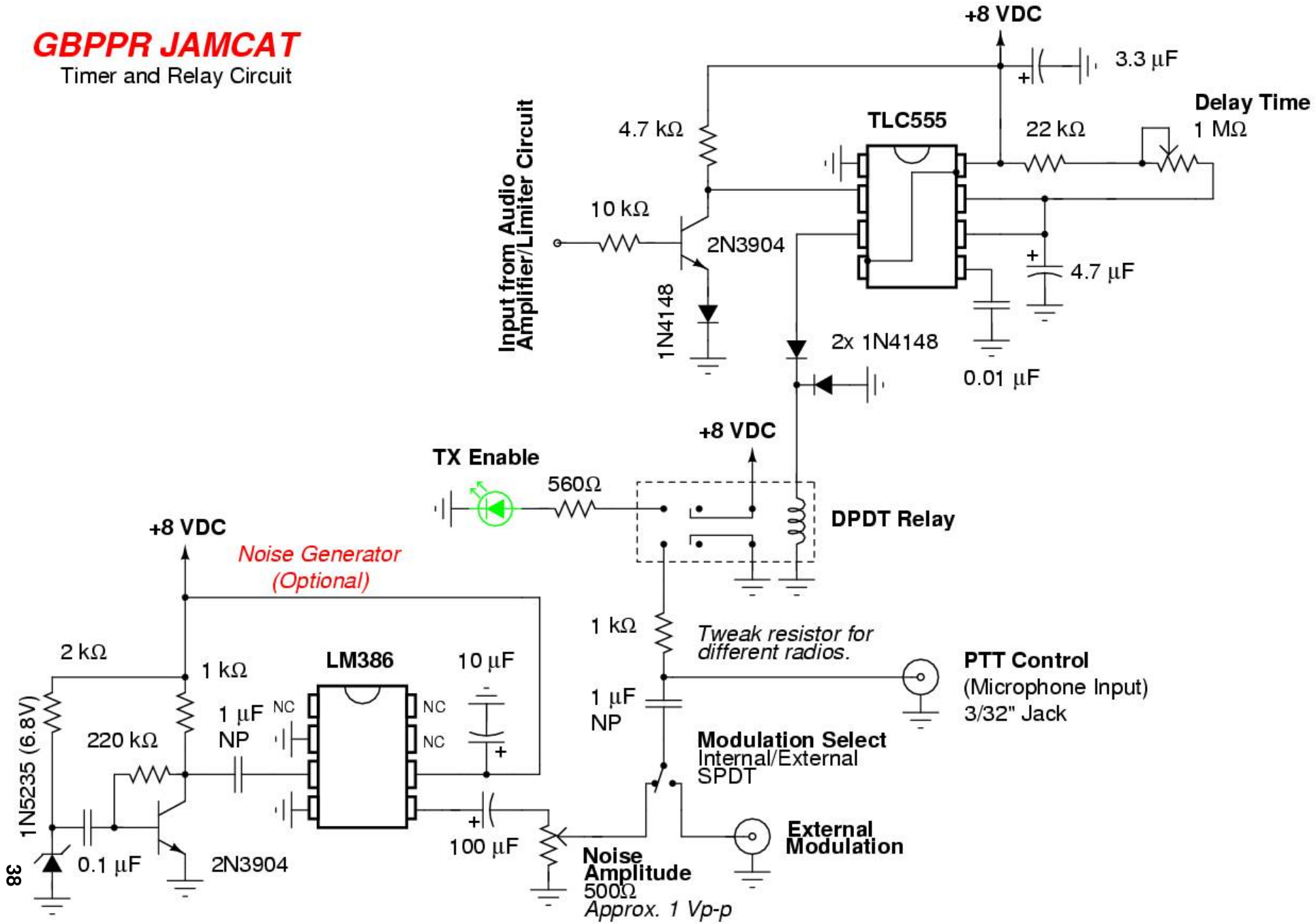
GBPPR JAMCAT

Audio Amplifiers and Limiters



GBPPR JAMCAT

Timer and Relay Circuit



Simple VHF RF Power Amplifier

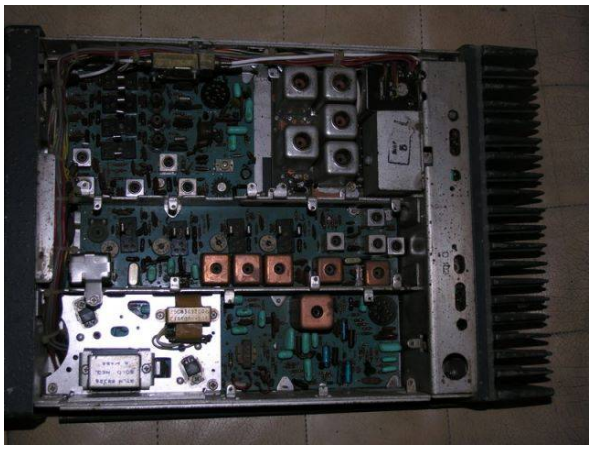
Overview

This is a quick project to utiltize the final RF power amplifier section from an old Motorola MOCOM 70 radio as a stand–alone 50 watt RF power amplifier.

These MOCOM four channel (crystal) radios were heavily used in the late 1970s up through the 1990s and can often be found at ham radio swapfests for a few dollars – or even for free!

There were several models of the Motorola MOCOM 70 made, with most covering the 25–50 MHz range (50/100 watts), the 136–174 MHz range (30/50/100 watts), and the 450–512 range (25/50/100 watts).

The most common of these radios were tuned for the 150–162 MHz range and so is the model we'll be using in this amplifier project.



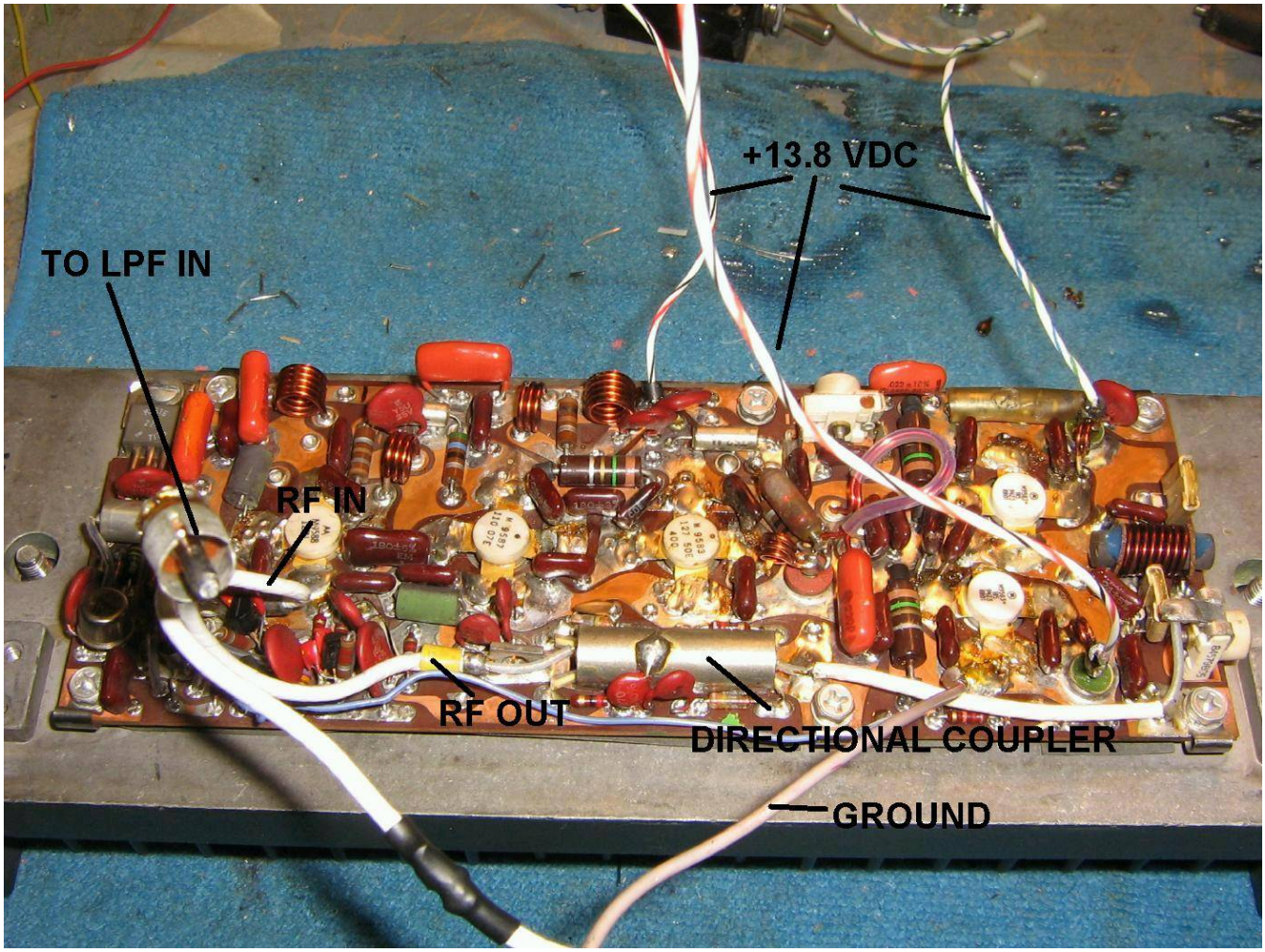
Just the stock rear amplifier section (and low–pass filter) from the MOCOM 70 will be needed. The MOCOM amplifier module just needs a +13.8 VDC @ 10 amp power source and around 500 mW of RF input power to reach around 50 watts RF output. When properly tuned for a narrow frequency range, the amplifier can reach 70 watts peak RF output.

