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# GBPPR 'Zine – Issue #6 – September 2004



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*"An ounce of prevention is worth a pound of cure."* – Benjamin Franklin (1706 – 1790)

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# 1D / 2D-type Coin Telephone Set

Continued from GBPPR 'Zine, Issue #5

COIN CRAFTS MANUAL 1-3  
Issue 1

## 1D/2D-TYPE COIN TELEPHONE SET DETAILED DESCRIPTION

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### 1. GENERAL

- 1.01 The 1D/2D coin telephone set is used in conjunction with system standard Dial-Tone-First (DTF) central office arrangements to provide coin telephone service.
- 1.02 The 1D/2D set consist of a ringer, polarity guard and surge protector, active speech network, handset, switchhook, and dial for residential like functions. Functions unique to coin service are handled by integrated circuits, A and B relays, 47A signal, coin return network, and coin relay.
- 1.03 These sets are available with rotary or TOUCH-TONE\* dial.
- 1.04 Codes for the 1D- and 2D- type sets are described in Table A.

TABLE A

CODE SIGNIFICANCE

| CODE | FIRST NO.  | LETTER      | SECOND NO.      |
|------|------------|-------------|-----------------|
| 1D1  | Box Type   | DTF<br>Mode | Rotary Dial     |
| 1D2  |            |             | TOUCH-TONE Dial |
| 2D1  | Panel Type |             | Rotary Dial     |
| 2D2  |            |             | TOUCH-TONE Dial |

- 1.05 Abbreviations used in this section are as follows:
- DTF—Dial-Tone-First
- CO—Central Office

# 1D / 2D-type Coin Telephone Set

## COIN CRAFTS MANUAL 1-3

CDR—Customer Dial Receiver

HT—Hopper Trigger

SCGT—Stuck Coin Ground Test

IRGT—Initial Rate Ground Test

### 1.06 Initial Rate Setting.

- (1) Initial rate may be adjusted from 5¢ to \$3.15 in 5¢ increments. Since there is no totalizer, this set is less likely to be put out of service by improper CO sequences.
- (2) Initial rate setting is accomplished by inserting one or more leads into the **negative** field (-VCC) with remaining leads inserted in positive field (+VCC). Six leads, terminated on back side of chassis are color coded and individually plug ended. Each lead represents a specified amount (see Table B). These plug-ended leads are pressed on the pin connectors to establish an initial rate setting.

TABLE B  
INITIAL RATE LEADS

| LEAD COLOR | LEAD MONETARY VALUE |
|------------|---------------------|
| BR         | 5 Cents             |
| R          | 10 Cents            |
| Y          | 20 Cents            |
| S          | 40 Cents            |
| W-BL       | 80 Cents            |
| W-BR       | 1 Dollar — 60 Cents |

## 2. FUNCTIONS

**2.01** Fig. 1 and 2 show block diagrams of rotary and TOUCH-TONE coin telephone sets, respectively. The 32A coin chassis includes an active network for speech equalization, the ringer, and an integrated circuit coin tone oscillator. The front cover consists of a dial, switchhook, handset, and terminal board (TB2), which connects to the chassis via an 11-pin connector (J1). The 47A signal is attached to the side of the coin chute where coins are sensed as they leave the lower

chute area. The 47A signal connects to the chassis via a 15-pin connector (J2).

### IDENTIFICATION AND DESCRIPTION OF COMPONENTS

**2.02** Polarity Guard and Surge Protector—maintains proper set polarity and limits surge voltage behind station protector to prevent circuit damage.

**2.03** A-Relay (Ground Lifter)—operates on loop current to open or “lift” the tip to ground path. This feature prevents the line unbalance that would be caused by a tip to ground path.

**2.04** B-Relay (Initial Rate)—is a latching relay which has two windings. One winding causes the relay to latch on initial rate deposit and the other unlatches the relay when the coin relay is actuated for coin collection or return.

**2.05** IC1 Integrated Circuit (Coin Logic)—is a hybrid integrated circuit (HIC) in a 40-pin dual in-line package. It acts as a controller of set functions during coin deposits, switchhook flashes, and dial operation.

**2.06** IC2 Integrated Circuit (Coin Tone Oscillator)—is a 14-pin HIC similar in construction to ICs used as TOUCH-TONE dial oscillators. It provides dual frequency coin deposit signals. It is switched on by the IC1 to provide a slow readout for 5¢ and 10¢ deposits and a fast readout for a 25¢ deposit.

**2.07** Speech Network—is a network which interconnects the loop, transmitter, and receiver. It provides ac and dc voltage equalization over the loop range and also TOUCH-TONE dial and coin tone equalization. During coin signaling, the speech portion is disabled so that the customer hears low level coin tones.

**2.08** Ringer—the C4B ringer is used. It is mounted on the 32A chassis frame and connected across the line.

**2.09** Dial—the TOUCH-TONE version uses a 70A dial which operates on either normal or reverse CO battery to provide end-to-end signaling capabilities. The rotary version has the dial pulse contacts in the ring lead.

**2.10** 47A Signal—attaches to the side of the 20A chute the same as the 1A totalizer of the

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# 1D / 2D-type Coin Telephone Set

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## ISS 1, COIN CRAFTS MANUAL 1-3

1C coin telephone set. Sensor elements in the coin paths convert mechanical energy of the coin to a voltage signal which in turn signals the coin logic.

2.11 1A-Type Coin Relay—is located in the tip to ground path. It collects or refunds the contents of the hopper when the tip to ground current flow is 41 milliamps.

### 3. THEORY OF OPERATION

**Note:** The CO battery requirements for system standard DTF service are defined as follows.

- (a) **Negative Battery:** -48 volt dc on ring with ground on tip.
- (b) **Positive Battery:** +48 volt dc on ring with ground on tip.
- (c) **Initial Rate Ground Test (IRGT):** -48 volt dc on tip (20 ma dc maximum) with ring open.
- (d) **Stuck Coin Ground Test (SCGT):** +48 volt dc on tip (20 ma dc maximum) with ring open.
- (e) **Coin Collect:** +130 volt dc on tip (41 ma dc minimum) with ring open.
- (f) **Coin Refund:** -130 volt dc on tip (41 ma dc minimum) with ring open. Collect and refund may be followed by a SCGT to assure the coins cleared the hopper. SCGT passes if no current flows, which indicates that the HT contacts have been restored.

#### ORIGINATING A LOCAL CALL

3.01 In DTF service, the customer is instructed to:

- listen for tone
- deposit coins
- dial

With the contention that upon hearing dial tone a customer will know he has accessed a working system. This is in contrast to coin first operation,

where the customer must invest initial rate to get dial tone.

#### IDLE STATE

3.02 In the on-hook condition the CO has -48 volt dc on R and ground on T. No loop current flows because switchhook contacts are open.

#### LOCAL CHARGE CALL, ANSWERED

3.03 When the customer picks up the handset, the switchhook closes and loop current flows. The A-relay operates and the network and TOUCH-TONE dial are enabled. A reset pulse initializes the logic and the set is ready for coin deposits. The CO recognizes a bid for service and supplies dial tone. The customer hears dial tone and deposits the first coin. The coin strikes the respective sensor element in the 47A signal, the value is registered, and the coin continues on to operate the hopper trigger (HT) contacts. As soon as the coin is registered in the logic, the coin oscillator generates coin tones. Immediately after the coin tone which makes initial rate, the B-relay is operated. After each deposit is signaled, the network and dial are reenabled. Loop battery is removed when the initial rate ground check (IRGC) is made, causing the A relay to release momentarily. This provides a path from tip-to-ground. The CO reapplies negative battery causing A relay to reoperate and removes ground from tip of line. When the customer hangs up, the switchhook opens, the A relay releases, coins are collected by collect battery from the CO and the B relay is released. As the coin relay armature releases, the hopper trigger (HT) restores and a stuck coin ground test (SCGT) is applied. If the coin has cleared the hopper, HT is open and the test passes. The set is now ready for the next call.

#### LOCAL CHARGE CALL, NOT ANSWERED

3.04 This call proceeds, as in 3.03, until busy signal is heard or there is no answer to ringing. Upon hanging up, the CO recognizes the disconnect and coin return battery is applied. The coin relay refunds the initial deposit, and the set is ready for the next call.

#### CALL TO A NONCHARGE NUMBER

3.05 When the customer picks up the handset, the switchhook closes, loop current flows,

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# 1D / 2D-type Coin Telephone Set

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## COIN CRAFTS MANUAL 1-3

and the set initializes as in 3.03. On receipt of dial tone, the customer dials a noncharge number. Call is completed in normal manner. When the call is terminated, the CO provides a refund cycle to return any coins that may have been deposited by mistake.

### ABANDONED CALL

**3.06** This is a situation whereby the customer terminates prior to dialing, during dialing, or before receiving a busy or audible ringing signal. When the switchhook opens at termination the CO recognizes the disconnect and applies a refund. If coins have been deposited, they are returned as in 3.04. If no money has been deposited, no current will flow through coin relay because HT is open.

### CHARGEABLE CALL WITH INSUFFICIENT OR NO DEPOSIT

**3.07** This call proceeds, as in 3.03, until the IRGT is made. The call is routed to an announcement trunk and the customer is advised how to properly make the call. If partial funds were deposited, a refund is made, and the set is ready for the next call.

### AUTOMATIC LOCAL OVERTIME

**3.08** Areas which have initial and overtime charging on local calls serve the customer as follows. One-half minute before the end of the initial period, the initial deposit is collected. A brief tone to alert the customer to deposit 5¢ for the first overtime period is sent. A SCGT is made at the end of the initial period. It will indicate the presence of a coin, if the customer had deposited 5¢ (HT closed), and the call is allowed to continue until 30 seconds from the end of the first overtime when the routine is repeated. If the customer did not deposit 5¢ (or another coin to close HT), the SCGT will not indicate the presence of a coin and the call is connected to an operator, who prompts the customer and listens for the coin deposit signal.

### LOCAL CALL—SIMULTANEOUSLY DEPOSITING COINS AND DIALING

**3.09** If a customer deposits a coin which is registered in the logic during dial operation, coin signaling is deferred until the dial is released. If the dial is operated during a coin tone, that tone is completed and the remainder is delayed until the dial is released. If the dial is operated

during a silent interval, the sequence halts immediately, and resumes on dial release. Thus the dial has priority over the coin logic for local calls. This prevents simultaneous coin and dial signaling which would cause misregistered digits.

**3.10** Initial charge is announced, and coin signals are heard by the position attendant. Overtime charges may be handled by another position in the group. The set functions as before by signaling each coin as deposited.

### ORIGINATING A TOLL CALL

#### 3.11 *Toll Call Through a Cord Switchboard.*

(a) The customer picks up the handset, receives dial tone and dials "0" (no deposit needed). When the operator connects, the trunk supplies refund in the event money had been deposited. Normal battery is replaced by reversed battery for the remainder of the call. The customer announces the called number and the operator specifies the initial charge. The customer deposits coins which are read out as they are deposited. The operator starts timing the call and at the end of the initial period, collects the initial deposit and announces "*your initial period is up, please signal when finished.*" The customer either flashes the switchhook or hangs up when through. If he flashes, he is advised of overtime charges. If he hangs up, the operator must call back. The operator listens to the coin signals, collects the money, and terminates. The customer hangs up and the set is ready for the next call initiation. The TOUCH-TONE dial is active during normal and reversed battery to provide end-to-end signaling.

#### 3.12 *Toll Call Through a TSPS.*

(a) Operator assisted (0 + NPA + 7 digits) or operator dialed ("0"-) calls progress as in 3.11 except the operator is located at a TSPS console. The customer may also begin by dialing the toll number or 1 + the toll number depending upon local practice. A position is seized and refund is applied. Reversed battery is supplied.

#### 3.13 *Toll Call—No Coins Used.*

(a) The set operates as residential for collect and third party billed calls.

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# 1D / 2D-type Coin Telephone Set

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## ISS 1, COIN CRAFTS MANUAL 1-3

### INCOMING LOCAL CALL

3.14 The set operates as residential.

### INCOMING TOLL CALL

#### 3.15 *Sent-Paid.*

(a) The set operates as residential.

#### 3.16 *Collect.*

- Upon answer, the local operator asks whether the charges are accepted and whether the set is a coin station.
- If coin station is verified and charges are accepted, coins are deposited in the coin station and are totaled by the operator. The set reads out each deposit as it is made. Coins are collected at the end of initial and overtime periods.

### 4. FEATURES

4.01 The following is a list of features applicable to the 1D/2D coin telephone set.

- (1) Stable and reliable operation from  $-30^{\circ}$  to  $+140^{\circ}$ F
- (2) Assures consistent coin signaling in all environments
- (3) Coin misregistration greatly reduced over previous coded sets which was caused by totalizer malfunction.
- (4) Circuit presents a constant DC resistance to the CO for all signaling and switching functions.
- (5) The network uses low transmitter current and ac amplification.
- (6) Set resistance is almost constant at approximately 300 ohms.
- (7) Automatic circuit reset, when going on-hook, eliminates set lockup when CO trouble conditions are encountered.

# 1D / 2D-type Coin Telephone Set

COIN CRAFTS MANUAL 1-3

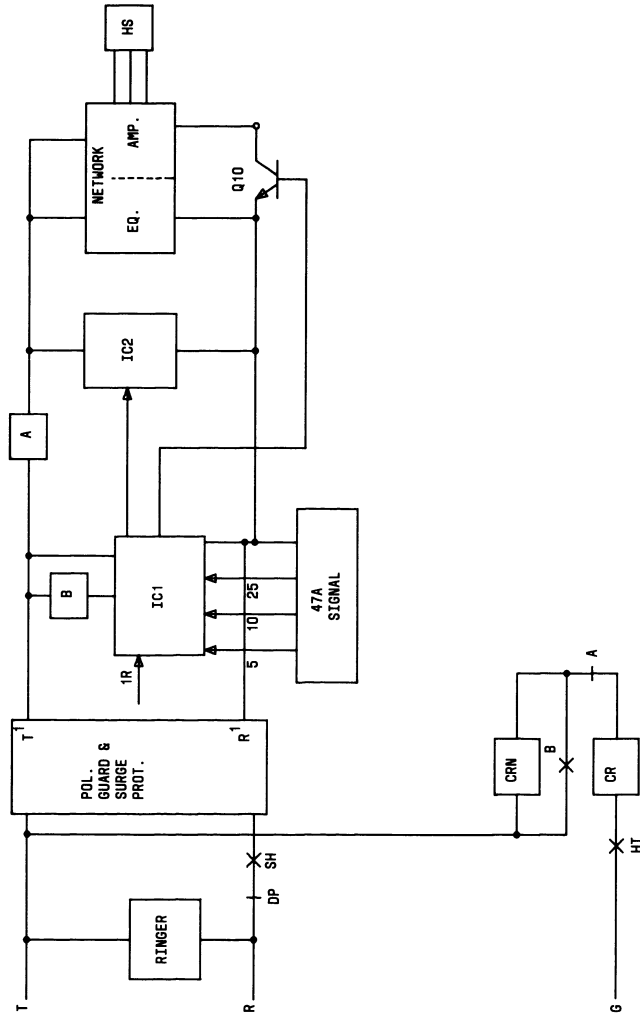


Fig. 1—1D1/2D1 Coin Telephone Set, Schematic

# 1D / 2D-type Coin Telephone Set

ISS 1, COIN CRAFTS MANUAL 1-3

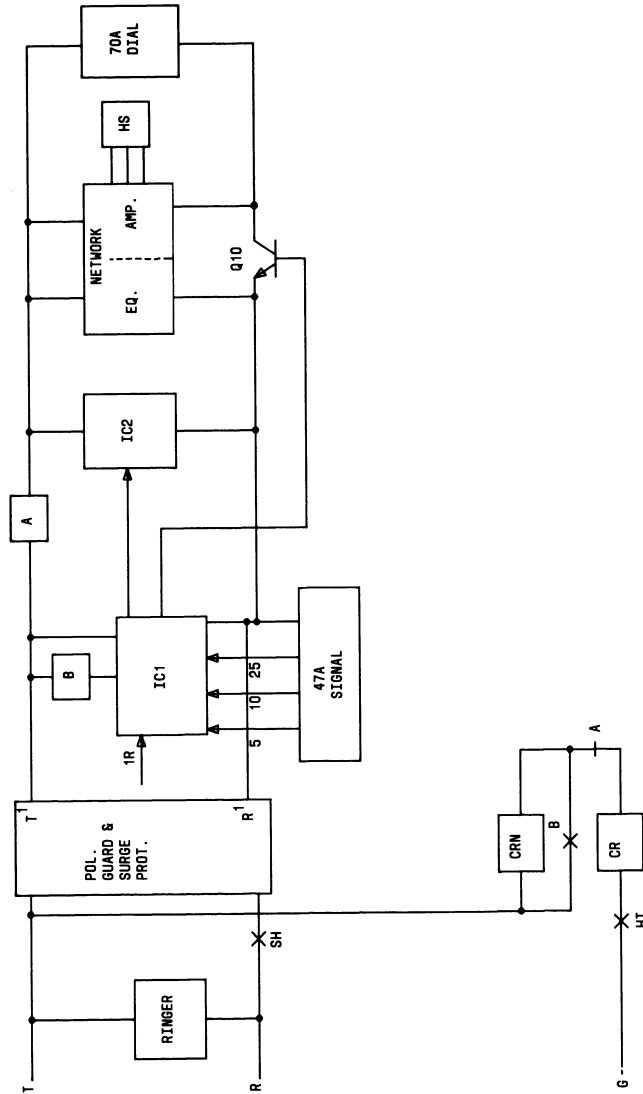


Fig. 2—1D2/2D2 Coin Telephone Set, Schematic



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# 1E-type Coin Telephone Set (Post Pay)

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Continued from GBPPR 'Zine, Issue #5

COIN CRAFTS MANUAL 1-4  
Issue 2

## 1E-TYPE COIN TELEPHONE SET

### DETAILED DESCRIPTION

#### POSTPAY SERVICE—THEORY OF OPERATION

##### DIAL POSTPAY (FIG. 1)

**Note:** This detailed description is based on the operation of a 50A hopper (MD). The new 51A hopper has the same effect on the set circuit, the difference being that the hopper trigger (HT) and 4480 ohm resistor in the 50A hopper has been replaced by an electronic delay circuit in the 51A hopper.