The MOCOM 70 amplifier section shown here had the Motorola part number `TLD1622A` stamped on the heatsink and the low–pass filter is Motorola part number `TFD6122A`.

With an approximate RF input power from 250–500 mW, the amplifier used for this project output the following RF power:

Frequency (MHz)	RF Output Power (Watts)
140	15 (+42 dBm)
150	50 (+47 dBm)
160	40 (+46 dBm)
170	31 (+45 dBm)

Pictures & Construction Notes



Stock VHF RF power amplifier module from an old Motorola MOCOM 70 radio.

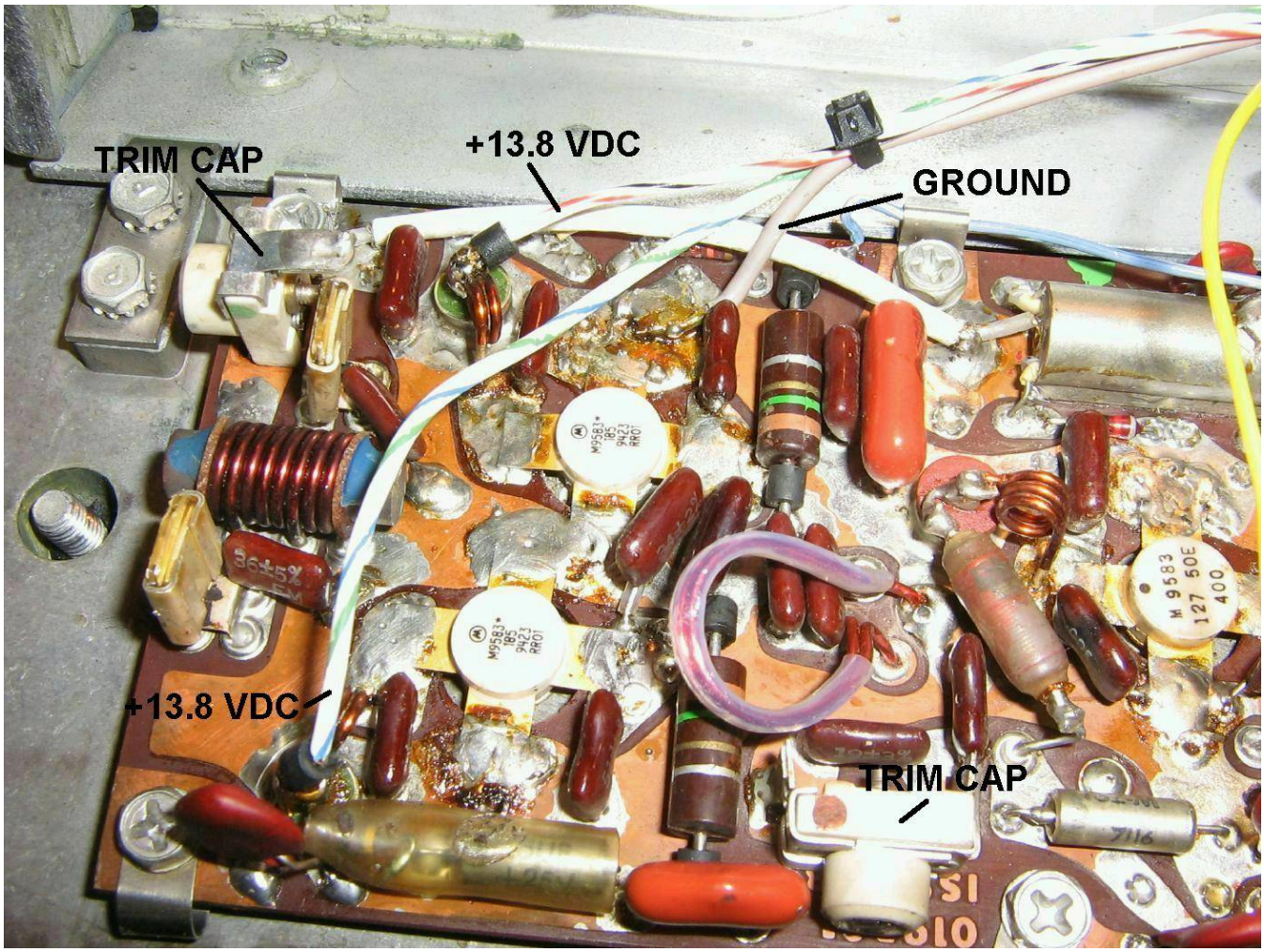
This amplifier module only requires a few wire connections.

There are only three +13.8 VDC power lines, one each for the high−current final RF transistors and another for the lower−current driver stages.

There is also a single ground wire which should be soldered directly to an emitter tab on one of the final RF transistors.

The RF input of approximately 500 mW enters via the coaxial cable on the lower−right of the circuit board.

The RF output from the amplifier passes through the cylindrical directional coupler (for SWR protection) and onto an external low−pass filter.



Closeup view of the two final RF output transistors.

There are two variable capacitors which can be used to peak the amplifier response over a narrow frequency range.

Each of the two final RF output transistors has its own +13.8 VDC power line which passes through a series 0.01 ohm / 3 watt resistor for voltage equalization.

The ground wire is soldered directly to the emitter on one of the RF transistors.

Cut the rear bracket off the Motorola MOCOM 70 radio using a cut−off wheel.

Grind the edges to get them as smooth as possible.

Heat the bracket using a blow torch to remove the stock feed−through capacitors and other soldered−on bits.

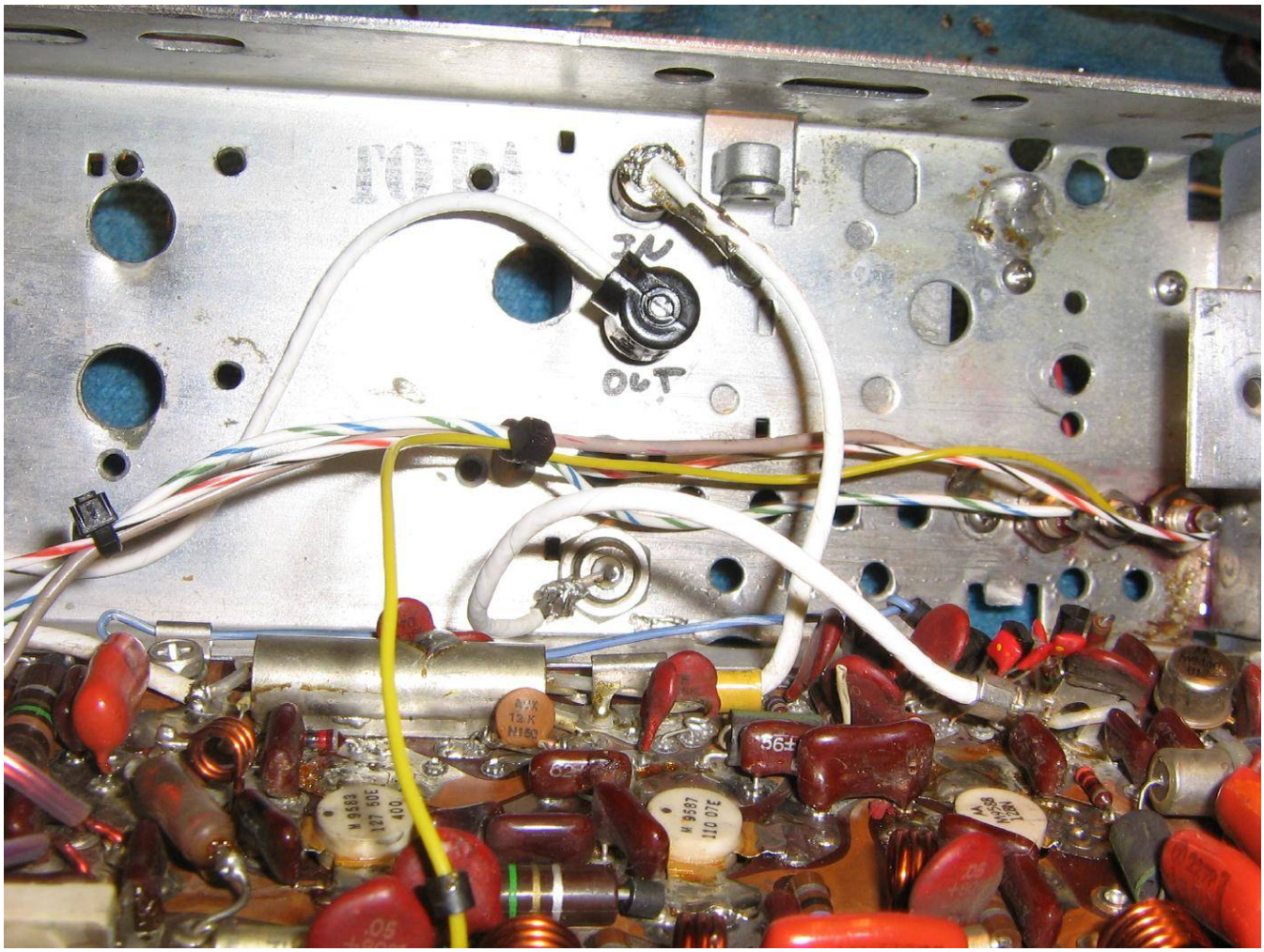
Clean the whole thing up and add your own feed−through capacitors and standoffs.

Here we can see the two series 0.01 ohm equalization resistors for the final RF output transistors and their own high−current 1000 pF feed−through capacitors.

The small feed−through capacitor is for the other +13.8 VDC power line.

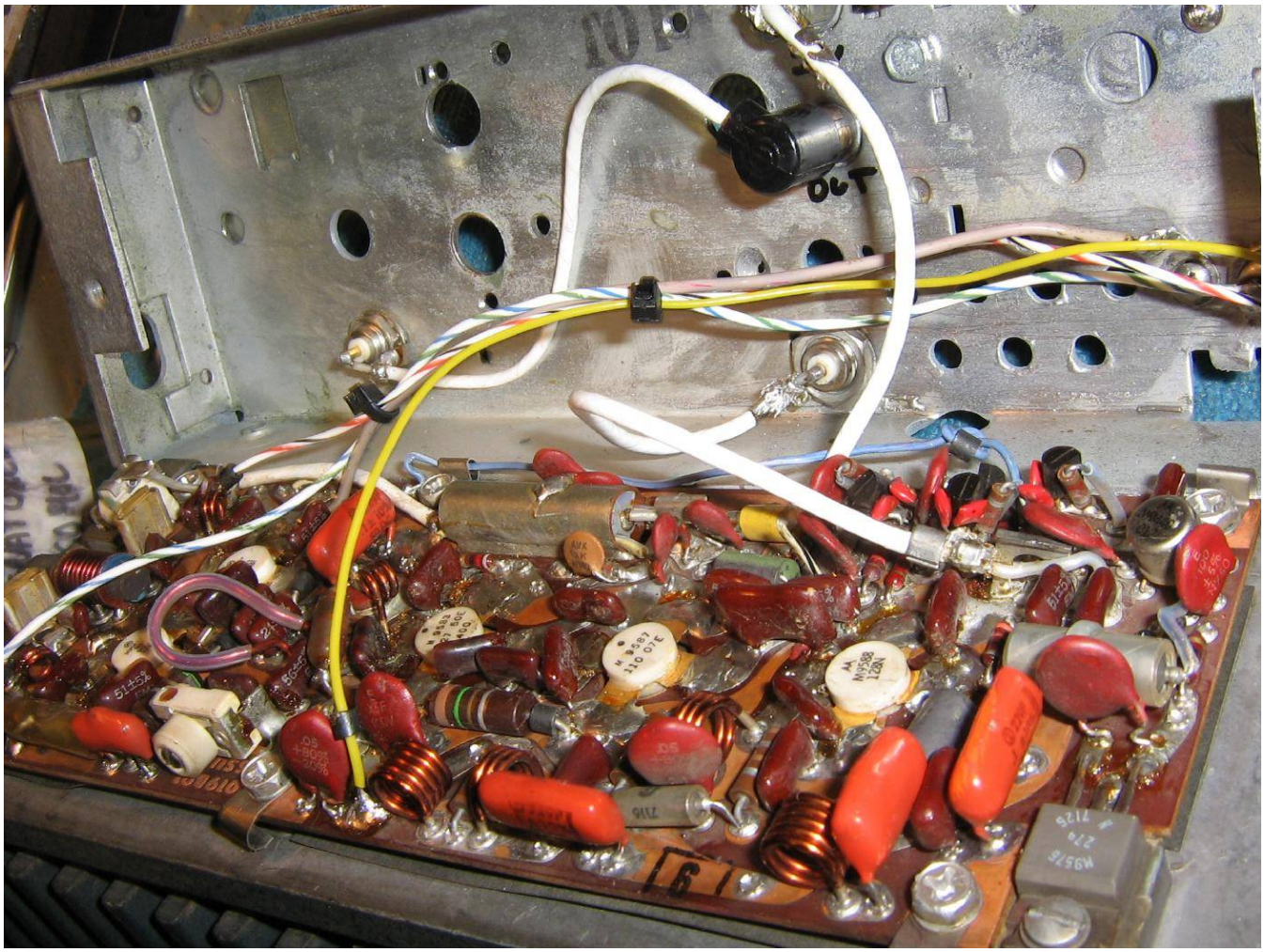
The large box is the stock low−pass filter.