1.01 In Postpay service, the central office (CO) supplies -48 volt to ring with tip grounded.

1.02 When the handset is lifted, switchhook contacts operate and current flows from the ring lead to tip. The path is through the normally closed T2 contact, DP, operated SH2 and SH4, through the speech network, through normally closed T1 [parallel with hopper trigger (HT)] to tip.

1.03 The called number is then dialed and the called party must answer before a coin deposit is made. When the called party answers, the CO automatically opens (splits) the transmission path and sends a **deposit-coin** tone to the calling party.

**Note:** The "deposit-coin" tone is a low frequency tone to inform the calling party that the called party has answered and the initial rate deposit should be made immediately.

1.04 During the time the connection is split, the CO S relay operates and reverses the loop to the set (negative on tip, ground on ring). This reversed loop prepares the set to receive the initial rate by causing the ring lead to be more positive than tip. With the loop reversed, the totalizer will not restore because diode CR4 is forward biased and SH3 (NO) is closed, thus shorting the totalizer and allowing an accumulation of deposits up to, or more than, the initial rate.

1.05 If the totalizer is set for more than 5-cent initial rate, and the calling party deposits a nickel, the HT will operate but is shorted by the normally closed totalizer contact T1. Any time the initial rate requirement is satisfied, totalizer contact T1 will open.

1.06 With HT and T1 both open, the 4480 ohm resistor, located on the 50A hopper, is momentarily placed in series with the loop which creates essentially a low current pulse.

**Note:** This momentary pulse must have a minimum width of 100 milliseconds and a maximum of 300 milliseconds. The CO recognizes the pulse by use of two relays with different release currents.

1.07 When the CO recognizes this pulse, the CO margin relay will release, thus removing the split connection and establishing the talking circuit. This marginal relay is critical to loop length. Over range will cause improper operation.

1.08 When the switchhook is restored, SH3 (NO) contact opens, and the short around the totalizer is removed. Current now flows through the totalizer, operating the S relay, and the totalizer steps back to **home** position.

**Note:** Unlike a Coin-First or Dial-Tone-First set, the totalizer in a postpay set remains off **home** through the total call period for local calls.

1.09 In cases of toll calling, when the customer dials the operator, the CO recognizes the toll call, will not reverse tip and ring, thus the ring lead remains negative throughout the call.

**Note:** When operator call back is required, negative battery must be supplied on the ring lead.

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# 1E-type Coin Telephone Set (Post Pay)

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## COIN CRAFTS MANUAL 1-4

1.10 With negative on ring, diode CR4 is reversed biased, thus allowing the totalizer to **read out** all coin deposits requested by the operator. In addition, the 446F diode across HT contact is forward biased, shorting the HT contact, thus reducing the noise (caused by opening and closing of HT) transmitted to the operator.

### MANUAL POSTPAY (FIG. 2)

1.11 The manual coin telephone set consists of the talking and signaling circuitry of a

standard 500-type telephone set but also provides coin signaling upon deposit of coins.

1.12 The manual set is usually connected directly to an operator circuit, and the operator will hear all coin deposit tones.

1.13 As in dial postpay service, it is necessary that the CO provide negative battery at all times when the set is connected to an operator circuit.

# 1E-type Coin Telephone Set (Post Pay)

ISS 2, COIN CRAFTS MANUAL 1-4

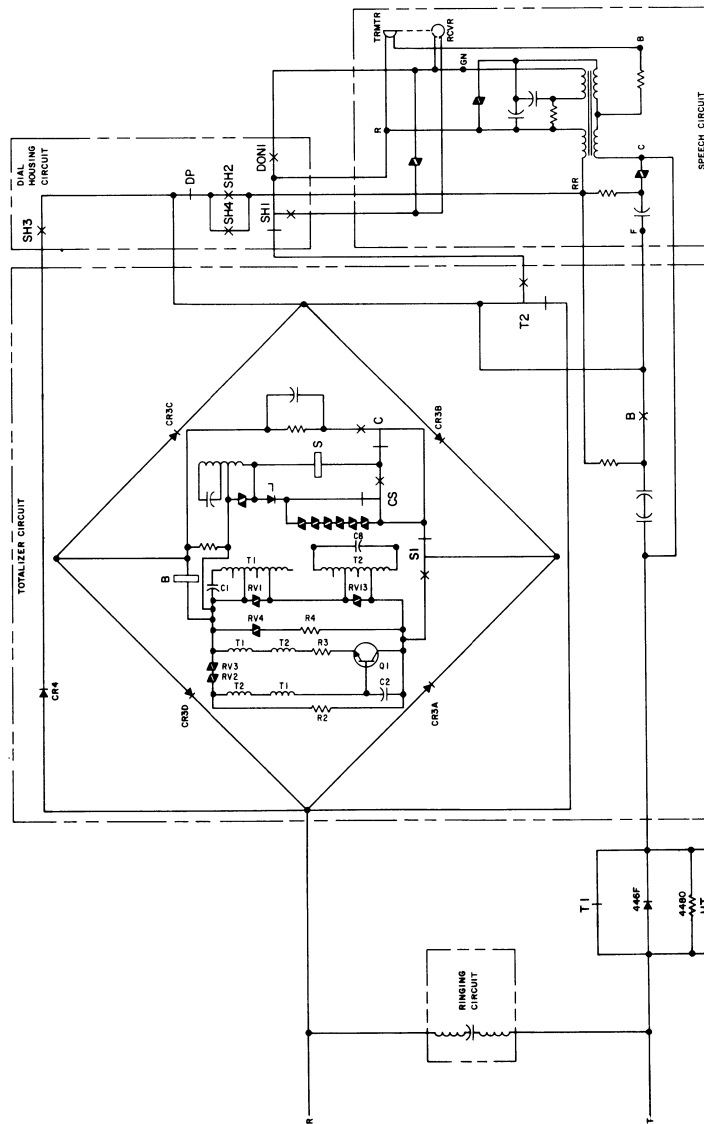


Fig. 1—1E1 Coin Telephone Set, Schematic

# 1E-type Coin Telephone Set (Post Pay)

COIN CRAFTS MANUAL 1-4

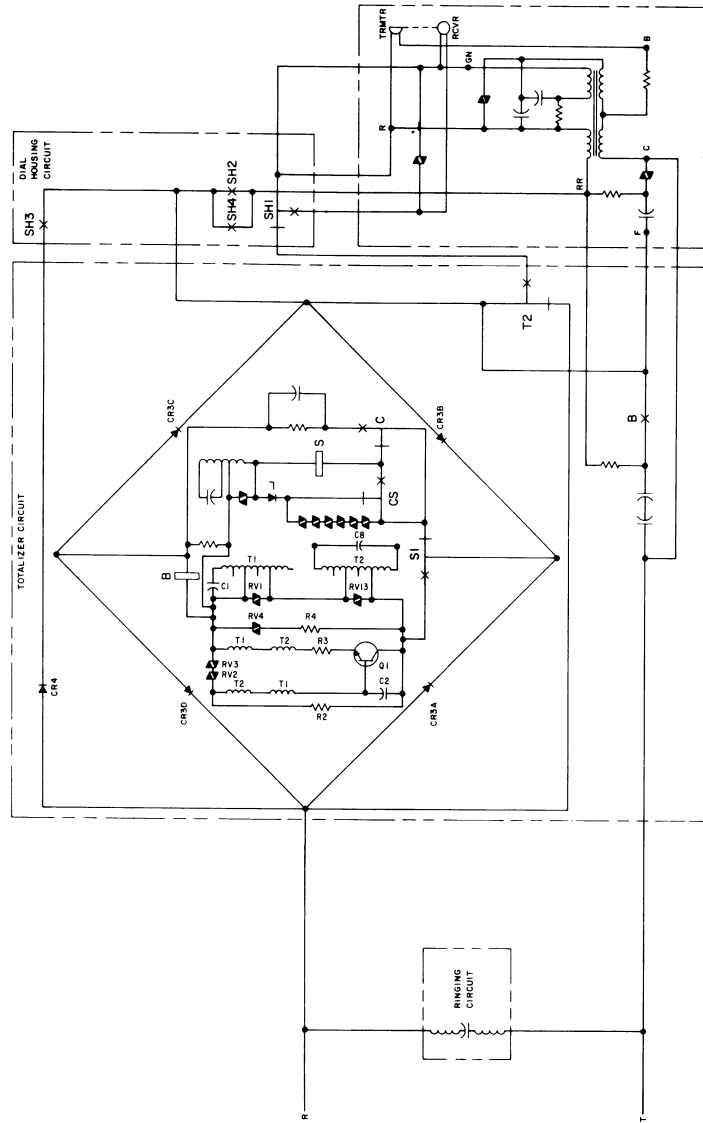
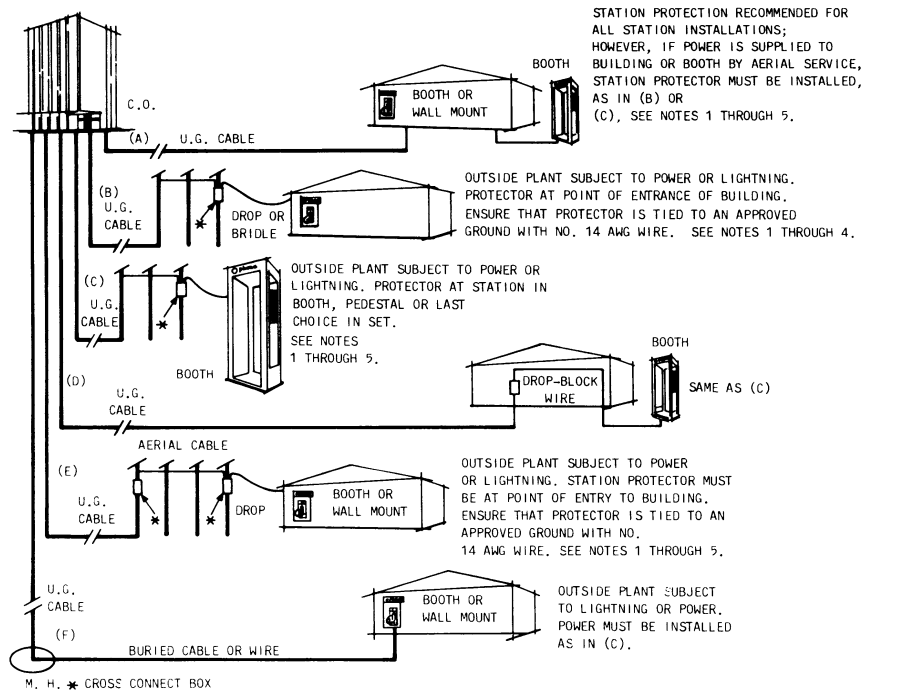


Fig. 2 — 1E3 Coin Telephone Set, Schematic

# Coin Station Protection Diagram

COIN CRAFTS MANUAL 1-10  
Issue 2

## PROTECTION



### NOTES:

1. FOR ADDITIONAL INFORMATION ON STATION PROTECTOR AND SIGNALING GROUNDS, REFER TO SECTION 460-100-400.
2. HOUSINGS OF ALL OUTSIDE STATIONS MUST BE GROUNDED. IF SET IS NOT MOUNTED IN A GROUNDED ENCLOSURE, RUN A NO. 14 AWG WIRE FROM STATION TO NEAREST APPROVED GROUND.
3. CARBON BLOCKS THAT BREAK DOWN PREMATURELY CAN CAUSE FAILURES OF COIN COLLECT OR REFUND. CARBON BLOCKS SHOULD BE CHECKED ON "COINS DON'T RETURN" TROUBLE REPORTS, AND IF FAULTY CARBONS ARE FOUND, IT IS RECOMMENDED THAT THEY BE REPLACED BY GAS TUBE PROTECTORS. IN AREAS SUBJECT TO FREQUENT LIGHTNING EXPOSURES, GAS TUBE PROTECTORS ARE RECOMMENDED.
4. WHEN THE PROTECTOR IS MOUNTED IN AN ENCLOSURE SUCH AS A BOOTH OR SHELF, BOND THE ENCLOSURE AND PROTECTOR GROUND TOGETHER WITH NO. 14 AWG WIRE.
5. WHEN PROTECTOR IS MOUNTED INSIDE SET, CONNECT WIRING PER VIEW A OR B BELOW.

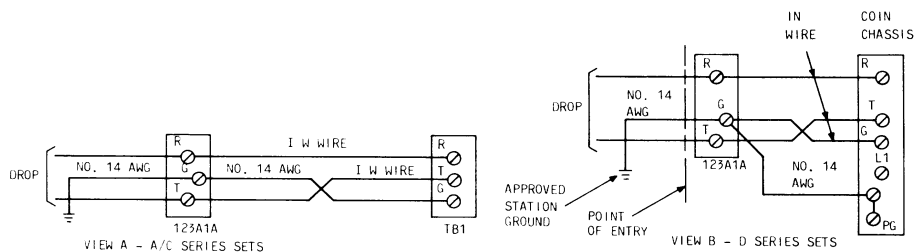


Fig. 1—Special Protection Requirements

# Block Diagram of ACTS

COIN CRAFTS MANUAL 3-6

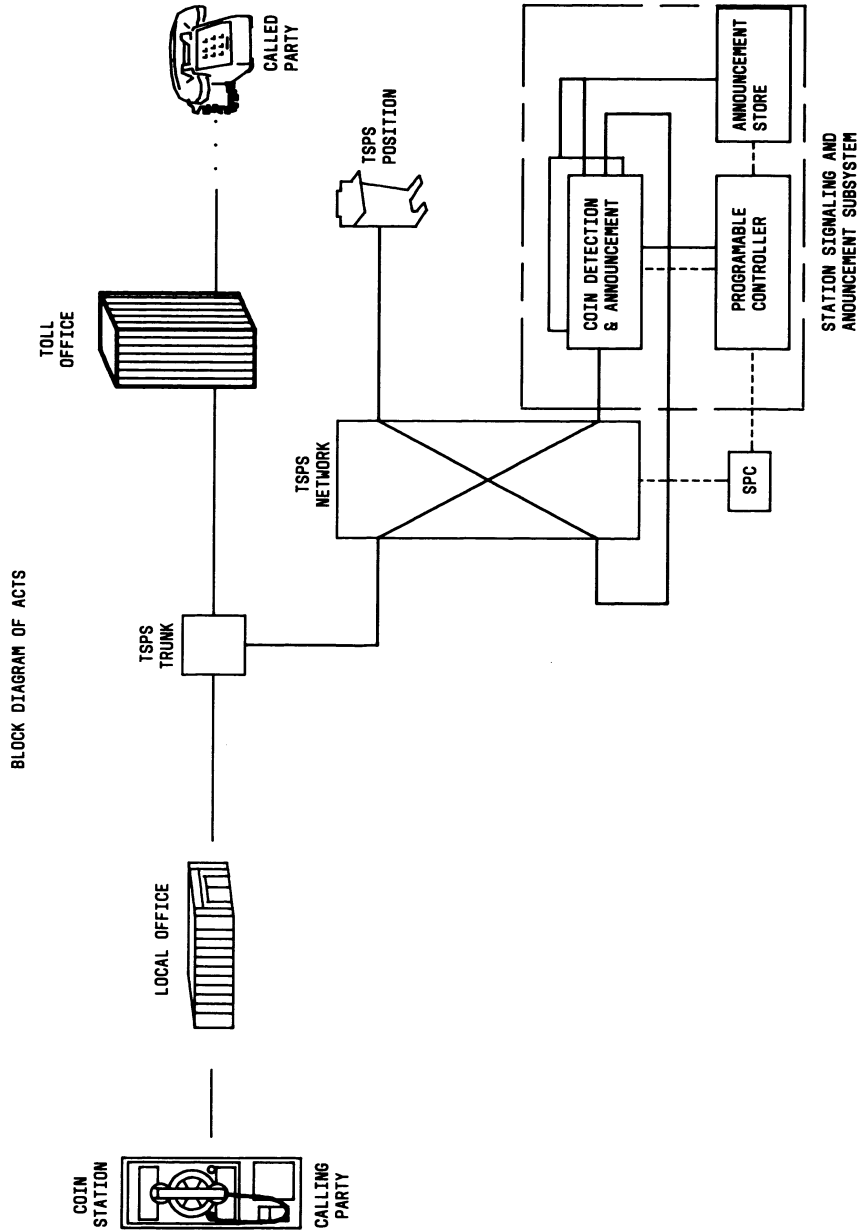


Fig. 1—Block Diagram of ACTS

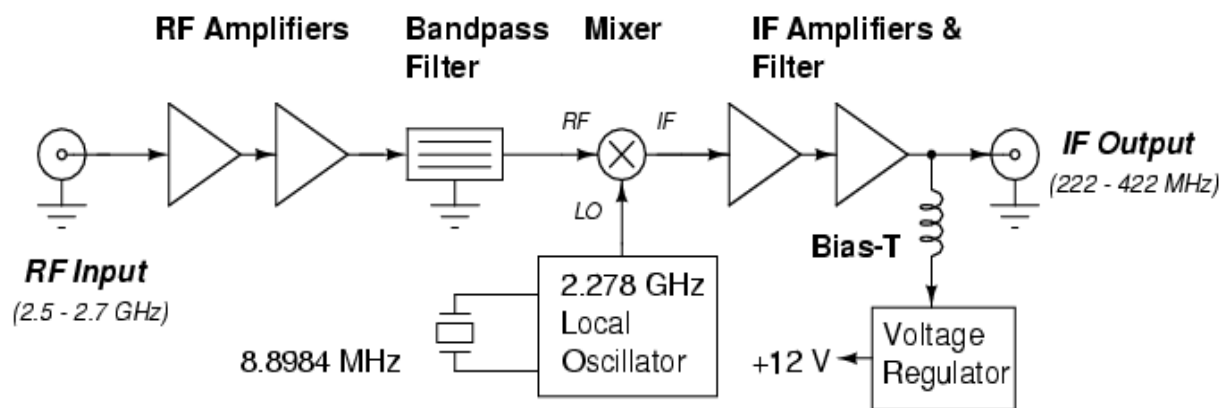
# Converter for Monitoring 2.4 GHz Cordless Phones

It is possible to receive conventional, Frequency Modulated (FM) 2.4 GHz cordless phones (the cheap kind) using a regular communications receiver (scanner) by *downconverting* their 2.4 GHz transmit frequencies to much lower ones.