TNC connectors were added for the RF input/output to the amplifier from the TX/RX relay circuit.



Internal wiring overview of the completed amplifier module.

The low–pass filter connections are labeled **IN** and **OUT**.



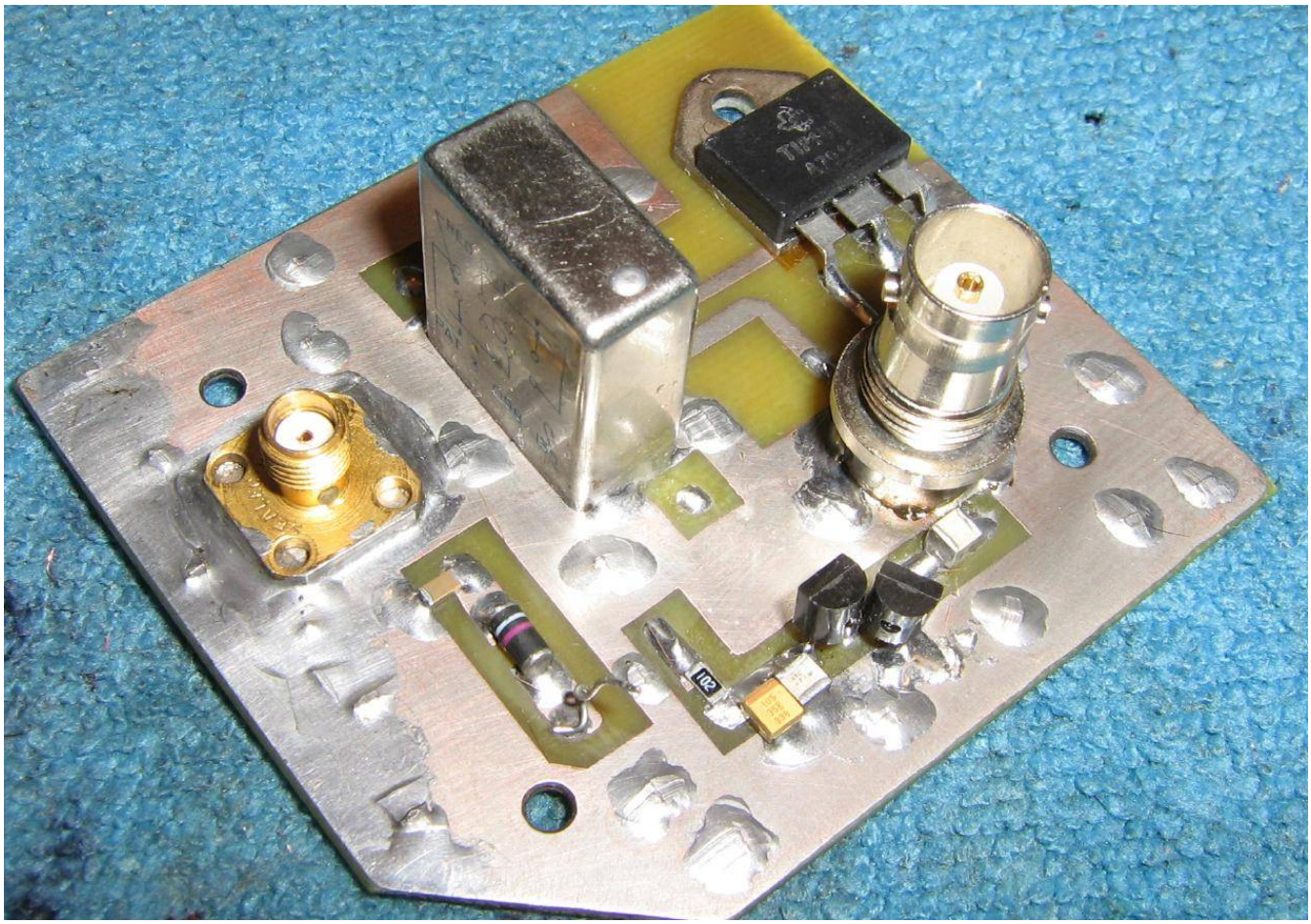
The RF output is passing through the low−pass filter, then onto a TNC connector on the left side.

The yellow wire is the lower−current +13.8 VDC power line.

The two striped wires are for the high−current +13.8 VDC used by the final RF output transistors.

Each of the +13.8 VDC power lines has a ferrite bead slipped over the wire.

The large−gauge brownish wire is the ground.



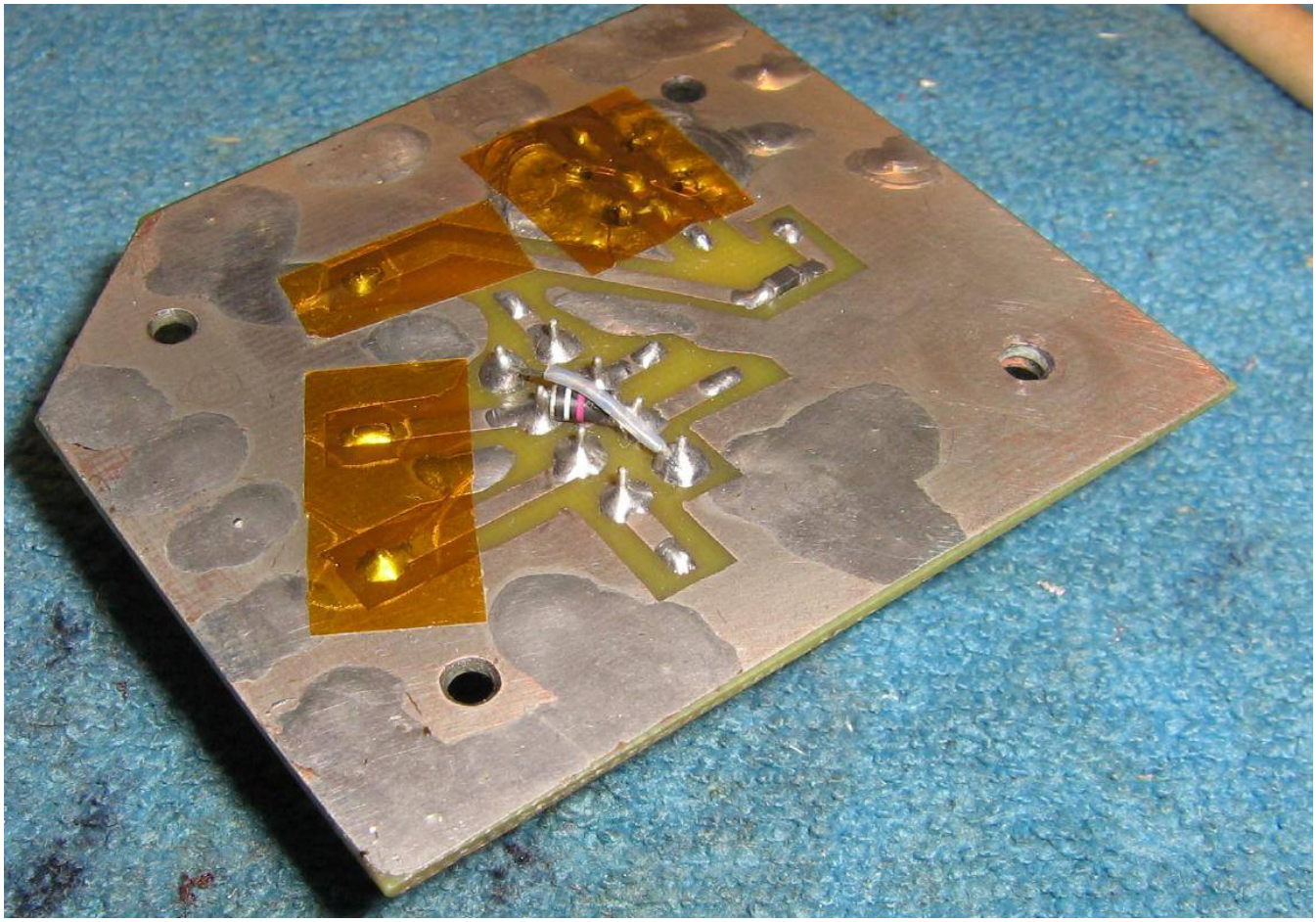
Overview of the RF−switched TX/RX relay circuit.

The relay circuit's RF input is via the BNC connector. The RF output is via the SMA connector.

A capacitive tap is taken via a series 1 pF capacitor / 100 ohm resistor on the RF input line.

Two MBD301 hot−carrier diodes rectify the RF input signal and generate a DC voltage which is then applied to the base of the TIP141 Darlington transistor. The TIP141 controls the coil in the DPDT RF relay.

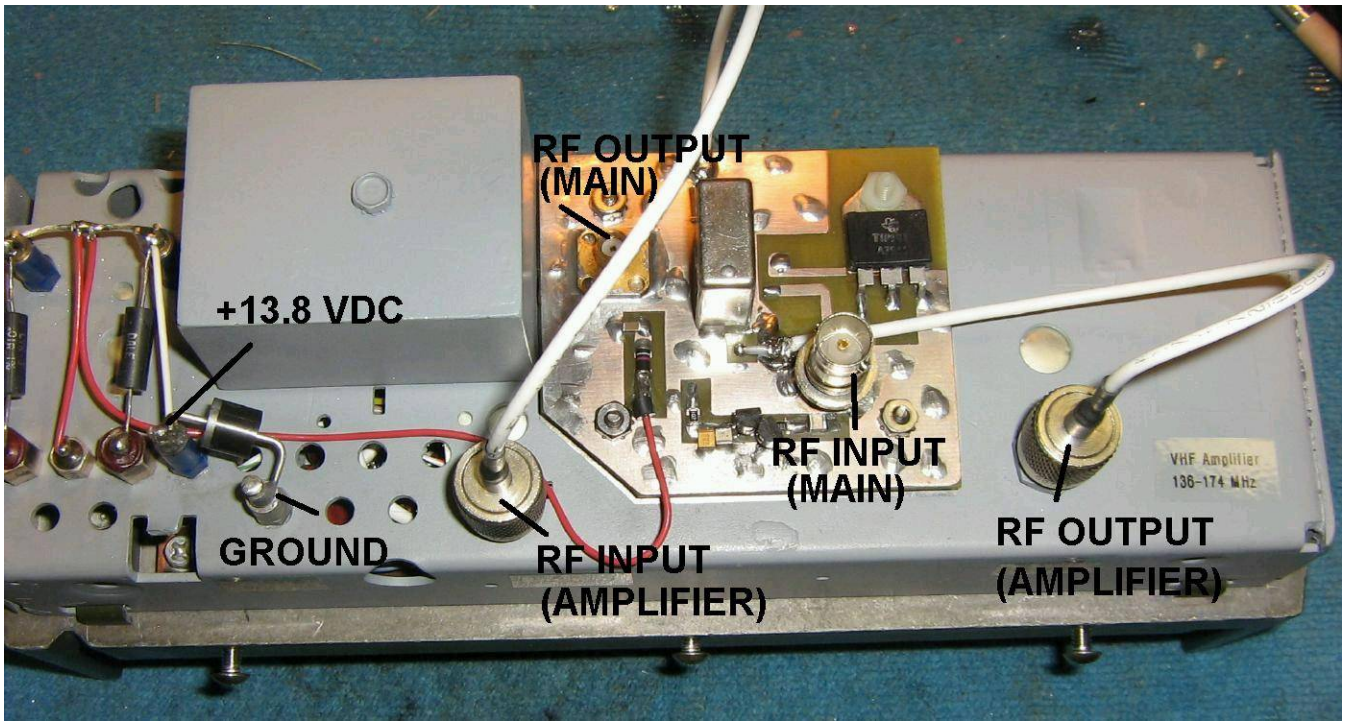
Those DPDT RF relays can be salvaged from RF amplifier in certain older Motorola two−way radios.



Bottom view of the RF−switched TX/RX relay circuit.

Try to keep any traces carrying RF as short as possible.

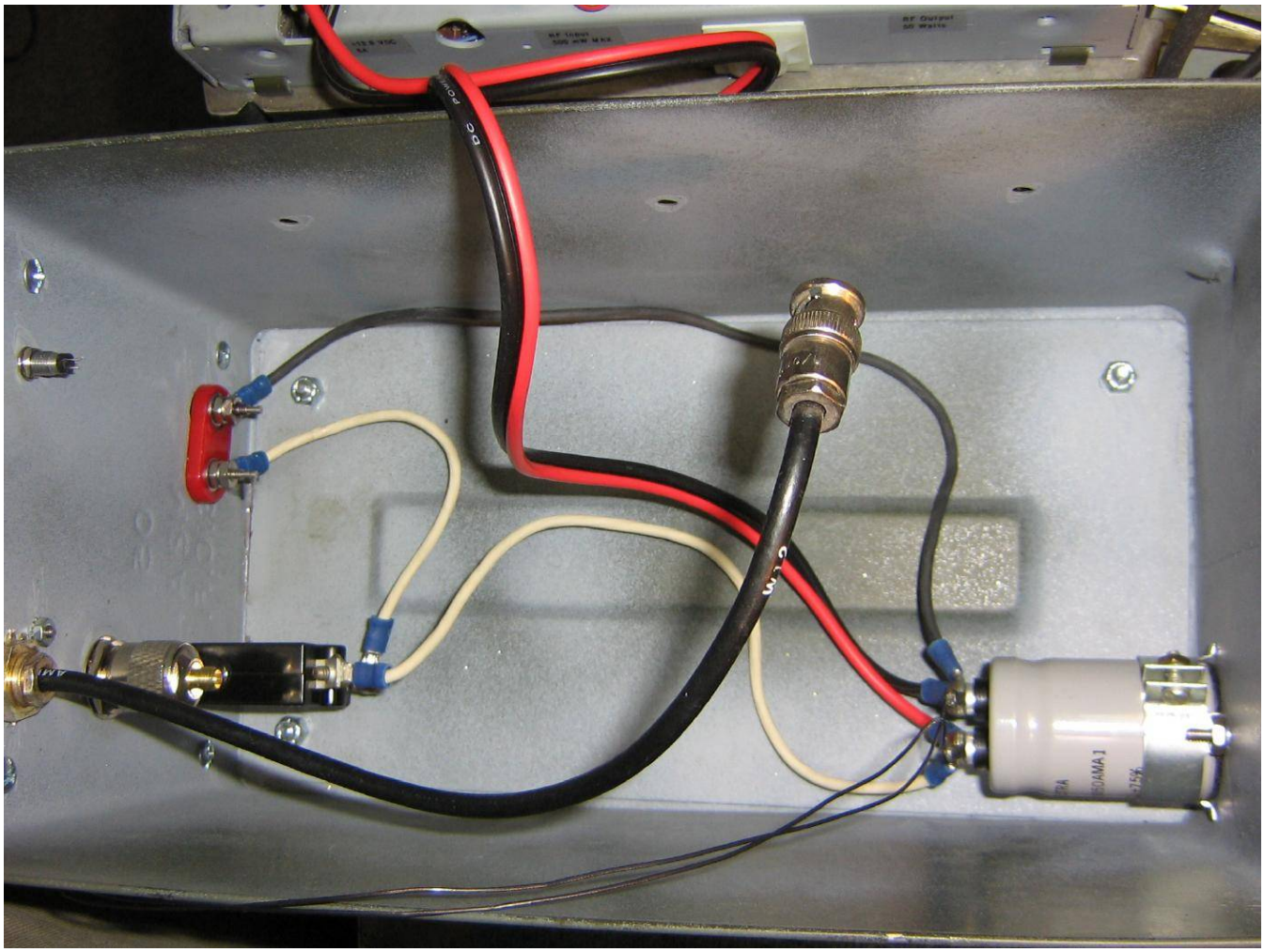
Surface−mount components should be used in the RF detect circuit.