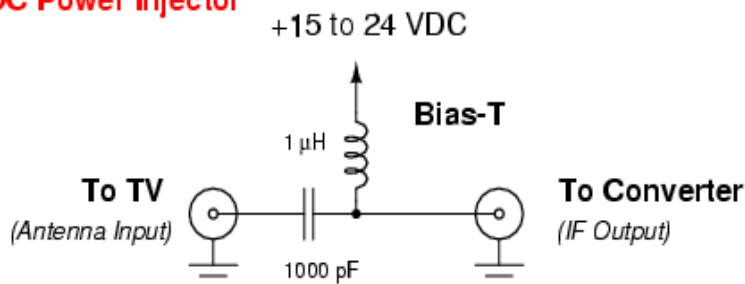
This receiver converter is based around a surplus [California Amplifier](#) Multipoint Microwave Distribution Service (2.5 – 2.7 GHz) downconverter. These are the systems which are used to provide cable TV service to rural areas when running coaxial cable is not practical. The downconverter will remain mostly intact, with its current Local Oscillator (LO) of 2.278 GHz staying the same, but the Band Pass Filter (BPF) and mixer stages will be modified. It should be noted that the stock MMDS downconverter *will* receive the 2.402 – 2.483 GHz Part 15 band, but with about 20 dB of additional attenuation. These modifications will help improve that.

What this conversion does is to allow incoming RF signals (2.402 – 2.483 GHz, in this case) to be mixed with a LO frequency of 2.278 GHz and converted down to a much lower VHF frequency. *Example:* a 2.45 GHz signal will be output as a 172 MHz signal ( $2.45 \text{ GHz} - 2.278 \text{ GHz} = 172 \text{ MHz}$ ). This allows us to quickly scan the 2.4 GHz Part 15/ISM band using a conventional communications receiver to step through 124 – 205 MHz (wide or narrow FM). It is possible to receive 2.4 GHz cordless phones, 2.4 GHz baby monitors, WaveLAN transmitter audio, and even 2.4 GHz amateur radio transmissions using this setup.

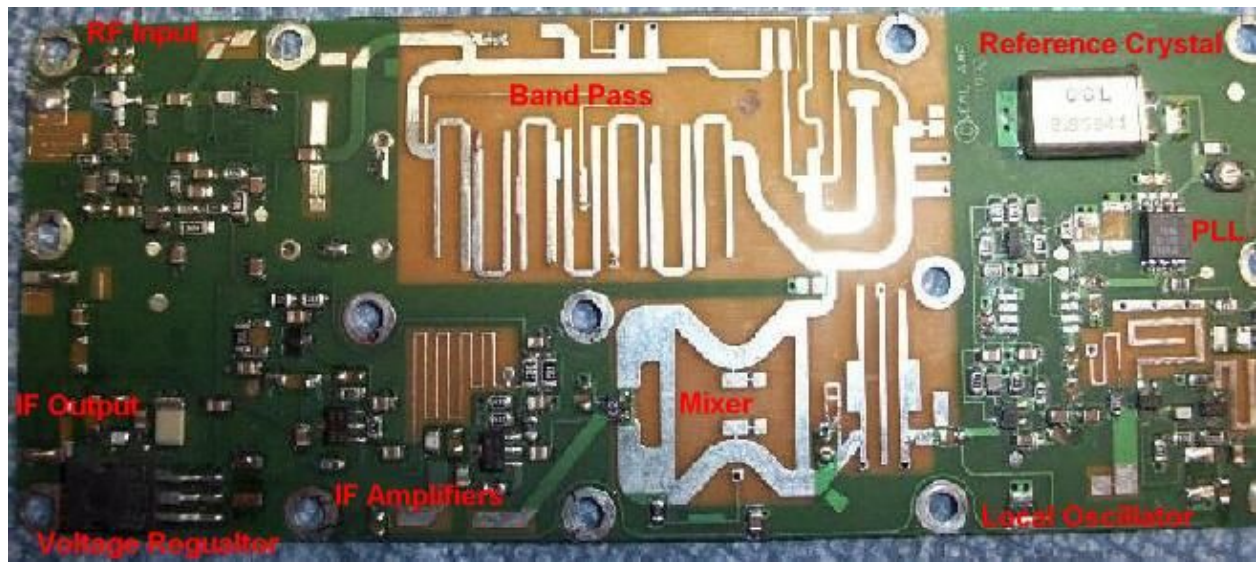
## Original California Amplifier MMDS Downconverter Block Diagram



### DC Power Injector



## Original California Amplifier MMDS Downconverter PC Board



The original, stock MMDS downconverter was used to receive cable TV signals that were broadcast in the 2.5 – 2.7 GHz band. These converters, when connected to a high-gain parabolic dish antenna, converted the 2.5 – 2.7 GHz MMDS signals down to VHF TV frequencies (222 – 422 MHz). You would then "tune" your TV to these standard TV channels (cable channels 24 – 57) and could view the TV signal which was transmitted in those microwave bands.

## Comparison Picture – Stock & Modified Downconverters







This modification will replace the converter's 2.5 – 2.7 GHz microstrip line BPF with a Toko 4DFA-2450T-10, 2-pole, 2.45 GHz BPF (Digi-Key Part No. TKS2610CT-ND, \$24.06). The mixer stage is replaced with a Mini-Circuits MBL-25MH mixer. The 2.278 GHz LO signal will also be increased to +17 dBm for improved third-order intercept and signal linearity.

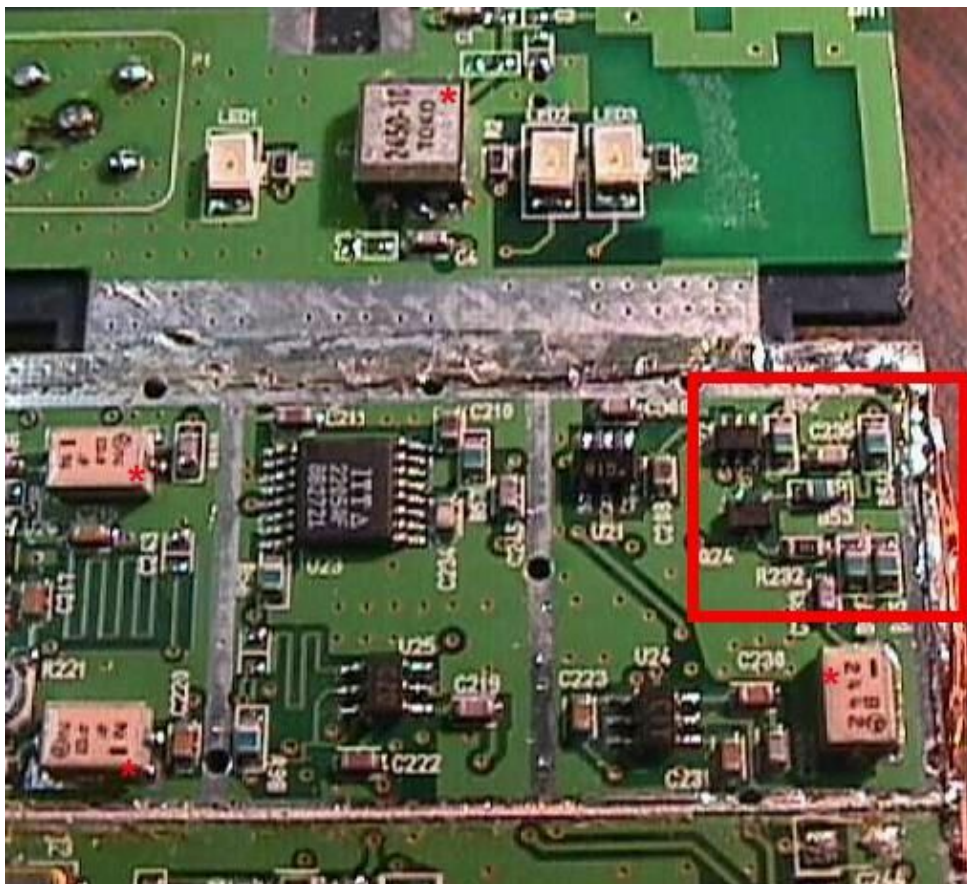
You'll note that the BPF shown in the above picture is *not* the Toko model in the schematic. It's actually a 2.45 GHz duplex filter from an old Metricom Ricochet radio. The Toko model will have the same performance and is a lot easier to purchase. Another difference between the schematic and the picture is that I originally used the converter's stock Intermediate Frequency (IF) amplifier to "boost" the mixer's IF output. Though the results varied, I found the extra gain actually *decreased* the converter's performance. This is because the receiver connected to the IF output (a Radio Shack PRO-2042, AOR AR8000, and Standard CCR708 were tested in this case) contains the needed amplifiers and filtering. There is no need for additional IF amplification, unless you're using an old, deaf receiver for the IF rig.

The area where the microstrip line BPF was is isolated (using a Dremel tool) and the new PC board containing the BPF and mixer was added. The LO signal is tapped *after* the downconverter's microstrip line BPF and sent, via a small coax (RG-196) connection, to the VNA-25's RF input through a 6 dB resistive attenuation pad. The stock 2.278 GHz LO signal is increased to +17 dBm and applied directly to the mixer.

On the 2.4 – 2.5 GHz RF input side, the signal is tapped after the second RF amplifier and is connected via a *very* short coax cable to the BPF's RF input. In a pinch, 2.45 GHz band pass filters can be salvaged from old 802.11b wireless LAN hardware.



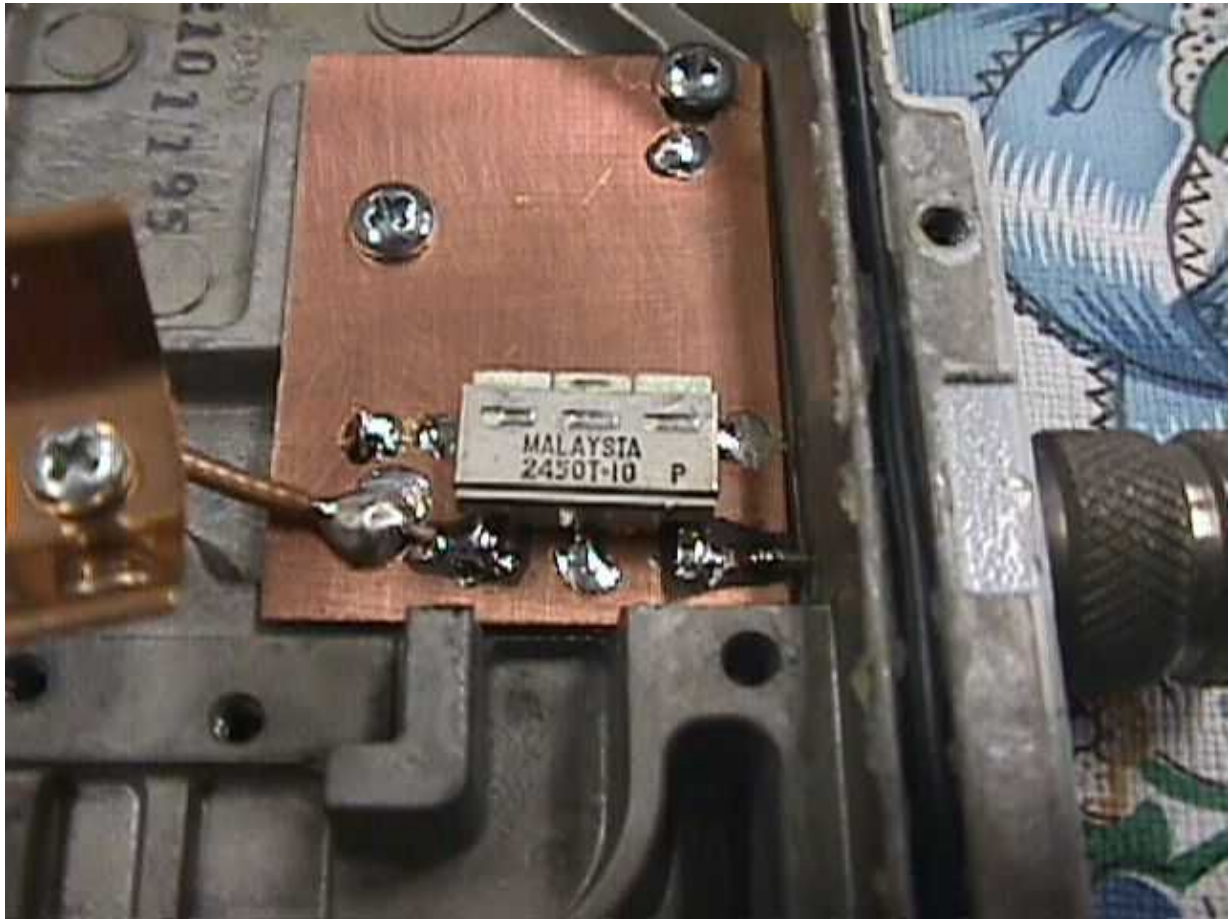
The PC board shown in the pictures also has a small 78L05 voltage regulator on it. Here is the downconverter's +12 VDC voltage regular output tap (yellow wire) to feed the 78L05's input.



Picture of a dead 802.11b wireless LAN card. There are *four* (marked with little red stars) useable [Murata](#) 2.45 GHz band pass filters on this particular card. To remove them, heat the underside of the PC board quickly with a hot air gun and then pick them up with a tweezers. The area in the red square is an [Agilent MGA-86563](#) receive pre-amplifier. This can be used as an (optional) stand-alone, external receive pre-amplifier.



Overview of an (optional) external 2.45 GHz band pass filter which can be placed ahead of the downconverter to reduce out-of-band interference and intermodulation products. The case is from another California Amplifier downconverter.



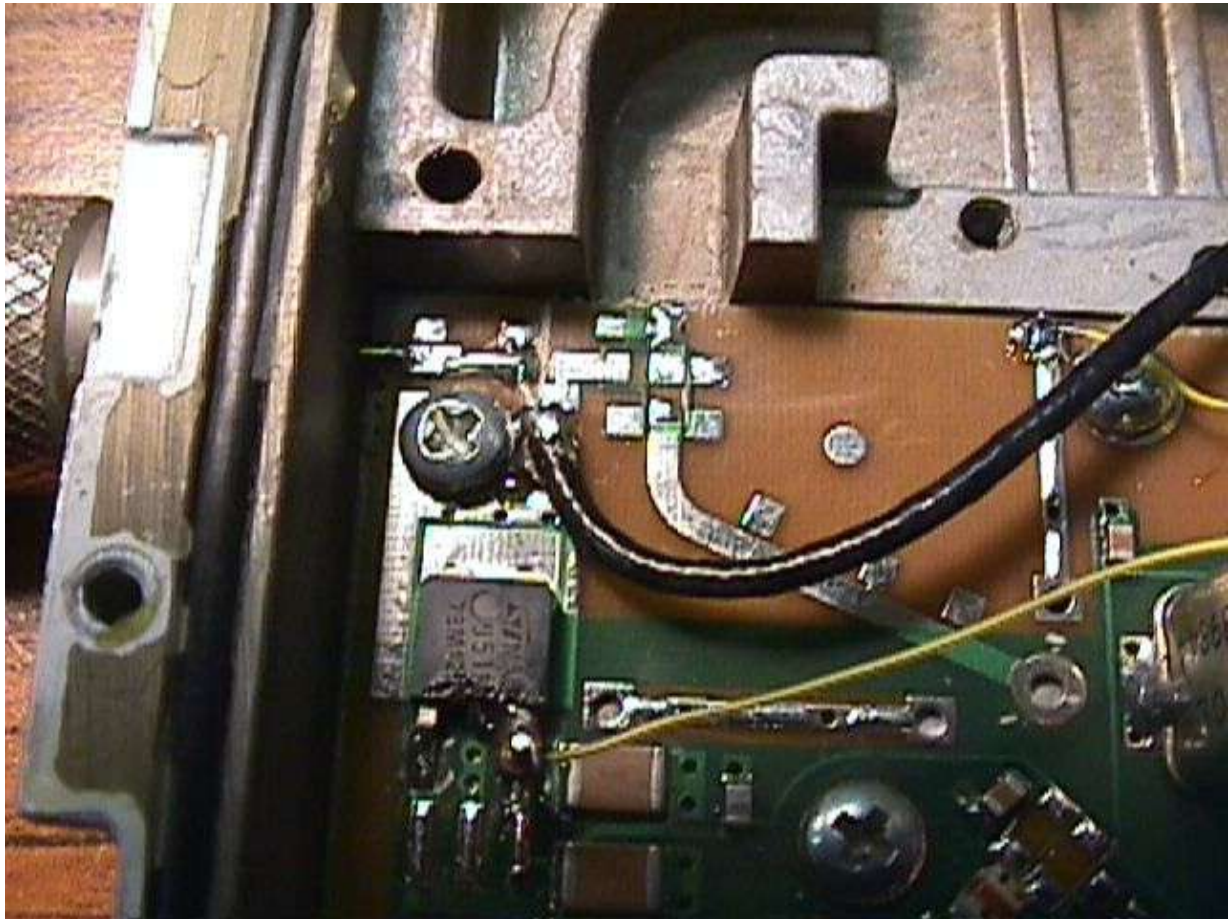
Band pass filter's internal view. RF input (antenna input) is on the right, RF output (to downconverter) is on the left. The filter shown is a Toko 4DFB-2450T-10, 3-pole, 2.45 GHz BPF (Digi-Key Part No. TKS2618CT-ND, \$40.19).



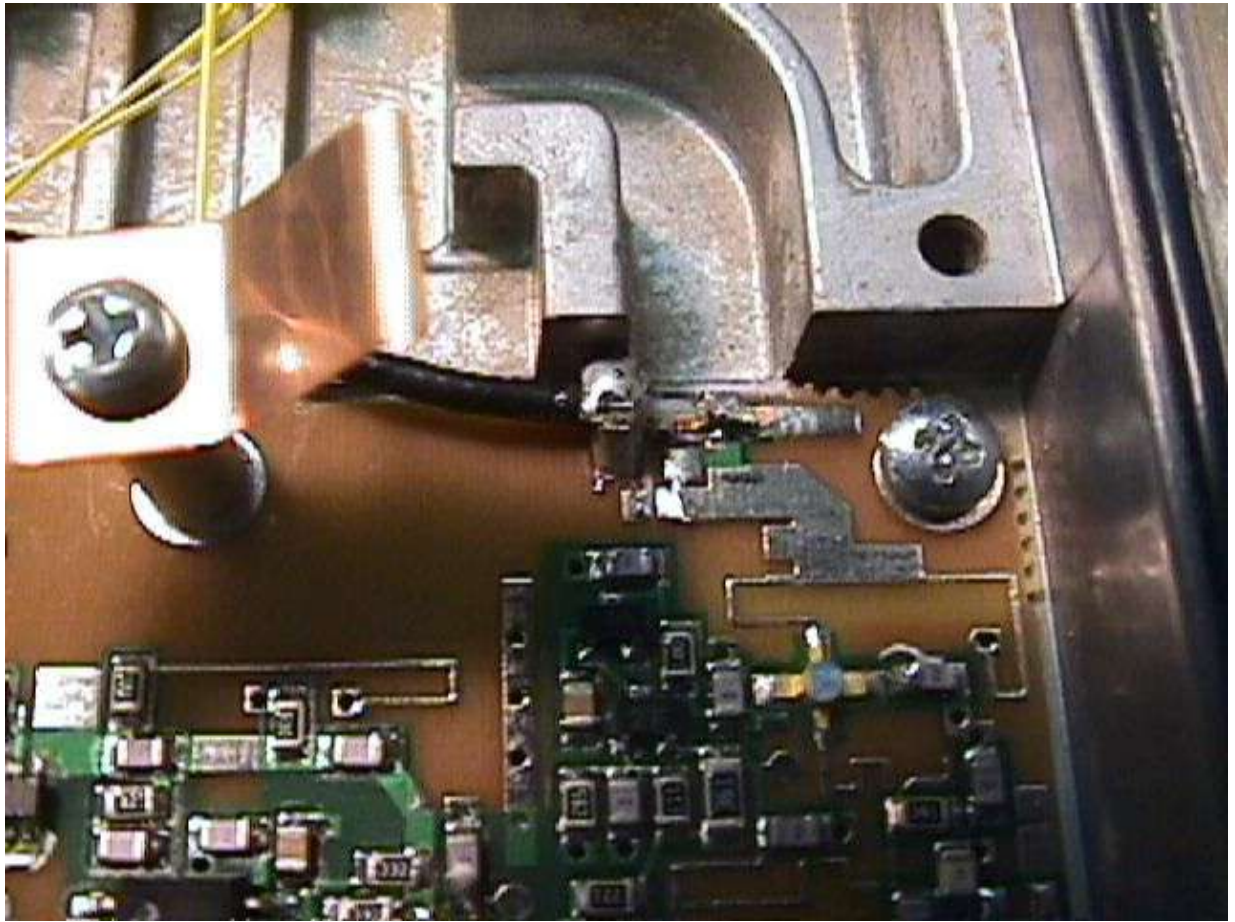
Filter's RF output N-connector. Yes, this is *incorrect* construction at those high microwave frequencies, but I didn't have a choice.



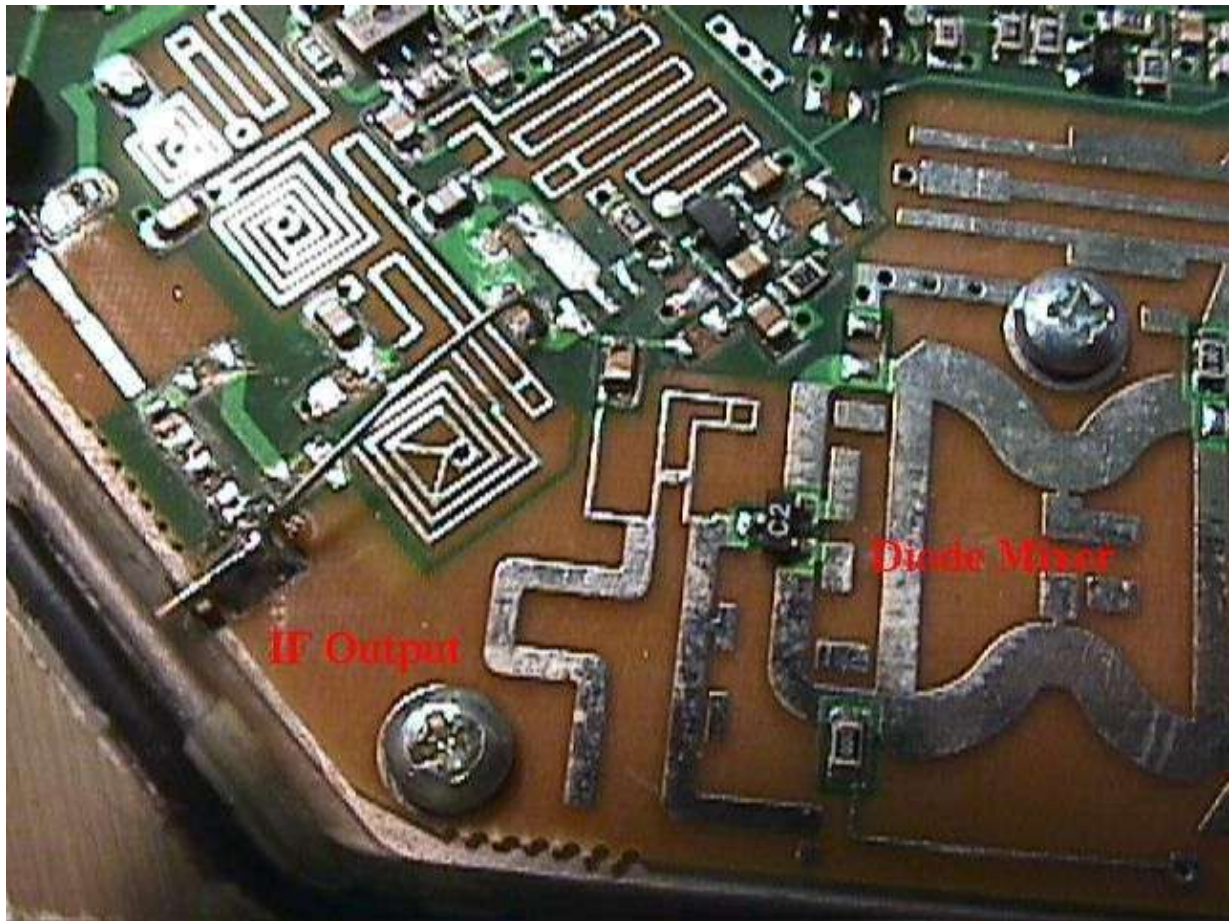
Here is a modified high-gain California Amplifier MMDS downconverter connected to an AOR-8000 receiver. The sharp, 2.5 – 2.7 GHz BPF on the converter's RF input was removed and at the IF output the amplifiers and filtering were bypassed.



Converter's RF input (2.402 – 2.483 GHz). The original MMDS-band filter was removed and a coax jumper is needed to "jump over" to the pre-amplifier section. Ignore the yellow wires.



Coaxial input to the receive pre-amplifier.

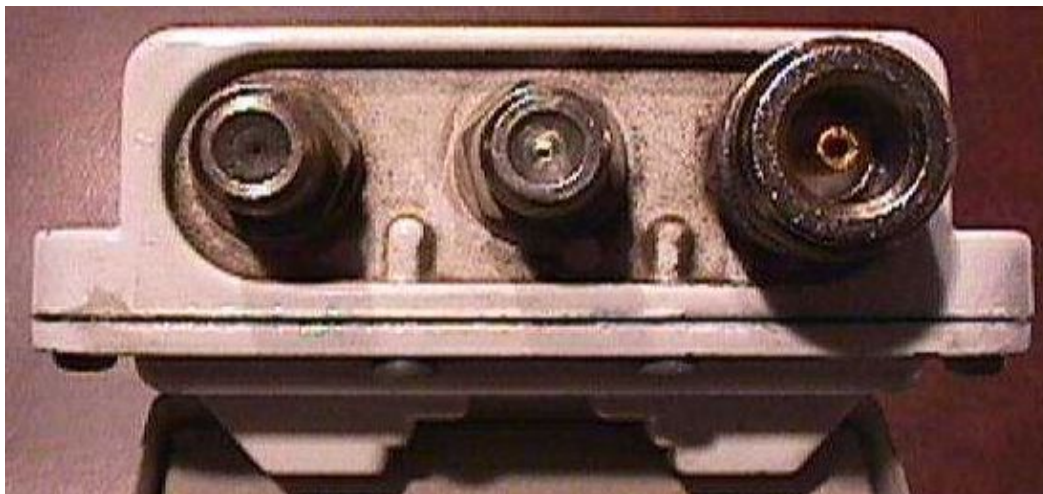


IF output (to the AOR-8000 receiver). The IF output is tapped after the diode mixer/DC blocking capacitor via a short wire loop and is sent straight to a F-connector. In this particular downconverter, I left the original, small 2.5 – 2.7 GHz microstrip line BPF filter (located above the screw on the right) and diode mixer sections intact. Performance was still very good.

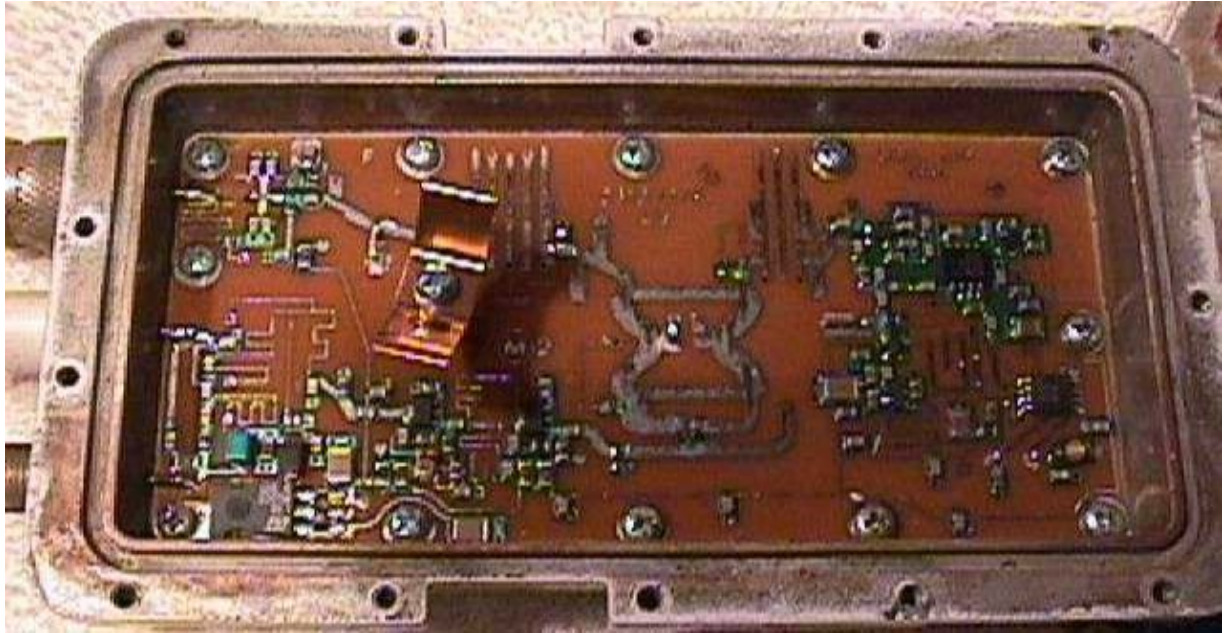




Case label on a dumpster-dived CalAmp MMDS downconverter.



Downconverter's RF connectors. RF input (2.5 – 2.7 GHz) on the right, IF test (–20 dB) in the middle, and IF output/DC input (222 – 408 MHz) on the left. To clean them, use a good spurt of electronics cleaner and a Q-tip.



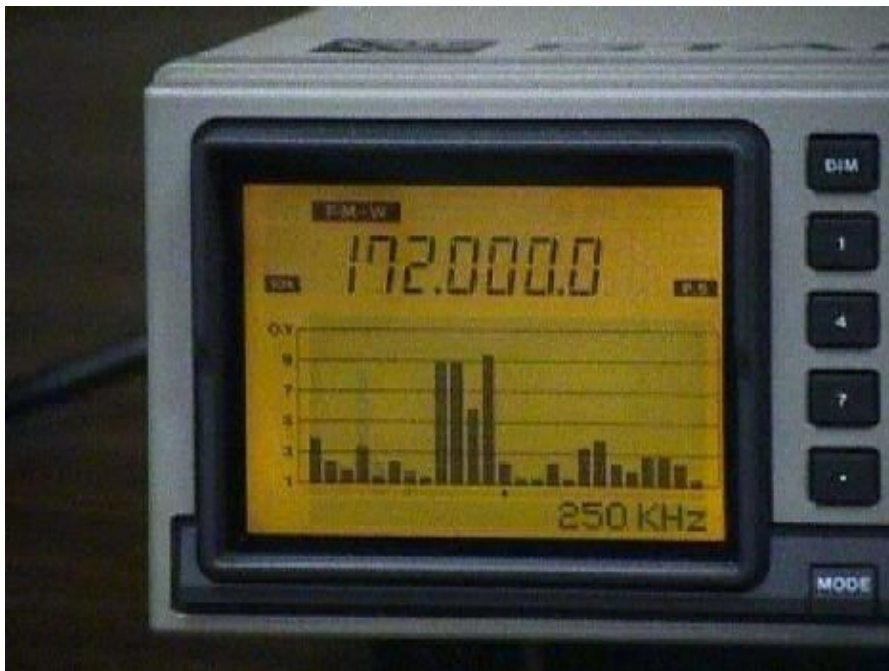
Internal view. This particular model is physically smaller than other models and the BPF doesn't have a sharp as roll-off either. This makes it ideal for receiving the 2.4 GHz band without the need for any internal modifications.



Here is an experiment using a CalAmp Yagi antenna with an integrated MMDS downconverter to receive microwave oven radiation leakage (2.45 GHz). The IF receiver is a Standard CCR708 tuned to 172 MHz (in wideband FM mode) with the spectrum sweep 250 kHz wide.



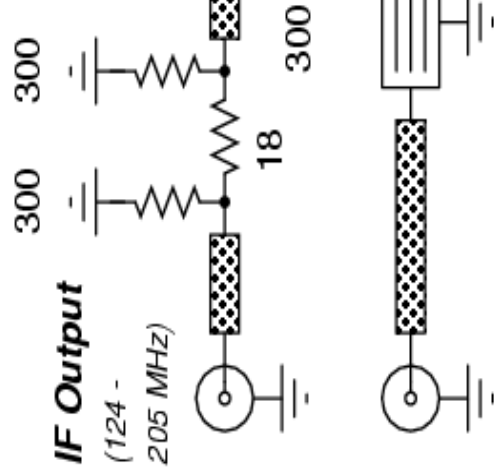
Noise floor shown at 172 MHz while connected to the powered MMDS downconverter.