Finished amplifier block with the TX/RX relay mounted.

The RF input to the amplifier is via the TNC connector on the lower–left, the RF output is via the TNC connector on the lower–right.

The main RF input is via the BNC connector and the RF output via the SMA connector. These will go to front panel–mounted RF connectors.



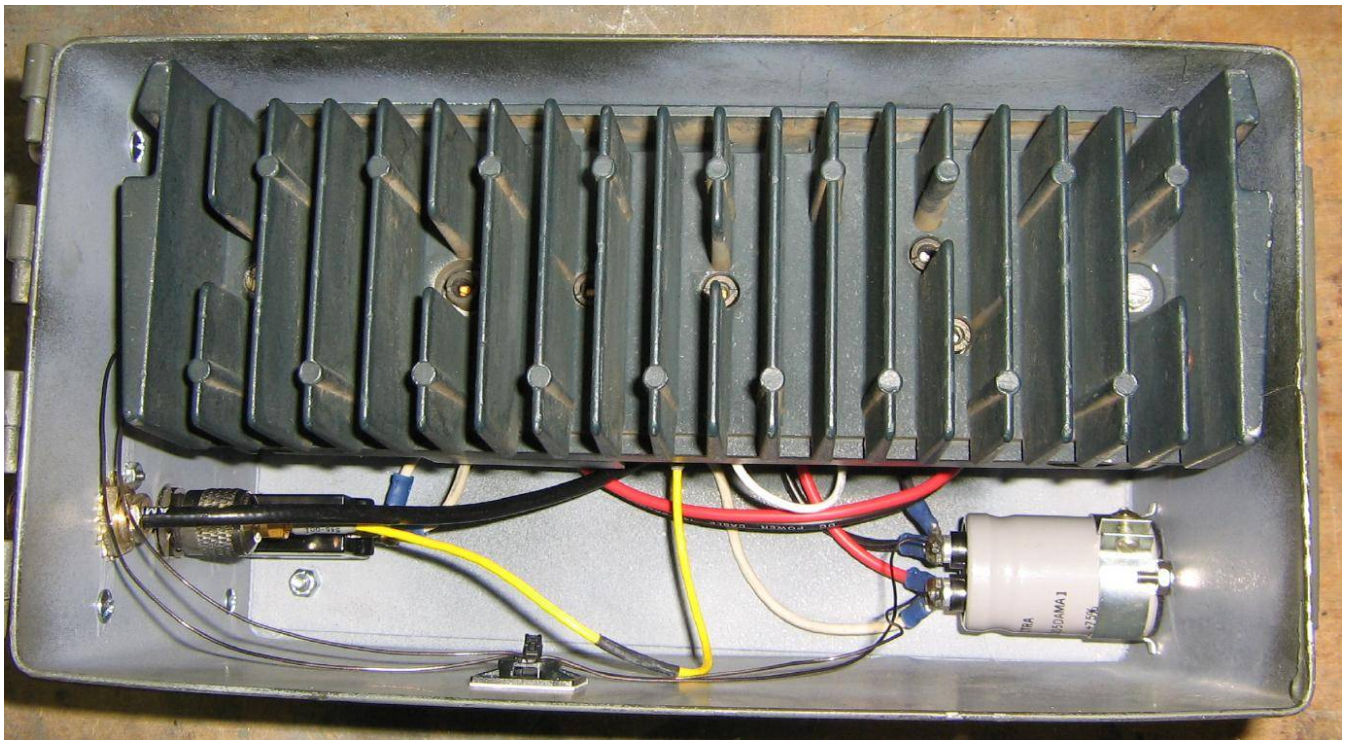
Amplifier case internal overview.

The amplifier's case will be an old ammo box.

The RF input (BNC) and RF output (N with a SMA adapter) connectors are along the left−side.

The +13.8 VDC power input is via the banana jacks. Single−point connections and 14 gauge (or larger) wire should be used for the amplifier's DC power wiring. The amplifier can draw up to around 10 amps.

The 4,700 µF / 50V capacitor mounted on the right−side helps to smooth out the power supply.



Finished amplifier internal overview.

It's a little cramped, but it works.

Add a smear of heatsink thermal compund along the amplifier's edge to make better thermal contact with the ammo box case.

A SMA jumper connects the RF output from the amplifier to the panel–mounted N connector.

Finished amplifier front–panel overview.

The BNC connector is for the RF input and the N connector is for the RF output. Dustcaps are on both the connectors.

The banana jacks are for the +13.8 VDC @ 10 amp power input.

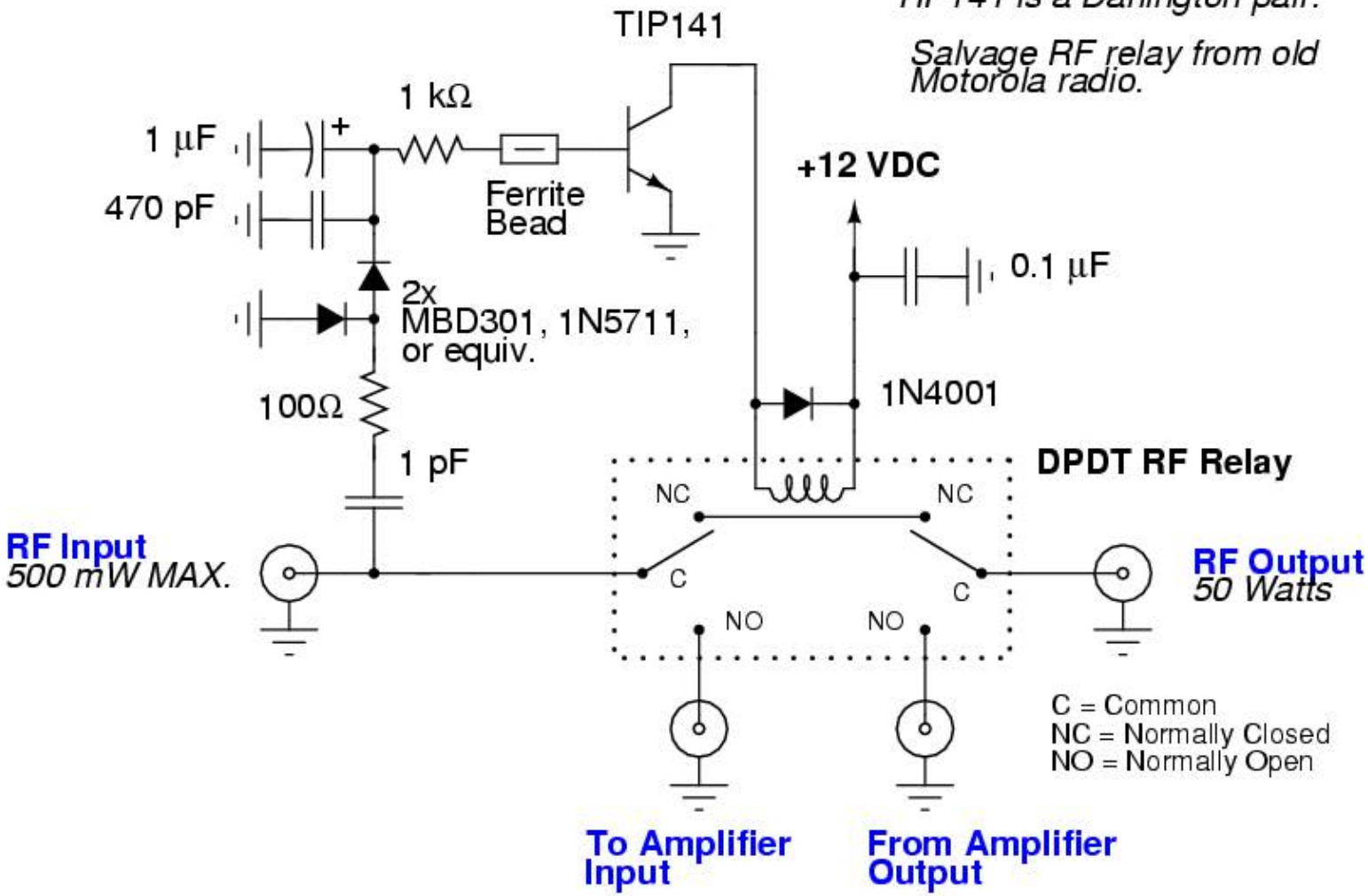
The power switch has an integrated 15 amp circuit breaker.

The red LED is for DC power indication.

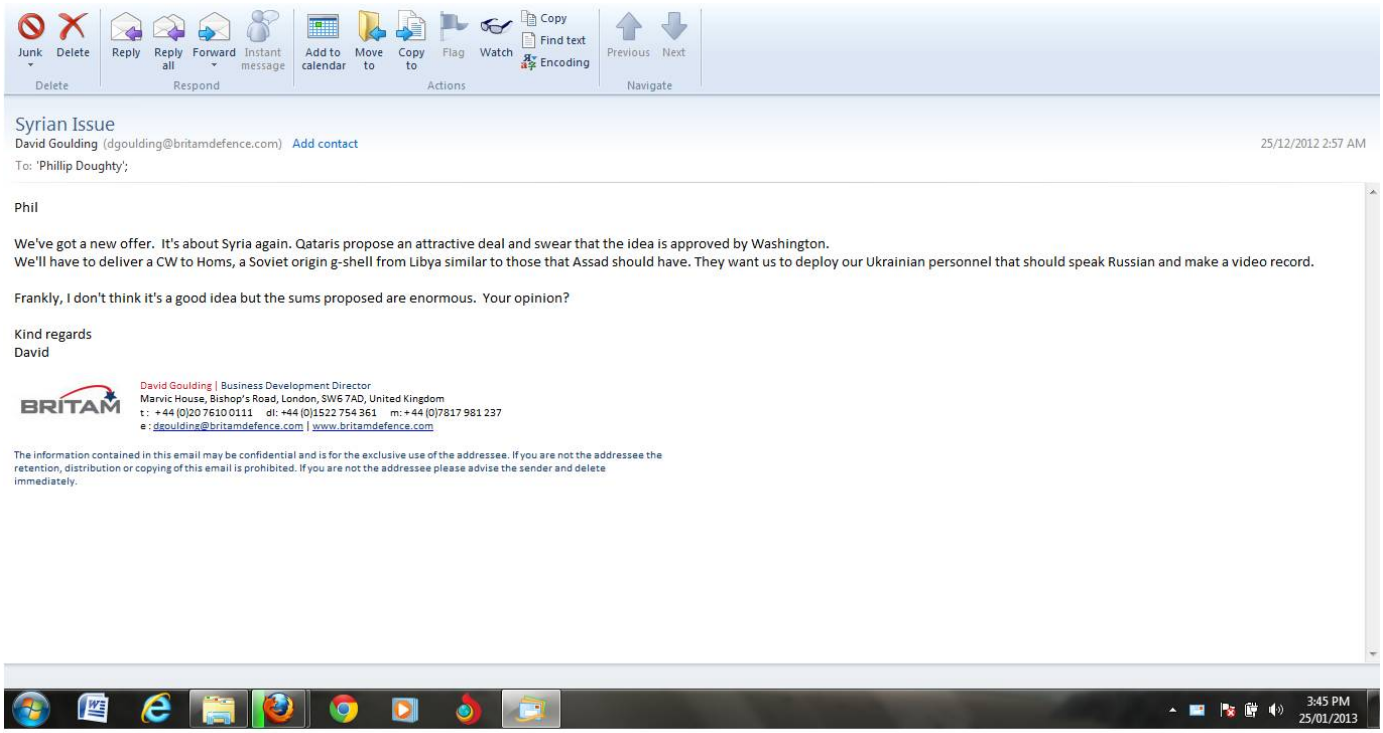
RF-Switched TX/RX Relay

TIP141 is a Darlington pair.

Salvage RF relay from old Motorola radio.

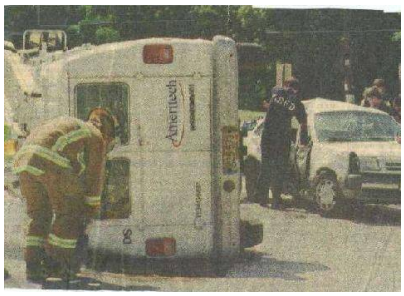


Bonus



Look out for a false–flag chemical weapons attack to be blamed on Syria...

End of Issue #106



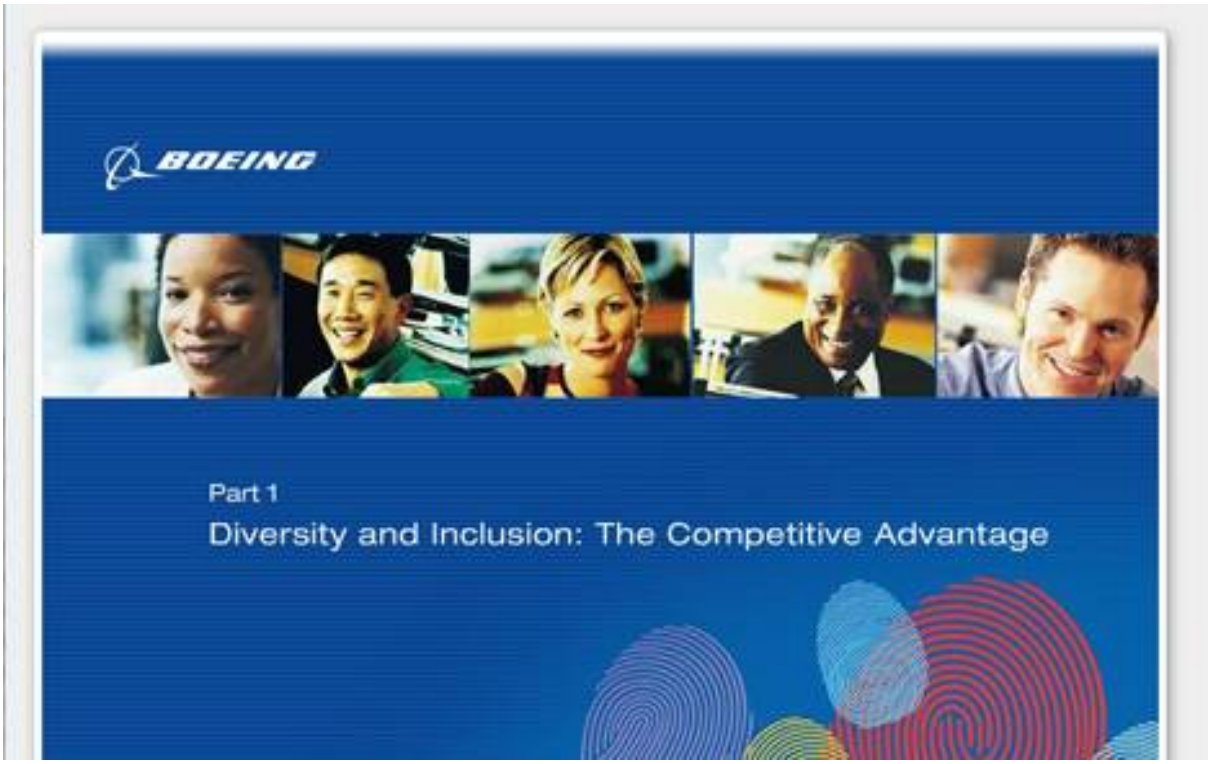
Any Questions?