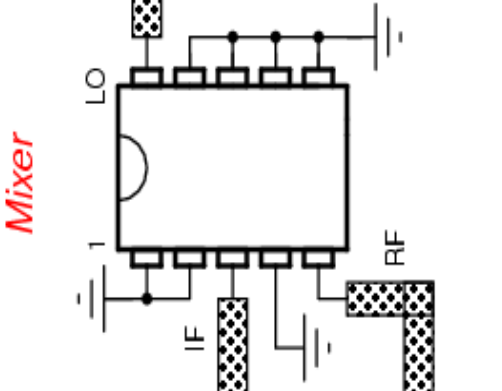
Microwave oven leakage is observed! The 2.45 GHz oven RF radiation is mixed with the downconverter's internal 2.278 GHz LO signal and then converted to 172 MHz. Microwave ovens tend to drift slightly in frequency, as the spectrum display shows.

# 2.4 GHz Cordless Phone Receive Converter

3 dB Att. Pad



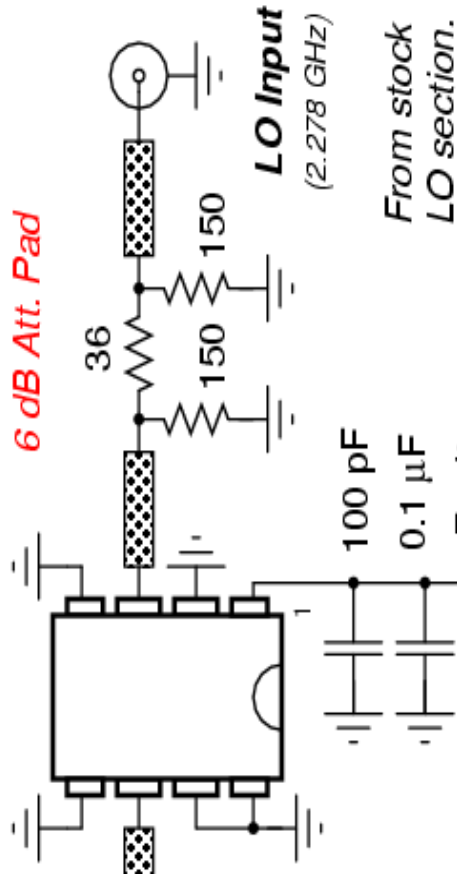
Mini-Circuits  
MBL-25MH  
*Mixer*



**RF Input**  
(2402 - 2483 MHz)  
**2.45 MHz Band Pass Filter**  
Digi-Key Part #TKS2610CT-ND

From receive pre-amplifiers.

Mini-Circuits  
VNA-25  
*LO Amplifier*



6 dB Att. Pad

LO Input  
(2.278 GHz)

From stock LO section.

+5 VDC

50 Ω microstrip line

# Miscellaneous Frames Description / 1A ESS

BELL SYSTEM PRACTICES  
AT&TCo Standard

SECTION 231-036-000  
Issue 1, May 1979

## MISCELLANEOUS FRAMES

### DESCRIPTION

#### NO. 1 AND NO. 1A ELECTRONIC SWITCHING SYSTEMS

| CONTENTS   | PAGE | CONTENTS  | PAGE |
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| 1. GENERAL . . . . .                                     | 1    | 3. Trunk Distributing Frame (or Intermediate Distributing Frame) . . . . .  | 6    |
| 2. PHYSICAL DESCRIPTION . . . . .                        | 1    | 4. Power Distributing Frame . . . . .   | 7    |
| A. Main Distributing Frame . . . . .                     | 2    | 5. Miscellaneous Trunk Frame . . . . .  | 8    |
| B. Protector Frame . . . . .                             | 2    |   |      |
| C. Trunk Distributing Frame . . . . .                    | 2    | 1. GENERAL  |      |
| D. Intermediate Distributing Frame . . . . .             | 2    | 1.01 This section describes the miscellaneous frames listed below that are used in the 2-wire No. 1 and No. 1A Electronics Switching System (ESS) and the 4 wire No. 1 ESS. |      |
| E. Power Distributing Frame . . . . .                    | 2    | • Main Distributing Frame   |      |
| F. Miscellaneous Trunk Frame . . . . .                   | 2    | • Protector Frame   |      |
| 3. FUNCTIONAL DESCRIPTION . . . . .                      | 3    | • Trunk Distributing Frame  |      |
| A. Main Distributing Frame and Protector Frame . . . . . | 3    | • Intermediate Distributing Frame   |      |
| B. Trunk Distributing Frame . . . . .                    | 3    | • Power Distributing Frame  |      |
| C. Intermediate Distributing Frame . . . . .             | 3    | • Miscellaneous Trunk Frame   |      |
| D. Power Distributing Frame . . . . .                    | 3    | 1.02 When this section is reissued, the reason for reissue will be listed in this paragraph.  |      |
| E. Miscellaneous Trunk Frame . . . . .                   | 3    |   |      |
| 4. ABBREVIATIONS . . . . .                               | 3    |   |      |

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| 2. Protector Frame, Front View . . . . .    | 5    |

#### 2. PHYSICAL DESCRIPTION

2.01 The miscellaneous frames are used to perform noncontrol functions and are primarily distribution frames used to interconnect two groups of leads in a unique pattern according to office assignments.

#### NOTICE

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Printed in U.S.A.

Page 1

## SECTION 231-036-000

### A. Main Distributing Frame

**2.02** The main distributing frame (MDF) provides for the flexible association of outside plant cable pairs with central office equipment.

**2.03** The MDF (Fig. 1) is a single sided frame, 8 feet high and 1 foot wide. A module consists of six MDFs and measures 6 feet 6 inches long (Fig. 1). A module of MDFs provides for 6000 pairs from outside plant flexible access to 6080 inside central office plant pairs.

### B. Protector Frame

**2.04** A module of single-sided protector frames 6 feet 6 inches long, 8 feet high, and 1 foot deep provides the protectors for 6000 pairs from outside plant. This frame will be used in conjunction with the MDF. With the protector frame, the stub cables may be run either to the cable vault through a slot or sleeves in the floor, overhead to the ceiling, or to a wall mounted cable rack.

**2.05** The protector frame (Fig. 2) has 12 vertical sections and each section can accommodate five 302 type connectors. The right-hand side of each protector frame module mounts test jacks, microphone, test battery supply, etc.

**2.06** The protector frame, unlike other No. 1 ESS frames, is connected to building ground by an insulated No. 00 gage grounding wire. The protector frame must be electrically insulated from other No. 1 ESS frames to prevent introducing multiple grounds to the system.

### C. Trunk Distributing Frame

**2.07** A trunk distributing frame (TDF) is composed of six verticals of 1216 terminals each in a module 7 feet 0 inch high and 4 feet 4 inches wide, with provision for only one connection on each quick-connect terminal. The TDF provides for the cross connection of trunks to trunk link networks to simplify traffic balancing. See Figure 3.

### D. Intermediate Distributing Frame

**2.08** The intermediate distributing frame can be located at the head end of the main distributing frame, and in line with it, the two frames growing in opposite directions (Fig. 3). At this point, the intermediate distributing frame will be 8 feet high

and employ the same distributing frame (DF) module as the main distributing frame. However, the intermediate distributing frame (IDF) may be preferred in a frame lineup. Here, the IDF will be 7 feet high. The intermediate distributing frame provides for cross connection of trunk and trunk auxiliaries to the MDF via tie cables. This allows multiplied access of trunks to outside plant pairs and minimizes long jumpers. The IDF employs the same module as the TDF.

### E. Power Distributing Frame

**2.09** The power distributing frame (Fig. 4) is the fused distributing point for the +24 volts and -48 volts from the power plant to the various frames in the No. 1 and No. 1A ESS central office. The power distributing frame supplies an average of 500 amperes for each +24V and -48V. Three frame bus bars are provided for connection to the power plant. Distribution is made from terminals in fuse blocks and on the frame ground bus bar. The power distributing frame provides fusing for a maximum of ninety-eight +24 volt circuits and one hundred and six -48 volt circuits. A minimum of two frames are required for each central office. The frame is a standard single bay frame measuring 2 feet 2 inches wide and 7 feet high.

**2.10** For No. 1A ESS, -48 volt power from the -48 volt power plant is also delivered to the J5A007B-1 1A processor power distributing frame located in the processor area. Converters on the power distributing frame develop +24 volt requirements for the 1A processor frames. The +24 volt converters are used for offices that do not have a +24 volt power plant.

### F. Miscellaneous Trunk Frame

**2.11** The miscellaneous trunk (MT) frame (Fig. 5) is a single bay frame 2 feet 2 inches wide and 7 feet high. The frame has thirty-six 2-inch mounting plate spaces used for mounting trunk and service circuits. The MT frame mounts those trunk and service circuits which do not fit the universal pattern required for mounting on the universal trunk frame (UTF). Those circuits on the MT frame are cabled via unit terminal strips to their associated master scanner, signal distributor and distributing frame terminations.

2.12 The MT frame does not contain a scanner or signal distributor. The MT frame is also used to mount other equipment, such as a supplementary signal distributor, teletypewriter (TTY), and automatic identified outward dialing (AIOD).

### 3. FUNCTIONAL DESCRIPTION

#### A. Main Distributing Frame and Protector Frame

3.01 All outside cables from customer and other central offices are terminated at the protectors on the protector frame (Fig. 2) to prevent damage to office equipment from lightning strokes and power crosses on selected special circuits. Cables from the protectors are connected to alternate columns of terminal blocks at the main distributing frame and are distributed vertically. Protector cables are interconnected with cables from line link networks (LLNs) and intermediate distributing frames which are connected to the remaining columns (distributed vertically in the column).

3.02 Each protector frame (Fig. 2) provides 60 protector connectors each having 100 protector plug-in units. Carbon blocks within the protector units will ground the associated lines on lightning strokes and power crosses above 400 volts. The No. 1 ESS circuits are designed to be self protecting below 400 volts thus making heat coils unnecessary. For testing purposes, inside and outside cable pairs can be disconnected by removing the corresponding protector units.

#### B. Trunk Distributing Frame

3.03 The trunk distributing frame (TDF) interconnects the trunk and service circuits and the trunk link network (TLN) appearances. It is also a preferred point for cross-connections not requiring direct access to an outside cable pair. The TLN appearances are connected to alternate columns of terminal blocks and the trunk circuits and service circuits are connected to the remaining columns.

#### C. Intermediate Distributing Frame

3.04 The intermediate distributing frame interconnects the main distributing frame and incoming and outgoing trunk circuits. Physically, the intermediate distributing frame is the same as the trunk distributing frame. Cable pairs from the main distributing frame are connected to

alternate columns of terminal blocks while cable pairs from the trunk circuits are connected to the remaining columns.

#### D. Power Distributing Frame

3.05 Power feeders are run from the +24 volt and -48 volt power plant to the two (or more, if required) power distributing frames (PDFs) in the switchroom. These feeders are composed of battery and ground-return leads. At the power distributing frame each battery lead is filtered by a 35,000 uf capacitor shunt to ground and is branched through the banks of fuses that feed the various system units.

3.06 The distribution of power is so arranged that no two duplicate circuits are fed from the same power distributing frame.

3.07 At each functional frame, each battery lead from a power distributing frame terminates on a filter which feeds the fuse panel supply bus. The ground return lead is connected to the terminal provided by the ground return system on the frame. The fuse panel branches the dc power to the circuitry within the functional frame.

#### E. Miscellaneous Trunk Frame

3.08 The miscellaneous trunk (MT) frames accommodate most of the trunks and other related equipment that cannot be mounted in the combined miscellaneous trunk (CMT), miniaturized universal trunk (MUT), or UTF frames. Low runner trunks and most test circuits are mounted in the MT frames. Also mounted in the MT frame are certain common system units which require connection to the master scanner and/or signal distributor.

### 4. ABBREVIATIONS

4.01 The abbreviations used in this Section are as follows:

|      |                                      |
|------|--------------------------------------|
| AIOD | Automatic Identified Outward Dialing |
| CMT  | Combined Miscellaneous Trunk         |
| DF   | Distributing Frame                   |
| ESS  | Electronic Switching System          |

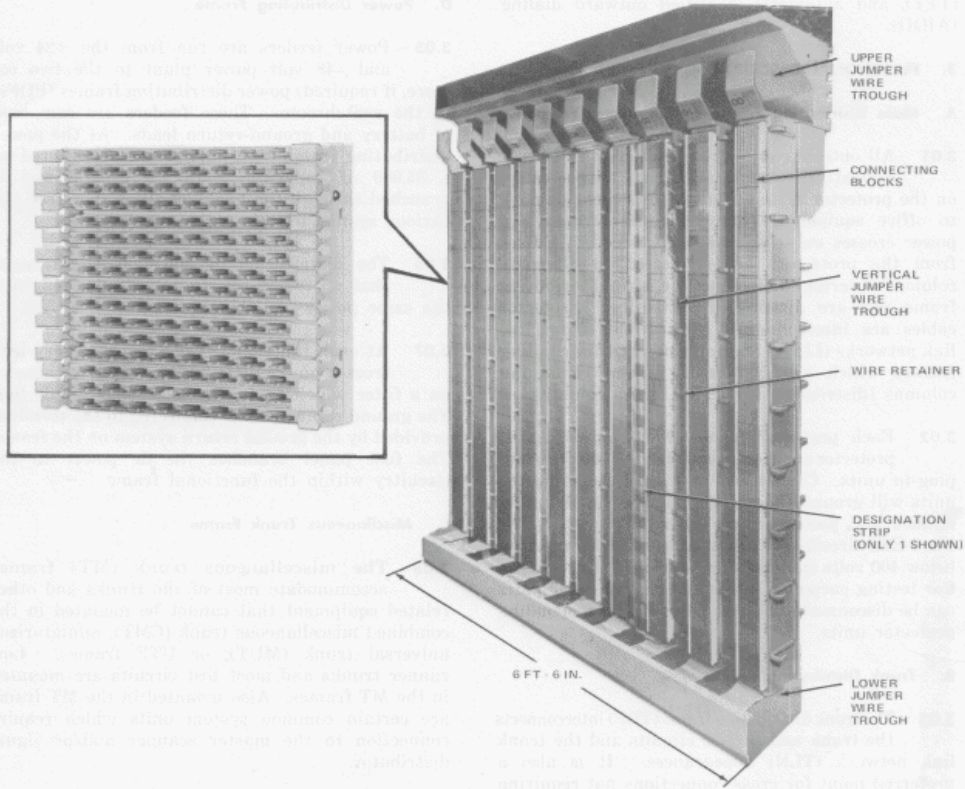


Fig. 1—Main Distributing Frame Module

|     |                                 |     |                          |
|-----|---------------------------------|-----|--------------------------|
| IDF | Intermediate Distributing Frame | PDF | Power Distributing Frame |
| LLN | Line Link Network               | TDF | Trunk Distributing Frame |
| MDF | Main Distributing Frame         | TLN | Trunk Link Network       |
| MT  | Miscellaneous Trunk             | TTY | Teletypewriter           |
| MUT | Miniaturized Universal Trunk    | UTF | Universal Trunk Frame    |



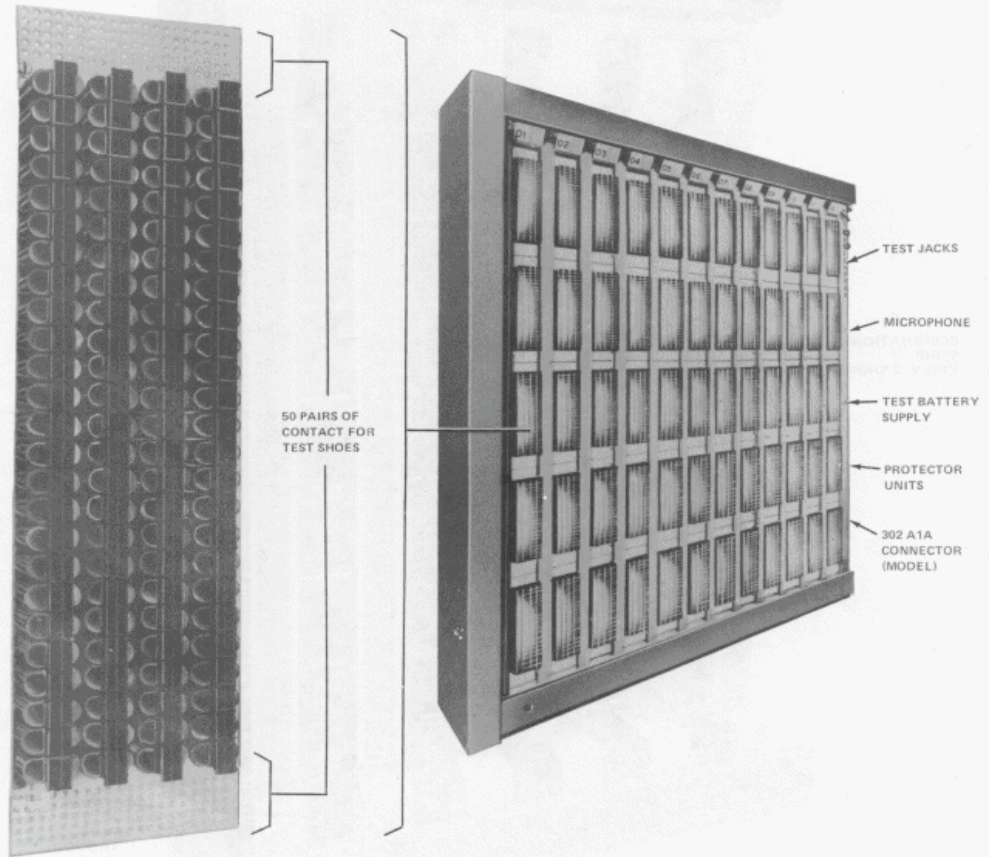


Fig. 2—Protector Frame, Front View

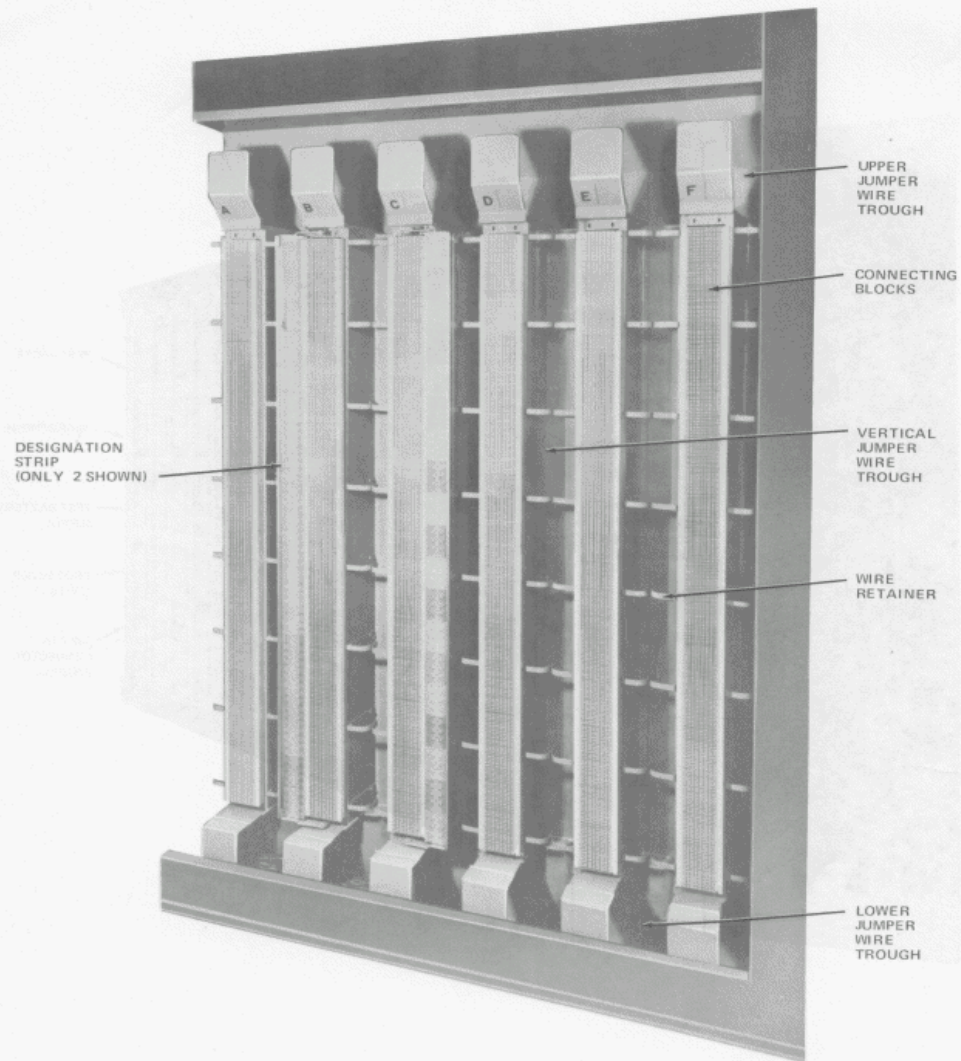


Fig. 3—Trunk Distributing Frame (or Intermediate Distributing Frame)

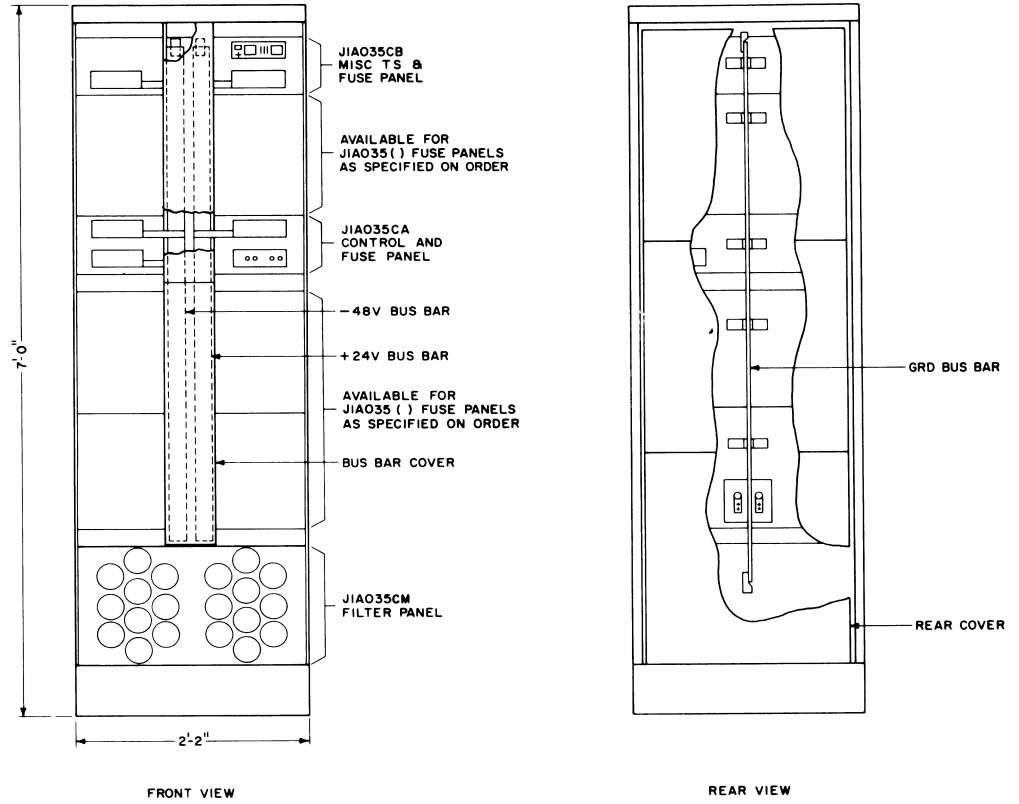


Fig. 4—Power Distributing Frame

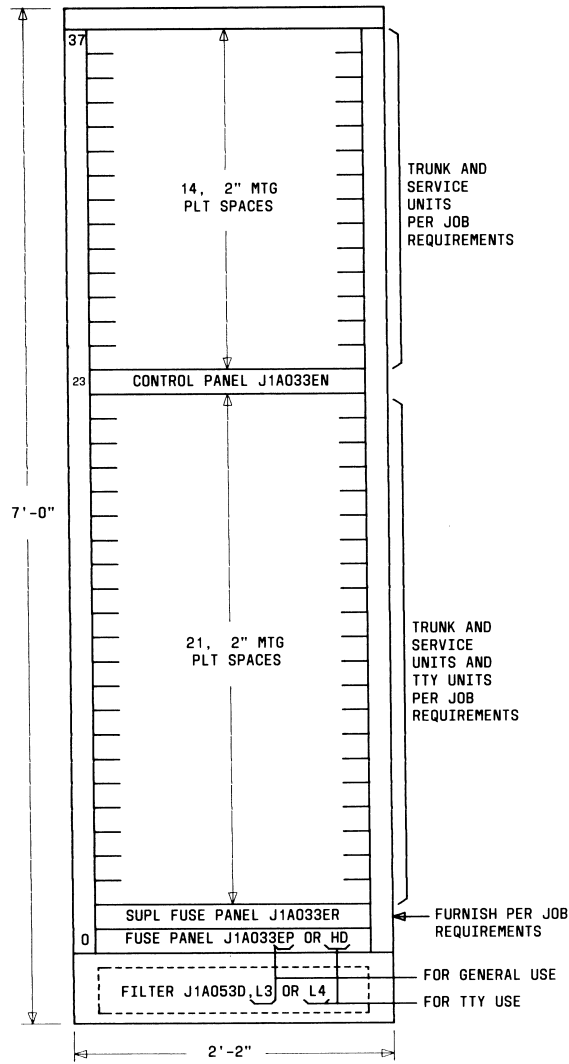


Fig. 5—Miscellaneous Trunk Frame

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*Bonus*

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Directorate of Science and Technology  
Central Intelligence Agency



Careers That Can Make a Difference in Our World

# Working at the leading edge of technology

**Y**ou have invested time, money, and effort in developing your career potential. Now, you want a career in which you can be sure that your potential will be fulfilled — and rewarded. The Central Intelligence Agency's Directorate of Science and Technology offers you that and more. We offer a chance to make a positive contribution to national security and world peace, a chance to embark on a career that can make a difference.

Your professional career with the Directorate of Science and Technology (DS&T) will often mean exploring technology that is well beyond the state of the art. As a DS&T professional, you may be working to solve an immediate problem . . . you may be applying personal initiative to develop technology that will answer an anticipated need . . . or you may be working on long-range concepts that are far beyond the purview of academia and private industry. We do all these things and more. It is an exciting environment, full of enthusiasm that comes naturally when scientific and technical professionals are encouraged to put their creativity and innovation to full use.

## The Directorate of Science and Technology (DS&T) is the technical arm of the CIA.

The Directorate of Science and Technology is one of the four major components of the Central Intelligence Agency. The other three directorates have the primary roles in operations, analysis, and administration. The DS&T has a wide range of responsibilities in the development and application of technology to meet

intelligence needs. This includes exploratory research and development; the design, development, and operation of both large-scale systems and specialized equipment; and the collection, processing, and analysis of print, broadcast, photographic, and signals intelligence.

## The historical role of technology in intelligence.

Collecting and evaluating information about one's environment and the threats it may contain have always been critical to man's survival. As early as the 5th century B.C., the Chinese military strategist Sun Tzu recognized the importance of good intelligence. "To win 100 battles is not the acme of skill. To find security without fighting is the acme of skill."

Throughout history, as technology has developed it has been applied to the intelligence-gathering process. Intelligence professionals were assisted by developments such as code-breaking techniques and tools, invisible ink, the telescope, camera, and telegraph. Basically, however, the technology was simple and the intelligence was focused on military concerns until well into the 1900s.

Since the establishment, in 1947, of the Central Intelligence Agency, the world has changed considerably. From an initial military focus, the intelligence effort has expanded to all areas of international concern. More and more data are required to effectively evaluate the capabilities, intentions, and resources of potential adversaries. The technological revolution since the founding of the Agency has provided the means to collect and evaluate this type of information. The DS&T has grown from a small part of the CIA to a major directorate with the mission of devising better means of collecting and using intelligence via technical means, against both current and future threats.

## The DS&T plays a crucial part in the intelligence process.

The “business” of any intelligence organization is the collection, processing, analysis, and presentation of information. Within the CIA, the Directorate of Science and Technology has a role in each of these intelligence functions. We conceptualize and develop new technologies to aid in intelligence collection and to support agents in the field. We apply the most advanced technical innovations to aid in information processing and analysis, and we develop advanced technical means to get the intelligence and analysis to senior policymakers in the most useful form.

DS&T professionals support the highest echelons of the U.S. Government. All national policymakers depend upon reliable and comprehensive information about world events. The technical means developed within the DS&T enhance the quality of the collection, analysis, and presentation of the information upon which decisions of major importance are founded.

## How the DS&T is organized.

The diverse activities of the DS&T are interrelated and may be divided into two main functions: (1) information collection, processing, and analysis, and (2) the development of supporting technology. The first involves information gathered from various sources — foreign broadcast and print media, signals, and photography. The other main category of DS&T activities involves the conception, development, and production of the most advanced technologies and systems to support the collection, processing, and analysis of information.



# A challenging career with unequaled opportunities

**I**n the DS&T, you will be working with the best—the best people in a wide range of technical and scientific disciplines and in the best environment available. You will be dealing with technologies as advanced as, and in some cases more advanced than, any found in private industry or academia, while interacting with top university and industry specialists. Many DS&T staff members participate in interagency intelligence committees and working groups with high visibility within the Intelligence Community.

## Advantages are unique ... and opportunities for advancement are many.

While working with the best people and resources, you will also find that the DS&T allows its professionals a larger scope of responsibility earlier than is generally the case in private industry. DS&T officers are often project managers, guiding their programs from conception to application.

There may be fewer constraints than in the commercial sector, because national security often calls for one-of-a-kind, limited-production developments. Unique problems demand unique solutions. And our engineers and other professionals have the most advanced resources and the responsibility to use them in achieving those solutions.

Along with early and comprehensive responsibility can come rapid advancement and many other advantages:

- Promotions are competitive and based on your accomplishments. You are given additional responsibilities as soon as you are ready to assume them.
- You can select the career direction you prefer. You may specialize in one field or subject, expand your expertise to cover several fields, or concentrate on developing managerial skills. And you may switch career directions as your career progresses and your interests change.
- You will be working on important projects at the leading edge of your field of interest.
- You may have direct contact with senior U.S. officials and policymakers as an important part of your job.
- You will associate with senior experts in your field, not only at the CIA but also in other government agencies, in universities, and in private industry.
- You will have access to extensive information.
- You may have opportunities for travel and overseas assignment.
- Some persons who join us directly from college will enter the Career Training Program, an intensive one-year study of the CIA, the Intelligence Community, and the intelligence process. All career trainees receive instruction in the specialties of each of the directorates and in-depth training in the work of the directorate to which they will be assigned. DS&T trainees take a three-week directorate course designed to convey a sense of technical issues and increase awareness of the DS&T's tasks and responsibilities. Career trainees also serve several interim assignments, each ten to twelve weeks, in Agency offices. The program is conducted primarily in the Washington, D.C. metropolitan area.





## Career benefits and continuing training are excellent.

We seek to offer you salaries and career benefits competitive with those of academic institutions and private industry. There is ample provision for rapid advancement based upon merit. There are also several awards systems which provide for additional recognition of exceptional performance.

Staff members participate in excellent life and health insurance programs and benefit from generous provisions for annual leave and sick leave. Upon retirement, you will be eligible for benefits under the Federal Employee Retirement System. Positions that involve overseas assignment include pay differentials, cost-of-living and housing allowances, 100% medical and hospitalization coverage, educational allowances for children, and liberal home leave.

The DS&T supports graduate study, provides a variety of training courses throughout your career, and offers opportunities for sabbaticals.

You learn on the job by tackling increasingly demanding projects and through interaction with senior colleagues and national leaders. You also increase your knowledge and capabilities by formal training. We encourage and support advanced study at universities and offer you a wide range of specialized courses given internally. This emphasis on self-improvement and professional development continues throughout your career.

As part of your training and career growth, you may have the opportunity for foreign travel or for temporary assignment abroad, although willingness to serve abroad is not a requirement for most positions in the DS&T.

Many of our professionals have experience in private industry, academia, or other government agencies. Interchange with outside organizations for purposes of career growth and professional skill improvement is encouraged.

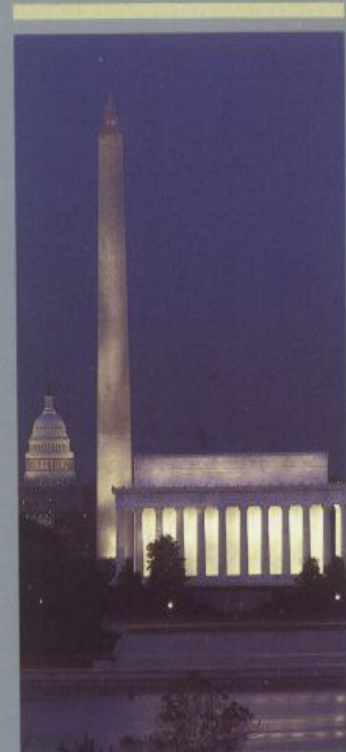
DS&T staff members actively participate in professional organizations, conferences, and symposia, and may sometimes publish the results of personal research.

## Washington, D.C. is your home base.

The CIA Headquarters is located in suburban Virginia, only seven miles from Washington, D.C. Most DS&T offices are outside the headquarters area, at several locations in Washington and Virginia. There is a wide choice of where to live — in the city of Washington, in the adjacent suburbs of Virginia or Maryland, or in the countryside.

Washington, D.C., one of the most beautiful cities in the country, is a highly cosmopolitan area. It is home to several fine universities, the Smithsonian Institution, and many other excellent museums and art galleries. Theater and music in Washington at the Kennedy Center, Wolf Trap, the National Theater, and elsewhere are second to none.

Washington and its surroundings have fine dining, shopping, and top-quality sports teams, both college and professional. Cultural, historical, and entertainment activities abound . . . and the seashore or mountains are only a few hours away.





## Challenging positions are available in many disciplines.

The Directorate of Science and Technology seeks applicants from a wide variety of disciplines and experience. Areas of opportunity in many of these disciplines are described in detail on subsequent pages. If you have a bachelor's degree, master's degree, or a doctorate in a scientific or technical subject — or skills and experience in any of the other areas or disciplines in the following list — the chances are good that we can offer you an interesting career.