Editorial and Rants

For just 50 cents a day, you too could help feed this starving African child.

Won't you please help?

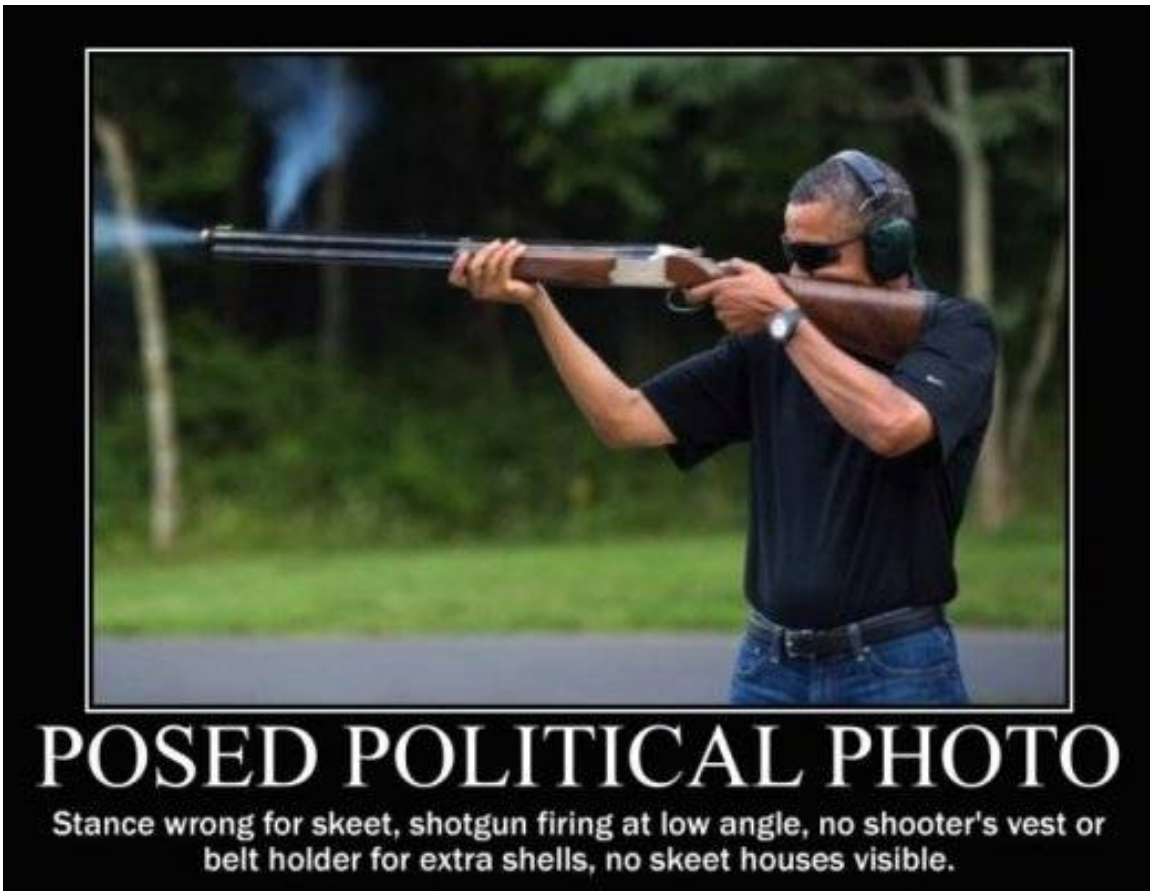
LOL! Change!

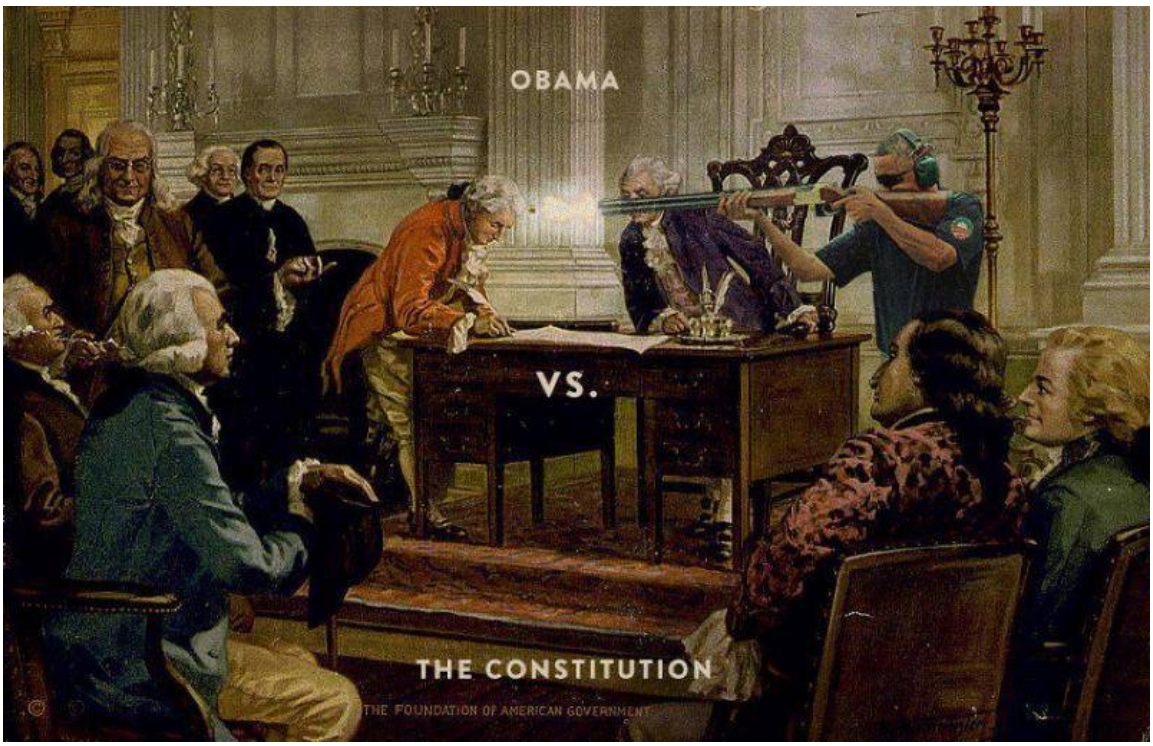


All Aboard the Boeing 787 Diversityliner!

Expect more of this type of thing as Obama turns the U.S. into a nation of takers instead of a nation of makers...

Once–thriving U.S. engineering companies are being taken over by snooty "MBA types" who outsource their contracting and labor – and engage in failed social experiments – all in order to save a few shekels. Change!


POSED POLITICAL PHOTO
Stance wrong for skeet, shotgun firing at low angle, no shooter's vest or belt holder for extra shells, no skeet houses visible.


OBAMA
VS.
THE CONSTITUTION
THE FOUNDATION OF AMERICAN GOVERNMENT

ASSAULT VEHICLE

It's black, scary-looking, and was clearly **designed to kill innocent people** by enabling the driver to exceed the legal speed limit by over 100 mph.

32,367 people were killed

on the roadways in 2011. Americans don't need 470 HP.

Ban them.