Automated Manufacturing/  
CAD/CAM

Business Administration  
Chemistry/Chemical Engineering  
Communications  
Computer Science  
—ADP  
—artificial intelligence  
—data base management  
—expert systems  
—hardware and software design  
—networking  
—operations  
—programming  
—systems analysis

Contract/Project Management

Crafts & Trades:

plastics, leather, wood, tools and dies, printing, engraving, art, papermaking, bookbinding, ceramics, modelmaking, inks and dyes, cabinetmaking

Economics/Econometrics

Electro-optics

Engineering

—aeronautical  
—aerospace  
—civil  
—design  
—electrical/electronic  
—general  
—human factors  
—industrial  
—mechanical  
—nuclear  
—structural

Foreign Area Studies

Geography

Graphic Design/Illustration

History

Imagery Analysis

International Relations

Journalism

Languages

Laser Technology

Library/Documentation Science

Life Sciences

Materials Science

Mathematics

Medicine

Microelectronics

Military Science

Modeling and Simulation

Photogrammetry

Photography/Video

Physics

Political Science

Power Source/Storage Technology

Psychology

Radar/Antenna Design

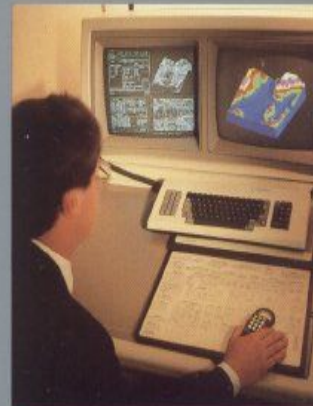
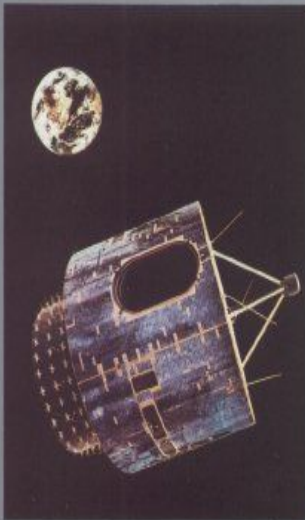
Satellite Technology

Sensing Technology

Signal Processing/Analysis

Social Science

Telemetry



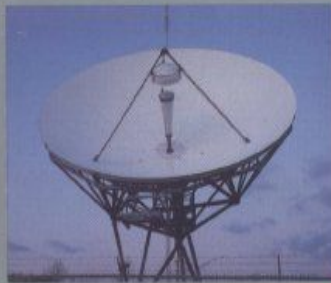
# Information collection and processing put critical facts into the hands of policymakers.

**T**he Directorate of Science and Technology plays a central role in the intelligence process in a number of ways, one of which involves worldwide technical collection, processing, and analysis of information. This information — the basic ingredient of all intelligence — comes in a variety of forms.

## International open-media information processing provides an overview.

All foreign print and broadcast information has potential intelligence value. Radio, television, newspapers, and periodicals are openly published or broadcast internationally every day. This information is carefully monitored through high-frequency receivers, satellite channels, subscriptions, news agencies, wire services, foreign data bases, and other overt means. Articles, broadcasts, and books selected for translation and transmission to the United States are part of a critical information pipeline for national policymakers and intelligence analysts.

It is the role of the Foreign Broadcast Information Service (FBIS) to monitor, select, process, translate, edit, analyze, and disseminate a huge volume of collected information. The information processed every day is distributed via an unclassified wire service, a daily report, serial reports, and other specialized publications.



People from many disciplines are involved, including language officers, editors, analysts, communications specialists, data base managers, experts in automated data base search and retrieval, and engineers and technicians for maintenance of overseas installations. Overseas travel or assignment is a part of many FBIS career positions.

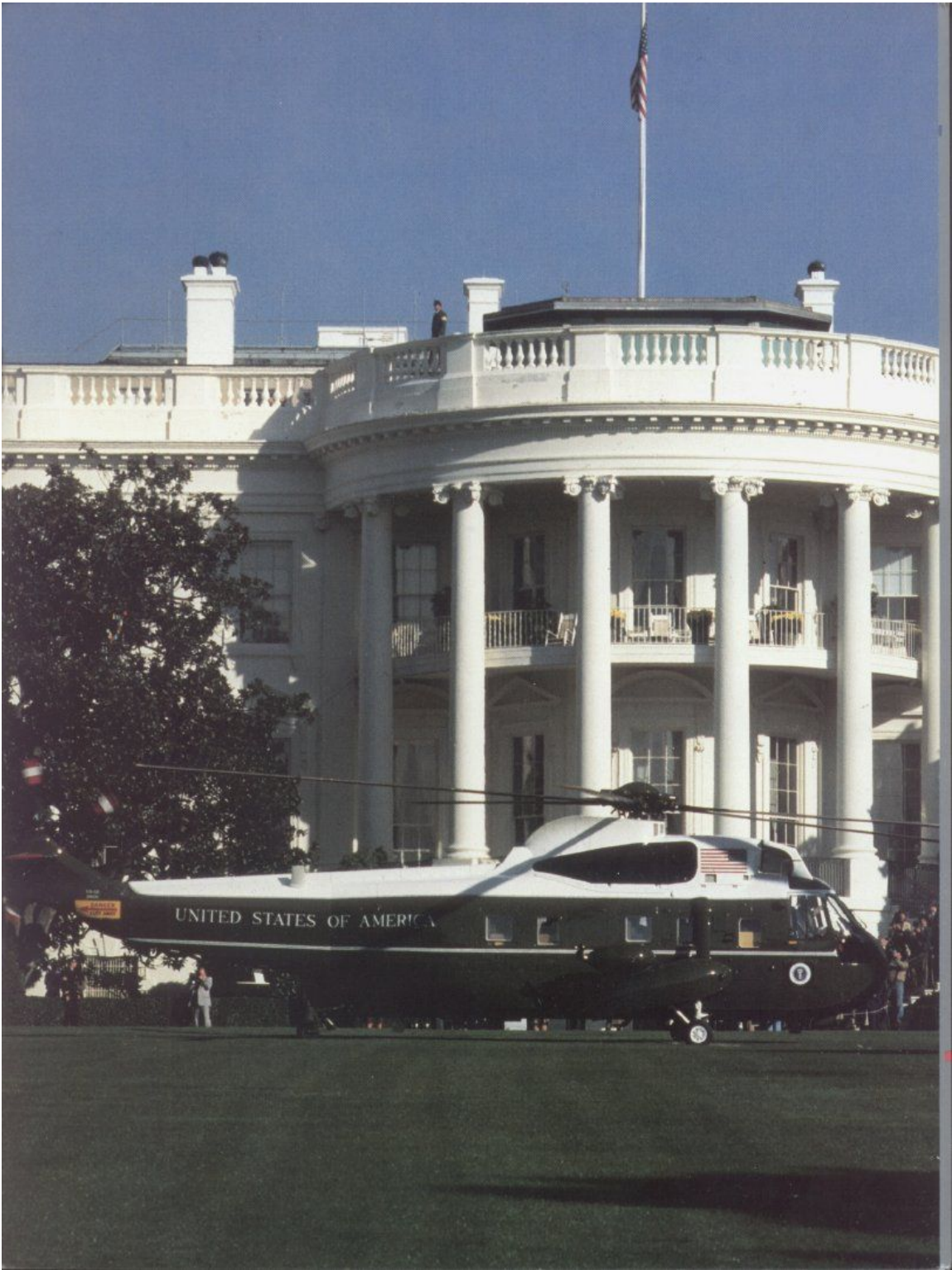
## Worldwide signal collection and analysis broaden our world view.

Signals intelligence is a specialized science. It requires the collection, processing, and analysis of signals, inadvertent electromagnetic radiation, and other signals-related data, and being responsive to foreign technological advances. Signals intelligence, a vital element in maintaining our knowledge of the current state of world affairs, is a product of the Office of SIGINT Operations (OSO).

The OSO mission demands that we work at the forefront of appropriate technologies. We develop, operate, and maintain highly sophisticated equipment that allows us to perform signal collection, processing, and analysis with maximum reliability and efficiency.

Career positions include electronic engineers, physicists, computer programmers, signal operators, electronic technicians, operations analysts, mathematicians, signal analysts, and linguists. Opportunities for foreign travel or assignment exist for selected positions.

Signals intelligence is of direct concern to the President, National Security Council, Joint Chiefs of Staff, and others involved in the shaping of national policy, as well as to analysts throughout the Intelligence Community responsible for providing multi-source information and analysis on issues of national security.



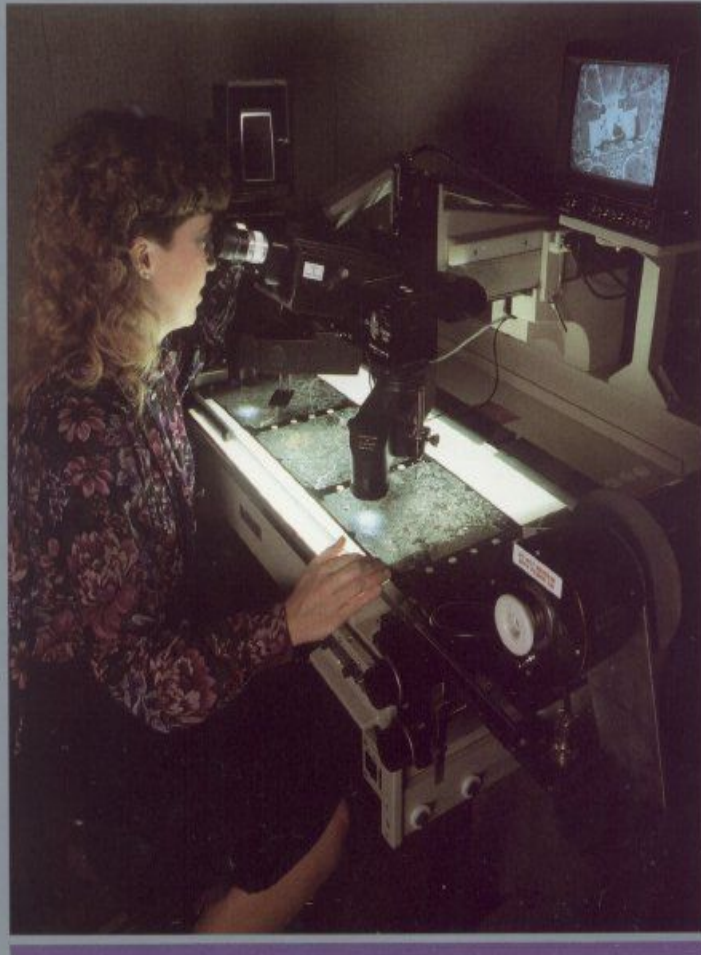
## Comprehensive imagery interpretation and analysis help clarify our picture of world affairs.

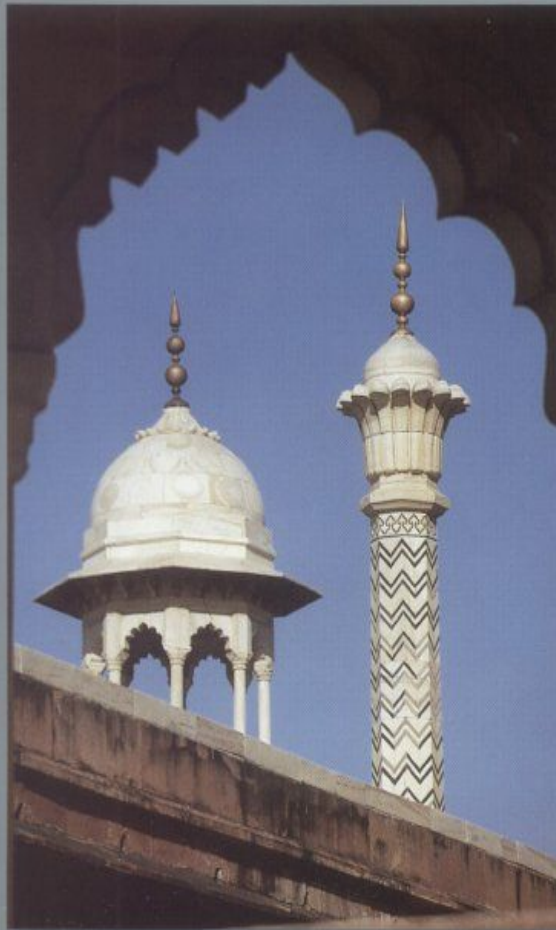
Visual imagery also plays a vital role in the intelligence process. The images come in all forms and from a wide array of sources — newspapers, hand-held cameras, aircraft, television, and electromagnetic devices. It is the role of the National Photographic Interpretation Center (NPIC) to analyze imagery from these varied sources and to provide basic intelligence data on crucial subjects such as military forces, military equipment production, arms control, and natural disasters.

Imagery analysts have the job of interpreting and evaluating the significance of the imagery received. Our analysts are largely liberal arts and social science generalists, with backgrounds in international affairs, economics, political science, history, geography, earth sciences, area studies, and other disciplines. The imagery analyst develops expertise in specific issues and geographic regions, coordinating analyses with other experts in the Intelligence Community and contributing to published intelligence reports.

Imagery scientists are needed to enhance the quality of some imagery, to conduct engineering studies on imaging systems and equipment, to provide measurements from the imagery, and to develop, modify, and maintain specialized equipment. These tasks involve work with the latest image science equipment, including measuring comparators, image digitizers, digital image displays, and advanced computers. Image science positions require a background in mathematics, electrical and electronic engineering, photographic science, statistics, photogrammetry, remote sensing, physics, computer science, or digital signal processing.

Additional personnel are needed to support the analytical and reporting tasks of NPIC. Positions are available for individuals with varied academic and work backgrounds, including computer scientists, data base managers, photographers, graphic artists, editors, librarians, researchers, and model makers. All these professionals have many opportunities within NPIC to exercise innovative approaches to the handling and analysis of large amounts of critical information.





# The development of supporting technology is the foundation of technical intelligence collection.

**T**echnology is constantly changing, evolving, and expanding. The activities of DS&T professionals are prominent in this process of change, where working with concepts and technologies beyond the state of the art is our norm.

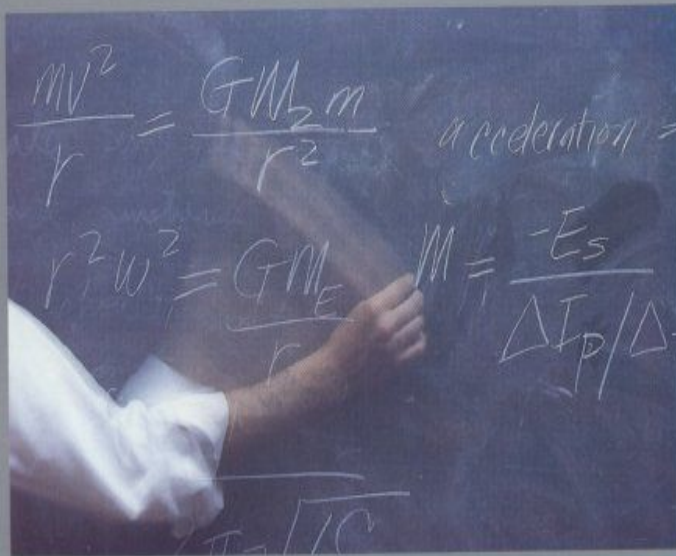
DS&T activities in technology development are diverse, ranging from long-term research and development to the creation of technical support tools for case officers and agents in the field.

Long-term basic and applied research develops tomorrow's technology.

Although every office in the Directorate of Science and Technology pursues some research, the role of the Office of Research and Development (ORD) is unique. ORD is the "corporate" research arm of the Central Intelligence Agency, serving all of the CIA and answering the future technology needs of the entire Intelligence Community.

The role of ORD is to bring today's and tomorrow's technology to bear in fulfilling the overall mission of the CIA. ORD provides the methods, techniques, and systems concepts and designs to support the varied functions of intelligence. We perform exploratory research, pushing beyond the state of the art, and developing and applying technologies and equipment more advanced than anything commercially available. Like all the work within the DS&T, it is highly specialized, but the frontiers are open-ended. Creativity, innovation, and imagination are prime requirements.

The work of ORD involves applied research, development, testing, and evaluation of a wide spectrum of technologies and methodologies. These include the physical sciences, communications, sensors, semiconductor applications, artificial intelligence, image understanding, operations research, process modeling, data base management, high-speed computing, and decision making and inference. Any and all technologies with a potential intelligence function are pursued, generally to the prototype or demonstration of feasibility level. This involves close project management contact with many of the largest private industry contractors in the nation and the opportunity to work with the latest equipment and the most expert people in government, academia, and business. Because of the advanced level of work in ORD, graduate degrees are strongly preferred, as is professional experience.





## Systems development and engineering take programs from concept to product.

The Office of Development and Engineering (OD&E) pursues research and development with specific and often immediate applications to meet the needs of national-level policymakers. OD&E provides total systems development for major systems—from requirements definition through design, engineering, and testing and evaluation, to implementation, operation, and even support logistics and maintenance. These are generally large state-of-the-art systems that are not available commercially or in private industry.

It is exciting and demanding work with a very high level of technical challenge. OD&E requires a wide variety of disciplines in advanced areas such as: laser communications, digital imagery processing, real time data collection and processing, electro-optics, advanced signal collection, artificial intelligence, advanced antenna design, mass data storage and retrieval, and large systems modeling and simulation. Our work includes totally new concepts and systems as well as system upgrades.

Because we work closely with many of the most highly regarded private contractors in the nation, scientific and technical professionals who have contract management skills are highly valued.

Much is expected, but much is offered in return, including early responsibility and a chance to work on very large and advanced systems from conception to completion. Our engineers have more independence than in most private industry positions; they operate with authority for not only technical matters but scheduling and production changes as well.

Our challenge is to anticipate and answer technical requirements of the national Intelligence Community. It's an uncommon challenge for the professional with uncommon ambition.





## Technology application and modification support immediate intelligence-collection needs.

Despite the huge advances in technical collection systems, human intelligence-gathering activities remain an indispensable part of the intelligence process. To increase the scope, effectiveness, and safety of such activities through technical means is the role of the Office of Technical Services (OTS).

Like other DS&T offices, the work of OTS involves development and engineering, both in our own advanced facilities and through outside contractors. We oversee the design, development, evaluation, and deployment of specialized and unique equipment to ensure it will withstand rigorous field and operating conditions. Our scientific and technical professionals involved in this effort are active in areas of analog, digital, and satellite communications, still photography, video and image enhancement, chemical imagery, coding and decoding devices, and various aspects of modern computer technology.

Other OTS personnel apply a wide variety of crafts and skills in support of the collection process. Graphic artists, locksmiths, wood technologists, and experts in working with plastics, leather, paper, and machine tools all contribute to the OTS effort — as do other professionals with backgrounds in languages, international relations, military skills, document analysis, and many other specialties.

OTS is a fast-paced, dynamic environment with particular appeal to experienced engineers as well as to recent graduates who want hands-on experience in basic engineering and other disciplines. OTS offers extensive in-house training and encourages its officers to seek outside educational opportunities. Overseas assignments are available for some OTS personnel. OTS officers must be inventive, flexible, and able to think on their feet — technical specialists with an interest in hands-on problem solving. The work is demanding but never boring.



## Unique requirements call for unique individuals.

The challenging work undertaken by all the DS&T offices is unlike what you are likely to find anywhere else. It offers many opportunities for individual initiative, as well as creative teamwork, applied in an exciting environment where your personal responsibility and involvement are at their maximum. It is work that is critical to our national security and that provides great personal satisfaction.

## Explore a career with the Directorate of Science and Technology.

Experienced professionals and college students who are interested in a career with the DS&T are invited to apply for employment.

To qualify for a position, you must be a native or naturalized U.S. citizen. If you are married, there is a requirement that your spouse has, or is acquiring, U.S. citizenship.

Because of the nature of our responsibilities, we must conduct a security investigation of each applicant. For this reason, it is important that you contact us as far ahead of the time you want to start working as possible.

To apply, write to the Director of Personnel, Central Intelligence Agency, Washington, D.C. 20505. Enclose a resume of your education and work experience and request preliminary application forms.

Or, if you are in college, see your Placement Officer (preferably six to nine months before graduation) and request an interview with the CIA representative who visits your campus or whose regional office may be situated nearby.

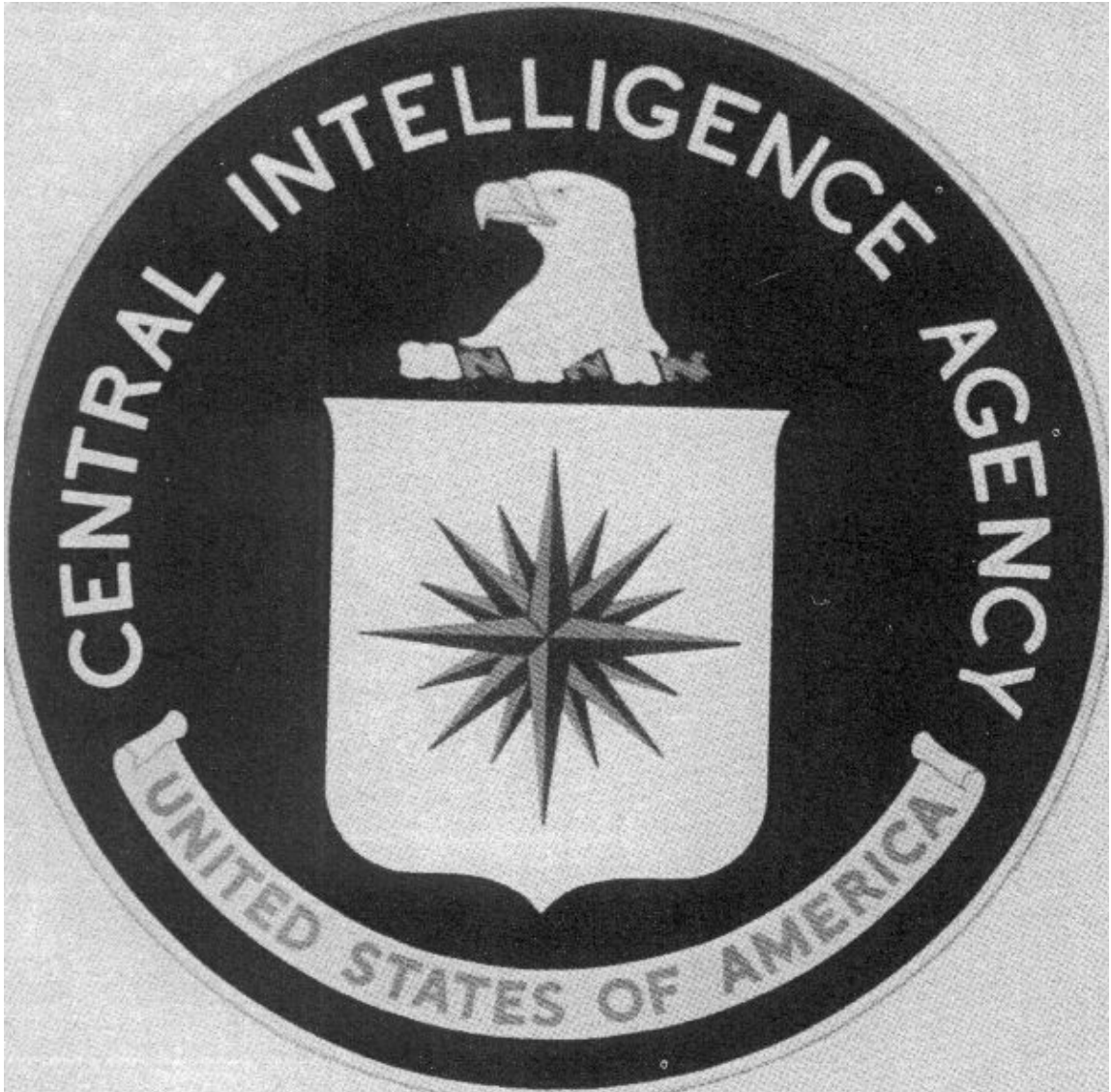
We encourage you to investigate the personal and professional potential a career with the DS&T may hold for you. If you are the right person for the unique challenges and opportunities we offer, we are sure you can't find a career like it anywhere else.

CIA is an Equal Opportunity Employer.





... where your career is America's strength.



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## *End of Issue #6*



Any Questions?

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## Editorial and Rants



Typical Europeans



### Typical Terrorists

Why do Euro-savages support terrorists?

Here is a letter from Osama bin Laden to the American People on October 3, 2001:

*Our current battle is against the Jews. Our faith tells us we shall defeat them, God willing. However, Muslims find that the Americans stand as a protective shield and strong supporter, both financially and morally. The desert storm that blew over New York and Washington should, in our view, have blown over Tel Aviv. The American position obliged Muslims to force the Americans out of the arena first to enable them to focus on their Jewish enemy. Why are the Americans fighting a battle on behalf of the Jews? Why do they sacrifice their sons and interests for them?*

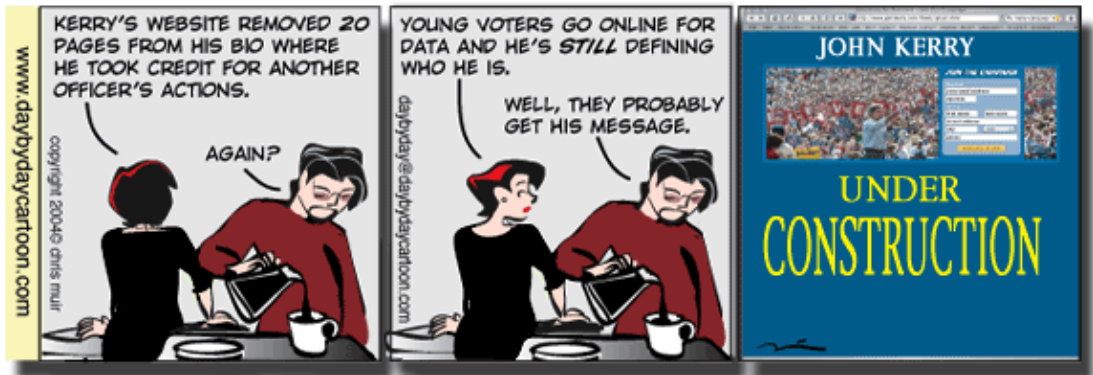
And in an article on anti-semitism in the New York Times on August 22, 2004:

*...Much of this year's neo-Nazi activity in France has been concentrated in the eastern region of Alsace, a traditionally German-speaking area along the German border. Officials there say Alsace's neo-Nazi movement is an extension of a broader movement in Germany. On Saturday, about 3,000 people took part in a neo-Nazi march in the German town of Wunsiedel, about 250 miles from Alsace, to commemorate the death, in 1987, of Adolf Hitler's deputy Rudolf Hess.*

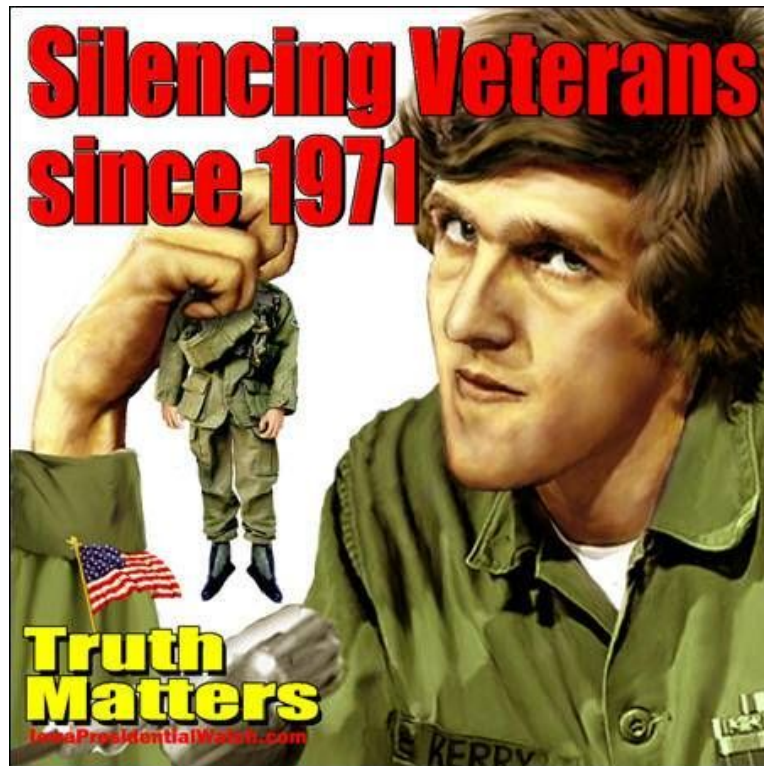
Oh. Nevermind.

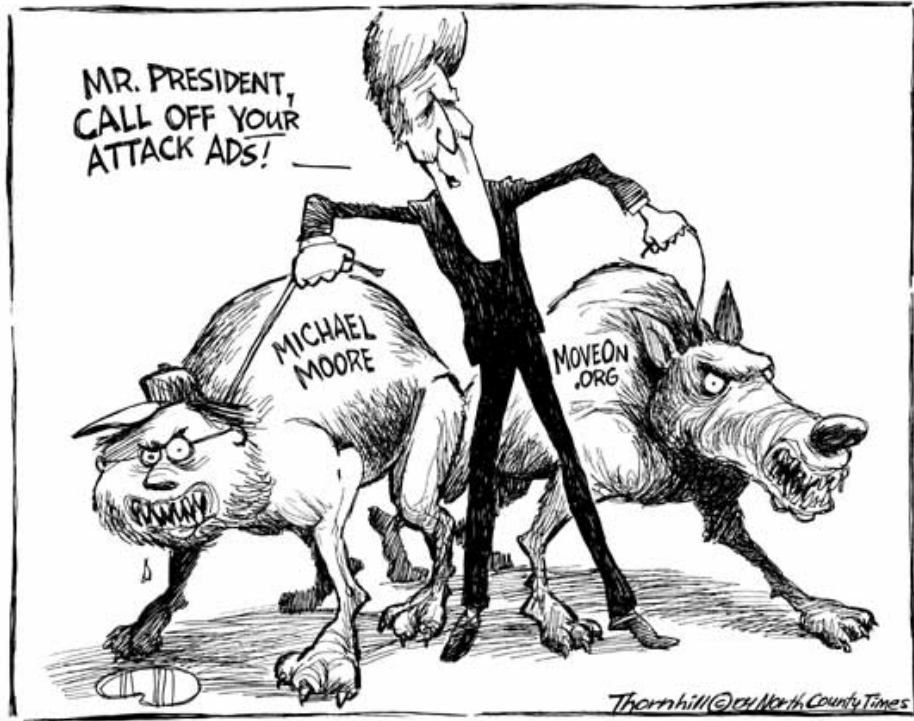
*"A recent survey showed that one in five Germans drink [alcohol] just to get drunk. The other four drink to forget." – Dennis Miller*





10 OUT OF 10  
TERRORISTS AGREE  
ANYBODY BUT  
**BUSH**







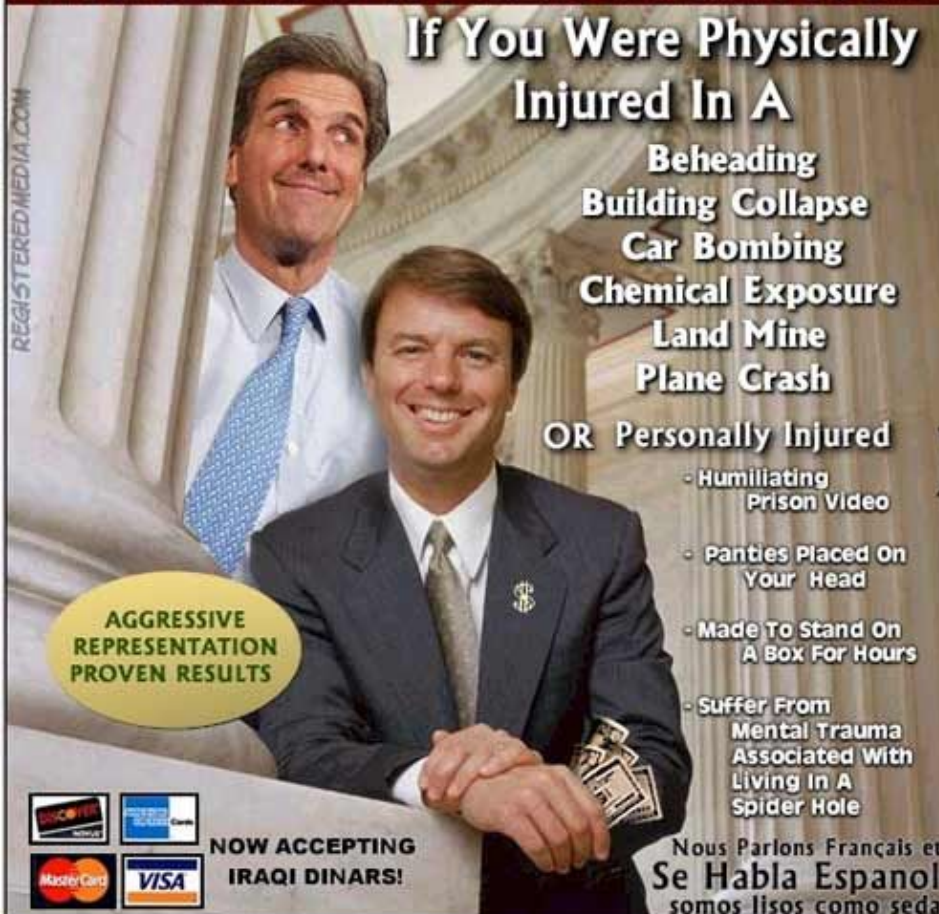


**I am this full of crap.  
I was never in Cambodia, not ever.  
My Purple Hearts were self-inflicted.  
My Bronze Star was based on a lie.  
My Silver Star, on an assassination.  
The only atrocities I witnessed  
were those I myself committed.  
I deserted my band of brothers and  
gave aid and comfort to the enemy.  
I am absolutely unfit for command.**

# HURT?

WE'LL TAKE IT TO THE TERRORISTS...IN COURT

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If You Were Physically Injured In A

- Beheading
- Building Collapse
- Car Bombing
- Chemical Exposure
- Land Mine
- Plane Crash

OR Personally Injured

- Humiliating Prison Video
- Panties Placed On Your Head
- Made To Stand On A BOX For Hours
- Suffer From Mental Trauma Associated With Living In A Spider Hole

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\*04 via SAT PHONE